MILITARY STANDARD

CONFIGURATION MANAGEMENT PRACTICES FOR SYSTEMS, EQUIPMENT, MUNITIONS, AND COMPUTER PROGRAMS

DEPARTMENT OF THE AIR FORCE

Washington, DC 20330

Configuration Management Practices for Systems, Equipment, Munitions, and Computer Software

1. This Military Standard is approved for use by all departments and agencies of the Department of Defense.

2. Recommended corrections, additions, or deletions should be addressed to: Air Force Systems Command, HQ AFSC/SDXP, Andrews Air Force Base, Washington, MD 20334.

FOREWORD

1. This military standard sets forth configuration management practices which are to be tailored to specific programs and implemented by the contract work statement. The standard also establishes configuration management requirements which are not covered in DOD-STD-480, MIL-STD-481, MIL-STD-482, and MIL-STD-490.

2. This military standard is arranged in two parts. Part 1 states the general requirements for configuration management and the application of each appendix of the standard to specific detail requirements. Part 2 consists of appendixes which supplement or add configuration management requirements not contained in DOD-STD-480, MIL-STD-481, MIL-STD-482, and MIL-STD-490.

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MILITARY STANDARD
CONFIGURATION MANAGEMENT PRACTICES FOR SYSTEMS, EQUIPMENT, MUNITIONS, AND COMPUTER SOFTWARE

Part 1 - General Requirements

1. SCOPE

1.1 <u>Scope (Requirements).</u> This standard establishes requirements for configuration management in the following areas:

    a. Configuration management plan
    b. Configuration identification
    c. Configuration control
    d. Configuration audits
    e. Interface control
    f. Engineering release control
    g. Configuration management reports/records

1.2 <u>Purpose.</u> The purpose of this standard is to establish uniform configuration management practices that can be tailored to all systems and configuration items including those systems and configuration items procured by the Air Force for other agencies.

1.3 <u>Application.</u> Configuration management requirements established by this standard apply during the applicable system life cycle phases of configuration items whether part of a system or an independent configuration item. Contracts invoking this standard will specifically identify the appropriate applicable paragraphs and appendixes or portions thereof as defined in the contract work statement depending upon the scope of the program, other contractual provisions, and the complexity of the configuration item being procured. The contractor shall ensure that all software, hardware, firmware and documentation procured from subcontractors is generated according to the requirements of this standard.

1.4 <u>Definitions.</u> For definitions of terms used in this standard and not defined in Section 5 herein, refer to DOD-STD-480, Appendix E.

2. REFERENCED DOCUMENTS

2.1 <u>Specifications and Standards.</u> The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this standard to the extent specified herein:

<u>SPECIFICATIONS</u>

<u>Military</u>

DOD-D-1000	Drawing, Engineering and Associated List
MIL-Q-9858	Quality Program Requirements
MIL-L-9931	Lot Numbering, Dating and Preparing Data Cards for Guided Missile Explosive Assemblies, Sub-Assemblies and Parts
MIL-P-15024	Plate, Identification - Information and Marking for Identification of Electrical, Electronic and Mechanical Equipment
MIL-I-45208	Inspection System Requirements
MIL-S-83490	Specification, Types and Forms

<u>STANDARDS</u>

<u>Military</u>

DOD-STD-100	Engineering Drawing Practices
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of US Military Property
DOD-STD-480	Configuration Control - Engineering Changes, Deviations and Waivers
MIL-STD-481	Configuration Control - Engineering Changes, Deviations and Waivers (Short Form)
MIL-STD-482	Configuration Status Accounting Data Elements and Related Features
MIL-STD-490	Specification Practices
MIL-STD-499	Engineering Management
MIL-STD-1167	Ammunition Data Card
MIL-STD-1168	Lot Numbering of Ammunition
MIL-STD-1521	Technical Reviews and Audits for Systems, Equipments, and Computer Software

<u>PUBLICATIONS</u>

<u>Air Force-Navy Aeronautical Bulletin</u>

152	Number, Serial, Aircraft Engine (Instructions for Assignment)

<u>Air Force Procurement Instruction</u>

57-303	Assignment of Serial Numbers to Aircraft and Missiles

Air Force Logistics Command Exhibit

MCMS 67-2   Mobile Training Unit (MTU) Identification
                        Numbering System

Air Force Manuals

AFM 66-1   Maintenance Management

Regulations

AFR 57-4   Retrofit Configuration Changes
AFR 67-35   Assignment of Serial Numbers to
                        Air Force Equipment

(Copies of specifications, standards, drawings, and publications
required by suppliers in connection with specific procurement
functions should be obtained from the contracting agency or as
directed by the contracting officer.)

2.2 Other Publications. The following documents form a part of
this standard to the extent specified herein. Unless otherwise
indicated, the issue in effect on date of invitation for bids or
request for proposal shall apply.

Defense Standardization Manual

4120.3-M   Standardization Policies, Procedures
                        and Instructions

Cataloging Handbook

H 4-1   Federal Supply Code for Manufacturers
                        (United States and Canada) - Name to Code

(Application for copies should be addressed to the Superintendent
of Documents, US Government Printing Office, Washington DC 20402.)

3. REQUIREMENTS

3.1 <u>Introduction.</u> Configuration management is a discipline applying technical and administrative direction and surveillance to (a) identify and document the functional and physical characteristics of a configuration item, (b) control changes to those characteristics, and (c) record and report change processing and implementation status. It includes configuration identification, control, status accounting and audits. Configuration management is thus the means through which the integrity and continuity of the design, engineering and cost trade-off decisions made between technical performance, producibility, operability, and supportability are recorded, communicated, and controlled by program and functional managers.

3.1.1 <u>Configuration management plan.</u> The contractor shall establish within his organization, responsibility for implementing the requirements of configuration management invoked by the contracting agency. The responsibilities and procedures shall be documented in a configuration management plan which shall be subject to review or approval by the contracting agency. For Hardware Configuration Items (HWCIs), the plan shall be in accordance with the criteria set forth in Appendix I. For Computer Software Configuration Items (CSCIs) the plan shall be incorporated in one of the following: the Software Development Plan (SDP), the Software Configuration Management Plan (SCMP), or the System Configuration Management Plan (see 6.2). Where no new or additional configuration management requirements have been invoked and the contractor's configuration management system has been previously validated by the contracting agency, submittal of the configuration management plan may not be required.

3.2 <u>Baseline management.</u> One of the more important aspects of configuration management is the concept of baseline management. Baseline management is formally required at the beginning of an acquisition program.

   a. Baselines may be established at any point in a program where it is necessary to define a formal departure point for control of future changes in performance and design. System program management normally employs three baselines for the validation and acquisition of systems: the functional, allocated, and product baselines. Equipment and munitions management may employ all three baselines or employ only the functional and product baselines depending upon complexity or peculiar requirements. The baselines are documented by approved configuration identifications which are the basis for control of changes in system/configuration item requirements. Software management normally employs a Developmental Configuration to describe the software design prior to establishing the Product baseline and after the establishment of the Allocated and Functional baselines.

b. Baselines are the basic requirements from which contract costs are determined. Once defined, changes in these requirements are formally approved and documented to provide an equitable way to adjust contract costs. (See DOD-STD-480 and MIL-STD-481.) Essentially, configuration management is oriented toward change management. The use of these separate baselines provides necessary latitudes for defining changes so that, initially, most changes may be made within the scope of the functional baseline for the total system/segment requirements, and ultimately, changes shall be defined as they affect individual configuration items.

c. All descriptions of baselines (functional, allocated, and product) of a system, or other configuration items, used to state product performance and design requirements (and to be used as a common reference by industry and the Government) must be contained in specifications. However, descriptions of the contractor's internally controlled developmental configuration of a CSCI, used to describe the evolving configuration of the software design during software development are contained in design documents (not specifications) and software listings. MIL-STD-490 establishes criteria for a uniform specification program for all contractor-prepared documents and is also compatible with the criteria for those specifications which may subsequently be prepared and issued under the military series of documents (DOD 4120.3-M) All specifications incident to configuration management are organized in content, format, and use to recognize the environment imposed by configuration management principles. They recognize the specific periods of design evolution reflected in the baseline concept. Further, they are organized for progressive definition of technical requirements and change control. They are the means of relating performance requirements to the design definition expressed in drawings.

3.3 System engineering and interface control. There are two closely related tasks which must be accomplished in the design and development of configuration items and in the development of the specification requirements for the configuration items. These two tasks are system engineering and interface control.

3.3.1 System engineering. System engineering for the total system or a functional area (system element or segment) is normally vested in a single contractor or contracting agency. System engineering, as it relates to configuration management, is the application of scientific and engineering efforts to transform an operational need into a description of system performance parameters; a system configuration must be ultimately called out in the configuration item specifications. In this way, the system engineering agency or contractor generates requirements for configurations which will satisfy the operational need, constrained technically only by the content of the system

specification. The system engineering agency or contractor is responsible for assessing the impact of changes to configuration item specifications or to the system specification. This includes modifications to operational systems. (See MIL-STD-499 for system engineering criteria.)

3.3.2 Interface control. Interface control is the coordinated activity required to assure that the functional and physical characteristics of systems and equipments are compatible. The interface control contractor is a coordinator with responsibility to assure that configuration item identification conforms to the functional interfaces established by system engineering and that the configuration items, including computer software as finally designed, are physically and logically compatible, will assemble together, and can be operated and supported as intended. The interface control contractor or agency is responsible for control of space allocation where necessary to assure that equipment can be installed in a facility or existing system, and is responsible for management control of interface control drawings. The interface control contractor may be made responsible for the preparation of all interface control, including installation control drawings. The interface control contractor shall normally assess the impact of changes which affect interfaces. Appendix II establishes the requirements for interface control of the system with other systems, and between configuration items within the system, including computer software (see 6.2).

3.4 Configuration identification. Selection of configuration items shall be in accordance with the guidance contained in Appendix XVII. For every configuration item, configuration identification shall be established in the form of technical documentation. Initially, functional configuration identification is used to establish performance-oriented requirements for the design and development of the higher level configuration item. These requirements may be translated into allocated configuration identification for selected configuration items that are part of a higher level configuration item. A Developmental Configuration identification contains each CSCI's design documentation and software listings as the CSCI is undergoing development. (The design documentation and listings become the product configuration identification for software.) Finally, for developed configuration items (Government or private), product configuration identification shall be used to prescribe "build-to" or form, fit, and function requirements, and acceptance tests appropriate to these requirements.

3.4.1 Functional Configuration Identification (FCI). FCI is required for all systems and all configuration items specified in the contract which are allocated from a system requirement, except privately developed items. Whenever possible, the initial FCI (i.e., the functional baseline or changed functional baseline of a system required to be modified) will be established concurrently with approval to initiate engineering or operational systems

development. The establishment of the functional baseline will occur no later than System Design Review (SDR). The FCI shall be documented by a Type A specification prepared in accordance with MIL-STD-490.

3.4.2 Allocated Configuration Identification (ACI). ACI shall be used to govern the development of selected configuration items that are allocated from system requirements or are part of a higher level configuration item, including those that will become a part through modification of a higher level configuration item. The allocated baseline will be formally established with the award of engineering or operational systems development contract(s) whenever possible. For HWCIs, the timing of the establishment of the allocated baseline will be as agreed between the contractor and the contracting agency, but not later than Critical Design Review (CDR). For CSCIs, the allocated baseline shall be established upon completion of Software Specification Review (SSR). The ACI shall be documented by Type B specifications, Software and Interface Requirements Specifications, and other documents prepared in accordance with MIL-STD-490.

3.4.3 Product Configuration Identification (PCI). PCI shall be used to prescribe necessary "build-to" or form, fit, and function requirements and the acceptance tests for those HWCI requirements. The kind and level of detail to be contained in the PCI shall be determined in consideration of requirements for the anticipated method of reprocurement and for logistic support of potentially reparable components which are part of a configuration item. The contractor shall establish a Developmental Configuration for each CSCI to maintain internal configuration management during software development. Computer software design documentation and software shall be developed, reviewed, and entered into the contractor's Developmental Configuration. After the software and documentation for the CSCI are approved at the functional and physical configuration audits the documentation of the contractor's Developmental Configuration shall become part of the contracting agency's product baseline. In addition to other contractual requirements such as DOD-STD-100 and MIL-STD-490, documentation for the PCI shall be prepared in accordance with the following:

3.4.3.1 Reparable HWCIs. On reparable HWCIs developed at Government expense, as identified and required by the contracting agency, design disclosure documentation to the level of nonreparability shall be developed. On those reparable items tested by automatic or semi-automatic test equipment, the maintenance of the configuration of the item will be at the lowest level tested automatically or semiautomatically. The maintenance documentation shall consist of product specifications, drawings, and associated lists, including the detail design of all interfaces.

3.4.3.2 Nonreparable HWCIs. On nonreparable HWCIs developed at Government expense, form, fit, and function documentation shall be used. This documentation describes the physical and functional characteristics of the HWCI as an entity, but does not describe characteristics of the elements that make up the HWCI. For those nonreparable HWCIs that are also expendable, the PCI may consist of a detail design specification (as in the case of clothing and subsistence), or of a detail design specification incorporating performance requirements and certain drawings, where interchangeability or other functional considerations prevail (as in the case of ammunition).

3.4.3.3 Privately developed configuration items. On privately developed configuration items (reparable and nonreparable), form, fit, and function documentation (equivalent to function type specification per MIL-STD-490) shall be used, except when the Government intends to repair the configuration item and purchases other design data for this purpose. On all configuration items planned for test on automatic or semiautomatic test equipment, the criteria for configuration identification shall be form, fit, function, and testability.

3.4.4 Precedence. Functional, allocated, and product configuration identification shall be mutually consistent and compatible. Should conflicts arise between such identification, the order of precedence shall be (a) functional, (b) allocated, and (c) product, unless otherwise specified by the contracting agency.

3.4.5 Addendum to configuration identification. When an existing configuration item can by changed for a new application and it is required that the original configuration identification document be retained, the change can be described by means of an addendum to the configuration item specification. Appendix IV describes the use and format for preparation of an addendum to a configuration item specification (see 6.2).

3.4.6 Inventory item identification. Configuration items previously procured and entered into the Government inventory and which are suitable for use as a part of the configuration baseline of the system or configuration item shall be identified in an inventory item specification in accordance with Appendix XII of MIL-STD-490. Appendix V provides supplementary information to be followed in the preparation of the inventory item specification (see 6.2).

3.4.7 Computer Software Configuration Identification. CSCI specifications, design documents, and listings shall define software requirements and design details for a single CSCI. The subparagraphs below identify the specifications and design documents of the CSCI.

3.4.7.1 <u>Requirements specifications.</u> The Software Requirements Specification (SRS) shall define system requirements allocated to a specific CSCI. The Interface Requirements Specification (IRS) shall describe in detail the requirements for one or more CSCI interfaces. Interface requirements shall include the interface between a CSCI and other configuration items. The SRS and IRS shall be authenticated at the Software Specification Review and establish the allocated baseline for the CSCI (see 6.2).

3.4.7.2 <u>Design documents and listings.</u> The Software Top Level Design Document (STLDD) shall define the top-level design of the CSCI. Upon the successful review of the STLDD at Preliminary Design Review, the contractor shall establish the Developmental Configuration for the CSCI. The contractor shall prepare the Software Detailed Design Document (SDDD), the Interface Design Document(s) (IDD(s)), and Data Base Design Document(s) (DBDD(s)), to define the detailed design of the CSCI. Upon successful review of the SDDD, IDD(s), and DBDD(s), at Critical Design Review the contractor shall enter these documents into the Developmental Configuration. The contractor shall then code and test software Units, and enter the source and object code, and associated listings of each successfully tested Unit into the Developmental Configuration (see 6.2).

3.4.7.3 <u>Software product specification.</u> At the completion of formal testing of the CSCI, the contractor shall combine the updated design documents and software listings contained in the Developmental Configuration to comprise a Software Product Specification (SPS) for the CSCI. The integrity of the SPS is established by the Physical Configuration Audit (PCA) and dependent upon the accuracy with which the SPS describes the detailed configuration of the qualified (or to be qualified) CSCI. Upon authentication of the SPS following the PCA the SPS will establish the product baseline (see 6.2).

3.4.8 <u>Specification form.</u> Specifications prepared for new design configuration items which are to be produced for the operational inventory shall be prepared as Form 1a or 1b in accordance with MIL-S-83490 unless otherwise specified by the contracting agency.

3.4.9 <u>Specification authentication.</u> The cover page of the specification (or of each part of a configuration item specification) for a system/configuration item shall provide for approval signature by a responsible person of the contracting agency. Authentication by the contracting agency normally will be accomplished on that issue of the specification which is to be the contractual requirement for the baseline which the particular specification defines. Figure 1 is an example of a cover page for specifications (see 6.2). Changes to the specification subsequent to authentication by the contracting agency and its contractual incorporation shall be accomplished in accordance with formal change procedures e.g., as set forth in DOD-STD-480, MIL-STD-490 and this standard.

SPECIFICATION NUMBER   12345B

CODE IDENT   XXXXX

*PART I OF TWO PARTS

(Date)

*SYSTEM SPECIFICATION
*PRIME ITEM DEVELOPMENT SPECIFICATION
*PRIME ITEM PRODUCT FABRICATION SPECIFICATION
*ADDENDUM SPECIFICATION
FOR
(APPROVED TITLE)
(TYPE DESIGNATOR, CONFIGURATION ITEM NUMBER, ETC.)

*AS APPLICABLE

AUTHENTICATED BY _____   APPROVED BY _____
                (CONTRACTING AGENCY)   (CONTRACTOR)

DATE _____   DATE _____

FIGURE 1.   Specification Cover Page

3.5 Specification maintenance. After initial release of a specification defining any of the three baselines as applicable to a specific contract, subsequent changes to each specification shall be formally approved and shall be documented and made a part of the specification. Appendix VII sets forth procedures for maintenance of equipment/munitions specifications and related data. Appendix VIII sets forth procedures which are applicable to maintenance of specifications and related data for computer software.

3.6 Configuration item identification. Identification numbering and marking requirements for configuration items and the associated configuration identification documentation shall be as contained in Appendix IX.

3.7 Engineering release requirements and correlation of manufactured products. The contractor shall maintain a current engineering release record of all specifications and drawings for configuration items accepted, or to be accepted by the contracting agency. The engineering release records shall interrelate with the contractor's internal system of controls to assure that all approved Class I engineering changes have been incorporated in production items, as specified. Appendix X establishes the minimum criteria and capabilities to be provided by the contractor's engineering release system and his control system for verifying that manufactured products correlate with the released engineering data.

3.8 System allocation document. A system allocation document shall be prepared as defined on the Contract Data Requirements List (CDRL) to identify the aggregation of configuration items which are the basis for system design and integration. The system allocation document is normally used for those systems which are in a fixed installation, e.g., a ground electronic system or a ballistic missile silo; however, it can be used on other types of systems when specified by the contracting agency. The system allocation document shall be maintained until completion of all system testing required to complete the design and development program. The system allocation document shall be in accordance with Appendix XI (see 6.2).

