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**Airborne Systems**  
**Software Acquisition Engineering Guidebook**  
**for**  
**REGULATIONS, SPECIFICATIONS,**  
**AND STANDARDS**

NOVEMBER 1977

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DEPUTY FOR ENGINEERING  
AERONAUTICAL SYSTEMS DIVISION  
WRIGHT-PATTERSON AFB, OH 45433



PREPARED BY  
TRW DEFENSE AND SPACE SYSTEMS GROUP  
ONE SPACE PARK  
REDONDO BEACH, CA 90278

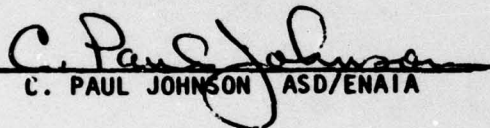
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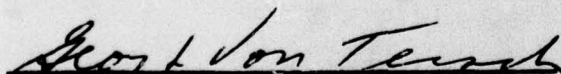
This technical report has been reviewed and is approved for publication.

  
C. PAUL JOHNSON ASD/ENATA

  
ERWIN C. GANGL ASD/ENAT

  
LOUIS J. URBAN  
Technical Director, ASD/ENA

FOR THE COMMANDER

  
GEORGE L. VON TERSCH, COL, USAF  
Director, Avionics Engineering  
Deputy for Engineering

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Airborne Systems Software Acquisition Engineering Guidebook for  
Regulations, Specifications, and Standards

E. Jucevic

TRW Defense and Space Systems Group  
Redondo Beach, California

November 1977

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report is one of a series of guidebooks whose purpose is to assist Air Force Program Office and Engineering personnel in the Acquisition and Engineering of Airborne Systems Software. This guidebook describes the structure and functions of the Regulations, Specifications, and Standards (RSS) System of documents. It describes how to select appropriate RSS for contractual compliance and how to tailor them and reference them in the contractual documents. It also explains how to develop the data item requirements and contains a summary of		

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cont. → key RSS, an RSS bibliography, a list of related guidance documents and lists of definitions abbreviations, and acronyms.



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## PREFACE

This guidebook on regulations, specifications, and standards is one of a series of guidebooks intended to assist the Air Force Program Office and engineering personnel in software acquisition engineering for airborne systems. The contents of the guidebooks will be revised periodically to reflect changes in software acquisition policies and practices and feedback from users.

This guidebook has been prepared under the direction of the Aeronautical Systems Division (ASD), Deputy for Engineering (EN), in coordination with the Space and Missile Systems Organization (SAMSO), Air Force Systems Command (AFSC).

The series of Software Acquisition Engineering Guidebooks (Airborne Systems) is currently planned to cover the following topics:

1. SAE Guidebooks – Application and Use
2. Regulations, Specifications, and Standards
3. Quality Assurance
4. Reviews and Audits
5. Contracting for Software Acquisition
6. Statements of Work and Requests for Proposal
7. Verification, Validation, and Certification
8. Configuration Management
9. Measuring and Reporting Software Status
10. Software Cost Measuring and Reporting
11. Requirements Analysis and Specification
12. Computer Program Documentation Requirements
13. Computer Program Maintenance

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## ABBREVIATIONS AND ACRONYMS

AF	Air Force
AFR	Air Force Regulation
AFSC	Air Force Systems Command
AFSCP	Air Force Systems Command Pamphlet
AFSCR	Air Force Systems Command Regulation
APP	Advanced Procurement Plan
ASD	Aeronautical Systems Division
ASPR	Armed Services Procurement Regulation
BA/PA	Budget Authorization/Procurement Authorization
CDRL	Contract Data Requirements List
CI	Configuration Item
CMP	Configuration Management Plan
CONTR	Contractor
CPCI	Computer Program Configuration Item
CPDP	Computer Program Development Plan
CRISP	Computer Resources Integrated Support Plan
D&F	Determinations and Findings
DCP	Decision Coordinating Paper
DID	Data Item Description
DMP	Data Management Plan
DOD	Department of Defense
DODD	Department of Defense Directive
DODI	Department of Defense Instruction
DSARC	Defense Systems Acquisition Review Council
DT&E	Development Test and Evaluation
FCA	Functional Configuration Audit
FPIF	Fixed Price Incentive Fee
FQR	Formal Qualification Review
HQ AFSC	Headquarters Air Force Systems Command
HQ USAF	Headquarters United States Air Force

## ABBREVIATIONS AND ACRONYMS (Concluded)

MAJCOM	Major Command
MIL STD	Military Standard
OSD	Office of the Secretary of Defense
PDR	Preliminary Design Review
PM	Program Manager
PMD	Program Management Directive
PMP	Program Management Plan
PMRT	Program Management Responsibility Transfer
PO	Program Office
PCA	Physical Configuration Audit
QA	Quality Assurance
RFP	Request for Proposal
ROC	Required Operational Capability
RSS	Regulations, Specifications, and Standards
SAF	Secretary of the Air Force
SAMSO	Space and Missile Systems Organization
SDR	System Design Review
SEMP	System Engineering Management Plan
SOW	Statement of Work
SSP	Source Selection Plan
SRR	System Requirements Review
T&E	Test and Evaluation
TEMP	Test and Evaluation Master Plan
TEOA	Test and Evaluation Objectives Annex
TRR	Test Readiness Review
USAF	United States Air Force
WBS	Work Breakdown Structure

## 1. INTRODUCTION

### 1.1 PURPOSE AND SCOPE

The purpose of this guidebook is to assist Air Force Program Office and engineering personnel to interpret, select, and apply regulations, specifications, and standards (RSS) to the acquisition of airborne system software.

This guidebook describes the structure and functions of the RSS system of documents, emphasizing areas of special importance for airborne system software acquisition under the 800 series of Air Force regulations, and explains both the obligations of an acquisition program to comply with certain RSS and the vital support that other RSS will provide in the establishment of requirements for contract compliance. This guidebook describes how to select appropriate RSS for contractual compliance, how to tailor them for maximum effectiveness, and how to reference them in the contract documents. It also explains how to develop an entire set of data item (i. e., documentation) requirements for a software development program. Finally, it contains summaries of key RSS, an RSS bibliography, a list of related guidance documents, and lists of definitions, abbreviations, and acronyms.

### 1.2 CONTEXT OF RSS

#### 1.2.1 RSS Within the System Life Cycle

The greatest value of regulations, specifications, and standards for a procurement is their ability to establish common acquisition directions and goals for Government and contractor personnel. To accomplish this task effectively, the RSS must be selected, tailored, and applied early enough to be assimilated and implemented in their intended manner.

The general path that a program should take in establishing its RSS requirements at the start of an acquisition is defined by HQ USAF in a Program Management Directive (PMD). The PMD may identify regulations within the AF 800 series that are to be followed and also some regulations not to be followed. From this general RSS baseline, a program must develop successive levels of RSS requirements that will carry it through the entire acquisition process and sustain the operating and supporting commands thereafter. This entire structure of RSS should be identified by the end of the conceptual phase, even though some items still are tentative. By the end of the validation phase, the Program Office should have established the definitive, tailored set of RSS that will guide it and all other program participants through the full-scale engineering development, production, deployment, and operation/maintenance phases.

#### 1.2.2 RSS Within the Guidebook Series

This guidebook is only an introduction to the RSS system and a general account of its application to the acquisition process. The other volumes of this series contain the detailed guidelines for interpreting, evaluating, and applying the particular RSS that are appropriate to their special subject matter.

This guidebook has many links with two others: "Contracting for Software Acquisition" and "Statements of Work and Requests for Proposal." It also has close connections with "Computer Program Documentation Requirements." For the other guidebooks in this series, it is an important support document.

### 1.3 CONTENTS OF THE GUIDEBOOK

This guidebook contains the following parts:

- Abbreviations and Acronyms. A list of abbreviations and acronyms used in this guidebook.
- Section 1, Introduction. Describes the purpose and scope of this guidebook, states the general functions of RSS within the system acquisition life cycle and within this guidebook series, and outlines the contents of this guidebook.

- Section 2, Software Acquisition Life Cycle. Briefly describes defense system life cycle.
- Section 3, RSS System. Provides an overview of the entire RSS system, discusses the importance and characteristics of the AF 800 series of RSS to software acquisition, and briefly examines other useful RSS.
- Section 4, Using RSS as Compliance Documents. Discusses the process of referencing RSS as compliance documents, general procurement and contractual considerations, and selection and tailoring of RSS.
- Section 5, Defining Program Data Items. Describes the entire procedure for establishing program-peculiar data item requirements. Discusses Data Item Descriptions (DIDs), the Data Call process, and several alternate documentation standards.
- Appendix A, Summaries of Key RSS. Summarizes key RSS having particular significance for acquisition of airborne systems with software components.
- Appendix B, RSS Bibliography. Lists several hundred RSS that have some relation to software acquisition management and development tasks.
- Appendix C, Related Guidance Documents. Lists several guidebooks outside this series that offer useful information on RSS and software data items.
- Appendix D, List of Definitions. Defines some basic software acquisition terms.

A pocket at the end of this guidebook contains a wall chart showing basic documentation requirements for the entire life cycle of a medium or large software development program.

The titles, numbers, and dates of the RSS discussed in this guidebook, including Appendices A and B, are based on the latest information available at the time of publication. Before RSS are used or referenced in an acquisition, the latest official Government indexes should be consulted to determine if they are still current.

## 2. SOFTWARE ACQUISITION LIFE CYCLE

The normal weapon system acquisition life cycle, as defined in AFR 800-2, "Program Management," and in more detail in AFR 800-3, "Engineering for Defense Systems," consists of five phases: conceptual, validation, full-scale engineering development, production, and deployment. Figure 2-1 shows these phases together with the major tasks for both software (CPCI) and hardware (CI) development, related design reviews, configuration audits, baselines, and the four milestones defined by DODD 5000.1.

Software development proceeds through the system life cycle essentially in the same manner as hardware development. The major difference is that software development requires no production phase, but proceeds directly from full-scale development to deployment.

The concurrent hardware and software development cycles illustrated in Figure 2-1 are applicable in a general sense to systems requiring comparable development efforts for both. In addition, computer programs often are developed for studies, concept validation, and other special circumstances that do not include parallel hardware development. Several software development life cycles therefore may occur during one system development life cycle.

The general tasks required for software development after establishment of the hardware and software requirements are as follows:

- a. Preliminary design,
- b. Detailed design,
- c. Coding and unit test,
- d. Integration and test (CPCI tests and integrated system testing), and
- e. Installation.

Table 2-1 briefly describes these tasks and relates them to reviews, audits, baselines, and primary product documents.

The reviews and audits shown in Table 2-1 and Figure 2-1 are based on the requirements of MIL-STD-1521A (USAF) except for the TRR (Test Readiness Review), a contractor internal review that ensures that prerequisites for software integration and system testing have been performed. Separate reviews and audits usually are conducted for the hardware and software portions of a system subsequent to SDR (System Design Review) and prior to the integrated system FCA (Functional Configuration Audit), PCA (Physical Configuration Audit), and FQR (Formal Qualification Review). The configuration management principles of MIL-STD-483 and the specification requirements of MIL-STD-490 also are implied in Table 2-1 and Figure 2-1.

For additional information on the software development environment, see AFR 800-14, Vol. II, and the guidebook in this series entitled, "SAE Guidebooks - Application and Use."

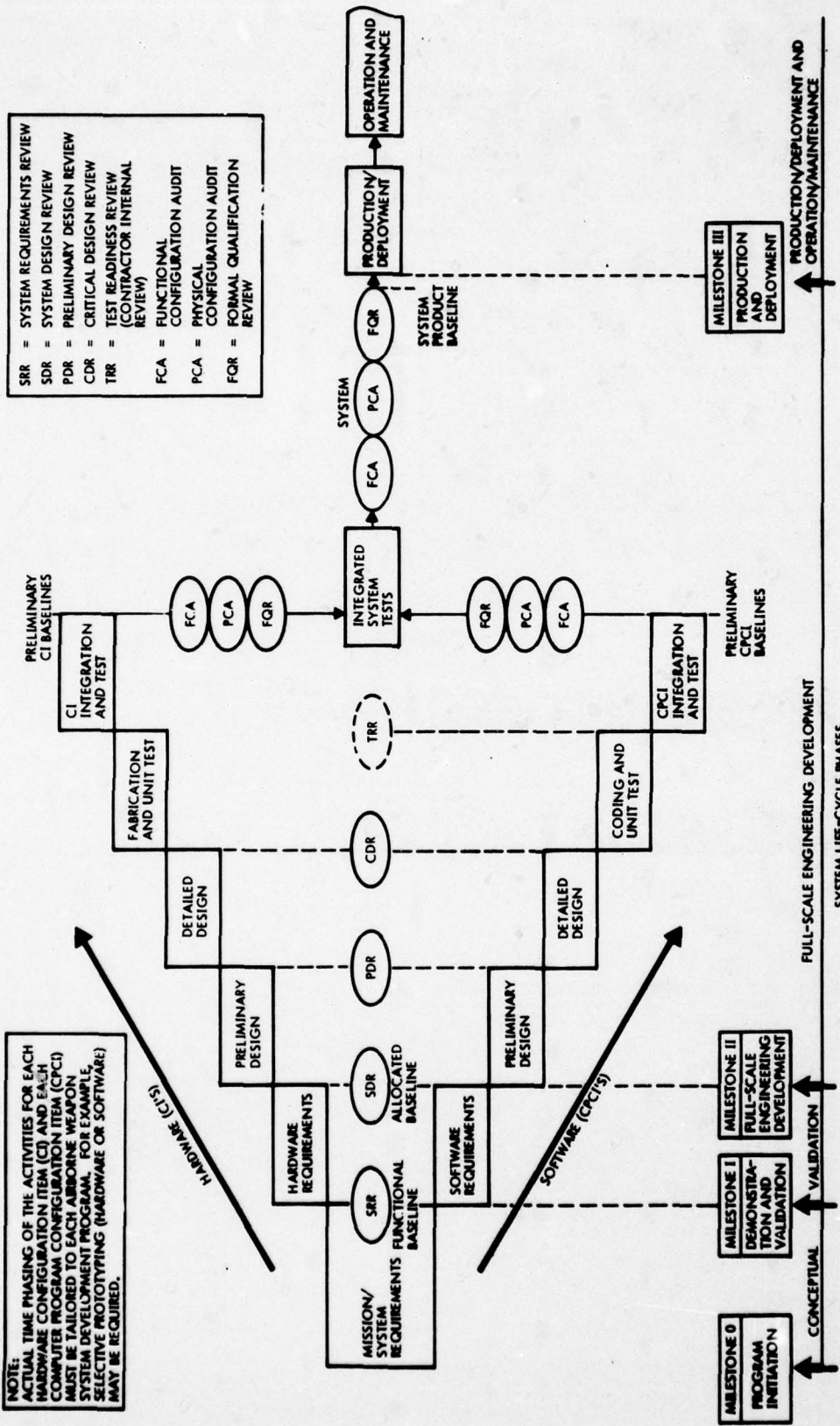


Figure 2-1. Idealized System Life Cycle

### 3. RSS SYSTEM

The RSS system is massive and complicated, and is often cumbersome because it was not designed as a system originally and has never been maintained as a system. Nevertheless, its parts fit together in a loose structure possessing some logical relationships. This section describes the RSS structure and points out those parts that are most important to the AF Program Office and engineering personnel involved in airborne system software acquisition.

#### 3.1 RSS CATEGORIES AND TYPES

RSS that have a bearing on procurements within DOD may be divided into two categories:

- a. Internal Documents. These are RSS applicable internally to the Government (directives, regulations, etc.) or internally to a contractor (procedures, internal reports, etc.).
- b. Compliance Documents. These are RSS that are used to impose contract requirements on a contractor (specifications and standards).

A further breakdown of the RSS within these two categories is shown in Table 3-1, together with the RSS documents that govern the format and content of each RSS type and the rules for referencing compliance documents in procurement contracts. The purposes of most of the document types in the RSS system are described in Table 3-2.

Note in these two tables that the RSS system employs two general kinds of "specifications:" (a) the military, Federal, and DOD industry adopted specifications that contain general requirements (Type 9) or detail requirements (Type 8) applicable to more than one procurement program and (b) the program-peculiar specifications (Types 5, 6, and 7) that define unique procurement items.

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Table 2-1. Major Component System/Software Life Cycle

System Acquisition Life Cycle Phase	Software Development Tasks	Reviews and Audits	Baselines	Primary Software Product Documents			
				Document Type	Time of Issue	Originator	
<b>CONCEPTUAL PHASE</b> <b>Purpose:</b> To define overall mission and system requirements.	Preliminary statement of software requirements, if available.	1. System Requirements Review (SRR)* 2. DSARC I (Program Decision)	Functional Baseline (configuration control of Preliminary System Spec or Preliminary System Segment Spec)	Preliminary System Spec (or Preliminary System Segment Spec)	At SRR	Program Office or conceptual phase contractor	
<b>VALIDATION PHASE</b> <b>Purpose:</b> To validate system concepts and establish the functional requirements for major end items of the system.	Major system characteristics are refined through studies, system engineering, and preliminary equipment and computer program development, test, and evaluation.	1. System Design Review (SDR) 2. DSARC II (Ratification Decision)	Allocated Baseline (configuration control of System Spec or System Segment Spec and usually of CPCI Development Specs)	1. Final System Spec (or Final System Segment Spec) 2. Preliminary CPCI Development Specs	At SDR	Validation phase contractor	
<b>FULL-SCALE ENGINEERING DEVELOPMENT PHASE</b> <b>Purpose:</b> To design, build, and test system end items; to integrate end items into a complete system; and to test system under as nearly operational conditions as possible.	1. Preliminary Design. Definition of the CPCIs in terms of functions, external and internal interfaces, storage allocation, operating sequences, and data base design. 2. Detailed Design. Definition of CPCI structure, interface logic, and data base to point where coding can begin. 3. Coding and Unit Test. Routines and data files are coded, debugged (will compile), and checked out (will produce correct results from predefined inputs). 4. Integration and Test a. CPCI Tests. CPCIs are tested together in increasingly larger combinations until all CPCIs developed by the same contractor are functioning together correctly. b. Integrated System Testing. All CPCIs and hardware CIs of the system are tested together to verify that the system meets the requirements of the system spec.	Preliminary Design Review (PDR)	--	1. Final CPCI Development Specs 2. Preliminary CPCI Code-To Product Specs	At PDR	Software development contractor	
		Critical Design Review (CDR)	--	Final CPCI Code-To Product Specs	At CDR	Software development contractor	
		Test Readiness Review (TRR, a contractor internal review)	--	--	--	--	--
		1. Functional Configuration Audit (FCA) 2. Physical Configuration Audit (PCA)	Preliminary Product Baseline (configuration control of System Spec or System Segment Spec, of CPCI and CI Development and Product Specs, and of CPCIs and CIs themselves)	CPCI As-Coded Product Specs	At PCA	Software development contractor	
	1. Same as preceding (FCA, PCA), as required 2. Formal Qualification Review (FQR) 3. DSARC III (Product Decision)	Product Baseline (configuration control of same items as for Preliminary Product Baseline, but updated)	1. User Manual 2. Positional Handbooks 3. Computer Programming Manual	At Product Baseline	Software or hardware development contractor or system integration contractor, as appropriate		
<b>PRODUCTION/DEPLOYMENT AND OPERATION/MAINTENANCE PHASES</b> <b>Purpose:</b> To field system to operational sites and install and test them, then to operate and maintain them.	Installation, maintenance, and modification, as required.	--	None (usually continuing configuration control of specs and products)	--	--	--	

\*SRRs normally are conducted during the conceptual phase or validation phase, but also may be conducted any other time.

\*\* Example documentation requirements for software acquisition are listed in Table 5-2 and shown in life cycle context in Figure 5-1.

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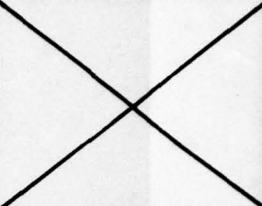
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Table 2-1. Major Components of Typical System/Software Acquisition Life Cycle

	Software Development Tasks	Reviews and Audits	Baselines	Primary Software Product Documents**			
				Document Type	Time of Issue	Originator	Governing KSS
PRELIMINARY	Preliminary statement of software requirements, if available.	1. System Requirements Review (SRR)* 2. DSARC I (Program Decision)	Functional Baseline (configuration control of Preliminary System Spec or Preliminary System Segment Spec)	Preliminary System Spec (or Preliminary System Segment Spec)	At SRR	Program Office or conceptual phase contractor	MIL-STD-490, MIL-STD-483, and appropriate DIDs.
CONCEPTUAL	Major system characteristics are refined through studies, system engineering, and preliminary equipment and computer program development, test, and evaluation.	1. System Design Review (SDR) 2. DSARC II (Ratification Decision)	Allocated Baseline (configuration control of System Spec or System Segment Spec and usually of CPCI Development Specs)	1. Final System Spec (or Final System Segment Spec) 2. Preliminary CPCI Development Specs	At SDR	Validation phase contractor	MIL-STD-490, MIL-STD-483, and appropriate DIDs.
DEVELOPMENT	1. <u>Preliminary Design</u> . Definition of the CPCIs in terms of functions, external and internal interfaces, storage allocation, operating sequences, and data base design.	Preliminary Design Review (PDR)	--	1. Final CPCI Development Specs 2. Preliminary CPCI Code-To Product Specs	At PDR	Software development contractor	MIL-STD-490, MIL-STD-483, and appropriate DIDs.
	2. <u>Detailed Design</u> . Definition of CPCI structure, interface logic, and data base to point where coding can begin.	Critical Design Review (CDR)	--	Final CPCI Code-To Product Specs	At CDR	Software development contractor	MIL-STD-490, MIL-STD-483, and appropriate DIDs.
	3. <u>Coding and Unit Test</u> . Routines and data files are coded, debugged (will compile), and checked out (will produce correct results from predefined inputs).	Test Readiness Review (TRR, a contractor internal review)	--	--	--	--	--
	4. <u>Integration and Test</u> a. <u>CPCI Tests</u> . CPCIs are tested together in increasingly larger combinations until all CPCIs developed by the same contractor are functioning together correctly. b. <u>Integrated System Testing</u> . All CPCIs and hardware CIs of the system are tested together to verify that the system meets the requirements of the system spec.	1. Functional Configuration Audit (FCA) 2. Physical Configuration Audit (PCA)  1. Same as preceding (FCA, PCA), as required 2. Formal Qualification Review (FQR) 3. DSARC III (Product Decision)	Preliminary Product Baseline (configuration control of System Spec or System Segment Spec, of CPCI and CI Development and Product Specs, and of CPCIs and CIs themselves)  Product Baseline (configuration control of same items as for Preliminary Product Baseline, but updated)	CPCI As-Coded Product Specs  1. User Manual 2. Positional Handbooks 3. Computer Programming Manual	At PCA  At Product Baseline	Software development contractor  Software or hardware development contractor or system integration contractor, as appropriate	MIL-STD-490, MIL-STD-483, and appropriate DIDs.  Appropriate DIDs.
INSTALLATION	Installation, maintenance, and modification, as required.	--	None (usually continuing configuration control of specs and products)	--	--	--	--

\* Conducted during the conceptual phase or validation phase, but also may be conducted any other time.  
 \*\* Configuration requirements for software acquisition are listed in Table 5-2 and shown in life cycle context in Figure 5-1.

I. INTERNAL DOCUMENTS	Governing RSS*
A. GOVERNMENT INTERNAL DOCUMENTS	
1. Directive Types	
1a. DOD Directives (DODD) 1b. DOD Instruction (DODI) 1c. Regulation 1d. Manual 1e. Operating Instruction 1f. Publishing Bulletin 1g. Supplement 1h. Technical Orders	
2. Informative Types	
2a. Pamphlet 2b. Visual Aid 2c. Base or Headquarters Official Bulletin 2d. Staff Digest	
3. Special Types	
3a. Design Handbook 3b. Guidebook	
B. CONTRACTOR INTERNAL DOCUMENTS	
4. Contractor Internal Types	
4a. Design Handbook and Manual 4b. Report 4c. Contractor Standard 4d. Contractor Procedure and Process Document	
AFR 5-1	Contractor Documentation Policies and Standards

\* For format and content.

