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Memorandum

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TO : See distribution

DATE: SEP 8 1966

FROM : Manager, Apollo Program, DA

SUBJECT: Updating of K-AM-02, Apollo/Saturn Logistics Support Requirements Plan, dated May 31, 1966

Enclosed are change pages for Exhibit 1,"Logistics Management Information System," and Exhibit 7, "EDP Support Requirements Plan." These pages replace material previously published in preliminary form. Also included are change pages for Section I, "Introduction," and Section III, "Policy." These pages clarify the applicability of K-AM-02 to Kennedy Space Center contractors and other NASA Centers and their contractors.

John G. Shinkle

Enclosure: K-AM-02 change pages

Distribution:
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Feb 14, 1967

K-AM-02

APOLLO/SATURN

LOGISTICS SUPPORT REQUIREMENTS

PLAN

REVISION 1

MAY 31, 1966

SUPERSEDES ALL PREVIOUS EDITIONS

APPROVED:

(130-39-0003)

Rocco A Petrone

Rocco A. Petrone, Director
Plans, Programs, and Resources

LIST OF EFFECTIVE PAGES

as of
August 31, 1966

Insert latest changes; destroy superseded pages.

TOTAL NUMBER OF PAGES IN THIS DOCUMENT IS 388, CONSISTING OF:

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Please refer comments to Apollo/Saturn Program
Control Office, Logistics, DC, 867-7440

FOREWORD

This LOGISTICS SUPPORT REQUIREMENTS PLAN establishes the logistics program for the Apollo/Saturn Program at Kennedy Space Center. The plan is directive on all Kennedy Space Center Apollo/Saturn operations and is effective upon date of signature.

This plan recognizes that much of the equipment required for the Apollo/Saturn Program at Kennedy Space Center has been designed, procured, manufactured, or is in the production process. Therefore, many logistics requirements for these phases have been accomplished. During the development of this plan, consideration was given to hardware designed and procured under the program direction of Manned Spacecraft Center, Marshall Space Flight Center, and Kennedy Space Center. This plan also acknowledges the effort of the numerous contractors who have been working under the direction of these Centers utilizing approved operational procedures.

Kennedy Space Center, as the operational user of the products developed under this tri-center management direction, must now integrate these products into an operational system utilizing present practices and techniques when possible. This plan provides for the formalizing of the logistics program at Kennedy Space Center, improvement of logistics support, and, on implementation, a basis for management visibility and action.

Sections I through III provide general information and policy. Section IV defines the responsibilities of Kennedy Space Center organizations to direct implementation and to accomplish the requirements within established organizational structure and policy. Section V includes eight Exhibits which contain the instructions, guidelines, and format. Where required for uniformity, the Exhibits amplify the information contained in Section I through IV. Preceding the eight Exhibits is a brief description of their contents.

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K-AM-02
KSC APOLLO/SATURN
LOGISTICS SUPPORT REQUIREMENTS PLAN

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LIST OF ILLUSTRATIONS

SECTION I
INTRODUCTION

1.1 GENERAL

The Apollo/Saturn Logistics Support Requirements Plan (K-AM-02) provides the direction required to implement a logistics program in support of the Apollo/Saturn Program at KSC. It establishes policy and requirements, and assigns related responsibility. It describes the logistics interfaces between KSC organizational elements and between KSC and other NASA Centers and the NASA Apollo Program Office. This plan will be supplemented by other directives as necessary. It supersedes K-AM-02 dated December 13, 1965, and all previous editions.

1.2 BACKGROUND

This plan was developed to identify essential elements required to support the KSC logistics responsibilities and, additionally, to comply with the intent of the Apollo Logistics Requirements Plan, NHB 7500.1. It is a requirements control document necessary to effect efficient integration of all logistics activities at KSC in support of the Apollo/Saturn Program.

1.3 AUTHORITY

The KSC Apollo/Saturn Logistics Support Requirements Plan is released under the authority of the Apollo Program Manager. It is directive on all KSC elements engaged in the Apollo/Saturn Program.

1.4 PURPOSE

The purpose of this plan is to formally establish the logistics system in support of the Apollo/Saturn Program at KSC. Additionally, its purpose is to provide for the integration of the logistics products and services developed by KSC with those developed by other Centers for KSC.

1.5 OBJECTIVES

The objectives of this plan are:

a. To establish requirements for accomplishment of the program logistics functions.

b. To identify KSC organizations having logistics responsibilities.

c. To assign responsibility to KSC organizations to identify, acquire, provide, maintain, and manage the required human and material resources.

d. To provide guidelines for accomplishing the program logistics functions in a manner, and within time constraints, which precludes program schedule slippage, personnel injury, and equipment damage or degradation.

e. To provide guidelines for effective accomplishment of program logistics functions at the lowest cost consistent with program schedule requirements.

Changed August 31, 1966

f. To provide management visibility of the logistics program at KSC to permit effective decisions and actions.

1.6 APPLICABILITY AND SCOPE

The provisions of this plan apply to all KSC organizational elements having logistics management/operational responsibilities in the Apollo/Saturn Program at KSC. This plan shall be made a provision of existing contracts applying to KSC contractors engaged in the Apollo/Saturn Program at KSC in accordance with 1.8.2 below. This plan will apply to Apollo/Saturn contracts managed entirely by other NASA Center if so contractually directed. It is intended that this plan shall be made a contractual requirement for all future Apollo/Saturn contracts where the tasks under the contract are performed at KSC. Its scope encompasses all presently KSC managed logistics functions and future activities required in support of the Apollo/Saturn Program at KSC.

1.7 REQUIREMENTS PLAN

This is primarily a requirements document and, except for those actions which require uniformity throughout all phases of the Apollo/Saturn Logistics Program at KSC, does not prescribe detailed methods of accomplishment. The model forms in this plan will be a requirement after approval by KSC Forms Management, GA. Forms currently in use may continue to be used until receipt of approved forms. Documentation requirements are illustrated in Figure 1-1. Logistics Bulletins will be issued as required to cover specific situations as they occur.

1.8 IMPLEMENTATION

1.8.1 KSC ORGANIZATIONAL ELEMENTS. These elements will implement the provisions of this plan at all KSC management/operational levels by September 30, 1966. KSC contractors engaged in the Apollo/Saturn Mission will be contractually directed by the appropriate Contracting Officer to implement this plan by September 30, 1966, as provided for in paragraph 1.8.2.

1.8.2 KSC APOLLO/SATURN CONTRACTORS. The provisions of this plan shall not be cited as authority for change in scope of any existing contract except as specified herein. The Contracting Officer shall, when requested by the appropriate NASA/KSC Technical Representative, incorporate the requirements of this plan into new contracts as applicable to the statement of work. The requirements of this plan shall be incorporated into existing contracts by the Contracting Officer on request of the appropriate NASA/KSC Technical Representative as follows:

a. In its entirety as applicable to the statement of work if this can be accomplished at no additional cost to the Government.

b. In its entirety as applicable to the statement of work if the provisions herein are covered in the present contract(s) and change in scope is limited to authorized EDP reprogramming costs.

c. To the degree necessary to insure compatibility of this plan and tasks actually covered in present contract(s) provided:

1. the change in scope is limited to authorized EDP reprogramming costs.

2. that such limited implementation will, in fact, satisfy the provisions of this plan.

