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KSC Apollo/Saturn V Master
TEST PLAN



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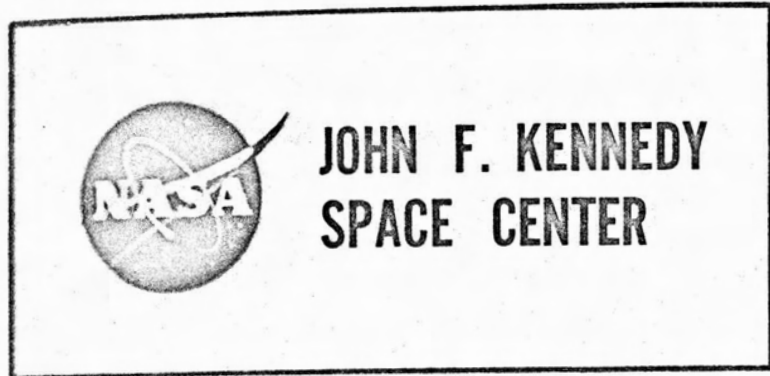
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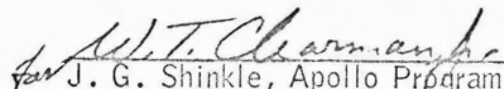
KSC APOLLO/SATURN V

MASTER TEST PLAN

August 1, 1966

APPROVED:

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SECTION I INTRODUCTION

1.1 AUTHORITY

The John F. Kennedy Space Center (KSC) Apollo/Saturn V Development/Operations Plan, K-PM-0, establishes the requirement for an Apollo/Saturn V Master Test Plan (MTP). This document, prepared by the Saturn Systems Office (DG), fulfills this requirement.

1.2 PURPOSE

The MTP provides the National Aeronautics and Space Administration (NASA) and NASA contractors with a common definition of the following:

- a. The development, qualification, and acceptance test program for KSC-provided ground support equipment (GSE).
- b. The Saturn (SA)-500F test requirements for which KSC is responsible in support of the Apollo/Saturn V Program.

This document provides the authority and responsibilities for detailed test planning and describes the interfaces and other relationships established to accomplish the test task.

1.3 SCOPE

The MTP describes the KSC-provided GSE development, qualification, and acceptance tests; GSE assembly, installation, and testing; and SA-500F compatibility tests. Responsibilities associated with these tests and operations are identified.

1.4 RESPONSIBILITIES

1.4.1 MANAGER, APOLLO PROGRAM. The Apollo Program Manager is responsible for establishing the responsibility for and monitoring the performing of the following:

- a. Establishment, review, and approval of test requirements for compliance with program objectives and applicable program directives, such as Apollo Tests Requirements (ATR), NPC 500-10.
- b. Development and monitoring of program schedules.
- c. Maintaining cognizance of costs relative to KSC-provided GSE for development, qualification, and acceptance testing.
- d. Establishing the specification and product baselines.
- e. Conduct of development and qualification tests.
- f. A configuration management program.
- g. Conduct of acceptance tests.

1.4.2 KSC ORGANIZATIONS RESPONSIBLE FOR DESIGN. The KSC organizations responsible for design shall provide detailed plans necessary to implement the requirements in this document. This responsibility includes those actions to:

- a. Establish criteria and functional test descriptions for first level of system identification.
- b. Establish development, qualification, and acceptance test plans.
- c. Recommend test locations for each test, such as factory, R-Test Facility at Marshall Space Flight Center, and KSC.
- d. Review test plans developed by the contractor in accordance with contractual requirements.
- e. Establish schedules for development, qualification, and acceptance tests.
- f. Conduct or monitor development, qualification, and acceptance tests.
- g. Identify test and design data to be included with the delivered equipment at KSC.
- h. Approve contractor procedures for documenting all failures and nonconformances.

1.4.3 QUALITY ASSURANCE. Quality Assurance shall ensure that the equipment is built and tested according to applicable specifications and drawings outlined and specified by the KSC organization responsible for the design of the equipment.

1.5 APPLICABLE DOCUMENTS

The following documents apply to the MTP.

- a. NPC 500-10 - Apollo Tests Requirements.
- b. NPC 200-1A - Quality Assurance Provisions for Inspecting Agencies.
- c. NPC 200-2 - Quality Program Provisions for Space Systems Contractors.
- d. NPC 200-3 - Inspection System Provisions for Suppliers of Space Materials, Parts, Components and Services.
- e. NPC 500-1 - Apollo Program Configuration Management Manual.
- f. NPC 250-1 - NASA Reliability Publication.
- g. M-DE 8000.001 - Apollo System Specification.
- h. M-DE 8020.008 - Natural Environment and Physical Standards Specification.
- i. NASA SP-6001 - Apollo Terminology.
- j. K-PM-0 - Apollo/Saturn V Development/Operations Plan.
- k. K-AM-0 - Apollo/Saturn Program Management and Support Plan.
- l. K-AM-03 - Apollo/Saturn Configuration Management Plan.
- m. K-V-03 - Apollo/Saturn V GSE Validation Test Requirements.
- n. K-V-031 - Apollo/Saturn V Complex 39 GSE Installation Assembly and Test Plan.
- o. K-V-04 - Apollo/Saturn V Test Requirements (SA-500F).

1.6 CHANGES, DEVIATIONS, AND REVISIONS

1.6.1 CHANGES AND DEVIATIONS. Requests for changes and deviations to the MTP shall be processed in accordance with Appendix A of this document. Changes and deviations are defined in Appendix A.