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Governing RSS*	Rules for Compliance References	II. COMPLIANCE DOCUMENTS	Governing RSS*
5-1	In general, internal documents (Types 1 through 4) should not be listed as compliance references in compliance documents (Types 5 through 11)	C. PROGRAM-PECULIAR COMPLIANCE DOCUMENTS	MIL-STD-490 and MIL-STD-483
		5. System Specification	
		6. System Segment (or Subsystem) Specification	
		7. CI (and CPCI) Specification	
		7a. Development Specification	
		7b. Product Specification	
		D. GENERAL COMPLIANCE DOCUMENTS	MIL-STD-961
		8. Detail Specifications (Military, Federal, and DOD Adopted Industry)	
		9. General Specifications (Military, Federal, and DOD Adopted Industry)	
		10. Handbooks (Military, Federal, and DOD Adopted Industry)	MIL-STD-962
		11. Standards (Military, Federal, and DOD Adopted Industry)	
for ntation s and ds			

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Table 3-1. RSS Types

ance	II. COMPLIANCE DOCUMENTS	Governing RSS*	Rules for Compliance References
al 1	C. PROGRAM-PECULIAR COMPLIANCE DOCUMENTS	MIL-STD-490 and MIL-STD-483	In general, a compliance document (Types 5 through 11) should contain compliance references only to documents below it in this chart.
not	5. System Specification		
	6. System Segment (or Subsystem) Specification		
	7. CI (and CPCI) Specification		
5	7a. Development Specification		
	7b. Product Specification	MIL-STD-961	Prohibited references include the following:
	D. GENERAL COMPLIANCE DOCUMENTS		
	8. Detail Specifications (Military, Federal, and DOD Adopted Industry)		
	9. General Specifications (Military, Federal, and DOD Adopted Industry)	MIL-STD-962	<ul style="list-style-type: none"> <li>● A system specification should not reference a DOD directive or an AF regulation</li> <li>● A CPCI specification should not reference a system segment specification or a system specification</li> <li>● A general specification should not reference a detail specification</li> <li>● A standard should not reference a handbook or a specification</li> </ul>
	10. Handbooks (Military, Federal, and DOD Adopted Industry)		
	11. Standards (Military, Federal, and DOD Adopted Industry)		

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I. INTERNAL DOCUMENTS	
A. GOVERNMENT INTERNAL DOCUMENTS	
1. <u>Directive Types</u>	<p>1a. <u>DOD Directives (DODI)</u>. DOD directives provide policy guidance to the Air Force, Army, Navy, and other DOD agencies. They are implemented in the Air Force through the AF Standard Publication System.</p> <p>1b. <u>DOD Instruction (DODI)</u>. DOD instructions describe how a DOD directive policy is implemented. DODIs are implemented in the Air Force through the AF Standard Publication System.</p> <p>1c. <u>Regulation</u>. Regulations are policy statements of DOD, Air Force, or other DOD components.</p> <p>1d. <u>Manual</u>. Manuals implement regulations by defining policies, concepts, techniques, procedures, and responsibilities.</p> <p>1e. <u>Operating Instruction</u>. Operating instructions announce policy and prescribe procedures within a headquarters (headquarters operating procedures or HOI), within an organizational element (e.g., branch operating instruction, or BOI), or within a maintenance functional area (maintenance operating instruction, or MOI).</p> <p>1f. <u>Publishing Bulletin</u>. Publishing bulletins direct and inform personnel of the AF publications distribution system operating under AFM 7-1.</p> <p>1g. <u>Supplement</u>. Supplements are issued at the command level to supplement a basic publication (regulation, manual, or instruction) of a higher headquarters. They are not substitutes for new publications and are not used to correct or alter existing publications.</p> <p>1h. <u>Technical Orders</u>. Technical Orders are instructions for operating and maintaining equipment or performing other tasks that require a standard procedure.</p>
2. <u>Informative Types</u>	<p>2a. <u>Pamphlet</u>. Pamphlets are nondirective, informal informational publications.</p> <p>2b. <u>Visual Aid</u>. Visual aids are permanent or temporary charts, posters, or other graphic illustrations issued for display.</p> <p>2c. <u>Base or Headquarters Official Bulletin</u>. These bulletins contain temporary announcements, notices, and instructions.</p> <p>2d. <u>Staff Digest</u>. Staff digests contain summaries of significant staff actions, important announcements, and special notices.</p>
3. <u>Special Types</u>	<p>3a. <u>Design Handbook</u>. Design Handbooks are suggested practices that supplement specifications and standards by bringing together procedural and technical design information in the form of general design and engineering data. Design handbooks are not directive and are not an integral part of the Defense Standardization Program.</p> <p>3b. <u>Guidebook</u>. Guidebooks assist the Air Force or other DOD component in performing management activities.</p>
B. CONTRACTOR INTERNAL DOCUMENTS	
4. <u>Contractor Internal Types</u>	<p>Contractor internal documents are normally nondeliverable documents that contractors employ for standardization, guidance, instruction, and reporting within their own organizations during the planning and implementation of a Government contract. They include:</p> <p>4a. <u>Design Handbook and Manual</u></p> <p>4b. <u>Report</u></p> <p>4c. <u>Contractor Standard</u></p> <p>4d. <u>Contractor Procedure and Process Document</u></p>

II. COMPLIANCE DOCUMENTS	
C. PROGRAM-PECULIAR COMPLIANCE DOCUMENTS	
5. <u>System Specification</u> *	<p>The system specification states the technical and mission requirements, allocates requirements to segments, subsystems, configuration areas, defines the interfaces between the functional areas, and requirements. (The system specification is Type A in MIL-STD-483, Appendix III.)</p>
6. <u>System Segment (or Subsystem) Specification</u> *	<p>A system segment is a discrete package of system performance, interfaces, and configuration items allocated for development to Government organization by the procuring activity. A system segment when a system or major equipment is acquired on an increment when a segment of an existing system requires major modification. System segment specification is the same as for a system specification (Type B in MIL-STD-483). When coverage is limited to a single prime item development specification (Type B1 in MIL-STD-483) is adequate, requires the latter to be used instead of a system segment specification.</p>
7. <u>CI (and CPCI) Specification</u> *	<p>Configuration item (CI) specifications generally are prepared to describe technical characteristics of CIs that the contractors are developing. CPCI specifications describe technical characteristics of computer program configuration item (CPCI) specifications.</p> <p>7a. <u>Development Specification</u>. The CPCI development specification (Type B1 in MIL-STD-483) specifies the performance requirements of a CPCI element. It describes in operational terms all requirements necessary to design the CPCI or element. Performance criteria.</p> <p>7b. <u>Product Specification</u>. The CPCI product specification (Type B2 in MIL-STD-483) specifies the detailed design of a CPCI element. It includes technical descriptions, flow charts, and in the final version, prior to coding, this specification defines the code-to-design; as-coded design.</p>
D. GENERAL COMPLIANCE DOCUMENTS	
8. <u>Detail Specifications</u> *	<p>(Military, Federal, and DOD Adopted Industry)</p>
9. <u>General Specifications</u> *	<p>(Military, Federal, and DOD Adopted Industry)</p> <p>Military Specifications cover items or services that are intrinsic to the military. Federal specifications, which are issued by the General Services Administration (GSA), cover items or services that are used by, or for, or more Federal agencies, at least one of which is an agency of the Department of Defense. Specifications may be either detail or general:</p> <p>a. A detail specification covers all requirements for one or more items or services to a level of detail that eliminates the need for preparation of a general specification. A detail specification also may take the form of a reference to a general specification for requirements common to both.</p> <p>b. A general specification covers requirements common to a group of systems, or other products, or to a group of services or materials.</p>
10. <u>Handbooks</u> (Military, Federal, and DOD Adopted Industry)	<p>Handbooks present general information, procedural or technical information that is related to the Defense Standardization Program, design, engineering, production procurement, or supply management. Preparation of specifications and standards. Military handbook reference material that will serve the Standardization Program. Handbook reference is optional, and not all handbooks have references.</p>
11. <u>Standards</u> (Military, Federal, and DOD Adopted Industry)	<p>Standards are publications that establish engineering and technical requirements for items, materials, processes, methods, designs, and engineering in procurement through the medium of specifications and are features of an item. Standards are invoked at the discretion of the procuring activity in accordance with AFR 73-1, "Defense Standardization Program".</p> <p>* Specifications describe the essential technical requirements to be procured, including the procedures for determining when to be met.</p>

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Table 3-2. Description of RSS Types

<b>INTERNAL DOCUMENTS</b>
<b>GOVERNMENT INTERNAL DOCUMENTS</b>
<b>Directives (DODI).</b> DOD directives provide policy for the Air Force, Army, Navy, and other DOD components. They are implemented in the Air Force through the AF Standard Publication System.
<b>Instructions (DODI).</b> DOD instructions describe how policy is implemented. DODIs are implemented through the AF Standard Publication System.
<b>Regulations.</b> Regulations are policy statements of DOD, for DOD components.
<b>Standards.</b> Standards implement regulations by defining methods, techniques, procedures, and processes.
<b>Operating Instructions.</b> Operating instructions announce the procedures within a headquarters or other organization (e.g., branch operating instruction, maintenance instruction, or MOI).
<b>Bulletin.</b> Publishing bulletins direct and control the AF publications distribution under AFM 7-1.
<b>Supplements.</b> Supplements are issued at the command level or higher headquarters. They are not publications and are not used to correct or supplement.
<b>Orders.</b> Technical Orders are instructions for maintaining equipment or performing operations that require a standard procedure.
<b>Types</b>
<b>Amphlets.</b> Amphlets are nondirective, informal publications.
<b>Visual aids.</b> Visual aids are permanent or temporary publications or other graphic illustrations issued for headquarters use.
<b>Headquarters Official Bulletin.</b> These bulletins are used for announcements, notices, and reports.
<b>Staff digests.</b> Staff digests contain summaries of significant, important announcements, and special reports.
<b>Handbook.</b> Design Handbooks are suggested publications that complement specifications and standards by providing procedural and technical design information of general design and engineering data. They are not directive and are not an integral part of the Standardization Program.
<b>Guidebooks.</b> Guidebooks assist the Air Force or other organization in performing management activities.
<b>CONTRACTOR INTERNAL DOCUMENTS</b>
<b>Internal Types</b>
<b>Standard documents.</b> Standard documents are normally nondeliverable publications that contractors employ for standardization, and reporting within their own organization during the planning and implementation of a contract. They include:
<b>Standard Book and Manual</b>
<b>Standard Procedure and Process Document</b>

<b>II. COMPLIANCE DOCUMENTS</b>
<b>C. PROGRAM-PECULIAR COMPLIANCE DOCUMENTS</b>
<b>5. System Specification*</b> The system specification states the technical and mission requirements for the system, allocates requirements to segments, subsystems, configuration items, or other functional areas, defines the interfaces between the functional areas, and specifies system level test requirements. (The system specification is Type A in MIL-STD-490 and is also discussed in MIL-STD-483, Appendix III.)
<b>6. System Segment (or Subsystem) Specification*</b> A system segment is a discrete package of system performance requirements, functional interfaces, and configuration items allocated for development to one contractor or one Government organization by the procuring activity. A system segment specification is used when a system or major equipment is acquired on an incremental or evolutionary basis or when a segment of an existing system requires major modification. The format for a system segment specification is the same as for a system specification (Appendix III in MIL-STD-483). When coverage is limited to a single prime item and a prime item development specification (Type B1 in MIL-STD-483) is adequate, MIL-STD-483 requires the latter to be used instead of a system segment specification.
<b>7. CI (and CPCI) Specification*</b> Configuration item (CI) specifications generally are prepared by contractors to describe the technical characteristics of CIs that the contractors are developing. For software, two types of computer program configuration item (CPCI) specifications are applicable. <b>7a. Development Specification.</b> The CPCI development specification (Type B5 in MIL-STD-490 and Part I in MIL-STD-483) specifies the performance, design, and test requirements of a CPCI element. It describes in operational, functional, or mathematical terms all requirements necessary to design the CPCI or element and to test it against performance criteria. <b>7b. Product Specification.</b> The CPCI product specification (Type C5 in MIL-STD-490 and Part II in MIL-STD-483) specifies the detailed design of a CPCI or CPCI element in terms of technical descriptions, flow charts, and in the final version, computer program listings. Prior to coding, this specification defines the code-to-design; after coding, it defines the as-coded design.
<b>D. GENERAL COMPLIANCE DOCUMENTS</b>
<b>8. Detail Specifications*</b> (Military, Federal, and DOD Adopted Industry)
<b>9. General Specifications*</b> (Military, Federal, and DOD Adopted Industry) Military Specifications cover items or services that are intrinsically military in character, are commercial items with features that meet special military requirements, or are commercial items with no present or known potential use by Federal agencies other than the military. Federal specifications, which are issued by the General Services Administration (GSA), cover items or services that are used by, or have a potential use by, two or more Federal agencies, at least one of which is an agency other than DOD. Specifications may be either detail or general: <b>a.</b> A detail specification covers all requirements for one or more types of items or services, to a level of detail that eliminates the need for preparation of or reference to a general specification. A detail specification also may take the form of a specification sheet that refers to a general specification for requirements common to the family of items or services. <b>b.</b> A general specification covers requirements common to a group of weapon systems, subsystems, or other products, or to a group of services or materials.
<b>10. Handbooks (Military, Federal, and DOD Adopted Industry)</b> Handbooks present general information, procedural or technical use data, or design information that is related to the Defense Standardization Program and will be used in equipment, design, engineering, production procurement, or supply management operations, or for preparation of specifications and standards. Military handbooks also provide industry with reference material that will serve the Standardization Program. The use of handbooks as standardization references is optional, and not all handbooks are appropriate for such references.
<b>11. Standards (Military, Federal, and DOD Adopted Industry)</b> Standards are publications that establish engineering and technical limitations and applications for items, materials, processes, methods, designs, and engineering practices. They function in procurement through the medium of specifications and are used to standardize one or more features of an item. Standards are invoked at the discretion of the procuring agency, in accordance with AFR 73-1, "Defense Standardization Program."
*Specifications describe the essential technical requirements of items, materials, or services to be procured, including the procedures for determining whether the requirements have been met.

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The most important RSS for acquisition of software for airborne systems are listed in Table 3-3 and are summarized in Appendix A. Additional RSS that have some relevance to software acquisition are listed in Appendix B.

The Air Force, major commands, and field organizations are required to review the need for, and the content of, each document issued by the organization and to periodically issue indexes of all current standard documents. Table 3-4 lists the most important indexes and several other documents concerning the generation and use of RSS.

The numbering conventions for identification of major kinds of RSS are shown in Table 3-5.

### 3.2 IMPORTANCE OF AF 800 SERIES DOCUMENTS

The most important regulation concerning the acquisition of software for airborne systems is AFR 800-14, Volume II, entitled "Acquisition and Support of Computer Resources in Systems." This regulation and its companion Volume I (with AFSC Supplement 1) provide guidance for the proper planning, development, acquisition, employment, and support of computer hardware and software resources for major defense systems. Computer resources are the only commonly used components of Air Force systems whose acquisition and support have been treated in a separate regulation. One reason is that computer resources, particularly software, are sometimes minor parts of a total system in terms of resources expended and therefore have at times received inadequate management attention. Moreover, computer technology is a new and different technology in many respects and often is the critical path item in system procurements.

Volume I of AFR 800-14 establishes the basic policies for managing the acquisition and support of computer resources, and Volume II is a comprehensive presentation of the concepts and procedures required for implementing these policies. Volume II contains sections on management

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Table 3-3. List of Key RSS

Appendix A Paragraph Number	RSS Category and Type	RSS No.	RSS Title
A.1	INTERNAL DOCUMENTS		
A.1.1	DOD Documents	DOD 4120.3-M DODD 5000.1 DODD 5000.2 DODD 5000.3 DODD 5000.19  DOD 5000.19-L, Volume II  DODD 5000.29 DODD 5000.31  DODI 5010.12 DODD 5010.19 DOD 7935.1-S	Standardization of Policies, Procedures, and Instructions Major System Acquisitions Major System Acquisition Process Test and Evaluation Policies for the Management and Control of DOD Information Requirements Acquisition Management Systems and Data Requirements Control List (AMSDL) Management of Computer Resources in Major Defense Systems Interim List of DOD Approved High Order Programming Languages (HOL) Management of Technical Data Configuration Management Automated Data Systems Documentation Standards
A.1.2	AF Regulations	AFR 65-3 AFR 73-1 AFR 74-1 AFR 80-14 AFR 100-2 AFR 800-2 (CI) AFR 800-3 AFR 800-4 AFR 800-11 AFR 800-14, Volume I AFR 800-14, Volume II AFR 800-19	Configuration Management Defense Standardization Program (DSP) Quality Assurance Program Research and Development Test and Evaluation Management of the USAF Automatic Data Processing Program Acquisition Management - Program Management Engineering for Defense Systems Transfer of Program Management Responsibility Life Cycle Costing (LCC) Management of Computer Resources in Systems Acquisition and Support Procedures for Computer Resources in Systems System or Equipment Turnover
A.1.3	AFSC Pamphlets	AFSCP 800-7	Configuration Management
A.1.4	SAMSO Pamphlets/Regulations	SAMSOP 74-2 SAMSOR 70-2	Contractor Software Quality Assurance Evaluation Guide Request for Proposal Policy
A.1.5	AFSC Design Handbooks	AFSC DH 4-2	Electronic Systems Test and Evaluation
A.1.6	Navy Instructions	NAVMATINST 4130.2A  SECNAVINST 3560.1	Configuration Management of Computer Software Associated with Tactical Digital Systems and other Technical Computer Systems Tactical Digital Systems Documentation Standards
A.1.7	Army (DOD) Regulations	AR 70-37	Configuration Management
A.1.8	Technical Orders	TO-00-5-2	Technical Order Distribution System
A.2	COMPLIANCE DOCUMENTS		
A.2.1	Military Specifications	MIL-Q-9858A MIL-S-52779 (AD) MIL-S-83490	Quality Program Requirements Software Quality Assurance Program Requirements Specifications, Types and Forms
A.2.2	Military Standards	MIL-STD-130E MIL-STD-480 MIL-STD-481A  MIL-STD-482A MIL-STD-483 (USAF)  MIL-STD-490 MIL-STD-499A MIL-STD-881A MIL-STD-1521A (USAF)  MIL-STD-1588 (USAF) MIL-STD-1589 (USAF) MIL-STD-1679 (Navy) Draft	Identification Marking of U.S. Military Property Configuration Control - Engineering Changes, Deviations and Waivers Configuration Control - Engineering Changes, Deviations and Waivers (Short Form) Configuration Status Accounting Data Elements and Related Features Configuration Management Practices for Systems, Equipment, Munitions and Computer Programs Specification Practices Engineering Management Work Breakdown Structures for Defense Material Items Technical Reviews and Audits for Systems, Equipments, and Computer Programs JOVIAL (J3) JOVIAL (J73/1) Tactical Software Development
A.2.3	SAMSO Standards	SAMSO Exhibit 73-3 (Considered a standard by SAMSO) SAMSO-STD 73-5B	Standard Engineering Practices for Computer Software Design and Development Quality Assurance Requirements for Space and Missile Systems

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Table 3-4. List of Indexes and General RSS Publications

Document Number	Document Title
AFR 0-1	Guide to Indexes, Catalogs, and Lists of Departmental Publications
AFR 0-2	Numerical Index of Standard Publications and Recurring Periodicals
AFR 0-4	Department of Defense, Joint Chiefs of Staff, Interservice Publications, and Air Force Acquisition Documents
AFR 0-15	Defense Intelligence Agency (DIA) and Specialized USAF Intelligence Publications
AFR 5-1	Air Force Publications Management Program
AFR 81-6	International Military Standardization Programs (AFSC Supplement 26 October 1967)
AFSCR 0-2	Numerical Index of AFSC Publications
AFSCM/AFLCM 81-1	Specifications and Standards Manual
MIL-STD-143B	Order of Precedence for the Selection of Standards and Specifications

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Table 3-5. RSS Identification Number Conventions

Document Type	Document Subtype	Format of Document Number *
Directives	DOD Directives	DODD 1111.1
Instructions	DOD Instructions	DODI 1111.1
Regulations	DOD Regulations Air Force Regulations Air Force Systems Command Regulations	DOD 1111.1-R AFR 11-1 AFSCR 11-1
Manuals	Department of Defense Manuals Air Force Manuals Air Force Systems Command Manuals	DOD 1111.1-M AFM 11-1 AFSCM 11-1
Technical Orders	USAF Technical Orders	TO 11-1-1
Pamphlets	Air Force Pamphlets Air Force Systems Command Pamphlets	AFP 11-1 AFSCP 11-1
Bulletins	USAF Specification Bulletin AF/Navy Aeronautical Bulletin	USAF Spec Bul 111 ANA Bul 111
Design Handbooks	AFSC Design Handbooks	DH 1-1
Specifications	Military Specifications Federal Specifications Aerospace Material Specifications	MIL-S-1111 FED Spec 11-1-111 AMS 111
Handbooks	Department of Defense Handbooks Military Handbooks Federal Handbooks	DOD 1111.1-H MIL-HDBK-111 H11 (year)
Standards	Military Standard (book form) Military Standard (sheet form) AF/Navy Aeronautical Standards AF/Navy Aeronautical Design Standard Federal Standards National Airspace Standards Institute American National Standards Institute Federal Information Processing Standards	MIL-STD-111 MS 11111 AN 1111 AND 1111 FED-STD-111 NAS 1111 ANSI X3.11 year FIPS PUB 11

\* The digit "1" in these document numbers represents any digit.

directives and plans, system engineering, software testing, configuration management, software documentation, contract preparation, turnover and transfer, and deployment.

Four major computer resource directives and plans are defined in AFR 800-14, Volume II:

- a. Program Management Directive (PMD). "The official HQ USAF management directive used to provide direction to the implementing and participating commands and satisfy documentation requirements. It will be used during the entire acquisition cycle to state requirements and request studies as well as initiate, approve, change, transition, modify or terminate programs. The content of the PMD, including the required HQ USAF review and approval actions, is tailored to the needs of each individual program." (Definition from AFR 800-2, Attachment 3, 16 March 1972.)
- b. Program Management Plan (PMP). "The document developed and issued by the Program Manager which shows the integrated time-phased tasks and resources required to complete the task specified in the PMD. The PMP is tailored to the needs of each individual program." (Definition from AFR 800-2, Attachment 3, 16 March 1972.)
- c. Computer Resources Integrated Support Plan (CRISP). "The CRISP identifies organizational relationships and responsibilities for the management and technical support of computer resources. It functions during the full-scale development phase to identify computer resources necessary to support computer programs after transfer of program management responsibility and system turnover. The CRISP continues to function after the transfer of program management responsibilities and system turnover as the basic agreement between the supporting and using commands for management and support of computer resources." (Definition from AFR 800-14, Volume II, 26 September 1975.)
- d. Computer Program Development Plan (CPDP). "The CPDP identifies the actions needed to develop and deliver computer program configuration items and necessary support resources. It will be prepared by the implementing command or, if the development effort is contracted, the plan may be prepared by the contractor and approved by the implementing command." (Definition from AFR 800-14, Volume II, 26 September 1975.)

A regulation closely related to AFR 800-14 is AFR 800-2, entitled "Acquisition Management - Program Management." This is the management regulation for all Air Force acquisition of DOD-identified major defense systems. The entire system is managed according to AFR 800-2, and its computer resources are managed according to AFR 800-14.

A large number of other regulations, as well as pamphlets and manuals, are included in the Air Force 800 series of RSS. The series as a whole covers the acquisition of entire systems from the time the requirement is initially approved until the system is available to the operating command. The RSS bibliography in Appendix B lists many of these 800 series documents. The major characteristics of the 800 series RSS are summarized in Table 3-6.

The Air Force has another series of RSS - the 300 series - that is devoted entirely to the regulation and control of another category of computer systems, those that function as independent data processing systems rather than as integral elements of larger systems. This category is referred to in regulations as automatic data processing (ADP) systems and is carefully distinguished from the "computer resources" embedded in major defense systems.

Despite its different subject matter, the 300 series can play an important role in the acquisition and support of embedded computer resources. For one thing, the Air Force ADP Program Single Manager established by AFR 300-2, "Management of ADP Systems", is responsible for providing requested ADP technical and managerial information and advice to AFR 800-14 programs through HQ USAF coordination. In addition, several regulations and manuals in the 300 series can be employed for 800 series programs, including those pertaining to standardization of data elements, equipment, and computer programs and use of higher level programming languages. The general relationship of the 800 series and 300 series RSS is shown in Figure 3-1.

<b>A. MISSION REQUIREMENTS</b>
New or improved mission requirements may be initiated by any Air Force organization or by higher authority. Requirements are transmitted to Major Command and HQ USAF in the form of a Required Operational Capability (ROC) as specified by AFR 57-1 for new or improved operational capabilities. HQ USAF will validate the requirement, and if the requirement is approved, issue a Program Management Directive (PMD). The PMD establishes the basis and authority for subsequent management of the project. The directive may specifically identify any regulation to be followed or excluded in the acquisition. For airborne system software acquisitions, it will normally identify the AFR 800 series as the management policy and procedure directives to be followed.
<b>B. ACQUISITION RESPONSIBILITIES</b>
The acquisition of assigned defense systems, including any necessary software, is the responsibility of HQ USAF. An implementing command, usually the Systems Command, is selected and is given maximum authority and responsibility to acquire a system. A Program Manager is appointed and given authority to act on behalf of the implementing command to conduct the acquisition program within the approved performance, schedule, and funding requirements.
<b>C. PROGRAM MANAGEMENT RESPONSIBILITIES</b>
The Program Manager organizes, plans, directs, and controls the entire program. He prepares the Program Management Plan (PMP), which is a directive on all participating organizations, and establishes the scope, cost, and schedule for all program efforts. He assesses for HQ USAF all changes in the PMP, level of effort, system requirements, cost, and schedule. He coordinates the activities of participating organizations and reports to higher headquarters the performance progress of the program and recommended changes. For selected programs, the Program Manager is authorized direct communication of problems and recommended solutions to the commander of the implementing command, the Chief of Staff, and the Secretary of the Air Force. An AFR 800 series managed program delegates maximum authority and responsibility to the Program Manager. Program review and approval of such items as system requirements, performance, schedule, and funding are responsibilities of higher headquarters.
<b>D. PROGRAM MILESTONES</b>
The principal milestones of an 800 series program are the transition points between acquisition life cycle phases. At these milestone points, specifications are baselined for configuration control and reviews are conducted. On most programs, DOD approval is required (DSARC) at the end of each of the first three phases (conceptual, validation, and full-scale engineering development) before the next phase begins. With the approval of HQ USAF, the Program Manager may identify intermediate milestones, in addition to those called out by the regulations and standards.
<b>E. REVIEWS</b>
System requirement reviews, system design reviews, preliminary design reviews, and critical design reviews are usually conducted in accordance with MIL-STD-1521A (USAF), "Reviews and Audits." The design reviews are not the means of providing technical direction or even of approving or disapproving the information presented. This information represents only the intended design approach of the contractor. The assessment of that information as a measure of technical progress and design acceptability can, however, be the basis for independent technical direction by the Program Manager.
<b>F. REPORTING</b>
A Program Manager continually assesses progress, performance, and costs and reports appropriate problems and recommended changes to a higher headquarters. In addition, he conducts periodic reviews, as directed or as planned, for AFSC, the Air Force, or the Secretary of Defense.