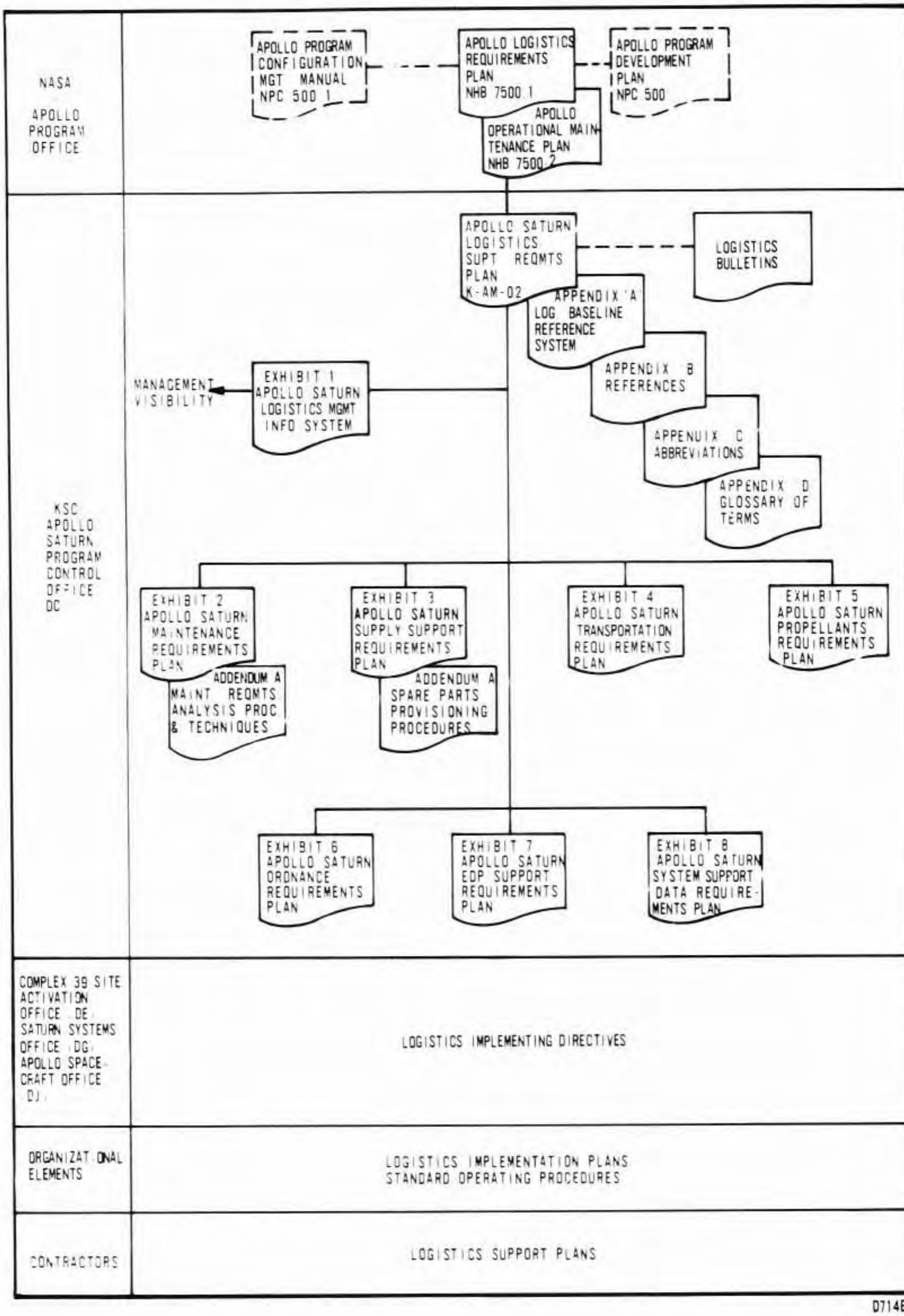

Figure 1-1. KSC Apollo/Saturn Logistics Documentation Requirements

However, if substantial changes in contract cost or scope will result through the full or partial incorporation of this document, the decision as to its full or partial incorporation will be made by the appropriate KSC Directorate, the Saturn Systems Office (DG) or the Apollo Spacecraft Office (DJ) as appropriate, the Apollo Program Manager, and the Center Procurement Officer.

1.8.3 OTHER NASA CENTERS. These Centers may contractually direct their Apollo/Saturn contractors operating at KSC to comply with applicable provisions of this plan as outlined in 1.8.2 above, or by such other method(s) which fulfill these provisions.

1.8.4 IMPLEMENTING DIRECTION. The Saturn Systems Office (DG) and Apollo Spacecraft Office (DJ) will issue the necessary implementing direction. This direction will identify the time-phased requirements to be accomplished to meet the approved launch schedules. It will be in sufficient depth to assure complete guidance to the KSC management, design, and operating/maintenance organizations and in consonance with other provisions of this section (1.8). Additionally, this plan will cover the interface actions between KSC and the appropriate Program Offices at MSC and MSFC which are required to assure integrated logistic support at KSC.

1.8.5 IMPLEMENTING PLANS AND OPERATING PROCEDURES. The management, design, and operating/maintenance organizations at KSC will develop the plans and standard operating procedures necessary to implement the provisions of this document and direction issued by the Saturn Systems Office (DG) and the Apollo Spacecraft Office (DJ). These plans and procedures will delineate the actions to be accomplished by the KSC organizations and/or its supporting contractors and will assign responsibilities within the KSC organization. Contractor implementation will be as provided in 1.8.2 this Section. Where the provisions of this plan conflict with plans and procedures of other NASA Centers, the System/Spacecraft Office will be notified and resolution and/or interim guidance requested.

1.8.6 LOGISTICS SUPPORT PLANS. Within the limitations provided for in this section (1.8), each KSC contractor having a support and/or an equipment responsibility will prepare the necessary support plans. Present logistics plans, if adequate, may be acceptable. These plans will specify the methods by which the contractor proposes to perform at KSC and will be submitted to the appropriate NASA/KSC Technical Representative for review or approval. Other NASA Center contractors at KSC will provide logistics support plans to KSC as directed by the appropriate Center.

1.9 LOGISTICS COORDINATOR

Each KSC organizational element having a design/maintenance/or operating function in the logistics area will appoint a single point of contact for logistics matters. The name, building number, room number and telephone extension of this single point of contact will be provided to the appropriate System/Spacecraft Office, with an information copy to the Program Control Office.

1.10 CHANGES AND REVISIONS

Changes and revisions to this document shall be effected, as required, to assure its usefulness throughout the life of the program. Conflicts between the provisions of this plan and other KSC, MSC, MSFC, or NASA APO documents identified by KSC organizational elements will be reported through the System/Spacecraft Office to the Program Control Office (DC) for resolution and interim guidance. Other NASA Centers and NASA/APO are requested to report conflicts directly to the Program Control Office (DC). Recommendations for changes to this plan will be transmitted to DC for consideration for inclusion in later changes or revisions to the plan. These will be accomplished as specified in KSC Format for Apollo/Saturn Tree Documents, K-AM-041/2, revised December 10, 1965.

SECTION II
INTEGRATED LOGISTICS SUPPORT

2.1 GENERAL

2.1.1 APPROACH. This section describes the fundamental approach for logistics support of the Apollo/Saturn Program at KSC. The approach adapts the requirements of NHB 7500.1 to the environment which actually exists at KSC. It is equally applicable to the support of equipment on hand as well as to equipment being procured or modified. It does not require duplication of effort already accomplished except when determination has been made that improvement is required. This logistics system, when applied, will verify the adequacy of existing support or establish identifiable requirements for improving support of the Apollo/Saturn Program at KSC.

2.1.2 LOGISTICS SUPPORT. Apollo/Saturn logistics support at KSC encompasses the following two major functions:

a. Logistics Products Development. This is the process of determining the logistics products required to support the Apollo/Saturn mission.

b. Logistics Resources Management. This is the process of integrating required logistics products and services into an operational system that insures total support and will provide information from which effective management action can be derived.

2.1.3 POLICY AND RESPONSIBILITY. The KSC Apollo/Saturn policies, delineating the extent to which the efforts outlined for this support are to be implemented, are discussed in Section III. The KSC organizations responsible for establishing, directing, and accomplishing these efforts are specified in Section IV.

2.2 LOGISTICS PRODUCTS DEVELOPMENT

The development of logistics products (see definition, Appendix "D") is the determination of types, quantities, usage conditions, and the common elements of these products as accomplished through the activities diagrammed in Figure 2-1, Logistics Products Development Flow Diagram. The initial process is the establishment of the logistics baseline for Aerospace Vehicle Equipment (AVE) as it is currently configured. The logistics requirements initially developed are expanded as the result of operations analysis of the Operational Ground Equipment (OGE), and maintenance requirements analysis performed on the combined AVE/OGE. Logistics requirements summaries consolidate the results of these analyses and establish the specified products required to support the end items in the area of utilization. (See paragraph 2.2.5.)

The process, however, is not completed with initial accomplishment. Changes to AVE configuration, end item modifications and environmental or program variations, must be considered for impact. Information of all such changes

