

MPR 1280.2  
REVISION H-1  
EFFECTIVE DATE: March 1, 2016  
EXPIRATION DATE: March 1, 2026

---

# MARSHALL PROCEDURAL REQUIREMENTS

**ED01**

**PROCESS CONTROL**  
*With Change 1 (3/21/16)*

**COMPLIANCE IS MANDATORY**  
DIRECTIVE IS UNCONTROLLED WHEN PRINTED  
Verify current version before use at <https://dml.msfc.nasa.gov/directives>

<b>Marshall Procedural Requirements ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 2 of 15</b>

## DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Change/ Revalidation/ Canceled)	Document Revision/ Change	Effective Date	Description
Baseline		5/14/99	Document converted from MSFC-P09.1 to a Directive. Previous history retained in system as part of canceled or superseded ISO Document files.
Revision	A	8/16/99	Servicing requirements added to document. Administrative changes due to reorganization (org. code and organization terminology).
Revision	B	3/6/00	Remove reference to MPG 1441.1 (canceled) and replace with MPG 1440.2 (new version).
Revision	C	8/18/00	General revision; Incorporated software processes into document sections P.1; P.4 h; P.4 i; 1.5; 3.4, 3.5, 3.6; and 5.
Revision	D	5/15/01	Reformatted per MPG 1410.2. Added applicable document to P.4. Added definition of qualified operator. Revised to meet requirements of ISO 9001:2000, specifically sections 3.2.2, 3.2.3, 3.2.4, 3.2.5, 3.2.9 and 3.6.
Revision	E	5/12/03	General revision; Includes additional requirements to comply with AS9100.
Revision	F	10/26/2004	Changed MPG to MPR and "Marshall Procedures and Guidelines" to "Marshall Procedural Requirements" throughout document; revised text to use "shall" to state requirements; updated font.
Revision	G	12/16/2009	Revised 2. Applicability statement to address the applicability of this directive to the Michoud Assembly Facility. Added MPR 7123.1 and associated requirements. Added applicable documents to P.4. Corrected grammatical errors. Definitions reordered alphabetically. Corrected multiple requirements statements on page 11. Removed multiple requirement statements on page 8. Updated document to comply with AS9100C. Updated flow chart to match new requirements.
Change	1	9/27/2013	On 9/27/13, at the request of the OPRD, an administrative change was made to remove MPR 8730.4 that has been cancelled.
Change	2	4/7/2014	On 4/7/14, at the request of the OPRD, administrative changes were made to paragraph 3.4.1 to require unique serial number assignment for MSFC-produced products. An equivalent requirement was previously located in MPR 8040.2, "Product Identification and Traceability", which is being cancelled. Updated footer on all pages to identify correct Master List URL.
Revision	H	3/1/2016	This is a major rewrite. Directive revised and contents organized according to current MPR template. "Table of Contents" were edited by incorporating "Definitions" as "Appendix A". Updated P.6 Cancellation to December 16, 2009. Chapter 1 "Responsibilities," Chapter 2 "Procedures," and Appendix D "Records" were all rewritten. P.4 "Applicable Documents" updated.
Change	1	3/21/16	On 3/21/16, at the request of the OPRD, an administrative change was made to replace MPR 7150.1 with NPR 7150.2 in coordination with cancellation of MPR 7150.1.
Revalidation	H-1	12/18/20	Revalidated – no changes to responsibilities or requirements. Expiration date extended from March 1, 2021 to March 1, 2026. (Minor editorial changes made to remove quotation marks around directive titles and indent and italicize Notes as required by NPR 1400.1.)

