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**APOLLO/SATURN  
GUIDE FOR THE PREPARATION  
OF SPECIFICATIONS**

VOLUME I OF II VOLUMES  
EXISTING EQUIPMENT

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GUIDE FOR THE PREPARATION  
OF SPECIFICATIONS**

**VOLUME I OF II VOLUMES  
EXISTING EQUIPMENT**

MAY 1, 1967

**APPROVED:**



M. P. Gassman, Chief  
Program Management Systems Integration

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## LIST OF EFFECTIVE PAGES

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## SECTION I INTRODUCTION

### 1.1 PURPOSE

Volume I provides a guide for the preparation of specifications for existing equipment in the Apollo/Saturn Program at KSC. This volume provides guidelines for the preparation of Project, System, and Contract End Items (CEI) level specifications in accordance with the requirements of K-AM-03. This guide is intended for use by design engineers and writers in the preparation of specifications.

### 1.2 BACKGROUND

The Apollo Program Specification established specifications (Project, System, and CEI) as the controlling documents for the definition, acquisition, and control of the configuration of all Apollo/Saturn hardware and software. Some Apollo/Saturn equipment under the design cognizance of KSC has been developed, accepted, and integrated without the preparation of specifications in accordance with the Apollo/Saturn Uniform Specification Program. Extensive documentation is available at KSC on this equipment. KSC Apollo Program Directives No. 2 and No. 3 require that:

- a. The relevant documentation for existing equipment be assembled into specifications.
- b. The CMO (DC) provide guidelines to KSC Design Organizations in this task.

This Volume provides CMO (DC) guidelines for the preparation of specifications for existing Apollo/Saturn equipment at KSC. This document contains broad guidelines for the preparation of specifications and cannot, within its scope, resolve all unique problems. The CMO (DC) will, on request, provide suggestions and directions on the solution of unique problems in specification preparation.

### 1.3 SCOPE

This volume provides guidelines for the preparation of specifications for existing equipment at KSC, including the development of Project, System, and CEI level specifications. Volume II provides guidelines for the preparation of specifications for new equipment and major modifications.

### 1.4 KSC UNIFORM FORMAT FOR SPECIFICATIONS AND STANDARDS

Uniform format for Specifications and Standards, KHB 8070.1, "Establishes a standard format for the preparation of KSC developed specifications and standards to be used when

a specific program format has not been prescribed by higher authority. An example of a program-prescribed format can be found in NPC 500-1, Apollo Configuration Management Manual" (Preface to KHB 8070.1, dated October 6, 1966). KHB 8070.1 is not applicable to the preparation of Apollo/Saturn Project, System, and CEI level specifications. Specifications and standards for processes and materials prepared in accordance with KHB 8070.1 may be referenced in KSC Apollo/Saturn specifications as authorized standards for processes and materials.

## 1.5 DEFINITIONS

Appendix B to Volume II of this document contains definition of basic terms used in this volume.

## 1.6 REFERENCES

K-AM-03, Apollo/Saturn Configuration Management Plan

K-AM-030/1, KSC Top Level Specification Tree

KSC Apollo Program Directive No. 2, dated December 8, 1965

KSC Apollo Program Directive No. 3, dated February 2, 1966

KHB 8070.1, Uniform Format for Specifications and Standards, October 6, 1966

NPC 500-1, Apollo Configuration Management Manual

## 1.7 USE OF EXISTING DOCUMENTATION FOR SPECIFICATION PREPARATION

A specification should be prepared in the precise format established by K-AM-03 and at the appropriate milestone during the Definition or Acquisition Phase. KSC Design Organizations and contractors have extensive technical documentation for existing equipment. This documentation, i.e., drawings and test procedures, can be used to reduce the manhours and cost required to prepare a specification. The existing documentation for the equipment to be specified can be reviewed and appropriate documents selected for reference in the proposed specification. Documents selected in this process are, hereafter, referred to as selected source documents. Instead of transcribing all the data from the selected source documents to the specification being prepared, reference may be made to the selected source document under the appropriate paragraph heading. In using this reference method for the preparation of specifications, the requirements of 1.7.1 must be observed.