<b>G. CONFIGURATION</b>
A Program Manager AFR 65-3, "Configuration and document for The use of practical a product configuration baselines from not explicitly requirements as documenting software requirements a computer program
<b>H. SOFTWARE</b>
The AFR 800 series CPCIs. A Program configuration manager required data items List, Form DD14 to describe the quality requirements use and modification documents. The Item Description Systems and Data
<b>I. SOFTWARE</b>
Requirements for specification, all system, and other from the system ware requirements in a series of C
<b>J. SOFTWARE</b>
AFR 800-14, Vol FORTRAN, JOV degree practical
<b>K. SOFTWARE</b>
AFR 800 series 483 include in each (Section 4) on the is included in the test reports. When it is presumed the acceptance. The systems acquire This regulation evenness; it includes AFSC DH 4-2, "ing guidelines for
<b>L. INTEGRATION</b>
An AFR 800 series supported by systems that the Program that when the acquisition operating command the future needs system operation

25-A

Table 3-6. Major Characteristics of AF 800 Series Documents

any Air Force organization Major Command and HQ USAF specified by AFR 57-1 for validate the requirement, and Joint Directive (PMD). The PMD is the project. The director is included in the acquisition. Identify the AFR 800 series allowed.

necessary software, is the usually the Systems Command, ability to acquire a system. A behalf of the implementing improved performance, schedule,

controls the entire program. He directive on all participating effort, system requirements, participating organizations and of the program and recommended authorized direct commander of the implementing force. An AFR 800 series ability to the Program Manager. requirements, performance, quarters.

transition points between specifications are baselined for programs, DOD approval is begins (conceptual, validation, and milestones, in addition to those

liminary design reviews, and with MIL-STD-1521A (USAF), of providing technical director. This information of that acceptability can, however, be in Manager.

formance, and costs and reports headquarters. In addition, AFSC, the Air Force, or the

<b>G. CONFIGURATION MANAGEMENT</b>	
	A Program Manager must employ a configuration management program, based on AFR 65-3, "Configuration Management," including Appendix F, that will identify and document functional and physical characteristics of all CPCIs under development. The use of practices such as those defined in MIL-STD-483 are a means of identifying a product configuration, obtaining configuration status information, and establishing baselines from which changes can be proposed, assessed, and recorded. Although not explicitly required, the procedures used are usually those of MIL-STD-483. CPCI specifications as outlined in MIL-STD-490 and MIL-STD-483 are the usual means of documenting software requirements and design: development specifications describe requirements and product specifications describe first the code-to design of the CPCI computer programs and then their as-coded design.
<b>H. SOFTWARE DOCUMENTATION</b>	
	The AFR 800 series requires that software be identified and documented as one or more CPCIs. A Program Manager usually can use the CPCI specifications required for configuration management as the foundation of his software documentation set and add other required data items as necessary. A well-balanced CDRL (Contract Data Requirements List, Form DD1423) usually will include system, development, and product specifications to describe the software; test plans, procedures, and reports to support the software quality requirements; user manuals and perhaps maintenance manuals to describe the use and modification or correction of the software; and management and change control documents. The content of each document is specified in the CDRL by one of the Data Item Descriptions (DIDs) listed in DOD 5000.19-L, Volume II, "Acquisition Management Systems and Data Requirements Control List (AMSDL)."
<b>I. SOFTWARE REQUIREMENTS</b>	
	Requirements for the software portion of a system usually are first stated in the system specification, along with the general requirements for the hardware, personnel subsystem, and other basic elements of the system. These requirements are allocated from the system requirements specified in the same document. Subsequently the software requirements are restated and further allocated to modules of the software system in a series of CPCI (computer program configuration item) development specifications.
<b>J. SOFTWARE STANDARDS SELECTION</b>	
	AFR 800-14, Volume II, requires the use of higher order languages (HOLs) such as FORTRAN, JOVIAL, or COBOL rather than assembly language, to the maximum degree practical.
<b>K. SOFTWARE TESTING</b>	
	AFR 800 series systems that use the configuration management procedures of MIL-STD-483 include in each system, segment, and CPCI development specification a section (Section 4) on the testing of each requirement in the specification. Frequently, a task is included in the statement of work for preparation of test plans, test procedures, and test reports. Whenever a specification does not identify a particular test requirement, it is presumed that success or failure of a test of that requirement is immaterial to acceptance. The Air Force policies and requirements for test and evaluation of all systems acquired under AFR 800-2 are contained in AFR 80-14, "Test and Evaluation." This regulation emphasizes the test and evaluation of systems for suitability and effectiveness; it includes computer programs to the extent that they are part of a system. AFSC DH 4-2, "Electronic Systems Test and Evaluation," includes a Chapter 5 containing guidelines for test and evaluation of computer programs in accordance with AFR 80-14.
<b>L. INTEGRATED LOGISTICS SUPPORT</b>	
	An AFR 800 series program must provide for an Integrated Logistic Support Program supported by system engineering and life cycle costing. The AFR 800 series presumes that the Program Manager is a temporary agent of the implementing command and that when the acquisition task is completed, the system will be turned over to an operating command and to supporting commands. The Program Manager must anticipate the future needs of the operating and supporting commands and the recurring cost of system operations.

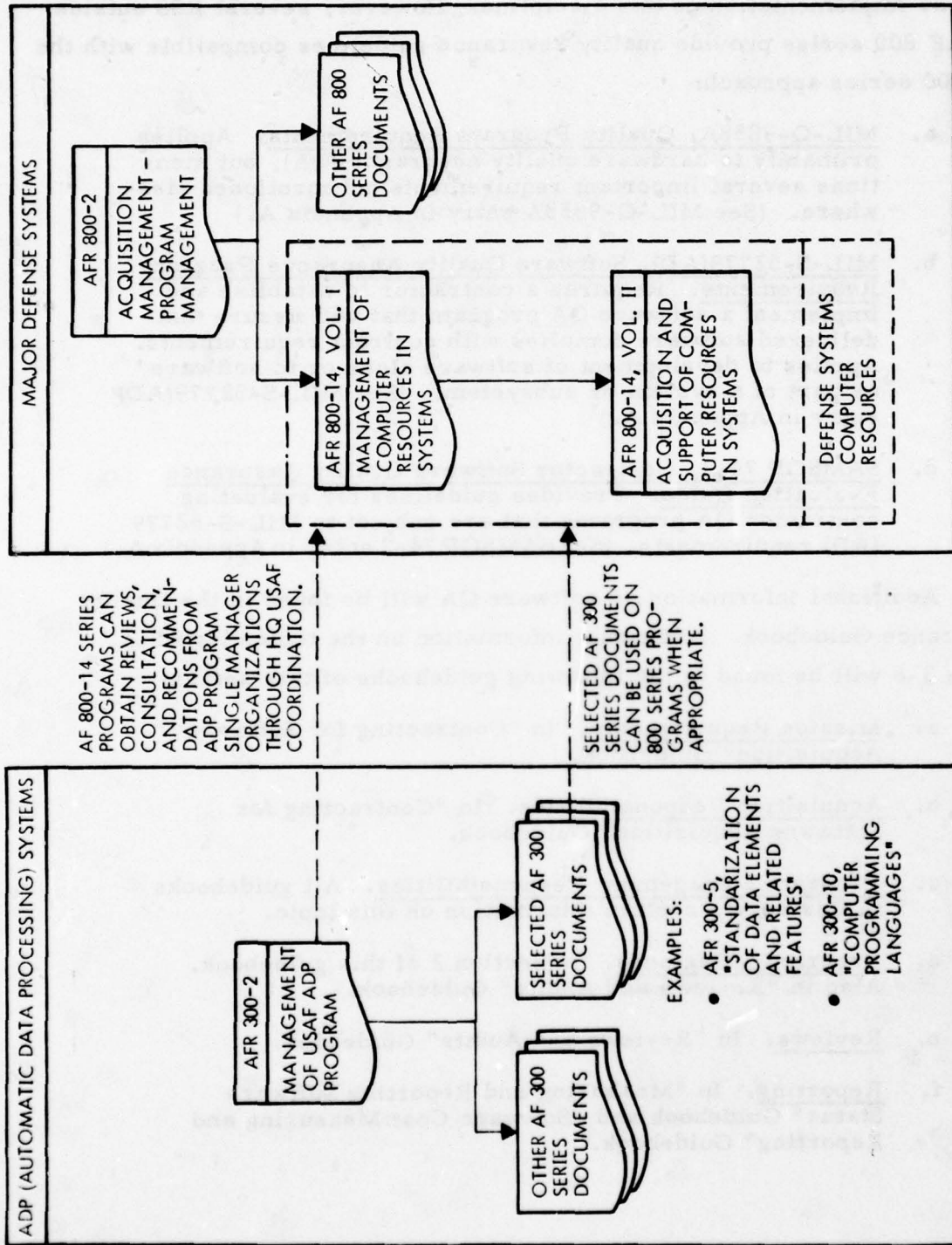


Figure 3-1. General Relationship of AF 800 Series and 300 Series Documents

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Table 3-6 does not mention quality assurance because none of the AF 800 series of RSS, including AFR 800-14, specifically addresses the need or implementation of this discipline. However, several RSS outside the AF 800 series provide quality assurance guidelines compatible with the AF 800 series approach:

- a. MIL-Q-9858A, Quality Program Requirements. Applies primarily to hardware quality assurance (QA), but mentions several important requirements not mentioned elsewhere. (See MIL-Q-9858A entry in Appendix A.)
- b. MIL-S-52779(AD), Software Quality Assurance Program Requirements. Requires a contractor to establish and implement a software QA program that will assure that delivered software complies with contract requirements. Applies to development of software alone or to software as part of a system or subsystem. (See MIL-S-52779(AD) entry in Appendix A.)
- c. SAMSOP 74-2, Contractor Software Quality Assurance Evaluation Guide. Provides guidelines for evaluating contractor QA programs that are subject to MIL-S-52779 (AD) requirements. (See SAMSOP 74-2 entry in Appendix A.)

Additional information on software QA will be found in the Quality Assurance Guidebook. Additional information on the topics listed in Table 3-6 will be found in the following guidebooks of this series:

- a. Mission Requirements. In "Contracting for Software Acquisition" Guidebook.
- b. Acquisition Responsibilities. In "Contracting for Software Acquisition" Guidebook.
- c. Program Management Responsibilities. All guidebooks in this series contain information on this topic.
- d. Program Milestones. In Section 2 of this guidebook. Also in "Reviews and Audits" Guidebook.
- e. Reviews. In "Reviews and Audits" Guidebook.
- f. Reporting. In "Measuring and Reporting Software Status" Guidebook and "Software Cost Measuring and Reporting" Guidebook.

- g. Configuration Management. In "Configuration Management" Guidebook.
- h. Software Documentation. In "Computer Program Documentation Requirements" Guidebook and "Requirements Specification" Guidebook.
- i. Software Requirements. In "Requirements Specification" Guidebook.
- j. Software Standards Selection. In Appendix B of this guidebook, particularly subsections B.1.4.8 and B.2.2.
- k. Software Testing. In "Verification, Validation, and Certification" Guidebook. For relation of the quality assurance section (Section 4) of program-peculiar specifications to testing, see the "Computer Program Documentation" Guidebook.

### 3.3 DOD STANDARDIZATION PROGRAM

The DOD standardization program, established by DOD Directive 4120.3, is a major national effort to uniformly document management and technical agreements and decisions applicable to more than one DOD program. Military standards, military handbooks, general military specifications, and detailed military specifications are the primary instruments for implementing this standardization program. These documents supplement the Federal standards and Federal specifications issued by the General Services Administration and the adopted industry specifications and standards issued by approved industry groups.

More than 42,000 standardization documents are currently used by the Department of Defense. Most of these documents are concerned with procurement of specific items of equipment, with standards for specific parts, and with items peculiar to each of the services. This large number may be reduced to possibly a hundred or so specifications and standards that commonly are referenced in ASD and SAMSO software procurement contracts.

### 3.4 NON-RSS PROGRAM-PECULIAR DOCUMENTS

One group of documents essential to any system acquisition has not been discussed in the preceding parts of this section. These are the program-peculiar plans, procedures, manuals, and other documents that a contractor must prepare and deliver to the procuring agency to provide needed visibility or to permit operation and maintenance of the system by other organizations. This group includes such documents as the following:

- a. Computer Program Development Plan (CPDP)
- b. System Engineering Management Plan (SEMP)
- c. Configuration Management (CM) plans
- d. Quality Assurance (QA) plans
- e. Standards and conventions
- f. Program schedules
- g. Agenda for reviews and audits
- h. Minutes of reviews and audits
- i. Configuration index
- j. Engineering Change Proposal (ECP)
- k. Specification Change Notice (SCN)
- l. Training support data
- m. User manual
- n. Positional handbook
- o. Computer programming manual
- p. Test plan, procedure, and report

These types of program-peculiar documents, while required by the RSS system and in some cases defined in detail by RSS, are not themselves considered RSS because they do not have the kind of regulating or standardizing functions in the acquisition process that RSS have.

Although similar in many ways to program-peculiar specifications such as the system specification, development specification, and product specification, these non-RSS documents normally are not used to define specific contract requirements. For example, an acceptance test plan and procedures document may be used to determine the acceptability of a product by providing the means to compare the product with the requirements of the system specification. The system specification however, not the test document, is the primary measure of contractual compliance.

Some of the other documents in this category are instructional (user manuals and positional handbooks), some are administrative (agenda, minutes, ECP's, SCN's), and some are plans for management control (CM and QA plans). These documents are similar to some of the contractor internal documents but are deliverable and the contractor internal documents normally are not.

Because this group of non-RSS program-peculiar documents must be considered to round out a complete program-peculiar documentation set, this guidebook at times considers this group and the program-peculiar specifications to be part of the same set. Section 5, for example, treats this entire set together in discussing data item requirements.

## 4. USING RSS AS COMPLIANCE DOCUMENTS

### 4.1 THE REFERENCING PROCESS

Requirements to be imposed on a contractor for an ASD or SAMSO program must be specified in the statement of work (SOW), contract exhibits, program-peculiar specifications, or other program-peculiar requirement documents. To reduce the number of different practices, processes, and items involved in procurements, Armed Services Procurement Regulation (ASPR) 1-1202 requires that contractual requirements be established whenever possible by referencing existing military, Federal, and adopted industry specifications and standards. Such referencing also reduces the amount of detail present in the contract documents themselves and takes advantage of the accumulated experience behind the referenced documents.

Software users, buyers, and developers have not yet built up a library of specifications and standards to match those of the hardware industry, which has had the advantage of more than a century of standardization activity. Still, the number of specifications and standards applicable to software acquisition is sufficient to permit standardization in many areas. A relatively small but growing number of software-unique or software-included specifications and standards is available, as well as some intended originally for hardware acquisition but suitable in varying degrees for software also.

Establishing contractual requirements by referencing specifications and standards involves all of the legal obligations and perils associated with any contractual agreement. Ambiguities, omissions, and other inaccuracies are costly in terms of confusion, slipped schedules, unsatisfactory products, cost overruns, and support problems. It is important, therefore, that the referenced specifications and standards accurately define the requirements desired. This accuracy is achieved by selecting the specifications and standards that most closely state the desired requirements and then carefully tailoring the contract references to supply any clarifications needed.

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To some extent, the terms "selection" and "tailoring" can be used as synonyms, meaning "to choose a set of specifications and standards that establish the requirements for a procurement." This guidebook, however, makes this distinction:

- a. Selection: Choosing a set of specifications and standards that in whole or in part contain requirements that a procurement must satisfy.
- b. Tailoring: Limiting or modifying the applicability of the specifications and standards selected.

#### 4.2 PROCUREMENT CONSIDERATIONS

Some familiarity with procurement methods and contract functional details will help software acquisition engineers/managers to establish more effective requirements and avoid hazards. Important points to know include the effects of statement of work (SOW) task statements on contract specification documents and referenced compliance documents, the difference between strict compliance and substantial compliance, and the importance of re-evaluating established requirements as an acquisition proceeds.

The following few pages touch only the surface of this subject. Further information is included in the guidebooks entitled "Contracting for Software Acquisition" and "Statements of Work and Requests for Proposal."

##### 4.2.1 Procurement Methods

The current basis of military procurement authority is Public Law 413, and Armed Services Procurement Act of 1947. This law is implemented and expanded by the Armed Services Procurement Regulations (ASPR), Air Force Regulations (AFR), Air Force System Command Regulations (AFSCR), and Aeronautical Systems Division (ASD) and SAMSO regulations. These regulations require that all purchases and contracts for supplies and services shall be made by formal advertising, unless they are within the scope of the specific exceptions that permit negotiation. These exceptions are design flexibility, tight security, speed in purchasing, specific makes or models, or intentional development of additional suppliers.

Negotiation is a more flexible and relatively informal bidding process to determine the best source available. Negotiation may be competitive or non-competitive. Because of the contracting officer's greater freedom of action under negotiation, this method is particularly attractive for complex system or equipment procurement, particularly during those phases of a program when development, detailed design, and product specifications are to be developed. ASD and SAMSO needs are such that negotiation is usually the method selected by the contracting officer.

The general procedures used in negotiation include preparation of a Request for Proposal (RFP), distribution of the RFP, receipt of proposals and quotations from sources of supply, evaluation of proposals, negotiations with suppliers, and contract award. The RFP must include the following items:

- a. Statement of Work (SOW)
- b. Contract Data Requirement List (CDRL) (DD Form 1423)
- c. Delivery Schedule
- d. List of Government furnished equipment
- e. Type of contract proposed
- f. All other provisions to be included in the final contract that may affect price.

The general procedures used in formal advertising, the other procurement method, include preparation of an invitation for bids, distribution of the invitation, submission of bids, opening and evaluation of bids, and awarding of a contract. The invitation for bids must include all the information needed by the prospective contractors to make a sound and reasonable bid. Complete specifications to be met, delivery schedules, bond requirements, and all other provisions to be included in the final contract must be specifically included in the invitation to bid.

#### 4.2.2 Types of System Acquisition Contracts

Government contracts for system acquisition generally are either fixed price or cost-reimbursement types. The decision as to which contract type to use is a very important aspect of the procurement and is to a large extent based upon the degree of definition of the technical requirements. The tighter the contractor's efforts can be defined, the greater the financial control that can be placed on the contractor. For efforts that can be tightly defined, fixed price contracting can be used, with the contractor being required to deliver a supply or service within a ceiling price. If the contractor effort cannot be tightly defined, a cost-reimbursable contract should be used, with the contractor required only to exert his best effort to supply the service or item within the funding provided. Additional characteristics of these two kinds of contracts are as follows:

- a. Fixed Price Contracts. Fixed price contracting refers to a family of pricing arrangements whose common characteristic is a ceiling beyond which the Government bears no responsibility for payment. The most common type is a firm fixed price contract in which the contractor or supplier agrees to furnish certain specified items or services to the Government for a certain price. The fixed-price-incentive-fee (FPIF) contract is a more general arrangement that includes a target price as well as a ceiling price that limits the Government's liability. The contractor or supplier is motivated to keep his costs low on a fixed price contract because the lower his costs, the higher his profit.
- b. Cost-Reimbursement Contracts. The other basic type of system acquisition contract is the cost-reimbursement contract. This is a family of pricing arrangements that provide for payment of allowable, allocable, and reasonable costs incurred in the performance of a contract, to the extent that such costs are prescribed or permitted by the contract. Typically, the contractor is reimbursed for all costs incurred in supplying the items or in performing the services identified, plus a stipulated fee. The cost-reimbursement contract allows a fair price to be paid in those situations where exact costs cannot be determined prior to performance of the contract. The incentive for the supplier to keep the costs low in a cost-reimbursement contract is usually less than for an equivalent fixed price contract. Fee structures stipulated in Government procurements include fixed fees; incentive fees based upon contract cost, schedules, or performance; award fees; or a combination of these. Cost-reimbursement contracts are always associated with negotiation and usually with items having a performance type specification.

#### 4.2.3 Contract Organization

Government contracts are organized for ease of tailoring. The typical organization of a system acquisition contract is shown in Table 4-1. The purpose of each of the four parts is as follows:

- a. Part I, General Instructions. Part I may simply be a single page (the cover sheet) that includes a table of contents for the contract and appropriate signature blocks.
- b. Part II, The Schedule. Part II identifies the unique agreements that form the basis of the contract.
- c. Part III, General Provisions. Part III includes the mandatory and appropriate optional clauses identified by the ASPR and other Government regulations.
- d. Part IV, List of Documents and Attachments. Section M, a list of the attachments, exhibits, and annexes to the contract, is followed by a copy of each of the items listed. A contract attachment is used to establish requirements in the attached document as an alternative to establishing excessive text or lists in the contract. An exhibit is used to establish deliverable requirements in the attached document as an alternative to establishing an extensive list of line or sub-line items in the schedule. (The term "exhibit" should not be used to identify any other type of contractual document.) An annex is an attachment to an attachment.

The SOW usually is prepared as Attachment 1. It is referenced in Section E, Supplies/Services. The SOW may contain both "stand alone" tasks and task statements that reference other requirement documents to set forth detailed requirements. The SOW usually identifies any Government interfaces in the management of the program and lists the contractor tasks (i. e., the management systems to be used, the studies, analyses, and tests to be performed, the software and hardware items to be produced, and any services desired).

Technical requirements, including system specifications, system segment specifications, and configuration item (CI) specifications, generally are prepared as separate requirement attachments. This

Table 4-1. Typical Contract Format

**Part I. General Instructions**

- Section A. Cover Sheet
- Section B. Contract Form and Representations, Certifications, and Other Statements of Offeror
- Section C. Instructions, Conditions, and Notices to Offeror
- Section D. Evaluation and Award Factors

**Part II. The Schedule**

- Section E. Supplies/Services and Prices
- Section F. Description/Specifications
- Section G. Preservation/Packaging/Packing
- Section H. Deliveries or Performance
- Section I. Inspection and Acceptances
- Section J. Special Provisions
- Section K. Contract Administration Data

**Part III. General Provisions**

- Section L. General Provisions

**Part IV. List of Documents and Attachments**

- Section M. List of Documents, Exhibits, and Other Attachments

arrangement allows tailoring of detailed requirements by the wording used in the SOW task statements. Even detailed "compliance" requirements in a referenced requirement document can be tailored or even reduced to "non-compliance" by the wording in the SOW task statement. This possibility must be recognized by those preparing and reviewing contracts, SOW's, annexes, and other referenced requirement documents. (For additional information on preparation of SOWs, see the guidebook entitled "Statements of Work and Requests for Proposal.")

#### 4.2.4 Contract Terminology

Because the principal parties to a contract have different points of view, they may be expected to differ at times in their interpretation of contract stipulations, particularly where the language is uncertain or inconsistent. To improve the prospect of a common understanding of a contract, Program Managers should strive for the greatest possible clarity of language. The following are essential precautions:

- a. Certainty of Terms. Requirements must be stated in precise, definite, and unambiguous terms.
- b. Consistency of Terms. The same terms must be used to refer to things throughout the contract and requirements documents. Preparation of a good glossary of terms for the procurement is an important aid to consistency.
- c. Terms Defining Sufficiency of Performance. If strict compliance to a requirement is desired, the requirement must be specific and capable of measurement to the accuracies specified. When such vague requirements as "high reliability," "best design practices," "good workmanship," or "suitable for the purpose intended" appear in a contract, it must be assumed that only substantial, or approximate, compliance by the contractor is required. Vague requirements are adequate for products whose characteristics are impossible to define exactly or to measure in a universally acceptable way, but not for products that must conform strictly to requirements expressible in precise terms. Some products may require a mixture of strict compliance for some requirements and only substantial compliance for others. Misunderstandings usually can be avoided by including in the quality assurance requirements the details of the tests and inspections that will be used to determine compliance.

#### 4.2.5 Contract Changes

The requirements in a contract form the baseline against which all progress and subsequent contractual changes are measured. Contract changes are always processed in writing by the contracting officer, and other Government representatives must avoid any oral or written communication with a contractor that might be interpreted as redirection or modification of the contract.

The language in a contract that defines the scope or outer limits of the contractor's effort is of critical importance, because work outside the stated scope requires new negotiations on costs, price, fee, and possibly schedule. If the limits are not clearly expressed, it is difficult to determine if or where there has been an increase in scope. Because the SOW has such an important role in establishment of contract requirements, deficiencies in SOW language, approach, terminology, and content often create problems throughout the acquisition process.

Attaining the top five percent of the required performance of a system, subsystem, or other item frequently causes substantial cost increases or schedule slips. During full-scale development, it may be advantageous to reevaluate the established requirements by means of tradeoff studies to see if requirements can be reduced without degrading essential overall program goals. Care must be taken, however, to ensure that changing one system requirement does not have a much bigger effect elsewhere in the total life cycle cost. Any decisions resulting from tradeoff studies must be implemented by changing the requirements in the contract.

### 4.3 SELECTING RSS AS COMPLIANCE DOCUMENTS

#### 4.3.1 General Guidelines for Selecting RSS

General guidelines for selecting compliance documents to be applied to a contract are as follows:

- a. Using Internal Document. Government internal documents (see Table 3-1) should never be referenced as compliance documents. Internal contractor documents should not be referenced as compliance documents in RFPs or during any contractor selection process, but

certain such documents may be appropriate to negotiate into a contract after contractor selection if they clarify the basis of contractor performance and if their use does not jeopardize potential competition that may be desired during subsequent program phases or reprocurement. Care should be exercised to avoid use of contractor prepared plans as compliance documents where the requirements can better be expressed through established specifications or standards.

- b. Using Appropriate Specifications and Standards. The requirements of any Federal, military, or industry adopted specification or standard may be imposed on a contractor. For software procurements, the number of appropriate specifications and standards currently available is not large, perhaps somewhere between one hundred and two hundred, and many of these are only marginally appropriate.
- c. Checking RSS Adequacy. The adequacy of a specification or standard for a particular application must not be assumed. The latest version should be examined to ensure that it addresses the current need. References within standardization documents, for example, often are illegitimate in that they do not follow the DOD general referencing principles (see rules for compliance references in Table 3-1). Types of references to be suspicious of include the following:
  - 1. Handbooks and standards that reference anything besides other handbooks and standards. These documents generally are stand-alone documents and therefore should not reference specifications.
  - 2. General specifications that reference detailed specifications.
  - 3. General compliance documents (those applicable to more than one DOD program) that reference any program-peculiar specification (i. e., system specifications, system segment specifications, or CI or CPCI specifications).
  - 4. General compliance documents (military specifications, handbooks, or standards) that reference any Government internal documents, such as regulations, manuals, and operating instructions.