**COMPLIANCE IS MANDATORY**  
**DIRECTIVE IS UNCONTROLLED WHEN PRINTED**  
Verify current version before use at <https://dml.msfc.nasa.gov/directives>

<b>Marshall Procedural Requirements</b>		
<b>ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 3 of 15</b>

## TABLE OF CONTENTS

Preface

P.1 Purpose

P.2 Applicability

P.3 Authority

P.4 Applicable Documents and Forms

P.5 References

P.6 Cancellation

CHAPTER 1. RESPONSIBILITIES

CHAPTER 2. PROCEDURE

Appendix A Definitions

Appendix B Acronyms

Appendix C (Reserved for Verification Matrix)

Appendix D Records

**COMPLIANCE IS MANDATORY**  
**DIRECTIVE IS UNCONTROLLED WHEN PRINTED**  
Verify current version before use at <https://dml.msfc.nasa.gov/directives>

<b>Marshall Procedural Requirements ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 4 of 15</b>

## PREFACE

### P.1 PURPOSE

The purpose of this requirement is to establish a consistent method for the control of hardware and software processes that directly affect the quality of products in accordance with MPD 1280.1.

### P.2 APPLICABILITY

a. This MPR applies to Center personnel, programs, projects, and activities, including contractors and resident agencies to the extent specified in their respective contracts or agreements. (“Contractors,” for purposes of this paragraph, include contractors, grantees, Cooperative Agreement recipients, Space Act Agreement partners, or other agreement parties.)

b. This MPR applies to the Michoud Assembly Facility.

c. This MPR applies the following: all mandatory actions (i.e., requirements) are denoted by statements containing the term “shall.” The terms: “may” or “can” denote discretionary privilege or permission, “should” denotes a good practice and is recommended, but not required, “will” denotes expected outcome, and “are/is” denotes descriptive material.

d. This MPR applies the following: all document citations are assumed to be the latest version unless otherwise noted.

### P.3 AUTHORITY

MPD 1280.1, Marshall Quality Management System Policy

### P.4 APPLICABLE DOCUMENTS AND FORMS

a. NPR 1441.1, NASA Records Management Program Requirements

b. NPR 2810.1, Security of Information Technology

c. NPR 7150.2, NASA Software Engineering Requirements

d. NRRS 1441.1, NASA Records Retention Schedules

e. MPR 1410.1, Organizational Issuances

f. MPR 1440.2, MSFC Records Management Program

**COMPLIANCE IS MANDATORY**  
**DIRECTIVE IS UNCONTROLLED WHEN PRINTED**  
Verify current version before use at <https://dml.msfc.nasa.gov/directives>

<b>Marshall Procedural Requirements</b>		
<b>ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 5 of 15</b>

- g. MPD 5340.1, Foreign Object Damage/Foreign Object Debris Prevention Operations
- h. MPR 5340.1, Controlled Work Area, Cleanroom and Flow Bench Operations
- i. MPR 6410.2, Identifying, Packaging, Handling, and Moving Program Critical Hardware
- j. MPR 6430.1, Lifting Equipment and Operations
- k. MWI 8715.15, Ground Operations Safety Assessment Program
- l. MPR 8730.1, Inspection and Testing
- m. MPR 8730.3, Control of Nonconforming Product
- n. MSFC- STD -246, Standard Design and Operational Criteria of Controlled Environmental Areas
- o. MSFC- STD- 3598, Standard for Foreign Object Debris/ Foreign Object Damage Prevention

**P.5 MEASUREMENT / VERIFICATION**

None.

**P.6 CANCELLATION**

MPR 1280.2G-2, Process Control, dated December 16, 2009.

*Original signed by*

Todd A. May  
Director

<b>Marshall Procedural Requirements</b>		
<b>ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 6 of 15</b>

## **CHAPTER 1. RESPONSIBILITIES**

1.1 Managers responsible for Hardware and Software Production. Management is responsible for:

1.1.1 Identifying the process owners for hardware and software production processes within their organization.

1.1.2 Ensuring the effectiveness of these processes being implemented within their organization.

1.2 Process Owner. The process owner is responsible for:

1.2.1 Establishing the appropriate controls for the hardware or software production processes under their purview.

1.2.2 Ensuring that the production activities are carried out in accordance with the established controls.

<b>Marshall Procedural Requirements ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 7 of 15</b>

## **CHAPTER 2. PROCEDURE**

2.1 Managers shall identify owners for each hardware and software production process that comes under their organizational purview.

2.2 Each process owner shall establish process control documentation appropriate to the particular hardware or software end-products to be produced, such that the product requirements and customer requirements are met, and that all applicable NASA and MSFC policy, statutory/regulatory requirements, applicable specifications and standards, and any applicable systems engineering processes are effectively implemented.