3.9 Configuration audits. Configuration audits shall consist of a Functional Configuration Audit (FCA) and PCA.

3.9.1 Functional Configuration Audit. The Functional Configuration Audit is a means of validating that development of a configuration item has been completed satisfactorily. FCAs shall be conducted on configuration items to assure that:

   a. Test/analysis data for a configuration item verify that the configuration item has achieved the performance specified in its functional or allocated configuration identification.

b. The contractor maintains internal technical documentation that describes the physical configuration of each unit of the configuration item for which test/analysis data are verified.

3.9.2 Physical Configuration Audit. The Physical Configuration Audit is a means of establishing the product configuration identification used initially for the production and acceptance of configuration items (see 6.2). The PCA will assure that the as-built configuration of a configuration item, selected jointly by the Government and contractor, matches the same configuration item's product configuration identification or that differences are reconciled. The PCA will also assure that the acceptance testing requirements prescribed by the documentation are adequate for acceptance of production units of a configuration item by the quality assurance activities.

a. When the developing contractor is also the contractor for producing production articles, the following shall apply:

(1) The first production article or the first article delivered for operational use of a configuration item shall be selected for the audit.

(2) Achievement of the key functional characteristics of the configuration item shall have been demonstrated in those cases where production/release is authorized prior to completion of the FCA.

(3) The contractor shall identify any differences between the physical configuration of the selected configuration item and the development configuration item used for the FCA, and shall certify or demonstrate to the Government that these differences do not degrade the functional characteristics of the selected configuration item.

(4) If the FCA has not been completed prior to accomplishment of the PCA, the Government may conditionally approve hardware production units until the FCA is completed, provided that other acceptance requirements for the hardware units have been met.

b. Where the developing contractor is not preselected to be the production contractor, the following shall apply for the developing contractor:

(1) The most complete development hardware unit of the HWCI will be selected for the PCA.

(2) The FCA must have been accomplished prior to completion of the PCA.

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(3) The contractor shall identify any differences between the physical configuration of the selected configuration item and other development configuration item used for the FCA, and shall certify or demonstrate to the Government that these differences do not degrade the functional characteristics of the selected configuration item.

3.9.3 Audits performed on privately developed configuration items. When privately developed items are acquired by the Government as configuration items for the Defense inventory, configuration audits shall be performed to the extent necessary to:

a. Validate that the functional characteristics of the developed configuration item are satisfactory for the intended use, with the audit limited to an examination of the test data applicable to the requirements of the Government for that configuration item.

b. Establish the Product Configuration Identification (PCI) to be used for production and acceptance purposes. Normally, the contractor-offered form, fit, function, and testability technical documentation will be established as the PCI. However, for those configuration items where the Government negotiates an agreement with the contractor going beyond form, fit, and function documentation, the more detailed documentation will be established as the PCI.

3.9.4 Formal Qualification Review (FQR). A formal qualification review is a means of establishing by certification/authentication that a new group of configuration items comprising a system has satisfactorily qualified to the specification requirements. (The FQR does not pertain to the Qualified Products List (QPL) covered in FAR Section I, Part II and DOD 4120.3-M). The procedures, tasks, and responsibilities for accomplishment of the FQR when the contracting agency requires contractor participation, are contained in MIL-STD-1521.

3.9.5 Relationship of audits to other reviews. Wherever practicable and appropriate, configuration audits shall be accomplished in conjunction with other audits and reviews. MIL-STD-1521 establishes procedures, tasks, and responsibilities for conducting configuration audits.

3.10 Engineering changes (equipment/munitions). Changes to the documentation which define the functional or allocated baselines (system or HWCIs) shall be formally controlled by the contractor. After the documentation which defines these baselines is made a contractual requirement, subsequent changes to that contractual documentation require formal approval by the contracting agency. After the product baseline is established contractually, subsequent changes to the hardware and its

associated documentation require formal approval by the contracting agency. Appendix XIII provides criteria supplementary to DOD-STD-480 and MIL-STD-481 on engineering changes (see 6.2).

3.10.1 <u>Engineering changes (computer software)</u>. Appendix XIV provides procedures for implementing changes to computer software and its documentation (see 6.2).

3.11 <u>Reporting the accomplishment of updating/retrofit changes</u>. The accomplishment of updating/retrofit changes is required to be reported in order to maintain status on all configuration items in the custody of a contractor, unless otherwise directed by the contract. Appendix XV delineates the detailed procedures for reporting accomplishment of updating/retrofit changes by the contractor during test, and installation and checkout phases of the program. These procedures are intended for use only by contractor's test and field organizations to report Time Compliance Technical Order (TCTO) and Engineering Change Proposal (ECP) accomplishments to his home plant and other activities as directed by the contracting agency (see 6.2).

3.12 <u>Configuration management records/reports</u>. Configuration management records/reports shall insure that:

a. There will be a configuration record documenting all approved changes to all configuration items.

b. Configuration status accounting reporting of a configuration item mission, design, series or type, model, and series will be implemented at the time the product configuration identification is approved/accepted. The system/equipment/software program manager shall ensure that configuration status accounting is maintained normally until the last unit of the configuration type, model, series is delivered. The documentation shall be as established by the system/equipment/software program manager and as a minimum will include identification of:

(1) Technical documentation comprising the configuration identification.

(2) Essential configuration item data elements.

(3) Contractual information required to be included in the records/reports for each configuration item, including contractor identification code.

(4) Proposed Class I changes to configuration and the status of such changes.

(5) Approved changes to configuration, including the specific number and kind of configuration items to which these changes apply, the implementation status of

such changes, and the activity responsible for implementation.

c. The configuration status accounting records contractually required will utilize the data elements and their related data items, codes, use identifiers, and data chains established in MIL-STD-482. Data elements not reflected in MIL-STD-482 may be utilized as pertinent to any specific program. However, a complete description of the new data element shall be submitted to the preparing activity of MIL-STD-482 for consideration and possible inclusion in the standard.

d. The contract will specify the specific data base supplied configuration management reports required for the program. Format, content and timing will be as agreed between the contractor and the contracting agency.

3.13 **Advance Change Study Notice (ACSN).** Prior to the preparation of a formal routine Engineering Change Proposal (ECP) or Contract Change Proposal (CCP) or Task Change Proposal (TCP), the contractor shall notify the contracting agency. An ACSN may be used to notify the contracting agency of its intent to submit a change proposal (see 6.2). Figure 2 is an example ACSN Form. Any similar format with essentially the same information may be used. Emergency, urgent, compatibility and record type ECPs do not require an ACSN prior to submittal. Use of ACSN will be subject to agreement between the contractor and the contracting agency. The contracting agency upon receipt of an ACSN will then authorize the contractor to take one of the following courses of action:

a. The contracting agency is not interested in the change and no further effort is authorized.

b. The contractor shall evaluate alternate course(s) of action recommended by the contracting agency.

c. Contractor shall submit additional information about change, prior to formalization of a decision by the contracting agency.

d. Authorize the contractor to perform engineering effort necessary to prepare a formal ECP.

NOTE: The use of ACSNs should be documented in the CM Plan when one is used.

3.14 **Contract Change Proposal/Task Change Proposal (CCP/TCP).** A CCP or TCP shall be used to propose changes to contractual requirements other than those contained in specifications and engineering drawings, e.g., SOW tasks, test plan, or other contractual document such as a configuration management plan. CCPs/TCPs will not be applied unless procedures for

processing them are established by both the contractor and the program office. Figure 3 is an example form. Any similar format with essentially the same information may be used. CCPs/TCPs will not be used in lieu of ECPs (see 6.2).

3.15 Quality Assurance Provisions/Qualification Requirements. A verification matrix shall be included in any of the hardware specifications prepared per the appendixes of this standard. This matrix provides for the correlation of Section 3 performance requirements with Section 4 verification requirements. Figure 4 is a sample verification cross-reference matrix. Software specifications shall be prepared in accordance with the applicable Data Item Descriptions.

ADVANCE CHANGE/STUDY NOTICE (ACSN)	ACSN NUMBER
	ORIGINATOR
TITLE	DATE

ITEM AFFECTED *(Identify contracts, systems/subsystems, and when possible, CIs or components affected by the change.)*

NEED FOR THE CHANGE *(Explain (1) how and when need was recognized; for example, test results, field reports, engineering review meeting; (2) impact of not making change; for example, safety hazard, mission failure, high maintenance costs, schedule slippage; and (3) how change will improve system; for example, increased reliability, reduced weight, decreased cost, substantially improved performance.)*

DESCRIPTION OF CHANGE/STUDY *(Describe change or study recommended to correct a problem or to capitalize on an improvement opportunity. Additional sheets may be attached as necessary to describe the change/study. Rough sketches or diagrams may be attached to amplify the description.)*

ALTERNATIVES TO SUGGESTED CHANGE/STUDY *(Briefly describe alternative solutions to the problem other than the one recommended. Include advantages, disadvantages and cost.)*

COST ESTIMATES *(Enter rough cost estimates for RDT&E and production. If preferred, ranges of estimates may be listed instead of a single estimate.)*

SPO	CONTRACT ADMINISTRATION OFFICE	CONTRACTOR
SIGNATURE AND TITLE *(Approving Authority)*	SIGNATURE AND TITLE *(Approving Authority)*	SIGNATURE AND TITLE *(Approving Authority)*

AFSC FORM SEP 77 223

AFSC - ANDREWS AFB MD 1977

FIGURE 2.   Advance Change Study Notice Form (Sample)

CONTRACT CHANGE PROPOSAL/TASK CHANGE PROPOSAL	Number:
	Date:
	Page of Pages

TITLE:

Item(s) affected (Identify contractual requirement(s) affected):

NEED (Explain benefit(s) of making the change and impact of not making change):

DESCRIPTION OF PROPOSED CHANGE (Enter a detailed description of the proposed task, including man-hours and any special equipment required):

ALTERNATIVES TO PROPOSED CHANGE (Explain reasons for/against each alternative, and its cost):

| COST ESTIMATE (Contract cost adjustment required for the task): | SCHEDULE (Enter schedule for completing work and, when applicable, date for submittal of results): |
| URGENCY CONSIDERATIONS (When applicable, describe any condition bearing on the urgency of obtaining approval for change) | |

(NOTE: Any block may be continued on separate sheet(s) as required)

FIGURE 3.   Contract Change Proposal/Task Change Proposal (CCP/TCP) Form (Sample)

VERIFICATION CROSS REFERENCE MATRIX

METHOD LEGEND: 1 - Inspection   2 - Review of Analytical Data
                     3 - Demonstration   4 - Test
                     N.A. - Not Applicable

TEST CATEGORY LEGEND: A - Engineering Test & Evaluation
                            B - Preliminary Qualification
                            C - Formal Qualification
                            D - Reliability Test & Analysis
                            E - Engineering Critical Component Qualification
                            F - System Test

SECTION 3.0 REQUIREMENT	VERIFICATION METHOD(S)					TEST CATEGORY						SECTION 4.0 VERIFICATION REQUIREMENT
REFERENCE	1	2	3	4	NA	A	B	C	D	E	F	
3.0 3.1 3.1.1 3.1.1.1 3.2 3.2.1 3.2.1.1 3.2.2.1 3.2.2.2 3.3 3.4 etc.					X							

FIGURE 4.   Verification Cross Reference Matrix (Sample)

4. DATA

4.1 <u>Data requirements.</u> The selected requirements in support of this standard will be reflected in the Contract Data Requirements List (CDRL) (DD Form 1423), attached to the request for proposal, invitation for bids, or the contract, as appropriate.

5. DEFINITIONS

5.1 Terms. Terms used in this standard not included in, or applied differently than, DOD-STD-480 Appendix E entitled Definitions, are abridgements of definitions from noted source documents or from the appendixes of this standard and are as follows:

a. Advance Change Study Notice (ACSN). Prior to the preparation of a formal routine ECP or CCP/TCP, the contractor notifies via an ACSN the contracting agency of his intent to submit a proposal. The ACSN contains information establishing the need for a change and enables effective initial evaluation of a suggested change prior to preparation of a formal proposal. The ACSN states the problem, provides a solution, any known alternative solutions and a cost estimate. It may also be prepared by the contracting agency to request the contractor to prepare a proposal based on its content. Emergency, urgent, compatibility and record type ECPs do not require an ACSN prior to submittal. Use of ACSNs are subject to agreement between the contractor and the contracting agency. (See paragraph 3.13 above and 6.2.)

b. Allocated Baseline. The approved allocated configuration identification as defined in DOD-STD-480.

c. Baseline Management. Baseline management is the application of technical and administrative direction to designate the documents which formally identify and establish the initial configuration identification at specific times during its life cycle, i.e., functional, allocated, and product baselines.

d. Computer Software. A combination of associated computer instructions and computer data definitions required to enable the computer hardware to perform computational or control functions.

e. Computer Software Component (CSC). A functional or logically distinct part of a Computer Software Configuration Item (CSCI). Computer Software Components may be top-level, or lower-level.

f. Configuration item. Hardware or software, or an aggregation of both, which is designated by the contracting agency for configuration management.

g. Configuration Item Development Record. The configuration item development record provides status information on the development progress of a configuration item as reflected by configuration audits and design reviews.

h. **Computer Software Configuration Item.** See Configuration Item.

i. **Configuration Item Identification (CII) Number.** A CII number is a permanent number assigned by the design activity to identify a configuration item. The number is a common identification for all units in a configuration item type, model, series, and serves as a permanent address for all actions and documentation applicable to the type, model, and series. The CII number is seven-digits with alpha-numeric characters.

j. **Configuration Item Specification Addendum.** A configuration item specification addendum is accomplished by writing a new specification (addendum) by direct reference to an existing specification and recording in the new specification reference to each paragraph in the existing specification. A specification created in this manner is a new and complete specification with a new specification number.

k. **Configuration Management Plan.** The configuration management plan defines the implementation (including policies and methods) of configuration management on a particular program/project. It may or may not impose contractor requirements depending on whether it is incorporated on the contract.

l. **Developmental Configuration.** The contractor's software and associated technical documentation that defines the evolving configuration of a CSCI during development. It is under the development contractor's configuration control and describes the software configuration at any stage of the design, coding and testing effort. Any item in the Developmental Configuration may be stored on electronic media.

m. **Engineering Release Record.** The engineering release record comprises the official data file which records and interrelates engineering data, and changes thereto, which technically describe and are to be or have been used to build/operate/maintain configuration items.

n. **Firmware.** The combination of a hardware device and computer instructions or computer data that resides as read-only software on the hardware device. The software cannot be readily modified under program control. The definition also applies to read-only digital data that may be used by electronic devices other than digital computers.

o. **Formal Qualification Review (FQR).** A formal review, normally accomplished incrementally at the contracting facility, of test reports and test data generated during the formal qualification of a new group of configuration items comprising a system to ensure that all tests required by

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Section 4 of the development specification(s) have been accomplished and that the system performs as required by Section 3. Usually held in conjunction with the FCA, it may be delayed until after the FCA/PCA if total system testing is required (see MIL-STD-1521).

p. Functional baseline. The approved functional configuration identification as defined in DOD-STD-480.

q. Hardware Configuration Item (HWCI). See configuration item.

r. Interface Control. Interface control comprises the delineation of the procedures and documentation, both administrative and technical, contractually necessary for identification of functional and physical characteristics between two or more configuration items which are provided by different contractors/Government agencies, and the resolution of the problems thereto.

s. Interface Control Working Group (ICWG). For programs which encompass a system/configuration item design cycle, an ICWG normally is established to control interface activity between contractors or agencies, including resolution of interface problems and documentation of interface agreements.

t. Product baseline. The approved product configuration identification as defined in DOD-STD-480.

u. System Allocation Document. A system allocation document is a document which identifies the aggregation of configuration items by serial number and the system configuration at each location.

v. Updating Changes. Updating changes (unique to the Air Force) are configuration changes to previously delivered systems, equipment and munitions, including related Contractor Furnished Equipment (CFE), and delivered spares for which the change requirement is identified prior to the established AFSC/AFLC program management transfer, regardless of the method of generation. This includes change requirements identified during production, testing and operation. (See AFR 57-4)

w. Contract Change Proposal (CCP). A formal priced document also referred to as "Task Change Proposal (TCP)" used to propose changes to the scope of work of the contract. It is differentiated from an ECP by the fact it does not affect specification or drawing requirements. It may be used to propose changes to contractual plans, the SOW, CDRL, etc. (See the Task Change Proposal Data Item Description and paragraph 3.14 above.)

x. <u>Computer Data Definitions.</u> A statement of the
characteristics of elements of information operated upon by
hardware in responding to computer instructions. These
characteristics may include, but are not limited to, type,
range, structure, and value.

6. NOTES

6.1 <u>Intended use.</u> This standard is used to establish uniform configuration management practices that can be tailored to all systems and configuration items including those systems and configuration items procured by the Air Force for other agencies.

6.2 <u>Data requirements list and cross reference.</u> When this standard is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of the DOD FAR clause on data requirements (currently DOD FAR Supplement 52.227-7031) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this standard is cited in the following paragraphs.

<u>Paragraph No.</u>	<u>Data Requirements Title</u>	<u>Applicable DID No.</u>
3.14, 5.1w	Task Change Proposal	DI-A-300
3.14, 5.1w	Contract Change Proposal/ Task Change Proposal	DI-A-3020
10.3.2.1, 70.10, 130.4.2	Configuration Item Development Specification	DI-E-3102
3.4.9	Configuration Item Product Fabrication Specification	DI-E-3103
3.4.5, APP. IV	Addendum Specification	DI-E-3104
3.4.6, APP. V	Inventory Item Specification	DI-E-3105
3.11, APP. XV	Installation Completion Notification	DI-E-3107
3.1.1, APP. I	Configuration Management Plan	DI-E-3108
3.8, APP. XI	System Allocation Document	DI-E-3116
80.4.2.3, 80.5, 80.5.5, 80.5.5.1, 80.5.5.4.1	Configuration Index (Computer Program)	DI-E-3122
80.5, 80.5.6	Change Status Report (Computer Program)	DI-E-3123

Paragraph No.	Data Requirements Title	Applicable DID No.
3.13, 5.1	Advance Change Study Notice	DI-E-3127
3.11, 3.13, 3.14, 5.1, 10.3.1, 20.6.1, 70.2, 70.6, 70.6.2, 70.6.5, 70.6.6, 70.10.2, APP. VIII, 90.1.1, 100.4, APP. XIII, APP. XIV, 150.1, 170.6	Engineering Change Proposal	DI-E-3128
40.4.1, 40.5, 70.1-70.9, 70.10.2, APP. VIII, 90.1.1, 130.4.2, 130.6, 140.6.3, 140.8.8	Specification Change Notice	DI-E-3134
3.11, 70.2, 80.5.1, 130.2, 140.4	Engineering Changes, Deviations, and Waivers (Short Form)	DI-E-5034
3.11, 70.2, 80.5.1, 130.2, 140.4	Engineering Changes, Deviations, and Waivers	DI-E-5035
3.9.2	Physical Configuration Audit Plan	DI-E-5603
3.3.2	Interface Control Management Data	DI-E-30123
3.3.2	Interface Master Gage Control Document	DI-E-30124
3.3.2	Interface Control Drawing Documentation	DI-E-30125
20.5.4.3	Interface Management Reporting	DI-M-30418
3.1.1, 10.1, 80.4.2, 80.5.2	Software Development Plan	DI-MCCR-80030
3.1.1, 10.1, 80.4.2, 80.5.2	Software Configuration Management Plan	DI-MCCR-80009

Paragraph No.	Data Requirements Title	Applicable DID No.
80.4.1.3, 80.4.2.3, 80.5, 80.5.4, 80.5.5.1, 80.5.5.4.1, 90.1.2	Version Description Document	DI-MCCR-80013
3.4.2, 3.4.7.1, 20.4.6, 80.4.1.1, 80.4.1.2, 80.5.3, 80.5.5.1, 80.5.5.2	Software Requirements Specification	DI-MCCR-80025
3.4.2, 3.4.7.1, 20.4.6, 80.4.1.1, 80.4.1.2, 80.5.3, 80.5.5.1, 80.5.5.2	Interface Requirements Specification	DI-MCCR-80026
3.4.7.3, 80.4.1.2, 80.4.2.1, 80.5.3, 80.5.5.1, 110.3.3	Software Product Specification (includes)	DI-MCCR-80029
3.4.7.2	Software Top Level Design Document	DI-MCCR-80012
3.4.7.2	Software Detailed Design Document	DI-MCCR-80031
3.4.7.2	Interface Design Document	DI-MCCR-80027
3.4.7.2	Data Base Design Document	DI-MCCR-80028

(Data item descriptions related to this standard, and identified in section 6 will be approved and listed as such in DOD 5000.19-L., Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.3 Changes from previous issue. Asterisks or vertical lines are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

10. HARDWARE CONFIGURATION MANAGEMENT PLAN

10.1 Purpose. This appendix provides criteria to be followed in the development of a configuration management plan for the implementation of configuration management requirements invoked by the contracting agency. This appendix is applicable to configuration management requirements for the system/segment and HWCIs (including HWCIs containing software). For CSCIs, the criteria in the Software Development Plan and Software Configuration Management Plan Data Item Descriptions may be followed in the development of a software configuration management plan.

