Statement of Work (SOW)

For The

United States Special Operations Command (USSOCOM)

Silent Knight (SK) System

System Development and Demonstration (SDD)

Document Number: U0141FEW, Revision B

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Prepared for
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REVISION HISTORY

Rev	Date	Description
-	September 19, 2006	Initial Release
A	November 6, 2006	1. Added Radar PIDS as customer approval 2. Added Radar PIDS as CDRL 3. Added Contractor Flight Test requirement 4. Added Technical Data Package (3.1.2.11)
B	November 26, 2006	1. Removed reference to CDRL's A018-A033 and A035-A037 2. Revised Appendix A CDRL Table 3. Added contractual binding data from Proposal ENs to the SOW.

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1 INTRODUCTION

This Statement of Work (SOW) defines the System Development and Demonstration (SDD) Phase of the Silent Knight (SK) Program. [redacted] The cost reductions and performance capability improvements are achieved through a common SK System utilizing updated technologies and [redacted] The program includes the associated program management, engineering, qualification, and logistic support requirements.

The objectives of the SK System include:

a. Improve Terrain Following (T/F) and Terrain Avoidance (T/A) performance
b. Improved Weather Detection and Interleaved Mode capabilities
c. [redacted]
d. [redacted]
e. [redacted]
f. Lower weight
g. Higher reliability and lowered USSOCOM Operations and Sustainment (O&S) costs
h. Planned growth that permits affordable incorporation of future SOF Warfighter needs

[redacted]

1.1 Scope

The Contractor during the execution of the SK SDD Program designs and develops the SK System. [redacted] The SK System Specification establishes all design, fabrication, performance and test requirements for the system. The requirements provided by this SOW establish the Contractor tasks necessary to support the design, development, qualification and delivery of the SK System. The Contractor acts as the Lead System Integrator (LSI) for development, installation, integration and test of the SK System and is responsible for installed system performance. Quantities, configurations, and delivery dates are as defined in the Purchase Contract.

This SOW addresses the System Development and Demonstration (SDD) of the SK System to include the following activities:

a. System Engineering
b. Software Engineering
c. Integration, Verification, and Validation (IV&V)
d. Electromagnetic Environmental Effects
e. Reliability, Maintainability / Testability, System Safety / Human Factors and Supportability (RMS&S)
f. Program Management
g. Production
h. Program Protection
i. Materials Process Standards and Parts Control
j. Configuration Management (CM)
k. Data Management (DM)
l. Quality Assurance (QA)

1.2 Definitions

The following scheme is used within this document to make references to USSOCOM Source Documents and internal cross-references:

a. (SOO x.x) where "x.x" represents a Statement of Objective (SOO) paragraph reference
b. (SRD x.x) where "x.x" represents a System Requirements Document (SRD) paragraph reference
c. (CLIN xxxx) where "xxxx" represents a Request for Proposal (RFP) Contract Line Item Number (CLIN) reference
d. (section x.x) where "x.x" represents a section number for an internal cross-reference within this document

Appendix C provides a cross reference between the USSOCOM SK SOO and the requirements stated within this SOW.

All statements within this document containing the verb "shall" are explicit requirements to be complied with and represent the minimum performance necessary for compliance with the SDD contract.

2 APPLICABLE DOCUMENTS

The following documents of the exact issue shown form a part of this SOW to the extent specified herein. Where a revision by supplement, amendment, or notice is called out, the entire document up to and including that revision is being referenced. In the remaining paragraphs of this SOW, only the basic document numbers are stated. In the event of conflicting requirements, the order of precedence shall be: (1) the Purchase Contract, (2) the Statement of Work (SOW), (3) the procurement control drawing, and (4) documents referenced herein including Government documents, Raytheon documents, and other publications.

2.1 Government Documents

Consistent with the Federal Acquisition Reform Act of 1995, military specifications and standards shall be used as guidelines where feasible to support Silent Knight Program planning and execution in accordance with DFARS 252.211-7000.

2.1.1 Military Standards

Table 2-1 identifies the Military Standards referenced within this document.

Table 2-1. Military Standards

Document Number	Date	Description
MIL-STD-129P	29 Oct 04	Military Shipping Label Requirements
MIL-STD-130L	20 Dec 04	Identification Marking For U.S. Military Property
MIL-STD-1472F	23 Aug 99	Human Engineering
MIL-STD-461E	20 Aug 99	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
MIL-STD-464A	19 Oct 02	Interfaced Standard Electromagnetic Environmental Effects Requirements For Systems
MIL-STD-704F	03 Dec 04	Aircraft Electrical Power Characteristics
MIL-STD-810F	05 May 03	Environmental Test Methods and Engineering Guidelines
MIL-STD-882D	10 Feb 00	Standard Practice for System Safety
MIL-STD-961E	01 Aug 03	Defense and Program-Unique Specifications Format and Content

2.1.2 Military Handbooks

Table 2-2 identifies the Military Handbooks referenced within this document.

Table 2-2. Military Handbooks

Document Number	Date	Description
MIL-HDBK-5J	31 Jan 03	Metallic Materials and elements for Aerospace Vehicle Structures (Reference only – replaced by DOT/FAA/AR-MMPDS-01)
MIL-HDBK-17	12 Dec 02	Composite Materials
MIL-HDBK-61A	07 Feb 01	Configuration Management Guidance
MIL-HDBK-217F	28 Feb 95	Reliability Prediction of Electronic Equipment, Notice 1 and 2
MIL-HDBK-237C	17 Jul 01	Electromagnetic Environmental Effects And Spectrum Certification Guidance For The Acquisition Process

Table 2-2. Military Handbooks

Document Number	Date	Description
MIL-HDBK-263B	31 Jul 94	Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assemblies and Equipment (excluding electrically initiated explosive devices)
MIL-HDBK-454A	03 Nov 00	General Guidelines for Electronic Equipment
MIL-HDBK-470A	04 Aug 97	Designing and Developing Maintainable Products And Systems, Volume I And Volume II
MIL-HDBK-514	03 Mar 03	Operational Safety, Suitability, and Effectiveness for the Aeronautical Enterprise
MIL-HDBK-516B	10 Oct 05	Airworthiness Certification Criteria
MIL-HDBK-2165	31 Jul 95	Testability Program For Systems And Equipments

2.1.3 Guides

Table 2-3 identifies Guides referenced within this document.

Table 2-3. Government Guides

Document Number	Date	Description
DOT/FAA/AR-MMPDS-01	Jan 03	Metallic Materials Properties Development and Standardization (MMPDS)
Version 1.02	10 Feb 06	*Systems Engineering Plan (SEP) Preparation Guide* provided by the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics Defense Systems, Systems Engineering, Enterprise Development (OUSD(AT&L) DS/SE/ED)
MIL-DTL-31000C	09 Jul 04	General Specification For Technical Data Packages
JSSG 2010	30 Oct 98	Joint Service Specification Guide (JSSG) 2010 for Crew Systems

2.1.4 Department of Defense Publications

Table 2-4 identifies the Department of Defense publications referenced within this document.

Table 2-4. Department of Defense Publications

Document Number	Date	Description
Version 1.0	17 Oct 04	Defense Acquisition Guidebook (DAG) - http: // akss.dau.mil/dag/
CJCSI 3170.01E	11 May 05	Chairman of the Joint Chiefs of Staff Instruction (CJCSI) - Joint Capabilities Integration and Development System
DFARS 252-227-7013	Oct 88	Defense Federal Acquisition Regulations Supplement (DFARS) Rights in Technical Data – Noncommercial Items
DFARS 252.211-7000	N/A	Defense Federal Acquisition Regulations Supplement (DFARS) Acquisition Streamlining
DoD Directive 4650.1	06 Jun 04	Department of Defense (DoD) Directive - Policy for Management and Use of the Electromagnetic Spectrum
DoD Instruction 5000.2	12 May 03	Department of Defense (DoD) Instruction - Operation of the Defense Acquisition System
5000.4-M-2	02 Feb 04	Software Resources Data Report (SRDR) Manual
DoD Directive 5200.39	10 Sep 97	Security, Intelligence, Counterintelligence Support to Acquisition Program Protection.

2.1.5 United States Army Publications

Table 2-5 identifies the United States Army publications referenced within this document.

Table 2-5. United States Army Publications

Document Number	Date	Description
[redacted]		
ADS-37A-PRF	28 May 96	Electromagnetic Environmental Effects (E^3) Performance And Verification Requirements
[redacted]		
N/A	12 Jul 06	DRAFT – Airworthiness Qualification Plan (AQP) [redacted]

2.1.6 United States Special Operations Command Publications

Table 2-6 and Table 2-7 identify USSOCOM publications referenced within this document.

Table 2-6. USSOCOM Publications

Document Number	Date	Description
H9222-06-R-0002 Draft	08 Jun 06	USSOCOM SK Radar Request For Proposal
N/A	Jun 05	Joint Service Specification Guide (JSSG) for Special Operations
AR-70-62	07 Jul 00	Airworthiness Qualification of US Army Aircraft Systems
N/A	N/A	SK Radar Capability Development Document (CDD)
N/A V3.0.1	21 Aug 06	Silent Knight, System Engineering Plan (SEP), Milestone - B
N/A	31 Mar 06	Security Classification Guide (SCG) for the Silent Knight Radar Program

Table 2-7. USSOCOM Publications – Non-Contract Compliance

Document Number	Date	Description
Revision 4.0	21 Aug 06	DRAFT - System Requirements Document (SRD)
Revision 10.0	21 Aug 06	DRAFT - Statement of Objective (SOO)

2.1.7 [redacted]

[redacted]

2.1.8 United States Air Force Publications

Table 2-9 identifies the United States Air Force publications referenced within this document.

Table 2-9. United States Air Force Publications

Document Number	Date	Description
AFPD 62-6	01 Oct 00	Air Force Policy Directive (AFPD) Aircraft Airworthiness Certification

2.2 Non-Government Publications

Table 2-10 identifies the Non-Government publications referenced within this document.

Table 2-10. Non-Government Publications

Document Number	Date	Description
ANSI/ESD-S20.20	04 Aug 99	Electrostatic Discharge Control Program Standard
ASME-Y14.100	30 Jan 98	Engineering Drawing Practices
ASTM D 3951	10 Nov 98	Standard Practice for Commercial Packaging
ISO 9001:2000	21 Dec 00	Quality System – Model for Quality Assurance in Design, Development, Production, Installation and Servicing
RTCA-DO-160E	09 Dec 04	Environmental Conditions and Test Procedures for Airborne Equipment
RTCA-DO-178B	03 Mar 99	Software Considerations in Airborne Systems and Equipment Certification
SAE ARP 4761	Dec 96	Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment
U0141FEY	25 SEP 06	SK System Specification
U0141FFC	22 SEP 06	SK Airworthiness Qualification Specification

3 REQUIREMENTS

[redacted]

The *SDD Execution Documents*, as detailed within Figure 3-1, are derived from the listed *USSOCOM Source Documents* and become the basis of all SK SDD Program Requirements. Following Contract award, neither the SOO nor SRD are retained as contract compliance items.