**1.7.1 REQUIREMENTS FOR USE OF SELECTED SOURCE DOCUMENTS.** When selected source documents are used to specify requirements of a paragraph in a specification, the following shall apply:

- a. The reference in the specification must be exact; i.e., to a specific document which is adequately identified (title, issue date, and revision).
- b. The reference must be usable; i.e., if the referenced data is not extensive or is not easily identified in the referenced document, the data should be entered under the appropriate paragraph heading.
- c. All documents referenced in the specification must be identified in Section 2 of the specification.
- d. The requirements of Sections 1 and 2 of the specification shall be specifically stated and shall not be identified by referring to selected source documents.
- e. The design and performance requirements must be established, paragraph by paragraph, as required by Section 3 of the appropriate specification outline. Where a paragraph of the specification is not applicable to the equipment being specified, Not Applicable shall be entered after the paragraph heading.
- f. Specified testing requirements for formal qualification must be identified in Section 4 of the specification for each design/performance requirement established in Section 3.
- g. A schematic block diagram shall be provided and shall illustrate:
  - (1) The interrelationship of components at the next lower level of identification within the equipment; i.e., in a Project specification, show the interrelationship of systems.
  - (2) The external interfaces of the equipment.
- h. The specification shall contain a complete list of components at the next lower level of specifications; i.e., in a System specification, identify all the component CEs.
- i. Section 5, Preparation for Delivery, shall be provided for the applicable Part I or II of the specification, when the item being specified may have to be reprocured.
- j. Reference to the selected source documents may be used to provide the requirements for Sections 6 and 10 of the appropriate Part I or II of the specification.

k. Selected source documents shall be identified and controlled in accordance with 1.8.1.

## 1.8 REFERENCE TO DOCUMENTS IN SPECIFICATIONS

In addition to the standard method of referencing documents (1.8.1), selected source documents (1.8.2) may be referenced in specifications for existing equipment at KSC.

**1.8.1 FILE OF AUTHORIZED STANDARDS AND SPECIFICATIONS.** KSC and contractor design engineering organizations maintain permanent libraries of authorized NASA, DOD and commercial standards, processes, and specifications for the various technologies within their cognizance. Appendix C to Volume II provides a list of specifications and standards applicable to the Apollo/Saturn Program. The standard method for referencing these documents should be followed (see applicable Exhibit referenced in Sections II through IV).

**1.8.2 SELECTED SOURCE DOCUMENTS.** Documents not contained in the library described in 1.8.1 may be referenced in the specifications for existing equipment; e.g., drawings, special lists, procedures, and quality control records. These documents:

a. Shall become a part of the specification and be maintained in separate package by the cognizant KSC design organization or design contractor.

b. Shall be individually listed in Section 2 of the specification.

c. Shall be authorized documents and subject to an engineering release system which meets the requirements established by K-AM-03 for engineering release systems.

d. May be referenced in Sections 3 through 6 and 10 (Appendix) of the specification, subject to the requirements of 1.7 above.

## 1.9 STANDARD METHOD OF SPECIFICATION PREPARATION

Guidelines for the use of selected source documents for the preparation of specifications are provided in 1.7 and 1.8. While this method of specification preparation is optional, the standard method of specification preparation is preferred. KSC design organizations or contractors may prepare specifications for existing equipment in the standard method without the use of selected source documents as described in 1.7 and 1.8. In the standard method of specification preparation references within Sections 3, 4, 5, 6 and 10 shall be confined to the documents listed in 1.8.1. In preparing specifications in the standard method, the requirements of the applicable Section of this volume (I through IV) and the correction of errata in Appendix A to Volume II shall be observed in the preparation of specifications for existing Apollo/Saturn equipment under KSC design cognizance.

## SECTION II PREPARATION OF PROJECT AND SYSTEM SPECIFICATIONS

### 2.1 PROJECT SPECIFICATIONS

Project specifications are prepared in accordance with Exhibit I of NPC 500-1. Documentation for the existing equipment should be researched and applicable documents should be identified as selected source documents for the proposed specification. (See 1.7 and 1.8 for guidelines for the use of selected source documents. Refer to Appendix A to Volume II for correction of errata in Exhibit I.)

### 2.2 FACILITY AND REAL PROPERTY INSTALLED EQUIPMENT (RPIE)

Facility and RPIE shall be specified in accordance with Section IV of this volume which also provides guidelines for the identification of Facility CEIs.

### 2.3 GROUND SUPPORT EQUIPMENT SYSTEMS

Apollo/Saturn Ground Support Equipment (GSE) systems shall be specified in accordance with Exhibit I or II of NPC 500-1. (See Appendix B for the definition of a system and a system specification.) When the equipment composing a system was procured as individual CEIs, the System specification shall be prepared in accordance with Exhibit I, and the selected source document method (1.7 and 1.8).

Two alternatives are available when the system was procured as a CEI.

- a. The specification can be prepared in accordance with Exhibit II, Prime Equipmentn (see Section III).
- b. The System can be divided into individual CEIs before specification preparation. A specification shall then be prepared for the system in accordance with Exhibit I. CEI specifications shall then be prepared in accordance with the applicable Exhibits (II, IV, V, VI), for the CEIs identified within the system.

