MILITARY STANDARD
TECHNICAL REVIEWS AND AUDITS FOR SYSTEMS, EQUIPMENTS, AND COMPUTER SOFTWARE

TO ALL HOLDERS OF MIL-STD-1521B:

1. THE FOLLOWING PAGES OF MIL-STD-1521B HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
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2. Retain this notice and insert before table of contents.

3. Holders of MIL-STD-1521B will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the Military Standard is completely revised or canceled.

Custodians:
Air Force - 13

Preparing Activity:
Air Force - 13

Review Activities:
Air Force - 10, 11, 80, 85

FIGURES

APPENDIXES

3.10 Production Readiness Review (PRR). This review is intended to determine the status of completion of the specific actions which must be satisfactorily accomplished prior to executing a production go-ahead decision. The review is accomplished in an incremental fashion during the Full-Scale Development phase, usually two initial reviews and one final review to assess the risk in exercising the production go-ahead decision. In its earlier stages the PRR concerns itself with gross level manufacturing concerns such as the need for identifying high risk/low yield manufacturing processes or materials or the requirement for manufacturing development effort to satisfy design requirements. The reviews become more refined as the design matures, dealing with such concerns as production planning, facilities allocation, incorporation of producibility-oriented changes, identification and fabrication of tools/test equipment, long lead item acquisition etc. Timing of the incremental PRRs is a function of program posture and is not specifically locked in to other reviews.

OTHER DEFINITIONS

3.11 For further guidance on cost terminology see the latest edition of DODI 5000.33, Uniform Budget/Cost Terms and Definitions.

3.12 New titles are being phased in for the levels of maintenance. They are (with their former terms): On Equipment (Organizational), Off Equipment - On Site (Intermediate), Off Equipment - Off Site (Depot). See the latest edition of AFR 66-14, Equipment Maintenance Policies, Objectives, and Reponsibilities.

3.13 For definitions of the various levels of repair, see the latest edition of MIL-STD-280A, Definition of Item Levels, Item Exchangeability, Models, and Related Terms.

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

3.15 Engineering Data: Engineering documents such as drawings, associated lists, acompanying documents, manufacturer specifications, manufacturing planning documentation, and standards or other information prepared by a design activity and relating to the design, manufacture, procurement, test, or inspection of hardware items or services, as defined in DOD-STD-100 and DOD-D-1000.

10. System Requirements Review (SSR).

10.1 General. The SRRs are normally conducted during the system Concept Exploration or Demonstration and Validation phase. Such reviews may be conducted at any time but normally will be conducted after the accomplishment of functional analysis and preliminary requirements allocation (to operational/maintenance/training Hardware Configuration Items (HWCIs), Computer Software Configuration Items (CSCIs), facility configuration items, manufacturing considerations, personnel and human factors) to determine initial direction and progress of the contractor's System Engineering Management effort and his convergence upon an optimum and complete configuration.

10.2 Purpose. The total System Engineering Management activity and its output shall be reviewed for responsiveness to the Statement of Work and system/segment requirements. Contracting agency direction to the contractor will be provided, as necessary, for continuing the technical program and system optimization.

10.3 Items to be Reviewed. Representative items to be reviewed include the results of the following, as appropriate:

a. Mission and Requirements Analysis

b. Functional Flow Analysis

c. Preliminary Requirements Allocation

d. System/Cost Effectiveness Analysis

e. Trade studies (e.g. addressing system functions in mission and support hardware/firmware/software).

f. Synthesis

g. Logistics Support Analysis

h. Specialty Discipline Studies (i.e., hardware and software reliability analysis, maintainability analysis, armament integration, electromagnetic compatibility, survivability/vulnerability (including nuclear), inspection methods/techniques analysis, energy management, environmental considerations).

i. System Interface Studies

j. Generation of Specification

k. Program Risk Analysis

l. Integrated Test Planning

m. Producibility Analysis Plans

n. Technical Performance Measurement Planning

o. Engineering Integration

p. Data Management Plans

q. Configuration Management Plans

r. System Safety

s. Human Factors Analysis

t. Value Engineering Studies

u. Life Cycle Cost Analysis

v. Preliminary Manufacturing Plans

w. Manpower Requirements/Personnel Analysis

x. Milestone Schedules

10.3.1 The contractor shall describe his progress and problems in:

10.3.1.1 Risk identification and risk ranking (the interrelationship among system effectiveness analysis, technical performance measurement, intended manufacturing methods, and costs shall be discussed, as appropriate).

