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Space Administration

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George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

ED43

MULTIPROGRAM/PROJECT COMMON-USE
DOCUMENT

**MSFC ENGINEERING
DOCUMENTATION
STANDARD**

Approved for Public Release; Distribution Unlimited

CHECK THE MASTER LIST— VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Cancelled)	Document Revision	Effective Date	Description
Revision	D		General Revision – Deleted document preparation requirements excluding drawings and parts lists. Data included in MWI 7120.4. Previous history retained as part of superseded or cancelled MSFC Documentation Repository files.
Revision	E		Para 2.j Replaced CM-INST-002 with “MSFC Forms, All MSFC forms are accessible at http:// starbase.msfc.nasa.gov:8000/forms.” Para 4.2.2, deleted “or CM-INST-002”. Para 5.1.2.1 deleted and renumbered subsequent paragraphs. Para 5.2.2 deleted last sentence, “Forms and preparation instructions can be found in CM-INST-002.” Para 5.2.3 deleted “per CM-INST-002” in last sentence. Tables I, II, III, and IV, deleted references to “CM-INST-002.” Para 5.4.1.b deleted “(see CM-INST-002)”.
Revision	F		CONTENTS added “4.4.4. ICMS Database Reports.” Deleted paragraph 2.1 and paragraphs k., l., and m. and renumbered paragraphs accordingly. 4.1.c., deleted “that is authorized for release.” 4.1.d. deleted 2 nd sentence. 4.2.2.a. deleted 2 nd sentence. 4.3.2.2, replaced “in accordance with MIL-STD-130 and MIL-STD-129, part and bulk marking, respectively.” with “as shown below.” To satisfy RCAR 177, paragraphs 4.3.3 a. through c. are changed to read: “4.3.3.3 <u>Matched Set Dash Numbers</u> . Dash numbers shall be assigned to two or more matched or machined parts that are not interchangeable. The following rules apply: a. When an assembly is created having matched parts, each part must be identified with a dash number and a separate EPL. b. The next higher assembly(s) will identify each matched part in the drawing(s) and the EPL(s) until they are reassembled as a matched set. The assembling drawing will have a note stating “Matched Set” next to the find numbers. This note number will also be added to the EPL. c. Matched parts drawing requirements shall be per MSFC-STD-2806.” 4.4.2 Replaced sentence with “The Release Desk shall be the single point of release for MSFC in-house projects' flight and flight-related ground support equipment (GSE) configuration documentation in accordance with the documentation approval matrix contained in each project's configuration management plan.” 4.4.2.a., replace text with “The Release Desk may release nonconfiguration documentation as defined in the project's data management plan. ”Delete “NOTE: Manufacturing must sign all FEO's and FEPL's.” Added new paragraphs 4.4.4 through 4.4.4.5. ICMS Database Reports. 4.5.1, deleted “according to the requirements of MIL-STD-100 and.” 4.5.2 Replaced text with: “A complete set of original drawings and parts lists and a listing of all specifications and standards and ancillary documents used for the design definition shall be obtained and placed in the MSFC Repository. When available, drawing trees, indented part lists, and/or associated listings shall also be placed in the MSFC Repository. MSFC Form 2896 shall accompany the package.” 4.5.3.b, 2 nd para, add “and documented in the configuration management plan” after “systems engineer” 5.2.2, delete “MSFC Form 421-1,” in first sentence and added “shall be prepared according to the format specified in MSFC-STD-2806 and” 5.3.4, 1 st sentence changed to read “Although the Secretariat is responsible to review the package, the Release Desk also reviews each approved package to ensure that all the required forms are included and properly

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			<p>completed." Change 2nd sentence to read: "If corrections are required, the Release Desk shall return the package to the Secretariat who in turn will forward to the OPR designee."</p> <p>5.3.7, 1st sentence changed to read: "Although the Secretariat is responsible to review the package, the Release Desk also reviews each approved change package to ensure that all the required forms are included and properly completed." Change 2nd sentence to read as follows: "If corrections are required, the Release Desk shall return the package to the Secretariat who in turn will forward to the OPR designee."</p>
Revision	G		<p>Paragraph 3 - deleted duplicate definitions contained in cited documents (2.c and 2.d); deleted forms from definitions (2.e, 2.f, 2.g, 2.i, 2.j, 2.k, 2.l, and 2.n) and added form numbers to form titles when used in the text.</p> <p>5.2.1.f., Added 2 new sentences at the end of paragraph: " An EO shall not be written to delete parts that were added by a previous EO that has not been incorporated. The EO must be canceled and reissued in accordance with paragraph 5.2.1.g."</p>

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FOREWORD

This standard specifies the requirements and instructions for releasing MSFC configuration documentation through the MSFC Release Desk. It also specifies the requirements for preparation of engineering drawings and parts lists. This standard shall be used only for MSFC in-house programs/projects.

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1. SCOPE

This document specifies the requirements and instructions for releasing Marshall Space Flight Center (MSFC) configuration documentation as specified in MWI 7120.4. It also specifies the requirements for preparing engineering drawings and parts lists. This standard is intended for MSFC in-house use only.

2. APPLICABLE DOCUMENTS

- | | |
|-----------------------|--|
| a. MPG 8040.1 | Configuration Management, MSFC Programs / Projects |
| b. MPG 8040.3 | Product Traceability |
| c. MWI 2210.1 | MSFC Documentation Repository Input/Output and Data Management Project Requests |
| d. MWI 7120.4 | Documentation Preparation, Programs/Projects |
| e. MWI 8040.2 | Configuration Control, MSFC Programs/Projects |
| f. MWI 8040.3 | Deviation and Waiver Process, MSFC Programs/ Projects |
| g. MSFC-MNL-1951 | Change Processing, Tracking, and Accounting System Users Guide |
| h. MSFC-STD-2806 | MSFC Tailoring Guide for the Global Drawing Requirements Manual |
| i. MWI 8040.5 | Floor Engineering Orders and Floor Engineering Parts Lists (FEOs/FEPLs) |
| j. MSFC Forms | All MSFC forms are accessible at http://starbase.msfc.nasa.gov:8000/forms |
| k. H4/H8 | Commercial and Government Entity (CAGE) Cataloging Handbook |
| l. Global Engineering | Drawing Requirements Manual, ninth edition 1995 |
| m. OWI ED43-017 | MSFC Engineering Drawing Checking |

3. DEFINITIONS

The following acronyms/definitions are related to the MSFC Integrated Configuration Management System (ICMS) and Change Processing, Tracking, and Accounting System (CPTAS) (refer to MSFC-MNL-1951). The definitions in MPG 8040.1, MWI 8040.2, MWI 8040.3, and MWI 7120.4 apply.