The second alternative shall be selected when:

- a. The System contains identification (Exhibit III) or requirement items (Exhibit IV).
- b. Assemblies or components within the system were designed or are now under the design cognizance of different contractors or KSC Design Organizations.

SECTION III  
PREPARATION OF CONTRACT END ITEM SPECIFICATIONS FOR  
GROUND SUPPORT EQUIPMENT

3.1 GROUND SUPPORT EQUIPMENT

This section provides guidelines for the preparation of CEI specifications for GSE. Section IV provides guidelines for the preparation of specifications for Facility Contract End Items and Real Property Installed Equipment.

3.2 SELECTION OF APPROPRIATE EXHIBIT OF NPC 500-1

Background data for the selection of the applicable exhibit for CEI specifications for ground support equipment is provided in paragraphs 1 through 6.2 of Exhibit XI. Table 3-1 provides a ready reference to the exhibits for GSE and is intended only as an aid in preliminary selection of the applicable exhibit. After making the preliminary selection of an exhibit, the data outlined in the Source Of Criteria column of Table 3-1 should be researched to ensure that the selected exhibit fulfills all the requirements for the existing equipment which must be specified.

3.3 PRIME EQUIPMENT SPECIFICATIONS, EXHIBIT II OF NPC 500-1

Contract End Item specifications should be prepared according to the simpler format of Exhibit IV, V, or VI, whenever possible. Exhibit II should only be used when the equipment strictly adheres to the definition of prime equipment as defined in Table 3-1. (Appendix A to Volume II contains corrections for errata in Exhibit II.)

3.4 SPECIFICATIONS FOR IDENTIFICATION ITEMS, EXHIBIT IV OF NPC 500-1

Selected source documents (refer to 1.8) may be used in the preparation of specifications for requirements items, provided that the requirements of 1.7 are observed. (Appendix A to Volume II contain corrections for errata in Exhibit IV.)

3.5 SPECIFICATIONS FOR REQUIREMENT ITEMS, EXHIBIT V OF NPC 500-1

Selected source documents (refer to 1.8) may be used in the preparation of specifications for requirements items provided that the requirements of 1.7 are observed. (Appendix A to Volume II contain corrections for errata in Exhibit V.)



Table 3-1. Criteria for Classification of CEI and Selection Applicable Exhibit

CEI Classification and Applicable Exhibit	Criteria	Source of Criteria (Exhibit No. and Paragraph)
	<p><u>NOTE</u></p> <p>Criteria presented in this table is summary in form and is intended only as a guideline. After preliminary selection of CEI classification referenced data - Source of Criteria, Column 3 - should be studied.</p>	
Identification Item: Exhibit IV	<ol style="list-style-type: none"> <li>1. It can be qualified by inspection/simple demonstration.</li> <li>2. <u>Once in manufacture</u> - Quality Control can be the basis for quality verification; acceptance can be based on one-for-one relationship between drawings and hardware; acceptance testing to verify performance has not been specified.</li> <li>3. Because of its use, interfaces and simplicity of function and design, few design changes are anticipated after product configuration baseline has been established.</li> </ol>	IV: 1.0 thru 3.0 and 6.0
Requirements Items: Exhibit V	<ol style="list-style-type: none"> <li>1. The item has been developed: i.e., in Government inventory or "off the shelf."</li> <li>2. It is an item which is Government Furnished Equipment (GFE). CEIs being developed for the Apollo/Saturn program by another contractor or agency cannot be considered as being "in" inventory.</li> <li>3. It is used with or assembled into an equipment being developed.</li> </ol>	V: 1.0 thru 3.0 and first and second paragraphs of 6.0



Table 3-1. Criteria for Classification of CEI and Selection of Applicable Exhibit

CEI Classification and Applicable Exhibit	Criteria	Source of Criteria (Exhibit No. and Paragraph)
Critical Component: Exhibit VI	Components identified as critical by NASA and cognizant contractor. There are two classes of critical components: Engineering Critical and Logistics Critical.	VI: 1.0 thru 3.0 and 6.0
Prime Equipment: Exhibit II	<ol style="list-style-type: none"> <li>1. Equipment designated as a deliverable Contract End Item which cannot be specified using the simplified formats for Identification Items (IV) or Requirements Items (V).</li> <li>2. The more complex contractor-designed CEIs that require extensive functional tests while in the assembled condition.</li> </ol>	II: 1.0 thru 3.0

## 3.6 SPECIFICATIONS FOR CRITICAL COMPONENTS, EXHIBIT VI OF NPC 500-1

3.6.1 USE OF SELECTED SOURCE DOCUMENTS. Exhibit VI shall be used to specify requirements for Critical Components specifications. Selected source documents (refer to 1.8) may be used in the preparation of Critical Component specifications, provided that the requirements of 1.7 are observed.

