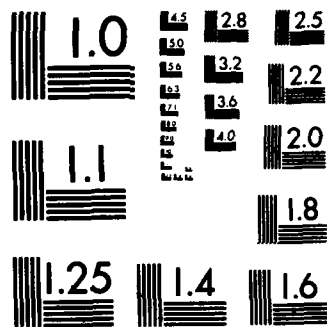




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HANDBOOK FOR EVALUATION AND LIFE CYCLE
PLANNING FOR SOFTWARE

Volume I: Program Management

Michael Forshee, Capt, USAF
Teresa Fox-Daeke, Capt, USAF
James Dalrymple, Capt, USAF
Dan Papa, Capt, USAF
Steve Forest, 1Lt, USAF
Guy Ingram, 2Lt, USAF

1 February 1983

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ELECTRONIC SYSTEMS DIVISION
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REVIEWED BY

Charles Carvalho Jr., Captain

CHARLES CARVALHO, Jr., Capt, USAF
Computer Systems Acquisitions Manager

William P. Nelson

WILLIAM P. NELSON, Capt, USAF
Chief, Computer Resources Engineering Branch

FOR THE COMMANDER

Eugene C. Kalkman

EUGENE C. KALKMAN, SES
Chief Engineer & Assistant
Deputy for Technical Operations

APPROVED BY

Joseph J. Farinello

JOSEPH J. FARINELLO, GM-14
Chief, System Quality Division
Deputy for Acquisition Logistics
and Technical Operations

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ACKNOWLEDGEMENTS

This book was developed to assist ESD computer resource personnel in the performance of their daily acquisition related activities. It contains a collection of available software related guidelines, checklists, and standard verbage associated with AF 800 series software and computer resources life cycle activities. The activities provided came from many different sources, e.g. guidebooks, Computer Resource Acquisition Management System (CRAMS), MITRE studies, information exchanges with other AFSC product divisions, and most importantly, from experienced software acquisition managers here at ESD.

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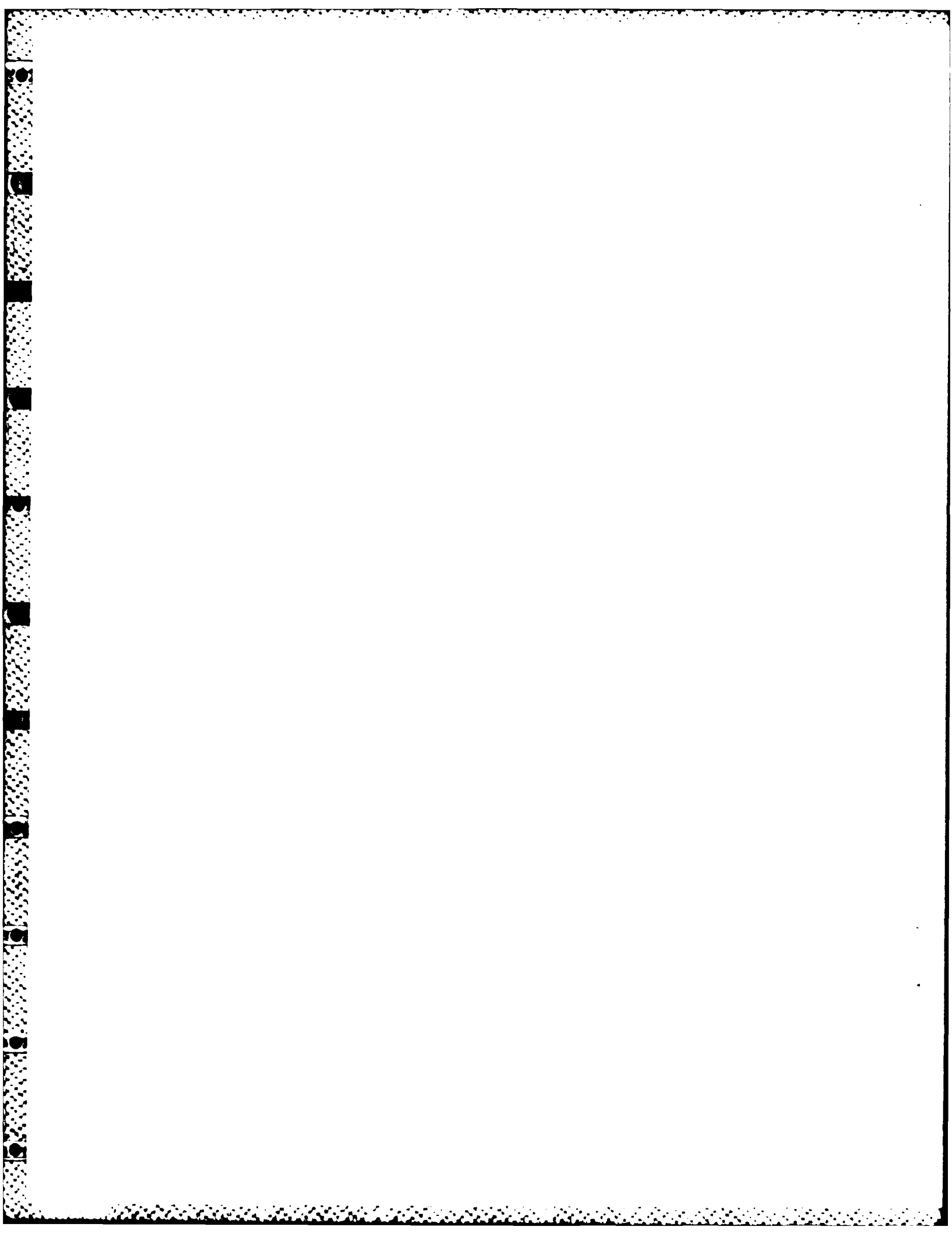
VOLUME I: PROGRAM MANAGEMENT

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Section 1. Program Management Plan

1-1. Review the program PMD, AFSC Form 56, and ESD Form 211 to determine program specific direction.

1-2. Review AFSCR/AFLCR 800-2, Management of Multi-Service Systems, Programs, and Projects for Tri-Service Programs.

1-3. Review AFR 800-2, Acquisition Program Management with emphasis on the attached DOD Directives.

1-4. Review AFSCP 800-3, A Guide for Program Management. Particular attention should be paid to Paragraph 3-7, Chapter 23 - Managing Computer Resources.