Any such deficiencies in a document that is otherwise appropriate for an application can be corrected by tailoring.

- d. Second-Tier Documents. Do not reference in a contract any second-tier specifications or standards that already are an integral part of a compliance document or are referenced in a contractual DID.
- e. Amendments and Revisions. When listing compliance documents, include any amendments and revisions that are applicable and give their dates.

#### 4.3.2 Misapplication of Compliance References

A major problem in applying specifications and standards to a procurement is determining the optimum level for stating requirements. Special care must be taken to prevent one or more of the following unintended results:

- a. Inappropriate Application. The most appropriate RSS having specific application to the contract are not selected.
- b. Overapplication. Overapplication has been blamed for increasing acquisition cost on some programs without reducing life cycle cost. Some of the many common forms of overapplication are as follows:
  1. Unessential documents are referenced because inadequate time was taken to properly understand their function.
  2. All provisions of the referenced documents are imposed on the contractor to ensure maximum performance, without adequate regard to cost.
  3. "Potential high cost driver" specifications and standards are not identified and given proper attention. Potential high cost drivers are standardization documents that establish general requirements whose applicability changes during the program life cycle or whose different sections apply to different phases or types of programs. These documents should always be identified by the contractor and subjected to special management attention by both the contractor and the Government.
  4. Requirements or tasks accomplished in an earlier phase of the program are still included in the current contract.
  5. Unintended requirements are imposed on the contractor by references in lower-tier compliance documents that were not adequately examined.
  6. More rigorous standards are imposed than are necessary, because of a failure to discriminate between various levels of requirements or because of a failure to appreciate the objectives of the procurement.

- c. Underapplication. Insufficient compliance requirements are imposed on the contractor, reducing direct design or other acquisition costs but increasing operation and maintenance costs.
- d. Conflicting Application. Conflicting requirements are imposed by different compliance documents that have the same precedence level and equal priorities.
- e. Cast in Concrete. Compliance references are tailored once and only once, at the start of a procurement, and no refinement of these references is sought or permitted.

To help achieve the correct referencing level, the following directives have been issued:

- a. ASPR 4-1204. This ASPR requires that all references to specifications and standards be tailored so that purchase descriptions state only the actual minimum needs of the Government.
- b. AFSC Regulation 800-25. This regulation, entitled "Application of Military Specifications and Standards to DOD Procurement," requires that specifications and standards referenced in purchase documents be tailored to limit the application of requirements to those essential for, or consistent with, overall program success.
- c. DOD Design-to-Cost Directives. The design-to-cost principles that DOD has directed for most acquisition programs are designed to permit program offices and contractors to trade off all but the most basic program requirements for the purpose of achieving a better life cycle cost. These directives encourage program participants to question all system requirements that affect life cycle cost so that the best balance between acceptable performance, schedule, and life cycle cost can be achieved. One of the most effective ways to identify and limit requirements for these design-to-cost objectives is to tailor the purchase document references to specifications and standards.

#### 4.4 TAILORING RSS

Tailoring of specifications and standards is one of the areas of inquiry of the Defense System Acquisition Review Councils (DSARCs). All program managers should be prepared to answer specific questions about this subject at DSARC reviews.

#### 4.4.1 General Guidelines for Tailoring RSS

Tailoring is the process of limiting or modifying the applicability of specifications, standards, and other documents referenced in a SOW and in program-peculiar specifications so that the responsible contractor is required to fulfill only those portions of the referenced documents that are consistent with minimum high priority program needs. These needs typically include estimated development costs, operation costs, and maintenance costs as well as the schedule, design, and performance constraints of the program.

Recommendations on additional cost effective tailoring of compliance documents should be solicited from prospective contractors at appropriate times during the acquisition process. Care must be taken, however, to avoid releasing information about proposed procurements outside the Government prior to the official release. Only the contracting officer is authorized to discuss this kind of information or release it to potential contractors.

Methods used to tailor referenced RSS include the following:

- a. Specifying Requirements. This is a list of the applicable sections or paragraphs of a referenced document. This method is used in Table 4-2 for MIL-S-83490.
- b. Specifying Exceptions. This is a list of the exempted portions of a referenced document. This method is used in Table 4-2 for MIL-STD-480, 483, 490, and 1521A.
- c. Self-Tailoring Detailed Requirements. General military specifications and standards typically state requirements in ways that self-tailor the requirements in a detailed CI or CPCI specification. Either the actual requirements or the data needed to estimate the actual requirements must be provided in the detailed specification. With this method the tailoring occurs without modification of the referenced documents.
- d. Specifying Required Values. Performance values desired are added to the document reference.

Table 4-2. Example of Tailored Compliance Document List

<b>CONTRACTOR TASKS</b>		
<p><u>Compliance Documents.</u> In the performance of this contract, the contractor shall comply with all of the following documents of the exact issue shown to the extent specified in the column entitled, "Tailored Application":</p>		
<u>Document</u>	<u>Title</u>	<u>Tailored Application</u>
MIL-STD-480 68 Oct 30	Configuration Control – Engineering Changes, Deviations and Waivers	All (except 4.8.7.1.2, 5, 6, 7, 8, and Appendices B, C)
MIL-STD-483 (USAF) 70 Dec 31 71 Jun 01	Configuration Management Practices for Systems, Equipment, Munitions and Computer Programs	All (except 3.8, 3.9.4, 3.10 [except 3.10.1] 3.11, 3.12, and Appendices IV, XI, and XV).
MIL-STD-490 68 Oct 30 Notice 1 69 Feb 01 Notice 2 72 May 18	Specification Practices	All (except Appendices I [which is replaced by draft of MIL-STD-490A Appendix I dated 1 Aug 75], V, VII, VIII, IX, X, XI, XIV, and XV).
MIL-STD-1521A (USAF) 76 Jun 01	Technical Reviews and Audits for Systems, Equipment and Computer Programs	All (except 3.7, 5.1.7, and Appendix G).
MIL-S-83490 68 Oct 30	Specifications, Types and Forms	Types A, B1, B2, B3, B5, C4, and C5, Form 1A, 1A-490 Format/Contents.

- e. Supplementing Requirements. Descriptive text is added to the document reference to define more clearly the intended requirements or application.
- f. Restricting Data Items. Because Government contracts always limit a contractor's responsibility for deliverable data to the items on the Contract Data Requirements List (DD Form 1423), the CDRL itself is a tailoring device. It automatically eliminates from the delivery requirements any additional data requirements expressed or implied in compliance documents.
- g. Extracting Requirements. Requirements are extracted from specifications and standards instead of merely referenced. This method facilitates understanding of requirements but may increase the size of the contract unduly. It also may introduce new references or may omit essential related requirements, such as the quality assurance provisions for an extracted design requirement.
- h. Contractor Choice. Many requirements can be stated in such a way that the contractor is given a choice. He might, for example, be permitted to choose between two or more suitable specifications or standards for a structured design notation.
- i. Prioritizing Requirements. Referenced requirements may be tailored by establishing a scale of priorities among all the purchase documents. This important and sometimes complex method is discussed further in the next subsection.

#### 4.4.2 Tailoring by Prioritizing Requirements

At the beginning of any new system program, it is not practicable to define and describe all technical requirements down to the level of detail ultimately required. The requirements therefore are defined in stages as the program evolves, based upon tradeoff studies and other developments. At each stage, a prioritizing of the defined requirements is required to establish guidelines for resolving conflicts that usually exist in requirements for any complicated system. Product accuracy, speed, and reliability usually are at odds with each other as well as with the development schedule and life cycle costs. Unless some attempt is made to formally establish priorities among the basic program requirements, informal and probably inconsistent priorities will be assigned by the various participants as they make decisions to resolve the conflicts. Establishing priorities is fundamental to conducting requirement tradeoff studies and effectively tailoring requirements.

Unfortunately no uniform way is available to establish priorities or to document them or to resolve conflicts when they occur. One overall consideration is the order of precedence of requirements. The general rule is that requirements stated in a supplied document take precedence over requirements in referenced documents. For example, contractual and SOW requirements take precedence over conflicting requirements in program-peculiar documents such as system or CPCI specifications. Program-peculiar requirement documents take precedence over the documents referenced therein, such as general military specifications and standards. This also means that program-peculiar specifications should reference only lower-level program-peculiar specifications. Otherwise, conflicts would occur where specifications at different levels would seem to have precedence over each other.

The order of precedence establishes priorities only in cases of conflict. Where there are no conflicts and no other prioritization, an applicable requirement in a subtier reference has the same weight or priority as a requirement in the primary document. There are, however, some general rules that provide additional prioritization of requirements:

- a. Specific or detailed requirements always take precedence over general requirements. Detailed military specifications therefore take precedence over their corresponding general military specifications.
- b. Compliance requirements take precedence over goals. It is often possible to establish a wide range of acceptable values for many of the parameters of a complex system. By indicating minimum and maximum values and stating which extreme is the desired value or goal, it is possible to conduct parametric trade studies to optimize the system. For parameters where a wide range of values is not practical, the maximum acceptable tolerances from the nominal should be stated.

Lacking other guidance, the contract fee structure, including incentive provisions, will establish top level priorities for a program as far as most participants are concerned. Although this prioritizing of requirements is very general, its importance in properly tailoring requirements should not be underestimated.

Requirement conflicts often are the result of erroneous assumptions by program personnel, such as the following:

- a. Reducing a particular contract cost will automatically reduce life cycle cost.
- b. All contractors and suppliers have a common understanding of the rules for prioritizing requirements and therefore will establish the same priorities.
- c. Performance parameters are very important and therefore always should have the highest priority.
- d. The program manager bears the total responsibility for requirement priorities and conflicts.

The program manager does bear ultimate responsibility for establishment and promulgation of guidelines for requirement priorities, but all program personnel participating in requirements definition should be on the lookout for priority conflicts and the means to prevent them.

This is a troublesome and largely uncharted area in Government procurements and deserves more attention. Until more formal guidance becomes available, each program should establish its own set of explicit guidelines for prioritizing requirements and should review and modify the guidelines as necessary whenever requirements are defined at a lower level of detail. Furthermore, the guidelines should be imposed on all program participants.

## 5. DEFINING PROGRAM DATA ITEMS

Because program-peculiar data items form the major channel for communication of program requirements, design, and all other primary information required in the acquisition process, the requirements of this entire class of software documentation – both specifications and non-specifications – are discussed together in this section.

### 5.1 DATA ACQUISITION PROCESS

#### 5.1.1 Data Items

Data items are the various kinds of recorded information required during the acquisition process to support the management and technical objectives of a program. All of the following are data items:

##### a. Administration/Management Data

- Data used to administer, manage, and enforce contractual requirements
- Data designed to provide management visibility
- Project management reporting
- Milestone management technique data, such as PERT or other network information
- Status data
- Milestone data
- Problem statements
- Plans

##### b. Financial Data

- Dollar expenditures
- Forecasts
- Status data
- Cost data
- Manpower data
- Accounting data

c. Technical Data

- Research and engineering data
- Specifications
- Standards
- Manuals
- Technical reports
- Engineering drawings and associated lists
- Process sheets
- Catalog item identifications

Technical data may consist of photographs and drawings as well as text and tables.

The Armed Services Procurement Regulations (ASPR) consider computer programs, as recorded in machine-readable form on decks, tapes, or disks or in human-readable form on listings, to be data and require that software be listed on the Contract Data Requirements List (CDRL), DD Form 1423, along with other types of data items. AFSC requires that software also be listed in the contract schedule.

Since all data items are "documented" information, the terms "data item" and "document" will be used interchangeably in this guidebook.

5.1.2 Managing Data Acquisition

Data items should be planned and produced by organized data management activity. Objectives of a sound data management program include:

- a. Improving administration of contract data requirements.
- b. Providing uniform procedures for planning and acquiring data for all program phases, areas, and disciplines.
- c. Attaining positive control of data acquisition through continuous review of data requirements and elimination of non-essential, ineffective, and duplicate requests for data items.

- d. Limiting acquisition of data items to those selected from DOD 5000.19-L, Volume II (AMSDL).
- e. Specifying contract data requirements on a CDRL (DD Form 1423) to provide visibility and control.
- f. Deferring delivery of data until it is needed.
- g. Promoting effective use of data by all appropriate program areas.
- h. Ensuring that data cost is justified by its intended use.

#### 5.1.3 Data Acquisition Package

The primary elements of an RFP package related to data acquisition are the Contract Data Requirements List (CDRL, DD Form 1423), the associated set of Data Item Descriptions (DIDs), and the Statement of Work (SOW).

The CDRL identifies each data item the contractor is to deliver and specifies its desired content and format by referencing an appropriate DID. The CDRL also specifies date(s) of submission, frequency of submission, distribution addresses and number of copies, the DID identifier, the reference to the SOW task statement or to contract provisions, and the inspection and acceptance criteria. To supplement this information, backup sheets may be attached to the CDRL and referenced in the CDRL. CDRL backup sheets also may be used to tailor the data item preparation instructions of a referenced DID.

All data to be acquired must be listed in the CDRL because the contractor is not obligated to deliver any data not included there. One exception is the contractor internal data acquired through the Data Accession List (described in subsection 5.4.2).

Including a SOW reference in the CDRL ties the data item to the SOW task description where the contractor effort for preparation of the data item is identified. If a specific document, such as a user's manual, is to be verified in testing, this requirement must be addressed in the SOW task description. The SOW task description in turn should reference the related CDRL sequence item number and thus point to the correct DID.

Suitability of the content and format of each data item, as specified in its DID, should be established by review and evaluation. This suitability must take into account the needs of the task indicated by the SOW reference.

#### 5.1.4 Data Item Descriptions (DIDs)

##### 5.1.4.1 Standard DIDs

The content and organization of each data item to be acquired from a contractor must be defined in a DID. A typical DID is a one-page to five-page description of the content, format, preparation instructions, and use of a data item and bears a DOD control number that can be used in CDRLs to reference the DID. Some DIDs provide alternate or expanded descriptions of documents defined in Government standards such as MIL-STD-490 and MIL-STD-483. Others describe documents not defined in any formal standard.

DOD 5000.19-L, Volume II, entitled "Acquisition Management Systems and Data Requirements Control List (AMSDL)," lists about a thousand standard DOD DIDs originated by the AF and other military departments and by DOD agencies and offices. Standard DIDs are approved for general use. The DIDs related to software represent a wide spectrum of software concepts and terminologies, and no attempt to correlate related types is evident. Air Force DIDs are assigned the block of numbers from 3000 to 3999, but some AF DIDs also appear in the 6000 and 7000 series blocks. In addition to the standard DIDs, there are also unique DIDs (UDIDs), modified DIDs, and "R&D" DIDs, all of which are discussed further in subsection 5.1.4.2, "Tailoring DIDs." About a thousand UDIDs are listed in the AMSDL.

Part V of the AMSDL contains instructions for ordering copies of the AMSDL and copies of DIDs and UDIDs.

Each standard DID and unique DID carries a prefix letter that relates it to the functional category most nearly describing the use of the data. The functional categories and their corresponding letters are as follows:

- A Administrative/Management
- E Engineering and Configuration Documentation
- F Financial
- H Human Factors
- L Logistics Support
- M Technical Publications
- P Procurement/Production
- R Related Design Requirements
- S System/Subsystem Analyses
- T Test
- V Provisioning

Revisions to a DID are indicated by an alpha character suffix (e. g. , DI-E-3119A).

Table 5-1 lists 64 data items applicable to software acquisition, operation, and maintenance. Some of these data items are unique to software while others provide visibility into critical areas of software development. The table specifies standard DIDs for all but five items:

- a. Standard DIDs for the Computer Program Development Plan (CPDP) and Quality Assurance Plan currently are under review and have not yet been assigned DID identifiers.
- b. No DIDs exist for the Computer Resources Integrated Support Plan (CRISP) and Test Evaluation Master Plan (TEMP) because these items are not intended to be prepared by contractors. (A contractor participating in the conceptual or validation phases may be assigned to prepare the CRISP, however.)

- c. No suitable DID exists yet for the Interface Design Specification (IDS).

Twenty-five of the data items in Table 5-1 have been selected for an example software documentation set that is discussed in subsection 5.3.6 and is illustrated in the wall chart accompanying this guidebook.

#### 5.1.4.2 Tailoring DIDs

It is not always possible or desirable to meet the data requirements of a specific acquisition program using only existing standard DIDs. The applicable regulations (AFR 310-1 and its supplements) recognize this and provide for modification of existing DIDs and creation of new unique DIDs. These two non-standard types of DIDs provide the means for defining documents to meet specific needs not addressed in the standard DIDs. The characteristics of these two non-standard types of DIDs are as follows:

- a. Modified DIDs. A modified DID represents requirements for which a standard DID is generally acceptable, but for which there are program-specific needs (1) to clarify usage, (2) to reduce the scope by deletions from the standard DID, or (3) to adjust the content within the intent and scope of the standard DID. If such modifications involve rewriting the DID, they require approval of the AFSC Data Management Office. A revision that can be described briefly, however, or that is to be used only one time, may be specified directly on the CDRL. In any of these cases, the DID identifier is suffixed by "/M" to indicate the modification.
- b. Unique DIDs. Unique DIDs (UDIDs) represent requirements considered to be unique to a command or to an acquisition program and therefore not suitable for general use. UDIDs generally are initiated to accommodate the data requirements of new or modified regulations or standards. UDIDs must be submitted to the AFSC Data Management Office for approval. UDIDs are kept on file and periodically reviewed for applicability on other programs and for possible change to the status of standard DIDs.

DIID Identifier	Data Item Name	Guidance	Comments
<b>ADMINISTRATIVE/MANAGEMENT</b>			
* † A-3002 A-3007 A-3009 A-3022 A-3027* A-3029*	CRISP R&D Status Reports Program Schedule Program Milestones Contract Data Management Plan Data Accession List/Internal Data Agenda - Design Reviews, Configuration Audits, and Demonstrations	800-14 Vol. II ASPR 7-404.6  ASPR 9-502 1521A	Approved by CRWG (Computer Resources Working Group)  Contractor internal data. SRR, SDR, PDR, CDR, FCA, PCA.
<b>ENGINEERING AND CONFIGURATION MANAGEMENT</b>			
* * * E-3101* E-3104 E-3107 E-3108* E-3144 E-3146 E-3147 E-3148* E-3149A* E-3120A* E-3121* E-3122* E-3123* E-3127 E-3129 E-3134* E-30145*	Interface Design Specification (IDS) Computer Program Development Plan (CPDP) System (Segment) Specification Addendum Specification Installation Completion Notification Configuration Management Plan System Modification Design Data and Reports System Allocation Document System Segment Specification (Modification Program) Minutes of Formal Reviews and Audits Computer Program Development Specification Computer Program Product Specification Version Description Document (Computer Programs) Configuration Index (Computer Program) Change Status Report (Computer Program) Advance Change/Study Notice Request for Deviation/Waiver Specification Change Notice (SCN) (Computer Programs) Computer Software/Computer Program/Computer Data Base Configuration Items	483, App. 2 800-14 Vol. II 483, App. 3 483, App. 4 483, App. 15 483, App. 1  483, App. 11 483, App. 3 1521A 483, App. 6 483, App. 6 483, App. 8 483, App. 8 483, App. 8, 14 480 483, App. 8	Interface control document. Recommended for source selection.  To Part I or Part II. Change implementation. Basis for modifications.  SRR, SDR, PDR, CDR, FCA, PCA Part I. Part II. Version release. Approved changes. Proposed changes.  Related to ECP. Software as a data item.
<b>HUMAN FACTORS</b>			
H-3251 H-3258A H-3261A H-3267 H-3269A H-3272 H-5076A* H-7012	Personnel Subsystem/Human Factors Plan Training Support Data Human Engineering Design Approach Evaluation Needs/Exercise Requirements Training Needs/Exercise Requirements Personnel Subsystem Test and Evaluation Plan Computer Software Change Proposal Human Operator/Critical Tasks Analysis Report		In place of manuals. Input to software requirements. Input to software requirements.  Requirements and documentation.
<b>TECHNICAL PUBLICATIONS</b>			
M-3401 M-3402 M-3409* M-3410* M-3411* M-3415*	T.O. Publication Plan T.O. Status and Schedules Positional Handbook User's Manual (Computer Program) Computer Programming Manual Catalog and Glossary of Computer Program and Programming Documentation		Proposing user documentation. Documentation status.  For all programs delivered.
<b>RELATED DESIGN DOCUMENTS</b>			
 * R-3527 R-3528 R-3529	Quality Assurance Plan System Security Plan Clandestine Vulnerability Analysis System Security Standard	MIL-S-52779	Development and operation. Requirements. Operational.

Table 5-1. AF DIDs Applicable to Software Acquisition

Computer Program Product Specification Version Description Document (Computer Programs) Configuration Index (Computer Program) Change Status Report (Computer Program) Advance Change/Study Notice Request for Deviation/Waiver Specification Change Notice (SCN) (Computer Programs) Computer Software/Computer Program/Computer Data Base Configuration Items	483, App. 6 483, App. 8 483, App. 8 483, App. 8, 14 480 480 483, App. 8	Part II. Version release. Approved changes. Proposed changes.
<b>HUMAN FACTORS</b>		
H-3251 Personnel Subsystem/Human Factors Plan Training Support Data Human Engineering Design Approach Evaluation Needs/Exercise Requirements Training Needs/Exercise Requirements Personnel Subsystem Test and Evaluation Plan Computer Software Change Proposal Human Operator/Critical Tasks Analysis Report		In place of manuals. Input to software requirements. Input to software requirements. Requirements and documentation.
<b>TECHNICAL PUBLICATIONS</b>		
M-3401 T.O. Publication Plan T.O. Status and Schedules Positional Handbook User's Manual (Computer Program) Computer Programming Manual Catalog and Glossary of Computer Program and Programming Documentation		Proposing user documentation. Documentation status. For all programs delivered.
<b>RELATED DESIGN DOCUMENTS</b>		
 * R-3527 Quality Assurance Plan System Security Plan Clandestine Vulnerability Analysis R-3528 System Security Standard R-3529 Reliability/Maintainability Allocations, Assess- ment, Analysis R-3535 Reliability/Maintainability Data Reporting and Feedback Failure Reports R-3537A	MIL-S-52779	Development and operation. Requirements. Operational.
<b>SYSTEM/SUBSYSTEM ANALYSES</b>		
S-3581 Subsystem Design Analysis Report S-3582 Subsystem Engineering Development Record S-3591A Technical Reports (Timing and Sizing Data) S-3604 Functional Flow Diagrams S-3605 Requirements Allocation Sheets S-3606 System/Design Trade Study Reports S-3607 Schematic Block Diagrams S-3608 Time Line Sheets S-3618 System Engineering Management Plan (SEMP) S-3619 Technical Performance Measurement Report	499A 499A 499A 499A 499A 499A	(See also S-3619) (See also S-3619) Requirements derivation. Requirements derivation. Requirements derivation. Requirements derivation. Requirements derivation. Overall management. Per SEMP.
<b>TEST</b>		
† T-3704 System Test Plan T-3703* Category I Test Plan/Procedures T-3706* Category II Test Plan/Procedures T-3717* Category I Test Report T-3718 Test Reports - General T-3719* Category II Test Report T-3729 Test Facility Requirements Document	AFR 80-14/ AFSC Supp. 1.	Program basic test document. Alternative to 3703/3706. CPCI and segment levels. System level. CPCI and segment levels. Quick Look, Interim, Addendum. System level. Prior to system testing

\* Part of example software documentation set shown in Figure 5-1 and Table 5-2.

† CRISP and TEMP are usually prepared by Government, but CRISP may be assigned to a contractor.

‡ No DID exists for IDS.

§ AFSC DID for CFDP is under review; DID number not yet assigned.

|| No DID exists for QA plan.

A third type of non-standard DID is the "R&D" DID, which reflects data item requirements related to feasibility or experimental investigations that cannot be satisfied by any standard DID. "R&D" DIDs are generated solely for the unique requirements of a particular R&D program and are denoted by prefixing their identifiers with "R&D." "R&D" DIDs also must be submitted to the AFSC Data Management Office for approval.

#### 5.1.5 Procedure for Defining Data Items

The procedure for defining requirements for a complete set of data items for a software acquisition may be described in the following nine steps:

- a. Verify prerequisites.
- b. Adopt a data item charting method.
- c. Establish tentative data item requirements.
- d. Identify mandatory data item requirements.
- e. Include requirements of the applicable RSS specified in the Program Management Plan (PMP).
- f. Incorporate the program-unique data requirements required by SOW tasks.
- g. Solicit user data item requirements with the Data Call procedure.
- h. Consolidate the total data item package, adding any basic data item requirements not identified in the preceding steps.
- i. Review the total data requirements for essentiality.

These steps are described in the following subsections (5.2 and 5.3), and some additional possible steps involving contractors are described in 5.4.

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## 5.2 PRELIMINARY STEPS IN DEFINING DATA ITEMS

### 5.2.1 Prerequisites

Before requirements for the major data items in a software procurement can be accurately identified, certain other kinds of information must be available:

- a. System Application. The intended use of the system in which the software will be used must be known. How long will it last? Who will maintain it? How often will it be updated or upgraded? These matters may greatly impact the kind and quantity of documentation needed.
- b. CPCI Selection. The computer program configuration items (CPCIs) must have been identified and their major functional characteristics defined. This information normally is included in the System Specification or System Segment Specification. (Division of the software product into an excessive number of CPCIs or improper allocation of functions among CPCIs increases documentation problems by multiplying and complicating CPCI interfaces. Data managers who suspect such circumstances should determine if a remedy is possible before they proceed far down the data item definition path.)
- c. Acquisition Method. The main features of the acquisition method must be known. The number and relationship of development contractors to be employed affects the number of interfaces to be defined, documented, and formally controlled. Furthermore, any hand-offs, or transfers, of responsibility between organizations creates a need for supporting documentation. Such transfers become even more complicated when separate contracts are required for different acquisition phases. Finally, the total number of parties involved in the procurement - buyers, users, and contractors - and their various responsibilities affect the program's basic information needs, as well as the need for reviews and approvals.
- d. Schedule and Budget. The buyer's schedule constraints and budget constraints must be known. Since the schedule in the CDRL is essentially the schedule of the entire program, an impossible document delivery schedule is a threat to the entire project. Similarly, if the budget is insufficient to finance the data items considered mandatory, some budget readjustments may be necessary.

