Earth Observing System (EOS)

Advanced Microwave Sounding Unit-A (AMSU-A)

SOFTWARE TEST PLAN


Contract No: NAS 5-32314

CDRL: 033


Submitted to:


National Aeronautics and Space Administration

Goddard Space Flight Center

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## Section 1

## INTRODUCTION

### 1.1 Identification

This is the *Software Test Plan* (STP) for the software to be used in the Earth Observing System (EOS) Advanced Microwave Sounding Unit-A (AMSU-A) system. This document is submitted in response to Contract NAS 5-32314 as CDRL 033 and in accordance with Data Item Description (DID) DI-MCCR-80014A and NASA-DID-999. This document applies to the following Computer Software Configuration Items (CSCI):

| | | |
|---|---|---|
| a. | Special Test Equipment, EOS/AMSU-A1 | CSCI No. N5 |
| b. | Spacecraft Workstation, EOS/AMSU-A1 | CSCI No. N6 |
| c. | Special Test Equipment, EOS/AMSU-A2 | CSCI No. N9 |
| d. | Spacecraft Workstation, EOS/AMSU-A2 | CSCI No. N10 |

### 1.2 Scope

This document defines the formal qualification tests required for the ground support software used in the test and integration of the AMSU-A instruments. The ground support software consists of the Computer Software Configuration Item (CSCI) installed in the ground support equipment (GSE) used to calibrate the AMSU-A at Aerojet, and the CSCI installed in the GSE delivered to the spacecraft integration facility for use in final instrument checkout.

### 1.3 Purpose and Objectives

The purpose of the Software Test Plan is to describe the test environment, test objectives, schedule and data recording, and analysis for the EOS/AMSU-A software formal qualification tests.

### 1.4 Document Status and Schedule

This is the third submittal of the EOS/AMSU-A Software Test Plan, updated for the Critical Design Review (CDR).

### 1.5 Document Organization

This document contains the following information as required by Contract Data Requirements List (CDRL) 033 and Data Item Description (DID) DI-MCCR-80014A except for paragraphs 1 and 2 which are prepared in accordance with NASA-DID-999, per agreement with the NASA project office.

Section 1 – This section identifies the EOS/AMSU-A software and contains a brief overview of the CSCI and this document.

Section 2 – This section contains a list of applicable documents.

Section 3 – This section provides a description of the software test environment. This includes hardware, software, and firmware necessary to perform formal qualification testing.

Section 4 – This section identifies each formal qualifications test with a description of the formal qualification test requirements for the CSCI. It also includes the test schedule.

Section 5 – This section describes the data reduction and analysis procedure to be used during and following the tests identified in this STP. This includes the methods for retention of the information resulting from data reduction and analysis.

Section 6 – This section provides an alphabetical listing of acronyms and abbreviations used in this STP.

Appendix A – Appendix A provides tables for cross-referencing SRS requirements with test plan paragraphs.

The EOS/AMSU-A Software Documentation Tree is as shown in Figure 1.

| Document | Doc. No. | CDRL No. |
|---|---|---|
| **Software Management Plan** | | 008 |
| Acquisition Activities Plan | | 508 |
| Software Standards and Procedures | | 402 |
| Assurance Plan | AE-26581 | 309 |
| Configuration Management Plan | | 005 |
| **Software Product Specification** | | **306** |
| Software Concept Document | 10832 | |
| Software Requirements Specification | 10457 | |
| Software Architectural Design | 10464 | |
| Software Detailed Design Document | | |
| Firmware Support Manual | | |
| Version Description Document | | |
| User's Guide | | |
| **Firmware Product Specifications** | | **306** |
| Firmware Concept Document | 10436 | |
| Firmware Requirements | 10458 | |
| Firmware Detailed Design Document | 10387 | |
| Firmware Version Description | | |
| **Firmware Test Plan** ◄── | 10369/10352 | 033 |
| Software Test Procedures | AE-26602 | 508 |
| Software Test Reports | | 402 |
| Firmware Test Procedures | AE-26600 | 309 |
| Firmware Test Reports | | 005 |

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**Figure 1   EOS/AMSU-A Software Documentation Tree**

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## Section 2

## RELATED DOCUMENTATION

**2.1**      **Parent Documents**

None.

**2.2**      **Applicable Documents**

The following documents are referenced or applicable to this report. Unless otherwise specified, the latest issue is in effect.