10.2 Scope. Depending on the terms and conditions of the request for proposal or the contract, the requirements that prescribe what is to be done to implement configuration management shall be planned and documented in a configuration management plan prepared by the contractor, unless otherwise specified by the contracting agency. The plan may be limited to defining the contractor's implementation of configuration management as it relates to the configuration identification, configuration control, and configuration status accounting. When required to be furnished to the contracting agency, the plan is intended primarily as an exchange of information between the contracting agency and the contractor on the configuration management policy and methods of the contractor, as he intends implementation on a given contract effort, and this increases the probability of clear understanding of the intent of both parties. For the most part, the document should be written in simple positive statements that implement the precise configuration management requirements to be met by the contractor.

10.3 Organization and content.

10.3.1 Section 1, Organization. Describe the relationship of the contractor's program/project management to configuration management.

An organizational chart for the program (or company, or division of company) which illustrates the structure for program/project management should be used. The chart, either through the use of narrative description or flow diagrams, should illustrate the authority/responsibility of the key organizational elements in the company impacted by contractual requirements for configuration management.

Identify the organizational level of engineering control group(s) as well as their authority and responsiblity influencing the program. A discussion of the contractor's policy and procedure determining the formal establishment of configuration, and control of changes to established configuration, as these relate to specification preparation, drawing preparation, engineering

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release, ECP preparation, configuration management audits, configuration indexing and accounting, and quality control procedures (only to the extent they assure delivery of approved configuration) shall be included herein, to the level of detail necessary to determine the integrity of configuration management practices.

10.3.2 Section 2, Configuration identification.

10.3.2.1 Specifications. The plan shall identify the specifications (e.g., Type A, B1, B2, C1, C2a, C2b, etc.) that the contractor shall prepare, existing specifications for inventory items, and the use of these specifications to establish and control, as appropriate to this program (contract), the FCIs, ACIs, and PCIs developed within the contractor's organization. The alignment of authority and responsibility of the contractor and the contracting agency with respect to establishment of the configuration identifications, and changes to the specifications establishing the configuration identifications, including clear delineation of responsibility for cost and schedule impacts which may result shall be included herein. The plan shall identify known specifications below prime configuration item level that will be prepared; i.e., critical items. The plan shall also identify any limitations on contracting agency approval of content and the intended point in the program when the above specifications will be presented for delivery (or otherwise made available) to the contracting agency. The applicability of appropriate policy and appendixes of MIL-STD-490 and appendixes of this standard to this program (contract) shall be stated. Any need for deviation of the content of those appendixes deemed applicable to this program shall be stated. Any limitation on delivery to, or use by, the contracting agency of contractor-prepared specifications shall be stated (see 6.2).

10.3.2.2 Drawings. This section shall define the drawing practices for application to this program, and the application of DOD-D-1000, DOD-STD-100 and standards referenced therein. Also, appendixes of this standard shall be applicable as stated herein. Any need for deviation of the content of those standards and appendixes deemed applicable to this program shall be stated. Any limitations on delivery to, or use by, the contracting agency, of contractor-prepared drawings shall be stated.

10.3.3 Section 3, Configuration control. The contractor shall define the policies and procedures used within his organization for control to established configuration identifications, and for processing changes to established configuration identifications. Configuration control at interfaces between the contracting agency and the contractor shall be stated. To the extent this subject is clear in Section 1, it need not be redundantly included herein. This section shall be specific as it treats the subject of control of technical interfaces, both between the contractor and

the contracting agency and, when appropriate, the contractor and other contractors involved in the program. Plans for specific application of DOD-STD-480, MIL-STD-481, and appendixes of this standard to this program (contract) shall be stated, and any requirement for deviation of content of those appendixes selected for application shall be stated.

10.3.4 Section 4, Configuration status accounting. The contractor shall state his plans for application of configuration index and status accounting records for this program (contract). He shall state his understanding relative to his responsibility to (a) submit data to an integrating agency, who will collate, prepare, and distribute reports; (b) collate, prepare, and distribute specific reports himself; (c) accept inputs from other contractors (agencies), collate such data with his own inputs, and prepare and distribute reports. He shall specifically state his intentions for the implementation of MIL-STD-482. It should be noted there is latitude with respect to status accounting reporting, particularly if EDP methods are implemented, therefore contract cost and schedule implications which limit the flexibility of the contracting agency to request changes or additions to initially established formats shall be stated.

10.3.5 Section 5, Subcontractor/vendor control. The contractor shall indicate his proposed methods for control over subcontractors and vendors, insofar as it impacts on his configuration management committments to the contracting agency. The methods used to determine their capability and monitor their ability to support the requirements of configuration management shall be explained.

10.3.6 Section 6, Program phasing. The contractor shall establish the major milestones for implementation of configuration management. These shall include, but not be limited to:

a. Establishment of the configuration control board

b. Phasing for specification program implementation, including specification maintenance

c. Establishment of each of the configuration identifications

d. Establishment of interface control agreements with associate contractors

e. Establishment of configuration index and status accounting procedures.

10.3.7 Section 7, Management integration of configuration management. The contractor shall describe the integration of configuration management activities with other project and

program/management activities. He shall be specific in defining the relationship between configuration management at the configuration item level, and its relationship to the work breakdown structure for control of work authorization and cost control in his facility(ies). He shall be specific in defining the relationship between events critical to configuration management and schedule control of the program project, e.g., sequencing of design reviews, release of engineering, production, test, logistic support events, audits, etc.

10.3.8 **Section 8, Configuration audits.** The contractor shall describe his plans for conducting/supporting the following configuration audits including a description of the audits:

a. Functional configuration audit (FCA)

b. Physical configuration audit (PCA).

10.3.9 **Section 9, Software specific configuration management.**

10.3.9.1 **Developmental Configuration.** This paragraph shall identify the contractor's internal Developmental Configuration(s) to be used in the development of the CSCI(s). For each Developmental Configuration identified, the method of establishing it shall be described and the contents shall be listed. For example, the engineering release of the first draft of the Software Top Level Design Document (STLDD), prior to submitting it at the Preliminary Design Review, shall establish the internal Developmental Configuration.

10.3.9.2 **Report for Software Problems and Changes.** This paragraph shall identify and describe the format used to document software problems and changes detected during software development. This report shall include:

a. System or Project Name - The name of the system or development project to which this report applies.

b. Originator - The name, telephone number, and designation of the organization submitting the report.

c. Problem Number - The assigned problem number (once a problem number has been assigned in accordance with established project configuration control procedures).

d. Problem Name - A brief phrase descriptive of the problem and descriptive of similar problems, if applicable.

e. Software Element of Document Affected - The specific software element(s), document(s) paragraph(s), or both to which the report applies, including appropriate configuration identification and version number, if

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applicable.   Include   all   established   baselines   or
Developmental Configurations affected.

f. Origination Date - The date the report is first submitted.

g. Need Date or Priority - The date the fix is needed in order
    to maintain established schedules or priority in accordance
    with established standards.

h. Description of Problem - A description of the problem and
    the conditions,   inputs,   and equipment configuration under
    which the problem arises. A description of the activities
    leading up to the problem occurrence. Sufficient problem
    information to permit duplication and analysis.   Include
    relationship to other reported problems and modifications.

i. Analyst - The name, telephone number, and organization of
    the individual assigned to analyze the problem.

j. Date Assigned - The date the analyst was assigned.

k. Date Complete - The date the analysis was completed.

l. Analysis Time - The time required to analyze the problem
    report.

m. Recommended Solution - After analysis of the problem, the
    recommended   solution   and   alternative   solutions,   if
    available. The nature of the recommended solution by a
    short descriptive phrase.   When applicable, supporting
    rationale and test results.

n. Impacts - The cost, schedule, and interface impacts if the
    solution is approved. Also, performance impacts if the
    solution is not approved. As applicable, include the impact
    on the other systems, configuration items, other
    contractors, system employment, integrated logistics
    support, system resources, training, etc.

o. Problem Status - The problem status designated by the
    configuration control procedures.

p. Approval of Solution - To be designated by the cognizant
    configuration control authority.

q. Follow-up Action - Actions following resolution of the
    problem.

r. Corrector - The name, telephone number, and organization of
    the individual correcting the problem.

s. Correction Date - The date the problem was corrected.

t. Version Number - The version in which the problem will be corrected.

u. Correction Time - The time required to correct the problem.

v. Implementation Solution - A brief description of the implemented solution to the problem.

10.3.9.3 Review Procedures. This paragraph shall describe the purpose of and the procedures to be employed by any review boards (e.g., Software Configuration Control Board) associated with the flow of configuration control. This paragraph shall also describe how the procedures used by any Review Boards, in conjunction with the configuration identification scheme, provide historical traceability.

10.3.9.4 Storage, Handling, and Release of Project Media. This paragraph shall describe the methods to formally control the storage, handling, and release of software and documentation (including master copies) during the development process.

20. INTERFACE CONTROL

20.1 <u>Purpose.</u> This appendix sets forth criteria and guidance for the establishment of interface control including installation requirements.

20.2 <u>Scope.</u> This appendix provides guidance for the documentation and control of all physical and functional interfaces of systems, equipment, munitions, computer software, facilities, and installation requirements.

20.3 <u>Applicability.</u> When specified in the contract, the criteria and guidance of this appendix is applicable to all contractors to the Government whose configuration items have an interface with other configuration items which are the responsibility of another contractor or Government agency.

20.4 <u>Definitions.</u>

20.4.1 <u>Interface.</u> The term interface is defined as the functional and physical characteristics required to exist at a common boundary between two or more equipments/computer software products, which are provided by different contractors/Government agencies.

20.4.2 <u>Installation control requirements.</u> The term installation control requirements denotes the space or location allocated for each configuration item or equipment, taking into account installation, assembly, test, operation, maintenance, environment, power requirements allocated for each item.

20.4.3 <u>Interface Control Drawing (ICD).</u> An interface control drawing depicts physical and functional interface engineering requirements of a configuration item which affect the design or operation of co-functioning configuration items. These drawings are used as design control documents, delineating interface engineering data coordinated for the purpose of (a) establishing and maintaining compatibility between co-functioning configuration items, (b) controlling interface designs thereby minimizing changes to configuration item requirements which would adversely affect compatibility with co-functioning subsystems, (c) communicating design decisions and changes to participating activities, (d) establishing envelope and access compatibility to verify that all interfacing contractor/Government agency supplied configuration items can function without interference through assembly, test, and all expected operating conditions, and (e) containing master gage dimensional control. For interface control drawing delineation requirements as well as envelope interfaces and installation envelopes, refer to DOD-STD-100.

20.4.4 <u>Programming and timing interfaces.</u> Describes the critical system function interfaces and signal timing constraints inherent

in the system hardware and computer software.

20.4.5 **System released ICD.** A system released ICD is an authorized drawing which has been signed by the contractor who has prime responsibility, by the participants, and the system engineering/interface control contractor.

20.4.6 **Interface Requirements Specification (IRS).** The IRS specifies in detail the requirements for one or more CSCI interfaces in the system, segment, or prime item. Under various conditions the interface requirements may be included in the associated Software Requirements Specification (see MIL-STD-490). The IRS is part of the allocated configuration identification in accordance with MIL-STD-490.

20.5 **General guidance.**

20.5.1 The contracting agency will determine the requirements for the control of interfaces and installation requirements during the validation or equivalent phase. The responsibility for developing configuration identification covering system interface requirements may be contractually delegated in whole or in part to the system engineering/interface control contractor.

20.5.2 Interfaces detailed during the demonstration and validation phase shall be treated as system criteria and shall not be established as part of the interface control activity. This exclusion allows contractors/Government agencies the flexibility to negotiate interface agreements among themselves within the limits of the established system criteria.

20.5.3 Programs entering the acquisition phase can be broken into two categories as follows:

    a.   Those programs requiring a total hardware/computer software development cycle (encompassing a system/equipment/computer software design phase).

    b.   Those programs not requiring a total development cycle (where program progresses directly from validation to production).

20.5.4 When required for those programs encompassing a system/equipment/computer software design cycle, the use of an Interface Control Working Group (ICWG) will be specified by the request for proposal as the interface control activity. The establishment of an ICWG requires determination of the following:

20.5.4.1 The chairmanship of the ICWG must be designated by the responsible interface control contractor through coordination with the contracting agency.

20.5.4.2 The extent to which contractors and Government agencies will support the interface control activity must be determined (e.g., what agency will be responsible for interface drawing release system).

20.5.4.3 The agency which will be responsible for status accounting and reporting must be designated (see 6.2).

20.5.5 For those programs where the use of an ICWG is not applicable, the contracting agency will contractually specify other procedures for an interface control activity.

20.5.6 Relationships, responsibilities, and requirements will be as specified in the contractual statement of work.

20.6 Interface Control Working Group (ICWG).

20.6.1 The ICWG serves as the official communications link between program participants to resolve interface problems, document interface agreements, and coordinate ECPs. The ICWG shall consist of at least one member from each of the contractors and Government agencies participating in the system development. A roster of all affected contractors and agencies represented on the ICWG will be maintained by the contracting agency and this information provided to all participants.

20.6.2 The establishment of system interface control by the ICWG requires the identification and definition of interfaces, scheduling, preparation, approval, release, and control of formal interface drawings.

20.6.3 Interface control drawings shall be used to record the design agreements by the contracting agency, and shall, in conjunction with production drawings, diagrams, facility construction drawings, and specifications provide a means to evaluate and control all mutually interdependent/interacting design parameters at interfaces between participants'; equipment, computer software or facilities.

20.6.4 Interface control drawings may be used to control certain interfaces where a single participant controls the design of both configuration items when deemed necessary by the contracting agency.

20.6.5 Interface control drawings and revisions thereto will be scheduled for completion at the earliest need of the program to support any participating contractor or agency. The drawings/revisions will be scheduled and approved by the originator to support participating contractor's Preliminary Design Reviews at the earliest need of the program. They shall be scheduled for completion, released by the originating contractor, signed by the interfacing participants, and approved by the ICWG

chairman prior to the time of the applicable Critical Design Review. All drawings/revisions shall be complete, approved, and system released prior to the time of the Physical Configuration Audit.

20.6.6 Individual interface control drawings developed under the procedures of this appendix shall be maintained by the originating contractors to reflect all approved changes. However, the interface control contractor shall maintain an up-to-date reproducible file of all approved ICDs.

20.6.7 Interface control drawings shall reflect the effects of any waivers or deviations on the interface depicted, but shall not be used as the primary means of documenting such waivers and shall not be used in the fabrication of hardware. Interface control drawings may be used to establish requirements for interface master gages.

20.6.8 Interface control drawings shall be prepared in accordance with DOD-STD-100. However, if it is deemed necessary, additional details and drawing preparation instructions may be contractually specified by the contracting agency.

20.6.9 Interface control responsiblity delegation.

20.6.9.1 Participating contractors/Government agencies shall be designated prime and collateral responsibilities for the ICWG. In the matrix (figure 5), the interface control contractor has the prime responsibility in each of the actions shown. The participating contractors and contracting agency have collateral responsibilities where so indicated.

20.6.9.2 Exclusion. The ICWG shall not have the authority to approve fixes to facilities, computer software, or equipment required because of non-conformant interface conditions discovered in the field or at equipment/computer software acceptance. However, the ICWG shall assist the contracting agencies responsible for approval action upon request, and shall review and recommend fixes for resolution of interface incompatibilities.

20.6.10 ICWG procedures. The Interface Control Working Group (ICWG) procedures are shown on the flow chart in Figure 6.

20.6.11 ICWG control sheet. The ICWG actions in connection with interface control drawings shall be recorded on a form similar to Figure 7. Any other form may be used as long as it provides the necessary information.

RESPONSIBILITIES	PARTICIPATING CONTRACTORS	CONTRACTING AGENCY
Provide materials and serivces to manage	X	X
Establish policy and procedure and chair ICWG	X	X
Administrative control and processing ICDs	X	X
Prepare ICD authorized by contracting agency	X	X
Assist in resolution of interface problems	X	X
Establish complete interface control requirements	X	X
Use specs and drawings to identify interfaces	X	X
Review interface recommendations with ICWG reps.	X	X
Recommend required controls including gages	X	X
Request contracting agency direction	Interface control contractor	
List approved ICDs in system ICD	Interface control contractor	
Assign ICD preparation responsibility	Interface control contractor	
Obtain ICD agreements and signatures	X	X
Final ICD review, approval and release	Interface control contractor	
Schedule and document ICWG actions and update	Interface control contractor	
Issue meeting agenda 5 days before meeting	Interface control contractor	
Issue meeting minutes 5 days after meeting	Interface control contractor	
Participate in and support ICWG meetings	X	X
Identify and evaluate class 1 changes for impact	X	X
Evaluate problems and issue action items	X	X
Prepare and distribute approved ICD	Interface control contractor	
Maintain file of ICDs	Interface control contractor	
Prepare and maintain master tooling documents	X	
Maintain ICWG activity status	X	
Support participating contractor activities	X	
Conduct fit checks	X	

Notes:

ICWG RESPONSIBILITIES OF THE INTERFACE CONTROL CONTRACTOR, PARTICIPATING CONTRACTORS, AND THE CONTRACTING AGENCY

The interface control contractor has the prime responsibility in seeing that all of the above actions are accomplished. He has the sole responsibility for those items where the term "interface control contractor" appears. An "X" in the above columns indicates that the participating contractors or the contracting agency, or both, have collateral responsibility for the actions shown.