1.6.2 REVISIONS. Revisions to the MTP shall be published by the Saturn Systems Office (DG), when appropriate.

1.7 ABBREVIATIONS

Accepted Apollo/Saturn V Program abbreviations and codes are used in this document. Conventional first usage treatment is followed; i.e., on first use, the term is stated in full, followed by the accepted abbreviation in parentheses.

1.8 DEFINITIONS

Definitions of terms in this document are in agreement with those given in the ATR.

SECTION II SUMMARY

An early task in the KSC Apollo/Saturn V test program is the provisioning of GSE for which KSC is responsible. This task includes design and fabrication with attendant development testing, acceptance testing, and qualification testing. The initial phase of site activation is facilities construction and outfitting. Concurrent with this is the development of KSC-provided GSE. As individual facilities or portions of facilities become available on Launch Complex 39 (LC-39), the GSE is installed, assembled, and tested. Testing includes receiving tests, subsystems and systems tests, and functional systems integration tests between all interrelated systems and facilities.

Following integrated systems tests, operational checkout of the complex is performed, utilizing the SA-500F facility checkout vehicle. This includes mechanical fitchecks of GSE and operational checkout of the propellants and pneumatics systems and associated electronic and electrical GSE. Operational checkout of the remaining GSE is accomplished utilizing flight vehicles.

SECTION III TEST CONCEPT

3.1 GENERAL

The ATR, NPC 500-10, provides general test policy for the Apollo Program and establishes the purpose, philosophy, responsibility, and criteria for Apollo/Saturn V testing. This section of the MTP supplements the ATR and presents the guidelines to be used in the KSC test program for test documentation, development, acceptance, and qualification of KSC-provided GSE.

3.2 TEST POLICY

The Apollo test program is a key factor in ensuring the successful accomplishment of the Apollo mission. Consistent with a policy of minimizing costs, meeting schedules, and ensuring reliable performance under mission conditions, the following rules are established.

- a. Test requirements shall be established by the responsible KSC design and operating organizations.
- b. Test planning shall be documented and approved by the Apollo Program Manager's Office (DA).
- c. Test procedures shall be documented and approved by the responsible KSC design and operating organizations.
- d. Testing to verify the readiness of GSE for use shall be performed by KSC operating organizations.
- e. Testing shall be performed at the highest level practicable, consistent with test objectives, economy, and safety.
- f. Testing shall be kept to a minimum necessary to establish confidence in the performance of hardware.
- g. Test acceptance shall be accomplished by the responsible KSC organization. KSC is responsible for development, acceptance, and qualification tests of certain GSE. Implementation of these KSC-provided GSE tests may be delegated to vendors or contractors; however, the responsible KSC organizations shall approve the test plans and accept the test results. Testing of subsystems may be accomplished at vendor facilities or Government facilities, as dictated by economy and schedules. Further development, acceptance, and qualification tests of GSE as part of a larger system shall be performed at KSC by the responsible KSC organizations.

The KSC GSE development, acceptance, and qualification test responsibilities include determination of the tests required; failure effects analyses; establishment of hardware criticality categories; preparation of test plans, specifications, and procedures; the performance of appropriate tests (or test monitoring and approval of results of tests performed by assigned contractors); and reporting on test results and progress of GSE development.

The Saturn Systems Office (DG) has program management responsibility for development of KSC-provided GSE.

KSC-provided support services available to organizations participating in testing are summarized in the Apollo/Saturn Program Management and Support Plan, K-AM-0, and are further delineated in the applicable support services plans.

3.3 TEST DOCUMENTATION

Test requirements and plans subordinate to this document describe the test activities and include KSC-provided GSE development, qualification, and acceptance tests; GSE installation, assembly, and test; and complex operation checkout with SA-500F. Generally, these documents serve to organize and integrate the requirements and to describe the plan for satisfying the requirements. Requirements for detailed procedures needed to accomplish these plans are also described, along with responsibilities for development of procedures. These documents and their relationships to the MTP are shown in Figure 3-1.