*Note: Examples of process controls include: drawings, specifications, equipment, materials, work instructions, work environment, training, nonconformance control, workmanship criteria in-process inspection, configuration control, and control of data and records.*

2.2.1 The process control documentation shall be established, approved, released, and maintained in accordance with applicable governing requirements for the appropriate documentation system, and any required customer, project, and/or statutory/regulatory approval authorities.

*Note: Process control documentation may be established as organizational issuances, or other appropriate document types. Refer to MPR 1410.1 for additional details concerning document approval, release, and periodic review requirements.*

2.2.2 The process control documentation shall describe (if applicable) how specific work authorizing documentation is used to address specific production requirements, process control parameters, and to record evidence of completion of production activities and inspections for each specific production run.

2.2.3 The process owner shall evaluate against the following lists and include appropriate process controls for those that are determined to be applicable based on the particular requirements for the type of end-products to be produced. These end-product requirements drive the specific process controls that are to be selected and implemented in each case.

2.2.3.1 For processes that produce any type of hardware or software products, include the following controls (if applicable):

- a. Documented information that describes the characteristics of the product, including any applicable drawings, parts list, or specifications.
- b. Instructions or procedures, as necessary, to describe materials or resources to be used and specific process steps or sequences to be performed.

<b>Marshall Procedural Requirements</b>		
<b>ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 8 of 15</b>

c. Description of any required production equipment, tools, or software programs, and how they are to be used and maintained for producing the product.

d. Description of any required measuring equipment and how they are to be calibrated and used to record any data that may be needed to satisfy customer or product requirements.

2.2.3.2 For processes that produce flight hardware or software products, and associated ground support equipment interfacing with flight hardware or flight software, also include the following additional controls (if applicable):

a. Ensuring that suitable production equipment, tooling, and measuring equipment are used to monitor and control critical process parameters and key characteristics, such that the variation of these parameters are held within acceptable limits per applicable product requirements, specifications, and standards.

b. Include applicable statistical techniques for establishing, controlling, and verifying the process capability and product characteristics (if needed to meet product requirements).

c. Include provisions for “in-process” product inspection points, if required in accordance with the product requirements. This is intended to recognize that some inspections may have to be done “in-line”, prior to completion of the production process, if the resulting final product cannot be adequately inspected at a later stage.

*Note: Refer to MPR 8730.1, for additional information about in-process inspections, and project specific product verification/validation and quality plans.*

d. Accounting for all product during production (e.g., parts quantities and split orders).

e. When serial/lot traceability is required, ensuring unique serial/lot number assignment by including serial/lot traceability requirements and assignment information (e.g., required point of serial/lot number assignment, or specific serial/lot numbers to be used or avoided) in approved process control or work authorizing documentation.

f. Generating and maintaining records to provide evidence that all production operations, and any required inspections, have been completed as planned, or as otherwise documented and authorized.

g. Implementing methods for the prevention, detection, and removal of foreign objects. Refer to MPD 5340.1, and MSFC–STD-3598, as applicable.

h. Providing for, monitoring and controlling suitable work environment, utilities, and supplies, such as water, gasses, and electricity and chemical products, as specified in the applicable product requirements. Refer to MPR 5340.1, MSFC-STD-246, for more details concerning environmentally controlled work areas.

<b>Marshall Procedural Requirements</b>		
<b>ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 9 of 15</b>

*Note: Work environment includes buildings, rooms, environmentally controlled work areas, clean rooms, and flow benches. Product specific requirements can include temperature, humidity, lighting, cleanliness, and protection from electrostatic discharge, etc.*

i. Any specific instructions needed to control how the product is to be handled, stored, or otherwise dispositioned, while the hardware is under process owner's control. Refer to MPR 6430.1, and MPR 6410.2, if applicable.

j. Any additional information (illustrations, diagrams, or instructions) as necessary to specify workmanship or provide supplemental processing instructions, in addition to those mentioned above.