1-5. Prepare the software portion of the PMP so that it provides planning for acquisition management and management visibility of project status. Insure coverages of the following areas, when applicable (Ref AFR 800-14, Vol II, para 3-7):

a. Operational and support concepts for computer programs based upon studies, analyses, experience, command inputs. Organic support decisions must be based on AFR 26-12.

b. Identification of allocated computer resource technical and managerial expertise.

c. The system engineering approach used to change operational requirements to computer resources.

d. The pros and cons of hardwired vs programmable computers, including design risk, system integrity and life cycle cost.

e. Standardization and commonality consideration used in determining system hardware and software requirements.

f. Computer program and data rights requirements.

g. A master, computer resource, development schedule showing interrelation to the total system acquisition life cycle.

h. Identification of required intersystem interfaces.

i. Growth and spare processing capacity requirements.

j. Requirements for acquisition and support of documentation.

k. Software support facility requirements; simulation, integration and other applicable facilities.

l. Configuration management concepts.

m. Criteria for the transfer of program management responsibility and system/equipment turnover.

1 February 1983

n. Preparation of the Computer Resources Integrated Support Plan, (CRISP).

1-6. Insure provisions have been made to develop a CRISP (AFR 800-14, Vol II, Paragraphs 3-7, and 3-8).

1-7. Coordinate draft PMP with program office and all applicable outside agencies.

Section 2. Interface Control Working Group

- 2-1. Review AFR 800-14, Volume II, Para 6-5.c for compliance requirements.
- 2-2. Review MIL-STD-483, Appendix II, Para 20.6 for ICWG compliance requirements.
- 2-3. Insure that the ICWG identifies and controls all software interfaces which cross contract boundaries (e.g., external to the given contract or are external to this system).
- 2-4. Participate in ICWG meetings covering software interfaces.
- 2-5. Assist in preparing Interface Control Documents (ICDs) for external software interfaces.
- 2-6. Insure that the contractor designs according to the ICDs.

Section 3. Computer Resources Integrated Support Planning

- 3-1. Review AFR 800-14, Vol II, paras 3-8 and 3-10, and Chapter 10 for compliance requirements.
- 3-2. Review AFLCR 800-21 for informational purposes only.
- 3-3. Review AFR 66-14 for Maintenance Concepts.
- 3-4. Review AFR 800-8 for Integrated Logistics Support Planning Concepts.
- 3-5. Review AFR 800-4 for Program Management Responsibility Transition Agreements.
- 3-6. Review AFR 800-19 for System/Equipment Turnover Agreement Concepts.
- 3-7. Review ESD Guidebooks ESD-TR-77-327 "Software Acquisition Management - Software Maintenance", ESD-TR-77-130 "Software Acquisition Management - Software Development and Maintenance Facilities" and ESD-TR-75-85 "AF Guide for Monitoring and Reporting Software Development Status".
- 3-8. Review the following Program Management Documents (when they first become available).
 - (a) Program Management Directives (PMD)
 - (b) Program Management Plan (PMP)
 - (c) Request for Proposals (RFP)
 - (d) Integrated Logistic Support Plan (ILSP)
 - (e) Computer Program Development Plan (CPDP)
 - (f) Operational Support/Configuration Management Plan (OS/CMP)
 - (g) Interface Control Documentation (ICD) (if applicable)
- 3-9. Review Figure I-3-1, Computer Resources Integrated Support Plan Outline.
- 3-10. Review Figure I-3-2, Operational Support/Configuration Management Plan Outline.
- 3-11. Review Figure I-3-3, Computer Resources Integrated Support Plan Checklist.
- 3-12. Review Figure I-3-4, Model Computer Resources Working Group Charter.

Figure I-3-1. Computer Resources Integrated Support Plan

(Reference AFLCR 800-21, Attachment 7)

1.0 Introduction.

1.1 OVERVIEW. (Give the purpose of the CRISP and identify the system/subsystem it addresses. Include a brief program summary along with the structure of CRISP, i.e., number of volumes and subjects.)

1.2 APPLICABILITY. (State any pertinent background not included in Paragraph 1.1. Document the scope of the CRISP and the authority (i.e., PMD, AFR 800-14, etc.))

1.3 REFERENCES. (This paragraph may include abbreviations/acronyms, glossary, and list of applicable documents. Basically relate the CRISP to other CRISP interfaces.)

1.4 SYSTEM DESCRIPTION. (A brief description of this weapon system and/or subsystem and present status of the system. Not a detailed description.)

1.5 PROCESSOR(S) AND SOFTWARE DESCRIPTION. (Processor identification and a description of the software (firmware) associated with each system/subsystem. Microprocessor applications should be identified as software intensive or hardware intensive. Firmware should be classified as software intensive (SWIF) or hardware intensive (HWIF). A block diagram should be included to provide graphic representation of the system.)

2.0 Management Approach.

2.1 MANAGEMENT FOCAL POINTS. (This section should contain information on CRWG members, organizations involved, offices of primary responsibility (OPR) and their responsibilities, organizational structure, and interface description for pre- and post-PMRT. An organizational chart should be included.)

2.2 SUPPORT CONCEPT. (Details of the support should include plans/procedures to establish and operate the support facility with reference to the management impacts. Phase charts for implementation may be included. Identification of funding requirements should be documented for all phases of life cycle support. Emphasis should be given to the tasks AFLC performs in support of development before PMRT for SPO budgeting; for instance, those tasks performed by the industrially funded Software Support Centers.)

2.3 SYSTEM/SUBSYSTEM TURNOVER. (This section details the plans/procedures for operational and support system turnover. It gives procedures/plans for the support of computer programs during turnover.)

2.4 PROGRAM MANAGEMENT RESPONSIBILITY TRANSFER (PMRT). (Paragraph gives procedures/plans for operational system before and at PMRT. Include the procedures/plans for support system operations pre- and post-PMRT. Separate PMRT plans may be referenced where appropriate, and will become a part of this plan to the extent at which they apply to computer resources.)

1 December 1983

2.5 SOFTWARE CHANGES. (This paragraph details methodology and time constraints for reprogramming actions on the operational programs (i.e., block changes, emergency changes.) Information should include pre- and post-PMRT.)

2.6 MODIFICATIONS. (Identify procedures for modifications to the system according to AFR 57-4.)

2.7 DEFICIENCY REPORTING. (Identify method for reporting deficiencies in computer programs and procedures to correct these deficiencies.)

3. Configuration Management.

3.1 GENERAL. (Identify basic concepts for maintaining configuration control of the computer resources. Include references to applicable documents as appropriate. Also reference the appendix for designating the CPCI listing.)

