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Report 9803-1
May 1994
Final



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Earth Observing System (EOS)/Advanced
Microwave Sounding Unit A (AMSU-A)
Configuration Management Plan, May 1994

(NASA-CR-189371) EARTH OBSERVING
SYSTEM (EOS)/ADVANCED MICROWAVE
SOUNDING UNIT A (AMSU-A)
CONFIGURATION MANAGEMENT PLAN Final
Report (Aerojet Electrosystems
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Contract No: NAS 5-32314
CDRL 005, Configuration Management Plan

Submitted to:

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Submitted by:

Aerojet Electronic Systems Plant
1100 West Hollyvale Street
Azusa, California 91702



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1.0 INTRODUCTION

1.1 Purpose - The purpose of this plan is to identify the baselines to be established during the development life cycle of the EOS/AMSU-A, and define the methods and procedures which Aerojet will follow in the implementation of configuration control for each established baseline.

This plan is written in response to the Goddard Space Flight Center (GSFC) EOS Configuration Management Plan, 420-02-02, dated January 1990. It is the intent of this plan to meet the basic requirements specified in DOD-STD-480B, DOD-D-1000B, MIL-STD-483A, and MIL-STD-490B.

This formal Configuration Management (CM) system is intended to assure:

- a. Definition of all documentation required for the EOS/AMSU-A product design, fabrication, test, and performance.
- b. Correct and complete descriptions of the approved EOS/AMSU-A configuration. Descriptions include specifications, drawings, parts lists, test procedures, and operating manuals.
- c. Traceability of the EOS/AMSU-A product and its parts to their descriptions.
- d. Accurate and complete identification of each material, part, subassembly, and assembly that goes into the EOS/AMSU-A.
- e. Systematic evaluation of proposed changes to the approved EOS/AMSU-A configuration, and control of implementation of these changes.
- f. Accurate and complete accounting of all changes to the EOS/AMSU-A.

1.2 Scope - This plan establishes the Configuration Management process to be used for the deliverable hardware, software, and firmware of the EOS/AMSU-A during development, design, fabrication, test, and delivery.

1.3 Identification - Aerojet has identified the EOS/AMSU-A1 with Configuration Item (CI) Number N3, and EOS/AMSU-A2 with Configuration Item Number N4.

The EOS/AMSU-A Computer Software Configuration Item (CSCI) numbers are identified as:

<u>CSCI Name</u>	<u>CSCI No.</u>
Special Test Equipment, EOS/AMSU-A1	N5
Spacecraft Workstation, EOS/AMSU-A1	N6
Instrument Control Firmware, EOS/AMSU-A1	N7
Command and Data Handling Firmware, EOS/AMSU-A1	N8
Special Test Equipment, EOS/AMSU-A	N9
Spacecraft Workstation, EOS/AMSU-A2	N10
Instrument Control Firmware, EOS/AMSU-A2	N11
Command and Data Handling Firmware, EOS/AMSU-A2	N12

2.0 ORGANIZATION

2.1 Organizational Structure - With the integrated product team approach, the activities of the disciplines pertinent to the EOS/AMSU-A program are coordinated and integrated into product development teams by EOS/AMSU-A program management. As a member of the EOS/AMSU-A team, the Configuration Management officer is directly responsible to the EOS/AMSU-A Performance Assurance Manager on program unique CM matters (Figure 1), and to the Director of Mechanical Products Engineering on CM policy matters (Figure 2).

2.2 CM Organization - The CM organization provides the technical and administrative direction and surveillance required for configuration management activities.

The plan establishes organizational responsibilities for implementing the CM system, top-level policies for configuration identification, configuration change control, configuration status accounting, and configuration verification of the deliverable hardware and software for the EOS/AMSU-A.

2.3 Subcontractor Requirements - Major subcontractors with design responsibility developed for the EOS/AMSU-A will be required to establish a CM program consistent with the