- a. Baseline. Point at which the Configuration Control Board takes control of the drawing/document.
- b. Commercial and Government Entity (CAGE) Code. The CAGE Code is a five-character code listed in Cataloging Handbook H4/H8 that is assigned to commercial and Government activities that manufacture or develop items, or provide services and/or supplies for the Government. When used with a drawing or part number, the CAGE

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Code designates the design activity to which the drawing or part number is assigned. The CAGE Code was previously called manufacturer's code, code identification number, or Federal Supply Code for Manufacturers (FSCM).

c.. Effectivity. As it pertains to ICMS, an effectivity is the project code plus numerical effectivity, e.g., MG01, etc., and represents the configuration of a flight or experiment.

d. Find Number. The Find Number is the numbered item on the Engineering Parts List (EPL) that corresponds to the numbered callout on a Drawing. Each numbered part on the EPL shall be identified by the corresponding find number on the drawing.

e. Lot Number. A unique number assigned to identify a group of identical parts that are produced concurrently by a common process. Lot number requirements apply to procured parts and parts manufactured in-house.

f. Part Identification Number (PIN). See paragraph 4.3.2.2.

g. Release. The point at which a document is electronically entered into ICMS and has the Release Desk "football" stamp applied.

h. Serial Number. A permanent number assigned sequentially to selected hardware which, in conjunction with the part number, permits isolation of the item and facilitates hardware allocation, traceability, accountability, location determination, and identification of design change effectivity.

4. GENERAL REQUIREMENTS

4.1 Engineering Documents Usage.

a. The drawing, EPL (MSFC Form 420), Engineering Order (EO) (MSFC Form 421), and specification (which includes all book form requirements) are the primary engineering "as-designed" documents described herein and in MWI 7120.4, all of which are released through the Integrated Configuration Management System (ICMS).

b. At the request of the project manager, the S&MA office or designee is responsible for generating the as-built documentation list from the inspection records. The CM project support organization shall be responsible for performing the as-designed/as-built comparison at the request of the project manager in support of a physical configuration audit. The project manager in coordination with S&MA and CM shall allow sufficient time in the project schedules to perform inspections, physical configuration audits, and to resolve discrepancies.

c. Each "as-designed" document shall be listed in the Engineering Change Request (ECR) (MSFC Form 2327).

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d. The Documentation Package/Routing Slip (DP/RS)(MSFC Form 3418) is used for tracking authorized released documents.

e. The Deviation Approval Request (DAR)(MSFC Form 833) process is defined in MWI 8040.3.

f. Checking engineering documentation shall be accomplished in accordance with OWI ED43-017.

4.2 Documents Released in the MSFC ICMS.

4.2.1 Drawings. Drawings shall be prepared in accordance with the Global Drawing Requirements Manual (GDRM), ninth edition, and its tailoring guide, MSFC-STD-2806.

4.2.2 Engineering Parts List (EPL). The EPL identifies part(s) information including release authority, part(s) numbers, quantities, weights, traceability requirements and part(s) descriptions required to build the respective assemblies and subassemblies. MSFC separates the EPL from the drawing to allow it to be expeditiously prepared and changed separately from the drawing. In many cases, the drawing will not have to be changed if the find (item) number only (no part number) appears on the assembly drawing.

a. All parts called out in the assembly drawing shall be listed by find (item) number on the EPL for the drawing.

b. The EPL must pass a manual and electronic edit before release.

For additional information, refer to the official MSFC forms preparation instructions.

4.2.3 Floor Engineering Parts List (FEPL) (MSFC Form 420). The FEPL is used to expedite a change to an EPL at the shop floor level. New parts (find numbers) shall not be added by a FEPL; the FEPL must at all times match the drawing. FEPL's must be processed in sequential order. Instructions for processing FEPL's are in MWI 8040.5. The FEPL shall be released as a CCB-approved official EPL prior to final acceptance of hardware for testing, shipping, or storage. When all approvals are obtained, it will be the same as a routine EPL.

4.2.4 Engineering Order (EO). The EO describes changes to a physical part/assembly. Additional changes made during a revision, in addition to the incorporation of outstanding EO's, shall be documented on a "non" effectivity EO. Changes to an assembly that affect the EPL only may be made by EPL revision in lieu of an EO, with the exception of adding new parts or deleting find numbers. **The EO itself does not change the drawing or the EPL; it must be incorporated to effect the drawing change.**

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4.2.5 Floor Engineering Order (FEO) (MSFC Form 421). The FEO is used to expedite release of a change to a drawing (or EPL) that has reached the shop floor. It is usually initiated by the shop and authorizes fabrication before all approvals have been obtained. However, the FEO shall be released as a CCB-approved official EO prior to inspection. For additional details, refer to MWI 8040.5.

4.2.6 Specifications (SPEC)/Standards (STD)/Interface Control Documents (ICD). Configuration documentation release is described in paragraph 5.3.

4.2.7 Document Release List (DRL) (MSFC Form 420-5). The DRL is used only in the release package to maintain status information (SPEC, STD, and ICD).

4.2.8 Documentation Package/Routing Slip (DP/RS). A DP/RS shall accompany each package of drawings/DRL's/EPL's/EO's for tracking purposes. The DP/RS has a unique number which may be referenced on the ECR, CCBD, work orders, etc., to specify the documentation numbers involved.

4.3 Information on Specific MSFC ICMS Effectivities and Drawing, Part, and Dash Numbering, Etc.

4.3.1 Drawing Numbers. Drawing numbers are assigned by the Release Desk. The Release Desk, upon request, will assign blocks of numbers for particular projects.