3.2 CONFIGURATION CONTROL RESPONSIBILITIES. (This section should detail the change control authority, organizational responsibilities, and interaction/interface between acquiring, using, and supporting commands. The information should cover pre- and post-PMRT.)

3.3 CHANGE CONTROL. (Identify the plans and procedures for recommending, approving and processing changes to the computer programs. These changes may be software only, software/hardware, and routine vs emergency change requirements. These plans and procedures should cover pre- and post-PMRT.)

3.4 STATUS ACCOUNTING. (Identify the CPCI configuration baseline and procedures for accounting for implementation of the change(s).)

3.5 COMPUTER PROGRAM CONFIGURATION ITEM IDENTIFICATION (CPIN). (Identification of the computer programs as configured items and procedures for assigning Computer Program Identification Number. Reference CPIN Compendium 80-1 and AFR 800-21, Chapter 11.)

4.0 Documentation.

4.1 DATA RIGHTS. (This paragraph should address data rights and licensing agreements for all software.)

4.2 OPERATIONAL SYSTEM DOCUMENTATION. (Identify the documentation required to support the operational system (i.e., organic, contractor) which will assume timely support of all involved computer programs according to the support concept. Include need dates and transfer methods.)

4.3 DOCUMENTATION CONTROL PLANS/PROCEDURES. (This section should cover the documentation control plans/procedures for controlling and updating documentation. Also address storage plans/procedures for documentation.)

4.4 DOCUMENTATION IDENTIFICATION (CPIN).

5.0 Personnel and Training.

5.1 PERSONNEL. (Identify personnel and specialty requirements for managing and supporting the computer resources involved. This section should also identify the contractor resources required for interim contractor support and funding responsibility.)

5.2 TRAINING. (This section should identify the training required (formal and informal) to support the computer resources involved and ensure successful operation and management of the system.)

6.0 Support Equipment/Software and Facility Requirements.

6.1 EQUIPMENT REQUIREMENTS. (Identify supporting command equipment required to support the operational software programs following PMRT. The concept for acquisition, integration, and operation of the support equipment and plans for verification and validation of the support equipment should be identified.)

6.2 SOFTWARE/FIRMWARE. (Identify the software/firmware programs required; method for acquisition, integration, and operation; plans for verification, validation, and engineering analysis of the operational software; and related mission equipment interfaces.)

6.3 SUPPORT SOFTWARE (GENERAL). (Describe support software (i.e., computer, translators, scientific subroutines, media to media conversion programs, etc.,) required and identify associated documentation if not identified in Section 4.0.)

6.4 FACILITIES. (Describe the requirements for physical housing of support equipment and plans to establish housing.)

6.5 MAINTENANCE OF COMPUTER RESOURCES EQUIPMENT. (Identify a plan to maintain the equipment to include funding responsibilities.)

7.0 Test Support.

7.1 OPERATIONAL TEST AND EVALUATION. (Identify field requirements, adaption for operational personnel, special support equipment, special support procedures, interfacing agencies, and any special maintenance requirements.)

8.0 Verification and Validation (V&V).

8.1 OPERATIONAL SOFTWARE. (Identify verification and validation and acceptance testing requirements for computer programs involved. Include plan and requirement for independent V&V of the operational software and any interfacing agencies. Responsibilities and procedures for V&V prior to and following PMRT.)

8.2 SUPPORT SOFTWARE. (Identify verification and validation and acceptance testing requirements of support software. Plans and requirements for independent V&V of support software. Separate test plans and procedures developed for the purpose may be referenced. Responsibilities and procedures for V&V prior to and following PMRT.)

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9.0 Security. (Identify any special security handling procedures and the impact of the security procedures on operational support.)

10.0 Security Assistance. (Identify the sale or possible sale of the system to a foreign country, the equipment/software that is not releasible to foreign countries, and the support concept/responsibilities.)

Figure 1-3-2. Operational Support Configuration Management Plan Outline

(Reference AFLCR 800-21, Attachment 6)

1.0 INTRODUCTION. (A general overview of the applicable system, commands supporting, implementing and using the system, and areas of emphasis in the procedures.)

1.1 PURPOSE. (Discusses what the procedures will establish in regards to support operations, responsibilities and relationships of involved organizations and which are to be used from system turnover and post-PMHT.)

1.2 SCOPE. (Identifies specific command organizations, configuration management requirements, and functional responsibilities affected by this plan.)

1.3 APPLICABILITY. (Define the relationship of this plan to controlling documents (AFRs) and other management documents. Applicable Memorandums of Agreement will be superseded by the appropriate O/S CMP.)

1.4 DEFINITIONS/ABBREVIATIONS.

1.5 APPLICABLE DOCUMENTS.

2.0 MANAGEMENT FOCAL POINTS. (These sections shall explicitly delineate commands and their affected organizations' authority, responsibilities, interrelationship, configuration management requirements, and operation management requirements.)

2.1 CONTROL BOARDS, PANELS, AND GROUPS. (Single control points for the ECS and each of its CPCIs will be addressed in terms of:

1. Control authority will be defined, delineated, and control point interfaces explicitly defined.
2. Responsibilities will be delineated to comply with AFR 800-14 Chapter 6 and the applicable involved Command's management plans.
3. Control boards/panels will be explicitly defined in terms of membership, authority, responsibility, and interface relationships.)

2.2 ORGANIZATION RESPONSIBILITIES. (Support/User/Implementing organizations will be defined in terms of:

1. System and CPI requirements and responsibilities.
2. Requirements for system and CPI support.
3. Participation in verification/validation test planning, accomplishment, and evaluation.
4. Participation in system and CPI change process.
5. Participation in Quality Assurance activities.

3.0 CONFIGURATION MANAGEMENT. (These paragraphs will explicitly define AFR 800-14 Chapter 6 requirements for classifying configuration changes, identifying configuration items, and management phases.)

3.1 CHANGE/DISCREPANCY CLASSIFICATIONS.

3.2 COMPUTER PROGRAM CONFIGURATION ITEMS.

4.0 DEFICIENCY REPORT/CHANGE PROCEDURES. (These paragraphs will detail emergency, urgent, and routine discrepancy and change processing requirements for support activities prior to PMRT and post-PMRT. These procedures will be unique to this O/S CMP. Existing AFR's will be referenced with O/S CMP detailing the necessary actions and interfaces required to comply with those AFRs.

4.1 REPORTING REQUIREMENTS. (Specifically address mission data changes, hardware-software changes, hardware-only changes, and software-only changes.)