### Military

| | |
|---|---|
| MIL-STD-1553 | Digital Time Division Command/Response Multiplex Data |

### National Aeronautics and Space Administration

| | |
|---|---|
| DI-MCCR-80014A | Software Test Plan Data Item Description |
| GSFC 422-12-12-0 | Performance and Operation Specification for the AMSU-A EOS PM Project |
| GSFC 422-10-04 | Earth Observing System (EOS) Instrument Project Software Acquisition Management Plan |
| NASA-DID-999 | Template |

### Aerojet

| | |
|---|---|
| AE-26581 | Software Assurance Plan NASA EOS/AMSU-A CDRL (309) to be issued 31 March 1994 |
| AE-26583 | SRS for the Special Test Equipment, and Spacecraft Workstation for EOS/AMSU-A1 and A2 to be issued 28 July 1994 |

(Copies of Aerojet documents may be obtained from Aerojet, P.O. Box 296, Azusa, CA 91702, ATTN: Data Center)

**2.3**      **Information Documents**
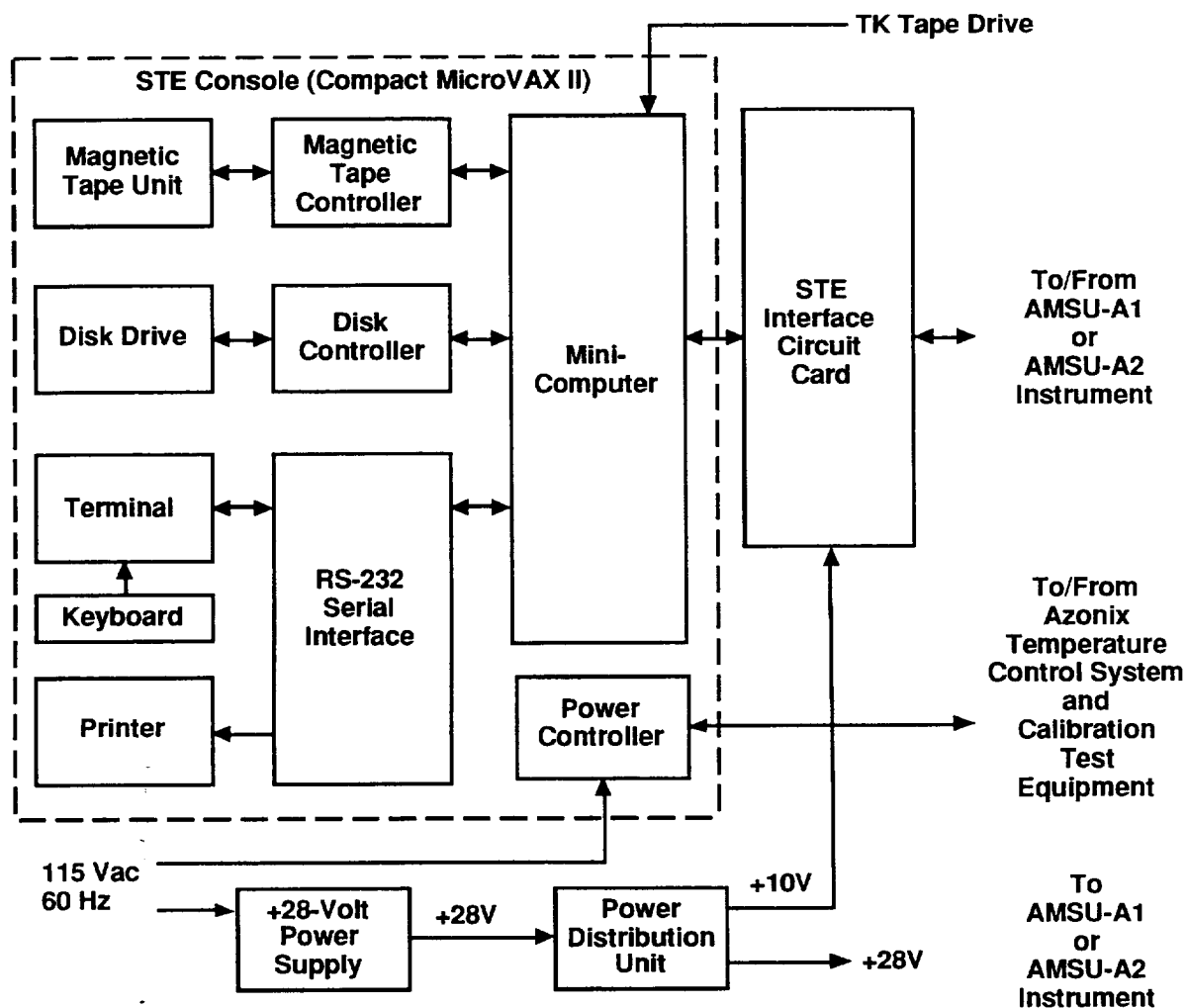
None.

## Section 3

## SOFTWARE TEST ENVIRONMENT

The following subsections identify and describe the plans for implementing and controlling the resources (software, firmware, and hardware) necessary to perform formal qualification testing of the EOS/AMSU-A software. The software test environment is illustrated in Figure 2.



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**Figure 2 Software Test Environment**

## 3.1 Software Items

The software items to be used to perform formal testing of the EOS/AMSU-A software are as follows. No software other than the software identified below and software developed as test drivers will be used to test the EOS/AMSU-A software.