4.3.2 Part Numbers (P/N) Each MSFC part or assembly part number includes a drawing number and a unique dash number. The MSFC part/assembly procurement specification number shall not be used as a part number. The procurement specification, which may be used to procure more than one part, is referenced on the part drawing.

4.3.2.1 Serial/Lot Number. Serial/lot numbers, when required, according to the traceability criteria of MPG 8040.3, shall be assigned and logged by the Release Desk. Design shall specify the requirements for them on the engineering documentation (drawings, specifications, and purchase order requests).

The following information shall be provided to the Release Desk at the time of the request:

- a. Drawing number
- b. Part number(s) for which serial/lot numbers are required
- c. Quantity of parts by part number (for serial numbers)
- d. Number of lots required per part number
- e. Unique serial or lot number construction, if required

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When MSFC-designed equipment is to be procured, the MSFC engineering personnel submitting the purchase request shall obtain the required serial and lot numbers, as identified above, and include them in the purchase request.

4.3.2.2 Unique Part Identification Numbers (PIN). The MSFC part/assembly PIN is the P/N (4.3.2) and the serial or lot number (4.3.2.1) and provides a path to the "as-built" part identification "data." In addition, MSFC's CAGE CODE, 14981, shall precede the P/N as shown below.

14981-10M12345-1-001

	Serial No. 1 (Serialized for the first item)
	MSFC Part Number
	MSFC CAGE CODE

4.3.2.3 Assembly Identification Data. In addition to the part information in 4.3.2.2, the assembly identification shall include the drawing revision and EPL dash number.

4.3.3 Dash Numbers. A dash number system shall be used to identify parts, assemblies, or installations, which are completely described on drawings. Such part numbers shall consist of the drawing number with a dash number suffix. The use of dash numbers is classified as follows:

- a. To denote the shown and opposite-hand part of details, assemblies, or installations.
- b. To designate a part detailed on a detail, assembly, or installation drawing, including parts or bulk material, e.g., the pieces that make up a window of laminated glass, molded rubber parts with metal weldments, tape, wires, adhesives, etc.

NOTE: Dash numbers shall be assigned to parts or bulk material, e.g., the pieces that make up a window of laminated glass, molded rubber parts with metal inserts, weldments, tape, wire, adhesives, etc.

- c. To provide part numbers for the variations shown on tabulated and untabulated drawings.
- d. On tabulated detail drawings utilizing tabulation blocks, no other listing is required. For other untabulated versions, list the tabulated part numbers above the title block thus:

97MXXXXX-5	NOTED
97MXXXXX-3	NOTED
97MXXXXX-1	SHOWN

4.3.3.1 Odd Dash Numbers. The first part shown on a multidetail drawing shall be assigned a part number "basic drawing number -1." The -1 shall also be assigned as

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the part number to the first total version shown on an assembly or installation drawing. The identification shall be so noted immediately above the title block thus: 97MXXXXX-1 SHOWN. Detail parts defined on a "detail assembly" drawing shall be dash numbered with consecutive odd numbers, beginning with -3, i.e., -3, -5, -7, etc., if only one assembly is anticipated. If more than one assembly is anticipated, start numbering with -9 or higher.

4.3.3.2 Even Dash Numbers. Even dash numbers shall be used to denote opposite-hand (mirror image) parts, assemblies, or installations to those shown. The opposite part shall be assigned the next consecutive even dash number. For example: -2 would be the opposite of -1, -6 the opposite of -5, etc. The opposite part need not be pictured but must be noted. Where the opposite part is noted for a total version of an assembly, installation, or detail drawing, it shall be so noted above the title block thus:

97MXXXXX-2	OPPOSITE
97MXXXXX-1	SHOWN

Opposites of details completely described on detail assembly or installation drawings shall be noted in the callout on the body of the drawing. A part that is difficult to visualize as an opposite shall require a new drawing and drawing number. Dash numbered assemblies may share a drawing but must have separate EPL's. Multiple assemblies (-1, -3, -5, etc.) may be shown on the same drawing, but each must have its own separate parts list.

4.3.3.3 Matched Set Dash Numbers. Dash numbers shall be assigned to two or more matched or machined parts that are not interchangeable. The following rules apply:

- a. When an assembly is created having matched parts, each part must be identified with a dash number and a separate EPL.
- b. The next higher assembly(s) will identify each matched part in the drawing(s) and the EPL(s) until they are reassembled as a matched set. The assembling drawing will have a note stating "Matched Set" next to the find numbers. This note number will also be added to the EPL.
- c. Matched parts drawing requirements shall be per MSFC-STD-2806.

4.3.3.4 Bulk Material Dash Numbers. Dash numbers may be used to provide numbers for bulk materials, which are cut to fit at the point of assembly. The length, type material, etc., shall appear in the General Notes.

4.3.4 Identical Parts. Where two or more near identical parts are called out on the face of a tabulated drawing and an additional view is not required, i.e., two identical parts except for material or opposites, the different part numbers may be assigned to one find number and the usage so noted. The two dashes will require two EPL's. For example,

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-1 and -3 EPL's or -1 and -2 shown and opposite EPL's may share the same find numbers.

4.3.4.1 Reference Parts. Parts shall not be noted REF when they are identified by number. Such parts are shown in phantom. Repeated find numbers and part numbers shall be noted REF also.

4.4 ICMS Operations and Release Desk Functions.

4.4.1 ICMS Release. Drawing/document release is the point at which an initial issue or revision of a document becomes an official baselined "as designed" drawing/document in ICMS.

a. A DRL, EPL, or EO shall accompany each drawing or document being processed through the release system for release.

b. Under no circumstances shall a part be released more than once for the same top assembly and effectivity, i.e., only one configuration can exist for each effectivity and drawing revision.

4.4.2 Release Desk Functions. The Release Desk shall be the single point of release for MSFC in-house projects' flight and flight related ground support equipment (GSE) configuration documentation in accordance with the documentation approval matrix contained in each project's configuration management plan.

a. The Release Desk may release nonconfiguration documentation as defined in the project's data management plan .

b. The Release Desk stamp, applied on initial releases above the title block of the drawing or graphic sheet of the EO, will not appear on subsequent issue. For revisions, a new Release Desk Stamp is required beside the drawing revision block.