4.2 COORDINATING. (Processing and coordination requirements and responsibilities for deficiency reports and changes.)

4.3 CONTROL BOARD/PANEL PROCESSING. (Change processing requirements for each control board/panel/group.)

4.4 CHANGE/DISCREPANCY PROCESSING. (Discrepancy fault detection/isolation requirements and responsibilities. CPCI requirements and responsibilities relative to:

1. CPIN assignment.
2. Change requirement establishment, disposition, workloading.
3. Change implementation validation.
4. Error recurrence control.
5. Interface Test Adapters (ITA) requirements and responsibilities for design, development, documentation, and delivery.)

4.5 CORRECTIVE ACTION ACCOMPLISHMENT. (Change/Discrepancy corrective action accomplishment requirements and responsibilities by category of discrepancy and change.)

4.6 QUALITY ASSURANCE. (Identify procedures to ensure testing, documentation, deficiency reporting, validation, and certification are accomplished.)

4.7 REPOSITORY. (Library repository responsibilities for CPCI build, impound, and reproduction.)

4.8 DOCUMENTATION. (Engineering and User Data update responsibilities and procedures for corrective actions/changes.)

4.9 SYSTEM INTEGRATION. (CPCI and System integration requirements and responsibilities.)

4.10 DISTRIBUTION. (CPCI media and documentation release and distribution requirements and responsibilities. Specifically identify release points, receiving points, and CPCI Office of Primary Responsibility.)

4.11 SAFETY REQUIREMENTS.

5.0 STATUS ACCOUNTING. (These paragraphs shall define requirements for determining the status of the approved configuration baseline, proposed changes, and the status of changes approved for implementation.)

5.1 REPORTING REQUIREMENTS.

5.2 STATUS ACCOUNTING SYSTEMS.

6.0 COMMUNICATIONS REQUIREMENTS. (These paragraphs will identify each specific interface of involved organizations by individual, organization, phone, and address. Organizations requiring identification are control boards, media distribution point, documentation distribution point, and media/documentation receiving point. Requirements for electronic communication shall be defined.)

7.0 SECURITY. (These paragraphs shall define expansion of AFR 800-14 requirements. If none is required, these paragraphs should so state.)

APPENDICES (The different configuration management plans applicable to the ECS's CPCI's will be attached as individual appendices.)

Figure 1-3-3. Computer Resources Integrated Support Plan Checklist

1. Has the purpose of the CRISP been defined along with its scope and authority?
2. Have the system acquisition phases been defined (including production/deployment)?
3. Have the applicable regulations pertaining to the information in the CRISP been referenced?
4. Does a schedule exist in the CRISP which reflects the program events and their milestones during the developmental and production phase of the system acquisition?
5. Does the above schedule include Program Management Responsibility Transfer (PMRT)?
6. Has a brief description of the weapon system and/or subsystem and present status of the system been written?
7. Have responsibilities for composite system integrity been defined to include:
 - a) computer storage utilization
 - b) computer program operating time and priorities
 - c) computer program interface techniques
 - d) computer program baseline integrity
 - e) utilization of computer modules and peripherals
8. Has the CRISP identified the computer programs required to support the computer equipment and other computer programs including acquisition responsibilities?
9. Has the CRISP identified the computer equipment and devices required to facilitate computer program changes, including acquisition responsibilities?
10. Have the Computer Resources Working Group members been identified? Have the implementing, supporting and using commands been identified?
11. Have the offices of primary responsibility and management focal points for support of computer resources and the channels of communication among organizations been identified and defined?
12. Have organizations responsible for funding, scheduling, and system integration been identified?

13. Have other appropriate working groups been defined? For example:
 - a. Transfer and Turnover (TTWG)
 - b. Interface Control Working Group (ICWG)
 - c. Any required joint service working groups (i.e, joint service working group and joint test working group)
 - d. Test Planning Working Group (TPWG)
14. Have details of the support concept been explained including plans/procedures to establish and operate the support facility with reference to management impact?
15. Has the CRISP defined the plan(s) to establish and operate necessary support facilities? NOTE: Common and existing facilities will be used whenever practicable.
16. Have the provisions for the transfer of program management responsibility been defined?
17. Have provisions for the turnover of the system/equipment been made?
18. Has the turnover and transfer (clause) of a system been provided?
19. Has the methodology for software changes and time constraints for reprogramming actions been explained in detail?
20. Have deficiency reporting procedures been defined?
21. Have provisions been made for planning for configuration management of computer programs including the assignment of configuration control responsibilities during the deployment phase? NOTE: This should also include the Development and Transition and Turnover Phases. This planning should reflect the operational and support concepts for the system.
22. Has an organization been designated to chair the Configuration Control Board (CCB) and the Computer Program Configuration Sub-Board (CPCSB) during each system acquisition phase?
23. Have data rights included along with licensing agreements been explained for the software?
24. Have provisions been made by the program office to obtain Computer Program Identification Numbers (CPINs)?
25. Has the documentation required to support each type of computer program been identified?
26. Are documentation resources specified in the Contract Data Requirements List?

27. Has a list of data items been included as an appendix? Has tailoring been addressed?

28. Have the training requirements for the user and AFLC been identified? Has follow-on training been identified? Is the training equipment needed to support the training provided by the implementing command or ATC?

29. Have qualified personnel been identified, by organization, to support the computer equipment and computer program at PMRT?

30. Has the computer resources working group considered Independent Verification and Validation? Has the recommendation to the program manager been documented?

31. Have provisions been made for the verification and validation process of computer programs throughout the system life cycle?

32. Is the draft CRISP fully updated and coordinated?

33. Is the final prepared for coordination/signature?

Figure I-3-4. Model Computer Resources Working Group Charter

A-1 GENERAL

The (Program Name) Computer Resources Working Group (CRWG) is established and chartered in accordance with AFR 800-14, this regulation being used as guidance for the (Program Name) Program. The CRWG will be established prior to the beginning of the Full Scale Development (FSD) Phase. It will remain in existence under the chairmanship of a designated representative of the program director until Program Management Responsibility Transfer (PMRT). Following PMRT, the chairmanship of the CRWG will be amended as mutually agreed upon by the supporting and using organizations.

A-2 PURPOSE

The purpose of the CRWG is to prepare and update the Computer Resources Integrated Support Plan (CRISP) for the (Program Name). In so doing, the CRWG will identify, plan, initiate, and coordinate activities necessary to accomplish these objectives. The CRWG will address those support activities which require the interaction of multiple organizations. The CRWG will serve as a forum for the supporting and using organizations to discuss, communicate and agree on recommendations for the resolution of problems in the support of computer resources. It will provide insight into support activities and their effectiveness.