2.3 For flight hardware/software processes, the process owner shall verify the production process, documentation, equipment, tools and software programs prior to use for production of customer's hardware/software.

2.3.1 Verify that the production processes, process control documentation, equipment, tooling, and software are capable of producing parts and assemblies that meet requirements. This may be done by producing one or more representative production items which are then inspected or tested to verify that they meet applicable requirements.

2.3.2 Ensure that production equipment, tools and software are properly maintained, periodically inspected, and stored when not in use, such that the capability to produce conforming end-product is preserved as needed, in accordance with project product requirements.

2.3.3 When changes occur that invalidate the original production process verification results (e.g., engineering design changes, production process changes, tooling changes), update process control documentation to reflect necessary changes, obtain approvals from organizational management and any required customer, project, and/or statutory/regulatory approval authorities in accordance with contract, project, and/or statutory/regulatory requirements, and repeat the production process verification steps above to ensure that the process still produces conforming product.

2.4 The process owner shall validate (if applicable) any production processes where the resulting product cannot be verified by subsequent inspection or test, and therefore, deficiencies in the product would become apparent only after the product is in use. These processes may require special controls to ensure conformance of the resulting product output, which may include:

2.4.1 Special criteria for review and approval of processes controls by specific subject matter experts.

<b>Marshall Procedural Requirements</b>		
<b>ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 10 of 15</b>

2.4.2 The use of specific methods, procedures, equipment, records, and special qualification of personnel.

2.4.3 Revalidation, when changes occur that invalidate the original validation results.

2.5 The process owner shall ensure that production operations are carried out in accordance with approved process control and any applicable work authorizing documentation (e.g., drawings, parts lists/bills of materials, process flow charts, plans, travelers, routers, work orders, process cards, inspection documents, list of specific or non-specific tools and numerical control machine programs required and any specific instructions on their use).

2.6 The process owner shall ensure the quality of the work is controlled and validated, if work is planned to be transferred on either a temporary basis or permanent basis to a qualified contractor or partnering organization; conformity of the work to requirements is planned, controlled and validated using processes defined by the responsible MSFC organization.

2.7 The process owner shall coordinate as required with SMA to ensure appropriate SMA involvement for quality sensitive or safety critical hardware, software and operations, in accordance with MPR 8730.1 and MWI 8715.15.

2.8 Any nonconforming product identified during the production processes are handled in accordance with MPR 8730.3. Refer to MPR 8730.3 for additional information.

2.9 The process owner shall ensure the requirements from NPR 7150.2 and NPR 2810.1 are addressed for software processes, where applicable.

2.10 Managers of these processes shall periodically review the processes under their purview for effectiveness, and initiate any root cause analysis or process improvement methodologies appropriate to their findings.

*Note 1: Evidence of process reviews for effectiveness may include updates to instructions and other process documentation, as well as employee performance evaluation and training processes for any process implementation issues.*

*Note 2: Effectiveness may be defined on a scale of 1-5 as illustrated below, or by some other suitable measure.*

<b>Marshall Procedural Requirements ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 11 of 15</b>

Process Management Standard, Mallory, Richard, *Quality Standards for Highly Effective Government*, Trafford Publications, 2014

Standard Process	Measurements	Process improvement / employee empowerment
0 – Process is not standardized. 1 – A process flowchart or procedure document exists. May not be current or complete. 2 - Process flowchart or procedure document exists and is current/ complete. 3 - Process flow is regularly updated. Aim is clear and periodic feedback is obtained. 4 – Flowchart or procedure document is regularly referenced and is used for training. Regular feedback is provided. 5 – Flowchart is uniformly used at an auditable standard. It is linked to metrics and continuous improvement efforts.	0 – Customer requirements are unknown. 1- Some customer requirements have been established, but are often based on dissatisfaction, waste, or error. 2 – Customer requirements have been established and validated. 3 - Key process measures exist, and at least one is regularly updated. 4 – Several key process measures - validated with customer requirements, and regularly updated. 5 –The process is stable, and performing within control limits. Measures are linked to benchmarks.	0 – No systematic improvement efforts. No employee involvement. 1 – A few process improvements - all based on management initiatives. 2 – A few process improvements based on employee suggestions. 3 – A fact-based structure for analysis and problem solving is in place. 4 – The work force participates in continuous improvement and it follows an established problem solving structure – <i>tools are used</i> . 5 – There is evidence of continuous systematic improvement and measurable, positive results.