4.4.3 Distribution. The MSFC Documentation Repository is the single point for distribution of released documents in accordance with the distribution list prepared by the originating organization. The Repository requires the originator to complete MSFC Form 2896 in accordance with MWI 2210.1. The form is available electronically. The Repository maintains standard distribution lists, which should be updated by the originating organization.

4.4.4. ICMS Database Reports. Various reports and lists are generated to assist manufacturing, assembly, and inspection of flight hardware. Manufacturing and quality inspection may use the following reports in the build up and inspection process.

4.4.4.1 Generation Breakdown. This is an indented parts list reflecting the specific top assembly configuration.

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4.4.4.2 Engineering Master Parts List. This reflects the summation of parts and the identification of usage in a prescribed assembly. The information is tallied by the database based upon the release of drawings, EPL's, and EO's. This report is useful in (1) allowing shops to order parts based upon the quantity of vendor parts or materials, and (2) allowing a quick search of the configuration to identify the location of a specific part.

4.4.4.3 Periodic Activity. This identifies all the activities (released drawings, EPL's and EO's) that have occurred against a project based upon the project code within a specific time period.

4.4.4.4 Release Record List. This identifies all the EPL's and EO's released against a project.

4.4.4.5 As-designed/As-built Report. This identifies the differences between the as-designed configuration and the as-built configuration.

4.5 ICMS Requirements for Design Responsibility Transfer.

4.5.1 Transfer of Design Responsibility to MSFC. The transfer of design responsibility from a contractor or other design organization shall be accomplished as specified herein.

4.5.2 Requirements for Design Documentation. A complete set of original drawings and parts lists and a listing of all specifications and standards and ancillary documents used for the design definition shall be obtained and placed in the MSFC Repository. When available, drawing trees, indentured part lists, and/or associated listings shall also be placed in the MSFC Repository. MSFC Form 2896 shall accompany the package.

4.5.3 Documenting MSFC Changes to the Design Documentation. Two methods are available to document MSFC design changes to contractor or other design activity drawings:

a. Preparation of an altered item drawing is done when changes are expected to be simple and few. When anticipated that changes will be complex or numerous, conversion of the drawing set should be accomplished in accordance with paragraph 4.5.5.

b. If all or most of the changes are expected to be to a defined area of the contractor's design, a combination of the two methods is possible, utilizing the conversion method for the portion requiring extensive change and the "altered item drawing" method for the remainder. However, for any assembly converted, all subtier parts and assembly drawings must also be converted.

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The decision of which method to use, or whether to use a combination of the two, shall be made by the project manager or systems engineer and documented in the configuration management plan.

4.5.4 Preparation of an Altered Item Drawing. An altered item drawing shall be prepared in accordance with the Global Drawing Requirements Manual.

4.5.5 Conversion of Contractor or Other Design Activity Drawing to MSFC Drawings. The following actions are required for conversion to an MSFC drawing:

- a. Change the Cage Code, the drawing and part numbers, and design activity identification (logo) from contractor to MSFC.
- b. State in the revision description field, "Made from drawing XXXXXXXX, Cage Code No. XXXXX." Also, describe any additional changes made.
- c. Prepare EPL's utilizing MSFC Form 420 for all assemblies. Also prepare DRL's to release specifications and other documentation.

NOTE: If the format of the original design activity's parts list is sufficiently similar to MSFC Form 420 and provides the required input data, its use may be allowed, as is, or with necessary modification, to provide the ICMS input.

- d. After release, changes shall be made by EO's and drawing revisions to incorporate outstanding EO's.

5. DETAILED REQUIREMENTS

5.1 Engineering Parts List (EPL)

5.1.1 General. The EPL shall be used to: (1) list all components of an assembly; (2) release detail parts concurrent with or prior to release of their using assembly drawing; and (3) release "nonpart" documents referred to on the assembly drawing (e.g., schematics, etc.).

When an EPL is entered in the ICMS through the online system, confirmation data sheets are created. After the transaction is entered, a confirmation edit is run. If there are no errors, the transaction is locked and a confirmation data sheet printed. This sheet shall be used to obtain the approval signatures. These data sheets will serve in the same capacity as MSFC Form 420 for approval purposes. When the on-line system is not used, the EPL, MSFC Form 420, shall be utilized for appropriate signatures for all EPL transactions.

Release approval signature on the EPL being revised, and the approved CCBD, authorize the release of all subtier EO's and EPL's being automatically adjusted. The

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following message will automatically appear in the revision description of each EO and EPL data sheet being revised: “This revision issued to accomplish effectivity adjustment authorized by EPL/DRL (actual part number, drawing revision, dash number, and dash number revision appear here).”

NOTE: The term “usage” pertains to Top Assembly, Project Code, and Effectivity in part or in whole.)

5.1.2 Preparation. The confirmation data sheets shall be used to obtain the approval signatures when using the ICMS online system. When the on-line system is not used, MSFC Form 420 shall be used to obtain the approval signatures.

5.1.2.1 Preparing a FEPL. Preparation/procedures shall be as defined in MWI 8040.5.

5.1.3 Adjusting Effectivities. The effectivities of superseded and related EPL’s, and EO’s must be adjusted or matched if affected by a revision.

5.1.3.1 Adjusting Effectivities of Other EPL’s of an Assembly for which a New or Revised EPL is being Issued, creating an Effectivity Duplication. Only one assembly drawing revision (and, therefore, one EPL) can exist for a specific effectivity. When a new or revised EPL is issued with effectivities that overlap those of other EPL’s of the same assembly (same part number), the effectivities of the prior EPL’s must be decreased (adjusted) to avoid any duplication. This must be done concurrent with release of the new or revised EPL, as described below:

5.1.3.1.1 Automatic Method. The codes listed below are to be inserted in block 22, sheet “A”, MSFC Form 420 of the EPL to automatically accomplish the action indicated. The affected “made from” EPL and/or other existing EPL’s (of the **same** part number as the new or revised EPL) will be automatically revised and reissued by the Integrated Configuration Management System (ICMS) to eliminate duplication with the effectivity of the new or revised EPL. When revising an existing EPL, or creating a new EPL, insert “AA” to eliminate duplication of effectivities of other existing EPL’s.