If some of these items of information are not available, the data item definition task may be performed, but the results should be carefully reviewed later, when all of these fundamental facts have been established.

#### 5.2.2 Data Requirement Charts

An extremely helpful tool for the data item definition process is a visual display of the data items in relation to each other and to some structured aspect of the program, such as the life cycle. Figure 5-1 is an example of a program life cycle chart that includes all 25 items of a basic documentation set for software acquisition. (Table 5-2 explains how this documentation set was selected.) In addition to the kinds of information shown in Figure 5-1, known dates should be included for key events or transition points. These dates are important to know when evaluating the realism of a proposed documentation set. Multiple diagrams may be required to document parallel activities performed by different groups or to show the additional data items of a larger documentation set.

Another useful type of chart is the documentation tree, in which data items are related to the system hierarchy (e.g., system, subsystem, module, routine).

### 5.3 PREPARING THE CDRL

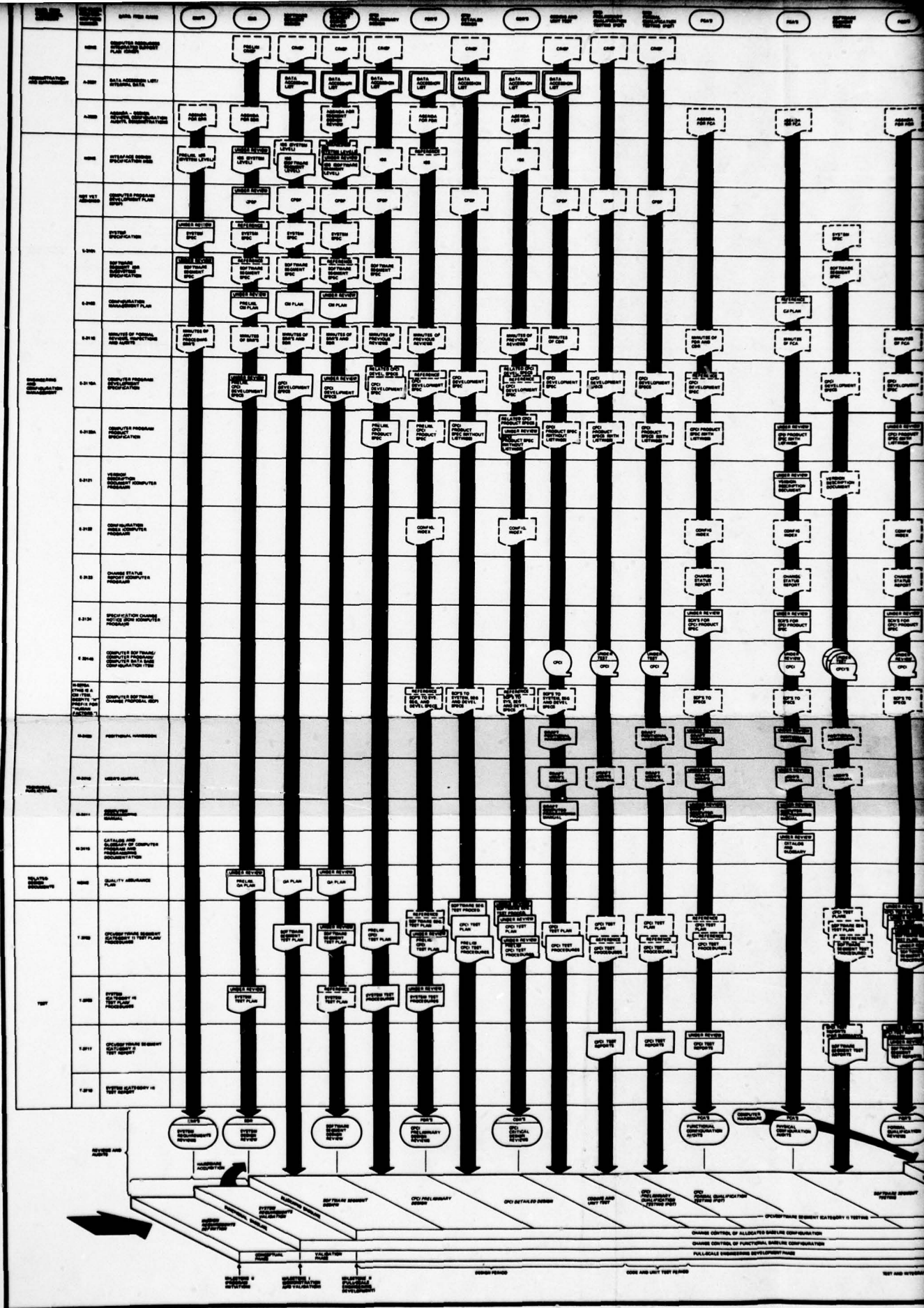
#### 5.3.1 Tentative Data Requirements

Data requirements definition should begin with a tentative list or chart that identifies the functional areas that will have data requirements and the times in the program life cycle when these data items will be needed.

#### 5.3.2 Mandatory Requirements

Some data items are mandated by current policies or by the specific requirements of the Program Management Directive (PMD) and the Program Management Plan (PMP). For example, a Computer Resources Integrated Support Plan (CRISP) and a Computer Program Development Plan (CPDP) are required under current USAF policies.

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### 5.3.3 Requirements of PMP-Referenced RSS

Data requirements of the applicable regulations, specifications, and standards referenced in the Program Management Plan (PMP) must be included. For example, the applicability of MIL-STD-483 (USAF) and MIL-STD-1521A (USAF) in the PMP implies that certain program-peculiar specifications are required.

Requirements for program-peculiar software documentation reside primarily in the following RSS:

- a. AFR 800-14, Volume II, "Acquisition and Support Procedures for Computer Resources in Systems." This regulation devotes a chapter (Chapter 7) to documentation requirements and acquisition. Documentation also is addressed in the context of various aspects of acquisition, including planning (sections 3-4 through 3-9), engineering management (4-5, -6, -7, -9), testing (5-5), configuration management (6-5, -6, -7, -8, -9), and contractual requirements (8-4, -5, -6).
- b. MIL-STD-483 (USAF) "Configuration Management Practices for Systems, Munitions, and Computer Programs." This standard supplements MIL-STD-490 in the definition of the content and organization of system and segment specifications (Appendix III) and CPCI development and product specifications (Appendix VI). In addition, MIL-STD-483 defines the content and usage of Engineering Change Proposals (ECPs) for software (Appendix XIV) and various status accounting tools useful in change control (Appendix VIII).
- c. MIL-STD-1521A (USAF) "Technical Reviews and Audits for Systems, Equipments, and Computer Programs." This standard prescribes the requirements for the conduct of technical reviews and audits in conjunction with the documents defined in MIL-STD-483 (USAF). Specific direction is provided concerning the review and audit of CPCIs and their associated documentation. Each type of review or audit is described in an appendix to the standard.
- d. AFR 310-1 "Management of Contractor Data." This regulation sets forth the policies, procedures, and responsibilities governing contractor documentation (data) requirements. Of particular importance are the Data Call, preparation and review of documentation requirements, preparation of the Contractor Data Requirements List (CDRL), and data item description (DID) processing.

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#### 5.3.4 SOW Program-Unique Requirements

Additional data requirements may be derived directly from task descriptions in the SOW. All special studies, evaluations and analyses identified in the SOW should result in formal reports. Such program-unique requirements for documentation require unique, or at least tailored, data items. Each entry in the CDRL for one of these data items must reference the SOW task that requires preparation of the data item.

#### 5.3.5 User Requirements (Data Call)

The Data Call procedure established by AFR 310-1 is used to survey the future data needs of using and supporting commands. The Data Call is a formal request from the program data manager to all organizations participating in the acquisition, asking them to identify the data they will require. Each responding activity is required to express its data requirements in terms of approved or proposed DIDs (DD Forms 1664) and to document these requirements on a CDRL form (DD Form 1423) containing delivery schedule information.

Software users should have a strong interest in defining the documentation they will be receiving with the software. Users often are satisfied to receive a good set of user manuals and product specifications. Some users, however, may want certain types of test documents, test results, and operations manuals before accepting the software. They also may think it advisable to get involved in the development process earlier by reviewing the proposed requirements and proposed design before a line of code is written. For large systems, a user organization may insist that a simulation of the proposed design be built so that the users can operate it and verify that the design will solve their problem. All such user decisions affect the data requirements.

#### 5.3.6 Consolidation of Requirements

The program data manager reviews all CDRLs resulting from the Data Call and consolidates them into a single document set listed in a single CDRL, together with the data requirements from other sources

(i. e., subsections 5.3.1 through 5.3.4). In the process, he eliminates any redundancies, coordinates data requirements that are similar, sees that all functional areas of the program are provided for, and ensures that the resulting CDRL is compatible with DOD 5000.19-L, Volume II (AMSDL). He should determine that all essential items in the following major data categories have been included:

- a. Contractual Baseline Documents. Contractor documents that become part of the contract as compliance requirements. Examples: system, development, and product specifications.
- b. Verification Documents. Documents used to determine compliance with the contract, to certify that services or deliveries are accomplished, or to confirm acceptability of products. Examples: test plans and procedures.
- c. Visibility Documents. Documents used as a basis for management decisions and evaluation of progress. Examples: status, progress, and analysis reports.
- d. Government Involvement Documents. Documents that define requirements for use of Government furnished property or facilities or that call for participation of Government personnel. Examples: System Allocation Document, Personnel Subsystems/Human Factors Development Program.
- e. Follow-On Documents. Documents required beyond the development effort. Examples: operational manuals, handbooks, and descriptive material needed for maintenance or modification of the system software, including support and utility software and test tools.

Some data items fall into more than one of the above categories.

A basic set of 25 data items suitable for Air Force software procurements is shown in Table 5-2, together with the reasons for selection of these particular data items. Considerable latitude is possible in this selection process, depending on the type of procurement, the anticipated roles of contractors and Government agencies, and the nature of the software to be acquired.

After achieving a coherent, consolidated documentation set, the data manager should perform a preliminary evaluation of data item essentiality versus cost in preparation for a more formal CDRL review (described in subsection 5.3.7). The goal of this evaluation is to ensure that only those data items essential to acquisition, operation, or maintenance are included.

#### 5.3.7 Review of Essentiality

Before the consolidated CDRL is issued as part of an RFP and again before it is incorporated into a development contract, a special Data Requirements Review Board (DRRB) should review it for the following qualities:

- a. No duplication or overlap of data requirements.
- b. Consistency of the document set with the procuring organization's acquisition policies and with Government procurement policies.
- c. Consistency of the document set with its intended uses.
- d. Essentiality of each data requirement and the set as a whole. Individual data items must be found essential to present or future management of the program, to system operation, or to software maintenance.
- e. Reasonableness of delivery dates.
- f. Inclusion of contractual provisions to ensure that the documents received will be fit for their intended use.

Before contract award, the DRRB should review the CDRL again to evaluate the contractor's price estimate and to ensure that data requirements have not deteriorated during negotiations.

Following a successful DRRB review, the approved CDRL should be transmitted to the procuring officer for inclusion in the appropriate procurement instrument.

Table 5-2. Rationale for Select Set for Software Ac

CDRL Preparation Step	Item No.	DID Identifier	Data Item Name		
A. Mandatory Requirements	1.	E-30145 (to be published soon in AMSDL)	Computer Software/Computer Program/Computer Data Base Configuration Item(s)	Required per ASPR on decks, tapes, or as on computer list	
	2.	(No DID exists.)	Computer Resources Integrated Support Plan (CRISP)	Required under USA	
	3.	(AFSC DID under review.)	Computer Program Development Plan (CPDP)	Required under USA	
B. Requirements of PMP-Referenced RSS	4.	(No DID exists.)	Interface Design Specification	Defines interfaces between organizations, or between systems developed by the same organization	
	5.	E-3101	System (Segment) Specification	Defines the system functional requirements	
	6.	E-3119A	Computer Program Development Specification	Defines the CPCI all requirements.	
	7.	E-3120A	Computer Program Product Specification	Defines the CPCI details	
C. SOW Program-Unique Requirements	--	--	--	No SOW program-unique to be developed has analysis or development	
D. User Requirements (Data Call)	8.	M-3409	Positional Handbook	Required for system to the prime mission	
	9.	M-3410	Users Manual	Provides instructions	
	10.	M-3411	Computer Programming Manual	Provides programming or modification of the	
	11.	M-3415	Catalog and Glossary of Computer Program and Programming Documentation	Describes and cross documentation development acronyms, and terms	
E. Other Basic Requirements	● Acquisition Management	12.	A-3027	Data Accession List/Internal Data	These data items for
		13.	A-3029	Agenda--Design, Reviews, Configuration Audits, and Demonstrations	
	● Configuration Management	14.	E-3118	Minutes of Formal Reviews and Audits	These data items for both software and s
		15.	E-3108	Configuration Management Plan	
		16.	E-3121	Version Description Document (Computer Program)	
		17.	E-3122	Configuration Index (Computer Program)	
		18.	E-3123	Change Status Report (Computer Program)	
	● Quality Assurance	19.	E-3134	Specification Change Notice (Computer Program)	Describes plan for complies with requ
		20.	H-5076A	Computer Software Change Proposal	
		21.	(No DID exists.)	Quality Assurance Plan	
	● Test	22.	T-3703	Category I (CPCI/Segment) Test Plan/Procedures (Computer Programs)	These data items at and system levels.
			T-3717	Category I (CPCI/Segment) Test Report (Computer Programs)	
24.		T-3706	Category II (System) Test Plan/Procedures		
25.		T-3719	Category II (System) Test Report		

Table 5-2. Rationale for Selection of Example Documentation Set for Software Acquisition

Step	Item No.	DID Identifier	Data Item Name	Comments	
	1.	E-30145 (to be published soon in AMSDL)	Computer Software/Computer Program/Computer Data Base Configuration Item(s)	Required per ASPR to acquire the software itself, recorded on decks, tapes, or other computer-readable media, as well as on computer listings.	
	2.	(No DID exists.)	Computer Resources Integrated Support Plan (CRISP)	Required under USAF policy.	
	3.	(AFSC DID under review.)	Computer Program Development Plan (CPDP)	Required under USAF policy.	
	4.	(No DID exists.)	Interface Design Specification	Defines interfaces between software items developed by different organizations, or between different types of software items developed by the same organization (MIL-STD-483, Appendix II).  Defines the system (or segment) functional requirements.  Defines the CPCI allocated requirements.  Defines the CPCI design.	
	5.	E-3101	System (Segment) Specification		
	6.	E-3119A	Computer Program Development Specification		
	7.	E-3120A	Computer Program Product Specification		
Comments	--	--	--	No SOW program-unique data items are required if the software to be developed has only routine functions that need no special analysis or development tasks.	
Items	8.	M-3409	Positional Handbook	Required for systems in which a human operator is essential to the prime mission.	
	9.	M-3410	Users Manual	Provides instructions for operational use of the software.	
	10.	M-3411	Computer Programming Manual	Provides programming information required for maintenance or modification of the software.	
	11.	M-3415	Catalog and Glossary of Computer Program and Programming Documentation	Describes and cross-references the software and software documentation developed for a system and defines abbreviations, acronyms, and terms.	
Finance	12.	A-3027	Data Accession List/Internal Data	These data items facilitate acquisition management tasks.	
	13.	A-3029	Agenda--Design, Reviews, Configuration Audits, and Demonstrations		
	14.	E-3118	Minutes of Formal Reviews and Audits	These data items facilitate configuration management of both software and software documentation items.	
	15.	E-3108	Configuration Management Plan		
	16.	E-3121	Version Description Document (Computer Program)		
	17.	E-3122	Configuration Index (Computer Program)		
	18.	E-3123	Change Status Report (Computer Program)		
	19.	E-3134	Specification Change Notice (Computer Program)		
	20.	H-5076A	Computer Software Change Proposal		
	21.	(No DID exists.)	Quality Assurance Plan		Describes plan for assuring that software delivered complies with requirements of the contract.
	22.	T-3703	Category I (CPCI/Segment) Test Plan/Procedures (Computer Programs)		These data items support testing at CPCI, segment, and system levels.
	23.	T-3717	Category I (CPCI/Segment) Test Report (Computer Programs)		
	24.	T-3706	Category II (System) Test Plan/Procedures		
	25.	T-3719	Category II (System) Test Report		

## 5.4 ACQUIRING ADDITIONAL CONTRACTOR DATA

### 5.4.1 Precontractual Contractor Data

Certain types of contractor prepared data may be acquired precontractually for use in contractor evaluation and selection. These data items include:

- a. Computer Program Development Plan (CPDP)
- b. Configuration Management Plan (CMP)
- c. Systems Engineering Management Plan (SEMP)
- d. Quality Assurance Plan
- e. Human Engineering Design Approach
- f. Personnel Subsystem Test and Evaluation Plan
- g. System Safety Plan

Such documents are used to evaluate contractor understanding of contractual requirements and capability to comply with such requirements.

For large software procurements, certain required manuals and handbooks may depend on the design approach and therefore are not clearly identifiable through a Data Call procedure. In such a case, contractors should be required to address specific operational and support documentation in their proposal plans for developing technical documentation.

Precontractual documents for the foregoing purposes are obtained by including the data requirements in the RFP CDRL, providing the related DIDs, and identifying the documents in the Instructions for Proposal Preparation (IFPP), also sometimes called Instructions to Offerers. If incorporated into a contract or SOW, these documents establish contractual requirements.

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#### 5.4.2 Additional Data After Contract Award

Additional data may be acquired after contract award by the three following methods:

- a. Data Accession List. The acquisition of a Data Accession List/Internal Data (DID A-3027) from a contractor ensures the procuring program access to all data generated by the contractor for his own use in performing the contract. This data includes interim and supporting technical documentation and management documentation not otherwise available, such as plans, schedules, intermediate development milestones, and resource allocations. The requirement for a Data Accession List must be included on the CDRL, however, and a corresponding SOW task or contract provision is required, specifying that the contractor is to maintain a list of all data that he generates for internal use. Requested data is supplied in the contractor's own format.
- b. Deferred Delivery. This method consists of timing the delivery of data, or of the software itself, to a firm operational need whose data cannot be established at the time of contract award. The deferred items still must appear on the CDRL, but with the time and/or place of delivery not specified. The contractor is expected to price the data at the time of contracting and to incur data preparation costs prior to the call for delivery. The use of deferred delivery requires an enabling clause in the contract (see ASPR 7-104.9(d)).
- c. Deferred Ordering. This method applies to cases where data generated in performance of the contract is required by the Government even though not specified in the contract as deliverable data. Such data is acquired through negotiation of delivery dates and preparation costs. The cost of generating the data is not an additional cost subject to negotiation, however, since it was part of the contracted effort. There is no data entry in the CDRL for such items, but the contract must include an enabling clause (ASPR 7-104.9(m)) and the clause entitled "Rights in Technical Data and Computer Software." This is the only one of these three methods that requires negotiation of costs for the additional data requested.

#### 5.5 ALTERNATE STANDARDS FOR SOFTWARE DOCUMENTATION

In addition to the Air Force standard data items discussed in the preceding parts of this section, other defense agencies have published various standards and specifications for entire sets of software documentation. The documents prescribed in these other standardization

sources may be used for defining new DIDs for Air Force software procurements where appropriate, or at least may provide models for revising or expanding standard DIDs.

The two current alternate documentation standards offering the most potential to airborne system software procurements are:

- a. DOD 7935.1-S, "Automated Data Systems (ADS) Documentation Standards"
- b. SECNAVINST 3560.1, "Tactical Digital Systems Documentation Standards"

Another standard, WS-8506, Rev. 1, "Requirements for Digital Computer Program Documentation," 1 Nov. 1971, formerly issued by the Naval Ordnance Systems command, has been superseded by SECNAVINST 3560.1, listed above.

Before any document types included in such standards are selected or adapted to an AF 800 series procurement, careful consideration must be given to possible effects on related management practices, reviews and audits, and associated documentation. Furthermore, the two standards listed above specifically address certain types of computer applications: general purpose computers for DOD 7935.1-S and shipboard tactical systems for SECNAVINST 3560.1. At the same time, however, these standards describe a complete, integrated set of documents at a uniform level of detail, something that the Air Force standard DIDs do not do.



**A.1 INTERNAL DOCUMENTS**

**A.1.1 DOD Documents**

**DOD 4120.3-M - 3 January 1972  
STANDARDIZATION POLICIES, PROCEDURES, AND INSTRUCTIONS**

**A. Purpose. This directive establishes policies and responsibilities criteria for application to design, development, procurement, production, and support of DOD equipment and supplies.**

**B. Outline of Contents**

- Chapter 1. General Policies**
- Chapter 2. Policies and Procedures for Standardization of Documents**
- Chapter 3. Studies and Working Groups**
- Chapter 4. Qualified Products Lists**
- Chapter 5. Outline of Form and Instructions for the Preparation of Specifications and Associated Documents**
- Chapter 6. Military Outline of Form and Instructions for the Preparation of Standards and Handbooks**
- Chapter 7. Procedure for Determination and Implementation of Item Standardization Status Coding**

**C. Comments. A good document for becoming familiar with military standard and military handbook formatting and revision pages.**

DODD 5000.1 - 18 January 1977  
MAJOR SYSTEM ACQUISITIONS

A. Purpose. This DOD directive is used by DOD component heads for acquisition of major defense systems designated by the Secretary of Defense.

B. Outline of Contents

1. Purpose
2. Application
3. Policy
  - a. Mode of Operation
  - b. Conduct of Program
  - c. Program Considerations
4. Implementation

C. Comments. The Air Force implements this directive via AFR 800-2. The 18 January 1977 version of DODD 5000.1 is a reissue that cancels the 22 December 1975 version.

DODD 5000.2 - 18 January 1977  
MAJOR SYSTEM ACQUISITION PROCESS

A. Purpose. This directive defines the policies and procedures used by the DOD in the decision-making process for acquisition of major systems.

B. Outline of Contents

I. Purpose

II. Applicability and Scope

III. Definitions

IV. Policies and Procedures

V. Effective Date and Implementation

C. Comments. This directive supplements DODD 5000.1 and establishes the Defense System Acquisition Review Council (DSARC) charter. It is a key directive for acquisition of embedded computer systems.

DODD 5000.3 - 20 May 1975  
TEST AND EVALUATION

A. Purpose. This directive establishes policy for the test and evaluation of defense systems programs. It can be used by contracting officials to prepare or review software test plans, test procedures, and test report documents.

B. Outline of Contents

I. Purpose

II. Cancellations

III. Scope and Applicability

IV. Policies and Principles

A. General

B. Development Test and Evaluation

C. Operational Test and Evaluation

D. Test and Evaluation for Major Ships of a Class

E. Test and Evaluation for One-of-a-Kind Systems

F. Production Acceptance Test and Evaluation

G. Test and Evaluation Master Plan

H. Changes to Test and Evaluation Plans

I. Defense Systems Acquisition Review Council  
(DSARC)/Decision Coordinating Paper Procedures  
for Major Defense Systems

V. Waivers

VI. Exclusions

VII. Responsibilities of the Deputy Director of Defense  
Research and Engineering, Test and Evaluation

VIII. Reporting Requirements

IX. Effective Date and Implementation

DODD 5000.3 (Concluded)

C. Comments. While not solely applicable to software, several sections of this directive can be used effectively to plan and/or monitor software test and evaluation. This directive specifies that test and evaluation shall be scheduled in the acquisition, and that testing shall begin early and continue throughout the development cycle. This directive may be used as the justification for top-down testing. This directive is implemented, in part, by AFR 80-14.

DODD 5000.19 - 2 June 1971; Reprint with Change 1 - 1 June 1973  
POLICIES FOR THE MANAGEMENT AND CONTROL OF DOD  
INFORMATION REQUIREMENTS

A. Purpose. This directive establishes uniform policies and criteria for use in the management and control of Department of Defense (DOD) information requirements and resultant information systems that may be placed on DOD components and on contractors and other external agencies and organizations. Its objective is to assure optimum effectiveness and economy in the flow of information and prevent the generation of unauthorized or duplicative information requirements/systems by requiring that each request for information undergo an objective review and meet the criteria prescribed in the directive.

B. Outline of Contents

1. Purpose and Objectives
2. Cancellation
3. Applicability and Scope
4. Definitions
5. Policy, Principles, and Criteria for use in Generating Information Requirements
6. Responsibilities
7. Delegations
8. Effective Date and Implementation

Enclosures:

1. References
2. Definitions
3. OMB Circular A-40
4. Reviewing New/Revised Interagency Information Requirements
5. Section V - Management of Federal Reports

C. Comments. DODD 5000.19 provides the policies for management and control of DOD information requirements and resultant information systems as specified in the directive. It addresses all information systems as general items and does not single out software systems.

DOD 5000.19-L, Volume II - January 1977  
ACQUISITION MANAGEMENT SYSTEMS AND  
DATA REQUIREMENTS CONTROL LIST (AMSDL)

A. Purpose. This document is used by DOD contracting officials to select (1) Acquisition Management Systems and their source documents and (2) Data Item Descriptions (DIDs) for application to contracts.

B. Outline of Contents

Part I. Acquisition Management Systems List/Associated DIDs

Part II. Numerical Listing of DIDs

Part III. Keyword Index of DIDs

Part IV. Cancelled/Superseded List (2 sections)

Part V. Appendix/Explanatory Information

C. Comments. The AMSDL supersedes DOD 7000.6M, "Acquisition Management Systems List," September 1973, and the DOD Authorized Data List (DODADL), TD-3, "Index of Data Item Descriptions," 1 June 1976.

