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ACCEPTANCE TEST PLAN
FOR THE
BENCH TEST EQUIPMENT
ULTRAVIOLET SPECTROMETER EXPERIMENT S169

Prepared for
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1.0 SCOPE

This acceptance test plan outlines the acceptance testing including sequence of testing, responsibilities, and scope of tests for the Bench Test Equipment (BTE) for the Ultraviolet Spectrometer Experiment S169. The BTE is classified as mission support equipment Class II in accordance with MSC-GSE-MEIS-2A, Section 10.2, Appendix B.

All tests are applicable for all three contracted BTE units unless otherwise specified. Each BTE shall consist of the following elements:

- a. Control Unit
- b. Digital Recorder
- c. Buffer Amplifier
- d. Test Cables
- e. Sensor Excitation Source
- f. J1 Junction Box
- g. J2 Junction Box
- h. J3 Junction Box

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this document to the extent specified herein:

2.1 NORTH AMERICAN ROCKWELL

MH01-12909-234 - CSM/UV Spectrometer Ground Requirements/BTE Apollo GSE Interface Requirements

MC-999-0002C - Electromagnetic Interference Control for the Apollo Space System

2.2 APL/JHU

S4S-0-785 - UVS End Item Acceptance Test Procedure

CEI 7232-3000-01 - The Bench Test Equipment for Ultraviolet Spectrometer Experiment S169

S4S-3-784 - BTE Test Procedure for Ultraviolet Spectrometer Experiment S169

S4S-0-786 - UVS/BTE Electromagnetic Interference Test Procedure

2.3 NASA

MSC-GSE-MEIS-2A - Ground Support Equipment Master End Item Specification

3.0 ACCEPTANCE TESTS

3.1 RESPONSIBILITY FOR TEST AND INSPECTION

APL shall be responsible for the performance of all tests as specified herein. APL Quality Assurance and MSC representatives shall inspect the item at the start of Acceptance Tests. All systems tests shall be monitored by APL Quality Control and MSC representatives. Unless otherwise specified in the contract, APL may utilize its own or any other test facilities and inspection services as deemed proper. Inspection records of the examination and tests shall be kept complete and available for review upon request.

3.2 TEST SEQUENCE

The BTE shall be tested in the following sequence:

- a. Wiring Harness Test.
- b. Subsystem Test.
- c. Full Systems Functional Acceptance Test.
- d. Electromagnetic Interference Test (EMI),

One Unit Only.

3.3 BTE TEST EQUIPMENT REQUIRED

The following standard electrical test instruments are required to conduct the specified tests:

- a. Hewlett-Packard 545A Oscilloscope or equivalent.
- b. Simpson 269 or equivalent.
- c. Two Dana Digital Voltmeters 5400 or equivalent.
- d. Hewlett-Packard 721A Power Supply or equivalent.
- e. Hewlett-Packard 524D Electronic Counter.
- f. Special BTE Diagnostic Cable.

3.4 TEST DESCRIPTION

3.4.1 Harness

Acceptance test of the harness shall consist of inspection and a continuity test prior to integration with

subsystems and shall be verified according to APL Drawing 7232-3101, "Schematic Diagram, BTE Control Unit".

3.4.2 Subsystem Test

After inspection, functional tests shall be conducted on subsystems, using a breadboard harness, to ensure proper operation prior to full systems integration.

3.4.3 Full Systems Functional Acceptance Test

Prior to the performance of the initial full systems functional acceptance test, the test item shall be examined by APL Quality Assurance and MSC representative and verified that the test item is ready for test. Testing shall be in accordance with S4S-3-784, "BTE Acceptance Test Procedure", and shall meet the requirements of "BTE Contract End Item Specification, Product and Acceptance Requirements - UVS S169", CEI 7232-3000-01. Proper operation of all critical and secondary functions of the BTE shall be verified, and all electrical interface requirements to the UVS shall be met in accordance with MH01-12909-234, "CSM/UV Spectrometer Ground Requirements/BTE Apollo GSE Interface Requirements".