### 3.1.1 Subsystem 1 Software Items

The software items to be used in the software test environment during formal qualification testing are:

**Item Description**

Operating system
Compiler
OASIS/CSTOL
TAE Plus
Test data drivers
Test data generators

## 3.2 Hardware and Firmware Items

The hardware and firmware items to be used to perform formal testing of the EOS/AMSU-A software are identified below.

### 3.2.1 Subsystem 1 Hardware and Firmware Items

The hardware and firmware items to be used in the software development system during formal qualification testing are:

| Item Description | Purpose |
| --- | --- |
| Special Test Equipment Micro Vax Computer | Provides hardware test environment for the CSCI under test |
| AMSU-A Signal Processor breadboard and test set | Provides data input and response to commands |
| SUN SPARC Workstation | Provides hardware test environment for spacecraft contractor CSCI under test |

## 3.3 Proprietary Nature and Government Rights

The data rights for all deliverable software and documentation developed by Aerojet for the EOS/AMSU-A project is provided to NASA without restriction. Commercial-off-the-shelf (COTS) software delivered as part of the EOS/AMSU-A CSCI, however, is provided with vendor restrictions maintained.

## 3.4 Installation, Testing, and Control

The installation and test of the commercial-off-the-shelf software used during the testing of the CSCI will be in accordance with standard procedures for each product. Standard commercial practices will be followed for control of the test environment during formal qualification testing. Configuration management practices defined in the EOS/AMSU-A Configuration Management Plan will be followed by all CSCI, and verified by directory listings with date and time stamp.

## Section 4

## FORMAL QUALIFICATION TEST IDENTIFICATION

**4.1      Special Test Equipment, EOS/AMSU-A1 CSCI-N5 and EOS/AMSU-A2 CSCI-N9**

The overall software test process will be conducted by Software Engineering and Quality Assurance as shown in Figure 3.

**4.1.1      General Test Requirements**

Formal Qualification Test (FQT) will serve as the mechanism by which the EOS/AMSU-A1 CSCI-N5 and EOS/AMSU-A2 CSCI-N9 are formally verified to meet the functional, performance, and interface requirements specified in AE-26583. These CSCI are classified as Mission Support Heritage software used in the development or operation of EOS, but whose failure would not cause permanent reduction in capability. This software is defined as Category 2 software within the Aerojet Software Standard and Procedures guidelines. This software has been developed for other projects and will be used in significant portion to reduce the life-cycle cost of development and to improve reliability. An independent team is required for Verification and Validation. CSCI-N5 (EOS/AMSU-A1) and CSCI-N9 (EOS/AMSU-A2) are identical in function, operating, and capabilities. They differ only in the number of sensor channels and housekeeping data elements. Therefore the tests for these CSCI will be identical. The following general requirements apply to all formal qualification tests.

a.      Each test must verify correct implementation of the identified set of requirements using nominal conditions

b.      Each test must verify compliance with the resource utilization requirements specified in 3.6 of AE-26583.

**4.1.1.1      Qualification Test Performance**

The performance of the formal qualification tests will include the following:

a.      Performance with rigid controls on the software configuration

b.      Formal documentation with controlled test plans and procedures

c.      Customer review and approval of the test plan

d.      Aerojet Quality Assurance review and audit of all aspects of formal testing

e.      A test verification matrix to provide traceability from the software specification requirements to the test plans and procedures.

These tests will provide adequate data for assessment of the EOS/AMSU-A1 CSCI-N5 and EOS/AMSU-A2 CSCI-N9 capability to meet the specified requirements.

At the end of each formal qualification test (FQT), the formal test data, discrepancy reports, and corrective actions will be reviewed. Formal qualification testing of the EOS/AMSU-A1 CSCI-N5 and EOS/AMSU-A2 CSCI-N9 is complete after it is demonstrated that the software meets all requirements as specified in the SRS as verified during the test data review held after each FQT is conducted.