NOTE: 10M12345-1B102A is an example of another existing EPL of the same part number as EPL 10M12345-1C101-; 10M12345-3B102A is not.

5.1.3.2 Adjusting/Matching the Effectivities of EO’s and EPL’s affected by Revision to the Effectivity of an Assembly. To maintain the effectivities of the releasing EPL’s of parts/assemblies consistent with the effectivity of their using assembly and the effectivity of EO’s consistent with the effectivity of the part/assembly to which they apply, these related EPL’s and EO’s must be revised to correct their effectivity. This must be done concurrent with release of the EPL being revised utilizing the following rules and methods as applicable:

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- a. The effectivities for which an assembly is released must include all of the effectivities called for by its using assemblies.
- b. The effectivities of an EO must be contained within the effectivity range of the part/assembly to which it applies.
- c. When the effectivity of the EPL of any assembly in the hierarchy is changed, the effectivity of all related (both subtier and higher) assembly **EPL's** must be revised accordingly. **Exceptions:** When the part/assembly has usage in other next assemblies for some or all of the effectivities being deleted.
- d. The effectivity of all outstanding EO's against these assemblies and their detailed parts must contain only the effectivity usage of the part/assembly to which it applies. **Exceptions:** (1) When the part/assembly has usage in other next assemblies for some or all of the effectivities being deleted; and (2) when it is not intended that the EO apply to some or all of the added effectivities.

No auto-adjust action will be taken on EPL's and EO's of subassemblies being added or deleted in conjunction with the auto-adjust transaction, if the package also contains other transactions to the deleted subassemblies' EPL's. The following rules apply in this situation:

- e. If subassemblies are being added, they must have the matching top assembly/project code/effectivity, or the package must include input forms for establishing the top assembly/project code/effectivity match; otherwise, the entire package will be rejected.
- f. If subassemblies are being deleted, the designer shall determine if the top assembly/project code/effectivity of the deleted subassemblies require revision and subsequently, must take action to delete any top assembly/project code/effectivity applications that are no longer valid after the auto-adjust action, either by current or anticipated future usage.

5.1.3.2.1 Semiautomatic Method. Check block 46 on the EPL B sheet being revised, and list on sheet C the part number and drawing revision of the EPL's and the part number and EO dash number of the EO's to be revised. Those listed will be automatically revised and reissued by the ICMS to match (increase/decrease) their effectivity the same as the effectivity increase/decrease of the EPL revision being released. This method is applicable to both subtier and higher-level assemblies.

5.1.3.2.2 Fully Automatic Method. Enter "FA" in block 22 of MSFC Form 420 for the EPL being revised. On the reverse side of MSFC Form 420, enter an "X" in Full Auto-Adjust, block 46, and enter the target Project Code and Effectivity in Full Auto-Adjust PC and Full Auto-Adjust Eff blocks for usage increases. Usage increase or decrease of this change will be automatically applied to (1) EO's to this assembly and subtier assemblies/parts

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and (2) EPL's for subtier assemblies. The configuration of the increased usage shall be the same as the configuration of the Project Code/Effectivity.

No auto-adjust action will be taken on EPL's and EO's of subassemblies being added or deleted in conjunction with the auto-adjust transaction, if the package also contains other transactions to the deleted subassemblies EPL's. The following rules apply in this situation:

- a. If subassemblies are being added, they must have the matching top assembly/project code/effectivity, or the package must include input forms for establishing the top assembly/project code/effectivity match; otherwise, the entire package will be rejected.
- b. If subassemblies are being deleted, the designer shall determine if the top assembly/project code/effectivity of the deleted subassemblies require revision and subsequently, must take action to delete any top assembly/project code/effectivity applications that are no longer valid after the auto-adjust action, either by current or anticipated future usage. This action must be accomplished manually according to paragraph 5.1.3.1.1, with the exception that EO's to the deleted assemblies and their subtier assemblies/parts and EPL's for their subtier assemblies may be corrected by auto-adjust action against the deleted assemblies.

5.1.3.3 Correcting Effectivities of Incorporated EO's. EO's incorporated into a drawing must, concurrent with release of the incorporating revision, be revised to delete the effectivities included in the effectivity of the new revision. Check Incorporated EO Effectivities, block 46, on the B sheet of the EPL being revised and list on sheet D the incorporated EO's. These EO's will be automatically revised and reissued to delete the effectivities included in the effectivity of the new drawing revision.

5.1.4 Engineering Parts List (EPL) Identification. The EPL consists of the assembly drawing number, dash number, and drawing revision letter plus an EPL dash number (101 to 199) and revision letter(s). The following rules apply to EPL's:

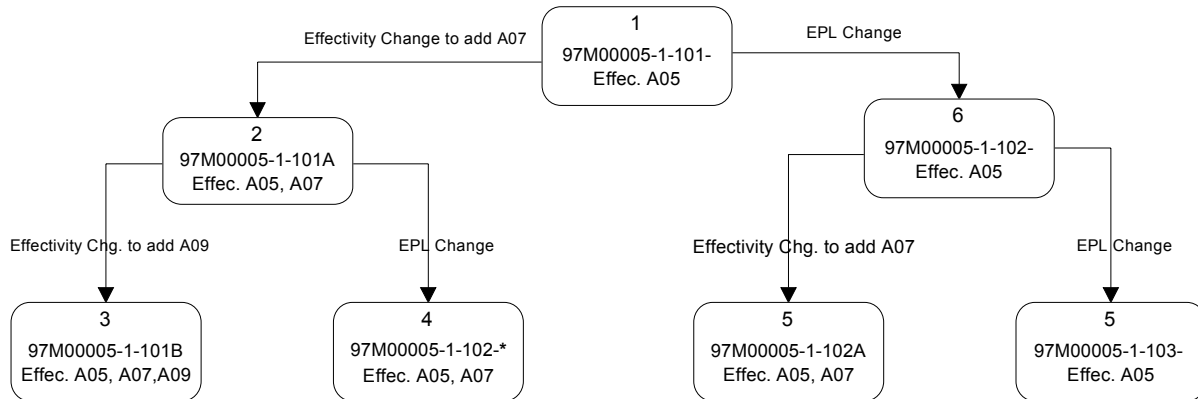
- a. Only one EPL is allowed per assembly dash number/drawing revision.
- b. A configuration definition change to the EPL shall be noted by changing the EPL dash number, regardless of a change or no change to the associated effectivity.
- c. An effectivity only change shall be made by changing the EPL dash number revision letter(s), e.g., 96M12345-101- would go to 96M12345-101A.
- d. Each EPL dash number and dash number revision is superseding. Only the numerically highest dash number (i.e., 103 vs. 102) is active, and only the alphabetically highest revision letter (i.e., B vs. A) is active.