10.3.1.2 Risk avoidance/reduction and control (the interrelationships with trade-off studies, test planning, hardware proofing, and technical performance measurement shall be discussed, as appropriate).

10.3.1.3 Significant trade-offs among stated system/segment specification requirements/constraints and resulting engineering design requirements/ constraints, manufacturing methods/process constraints, and logistic/cost of ownership requirements/constraints and unit production cost/design-to-cost objectives.

10.3.1.4 Identifying computer resources of the system and partitioning the system into HWCIs and CSCIs. Include any trade-off studies conducted to evaluate alternative approaches and methods for meeting operational needs and to determine the effects of constraints on the system. Also include any evaluations of logistics, technology, cost, schedule, resource limitations, intelligence estimates, etc., made to determine their impact on the system. In addition, address the following specific trade-offs related to computer resources:

f. Survivability/Vulnerability (including nuclear)

g. Reliability/Maintainability/Availability (R/M/A)

h. Electromagnetic Compatibility

i. Logistic Support Analysis to address, as appropriate, integrated logistics support including maintenance concept, support equipment concept, logistics support concept, maintenance, supply, software support facilities, etc. (MIL-STD-1388-1 and 2)

j. System Safety (emphasis shall be placed on system hazard analysis and identification of safety test requirements)

k. Security

l. Human Factors

m. Transportability (including Packaging and Handling)

n. System Mass Properties

o. Standardization

p. Electronic Warfare

q. Value Engineering

r. System Growth Capability

s. Program Risk Analysis

t. Technical Performance Measurement Planning

u. Producibility Analysis and Manufacturing

v. Life Cycle Cost/Design to Cost Goals

w. Quality Assurance Program

x. Environmental Conditions (Temperature, Vibration, Shock, Humidity, etc).

y. Training and Training Support

z. Milestone Schedules

aa. Software Development Procedures

20.3.2 Results of significant trade studies, for example:

a. Sensitivity of selected mission requirements versus

realistic performance parameters and cost estimates.

b. Operations design versus maintenance design, including support equipment impacts.

c. System centralization versus decentralization

d. Automated versus manual operation

e. Reliability/Maintainability/Availability

f. Commercially available items versus new developments

g. National Stock Number (NSN) items versus new development

h. Testability trade studies (Allocation of fault detection/isolation capabilities between elements of built-in test, on board/on-site fault detection/isolation subsystem, separate support equipment, and manual procedures)

i. Size and weight

j. Desired propagation characteristics versus reduction interference to other systems (optimum selection frequencies)

k. Performance/logistics trade studies

l. Life cycle cost reduction for different computer programming languages

m. Functional allocation between hardware, software, firmware and personnel/procedures

n. Life Cycle Cost/system performance trade studies to include sensitivity of performance parameters to cost.

o. Sensitivity of performance parameters versus cost

p. Cost versus performance

q. Design versus manufacturing consideration

r. Make versus buy

s. Software development schedule

t. On-equipment versus off-equipment maintenance tasks, including support equipment impacts

u. Common versus peculiar support equipment

20.3.3 Updated design requirements for operations/maintenance functions and items.

20.3.4 Updated requirements for manufacturing methods and processes.

i. Maintenance related trade-off studies and findings (includes commercially available equipment, software fault diagnostic techniques)

j. Logistic cost impacts

k. Support procedures and tools for computer software which facilitate software modification, improvements, corrections and updates

l. Hardness critical items/processes

m. Support equipment concept.

20.3.12 System compliance with nuclear, non-nuclear and laser hardening requirements. High risk areas or design concepts requiring possible advances of the state-of-the-art as a result of survivability criteria shall be identified, and prepared approach(es) to the problem reviewed. Prepared test programs shall be reviewed for sufficiency and compatibility with the specified threat environment and existing simulation test facilities.

20.3.13 The optimization, traceability, completeness, and risks associated with the allocation technical requirements, and the adequacy of allocated system requirements as a basis for proceeding with the development of hardware and software configuration items. Include any available preliminary Software Requirements and Interface Requirements Specifications.

20.3.14 Manufacturing (HWCIs only).

20.3.14.1 Production feasibility and risk analyses addressed at the SRR shall be updated and expanded. This effort should review the progress made in reducing production risk and evaluate the risk remaining for consideration in the Full Scale Development Phase. Estimates of cost and schedule impacts shall be updated.