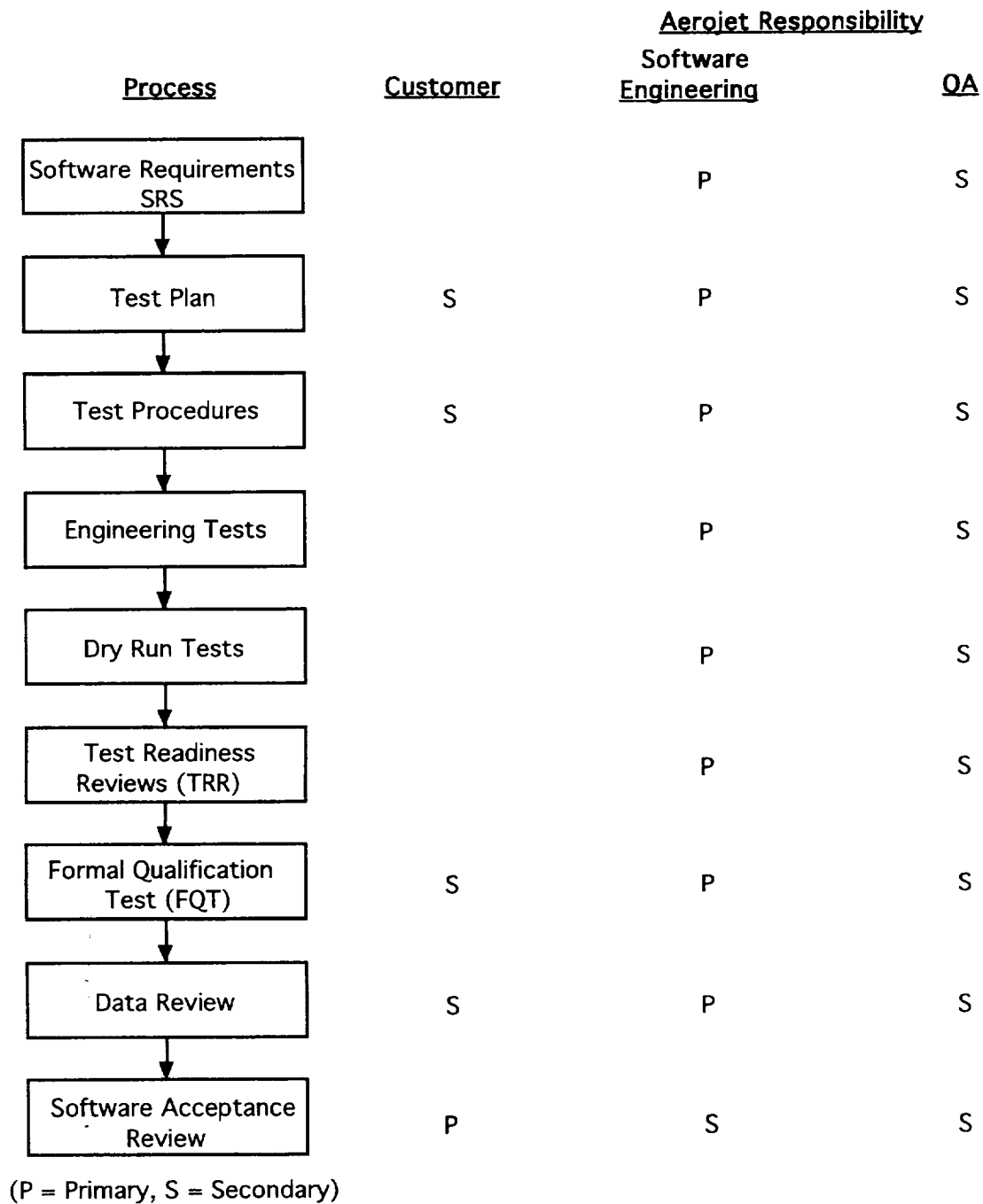| Process | Customer | Aerojet Responsibility Software Engineering | QA |
|---|---|---|---|
| Software Requirements SRS | | P | S |
| Test Plan | S | P | S |
| Test Procedures | S | P | S |
| Engineering Tests | | P | S |
| Dry Run Tests | | P | S |
| Test Readiness Reviews (TRR) | | P | S |
| Formal Qualification Test (FQT) | S | P | S |
| Data Review | S | P | S |
| Software Acceptance Review | P | S | S |

(P = Primary, S = Secondary)

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**Figure 3  Software Test Process and Responsibility**

Appendix A of this test plan contains the CSCI qualification matrix that relates each SRS requirement paragraph number to a particular test method. This ensures that each requirement is tested, that every test satisfies one or more requirements, and that definitive acceptance criteria are established. Appendix A also provides a cross reference matrix that provides a list of qualification tests and the SRS requirements satisfied by each test.

Detailed Software Test Procedure documents that identify and describe the test cases for the formal qualification tests described in this test plan will be prepared. The test procedures will include set-up procedures, procedures for conducting each test, procedures for analyzing the test results, and what test drivers and supporting software are required. QA personnel perform an auditing, evaluating, and monitoring role during testing and, when the test is completed, keep certified test history documents (i.e., as-run test procedures, test deficiencies, and test results). The test procedures will be reviewed during engineering dry runs to check the validity of the test, to verify the applicability of the procedures, and to identify potential software problems. A quality assurance dry run will be conducted after the engineering dry runs are completed and procedures have been updated, to verify readiness to conduct a formal qualification test. Results from the qualification test dry runs will be presented and discussed at the Test Readiness Review (TRR) to be held approximately 30 days prior to formal test.

The testing will be conducted by a test team consisting of one or more members dedicated to the test function, personnel from design and development groups, systems engineering, and a QA representative.