FIGURE 1 EOS PROGRAM TEAM

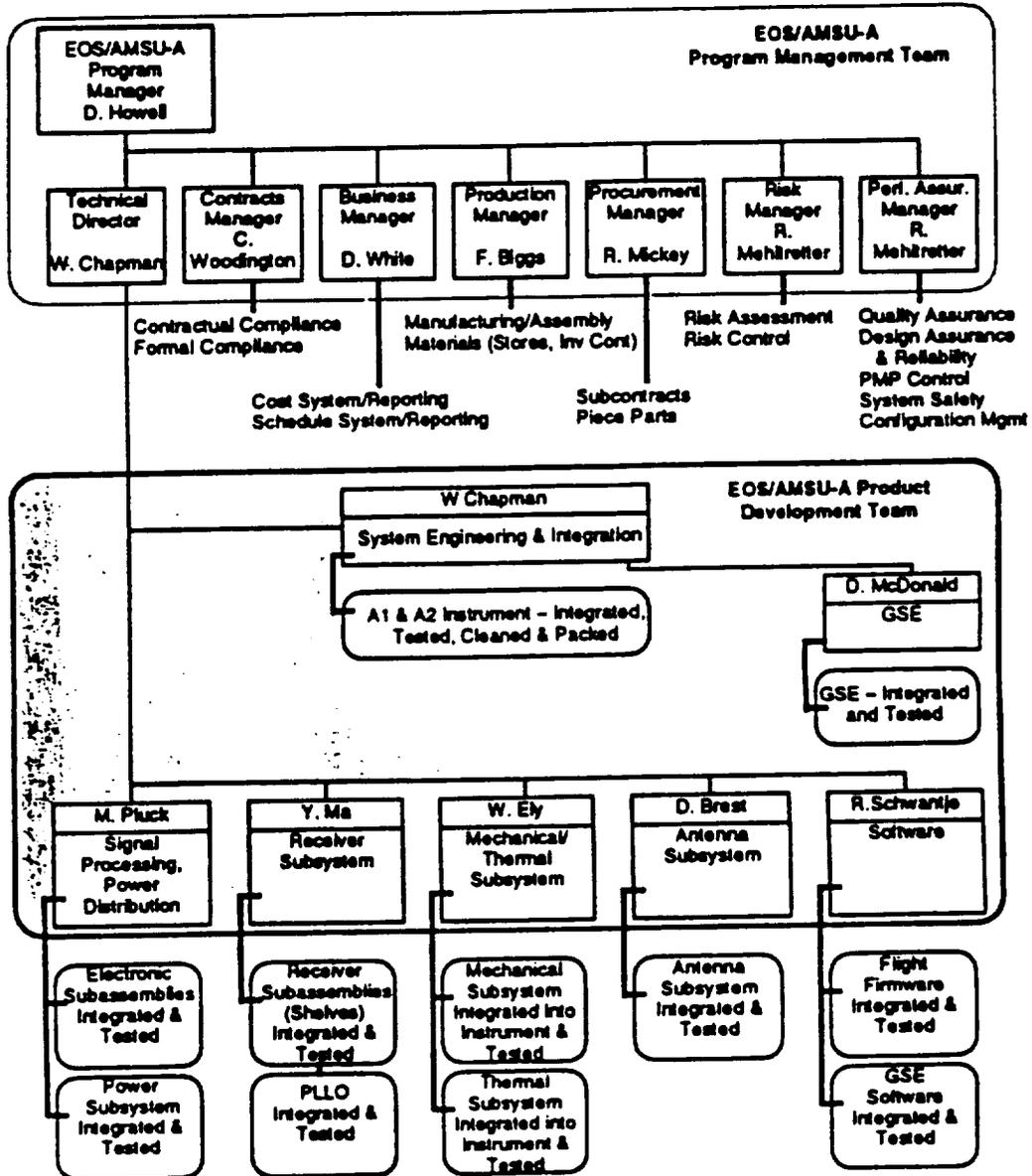
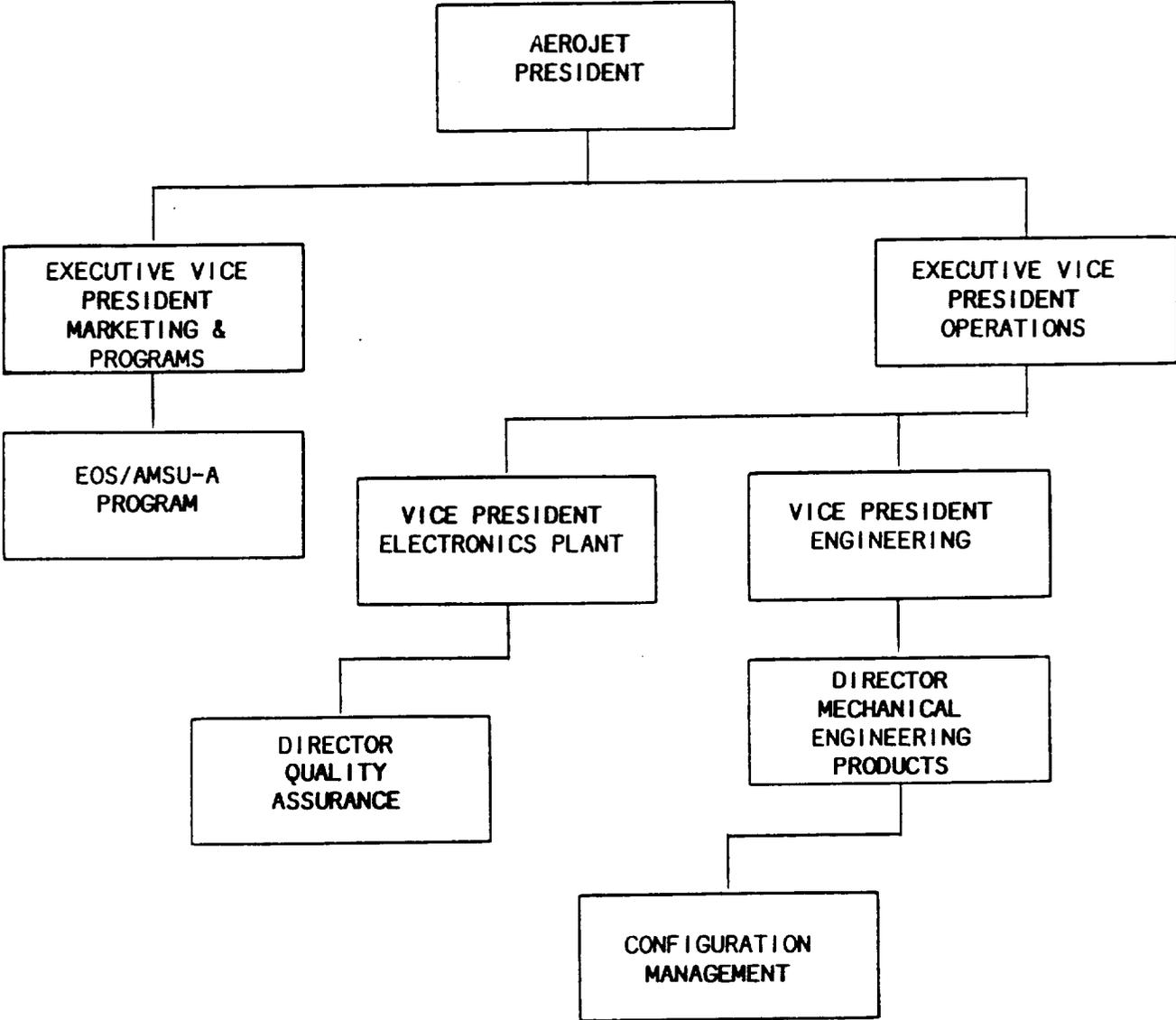


FIGURE 2 PARTIAL AEROJET ORGANIZATION CHART



intent of MIL-STD-483A. The pertinent CM requirements will be set forth in the subcontract Statement of Work (SOW) and Subcontract Data Requirements Lists (SDRLs).

2.4 Related Functions

2.4.1 Data Center - The Data Center, an element of Configuration Management, is the central release, distribution point, and repository for all engineering specifications, standards, and test procedures. It issues and controls number assignments for documents. It is also the control point for all deliverable reports, plans, and other technical data. It provides Government, industry, and program-peculiar documents and works in conjunction with the Engineering Library in providing source material.

2.4.2 Data Management - Management of EOS/AMSU-A data, principally for scheduling, planning, and delivery of data required by the Contract Data Requirements List (CDRL), is provided by the EOS/AMSU-A Configuration/Data Manager.

2.4.3 Engineering Specifications - The Engineering Specifications Organization consists of engineers and technical specialists who work with the Program Manager, software engineers, systems engineers, designers, and other technical personnel in preparing and coordinating the specifications, standards, test procedures, and other engineering documents and changes to them, used to identify the EOS/AMSU-A CIs and CSCIs. Documentation is prepared in accordance with MIL-STD-490A, DOD-STD-480B and applicable Data Item Descriptions (DIDs).

2.4.3.1 Applicable Documents

2.4.3.1.1 Government Documents - The following documents of the exact issue shown form a part of this document to the extent specified herein. If no issue date is listed, the latest revision is applicable.