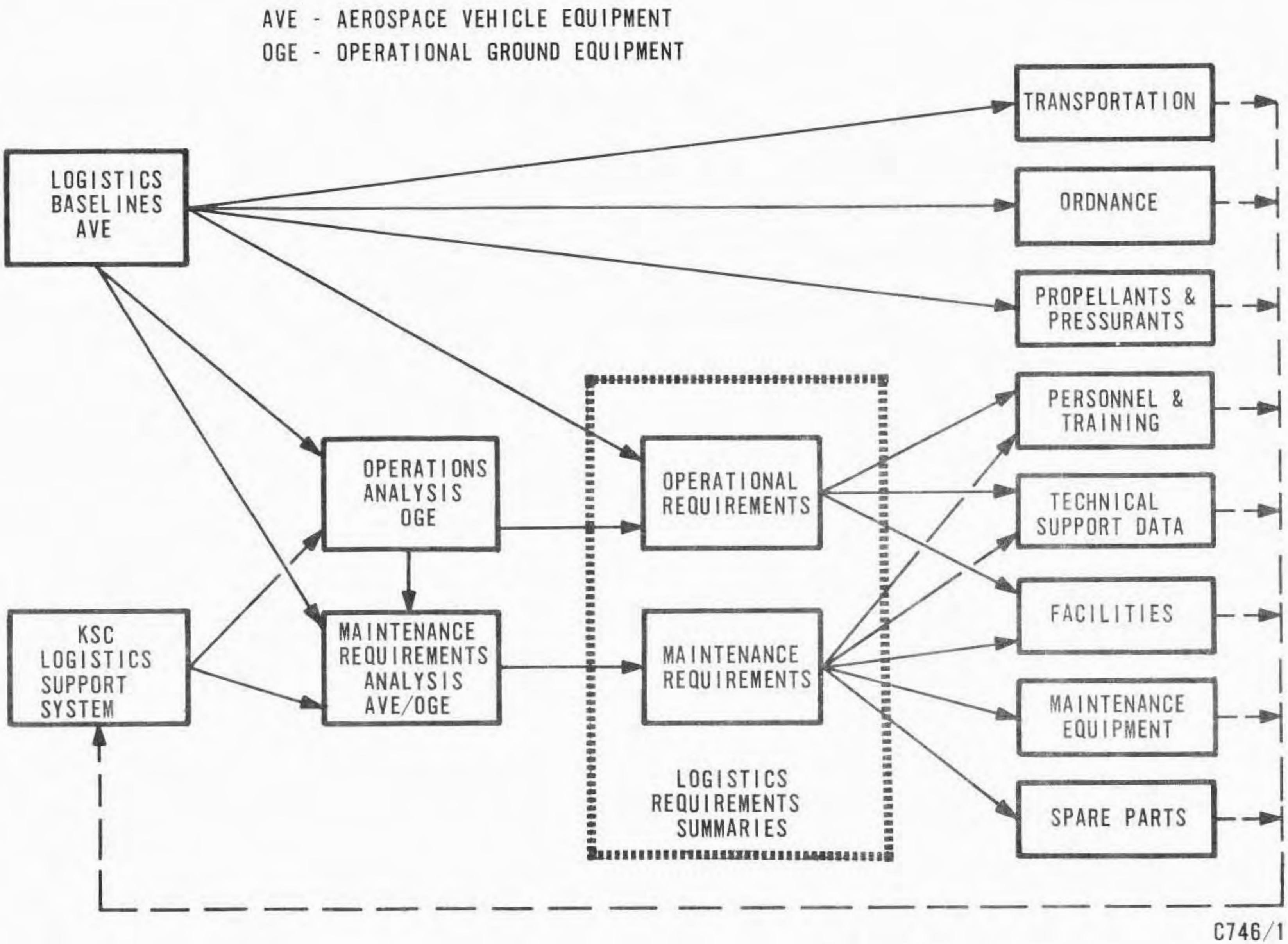

Figure 2-1. Logistics Products Development Flow Diagram

must be fed back to permit their being included in additional or refined analyses. The outputs of these analyses may result in changes to logistics baseline data and/or logistics product requirements.

2.2.1 KSC LOGISTICS SUPPORT SYSTEM. The KSC logistics support system is the network of supply and maintenance facilities at KSC including those of the contractors engaged in the Apollo/Saturn Program. The system is defined by the maintenance and supply functions (and related support activities: transportation, training, etc.) performed at each of these facilities, to maintain the Aerospace Vehicle Equipment (AVE) and Operational Ground Equipment (OGE) in an operational condition.

The system is not static. Accomplishment of the actions illustrated in Figure 2-1 establishes a continuous flow of information, which is used to modify the system, either through the provision of additional equipment and facilities or by the establishment of alternate methods of operation to accomplish the end result.

Past actions have established the present support system and the existing logistics products. Additional logistics baseline information and further operations and maintenance requirements analyses are needed to verify adequacy of existing requirements or identify new requirements. The acquisition of new equipment or modification to existing equipment also impacts the support system. Analysis must be performed to identify the extent of this impact. This analysis is to be performed in accordance with the procedures outlined herein.

2.2.2 LOGISTICS BASELINES. The logistics baselines identify the system design information needed to determine the logistics products requirements for the AVE. Analysis of this information, which is based on the successful AVE operational flow path, serves to identify the following:

a. Activities performed on the AVE in their sequence of accomplishment.

b. Operations flow within these AVE activities and their associated tasks.

c. Operational Ground Equipment (OGE) needed to support the AVE activities.

d. Operational personnel required to perform operations on the AVE.

e. Operations instructions.

f. Facilities required to support the operations of the AVE.

g. Time flow of the AVE operations and identified tasks.

h. AVE systems specifications and engineering documentation.

Since the Apollo/Saturn Program is presently being implemented at KSC, much of the baseline data has already been developed and is available in existing documentation. The logistics baselines evolve from a correlation of existing information with AVE activities and identify required missing data by means of the reference indexing system outlined in Appendix "A", Logistics Baseline Reference System. (The detailed development of the specifications and engineering documentation required by the logistics baselines is a system design responsibility and is implemented in accordance with KSC Apollo/Saturn Configuration Management Plan, K-AM-03.)

2.2.3 OPERATIONS ANALYSIS. The operations analysis provides the systems design information needed to identify logistics products requirements for the OGE. It consists of analysis of the successful OGE operational flow path to identify the following:

a. Activities performed on the OGE in their sequence of accomplishment.

b. Operations flow within those OGE activities and the associated tasks.

c. Ground Support Equipment (GSE) needed to support the OGE activities.

d. Operational personnel required to operate the OGE.

e. Operations and maintenance instructions.

f. Facilities required to support the operations of the OGE.

g. Time flow of the OGE operations and the identified tasks.

h. OGE systems specifications and engineering documentation.

While the operations analysis of the OGE established by the logistics baselines is considered a systems design rather than a logistics activity, it is included in this document to illustrate the interface and interdependence between systems design and logistics. The techniques employed in the logistics baseline reference system (Appendix "A") will be used to identify the availability of logistics products related to this operations analysis.

2.2.4 MAINTENANCE REQUIREMENTS ANALYSIS. Maintenance requirements analysis is an engineering process to determine the logistics products required to perform preventive and corrective maintenance on the end item within its system configuration. The analysis is performed on each end item of AVE and OGE identified by the logistics baselines and the operations analysis tasks. It considers possible contingencies which can cause deviations to the successful operational flow path established by the logistics baselines and the operations analysis. It identifies the maintenance activities required to minimize the effects of these deviations on the operational flow paths. The maintenance requirements analysis is performed by applying engineering judgment supported by detailed activities analysis sheets, requirements analysis sheets, trade studies, and timed flow analysis sheets. The degree of detail required to support the engineering judgment is determined by the criticality and complexity of the item under review. Ideally, a complete maintenance requirements analysis should be performed on each end item.

2.2.4.1 Priorities. Because of time and budget limitations and the status of the program, it is not feasible to accomplish a complete analysis on each item for which KSC has design responsibility. The following priorities have been established for accomplishment of maintenance requirements analysis on new or modified KSC equipment or on existing KSC equipment when improvement in support is required:

a. Priority I - Equipment or system, the failure of which would result in vehicle loss and/or a personnel hazard.

b. Priority II - Equipment or system, the failure of which would result in missing the planned launch window, failing to obtain mission data, and/or a lesser personnel hazard.

c. Priority III - Equipment or system, the failure of which would result in partial countdown recycling and no personnel hazard.

d. Priority IV - Equipment or system, the failure of which would have no significant effect on the vehicle or mission.

The responsible KSC implementing organization, in coordination with the appropriate Apollo/Saturn Systems Office (PPR-1, 4 or 5), shall establish the criticality and complexity criteria for determining the degree of detail to which the maintenance requirements analysis will be performed. The detailed approach to be considered in conducting the maintenance requirements analysis is outlined in Addendum "B", Exhibit 2, KSC Maintenance Requirements Analysis Procedures.

2.2.5 LOGISTICS REQUIREMENTS SUMMARIES. End item logistics requirements are documented in End Item Reports (EIR's). The EIR summarizes, by support location, those logistics products determined to be required as a result of logistics baselines, operations analysis, and maintenance requirements analysis. KSC Apollo/Saturn logistics products are consolidated and summarized for each location in Site Logistics Requirements Summaries (SLRS's). SLRS's are prepared for functionally related groups of end items, for the spacecraft, for the Saturn IB system, and for the Saturn V system. The detailed approach to be considered in preparing the EIR's and the SLRS's is outlined in Addendum "B", Exhibit 2, Maintenance Requirements Analysis Procedures. In those cases where the logistics products have been adequately identified and documented, the requirement for an EIR may be waived.

The general approach for developing the SLRS's is described in the following paragraphs and is represented by the logistics products blocks in Figure 2-1.

2.2.5.1 Spare Parts. The EIR contains a list of logical spare parts needed to perform maintenance at each support location based on the maintenance concept for the end item. Spare parts quantities are determined by considering equipment operating times and cycles, consumption rate of the part, reparability of the failed part, total population and value of the component in the program, and lead time for procurement of a replacement spare part. Where the consumption rates are not available for a given spare part, anticipated failure rates will be substituted. Detailed provisioning procedures are outlined in Addendum "A", Exhibit 2, Spare Parts Provisioning Procedures.

2.2.5.2 Maintenance Equipment. Specific types and quantities of maintenance equipment required at each location are determined by a loading analysis. This loading analysis is conducted for each maintenance equipment requirement identified in the EIR's. The loading analysis considers failure rates, maintenance schedules, and maintenance activity duration, when this information is available. When specific data is not available, engineering estimates based on experience with similar applications and equipment can be incorporated into the loading analysis. A comparison of the maintenance equipment requirements with available resources will be made to identify the need for new or additional equipment. The results of the maintenance loading analysis will be summarized in the SLRS.