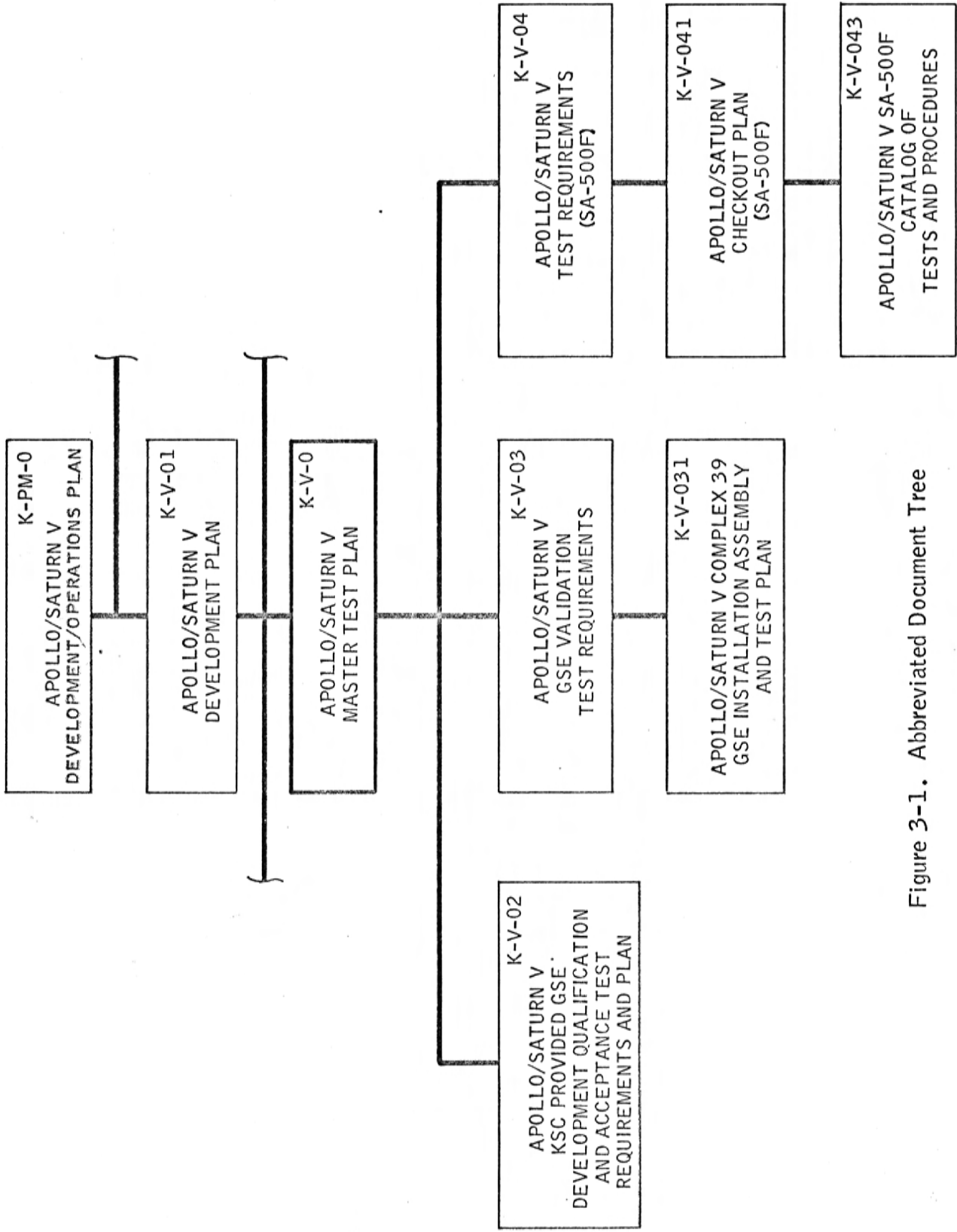


Figure 3-1. Abbreviated Document Tree

SECTION IV
APOLLO/SATURN V KSC-PROVIDED GSE
DEVELOPMENT, QUALIFICATION, AND ACCEPTANCE

4.1 SCOPE

This section presents the guidelines to be used in the KSC GSE test program from initial design to installation. It identifies the various test types, requirements, and objectives and establishes ground rules to be followed in accomplishing the testing of KSC-provided GSE during its development and manufacture.

4.2 OBJECTIVES

The objectives of the KSC-provided GSE development, acceptance, and qualification test program are as follows:

- a. Evaluate new materials, processes, piece parts, components, assemblies, subassemblies, and systems.
- b. Verify that hardware fulfills design and quality requirements prior to delivery from contractor plants.
- c. Establish confidence that hardware will perform adequately.
- d. Minimize time and cost of reaching operational status.
- e. Verify compatibility between hardware levels.

4.3 TEST TYPES

Testing accomplished prior to site activation is categorized by type, such as:

- a. Development Testing.
- b. Acceptance Testing
- c. Qualification Testing.

The relationship of these types with the KSC test program from design to installation is shown in Figure 4-1.

4.4 GENERAL REQUIREMENTS

The following ground rules are established.

- a. When planning tests, emphasis shall be given to simulating the most adverse environments for the specific hardware. The organization responsible for the test requirements shall determine the levels of environment and the operating times or cycles.
- b. The organization responsible for the test requirements for a particular GSE