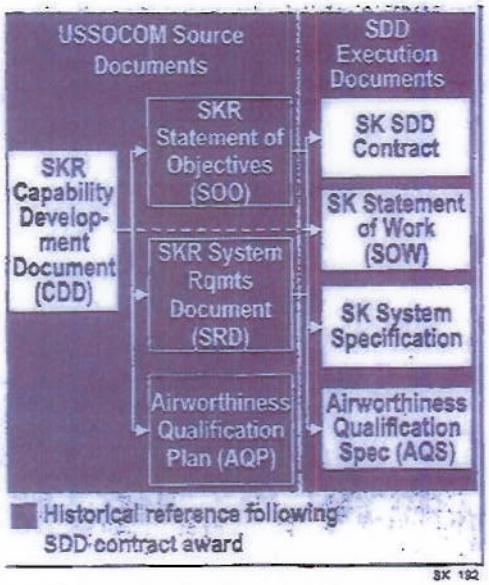

Figure 3-1. SK Program Documents

3.1 Management

The following sections identify the Contractor's Program Management Organization required to support SK SDD including:

a. SDD Program Management
b. Configuration Management (CM)
c. Financial Management
d. Schedule Management
e. Data Management (DM)

3.1.1 SDD Program Management

This effort establishes and maintains uniform and consistent management over all product areas. The effort shall include the following: Program Planning and Control, Facilities Planning, Subcontractor Management, Financial Management, Data Management, Management and Accountability for GFI/GFE, Configuration Management, Quality, Production Transition Planning, Schedule, and Risk Management. Program Management is responsible for internal and external program management reviews.

The Contractor shall define the utilization of Program Management tools and establish review processes that promote program transparency, timeliness of reporting, simplified program monitoring, enhanced coordination and management of customer expectations.

The Contractor shall structure the SDD program in such a way as to meet government funding constraints. (SOO 3.5.1)

The Contractor shall structure the SK System SDD Program in severable increments (capability options, alternatives, etc.) to manage adjustments in program funding (SOO 3.5.2).

3.1.1.1 Program Management Hierarchy

Data from subservient Management Sections within this SOW shall be consolidated and reported to USSOCOM by SK Program Management. Subservient Management Sections within this SOW are:

a. SK Radar Production/Test Equipment Management – Section 3.5.1

b. MDS Design Management – Section 3.6.1.1

c. Operational Test Management – Section 3.7.2.1

d. LRIP Production Management – Section 3.8.2.1

All elements within this SOW not identified as subservient above shall be covered by SK Program Management (section 3.1.1).

3.1.1.2 Program Planning and Control

The follow paragraphs detail the aspects of Program Planning and Control for the SK SDD Program.

3.1.1.2.1 Program Management Plan (PMP)

The Contractor shall document program planning activities within a Program Management Plan (PMP). The PMP shall be submitted to USSOCOM for review/approval in accordance with CDRL Sequence Number A00T. The Contractor shall use his documented management policies and practices and shall maintain a current file of such policies and instructions for review by authorized USSOCOM personnel. The Program shall be assigned a manager who shall be responsible for all Contractor efforts on the program and shall have authority commensurate with that responsibility in his relationship to USSOCOM. It is the prime responsibility of the Contractor's Program Manager to ensure that the procured hardware meets the technical requirements of the specification and this SOW. USSOCOM shall be advised prior to changes being made in the Program Manager position.

3.1.1.2.2 Risk Management

The Contractor shall establish and conduct a risk management program that ensures risks are identified, assessed, and appropriately mitigated to minimize cost, schedule, and performance impacts at any time during the Program execution. The Contractor documents their risk planning activities within a Risk Management Plan (RMP). The Contractor shall aggressively work to mitigate high and moderate risks as quickly as possible, consistent with good risk management practices. The Contractor shall present status reports at program reviews.

3.1.1.3 Collaborative Environment

The Contractor shall develop a collaborative environment that is the primary means of sharing, reporting, collecting, recording and accessing program information between the Contractor and USSOCOM. The environment will provide real-time, secure collaborative access to a single source of management information, product information, and technical data. Through the collaborative tool, USSOCOM will have access to the following types of information:

a. Contract Documents (SRD, SOO, SOW, RFP, etc.)
b. Program Plans
c. Integrated Master Schedule (IMS)
d. Program CWBS/CWBS Dictionary
e. Review and Meetings (Agendas, Presentations, and Minutes)
f. Contractor Deliverable Specifications
g. Design Analysis/Trade Study Reports
h. Requirements Traceability Database (SOO 3.6.5)
i. Engineering Change Proposal (ECP)
j. Deviations/Waiver Requests
k. Technical Performance Measures (TPM)
l. Risk and Opportunities
m. Earned Value Management (EVM)
n. Action Items

The Contractor shall document their collaborative environment planning activities within a Collaborative Environment Plan (CEP). This plan shall address how the Contractor will ensure segregation/protection of proprietary information by means of a firewall for the various MDS Aircraft Contractor/Subcontractors. Common SK System information shall be available for all Team Members.

3.1.1.4 Processing of Classified Data

The Contractor shall establish and maintain the resources necessary for the processing of classified data and electronic sending and receiving of classified data via secure telephone and Secret Internet Protocol Router Network (SIPRNET) capability. (SOO 3.2.4)

3.1.1.5 Capability Maturity Model Integration (CMMI)

The Contractor shall use CMMI accredited processes and procedures for Systems, Hardware, and Software Engineering (Standard CMMI Assessment Method for Process Improvement [SCAMPI] method) as follows:

a. System Engineering – Level 3 (SRD 3.2.10.1)
b. Hardware and Firmware Engineering – Level 3 (SRD 3.2.10.1)
c. Software Engineering – Level 5 (SRD 3.2.10.2)

3.1.1.6 Government Furnished Information/Equipment (GFI/GFE)

Appendix B identifies the GFI/GFE that will be made available to the Contractor to support the SDD phase of the SK Program.

The Contractor shall identify resources (including personnel, aircraft, equipment, support, facilities, instrumentation, GFI/GFE, etc.) to (SOO 3.2.2):

a. Transition from contractor testing activities to USSOCOM testing activities
b. [redacted]

The Contractor shall minimize reliance on GFI/GFE by independently obtaining access to design information needed to execute the SK System SDD phase (SOO 3.2.2).

During contract execution, the Contractor may request additional GFI/GFE to support program execution. The Contractor must provide justification, cost, and schedule substantiation for each additional request made.

3.1.1.7 Contractor Reviews and Meetings

Table 3-1 provides a consolidated listing of SK Program Reviews and Meetings for the SDD Phase of the Program. This table identifies:

a. Review/Meeting Title

b. Review/Meeting Description

c. Requirements for formal Agendas/Minutes (CDRLs)

Emphasis shall be placed on the assignment of action item responsibility and scheduling of resolutions. As a goal, reviews and meeting shall be held concurrent with, immediately before, or after Program Management Reviews (PMR) and other meetings for cost-effective travel management.

Table 3-1. Contractor Reviews and Meetings

Title	Description	Agenda	Minutes
Integrated Baseline Review (IBR)	IBR shall be conducted at the Contractor's facility. The IBR establishes a mutual understanding between the Contractor and USSOCOM of the project Performance Measurement Baseline (PMB). The SK IBR will be conducted within 90 days of contract award. USSOCOM approval of the IBR indicates establishment of program baseline for schedule and budget.	A003	A004
System Requirements Review (SRR)	A SRR shall be conducted at the Contractor's facility. The SK System Specification shall be reviewed at SRR. USSOCOM approval of the SRR confirms that the system/product requirements and concept baseline are adequately defined and that IPTs are ready to proceed with system and product preliminary design (architecture).	A003	A004
System Functional Review (SFR)	Determines if the Prime Item Development Specifications (section 3.3.3.1.3), and Interface Requirement Specifications (section 3.6.1.2.1) are sufficiently well understood and defined to form a basis for proceeding into preliminary design. A SFR shall be conducted at the Contractor's facility. The SK Radar, Test Equipment and MDS A/C Integration Prime Item Development Specifications (PIDS) shall be reviewed at SFR. USSOCOM approval of the SFR authorizes the Contractor to proceed with hardware/software Preliminary Design.	A003	A004

Table 3-1. Contractor Reviews and Meetings

Title	Description	Agenda	Minutes
Preliminary Design Review (PDR)	PDR shall be conducted at the Contractor's facility. The PDR may be divided into multiple reviews for SK Radar, MDS and Test Equipment. USSOCOM approval of the PDR authorizes the Contractor to proceed with detailed design.	A003	A004
Critical Design Review (CDR)	CDR shall be conducted at the Contractor's facility. The CDR may be divided into multiple reviews for SK Radar, MDS and Test Equipment. USSOCOM approval of the CDR shall authorize the Contractor to begin fabrication of the qualification articles.	A003	A004
Functional Configuration Audit (FCA)	FCA shall be conducted at the Contractor's facility. The Functional Configuration Audit is used to verify that the actual performance of the configuration item meets System Specification requirements as defined in Section 3.3.3.1.2.	A003	A004

Table 3-1. Contractor Reviews and Meetings

Title	Description	Agenda	Minutes
Operational Test Readiness Review (OTRR)	The OTRR is a multi-disciplined product and process assessment to ensure that the "production configuration" system has successfully completed Contractor DT flight testing and can proceed into Initial Operational Test and Evaluation with a high probability of successful completion. Successful performance during operational test generally indicates that the system is suitable and effective for service introduction. The Full Rate Production Decision may hinge on this successful determination. The OTRR shall be conducted at USSOCOM Flight Test Facility or Contractor's facility. The Contractor shall conduct an OTRR prior to Operational Test (OT). USSOCOM approval of the OTRR indicates that the SK System is ready to begin Operational Suitability Flight Testing (section 3.7.2).	A003	A004
PPU Production Readiness Review (PPRR)	PPRR shall be conducted at the Contractor's facility. USSOCOM approval of the PRR indicates the SK System is ready for Pilot Production (section 3.5.3)	A003	A004
LRIP Production Readiness Review (LPRR)	LPRR shall be conducted at the Contractor's facility as part of the Optional LRIP CLIN effort. USSOCOM approval of the PRR indicates the SK System is ready for LRIP (section 3.8.2).	A003	A004
Physical Configuration Audit (PCA)[1]	PCA shall be conducted at the Contractor's facility as detailed in Section 3.1.2.3.3. PCA shall be conducted on a LRIP Production representative end item (section 3.8.2.4) to support USSOCOM's full rate production decision.	A003	A004
Aircraft Configuration Control Board (CCB)	The Contractor shall participate in USSOCOM initiated Aircraft Configuration Control Board (CCB) meetings to demonstrate Aircraft modifications meet Air Worthiness Certification Requirements (Table 3-5) (SOO 3.1.2).	N/A	N/A
Flight Test Program Reviews	Quarterly meeting to review Flight Test Program status as defined in Sections 3.7.1.1.5 and 3.7.2.1.1.3.	N/A	N/A

[1] The PCA is contained within the CLIN 1002 (LRIP Option) and will not become part of the program baseline until the option is awarded.