2.2.5.3 Facilities. Facility requirements identified by the logistics baselines, operations analysis, or the maintenance requirements analysis, which are not provided for, within available facilities, will be documented in the EIR's and the SLRS's. The elements considered under facility requirements include:

a. Spare parts storage areas.

b. Maintenance work areas.

c. Operational work areas.

d. Electrical power source.

e. Environmental conditions (e.g., shielding, clean rooms, etc.).

f. Air conditioning.

g. Maintenance levels.

h. Administrative equipment (e.g., files, desks, bookcases, etc.).

Since the facilities for the Apollo/Saturn Program at KSC have been substantially completed, the requirement for acquisition of new facilities must consider availability of funds, lead time for approval, and construction, in terms of need dates. Alternate means of accomplishing the mission, in lieu of new construction, must be explored. These would include the following, in order of precedence as appropriate:

a. Use of Air Force Eastern Test Range facilities.

b. Additional contract support.

c. Reduction of questionable cost effective maintenance levels.

2.2.5.4 Technical Support Data. Technical support data includes, but is not limited to, the following:

a. Systems descriptions, logic diagrams, and/or equipment operations and maintenance manuals published as NASA documents.

b. Contractor documents consisting of engineering drawings, specifications, schematics, wiring diagrams, logic diagrams, parts list, check lists, operation/maintenance/task instructions, and manuals.

c. Commercial manuals for an end item.

The source of technical support data can be from MSC, MSFC, KSC or from contractors working under contractual arrangements with those Centers. The determination of which type of technical support data is required is based upon end item complexity in its system configuration, the complexity of the related operations or maintenance procedures, and the degree of experience and skill of personnel who will perform operations and maintenance.

Exhibit 8, KSC Apollo/Saturn Technical Data Requirements Plan, provides detailed considerations for evaluating the requirements for, and the adequacy of, the technical data provided.

2.2.5.5 Personnel and Training. End item reports identify training requirements and establish the quantities, types, and skills of personnel needed to operate and maintain the end items at each support location. The site logistics requirements summaries consolidate end item personnel requirements for operations and maintenance at each location to establish overall personnel requirements for the system. Personnel quantities are determined by evaluating and combining activities performed by similar personnel types and skills, based on personnel loading. Personnel loading is developed from system operating times and cycles, preventive maintenance schedules and performance durations, and failure rates and corrective maintenance action durations. A comparison of personnel available against those required by types, skills, and quantities for each support location is necessary to determine training requirements and/or to establish additional personnel requirements. The conduct of training is prescribed in K-AM-06, KSC Apollo/Saturn Training Plan.

2.2.5.6 Propellants and Pressurants. Requirements for acquisition, movement, storage, and control of propellants and pressurants (cryogenics, storable fluids, gases, hypergols, etc.) are derived from the AVE logistics baselines. Type requirements, as well as facility and handling requirements, have already been determined to support the Apollo/Saturn Program at KSC. Exhibit 5, KSC Apollo/Saturn Propellants Requirements Plan, details the services required, methods of forecasting quantity requirements, and the procedures needed in support of this logistics product.

2.2.5.7 Ordnance. Ordnance includes explosive items such as control rockets, igniters, detonators, squibs, and explosive valves, bolts, and bridge wire. The need for this logistics product is determined from the AVE logistics baselines. The requirements for receiving, handling, and managing ordnance material is contained in Exhibit 6, KSC Apollo/Saturn Ordnance Requirements Plan.

2.2.5.8 Transportation. The KSC transportation system must be capable of delivering, in a timely, safe, and economical manner, all personnel, supplies, and equipment required in support of the KSC Apollo/Saturn Program needs. KSC assumes the responsibility for equipment, spacecraft, and stage transportation at the point of transport interface. KSC transportation agencies provide the following:

a. Instructions, schedules, terminal arrangements, and support services pertinent to arrival, inter-KSC movement, and departure by ground, air, or marine transport.

b. Specialized handling equipment and trained operators for movement of propellants, pressurants, ordnance, and other hazardous materials.

c. Traffic management, security, progress monitoring, and reporting on movement of spacecraft, stages, and critical items.

To accomplish these services, KSC transportation agencies must consider:

a. The configuration of the items to be transported.

b. Time-flow analysis of movement from point of arrival to final destination at KSC.

c. Transportation mode to be utilized.

d. Special transportation equipment and special materials handling equipment needed.

The need for transportation services is determined from activities enumerated in the logistics baselines activity flow diagrams. Transportation requirements are detailed in Exhibit 4, KSC Apollo/Saturn Transportation Requirements Plan.

2.3 LOGISTICS RESOURCES MANAGEMENT

Logistics resources are defined as the KSC logistics products and services available to satisfy the logistics requirements established for the Apollo/Saturn Program by MSC, MSFC and KSC. Management of these resources must assure that they are provided, distributed, and applied in a timely manner which satisfies the program mission during both the activation and operational phases. Management of logistics resources is accomplished by:

a. Consolidating and integrating the logistics products and services requirements established by MSC, MSFC and KSC.

b. Evaluating these requirements to assure that all have been identified.

c. Comparing these requirements against available resources to identify voids, deficiencies, and excesses.

d. Determining necessary corrective actions.

e. Establishing systematic review, control, and reporting procedures to assure continuous management visibility for surveillance at all levels of supervision.

f. Implementing the maintenance services established in Exhibit 2. KSC Apollo/Saturn Maintenance Requirements Plan.

g. Implementing the supply support services defined in Exhibit 3, KSC Apollo/Saturn Supply Support Requirements Plan.

Figure 2-2, Logistics Resources Management Flow Diagram, depicts the relationship which exists between MSC, MSFC and KSC and the actions which take place to assure satisfying program needs. It illustrates the necessity for continuous review to assure the availability of valid logistics products and to keep abreast of the changes in equipment configuration which would impact available logistics resources. The logistics resources management system will utilize the configuration index as outlined in the KSC Apollo/Saturn Configuration Management Plan, K-AM-03, to identify end item relationships. Exhibit 7, KSC Apollo/Saturn EDP Support Requirements Plan, outlines the electronic data processing (EDP) support to be implemented for logistics management.

2.3.1 MSFC LOGISTICS REQUIREMENTS. MSFC procured stages and operational ground equipment are evaluated by MSFC to determine the logistics products to be provided for and service requirements to be imposed on the KSC support system. These requirements are developed by MSFC in accordance with their interpretation of NHB 7500.1 and are forwarded to KSC for integration.

2.3.2 MSC LOGISTICS REQUIREMENTS. MSC procured spacecraft and operational ground equipment are evaluated by MSC to establish the logistics products to be provided for and service requirements to be imposed on the KSC support system. These requirements are developed by MSC in accordance with their interpretation of NHB 7500.1 and are forwarded to KSC for integration.

2.3.3 KSC LOGISTICS REQUIREMENTS. KSC logistics products and services for KSC procured operational ground equipment, and facilities, are developed as outlined in paragraph 2.2.