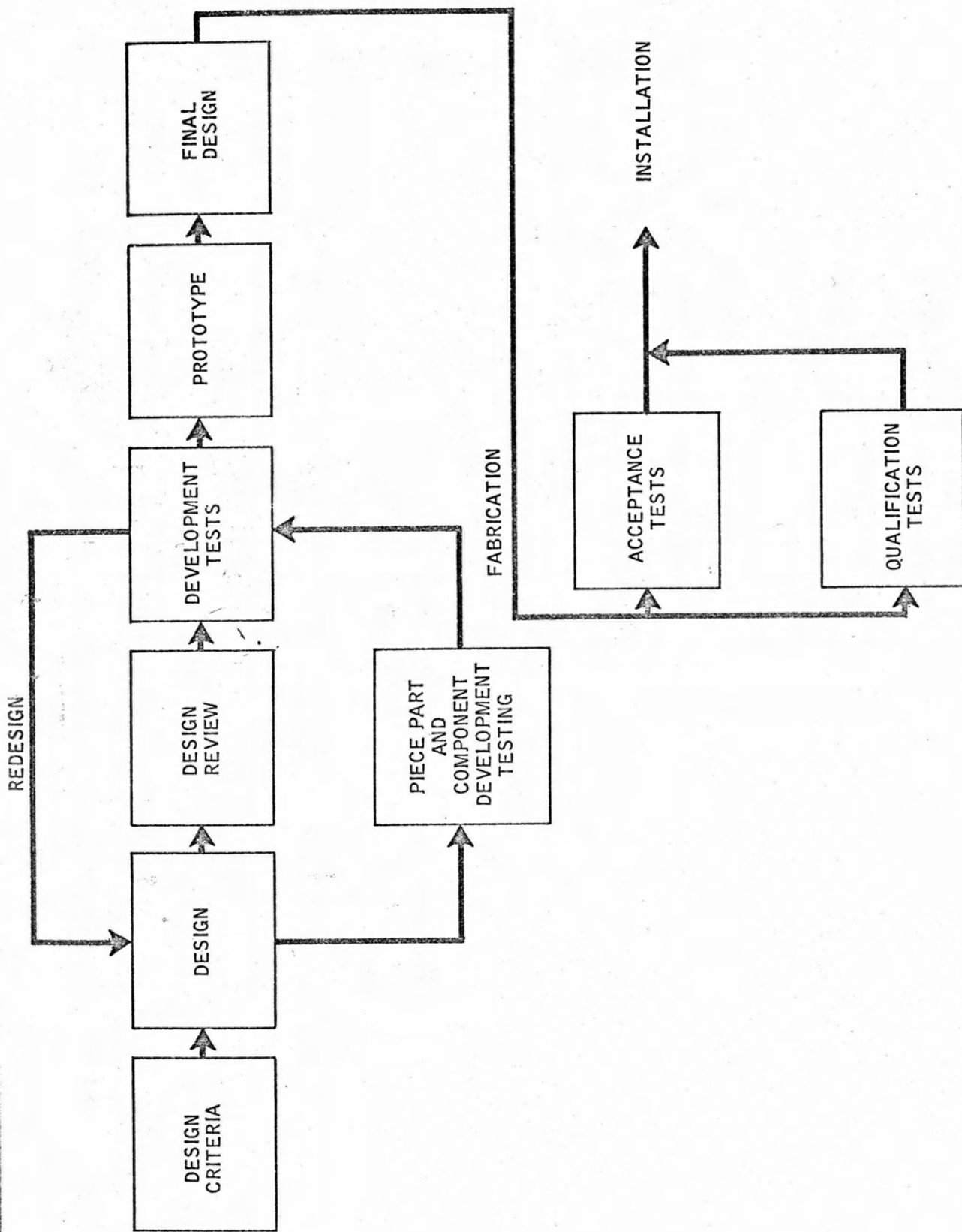


Figure 4-1. GSE Test Relationships

system shall develop a priority list of tests for all hardware in the system. This priority list is used to develop the test plans for the system. The following factors shall be considered in establishing the listing.

1. Criticality category.
2. Presence of new technology.
3. Design safety factors.
4. Test type.

c. Test plans and schedules shall be provided by the responsible design organization and approved by the Saturn Systems Office (DG).

d. The organization responsible for design shall develop a failure effect analysis system which will establish the criticality categories of hardware. The appropriate test plans shall list the criticality categories of all GSE defined as follows:

1. Priority I - Equipment whose failure can cause loss of the vehicle, human life, or result in hazards to astronauts.
2. Priority II - Equipment whose failure can result in a launch scrub or serious personnel injury.
3. Priority III - Equipment whose failure can cause a launch delay.
4. Priority IV - Equipment whose failure may result in information loss but has no significant effect on the launch operation.

e. Special effort shall be made to avoid duplications of previous tests. Items which have been qualified for an equivalent application shall be carefully reviewed by the responsible organization for acceptance as a qualified item. If the previous application is considered similar but not equal or more severe, the test plan shall concentrate on testing in the areas of new or increased requirements. Similarity of design, fabrication, and inspection procedures shall be considered. The applicable history and methods of prior tests shall be referenced or incorporated into test plans.

f. The organization responsible for design shall prepare a spares plan providing for the following:

1. Establishment of spares requirements to support GSE test and check-out operations.
2. Contractual provisions for the manufacture and acceptance testing of spares in quantities sufficient to accomplish each test program on schedule. Spares shall be subjected to the same tests and shall be functionally and physically interchangeable with replaced items.

3. Ensurance of the availability, preservation, and accountability of the spares; establishment of logs for each spare unit to record its test data and accumulated operating time or cycles; and instructions for the disposition of the replaced defective hardware.

g. The organization responsible for design shall identify, within its test plans, the major test facilities and special test equipment required and shall identify test equipment and facilities to be provided by the Government and by the contractor.

h. The calibration and maintenance of test equipment shall be in accordance with Section 9 of the Quality Program Provisions for Space Systems Contractors, NPC 200-2.

i. Reporting requirements shall be established by the organization responsible for design.

4.5 DEVELOPMENT TESTING

4.5.1 OBJECTIVES. Development tests shall be performed to ensure the proper functioning of the components of the system. Specific test objectives include: determination of feasibility of design approach; evaluation of hardware performance under simulated or actual environmental conditions; and evaluation of hardware failure modes and safety factors. Development tests are categorized as: Structural, Dynamic, Environmental, and Compatibility.

4.5.2 REQUIREMENTS. The Development Test Requirements are as follows:

a. Tests shall be performed on developmental hardware which is representative of but not necessarily identical to the installed KSC-provided GSE.

b. Development testing shall be completed at the subsystem level prior to progressing to the system level.

c. The KSC organization responsible for design shall determine when development testing has progressed to the degree that qualification testing may commence.

d. The contractor's design and development effort shall be in accordance with Section 4.2 of NPC 200-2.

4.5.2.1 Structural Tests. Structural tests shall be performed to determine the ability of structures to withstand predicted or measured static and dynamic forces which may be encountered in assembly, storage, transportation, handling, testing, and launch.

Structural tests shall be performed to determine the following, as applicable:

- a. Effects of forces generated by cryogenics, winds, thrust, vibration, and mass.
- b. Effects of normal environments on the structure.
- c. Safety factors, failure characteristics, and design limitations by the proper sequencing and application of overstress.