FIGURE 5.   Matrix of Interface Control Responsibilities

INTERFACE CONTROL DRAWINGS (ICD)

```
     ANY
PARTICIPATING            ALL                                      CONTRACTING
 CONTRACTOR            PARTIES              ICWG                     AGENCY

┌──────────┐        ┌──────────┐        ┌──────────┐            ┌──────────┐
│          │        │ REVIEWS  │        │          │            │          │
│ORIGINATES│───────▶│   AND    │───────▶│ APPROVES │───────────▶│ REVIEWS  │
│   ICD    │        │ESTABLISHES│        │   OR     │            │   OR     │
│          │        │ POSITION │        │DISAPPROVES│           │ RESOLVES │
└──────────┘        └──────────┘        └──────────┘            └──────────┘
```
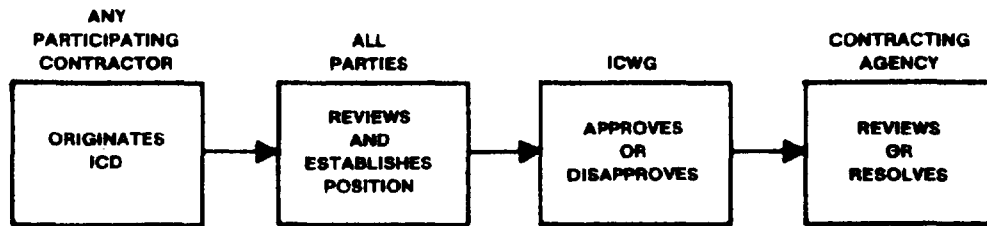
1. Any participating contractor originates ICD.

2. All affected parties review ICD and submit recommendations to ICWG Chairman.

3. ICWG Chairman evaluates proposed ICD.

4. ICWG approves/disapproves ICD.

    a. If ICWG decision is unanimous, the ICD is forwarded to the contracting agency for review.

    b. If disagreement exists within ICWG, then ICWG Chairman forwards ICD to contracting agency for resolution together with his recommendations.

5. When the ICD is incomplete and release must be made at that time, the ICD shall be appropriately identified and followup action assigned by ICWG Chairman for completion of ICD.

ENGINEERING CHANGE PROPOSALS (ECPs)

```
 ORIGINATING      ALL PARTICIPATING          ICWG                CONTRACTING
 CONTRACTOR         CONTRACTORS             CHAIRMAN             AGENCY-CCB

┌──────────┐        ┌──────────┐        ┌──────────┐            ┌──────────┐
│          │        │ REVIEWS  │        │RECOMMENDS│            │ APPROVES │
│   ECP    │───────▶│   AND    │───────▶│ ACTIONS  │───────────▶│    OR    │
│ INITIATED│        │ESTABLISHES│        │  TO CCB  │            │DISAPPROVES│
│          │        │ POSITION │        │          │            │          │
└──────────┘        └──────────┘        └──────────┘            └──────────┘
```
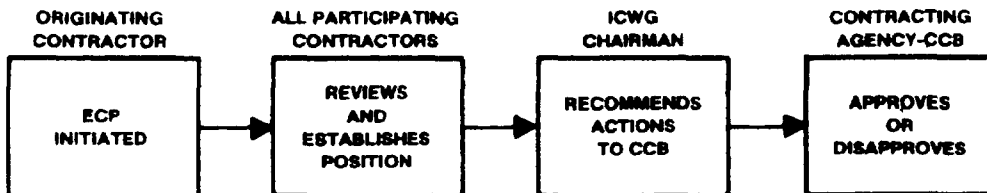
1. ECP prepared by initiator.

2. All participating contractors review ECP for interface implications on their system/segment and submit recommendations to ICWG.

3. ICWG conducts evaluation of ECP and participating contractors recommendations.

4. ICWG Chairman recommends to CCB through contracting agency approval/disapproval of ECP from an interface point of view.

5. Contracting agency CCB evaluates and approves/disapproves ECP.

FIGURE 6.   Flow Chart of ICWG Procedures

ICWG CONTROL SHEET

BRIEF DESCRIPTION OF FUNCTIONAL PHYSICAL INTERFACE	AGENCY AFFECTED CONT/GOVT	INTERFACE CONTROL DRAWING			TOOLING GAGE DOCUMENTS, IF AFFECTED	ICWG REVIEWS			ICWG ACTION ITEM NO.	ICD APP. DATE	ECP APPROVAL		
		NO.	TITLE	REV		PARTICIPATING AGENCIES	DATE	DATE MINS. DISTR.			CONTR	NO.	DATE

FIGURE 7. Example of ICWG Control Sheet

30. SYSTEM SPECIFICATION/SYSTEM SEGMENT SPECIFICATION

This Appendix has been replaced by DI-CMAN-80008 System/Segment Specification.

40. ADDENDUM TO CONFIGURATION ITEM SPECIFICATION

40.1 <u>Purpose.</u> An addendum to an existing configuration item specification is used to describe requirements for a new configuration item which is similar to the existing configuration item.

40.2 <u>Scope.</u> The addendum specification creates a new configuration item specification; i.e., identification different from the orginal specification. The specification so created (basic specification plus addendum) then becomes controlled and maintained as a separate and distinct specification, to be up-dated and revised as necessary, independent of changes to the basic specification from which it was created.

40.3 <u>Applicability.</u> An addendum to an existing specification is used when there is a requirement to retain the existing configuration item for some applications and the new (modified) configuration item can be created by minimum redesign of the existing configuration item. The preparation of an addendum to an existing specification shall be used when the following conditions are satisfied:

    a. There is sufficient reason to establish direct relationship between the new configuration item and an existing configuration item as a basis for design and development; e.g., progressing from one type, model, series of a configuration item to another; minor changes must be accomplished to a very limited number of units of a configuration item for a specific mission.

    b. The basic specification, to which the addendum is prepared, complies with the requirements of MIL-STD-490 and this standard, with respect to format and content.

    c. An addendum shall be created only when the configuration item identification is different from that of the configuration item specified in the basic specification.

    d. When more than 40 percent of the paragraph requirements in the basic specification must be changed to identify the new configuration, a completely new specification shall be generated.

40.4 <u>Preparation instructions.</u> The specification addendum is prepared in a manner which permits ready comparison to the exact relationship between two configuration items. This is accomplished by writing the new specification (addendum) by direct reference to the existing specification on a paragraph-by-paragraph basis, recording in the new specification specific reference to each paragraph in the existing specification and noting each addition, deletion, or change. Where no change is

necessary specify the paragraph number followed by the wording "no change". When no sub-paragraphs are changed only the related major paragraphs need be listed. The paragraph numbering between the two documents shall be identical, with the exception of paragraphs added to the new document which do not have an exact counterpart in the existing specification. For convenience of preparation, as an option, all paragraphs having "no change" can be collectively identified in a single paragraph. A specification created in this manner is a new and complete specification in every sense with a new specification number assigned per MIL-STD-490. the basic specification shall be the first entry in section 2; applicable documents, of the addendum specification.

40.4.1 Addendum specification cover page. When a new specification is created by the preparation of an addendum to an existing specification, an addendum cover page shall be prepared which conforms to the format and includes the content required by sample format A as shown on figure 8. All of the data on the addendum cover page refer to the specification used as the basic document against which the addendum is prepared. Each article of data to be entered on the cover page shall be transcribed from the title page and the specification change notices(s) (SCN) of the basic specification.

40.5 Change to addendum specification. Both the specification created by the addendum and the basic specification to which the addendum is prepared shall have independent change cycles. A specification change notice (SCN) to either is not automatically a change to both. Each change to either document shall be reviewed, and if it is desirable to change both the basic specification and the specification prepared as an addendum, then two separate specification change notices shall be prepared.

SAMPLE FORMAT "A"

Specification Number 12345

Code Ident XXXXX

(Date)

ADDENDUM SPECIFICATION

This specification has been prepared as an Addendum to: *Prime Item (Development/Product Fabrication) Specification

Specification No._____

configuration item No._____

FOR
(Approved Title)
(Type designator, configuration item number, etc.)

The exact content of specification (insert same number as abov.) used as the basic document for this addendum is the revision referenced above plus the following specification change notices to specification (insert same number as above).

*Note: Use Development if Type B Addendum and Product Fabrication if Addendum to Type C.

FIGURE 8. Cover Page — Addendum Specification

50. INVENTORY ITEM SPECIFICATION

50.1 Purpose. This appendix provides supplementary information for use in preparation of an inventory item specification in accordance with appendix XII of MILSTD-490, titled Type C4, Inventory Item Specification. (Paragraph numbers cited below refer to paragraphs of the inventory item specification format of MIL-STD-490, appendix XII.)

50.2 Section 3, Requirements. Each paragraph of the inventory item specification which identified an inventory item from the Government inventory shall include the following information:

Inventory Item Specification Number	Nomenclature	Federal Stock Class Code	Part Number

50.3 Section 10, 20, etc., Appendixes. The function specification referred to here shall be the existing specification (Government- or contractor-prepared) which identifies the inventory item to be used. A new specification shall be prepared only when the inventory item is to be modified. Each appendix shall follow the following format:

Appendix _____

1. SCOPE This appendix establishes the requirement for one item of equipment from the Government inventory identified as (insert nomenclature, specification number and date, and other identifying data) for the (insert system/configuration nomenclature).

2. APPLICABLE DOCUMENTS

3. REQUIREMENTS (only when requirements are not contained or are over and above those in the specification for the inventory item).

4. QUALITY ASSURANCE

4.1 Qualification (only when tests are required which are over and above those in the inventory item specification).

4.2 Receiving tests

5. PREPARATION FOR DELIVERY

60. COMPUTER SOFTWARE CONFIGURATION ITEM SPECIFICATION

This Appendix has been replaced by DI-MCCR-80025, Software
Requirements Specification, and DI-MCCR-80026, Interface
Requirements Specification.

70. SPECIFICATION MAINTENANCE, EQUIPMENT/MUNITIONS

70.1 <u>Purpose.</u> This appendix provides amplified instructions for the preparation of a proposed specification change notice, an approved specification change notice, specification change pages, and specification revisions as set forth in MIL-STD-490 as well as indexes (logs) required. For computer software specification maintenance, see Appendix VIII.

70.2 <u>Scope.</u> The proposed Specification Change Notice (SCN) identifies a proposed change to a contractually applicable specification. After the proposed SCN is contractually accepted, an approved SCN provides a record of the change and the associated ECP. The proposed specification change notice identifies exactly the proposed changes to the specification contents. The specification revision is a complete revision of the specification and shall incorporate all previously contractually approved changes.

70.3 <u>Applicability.</u> Each contractor to the Government shall be responsible for compliance by his subcontractors, vendors, and suppliers to the extent specified in paragraph 1.3 of this standard.

70.4 <u>Distribution of SCN.</u> Proposed specification change notices shall not be distributed to other activities on the specification distribution list until the SCN has been approved by the contracting agency. Approved SCNs shall not be furnished to the Defense Technical Information Center. After the approved specification is furnished to the Defense Technical Information Center, only complete revisions of the specification shall be furnished thereafter.

70.5 <u>Approved SCN.</u> The approved SCN shall be inserted into the specification immediately in front of Section 1 following the title page. The previously approved SCN (DD Form 1696) shall be removed when the latest approved SCN is inserted in the specification.

70.6 <u>Preparation of the SCN.</u> By definition, all Class I engineering changes require an SCN (see 6.2). Errata of a minor nature (such as typographical errors, punctuation, etc.) normally shall not be corrected, except as an incidental part of the next technically required ECP and accompanying proposed SCN. For those ECPs that do not affect the specification contents and affect the hardware only, the approved SCN shall indicate only that the SCN has been added to the ECP for change traceability. The following instructions apply in addition to those contained in MIL-STD-490. Figure 9 is an example of entries on the SCN.

SPECIFICATION CHANGE NOTICE
(SEE MIL-STD-490 FOR INSTRUCTIONS)

DATE PREPARED

1. ORIGINATOR NAME AND ADDRESS (SCN Preparing Activity)	2. ☒ PROPOSED ☐ APPROVED	3. CODE IDENT. (Design Actvty)	4. SPEC NO.
		5. CODE IDENT. (SCN Prep Actvty)	6. SCN NO. 3

7. SYSTEM DESIGNATION (Type, Model, Series etc)	8. RELATED ECP NO. 4-R1	9. CONTRACT NO.	10. CONTRACTUAL ACTIVITY (Note 2) Authority

11. CONFIGURATION ITEM NOMENCLATURE	12. EFFECTIVITY (Serial Numbers of all Configuration Items Affected by this SCN)

THIS NOTICE INFORMS RECIPIENTS THAT THE SPECIFICATION IDENTIFIED BY THE NUMBER (AND REVISION LETTER) SHOWN IN BLOCK 4 HAS BEEN CHANGED. THE PAGES CHANGED BY THIS SCN BEING THOSE FURNISHED HEREWITH AND CARRYING THE SAME DATE AS THIS SCN. THE PAGES OF THE PAGE NUMBERS AND DATES LISTED BELOW IN THE SUMMARY OF CHANGED PAGES. COMBINED WITH NON-LISTED PAGES OF THE ORIGINAL ISSUE OF THE REVISION SHOWN IN BLOCK 4. CONSTITUTE THE CURRENT VERSION OF THIS SPECIFICATION.

13. SCN NO.	14. PAGES CHANGED (INDICATE DELETIONS)	* S	* A	15. DATE
3	PAGES CHANGED AND TRANSMITTED HEREWITH 6 7 7a 12 deleted	X X	 X	

SCN No.	ECP No.	SUMMARY OF PREVIOUSLY CHANGED PAGES			
1	2-R1	1, 2 2/9/67	X		3/12/67
2	3-R2	11 4/24/67	X		5/8/67
4	6	Disapproved 4/10/67			
5	7-C1	9, 15, 21 4/12/67	X		
6	8	4, 8, 12 4/15/67	X		

Note 1. Blocks 2, 4, 6, 8, 9, 11, 13, and 16 are self-explantory

Note 2. Type of contractual action required for implementation of this SCN, e.g., Contract Change Order, Supplemental Agreement, etc

16. TECHNICAL CONCURRENCE (Contracting Agency)	DATE (Approval Date)

FORM
DD 1 DEC 64 1696

* "S" indicates supersedes earlier page   "A" indicates added page

FIGURE 9. Example of entries of SCN.

70.6.1 Block completion. An SCN shall initially be submitted complete, except for block 10. If all data cannot be included within the space allocated on the forms, use attachments as necessary, with appropriate references in the blocks. The contractor shall enter the contract change order, or equivalent contract approving authority number, in block 10 when this authority is officially received and prior to inclusion of the SCN in the specification to which it applies. The contractor shall assure that approved SCNs, including changed pages, are in complete accord with the contractual authority which approved the SCN prior to inclusion in the specification. The contractor shall then distribute those SCNs in accordance with the specification distribution list as described on the DD Form 1423.

70.6.2 Supersession. When a contractor is requested to resubmit a proposed SCN, the resubmitted SCN shall retain the same SCN number with a new date. An SCN shall only be revised and resubmitted in conjunction with a revision to an ECP. When an SCN is revised and resubmitted, the resubmitted SCN shall show that the previous dated SCN has been superseded.

70.6.3 Proposed/approved SCNs. Proposed/approved SCNs shall be identified by appropriate marking in block 2. Approved SCNs shall be marked by completion of blocks 2 and 10, citing the contractual authority; e.g., contract change order (CCO).

70.6.4 Date prepared (upper right-hand corner DD form 1696). This is date of contractor preparation and shall be the date on the specification change pages.

70.6.5 Effectivity (block 12). Block 12 shall be completed to show all the HWCI serial numbers affected by the SCN/ECP. System specification SCNs shall state (not applicable).

70.6.6 Summary of change pages (block 14). In addition to the change pages, enter the related ECP number of each SCN and the date appearing on the change pages of that SCN.

70.6.7 Date (block 15). This date shall be the approval date of the SCN. If the SCN has not been approved, leave the date blank.

70.6.8 Technical concurrence (block 16). The chairman of the configuration control board will sign the SCN.

70.7 Specification change page. The specification change page(s) shall be attached to the SCN and shall constitute an integral part of the SCN. Updated and reissued pages shall be complete reprints of pages suitable for incorporation by removal of old pages and insertion of new pages. All portions affected by the change shall be indicated by a symbol in the right-hand margin. Proposed change pages shall be printed on colored paper.

70.7.1 <u>Proposed specification change pages.</u> When a proposed specification change page is used, the page shall reflect only the changes of that particular page; i.e., the paragraphs not being changed need not be incorporated on the page.

70.8 <u>Specification revisions.</u> A revision is defined as the reissue of a specification, with all the SCNs incorporated in the body of the specification. A specification shall not be revised without specific approval of the contracting agency. The contracting agency will establish a convenient cutoff point, oriented to a production article number or change in baseline. The specification revision shall incorporate the information identified on the latest approved specification change notice.

70.9 <u>Superseded specification.</u> The issue of the specification superseded by the revised specification shall be retained intact with all specification change pages and SCNs by the custodian to provide complete continuity of all previous changes.

70.10 <u>Configuration item development record.</u> The configuration item development record provides status information on the development progress of the HWCI as reflected by specification audits and reviews. The configuration item development record for each HWCI of the system which is of new design shall be assembled and maintained in a log. The log serves as an index of all HWCIs of the system which are of new design and records significant program actions. The log may be prepared by the integrating or systems engineering contractor designated by the contracting agency. Distribution of a contractor-prepared log will be as specified by the contracting agency on the appropriate CDRL. The initial issue of the log shall include a record for all specifications for HWCIs of new design which are part of the functional or allocated baseline. As requirements for additional new design HWCIs are established, a record shall be added for each specification. Each configuration item development record contains information which may be included in configuration status accounting records.

70.10.1 <u>Preparation of the configuration item develoment record - part 1.</u> This part of the record shall be prepared in a format essentially as shown on figure 10. The following information shall be provided:

a. Nomenclature - Enter the title of the specification (the title of the specification shall be the same as the nomenclature of the HWCI).

b. Development specification number and date - Enter the date on which the contracting agency authenticated the specification.

c. Configuration item identification.

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CONFIGURATION ITEM DEVELOPMENT RECORD - PART I

Nomenclature

Development Specification
Number and Date   12345A   21 Sept 67
Authentication Date   27 Oct 67

Configuration Item
Identification

Configuration Item
Part Number

Preliminary Design Review
Scheduled Date: 10 Jan 68
                     11 Jan 68 c
	Critical Design Review
	Scheduled Date: 11 Apr 68
	                     14 Apr 68 c

Functional Configuration
Audit - Scheduled Date:
             11 July 68
             12 July 68 c
	Production Specification
	Scheduled Submittal Date:
	             1 Aug 68
	             1 Aug 68 c

Physical Configuration Audit - Scheduled Date: 13 Sept 68
                                            15 Sept 68 c

Configuration Item Qualification Scheduled Date: 10 Oct 68
                                                10 Oct 68 c

Product Specification   17 Oct 68
Scheduled Authentication Date: 17 Oct 68 c

Configuration Item Formal Qualification Certification Date: 25 Oct 68

Qualification Test Report

Contractor	Contract No.