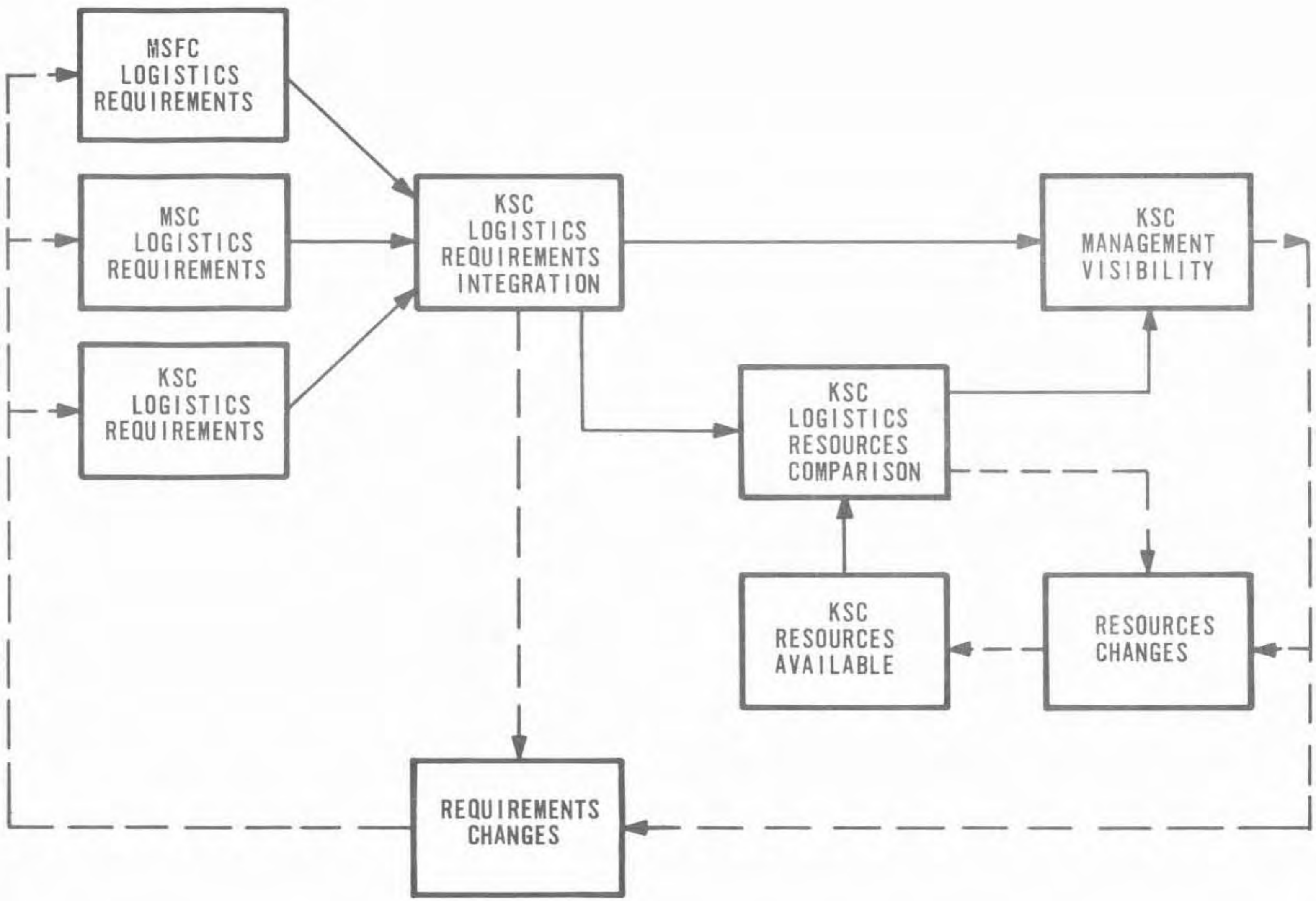

Figure 2-2. Logistics Resources Management Flow Diagram

2.3.4 KSC LOGISTICS REQUIREMENTS INTEGRATION AND RESOURCES COMPARISON. The logistics products and service requirements should be submitted to KSC operating organizations, in the form of site logistics requirements summaries by MSC, MSFC, and KSC design organizations, for that portion of the Apollo/Saturn systems for which they have design and/or procurement responsibility. Since much of the Apollo/Saturn Program has been implemented, an SLRS, in the strict format established by NHB 7500.1, is not required: provided, the logistics products and service requirements for each end item have been identified for each support location, adequately documented, and formally submitted. The logistics products requirements for MSC, MSFC, and KSC will be combined by location and evaluated to determine recommended additions or deletions. All logistics products will be subject to this comparison evaluation. In the evaluation, KSC will consider surplus resources from other programs, as well as Apollo/Saturn resources already procured and/or remaining from the site activation phase. Recommended changes or deletions will be submitted to the appropriate Center for consideration and necessary action.

2.3.5 KSC MANAGEMENT VISIBILITY. The management of logistics resources in support of the Apollo/Saturn Program at KSC is dependent upon timely and effective coordination between KSC/MSC and KSC/MSFC. It is only as a result of clearly defined and integrated efforts that management of these resources can be accomplished. Management visibility is established through status summaries of logistics products availability which indicate:

a. Delivery schedule slippage.

b. Consumption trends.

c. Current and potential problem areas.

d. Impacts on mission objectives.

Implementation of Exhibit 1, KSC Apollo/Saturn Logistics Management Information System, will provide this status data on the logistics products from which management consideration and action are derived. Exhibit 7, KSC Apollo/Saturn EDP Support Requirements Plan, provides the capability of using uniform reporting data formats and machine processing for flexible management visibility.

SECTION III
POLICY

3.1 GENERAL

All KSC Apollo/Saturn logistics plans and actions shall be accomplished in accordance with the policies, procedures, methods, and guidelines outlined in this plan, including the Exhibits incorporated in Section V. Policy is determined by the Director, KSC, and is established and enunciated by the Apollo Program Manager (DA). Figure 3-1 illustrates the logistics management functional flow at KSC.

3.2 LOGISTICS SUPPORT PLAN IMPLEMENTATION

The requirements of this plan shall be implemented to develop and provide support for all new equipment and for existing equipment in instances where support has been determined by the appropriate Saturn Systems Office (DG) or the Apollo Spacecraft Office (DJ) to require improvement.

3.3 UTILIZATION OF EXISTING PRACTICES

The KSC Apollo/Saturn logistics system shall utilize existing practices wherever possible. Established internal operations of organizations and contractors concerned will not be changed except as might be required to achieve an integrated KSC Apollo/Saturn logistics support program.

3.4 DEVELOPMENT OF LOGISTICS PRODUCTS

Identification and development of logistics products (paragraph 2.2) shall be based on a maintenance requirements analysis. However, logistics products development will not be delayed if analysis data is not available, but will instead be based on analysis of available engineering data and experience provided by the design agency.

3.5 REQUIREMENTS ANALYSIS PRIORITY SYSTEM

Logistics products developed from engineering data and experience shall be verified, where warranted, by a requirements analysis provided by the design agency in accordance with priorities established in paragraph 2.2.4.1.

3.6 MAINTENANCE REQUIREMENTS ANALYSIS DETERMINATION

In areas of KSC design responsibility, existing contracts shall be evaluated by the design organization, in coordination with the operating organization, to determine the need for performing a maintenance requirements analysis. The criteria established in paragraph 2.2.4 shall be used as the basis for such determination. Indicated need to perform a maintenance requirements analysis shall not be construed as authority for a change in contract scope of work. (Reference paragraph 1.8.2.)

Where a change in scope is required, or indicated, it will be brought to the attention of the Saturn Systems Office (DG) or the Apollo Spacecraft Office (DJ), the Program Control Office (DC), and the contracting officer for resolution as delineated in paragraph 1.8.2. In areas where KSC does not have design cognizance, such recommendations shall be made through program channels to the Center having design cognizance.