Table 3-1. Contractor Reviews and Meetings

Title	Description	Agenda	Minutes
Interface Control Working Group (ICWG)	The Contractor shall support ICWG Meetings between USSOCOM and other program Contractors, as required by the contract. The Contractor's support to these ICWG Meetings is intended to ensure the Contractor has an ongoing opportunity to provide and receive meaningful and timely inputs from USSOCOM and other SK System Contractors relevant to the Contractor's design and the interfaces initial review. The ICWG is responsible for Interface Management as detailed in Section 3.6.1.2.1 of this SOW. ICWG Meetings shall be conducted at the Contractor's facility. The Contractor shall hold an initial review within 90 days after receipt of order. The objective of this review is to demonstrate that the plans and schedules associated with executing the Integrated Product Development Process are sufficiently mature to continue work	N/A	N/A
Sustainment Design and Planning Working Group	The Sustainment Design and Planning Working Group will use projected ownership cost baselines and the O&S cost goals for the SK Radar. At technical reviews, the working group will address: a) Ownership cost baselines and objectives, b) Reliability, maintainability, and availability objectives, c) Benefits of innovative sustainment design approaches, and d) Achievable improvements for equipment availability during missions, maintenance downtimes, and ownership costs.	N/A	N/A
[redacted]	The CSWG meetings will be used to solicit design input (requirements) and approval for the Pilot-Vehicle Interface (PVI) design from the user community. Objectives of each meeting of the CSWG will be provided by the MSD IPT and reviewed by the SEIT. Participants of the CSWG will include: USSOCOM, Raytheon, AIC, Rockwell Collins, and pilots. Crew Demonstrations are in-process/incremental design reviews for the SK crew control/displays (section 3.6.1.9).	N/A	N/A

Table 3-1. Contractor Reviews and Meetings

Title	Description	Agenda	Minutes
Program Integrated Product Team (PIPT)	The PIPT shall provide a venue for coordinating program direction and decisions within Contractor/USSOCOM Team. The PIPT shall monitor/review: a) Program Cost, Schedule and Technical Performance, b) Program Risks and Mitigation Strategies, c) System Safety, d) TPI/TPM and KPP/CPI, e) Test Planning, and f) GFI/GFE Requirements. The Contractor shall co-chair with the USSOCOM Program Manager (PM) a SK Program Integrated Product Team (PIPT) (SOO 3.2.3)	N/A	N/A
Program Management Reviews (PMRs)	The PMRs shall address significant program accomplishments, including but not limited to: schedule; technical status; results of analyses and test; technical performance measurements; risk identification assessment and abatement; and the contract status. In addition, the Contractor shall review the status of cost trade studies performed. The Contractor shall conduct quarterly PMRs at the Contractor's facility to brief program status to USSOCOM.	A003	A004
Technical Interchange Meetings (TIM)	The Contractor shall support periodic TIMs and technical working group meetings at any location deemed appropriate by the Contractor or USSOCOM in support of all functional and support disciplines covered in this SOW. The Contractor shall invite USSOCOM to all TIMs and technical working group meetings held for the SK Program. USSOCOM representatives will attend at their discretion.	N/A	N/A
SK Radar FQT	As described in Section 3.4.4.3.1	N/A	N/A
[redacted]	As described in Section 3.6.1.3.6.4	N/A	N/A

3.1.1.8 Program Metrics Plan

The Contractor shall develop a SK Program Metrics Plan that provides visibility into the health of program execution in key areas and the associated processes. Program metrics are defined, developed, tracked, and reported as an indicator and predictor of the program's ability to meet its contractual requirements and performance objectives. The SK Metrics Plan will cover:

a. Establishment of measurement and analysis objectives

b. Specification of metrics and collection parameters (e.g., method, frequency)

c. Analysis methods

d. Metrics and analysis data storage and configuration management

e. Metrics analysis review and communication

The SK Program metrics database will be the sole repository for tracking [redacted] management, productivity, and technical metrics. In addition, Key Performance Parameters (KPP), Critical Technical Parameters (CTP) and Technical Performance Indices/Metrics (TPI/TPM) will be tracked within the SK program metrics database. Metrics will be reviewed and updated monthly; highlighted at all program technical reviews; and posted for USSOCOM review using the Program's electronic collaborative environment (section 3.1.1.3).

3.1.2 Configuration Management (CM)

The Contractor shall establish and maintain a Configuration Management (CM) program that addresses all SK System hardware, software, and documentation. This program shall include responsibilities and procedures for implementing the requirements of configuration management under the general guidance of MIL-HDBK-61 as defined in the Contractor's configuration management plan. The Contractor shall prepare/submit a combined CM/DM Plan in accordance with CDRL Sequence Number A00M for USSOCOM approval.

3.1.2.1 Configuration Status Accounting

The Contractor and its subcontractors shall establish and maintain a Configuration Status Accounting (CSA) system database. It shall include the common element subsystem components for which the Contractor is responsible. The Contractor's CSA approach shall be defined in the Contractor's CM plan. The Contractor shall provide CSA reports as requested by USSOCOM.

The CSA Reports shall record and report the status of proposed and actual changes to work products. In addition, the CSA Reports identifies the status of documentation and provides traceability to establish baselines. At a minimum, specific CSA that shall be performed by the Contractor are:

a. CI number and nomenclature

b. Model/drawing/document number – current revision and revision history

c. Engineering bill of material/indentured parts list changes

d. Change notice number, workflow status, associated Contractor change proposal number

e. Drawings/document/part number, specification and standards

f. Outstanding changes

g. Metrics for use in monitoring the process during development

h. Number of changes processed

i. Number of released work products (planned vs. actual)

j. Variances (deviations and waivers)

The Contractor and its subcontractors shall prepare as-built and as-modified configuration bills of material listing. The as-built and as-modified bill of material listing shall show the manufacturing sequence number of the product as well as any component within the product.

The Contractor shall prepare metrics (performance measures) for use in monitoring the process and developing continuous improvements. Emphasis shall be placed on process efficiency and schedule performance, as reflected in cycle items for release of configuration documentation and the processing of changes.

The Contractor shall establish and maintain a configuration status accounting (CSA) system database for deliverable hardware in accordance with Contractor's format for the components for which Contractor is responsible. The Contractor's CSA approach is defined in the Contractor's CM/DM Plan.

3.1.2.2 Configuration Items

The Contractor shall treat deliverable end items as a Configuration Item (CI) and shall apply appropriate CM disciplines to both the hardware and software elements of the end item and the configuration documentation, which defines the end item.

3.1.2.3 Baseline Evolution and Management

Baseline evolution is the process under which increasingly detailed technical data (e.g, specifications and drawings) evolve from informal data, to controlled data (Contractor configuration control), and eventually to baselined data (USSOCOM controlled). Baselines shall be controlled throughout the life cycle of the CI. Baselines shall be documented by engineering documentation (Statement of Work, Procurement Drawing, specifications, drawings, and approved changes). The configuration of the CI may be defined at any time by its baselined configuration plus approved changes to the baseline.

The Contractor shall establish, develop, and control three baselines: (1) Functional, (2) Allocated, and (3) Product. Each baseline shall consist of key documentation placed under contractual control at the appropriate time in the life cycle of the CI.

3.1.2.3.1 Functional Baseline

The Contractor's Functional Baseline is established at Initial Baseline Review (Table 3-1). The Functional Configuration Documentation (FCD) consists of the:

a. SK System Specification (SS) – Section 3.3.3.1.2

b. SK Statement of Work (SOW) – This document

c. Contractor Data Requirement List (CDRL) – SK SOW, Appendix A

Changes to the Contractor's Functional Baseline contractual documentation shall require contract modification/approval by USSOCOM.

3.1.2.3.2 Allocated Baseline

The Contractor's Allocated Baseline establishes the functional characteristics allocated to the CI from the system-level requirements. The Allocated Configuration Documentation (ACD) includes the Contractor's lower tiered specifications and other related data, which describes the

hardware/software. The Allocated Baseline is established at successful completion of the Contractor's Preliminary Design Review (PDR) and progressively expands as the Contractor progresses deeper into the design. Changes to the Contractor's ACD are controlled by the Contractor.

3.1.2.3.3 Product Baseline

The Product Baseline is the "build-to" set of technical requirements to be used during the fabrication of flight hardware, test, operation, maintenance, and logistics support phase of the Configuration Item's (CI) life cycle. The Contractor Initial Product Baseline shall be established at the successful completion of the Contractor's Critical Design Review (CDR) and is finalized at successful completion of the Physical Configuration Audit (PCA) (Table 3-1). The Contractor's Product Configuration Documentation consists of the technical documentation describing the CI at the time of the CDR and progresses to include all of the technical documentation, including drawings, which define the CI at the time of PCA. Changes to the Product Baseline are controlled by the Contractor until PCA.

3.1.2.4 Drawing Control

The Contractor shall use ASME-Y14.100 as a guide in preparing program drawings. Engineering drawings shall depict the physical description for each part and assembly. Production drawings are to be placed under internal configuration control as they are released. All other drawings shall be under internal configuration control. Upon USSOCOM authentication of the product specification, all drawings shall be part of the product baseline and controlled accordingly.

3.1.2.5 Configuration Item Identification

3.1.2.5.1 Configuration Identification

Configuration Item identification performed by the Contractor shall provide the proper identification of documentation to establish the Functional, Allocated and Product baselines for each CI. Such identification shall include the specific version(s) of each CI for which the documentation applies (if different).

3.1.2.5.2 Nomenclature of Configuration Items

The Contractor shall complete the DD Form 61, or shall assist USSOCOM as required to complete the DD Form 61, including any re-submittals as may be required as a result of USSOCOM action. Request for Nomenclature shall be prepared in accordance with CDRL Sequence Number D001.

3.1.2.5.3 Serial Numbers

The serial number of a part shall not be changed when an item is reworked or retrofitted. The serial number shall be used to establish and control effectivity of both the original design and the changed design. The serial number shall be permanently affixed to the part.

3.1.2.5.4 Part Numbering

A unique part number shall identify each design configuration of a detailed part, subassembly, or assembly drawing. Said part number shall be the Contractor's actual number and shall not include or duplicate USSOCOM's procurement control drawing number.