4.5.2.2 Dynamic Tests. Dynamic tests shall be performed to determine the dynamic characteristics under conditions simulating operational conditions insofar as practical. When design changes are made that significantly affect dynamic characteristics, a dynamic test shall be performed on the modified configuration.

4.5.2.3 Environmental Tests. Environmental tests shall be performed to determine that items will perform to design specifications under the equipment use environment.

4.5.2.4 Compatibility. Compatibility tests shall be performed to determine the physical, functional, and operational compatibility of the GSE.

4.6 ACCEPTANCE TESTING

4.6.1 **OBJECTIVES.** Acceptance tests shall be conducted on all hardware to determine conformance to design or specifications as a basis for acceptance. They may apply to parts, equipment, or systems. Acceptance tests include the following:

- a. Receiving Tests.
- b. In-Process Tests.
- c. Manufacturing Checkout Tests.

4.6.2 **GENERAL.** Acceptance tests shall be performed under the surveillance of the KSC organization responsible for design or an authorized representative. A receiving document (DD-250) shall be executed to indicate hardware acceptance by KSC. The design organization representative shall certify that acceptance tests have been successfully completed. Any waivers to the test granted the contractor and the times or cycles the equipment has been through acceptance testing shall be logged on the DD-250.

4.6.3 **RECEIVING TESTS.** Receiving tests are nondestructive, functional tests performed for acceptance on piece parts, components, materials, or assemblies on receipt by a manufacturer or a using agency at an assembly facility.

These tests shall be performed according to approved procedures on all piece parts, components, materials, or assemblies to be incorporated into KSC-provided GSE. The tests are normally completed prior to installation into the next higher assembly.

4.6.4 **IN-PROCESS TESTS.** In-process tests occur during fabrication. They are conducted for acceptance. They include all tests performed at intermediate points between receiving tests and start of final manufacturing checkout. Principal tests within this category are screening tests, ambient tests, and environmental tests. These tests shall be performed on all operational units and shall be completed prior to installation into the next higher assembly. These tests are defined as follows:

a. **Screening Tests** - Screening tests are fabrication tests performed on selected electrical/electronic or electromechanical components for acceptance. Screening tests employ nondestructive environmental, electrical/electronic, or mechanical stresses to identify anomalous items.

b. **Ambient Tests** - Ambient tests are fabrication tests performed for acceptance under ambient environmental conditions such as pressure, temperature, humidity, or other conditions normal for the test location.

c. **Environmental Tests** - Environmental tests are fabrication tests performed for acceptance under environmental rigors other than ambient for verifying the quality of the GSE.

In-process tests shall meet the aforementioned objectives and shall be performed at points of assembly where further assembly would reduce the capability of a complete functional test of the specific unit.

4.6.5 MANUFACTURING CHECKOUT TESTS. Manufacturing checkout tests are performed for acceptance after final assembly at a manufacturer's plant to ensure that hardware meets the following requirements:

a. Was manufactured in accordance with design documents, drawings, and specifications.

b. Functions in accordance with design specifications and intent.

c. Will mate physically and functionally with simulated flight equipment or other simulated GSE.

The successful completion of manufacturing checkout is a prerequisite on all KSC-provided GSE major system and/or major and items prior to installation into a higher assembly at the installation site.

4.7 QUALIFICATION TESTING

4.7.1 OBJECTIVES. The qualification test program consists of a series of pre-determined tests to demonstrate or verify that parts, components, subassemblies, and assemblies meet specification requirements necessary to ensure operational suitability. Tests to destruction or post-test inspection of disassembled articles are required to determine safety factors and locate significant failure modes. The effects of varied stress levels, combination of tolerances, drift or design parameters, and combination and sequence of environments shall be investigated as necessary to meet the objective. Qualification tests are categorized as: Structural, Dynamic, Environmental, and Compatibility. Definitions of these categories are the same as discussed in paragraphs 4.5.2.1, 4.5.2.2, 4.5.2.3, and 4.5.2.4, respectively.

4.7.2 REQUIREMENTS. A minimum of one major GSE component, assembly, or system shall be subjected to qualification testing prior to shipment of the first major GSE component, assembly, or system from a manufacturing plant. As defined in the ATR, this includes piece parts, components, and materials.

Acceptance testing shall be performed on hardware prior to its being installed in a major GSE component, assembly, or system for qualification testing.

As a prerequisite for qualification testing, functional test time, in addition to fabrication test time, shall be accumulated on nonconsumable test specimens. The functional test time shall be representative of that portion of the functional life cycle to be encountered prior to mission use. Consumable test specimens shall be tested to ensure that the functional life cycle required during an operational mission will be met.

The KSC organization responsible for design is responsible for determining the number of units to be tested for each class of hardware.

Qualification tests shall be performed in accordance with Section 4.3 of the Quality Program Provisions for Space Systems Contractors, NPC 200-2.

4.7.2.1 Test Specimen Control. Qualification tests shall be performed on hardware under strict environmental control. Revisions to procedures, adjustments, or tuning are not permitted during a test unless peculiar to the mission. If such action becomes necessary, the test specimen shall be disqualified pending corrective action. The majority of hardware that has been subjected to qualification tests shall not be utilized at LC-39. Qualification test reports shall state the dispositions of the test specimens.

Major systems can be qualified when cost and schedule restraints prohibit destructive testing. This is done by a combination of component and part qualification testing, by system or acceptance testing, and through test and checkout operations at KSC. Equipment qualified in this manner may be used on LC-39.

