



QS-R-004
REVISION C

EFFECTIVE DATE: October 20, 2003

ORGANIZATIONAL INSTRUCTION

RELIABILITY PROGRAM PLAN

OPR (s)

OPR DESIGNEE

QS40

Prince Kalia

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		11/20/97	
Revision	A	7/1/99	Changes made to reflect new organization code changes and/or Changes made to reflect new directives renumbering scheme and cancellation of handbooks NHB 5300.4 (1A-1) and (1D-2). In addition, changes were made to incorporate the corrective action requirements of NCR 266.
Revision	B	9/09/02	Format and numbering change to implement requirements of QS-A-001 rev F.
Revision	C	10/20/03	Changes made to reflect new organization code changes, cancellation of handbook NHB 5300.4 (1G), and update/correct 4.0 Instructions verbiage.

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Reliability Program Plan

1. SCOPE

1.1 Scope

This Organizational Instruction (OI) is applicable to development, evaluation, and approval of a Reliability Program Plan (RPP).

1.2 Purpose

The purpose of this OI is to provide procedures that shall be used in the development, evaluation and approval of a RPP. The development of a RPP early in the design and development phase of a program is paramount to achieving established Reliability requirements.

1.3 Applicability

This OI is applicable to all S&MA personnel supporting MSFC projects that include Reliability requirements. The instructions identified in this OI shall be used for development, review, and approval of the RPP.

2. Applicable Documents

ANSI/ISO/ASQC A8402-1994 *Quality Management and Quality Assurance - Vocabulary*

NHB 5300.4 (1D2) *Safety, Reliability, Maintainability & Quality provisions for the Space Shuttle Program*

NASA-STD-8729.1 *Planning, Developing and Managing an Effective Reliability and Maintainability Program*

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3. Definitions

All definitions applicable to this OI are addressed in the following document:

ANSI/ISO/ASQC A8402-1994

Quality Management and Quality Assurance - Vocabulary

NHB 5300.4 (1D2)

Safety, Reliability, Maintainability & Quality provisions for the Space Shuttle Program

NASA-STD-8729.1

Planning, Developing and Managing an Effective Reliability and Maintainability Program

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Supportability and Logistics Engineering

4. Instructions

4.1 Reliability Program Plan Contents

The RPP shall describe how the Reliability tasks will be performed, and *how* the Reliability requirements will be met; it is not sufficient to merely state that the various required tasks will be performed.

Representative Key Elements of Reliability Program Plan

- Reliability Organization Chart
- Reliability Plan to include
 - I.Design for Reliability (DFR) processes including Reliability Design Criteria
 - II.Reliability Trade Studies and Sensitivity Analysis
 - III.Failure Modes and Effects Analysis and Critical Items List of the hardware including higher level analysis during conceptual design analysis effort

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- IV. Reliability-Maintenance Interface through Reliability Centered Maintenance Analysis (RCMA) or other appropriate process.
- V. Design Reviews and Readiness Reviews
- VI. Problem Reporting and Corrective Action & Trending
- VII. ALERTS
- VIII. EEE Parts Control
- IX. Process Controls for critical processes of flight hardware.
- X. Limited Life Items List
- XI. Reliability Road-map including Reliability Growth Plan and Reliability Testing including Highly Accelerated Life Testing (HALT) where applicable or other Accelerated Life testing of hardware.
- XII. Flight hardware Acceptance and Qualification requirements along with supporting rationale/philosophy and necessary documentation.
- XIII. Probabilistic Risk Assessment and/or other quantitative risk assessment (For example: Assessing Mean Time Between Failures (MTBF)) at system and component level etc) along with ground rules and assumptions.
- XIV. Role in Integrated Reliability, Maintainability and Supportability. At MSFC, S&MA provides leadership for R&M analysis and Engineering provides leadership for Supportability analysis process as part of the System Design effort.
- XV. Software Reliability Growth Model and Plan
- XVI. Human Reliability/error and its implication during design, analysis and processing of the hardware.
- XVII. Reliability Skill level definition and Training Plan
- XVIII. Plan for application of Reliability Engineering to HW/SW design and critical processes to minimize life cycle cost.

The Reliability Program Plan (RPP) shall also identify and include the following:

- a) All Reliability requirements and any other requirements that relate to Reliability, such as Availability.
- b) Documents which are applicable to the requirements and performance of tasks covered by the Plan.
- c) Definitions of Reliability terms used in the RPP.

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- d) Identification of all hardware and software covered by the Reliability program.
- e) Provide details of reliability analysis software used along with justification if not using commercial-off-the-shelf (COTS) R&M software.
- f) Details of the S&MA Reliability Organization and how it interfaces with the Engineering, Operations and Program Organizations.
- g) A matrix or table, which shows the relationship of the RPP tasks to the contract requirements.
- h) The phasing-in of the reliability activities with the major Program milestones must be done to facilitate optimization of the life cycle cost.
- i) A Reliability task schedule, including completion dates.
- j) Responsibilities of Reliability managers and personnel and their relationships to the required tasks, as well as their interfaces with other organizations, which have inputs to the Reliability tasks.
- k) Detailed discussion of how each required task would be performed along with ground rules, assumptions and applicable documents and how Reliability requirements will be met.
- l) Identify all required data submittals along with submittal dates; provide a matrix or table showing the relationship of the data submittals to the Reliability tasks.
- m) Complete description of all in-house procedures, systems, and forms which will be used.

4.2 Reliability Program Plan Evaluation

S&MA and the Program shall independently review for compliance with the instructions identified in this OI, and for compliance with the contract requirements the RPP.

4.3 Reliability Program Plan Approval

The RPP shall be approved in accordance with Project requirements, after all review discrepancies have been

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corrected. This RPP can be the RPP can be included in the Project Plan, S&MA Plan, or be a standalone document

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5. Notes

5.1 Directive Replacement. This Directive replaces S&MA-CR10-R-Y-004, Reliability Program Plan.

6. Safety Precautions and Warning Notes

N/A

7. Appendices, Data, Reports, and Forms

None

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8. Quality Records

Quality Record	Repository	Period of Time
Reliability Program Plan QS40: OPR	Hard copy maintained by the applicable Program/Project Office	Retain until end of program plus 3 years.

9. Tools, Equipment, And Materials

N/A

10. Personnel Training And Certification

Training will include reliability engineering and program management concepts and principles.