FIGURE 10.   *Configuration Item Development Record — Part 1*

d. Configuration item part number. Not applicable to CSCIs.

e. Enter the date scheduled by the contractor for the Preliminary Design Review (PDR) for the HWCI. Enter the data followed by a "C" to indicate when the PDR was completed.

f. Enter the date scheduled by the contractor for the Functional Configuration Audit (FCA) for the HWCI. Enter the date followed by a "C" to indicate when the FCA has been completed.

g. Enter the date scheduled by the contractor for the Critical Design Review (CDR) for the HWCI. Enter the data followed by a "C" to indicate when the CDR was completed.

h. Enter the date scheduled for submittal of the specification for the HWCI. Enter the date followed by a "C" to indicate action completed.

i. Enter the date scheduled for the PCA. Enter a "C" after the date to indicate that the PCA has been completed.

j. Enter the date scheduled for completion of formal qualification of the HWCI to specific requirements. Enter the date followed by a "C" to indicate action completed.

k. Enter the date scheduled for authentication of product specification. Enter the data followed by a "C" to indicate action completed.

l. Enter the date of acceptance by the contracting agency of the certified qualification of the HWCI.

m. Enter the identity of the test report/documentation which sets forth results of the qualification tests of the HWCI.

n. Enter the name of the contractor responsible for the design/manufacture of the HWCI.

o. Enter the contract number under which the development and qualification of the HWCI is accomplished.

p. Whenever a date for any event is rescheduled, cross out the original date and enter the rescheduled date.

70.10.2 Preparation of the configuration item development record - Part 2. This part of the record, when applicable, shall be prepared in a format essentially as shown on figure 11. The following information shall be provided:

a. Nomenclature - Enter the title of the specification. (The title of specification shall be the same as the nomenclature of the HWCI.)

b. Develpment specification number and date.

c. Impact of changes on related configuration items. Whenever a change to the HWCI has an impact on related configuration items, the specification or document title and identification number of the affected configuration item, the SCN and ECP covering the changes to the affected configuration item, and the contractor's name who is responsible for the related configuration item shall be listed.

CONFIGURATION ITEM DEVELOPMENT RECORD - PART 2						
Nomenclature of Configuration Item						
Configuration Item Specification Number and Date:						
Configuration Item Specification		Impact of Changes on Related Configuration Items				
SCN	ECP	Specification/Document Title and Number	SCN	ECP	CONTR	
Contractor			Contract No.			

FIGURE 11. Configuration Item Development Record — Part 2

80. SPECIFICATION AND SUPPORT DOCUMENTATION MAINTENANCE, COMPUTER SOFTWARE

80.1 Purpose. This appendix provides amplified instructions for the preparation of configuration control forms and documents that are used for reporting proposed and approved changes as well as current status and version(s) of CSCIs and their associated documentation. Also, requirements are included that pertain to the preparation timing of the various configuration control forms as they relate to Class I and Class II changes. Adherence to the requirements contained in this appendix will ensure that accurate records are developed, maintained, and disseminated for all CSCIs and for the status of all approved changes and change proposals throughout the acquisition phase. Change maintenance procedures are initiated for each specification, support document, or CSCI at the time of formal approval or acceptance of the specification or document by the contracting agency.

80.2 Scope. This appendix is divided into three sections. Paragraph 80.4 and associated subparagraphs contain general configuration control processing requirements pertaining to Class I and Class II CSCI changes. Subparagraphs of 80.5 contain instructions (or references to other sources that contain instructions) for the preparation of required configuration control documents. Finally, paragraph 80.6 contains information pertinent to specification and document revisions.

80.3 Applicability. This appendix is applicable for use during the acquisition and operational phases of CSCI design, development, test and support. Each contractor shall be responsible for compliance by subcontractors in accordance with paragraph 1.3 of this standard.

80.4 Configuration control change process. All changes to established functional, allocated, or product baselines are Class I changes. Slight changes to documentation or other changes of a minor nature are Class II changes. Requirements for defining a computer software change as Class I or Class II are presented in Appendix XIV. The following paragraphs define configuration control procedures for Class I and Class II changes.

80.4.1 Class I change processing. Initial Class I change processing shall be performed in one or two steps. One step change processing is the simultaneous submission of the formal ECP and SCN with change pages for the appropriate specification(s) by the contractor to the contracting agency Configuration Control Board (CCB). Two step change processing consists of the following steps:

a. Submission of a preliminary ECP by the contractor to the contracting agency CCB without SCN or change pages.

b. Submission of the formal ECP, completed SCN and change pages
    to the appropriate specification(s) to the CCB.

80.4.1.1 Use of one step change processing. One step change
processing shall apply to changes in the System/Segment
Specification when an approved change to the Software Requirements
Specification or Interface Requirements Specification impacts the
System/Segment Specification. One step change processing shall
also be used for changes to the Software Requirements
Specification or Interface Requirements Specification when the
changes are of a minor nature to accomplish expansions or
refinements, such as the elimination of "TBDs".

80.4.1.2 Use of two step change processing. Two step change
processing shall be used for proposed major changes to the
Software Requirements Specification and Interface Requirements
Specification, such as the addition or deletion of significant
capabilities, which may entail extensive system engineering
analysis and result in changes to many pages of the
specification. Two step change processing shall always apply to
the Software Product Specification. Modification of the CSCI is
accomplished between steps one and two of the process by
furnishing computer-generated change pages for the SCN package to
the Software Product Specification.

80.4.1.3 Post CCB approval action. Upon approval of the formal
ECP and the SCN(s) by the contracting agency CCB, for two step
change processing the contractor shall complete the change process
for the current modification by preparing the following items for
distribution:

a. Specification change notice package, consisting of the
    specification change notice and specification change pages,
    for each affected specification.

b. Revised CSCI.

d. Version Description Document related to the revised CSCI.

80.4.2 Class II change processing. Class II changes usually do
not require approval by the contracting agency CCB prior to
implementation by the contractor. Class II changes shall be
documented using only page 1 of the standard ECP form, or using
the Software Problem/Change Report (SPCR) as described and
prepared according to the Software Development Plan, Software
Configuration Management Plan, or the System Configuration
Management Plan.

80.4.2.1 Class II change report applicability. A Class II ECP or
SPCR may address both a Software Requirements and an Interface
Requirements Specification, or a Software Product Specification,
but never the requirements and product specifications

simultaneously. A Class II ECP or SPCR may be used to maintain any delivered document.

80.4.2.2 Reporting Class II changes. Class II changes shall be reported to the contracting agency by including an SPCR or Class II ECP as part of the next Class I ECP package for the same CSCI. Class II changes shall be included in SCNs issued to incorporate Class I changes. The SCN shall indicate the classification of each change specified therein.

80.4.2.3 Other Class II change processing requirements. All Class II changes installed in a CSCI shall be identified in the next issue of the Version Description Document by ECP or SPCR number, title, and issue date. Class II ECPs and SPCRs shall also be reported in the computer software configuration index.

80.5 Configuration control documents and forms. Instructions (or references to sources that contain instructions) for the preparation of the configuration control documents are contained in the following subparagraphs:

80.5.1	Engineering Change Proposal (ECP)
80.5.2	Software Problem/Change Report (SPCR)
80.5.3	Specification Change Notice (SCN)
80.5.4	Version Description Document (VDD)
80.5.5	Computer Software Configuration Index
80.5.6	Change Status Report

The forms and documents listed above shall be used to maintain specifications and support documentation, as applicable to any specific proposed or approved change(s). Requirements for applying the appropriate documents and forms for a specific change are delineated in the following subparagraphs.

80.5.1 Engineering Change Proposal (ECP). The contractor shall provide a preliminary ECP to the contracting agency CCB for all proposed Class I changes to a CSCI. Upon approval and implementation of the change, using the two-step process, the contractor shall submit the formal ECP to the contracting agency CCB. A single ECP can accommodate more than one change including changes to two or more CSCI(s) developed by several contractors and subcontractors. Page I of an ECP form may be used to report Class II changes. Instructions for completing an ECP are provided in Appendix XIV.

80.5.2 Software Problem/Change Report (SPCR). If the contractor does not use page 1 of an ECP to report Class II changes, the contractor shall use a Software Problem/Change Report. The Software Problem/Change Report format is described in the Software Development Plan, Software Configuration Management Plan, or the System Configuration Management Plan.

80.5.3 <u>Specification Change Notice (SCN).</u> The SCN shall be used to document all Class I and Class II changes to Software Requirements, Interface Requirements, and Software Product Specifications and Class I changes to the System/Segment Specification.

80.5.3.1 <u>Distribution of SCN.</u> A proposed SCN shall be distributed to other activities on the specification distribution list only after the SCN has been approved by the contracting agency.

80.5.3.2 <u>Supersession.</u> When a contractor is requested to resubmit a proposed SCN, the resubmitted SCN shall retain the same SCN number with a new date. An SCN shall be revised and resubmitted only in conjunction with a revision to an ECP. When an SCN is revised and resubmitted, the resubmitted SCN shall show that the previous dated SCN has been superseded.

80.5.3.3 <u>Approved SCN.</u> The approved SCN shall be inserted into the specification immediately in front of Section I following the title page.

80.5.3.4 <u>Specification change page.</u> The specification change page(s) shall be attached to the approved SCN and shall constitute an integral part of the SCN. Updated and reissued pages shall be complete reprints of pages suitable for incorporation by removal of old pages and insertion of new pages. All portions affected by the change shall be indicated by a symbol in the right or left hand margin.

80.5.3.5 <u>Proposed specification change pages.</u> Proposed specification change pages may be attached to a proposed SCN. A proposed specification change page shall reflect only the changes of that particular page (i.e., the paragraphs not being changed need not be incorporated on the page.)

80.5.3.6 <u>Preparation of the SCN.</u> A sample SCN is presented in Figure 9. If required by the contracting agency, the Specification Change Notice shall be prepared by the contractor in accordance with the Specification Change Notice Data Item Description (see 6.2).

80.5.4 <u>Version Description Document.</u> The Version Description Document shall be prepared to accompany the release of each version of a CSCI and to accompany each release of an interim change (i.e., changes that occur between CSCI versions). This document shall record the items delivered and additional pertinent data relating to status and usage of the CSCI change. The contractor shall prepare the Version Description Document in accordance with the format and content of the Version Description Document Data Item Description (see 6.2).

80.5.5 Computer software configuration index. The computer software configuration index (henceforth referred to as "index") provides the current status of specifications and additional contractual deliverable documents which depend for their content on the CSCI configuration. Document status is maintained by dates of issue, document number and title, ECPs, SCNs, and revision identifiers associated with each issue or document change resulting from accomplished changes. Additionally, the index contains a section which provides a summary record of milestones for CSCI development, audit, and qualificiation. One index is maintained for each CSCI; however, status data pertaining to a group of interrelated CSCIs may be combined in a single index when so approved by the contracting agency (see 6.2).

80.5.5.1 Organization and content. The index contains numerous sections that may be in book form. The format is not mandatory, but the elements of information are. The index shall be prepared based on the guidelines in this appendix and will be generally in the format as described herein. The body of the index shall have one historical record section and an additional section for each type of document or document series associated with the CSCI. The following is an example of a typical outline of a computer software configuration index for a CSCI:

Section A   - Development Record
Section I   - Software Requirements/Interface Requirements
                Specification
Section II   - Software Product Specification
Section III   - Test Documentation
Section IV   - Manuals
Section V   - Version Description Document.

80.5.5.2 Preparation and maintenance. The initial issue of the index shall be prepared and delivered by the contractor after the establishment of the functional baseline or allocated baseline, whichever occurs later, as required by the contracting agency. Subsequent issues shall be published and distributed thereafter at regular intervals (e.g., monthly) as established by the contracting agency. The initial issue shall contain only Section A, which identifies significant schedule and completed milestone data pertaining to the CSCI, and Section I, which lists the basic issue of the Software Requirements Specification and, if applicable, Interface Requirements Specification(s). In those instances of complex CSCIs for which a volume structure of the specification has been approved by the contracting agency, this listing shall identify each volume as a separate issue. An additional section (i.e. of the Sections II through VI as identified in 80.5.5.1) is added as the basic issue of any subsequent document if delivered by the contractor for approval or acceptance by the contracting agency. Each succeeding issue of the index is expanded and revised to reflect milestone data in Section A and to include the listings specified in 80.5.5.4 below. A

section may be deleted from the index once a particular document or document series has outlived its usefulness. The first page(s) of the index shall be prepared to conform to figure 12 and in accordance with the following instructions:

a. Issuing agency - Enter the name of the contractor responsible for the design/development of the CSCI.

b. Contract No. - Enter the number of the Government contract under which the CSCI development is accomplished.

c. CDRL Item No. - Enter the item number from the Contract Data Requirements List (CDRL) for the CSCI.

d. Document No. - Enter the contractor's document number for the configuration index.

e. Date - Enter the publication date of the given index issue.

f. CSCI nomenclature - Enter the approved nomenclature of the CSCI.

g. System - Enter the title and number of the system of which the CSCI is a part, as assigned by the contracting agency.

h. CSCI No. - Enter the software inventory number based on the agreed to software inventory numbering system.

i. Issue No. - Enter the issue number of the index. The number "1" is assigned to the first issue; subsequent issues are numbered consecutively.

j. Table of contents - Provide a table of contents at the front of the index, following the data contained in the blocks described above. The table of contents shall identify the page number on which the initial entry appears for each section, for each separate document or volume under a section where applicable, and for each of the two parts of a section.

80.5.5.3 Preparation of development record, Section A. This section of the index shall be prepared in a format equivalent to that illustrated on figure 13, to include the information specified below.

a. CSCI No. and nomenclature - Enter the number and approved name of the CSCI as it appears on the front cover of the CSCI specifications (e.g., TM1112A, Message Interface Computer Software for SPACE, System 4XXL).

CONFIGURATION INDEX
(Computer Software)

Issuing Agency		Document No.	
Contract No.	CDRL Item No.	Date	
CSCI Nomenclature			
System		CSCI No.	Issue No.

TABLE OF CONTENTS

FIGURE 12.   Computer Software Configuration Index

CONFIGURATION ITEM DEVELOPMENT RECORD - SECTION A	
CSCI No. and Nomenclature	
SPECIFICATIONS AND DOCUMENTS	REVIEWS AND AUDITS
Software Requirements Specification Issued: Authenticated:	Software Specification Review
Interface Requirements Specification(s) Issued: Authenticated:	
Software Top Level Design Document* Issued:	Preliminary Design Review
Software Test Plan Issued: Approved:	
Software Detailed Design Document* Issued:	Critical Design Review
Software Test Description Issued: Approved:	
Interface Design Document* Issued:	
Data Base Design Document* Issued:	
Software Test Procedure Issued: Approved:	Test Readiness Review
Software Test Report Issued: Authenticated:	Functional Configuration Audit
Software Product Specification Approved:	Physical Configuration Audit
Contractor	Contract No.

* The authenticated versions of these documents are equivalent to the
authenticated Software Product Specification.

FIGURE 13.   Configuration Item Development Record — Section A (CSCI)

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b. Specifications and documents - For each specification or document listed in the left hand column of figure 13, enter the date of basic issue and, for those items not indicated by an asterisk, enter the date of authentication or approval.

c. Reviews and audits - For each milestone event indicated in the right hand column of figure 13, enter the (starting and) ending date(s) of the (incremental) activity.

80.5.5.4 <u>Organization of content, Sections I through VI.</u> Each section of the index devoted to a specification or document series shall be further subdivided into two parts. Part 1 contains a listing of the basic issues(s) and all subsequent updatings of the specification or document, together with identification of ECPs incorporated and associated SCNs. Part 2 lists ECPs which have been approved and will affect the specification or document but which have not yet been reflected in a published specification or document revision or set of specification or document change pages.

80.5.5.4.1 <u>Part 1 - Identification.</u> Part 1 of each section shall contain information concerning the basic documentation equivalent to that illustrated in figure 14. The figure illustrates data only for Section I of the index, and for a requirements specification which is issued as a series of separate volumes and appendixes. Data shall be provided in Part 1 of each section as appropriate to single volume documents and the given section, as follows:

a. <u>Issue.</u> The first entry in this column is always "BASIC" for all documents or volumes in Section I through V. The first entry in Section VI is "VDD-1". Each succeeding entry will be:

(1) for Sections I and II, an SCN number; or

(2) for Section VI, a VDD number.

Except for VDDs in Section VI: "BASIC" is replaced by a suitable indicator when a complete revision is issued, e.g., "REV A". The listing of all previous updates to the basic issue or to any previous revision is deleted from the index when a new revision appears.

COMPUTER SOFTWARE CONFIGURATION INDEX

SECTION I - SOFTWARE REQUIREMENTS SPECIFICATION, ESD499L385
(9 VOLUMES + 4 APPENDIXES)

PART 1.   BASIC DOCUMENTATION

ISSUE	CHANGE		TITLE	ISSUED
BASIC	VOLUME 1		GENERAL	01-31-76
SCN 1-1	ECP	1	F/TELL OVER MULTIPOINT LINE	02-30-76
	SPCR	1	CLARIFY FUNCTION DESCRIPTION	
SCN 4-1	ECP	7	DELETE BIRDIE-6	05-07-76
.	.		.	.
.	.		.	.
.	.		.	.
BASIC	VOLUME 2		SURVEILLANCE	01-31-76
SCN 1-2	ECP	1	F/TELL OVER MULTIPOINT LINE	02-30-76
SCN 3-2	ECP	4	ADD TRACKING-ON-STATION ARPS	04-06-76
	SPCR	3	DELETE REFS IN TABLE 2-1	
	SPCR	5	CLARIFY ALRI SMOOTHING CONSTANTS	
SCN 9-2	ECP	11	SYSTEM LIMITS FOR MANUAL REPORTS	12-05-76
.	.		.	.
.	.		.	.
.	.		.	.

APPENDIX IV   (continued)

SCN 38-IV	ECP	57	MODIFY SUPPRESS TAPE SRN MESSAGE	03-18-77
	SPCR	50	CLARIFY SIM TAGS	
SCN 47-IV	ECP	63	CHANGE EVALUATION REQUEST FORMAT	06-12-78
	SPCR	60	MISCELLANEOUS CORRECTIONS TO SIM	

PART 2.   APPROVED CHANGES

ECP NO.	TITLE	VOL/APP	APPROVED
90	EXPAND LEGAL RANGE OF TAPE SRN	1, 5, 7, I, III	12-19-77
94-1	MONITOR EXCHANGE TELL LINE	3, 4	02-06-78
95	COMPENSATE GRID VS. TRUE NORTH	1, 2, 3, II	06-24-78
101	DISPLAY FUNCTION CHANGES	3, 8, 9, I	06-24-78
105	DELETE AUTOMATIC MODE CHANGE	2	07-02-78

FIGURE 14.   Configuration Index: Sample Section I — CSCI Requirements Specification

b. Change. For the first entry, this column shall be used to identify the number of the given document or volume. For each succeeding entry in the "ISSUE" column (i.e., SCN number, or VDD number), this column shall contain a listing of the numbers of all ECPs and SPCRs which are incorporated in the given updating.

c. Title. The title of the given document or volume is entered opposite the "BASIC" entry. The title of the change is listed opposite each Class I or Class II ECP number appearing in the preceding column.

d. Date of Issue. The date listed is the date of issue corresponding to each basic issue, SCN, change issue identifier, or VDD number appearing in the first column.