20.3.14.2 Review of the Production Capability Assessment shall include:

20.3.14.2.1 A review of production capability shall be accomplished which will constitute an assessment of the facilities, materials, methods, processes, equipment and skills necessary to perform the full scale development and production efforts. Identification of requirements to upgrade or develop manufacturing capabilities shall be made. Requirements for Manufacturing Technology (MANTECH) programs will also be identified as an element of this production assessment.

20.3.14.3 Present the management controls and the design/manufacturing engineering approach to assure that the equipment is producible.

20.3.14.4 Present a review of trade-off studies for design requirements against the requirement for producibility, facilities, tooling, production test equipment, inspection, and capital equipment for intended production rates and volume.

20.3.14.5 The analysis, assessments and trade-off studies should recommend any additional special studies or development efforts as needed.

20.3.15. Engineering Data. Evaluate the contractor's drawing system, reviewing the drafting room manual, the preparation and review procedures, change control procedures, flowdown of requirements to subcontractors and vendors, and other aspects fundamental to the acceptability of Level 3 drawings. If available, review completed drawings from other programs or the normal company product line to determine compliance with the company procedures.

20.4 Post Review Action. After completing the SDR, the contractor shall publish and distribute copies of Review Minutes. The contracting agency officially acknowledges completion of the SDR as indicated in paragraph 4.2.4.

quipment shall be made available for review by the contracting agency.

z. Firmware to be provided with the system: microprogram logic diagrams nd reprogramming/instruction translation algorithm descriptions, fabrication, ackaging (integration technology (e.g., LSI, MSI), device types (e.g., CMOS, MOS)), and special equipment and support software needed for developing, esting, and supporting the firmware.

aa. Life Cycle Cost Analysis

ab. Armament compatibility

ac. Corrosion prevention/control considerations

ad. Findings/Status of Quality Assurance Program

ae. Support equipment requirements.

0.2.2 CSCIs:

a. Functional flow. The computer software functional flow embodying all f the requirements allocated from the Software Requirements Specification and nterface Requirements Specification(s) to the individual Top-Level Computer ware Components (TLCSCs) of the CSCI.

b. Storage allocation data. This information shall be presented for ach CSCI as a whole, describing the manner in which available storage is llocated to individual TLCSCs. Timing, sequencing requirements, and relevant quipment constraints used in determining the allocation are to be included.

c. Control functions description. A description of the executive ontrol and start/recovery features for the CSCI shall be available, including ethod of initiating system operation and features enabling recovery from ystem malfunction.

d. CSCI structure. The contractor shall describe the top-level tructure of the CSCI, the reasons for choosing the components described, the evelopment methodology which will be used within the constraints of the vailable computer resources, and any support programs which will be required n order to develop/maintain the CSCI structure and allocation of data storage.

e. Security. An identification of unique security requirements and a escription of the techniques to be used for implementing and maintaining ecurity within the CSCI shall be provided.

f. Reentrancy. An identification of any reentrancy requirements and a description of the techniques for implementing reentrant rountines shall be available.

g. Computer software development facilities. The availability, adequacy, and planned utilization of the computer software development facilities shall be addressed.

h. Computer software development facility versus the operational system. The contractor shall provide information relative to unique design features which may exist in a TLCSC in order to allow use within the computer software development facility, but which will not exist in the TLCSC installed in the operational system. The contractor shall provide information on the design of support programs not explicitly required for the operational system but which will be generated to assist in the development of the CSCI(s). The contractor shall also provide details of the Software Development Library controls.

i. Development tools. The contractor shall describe any special simulation, data reduction, or utility tools that are not deliverable under the terms of the contract, but which are planned for use during software development.

j. Test tools. The contractor shall describe any special test systems, test data, data reduction tools, test computer software, or calibration and diagnostic software that are not deliverable under terms of the contract, but which are planned for use during product development.

k. Description and characteristics of commercially available computer resources, including any optional capabilities such as special features, interface units, special instructions, controls, formats, etc. Include limitations of commercially available equipment such as failure to meet human engineering, safety and maintainability requirements of the specification and identify deficiencies.

l. Existing documentation (technical orders, commercial manuals, etc.) for commercially available computer resources and copies of contractor specifications used to procure computer resources shall be made available for review by the contracting agency.

m. Support resources. The contractor shall describe those resources necessary to support the software and firmware during operational deployment of the system, such as operational and support hardware and software, personnel, special skills, human factors, configuration management, test, and facilities/space.

n. Operation and support documents. The preliminary versions of the CSOM, SUM, CSDR, and CRISD shall be reviewed for technical content and compatability with the top-level design documentation.

o. Updated since the last review to all previously delivered software related CDRL items.

p. Review considerations applicable to 40.2.1 as appropriate.

