

ACIS Verification Summary Report

Specification: ACIS Contract End Item Specification

Requirement Number/Title: 3.2.6 Transportability and Transportation (VRSD 3.2.6-3)

Requirement Statement: All handling and transportation equipment used shall be compatible with the structural and environmental limits.

Verification Method: Analysis

Procedure Number: N/A

Configuration: Big yellow box (former All Sky Monitor shipping container) modified for ACIS Flight Support Assembly or Detector Assembly.

Cycle Time:

Verification Discussion/Results:

The All Sky Monitor shipping container was designed, built and used on the XTE program. Since the ASM is lighter than the DA and much lighter than the FSA, it was necessary to modify the shipping container. Larger casters, heavier structure, and larger isolators were substituted for the originals. Since the DA and the two shake fixture mounting plates weigh approximately the same as the FSU and its single mounting plate, one set of isolators could be used for either unit. The isolators were selected based on the manufacturer's literature.

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5-27-97
Date

AXAF-I CCD Imaging Spectrometer
(ACIS)

**Verification Assessment Report
-Power and Thermal-Control Structure-
-Mechanical Ground Support Equipment-
-Dynamic Analysis Report-**

Document No. ACIS-710-A-03VR

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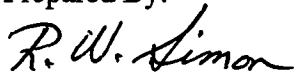
Contract # NAS8-37716

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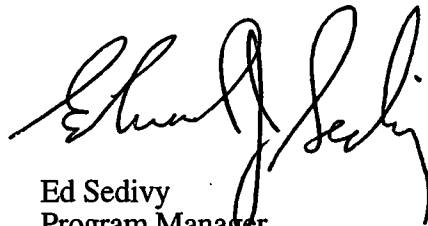


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CHANGE/REVISION RECORD

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1. INTRODUCTION

1.1 Scope

This document provides a collection of information which results from the implementation of the ACIS Verification Plan, 36-01203. It is intended to show that the delivered instrument meets a specific set of requirements from the ACIS Power and Thermal-Control Structure (PTS) Specification, ACIS-36-02101.

In particular, this report provides the analytical data to support the verification of specific PTS Specification requirements. These requirements were assessed to be best verified by analysis. The method selected in the verification of each specific requirement is the method which provides the assurance to the program that the requirements have been verified.

The Verification Cross Reference Matrix contained in the ACIS PTS Specification shows how each contractual requirement will be verified. The requirements documented herein have been designated to be verified by analysis and/or a combination of other verification methods.

1.2 Applicable Documents

ACIS Project Documents

36-02101	ACIS Power and Thermal-Control Structure (PTS) Specification
36-01203	ACIS Verification and Calibration Plan

2. METHODOLOGY

2.1 Requirements & Specifications

Verification methods to be used are defined in the verification matrix, compiled as an appendix to the ACIS Power and Thermal-Control Structure Specification, 36-02101.

2.2 Verification Descriptions

Summary level descriptions of each verification activity are located in the ACIS Verification Plan, 36-01203 and the ACIS Power and Thermal-Control Structure Specification, 36-02101. The specific definitions for this report are as follows:

2.2.1 Analysis Definition

Analysis is a method of verification, taking the form of the processing and accumulated results and conclusions, intended to provide proof that verification of a requirement(s) has been accomplished. The analytical results may be based on engineering study, compilation or interpretation of existing information, similarity to previously verified requirements, or derived from lower level examinations, tests, demonstrations, or analyses. Verification by analysis is a process used in lieu of or in addition to testing to verify compliance with specification requirements. The selected techniques may include systems engineering analysis, statistics and qualitative analysis, computer and hardware simulations, and analog modeling. Analytical techniques may be used in lieu of tests for such things as life, storage, failure analysis, safety, interchangeability, and some other performance requirements which cannot be verified by test.

2.2.2 Dynamic Analysis Definition

Dynamic stress analysis provides a comprehensive set of loads for the low frequency transient, vibro-acoustic, and shock environments for all mission phases. Also included are loads due to accelerations incurred from shipping and handling.

3. TEST DATA

3.1 Applicable Requirements

- | Requirement Reference | Requirement |
|-----------------------|---|
| 1. 3.2.1.6l | Mechanical Ground Support Equipment Characteristics
The Mechanical Ground Support Equipment shall: Be compatible with the shipping loads specified in paragraph 3.2.8f herein. |

Note: 3.2.8f Handling and Transportation: Vibration, shock, temperature, pressure, humidity, electrostatic potential, and contamination shall be controlled during transportation to not exceed flight hardware design levels.

- | | |
|-------------|---|
| 2. 3.3.6.2b | Strength
The Mechanical Ground Support Equipment shall be designed to withstand the effects of repeated loads and pressure cycles caused by operation, ground handling and transportation. |
|-------------|---|

3.2 Analytical Discussion

The Power and Thermal-Control Structure Mechanical Ground Support Equipment structural analyses are provided for review and comment per contractual data requirement SSE03: Vol. 2, Stress Analysis, and Vol. 8, Dynamic Analysis. The dynamic analyses for the various Power and Thermal-Control Structure components and piece parts have been provided via this route.

- | Requirement Reference | Requirement |
|-----------------------|---|
| 1. 3.2.1.6l | Mechanical Ground Support Equipment Characteristics
The Mechanical Ground Support Equipment shall: Be compatible with the shipping loads specified in paragraph 3.2.8f herein. |

DISCUSSION

The Power and Thermal-Control Structure structure has been analyzed to the ground handling loads and load paths. In all cases, the ground handling loads are less than the flight loads at the attachment locations. Thus, by similarity, positive margins of safety exist for the affected structural elements for ground handling/shipping loads. This information has been provided previously per SSE03 data submittals, reference Vol. 2. Loads comparison can be found in part in SSE03, Vol. 8, Dynamic Analysis. This discussion verifies compliance with paragraph 3.2.1.6l of the PTS Specification, no further action is required.

2. 3.3.6.2b Strength

The Mechanical Ground Support Equipment shall be designed to withstand the effects of repeated loads and pressure cycles caused by operation, ground handling and transportation.

DISCUSSION

The Power and Thermal-Control Structure MGSE structure has been analyzed to the ground operations structural loads. This information has been provided previously per SSE03 data submittals, reference Vol. 2 (section 6.5 - GSE) for stress analysis and associated load factors, and Vol. 8 also for dynamic shipping load factors. Positive margins of safety were obtained for the lifting and shipping fixtures, using the appropriate factors of safety (SSE03, Vol. 2). This discussion verifies compliance with paragraph 3.3.6.2b of the PTS Specification, no further action is required.