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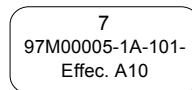
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NOTE: The EPL revision letter is not part of the part identification and shall not be in the Operations Maintenance Instruction, part marking/tagging, "as-built" configuration.

The following Figure 1 illustrates typical EPL reidentification steps resulting from various types of changes for effectivities that have **not** flown:



To create a new Assembly Drawing with a new Effectivity (A10), utilize a "make from" thus a Drawing Revision to Drawing 97M00005-1-102 * (4) above to create:



For which the same rules for Effectivity changes and EPL changes as above apply.

FIGURE 1. EPL Reidentification Steps

5.2 Engineering Order (EO)

5.2.1 **General.** The EO serves as an auxiliary to a previously released drawing and provides advance notice of a design or documentation change or correction to be made to the drawing.

- An EO is applicable to all next assemblies of the part/assembly to which it applies for the effectivity specified.
- The EO shall list all parts being affected.
- An EO shall always be written against (identified to) and describe changes to a physical part/assembly except in those cases where the drawing itself is documentary or procedural in content. In these cases, the drawing does not identify hardware, and the EO shall be written against the drawing number.

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d. When changes are similar and/or related in content, two or more EO's may appear on the same input form. The use of multiple EO's should be confined to the following:

(1) To describe an identical change for several parts or documentary drawings.

(2) To describe simple changes to several parts or documentary drawings which pertain to related overall system change.

e. The use of one EO per input form shall always be considered preferable when changes are complex or lengthy.

f. An EO may modify a condition created by a previously issued EO. The new EO shall state: "This EO supersedes the configuration established by EO ____." An EO shall not be written to delete parts that were added by a previous EO that has not been incorporated. The previous EO must be canceled and reissued in accordance with paragraph 5.2.1.g.

g. If changes to existing EO's are to be accomplished by taking the current EO effectivity to "none" and reissuing the EO under a new number, with the change incorporated, the new EO shall contain the following statement: "This EO cancels and supersedes EO___ in its entirety.

h. An EO may be created by an organization other than the design activity controlling the drawing. In all cases, the EO shall be approved by the controlling activity.

i. A released EO shall be revised only to change the CCBD, PCN, project code, or effectivity.

j. An FEO may create a new part/assembly dash number (i.e., -3, -5, etc.). If a new dash numbered part is required, the creation of the new dash number shall be written against the -1 assembly/part and contain all information required for manufacturing the assembly. For Instructions to complete and process an FEO, see MWI 8040.5.

k. The physical incorporation of the drawing change(s) detailed in an EO is usually accomplished at a later date. During the interim period, the EO is utilized as the revised portion of the drawing.

l. All outstanding EO's are part of the part identification. Revisions to EO's are not part of the part identification.

m. Higher numbered EO's or later dated EO's do not take precedence in the event of conflict with previously issued EO's unless so stated. Such conflict (where no precedence statement exists) is an engineering error, which requires correction.

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- n. In the event of conflict, drawing and EPL revisions do not take precedence over previously issued EO's which were not incorporated and which have effectivities common to the revised drawing and/or EPL. Such conflict is an engineering error that requires correction.
- o. Usually, the only revisions allowed to a drawing will be to incorporate EO's.
- p. Changes to assemblies wherein both the drawing and EPL are affected shall be accomplished simultaneously by EO. Section III of the EO shall be completed to reflect the EPL changes required.
- q. Changes to assemblies wherein only the EPL is affected shall be accomplished by EPL revision (i.e., not by EO). This applies only when no drawing change of any type is necessary. A complete, definitive revision description must be provided on the EPL revision input form.
- r. Outstanding EO's shall be incorporated into drawing revisions when their quantity or complexity becomes such that correct and ready interpretation of the intended or designed definition becomes difficult or questionable. As a general policy, outstanding EO's should be incorporated into the drawing within 90 days and/or when more than six EO's are outstanding.
- s. Signatures, organizations, and approvals will be defined by the Signature Approval Matrix found in the specific program/project Configuration Management Plan (CMP).
- t. The confirmation data sheets are created when an EO is entered into the ICMS through the online system. After the transaction is entered, a confirmation edit is run. If there are no errors, the transaction is locked and a confirmation data sheet printed. This sheet shall be used to obtain the approval signatures. When the on-line system is not used, the EO, MSFC Form 421, shall be utilized for appropriate signatures for all EO transactions.
- u. Floor EO's: Reference MWI 8040.5.

5.2.2 Preparation. The forms to be used for the EO system are the input form for Engineering Order (computer-prepared application data sheet), MSFC Form 421, hereinafter referred to as the "A" sheet, and the Engineering Order (Graphic Data Sheet), , hereinafter referred to as the "B" sheet. The "B" sheet shall be prepared according to the format specified in MSFC-STD-2806, and is mandatory for initial release.

5.2.3 Add New Parts. When calling for parts that are not listed on the EPL (and therefore no find number is assigned), the graphic data sheet (of the EO) shall show the callout bubble without the find number, and add the part number in parenthesis at the

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bubble. The part number, quantity description, etc., will be added to the back of the "A" sheet.