DOD-STD-480B 15 Jul 1988	Configuration Control-Engineering Changes, Deviations, and Waivers
DOD-D-1000B 28 Oct 1977	Drawings, Engineering and Associated Lists
DOD-STD-100 30 Sep 1991	Engineering Drawing Practices
MIL-STD-483A 04 June 1985	Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs

MIL-STD-490A Specification Practices
04 June 1985

MIL-STD-1521B Technical Reviews and Audits for Systems,
04 Jan 1985 Equipment, and Computer Software

2.4.3.1.2 Non-Government Documents - The following documents of the exact issue shown form a part of this document to the extent specified herein. If no issue date is listed, the latest revision is applicable. In the event of conflict between the documents referenced herein and the contents of this document, the contents of this document shall be considered a superseding requirement.

NASA Documents

GMI 8040.1A Configuration Management

422-10-04 Software Acquisition Management Plan
4 Feb 1991

420-02-02 EOS Configuration Management Plan
Jan 1990

Aerojet Documents

Specifications

AE-26594 EOS/AMSU-A Software Performance Verification
Specification*, CDRL 308

AE-26607 EOS/AMSU-A Antenna Specification*, CDRL 301-1

AE-26608 EOS/AMSU-A Receiver Specification*, CDRL 301-2

AE-26609 EOS/AMSU-A Signal Processor and Power Distributor
Specification*, CDRL 301-3

AE-26611 EOS/AMSU-A Ground Support Equipment
Specification*, CDRL 301-4

*The above specifications are to be issued per Contract No. NAS 5-32314 CDRL schedule.

Reports

9862	Software Product Users Guide
10339	Software Management Plan*, CDRL 008
10428	EOS/AMSU-A Software Assurance Plan*, CDRL 309
10443	EOS/AMSU-A Software User's Guide (GSE)*, CDRL 306-10
10457	EOS/AMSU-A Software Requirements (GSE)*, CDRL 306-2A
10458	EOS/AMSU-A Software Requirements (Firmware)*, CDRL 306-2B
10459	EOS/AMSU-A Software Interface Requirements Document (Firmware)*, CDRL 306-3A
10460	EOS/AMSU-A Software Interface Requirements Document (GSE)*, CDRL 306-3B
10463	EOS/AMSU-A Software Detailed Design Document (GSE)*, CDRL 306-5
10464	EOS/AMSU-A Software Interface Design Document (GSE)*, CDRL 306-6A
10465	EOS/AMSU-A Software Interface Design Document (Firmware)*, CDRL 306-6B
10471	EOS/AMSU-A Performance Verification Procedure*, CDRL 412
UM-1	PDMS User's Guide

* The above reports are to be issued per Contract No. NAS 5-32314 CDRL schedule.

Standard Manuals

Aerojet Drafting Requirements Manual, Vol I-C

Aerojet Product Standardization Manual, Vol I-D

Other Documents

Aerojet Policy Directives

Contract Documentation Requirements List (CDRL) for EOS/AMSU-A

EOS/AMSU-A Program Directives

2.4.4 Quality Assurance - Verification that the prescribed engineering configuration is produced, as defined by the CM Master Configuration Control List (MCCL) for the hardware and the Software Configuration Control List (SCCL) for the software, is the responsibility of the Quality Assurance organization. All data in the EOS/AMSU-A configuration management database utilized to determine "as built" configuration and change incorporation verification will be checked and confirmed by responsible Quality Assurance personnel. Additionally, Quality Assurance is responsible for evaluating all phases of the software design, development, and support effort, including requirements, methodologies, and product "bonding."

3.0 CONFIGURATION MANAGEMENT ACTIVITIES

The discipline of configuration management is imposed by Aerojet Policy Directive, APD 6.03, Configuration Identification-Management and Control, which establishes policy and defines responsibilities for implementing the configuration management of Aerojet hardware and software products.

The Configuration Management Plan for the EOS/AMSU-A program is substantially the same as that used on National Oceanic Atmospheric Administration (NOAA)/AMSU-A. The major difference is the inclusion of a Software Configuration Management Plan, which is covered separately in Section 8.0.

Although existing NOAA/AMSU-A documentation will be used wherever possible, only documentation with configuration differences will be reidentified with unique EOS/AMSU-A numbers.

3.1 Configuration Identification - The EOS/AMSU-A Program configuration identification, established by specifications, drawings, and other technical documentation, will be documented in the Master Configuration Control List (MCCL) for hardware and the Software Configuration Control List (SCCL) for the software. The MCCL is initiated and maintained by the CM organization as the applicable specifications, drawings, and changes thereto, are formally released. The SCCL is also maintained by CM for applicable software specifications and version of source code for each CSCI.

Aerojet engineering specifications, standards, and procedures and changes to them will be prepared in accordance with the Aerojet Specifications and Standards Practices Manual, which is based on the format and content specified in MIL-STD-490A.

3.2 Drawings - The EOS/AMSU-A 2D and 3D CAD design, analysis, and documentation will reside electronically in a Product Data Management System (PDMS). PDMS is a data management and control system that provides an automated environment for effective management control and electronic delivery by product data.

Configuration Management will release all engineering drawings through PDMS and place them under PDMS control. Refer to the PDMS User's Guide, Report UM-1.

Aerojet Engineering drawings and associated lists will be prepared to DOD-D-1000B definition of Level 2 drawings and will meet the requirements of DOD-STD-100C.

4.0 BASELINE IDENTIFICATION FOR HARDWARE

4.1 Allocated Baseline - The allocated baseline is established at the start of the program by the Goddard Space Flight Center (GSFC) Performance and Operation Specification for the Advanced Microwave Sounding Unit A (AMSU-A/EOS), 422-12-12-01, March 1993.

4.2 Functional Baseline - The functional baseline is established upon approval by GSFC of the EOS/AMSU-A Performance Verification Plan and Specification, Report 10360 (CDRL 22).

4.3 Development Baseline - The development baseline is established upon release of the engineering drawings and specifications for fabrication and testing of the EOS/AMSU-A. These documents will be placed under formal configuration control for internal production release documentation.

4.4 Production (Product) Baseline - The product baseline is established upon successful completion of the Pre-Ship Review. This baseline establishes formal configuration control through the EOS/AMSU-A Systems Configuration Control Board.