80.5.5.4.2 Part 2 - Approved changes. This part shall contain a listing of all approved ECPs which affect the specification or document listed within the given section but which have not yet been incorporated into published changes. Upon approval of a formal ECP, the next issue of the index shall contain an entry under Part 2 of each section in which the document, or any volume of the document, was identified in the ECP as being affected by the proposed change. When a change package is submitted, the contracting agency will verify that the impact of the CSCI change is adequately reflected in the revised document(s) and that document changes are accurately reported in the formal revised ECP which accompanies the issue of changes. Upon approval of the revised ECP and submitted changes to each affected document or volume, the listing of the ECP under Part 2 which references that document/volume shall be deleted in the next issue of the index. The listing for each ECP shall comply with the following instructions, as illustrated in figure 14, Part 2:

Column 1. ECP No. - Enter the number of the ECP.

Column 2. Title/volume(s)/appendixes affected - enter (a) the title of the proposed change, and (b) if the document affected is issued in more than one volume or issued with separate appendixes, identify each volume or appendix affected by the change.

Column 3. Date approved - Enter the approval date of the ECP.

80.5.6 <u>Change status report.</u> The change status report details the status of all proposed changes to a CSCI for which the contractor is responsible, and for which existing documentation is listed in the configuration index. The purpose of the report is to provide the contracting agency and contractor, on a periodic basis, with the current status of all officially proposed ECPs to the CSCI. The change status report supplements the configuration index. It shall be published concurrently with the index and shall be used with the index to obtain current status information on the CSCI and related changes thereto (see 6.2).

80.5.6.1 <u>Preparation of the computer software change status report.</u> The change status report shall be organized into a minimum of two sections as described herein.

80.5.6.1.1 <u>Status listing.</u> Section I shall contain a listing by number of each successive ECP prepared against the CSCI, with a brief indicator or comment which characterizes the status of the ECP. An example of this listing is illustrated in figure 15. When an ECP is impacted by or impacts another ECP, an appropriate note indicating the impacted or impacting ECP shall be included in the comments column.

80.5.6.1.2 <u>Status summary.</u> Section II of the report shall contain a detailed summary of the status information for each ECP listed in Section I which is currently active. The summary shall appear in the first issue of the change status report following assignment of a number to an ECP in preparation, and shall continue to appear in each subsequent issue of the report for at least one issue following either (a) disapproval of the ECP or (b) completion of implementation of the change. The contractor may use his own form for the status summary, provided it contains the following minimum items of information:

a. The ECP number and date of preparation.

b. The short title of the proposed ECP.

c. A brief summary of the problem which the proposed change is to resolve.

d. A brief description of the proposed solution.

e. Reference documents - letters, reports of design studies or tests, problem reports, etc.

f. Preparation status - Whether the ECP is in process of coordination, is undergoing initial preparation, has been submitted, etc.

MIL-STD-483
APPENDIX VIII

CHANGE STATUS REPORT

Section 1.   Status Listing

System			Date	
CSCI Nomenclature		Spec No.	CSCI No.	
ECP No.	Title	Status	Comments	
2	Display Expansion Levels	A		
2-R1	Display Expansion Levels	A	SCN approved	
3	Data Link Buffer Output	A		
3-R1	Data Link Buffer Output	A	New information	
3-R2	Data Link Buffer Output	A	SCN approved	
4	Detection of Button Pop-up	A		
4-R1	Detection of Button Pop-up	S		
6	Process Simulated A-Link Data	D		
7	Detection of Input Data	A		
7-C1	Detection of Input Data	A	Editorial change	
7-R1	Detection of Input Data	P		
8	Data Monitor Feedback	X	Pending interface requirements	

Status Indicators: P - ECP is being prepared
                       S - ECP is submitted and under consideration
                          by the CCB
                       A - ECP has been approved by the CCB
                       D - ECP has been disapproved by the CCB
                       X - ECP has been deferred by the CCB
                       I - ECP has been implemented

Section 2.   Status Summary

(Contractor Format)

FIGURE 15.   Change Status Report, Computer Software

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g. Action status - Whether the ECP is awaiting CCB action, has been returned or withdrawn for revision/corrections, has been approved, requires further study, etc.

h. Implementation status - The dates of distribution of the approved change in the CSCI specification and shipment of the new CSCI version.

80.6 Specification/document revisions. A revision is defined as the reissue of a specification or contractual deliverable document with all the SCNs since the last reissue (or original issue) incorporated in the revised specification or document. A specification or contractual deliverable document shall not be revised without approval of the contracting agency. The specification or document revision shall not incorporate the information from any proposed SCNs that have not been approved.

80.6.1 Superseded specification/document. The superseded specification or document shall be retained intact with all change pages and SCNs to provide complete continuity of all previous changes.

90. DOCUMENT AND ITEM IDENTIFICATION

NUMBERING AND MARKING

90.1 <u>Scope.</u> This appendix establishes the numbers to be used for identifying documents and physical items in order to achieve configuration traceability for equipment, components, computer software, facility sites, and spares.

90.1.1 Identification numbers to be used for configuration management are as follows:

    a. Specification or standard number

    b. Configuration Item Identification Number for hardware, or the software inventory number, for the CSCI, based on the agreed to software inventory numbering system.

    c. Serial number (or lot number)

    d. Drawing and part number

    e. Change identification numbers:

        (1) Specification Change Notice (SCN)

        (2) Notice of Revision (NOR)

        (3) Engineering Change Proposal (ECP)

        (4) Request for deviation/waiver

    f. Code identification (federal supply code for Mfr.)

    g. Registration number (when specified in lieu of serial number)

    h. Program management code (when identified)

    i. Type, series, model designator.

90.1.2 Examples of identification numbers which are not normally used in configuration management; are as follows:

    a. Aerno number (except when authorized by the contracting agency)

    b. Production line number

    c. Synthetic part number

    d. Material codes

e. Federal Stock Number (FSN) (when specified)

f. Version Description Document number.

90.1.3 Applicability. This appendix applies to the configuration identification and marking of each configuration item and each of its components requiring configuration control which are accepted by the contracting agency for systems/configuration item programs or for follow-on spares procurement. Each contractor to the contracting agency shall be responsible for compliance by his subcontractors, vendors, and suppliers to the extent his subcontractors, vendors, and suppliers assign and control standard configuration identification numbers. Incorporation of this appendix in a contract shall not be construed as directing or permitting the contractor to change an existing identification for a system, HWCI (or part thereof), material, process, computer software or data base, or document specifying any of the foregoing if a past association with any Government agency has caused the existing identification to be entered into Government technical data or supply records.

90.2 General requirements.

90.2.1 Contractor responsibility. The contractor shall assign and control configuration identification numbers in accordance with this appendix without further approval of the contracting agency.

90.2.2 Numbers assigned by other design activities. Where the configuration item incorporates the design of a subcontractor, vendor, or supplier, the contractor shall use the configuration identification numbers assigned by these design activities without change except as specifically authorized by DOD-STD-100 (e.g., source control drawings).

90.3 Detail requirements.

90.3.1 Specification numbers. Specification identification numbers, specification change notices, and specification revisions shall be assigned as prescribed in MIL-STD-490 and MIL-STD-482.

90.3.2 Configuration item identification numbers.

90.3.2.1 The design activity and the manufacturer of the configuration item shall be identified by manufacturing code identification numbers taken from Handbook H4-1.

90.3.2.2 All discrete parts, assemblies, and units shall be identified by part numbers in accordance with DOD-STD-100.

90.3.2.3 A family of like units of a configuration item that individually satisfies prescribed functional requirements shall be

identified by an unchanging base number such as a configuration item identification number, or a type-model-series designator. This number:

a. Shall establish a base for serializing individual units of a configuration item

b. Shall not change when the unit is modified, even though the interchangeability of units within the family is affected

c. Shall remain the same even though the configuration item may have more than one application or may be reprocured through different contractors

d. Shall be composed of seven digits of alpha-numeric characters. (Note: On privately developed configuration items where the number exceeds seven digits, the last seven digits of the number will be utilized for EDP application.)

90.3.2.4 Serial or lot numbers. A single unit or lot in a family of like units of a configuration item shall be permanently and uniquely identified by a serial or lot number and the configuration item's unchanging base as follows:

a. Air vehicles - Serial numbers will be assigned by Air Force in accordance with AFPI 57-303

b. Engines for air vehicles - Serial numbers shall be constructed by the engine manufacturer in accordance with Bulletin 152

c. Mobile training sets (MTS) and resident training equipment (RTE) - Serial numbers shall be constructed by contractor in accordance with MCMs Exhibit 67-2

d. Aircrew trainers and mission flight simulation - Serial numbers shall reflect the program element code assigned by the prime class AMA and progressive numerical effectivity of the configuration item

e. For solid propellants, the requirements of MIL-L-9931 shall be followed for the assignment of lot numbers. For munitions, MIL-STD-1167 and MIL-STD-1168 shall be used for assignment of lot numbers

f. Ground communication-electronic-meterological (CEM) equipment - Delivered end configuration items and sets shall be identified with Air Force serial numbers assigned by the responsible Air Force configuration item manager in accordance with AFR 67-35

g. Air Force serial numbers for deliverable components not

included in (a) through (f) above, and having recoverability/repairability designator code "D" or "F" shall be identified, where appropriate, by Air Force serial numbers assigned by the Air Force configuration item manager in accordance with AFR 67-35

h. Manufacturers serial numbers or lot numbers for configuration items other than 90.3.2.4 a through g - Serial/lot numbers shall be:

(1) Maximum length of 15 digits of alpha-numeric characters

(2) Numeric in last four digits

(3) Assigned to units/lots of configuration items identified by the unchanging serial number base (paragraph 90.3.2.3)

(4) Unique and nonduplicating within the group identified by the non-changing serial/lot number base

(5) Assigned in numeric sequence within the configuration item group

(6) Permanent for the life of the unit.

90.3.3 Change identification numbers. Notice of revisions (NOR), requests for deviations/waivers, and engineering change proposals identification numbers are prescribed in DOD-STD-480.

90.3.4 Identification of physical configuration items. Configuration item identification numbers for configuration management shall be affixed or marked on physical configuration items in accordance with MIL-STD-130 and other contractually invoked specifications and standards, (e.g., MIL-P-15024).

90.3.5 Reuse of configuration item serial numbers. Configuration item serial numbers assigned to the original configuration item apply to all follow-on configuration items (within this contract or under separate contract) even though a change affecting interchangeability may require a part number change of the configuration item. Configuration item serial numbers, once assigned, shall not be reissued on follow-on procurements for the same configuration item.

90.3.6 Drawing numbers. Drawing numbers and drawing change identification shall be assigned in accordance with DOD-STD-100.

90.3.7 Identification of shipments. Configuration items for shipment or storage shall be identified in accordance with MIL-STD-129.

100. ENGINEERING RELEASE RECORDS AND CORRELATION OF MANUFACTURED PRODUCTS

100.1 **Purpose.** This appendix establishes the minimum requirements for achieving proper relationship between engineering/manufacturing data and manufactured HWCIs.

100.2 **Scope.** The criteria of this appendix applies to the contractor's engineering release system pertaining to:

a. Elements of data required

b. Production release functional capabilities

c. Release of engineering changes

d. Field release functional capabilities.

100.2.1 After the initial release of data, criteria are set forth for the control of incorporating Class I engineering changes in HWCIs. The internal control system of the contractor shall be capable of:

a. Reconciling engineering work authorizations to contract requirements

b. Verifying that released engineering and purchase orders are in accordance with contract requirements

c. Assuring that engineering changes are manufactured and incorporated into HWCIs as required by the released engineering changes.

100.3 **Applicability.** The criteria of this appendix applies to all contracts requiring the preparation of engineering drawings and specifications for HWCIs. The contractor to the contracting agency shall be responsible for compliance by his subcontractors, vendors, suppliers to the extent specified in paragraph 1.3 of this standard. No specific provisions for engineering release record requirements for CSCIs are included in this appendix. An engineering release system complying with the intent of this appendix shall be implemented by the contractor for CSCIs to assure that the objectives of this appendix are met.

100.4 **Engineering release requirements.** The contractor shall prepare and maintain engineering release records in accordance with his formats and procedures, and the minimum requirements herein. The contractor's formats and procedures may include information in addition to these minimum requirements providing that the portion thereof which constitutes engineering release records:

a. Is limited to an expression of configuration requirements defined by engineering data.

b. Does not reflect a hardware or other product configuration that varies from the engineering requirements contained in these data.

c. Does not reflect manufacturing status. Only one release record (which may be multi-sheet) shall be maintained for each drawing number. Drawings released by a subcontractor, vendor, supplier, or another contractor shall not be re-released by the contractor.

d. Shall meet the requirements established in DOD-STD-480 or MIL-STD-481 for waivers and limited effectivity ECPs.

100.4.1 <u>Elements of data required.</u> The contractor's engineering release records shall contain the standard configuration identification numbers (refer to Appendix IX and other elements of information listed in this subparagraph).

100.4.1.1 HWCI elements:

a. HWCI number

b. HWCI serial numbers

c. Top assembly drawing number

d. HWCI specification identification number.

100.4.1.2 Drawing elements:

a. Drawing number (including specification control and source control drawing numbers)

b. Drawing title

c. Code identification number

d. Number of sheets

e. Date of release

f. Change letters

g. Date of change letter release

h. Ancillary document numbers (ECNs, EOs, variations, etc.).

100.4.1.3 Part number elements:

a. Controlling drawing number

b. Part numbers released.

100.4.2 **Production release functional capabilities.** To the extent that the contractor has detail design responsibility, the contractor's release function and documentation, including drawings and associated lists, shall be capable of determining the following released engineering requirements:

a. Except for standard parts, the composition of any part number at any level in terms of subordinate part numbers

b. All next higher (next assembly) part numbers of any part, except parts assembling into standard parts

c. The composition of any HWCI in terms of part numbers and subordinate HWCI numbers

d. The HWCI number and HWCI serial numbers (effectivity) on which any subordinate provisioned or to be provisioned part is used. This does not apply to subcontractors, vendors, and suppliers who are not producing HWCIs.

e. Identification numbers of class I changes which have been partially or completely released for any configuration item number and HWCI serial number and class II changes as pertains to configuration item number

f. The configuration item numbers and HWCI serial numbers which constitute effectivity of each engineering change

g. The military specification numbers or military standard part numbers used within any nonstandard part number

h. The subcontractor, vendor, or supplier part numbers which have been assigned

i. The contractor specification document, specification control drawing numbers, or source control drawing numbers associated with any subcontractor, vendor, or supplier part number.

100.4.3 **Release of engineering changes.** The contractor's release function and documentation shall be capable of identifying engineering changes and retaining the record of superseded configuration requirements, affecting HWCIs which have been formally accepted by the contracting agency.

100.4.3.1 All class I and II engineering changes released for production incorporation shall be identified by identification numbers and shall be completely released prior to formal

acceptance of the HWCI where first installed.

100.4.3.1.1 The configuration released for each HWCI at the time of its formal acceptance shall be retained in release records for the time required by retention of records requirements in the contract, or as otherwise provided in 100.4.4 through 100.4.4.3.

100.4.4 Field release functional capabilities. Engineering data defining formally accepted equipment which is under the jurisdiction of the contractor, or government through category II testing and which is progressing through testing or through activation programs, shall be maintained current with all field activity requirements and released as follows:

100.4.4.1 Superseded requirements may be replaced by superseding requirements in the release records for units of a HWCI mission, design, series or type, model, series which are logistically supported by the contractor and which were accepted prior to the established product baseline (physical configuration audit).

100.4.4.2 Superseded requirements of the product baseline shall be retained as a reference release and superseding requirements added as a requirements release for all units of the HWCI which have been formally accepted or are under the jurisdiction of the contractor.

100.4.4.2.1 Superseded requirements shall be retained in all release records until status accounting records indicate that superseded configurations no longer exist.

100.4.4.3 Engineering changes to HWCIs which have been formally accepted by the contracting agency, and which are not under the jurisdiction of the contractor, shall be released for service action. For service action, the multiple release procedure shall not be used.

100.5 Correlation of engineering changes with manufactured products. It is the objective that each class I engineering change approved by the contracting agency be incorporated in all units within one mission, design, series or type, model, series of the HWCI affected. Complete verification of the production incorporation of engineering changes is therefore required to assure that engineering changes directed were accomplished on specific HWCIs. The requirements for accomplishing this function are based on production and quality control capabilities which the contractor is required to comply with in accordance with MIL-I-45208 or MIL-Q-9858 whichever is a requirement of the contract. Where the contractor has satisfactorily demonstrated his ability to control the design, manufacture, and incorporation of engineering changes, complete verification will be considered accomplished by a documented audit of the first incorporation of the engineering change, and routine surveillance thereafter.

110. SYSTEM ALLOCATION DOCUMENT

110.1 **Purpose.** This appendix provides criteria to be followed in the development of a System Allocation Document (SAD).

110.2 **Scope.** The SAD is used to identify the aggregation of configuration items (computer software, hardware, and facilities) which form the basis for system design and integration. It shall be the document that identifies the location of all configuration items by configuration item serial number for each location of the system/configuration item program. The contractor shall prepare the SAD and shall update and maintain the document as specified in the contract.

110.3 **Organization and content.** The SAD shall include the data contained in sample formats A, B, and C shown on figures 16, 17, 18, however, the format is not a mandatory requirement. The document shall consist of lists, prepared as book form drawings and assigned drawing numbers, which identify the system configuration of each location. It shall also consist of the top assembly drawings of the configuration items at those locations.

110.3.1 This document shall be identified by a title page showing the system/configuration item program designation number assigned by the contracting agency followed by the title "System Allocation Document" as indicated in figure 16, sample A.

110.3.2 Part I of the SAD shall contain the information shown in figure 17, sample B. This information shall be referenced/released by the Government agency or integrating contractor as a book-form drawing. The drawing may be in the form of a data processing machine printout.

    a. The location block shall contain the official designation of the Government agency or other organizational level where the listed configuration items will be integrated as a system for its mission.

    b. The system employment and configuration block shall contain a brief narrative describing the mission at the location and describing the configuration required for that mission.

    c. The specification reference block shall contain the paragraph numbers in the System/Segment Specification, section 3.1 system definition which are applicable to the narrated employment and configuration description. For configuration item programs, the pertinent paragraphs of Section 3.1 configuration item definition of the development specification shall be used.

    d. Mission equipment is the identified configuration items to be formally accepted by the contracting agency at the

contractor's plant for accountability thereafter by the
location. Some of these configuration items will be shipped
to the location with other configuration items installed in
them.

Note: The contracting agency regularly accepts configuration
items from one source and supplies them for installation in
equipment to be furnished as a configuration item by another
source. An example is an engine supplied for installation in an
aerospace vehicle. In these cases, the installing contractor shall
always identify the supplied configuration items in the list of
material of his drawing as Government-furnished.

   e.   The configuration item number for the HWCI, and the software
        inventory number for the CSCI, based on the agreed to
        software inventory numbering system.

   f.   The short title entry shall contain the noun phrase which is
        part of the title of the configuration item top drawing.

   g.   The part number shall contain the part number of all
        quantities of the HWCI allocated by engineering design to
        the location.