40.2.3 Support Equipment (SE):

a. Review considerations applicable to paragraph 40.2.1 and 40.2.2 as appropriate.

b. Verify testability analysis results. For example, on repairable integrated circuit boards are test points avaliable so that failure can be isolated to the lowest level of repair (See Section 3 Definitions, for "Level of repair").

c. Verify that the Government furnished SE is planned to be used to the maximum extent possible.

d. Review progress of long-lead time SE items, identified through interim release and SE Requirements Document (SERD) procedures.

e. Review progress toward determining total SE requirements for installation, checkout, and test support requirements.

f. Review the reliability/maintainability/availability of support equipment items.

g. Identify logistic support requirements for support equipment items and rationale for their selection.

h. Review calibration requirements.

i. Describe technical manuals and data availability for support equipment.

j. Verify compatibility of proposed support equipment with the system maintenance concept.

k. If a Logistic Support Analysis (LSA) is not done, then review the results of SE trade-off studies for each alternative support concept. For existing SE and printed circuit boards testers, review Maintainability data resulting from the field use of these equipments. Review the cost difference between systems using single or multipurpose SE vs. proposed new SE. Examine technical feasibility in

using existing, developmental, and proposed new SE. For mobile systems, review the mobility requirements of support equipment.

l. Review the relationship of the computer resources in the system/subsystem with those in Automatic Test Equipment (ATE). Relate this to the development of Built In Test Equipment (BITE) and try to reduce the need for complex supporting SE.

m. Verify on-equipment versus off-equipment maintenance task trade study results, including support equipment impacts.

n. Review updated list of required support equipment.

40.2.4 Engineering Data. Review Level 1 engineering drawings for ease of conversion to higher levels and, if available, review Level 2 and 3 drawings for compliance with requirements. The review of engineering data, as defined in paragraph 3.15, should consider the checklist items discussed in para 100.6, as properly tailored.

40.3 Evaluation of Electrical, Mechanical, and Logical Designs

40.3.1 HWCIs. The material of paragraph 40.2.1 above shall be evaluated to:

a. Determine that the preliminary detail design provides the capability of satisfying the performance characteristics paragraph of the HWCI Development specifications.

b. Estalbish compatibility of the HWCI operating characteristics in each mode with overall system design requirements if the HWCI is involved in multi-mode functions.

c. Establish the existence and nature of physical and functional interfaces between the HWCI and other items of equipment, computer software, and facilities.

40.3.2 CSCIs. The material of paragraph 40.2.2 above shall be evaluated to:

a. Determine whether all interfaces between the CSCI and all other configuration items both internal and external to the system meet the requirements of the Software Requirements Specification and Interface Requirements Specification(s).

b. Determine whether the top-level design embodies all the requirements of the Software Requirements Specification and Interface Requirements Specification(s).

c. Determine whether the approved design methodology has been used for the top-level design.

d. Determine whether the appropriate Human Factors Engineering (HFE) principals have been incorporated in the design.

e. Determine whether timing and sizing constraints have been met throughout the top-level design.

f. Determine whether logic affecting system and nuclear safety has been incorporated in the design.

(11) Survivability/Vulnerability (including nuclear)

(12) Producibility and Manufacturing

(13) Transportability, Packaging and handling

(14) Human Engineering and Biomedical Requirements (including Life Support and Crew Station Requirements)

(15) Standardization

(16) Design versus Logistics Trade-offs

(17) Support equipment requirements

d. Interface control drawings

e. Mock-ups, breadboards, and/or prototype hardware

f. Design analysis and test data

g. System Allocation Document for HWCI inclusion at each scheduled location.

h. Initial Manufacturing Readiness (for example, manufacturing engineering, tooling demonstrations, development and proofing of new materials, processes, methods, tooling, test equipment, procedures, reduction of manufacturing risks to acceptable levels).

i. Preliminary VECPs and/or formal VECPs

j. Life cycle costs

k. Detail design information on all firmware to be provided with the system.

