

FLIGHT SOFTWARE TEST PLAN
FOR THE
GLOBAL ULTRAVIOLET IMAGER
(GUVI)
INSTRUMENT

7366-9042

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1. Introduction

1.1 Scope

This document defines the flight software test plan for the Global Ultraviolet Imager (GUVI) flight instrument. The software test plan defines the formal software tests to be performed on the GUVI flight instrument. The GUVI flight software consists of two components, (1) detector processor software, and (2) telemetry processor software.

1.2 Applicable Documents

GUVI Technical Requirements Specification, 7366-9001

GUVI Flight Software Development Plan, 7366-9002

GUVI Subsystem Interface Control Document, 7366-9020

GUVI Flight Software Requirements Specification, 7366-9040

GUVI Flight Software Interface Control Document, 7366-9041

GUVI Acceptance Test Plan, 7366-9060

TIMED General Instrument Interface Specification, 7363-9050

Space Department Software Quality Assurance Guidelines, SDO-9989,
September 1992

2. Test Overview

2.1 Component Level Testing

Component level testing will be informal and will be performed by the flight software lead engineers. The flight software code will be tested on prototype hardware during this phase. The component level testing will be documented in the unit development folders. The flight software components will be tested on the flight processor boards by the flight software lead engineers before delivery for instrument integration and test.

2.2 Software Acceptance Test

Two formal flight software tests will be performed during instrument integration and test. The software acceptance tests will confirm that the flight software components meet the requirements set forth in the GUVI Flight Software Requirements Specification. The acceptance tests will be conducted by the GUVI system engineer.

At the beginning of the instrument integration and test phase, the GUVI electronics control unit (ECU) flight boards and chassis will be integrated. After the ECU integration is completed, the first software acceptance test will be conducted. The flight software test will be performed with the code installed in the flight ECU unit. The ECU will be connected to the GSE simulators of the detector and spectrograph subsystems.

The second flight software acceptance test will be performed after the entire GUVI flight instrument has been integrated. This flight software test will be conducted on the flight ECU, spectrograph, and detector subsystems. The flight instrument will be controlled by the instrument GSE unit.

3. Initial Software Acceptance Test

3.1 Test Objective

The initial software acceptance test will verify that the flight software requirements are met before the ECU is integrated with the flight spectrograph and detector subsystems. The test will exercise all commands and operating modes of the instrument. Critical timing parameters will be measured.

3.2 Test Environment

The flight software will be installed in the flight ECU. The ECU will be connected to the GSE simulators for the spectrograph and detector subsystems. The use of the GSE simulators will allow the ECU data inputs to be varied over a wider range than would be possible with the flight components. The ECU will be controlled by the GUVI GSE unit, and test data will be evaluated on the GSE unit.

3.3 Test Approach

The following tests will be performed during the initial acceptance test.

3.3.1 Maintenance Mode Test

With the instrument operating in maintenance mode:

1. Verify proper maintenance mode packet format.
2. Execute a block upload.
3. Execute memory copy functions.
4. Verify the data dump function.

3.3.2 Test Mode Test

With the instrument operating in test mode:

1. Verify proper test mode packet format.

2. Execute detector commands.
3. Verify pulse height data.
4. Execute SIS mechanism commands

3.3.3 Spectrograph Mode Test

With the instrument operating in spectrograph mode:

1. Verify proper spectrograph mode packet format.
2. Execute scan motor commands.
3. Verify spectrograph pixel data.
4. Execute star calibration command.
5. Measure detector processor transfer times.

3.3.4 Imaging Mode Test

With the instrument operating in imaging mode:

1. Verify proper imaging mode packet format.
2. Verify proper scan motor timing while scanning.
3. Verify imaging pixel data.
4. Verify response to broadcast messages.
5. Measure detector processor transfer times.
6. Verify sun sensor performance.

4. Final Software Acceptance Test

4.1 Test Objective

The final software acceptance test will verify that the flight software requirements are met after the entire flight instrument has been integrated. The test will exercise all commands and operating modes of the instrument. The test will verify that all interfaces with the flight subsystems are functional.

4.2 Test Environment

The flight software will be installed in the flight ECU. The ECU will be integrated with the flight spectrograph and detector subsystems. The ECU will be controlled by the GUVI GSE unit, and test data will be evaluated on the GSE unit. The spectrograph test cover will be used to provide an optical test source.

4.3 Test Approach

The following tests will be performed during the final acceptance test.

4.3.1 Maintenance Mode Test

With the instrument operating in maintenance mode:

1. Verify proper maintenance mode packet format.
2. Execute a block upload.
3. Execute memory copy functions.
4. Verify the data dump function.

4.3.2 Test Mode Test

With the instrument operating in test mode:

1. Verify proper test mode packet format.
2. Execute detector commands.
3. Verify pulse height data with the test lamp on.
4. Execute SIS mechanism commands

4.3.3 Spectrograph Mode Test

With the instrument operating in spectrograph mode:

1. Verify proper spectrograph mode packet format.
2. Execute scan motor commands.
3. Verify spectrograph pixel data with the test lamp on.
4. Execute star calibration command.

4.3.4 Imaging Mode Test

With the instrument operating in imaging mode:

1. Verify proper imaging mode packet format.
2. Verify proper scan motor operation while scanning.
3. Verify imaging pixel data with the test lamp on.
4. Verify response to broadcast messages.
5. Verify sun sensor performance.

5. Test Documentation

5.1 Test Procedures

Test procedures will be developed for the flight software acceptance tests. The test procedures will be available for review 30 days before the particular test.

5.2 Test Reports

A flight software acceptance test report will be prepared within 30 days after test completion.