4.7.2.2 Requalification Tests. Any failure of a test specimen during qualification tests shall disqualify all hardware with the same configuration until hardware or procedural changes are applied. The qualification tests will then be rerun. Approval by the KSC organization responsible for design is required to rerun qualification tests. During requalification testing, all units must perform without failure, including the units for which defects have been corrected. In the above cases, extreme caution shall be taken to ensure that all changes and corrections are made to all units with the same configuration and that such action will not degrade the units. An exception of the above rules is that, if the cause of failure is a quality defect which can be detected by nondestructive inspection, those sample units which have already been tested without failure need not be re-tested.

Additionally, requalification tests are required when:

- a. Design or manufacturing changes have been made that affect functioning or reliability.
- b. Inspection, test, or other data indicate that a more severe environment or operating condition exists than that to which the equipment was originally tested.
- c. The manufacturing source is changed.

SECTION V EQUIPMENT INSTALLATION, ASSEMBLY, AND TEST

5.1 GENERAL

The equipment installation, assembly, and test task is to install, assemble, and test the LC-39 equipment to support the processing of Saturn V vehicles.

5.2 EQUIPMENT INSTALLATION AND ASSEMBLY

Equipment installation and assembly starts after construction and outfitting of the major facilities. There is a planned overlap of facility construction and outfitting and equipment installation to provide the most efficient use of the time allocated for site activation.

Equipment installation is accomplished in two phases. The first phase is to install, assemble, and test the mechanical equipment and the related electrical support equipment required to support SA-500F processing. The second phase is installation, assembly, and test of the remaining electrical, mechanical, and electronic equipment required to process flight vehicles.

The primary planning task for LC-39 equipment installation, assembly, and test consists of determining test requirements, preparing test plans, and procedures, providing installation drawings, and preparing equipment operation and maintenance instructions.

5.3 TEST

The requirements for testing the equipment after installation and prior to vehicle operations are detailed in the Apollo/Saturn V GSE Validation Test Requirements, K-V-03. The requirements specify the test to be conducted, test conditions, criteria to be met, and data required. The order of testing, acceptance criteria, reports, and KSC and contractor organization responsibilities are included in the Apollo/Saturn V Complex 39 GSE Installation Assembly and Test Plan, K-V-031, which, together with the test requirements and ground system specifications, forms the basis for preparation of the test procedures.

5.4 CONFIGURATION CONTROL

The configuration of KSC-provided equipment is controlled during equipment installation and checkout in accordance with the Apollo/Saturn Configuration Management Plan, K-AM-03. Specification, drawing, and interface documentation control methods are established, and the method of configuration identification and accounting is defined.

5.5 RESPONSIBILITIES

Equipment installation, assembly, and test are the responsibilities of various KSC organizations, depending upon the type of equipment.

Installation contractors, space vehicle contractors, and support services contractors support KSC in accomplishing the equipment installation and assembly tasks. Equipment tests included as a part of an installation contract are considered to be a part of the installation task. Testing subsequent to the completion of equipment installation or assembly is the responsibility of KSC operating organizations supported by space vehicle and support services contractors.

The Apollo Program Manager (DA) has program management responsibility for overall planning and evaluation of equipment installation, assembly, and test.

Preparation of management plans for equipment installation, assembly, and test is the responsibility of the Apollo Systems Office (DG). Preparation of installation drawings and operation and maintenance instructions is the responsibility of the cognizant design organization. The preparation of test procedures is the responsibility of the KSC operating organizations responsible for assigned equipment.

Cognizant equipment design organizations are responsible for the preparation of reports covering installation activities. Equipment operating organizations are responsible for the preparation of reports covering assembly and test activities. These reports are prepared in accordance with requirements established by the Apollo Systems Office (DG).

5.6 SA-500F COMPLEX OPERATIONS CHECKOUT

5.6.1 OBJECTIVES. The objective of the SA-500F complex operations checkout is to verify the LC-39 propellant loading and pneumatic servicing capability, and vehicle-to-facility mechanical compatibility.

5.6.2 TEST REQUIREMENTS. The primary planning task for SA-500F complex operation checkout is the determination of test requirements and the preparation of test plans and procedures.

Test requirements for complex operation checkout with SA-500F are set forth in the Apollo/Saturn V Test Requirements (SA-500F), K-V-04. The requirements specify the tests to be performed, test conditions, performance criteria or tolerance to be met, data requirements, and any special test equipment required.

5.6.3 SA-500F PROCESSING. SA-500F is processed through LC-39 in the same manner as a flight vehicle to reduce extensive ground test time on the initial flight vehicle. In addition to demonstrating the feasibility of processing a Saturn V space vehicle, SA-500F operations provide personnel training that is directly applicable to subsequent flight vehicle processing.

SA-500F is used at LC-39 to verify the following:

- a. Adequacy of transportation and handling equipment techniques and procedures.
- b. Adequacy of assembly techniques and procedures.
- c. Adequacy of propellant loading facilities, equipment, and procedures.
- d. Adequacy of pneumatic servicing facilities, equipment, and procedures.
- e. Compatibility with the LC-39 facilities.

In addition to these tasks, special tests are performed involving operations or equipment not planned for normal vehicle processing or rework operations.

SA-500F processing begins with receipt of SA-500F components at KSC.

The S-IC-F and S-II-F stages are off-loaded at the barge terminal and transferred to the Vehicle Assembly Building (VAB) for inspection.

The S-IVB-F stage, IU-F section, and facilities spacecraft are received in the VAB transfer aisle after utilization on the Saturn IB Program.

5.6.3.1 Premating and Mating Operations. Premating and mating operations are performed with all stages, the instrumentation unit, and the spacecraft in the VAB. These operations demonstrate handling techniques, fin and fairing installation, fit and function of work stands and platforms, erection and mating operations, and vehicle alignment checks.