3.1.2.5.5 Nameplates and Marking of Detail Parts

Nameplates are required for each SK Line Replaceable Unit (LRU). Detail parts shall be marked with their assigned part numbers. Nameplate preparation and detail part marking shall be accomplished using MIL-STD-130 as a guide.

3.1.2.6 Release System

The Contractor shall establish and maintain a formal engineering release record system which ensures compliance to the requirements herein. The Contractor's release system shall be capable of identifying basic releases and any engineering changes made after basic release. The Contractor's release system shall provide a positive method of control of released configuration documentation and shall ensure that only authorized revisions will be incorporated and released. The configuration released for each unit of each item at the time of formal acceptance must be retained in the release records for the life of the contract. The Contractor may use his own procedures and formats for his release records, providing they meet the requirements of this SOW.

3.1.2.7 Change Processing and Control

Changes to the released configuration documentation shall only be accomplished via a Class I Engineering Change Proposal (ECP), Class II ECP, or Internal Changes as defined within the following paragraphs.

To comply with these requirements, the Contractor shall plan, organize, and implement a program to ensure control of changes. Engineering Change Proposals (ECP) shall control changes to the approved baseline.

All requests for Major/Critical Deviation or Waivers submitted due to non-conformance issues shall be prepared using MIL-HDBK-61 as a guide. Minor Deviations will be processed by the SK Program CCB during development. Minor Waivers will be processed by the Contractor's Quality Control System Material Review Board (MRB).

3.1.2.7.1 Change Classification

The Contractor shall classify changes (Class I, Class II, or Internal) in accordance with the criteria specified below.

3.1.2.7.2 Class I Changes

For Class I changes, the Contractor shall submit an ECP in accordance with CDRL Sequence Number A00R. The ECP shall include a detailed description of the proposed change as it affects drawings, specifications, acceptance or test procedures, manufacturing processes, and documentation identified as part of an approved baseline (i.e. released and approved configuration data). The Contractor shall not incorporate a Class I ECP prior to receiving approval from USSOCOM. The following shall be considered by the Contractor when determining the classification of ECPs as Class I:

1. Affects to approved-functional baselined specification requirement such as performance, reliability, maintainability, weight, balance, moment of inertia, interface characteristics, electromagnetic characteristics, etc.
2. Affects one or more of the following, after product baseline:
   a. Products furnished by a customer

b. Safety
c. Compatibility with interfacing products
d. Preset Adjustments to the extent that product identification should be changed
e. Interchangeability (substitutability) of replaceable products, assemblies, or components
f. Change to a previously non-selected supplier, where supplier selection is specified
g. User skills or physical attributes
h. Operator or maintenance training

3. Requires retrofit of delivered products, e.g., by product recall, modification kit installation, attrition (replacement during maintenance by modified spares), etc.
4. Affects cost/price to customer(s) including incentives and fees, guarantees, warranties, contracted deliveries or milestones; and is an engineering change that does not impact factors 1 through 3.

3.1.2.7.3 Class II Changes

All changes not classified as Class I are considered to be Class II. In most cases, USSOCOM concurrence of Class II changes is not required.

3.1.2.7.4 Internal Changes

The Contractor shall implement an internal configuration control system, which shall ensure control of the released configuration documentation prior to USSOCOM approval and/or establishment of the Product Baseline. The Contractor may use his own forms. Contractor internal changes are not to be submitted to USSOCOM.

3.1.2.7.5 Engineering Change Proposal (ECP) Numbering

The Contractor shall establish an ECP numbering system for changes submitted to USSOCOM. Each ECP shall be assigned a unique number; once assigned, the ECP number shall be retained for all subsequent submissions of that ECP. Unrelated engineering changes shall not be covered under the same ECP change number. Each ECP shall contain the total impact of the proposed change on the hardware, software, documentation and qualification. Where a variety of configurations may exist, all effectivity shall be considered when preparing each ECP.

3.1.2.7.6 Priority of Changes

The Contractor shall recommend the priority of all Class I changes using MIL-HDBK-61 as a guide.

3.1.2.7.7 Initiation of Changes

The Contractor or USSOCOM may initiate changes.

3.1.2.7.8 SK System Change Control Board (CCB)

A SK System Change Control Board (CCB) shall be established at the Contractor's facility for the SK Program. All Class I changes (form, fit, function, safety, schedule) for the approved baseline shall require the approval of USSOCOM prior to incorporation. Any changes impacting the MDS Aircraft shall be submitted to the Aircraft CCB (Table 3-1) for review, approval and implementation planning.

3.1.2.7.9 Configuration and Change Accountability

Submitted and approved configuration change status data for hardware shall be included as part of the Contractor's configuration verification and accounting system. The Contractor shall report configuration status using MIL-HDBK-61 as a guide.

3.1.2.8 Software Configuration Control

Software configuration control performed by the Contractor shall establish a development configuration and baseline for each CSCI and firmware. The Contractor shall control the preparation and dissemination of changes to the master copies of deliverable software drawings, software, firmware, and software/firmware documentation that has been placed under configuration control; so they reflect only approved changes.

3.1.2.9 Non-Deliverable Computer Programs

The Contractor shall ensure that non-deliverable support software and computer hardware used to develop and test configuration item software and hardware is under the control of the Contractor's Quality Assurance Organization or Contractor CM Organization.

3.1.2.10 Functional Configuration Audits (FCA)

The Contractor shall conduct an FCA (Table 3-1) for the SK Radar under the general guidance of MIL-HDBK-61. The Contractor will document their FCA planning activities within an FCA Plan. The FCA shall verify that the configuration items meet the approved:

a. Hardware Specifications Section 3.4.3.6

b. Software and Firmware Specifications Section 3.4.2.10

In addition, test data shall be reviewed to verify that the hardware performs as required by its functional/allocated configuration documentation. USSOCOM will be notified of the FCA and will be invited to participate. Approval of configuration audits by USSOCOM:

a. Shall be in writing

b. Shall signify that the audit was conducted in accordance with the requirements established herein

c. Shall affirm that all action items resulting from this activity have been successfully completed

3.1.2.11 Technical Data Package (TDP)

The Contractor shall prepare/submit a Developmental Design Drawings and Associated Lists - Technical Data Package (TDP) in accordance with CDRL B002 and as described in Section 3.6.2.2 of the Detail Specification for Technical Data Packages (MIL-DTL-31000C).

3.1.3 Financial Management

The Contractor shall provide proper financial control disciplines throughout the program for early identification and resolution of potential threats to program success and ensure compliance with DoD financial and performance reporting requirements. The Contractor shall use a financial management system to accumulate, analyze, and document cost and staffing data to the appropriate level of the program CWBS. The Contractor shall provide and maintain an earned

value management system (EVMS) to assess the integrated cost and schedule performance data in accordance with the DoD and industry EVMS guidelines. The Contractor and Subcontractors with cost plus subcontracts over $5 million provide monthly Earned Value (EV) reporting. Note: Subcontractor Management is addressed in Section 3.5.1.1 of this SOW.

3.1.3.1 Performance Reporting

The following monthly Performance Reports shall be prepared and submitted to USSOCOM by the Contractor:

a. Contract Performance Report in accordance with CDRL A015

b. Program Status and Management Report in accordance with CDRL A001

3.1.3.1.1 Estimate at Completion (EAC)

To control contract costs, the Contractor shall use a disciplined estimate-at-completion process, which includes a monthly update of Estimate to Complete (ETC) and Estimate at Complete (EAC).

3.1.3.2 Earned Value Management System (EVMS) Plan

The Contractor will document an Earned Value Management System (EVMS) Plan that conforms to the Contractor's certified EVMS System. The Contractor shall measure and report program progress utilizing an Earned Value Management System (EVMS) compliant with American National Standards Institute/Electronic Industries Alliance Standard 748 (ANSI/EIA-748). (SOO 3.2.5)

The Contractor shall flow-down Earned Value Management requirements to subcontractors meeting the applicable thresholds and/or assigned critical tasks. The performance information reported by the subcontractors shall be incorporated and integrated into the Contractor's management system. (SOO 3.2.5)

3.1.3.3 Contract Work Breakdown Structure (CWBS)

The Contractor shall establish and maintain a Contract Work Breakdown Structure (CWBS) and CWBS Dictionary. The Contractor shall report schedule and cost collection data that maps to the program-level CWBS. The CWBS Dictionary provides a summary of the work scope descriptions and references to applicable sections of the SOW. The Contractor shall prepare/submit for USSOCOM approval, a CWBS in accordance with CDRL Sequence Number A016.

3.1.4 Schedule Management

The Contractor will develop an Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) as defined within the following paragraphs.

3.1.4.1.1 Integrated Master Plan (IMP)

The Contractor will develop an event-based integrated master plan (IMP) that defines Program events, activities required to complete the events, and exit criteria for determining that the activities are complete.

3.1.4.1.2 Integrated Master Schedule (IMS)

The Contractor shall prepare and submit an IMS that is based on the IMP. The IMS shall contain all critical milestones and contractual events and shall be submitted per CDRL Sequence Number A002. Pertinent Subcontractor schedule information shall be integrated into the Contractor's scheduling system.

3.1.5 Data Management (DM)

Data Management (DM) provides a common set of disciplined processes, procedures, and automated tools that ensures on-time delivery of SK Program data products and a centralized repository for documentation. The Contractor documents their data management planning activities within a combined Configuration/Data Management (CM/DM) Plan (section 3.1.2). (SOO 3.6.1)

3.1.5.1 Submittal Schedules

The Contractor Data Requirements List (CDRL), detailed in Appendix A, shall identify delivery schedule requirements for each data item. Significant[2] scheduled data submittals shall be documented as part of the Program Schedule (CDRL A002). The period of days called for shall be considered calendar days unless specified as work days. Delivery dates falling on weekends, national or USSOCOM holidays shall be delivered on the next regular workday.

3.1.5.2 Data Identification

All data submitted shall have a unique document or identification number, revision level and release date.

3.1.5.3 Data Transmittal Letter

The Contractor shall furnish a numbered, dated transmittal letter with each data transmittal. The Contractor's letter shall include, as a minimum:

a. Contract Number

b. Data Item Number

c. Data Item Description Number

d. Contractor Document Number, revision level, release date and title

e. Quantity and media

f. Partial (incremental) submittal (when data is submitted which does not fulfill the total data requirement, Contractor's letter shall so indicate).

g. When data is submitted or resubmitted by the Contractor in response to the instructions of USSOCOM, Contractor's letter shall include reference to USSOCOM's correspondence number and date of instructions.

h. Data submittals, which contain less than 100% of the documentation, shall be so noted.

[2] Repetitive elements such as the monthly Contractor's Progress, Status and Management Report (CDRL A001) are not required to appear in the Program Schedule.