DODD 5000.29 - 26 April 1976  
MANAGEMENT OF COMPUTER RESOURCES IN MAJOR DEFENSE SYSTEMS

A. Purpose. This DOD Directive is used by DOD component heads for management and control of computer resources during the development, acquisition, deployment, and support of major defense systems.

B. Outline of Contents

I. Purpose

II. Applicability and Scope

III. Duration

IV. Definitions

V. Policy

A. General

B. Requirements Validation and Risk Analysis

C. Configuration Management of Computer Resources

D. Computer Resource Life Cycle Planning

E. Support Software Deliverables

F. Milestone Definition and Attachment Criteria

G. Software Language Standardization and Control

VI. Responsibilities

VII. Effective Date and Implementation

Enclosure 1. Definitions

Enclosure 2. Charter of DOD Management Steering  
Committee for Embedded Computer  
Resources

I. Background

II. Scope

III. Objectives

IV. Activities

DODD 5000.29 (Concluded)

V. Organization and Composition

VI. Responsibilities

VII. Technical Panels

VIII. Method of Operation

IX. Definitions

X. References

Enclosure 3. Memorandum for "Technology Coordinating Papers"

- General Requirements for TCPs
- Utilization of TCPs
- Content of TCPs
- Management of TCP Process
- Distribution of TCPs
- Reviews and Critiques of TCPs

Enclosure 4. References

C. Comments. The Air Force implements this directive via AFR 800-14, Volume II.

DODI 5000.31 - 24 November 1976  
INTERIM LIST OF DOD APPROVED HIGH ORDER  
PROGRAMMING LANGUAGES (HOL)

A. Purpose. This DOD instruction specifies the high order programming languages (HOL) that are approved for development of software in major defense systems acquisition programs.

B. Outline of Contents

- I. Purpose
- II. Applicability and Scope
- III. HOL Definition
- IV. Policy
- V. Responsibilities

C. Comments. DODI 5000.31 supplements DODD 5000.29, "Management of Computer Resources in Major Defense Systems." It is designed to reduce the proliferation of HOLs in defense systems and to ensure control. It assigns to different controlling agencies the responsibility for maintaining stability and configuration of different HOLs. The approved HOLs are JOVIAL-J3, JOVIAL-J73, FORTRAN, SPL-1, CMS-2, TACPOL, and COBOL. DODI 5000.31 is implemented by AFR 300-10.

DODI 5010.12 - 5 December 1968  
MANAGEMENT OF TECHNICAL DATA

A. Purpose. This instruction establishes uniform policies and procedures for the management and administration of technical data contractually acquired in support of delivered equipment.

B. Outline of Contents

I. Purpose

II. Cancellation

III. Definitions

IV. Applicability and Scope

V. Objectives

VI. Policies and Procedures

VII. Responsibilities

VIII. Data Management Improvement Program

IX. Effective Date and Implementation

Enclosures

C. Comments. Mandatory reading for a basic understanding of deliverable documentation.

DODD 5010.19 - 17 July 1968; Change 1 - 6 August 1968  
CONFIGURATION MANAGEMENT

A. Purpose. This directive establishes the policies governing the configuration management of systems and equipments.

B. Outline of Contents

- I. Purpose
- II. Applicability
- III. Definitions
- IV. Objectives
- V. Policy
- VI. Waivers to This Directive
- VII. Implementation
- VIII. Effective Date

C. Comments. This directive gives a broad base understanding of the configuration management discipline. Also supplements DODI 5010-12.

DOD 7935.1-S - (In Process)  
AUTOMATED DATA SYSTEMS (ADS) DOCUMENTATION STANDARDS

A. Purpose. DOD Standard 7935.1-S will be used as the basis for documentation of all ADS projects, DOD-wide, that are initiated after the effective date of the standard.

B. Comments. This document replaces DOD 4120.17M, "Automated Data System Documentation Standards Manual," 29 December 1972. It implements DODI 7935.1, "DOD Automated Data Systems Documentation Standards," 13 September 1977. The standards in this manual may be used for defining new DIDs for AF weapon system software procurements where appropriate, or may provide models for revising or expanding standard AF DIDs.

**A.1.2 AF Regulations**

**AFR 65-3 - 1 July 1974; Change 1 - 1 September 1974;  
AFSC Supplement 1 - 25 July 1975  
CONFIGURATION MANAGEMENT**

**A. Purpose. This regulation prescribes policies and guidance for Air Force implementation of configuration management. It is part of the Joint DOD Services/Agency Regulation on Configuration Management.**

**B. Outline of Contents**

**Chapter 1. General**

**Chapter 2. Configuration Identification**

**Chapter 3. Configuration Control**

**Chapter 4. Configuration Status Accounting**

**Chapter 5. Configuration Audits**

**Appendix A. Definitions**

**Appendix B. References**

**Appendix C. Department of the Army  
Implementing Instructions**

**Appendix D. Department of the Navy  
Implementing Instructions**

**Appendix E. Marine Corps Implementing Instructions**

**Appendix F. Department of the Air Force  
Implementing Instructions**

**Appendix G. Defense Supply Agency  
Implementing Instructions**

**Appendix H. National Security Agency  
Implementing Instructions**

**Appendix I. Defense Communications Agency  
Implementing Instructions**

**Appendix J. Defense Nuclear Agency  
Implementing Instructions**

AFR 73-1 - 30 April 1975; AFSC Supplement 1 - 12 September 1975  
DEFENSE STANDARDIZATION PROGRAM (DSP)

A. Purpose. This AFR sets the policy and establishes the responsibilities in carrying out the Defense Standardization Program in the standardization of engineering criteria.

B. Outline of Contents

1. General Information
2. Air Force Policy
- 3.)
- 4.) } Air Force Command Responsibilities
- 5.) }
- 6.) }
7. Channels of Communication
8. Reporting on Standardization
9. Delegation of Authority
10. Supply of Forms
11. Documentation Disposition

C. Comments. This AFR implements DOD 4120.3-M.

AFR 74-1 - 4 August 1975  
QUALITY ASSURANCE PROGRAM

A. Purpose. This AFR prescribes the general policy requirements and responsibilities for implementing the Air Force Quality Assurance Program as established in DODD 4155.1.

B. Outline of Contents

1. Objectives of Air Force Quality Assurance Program
2. Explanation of Terms
3. General Policy
4. Program Requirements
5. HQ USAF Responsibilities
6. Major Command Responsibilities
7. Major Command Supplements

C. Comments. Gives good overview of program quality objectives.

AD-A058 428

TRW DEFENSE AND SPACE SYSTEMS GROUP REDONDO BEACH CALIF F/G 5/1  
AIRBORNE SYSTEMS SOFTWARE ACQUISITION ENGINEERING GUIDEBOOK FOR--ETC(U)  
NOV 77 E JUCEVIC F33657-76-C-0677

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AFR 80-14 - 10 February 1975  
RESEARCH AND DEVELOPMENT TEST AND EVALUATION

A. Purpose. This regulation outlines the policy and procedure for managing the test and evaluation activities during system development, acquisition, and deployment. It can be used by contracting officers to prepare or review software test plans, test procedures, and test results documents.

B. Outline of Contents. AFR 80-14 has the following sections:

- A. Concepts and Policies
- B. Test and Evaluation in Research, Exploratory Development, and Advanced Development
- C. Test and Evaluation in the Acquisition Process
- D. Use of Engineering Services in Test and Evaluation
- E. Assignment of Responsibilities
- F. Administration

C. Comments. This regulation establishes the management relationships among the implementing command, the Air Force Test and Evaluation Center, and the operating and supporting commands in successive phases of a system's life cycle, from conceptual through deployment and operation. This regulation implements DOD Directive 5000.3.

AFR 300-2 - 19 August 1977

**MANAGEMENT OF THE USAF AUTOMATIC DATA PROCESSING PROGRAM**

A. Purpose. This AF regulation is used by the implementing command program managers for the managing of automatic data processing (ADP) systems, capabilities, and services and provides guidance for ADP resource acquisition.

B. Outline of Contents

Section A. Policy

Section B. Responsibilities

Attachment 1. List of Acronyms and Terms

Attachment 2. Level of Approval Authorities

Attachment 3. Application of Policy Guidance to Management of ADP and Computer Resources

C. Comments. This 19 August 1977 version of AFR 300-2 supersedes AFR 300-1, 15 November 1974, and AFR 300-2, 14 February 1975.

AFR 800-2 (CI) - 16 March 1972; AFSC Supplement 1 - 18 October 1974  
Attachments 4 and 5 - 30 April 1975  
SAMSO Supplement 1 - 11 February 1977  
ACQUISITION MANAGEMENT - PROGRAM MANAGEMENT

A. Purpose. This AF regulation is used by implementing command program managers for management policy of Air Force acquisition programs.

B. Outline of Contents

1. General Information
2. Responsibilities
3. Communication

Attachment 1. Terms Explained

Attachment 2. Blue Line Channel of Communications

Attachment 3. DODD 5000.1

Attachment 4. DODI 5000.2

Attachment 5. DODD 5000.26

C. Comments. The basic AFR 800-2 (16 March 1972) included Attachments 1, 2, and 3. AFR 800-2 (CI), 30 April 1975, added Attachments 4 and 5. This regulation authorizes Air Force use of DOD policies.

AFR 800-3 - 1 June 1976  
ENGINEERING FOR DEFENSE SYSTEMS

A. Purpose. This Air Force regulation is used by implementing command program managers to define the engineering effort that will be applied, phase-by-phase throughout the acquisition life cycle.

B. Outline of Contents

1. Engineering for Defense Systems
  2. Technical Program Management
  3. Engineering Management Tasks
  4. Engineering Policy
  5. Responsibilities of HQ USAF
  6. Responsibilities of Implementing Command
  7. Responsibilities of HQ Air Force Logistics Command
  8. Responsibilities of Participating Commands
- Attachment 1. Engineering Principles for Defense Systems

C. Comments. This AFR sets forth the policies, principles, concepts, and techniques for the efficient planning and control of the technical program. This document implements AFR 800-2.

AFR 800-4 - 10 March 1975; AFSC/AFLC Supplement 1 - 14 August 1975  
TRANSFER OF PROGRAM MANAGEMENT RESPONSIBILITY

A. Purpose. This regulation states Air Force policy and assigns responsibility for the transfer of program management responsibility from an implementation to a supporting command.

B. Outline of Contents

1. Terms Explained
2. Policy
3. Responsibilities
4. Implementation

AFR 800-11 - 3 August 1973  
LIFE CYCLE COSTING (LCC)

A. Purpose. This regulation outlines policy and methodology for life cycle costing in the development, acquisition, and modification of defense systems and subsystems. This regulation may be used by contracting officers during the preparation of requests for proposal and contract award decisions.

B. Outline of Contents

1. Explanation of Air Force Policy on LCC
2. Terms Explained
3. Use of Life Cycle Cost
4. Formal Guidance From DOD
5. Other Related Directives
6. Responsibilities Assigned to HQ USAF
7. Responsibilities Assigned to HQ USAF
8. Responsibilities Assigned to ATC
9. Responsibilities Assigned to Other Commands
10. LCC Report, RCS:SAF-ILS 7201
11. How to Prepare
12. How to Submit
13. Documentation

C. Comments. The objective of LCC is to consider ownership cost (operation, maintenance, support, etc.) as well as development and acquisition cost, in order to provide visibility of economic advantages of the various design/development options and acquisition decisions. The use of LCC is not intended to make minimum cost the predominant decision factor, but to ensure a proper balance between cost and system effectiveness.

AFR 800-14, Volume I - 10 May 1974; AFSC Supplement 1 - 8 August 1977  
MANAGEMENT OF COMPUTER RESOURCES IN SYSTEMS

A. Purpose. This AF regulation is used by AF activities responsible for planning, developing, acquiring, supporting, and using systems managed or acquired under AFR 800-2.

B. Outline of Contents

Section A. General Information

1. Applicability of This Regulation
2. Objective of This Regulation
3. AF Policy on Management of Computer Resources in Systems

Section B. Assigned Responsibilities

4. Headquarters USAF
5. AF Systems Command (AFSC)
6. Program Manager
7. AF Logistics Command (AFLC)
8. Using Activities
9. Air Training Command (ATC)
10. Air University

Attachment 1. Terms Explained

Attachment 2. Applicability of AFRs Pertaining to ADP and Computer Resources

C. Comments. Volume I policies are implemented via Volume II procedures. AFSC Supplement 1 to Volume I clarifies the general policy in a number of areas, including Higher Order Programming Languages, microprocessors and microcomputers, firmware, and the meaning of "verification" and "validation."

AFR 800-14, Volume II - 26 September 1975  
ACQUISITION AND SUPPORT PROCEDURES FOR  
COMPUTER RESOURCES IN SYSTEMS

A. Purpose. This AF regulation is used by AF activities implementing technical management of computer resources (both hardware and software) for major defense systems.

B. Outline of Contents

Chapter 1. Introduction

Chapter 2. Computer Resources in System Acquisition Life Cycle

Chapter 3. Planning

Chapter 4. Engineering Management

Chapter 5. Testing of Computer Programs

Chapter 6. Configuration Management

Chapter 7. Documentation

Chapter 8. Identifying Contractual Requirements

Chapter 9. Turnover and Transfer

Chapter 10. Support

Attachment 1. Glossary

Attachment 2. Bibliography

Figure 2-1. Computer Program Life Cycle

Figure 7-1. Data Related to the Computer Program Life Cycle

Table 7-1. Standard Contract Data Items

C. Comments. Volume II of AFR 800-14 implements Volume I policies.

D. Cautions. The following parts of Volume II contain statements that are misleading or erroneous:

AFR 800-14 (Concluded)

- (1) Paragraph 2-5a (page 2-2) says:

"For computer programs, the preliminary design ... should be contained in the development specifications and become the basis for the PDR of the computer program."

Locating the preliminary design in the development specification instead of the product specification appears to be an editorial error. At least it contradicts paragraph 4-9c (page 4-4), which in discussing PDRs says:

"The design approach for computer programs is contained in portions of the product specification."

The following sentence in paragraph 4-9c lists as the contents of the initial portion of the product specification the same items that paragraph 2-5a says should be in the development specification.

- (2) Similarly, paragraph 2-8a (page 2-3) says that the

"... authenticated development specification forms the baseline from which the design phase [i. e., the "detailed" design phase, which follows PDR] initiates."

This is true if the baseline referred to is the "requirements" baseline, but not if it is the "design" baseline. The preliminary "code-to" product specification, which should be the major subject of review at PDR according to paragraph 4-9c (discussed above), is not mentioned at all in paragraph 2-8a.

AFR 800-19 - 27 May 1975  
SYSTEM OR EQUIPMENT TURNOVER

A. Purpose. This AFR establishes policy for the turnover to an operating command of systems or equipments developed under the program management concept.

B. Outline of Contents

1. Terms Explained
2. Air Force Policy
3. Responsibilities
4. Turnover Documentation

Attachment 1

C. Comments. This AFR addresses computer resources in Attachment 1. Supplements AFR 800-4.

**A.1.3 AFSC Pamphlets**

**AFSCP 800-7 - (Due 1 December 1977)  
CONFIGURATION MANAGEMENT**

**A. Comments. This pamphlet supersedes AFSCM/AFLCM 375-7.**

**A.1.4 SAMSO Pamphlets/Regulations**

SAMSOP 74-2 - 1 September 1976

**CONTRACTOR SOFTWARE QUALITY ASSURANCE EVALUATION GUIDE**

A. Purpose. This document is intended for use as a guide to Government personnel responsible for the evaluation of a contractor's software quality program when MIL-S-52779 (AD) is applied to the contract.

B. Outline of Contents

1. Scope

1.1 Applicability

1.2 Contractual Intent

1.3 Relation to Other Requirements

2. Applicable Documents

3. Requirements

3.1 Software QA Program

3.2 Software QA Program Requirements

3.2.1 Initial Quality Planning

3.2.2 Configuration Management

3.2.3 Testing

3.2.4 Corrective Action

3.2.5 Library Controls

3.2.6 Computer Program Design

3.2.7 Software Documentation

3.2.8 Reviews and Audits

3.2.9 Tools, Techniques, and Methodologies

3.3 Subcontractor Control

4. Responsibilities

4.1 Contractor

4.2 Government Review at Contractor, Subcontractor,  
Vendor Facilities

5. Preparation for Delivery

6. Notes

C. Comments. This evaluation plan should apply to all aspects of a contractor's program. The pamphlet emphasizes the planning and execution of a comprehensive software quality program.

SAMSOR 70-2 - 15 August 1975  
REQUEST FOR PROPOSAL POLICY

A. Purpose. This SAMSO regulation establishes the responsibilities and procedures for issuance of competitive and single-source RFPs.

B. Outline of Contents

1. Policy
2. Responsibilities
3. Procedures

Attachment 1. Executive Management Summary Letter

Attachment 2. Proposal Preparation Instructions

Attachment 3. Evaluation Factors for Award

Attachment 4. Sample Request for Proposal

Attachment 5. Sample Study Contract RFP

C. Comments. A very useful document. The amount and format of the information is such that it is easily understood for practical implementation.

#### A.1.5 AFSC Design Handbooks

AFSC DH 4-2 - 10 April 1971

#### ELECTRONIC SYSTEMS TEST AND EVALUATION

A. Purpose. This handbook documents Air Force technical knowledge in the area of electronic systems test and evaluation, and specifically discusses computer program subsystem test and evaluation in Chapter 5. This handbook can be used by contracting officers to prepare or review software test plans, test procedures, and test result documents.

#### E. Outline of Contents

1. General
2. Overview of Electronic Systems Testing
3. Test and Evaluation Functional Flow Diagram
4. Hardware Subsystem Test and Evaluation
5. Computer Program Subsystem Test and Evaluation
  - A. Test Planning
  - B. Test Tools
  - C. Computer Program Test Phases
  - D. Special Applications
6. Facility Subsystem Test and Evaluation
7. Personnel Subsystem Test and Evaluation
8. Critical Component Test and Evaluation
9. Intersystem/Intrasystem Integration Test and Evaluation
10. System Test and Evaluation
11. Logistics Evaluation
12. Test Hazards and Safety
13. Economics of Testing

C. Comments. This handbook contains criteria and guidance for the design of test and evaluation programs for Air Force systems and equipment. It is directed towards the testing and evaluation processes as set forth in AFR 80-14.

#### A.1.6 Navy Instructions

NAVMATINST 4130.2A - 19 July 1976  
CONFIGURATION MANAGEMENT OF COMPUTER SOFTWARE  
ASSOCIATED WITH TACTICAL DIGITAL SYSTEMS AND OTHER  
TECHNICAL COMPUTER SYSTEMS

A. Purpose. This instruction defines the responsibilities of Naval Systems Commanders and Project Managers for configuration management of computer software associated with tactical digital systems and other technical computer systems developed and/or maintained by the Naval Materiel Command. Tactical Digital Systems are fleet systems that employ digital processing techniques that contribute directly to performance in the areas of command and control, navigation, communication, weapons delivery, fire control, sensor surveillance, and electronic warfare.

#### B. Outline of Contents

1. Purpose
2. Cancellation
3. Applicability
4. Definitions
5. Background
6. Policy
7. Action
8. Implementation

C. Comments. NAVMATINST 4130.2A points out the need for configuration management during the life cycle of computer software associated with Tactical Digital Systems and other Technical Computer Systems and puts the responsibility of implementation on Naval Systems Commanders and Project Managers. (NAVMATINST 4130.2A should not be confused with NAVMATINST 4130.1A, which is the Navy portion of the Joint DOD Services/Agency Regulation on Configuration Management. See the summary for AFR 65-3.)

SECNAVINST 3560.1 - 8 August 1974

TACTICAL DIGITAL SYSTEMS DOCUMENTATION STANDARDS

A. Purpose. This Navy document is used by the procuring agency to select documentation for tactical systems software development. It identifies and describes documents that support the development and maintenance of tactical systems software.

B. Outline of Contents

1. Introduction

1.1 Purpose

1.2 Scope

2. Applicable Documents

3. Document Description

Part I. Operational Requirement Document Types

Part II. Technical Development Document Types

Part III. Test Document Types

Part IV. User-Narrative Document Types

Part V. Format

C. Comments. SECNAVINST 3560.1 is a very detailed document. It provides the user with the precise format and preparation instructions necessary for specifications, plans, and procedures relative to tactical systems computer program development. It does not prescribe which documents to use, but does suggest applications. It contains formats for data base documents and interface control specifications, which are not included in MIL-STD-490 or MIL-STD-483. The standards in this manual may be used for defining new DIDs for AF weapon system software procurements where appropriate, or may provide models for revising or expanding standard AF DIDs.

**A.1.7 Army (DOD) Regulations**

**AR 70-37 - Undated Draft  
CONFIGURATION MANAGEMENT**

**A. Purpose.** This regulation prescribes uniform policies and guidance for the Army for implementation of configuration management.

**B. Comments.** AR 70-37 is an appendix to DODD-XXXX.X, dated 1 July 1977, and constitutes the Army implementing instructions for the DOD directive. It is in draft form, but it is presumed that in its final form, it will supplement information in the DOD directive, spelling out specific responsibilities for different commands of the Army. Previous issues of the regulation described how configuration management is performed.

**A.1.8 Technical Orders**

TO-00-5-2 - 20 August 1973; Change 1 - 15 February 1974  
TECHNICAL ORDER DISTRIBUTION SYSTEM

**A. Purpose.** This document explains in detail the distribution policy, numerical indexing method, technical order codes, and revisions of technical orders for all USAF commands.

**B. Outline of Contents**

Section 1. Introduction

Section 2. Responsibilities

Section 3. Numerical Index and Requirement Table

Section 4. Technical Order Codes, Files, and Requirements

Section 5. Initial Distribution Requirements

Section 6. Requisitioning

Section 7. Distribution

Section 8. Special Weapons Technical Orders

Section 9. Military Assistance Program

Section 10. List of Applicable Technical Order Distribution

Section 11. Special Purpose Distribution Codes

Section 12. Interservice Distribution of Technical Publications

Section 13. Special Distribution

Section 14. Distribution of Non-Nuclear Munitions  
Specialized Technical Orders

Section 15. Interservice Technical Information Exchange  
Service (ITIES)

Section 16. TO Requirements and Distribution Checklist

**C. Comments.** The Air Force Technical Order System is a technical service specifically designed to support trained specialists in each of the commands and in other authorized using activities.

## A.2 COMPLIANCE DOCUMENTS

### A.2.1 Military Specifications

#### MIL-Q-9858A - 16 December 1963 QUALITY PROGRAM REQUIREMENTS

A. Purpose. This military specification applies to supplies and services for which the requirement of MIL-I-45208, "Inspection System Requirements," are inadequate to provide needed quality assurance. This specification requires the contractor to establish a quality program to assure compliance with contractual requirements. MIL-Q-9858A is mandatory for use by the Air Force, Army, Navy, and Defense Supply Agency.

#### B. Outline of Contents

1. Scope
2. Superseding, Supplementation, and Ordering
  - 2.1 Applicable Documents
3. Quality Program Management
4. Facilities and Standards
5. Control of Purchases
6. Manufacturing Control
7. Coordinated Government/Contractor Actions
8. Notes

C. Comments. Although MIL-Q-9858A is hardware-oriented, it contains some general quality assurance provisions that are not included in MIL-S-52779 (AD) and that can be applied to software procurements. These provisions include subsection 3.1 on quality program management organization, 3.2 on initial quality planning, 3.4 on quality program records, and 6.7 on indication of inspection status (could be applied to software library control).

MIL-S-52779 (AD) - 5 April 1974  
SOFTWARE QUALITY ASSURANCE PROGRAM REQUIREMENTS

A. Purpose. This military specification is applied by DOD contracting officials to the acquisition of computer programs and related documentation whether acquisition involves software alone or software as part of a system or subsystem.

B. Outline of Contents

1. Scope
  - 1.1 Applicability
  - 1.2 Contractual Intent
  - 1.3 Relation to Other Contract Requirements
2. Applicable Documents
  - 2.1 Amendments and Revisions
  - 2.2 Ordering Government Documents
3. Requirements
  - 3.1 Software QA Program
  - 3.2 Software QA Program Requirements
    - 3.2.1 Work Tasking and Authorization Procedures
    - 3.2.2 Configuration Management
    - 3.2.3 Testing
    - 3.2.4 Corrective Action
    - 3.2.5 Library Controls
    - 3.2.6 Computer Program Design
    - 3.2.7 Software Documentation
    - 3.2.8 Reviews and Audits
    - 3.2.9 Tools, Techniques, and Methodologies
  - 3.3 Subcontractor Control
4. Responsibilities
  - 4.1 Contractor
  - 4.2 Government Review at Contractor, Subcontractor, or Vendor Facilities

MIL-S-52779 (AD) (Concluded)

5. Preparation for Delivery (NA)

6. Notes

6.1 Intended Use

6.2 Ordering Data

6.2.1 Procurement Requirements

6.2.2 Contract Data Requirements

C. Comments. MIL-S-52779 (AD) requires the establishment and implementation of a software quality assurance program by the contractor. Section 3 defines the specific areas that the contractor's software QA program must address. It is important that Section 3 be tailored to each QA program.

MIL-S-83490 - 30 October 1968  
SPECIFICATIONS, TYPES AND FORMS

A. Purpose. The specification prescribes general requirements for the preparation of specifications for the departments and agencies of the DOD. It applies to specifications acquired from industry by contract or order and to equivalent acquisition from government sources.

B. Outline of Contents

1. Scope
2. Applicable Documents
3. Requirements
  - 3.1 General
  - 3.2 Types of Specifications
  - 3.3 Forms of Specifications
  - 3.4 Numbering of Specifications
  - 3.5 Material
4. Quality Assurance Provision
5. Preparation for Delivery
6. Notes

C. Comments. MIL-S-83490 defines in detail what the different types of specifications are as well as the different forms, i. e., Form 1a, 1b, etc. MIL-STD-490 is related to this specification in that it describes the detailed format for each of the types defined in MIL-S-83490.