5.6.3.2 Compatibility Checks. After completion of mating operations, SA-500F undergoes continuity checks, power-on tests, instrumentation calibrations, pneumatic and propellant systems leak and functional tests, and Launch Control Center (LCC) compatibility checks. These tests ensure facilities/launch umbilical tower (LUT)/LCC/vehicle compatibility and verify vehicle readiness for propellant loading tests at the pad. Upon completion of these tests, the vehicle/LUT combination is transferred by the crawler-transporter (C/T) to a pad for the first test flow. Data are obtained throughout transfer operations to verify vehicle/LUT structural integrity during C/T pickup, transfer to the pad, and emplacement operations. Vehicle wind loading data are acquired during processing of the assembled SA-500F vehicle to determine the erect vehicle's response to KSC surface winds during transfer to and from the pad and during the period the vehicle is at the pad.

With the LUT secured to the pad, connections are made with the Pad Terminal Connection Room, GSE, and pad facilities. Compatibility checks are then made with the networks, measurements, pneumatics, and propellants systems prior to propellant tanking operations and full pressure tests.

5.6.3.3 Propellant Tanking Tests. Propellant tanking tests are accomplished in a series of individual stage oxidizer and fuel loadings (in both manual and automatic modes), followed by complete vehicle liquid oxygen loading and complete vehicle liquid hydrogen loading. Successful completion of the full pressure and propellant tanking tests constitutes final acceptance of pressurization, propellant loading, and propellant conditioning systems.

5.6.3.4 Responsibilities. The Apollo Program Manager (DA) provides central program management planning, coordination, and evaluation of SA-500F complex operation checkout. The Director of Launch Operations (HA) has technical responsibility for implementing and conducting SA-500F complex operation checkout for the facilities checkout vehicle, associated vehicle GSE, and SA-500F integrating operations. The Apollo Program Manager (DA) is responsible for preparation of the requirements, special measurements, equipment lists, and plans for SA-500F complex operation checkout. The KSC operational organizations assist this effort as required by the Apollo Program Manager (DA). The Director of Launch Operations (HA) is responsible for preparation of the catalog of tests and for detailed handling and test procedures.

The Apollo Program Manager (DA) coordinates all requests for SA-500F complex operations checkout tests. The Apollo Program Manager (DA) establishes a status reports system to ensure proper flow of testing and coordinates any rescheduling, additions, or revisions to the test program.

The KSC operating organizations are responsible for the preparation of engineering evaluation reports for SA-500F complex operations checkout. Inputs are prepared in accordance with requirements established by the Apollo Program Manager (DA).

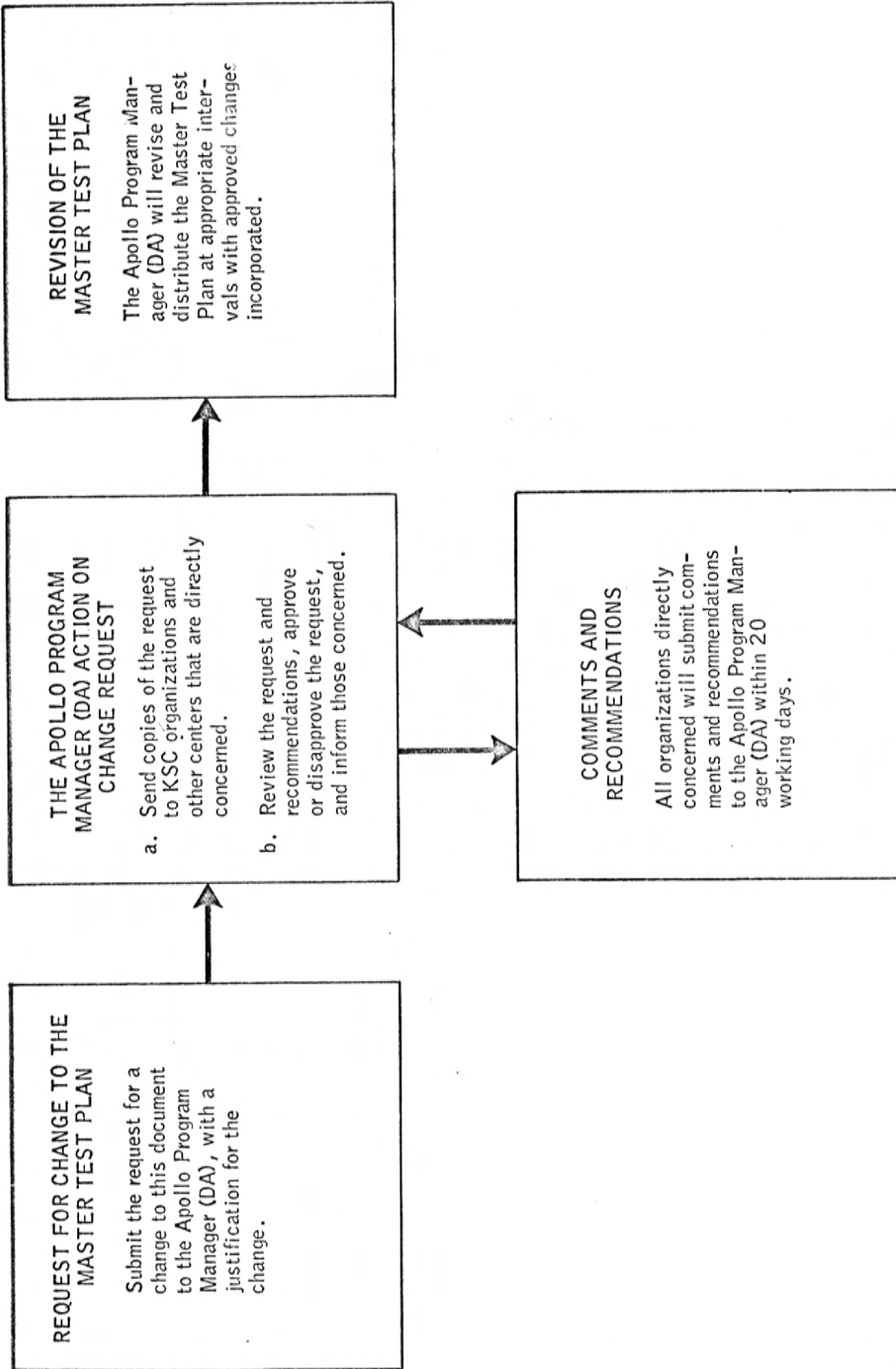
5.7 FLIGHT VEHICLE EQUIPMENT AND FACILITIES