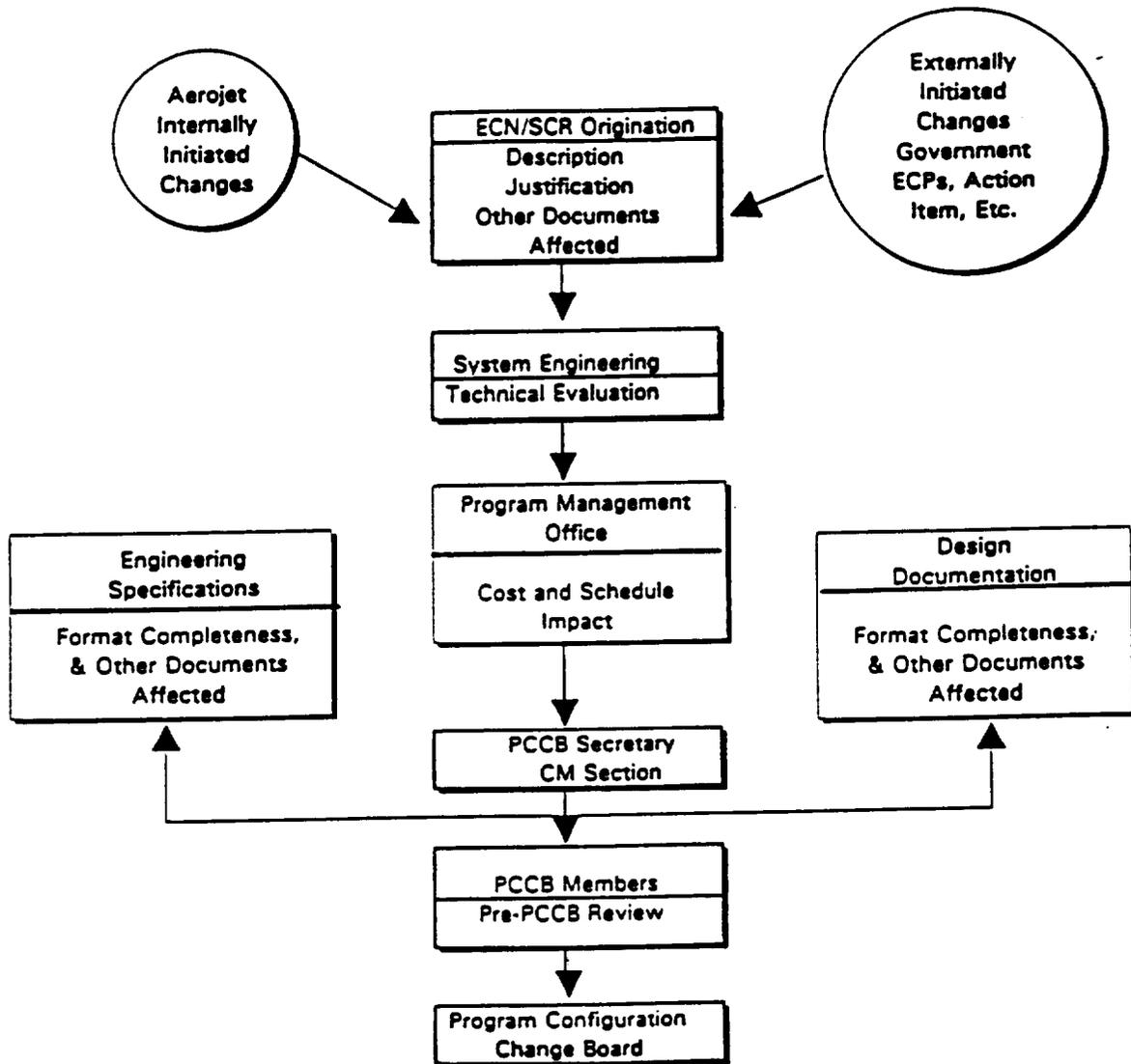
5.0 CONFIGURATION CHANGE CONTROL

5.1 Configuration Control Process - All engineering data establishing configuration identification will be formally released and will be under change control as directed in Aerojet APD 6.03. Changes are initiated by preparation of an Engineering Change Notice (ECN) form for hardware and also Software Design Document changes, and an Engineering Change Request Software (ECSR) form for software and firmware changes as depicted in Figure 3. The changes are reviewed by the Program Technical Director and the Program Management Office and are then received by CM for review, processing, and final disposition by the Program Configuration Change Board (PCCB).

5.2 Program Configuration Change Board (PCCB) - The PCCB is the vehicle for disposition of proposed changes. It is chaired by the Program Manager or his designated representative and is administered by the secretary assigned from CM. The PCCB members are responsible for advising the PCCB chairman of the effect that an individual change will have on their area of discipline for providing an analysis of the change. They represent the following integrated product teams (as appropriate):

- o Systems Engineering/Integration/Test
- o Signal Processing, Power Distribution
- o Receiver Subsystem
- o Mechanical/Thermal
- o Performance Assurance
- o Antenna Subsystem
- o Manufacturing
- o Software
- o Contracts

FIGURE 3 AEROJET CHANGE CONTROL PROCESS PRIOR TO PCCB APPROVAL



- o Procurement
- o Engineering Documentation

The PCCB membership will be established and defined in a Program Directive.

The PCCB Chairman's change control decisions are based upon a review of the total impact the change has on design, performance, schedule, documentation, test operations, cost, quality, reliability, interface, and maintainability.

5.3 EOS/AMSU-A Configuration Change Board Secretary - The EOS/AMSU-A Configuration Management Officer (CMO) will act as secretary of the PCCB and will assure implementation of the tasks of CM, including configuration identification, configuration control, configuration status accounting, configuration audits, and interface controls.

5.4 Change Disposition - Approved changes will be forwarded to the appropriate documentation department for incorporation. A disapproved change will be returned to the initiator with a rejection statement.

An individual member of the PCCB may disagree with the decision of the PCCB chairman and dissent in the form of a memo to the Program Manager. If the dissent is not resolved to the member's satisfaction, an appeal can be elevated in the Dissent Review Board (DRB). The Program Manager will establish a Dissent Review Board that consists of representatives from the teams impacted by the change. The dissenter and the originator of the ECN Request both attend the DRB Meeting. The Final decision will be made by the DRB members.

5.5 Change Classification - The PCCB chairman is responsible for classifying each change approved by the PCCB as Class I or Class II according to the following criteria:

- a. Class I per DOD-STD-480B, Paragraph 4.2.1
- b. Class II per DOD-STD-480B, Paragraph 4.2.2

In general, Class I changes will be those that affect the EOS/AMSU-A performance and operation specification, 422-05-02 or one of the Goddard Space Flight Center (GSFC) approved CI documents before baseline establishment. After the baseline is established, any change that affects product configuration of GSFC-approved documents will be classified as Class I.