Note: Initially, the contractor shall assign just one part number
for all allocations of a configuration item within one Mission,
Design, Series (MDS). Practice to the contrary may indicate that a
part number is being used as a configuration item number,
indicating noninterchangeability and adversely affecting updating
and maintenance.

   h.   The serial number entry shall contain all serial numbers for
        the total quantities of each "configuration item number"
        allocated by engineering design to the location.

   i.   Installed equipment shall contain the configuration items
        that are installed in the mission equipment at the
        contractor's plant, or as removed and replaced subsequent to
        acceptance and recorded in historical records accompanying
        the configuration item.

   j.   The configuration item number entry shall list all
        configuration items installed in each mission equipment
        configuration item number.

   k.   The short title, part number, and serial number shall be as
        defined in paragraphs f, g, and h, respectively, as applied
        to each installed equipment/configuration item number.

110.3.3 Part II of the SAD shall contain the top assembly drawing
and quantity of all configuration items shown in Part I. Figure
18, sample C, is provided as a guide; all entries are

self-explanatory. The equivalent to a hardware top assembly
drawing for computer software is a CSCI architecture diagram found
in the Software Product Specification.

110.3.4 Additional parts may be added, as approved by the
contracting agency, to contain different machine sorts of part I
data.

110.3.5 Configuration items that must be moved to different
locations at intervals shall be listed and identified as such so
that the entry need not be revised each time these configuration
items are rotated or moved from site to site. For each such
configuration item, the list shall identify, where practicable,
the office maintaining records of the configuration item's
movements.

SYSTEM ALLOCATION DOCUMENT

TECH CONTROL EQUIPMENT
FOR
OVERSEAS AUTOVON

(490L PROGRAMS)

LOCATION	DRAWING NUMBER
NAPLES, ITALY	90052151
COLTANO, ITALY	90052152
HILLINGDON, ENGLAND	90052153
LANGERKOPH, GERMANY	90052155
COROZAL, CANAL ZONE	90052156
FELDBERG, GERMANY	90052154
DONNERSBERG, GERMANY	90052158
MARTLESHAM HEATH, ENGLAND	90052160
FLOBECQ, BELGUIM	90052161
HUMOSA, SPAIN	90052162
SCHOENFELD, GERMANY	90052163
FUCHU, JAPAN	90052164
ATHENS, GREECE	90052166
ANKARA, TURKEY	90052167
FINEGOYAN BAY, GUAM	90052168
FUTEMA, OKINAWA	90052169
DAU, PHILIPPINE ISLANDS	90052170
GROSS MOUNTAIN, TAIWAN	90052171

FIGURE 16. Sample A, System Allocation Document

SYSTEM EMPLOYMENT AND CONFIGURATION				SPECIFICATION REFERENCE		LOCATION	
MISSION EQUIPMENT				INSTALLED EQUIPMENT			
CONFIG. ITEM NUMBER	SHORT TITLE	PART NUMBER	SERIAL NUMBER	CONFIG. ITEM NUMBER	SHORT TITLE	PART NUMBER	SERIAL NUMBER

DRAWING TITLE AND NUMBER

4XXL SYSTEMS ALLOCATION DOCUMENT PART I

NUMBER	SHEET	OF	ISSUE

FIGURE 17. Sample B, System Allocation Document

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CONFIG. ITEM NO.	SPEC NO.	EQUIPMENT NOMENCLATURE	CONFIG. ITEM QTY	ASSEMBLY TOP DWG NO.
LOCATION:				

	4XXL SYSTEMS ALLOCATION DOCUMENT PART II		
	NUMBER	SHEET OF	ISSUE

FIGURE 18. Sample C, System Allocation Document

120. CONFIGURATION AUDITS

This Appendix has been replaced by MIL-STD-1521, Appendixes G, H, and I.

130. ENGINEERING CHANGES (EQUIPMENT/MUNITIONS)

130.1 Purpose. This appendix provides supplementary information for configuration control of engineering changes in accordance with DOD-STD-480 and MIL-STD-481. These instructions pertain to all engineering changes (including VECPs) to hardware. Engineering changes to computer software are covered in Appendix XIV of this standard.

130.2 Scope. This appendix establishes unique provisions for engineering changes to the functional baseline as reflected in the system/segment or HWCI specification, the allocated baseline as reflected in the hardware development specifications, and the product baseline as reflected in the hardware product specifications. The baseline established in the contract is changed only by Class I ECPs approved by the contracting agency and incorporated in the contract by contract change documentation.

130.3 DELETED

130.4 Changes to the System/Segment Specification. The ECP format (DOD-STD-480) shall be used, except as follows:

a. The words "system specification ECP" shall be boldly identified directly above block 1, over the words "originator name and address," of DD Form 1692.

b. Figure 5 of DOD-STD-480 is changed to require a DD Form 1692-4, Cost summary, during engineering and operational development to the extent that cost data are available.

c. The mission capability of a system shall be identified by the mission, design, series or type, model, series designation of the system. Mission capability is defined as the system characteristics and operability requirements in the approved system specification. Proposals to change these requirements will only be made by the contracting agency and may result in a new mission, design, series or type, model, series designation of the system as determined by the contracting agency. DOD-STD-480 paragraph 20.9, "Block 31. Development requirements and status."

130.4.1 Changing the System/Segment Specification during the validation phase, including the source selection evaluation period.

130.4.1.1 During the validation phase, any of the competing contractors may require a change to the functional baseline as technically defined in the System/Segment Specification. In this circumstance, the contractor shall initiate a System/Segment Specification ECP for his segment (see Appendix III) per paragraph 4.6.1.1 of DOD-STD-480 and submit it with his formal proposal.

130.4.1.2 The System/Segment Specification shall be revised and expanded at the completion of the validation phase by an ECP. The HWCI development specifications which define the allocated baseline shall establish a more refined basis for the program and the succeeding contract. Any update of the System/Segment Specification at the end of the validation phase or at any other time as finally negotiated shall be accomplished by an ECP.

130.4.2 Changing the System/Segment Specification during the development/acquisition phase. The contractors shall accomplish the following during the development period of the acquisition phase for all ECPs affecting the System/Segment Specifications:

a. When changes to the System/Segment Specification affects the interface of HWCIs, and other contractor/agencies are involved, Appendix II shall be invoked, in which case the ICWG chairman, if any, or the interface control contractor or agency, will establish the responsibilities for actions on the ECP.

b. The contractor initiating the change shall be responsible for determining other contractors, system segments, and the functional interfaces affected.

c. The contractor shall be responsible for coordination of a preliminary ECP with the other affected contractors before submitting it to the systems engineering and integrating contractor or agency whichever is custodian of the System/Segment Specification. The custodian shall assign the ECP number and the SCN number and prepare the SCN.

d. Documentation of the ECP per paragraph titled Class I Changes During Engineering or Operational System Development of DOD-STD-480 shall include the estimated total impact of the change together with a description of the extent of coordination and understanding established with the other contractors. This shall include reference to all ECPs, to configuration items affected and known.

e. Systems engineering and integrating contractors or agencies shall be responsible for review and recommendation on all interface ECPs as well as for preparation of ECPs for changes to systems requirements which they initiate or are responsible to have prepared.

130.4.2.2 The contractors shall prepare ECPs using the following supplemental guidance:

a. Interface (code B) shall be used for all ECPs which affect more than one system segment and which require coordination between two or more contractors.

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b. Changes to integrated system test requirements shall be prepared as an interface ECP when such changes are required to correct the system/segment specification to make it compatible with the test plans. Such changes shall be proposed by the contractor designated by the contracting agency to plan and implement Category II (or equivalent) test program.

130.5 Engineering changes to development specifications.

130.5.1 Changes to development specifications during the validation phase or preparation of proposals. These changes are limited to the following cases:

a. When hardware development specifications are provided by the contracting agency as part of the validation contract or work statement.

b. That portion of the system/segment specification which may indicate use of an existing segment with already established HWCI Development Specifications (e.g., a Thor-Agena launching a new communications satellite system).

130.5.1.1 The validation contractors shall prepare ECPs to change these configuration item specifications using DOD-STD-480 procedures. Unless the contracting agency indicates to the contrary, these ECPs shall be held and submitted as part of the proposal package. The contractor shall coordinate the change with the established segment contractor as an interfacing change using Appendix II of this standard as a guide. The estimated cost of these ECPs shall be included in the contractor's proposed cost for the development/acquisition phase.

130.5.1.2 Contractors for the system segments, which incorporate configuration items having an established baseline, that are conducting a sole source validation under a separate contract shall submit ECPs during the validation period if they require changes to the configuration item specifications being used. Such ECPs must be processed as the design proceeds so that the validation contractors can be kept abreast of changes.

130.5.2 Engineering changes to development specifications during the evaluation period and during the development phase.

130.5.2.1 During the source selection evaluation, any ECPs submitted with the proposal (see 130.5.1 above) shall be formalized by the contractor when so directed by the contracting agency. These ECPs generally shall be no cost ECPs since they are to be included in the price quoted during the validation phase. In the event of changes required by the contracting agency during negotiation, the contractor shall be requested to prepare and submit ECPs, and the cost of these ECPs shall be included in the

negotiated price.

130.5.2.2 Configuration control of the allocated baseline for each HWCI shall be implemented beginning with incorporation of the hardware development specification into the contract. By definition, allocated requirements are in the hardware development specification and ECPs which only change these requirements must be substantiated in terms of performance, cost, or schedule effectiveness.

a. In addition to the requirements of the paragraph of DOD-STD-480 entitled "Class I Changes During Engineering or Operational System Development," a DD Form 1692-3 and DD Form 1692-4 shall be prepared to assess cost impact to the extent that such cost data are available. The figure of DOD-STD-480 entitled "ECP Form DD 1692 Page Utilization" is changed per the above.

b. The contractor shall provide the following additional information in block 17 entry of the DD Form 1692 in DOD-STD-480. The need for the proposed change shall contain a specific definition of the problem which the ECP proposes to solve, or of the new capability which the change proposes to provide. When the ECP is directed toward providing a new capability, the improvements shall be described in specific numerical terms and referred to applicable subparagraphs in the HWCI development specification.

c. Class II changes do not apply to development specifications.

130.6 Engineering changes to the product specification (product baseline). DOD-STD-480 is supplemented as follows for the preparation of ECPs to be submitted for approval after the product baseline has been established in the contract:

a. All ECPs shall be addressed and prepared at the contract level even though the change is at a level of reparable indenture.

b. The SCN will, if the ECP is approved, be the means by which the HWCI specification is changed and the basis for a change to the contract. The SCN number will be shown in block 8 of the DD Form 1692. The SCN for other configuration item specifications shall be listed in blocks 27 and 30. If the system/segment specification is also to be changed, blocks 28 and 30 will show the system/segment specification and system/segment specification SCN numbers.

c. Contractor's own engineering order forms shall be used as specified in paragraph 4.6.2 entitled "Class II engineering changes," of DOD-STD-480 for all Class II changes. The contractor shall use a checklist as an aid in making proper

classification of the ECP. A completed checklist shall accompany each Class II change when it is submitted to the local Government representative. An example of a checklist is shown is figure 19. The local Government representative signature shall be obtained on the engineering order form in all cases.

He will accomplish this review within three working days indicating his approval or disapproval of the classification. If the contractor disagrees with the determination of the Government representative, he shall not release the change. He shall treat the change as Class I and submit the change to the contracting agency for final resolution of the classification.

d. Once the product baseline is established, the hardware Development and the Product Specifications shall be treated as one specification. A single ECP shall be used to change the specifications. Separate SCN pages and specification change pages for the hardware Development and Product Specifications shall be submitted with the ECP.

e. Waivers will not be used when all units of a HWCI are affected.

130.7 <u>Addition of Aerospace Ground Equipment (AGE) HWCIs to the functional/allocated baselines.</u> When HWCIs of AGE required as a part of the total system configuration or to support an individual HWCI or system modification program are identified after award of the contract, the following procedures shall apply. An ECP shall be processed to incorporate the additional HWCI(s) of AGE into the functional/allocated baseline. For purposes of establishing a requirement for AGE, DD Form 1692, blocks 16 and 17, shall be used to describe the requirement/problem against which the following appropriate action will be accomplished:

a. When the HWCI of AGE is a new design (Developmental), the ECP data package shall include a preliminary draft of a development type HWCI specification in accordance with the applicable appendix of MIL-STD-490. The type of development specification shall be determined from the complexity and characteristics of the HWCI.

b. When the HWCI of AGE is an existing design which has been previously procured for the Government inventory (standard), the ECP data package shall include a proposed additional appendix to the inventory item specification (Appendix XII of MIL-STD-490, titled Type C4, Inventory Item Specification).

c. When the HWCI of AGE is a modification to an existing design
    of a HWCI, the ECP data package shall include a description
    of the proposed changes and be in the format of an addendum
    specification to the existing HWCI specification (See
    Appendix IV of this standard).

d. When the HWCI of AGE is an existing design of a privately
    developed HWCI including commercially available products,
    the ECP data package shall include a copy of the
    manufacturer's documentation identifying the form, fit, and
    function parameters of the HWCI. If the privately developed
    HWCI requires modification to make it suitable for the
    proposed application, a description of the required
    modifications shall be included.

130.8 Multiple HWCI ECPs. When more than one HWCI is affected by
a change under the cognizance of a single contracting agency, a
single ECP with separate dash numbers for each HWCI may be used in
lieu of separate ECPs for each HWCI.

CONFIGURATION ITEM _____ CONTRACT/CONTROL NUMBER _____

PART NUMBER _____

ENGINEERING CHANGE CLASSIFICATION CHECKLIST

YES	NO	CRITERIA (NOT LIMITED TO THE FOLLOWING)
		1. Are you recommending retrofit (attrition or kit)?
		2. Does this correct a deficiency (specification values or requirements)?
		3. Would it change Technical Manuals?
		a. Operational or Flight Manual
		b. Maintenance Manual
		c. Illustrated or Nonillustrated Parts Manual
		4. Would operational, test or maintenance computer software be affected?
		5. Are existing spares affected (obsoleted or require modification or will new spares be required)?
		6. Is interchangeability, substitutability or replaceability affected?
		7. Is safety affected?
		8. Is interface, electromagnetic characteristics or compatability affected (with GFE, AGE, or other)?
		9. Is weight, balance, or moment of inertia affected?
		10. Is AGE affected?
		11. Are training devices/equipment affected?

A "YES" answer to any of the above considered in relation to the criteria in DoD-STD-480 and the terms of the contract identifies the change as a class 1 ECP.

FIGURE 19.   Engineering Change Classification Checklist

140. ENGINEERING CHANGES (COMPUTER SOFTWARE)

140.1 Purpose. This appendix supplements the requirements of DOD-STD-480 to provide uniform procedures for preparing, formatting, and processing changes to Computer Software Configuration Items.

140.2 Scope. This appendix establishes the requirements for configuration control that are unique to computer software. It:

a. Supplements DOD-STD-480.

b. Replaces DOD-STD-480 paragraph 4.2.1 titled "Class I engineering change", (paragraph 4.2.1.1 titled "Class I engineering change to a privately developed item", is excluded) and paragraph 4.2.2 titled "Class II engineering change".

c. Provides guidance in preparing the DD 1692 series of forms for engineering changes to CSCIs. Hardware oriented requirements of DOD-STD-480 pertaining to engineering drawings, production/manufacturing, and logistics support do not apply to CSCIs. Other requirements of DOD-STD-480 which have not been supplemented by this appendix shall remain as contractually invoked.

140.3 Applicability. The requirements of this appendix are applicable to all contracts involving CSCIs during the acquisition and operational phases of CSCI design, development, test, and support. Each contractor to the Government shall be responsible for his compliance with this appendix as well as the compliance of his subcontractors, vendors and suppliers to the extent that they are involved in preparing, formatting, and processing engineering change proposals to CSCIs for which the prime contractor is responsible.

140.4 Multiple Configuration Item ECPs. When more than one configuration item is affected by a change under the cognizance of a single contracting agency, a single ECP with separate dash numbers for each configuration item may be used in lieu of separate ECPs for each configuration item.

140.5 Classification. The originator of an engineering change to a CSCI shall classify the change as Class I or Class II. Assuming that its purpose and necessity have been established, each ECP shall be assigned the appropriate classification by the originator in accordance with the definitions in this appendix (paragraph 140.6). Disagreements as to classification of computer software changes shall be processed in accordance with the procedure set forth in DOD-STD-480.

140.6 Definition of classification. DOD-STD-480 paragraphs

4.2.1, (excluding paragraph 4.2.1.1) and 4.2.2 are replaced by the following with respect to Class I and Class II computer software changes.

140.6.1 Class I change. A computer software change shall be classified Class I when one or more of the factors listed (subparagraphs a, b, c, or d) below is affected:

a. The Functional Configuration Identification (FCI) or Allocated Configuration Identification (ACI).

b. The approved Product Configuration Identification (PCI) including referenced documents that pertain to:

   (1) Performance, including reliability, maintainability, correctness, efficiency, integrity, usability, testability, flexibility, portability, reusability, or interoperability, outside stated tolerance.

   (2) Interface characteristics (external to the CSCI).

c. Non-technical contractual provisions:

   (1) Fee

   (2) Incentives

   (3) Cost to the Government

   (4) Schedules

   (5) Guarantees or deliveries.

d. Other factors:

   (1) Government Furnished Equipment (GFE)

   (2) Safety

   (3) Other computer software

   (4) Compatibility with support resources, trainers, or training devices/equipment

   (5) Delivered operation and support manuals for which adequate change/revision funding is not on existing contracts

   (6) Pre-set adjustments or schedules affecting operating limits or performance to such extent as to require assignment of a new software inventory number

(7) Skills, manning, training, biomedical factors or human engineering design.

140.6.2 Class II change. A computer software change shall be classified Class II when it does not fall within the definition of a Class I change in paragraph 140.6.1 above. Examples of a Class II change are (a) a change in documentation only (e.g., correction of documentation errors; corrections to code which do not affect software logic, design, or mathematical formulation; or addition of clarifying notes), or (b) other changes of a minor nature within categories specifically defined by the contracting agency in a given procurement (e.g., adaptation data or recompiling within specified limits).

140.6.3 Class I, ECP types. The type of Class I ECP applicable to CSCIs shall be used in accordance with the following guidelines. A preliminary ECP shall be prepared in accordance with DOD-STD-480. A formal ECP shall contain an assigned SCN number and sufficient definition of a proposed change and its impact, including schedule and cost data, to support formal approval and contractual authorization. Definition of the proposed change provided with a formal ECP need not normally include exact changes in CSCI specification data to the degree that such data represents products of the total computer software change implementation process.

140.7 Instructions for the preparation of ECP forms.

a. The contractor shall use the ECP form and format illustrated in DOD-STD-480 for the preparation of all Class I ECPs to CSCIs.

b. Instructions for ECP preparation contained in Sections 10 through 60 of Appendix A to DOD-STD-480 shall apply except as noted herein.

c. ECPs shall be submitted in the uniform format specified herein for all proposed changes:

(1) To the functional configuration identification and allocated configuration identification both before and after establishment of a product baseline for the CSCI, and,

(2) To the product configuration identification after the product baseline has been established.

140.8 Engineering Change Proposal DD Form 1692, Page 1.

140.8.1 Block 2, Class of ECP. Enter I or II for the applicable ECP Class as defined in 140.6.1 and 140.6.2 above.

140.8.2 **Block 5, ECP designation.** Instructions contained in paragraph 10.6 of DOD-STD-480 titled Block 5. ECP Designation apply, except for modified subparagraphs (a) and (b) as noted below:

a. Model/type - enter the CSCI identification.

b. Enter either a "P" for preliminary or "F" for formal, in accordance with 140.6.3 herein.