l. Verify corrosion prevention/control considerations to insure materials have been chosen that will be compatible with operating environment.

m. Findings/Status of Quality Assurance Program

50.2.2 CSCIs.

a. Software Detailed Design, Data Base Design, and Interface Design Document(s). In cases where the CDR is conducted in increments, complete documents to support that increment shall be available.

b. Supporting documentation describing results of analyses, testing, etc., as mutually agreed by the contracting agency and the contractor.

c. System Allocation Document for CSCI inclusion at each scheduled location.

d. Computer Resources Integrated Support Document.

e. Software Programmer's Manual

f. Firmware Support Manual

g. Progress on activities required by CSCI PDR (para 40.2.2).

h. Updated operation and support documents (CSOM, SUM, CSDM).

i. Schedules for remaining milestones.

j. Updates since the last review to all previously delivered software related CDRL items.

50.2.3 Support Equipment (SE):

a. Review requirements (paragraphs 50.2.1 and 50.2.2) for SE.

b. Verify maximum considerations GFE SE

c. Identify existing or potential SE provisioning problems

d. Determine qualitative and quantitative adequacy of provisioning drawings and data

e. Review reliability of SE

f. Review logistic support requirements for SE items

g. Review Calibration requirements

h. Review documentation for SE.

50.2.4. Engineering Data. Continuing from the results of the Preliminary Design Review (PDR), review engineering data as defined in para 3.15, as to suitability for intended use. The review should consider the checklist items discussed in para 100.6, as properly tailored.

50.3 Detailed Evaluation of Electrical, Mechanical, and Logical Designs

50.3.1 HWCIs. Detailed block diagrams, schematics, and logic diagrams shall be compared with interface control drawings to determine system compatibility. Analytical and available test data shall be reviewed to insure the hardware Development Specification has been satisfied.

50.3.1.1 The contractor shall provide information on firmware which is included in commercially available equipment or to be included in equipment developed under the contract. Firmware in this context includes the microprocessor and associated sequence of micro-instructions necessary to perform the allocated tasks. As a minimum, the information presented during CDR shall provide

70. Functional Configuration Audit.

70.1 General. The objective of the Functional Configuration Audit (FCA) shall be to verify that the configuration item's actual performance complies with its hardware Development or Software Requirements and Interface Requirements Specifications. Test data shall be reviewed to verify that the hardware or computer software performs as required by its functional/allocated configuration identification. For configuration items developed at Government expense, an FCA shall be a prerequisite to acceptance of the configuration item. For software, a technical understanding shall be reached on the validity and the degree of completeness of the Software Test Reports, and as appropriate, Computer System Operator's Manual (CSOM), Software User's Manual (SUM), and Computer System Diagnostic Manual (CSDM).

70.1.1 The FCA for a complex configuration item may be conducted on a progressive basis, when so specified by the contracting agency, throughout the configuration item's development and culminates at the completion of the qualification testing of the configuration item with a review of all discrepancies at the final FCA. The FCA shall be conducted on that configuration of the configuration item which is representative (prototype or preproduction) of the configuration to be released for production of the operational inventory quantities. When a prototype or preproduction article is not produced, the FCA shall be conducted on a first production article. For cases where configuration item qualification can only be determined through integrated system testing, FCA's for such configuration items will not be considered complete until completion of such integrated testing.

70.1.2 Recommendations of configuration item acceptance or non-acceptance to the local contract management agency are based upon and governed by procedures and requirements outlined in subsequent paragraphs.

70.1.3. Continuing with the results of the Critical Design Review (CDR), review engineering data as defined in para 3.15, as to the suitability for intended use. The review should consider the checklist items discussed in para 100.6, as properly tailored.

70.2 Contract Requirements

70.2.1 The schedules for the FCA shall be recorded on the configuration item development record by the contractor. A configuration item cannot be audited without the contracting agency authentication of the functional and allocated baseline. In addition, the contractor shall submit the final draft Product Specification for the configuration item to be audited to the contracting agency for review prior to FCA.

70.3 Contractor Responsibility

70.3.1 Prior to the FCA date (for configuration items to be audited), the contractor shall provide the following information to the contracting agency (this information shall be provided in addition to the general requirements of Section 4.):

a. Contractor representation(the test manager should be in attendance).

b. Identification of items to be audited:

(1) Nomenclature

(2) Specification identification number

(3) Configuration item number

(4) Current listing of all deviations/waivers against the configuration item, either requested of, or approved by the contracting agency.