A-3 RESPONSIBILITIES

The CRWG will have the following responsibilities in support of (Program Name) computer resources:

- a. Develop, update and maintain the Computer Resources Integrated Support Plan (CRISP) in accordance with AFR 800-14.
- b. Assist the program office in evaluating FSD activities in connection with computer resources.
- c. Identify those elements which should be included in the Turnover and PMRT Agreements, and insure that those elements are addressed in the Agreements.

A-4 CRWG MEMBERSHIP

At its inception and at all times prior to PMRT, the CRWG will be chaired by a designated representative of the (Program Name) Program Director. The group will be made up of members who will represent their organization's positions and advisors, who will only comment on such positions. The group will have representation from the following agencies, boards and groups:

Members:

System Program Office
ADCOM
AAC
CF

ATC
AFCS
AFLC

Advisors: (as applicable):

Computer Program Configuration Sub-Board (CPCSB)
Configuration Control Board (CCB)
Human Factors Board (HFB)
Test Planning Working Group (TPWG)
Turnover and Transfer Working Group (TTWG)
System Safety Group
Contractors:

Following contract award, the prime contractor may be asked to participate in selected CRWG meetings.

A-5 CRWG ADMINISTRATION

The CRWG will be administered in accordance with the following procedure:

- a. Minutes of CRWG meetings will be prepared and distributed within 15 days following each meeting.
- b. When practicable, CRWG members and advisors will be notified of meeting dates, locations, and proposed agenda at least 30 days prior to the meeting.
- c. CRWG action items will be tracked by the CRWG chairman and their status will be reported at each CRWG meeting.
- d. Agenda items may be submitted to the program director by CRWG members 15 days prior to each scheduled meeting.

A-6 PROGRAM SUMMARY

The following major periods of the (Program Name) Program are applicable to the planning of computer resources support:

- a. Validation Phase
- b. Full Scale Development Phase
- c. Production/Deployment Phase
- d. Operational Phase

Section 4. Turnover and Transfer

4-1. Review AFR 800-14, Volume II, Chapter 9, and AFR 800-4 for T&T requirements.

4-2. Review updated DD Form 250 to identify all deficiencies and exceptions that are still to be delivered or corrected.

4-3. Review ESD-TR-77-326, Validation and Certification, Para 5.2 to insure all requirements in AFR 800-14, AFR 800-19 and AFSCR/AFLCR 80-17 have been met.

4-4. Work with Transfer Working Group (TWG) to:

a. Insure that the CRISP and CRWG agreements are incorporated in the system Turnover and Transfer Agreements.

b. Insure that all software support requirements are adequately reflected in these agreements.

c. Assist in identifying computer resource deficiencies and exceptions at time of turnover.

Section 5. Early Warning Guidance Indicators

This section is intended to provide Early Warning Guidance (EWG) to Program Offices. It is not intended to be all encompassing. Each unique application should be tailored. Some questions may not be appropriate where as others may be insufficient in detail. This document will be constantly undergoing revisions as experience and insight is gained in the role of EWG.

There are three checklists tailored to different acquisition phases: I-5-1, Conceptual Phase EWG Indicators; I-5-2, Validation Phase EWG Indicators; and I-5-3, Development Phase EWG Indicators. Each phase is split into seven areas of concern: Software Quality Assurance, Configuration Management, Testing, Turnover & Transfer, Documentation, Engineering & Program Management, and Contract Requirements. Since each phase covers such a broad period of time, all the questions should be reviewed throughout the phase and asked at an appropriate time. In some cases it will be necessary to ask the question several times because of an insufficient answer or due to a need for reassurance. In some cases it will be necessary to revert back to questions associated with a previous phase as when severe problems occur. On the other hand, looking ahead will aid in planning.

Figure I-5-1. Conceptual Phase Early Warning Guidance Indicators

Software Quality Assurance (SQA)

Have government personnel been allocated to perform the software quality control function?

Has there been an assessment for future needs of SQA personnel?

Is there an SQA Plan for government personnel to follow?

Do organizational charts indicate the SQA personnel will be separate from the developers and report to the same management level?

Configuration Management (CM)

Have government personnel been assigned to carry out the CM practices and procedures? (AFR 800-14, Vol II)

Testing

Has the TEMP been written in accordance with AFR 80-14 and AFSC Sup 1?

Turnover and Transfer (T&T)

Has the Logistics Support Plan been written? (AFR 800-8)

Have supporting parties been notified of their responsibility? (AFR 800-14 AFSC Sup 1, para 6)

Documentation

Does the initial system specification reflect the operational requirement accurately and fully? Has this been verified by the Using Command?

Does it address all the topics of model System Spec Para 3.3.8?

Have the functions of the system been allocated to Configuration Items (CIs)? (MIL-STD-483 & 490)

Contract Requirement

Will the appropriate standards and specifications be called out in the contract, i.e., will MIL-STDs 483, 490, 1521A, . . . and MIL-S-52779A be invoked? Have they been tailored to this specific procurement?

Is there a CM Plan, SQA Plan, CPDP?

Will deliverables provide proof of adherence to every standard?

Have approved High Order Language (HOL) and Top Down Structured Programming (TDSP) been properly addressed?

Are the delivery requirements, including media and form, specified in the contract? (AFR 800-14, Vol II, Para 8-5)

Mgt-Program & Engineering Mgt

Has the Program Manager coordinated with AFLC, AFCMD, ATC and any other necessary focal points to cover support requirements of the system? i.e., are all necessary channels of communication open and are the required parties notified of their responsibility for supporting the system? (AFR 800-14, AFSC Sup 1, Para 6).

Figure I-5-2. Validation Phase Early Warning Guidance Indicators

T&T (Turnover & Transfer)

Have provisions been made to ensure incorporation of CRISP provisions in Turnover and Program Management Responsibility Transfer (PMRT) documents? (AFR 800-14, Vol II, Para 9-2)

Have Turnover and PMRT been considered in PMP and CRISP planning? (AFR 800-14, Vol II, Para 9-2)

Have using and supporting commands identified computer resources and associated documentation necessary to support the system? (AFR 800-14, Vol II, Para 10-3)

Do the plans provide for easy transition to the using command and their procedures?

Documentation

Are the documentation requirements periodically evaluated? (AFR 800-14, Vol II, Para 7-3d)

Have agreements from using and supporting commands been obtained for modifications or deletions to data defined? (AFR 800-14, Vol II, Para 7-4)

Where is the software program documented and is such documentation available for review? Are you getting the Version Description Document (VDD)?