Problems encountered during testing (either quality assurance dry runs or subsequent formal testing) will be documented in a Software Discrepancy Report (SDR). Each SDR will be reviewed by Aerojet Systems Engineering and provided to the cognizant software engineer to determine discrepancy cause and appropriate corrective action required. All resulting software changes or corrections in documentation, will be made by design and development personnel. Each SDR will have a matching Software Change Request attached when applicable. Software Change Requests for Class I changes will be submitted to the NASA EOS PM Project for approval, whereas Class II changes will be submitted for concurrence with change classification.

Design and development personnel will make all software modifications and will retest the modified software to the extent necessary to ensure that it operates correctly and has not affected other software elements. The modified software will then be returned for continued qualification testing, and non-regression testing as required. All changes in the software specifications or test procedures are subject to configuration control. Source media and documentation will be under QA bond and control from the start of formal qualification testing.

The software requirements will be qualified by a combination of capability tests, and performance tests.

### 4.1.1.1.1    Capability Tests

Capability tests will be performed to provide verification of requirements at the capability level of the completely integrated CSCI. These tests are oriented toward verifying proper performance of each capability and as such may not exercise the complete CSCI in an end-to-end fashion, but concentrate on the specific capability in question. This includes verification of all external and internal interfaces for each of the capabilities as applicable. The software will be tested in all modes, if these modes differ for the capability under verification.

#### 4.1.1.1.2    Performance Tests

Performance tests will be performed to test the completely integrated CSCI in an end-to-end fashion utilizing realistic input data gathered from previous tests. These tests consist of warm-load calibration, absolute accuracy, linearity, and NE$\Delta$T, and will be performed by analysis.

#### 4.1.1.2    Test Objectives

The general objectives of the test activity is to:

a. Verify all software requirements

b. Identify software problems

c. Provide the environment in which to test software corrections and dry run formal tests

d. Verify correct implementation of algorithms

e. Provide evaluation of software performance

f. Perform formal tests and demonstrations

g. Collect test data for analysis and evaluation to determine if specific test requirements are satisfied.

#### 4.1.1.3    Test Methods

The test methods will consist of one or a combination of the following:

a. Inspection is an element of verification consisting of investigation, without the use of special laboratory appliances or procedures, to determine conformance to those specified requirements that can be determined by such investigations. Inspection is generally non-destructive and includes, but is not limited to visual, auditory, simple physical manipulation, gauging, and measurement.

b. Demonstration is an element of verification denoting the determination of properties or elements of the CSCI (or program element thereof) by technical means, including functional operations or measurements, and application of established principles and procedures.

c. Analysis is an element of verification in the form of a study resulting in data, that is intended to verify a requirement, when inspection or demonstration cannot feasibly be employed to verify that requirement, at the verification level demanded by the specification. Such data may be formed by compilation of interpretation of existing data or design solutions, or be derived from original lower level inspections, or both. Data may be interpolated or extrapolated as applicable. This method would include data derived from failure modes and effects analysis.

### 4.1.1.4 Qualification Test Implementation

Aerojet test personnel will be responsible for administration of all Aerojet tests. The test director will be responsible for conducting the formal test which consists of a pre-test briefing, the test run, a post-test briefing, and a data review. The test director will have the authority to make changes in test procedures and the scheduling of required test equipment and personnel.

Pre-test briefings provide information on tests to be executed, data to be used, procedures involved, duties of active testing participants, and test results expected. Post-test briefings will provide the test results obtained and report on discrepancy reports that may have been gathered during the test.

If a failure or anomalous condition occurs during testing, an SDR will be initiated. The SDR identifies the test run and the discrepant condition. All SDR are kept, logged, and tracked by the Aerojet Quality Assurance department. A copy of all SDR generated during the test will be included in the final test report.

The test team will determine the effect of the anomaly or failure on the credibility of the tests and, if necessary, rerun the affected portion(s). If the cause of the failure cannot be determined, additional testing of the failing portion of the tests will be deferred pending resolution of the problem. Complete records of all deficiencies, corrective actions, and retests will be maintained and be available for inspection.

Upon completion of testing, the test results will be labeled and dated to identify the test and date of the test runs. All of the test results including tapes, printouts, listings, disks, and a copy of all SDR will be maintained by the Aerojet test personnel, under Aerojet Quality Assurance and Configuration Management Control.

### 4.1.1.5 Personnel Requirements

The personnel required for the test effort and function of each are as follows:

a.      Test director – schedule time for testing purposes; conduct test runs as specified in the test procedures during testing periods; maintain documentation related to the testing; and maintain testing status information. Additional functions include providing the test report summary after testing is complete, and supplying and maintaining any other test-related documentation.

b.      Software Quality Assurance – ensure that the tested software is bonded and managed under the procedures established by the Aerojet Software Quality Assurance and Configuration Management departments; monitor test documentation efforts; maintain log of formal tests; participate in qualification testing; and verify initiation, processing, and closure of SDR as required by the Software Assurance Plan and Procedures.

c.      Software Engineering – provide technical assistance as needed in the functions undergoing test during all qualification test periods.

d.      Systems Engineering – provide assistance as needed during data reduction and analysis.

e.      Customer or designated representative – monitor the development of the qualification testing effort, witness the formal qualification tests and verify documentation of any deviation from the test objectives by generation of SDR.