3.6.2 FORMAT FOR CRITICAL COMPONENT SPECIFICATIONS. Exhibit VI modifies the format of Exhibit II for the preparation of Critical Component specifications. (See Appendix A to Volume II for correction of errata in Exhibits II and VI.)

3.6.3 CONFIGURATION CHART AND SPECIFICATION CHANGE LOG. Engineering Change Proposals (ECPs) are addressed to the CEI in which the Critical Component is installed. Configuration charts and configuration change logs are not required for Critical Component specifications.

SECTION IV  
FACILITY SPECIFICATION, EXHIBIT III

**4.1 FACILITIES AND REAL PROPERTY INSTALLED EQUIPMENT**

Facilities and RPIE shall be specified in accordance with Exhibit III of NPC 500-1. The following guidelines help to identify facility and RPIE. An item of equipment is a Facility or CEI when it is:

- a. Listed as real property in the records of the KSC Real Property Accountable Officer.
- b. Funded from Apollo Construction of Facility (C of F) funds.

**4.2 REQUIREMENTS OF FACILITY SPECIFICATIONS**

NPC 500-1 includes requirements (Exhibit III) for Facilities CEI specifications in its series of exhibits for strictly stage and GSE equipment. The specification writer and reviewer must be aware that Facility specifications have some unique distinctions:

- a. The Part II Facility specification is audited and approved before construction begins.
- b. The drafting standards for drawings are Architectural and Engineering (A&E).
- c. Quality control and testing standards for construction elements are different than for items fabricated under a stage or GSE specification.
- d. Format requirements for Part II Facility specifications are unique.
- e. The Corps of Engineers operates in a distinctive manner different in some aspects from an aerospace design/fabrication contractor.

While Facility CEI specifications differ from specifications prepared according to the other Exhibits to NPC 500-1, the basic requirements for preparation are similar. Part I specification for a Facility CEI shall be prepared in accordance with 4.3.

**4.3 PART I, FACILITY SPECIFICATION**

**4.3.1 EXHIBIT III REQUIREMENTS.** For existing facilities, the Part I specification shall:

a. Provide the criteria used for planning the facility. This data should be contained in Section 3 of the specification. Exhibit III, paragraphs 6.2.2.1 through 6.2.2.7, provides a format which should be followed in preparation of Part I CEI specifications.

b. Specify only special testing, quality control procedures, and/or performance verification requirements necessary to ensure the adequacy of special or unique facility provisions. Standard facility verifications requirements are not included in Section 4 of Part I specification and, consequently, are not included in Section 2.

Format and data for Sections 1, 2, 6, and 10 (Appendix) are similar to the requirements for other exhibits. Section 5, Transportability, does not normally apply to Facility specifications.

**4.3.2 USE OF SELECTED SOURCE DOCUMENTS.** The original facility criteria documents (basic requirements for the facility being specified) submitted to the Corps of Engineers, or to the architectural and engineering contractor for the preparation of the construction bid package, may be referenced in Part I Facility specifications (1.8).

#### NOTE

The original criteria for a Facility CEI may have been changed (addition of new criteria or change in parameters) after the development of the Part II Facility specification. Documents containing these changes can also be referenced in a Part I Facility specification (1.7 and 1.8)

The specification shall be prepared in accordance with paragraph 6 of Exhibit III. In lieu of direct transcription of data from the facility criteria documents to the specification, a reference to the selected source documents can be inserted under the appropriate headings of the specification. The requirements of 1.7.1 must be observed.

#### **4.4 PART II, FACILITY SPECIFICATION**

**4.4.1 EXHIBIT III REQUIREMENTS.** Exhibit III does not provide a format for a Part II Facility CEI specification. Paragraph 6.1 of Exhibit III identifies the construction bid package (contracts, plans, and specifications) as the Part II Facility CEI specification.

4.4.2 CONFIGURATION BASELINE FOR FACILITY CEIs. The preparation of specifications for existing equipment is frequently related to the establishment of a configuration baseline. The following documents establish the baseline for Facility CEIs:

- a. Construction Bid Package (Part II Specification).
- b. Facility Change Log for the Facility CEI.
- c. Change packages for the applicable changes; e.g., Facility ECPs, identified in the Facility Change Log.
- d. Updated and released drawings that incorporate the changes identified in the Facility Change Log contained in the supporting change packages.

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