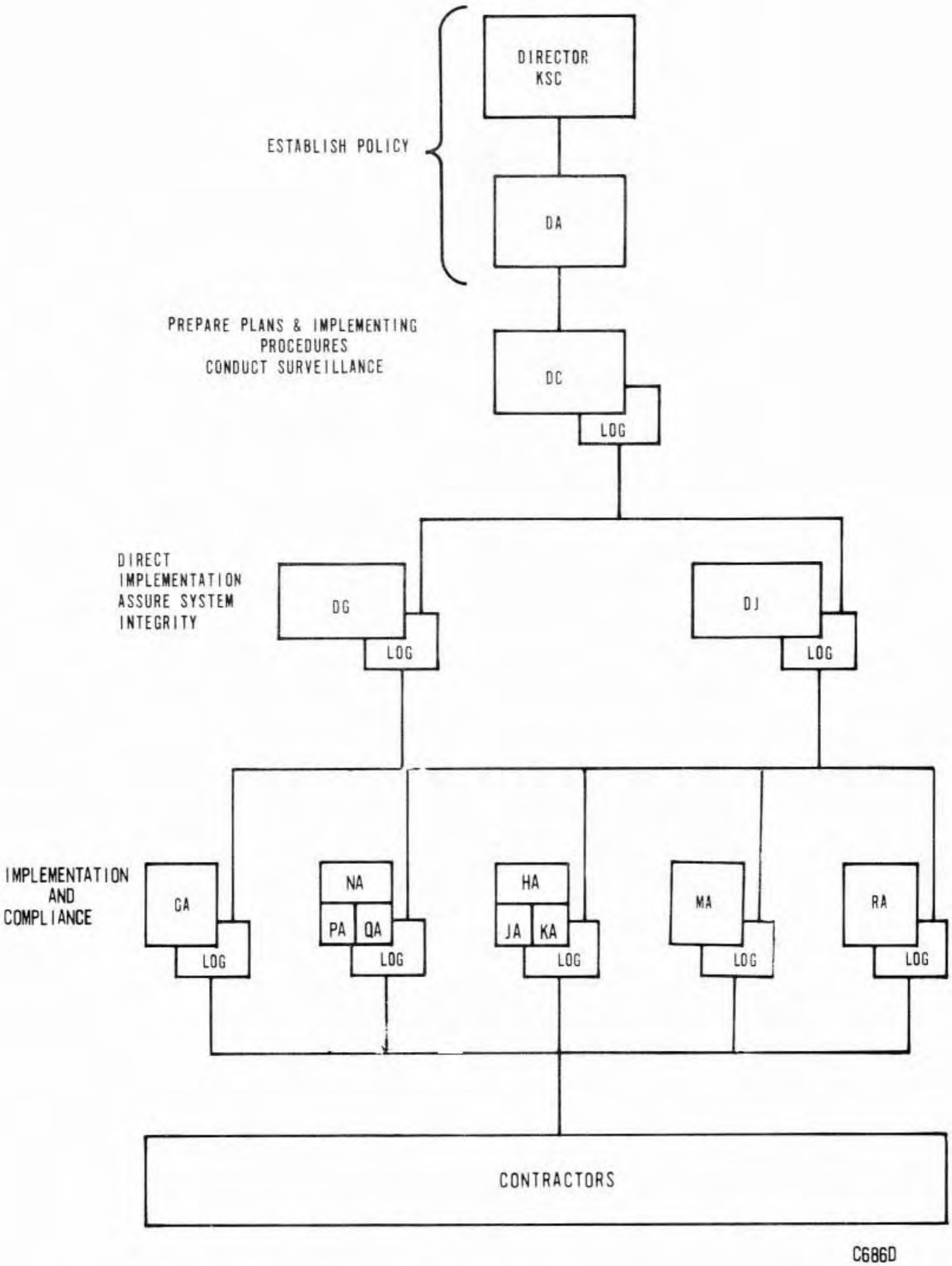

Figure 3-1. Logistics Management Functional Flow at KSC

3.7 SPARE PARTS PROVISIONING

Initial provisioning of peculiar spare parts (for definition of this term, refer to Appendix D) shall be accomplished by design agencies in coordination with the operating agency and the contracting officer, to cover requirements for 12 months. Standard item lists submitted to RA shall indicate an initial three-month requirement; these items shall be reviewed by RA for commonality with like items for a determination of actual buy quantities. (See Exhibits 2 and 3 for additional details.) When operating requirements indicate a change to this policy is desirable, (e.g., design instability or one-time buy) design agencies shall submit change recommendations to the appropriate Saturn Systems Office (DG) or Apollo Spacecraft Office (DJ) for prior approval.

3.8 SPARE PARTS REPLENISHMENT

Replenishment of spare parts shall insure stock is on hand to meet not less than a six-month requirement for peculiar spare parts and a three-month requirement for standard items. On items where the lead time is six months or more, replenishment should be in yearly increments. In all cases economic buys will be made. (See Exhibit 3 for additional details.)

3.9 BUDGET JUSTIFICATION

Spare parts list(s) with usage data, where appropriate, will be the basis for justification of budget requirements. If the exigencies of the program preclude MSC or MSFC providing standard parts list(s) when needed, they will be requested to provide a gross funding estimate based on engineering judgment.

3.10 SUSTAINING LOGISTICS ENGINEERING SERVICES

The KSC Director of Design Engineering (MA) shall provide sustaining logistics engineering services for equipment for which he has design responsibility.

3.11 REVIEW AND EVALUATION PROCEDURES

Systematic review and evaluation shall be accomplished to compare the material requirements of the Apollo/Saturn Program against available resources. Available resources which satisfy, or which can be modified to satisfy, the Apollo/Saturn Program technical and schedule requirements shall be applied. The review and evaluation shall be based on value to be gained and shall be performed frequently enough to insure adequate protection of Government resources. Results shall be subject to review by the Saturn Systems Office (DG), or the Apollo Spacecraft Office (DJ), and the Program Control Office (DC).

3.12 APPLICABILITY TO CONTRACTORS

See paragraph 1.8.2, Section I.

3.12.1 SUPPORT FUNCTIONS. Apollo/Saturn logistics support actions and functions, which are to be accomplished by a contractor, shall be covered in contract work statements and/or exhibits describing each obligation, required performance parameters, and reporting functions.

3.12.2 EQUIPMENT AND FACILITIES CONTRACTS. This plan, K-AM-02, or applicable portions thereof, shall be incorporated as a contractual requirement (by reference) in all equipment and facilities contracts consummated by KSC after the effective date of this document. This plan shall be incorporated in existing contracts in accordance with the provisions of paragraph 1.8.2.

3.13 REVISION AND CONFLICT OF LOGISTICS PLAN

Current logistics plans and procedures developed by the KSC design and operating organizations will be reviewed and revised in the event of program changes or as a result of changes in logistics support responsibilities. Revisions to current plans and procedures will be in consonance with the provisions of this plan. Any conflict between the provisions of this plan and other KSC Apollo/Saturn documents shall be brought to the immediate attention of DA through DC, where such conflicts shall be resolved on an individual basis.

3.14 REVIEW OF LOGISTICS PLANS

Copies of logistics plans and procedures (including revisions thereto) developed by design or operating organizations, or by systems offices, will be submitted to DC. DC will review for consistency with this plan and transmit comments on conflicts to the appropriate Saturn Systems Office (DG) or the Apollo Spacecraft Office (DJ) for resolution. In case of disagreement, comments will be reviewed jointly by DC and DG/DJ, as appropriate, and resolved or submitted to the Apollo Program Manager (DA) for resolution.

SECTION III
POLICY

3.1 GENERAL

All KSC Apollo/Saturn logistics plans and actions shall be accomplished in accordance with the policies, procedures, methods, and guidelines outlined in this plan, including the Exhibits incorporated in Section V. Policy is determined by the Director, KSC, and is established and enunciated by the Director, Plans, Programs, and Resources (PPR). Figure 3-1 illustrates the logistics management functional flow at KSC.

3.2 LOGISTICS SUPPORT PLAN IMPLEMENTATION

The requirements of this plan shall be implemented to develop and provide support for all new equipment and for existing equipment in instances where support has been determined by the appropriate Apollo/Saturn Systems Office (PPR-1, 4, or 5) to require improvement.

3.3 UTILIZATION OF EXISTING PRACTICES

The KSC Apollo/Saturn logistics system shall utilize existing practices wherever possible. Established internal operations of organizations and contractors concerned will not be changed except as might be required to achieve an integrated KSC Apollo/Saturn logistics support program.

3.4 DEVELOPMENT OF LOGISTICS PRODUCTS

Identification and development of logistics products (paragraph 2.2) shall be based on a maintenance requirements analysis. However, logistics products development will not be delayed if analysis data is not available, but will instead be based on analysis of available engineering data and experience provided by the design agency.

3.5 REQUIREMENTS ANALYSIS PRIORITY SYSTEM

Logistics products developed from engineering data and experience shall be verified, where warranted, by a detailed requirements analysis provided by the design agency in accordance with priorities established in paragraph 2.2.4.1.

3.6 MAINTENANCE REQUIREMENTS ANALYSIS DETERMINATION

In areas of KSC design responsibility, existing contracts shall be evaluated by the design agency, in coordination with the operating agency, to determine the need for performing a maintenance requirements analysis. The criteria established in paragraph 2.2.4 shall be used as the basis for such determination. Indicated need to perform a maintenance requirements analysis shall not be construed as authority for a change in contract scope of work.