3.4.3.1 Primary Performance Verification

3.4.3.1.1 Variable Power Source - Verified by adjusting the DC power supply to 28V DC and measuring the voltage at the appropriate pin jacks on the J1 Junction Box.

3.4.3.1.2 Timing, Enable, and Clock Pulses - Verified by measuring the characteristics of each signal at the appropriate pin jacks on the J2 and J3 Junction Boxes with an oscilloscope. Each signal shall conform to the waveform, rise and fall time, pulse duration, frequency, output, and load impedances as stipulated in MH01-12462-234, "CSM/UV Spectrometer Electrical Requirements", and CEI 7232-3000-01, "BTE Contract End Item Specification - UVS S169".

3.4.3.1.3 UVS Spectrum Count - Verified by applying a calibrated DC voltage to the appropriate test jacks on the J2 Junction Box and reading out a corresponding digital number from the digital recorder printout format.

3.4.3.1.4 Analog Data - Verified by applying a calibrated voltage to appropriate pin jacks on the J2 Junction Box and simultaneously comparing printout data on the digital recorder.

3.4.3.2 Secondary Performance Verification

3.4.3.2.1 Monitor Functions - Additional voltage monitor functions shall be verified by comparing DVM measurements versus digital printout data.

3.4.3.2.2 Grating Drive Motor Inhibit Signal - Verified by simulating a time period count within the BTE and observing the identical time period count on an electronic counter.

- 3.4.3.2.3 Elapsed-Time Indicator/Sun Gun - Verified by visual inspection when operating.
- 3.4.3.2.4 UVS Current Limiter Test Function - Verified by continuity test.
- 3.4.3.2.5 LSB/MSB Test Jacks - Verified by applying a calibrated DC voltage to the appropriate test jacks (spectrum count input) of the J2 Junction Box and reading out a corresponding analog voltage on a digital voltmeter.
- 3.4.3.2.6 Simulated Pulse Count - Verified by simulating a known pulse count within the BTE and observing the identical count on an electronic counter.
- 3.4.3.2.7 Buffer Amplifier - All signal monitor and control lines shall be verified as per S4S-3-784, BTE Test Procedure. Verification will include:
- a. DVM monitoring of all analog functions.
 - b. Oscilloscope monitoring of the digital signals.
 - c. Digital recorder printout data.
 - d. Time period count using an electronic counter.
- 3.4.3.2.8 BTE-UVS Demonstration Test - A BTE-UVS demonstration test shall be conducted per S4S-0-785, "UVS End Item Acceptance Test Procedure", to verify that the Bench Test Equipment and the Ultraviolet Spectrometer S169 are compatible. The demonstration test shall be conducted with one BTE and the Prototype UVS only.

3.4.4 Electromagnetic Interference Test (EMI)

EMI/BTE tests shall be performed as specified in Section 3.1.5.2.4 of NR Specification MC-999-0002C, "Electromagnetic Interference Control for the Apollo Space System", for radiated and conductive interference and shall be diagnostic in nature only. Tests shall be conducted on one BTE only and recorded as per S4S-0-786, "UVS/BTE Electromagnetic Interference Test Procedure".

3.4.4.1 Types of EMI Tests

- a. Conductive Interference, 30 Hz to 25 MHz.
- b. Radiated Interference, 15 kHz to 10,000 MHz.

3.4.4.2 EMI Test Location

The BTE EMI tests shall be conducted at the Melpar facility in Falls Church, Virginia.

3.4.5 Environmental Tests

Not applicable.

4.0 DATA LOGGING

The results of all test parameter measurements shall be contained in the BTE test procedure data sheets, which shall include entries which relate to date, time, operation, test sequence, location, and notation of failures or anomalies. Any anomalies or failures during or after formal acceptance testing shall be noted in the UVS/BTE log book.

5.0

DISPOSITION

The BTE shall, following successful completion of the Acceptance Test Sequence and the Acceptance Review, and contingent upon MSC approval of the acceptance data package, be used as follows:

BTE Serial Nos. 01, 02 and 03 shall be used to support all UVS test operations.