**COMPLIANCE IS MANDATORY**  
**DIRECTIVE IS UNCONTROLLED WHEN PRINTED**  
 Verify current version before use at <https://dml.msfc.nasa.gov/directives>

<b>Marshall Procedural Requirements</b>		
<b>ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 12 of 15</b>

## **APPENDIX A.**

### **DEFINITIONS**

Key Characteristics. An attribute or feature whose variation has a significant effect on product fit, form, function, performance, service life, or producibility, that requires specific actions for the purpose of controlling variation.

Management. Appropriate supervisor (e.g., Group, Department, Office, Directorate).

Process. Application of interrelated resources and activities that transform inputs into outputs. (Resources may include personnel, finance, facilities, equipment, techniques, and methods.)

Process Owner. The single, lowest-level organization or function with institutional responsibility for overseeing a process to ensure it is implemented effectively.

Product. That which is the end result of a process, e.g., hardware, software, reports.

Production. Application of resources and processes to transform materials, subproducts, and/or requirements into a hardware and/or software product.

Quality Sensitive. A term used to identify inspection and test verification by the SMA Directorate for flight hardware, flight software, and flight-associated ground support equipment; deliverable products that are to be assembled into a launch vehicle and associated equipment for testing, handling, launching, servicing, and maintaining a vehicle in space; qualification and requalification hardware; and hardware or software procured for development activities when the data resulting from development activities will be used in the “justification for qualification” of flight hardware, software, or flight-associated hardware. Hardware to be used in a hazardous operation may also be designated as quality sensitive by the responsible organization when included in the program/project quality planning documentation.

<b>Marshall Procedural Requirements ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 13 of 15</b>

**APPENDIX B.**

**ACRONYMNS**

<b>MPD</b>	<b>Marshall Policy Directive</b>
<b>MPR</b>	<b>Marshall Procedural Requirements</b>
<b>MSFC</b>	<b>Marshall Space Flight Center</b>
<b>MWI</b>	<b>Marshall Work Instructions</b>
<b>NPD</b>	<b>NASA Policy Directive</b>
<b>NPR</b>	<b>NASA Procedural Requirements</b>
<b>NRRS</b>	<b>NASA Records Retention Schedules</b>
<b>OWI</b>	<b>Organizational Work Instruction</b>
<b>SMA</b>	<b>Safety and Mission Assurance</b>
<b>STD</b>	<b>Standard</b>

**COMPLIANCE IS MANDATORY**  
**DIRECTIVE IS UNCONTROLLED WHEN PRINTED**  
Verify current version before use at <https://dml.msfc.nasa.gov/directives>

<b>Marshall Procedural Requirements ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 14 of 15</b>

**APPENDIX C.**

**(RESERVED FOR VERIFICATION MATRIX)**

None

<b>Marshall Procedural Requirements</b>		
<b>ED01</b>		
<b>Process Control</b>	<b>MPR 1280.2</b>	<b>Revision H-1</b>
	<b>Date: March 1, 2016</b>	<b>Page 15 of 15</b>

## **APPENDIX D.**

### **RECORDS**

Records generated as a result of hardware and software production process activities are maintained in accordance with NPR 1441.1, NRRS 1441.1, MPR 1440.2, and the applicable program/project Data Management Plan requirements. In addition, the following records are retained by the responsible custodian in accordance with specific record retention schedule/disposition, as described below:

D.1 Process control documentation, and any applicable work authorizing documentation, are retained by the organization responsible for the hardware/software production process in accordance with MPR 1410.1, or other applicable governing documentation system. MPR 1410.1 provides specific retention schedule/disposition information for organizational issuances which document organizational processes, as well as program/project data or processes.

D.2 Inspection records are retained in accordance with MPR 8730.1.

D.3 Nonconforming product records are retained in accordance with MPR 8730.3.