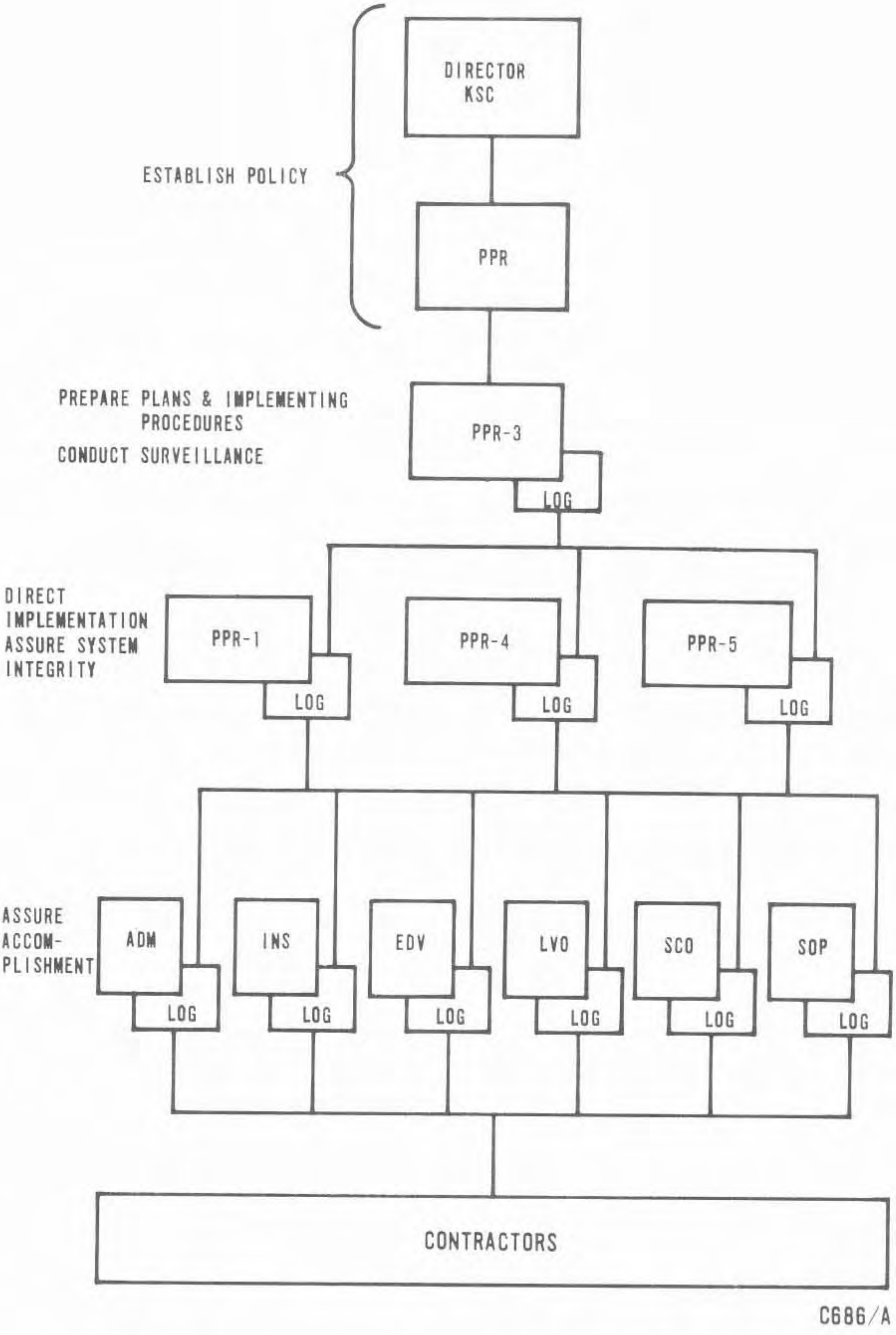

Figure 3-1. Logistics Management Functional Flow at KSC

Where a change in scope is required, or indicated, it will be brought to the attention of the Apollo/Saturn Systems Office (PPR-1, 4, or 5) and the Program Control Office (PPR-3) for resolution. In areas where KSC does not have design cognizance, such recommendations shall be made through program channels to the Center having design cognizance.

3.7 SPARE PARTS PROVISIONING

Initial provisioning of peculiar spare parts (for definition of this term, refer to Appendix D) shall be accomplished by design agencies in coordination with the operating agency, to cover requirements for 12 months. Standard item lists submitted to SOP shall indicate an initial three-month requirement; these items shall be reviewed by SOP for commonality with like items for a determination of actual buy quantities. (See Exhibits 2 and 3 for additional details.) When operating requirements indicate a change to this policy is desirable, (e.g., design instability or one-time buy) design agencies shall submit change recommendations to the appropriate Apollo/Saturn Systems Office (PPR-1, 4, or 5) for prior approval.

3.8 SPARE PARTS REPLENISHMENT

Replenishment of spare parts shall insure stock is on hand to meet not less than a six-month requirement for peculiar spare parts and a three-month requirement for standard items. On items where the lead time is six months or more, replenishment should be in yearly increments. In all cases economic buys will be made. (See Exhibit 3 for additional details.)

3.9 SUSTAINING LOGISTICS ENGINEERING SERVICES

KSC design cognizant agencies shall provide sustaining logistics engineering services for equipment for which they have design responsibility.

3.10 REVIEW AND EVALUATION PROCEDURES

Systematic review and evaluation shall be accomplished to compare the material requirements of the Apollo/Saturn Program against available resources. Available resources which satisfy, or which can be modified to satisfy, the Apollo/Saturn Program technical and schedule requirements shall be applied. The review and evaluation shall be based on value to be gained and shall be performed frequently enough to insure adequate protection of Government resources. Results shall be subject to review by the Apollo/Saturn Systems Offices (PPR-1, 4, or 5) and the Program Control Office (PPR-3).

3.11 APPLICABILITY TO CONTRACTORS

The provisions of this document shall not be cited as authority for change in scope of any existing contract except as specifically incorporated therein through appropriate contractual action.

3.11.1 SUPPORT FUNCTIONS. Apollo/Saturn logistics support actions and functions, which are to be accomplished by a contractor, shall be covered in contract work statements and/or exhibits describing each obligation, required performance parameters, and reporting functions.

3.11.2 EQUIPMENT AND FACILITIES CONTRACTS. This plan, K-AM-02, or applicable portions thereof, shall be incorporated as a contractual requirement (by reference) in all equipment and facilities contracts consummated by KSC after the effective date of this document. This plan shall be incorporated in existing contracts as follows:

a. In its entirety if this can be accomplished at no additional cost to the Government.

b. To the degree necessary to assure the provision of adequate logistics support at KSC. The determination of adequacy will be accomplished by the appropriate Apollo/Saturn Systems Office (PPR-1, 4, or 5).

Where neither of these alternatives can be accomplished within the provisions of current contract(s) without substantial changes in scope and attendant costs, the contract(s) shall be reviewed to determine what changes and costs would be incurred. The results of this review, together with appropriate recommendations, shall be forwarded to the appropriate Apollo/Saturn Systems Office (PPR-1, 4, or 5) for determination of action to be taken. A copy of each review report and recommended action shall be furnished to the Program Control Office (PPR-3).

3.12 REVISION AND CONFLICT OF LOGISTICS PLAN

Current logistics plans and procedures developed by design and operating organizations will be reviewed and revised in the event of program changes or as a result of changes in logistics support responsibilities. Revisions to current plans and procedures will be in consonance with the provisions of this plan. Any conflict between the provisions of this plan and other KSC Apollo/Saturn documents shall be brought to the immediate attention of the Director, PPR, through PPR-3, where such conflicts shall be resolved on an individual basis.

3.13 REVIEW OF LOGISTICS PLANS

Copies of logistics plans and procedures (including revisions thereto) developed by design or operating organizations, or by systems offices, will be submitted to PPR-3. PPR-3 will review for consistency with this plan and transmit comments on conflicts to the appropriate Apollo/Saturn Systems Office (PPR-1, 4 or 5) for resolution. In case of disagreement, comments will be reviewed jointly by PPR-3 and PPR-1, 4, or 5, as appropriate, and resolved or submitted to Director, PPR, for resolution.

SECTION IV
RESPONSIBILITIES

4.1 GENERAL

Logistics management is an integral part of the KSC Apollo/Saturn management system and is subject to the same disciplines. As such, each KSC organizational element bears responsibility for the successful and timely accomplishment of its assigned logistics functions. Figure 3-1, Logistics Management Functional Flow at KSC, illustrates the flow of functional responsibilities for the Apollo/Saturn logistics activities at KSC. Figure 4-1, Functional Flow Responsibilities and Inter-relationships, illustrates the logistics functional responsibilities of the KSC organizations and the interface which exists between KSC/MSC and KSC/MSFC. Detailed responsibilities are delineated in the Exhibits and supplemental procedures outlined in Section V. The following paragraphs delineate the broad logistics responsibilities assigned the organizational element indicated.

4.2 PROGRAM CONTROL OFFICE (PPR-3)

4.2.1 PLANNING AND MANAGEMENT. Exercise overall responsibility for KSC Apollo/Saturn logistics planning and management.

4.2.2 LOGISTICS POLICY. Assure execution of established KSC Apollo/Saturn logistics policy. Resolve questions of KSC logistics policy for the Apollo/Saturn Program.

4.2.3 MANAGEMENT INFORMATION. Assure timely availability of management information from which to evaluate KSC Apollo/Saturn logistics program execution.

4.2.4 LOGISTICS INTERFACE. Coordinate and resolve logistics problems between KSC organizations when these cannot be resolved by the Apollo/Saturn Systems Office (PPR-1, 4 or 5). In addition, coordinate and resolve interface problems between KSC and other NASA Centers and the NASA Apollo Program Office. Represent KSC in the development of inter-center agreements. Interpret provisions of NHB 7500.1 for application at KSC.

4.2.5 EDP SERVICES. Concur in requirements for utilization of EDP services for logistics products that have been validated by the appropriate Apollo/Saturn Systems Office.

4.2.6 PLANS REVIEW. Review logistics plans and procedures developed by KSC organizations for consistency and compliance within the intent of this plan. In coordination with PPR-1, 4 and 5, resolve conflicts and develop maximum uniformity in plans.