5.6 Reporting Documentation

5.6.1 Engineering Change Notice (ECN) - Any individual on the EOS/AMSU-A Program may initiate an Engineering Change Notice. Requests for changes will be submitted to the PCCB on ECN or SCR form as depicted in Figure 4. They will be used to request changes to all documentation comprising the technical data package. After review by program management, a change request is forwarded to the CMO who reviews and analyzes the ECN/ECRS for completeness, correct document change letter, and correct classification of the change.

The PCCB secretary then assigns a change identification number and distributes the ECR or ECRS for review by the PCCB members.

The PCCB chairman will subsequently disposition the change request.

ECN form is depicted in Figure 5. Instructions for completing the form are contained in the Aerojet Drafting Requirements Manual, Section 13, Volume 1-C.

5.6.2 Engineering Change Proposal (ECP) - PCCB recommended Class I changes depicted in Figure 6 will be submitted in an Engineering Change Proposal (ECP) in accordance with DOD-STD-480B.

Each Class I change will be submitted to the GSFC Contracting Officer, with copies to the Contract Technical Officer and Project CMO as an ECP documented on EOS Configuration Change Request, GSFC 480-39A.

5.6.3 Specification Change Notice (SCN) - The Specification Change Notice (SCN) will be used when only a portion of a document is revised. The SCN form and instructions for preparing it are contained in MIL-STD-483A, Appendix VIII and MIL-STD-490B. For Class I changes, the proposed SCN will be included in the Class I Configuration Change Request (CCR).

5.6.4 Notice of Revision (NOR) - The Notice of Revision (NOR) will be used to document all changes to NASA and other government documents and interface control documents not controlled by Aerojet. The NOR form and instructions for preparation are contained in MIL-STD-483A, Appendix VIII and MIL-STD-490B. The NOR will be included in the Class I Configuration Change Request (CCR).

6.0 CONFIGURATION STATUS ACCOUNTING FOR HARDWARE

Configuration Status Accounting is the recording and reporting of the information that is needed to manage configuration effectively, including a listing of the