(5) Status of Test Program to test configured items with automatic test equipment (when applicable).

70.4 Procedures and Requirements

70.4.1 The contractor's test procedures and results shall be reviewed for compliance with specification requirements.

70.4.2 The following testing information shall be available for the PCA team.

a. Test plans, specifications, descriptions, procedures, and reports for the configuration item.

b. A complete list of successfully accomplished functional tests during which pre-acceptance data was recorded.

c. A complete list of successful functional tests if detailed test data are not recorded.

d. A complete list of functional tests required by the specification but not yet performed. (To be performed as a system or subsystem test).

e. Preproduction and production test results.

70.4.3 Testing accomplished with the approved test procedures and validated data (witnessed) shall be sufficient to insure configuration item performance as set forth in the specification Section 3 and meet the quality assurance provisions/qualification requirements contained in the specification Section 4.

70.4.4 For those performance parameters which cannot completely be verified during testing, adequate analysis or simulation shall have been accomplished. The results of the analysis or simulations will be sufficient to insure configuration item performance as outlined in the specification.

70.4.5 Test reports, procedures, and data used by the FCA team shall be made a matter of record in the FCA minutes.

70.4.6 A list of the contractor's internal documentation (drawings) of the configuration item shall be reviewed to insure that the contractor has documented the physical configuration of the configuration item for which the test data are verified.

70.4.7 Drawings of HWCI parts which are to be provisioned should be selectively sampled to assure that test data essential to manufacturing are included on, or furnished with, the drawings.

70.4.8. Configuration Items (CIs) which fail to pass quality assurance test provisions are to be analyzed as to the cause of failure to pass. Appropriate corrections shall be made to both the CI and associated engineering data before a CI is subjected to requalification.

70.4.9 A checklist shall be developed which identifies documentation and hardware and computer software to be available and tasks to be accomplished at the FCA for the configuration item. See Pre-FCA checksheet.

70.4.10 Retests or additional tests shall be performed to assure compliance with paragraph 70.4.3.

70.4.11 Acknowledge accomplishment of partial completion of the FCA for those configuration items whose qualification is contingent upon completion of integrated systems testing.

70.4.12 For CSCIs the following additional requirements shall apply:

a. The contractor shall provide the FCA team with a briefing for each CSCI being audited and shall delineate the test results and findings for each CSCI. As a minimum, the discussion shall include CSCI requirements that were not met, including a proposed solution to each item, an account of the ECPs incorporated and tested as well as proposed, and a general presentation of the entire CSCI test effort delineating problem areas as well as accomplishments.

b. An audit of the formal test plans/descriptions/procedures shall be made and compared against the official test data. The results shall be checked for completeness and accuracy. Deficiencies shall be documented and made a part of the FCA minutes. Completion dates for all discrepancies shall be clearly established and documented.

c. An audit of the Software Test Reports shall be performed to validate that the reports are accurate and completely describe the CSCI tests.

d. All ECPs that have been approved shall be reviewed to ensure that they have been technically incorporated and verified.

e. All updated to previously delivered documents shall be reviewed to ensure accuracy and consistency throughout the documentation set.

f. Preliminary and Critical Design Review minutes shall be examined to ensure that all findings have been incorporated and completed.

g. The interface requirements and the testing of these requirements shall be reviewed for CSCIs.

h. Review data base characteristics, storage allocation data and timing, and sequencing characteristics for compliance with specified requirements.

70.5 Post Audit Actions

70.5.1 After completion of the FCA, the contractor shall publish and distribute copies of FCA minutes. The contracting agency officially acknowledges completion of the FCA as indicated in paragraph 4.2.4.

70.5.2 The accomplishment of the FCA shall be recorded on the configuration item Development Record by the contractor.

80. Physical Configuration Audit (PCA)

80.1 General. The Physical Configuration Audit (PCA) shall be the formal examination of the as-built version of a configuration item against its design documentation in order to establish the product baseline. After successful completion of the audit, all subsequent changes are processed by engineering change action. The PCA also determines that the acceptance testing requirements prescribed by the documentation is adequate for acceptance of production units of a configuration item by quality assurance activities. The PCA includes a detailed audit of engineering drawings, specifications, technical data and tests utilized in production of HWCIs and a detailed audit of design documentation, listings, and manuals for CSCIs. The review shall include an audit of the released engineering documentation and quality control records to make sure the as-build or as-coded configuration is reflected by this documentation. For software, the Software Product Specification and Version Description Document shall be a part of the PCA review.