Is there a software development schedule?

Do the SQA procedures provide for the review of software documentation? (MIL-S-52779A 3.2.4)

Are there procedures to review the software documents throughout the software life cycle?

Do procedures exist that provide for in-depth review of the design specification, interface specification, and data base design specification to assure efficiency, effectiveness, reliability, testability and adherence to standards?

Do the SQA procedures provide for the timely monitoring of resources in the area of processing time, storage and input/output channels to ensure the proper realization of specified reserves?

Mgt

Has a Computer Resources Integrated Support Plan been drafted and has the Computer Resource Working Group been established? (AFR 800-14, Vol II, Para 3-10)

Are the Computer Resources Integrated Support Plan and Computer Resources Working Group current? (AFR 800-14, Vol II, Para 3-10)

Has the Computer Program Development Plan been used to evaluate contractor approaches? (AFR 800-14, Vol II, Para 3-9)

Is the Computer Program Development Plan incorporated into the contract? (AFR 800-14, Vol II, Para 8-2a)

Have system studies been planned/accomplished to select design approaches and integrate computers and computer programs into the total system? (AFR 800-14, Vol II, Para 4-5a)

Have system performance and interface requirements been allocated to computer equipment and computer program configuration items? (AFR 800-14, Vol I, Para 3m(2))

Are periodic meetings with contractor, using and supporting commands required to assess the progress of the CPCIs? (AFR 800-14, Vol II, Para 4-10)

Contract Requirement

Do solicitation documents include explicit statements establishing Air Force rights to CPCIs and associated documentation? (AFR 800-14, Vol I & AFSC Supp 1, Para 3i)

Does the work breakdown structure and cost reporting system separately identify computer programs and related tasks? (AFR 800-14, Vol II, Para 8-3a)

Are all computer programs, equipment, and documents necessary to support and modify the operational programs identified and deliverable? (AFR 800-14, Vol II, Paras 3-8 & 8-3c)

Are appropriate safeguards included in vendor contracts to support the Government's requirements with respect to system configuration level? (AFR 800-14, Vol II, Para 8-6)

Does the contract have a requirement for a Software Quality Assurance Program? (MIL-S-52779A)

Do you have a software quality assurance program which assures compliance with the requirements of the contract? (MIL-S-52779A, paras 1.2 & 3.2.4)

Are there procedures for design reviews to ensure that provisions of the contract are met? (MIL-S-52779A para 3.2.6)

Do procedures exist that ensure the performance specification satisfies the requirements of the SOW and other governing specifications? (MIL-S-52779A para 3.2.6)

Do the SQA procedures assure the conduct of design walk-throughs? (MIL-STD-1679)

Do the procedures provide for the adherence to standards? (MIL-S-52779A para 1.3)

Does the SQA Program contain a procedure to identify conflicting requirements? (MIL-S-52779A para 3.2.4)

Testing

Does the test program include provisions to stress test computer equipment and computer program configuration items? (AFR 800-14, Vol II, Para 5-1)

Has the Preliminary Qualification Test process been evaluated and applied? (AFR 800-14, Vol II, Para 5-3a(2).(a))

Do provisions exist for integration and test of CPCIs into the system? (AFR 800-14, Vol II, Para 5-3b)

Do the CPI development specifications identify test approaches for qualifying the CPI and contractor requirements for GFE and support requirements? (AFR 800-14, Vol II, Para 5-5e)

Does the system level DT&E plan identify overall planning for CPI testing and does it contain provisions for installation and checkout of CPCIs into follow-on installations? (AFR 800-14, Vol II, Para 5-5f(11&12))

Are separate test procedures prepared for each qualification test? (AFR 800-14, Vol II, Para 5-5g)

Do qualification tests properly cover requirements for test and evaluation of CPCIs? (AFR 800-14, Vol II, Para 5-5g)

Are the results of all CPI tests documented? (AFR 800-14, Vol II, Para 5-5h)

Are the procedures for the review of test activities included in the SQA Program? (MIL-S-52779A 3.2.8)

Do the SQA procedures provide for the analysis of software requirements to determine testability? (MIL-S-52779A 3.2.8)

Do SQA procedures provide for the review of test procedures for compliance with appropriate standards, performance requirements and other contractual requirements? (MIL-S-52779A 3.2.8)

Do SQA procedures provide for the monitoring of tests and certification that test results are the actual findings of the test? (MIL-S-52779A 3.2.8)

Do SQA procedures provide for the review and certification of test reports? (MIL-S-52779A 3.2.8)

Are the test validation procedures adequate? (MIL-S-52779A 3.2.8)

Do SQA procedures assure that test related documentation is accurately maintained to allow repeatability of tests? (MIL-S-52779A 3.2.8)

Is the organization responsible for testing activities identified?
Are the various testing cycles identified?

Does the SQA program identify the software testing activities?

Do SQA procedures provide for the review of test plans for compliance with appropriate standards, performance requirements and other contractual requirements? (MIL-S-52779A 3.2.8)

CM

Are computer equipment and computer programs covered during the conduct of system design reviews, audits and management assessments. (AFR 800-14, Vol I, Para 3m.(10))

Are formal technical reviews required for all computer equipment and computer program configuration items? (AFR 800-14, Vol II, Para 4-9)

Is a successful PDR required prior to detail design?

Is a successful Critical Design Review required for each CPCI prior to proceeding into coding? (AFR 800-14, Vol II, Para 4-9c)

Are all deliverable computer programs identified and managed as CPCIs? (AFR 800-14, Vol I, Para 3m(8); Vol II, Paras 8-4b & 8-2a(1))

Are system and configuration item level interfaces specified and controlled? (AFR 800-14, Vol II, Paras 8-5a & 8-5c)

Is change control applied to CPCIs? (AFR 800-14, Vol II, para 6-8a)

Are configuration audits required/accomplished for all CPCIs? (AFR 800-14, Vol II, Para 5-8)

Are computer firmware and microprocessors/microcomputers treated as configuration items and documented accordingly? (AFR 800-14, Vol I, AFSC Sup 1, Para 3.m(8) ATT I, Para 3; MIL-S-52779A 1.1)

Is there a Configuration Management plan? (MIL-STD-483)

Is the Configuration Management Plan adequate?

Are the designated personnel qualified to perform Configuration Management Audits?