The equipment and facilities not checked out with the SA-500F facilities vehicle are checked out with flight vehicles. The requirements and plans for complex operational checkout with flight vehicles are incorporated in flight vehicle operations documentation.

APPENDIX A
CHANGES AND DEVIATIONS

A-1. APPROVAL PROCEDURE

Procedures for obtaining approval of changes and deviations to the Master Test Plan are provided in Figures A-1 and A-2.



NOTE: A change is defined as a modification to the Master Test Plan published as a supplement to the current issue.

Figure A-1. Deviation Approval Procedure

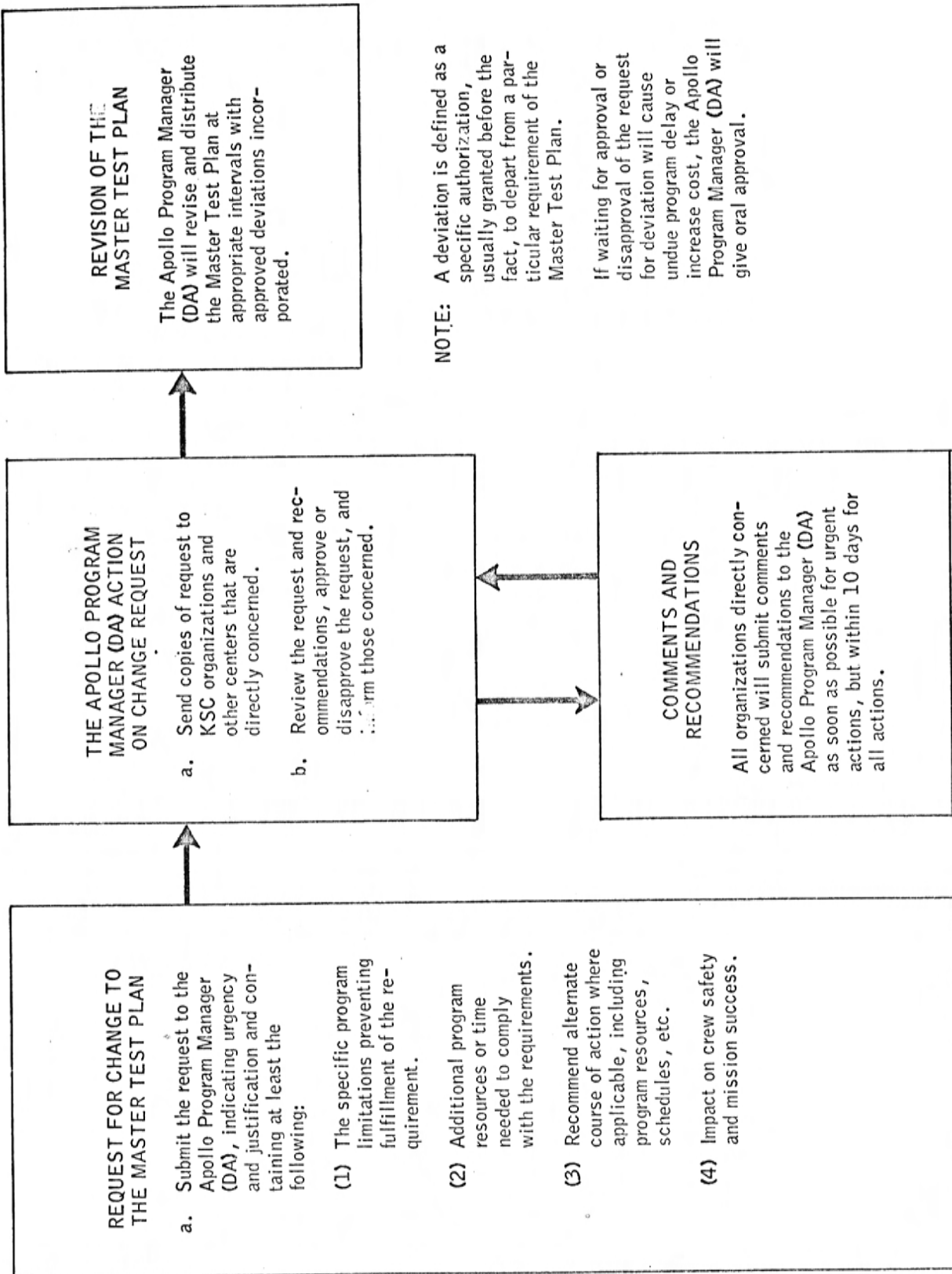


Figure A-2. Change Approval Procedure

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