FIGURE 4 AEROJET CHANGE CONTROL PROCESS FOLLOWING PCCB APPROVAL (CLASS II) CHANGES

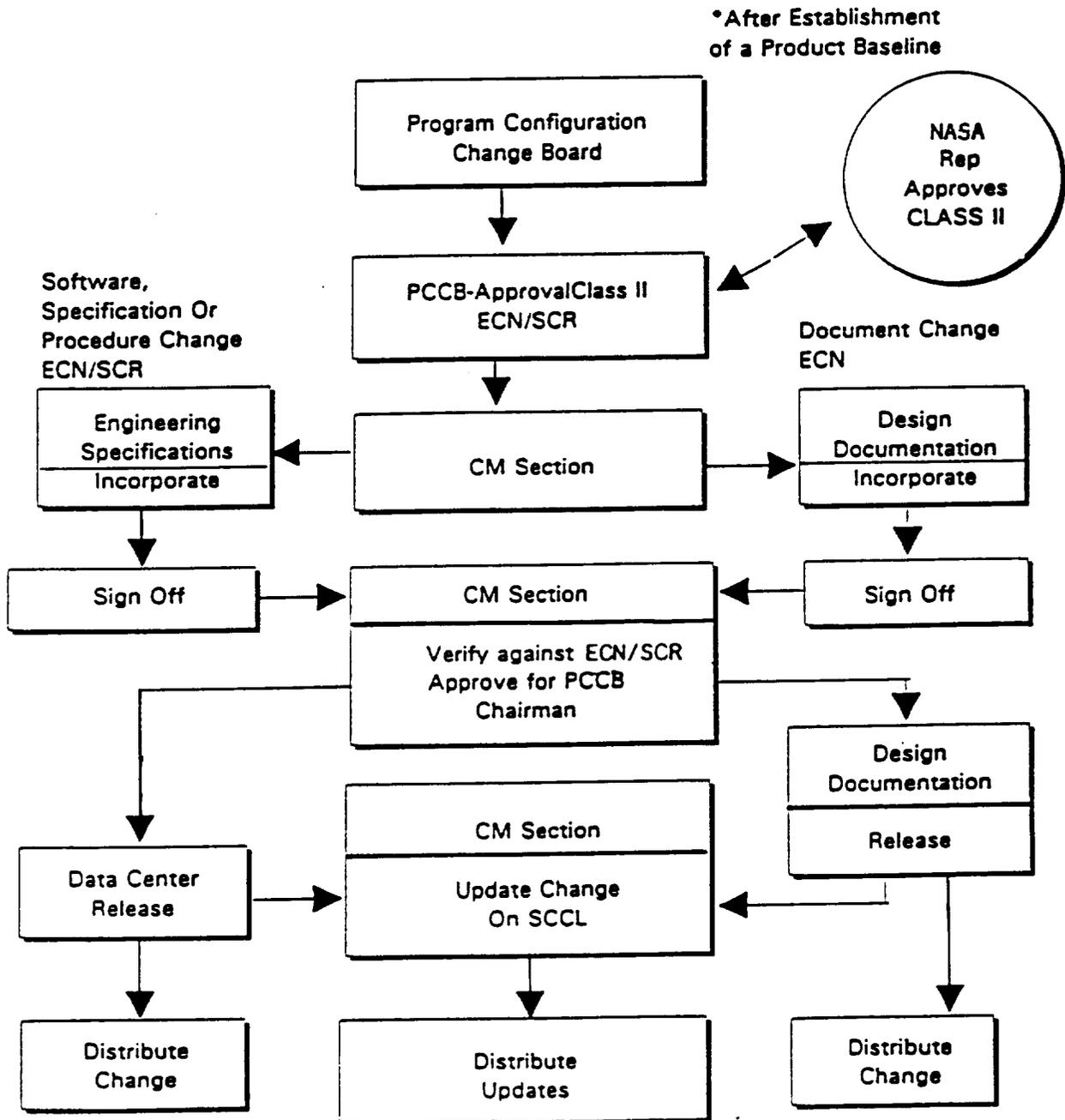


FIGURE 5 ENGINEERING CHANGE REQUEST (ECN) FORM

GENCORP ELECTRONIC SYSTEMS DIVISION
 Azusa, California
 CAGE Code 78143

ENGINEERING CHANGE NOTICE

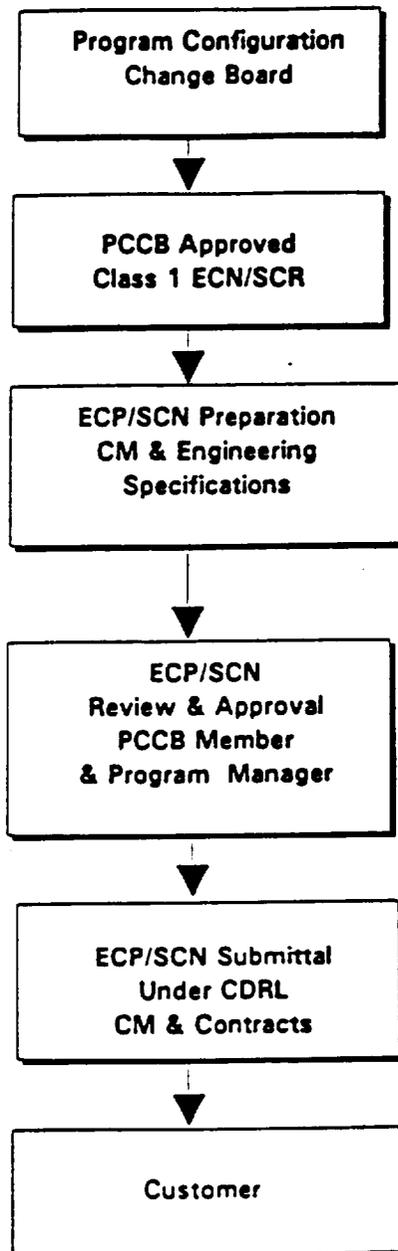
ADVANCE REL. INCORPORATE

8 NEW REV

1 PROGRAM	2 ECN NUMBER	3 CONTRACT NUMBER	4 PREPARED BY / DATE / EXT	5 DOCUMENT NUMBER	6 NEW REV
9 CHANGE CLASS. <input type="checkbox"/> I <input type="checkbox"/> II	9 MULTIPLE DOCUMENTS AFFECTED <input type="checkbox"/> YES <input type="checkbox"/> NO	9 CIG TYPE <input type="checkbox"/> DOC. CHG. <input type="checkbox"/> MOD.	14 HARDWARE PART NUMBER(S)	11 DOCUMENT TITLE	
10 EFFECTIVITY <input type="checkbox"/> END ITEM S/N <input type="checkbox"/> PART SERIAL OF NO.	11 CLEAR REV. NEW REV. MAND. LIST	12 DATE			
13. DESCRIPTION OF CHANGE					

13 SIGNATURES	CONCOR	DWSM	14 JUSTIFICATION/REASON FOR CHANGE	15 DISPOSITION OF MATERIAL ON ORDER	16 RETURN TO STOCK
TECH DIR					
ENGINEERING					
O.A.					
MFG.					
DSN ASSURANCE					
SPECS					
CHECK					

FIGURE 6 AEROJET CHANGE CONTROL PROCESS FOLLOWING PCCB APPROVAL (CLASS I CHANGES)



approved configuration identification (baseline data), the status of proposed changes to the configuration, and the implementation status of approved changes.

6.1 Controlling Lists - The following lists are part of the configuration accounting systems and provide a status of change activity against established customer baselines (e.g., allocated and product). These lists will be prepared and maintained using Aerojet established formats and procedures.

6.1.1 Master Configuration Control List - The MCCL is generated from the Engineering Bills of Material. It will depict the approved configuration of a CI and its lower-tier assemblies, subassemblies, piece parts, and components. The mandatory configuration of all Aerojet components acceptable for use in each CI will be listed by part revision. This list provides the Program Office, Manufacturing, Performance Assurance, Materiel, and Engineering with a common database of the current configuration. The list may be formatted in either of the following:
Indented Parts List (IPL) - The IPL indicates the indented position of the assemblies, subassemblies, piece parts, and processing specifications and standards that are identified as being a part of the EOS/AMSU-A from the top assembly down.

Where-Used List (WUL) - The WUL is an alphanumeric list of all assemblies, subassemblies, piece parts, and specifications and standards used on the CI. This list also contains their next higher assembly, next higher assembly revision level, effectivity, quantity, and description.

The MCCL is maintained in the Cincom MRP II database on the IBM mainframe. This database is security protected and only Configuration Management has authorization to make additions to and modify the Engineering bills of material.

Once the engineering drawing is released, the bills of material are revision controlled with the drawing.

6.1.2 Engineering Change Notice Log (ECNL) - The ECNL identifies all ECNs submitted to the PCCB for approval. This list contains the ECN number, issue date, affected document number, current revision level, change effectivity, classification of change, PCCB approval/disapproval date of incorporation, and, if Class I, the ECP number.

6.1.3 Engineering Change Proposal List (ECPL) - The ECPL identifies all ECPs submitted to the customer. This list contains the ECP number, document affected, the proposed SCN or NOR revision level, the date of submission, the customer approval/disapproval date, and any pertinent comments.

6.2 Drawing Tree - The drawing tree depicts the hierarchy from the top assembly down to the subassemblies and Aerojet designed detail parts. CM controls the assignment of drawing numbers and ensures integrity of the drawing tree.

7.0 CONFIGURATION VERIFICATION

7.1 Verification of Change Approval and Incorporation in Hardware (As-Designed/As-Built Record) - Approved engineering changes made to drawings will be verified by CM following incorporation by means of internal checking, review and approval activities. Approved changes made to CIs will be verified by Quality Assurance (QA) following incorporation.

The verification system will ensure that the released manufacturing, planning, and inspection records reflect the incorporation of the released engineering documentation and all approved changes into the hardware and software.

7.2 Configuration Verification - To ensure compliance with contract CM requirements, QA will conduct continuous configuration surveillance (internal audits). QA surveillance procedures, that are in place at Aerojet, are performed according to an appropriate schedule which is compatible with the overall program schedule EOS/AMSU-A.

QA surveillance is made of such activities as:

- o Production and inspection methods for implementing design changes, including related record maintenance.
- o Quality control system for serial number control of equipment and verification of change incorporation into the equipment.
- o Manufacturing process paper used for assuring correct drawing and ECN issue to the line.

8.0 CONFIGURATION CONTROL OF SOFTWARE AND FIRMWARE

8.1 Software Configuration Management - All releases and changes thereto for software and firmware to be included in the deliverable configuration are verified by the CMO, recorded in the SCCL, and retained in the Software Development Library.

8.2 Configuration Baseline Identification

8.2.1 Allocated Baseline for Software - The Allocated Baseline for the CSCI's is established at the start of the program by the GSFC Performance and Operation Specification for the Advanced Microwave Sounding Unit A (AMSU-A/EOS), 422-12-12-01, March 1993.