5.2.4 Create New MSFC Parts. Standard or vendor parts may be added by EO. MSFC parts shall be created by an EO. MSFC part number may be "created" on an MSFC detail drawing which can be called for on the EO and can be released with the same EO.

5.2.5 Correcting Effectivities of Incorporated EO's. EO's incorporated into a drawing must, concurrent with release of the incorporating revision, be revised to delete the effectivities included in the effectivity of the new revision.

5.2.6 Revising/Canceling EO's. An EO may be revised only to change the CCBD, PCN, project code, or effectivity. Technical changes will be made by issuing a new EO. The latest revised issue of an EO supersedes all previous issues. To cancel an EO, the effectivity will be changed to "None". Once an EO has been cancelled, it cannot be reinstated. All revisions shall be submitted on the "A" sheet only. For all revisions to an EO subsequent to the initial issue, only the computer printout shall be distributed. The words "RETAIN INITIAL GRAPHIC DATA SHEET" shall appear in the upper right corner of the printout. Graphic data sheets from the initial issue must be retained by the recipient for use with subsequent revisions

5.3 Release of Configuration Documentation

5.3.1 General. This chapter provides instructions for releasing MSFC configuration documentation specifications (SPEC's), standards (STD's), and interface control documents (ICD's).

5.3.2 Initial Package for Review and Release. The OPR designee prepares the initial package for review and release in accordance with the reviews and signatures set forth in the CMP Signature Matrix. The forms listed in Table 1 shall be used to assemble a specification/standard/ICD package, and Table II for drawings and parts lists for baseline release. The sources in parenthesis provide instructions for preparing these forms. The completed package shall be organized as shown in Table I and Table II.

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TABLE I. Initial Configuration Document Package Preparation Forms (Excluding Drawings and Parts Lists)

	<u>Title</u>	<u>MSFC Form</u>	<u>Release</u>
1.	Engineering Change Request (ECR)	2327	X
2.	Document Release List (DRL)	420-5	X
3.	Document Package Routing Slip (DP/RS)	3418	N/A
4.	Document Signature Page If Required (Refer to MWI 7120.4.)	N/A	X
5.	Specification/Standard/ICD (Refer to MWI 7120.4 for preparation instructions.)	N/A	X
6.	Configuration Control Board Directive (CCBD)	2312	X
7.	Repository Distribution List	N/A	X
8.	Document Input Record	2896	X

TABLE II. Initial Drawings and Parts Lists Package Preparation Forms

	<u>Title</u>	<u>MSFC Form</u>	<u>Release</u>
1.	Engineering Change Request (ECR)	2327	X
2.	Engineering Parts List (EPL) and Drawings	420	X
3.	Document Package Routing Slip (DP/RS)	3418	X
4.	Configuration Control Board Directive (CCBD) (paragraph)	2312	X
5.	Repository Distribution List	N/A	X
6.	Document Input Record	2896	X

5.3.3 Initial Package Disposition by CCB. The OPR designee shall forward the completed package to the appropriate CCB secretariat for processing through the CCB. The CCB then approves, approves with changes, or disapproves the package and issues a CCBD documenting the action taken. If the CCB approves the package as written, the CCB secretariat shall add the CCBD to the package, obtain a distribution list from the OPR designee for the Repository, and forward the package to the Release Desk for release. If the CCB approves the package with changes, the package and the CCBD describing the changes shall be returned to the OPR designee for corrections. The OPR designee shall make the CCB-directed changes and deliver to Drawing Checking for verification that the package is in agreement with the CCBD. Drawing

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Checking will forward the package to the CCB secretariat who will deliver to the Release Desk for release. A disapproved package shall also be returned to the OPR designee.

5.3.4 Package Distribution. Although the Secretariat is responsible to review the package, the Release Desk also reviews each approved package to ensure that all required forms are included and are properly completed. If corrections are required, the Release Desk shall return the package to the Secretariat who in turn will forward to the OPR designee. If corrections are not required, the package is released and forwarded to the Repository for distribution.

5.3.5 Revision Package for CCB Review and Disposition. The forms listed in Table III and/or Table IV shall be used to assemble a Configuration Document Revision Package, including drawings and parts lists. The OPR designee shall forward the change package to the appropriate CCB secretariat for processing through the CCB. The CCB then approves, approves with changes, or disapproves the package and issues a CCBD that approves and assigns a date for issuing the specification, standard, or ICD revision. The CCBD is attached to the package and returned to the OPR designee for preparation of the revised document.

TABLE III. Revised Configuration Document Package Preparation Forms

	Title	MSFC Forms	Release
1.	Engineering Change Request (ECR)	2327	X
2.	Document Release List (DRL)	420-5	X
3.	Document Change Package Routing Slip (DP/RS)	3418	X
4.	Document Signature Page If Required (Refer to MWI 7120.4)	N/A	X
5.	Revised Specification/Standard/ICD	N/A	X
6.	Configuration Control Board Directive	2312	X
7.	Repository Distribution List (If Changed)	N/A	X
8.	Document Input Record	2896	X

5.3.6 Revision Package Processing. The OPR designee shall generate the revision in compliance with the CCBD provided by the CCB secretariat and organize the completed package in accordance with Table III or Table IV. The OPR designee shall deliver the package to Drawing Checking for verification that the revision is in agreement with the CCBD. If corrections are required, Drawing Checking will return the package to the OPR designee. Otherwise, Drawing Checking will forward the package to the CCB Secretariat who will deliver to the Release Desk.

5.3.7 Revision Package Release and Distribution. . Although the Secretariat is responsible to review the package, the Release Desk also reviews each approved change package to ensure that all required forms are included and properly completed.

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If corrections are required, the Release Desk shall return the package to the Secretariat who in turn will forward to the OPR designee. If corrections are not required, the package is released and forwarded to the Repository for distribution.