Are the SQA procedures for auditing Configuration Management available and documented? (MIL-S-52779A 3.2.7, MIL-STD-483)

Do QA procedures exist to review and approve changes to configured software; i.e., SCP, ECP, etc.?

Do procedures exist for the timely reporting of corrective action for the analysis of problems and deficiency reports to determine trends extent and causes? (MIL-S-52779A 3.2.9)

Do procedures exist for the timely reporting of corrective action for the analysis of trends to prevent the development of non-conforming products? (MIL-S-52779A 3.2.9)

Do procedures exist for the timely reporting of corrective action for the review of the adequacy of improvement of corrective measures to be taken, and monitoring of the implementation of determine effectiveness of such measures? (MIL-S-52779A 3.2.9)

Do procedures exist for the timely reporting of corrective action for the analysis or review as otherwise provided for in the contract? (MIL-S-52779A 3.2.9)

Do procedures exist for the monitoring of Cats I and II ECPs?

Has the contractor established a Computer Program Library to be used for the control of source and object program materials? (MIL-S-52779A 3.2.5)

Are the controls established to control the alteration and/or changing of source and object program materials? (MIL-S-52779A 3.2.5)

SQA

Is an approved Higher Order Language (HOL), per DoDI 5000.31 and AFR 300-10, being used? If not, was an economic analysis accomplished + show use of approved HOLs was not cost effective or technically practical; has a waiver been obtained? (AFR 800-14, Vol I, Para 3e and AFSC Sup 1, Para 3(1): Vol II, Para 3-4c)

Have minimum design characteristics, such as spare memory and extra processing capacity, been determined? (AFR 800-14, Vol II, Para 3-4d, c, f) (i.e., has a sizing and timing analysis been performed?)

Does the SQA program provide for the review and audit of all software documentation? (MIL-S-52779A 3.2.4)

Are design walk-throughs required? (MIL-STD-1679)

Are there existing standards and conventions? (MIL-S-52779A 3.2.4)

Are standards and conventions being followed (as cited in CPDP and SOW)? (MIL-STD-1679)

Are design problems identified and followed-up for completed corrective action prior to approval of the design? (MIL-S-52779A 3.2.9)

Are reviews of software design accomplished prior to release for coding? (MIL-S-52779A 3.2.2) Has a CDR been held for each CPCI prior to release for coding?

Does the software QA Program allow for scheduled reviews and scheduled and unscheduled audits? (MIL-STD-1521A)

Does the SQA program provide for the results of the Reviews/Audits to be documented and published? (MIL-S-52779A 3.9)

Does the QA policy require an executive reporting responsibility external to the developing/engineering/Program Manager to assure an objective evaluation of conformity and progress? (MIL-S-52779A)

Do policies and procedures adequately cover program acceptance? (MIL-S-52779A)

Does a policy exist regarding the use and control of patches? (MIL-STD-1679)
Is the use of patches monitored?

Does the SQA organization have the independence to perform its tasks?
(MIL-S-52779A 3.1)

Do the personnel performing the SQA function have sufficient authority, responsibility, and freedom of action to evaluate software design and production activities, and to initiate and/or recommend changes?
(MIL-S-52779A 3.2.4)

Have the SQA procedures been accepted by the QA (of the Government) organization? (MIL-S-52779A 1.2)

Does the SQA Plan identify any tools, techniques and methodologies that are to be employed? (MIL-S-52779A 3.2.1)

Do these tools follow the controls of the SQA Plan? (MIL-S-52779A 3.2.1)

Do the QA procedures provide for a reporting and control system that permits management to monitor overall development status of the software?

Do the QA procedures provide for a reporting and control system that permits decisions making on the basis of quality assurance data?

Do the QA procedures provide for a reporting and control system that brings inadequacies, discrepancies and deficiencies, as well as proposal improvements to the attention of appropriate supervisory and management personnel in a timely manner? (MIL-S-52779A 3.2.9)

Does the SQA program impose the requirements on all the subcontractors?
(MIL-S-52779A 3.3)

Does the SQA requirement conflict with other requirements of the contract?
Do the QA procedures provide for a reporting and control system that permits rapid and effective corrective action when required with positive feedback and response?

Are there procurement control procedures and organization structure requirements to assure that subcontracted software conforms to SQA requirements imposed on the prime contractor?

Does the QA program require the conduct of timely reviews and audits of the subcontractor's documentation, procedures and program progress?

Does the QA program provide for formal inspection and acceptance by the prime contractor of subcontractor developed deliverables?

Does the QA group review all subcontract Statements of Work for inclusion of QA program requirements?

Do procedures exist for the acceptance of software from a subcontractor?

Does the SQA Plan identify and tools, techniques, and methodologies that are to be employed? (MIL-S-52779A 3.2.1)

Figure I-5-3. Development Phase Early Warning Guidance Indicators

CM

Do solicitation documents include explicit statements establishing Air Force rights to CPCIs and associated documentation? (AFR 800-14, Vol I, and AFSC Sup 1, Para 3.1)

Does the work breakdown structure and cost reporting system separately identify computer programs and related tasks? (AFR 800-14, Vol II, Para 8-3a)

Are the SQA procedures for auditing Configuration Management available and documented? (MIL-S-52779A 3.27 and MIL-STD-403)

Do QA procedures exist to review and approve changes to configured software, i.e., SCP, ECP, etc?

Do procedures exist for the timely reporting of corrective action for the analysis of problems and deficiency reports to determine trends extent and causes? (MIL-S-52779A 3.2.9)

Do procedures exist for the timely reporting of corrective action for the analysis of trends to prevent the development of non-conforming products? (MIL-S-52779A 3.2.9)

Do procedures exist for the timely reporting of corrective action for the review of the adequacy of improvement or corrective measures to be taken, and monitoring of the implementation to determine effectiveness of such measures? (MIL-S-52779A 3.2.9)

Do procedures exist for the timely reporting of corrective action for the analysis or review as otherwise provided for in the contract? (MIL-S-52779A 3.2.9)

Do QA procedures exist for the monitoring of the categorized failures i.e., Cat I & Cat II?