3.1.5.4 Data Accession List (DAL)

The Contractor shall submit a Data Accession List (DAL) that indexes released contractor generated documentation as defined herein and in CDRL Sequence Number A00P. The documents listed shall be prepared in Contractor format and will be available for USSOCOM review using the Program electronic collaborative environment. Any Contractor data marked proprietary shall be properly handled and protected by USSOCOM.

3.1.5.5 Data Review and Notification Disposition

USSOCOM will provide the Contractor written notification of data approval or rejection, including comments or instructions. Data requiring approval shall be reviewed and dispositioned within the time specified on each CDRL. Data not dispositioned within that time period may be assumed approved; however, the Contractor must provide, in writing their intent to assume approval. The Contractor upon partially or totally disapproved data by USSOCOM shall provide a revised submittal date for the corrected CDRL within sixty (60) days

3.1.5.6 Data Submitted In Support Of Multiple Requirements

Data submitted in support of more than one contractual requirement, such as Purchase Contracts, Statements of Work or CDRLs, shall be submitted under cover of one transmittal letter. Each requirement the data is being submitted in support of shall be clearly indicated on both the transmittal letter and the cover page of the data.

3.1.5.7 Electronic Submittals

The Contractor shall provide USSOCOM real time access via electronic methods to receive data items and other program documentation by use of the Program electronic collaborative environment (section 3.1.1.3).

3.1.5.8 Data Rights Marking

The Contractor will provide all software, firmware, and documentation with unrestricted data Rights. In the unanticipated event that data rights become required, the Contractor shall ensure that all deliverable data is marked in accordance with the requirements of DFAR 252.227-7013. The only markings acceptable are "Limited" and "Unlimited". If "Limited" data rights are claimed by the Contractor, the Contractor shall notify USSOCOM in writing and submit supporting documentation, as requested, justifying each claim. All Contractor data marked Proprietary shall be properly handled and protected by USSOCOM.

3.2 Quality Assurance (QA)

3.2.1 Quality System

The Contractor shall maintain a Quality Assurance System in accordance with ISO 9001 that ensures conformance to requirements herein. The system shall encompass all areas of performance including design, development, procurement, fabrication, assembly, inspection, test, maintenance, packaging, storage, shipping, and installation. The Quality Assurance System shall maintain provision for internal status reporting, and inspections. The system shall be applied to all delivered products, supplies and services of the Contractor, Subcontractors, and Vendors. The Contractor may be subjected to Quality System Surveys and Audits performed by USSOCOM at any time during the term of this contract.

3.2.2 Record Retention

The Contractor shall retain all records of manufacturing, inspection, and test for a period of seven years after final payment, or as required by USSOCOM's Purchase Contract, whichever is later.

3.2.3 Right of Access

USSOCOM has the right of access into the Contractor's facility at any time during the performance of this contract. This includes the facilities of any subcontractor that is performing work for the Contractor on this contract.

3.2.4 Non-Conforming Material

The Contractor shall maintain a system that identifies and segregates non-conforming material, tools, and test equipment. The Contractor shall take prompt and effective action to correct and prevent recurrence of the non-conformance. The Contractor shall maintain, on a trend basis, a system of defect level reporting for the purpose of demonstrating progress in quality improvement.

Material Review Board (MRB) authorization is granted by USSOCOM for the Contractor to hold minor MRB's only. Any non-conformance that affects the fit, form, function or safety, or may result in a departure from the requirements of USSOCOM drawing or specification shall be forwarded to USSOCOM as a request for Deviation or Waiver. Non-conforming material, equipment, parts, or assemblies may not be shipped until USSOCOM dispositions the Waiver/Deviation request.

3.2.5 Test Support Equipment

The Contractor shall be responsible for assuring that all test support equipment (e.g., electronic consoles, flight test interface panel, aircraft test equipment), including software downloaders and automated test equipment (ATE) is successfully tested and maintained in the proper configuration, regardless of location. All test support equipment, sometimes called Test Program Sets, including software, must be under the Contractor's configuration management controls and QA verified/accepted. The Contractor shall notify USSOCOM of any test limitations due to a different configuration of test support equipment. Documentation shall be readily available at the Contractor that clearly, accurately, and completely describes the configuration and acceptability of each piece of equipment, including associated software.

3.3 Integrated Systems Engineering (SE)

Systems engineering is the overarching process that a program team applies to transition from a stated capability need to an operationally effective and suitable system:

a. Operational Effectiveness (OE) – Measure of the overall ability of a system to accomplish a mission when used by representative personnel in the environment planned or expected for operational employment of the system considering organization, doctrine, tactics, supportability, survivability, vulnerability, and threat. (CJSCI 3170.01E)

b. Operational Suitability (OS) – The degree to which a system can be placed and sustained satisfactorily in field use with consideration being given to availability, compatibility, transportability, interoperability, reliability, wartime usage rates, maintainability, safety,

human factors, habitability, manpower, logistics supportability, natural environmental effects and impacts, documentation, and training requirements. (CJCSI 3170.01E)

Systems engineering encompasses the application of systems engineering processes across the acquisition life cycle (adapted to each and every phase) and is intended to be the integrating mechanism for balanced solutions addressing capability needs, design considerations, and constraints, as well as limitations imposed by technology, budget, and schedule. The systems engineering processes are applied early in concept definition, and then continuously throughout the total life cycle.[3]

3.3.1 Planning and Control

The Contractor's SE Team shall be responsible for the engineering content of the System Development and Demonstration (SDD) phase of the SK Program. The Contractor SE Team shall:

a. Establish and maintain uniform and consistent systems engineering processes over all product areas (e.g., SK Radar, MDS, and Test Equipment)

b. Provide day-to-day management of the technical aspects of the program, and of the SE staff

c. Control technical information, technical correspondence with the customer, technical information change management

d. Manage requirements analysis and allocation

e. Performance against plans; and monitor and report technical performance measures and maintenance/status of SE tasks within the Integrated Master Plan and Integrated Master Schedule.

f. Create and maintain all Systems Engineering Plans throughout the life of the program

3.3.1.1 Systems Engineering Plan (SEP)

The Contractor shall prepare and submit a Systems Engineering Plan (SEP) fully compliant with the strategies outlined in the USSOCOM SK SEP in accordance with CDRL Sequence Number **A00U**. The SEP shall describe the organization, activities, and management of the Systems Engineering tasks to be accomplished for the SK Program. The referenced *Systems Engineering Plan (SEP) Preparation Guide* will be used in the preparation of the SK SEP. Following contract award, the SK Program Integrated Product Team (PIPT), as defined in Table 3-1, shall review/update the USSOCOM SEP to incorporate Contractor's processes and procedures (SOO 3.3.3).

3.3.1.2 Test Planning

3.3.1.2.1 Test & Evaluation Master Plan (TEMP)

Following SDD Contract award, USSOCOM and Raytheon shall jointly develop a *Test & Evaluation Master Plan (TEMP)* for the SK Program in accordance with CDRL Sequence Number **A007**. The TEMP shall identify the high-level requirements and define the objectives

[3] Definition derived from Section 4.1 of the Defense Acquisition Guidebook.

and overall structure of Test and Evaluation (T&E) plans for the SK System. It provides the framework within which detailed T&E plans are generated. It details the test strategy, schedule, and resource requirements for test and evaluation. It relates program schedule, test management strategy, structure, Key Performance Parameters (KPPs), operational performance parameters (threshold and objective criteria), Critical Technical Parameters (CTPs), evaluation criteria, and major decisions. Specifically, the Test and Evaluation Master Plan (TEMP):

a. Defines operational and system requirements

b. Establishes test levels and objectives

c. Relates performance objectives to test level

d. Assigns test management responsibility

e. Assigns test execution and support responsibility

f. Establishes high-level test schedule

g. Defines how the system components will accomplish the planned testing and evaluation for each life cycle phase in order to support major program decisions

h. Identifies special T&E resources, including Test Program Set equipment, and requirements to facilitate long-range planning including the rationale and schedule for planned tests

i. Relates the T&E effort clearly to technical characteristics, technical risk, operational issues and concepts, system performance, reliability, availability, maintainability, logistics requirements, and major decision points

3.3.1.2.2 Consolidated Integration, Verification and Validation Plan

The Contractor shall document their integration, verification, and validation planning activities within a Consolidated Integration, Verification and Validation Plan (CIV^2P). This Test Plan shall comprehensively address the SK System Test Program as identified, but not limited to entries within Table 3-2. (SOO 3.1.5)

Table 3-2. SK Test Program

Description	SOW Reference	CDRL	
		Procedure	Report
SK Radar CSCI Design Verification Test (DVT)	3.4.2.12	A00A	A00B
SK Radar HWCI Design Verification Tests including Firmware (DVT)	3.4.3.8	N/A	N/A
SK Radar Final Qualification Test (FQT)	3.4.4.3.1	N/A	N/A
SK Radar Environmental Qualification Tests	3.4.4.3.2	A027	A026
SK Radar Electromagnetic Interference (EMI)	3.4.4.3.3.1	A029	A012
SK Radar Acceptance Test (AT)	3.4.4.3.4	A008	A009
SK MDS Software Final Qualification Test (FQT)	3.6.1.3.6.4	A00A	A00B

Table 3-2. SK Test Program

Description	SOW Reference	CDRL	
		Procedure	Report
SK System Acceptance Test (AT)	3.6.2.3.2.1	A008	A009
SK System Electromagnetic Environmental Effects (E^3) Testing	3.6.2.3.2.2	A010	A011/A00Y
SK System Development Test (DT)	3.7.1.1.3	A036	A037
SK System Operational Suitability Flight Test	3.7.2	N/A	N/A

Note: Many of the above listed tests are sufficient to warrant their own standalone test plan. In those cases, the standalone plan shall be referenced within the CIV^2P.

The Contractor shall be responsible for all inspections, verifications, and tests performed to ensure that the materials, parts, processes, workmanship, and assemblies comprising the equipment meet the applicable configuration and design requirements. (SOO 3.1.5)

[redacted]

Testing conducted on military aircraft will be performed at Government test facilities. The Contractor is not responsible for aircraft support (e.g., aircraft maintenance, pilots, and fuel) as identified in Appendix B (GFI/GFE). (SOO 3.1.5)

3.3.1.2.3 Systems Engineering Metrics

The Contractor will employ System Engineering (SE) development and quality metrics in the management of the SE development effort. SE metrics will be developed and managed within the Program Metrics Plan (section 3.1.1.8).

