

Quality Management Plan for the Alpha Magnetic Spectrometer 02 (AMS-02) Experiment

**Engineering Directorate
AMS-02 Experiment Collaboration**

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Basic



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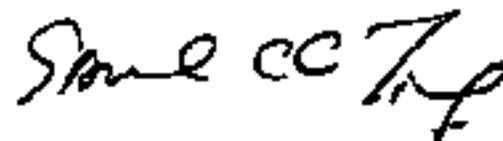
Quality Management Plan for the Alpha Magnetic Spectrometer 02 (AMS-02) Experiment

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PREFACE

This Quality Management Plan represents the agreement between the Alpha Magnetic Spectrometer – 02 (AMS-02) Experiment Collaboration and the Johnson Space Center AMS-02 Project Office for the AMS-02 Payload to be operated on the International Space Station (ISS) for a minimum of three (3) years.

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1.0 PURPOSE

This document establishes minimal considerations for the AMS-02 Experiment Collaboration quality management system (QMS) in the manufacturing (fabrication), testing (end-item and integrated), and delivery of flight hardware and software of AMS-02 Payload.

2.0 SCOPE

This document covers the essential provisions collaboration personnel are to follow to assure consistent quality during development, manufacturing (fabrication), and testing of flight hardware and software at their respective organizations or institutions.

3.0 RESPONSIBILITIES

Each organization or institution should be in compliance with *all* quality system requirements imposed by contract, agreements or regulatory authorities.

4.0 REFERENCE DOCUMENTS

JSC 27296	AMS Project Plan, Revision B
JPR 5335.3B	JSC Quality Manual
SAE AS9100	Quality Management Systems – Aerospace Requirements, Revision B

5.0 QUALITY CONSIDERATIONS

5.1 Procurement

The organization or institution is responsible for the quality of *all* products purchased from suppliers (*or otherwise provided e.g. barter, agreement, trade, etc.*). The organization or institution should have processes and procedures for inspection and/or testing of hardware or software upon receipt, method for documenting and tracking the procured item including limited life items, or other activities to ensure that the products meet the specified requirements from procurement through use.

5.2 Manufacturing/Fabrication

Processes and procedures are to be used for actual manufacture, fabrication, and assembly of flight hardware shall be documented in a detailed Quality Implementation Plan. These should be performed per detailed procedures to the latest released drawings and performed by approved or certified personnel. The Implementation Plan should address process certification and personnel certification requirements. When flight hardware or software is not in work, it should be kept in a designated approved and controlled flight storage area.

The organization or institution should identify all pertinent data required to manufacture, fabricate, inspect, use or maintain its hardware or software in the flight configuration and implement a configuration management system to insure that changes are traceable. These should include drawings, part lists, and specifications necessary for the approved configuration and design features. Also, information on materials, processes, type of manufacturing and assembly necessary for product conformity should be available.

5.3 Workmanship Standards

The organization or institution should establish criteria for workmanship that are easily understood (*e.g., written standards, representative samples, or illustrations*).

5.4 Non-Conforming Materials

The organization or institution should have detailed processes and procedures for identifying and controlling nonconforming products. Records of non-conformances and subsequent actions (e. g., dispositions) should be reported and documented. Non-conformances, anomalies and failures associated with qualification and flight hardware must be formally documented, with corrective action and required reverification or acceptance rationale. All Nonconformance Reports will be processed for approval or concurrence through the AMS-02 Configuration Control Board. All nonconformance events will be summarized within the safety data package submittals to the Payload Safety Review Panel to provide assurance that all safety related nonconformances have been properly addressed.

5.5 Calibration (Test Equipment)

Monitoring and measuring devices include, but are not limited to: test hardware, test software, automated test equipment (ATE) and plotters used to produce inspection data. Records should be maintained on monitoring and measuring devices and the process used for their calibration including details on equipment type, unique identification, location, frequency of checks, check method and acceptance criteria.

5.6 Test and Verification

The organization or institution should conduct comprehensive testing and verification to ensure that the AMS-02 flight hardware and software meet, design, fabrication, operational and performance requirements. Verification activities cover requirements in the areas of safety, interface, environment, reliability and performance. All discrepancies should be documented and dispositioned in accordance with non-conformance reporting procedures.

5.7 Quality Inspections

Detailed plans should be in place for quality inspections during fabrication and testing. These should state who will perform the inspections, where the inspections will be performed, and how frequently inspections are required.

5.8 Critical Process Controls (Changes, Approvals, Validation)

Critical processes that affect *flight safety* or *quality* should be identified and documented at the AMS Experiment Collaboration/AMS Project level. Changes to critical processes and procedures written to Critical Design Review approved configurations, drawings, and material or other specifications should be reviewed and approved through a formal, documented process.

5.9 Software Verification and Validation

Detailed plans and activities should be in place for Software Verification and Validation. These plans and activities confirm that the AMS-02 experiment will comply with its specifications, function properly as an integrated payload unit when interfaced with program/vehicle components, and is ready for use as a part of the flight system.

5.10 Training and Certifications

Organizations and institutions should:

- Determine the necessary competence for persons performing work affecting product *flight safety* or *quality*,
- Provide training or take other actions to satisfy these needs,
- Evaluate the effectiveness of actions taken,
- Maintain appropriate records of education, training, skills (*e.g., certifications*), and experience.

5.11 Documented History

Established processes and procedures should be used to document the history of flight hardware and software. Each organization or institution should document the history of fabrication, inspection, testing (end-item and integrated), and transfer of flight hardware or software (*e.g., Travelers, Routers, Work Authorization Documents, Test Preparation Sheets, etc.*). Records of discrepancies (*Discrepancy Reports (DRs), Problem Reports (PRs), etc.*) and their disposition and closure will be maintained. Each organization should deliver an “As Built” flight hardware documentation for flight support.

6.0 CHANGES TO QUALITY PLAN

Any changes to this quality plan will require review and approval by the AMS-02 Configuration Control Board and the AMS-02 Collaboration.