Has the supporting command established a Computer Program Library to be used for the control of source and object program materials? (MIL-S-52779A 3.2.5)

Are the controls established to control the alteration and/or changing of source and object program materials? (MIL-S-52779A 3.2.5)

Testing

Does the test program include provisions to test computer equipment and computer program configuration items? (AFR 800-14, Vol II, Para 5-1)

Are formal qualification test required to verify CPI performance against the development specifications? (AFR 800-14, Vol II, Para 5-3a)

Has the Preliminary Qualification Test process been evaluated and applied?
(AFR 800-14, Vol II, Para 5-3a(2).(a))

Do provisions exist for integration and test of CPCI's into the system? (AFR 800-14, Vol II, Para 5-5e)

Do the CPCI development specifications identify test approaches for qualifying the CPCI and contractor requirements for GFE or support requirements? (AFR 800-14, Vol II, Para 5-5e)

Does the system level DT&E plan identify overall planning for CPCI testing and does it contain provision for installation and checkout of CPCI's into follow-on installations? (AFR 800-14, Vol II, Paras 5-5f(1) & (2))

Are separate test procedures prepared for each qualification test and do they properly cover requirements for test and evaluation of the CPCI's? (AFR 800-14, Vol II, 5-5g)

Are the results of all CPCI tests documented? (AFR 800-14, Vol II, Para 5-5h)

Are the procedures for the review of test activities included in your SQA Program? (MIL-S-52779A 3.2.8)

Are changes to CPCI released by a Time Compliance Technical Order (TCTO)? AFR 800-14, Vol II, Para 6-8d)

Do the SQA procedures provide for the analysis of software requirements to determine testability? (MIL-S-52779A 3.2.8)

Do SQA procedures provide for the review of test plans for compliance with appropriate standards, performance requirements and other contractual requirements? (MIL-S-52779A 3.2.8)

Do SQA procedures provide for the review of test requirement and criteria for adequacy, feasibility and completeness? (MIL-S-52779A 3.2.8)

Do SQA procedures provide for the review of test procedures for compliance with appropriate standards, performance requirements and other contractual requirements? (MIL-S-52779A 3.2.8)

Do SQA procedures provide for the monitoring of tests and certification that test results are the actual findings of the test? (MIL-S-52779A 3.2.8)

Do SQA procedures provide for the review and certification of test reports? (MIL-S-52779A 3.2.8)

Do SQA procedures assure that test related documentation is accurately maintained to allow repeatability of tests? (MIL-S-52779A 3.2.8)

Documentation

Has consideration been given to deferred ordering, deferred requisitioning, or accession list technique? Are the documentation requirements periodically evaluated? (AFR 800-14, Vol II, Para 7-3d)

Does the Data Management Officer track data requirements against the CRISP? Are acceptance requirements for the data defined? (AFR 800-14, Vol II, Para 7-4)

Have agreements from using and supporting commands been obtained for modifications or deletions to data requirements? (AFR 800-14, Vol II, Para 7-4)

Do procedures exist that provide for in-depth review of the design specification, interface specification, data base design specification to assure efficiency, effectiveness, reliability, testability and adherence to standards?

Do the SQA procedures provide for the timely monitoring of resources in the area of processing time, storage and input/output channels to ensure the proper realization of specified reserves?

SQA

Is an approved Higher Order Language (HO) being used? (AFR 300-10) If not, was an economic analysis accomplished to show use of approved HOLs was not cost effective or technically practical; has a waiver been obtained? (AFR 800-14, Vol I, Para 3.e and AFSC Sup 1, Para 3.e(1) (Added); and AFR 800-14, Vol II, Para 3-4c)

Have minimum design characteristics, such as spare memory and extra processing capacity (sizing and timing analysis), been determined? (AFR 800-14, Vol II, Paras 3-4.d, e, and f)

Are design walk-throughs required? (MIL-STD-1679)

Are standards and conventions being followed? (MIL-STD-1679)

Are design problems identified and followed-up for completed corrective action prior to approval of the design? (MIL-S-52779A 3.2.9)

Has a CDR been accomplished prior to release for coding? (MIL-S-52779A 3.2.2)

Do policies and procedures adequately cover program acceptance? (MIL-S-52779A)

Contractual Requirement

Are appropriate safeguards included in vendor contracts to support the Government's requirements with respect to system configuration level? (AFR 800-14, Vol II, Para 8-6)

Are all computer programs, equipment, and documents necessary to support and modify the operational program identified and deliverable? (AFR 800-14, Vol II, Paras 3-8 & 8-3c(3))

Are the delivery requirements, including media and form specified in the contract? (AFR 800-14, Vol II, Para 8-5)

Are the Government's rights to computer program and associated data reflected in the contract provisions? (AFR 800-14, Vol II, Para 8-4)

Does the work breakdown structure and cost reporting system structure and cost reporting system separately identify computer program and related tasks? (AFR 800-14, Vol II, Para 8-3a)

Do solicitation documents include explicit statements establishing Air Force rights to CPCIs and associated documentation? Are the Government's rights to computer programs and associated data reflected in the contract provisions? (AFR 800-14, Vol II, Para 8-4) (AFR 800-14, Vol I & AFSC Sup 1, Para 3)

Are there procedures for design reviews to ensure that provisions of the contract are met? (MIL-S-52779A 3.2.8)

Do reviews and audits ensure that all contractual requirements are met? (MIL-S-52779A 3.2.8)

Do procedures exist that ensure the performance specification satisfies the requirements of the SOW and other governing specifications? (MIL-S-52779A 3.2.8)

Do the SQA procedures assure the conduct of walk-throughs? (MIL-STD-1679)

Do the procedures provide for the adherence to standards? (MIL-S-52779A)

T&T

Have using and supporting commands identified computer resources and associated documentation necessary to support the system? Is the CRISP continually updated to reflect the current support concept? (AFR 800-14, Vol II, Para 10-3)

Do policies and procedures adequately cover program acceptance? (MIL-S-52779A)

Mgt

Have system performance and interface requirements been allocated to computer equipment and computer program configuration items? (AFR 800-14, Vol I, Para 3.m(2))

Are periodic meetings with contractors, using and supporting commands required to assess the progress of the CPCIs? (AFR 800-14, Vol II, Para 4-10)

Have system studies been planned/accomplished to select design approaches and integrate computers and computer programs into the total system? (AFR 800-14, Vol II, Para 4-5a).

REFERENCES

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AFSC Sup 1	Retrofit Configuration Changes	1 Apr 74
AFR 65-3	Configuration Management	11 Jul 74
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AFR 66-12	Aircraft and Missile Equipment Accountability	15 Aug 78
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AFR 800-19	System or Equipment Turnover	27 May 75
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MIL-STD-1679(NAVY)	Weapon System Software Development	1 Dec 78
MIL-S-52779A	Software Quality Assurance Program Requirements	1 Aug 79

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ESD-TR-77-327	ADA053040	Software Maintenance	Oct 1977
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