**4.1.2**   **Test Classes**

The formal test classes are divided into the following:

a.   Capability tests – Test specific capability functions and interfaces

b.   Performance tests – Warm load calibration, absolute accuracy, linearity, and NEΔT.

**4.1.3**   **Test Levels**

The following levels of FQT test have been defined for the EOS/AMSU-A1 CSCI-N5 and EOS/AMSU-A2 CSCI-N9.

a.   CSC level – To evaluate compliance with Computer Software Components requirements specified in the SRS at the CSC level

b.   CSCI level – To evaluate compliance with requirements specified in the SRS at the CSCI level

c.   CSCI to CSCI integration level – external interfaces

d.   CSCI to Hardware Configuration Item integration level – external interfaces

e.   System level – System level tests are defined as tests utilizing data which evaluate the system performance in terms of system level requirements as specified in Appendix A of the SRS.

**4.1.4**   **Test Definitions**

The following subparagraphs identify and describe each formal qualification test to be conducted on the EOS/AMSU-A1 CSCI-N5 and EOS/AMSU-A2 CSCI-N9.

**4.1.4.1**   **Data Acquisition/Monitor/Commands Test – N5_FQT100 and N9_FQT100**

| | | |
|---|---|---|
| a. | Test Objective: | Verify that the software can acquire the sensor data across the MIL-STD-1553 interface and that the data can be presented on an interactive display, can be output to a hard-copy printer, and can be recorded on magnetic media. Verify that commands can be sent to the sensor across the MIL-STD-1553 interface. |
| b. | Special Requirements: | None |
| c. | Test Level: | CSCI |
| d. | Test Class: | Capability |
| e. | Qualification Method: | Demonstration |
| f. | SRS References: | Appendix A |
| g. | Type of Data to be Recorded: | Input data files and logged output data files |
| h. | Assumptions and Constraints: | None |

**4.1.4.2    Calibration Functions Test – N5_FQT200 and N9_FQT200**

a.  Test Objective:                    Verify the capability to process sensor data to produce correct warm load calibration coefficients, absolute accuracy values, linearity results, and NEΔT results

b.  Special Requirements:              None

c.  Test Level:                        CSCI

d.  Test Class:                        Performance

e.  Qualification Method:              Analysis

f.  SRS References:                    Appendix A

g.  Type of Data to be Recorded:       Input data files and logged output data files

h.  Assumptions and Constraints:       None

**4.1.5    Test Schedule**

All of the tests identified in 4.1.4 will be conducted during formal qualification testing as illustrated in the schedule illustrated in Figure 4.

**EOS/AMSU-A Software/Firmware Test Schedule**

| Task Description | 1994 | 1995 | 1996 | 1997 |
|---|---|---|---|---|
| | A M J J A S O N D | J F M A M J J A S O N D | J F M A M J J A S O N D | J F M A M J J |
| Major Milestones | Δ DCR      Δ PDR | Δ CDR | | |
| Dry Run STE Software | | | ▬ | |
| Dry Run AF Software | | | ▬ | |
| Dry Run OASIS/CSTOL Software | | | ▬ | |
| TRR | | | Δ    Δ | |
| FQT STE Software | | | ▭ | |
| FQT Firmware | | | ▭ | |
| FQTR OASIS/CSTOL | | | ▭ | |
| AR | | | | Δ |
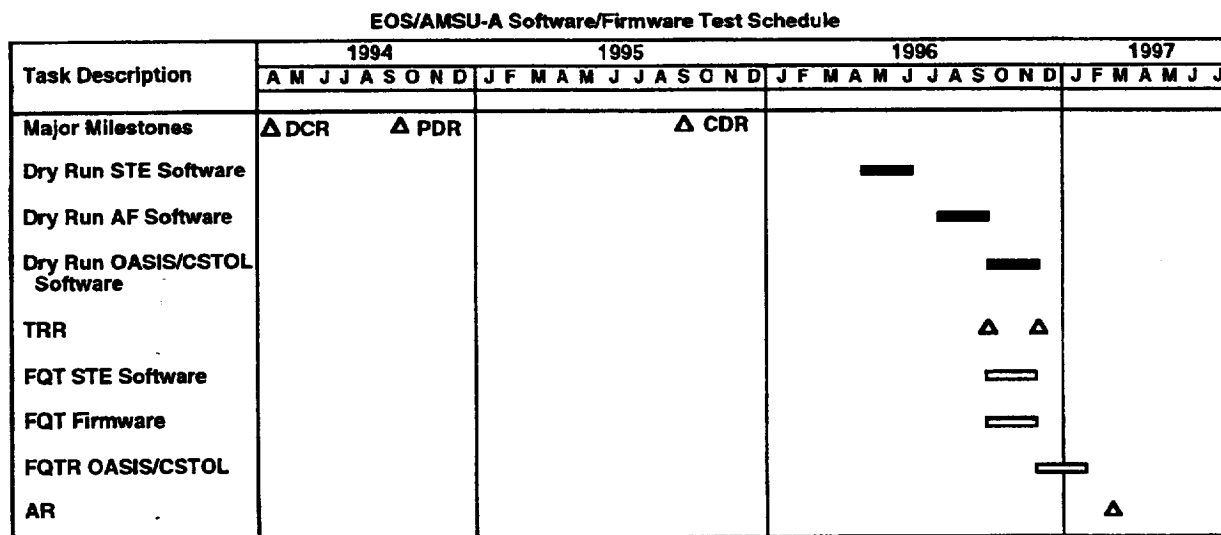
894-3455M