80.1.1 The PCA shall be conducted on the first article of configuration items and those that are a reprocurement of a configuration item already in the inventory shall be identified and selected jointly by the contracting agency and the contractor. A PCA shall be conducted on the first configuration item to be delivered by a new contractor even though PCA was previously accomplished on the first article delivered by a different contractor.

80.1.2 Formal approval by the contracting agency of the configuration item Product specification, and the satisfactory completion of a PCA results in establishment of the product baseline.

80.1.3 Recommendations of configuration item acceptance or nonacceptance to the responsible contract administration office (CAO) are based upon and governed by procedures and requirements outlined in subsequent paragraphs.

80.1.4 A final review shall be made of all operation and support documents (i.e., Computer System Operator's Manual (CSMOM), Software User's Maual (SUM), Computer System Diagnostic Manual (CSDM), Software Programmer's Manual (SPM), Firmware Support Manual (FSM)) to check format, completeness, and conformance with applicable data item descriptions.

80.1.5. Continuing with the results of the Punctional Configuration Audit (PCA), review engineering data as defined in para 3.15, as to the suitability for intended use. The review should consider the checklist items discussed in para 100.6, as properly tailored.

80.2 Contract Requirements

80.2.1 The schedules for the PCA shall be recorded on the configuration item Development Record by the contractor. A current set of listings shall be provided for each CSCI being audited. The contractor shall submit the final draft of the

product specification for the configuration item to be audited to the contracting agency for review prior to PCA.

80.3 Contractor Responsibility

80.3.1 The contractor shall provide the following information to the contracting agency (this information shall be provided in accordance with the general instructions of Section 4 and the contractural requirements):

a. Contractor representation (the test manager should be in attendance).

b. Identification of items to be accepted by:

(1) Nomenclature

(2) Specification Identification Number

(3) Configuration item Identifiers

(4) Serial Numbers

(5) Drawing and Part Numbers

(6) Identification Numbers

(7) Code Identification Numbers

(8) Software inventory numbering system

c. A list delineating all deviations/waivers against the configuration item either requested or contracting agency approved.

80.3.2 The PCA cannot be performed unless data pertinent to the configuration item being audited is provided to the PCA team at time of the audit. The contractor shall compile and make this information available for ready reference. Required information shall include:

a. Configuration item product specification.

b. A list delineating both approved and outstanding changes against the configuration item.

c. Complete shortage list.

d. Acceptance test procedures and associated test data.

e. Engineering drawing index including revision letters.

non-complex system some reviews may not be required, or, if required, may be limited in Scope. The tailoring procedures discussed earlier should result either in the exclusion of MIL-STD-1521 or in a tailored MIL-STD-1521 that reflects a limited scope technical review effort. Conversely, in a very complex development the review process will increase in levels and numbers of reviews.

b. In addition to the above, the degree of application is dependent upon the configuration item state of development (example, new design vs. commercially available) or the degree of any modifications, if involved. For example: a newly developed item may require the majority of the review topics/items and audits, while a commercially available configuration item with the appropriate documentation, i.e., verified test results, specifications, drawings, etc. may require reviews or audits limited to its application to the program and its interfaces. In the case of modified designs one must consider the degree and effect of the modifications. Reviews and audits may be limited to the modifications and their interfaces.

100.5 Scheduling of Technical Reviews and Audits

The schedule for Technical Reviews and Audits is extremely important. If they are conducted too early, the item for review will not be adequately defined. Conversely, if the review is too late, the program commitments could have been made erroneously, and correction will be both difficult and costly. For planning purposes, a good method for scheduling technical reviews is to relate them to the documentation requirements. For example, schedule a PDR after the hardware Development Specification or Software Top Level Design Document and Software Test Plan are available, since the essence of the PDR is to assess the contractor's approach to meeting these requirements of these documents. Scheduling of audits are dependent not only on documentation availability but also on hardware/software availability, and the completion of the acceptance qualification tests. Table 1 contains a list of the primary documentation associated with each review or audit and the estimated time phasing:

100.6. Tailoring Guidance for Engineering Data Reviews. Engineering Data reviews are conducted as part of the formal design reviews/audits in MIL-STD-1521. Use Figure 5, Review Checklist for Engineering Data, to help prepare for and conduct these reviews and audits. Note discrepancies on Figure 6, Engineering Data Discrepancy Sheet. Because reviews and audits are successively more detailed, more items on the checklist will apply as the program progresses. When all reviews and audits are completed, all items on the tailored checklist should be accomplished.