3.3.2 Requirements Management

The Contractor shall manage all SK Program requirements within a requirement management database (RMDB) tool providing bi-directional traceability between USSOCOM documents and all Contractor generated system/product level specifications. Requirements verification matrices shall be appended to each System/Product level specification clearly identifying the contractor's proposed methodology for verification. The Contractor's implementation of the traceability database shall permit on-demand access by USSOCOM authorized SK System PIPT Members. (SOO 3.6.5)

3.3.3 System Architecture and Design Support

The SK SE Team shall ensure that customer requirements and user needs are satisfied throughout the program. This includes planning, technical management, requirements management and flow down from the SK System Specification to the SK Multimode Radar (SK Radar), Test Equipment, and Mission Design Series (MDS); generation of System/Product level specifications, development; and analysis of system architectures and performance, and verification of technical compliance.

3.3.3.1.1 Specification Tree

The Contractor will prepare a SK Specification Tree or indentured list documenting the architecture of the SK System. The Specification Tree shall be a top-down diagram representation of the breakdown of specifications from the System Specification to the lower level specifications (e.g., subsystem). The Specification Tree will be made available for review at SFR; updates to the Specification Tree will be presented at scheduled Program Interface Control Working Group (ICWG) and Design Reviews.

3.3.3.1.2 SK System Specification

The Contractor shall submit a SK System Specification (SS) in accordance with CDRL Sequence Number A00J using MIL-STD-961E as a guide. The system specification describes design criteria, performance characteristics, and quality assurance provisions of the SK System. System specification requirements shall be derived from and be traceable to the USSOCOM SRD, SOO and SOW requirements as detailed in Section 3.3.2.

The Government shall retain approval authority of the SK System Specification for the life of the SK System (SOO 3.6.2).

The Contractor will lead a System Requirements Review (SRR), as detailed in Table 3-1, to review SK System Specification requirements with USSOCOM.

3.3.3.1.2.1 Specification Verification Requirements Matrix

The Specification Requirement Verification Matrix provides traceability between the System-level test procedures (similarity analysis or inspection test methods) and SK System Specification requirements. The Contractor shall prepare a Specification Requirement Verification Matrix for the SK System Specification in accordance with CDRL Sequence Number A00V.

3.3.3.1.3 SK Prime Item Development Specifications (PIDS)

The Contractor will document the product level structure of the SK System within Prime Item Development Specifications (PIDS) using MIL-STD-961E as a guide. The following SK products will be documented within a PIDS:

a. SK Multimode Radar (SK Radar) – As defined in Section 3.4

b. Test Program Set Equipment – As defined in Section 3.5.4

c. [redacted]

The PIDS shall describe design criteria, performance characteristics, and quality assurance provisions of the individual Products. PIDS requirements shall be derived from and traceable to the SK System Specification as detailed in Section 3.3.2.

The contractor shall prepare/submit for USSOCOM approval a SK Multimode Radar PIDS in accordance with CDRL Sequence Number D005. The Government shall retain approval authority of the SK Multimode Radar PIDS for the life of the Silent Knight System.

[redacted]

3.3.3.1.4 Airworthiness Qualification Specification

The Contractor shall prepare an Airworthiness Qualification Specification in accordance with the SK Airworthiness Qualification Plan and as discussed in ADS-51-HDBK. The Contractor shall prepare/submit for USSOCOM approval an Airworthiness Qualification Specification in accordance with CDRL Sequence Number A017.

a. Airworthiness Analysis – Table 3-5. Modeling, Simulation & Analysis/Trade Studies
b. Airworthiness Qualification (Initial) – Section 3.7.1.1.2
c. Airworthiness Qualification (Final) – Section 3.7.2.3

3.3.3.1.5 DoD Directive 4650.1 Certification

All SK System equipment shall comply with national and international spectrum standards and guidance on the use of the electromagnetic spectrum. The SK System shall be certified in accordance with DoD Directive 4650.1 and be supportable in the electromagnetic spectrum prior to fielding. The Contractor shall assist USSOCOM prepare a DD 1494 (Application for Equipment Frequency Allocation) to request permission to radiate at specified frequencies during the various program phases (e.g., conceptual, experimental, developmental, and operational) (SRD 3.2.6.3.1).

3.3.3.2 Integration, Verification and Validation (IV&V)

The following subsections define the contractor Integration, Verification and Validation (IV&V) processes that applies to the SK System and its sub-elements.

3.3.3.2.1 Integration

The Contractor shall perform Integration on the SK System and its sub-assemblies. Integration is the process of incorporating lower-level elements into a higher-level element (system) within the physical architecture. The System Integration work effort begins when the Contractor has a technical solution for the system or increment of capability. Through the use of systems engineering, the System Integration effort integrates components and subsystems, completes the detailed design, and reduces system-level risk. The effort typically includes the demonstration of prototype articles or engineering development models.[4]

3.3.3.2.2 Requirements Verification

The Contractor shall confirm that the SK System meets System Specification requirements. The purpose of verification is to:

a. Substantiate the realized (implemented or integrated) SK System (including interfaces) from the lowest level element up to the total SK System to ensure that the realized product conforms to the specifications
b. Generate evidence necessary to confirm that SK System elements at each level of the hierarchy meet their "build-to" specifications

[4] Definition derived from Section 4.3.3.2 of the Defense Acquisition Guide.

c. Verify that the materials employed in SK System solutions can be used in a safe and environmentally compliant manner[5]

Requirements verification shall be incremental throughout SK System Development and Demonstration and shall be defined within Section 4 (Verification) of the SK System Specification (section 3.3.3.1.2) and PIDS (section 3.3.3.1.3). The Contractor shall prepare a Requirements Verification Matrix (RVM) within each specification that contains (SRD 4):

a. A cross reference that correlates each requirement in the System Specification/PIDS with the verification method(s) identified in Table 3-3

b. The development phase in which the verification will occur

Program milestones and specific success criteria shall be developed by the Contractor showing the use of incremental verification in the design effort (SRD 4).

3.3.3.2.3 Requirements Validation

The Contractor shall perform Requirements Validation on the SK System. Validation tests the performance of the system within its intended operational environment, with anticipated operators and users. In the early stages of the system life cycle, validation may involve prototypes, simulations, or mock-ups of the system and a model or simulation of the system's intended operational environment[6].

Table 3-3. Verification Methodology

Method	Description
Inspection	A visual observation of equipment, drawings, or documentation to ensure a requirement has been met.
Analysis	A detailed calculation of probabilities, trial runs, synthetic scenarios and simulations, empirical data, and test results, to ensure a requirement has been met. This includes analysis of design data throughout the development process.
Demonstration	Non-parametric exercise of actual equipment to ensure a requirement has been met. Demonstration that a "growth" requirement has been met may be provided via analytical means.
Test	Parametric operation of (1) equipment in mock-up, hot bench, and environmental qualification setups; or (2) installed equipment in its operational environment, under controlled conditions, using approved detailed test procedures, to ensure a requirement has been met. Testing categories are as detailed in Section 3.4.4.3.
Process Control	The detailed review and analysis of process descriptions, process metrics, and production operations to ensure a requirement is met by consistent product compliance with specific standards of quality.

[5] Definition derived from Section 4.2.4.6 of the Defense Acquisition Guide.

[6] Definition derived from Section 4.2.4.7 of the Defense Acquisition Guide.

Table 3-3. Verification Methodology

Method	Description
Modeling/ Simulation	The digital detailed representation of a subsystem or function that is not able to be fully tested or demonstrated due to the overwhelming number of test/demonstration hours required to verify that requirements have been met.

3.3.3.3 Technical Performance Indices/Measures (TPI/TPM)

The Contactor shall develop Technical Performance Indices/Measures (TPI/TPM) that shall be used to report/monitor the progress in meeting specific critical requirements identified within the System Specification (section 3.3.3.1.2). The Contractor shall document TPI/TPMs within the Program Metrics Plan (section 3.1.1.8). TPI/TPM will be statused/updated monthly, highlighted at all Program Technical Reviews, and posted for USSOCOM's review using the Program's Collaborative Environment Tool (section 3.1.1.3). The SK PIPT will finalize the selection of the TPI/TPM listing by System Functional Review (SFR).

3.3.3.4 SK System

The Contractor shall define the extent to which the design solution (SOO 2.0, and 3.3.2):

a. Meets the SOF Aircraft
b. Monitors metrics during SDD to ensure SOF Aircraft
c. Verifies SK System

3.3.3.5 Modular Open Systems Architecture (MOSA)

The Contractor shall ensure MOSA is applied in the systems engineering approach to the SK System design and development to optimize system performance and minimize ownership costs. The design implements, when feasible, widely supported commercial interface standards.

3.3.4 Security

The Contractor shall control information in accordance with the SK Program Security Classification Guide (SCG). After contract award, the Contractor and USSOCOM shall update the SCG to incorporate specifics relating to the proposed design solution and Contractor Processes (SRD 3.2.4).

3.3.4.1 Operations Security (OPSEC) Plan

The Contractor shall document their OPSEC planning activities within an Operations Security (OPSEC) Plan. As part of this plan, the contractor will address integration of the security disciplines, system security engineering, counterintelligence, and operations security. The

Contractor will support USSOCOM inspections and program protection surveys of the Contractor's program protection. The plan must explain how the Contractor ensures coordination of systems, data and products with Systems Security Engineering (SSE) efforts to build life-cycle security features into systems and products covered by this agreement. Design and program reviews will include Program Protection and SSE status.

3.3.4.2 Critical Program Information (CPI)

The Silent Knight Radar shall be certifiable and accreditable in accordance with DoD Directive 5200.39 relating to *Security, Intelligence, and Counterintelligence Support to Acquisition Program Protection* (SRD 3.2.4).

CPI's are information, technologies, and systems that are of critical value to successful SK System mission performance, and the loss, theft, or compromise of which could degrade or shorten the effective combat lifetime of the SK System or provide significant technological advancement to an adversary. The Contractor will identify, in the OPSEC plan, locations where CPIs are developed, produced, analyzed, tested, maintained, transported, stored, or used in training. The Contractor will also develop cost effective countermeasures to prevent compromises that could significantly impact costs, schedule, performance, and supportability; impair program direction; degrade systems capabilities, shorten the life of the system; degrade system capability; lead to unauthorized technology transfer; or require additional resources to develop countermeasures.

3.3.4.3 Anti-Tamper

[redacted]

The Contractor shall develop a classified Anti-Tamper Plan Annex to the OPSEC Plan (section 3.3.4.1). This Annex will articulate the Anti-Tamper techniques they consider appropriate for each of the Critical Technologies and Critical Program Information (section 3.3.4.2). The Contractor will also state the planned effectiveness of each technique and the cost of development and cost impact on production of each technique.

[redacted]

Technology threshold guidance is provided in the Military Critical Technologies List (MCTL)[7]

[redacted]

3.3.4.4 Information Security

The Contractor shall comply with all security requirements as identified in the Department of Defense Contract Security Classification Specification (DD Form 254) generated by USSOCOM for the SK Program. These requirements will be executed in accordance with DoD 5220.22-M,

[7] Military Critical Technologies List (MCTL) - http://www.dtic.mil/mctl/

National Industrial Security Program Operating Manual (NISPOM), 1 Jan 95; DoD Directive 5200.1, the DoD Information Security Program, 13 Dec 96; and DoD Directive 5200.1R, 15 Jan 97. The Contractor shall provide for the protection of classified information up to the SECRET level as identified in classification guidance for classified information and materials received or generated as a part of the execution of this contract.