8.2.2 Functional Baseline - The Functional Baseline for the CSCI's shall be established by customer approval of the Software Requirements Specification (SRS) and the Interface Requirements Specifications (IRS). In addition, Aerojet is responsible for the preparation, submittal and approval of the Software Design Documents (SDD) and the Interface Design Documents (IDD).

8.2.3 Product Baseline Identification for CSCIs - The Product Baseline Identification will be established upon successful completion of the Software Acceptance Review.

8.2.4 Preliminary Design Review/Requirements Review - The following CSCI documents will be placed under formal configuration control upon approval by GSFC:

- o Software Management Plan
- o Sustaining Engineering and Operations Plan
- o Software Test Plan
- o Software Requirements Specification
- o Software Preliminary Design Document

8.2.5 Critical Design Review (CDR) - The following software CI documents will be placed under formal configuration control upon approval by GSFC:

- o Software Detail Design Document
- o Acceptance Test Specification

8.2.6 Coding and Unit Testing Phase - During the coding and unit testing phase, the source code, object code and associated output listings and magnetic media for each successfully tested and reviewed unit shall be entered into the Software Development Library for each CSCI.

8.2.7 Computer Software Component (CSC) Integration and Testing Phase - During the CSC integration and testing phase, all iterative updates to the design documentation, source code,

object code, and associated listings and magnetic media shall be entered into the Software Development Library.

8.3 Software Development Library (SDL) - A Software Development Library (SDL) shall be established as a repository for all EOS/AMSU-A software and documentation. The SDL provides a centralized location for storage, handling and release of project media. It is under the control of the EOS/AMSU-A Configuration Management Officer who controls all access to the contents. All EOS/AMSU-A documentation is controlled by Configuration Management and access to documents ancillary to the software development are controlled in a similar manner to the Software Development Library.

All data entering the SDL is assigned a unique identifier and is indexed by CSCI number, version, description, and media. This index is maintained on PC-based software and is routinely updated and distributed to the EOS/AMSU-A software Product Team.

Contents of the SDL can be checked out by team members. The name of the team member and the date an item is checked out or in is recorded in the SDL Index. The name of the last person checking out an item is maintained in the index in the event anything is missing.

Employees leaving Aerojet are required to check out through CM as a part of their exiting process.

8.4 CSCI and Related Documentation - The CSCIs will be identified by the location of where the Software processing will occur. Aerojet has assigned the following CSCI identifiers:

<u>CSCI Name</u>	<u>CSCI No.</u>
Special Test Equipment, EOS/AMSU-A1	N5
Spacecraft Workstation, EOS/AMSU-A1	N6
Instrument Control Firmware, EOS/AMSU-A1	N7
Command and Data Handling Firmware, EOS/AMSU-A1	N8
Special Test Equipment, EOS/AMSU-A2	N9
Spacecraft Workstation, EOS/AMSU-A2	N10
Instrument Control Firmware, EOS/AMSU-A2	N11
Command and Data Handling Firmware, EOS/AMSU-A2	N12

8.4.1 Computer Software Components (CSC) - Special Test Equipment - The Computer Software Components (CSC) of the Special Test Equipment will be identified by the prefix A1 or A2 if unchanged from the NOAA/AMSU-A project, or by the prefix E1 or E2 if modified,

followed by a 4-digit number related to the function they will perform. This number system is described in paragraph 5.3 of the Software Concept Document (Report 10432). The identifier following the number will relate further to its function and will be up to 24 additional characters in length.

8.4.2 Computer Software Components (CSC) - Spacecraft Workstation - The Computer Software developed for the Spacecraft Workstation does not consist of Computer Software Components (CSC) but is instead a data base type system in which data base tables are generated within the OASIS-CC/CSTOL environment. No CSC identifiers will be utilized.

8.4.3 Computer Software Components (CSC) - Instrument Control - The Computer Software Components (CSC) of the Instrument Control will be identified by an abbreviation or acronym of the function they perform.

8.4.4 Computer Software Components (CSC) - Command and Data Handling Firmware - The Computer Software Components (CSC) of the Command and Data Handling Firmware will be identified by an abbreviation or acronym of the function they perform.

8.4.5 Related Documentation - Numbering and revising of specifications will comply with MIL-STD-490A and will follow the Aerojet Product Standardization Manual, Volume I-D, Specifications and Standard Practices.

8.5 Configuration Control - Formal baseline configuration control software documents will be implemented upon their approval by GSFC. Internal configuration control will be implemented on the Development Configuration during its development. Immediately prior to the Test Readiness Review (TRR) formal configuration control will be implemented.

8.5.1 Flow of Configuration Control

8.5.1.1 Formal Configuration Control - Immediately prior to the start of the Test Rediness Review (TRR), the software will be placed under formal configuration control.

8.5.1.1.1 Changes to Documentation - Formal changes to the CSCI may be generated within Aerojet or by GSFC. Formal changes are initiated by a product team member with the origination of an Engineering Change Notice (ECN) for design documentation and a Software Change Request (SCR) for source code. The formal baseline configuration control processing flow, up to the Program Configuration Change Board (PCCB) is depicted in Figure 3.

8.5.2 Reporting Documentation

8.5.2.1 Software Change Request (SCR) - An SCR is used for documenting problems and proposed changes to the baselined configuration. An SCR form is depicted in Figure 7. Instructions for completing the SCR are contained in Report 9862, Software Product User's Guide.

8.5.2.2 Engineering Change Notice (ECN) - When requesting a change to a released specification or design document, an Engineering Change Notice Form will be initiated. The ECN form is depicted in Figure 5. Instructions for completing the form are contained in the Aerojet Drafting Requirements Manual, Section 13, Volume I-C.

8.5.3 Engineering Change Proposal - (ECP) - An Engineering Change Proposal (ECP) will be used to propose to the government any change that impacts the EOS/AMSU-A CSCIs cost, schedule, interface, or government controlled baselines. ECPs will be prepared in accordance with DOD-STD-480B and MIL-STD-483A and documented as EOS Configuration Change Request (CCR) GSFC 480-39A.

8.5.4 Specification Change Notice (SCN) - The Specification Change Notice (SCN) will be used when only a portion of a document is revised. The SCN form and instructions for preparing it are contained in MIL-STD-483A, Appendix VIII and MIL-STD-490B. For Class I changes, the proposed SCN will be included in the Class I Configuration Change Request (CCR).

8.5.5 Notice of Revision (NOR) - The Notice of Revision (NOR) will be used to document all changes to NASA and other government documents and interface control documents not controlled by Aerojet. The NOR form and instructions for preparation are contained in MIL-STD-483A, Appendix VIII and MIL-STD-490B. The NOR will be included in the Class I Configuration Change Request (CCR).

