

MPG 1280.2

REVISION E

EFFECTIVE DATE: May 12, 2003

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# **MARSHALL PROCEDURES AND GUIDELINES**

**ED01**

## **PROCESS CONTROL**

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### DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	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 Previous history retained in system as part of canceled or superseded ISO Document files.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.

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## PREFACE

### **P.1 PURPOSE**

The purpose of this procedure is to establish a consistent method for the control of hardware and software processes that directly affect the quality of products.

### **P.2 APPLICABILITY**

This MPG is applicable to all Center organizations and to all contractors performing work for the Center as contained in the provisions of the Marshall Management System.

### **P.3 AUTHORITY**

MPD 1280.1, "Marshall Management Manual"

### **P.4 APPLICABLE DOCUMENTS**

- a. MPG 1410.2, "Marshall Management Directives System"
- b. MPG 8730.1, "Inspection and Testing"
- c. MPG 1440.2, "MSFC Records Management Program"
- d. MPG 3410.1, "Training"
- e. MPG 8730.4, "Statistical Techniques"
- f. MPG 1280.7, "Servicing"
- g. NPD 2820.1, "NASA Software Policies"
- h. MPG 2810.1, "Security of Information Technology"
- i. MPG 1410.1, "Document and Data Control for Organizational Issuances"
- j. MPG 8730.3, "Control of Nonconforming Product"

### **P.5 REFERENCES**

None

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**P.6 CANCELLATION**

MPG 1280.2D dated May 15, 2001

Original signed by  
Axel Roth for

A. G. Stephenson  
Director

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## DOCUMENT CONTENT

### 1. DEFINITIONS

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

1.2 Master Process List. A list of all processes that affect the quality of a product. Organizational Work Instruction (OWI) master list can serve as the master process list. If all processes are not documented via the OWI master list, a separate process list must be generated and maintained current.

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

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

1.5 Production. Application of resources and processes to transform materials, sub-products, and/or requirements into a hardware and/or software product.

1.6 Qualified Operators. Personnel deemed capable and competent to perform a process by management.

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

1.8 Key Characteristics. The features of a material, process, or part whose variation has a significant influence on product fit, performance, service life, or manufacturability.

### 2. RESPONSIBILITIES

2.1 Management. Management is responsible for:

2.1.1 Identifying the process owner.

2.1.2 Reviewing at least annually the effectiveness of processes being implemented by their subordinates.

2.1.3 Addressing concerns about the effectiveness of processes brought to their attention.

2.1.4 Ensuring that controlled processes are being implemented

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by subordinates.

2.2 Process Owner. The process owner is responsible for:

2.2.1 Ensuring that processes related to production, installation, or servicing are completed under controlled conditions and methods.

2.2.2 Developing work instructions for all such processes in accordance with this procedure that meet the requirements outlined in MPG 1410.2, "Marshall Management Directives System," or MPG 1410.1, "Document and Data Control for Organizational Issuances."

2.2.3 Reviewing at least annually the effectiveness of processes.

2.2.4 Ensuring the review and approval of documented procedures by appropriate management.

### 3. PROCEDURE

Refer to the flow diagram in section 5 for further information; sub-paragraph numbers match flow diagram blocks.

Actionee		Action
Management	3.1	Identify the processes that affect product quality in your immediate organization and identify the process owner (i.e. Master Process List). This list shall be documented as a record. Review to ensure that these processes are carried out under controlled conditions. The results of this review shall be documented as a record.
Process Owner	3.2	Plan for product realization, taking into consideration:
	3.2.1	Establishment of process controls and development of control plans where key characteristics have been identified.
	3.2.2	Identification of in-process verification points when adequate verification of conformance cannot be performed at a later stage.
	3.2.3	Design, manufacture, and use of tooling so

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that variable measurements can be taken, particularly for key characteristics.

- 3.2.4 Processes where the resulting product cannot be fully verified by subsequent inspection and testing.
- Process Owner 3.3 Develop and/or improve controls for the process to ensure that the process is carried out under controlled conditions. The following items shall be addressed:
- 3.3.1 Documented procedures/instructions, where the absence of such could adversely affect quality.
- 3.3.2 Availability of and compliance with specified standards, codes, customer requirements, documented procedures, and quality plan.
- 3.3.3 Use and maintenance of suitable equipment, including monitoring and measuring equipment.
- 3.3.4 Monitoring and control of specific process parameters and product characteristics as well as measurement, where applicable.
- 3.3.5 Necessary inspections and tests in accordance with MPG 8730.1, "Inspection and Testing." If the results cannot be fully verified by subsequent inspection and testing of the product, the processes shall be completed by qualified operators and/or shall require continuous monitoring and control of process parameters to ensure that the specified requirements are met.
- 3.3.6 Accountability for all product (e.g., parts quantities, split orders, nonconforming product).
- 3.3.7 Records shall be maintained to provide evidence that all manufacturing and inspection operations have been completed as planned, or as otherwise documented and authorized.