**Figure 4   Test Schedule**

## 4.2 Spacecraft Workstation, EOS/AMSU-A1 CSCI-N6 and EOS/AMSU-A2 CSCI-N10

### 4.2.1 General Test Requirements

Formal Qualification Test (FQT) will serve as the mechanism by which the EOS/AMSU-A1 CSCI-N6 and EOS/AMSU-A2 CSCI-N10 are formally verified to meet the functional, performance, and interface requirements specified in AE-26583. This CSCI is classified as Mission Support Developed which is software used in the development or operation of EOS, but whose failure would not cause permanent reduction in capability. This software is defined as Category 2 Software within the Aerojet Software Standards and Procedures guidelines. An independent team is required for Verification and Validation. Testing may be conducted by any team other than those responsible for the implementation (coding) of the software being tested. CSCI-N6 (EOS/AMSU-A1) and -N10 (EOS/AMSU-A2) are really identical in function so the tests for each will be identical.

a. Each test must verify correct implementation of the identified set of requirements using nominal conditions.

b. Each test must verify compliance with the resource utilization requirements specified in 3.6 of the SRS.

See 4.1.1 for additional test requirements.

### 4.2.2 Test Classes

The formal test class consists of capability tests to verify specific capability functions and interfaces.

### 4.2.3 Test Levels

The following levels of FQT test have been defined for the EOS/AMSU-A1 CSCI-N6 and EOS/AMSU-A2 CSCI-N10.

a. CSCI level – To evaluate compliance with requirements specified in the SRS at the CSCI level

b. CSCI to HWCI integration level – external interfaces

c. System level – System-level tests are defined as tests utilizing data that evaluate the system performance in terms of system level requirements as specified in Appendix A of the SRS.

### 4.2.4 Test Definitions

The following subparagraphs identify and describe each formal qualification test to be conducted on the EOS/AMSU-A1 CSCI-N6 and EOS/AMSU-A2 CSCI-N10.

### 4.2.4.1 Executive Functions Test – N6_FQT100 and N10_FQT100

a. Test Objective: Verify that the tables created provide the ability to acquire the data from the input data source and present the data on the operator display. Verify that the CSTOL procedures convert the input commands into the proper corresponding sensor defined commands.

b.  Special Requirements:     None

c.  Test Level:               CSCI

d.  Test Class:               Capability

e.  Qualification Method:     Demonstration

f.  SRS References:           Appendix A

g.  Type of Data to be
    Recorded:                 Input data files and logged output data files.

h.  Assumptions and
    Constraints:              None

## Section 5

## DATA RECORDING, REDUCTIONS, AND ANALYSIS

**5.1      Data Recording**

The Aerojet Quality Assurance group will verify that the formal testing has been conducted, controlled, and documented in accordance with the test procedures. The complete set of test documentation (test procedures, test variances, test results, etc.) for formal tests will be kept in the Software Development Library (SDL), described in the Software Assurance Plan. Test materials kept within the SDL will include the following:

a.      Test Outputs – Where test outputs can be captured into a file, these outputs will be included as part of the test materials; otherwise, textual summaries will be included.

b.      Test Inputs – Where test inputs can be captured into a file, these inputs will be included as part of the test materials; otherwise, textual summaries will be included.

c.      Copies of all formal software test documents will also be maintained in the SDL.

**5.2      Data Reduction and Analysis**

Reduction and analysis of the recorded data will be accomplished using both computer-aided and manual methods. In many cases the captured test results will be compared manually to the expected test results. In cases where such manual comparison may be too time consuming, computer utilities will be used which examine two files of data (in this case an expected results file and the test results file) and report any differences that exist between them.

**5.3      Test Output Analysis**

All software generated test outputs will be evaluated according to the following criteria:

a.      Correctness – Test outputs will be analyzed and compared against "truth data" to ensure that they meet the requirements specified in the SRS, AE-26583.

b.      Format – Test outputs which are to be provided to an external interface as defined in the Interface Requirements Specification (included in an appendix of the SRS) will be analyzed to ensure exact compliance with the interface format.