140.8.3 **Block 8, Specification and other data affected.** The data items to be examined by the contractor for identification in this block shall include, at the minimum, all items listed on the Contract Data Requirements List (CDRL) for the CSCI development contract, as well as previously-delivered support and user manuals associated with the CSCI. This entry shall identify each data item affected by the proposed change, the nature of the effect, and any relevant impact on schedule or delivery of the data item.

140.8.4 **Block 9, Drawings affected.** List all drawings affected by the change.

140.8.5 **Block 13, In production.** This block is not applicable to CSCIs.

140.8.6 **Block 14, Name of part or lowest assembly affected.** Enter the names of Top Level Computer Software Components (TLCSCs), Lower Level Computer Software Components (LLCSCs), and Units affected.

140.8.7 **Block 15, Part number or type designation.** Enter the identification and revision status designator of each TLCSC, LLCSC, and Unit identified in block 14.

140.8.8 **Block 18, Effectivity.** Identify, by CSCI version number, the version of the CSCI into which the change will be incorporated. Enter the date(s) of the SCN(s). In the ECP submittal, the contractor shall indicate the new version number in block 18. If the impact of the ECP merits the issuance of a new version of the CSCI, block 18 of the ECP submittal shall also include a recommendation to this effect. Serial numbers may be used in lieu of version numbers upon agreement of the contracting agency.

140.8.9 **Block 19, Effect on production delivery schedule.** Identify effect on delivery schedule.

140.8.10 **Block 20, Retrofit.** This block may or may not apply to CSCIs. However, if the CSCI change is part of a larger hardware/equipment change and incorporation of the CSCI change is per a hardware retrofit schedule, that information will be included here either directly or by reference.

140.8.11 Block 21, Estimated costs/savings under contract. Enter a dollar estimate of costs (contract funding), either increased or decreased, which will result if the change is approved by the contracting agency. If the contractor at the time of submission of the formal ECP has available the firm cost proposal, this proposal shall be submitted and shall be accompanied by the appropriate cost breakdown.

140.9 Engineering Change Proposal DD Form 1692-1, page 2, Effects on functional/allocated configuration identification.

140.9.1 Block 29, Effects on employment, training, or operational effectiveness. The contractor shall enter the following information as applicable to the phase of CSCI development/operation at the time of ECP submission:

a. Describe effects of the proposed change on personnel and training requirements, including any changes or the effects on the operability or support of the system.

b. Identify any effect on contract engineering technical services that increases the scope or dollar limitation established in the contract.

c. Identify any required changes to the data base parameters or values, or to data base management procedures.

d. Identify and explain any estimated effects of the proposed change on acceptable computer operating time and cycle time utilization.

e. Provide an estimate of the net effect on computer software storage.

f. Identify and explain any other relevant impact of the proposed change on utilization of the system.

140.9.2 Block 31, Developmental requirements and status. The contractor shall identify in this block the schedule sequence of computer software design/development/test activities which will be required to implement the proposed change. In the case of ECPs which are initiated following the completion of significant preliminary design of the CSCI, or of a new CSCI version, specific information shall be entered in this block to identify significant requirements for computer software redesign, re-assembly, re-compiling, recoding, retest, special installation, adaptation, checkout, or live environment testing, as applicable, and to identify the specific impact of these factors on existing schedules for completion.

140.10 <u>Engineering Change Proposal DD Form 1692-2, page 3, Effects on product configuration identification.</u> Specific terms of information to be reported on DD Form 1692-2, as specified in the instructions under Section 30 of Appendix A to DOD-STD-480 are either already provided on the forms 1692 and 1692-1 or do not readily apply to computer software. In general, factors associated with the use and operation of CSCIs depend more directly on characteristics defined at the level of the requirements specification (Software Requirements Specification, and, if applicable Interface Requirements Specification(s)) than on those defined at the product configuration level; and factors of computer programming support are rarely, if ever, affected by modifications in the CSCI product configuration. However, the contractor shall review these factors and comply with the intent of blocks 37, 38, 42, 43, 44, and 46.

140.11 <u>Engineering Change Proposal DD Form 1692-3, page 4, Estimated net total cost impact.</u> DD Form 1692-3 shall not be used with ECPs to CSCIs. Net total cost estimates shall be based on all impact factors identified in the relevant blocks of DD Forms 1692 and 1692-1 and shall be reported as specified in 140.8.11 herein.

140.12 <u>Engineering Change Proposal, Page 5, Cost savings summary.</u> DD Form 1692-4 shall not apply in the case where all related ECPs being summarized refer to computer software changes only. When the related ECPs include changes to HWCIs, the form shall be used in accordance with instructions contained in Section 50 of Appendix A to DOD-STD-480.

140.13 <u>Engineering Change Proposal DD Form 1692-5, Page 6, Milestone chart.</u> DD Form 1692-5 shall not be used with ECPs for CSCIs. The significant scheduling information associated with computer software changes is normally that information relating to milestones in the change analysis/design/development/test process (e.g., as required in block 31 of DD Form 1692-1; see 140.9.2 herein). Schedule information for CSCI changes shall be provided, listing significicnt developmental milestones associated with the change, and representing events by the use of standard milestone chart symbols.

140.14 <u>Instructions for preparation of Notice of Revision (NOR) DD Form 1695.</u>

140.14.1 <u>Blocks 1 - 9.</u> A NOR is applicable to a CSCI when it was not specifically developed for a given system (commercially available) but is utilized with the system. For example, maintenance/diagnostic and utility programs that are provided with a given general purpose computer and must be modified/changed to operate within the allocated systems environment. The NOR would provide a record of change to the commercially available software for present and future use.

150. REPORTING THE ACCOMPLISHMENT OF

UPDATING/RETROFIT CHANGES

150.1 **Purpose.** This appendix applies to system, computer software, and equipment contractors responsible for releasing engineering and affecting TCTO/ECP accomplishments of approved Class I changes (DOD-STD-480). These data will be used by the contractor to update the configuration status accounting reports that he is producing for the contracting agency. This appendix does not supersede the requirements for reporting TCTO accomplishments via the AFTO Form 349 when AFM 66-1 and the 00-20 series technical orders are applicable.

150.2 **Applicability.** Each contractor to the contracting agency shall be responsible for compliance by his subcontractors, vendors, and suppliers to the extent specified in 1.3 of this standard.

150.3 **Scope.** Contractors shall record and report the accomplishment of Class I changes (DOD-STD-480) for system, computer software, equipment, and spares. Figure 20 is a suggested format for use in recording such information. This format shall not be used to report in-production changes. After preparation, the contractor shall forward the original and all copies with retrofit kit or modification instructions to the contracting agency or contractor agency having custody of the configuration item affected. Integrating contractors shall prepare an original and two copies of the report. In instances where a change to a configuration item must be accomplished concurrently with a change approved for associate contractor configuration item, an original and three copies shall be prepared.

150.3.1 Contracting agency or contractors having custody of the configuration items affected shall complete copies of the report upon accomplishment of the approved change. The completed original will be retained for filing with the equipment records. One copy shall be forwarded to the contracting agency configuration management organization, if required another copy shall be forwarded to the associate contractor's configuration management organization, and the third copy shall be forwarded to the contractor preparing configuration status accounting reports for the contracting agency. Processing of these completed reports shall be accomplished as they occur.

150.4 **Preparation instructions.** All entries on the report, with the exception of the signature blocks, shall be typewritten whenever possible. If a typewriter is not available, the entries shall be inserted with permanent black, blue, or blue-black ink. Signatures shall be made with permanent black or blue-black ink.

150.4.1 Format and entries

a. Block 1 - location - Enter the location where the change shall be accomplished. Example: "Electronic Systems Division," "Air Force Western Test Range," "576 Squadron."

b. Block 2 - identification of change - Enter ECP number as well as Time Compliance Technical Order (TCTO) and Data Code Number, when applicable.

c. Block 3 - configuration item affected - Enter all applicable numbers

d. Block 4 - date- Enter date of installation

e. Block 5 - check appropriate square and explain when necessary (see figure 20)

f. Block 6 - problems encountered during installation - Make entry when appropriate

g. Block 7 - proposed solution - Make appropriate entry

h. Enter "X:" in applicable "Distribution To" blocks

i. Sign and record "Name of Contractor Installation Agency" under "Installation Accomplished By"

j. Sign and record "Name of Government Inspection Organization" under "Installation Inspected By."

UPDATING/RETROFIT CHANGES

INSTALLATION COMPLETION NOTIFICATION

(1) Location		
(2) Identification of Change ECP No _____ TCTO No _____ Data Code No _____	(3) Config. Item Affected Config. Item No_____ Serial No _____ Part No _____ Version No _____	(4) Date

(5) Installation Fully Completed ☐   Partially Completed ☐
If Partially Completed,
Explain

(6) Problems Encountered During Installation

(7) Proposed Solution

Distribution to:	Installation Accomplished By:
Contract CMO ☐	**Signature Required**
Contracting Agency CMO ☐	Name of Contractor Installation Agency
Contractor/Government	Installation Inspected By:
Record Center Office ☐	**Signature Required**
	Name of Government Inspection Organization

FIGURE 20. (Sample Form)   Installation Completion Notice

160. NON COMPLEX COMPUTER PROGRAM SPECIFICATION

This Appendix has been deleted.

170. CRITERIA FOR SELECTING CONFIGURATION ITEMS

170.1 Purpose. This appendix provides criteria for selecting configuration items.

170.2 Scope. The criteria of this appendix shall be used in the configuration item selection process whenever it occurs during the life cycle.

170.3 Applicability. Each contractor shall be responsible for his compliance with this appendix as well as the compliance of his subcontractors, vendors, and suppliers in accordance with paragraph 1.3 of this standard.

170.4 General Considerations.

170.4.1 Need for Configuration Item Identification. Selection of configuration items is based on the definition contained in DOD-STD-480A: "an aggregation of hardware/software, or any of its discrete portions, which satisfies an end use function... configuration items are those specification items whose functions and performance parameters must be defined and controlled to achieve the overall end use function and performance."

170.4.2 Level of Government Control. The configuration item must be a manageable level of assembly. The selection of configuration items is normally a function of anticipated design and should be independent of the concept for future reprocurement. The selection process separates the elements of a system into individually identified subsets for the purpose of managing their development. The selection is normally limited to the designation of configuration items to major subsystem levels of the Work Breakdown Structure, or to a critical item of a lower level, when so identified. Configuration item selection reflects an optimum management level during acquisition. This level is one at which the contracting agency specifies, contracts for, and accepts individual elements of a system.

170.4.3 Logistics and Life Cycle Considerations. The selection of hardware/software to be managed as configuration items should be determined by the need to control a configuration item's inherent characteristics or to control that configuration item's interface with other configuration items. The selection is a management decision normally accomplished through the system engineering process in conjunction with configuration management and with the participation of logistics. Selecting configuration items should be with a full view of the life cycle cost and management impacts associated with such a designation. Choosing too many configuration items increases the cost of control; choosing too few or the wrong elements as configuration items runs the risk of too little control through lack of management visibility. It must be determined what control is needed to be

exercised in light of cost/benefit trade-offs. The configuration item selections are made accordingly.

170.4.4 Common Subsystem Considerations. On development programs for subsystems or support equipment that will be common to more than one system, the basic configuration item should be that assembly that is common to all applications. An assembly part that is required to meet interface or other requirements peculiar to one of the systems should be identified as a separate configuration item in that system.

170.4.5 Schedule Considerations. The major elements comprising the system should be identified as configuration items during the Demonstration and Validation Phase. Early selection of configuration items is important since management emphasis becomes greater as development progresses. As development continues and logistic or technical considerations surface, additional hardware/software can be designated configuration items. Usually, the configuration item selection process should be essentially complete by PDR for HWCIs and SSR for CSCIs.

170.5 Specific Considerations. The following paragraphs discuss some of the considerations upon which the configuration item selection decision shall be based.

170.5.1 DELETED

170.5.2 Engineering Release System. The configuration item must allow the contractor to release engineering changes at an assembly level which is reportable and which enables verification of change incorporation, i.e., does not preclude change incorporation verification in a lower level assembly.

170.5.3 Criticality. A configuration item should be identified as a separate configuration item if failure of the configuration item would adversely affect security, human safety, the accomplishment of a mission, or nuclear safety, or would have a significant financial impact.

170.5.4 Existing or Modified Existing Design Items. Existing articles that are not configuration items developed at Government expense should not generally be candidates for reidentification as new configuration items on new programs. Existing/modified design and commercially available equipment/computer software should not necessarily be excluded from configuration item selection. The considerations identified in the remaining subparagraphs of paragraph 170.5 should be addressed prior to making a decision.

170.5.5 New or Modified Design. Careful consideration shall be given new or modified design items, wherein more than a modest degree of complexity, utilization of new materials, processes or technology is involved; and, where the contracting agency wants

direct control over the performance requirements for that design item, at a specific time, i.e., when the contracting agency is directly concerned with detailed development.

170.5.6 <u>Interfaces.</u> Interfaces among HWCIs and CSCIs should be simple. Functions which are highly data or control interdependent should be allocated to the same HWCIs or CSCIs. Functions which exhibit a high disparity between input and output data rates should be allocated to separate HWCIs or CSCIs.

170.5.7 DELETED

170.5.8 <u>Maintenance.</u> When different agencies have responsibility for maintaining parts of an element, consider breaking the element into separate configuration items. An item which is clearly designated as "Repairable" is much more a configuration item candidate than one which is not repairable. Eventually logisticians must deal with the Line Replaceable Units (LRUs) which comprise the principal components of the subsystem. However, designating configuration items at the LRU level at the onset of full-scale development (FSD) would add significant cost to the development effort, especially in the area of change management. The LRU level is usually too low a level for effective configuration control during development.

170.5.9 <u>Support Equipment Considerations.</u> Without proper planning, minor items of support equipment could swell the list of configuration items. Minor in this context refers to items such as individual hand tools, as compared to hydraulic torque wrenches, engine build-up tools, etc. There will usually be little or no change activity on many of these minor items. It may be sufficient to list these items as "support equipment" in paragraph 3.2.4 of the configuration item Type B specification per MIL-STD-490 paragraph 20.3.2.4.c.

170.5.10 <u>Subassembly Characteristics.</u> Subassemblies (within a configuration item) should have a common mission relationship; should have common installation and deployment requirements (ground and airborne segments would be separate configuration items); should have a cycle of changes dependent on the configuration item; and should not be the subject of separate test or formal acceptance by the contracting agency (should be accomplished as part of a configuration item). If these conditions are not met, the subassembly should be either part of another configuration item or a separate configuration item.

170.5.11 DELETED

170.5.11.1 DELETED

170.5.11.2 DELETED

170.5.11.3 DELETED

170.5.12 Types. If there are different configurations due to different adaptation data for each operating location, the different configurations should be identified by types (MIL-STD-490 paragraph 4.1.2 and 4.3b) within a single configuration item.

170.5.13 Function. A given configuration item should avoid mixing training, mission (including initialization, normal operation, and back-up or degraded operation), test and maintenance, and support functions.

170.5.14 Supplier. Elements provided by different suppliers should be assigned to separate configuration items.

170.5.15 Use. Elements which are general purpose in nature, require the capability to be operationally reprogrammed, or are intended to be reused in another system or are likely to be changed after initial deployment should be considered as separate configuration items.

170.5.16 Location. The functions allocated to a configuration item should not be partitioned among separate geographic areas. Functions allocated to physically distinct processors in a distributed environment should be considered as separate configuration items.

170.5.17 Size. Configuration item selections which cannot be made on the basis of other criteria should be made to keep the configuration item to manageable proportions.

170.5.18 Schedule/Phasing. Elements scheduled for development, testing, and delivery at different times should be assigned to separate configuration items.

170.6 Effects of Configuration Item Selection. Configuration item selection affects cost, schedule and performance for the contracting agency, prime contractors, subcontractors and suppliers. The effects of configuration item selection should not be permitted to occur automatically upon selection of an item as a configuration item. The effects which are unnecessary or premature can be tailored out for each configuration item by means of an appropriate contractually recognized vehicle, e.g., Program Plan, Statement of Work, CM Plan, Exceptions and Deviations. Selection of an item as a configuration item for manageability may be based on its administrative complexity, technical (engineering) criticality or maintenance (logistics) criticality. The following is a listing of the usual effects of configuration item designation:

a. Formal preparation of discrete configuration identification - most often in the form of a specification(s).

b. A discrete development or requirements specification and a companion product specification.

c. Government approval of changes over the configuration identification governing the configuration item.

d. Continuing an accurate recording of the exact configuration status of the configuration item, including providing field activities precise data dealing with impending or completed modification actions.

e. Providing traceability of detailed design for follow-on activity, including historical data and individual status information for accident investigations, failure analysis, etc.

f. Individual design review activity (PDR, CDR, FQR, etc.) during development.

g. Individual qualification testing and reporting.

h. Individual physical and functional audits (PCA and FCA) at the conclusion of development.

i. Discrete and separate "related" ECP development preparation, review, approval and negotiation (for changes to configuration items).

j. Separate identification indices and qualification records.

k. Separate nameplates and discrete configuration item identifiers (i.e., configuration item number, type, model, series, etc.).

l. Preparation of separate operator's and user's manuals.

170.7 Effects of selecting too many configuration items. Too many configuration items may result in effects hampering visibility and management rather than improving it. These effects include:

a. Increased administrative burden in preparing, processing, and status reporting of engineering changes which tends to be multiplied by the number of configuration items.

b. Increased development time and cost as well as possibly creating an inefficient design.

c. Possible increase in management effort, difficulties in maintaining coordination and unnecessary generation of paper work.

170.8 **Effects of selecting too few configuration items.** Too few configuration items may result in costly logistics and maintenance difficulties. The following may result:

a. Loss of identity through separation of affected portions of a configuration item during field or depot maintenance or modification installation activity, e.g., an autocollimator and its mount.

b. Inability to control like individual remove/replace items when configuration item identification and control is at the "set" level, e.g., a storage battery set.

c. Loss of operational use of one function because required maintenance on another function requires action against the configuration item level, e.g., a configuration item having separate VHF/UHF functions loses both when maintenance must be done on either function.

170.9 **Configuration Item Selection Checklist.** The following questions should be used in selecting configuration items tailored to individual program/project requirements. If most of the questions can be answered NO, the item probably should not be a configuration item. If most of the questions can be answered YES, the item probably should be a configuration item. If the questions can be answered with approximately equal numbers of YESs and NOs, additional judgement is needed to determine if the item should be a configuration item. The selection of configuration items is a management decision based on experience and good judgment. It should be kept in mind that some of the factors such as serialization and nameplates will be required, regardless of configuration item selection, e.g., part of a higher level assembly.

a. Is it a critical high risk, and/or a safety item?

b. Is it readily identifiable with respect to size, shape and weight (hardware)?

c. Is it newly developed?

d. Does it incorporate new technologies?

e. Does it have an interface with hardware or software developed under another contract?

f. With respect to form, fit or function, does it interface with other configuration items whose configuration is controlled by other entities?

g. Is there a requirement to know the exact configuration and status of changes to it during its life cycle?

Custodian:
  Air Force - 10

Review Activities:
  Air Force - 11,13,15,17,19,26

Preparing activity:
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(Project CMAN-0-007)

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