5.3.8 ICD Revision. All changes shall be proposed by an ECR in accordance with the form's preparation instructions. The ECR shall be accompanied by a Preliminary Interface Revision Notice (PIRN). The PIRN shall be given a tracking number by the Interface Working Group (IWG) responsible for the ICD; in the absence of an IWG, the person responsible for maintenance of the ICD shall assign the number. The PIRN will record the agreement of all sides of the interface (the respective engineering, scientific or management organizations) with the necessity of the change. After all sides of the interface sign the PIRN, the controlling CCB shall issue a CCBD indicating approval of the ICD change. The CCBD shall state: "PIRN No. _____ is approved as IRN _____." (The CCB secretary shall assign the IRN number.)

TABLE IV. Revised Configuration Document Package Preparation Forms for Drawings and Parts Lists

	Title	MSFC Forms	Release
1.	Engineering Change Request (ECR)	2327	X
2.	Engineering Parts List (EPL)	420	X
3.	Engineering Order/Drawing Revision	421	X
4.	Document Package Routing Slip (DP/RS)	3418	X
5.	Configuration Control Board Directive (CCBD)	2312	X
6.	Repository Distribution List (If Changed)	N/A	X
7.	Document Input Record	2896	X

The OPR designee shall organize the ICD change package in the following order for each CCB-approved change and forward it to the Release Desk for release and subsequent routing to the MSFC Documentation Repository for distribution:

1. DP/RS
2. DRL
3. CCBD
4. ECR
5. IRN
6. DCI
7. Revised ICD
8. Reproduction Distribution List
9. Document Input Record

5.4 Cancellation of Documents. Configuration documentation should be reviewed at least every 5 years to determine which documents need to be updated or cancelled. A

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document shall be cancelled only by the organization having current maintenance authority. Once a document is cancelled, reissuance must have the approval of the Director, Engineering Directorate.

5.4.1 Responsible Office. To initiate document cancellations for documents released through the Release Desk, the responsible organization shall do the following:

a. The OPR Directorate/Office Director shall prepare a letter requesting the document cancellation. The letter is forwarded to the appropriate CCB for cancellation approval. The letter shall include the document title and number to be cancelled, the date the cancellation should be effective, and a brief statement of why the document is being cancelled.

b. The OPR designee shall submit a DRL, supporting documentation, and the document to be cancelled.

5.4.2 MSFC Release Desk. To process the cancellation, the Release Desk shall do the following:

a. Review and forward the documentation package to the MSFC Documentation Repository.

b. Ensure that any future actions against the document are referred to the originator or the organization with notification of the previous cancellation.

5.4.3 MSFC Documentation Repository. Upon receipt of the above document package, Repository personnel shall:

a. Maintain an electronic cancellation notice (DRL) as the latest revision of the cancelled document. NOTE: The Repository has discontinued the production of microfiche but does maintain some legacy microfiche.

b. Maintain electronic copy of the cancelled document and the cancellation letter.

c. Provide to requesters only copies of the revision that shows the cancellation notice.

d. Prevent acceptance/distribution of any future action against the cancelled document.

e. Provide one copy of the cancelled document to the originator, if requested.

6. NOTES

None

MSFC DOCUMENTATION REPOSITORY - DOCUMENT INPUT RECORD				
I. GENERAL INFORMATION				
1. APPROVED PROJECT: Multiprogram/Project	2. DOCUMENT/DRAWING NUMBER: MSFC-STD-555G	3. CONTROL NUMBER:	4. RELEASE DATE: 07/25/2002	5. SUBMITTAL DATE: 07/25/2002
6. DOCUMENT/DRAWING TITLE: MSFC Engineering Documentation Standard			7. REPORT TYPE: Standard	
8. CONTRACT NUMBER / PERFORMING ACTIVITY: ED43	9. DRD NUMBER:	10. DPD / DRL / IDRD NUMBER:		
11. DISPOSITION AUTHORITY (Check One): <input checked="" type="checkbox"/> Official Record - NRRS 12.A <input type="checkbox"/> Reference Copy - NRRS 8/5/A/3 (destroy when no longer needed)	12. SUBMITTAL AUTHORITY:	13. RELEASING AUTHORITY:		
14. SPECIAL INSTRUCTIONS: No hardcopy distribution required. Document will be available on the electronic masterlist.				
15. CONTRACTOR/SUBMITTING ORGANIZATION, ADDRESS AND PHONE NUMBER: ED43 Marshall Space Flight Center, AL 35812 256-544-3959		16. ORIGINATING NASA CENTER:		
		17. OFFICE OF PRIMARY RESPONSIBILITY:		
18. PROGRAMMATIC CODE (5 DIGITS):		19. NUMBER OF PAGES: 26		
II. ENGINEERING DRAWINGS				
20. REVISION:	21. ENGINEERING ORDER:	22. PARTS LIST:	23. CCBD:	
III. REPORTS, SPECIFICATIONS, ETC.				
24. REVISION: G	25. CHANGE:	26. VOLUME:	27. BOOK:	28. PART:
29. SECTION:	30. ISSUE:	31. ANNEX:	32. SCN:	33. DCN:
34. AMENDMENT:	35. APPENDIX:	36. ADDENDUM:	37. CCBD:	38. CODE ID:
39. IRN:				
IV. EXPORT AND DISTRIBUTION RESTRICTIONS				
<input type="checkbox"/> Privacy Act (see MWI 1382.1) <input type="checkbox"/> EAR (see MPG 2220.1)				
<input type="checkbox"/> Proprietary (see MPD 2210.1) <input type="checkbox"/> Other ACI (see NPG 1620.1 and MPG 1600.1)				
<input type="checkbox"/> Patent (see MPG 2220.1) <input checked="" type="checkbox"/> No statutory or institutional restrictions applicable - material may be electronically distributed to user in the NASA domain				
<input type="checkbox"/> ITAR (see MPG 2220.1)				
V. ORIGINATING ORGANIZATION APPROVAL				
40. ORG. CODE: ED43	41. PHONE NUMBER: (256) 544-3959	42. NAME: Mildred Wilkerson	43. SIGNATURE/DATE: <i>Mildred Wilkerson</i>	
VI. TO BE COMPLETED BY MSFC DOCUMENTATION REPOSITORY				
44. RECEIVED BY: <i>Lammy W...</i>		45. DATE RECEIVED: 7-26-02	46. WORK ORDER: 03-00805-2	