**5.4      Test Documentation**

The formal testing of the software will be completed when all of the tests described in this document have been conducted and the test materials have been analyzed to verify that the test results meet all of the above criteria. The test team will use Software Discrepancy Reports (SDR) and Software Change Request (SCR) forms to document anomalies encountered during the conduct of QA dry runs, FQT, and data reviews. A Test History Log will be used to record all of the chronological events pertinent to formal testing. Other test history documents such as As-run Test Procedures, SDR, SCR, and test results will be maintained. The following documents will be distributed at the completion of formal test:

a.      Software Change Requests/Software Discrepancy Reports
b.      Test History Logs
c.      Test History Documents
d.      Redlines to the test procedures
e.      Software Test Report.

The Software Test Report will be written for the tests listed after data reduction and analysis of the individual test results has been performed.

## Section 6

## NOTES

This section contains general information that aids in understanding this document. It includes an alphabetical listing of all acronyms, abbreviations, and their meanings as used in this document.

**6.1**  **Acronyms and Abbreviations**

| | |
|---|---|
| AMSU | Advanced Microwave Sounding Unit |
| CDR | Critical Design Review |
| CDRL | Contract Data Requirements List |
| CM | Configuration Management |
| COTS | Commercial Off The Shelf |
| CSC | Computer Software Component |
| CSCI | Computer Software Configuration Item |
| DCR | Design Concept Review |
| DID | Data Item Description |
| EOS | Earth Observing System |
| FQT | Formal Qualification Test |
| GSE | Ground Support Equipment |
| HWCI | Hardware Configuration Item |
| IRS | Interface Requirements Specification |
| NASA | National Aeronautics and Space Administration |
| PDR | Preliminary Design Review |
| QA | Quality Assurance |
| SCR | Software Change Request |
| SDL | Software Development Library |
| SDR | Software Discrepancy Report |
| SOW | Statement of Work |
| SPS | Software Product Specification |
| SQA | Software Quality Assurance |
| SAP | Software Assurance Plan |
| SRS | Software Requirements Specification |
| STE | Software Test Environment/Equipment |
| STP | Software Test Plan |
| STR | Software Test Report |
| TRR | Test Readiness Review |

# APPENDIX A

## QUALIFICATION CROSS-REFERENCE

1.0        Qualification Cross Reference

Table A-I is the requirements qualification matrix and the cross-reference matrix which will be completed upon completion of the SRS. Table A-I relates each requirement in the Software Requirement Specification to the qualification tests listed in section 4 of this document.

### Table A-I    CSCI Qualification Matrix

| SRS AE-26583 Paragraph No. | Paragraph Title | Test Method |
|---|---|---|
| 5.1.1.1 | Sensor Data | D, I |
| 5.1.1.2 | Calibration Test Equipment Data | D, I |
| 5.1.2.1 | Sensor Transactions | D, I |
| 5.1.2.2 | CTE Transactions | D, I |
| 5.1.3.1 | Display Data on Video Terminal | D |
| 5.1.3.2 | Output Commands to Sensor | D |
| 5.1.3.3 | Output Commands to Azonix | D |
| 5.1.3.4 | Output Commands to CTE | D |
| 5.1.3.5 | Output Commands to System Disk | D |
| 5.1.3.6 | Output Commands to Tape | D |
| 5.1.3.7 | Output Commands to Line Printer | D |
| 5.2.1.1 | Timing and Sizing Requirements | I |
| 5.2.1.2 | Sequence and Timing of Events | A |
| 5.2.1.3 | Throughput and Capacity | A |
| 5.2.2.1 | Error Detection and Isolation | D |
| 5.2.2.2 | Error Recovery | D |
| 5.2.3.1 | Reliability | A |
| 5.2.3.2 | Maintainability and Portability | N/A |
| 5.3 | Safety | N/A |
| 5.4 | Security and Privacy | N/A |

Legend:
  D       Demonstration
  A       Analysis
  I       Inspection
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## Report Documentation Page

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| 4. Title and Subtitle | 5. Report Date |
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| Earth Observing System/Advanced Microwave Sounding Unit -A (AMSU-A), Software Test Plan | August 1995 |
| | 6. Performing Organization Code  --- |

| 7. Author(s)  Robert Schwantje | 8. Performing Organization Report No.  10369A, August 1995 |
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| | 10. Work Unit No.  --- |

| 9. Performing Organization Name and Address  Aerojet  1100 W. Hollyvale  Azusa, CA 91702 | 11. Contract or Grant No.  NAS 5-32314 |
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15. Supplementary Notes

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16. ABSTRACT *(Maximum 200 words)*

This document defines the formal qualification tests required for the ground support software used in the test and integration of the AMSU-A instruments.

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11. SUPPLEMENTARY NOTES

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13. ABSTRACT (*Maximum 200 words*)

This document defines the formal qualification tests required for the ground support software used in the test and integration of the AMSU-A instruments.

| 14. SUBJECT TERMS EOS Microwave System | 15. NUMBER OF PAGES 18 |
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