8.6 Review Procedure

8.6.1 Program Configuration Change Board (PCCB) - Refer to Paragraph 5.2 of this plan.

8.6.2 Storage, Handling, and Delivery of Project Media - A Software Development Library (SDL) will provide a centralized location for the storage, handling, and release of project media. Centralization provides the following advantages:

- a. Storage and circulation of software and baselined documents can be managed more efficiently.

FIGURE 7 SOFTWARE CHANGE REQUEST (SCR)

SOFTWARE CHANGE REQUEST			
CSCI :	Processor:	Num Prefix:	Number:
Version :	Priority :	Originator:	
SCR Title :			
SCR Date :			
Type_Change:		Estimate:	
Brd Status :		Assigned :	
Board Auth :		Imp Status:	
Remarks :		FCC Num :	
Cross Reference		Xref ECR :	
Xref SCR1 :		Xref ECP :	
Xref SCR2 :		Seq Num :	
Xref SCR3 :		Document No:	
Descrip :			
Response:			
Solution:			
User/Analyst:		Date:	Analyst Rec.:
Developments:		Date:	Software Rec.:
Requirements:		Date:	Reqs Rec.:
Test:		Date:	Test Rec.:
Board Author:		Date:	Board Rec.:
Class:	Board Priority:		
Remarks: _____			

- b. Identifiers can be assigned and controlled according to established procedures.
- c. Access to software and documents can be controlled.
- d. The accuracy of change status accounting and reporting can be assured.

The software source code contained within the SDL will be delivered on either magnetic tape or floppy disk.

8.6.3 Additional Control - Configuration Management activities are integrated with other EOS/AMSU-A activities to the extent necessary to keep the program office apprised of the configuration status of the EOS/AMSU-A software at any particular point in time, and of the status of SCNs, ECPs, ECNs/SCRs and other configuration documentation. Delays that would result in potential schedule slippage (such as late receipt of inputs or delays in signoff for specifications, test documentation, ECPs and SCNs) are brought to the attention of the program office.

The EOS/AMSU-A Program Manager is responsible for maintaining the relationship of the CSCI level to the Work Breakdown Structure (WBS) for control of work authorization, scheduling and cost. CM is responsible for advising the Program Manager of any problems that may result in a schedule slippage for events critical to configuration management.

8.7 Configuration Status Accounting for Software - Configuration Management accounting reports provide the current status of the EOS/AMSU-A specification, design documents, and test documents.

8.7.1 Controlling Lists - The Status Accounting reports for Software are listed below.

8.7.1.1 Software Configuration Control List (SCCL) - Configuration of the CSCI and its documentation.

8.7.1.2 Software Engineering Change Notice (ECN) Log - Log of all requested configuration changes for Software documentation.

8.7.1.3 Unincorporated Software ECN List - List of all approved unincorporated changes.

8.7.1.4 Engineering Change Proposal List (ECPL) - Status of all Software ECPs.

8.7.1.5 Software Change Request (SCR) Status - A log of all requested configuration changes to source code.

8.8 Preparation for Specification Approval - All Documentation that requires approval will be submitted as an "Approval Draft" and on white paper.

Upon receipt of a letter from GSFC approving a document without comments, Data Management will request Engineering

Specifications to produce an updated document with a new date. Data Management will then submit it to GSFC as "Final".

Upon receipt of a contract letter from the Contracting Agency approving a document with comments, Configuration Management/Data Management (CM/DM) distributes the letter and the comments for internal approval. Upon internal approval, the originator of the document incorporates the comments and presents Data Management an updated document. The document will then be submitted to the Contracting Agency as "FINAL" and will carry a new date. Prior to submittal to GSFC, CM/DM reviews the updated document for assurance of correct incorporation of the contractor's comments and updates the CM status accounting record to reflect the release of the approved and authenticated document.

If GSFC disapproves a document, each subsequent submittal of that document will be labelled "Approval Draft", with a new date. Once it is approved by GSFC "Approval Draft" will be removed from the cover, new date added and submitted to GSFC as "FINAL".

8.9 Configuration Management Major Milestones - The major internal and NASA configuration management-related milestones for the life cycle phases of the EOS/AMSU-A CSCIs are depicted in Figure 8.

FIGURE 8 CONFIGURATION MANAGEMENT MAJOR MILESTONES

MILESTONES
Design Concept Review (DCR)
Preliminary Design Review (PDR)
Critical Design Review (CDR)
Test Rediness Review (TRR)
Software Acceptance Review
Pre-Environmental Test Review
Post-Environmental Test Review
Pre-Ship Review

ACRONYMS/ABBREVIATIONS

AMSU-A	Advance Microwave Sounding Unit A
APD	Aerojet Policy Directives
CAD	Computer Aided Design
CCR	Configuration Change Request
CDR	Critical Design Review
CDRL	Contract Data Requirements Lists
CI	Configuration Item
CM	Configuration Management
CMO	Configuration Management Officer
CMS	Code Management System
CSC	Computer Software Component
CSCI	Computer Software Configuration Item
DCR	Design Concept Review
DID	Data Item Descriptions
DM	Data Management
DRB	Dissent Review Board
ECN	Engineering Change Notice
ECNL	Engineering Change Notice Log
ECP	Engineering Change Proposal
ECPL	Engineering Change Proposal Log
ECRS	Engineering Change Request Software
EOS/AMSU-A	Earth /Advance Microwave Sounding Unit A
GSFC	Goddard Space Flight Center
GSE	Ground Support Equipment
IDD	Interface Design Documents
IPL	Indentured Parts List
IRS	Interface Requirements Specification
MCCL	Master Configuration Control List
MRP	Manufacturing Resource Planning
NOAA	National Oceanic Atmospheric Administration
NOR	Notice of Revision
PCCB	Program Configuration Change Board
PDMS	Product Data Management Systems
PDR	Preliminary Design Review
RDBMS	Relational Data Base Management System
SCCL	Software Configuration Control List
SCN	Software Change Notice
SCR	Software Change Request

ACRONYMS/ABBREVIATIONS

SDD	Software Design Documents
SDF	Software Development Files
SDL	Software Development Library
SDRL	Subcontract Data Requirements List
SOW	Statement of Work
SPS	Software Product Specification
SRLDB	Software Resource Library Data Base
SRS	Software Requirements Specification
TRR	Test Rediness Review
QA	Quality Assurance
WBS	Work Breakdown Structure
WUL	Where-Used List

REPORT DOCUMENTATION PAGE

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