The Contractor shall describe the required systems engineering tasks and develop a Systems Security Engineering Annex to the OPSEC plan. The Contractor shall design critical program protection measures into the system and develop test plans and perform verification testing. Where actual incorporation into the system is not cost effective for the current stage of development, provisions for incorporation shall be proposed, with a description of how incorporation could be accomplished at a later stage.

3.3.5 Reliability, Maintainability/Testability, System Safety/Human Factors and Supportability

The Contractor shall initiate Reliability, Maintainability/Testability, System Safety/Human Factors and Supportability (RMS&S) activities for all SK hardware. The Contractor will document its RMS&S planning activities within the RMS&S and System Safety Plans. RMS&S requirements shall be flowed-down to SK suppliers (section 3.5.1.1).

3.3.5.1 Reliability Engineering

The Contractor shall include in the Reliability Program a means of ensuring that the conclusions of reliability analyses result in appropriate changes to the equipment design to obtain the maximum inherent reliability. Reliability Program planning shall detail:

a. Required tasks
b. Schedule
c. Design teaming relationships
d. Monitor and control of subcontractors/suppliers
e. Processes to achieve quantitative and qualitative reliability requirements

3.3.5.1.1 Reliability Predictions

Reliability Predictions for each MDS shall be conducted using MIL-HDBK-217F stress-based methods. A complete hardware based reliability model shall be created and used to generate the stress-based prediction, including each element of the model. Where the fidelity of the tables in the handbook is insufficient, predictions may be augmented using reliability values obtained for similar designs. Nominal stress levels and temperatures shall be determined from circuit and thermal analysis. Substantiation of the prediction is required and may include historical data referencing failure rates of similar components used on similar aircraft. The source of all failure rates shall be stated.

3.3.5.1.2 Failure Reporting, Analysis and Corrective Action System

The Contractor shall establish a Failure Reporting, Analysis and Corrective Action System (FRACAS) program. The task shall include data collection and processing from Environmental Stress Screen (ESS), Design Verification Test (DVT), Acceptance Test (AT), Qualification Test (QT), and flight test activities. The identification of data shall include the LRU level, LRM level, LRM sub-level, detailed part numbers and other applicable identification. All data shall be retained in a form suitable for automated data processing of the original level of detail and identification. Failure reporting shall be included in each of the individual test reports. The

contractor shall conduct failure review boards (FRB) as defined by the RMS&S Plan and specific test plans.

3.3.5.1.3 Electronic Parts/Circuit Tolerance Analysis

An electronic parts/circuit tolerance analysis shall be conducted by the Contractor on critical circuits. The purpose of this analysis is to examine the effects of parts/circuits electrical tolerances over the range of specified operating environments and influence a more robust design. The analysis shall be performed on critical circuitry at extreme environmental conditions that affect component tolerance as specified in the item specifications.

3.3.5.1.4 Radar Stress Analysis and Part Application

The operating environment for installed equipment will be identified in terms of electrical and thermal stresses and documented in a Stress Analysis Report. The stress de-rating for electronic components will be in accordance with established criteria.

3.3.5.1.5 Reliability Reviews

Reliability Program status shall be addressed during scheduled USSOCOM/Contactor Reviews (e.g., SDR, PDR, and CDR).

3.3.5.1.5.1 Parts Control and Standardization Program

The Contractor shall perform a parts control and standardization program during product development and implementation that is economically planned, integrated and developed in conjunction with other engineering and logistics support planning functions. The program shall be executed by Parts Engineering, in accordance with the Contractor's Part Selection Process (PSP), to select parts that satisfy the SKR design requirements. The parts control and standardization program shall establish part selection criteria, maintain a list of all parts selected, and include an integrated program team review of all parts. The parts control and standardization program plan shall be documented and submitted as part of the RMS&S Plan (section 3.3.5).

3.3.5.1.5.2 Materials and Process Standards

The Contractor shall select materials and processes for delivered hardware and maintenance of the hardware that satisfies system requirements.

3.3.5.1.5.3 GIDEP Alert Monitoring

The Contractor shall monitor Government/Industry Data Exchange Program (GIDEP) alerts throughout all contract phases. Part deficiency data shall be reviewed in part selection evaluations to ensure no known obsolete or unsuitable parts are used.

3.3.5.2 Maintainability - Testability Program

The Contractor shall conduct a Maintainability/Testability Program using MIL-HDBK-470A and MIL-HDBK-2165 as guides. Planning will be developed that details required M/T tasks, schedule, design teaming relationships, and processes to achieve maintenance concept and quantitative and qualitative M/T requirements (part of the RMS&S Plan). The results of M/T analyses will be used to influence design to obtain the maximum inherent ease of maintenance and facilitate availability through innovative techniques for data collection, processing and maintenance planning. The Contractor will include Maintainability/Testability Program planning information in the RMS&S Plan (section 3.3.5).

3.3.5.2.1 Failure Modes, Effects and Criticality Analysis (FMECA)

An integrated Failure Modes, Effects and Criticality Analysis (FMECA), which includes failure mode and effects analysis, criticality analysis and Maintainability Information, shall be performed on each pertinent level of assembly of the system down to the LRM functional level. The analysis shall use the functional approach which defines failure modes in terms of functions of the equipment level being analyzed. The FMECA shall be integrated and interactive using inputs from reliability, maintainability, testability and safety. It shall identify possible failure modes and evaluate each failure mode for functional effect on the overall assembly. Functional failure modes as defined in the FMECA shall form the basis for BIT/Integrated Diagnostic design and impact to reliability and safety. The results of the FMECA analyses will be used to influence design to obtain the maximum inherent capability. The FMECA shall be submitted in accordance with CDRL Sequence Number D004.

3.3.5.2.2 Planned Maintenance System (PMS) Failure Modes and Effects Analysis (FMEA)

The Planned Maintenance System (PMS) Failure Modes and Effects Analysis (FMEA) defines the dominate failure modes and the effect of each failure mode on the item. The Planned Maintenance System (PMS) Failure Modes and Effects Analysis (FMEA) shall be submitted in accordance with CDRL Sequence Number D003.

3.3.5.2.3 Maintainability Analysis and Prediction

The Contractor will prepare a Maintainability Analysis and Prediction Report that document Maintainability Requirements, Maintenance Concepts, Scheduled Maintenance, Support Equipment, Special Tools, and contain a Mean-Time-To-Repair (MTTR) Prediction with supporting detailed Maintenance Task Analyses. The results of maintainability analyses will be used to influence design to obtain the maximum inherent capability. Wherever design changes occur, the Maintainability Analysis and Prediction report will be updated to reflect these changes.

3.3.5.2.4 Testability Analysis and Prediction

The Contractor will prepare Testability Analysis and Prediction Reports that documents Testability Requirements, Embedded BIT Architecture, and Testability Features. These reports will contain Fault Detection, Fault Isolation, and False Alarm Predictions performance, along with supporting detailed functional analysis. The results of testability analyses will be used to influence SK Radar design (hardware and software) and factory test equipment, and processes to obtain the maximum inherent capability. Wherever design changes occur, the Testability Analysis and Prediction Report will be updated.

3.3.5.2.4.1 Maintainability/Testability Verification

The contractor shall conduct sufficient engineering evaluations/tests to ensure the adequacy of the maintainability and testability features of the system.

3.3.5.2.5 Human Factors Engineering Analyses

The Contractor shall conduct Human Factors Engineering analysis and testing in support of the crew system and equipment design requirements using JSSG 2010 or SOF equivalent (JSSG for Special Operations) and MIL-STD-1472 as a guide. The human engineering effort and system

analysis shall be performed during system development, including Crew Station Working Groups and Maintainability Demonstrations, to validate physical and cognitive performance requirements for both the operator and maintainer. Human factors activities will be used to complete the following tasks:

a. Optimize maintenance procedures by maximizing accessibility, handling, and lifting considerations in accordance with Table 17 of the SK System Specification

b. Simplify the equipment interface display design by providing clear, concise instructions as evaluated by the Bedford Workload Scale

c. Minimize conditions that can degrade human performance by including error-proof design techniques, appropriate safety precautions, and ergonomic considerations

Human Factors Engineering analyses shall influence equipment layout, design, and installation.

The Contractor shall submit the following CDRLs in support of the Human Factors Engineering analysis and testing:

a. Human Engineering Test Plan A013

b. Human Engineering Test Report A014

3.3.5.2.6 Maintainability/Testability and Human Factor Reviews

Maintainability/Testability and Human Factor Programs status shall be addressed during scheduled USSOCOM/Contactor Reviews (e.g., SDR, PDR, and CDR).

3.3.5.3 Supportability

Supportability activities shall address performance and support requirements for the total life cycle of the SK system. The supportability of the design and the acquisition of SK system shall be cost-effective and provide the necessary infrastructure support to achieve peacetime and wartime readiness requirements.

Supportability is the inherent quality of a system, including design for reliability and maintainability, technical support data, and maintenance procedures to facilitate detection, isolation, and timely repair/replacement of system anomalies. This includes factors such as diagnostics, prognostics, real-time maintenance data collection, "design for support" and "support the design" aspects, corrosion protection and mitigation, reduced logistics footprint, and other factors that contribute to an optimum environment for developing and sustaining a stable, operational system. To minimize the logistics footprint, the supportability posture of defense systems should be factored into the design[8].

3.3.6 Producibility

The Contractor shall apply Producibility and Design for Manufacturing and Assembly (DFMA) principles in the development of the SK Radar. Producibility is the degree to which the design of the system facilitates the timely, affordable, and optimum-quality manufacture, assembly, and delivery of the system to the customer. Design engineering efforts concurrently develop

[8] Definition derived from Section 4.4.9 of the Defense Acquisition Guide.

producible and testable designs, capable manufacturing processes, and the necessary process controls to satisfy requirements and minimize manufacturing costs.[9]

3.3.7 Parts Obsolescence and Management

The contractor shall implement and maintain a Parts Obsolescence Management or Diminishing Manufacturing Sources and Materials Shortages (DMSMS) program throughout all contract phases. Part lifecycle evaluation shall be included in the part selection process and reviews conducted periodically after drawing release. This program will evaluate current and future availability of reliable parts.

3.3.8 Safety Engineering

The objective of system safety engineering is to achieve acceptable mishap risk through a [redacted] The Contractor will document their System Safety planning activities within the System Safety Plan. All aspects of safe TF/TA flight (hardware, software, and system) shall be included in the System Safety Program.