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- 3.3.8 Prevention, detection, and removal of foreign objects.
- 3.3.9 Suitable work environment needed to achieve conformity to product requirements. Work environment includes but is not limited to buildings, workspace, and associated utilities.
- 3.3.10 Monitoring and control of utilities and supplies such as water, compressed air, electricity and chemical products to the extent they affect product quality. (Note: Factors that may affect conformity of the product may include temperature, humidity, lighting, cleanliness, protection from electrostatic discharge, etc.)
- 3.3.11 Supporting services (such as transport or communication), where applicable, needed to achieve conformity to product requirements. Refer to the appropriate Center-level documentation.
- 3.3.12 Criteria for workmanship, stipulated in the clearest practical manner (e.g., written standards, representative samples or illustrations).
- 3.3.13 Validation, and revalidation as necessary, of any processes where the resulting output cannot be verified by subsequent monitoring or measurement of product, or where deficiencies become apparent only after the product is in use.
- 3.3.14 Training of personnel shall be, in accordance with MPG 3410.1, "Training," to ensure that processes are completed by qualified operators.
- 3.3.15 Records shall be maintained for qualified processes, equipment, operators, and inspectors.

Process  
Owner

- 3.4 Carry out production operations in accordance with approved production documentation (e.g., drawings, parts lists/bills of materials, process flow

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charts, plans, travelers, routers, work orders, process cards, inspection documents, list of specific or non-specific tools and numerical control (NC) machine programs required and any specific instructions on their use, etc.).

- |                                 |      |  |
|---------------------------------|------|--|
| Management                      | 3.5  | Identify persons authorized to approve changes to processes.   |
| Management,<br>Process<br>Owner | 3.6  | Identify and obtain acceptance of changes that require customer and/or regulatory authority approval in accordance with contract or regulatory requirements.   |
| Process<br>Owner                | 3.7  | Document and implement approved changes affecting processes, production equipment, tools, and programs.  |
| Process<br>Owner                | 3.8  | Assess the results of changes to production processes to confirm that the desired effect has been achieved without adverse effects to product quality.   |
| Process<br>Owner                | 3.9  | Validate production equipment, tools and programs prior to use in accordance with documented procedures. Validation shall include verification of the first article produced to the design specification.                              |
| Process<br>Owner                | 3.10 | Maintain and periodically inspect production equipment, tools and programs according to documented procedures.   |
| Process<br>Owner                | 3.11 | Establish storage requirements, including periodic preservation/condition checks, for production equipment and tooling in storage.   |
| Process<br>Owner                | 3.12 | If work is planned to be transferred on a temporary basis to a qualified contractor or partnering organization, the quality of the work will be controlled and validated using processes defined by the responsible MSFC organization. |
| Process<br>Owner                | 3.13 | Ensure the requirements of Servicing as outlined in MPG 1280.7 are addressed for servicing processes, where applicable.  |

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- Process Owner 3.14 When appropriate, identify applicable statistical techniques needed for establishing, controlling, and verifying the process capability and product characteristics as required by MPG 8730.4, "Statistical Techniques."
- Process Owner 3.15 Ensure the requirements from NPD 2820.1, "NASA Software Policies," and MPG 2810.1, "Security of Information Technology," are addressed for software processes, where applicable.
- Process Owner 3.16 Implement the developed procedures as initiated by customers via work requests. The work requests shall be maintained as a record for hardware processes, where applicable.
- Management/ Process Owner 3.17 At a minimum, annually review the effectiveness of the hardware and software processes, the appropriate master document lists, documented procedures, and requirements for records in your immediate organization. The review shall include both the implementation of the process by subordinates (record could be performance review) as well as the effectiveness of the process itself (record could be OWI review record). The results of this review shall be documented as a record.
- Process Owner 3.18 In the event of process nonconformity, take appropriate corrective action. Identify and control any nonconforming product. (See MPG 8730.3, "Control of Nonconforming Product.")
- Process Owner 3.19 Update management system and organizational documents containing the controls indicated above in 3.3, including the master documents list. When work instructions are developed or revised, they shall be written in accordance with MPG 1410.2, "Marshall

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Management Directives System," and MPG 1410.1, "Document and Data Control for Organizational Issuances," and maintained in accordance with MPG 1440.2, "MSFC Records Management Program."

#### **4. RECORDS**

The following records shall be maintained per MPG 1440.2, "MSFC Records Management Program," with retention time to be specified in the applicable work instructions, where not listed below:

- 4.1 Master Process List and Review (Reference 3.1)
- 4.2 Product realization planning (Reference 3.2)
- 4.3 Manufacturing and Inspection (Reference 3.3.7)
- 4.4 Qualified Processes and Personnel (Reference 3.3.15)
- 4.5 Persons authorized to approve changes to processes (Reference 3.5)
- 4.6 Work authorization requests (Reference 3.16)
- 4.7 Annual process reviews (including Supervisor and Process Owner reviews) (Reference 3.17)

#### **5. FLOW DIAGRAM**

See next page for diagram.

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