TABLE I
SCHEDULING REVIEWS AND AUDITS

Review	Time Phase	Primary Documentation
SRR	Usually accomplished in the Concept Exploration phase. However, may be used in other phases when the	Various analysis and trade study reports used to develop the system/segment

110. Production Readiness Review (PRR)

110.1 For specific guidance, see AFSCR 84-2, Production Readiness Review.

REVIEW CHECKLIST FOR ENGINEERING DATA

I. The following questions and considerations should be used prior to conducting an engineering data review. These are suggested guidelines, and should be used as such.

II. Pre-briefing preparation:
- a. Answer these questions:
  1. What is the purpose of the Review?
  2. What does the Contract require?
  3. How will the drawings be used?
- b. Arrange briefings:
  1. The Contractor shall brief the team on contractual requirements and status.
  2. The Engineering Data Management Officer (EDMO) or Chairperson should brief the team on the review procedures.
  3. Discuss corrective action procedures.

III. The Data Review:
- a. Build the package:
  1. Select sample of top assembly drawings.
  2. Look at Parts List of the top assembly or major subassembly drawings.
  3. Are other subassembly drawings listed in the top parts list?
  4. Are all drawings listed in the top parts list available?
  5. Are all drawings listed in the subassembly parts list available?
  6. Is manufacturing planning documentation available?
- b. Examine the engineering data for the following:
  1. Is the drawing legible and suitable for reproduction?
  2. Are processes/specifications listed?
  3. Look at notes on all drawings. Are all notes understandable? Are notes clear and concise?
  4. Are peculiar symbols, abbreviations, etc, explained?
  5. Are all dimensions and tolerances shown?
  6. Is the material identified?
  7. Are any reports referenced? If so, are they supplied in the package?
  8. Are copies of non-government specifications supplied as part of the package?
  9. Correct use of limited rights legends (DAR/FAR)?
  10. Are control drawings (particularly Source and Specification Control) properly used and marked? (DOD-STD-100)
  11. Are hardness critical items and hardness critical process markings correct?
  12. Are electrostatic discharge sensitive (ESDS) symbology and cautions included, as appropriate?
  13. Have changes been incorporated as required in the contract?

14. Are index and data lists available and correct?

15. Is there a distribution statement on each piece of engineering data?

16. Have specific marking requirements (MIL-STD-130) been defined?

17. Are acceptance test requirements included on all subassembly/detail drawings for items that might be spared separately by competitive reprocurement?

18. Is the proper engineering design information included for the level of drawing stated in the contract?

19. Could a military standard or specification be used in lieu of drawings?

20. Are applicable security classifications marked correctly?

21. Are the contractual requirements adequate?

22. Does the drawing package appear to be adequate to support the intended end use (i.e. logistics support, competitive reprocurement, etc)?

c. Record all deficiencies/discrepancies on the Engineering Data Discrepancy Sheet (see Figure 6) in sufficient detail to completely define the problem and action required for compliance.

At the end of the review, the EDMO (or Review Team Chief) collects all discrepancy sheets, signs them, and determines appropriate disposition. After resolution of discrepancies, the sheets will be filed in the Engineering Data Files.

Sheet __ of __

FIGURE 6

_____
(PROGRAM NAME)

Engineering Data Discrepancy Sheet

(To be used with the Review Checklist)

PRIME AND SUBCONTRACTOR/VENDOR NAME:_____

TYPE OF REVIEW:_____

REVIEWER'S NAME	DRAWING/DOCUMENT NUMBER	REV	DATE

DISCREPANCIES

ACTION REQUIRED/COMPLIANCE DUE DATE_____

PROGRAM OFFICE EDMO (or Team Chief) Signature_____

AIR LOGISTICS EDMO SIGNATURE_____

ACTION AGENCY: ____Contractor ____Program Office
____Contract Administration Office ____Other

This block to be used by Action Agency

DISCREPANCIES CORRECTED BY: _____ _____
(Signature) (Date)

After resolution, return to the Program Office EDMO

Custodian:
Air Force - 13

Preparing Activity:
Air Force - 13

Review Activity:
Air Force - 10, 11, 80, 85

(Project CMAN-0-006)