3.3.8.1 System Safety

The Contractor shall initiate a System Safety Program that meets the requirements in MIL-STD-882D. [redacted]

The Contractor shall ensure safety is designed into the subsystem and that equipment is designed and/or selected on the basis of inherent safety features that protect personnel and the equipment. All engineering changes shall be reviewed from a safety standpoint to ensure design changes do not degrade applicable safety requirements. The Contractor shall support investigation of incidents and accidents during fabrication, installation, test, and operation of the equipment. The Contractor shall document hazard analysis in a System Safety Hazard Analysis (SSHA) in accordance with CDRL Sequence Number A006.

3.3.8.2 Flight Safety

[redacted] The contractor shall meet the requirements contained in applicable sections of RTCA DO-160 and the following:

a. [redacted]

b.

c.

[9] Definition derived from Section 4.4.6.1 of the Defense Acquisition Guide.

3.3.8.3 Safety Integration and Management of Subcontractors

The contractor shall involve all subcontractors in its system safety program. As such, safety requirements shall be flowed down and reviews/resolution of identified hazards shall be included in the SK system hazard tracking system.

3.3.8.4 Hazard Evaluation (Risk Assessment Codes)

All identified potential hazards will be assigned a severity and probability code. The hazard risk assessment matrix shall be used for evaluation of the identified hazards (see Table 3-4). Mishap severity categories and mishap probability levels are defined in Tables A-I and A-II respectively within Appendix-A of MIL-STD-882D. Residual hazards with Risk Assessment Codes of "high" shall not be acceptable. Residual hazards with Risk Assessment Codes of "serious" shall require USSOCOM approval for risk acceptance.

Table 3-4. Hazard Severity/Probability Matrix

		Hazard Probability				
		A	B	C	D	E
Hazard Severity		Frequent	Probable	Occasional	Remote	Improbable
I	Catastrophic	[redacted]	[redacted]	[redacted]	Serious	Medium
II	Critical	[redacted]	[redacted]	Serious	Medium	Medium
III	Marginal	Serious	Serious	Medium	Medium	Medium
IV	Negligible	Medium	Medium	Low	Low	Low

3.3.8.5 Safety Reviews

The Contractor shall perform the following safety reviews:

a. System Safety Program Reviews – System Safety status shall be an agenda item at Program Reviews (e.g., PDR, CDR)

b. Host System Safety Working Group (SSWG) support – Participate in the joint SSWG activities as related to the SK system.

c. Test and Evaluation Safety – Ensure test plans and procedures are reviewed for safety. Test equipment and instrumentation shall be considered in the hazard analyses

d. Safety Assessment Report (SAR) – [redacted] Safety hazards shall be assessed using MIL-STD-882D and SAE ARP 4761 as guides. The report shall be submitted prior to first

flight and updated prior to final production airworthiness release request. The Safety Assessment Report shall document safety risks associated with test operations of the Silent Knight. The report shall identify which Computer Software Configuration Item (CSCI), Computer Software Unit (CSU), or firmware CI is safety critical. A matrix shall illustrate the relationship each CSCI, CSU, or firmware CI has with the safety critical functions and show traceability to the software requirements. The report shall include a functional hazard analysis (FHA). The report shall formally identify all safety requirements that were not implemented or partially implemented. It shall identify those hazards that were risk minimized. The report shall further document the ramifications of not proceeding further with designing "out" the residual hazardous conditions of the Silent Knight or potentially hazardous conditions that are processed by the Silent Knight.

e. Safety Review of Engineering Change Proposals (ECPs) and Requests for Deviation/Waiver – Review all ECPs, and Requests for Deviation/Waiver to determine the effects, if any, on system safety

3.3.8.6 Health Hazard Safety

Identification and control of human health hazards shall be incorporated into selection of materials, methods, processes, and parts for aircraft and support equipment, as well as the manufacture, repair, maintenance, servicing, use, and disposal activities of that equipment. Identified health hazards shall be eliminated or reduced to an acceptable level of risk if elimination is not technically or economically feasible. Potential health hazards shall be identified and evaluated and proposed protective measures provided in the occupational Health Assessment section of the System Safety Hazard Analysis.

3.3.8.7 Pollution Prevention

The Contractor shall establish and implement a Pollution Prevention Program for the SK System. The Contractor shall utilize internal procedures to eliminate, substitute less harmful materials to health and environment, or reduce the quantity of hazardous materials used.

Hazardous materials are defined as materials that, due to their chemical, physical or biological nature may cause safety, public health, or environmental concerns.

A list of any hazardous materials recommended for repair, operations, or maintenance shall be supplied. The Contractor shall identify a point of contact for the Contractor's Pollution Prevention Program. In the event of a Class I change that alters the design of a deliverable item of hardware, the Contractor shall document the impact to the Hazardous Materials list in the ECP.

The environmental compliance of military specification paints is often dependent on the revision letter of the military specification being used. Military specification paints used for SK System hardware must meet, at a minimum, the most recent version of the military specification in effect when the contract is awarded.

3.3.8.7.1 Environmental Materials and Process Selection

When selecting materials and processes, the Contractor minimizes the environmental impacts of the manufacture, operation, maintenance, and repair of its product. Environmental impacts will

be considered along with other design and manufacturing criteria. The selection of materials shall not include asbestos or surface coatings containing lead, or Ozone Depleting Substances (ODS). Volatile organic compound content in primers and topcoats shall not exceed federal, state and local regulatory requirements. The Contractor shall minimize use of other Hazardous Materials, including those used in production and maintenance procedures. If Hazardous Materials (HAZMAT) use is necessary, only shipboard compatible HAZMAT will be used. (SRD 3.2.5)

3.3.9 Logistics Support Planning

The Contractor shall implement a Logistic Support Program to plan, schedule, direct, coordinate and control all logistics activities. The Contractor shall report logistics status at all internal and external program and design reviews. Additionally, the Contractor's logistics organization shall ensure that system supportability is an integral element of the total system design.

3.3.9.1 Integrated Logistics Support Plan

An Integrated Logistics Support Plan (ILSP) shall be developed for the long-term, two-level sustainment of the Silent Knight system. The ILSP shall define ILS program requirements, tasks, and milestones for all phases of the SK Program. This shall include the analysis and identification of manpower and personnel; maintenance procedures; supply support; training for maintenance personnel and flight crews; facilities; packaging; handling; storage and transportation; and technical manuals. The ILSP shall be submitted in accordance with CDRL D002 and address the following areas (SOO 3.4.1):

a. Program description
b. Logistics support analysis
c. Support concept and planning for:
    - Development Test/Operations Test (DT/OT)
    - Interim Contractor Support (ICS)
    - Performance-Based Logistics (PBL)
d. Maintenance procedures
e. Training program
f. Logistics resource identification

3.3.9.2 Packaging, Handling, Storage and Transportability Data

Packaging, handling, storage, and transportability requirements for the SK System are defined in Section 3.5.6 of the System Specification. The Contractor will amass packaging, handling, storage, and transportability data and will update the data to reflect design changes implemented throughout SDD.

3.3.9.3 Training

The Contractor shall develop and execute a training program for USSOCOM maintainers and flight crews who will conduct flight test and support USSOCOM planning and execution of the flight test program.

3.3.9.4 Technical Publications

The contractor shall provide technical publications source data, for systems produced during this phase of the program, to enable USSOCOM to develop an Operator and Maintainer (O&M) training course and Interactive Electronic Technical Manual (IETM) for students. The source data shall describe the system and theory of operation; system capabilities; interfaces; component removal/installations/repairs (including battle damage)/fault isolation procedures; and preventive maintenance. Emphasis shall be placed on troubleshooting guides and matrices to allow for rapid and efficient identification of failed components.

3.3.9.5 Unique Identification (UID) Implementation Plan

The Contractor shall develop a Unique Identification (UID) Implementation Plan for the SK System. (SOO 3.4.1) The UID Implementation Plan will be detailed within the ILSP (section 3.3.9.1).

3.3.9.6 Database Compatibility

The Contractor shall ensure supply databases are compatible with existing Service Supply Systems (SOO 3.4.3).

3.3.9.7 SDD Maintenance Support

The Contractor shall provide support for maintenance and repair of SK Radar hardware and software supporting SDD: (SOO 3.1.3)

a. SK Radar Integration and Verification – Section 3.4.4

b. [redacted]

c. Qualification Flight Test – Section 3.7.1

d. Operational Suitability Flight Test – Section 3.7.2

SK Radar hardware to support the SDD is detailed in Section 3.5.3.

3.3.9.8 Sustainment Design and Planning Working Group

The Contractor shall support Sustainment Design and Planning Working Group Meetings as identified in Table 3-1.

3.4 SK Radar

This element addresses the Contractor's design and development efforts for the SK Radar and includes:

a. System Engineering (SE)
b. Processing Subsystem Development
c. Hardware and Firmware Development
d. Integration and Test

3.4.1 System Engineering (SE)

3.4.1.1 SK Radar Development

The Contractor SK Radar Systems Engineering (SE) shall be responsible for the following SK System Engineering tasks specifically related to the Multimode Radar:

Product (SK Radar) Design

a. Identify and assess functional and physical solution alternatives

b. Establish a product physical architecture and develop a product breakdown structure

c. Assess standardization opportunities and make or buy alternatives; finalize SK Radar MMR design

Component (SK Radar MMR sub-elements) Requirements and Architecture Development

a. Use the SK Requirements Database (SK Radar PIDS Requirements) and product breakdown structure to derive component boundaries, interfaces, and physical requirements

b. Generation of Hardware Requirement Specifications (HRS) for the SK Radar Hardware Configuration Items (HWCI)

c. Generation of Software Requirement Specification (SRS) for the Computer Software Configuration Items (CSCI) in accordance with CDRL Sequence Number A00D

d. Generation of Firmware Critical Item Development Specification (CIDS) for the SK Radar Firmware Configuration Items

3.4.1.2 Modeling, Simulation, and Analysis/Trade Studies

This section includes the Modeling, Simulation, and Analysis, (MS&A) efforts to support the Silent Knight Radar System. The tasks associated with this element shall provide the ongoing technical effort to track the system development process; develop and use simulations and models; and mature the system architecture and allocated requirements.

The tasks include:

a. Provide model and simulation technical development management, including but not limited to generating and maintaining an MS&A plan and providing model and simulation technical status to the program

b. [redacted]

c. Support the development of the radar including, but are not limited to, developing and maintaining performance analysis models for the radar for all modes [redacted]

d. Initiate Trade Studies to weigh design considerations and compromises against system and allocated requirement objectives and thresholds. Trade studies that lead to system design changes will have sufficient information to generate Class I/II Engineering Change Proposals (ECP) as defined in Section 3.1.2.7. The Contractor shall be responsible to perform and document trade studies in accordance with CDRL Sequence Number A005.