**A.2.2 Military Standards**

**MIL-STD-130E - 5 August 1977  
IDENTIFICATION MARKING OF U.S. MILITARY PROPERTY**

**A. Purpose.** MIL-STD-130E establishes the marking requirements and methods for identification of items produced and procured by all the military branches.

**B. Outline of Contents**

1. Scope
2. Referenced Documents
3. Definitions
4. General Marking Requirements
5. Detail Requirements

**C. Comments.** Although this military standard does not specifically address computer programs or software media, it may be used as a guide for marking and identifying deliverable software media.

MIL-STD-480 - 30 October 1968  
CONFIGURATION CONTROL - ENGINEERING CHANGES,  
DEVIATIONS, AND WAIVERS

A. Purpose. This DOD standard establishes the criteria and uniform practices for proposing, justifying, generating, and approving engineering changes, waivers, and deviations. It also provides requirements for configuration control with uniform terminology and definitions.

B. Outline of Contents

1. Scope
2. Referenced Documents
3. Definitions (Appendix E)
4. Requirements for Engineering Changes
  - 4.1 General
  - 4.2 Classification
  - 4.3 Engineering Change Justification
  - 4.4 Class I ECP Types
  - 4.5 Class I Engineering Change Priorities
  - 4.6 Format
  - 4.7 Preparation
  - 4.8 Submittal
  - 4.9 Approval and Review
  - 4.10 Revision of ECPs
  - 4.11 Correction of ECPs
5. Requirements for Notices of Revision
6. Additional Requirements for Facility Construction Contracts
7. Requirements for Deviations
8. Requirements for Waivers
  - 10 Appendix A. Instructions for Preparation of ECP
  - 80 Appendix B. Instructions for the Preparation of Request for Deviation
  - 90 Appendix C. Instructions for the Preparation of Request for Waiver
  - 110 Appendix E. Definitions

MIL-STD-480 (Concluded)

C. Comments. MIL-STD-480 applies requirements for technical, fiscal, and logistic information relative to proposed changes during engineering/operational systems development, production and the operational CI/CPCI life cycle. It may also be used for advanced development programs to control contractually imposed functional characteristics and design constraints. Additional latitude is provided by MIL-STD-480 in that it may also be applied to facility construction contract drawings and specifications during construction and operation period on an as-required basis due to operational weapons, systems, and equipment changes. MIL-STD-480 does not specifically address itself to software, but its techniques are required by the military standards used to control and identify software (e.g., MIL-STD-483, 490, and 1521A).

MIL-STD-481A - 18 October 1972  
CONFIGURATION CONTROL - ENGINEERING CHANGES, DEVIATIONS,  
AND WAIVERS (SHORT FORM)

A. Purpose. This standard prescribes requirements for the preparation and submittal of an abbreviated engineering change proposal as well as deviations and waivers. This standard is intended for use in contracts involving procurement of multi-application items or items for which the prescribed detail design was not developed by the contractor.

B. Outline of Contents

1. Scope
2. Referenced Documents
3. Definitions
4. Requirements for Engineering Changes
5. Requirements for Deviations
6. Requirements for Waivers
10. Appendix A. Instructions for the Preparation of ECP
20. Appendix B. Instructions for the Preparation of Request for Deviation
30. Appendix C. Instructions for the Preparation of Request for Waiver

C. Comments. MIL-STD-481A supplements MIL-STD-480. It provides a simplified method of configuration control, but has a very limited description of the effect on interfaces and logistic support. Where a detailed analysis and description of an engineering change is desired, MIL-STD-480 should be used. MIL-STD-481A does not specifically address itself to software, but its techniques may be applied to change management of software.

MIL-STD-482A - 1 April 1974  
CONFIGURATION STATUS ACCOUNTING DATA ELEMENTS  
AND RELATED FEATURES

A. Purpose. This standard provides a comprehensive listing of standard data elements for tailoring the selection of information to be recorded and reported to identify CIs and CPCIs and determine the status of change proposal and change implementation status of those CIs and CPCIs.

B. Outline of Contents

1. Scope
2. Referenced Documents
3. Definitions
4. General Requirements
5. Detailed Requirements
6. Notes

Appendix I. Index of Configuration Status Accounting  
Data Elements and Data Use Identifiers

Appendix II. Standard Data Elements and Related Features

Appendix III. Status Accounting Samples

C. Comments. MIL-STD-482A supplements the status accounting requirements of MIL-STD-480, 481A, 483, 490, and 1521A. It establishes data elements to be used as the content of configuration status accounting reports. It does not prescribe which data elements to use nor does it specify the report format or frequency. Such requirements are specified on a case-by-case basis by the managing organization.

MIL-STD-483 (USAF) - 31 December 1970  
CONFIGURATION MANAGEMENT PRACTICES FOR SYSTEMS,  
EQUIPMENT, MUNITIONS, AND COMPUTER PROGRAMS

A. Purpose. This Air Force standard is used by procurement officials and their staffs to apply configuration management requirements (including major baseline specifications) to contracts. As the title indicates, this standard can be applied to many other items besides computer programs.

B. Outline of Contents

1. Scope
2. Referenced Documents
3. Requirements
  - 3.1 Introduction
  - 3.2 Baseline Management
  - 3.3 System Engineering and Interface Control
  - 3.4 Configuration Identification
  - 3.5 Specification Maintenance
  - 3.6 Configuration Item Identification
  - 3.7 Engineering Release Requirements and Correlation of Manufactured Products
  - 3.8 System Allocation Document
  - 3.9 Configuration Audits
  - 3.10 Engineering Changes (Equipment/Munitions)
    - 3.10.1 Engineering Changes (Computer Programs)
  - 3.11 Reporting the Accomplishment of Updating/Retrofit Changes
  - 3.12 Configuration Management Records/Reports
4. Data
5. Definitions
  10. Appendix I. Configuration Management Plan
  20. Appendix II. Interface Control
  30. Appendix III. System Specification/System Segment Specification (Supplements MIL-STD-490)
  40. Appendix IV. Addendum to Configuration Item Specification

MIL-STD-483 (USAF) (Concluded)

- 50. Appendix V. Inventory Item Specification (Not applicable to computer programs, per AFSCM/AFLCM 375-7)
- 60. Appendix VI. Computer Program Configuration Item Specification (Part I and Part II Specifications. Supplements MIL-STD-490)
- 70. Appendix VII. Specification Maintenance, Equipment/Munitions
- 80. Appendix VIII. Specification and Support Documentation Maintenance, Computer Program (Includes preparation of specification change notices (SCNs), computer configuration indexes, configuration item development records, computer program change status listings, and version description documents (VDDs).)
- 90. Appendix IX. Document and Item Identification Numbering and Marking
- 100. Appendix X. Engineering Release Records and Correlation of Manufactured Products
- 110. Appendix XI. System Allocation Document
- 120. Appendix XII. Configuration Audits (FCA, PCA, FQR)
- 130. Appendix XIII. Engineering Changes (equipment/munitions)
- 140. Appendix XIV. Engineering Changes (computer programs) (Supplements MIL-STD-480)
- 150. Appendix XV. Reporting the Accomplishment of Updating/Retrofit Changes

C. Comments. MIL-STD-483 supplements MIL-STD-480, 481, 482, and 490 in that portions of MIL-STD-483 specifically address requirements of software not found in MIL-STD-480, 481, and 490. These include:

- 1. Computer program specification preparation instructions
- 2. Specification and support documentation maintenance for computer programs
- 3. Formatting and processing of changes to computer programs
- 4. Configuration audit objectives for computer programs.

MIL-STD-483 also includes all the requirements necessary for total configuration control and baseline management on a large USAF software contract.

MIL-STD-490 - 30 October 1968; Notice 1 - 1 February 1969;  
Notice 2 - 18 May 1972

## SPECIFICATION PRACTICES

A. Purpose. MIL-STD-490 establishes the format and contents of specifications for project-peculiar items, processes, and materials. It establishes uniform practices for specification preparation, ensures the inclusion of essential requirements, and aids in the use and analysis of specification content.

### B. Outline of Contents

1. Scope
2. Referenced Documents
3. Requirements
  - 3.1 Introduction
  - 3.2 Style, Format, and Identification of Specifications
  - 3.3 Changes and Revisions
4. General Requirements for Sections of Specifications
  - 4.1 Section 1. Scope
  - 4.2 Section 2. Applicable Documents
  - 4.3 Section 3. Requirements
  - 4.4 Section 4. Quality Assurance Provisions
  - 4.5 Section 5. Preparation for Delivery
  - 4.6 Section 6. Notes
  - 4.7 Appendix and Index
5. Detail Requirements
  10. Appendix I. Type A, System Specification
  20. Appendix II. Type B1, Prime Item Development Specification
  30. Appendix III. Type B2, Critical Item Development Specification
  40. Appendix IV. Type B3, Non-Complex Item Development Specification
  50. Appendix V. Type B4, Facility or Strip Development Specification
  60. Appendix VI. Type B5, Computer Program Development Specification

MIL-STD-490 (Concluded)

- 70. Appendix VII. Type C1a, Prime Item Product Function Specification
- 80. Appendix VIII. Type C1b, Prime Item Product Fabrication Specification
- 90. Appendix IX. Type C2a, Critical Item Product Function Specification
- 100. Appendix X. Type C2b, Critical Item Product Fabrication Specification
- 110. Appendix XI. Type C3, Non-Complex Item Product Fabrication Specification
- 120. Appendix XII. Type C4, Inventory Item Specification
- 130. Appendix XIII. Type C5, Computer Program Product Specification
- 140. Appendix XIV. Type D, Process Specification
- 150. Appendix XV. Type E, Material Specification

C. Comments. The Type B5 and Type C5 specifications apply directly to software. MIL-STD-490 is a standard that applies to all services. Revision A to this document is in preparation. It is intended to have the A revision resolve the discrepancies that exist now between MIL-STD-490 and MIL-STD-483.

MIL-STD-499A (USAF) - 1 May 1974  
ENGINEERING MANAGEMENT

A. Purpose. This standard is used as a guide by military agencies and contractors to plan, conduct, and manage system engineering activities.

B. Outline of Contents

1. Scope
2. Referenced Documents
3. Definitions
  - 3.1 Engineering Management
  - 3.2 Technical Program Planning and Control
  - 3.3 System Engineering Process
  - 3.4 Engineering Specialty Integration
  - 3.5 Technical Performance Measurement
4. General Criteria
5. Detailed Requirements
  - 5.1 System Engineering Management Plan (SEMP)
    - 5.1.1 Contractual Provisions
    - 5.1.2 Non-Contractual Provisions
  - 5.2 Review of Contractor's Engineering Management
6. Notes
  - 6.1 Relationship of Technical Program Planning to Cost and Schedule Planning
  - 6.2 Relationship of Technical Performance Measurement (TPM) to Cost and Schedule Performance Measurement
  - 6.3 Relationship of Integrated Logistics Support (ILS) to System Engineering
  - 6.4 Minimum Documentation
  - 6.5 Data

MIL-STD-499A (USAF) (Concluded)

10. Appendix A, Task Statements

10.1 Technical Program Planning and Control

- 10.1.1 Development of Contract Work Break-down Structure (CWBS) and Specification Tree
- 10.1.2 Program Risk Analysis
- 10.1.3 System Test Planning
- 10.1.4 Decision and Control Process
- 10.1.5 Technical Performance Measurement (TPM)
- 10.1.6 Technical Reviews
- 10.1.7 Subcontractor/Vendor Reviews
- 10.1.8 Work Authorization
- 10.1.9 Documentation Control

10.2 System Engineering Process

- 10.2.1 Mission Requirements Analysis
- 10.2.2 Functional Analysis
- 10.2.3 Allocation
- 10.2.4 Synthesis
- 10.2.5 Logistic Engineering
- 10.2.6 Life Cycle Cost Analysis
- 10.2.7 Optimization
- 10.2.8 Production Engineering Analysis
- 10.2.9 Generation of Specifications

C. Comments. This standard emphasizes the tailoring of engineering tasks to each particular program, and calls for all engineering tasks to be performed as a single total integrated engineering effort. It contains the requirements for preparation of a System Engineering Management Plan (SEMP) and provides criteria for the Program Manager to evaluate individual program engineering planning and output. The appendix includes task statements that can be tailored to particular programs as specific contractual requirements. The system qualities that this specification seeks to enhance, such as reliability, maintainability, and reduced life cycle cost, are not as readily achievable for software procurements as for hardware. The actual methodologies for this purpose are not well defined and the guidance documentation is meager.

MIL-STD-881A - 25 April 1975  
WORK BREAKDOWN STRUCTURES FOR DEFENSE MATERIAL ITEMS

A. Purpose. This standard defines all the requirements necessary for preparation and utilization of work breakdown structures (WBSs).

B. Outline of Contents

1. Scope
  - 1.1 Purpose
  - 1.2 Application
2. Referenced Documents
3. Definitions
  - 3.4 Work Breakdown Structure
  - 3.5 Summary Work Breakdown Structure
  - 3.6 Project Summary Work Breakdown Structure
  - 3.7 Contract Work Breakdown Structure
  - 3.8 Project Work Breakdown Structure
  - 3.9 Work Breakdown Structure
4. General Requirements
5. Detailed Requirements
  - 5.1.2 Electronics Systems
  - 5.2 Project Summary Work Breakdown Structure
  - 5.3 Contract Work Breakdown Structure
  - 5.4 Preparation of Project Work Breakdown Structure

Appendices

C. Comments. Avionics-oriented WBS elements are identified through Level 3 (aircraft system), Appendix C (missile system), and Appendix F (space system). Each of these appendices is currently deficient with respect to identifying on-board data processing and software as a Level 3 WBS element, although data processing appears at Level 3 within the ground support subsystem. Work is currently underway to revise MIL-STD-881A to accommodate embedded computer systems, but in the meantime Air Force Program Offices must add on-board data processing and software as a specific Level 3 WBS element to assure visibility into avionics software management.

MIL-STD-1521A (USAF) - 1 June 1976  
TECHNICAL REVIEWS AND AUDITS FOR SYSTEMS, EQUIPMENTS,  
AND COMPUTER PROGRAMS

A. Purpose. This standard gives the requirements for the conduct of the following seven milestone events: systems requirements review (SRR), system design review (SDR), preliminary design review (PDR), critical design review (CDR), functional configuration audit (FCA), physical configuration audit (PCA), and formal qualification review (FQR). This standard is used by contracting offices throughout the acquisition life cycle for the purpose of monitoring program activities to ensure contractual compliance.

B. Outline of Contents

1. Scope

1.1 Purpose

1.2 Classification

1.3 Application

2. Referenced Documents

3. Definitions

3.1 System Requirements Review (SRR)

3.2 System Design Review (SDR)

3.3 Preliminary Design Review (PDR)

3.4 Critical Design Review (CDR)

3.5 Functional Configuration Audit (FCA)

3.6 Physical Configuration Audit (PCA)

3.7 Formal Qualification Review (FQA)

4. General Requirements

4.1 Contractor Participation and Responsibilities

4.1.1 Subcontractors and Suppliers

4.1.2 Location

4.1.3 Contractor Requirements

4.2 Procuring Activity Participation

4.3 Sample Forms

MIL-STD-1521A (USAF) (Concluded)

5. Detailed Requirements

5.1 (Reference the appendices for the detailed requirements)

6. Notes

- 10. Appendix A. System Requirements Review (SRR)
- 20. Appendix B. System Design Review (SDR)
- 30. Appendix C. Preliminary Design Review (PDR)
- 40. Appendix D. Critical Design Review (CDR)
- 50. Appendix E. Functional Configuration Audit (FCA)
- 60. Appendix F. Physical Configuration Audit (PCA)
- 70. Appendix G. Formal Qualification Review (FQR)

C. Comments. This standard identifies contractor and Government responsibilities in the conduct of a review or audit, and outlines the minimum content of information to be presented. The reviews and actions connected with the reviews are defined. A flowchart of program activities showing when the reviews occur in relation to other program activities is given. (The Reviews and Audits Guidebook contains guidelines for interpretation and use of MIL-STD-1521A.)

D. Caution. Figure 1, the flowchart of program activity, shows the draft product specification as being an input to the CDR but not to the PDR.

MIL-STD-1588 (USAF) - 30 June 1976  
JOVIAL (J3)

A. Purpose. MIL-STD-1588 (USAF) establishes the standard specifications for the development of compilers for the JOVIAL (J3) programming language.

B. Outline of Contents

Chapter 1. Introduction

Chapter 2. Elements

Chapter 3. Statements

Chapter 4. Declarations

Chapter 5. Processing: Declarations

Chapter 6. Programs

Attachment 1. Compiler Specifications

Attachment 2. Standard Air Force Glossary

Attachment 3. Index

C. Comments. This standard describes in detail the procedure for developing and writing a compiler program in JOVIAL language. The JOVIAL language is a machine-independent, procedure-oriented, general purpose programming language.

MIL-STD-1589 (USAF) - 28 February 1977  
JOVIAL (J73/1)

A. Purpose. MIL-STD-1589 (USAF) describes in detail the Level I subset of the J73 JOVIAL language. This standard is intended for use by programmers in coding J73 JOVIAL programs. It is an implementation of AFR 300-10.

B. Outline of Contents.

Section 1. Global Concepts

Section 2. Declaration of Names

Section 3. Statements

Section 4. Formulas

Section 5. Basic Elements

Section 6. Directives

Appendix Cross-Reference Index

MIL-STD-1679 (Navy) Draft - 28 June 1976  
TACTICAL SOFTWARE DEVELOPMENT

A. Purpose. This standard is used by government agencies for guidance in the design and development of tactical software.

B. Outline of Contents

1. Scope
2. Reference Documents
3. Definitions
4. General Requirements
5. Detailed Requirements
6. Miscellaneous

C. Comments. A standard especially addressing tactical software is necessary because of factors concerning this software which are not common to general software, or which carry a significantly different degree of emphasis.

### A.2.3 SAMSO Standards

#### SAMSO EXHIBIT 73-3 - 6 October 1973 STANDARD ENGINEERING PRACTICES FOR COMPUTER SOFTWARE DESIGN AND DEVELOPMENT

A. Purpose. This standard presents software engineering practices for use in Requests for Proposal (RFPs) and software specifications. It references MIL-STD-482, 483, and 490, and DOD Manual 4120.17-M.

#### B. Outline of Contents

1. Scope
  - 1.1 Purpose
  - 1.2 Use
  - 1.3 Application
2. Referenced Documents
3. Definitions
  - 3.1 Accountability (Software)
  - 3.2 Computer Software
  - 3.3 Hardware/Software
  - 3.4 Standardized Terms
4. General Requirements
5. Detailed Requirements
  - 5.1 Software Management Procedures Manual
  - 5.2 Programming Practices, Standards, and Conventions Manual
  - 5.3 Software Accountability System

Figure 1. The Three Permitted Standard Logic Structures

C. Comments. Most of SAMSO Exhibit 73-3 concerns computer programming practices, standards, and conventions. It specifies characteristics for hierarchical program design, execution order, standardized logic, and programming standards manual requirements. SAMSO considers Exhibit 73-3 to be a standard.

**SAMSO-STD 73-5B - 2 February 1976  
QUALITY ASSURANCE REQUIREMENTS FOR SPACE AND MISSILE  
SYSTEMS**

**A. Purpose.** This SAMSO standard is approved for use by all SAMSO agencies and is intended as an aid in interpreting the requirements of MIL-Q-9858A. The quality assurance requirements of this standard supplement those of MIL-Q-9858A.

**B. Outline of Contents**

1. Scope
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    - 3.1.4 Availability of Documentation
    - 3.1.5 Management Review
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      - 3.1.5.2 Quality Audit
  - 3.2 Initial Quality Planning
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- 4.2 Measuring and Testing Equipment
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- 5. Control of Purchases
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  - 6.7 Indication of Inspection Status
- 7. Coordinated Government Contractor Actions
  - 7.1 Government Inspection at Subcontractor or Vendor Facilities
  - 7.2 Government Property
- 8. Notes

SAMSO-STD 73-5B (Concluded)

C. Comments. SAMSO STD 73-5B supersedes SAMSO EXHIBIT 73-5A of 15 April 1974 and is intended to satisfy special quality program requirements of specific programs by supplementing the requirements of MIL-Q-9858A. The most applicable sections of this standard with respect to software quality assurance is paragraph 4.1.3, "Computer Program Quality Assurance," and its associated paragraphs. Parallel use of SAMSO STD 73-5B and MIL-S-52779(AD) will result in duplication of some quality assurance requirements unless duplicative paragraphs are eliminated through tailoring.

## APPENDIX B

### RSS BIBLIOGRAPHY

Within each grouping in this appendix, documents are listed in order of the following subgroups and in numerical sequence within each subgroup:

- a. DODD/DODI/DODR/DODM
- b. JCSP
- c. AFR/AFM/AFP
- d. AFSCR/AFSCM/AFSCP/AFSC DH
- e. SAMSOR/SAMSOP
- f. NAVMATINST/ SECNAVINST
- g. AR
- h. LCC
- i. T. O.
- j. MIL-Q/MIL-S/MIL-M/MIL-T
- k. MIL-HDBK
- l. MIL-STD
- m. SAMSO-STD
- n. FIPS-PUB
- o. ANSI

The key documents summarized in Appendix A are marked with an asterisk in this appendix.

B. 1. GOVERNMENT DOCUMENTS PERTAINING TO  
SOFTWARE ACQUISITION ENGINEERING/MANAGEMENT TASKS

B. 1. 1 ACQUISITION POLICIES

DODD 4105. 55	Selection and Acquisition of Automatic Data Processing Resources
DODI 4105. 65	Acquisition of Automatic Data Processing Computer Program and Related Services
*DODD 5000. 1	Major System Acquisition
*DODD 5000. 2	Major System Acquisition Process
DODI 5030. 40	Government-Wide ADP Sharing Program
DODD 5100. 30	World-Wide Military Command and Control System
DODD 5105. 19	Defense Communications Agency
DODD 5118. 3	Assistant Secretary of Defense (Comptroller)
DODD 5160. 32	Development of Space Systems
AFR 23-8	Air Force Systems Command
AFR 23-36	Air Force Test and Evaluation Center
AFR 23-43	Federal Computer Performance Evaluation and Simulation Center
AFR 70-1	Procurement of AF Assigned Items Under the DoD Coordinated Program
AFR 70-10	Procurement of Electronic Equipment for Tri-Service Use Under the DoD Coordinated Procurement Program
AFR 70-18 AFSC Supplement	Local Purchase Program
AFR 80-1	Air Force Research and Development
AFR 80-53 AFSC Supplement SAMSO Supplement 1	Technical Evaluation of Independent Research and Development

**B.1.1 ACQUISITION POLICIES (Concluded)**

AFR 124-8	Violations of Public Trust in Contract, Procurement, and Other Matters
AFR 400-27	Basic Policies and Principles for Inter-service, Interdepartmental and Interagency Support
*AFR 800-2 (CI) AFSC Supplement 1 Attachments 4, 5 SAMSO Supplement 1	Acquisition Management - Program Management
*AFR 800-4 AFSC/AFLC Supp. 1 SAMSO Supplement 1	Transfer of Program Management Responsibility
*AFR 800-19	System or Equipment Turnover
AFLCM 70-6	Coordinated Procurement
AFSCR 300-1	Automatic Data Processing Program Management
MIL-STD-1679(Navy) Draft	Tactical Software Development

## B. 1.2 ACQUISITION MANAGEMENT PRACTICES

DODI 4100.31	Reports on Single Manager Operations
DODI 4140.38	ADP Management Information System
*DODD 5000.29	Management of Computer Resources in Major Defense Systems
DODI 5010.27	Management of Automated Data System Development
DODD 5100.40	Responsibilities for the Administration of the Automatic Data Processing Program
DODD 5126.34	Defense Procurement Management Review Program
DODD 7000.1	Resource Management Systems of the DoD
DODI 7000.2	Performance Measurement for Selected Acquisitions
DODI 7000.3	Acquisition Management Systems Control
DODM 7000.6	Acquisition Management Systems List
JCSP 12 (Volume I)	Information Exchange Planning Guidance
JCSP 14	Computer System and Program Catalog for Worldwide Command and Control System
JCSP 17	Management Procedures for the Worldwide Military Command and Control System Standard Systems
AFR 26-10	Manpower Utilization
AFR 27-9	Control and Documentation of Air Force Programs
AFR 57-1 IMC 76-1 & 2 SAMSO Supplement 1 AFSC Supplement 1	Required Operational Capabilities (ROCS)
AFM 66-18 AFSC Supplement 1	Engineering and Technical Services Management and Control

B. 1.2 ACQUISITION MANAGEMENT PRACTICES (Continued)

AFR 70-9 AFSC Supplement 1 MAC Supplement 1	Technical Representative of the Contracting Office (TRCO)
AFR 70-11	Implementing Procedures for the Army Single Department Procurement Assignments
AFR 70-12	Procurement Management Reporting System
AFR 70-13	Implementing Procedures for Single Department Procurement of Commodities Assigned to the Department of the Navy
AFR 70-15 AFSC Supplement 1 SAMSO Supplement 1	Source Selection Policy
AFR 70-16	Contract Management in Major Program Acquisition
AFR 70-17	Implementing Procedures for Purchase of Supplies Assigned to DSA Under the DoD Coordinated Procurement Program
AFP 70-19	Contracting for Operations and Maintenance Services
AFR 80-2 AFSC Supplement 1	Documents Used in the Management of Air Force Research and Development
AFR 80-3	Management of Air Force In-House Research and Development Labs
AFR 80-15 AFSC Supplement	Participation in Certain NATO Groups on Research, Development, Production, and Logistics Support of Equipment
AFR 80-51	Management of R&D Requirements in the Personnel, Training, and Education Program
AFM 178-6 AFSC Supplement 1	Resource Manager's Handbook
AFR 178-7 AFSC Supplement	Management and Control of Information Requirements

B. 1. 2 ACQUISITION MANAGEMENT PRACTICES (Continued)

*AFR 300-2	Management of the USAF Automatic Data Processing Program
AFM 300-6 AFSC Supplement SAMSO Supplement 1	Automatic Data Processing (ADP) Resource Management
AFR 300-7	Automatic Data Processing Planning Concepts
AFM 300-12 AFSC Supplement	Procedures for Managing Automatic Data Processing Systems
AFR 600-1 AFSC Supplement	Development, Selection and Application of Management Control Systems
AFR 800-10	Management of Multi-Service Systems, Programs and Projects
*AFR 800-14 (Volume I) Supplement 1 AFSC Supplement	Management of Computer Resources in Systems
*AFR 800-14 (Volume II)	Acquisition and Support of Computer Resources in Systems
AFSCM 70-1	Functions and Responsibilities of AFSC PR-MIPR Control Offices and the AFSC MIPR Liaison Office
AFSCR 70-2	AFSC Business Strategy Panel
AFSCR 70-7	AFSC Procurement Evaluation Panel
AFSCR 70-10	Physically Completed Contracts
AFSCR 70-11	Surveillance of Management Control Systems and Financial Reporting on Selected Acquisitions
AFSCM 70-480	Procurement Action Reporting System
AFSCR 80-15	R&D Source Selection Policy and Guidance
AFSCM 171-265	Acquisition of R&D Services
AFSCM 171-271	AFSC Aerospace Resources and Configuration System

**B. 1. 2 ACQUISITION MANAGEMENT PRACTICES (Concluded)**

<b>AFSCM 171-480 (Two Volumes)</b>	<b>Procurement Action Reporting System</b>
<b>AFSCM 171-490</b>	<b>Automated Reports Management System</b>
<b>AFSCR/AFLCR 800-2</b>	<b>Management of Multi-Service Systems, Programs and Projects</b>
<b>AFSCP 800-3</b>	<b>A Guide to Program Management</b>
<b>AFSCR 800-14 (AFLCR 800-14)</b>	<b>Joint AMC/NMC/AFLC/AFSC List of Authorized Acquisition Management Systems</b>

**B.1.3 RFP PACKAGE**

<b>AFSCP 70-4</b>	<b>Request for Proposal Preparation Guide</b>
<b>AFSCP 800-6</b>	<b>Statement of Work Preparation Guide</b>
<b>SAMSOR 70-1</b>	<b>Solicitation/Contract Terms and Conditions</b>
<b>*SAMSOR 70-2</b>	<b>Request for Proposal Policy</b>

## B. 1.4 MANAGEMENT CONTROLS

### B. 1.4.1 Visibility

DODI 4105.64	Technical Representation at Contractor Facilities
*DODD 5000.19	Policies for the Management and Control of DoD Information Requirements
*DODD 5000.19-L Supplement	Acquisition Management Systems and Data Requirements Control List (AMSDL)
DODD 5010.28	Department of Defense Management Review and Improvement Program
*MIL-STD 1521A	Technical Reviews and Audits for Systems, Equipment and Computer Programs
MIL-STD 1602	Requirements for Progress Reports for R&D Equipment
AFR 800-5 AFSC Supplement 1	Selected Acquisition Reports (SARs)
AFSCR 70-12 SAMSO Supplement 1	AFSC Procurement Summary Report
AFSCR 800-1	Command Review of Systems Acquisition Programs and Test Resources
AFSCR 800-18	Joint Operational and Technical Review (JOTR)

### B. 1.4.2 Cost and Schedule Control

DODI 5000.22	Guide to Estimating Costs of Information Requirements
DODI 7000.10	Contract Cost Performance Funds Status and Cost Schedule Status Reports
DODI 7000.11	Contractor Cost Data Reporting
DODI 7041.3	Economic Analysis and Program Evaluation
AFP 70-14	Probability of Incurring Estimated Cost (PIECOST)

B.1.4.2 Cost and Schedule Control (Concluded)

AFR 173-1 AFSC Supplement 1	Management of the Cost Analysis Program
AFR 173-10 (Three Volumes)	USAF Cost and Planning Factors
AFR 173-11	Independent Cost Analysis Program
AFR 175-4 SAMSO Supplement 1 AFSC Supplement 1	Auditing in the Air Force
AFR 177-13	Accounting for Research and Development
AFM 177-100	General Principles, Standards, and Policies of the Air Force Accounting and Finance System
AFR 178-1	Economic Analysis and Program Evaluation for Resource Management
AFR 800-6 AFSC Supplement IMC 77-1	Program Control - Financial
*AFR 800-11 SAMSO Supplement 1 IMC 76-1	Life Cycle Costing (LCC)
AFSCM 173-1	Cost Estimating
AFSCP 173-5 (AFLCP 173-5)	Cost/Schedule Control Systems Criteria
AFSCP 173-6 (AFLCP 173-6)	C/SCSC Joint Surveillance Guide
AFSCP 800-15 (AFLCP 800-15)	Contractor Cost Data Reporting (CCDR) System
AFSCP 800-19 (AFLCP 800-19)	Joint Design-to-Cost Guide: A Conceptual Approach for Major Weapon System Acquisition
LCC-3	Life Cycle Costing Guide for System Acquisition
MIL-STD-1641	Preparation of PERT/Time Networks and Reports for Training Device Contracts

B. 1. 4. 3 Contractor Cost Planning

AFR 800-17 Work Breakdown Structure for Defense Materiel Items  
AFSCM 173-4 Program Breakdown Structure and Codes  
\*MIL-STD-881A WBS for Defense Materiel Items

B. 1. 4. 4 Data Management

DODI 4151. 9 Technical Manual Management  
\*DODI 5010. 12 Management of Technical Data  
DODI 5010. 29 Acquisition of Data from Contractors  
DODI 7935. 1 DoD Automated Data Systems Documentation Standards  
DODI 7935. 1-S Automated Data Systems (ADS) Documentation Standards  
AFR 8-2 Air Force Technical Order System  
AFR 67-28 Engineering Data Distribution and Control  
AFM 300-4 Data Automation, Data Elements, and Related Features (Volume X, Comptroller)  
AFR 310-1 Management of Contractor Data  
AFR 310-3 Acquisition and Management of Data for Follow-on Procurements  
AFSC Supplement  
SAMSO Supplement 1  
AFR 400-42 The Defense Integrated Data System (DIDS)  
AFSCR 310-1 Management of Contractor Data  
IMC 77-1  
AFSCF Supplement 1  
AFSCR 310-2 Deterred Requisitioning of Engineering Data  
(AFLCR 310-2)  
AFSCM 310-2 Technical Publications Acquisition Management  
\*SECNAVINST 3560. 1 Tactical Digital Systems Documentation Standard

**B. 1. 4. 4 Data Management (Concluded)**

TO 00-5-1	Air Force Technical Order System
TO 00-5-2 TOP Supplement 100	Technical Order Distribution System
TO 00-5-15	Time Compliance Technical Order System
MIL-M-38784A	General Requirement for Preparation of Technical Manuals
MIL-T-38804	Time Compliance Technical Orders
*MIL-STD-490	Specification Practices
MIL-STD-831	Preparation of Test Reports
MIL-STD-885B	Procurement Data Packages
*MIL-STD-83490	Specifications, Types and Forms

**B. 1. 4. 5 Integrated Logistics Support**

AFP 800-7	Integrated Logistics Support Implementation Guide for DoD Systems and Equipment
AFR 800-8 AFSC Supplement SAMSO Supplement 1	Integrated Logistics Support (ILS) Program for Systems and Engineering
AFSCP 800-21	A Guide to Program Managers: Implementing Integrated Logistics Support
AFSCR 800-24 (AFLCR 800-24)	Standard Integrated Support Management System
MIL-STD-1388/1	Logistic Support Analysis
MIL-STD-1388/2	Logistic Support Analysis Data Definition

**B. 1. 4. 6 Communications**

DODD 4630. 1	Programming of Major Telecommunication Requirements
AFR 100-8 AFSC Supplement	Programming of Major Telecommunication Requirements

**B. 1. 4. 6 Communications (Concluded)**

AFM 100-20 Management of Electrical Record Communi-  
AFSC Supplement cation  
IMC 76-1 and 77-1  
SAMSO Supplement 1

AFR 100-41 Handling of Message Traffic for Other  
Government Agencies

**B. 1. 4. 7 Development Facilities and Resources**

DODI 4140. 41 Government Owned Material Assets Utilized  
as Government Furnished Material for Major  
Acquisition Programs

**B. 1. 4. 8 Standardization**

DODD 4120. 3 Defense Standardization Program

\*DOD 4120. 3-M Standardization Policies, Procedures and  
Instructions

DODI 4120. 16 COBOL Compiler Validation

DODD 4630. 5 Compatibility and Commonality of Equipment  
for Tactical Command and Control and  
Communications

DODD 5000. 9 Standardization of Military Terminology

DODD 5000. 11 Data Elements and Data Codes Standardization  
Procedures

DODI 5000. 12 Data Elements and Data Codes Standardization  
Procedures

DODI 5000. 18 Implementation of Standard Data Elements and  
Related Features

AFM 11-1 (Volume I) U. S. Air Force Glossary of Standardized  
Terms

AFM 11-1 (Volume II) Air Force Glossary of Comptroller Terms

AFM 11-1 (Volume III) Communications Electronics Terminology

B. 1. 4. 8 Standardization (Concluded)

*AFR 73-1 AFSC Supplement 1	Defense Standardization Program
AFM 300-4 (12 Volumes) AFSC Supplement (Volume I only)	Data Elements and Codes
AFR 300-5 AFSC Supplement SAMSO Supplement 1	Standardization of Data Elements and Related Features
JCSP 7	Worldwide Military Command and Control System Standards
JCSP 10	Tactical Command and Control and Communi- cations System Standards
MIL-STD-680	Contractor Standardization Plans and Management

B. 1. 4. 9 Configuration Control

*DODD 5010. 19	Configuration Management
DODD 5010. 20	Configuration Management Implementation Guidance
AFR 57-4 AFSC Supplement	Retrofit Configuration Changes
*AFR 65-3 AFSC Supplement 1	Configuration Management
AFSCM 171-380	Configuration Status Accounting System
*AFSCP 800-7	Configuration Management
AFSCM 800-380	Configuration Status Accounting System (CSAS)
*NAVMATINST	Configuration Management of Computer Software Associated with Tactical Digital Systems and Other Technical Computer Systems
*AR 70-37 Draft	Configuration Management

**B. 1. 4. 9 Configuration Control (Concluded)**

- \*MIL-STD-130E** Identification Marking of U.S. Military Property
- \*MIL-STD-480** Configuration Control-Engineering Changes, Deviations and Waivers
- \*MIL-STD-481A** Configuration Control-Engineering Changes, Deviations and Waivers (Short Form)
- \*MIL-STD-482A** Configuration Status Accounting Data Elements and Related Features
- \*MIL-STD-483 (USAF)** Configuration Management Practices for Systems, Equipment, Munitions and Computer Programs
- MIL-STD-1456** Contractor Configuration Management Plans

**B. 1. 4. 10 Quality Control**

**B. 1. 4. 10. 1 Quality Assurance**

- \*AFR 74-1** Quality Assurance Program
- AFR 74-6** Reporting of Quality Deficiency Data
- AFR 74-15** Procurement Quality Assurance
- AFR 80-38** Management of the Air Force Survivability Program  
**AFSC Supplement**
- AFSCR 74-6** Procurement Quality Assurance for System Programs  
**SAMSO Supplement 1**
- \*SAMSOP 74-2** Contractor Software Quality Assurance Evaluation Guide
- \*MIL-Q-9858A** Quality Program Requirements
- \*MIL-S-52779 (AD)** Software Quality Assurance Program Requirements
- MIL-STD-1535A** Supplier Quality Assurance Program Requirements
- \*SAMSO-STD 73-5B** Quality Assurance Requirements for Space and Missile Systems

**B. 1. 4. 10. 2 Reliability and Maintainability**

AFR 80-5 AFSC Supplement	Reliability and Maintainability Programs for Systems, Subsystems, Equipment and Munitions
MIL-HDBK-472	Maintainability Prediction
MIL-STD-470	Maintainability Program Requirements (for Systems and Equipment)
MIL-STD-471A	Maintainability Demonstration
MIL-STD-690B	Failure Rate Sampling Plans and Procedures
MIL-STD-721B	Definition of Effectiveness Terms for Reliability, Maintainability, Human Factors and Safety
MIL-STD-756A	Reliability Prediction
MIL-STD-757	Reliability Evaluation and Demonstration Data
MIL-STD-781B	Reliability Test Exponential Distribution
MIL-STD-785A	Reliability Program for Systems and Equipment Development and Production
MIL-STD-1304A	Reliability Report

**B. 1. 4. 10. 3 Security**

DODD 5200.5	Communications Security
DODD 5200.28	Security Requirements for Automatic Data Processing (ADP Systems)
DODM 5200.28-M	ADP Security Manual
AFR 8-9	USAF Communications Security and Emanations Security Publications
AFR 66-30	Product Improvement Programs for Operational Equipment
AFR 80-7 AFSC Supplement	Communications Security Research, Develop- ment, Test and Evaluation (COMSEC RDT&E) Procedures

B. 1. 4. 10. 3 Security (Concluded)

AFR 100-27	Release or Disclosure of Unclassified Messages
AFR 100-45 Vol. I (Unclassified) Vol. II (Secret COMSEC)	Communications Security Policies, Procedures, and Instructions
AFR 205-1 AFSC Supplement SAMSO Supplement	Information Security Program
AFP 205-2	Communications Security and Transmission Security
AFR 205-25	Safeguarding the Single Integrated Operational Plan (SIOP)
AFR 205-28 AFSC Supplement 1	Communications Security for Nuclear Command and Control Communications
AFR 207-1 AFSC Supplement 1 IMC 77-1, 77-2, 77-3 to the Supplement	The Air Force Physical Security Program .
AFM 207-3	Aircraft Systems Security Standards
AFM 207-21	System Security Standard-Command and Control and Communication System
AFR 300-8 AFSC Supplement 1	Security Requirements for Automatic Data Processing Systems (APDS)
AFSCP 207-1	System Security Engineering

B. 1. 4. 11 Production Planning

AFR 800-9	Production Management in the Acquisition Life Cycle
AFSCM 84-3	Production Management
MIL-STD-1528	Production Management

**B.2 GOVERNMENT DOCUMENTS PERTAINING TO  
SOFTWARE ENGINEERING/DEVELOPMENT TASKS**

**B.2.1 SYSTEM ENGINEERING**

<b>DODI 5010.8</b>	<b>DoD Value Engineering</b>
<b>DODD 5010.15</b>	<b>Defense Integrated Management Engineering System</b>
<b>DODI 7110.2</b>	<b>Budget Guidance for Value Engineering</b>
<b>AFR 122-1 AFSC Supplement SAMSO Supplement 1</b>	<b>The Air Force Nuclear Safety Program</b>
<b>AFR 122-9</b>	<b>The Nuclear Safety Crosscheck Analysis and Certification Program for Weapon Systems Software</b>
<b>AFR 122-10</b>	<b>Nuclear Weapon Systems Safety Design and Evaluation Criteria</b>
<b>AFR 127-8 AFSC Supplement</b>	<b>Responsibilities for USAF System Safety Engineering Programs</b>
<b>AFR 127-13 AFSC Supplement</b>	<b>Responsibilities for the USAF Aerospace Safety Program</b>
<b>AFR 320-1 AFSC Supplement SAMSO Supplement 1</b>	<b>Air Force Value Engineering Program</b>
<b>*AFR 800-3</b>	<b>Engineering for Defense Systems</b>
<b>AFR 800-15 AFSC Supplement 1</b>	<b>Human Factors Engineering and Management</b>
<b>AFSCR 8-4 SAMSO Supplement 1</b>	<b>AFSC Design Handbooks</b>
<b>AFSCR 80-17 (AFLCR 80-17) SAMSO Supplement 1</b>	<b>Air Force Engineering Responsibility for Systems and Equipment</b>
<b>MIL-H-46855A</b>	<b>Human Engineering Requirements for Military Systems, Equipment and Facilities</b>

### B.2.1 SYSTEM ENGINEERING (Concluded)

MIL-STD-415D	Design Criteria for Test Provisions for Electronic Systems and Associated Equipment
*MIL-STD-499A	Engineering Management
MIL-STD-876A	Digital Computation Systems for Real Time Training Simulators
MIL-STD-882A	Requirement for System Safety Program for Systems and Associated Subsystems and Equipment
MIL-STD-1379A	Training Operations and Training Data
MIL-STD-1472B	Human Engineering Design Criteria for Military Systems Equipment and Facilities
MIL-STD-1631A	Procedure for Selection of Electronics and Electrical Parts During Equipment Design

### B.2.2 PROGRAMMING STANDARDS

*DODD 5000.31	Interim List of DoD Approved High Order Programming Languages (HOL)
AFR 300-10	Computer Programming Languages
AFR 800-12	Acquisition of Support Equipment
AFSCR 65-8	Utilization of Assets as Government Furnished Material
*MIL-STD-1588 (USAF)	JOVIAL (J3)
*MIL-STD-1589 (USAF)	JOVIAL (J73/1)
FIPS PUB 1	Code for Information Interchange (also ANSI X3.4-1968)
FIPS PUB 15	Subsets of the Standard Code for Information Interchange
FIPS PUB 20	Guidelines for Describing Information Interchange Formats

## **B. 2. 2 PROGRAMMING STANDARDS (Concluded)**

**FIPS PUB 24**                      **Flowchart Symbols and Their Usage in  
Information Processing (also ANSI X3. 5-1970)**

**FIPS PUB 29**                      **Interpretation Procedures for Federal  
Standard COBOL**

**ANSI X3. 9-1966**                  **FORTRAN**

**ANSI X3. 10-1966**                **Basic FORTRAN**

**ANSI X3. 23-1974**                **COBOL**

## **B. 2. 3 SOFTWARE DESIGN STANDARDS**

**\*SAMSO Exhibit 73-3**              **Standard Engineering Practices for Computer  
Software Design and Development**

**SAMSO-STD 77-9**                  **Software Design Standards for the MX Weapon  
System**

## **B. 2. 4 COMPUTER PROGRAM TESTING**

**\*AFSC DH 4-2**                      **Electronic Systems Test and Evaluation**

## **B. 2. 5 OPERATIONAL TESTING**

**\*DODD 5000. 3**                      **Test and Evaluation**

**\*AFR 80-14**                          **Test and Evaluation**  
**AFSC Supplement**  
**SAMSO Supplement 1**

**MIL-STD-883**                        **Test Methods and Procedures for Micro  
Electronics**

**MIL-STD-1309A**                    **Definition of Terms for Automatic Electronic  
Test and Checkout**

**MIL-STD-1519**                      **Preparation of Test Requirement Documents**

**B. 2. 6 TRANSFER AND TURNOVER**

**AFR 800-4**                      **Transfer of Program Management**  
**AFSC Supplement 1**           **Responsibilities**  
**SAMSO Supplement 1**

**AFR 800-19**                      **System/Equipment Turnover**

**B. 2. 7 OPERATION AND MAINTENANCE**

**AFSCM 171-267**                **AFSC Maintenance Performance Monitoring**  
**System**

**MIL-STD-1345A**                **Data Measurement in Support of Maintenance,**  
**Calibration and Repair of Electronic**  
**Equipment**

**MIL-STD-1390B**                **Level of Repairs**

Additional information on the topics of this guidebook may be found in the following documents:

1. MIL-STD-883C: Guidelines for Selecting, Testing, and Analyzing Stress and Strength Data, prepared by the Aerospace Corporation for Department of the Army, Washington, D.C., 1974.

2. MIL-STD-883D: Guidelines for Selecting, Testing, and Analyzing Environmental Test Data, prepared by the Aerospace Corporation for Department of the Army, Washington, D.C., 1974.

### APPENDIX C

### RELATED GUIDANCE DOCUMENTS

3. MIL-STD-883E: Guidelines for Selecting, Testing, and Analyzing Vibration Test Data, prepared by the Aerospace Corporation for Department of the Army, Washington, D.C., 1974.

4. MIL-STD-883F: Guidelines for Selecting, Testing, and Analyzing Shock Test Data, prepared by the Aerospace Corporation for Department of the Army, Washington, D.C., 1974.

5. MIL-STD-883G: Guidelines for Selecting, Testing, and Analyzing Thermal Test Data, prepared by the Aerospace Corporation for Department of the Army, Washington, D.C., 1974.

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Additional information on the topics of this guidebook may be found in the following documents:

- a. SAMSO-GB-1, "Guide for Selecting, Tailoring, and Applying Specs and Standards," prepared by the Aerospace Corporation for Department of the Air Force, Headquarters, Space and Missile System Organization (AFSC), dated 3 January 1977.
- b. ESD-TR-75-91, "Software Acquisition Management Guidebook; Regulations, Specifications, and Standards," prepared by The Mitre Corporation for Deputy for Command Management Systems, Electronic Systems Division, Air Force Systems Command, dated October 1975. (Mitre Document Number: MTR-3080. U. S. Department of Commerce National Technical Information Series Number: AD-A016 401.)
- c. ASD-TR-76-11, "Summary of Software Related Standards and Regulations," Volume III of Management Guide to Avionics Software Acquisition, prepared by Logicon for Aeronautical Systems Division, Air Force Systems Command, dated June 1976.
- d. ESD-TR-76-159, "An Air Force Guide to Software Documentation Requirements," prepared by the Mitre Corporation for Deputy for Command and Management Systems, Electronic Systems Division, Air Force Systems Command, Dated June 1976.
- e. RADC-TR-74-300, Volume VII, "Documentation Standards," part of Structured Programming Series, prepared by IBM for Rome Air Development Center, Air Force Systems Command, and U. S. Army Computer Systems Command, dated September 1975. (NTIS Number: ADA008-639/7GI.)

APPENDIX D

LIST OF DEFINITIONS

The following set of definitions of basic computer terms is particularly clear and coherent. These definitions are extracted from the May 1975 draft of the Johns Hopkins University Applied Physics Laboratory "DOD Weapon Systems Software Management Study." They were proposed by APL to the DOD Weapon System Software Management Steering Committee for adoption as "working standard definitions in the Department of Defense." Their current status in DOD is unknown.

## LIST OF DEFINITIONS

1. Computer: Electronic machinery which, by means of stored instructions and data, performs rapid, often complex calculations or compiles, correlates and selects data. Examples: Analog and digital processors, data processors, information processors, real-time control processors, electronic calculators, hybrid computers and communications processing.
2. Computer Equipment/Computer Hardware: Devices capable of accepting and storing computer data, executing a systematic sequence of operations on computer data or producing computer outputs. Such devices can perform substantial interpretation, computation, communication, control, or other logical functions. Examples: central processing units, terminals, printers, analog/digital converters, tape drives, disks, and drums.
3. Computer Supplies: Consumables designated specifically for use in normal operation of computer systems such as magnetic or paper tape, special forms, punch cards, printer paper and ribbons.
4. Computer Software: A combination of associated computer programs and computer data required to command the computer equipment to perform computational or control functions.
5. Computer Program: A series of instructions or statements in a form acceptable to computer equipment, designed to cause the computer equipment to execute an operation or operations. Computer programs include operating systems, assemblers, compilers, interpreters, data management systems, utility programs, sort-merge programs, and maintenance/diagnostic programs, as well as applications programs such as payroll, inventory control, operational flight, satellite navigation, automatic test, crew simulator, and engineering analysis programs. Computer programs may be either machine-dependent or machine-independent, and may be general-purpose in nature or be designed to satisfy the requirements of a specialized process or a particular user.
6. Computer Data: A representation of facts, concepts, or instructions in a structured form suitable for acceptance, interpretation or processing by communication between computer equipment. Such data can be external to (in computer-readable form) or resident within the computer equipment and can be in the form of analog or digital signals.

LIST OF DEFINITIONS (Continued)

7. Computer Data Sources: Devices, media, and associated actions that generate computer data for use by a computer system. Includes devices producing analog or digital signals; punched cards or magnetic tape; and associated procedures, processes, or methods used to initiate, modify, or terminate the operation of a computer system.
8. Computer Equipment Outputs: Computer data, computer control signals or computer information transmitted to any device or medium internal or external to the computer system.
9. Computer Information: The meaning assigned to computer equipment outputs by humans through the means of known conventions used in data representation.
10. Computer Control Signals: Computer equipment outputs in the form of electrical, optical or audio signals used to initiate, modify, or terminate the operation of non-computer devices external to the computer system.
11. Computer System: An interacting assembly consisting of computer equipment, computer programs, and computer data.
12. Embedded Computer System (ECS): An embedded computer system is a computer system that is integral to an electro-mechanical system such as a combat weapons system, tactical system, aircraft, ship, missile, spacecraft, certain command and control systems, civilian systems such as a rapid transit system, and the like. Embedded computer systems are considered different than automatic data processing systems (ADPS) primarily in the context of how they are developed, acquired and operated in a using system. The key attributes of an embedded computer system are:
  - a. It is a computer system that is physically incorporated into a larger system whose primary function is not data processing.
  - b. It is integral to such a larger system from a design, procurement or operations viewpoint.
  - c. Its outputs generally include information, computer control signals and computer data.

### LIST OF DEFINITIONS (Concluded)

13. **Computer Software Documentation:** Technical data, including computer listings and printouts, in human-readable form which: (1) documents the design or details of computer software, (2) explains the capabilities of the computer software, or (3) provides operating instructions for using the computer software to obtain desired results from computer equipment.
14. **Computer System Documentation:** Information that describes the technical details of the computer system over its life cycle. Documentation includes, but is not limited to, equipment design specifications, engineering drawings, operators manuals, technical orders, computer software documentation, systems specifications, run diagrams, and interface specifications.
15. **Computer System Resources:** The totality of computer equipment, computer programs, computer data, associated computer documentation, contractual services, personnel and computer supplies.

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