ORGANIZATION / FUNCTION	MSFC PROVIDED		MSC PROVIDED		KSC PROVIDED						
					GSE				OTHER		
					EDV DSGN		LVO DSGN AND OPER	INS DSGN AND OPER	FACIL-ITIES	STAND TOOLS	SPEC TOOLS
	STAGES	GSE	SPACE-CRAFT	GSE	SOP OPER	LVO OPER					
I PERFORM MAINTENANCE REQUIREMENTS ANALYSIS	MSFC	MSFC	MSC	MSC	EDV	EDV	LVO	INS	EDV	USER**	DCD*
A. IDENTIFY MAINTENANCE REQUIREMENTS PRODUCTS											
1. MAINTENANCE GROUND EQUIPMENT											
2. TYPES OF MAINTENANCE											
3. LEVELS OF MAINTENANCE											
4. MAINTENANCE FACILITIES											
5. OPERATIONS AND MAINTENANCE INSTRUCTIONS											
6. PERSONNEL: SKILL LEVELS, QUANTITIES, TRAINING REQUIREMENTS											
7. SPARE PARTS											
II INITIAL PROVISIONING OF SPARE PARTS											
A. SPARE PARTS SELECTION	MSFC	MSFC	MSC	MSC	EDV	EDV	LVO	INS	EDV	DCD*	DCD*
B. REVIEW AND COMMENT	LVO	LVO	SCO	SCO	SOP	LVO SOP***	LVO SOP***	LVO SOP***	SOP	SOP	USER** SOP***
C. APPROVE SPARE PARTS LISTS	MSFC	MSFC	MSC	MSC	EDV	EDV	LVO	INS	EDV	DCD*	DCD*
D. PROCUREMENT INITIATION (EXHIBIT 2 ADDENDUM A FOR EXCEPTIONS)											
1. PECULIAR	MSFC	MSFC	MSC	MSC	EDV	EDV	LVO	INS	EDV		DCD*
2. STANDARD		SOP		SOP	SOP	SOP	SOP	SOP	SOP	SOP	
E. PROCUREMENT (EXHIBIT 2 ADDENDUM A FOR EXCEPTIONS)											
1. PECULIAR	MSFC	MSFC	MSC	MSC	ADM	ADM	ADM	ADM	ADM		ADM
2. STANDARD		ADM		ADM	ADM	ADM	ADM	ADM	ADM	ADM	
F. SPARE PARTS ALLOCATION (DISTRIBUTION)	MSFC		MSC		EDV	EDV	LVO	INS	EDV	DCD*	DCD*
III REPLENISHMENT OF SPARE PARTS (EXHIBIT 3 FOR EXCEPTIONS)											
A. DETERMINATION OF REQUIREMENTS											
1. PECULIAR	MSFC	MSFC	MSC	MSC	EDV	EDV	LVO	INS	SOP		USER**
2. STANDARD		SOP		SOP	SOP	SOP	SOP	SOP	SOP	SOP	
B. PROCUREMENT INITIATION											
1. PECULIAR	MSFC	MSFC	MSC	MSC	EDV	EDV	LVO	INS	SOP		SOP
2. STANDARD		SOP		SOP	SOP	SOP	SOP	SOP	SOP	SOP	
C. PROCUREMENT											
1. PECULIAR	MSFC	MSFC	MSC	MSC	ADM	ADM	ADM	ADM	ADM		ADM
2. STANDARD		ADM		ADM	ADM	ADM	ADM	ADM	ADM	ADM	
IV MAINTENANCE (EXHIBIT 2)											
V POSTLAUNCH REFURBISHMENT (EXHIBIT 2)											
VI PROPELLANTS AND PRESSURANTS (EXHIBIT 5)											
VII ORDNANCE (EXHIBIT 6)											
VIII TRANSPORTATION (EXHIBIT 4)											

LEGEND

DCD* - DESIGN COGNIZANT DIRECTORATE
USER** - LVO, EDV, SCO, INS, SOP
SOP*** - STANDARD ITEMS ONLY

D6810

Figure 4-1. Functional Flow Responsibilities and Inter-relationships

4.3 MANNED SPACECRAFT OFFICE (PPR-1)
APOLLO/SATURN I/IB SYSTEMS OFFICE (PPR-4)
APOLLO/SATURN V SYSTEMS OFFICE (PPR-5)

4.3.1 MANAGEMENT DIRECTION. Develop and implement management direction utilizing the logistic support guidance provided by this plan for that portion of the Apollo/Saturn Program at KSC for which they have program management responsibility.

4.3.2 COORDINATION. Provide coordination and approval of logistics plans to establish program management interface with logistics requirements, concepts, criteria, and development of schedules. Transmit unresolved problems and questions of policy to PPR-3 for resolution (paragraph 4.2.6).

4.3.3 MANAGEMENT VISIBILITY. Establish systematic review, control, and reporting procedures to assure continuous logistics management visibility for surveillance of that portion of the Apollo/Saturn Program for which they have program management responsibility.

4.3.4 CRITICALITY AND COMPLEXITY GUIDANCE. Establish guidelines for criticality and complexity criteria for determining the degree of detail to which the maintenance requirements analysis will be performed.

4.3.5 COORDINATION WITH MSC AND MSFC. Act as offices of primary interest in all relationships with MSC and MSFC program offices for that portion of the Apollo/Saturn Program at KSC for which they have program management responsibility. Review, approve, and transmit to, or coordinate with, corresponding program offices at MSC and/or MSFC all recommendations emanating from KSC design and operating organizations in the following areas:

a. Logistics baseline data.

b. Operations analysis data.

c. Maintenance requirements analysis data.

d. End Item Reports, Site Logistics Requirements Summaries, or other documentation containing equivalent data.

e. Logistics products development, requirements, availability, voids, deficiencies, integration and comparison.

f. Delivery schedules, impacts, and changes.

g. Sustaining engineering services.

4.3.6 SITE ACTIVATION. Develop schedules and coordinate and monitor activities of KSC design and operating organizations to assure site development and activation in accordance with Apollo/Saturn Program requirements.

4.3.7 EDP SERVICES. Validate requirements of KSC design and operating organizations for utilization of EDP services, including data elements and reports in their areas of responsibility.

4.3.8 CONTRACT CHANGES. Review recommendations from KSC design and operating organizations for contract change in scope necessary to improve logistics support. Coordinate approved recommendations with ADM for inclusion in contract(s).

4.3.9 RESOURCES. Review budget and manpower requirements to assure compatibility with program needs.

4.4 THE RELIABILITY AND QUALITY ASSURANCE OFFICE (PPR-6)

Establish and monitor the reliability and quality assurance policy for the Apollo/Saturn Program at KSC.

4.5 THE OPERATIONS SUPPORT OFFICE (PPR-7)

4.5.1 SUPPORT FACILITIES. Perform those functions enumerated in paragraph 4.3 for operational support facilities with the exception of spacecraft and launch vehicle checkout and launch facilities.

4.5.2 DOD INTERFACE. Define and coordinate KSC Apollo/Saturn logistics support requirements with DOD agencies located in the vicinity of KSC.

4.5.3 MANAGEMENT PROCEDURES. Develop management procedures and documentation for general support requirements.

4.6 THE ASSISTANT DIRECTOR FOR ADMINISTRATION (ADM)

4.6.1 TRANSPORTATION. Develop and implement a KSC Apollo/Saturn transportation logistics plan to provide specific direction for:

a. Control of shipments arriving or originating at KSC.

b. Utilization and control of intra-Center transportation equipment and facilities.

c. Control of intra-Center movement of Apollo/Saturn equipment and spare parts.

d. Emergency requirements.

4.6.2 TRAINING. Develop, initiate, monitor, and evaluate, in conjunction and coordination with operating elements, personnel training programs to assure the attainment of required personnel skills.

4.6.3 PROCUREMENT. Provide procurement policy and direction and consummate contracts for the acquisition of material as required by the design and operating organizations and approved by the appropriate Apollo/Saturn Systems Office.

4.7 ASSISTANT DIRECTORS FOR: LAUNCH VEHICLE OPERATIONS (LVO)
SPACECRAFT OPERATIONS (SCO)
ENGINEERING AND DEVELOPMENT (EDV)
INFORMATION SYSTEMS (INS)
SUPPORT OPERATIONS (SOP)

4.7.1 LOGISTICS IMPLEMENTATION PLAN. Develop and activate an implementation plan in accordance with paragraph 1.7.3 which provides the immediate direction and documentation required at the operating level for the equipment for which they have design or operating responsibility.

4.7.2 CONTRACTOR SUPPORT PLAN. Assure the development and monitor the activation of contractually approved contractor initiated support plans for their applicable areas of responsibility (paragraphs 1.7.3 and 1.7.4).

4.7.3 QUALITY ASSURANCE AND RELIABILITY. Conduct or monitor contractually approved contractor quality assurance and reliability inspection of all equipment, material, and spare parts received at KSC in accordance with criteria established by the NASA Center having design responsibility. Detailed requirements are contained in KSC Apollo/Saturn Reliability and Quality Assurance Plan, K-AM-05.

4.7.4 LOGISTICS BASELINE DEVELOPMENT. In accordance with their design responsibility and/or the interface relationship with MSFC and/or MSC, the applicable Assistant Directorate will:

a. Assure the availability of logistics baseline data from which to determine logistics products requirements. Source of data may be from in-house capabilities, KSC contractors, or from MSC and/or MSFC.

b. Coordinate and review in the light of KSC requirements.

c. Direct contractor development of required data within current contractual limitations.

d. Advise MSC and/or MSFC, through PPR-1, 4, or 5, of additional data needs.

4.7.5 OPERATIONS ANALYSIS. Monitor and review the products of operations analysis to assure availability of basic data to develop OGE logistic support requirements. For KSC-procured OGE, this will be done through contractually approved contractor efforts. KSC organizations cannot monitor the MSC and MSFC analysis actions. They will review documentation, resulting from this analysis, furnished by these centers which may disclose a requirement for more information to support the development of logistics products for MSC and MSFC-procured OGE. Coordination with MSC and/or MSFC will be accomplished through PPR-1, 4, and/or 5, as appropriate. (While this activity is not strictly a logistics responsibility, the information derived from the operations analysis is a prerequisite to development of logistics products requirements).

4.7.6 MAINTENANCE REQUIREMENTS ANALYSIS.

a. Establish criticality and complexity criteria for determining the degree of detail to which the maintenance requirements will be performed. Guidelines will be provided by PPR-1, 4, and/or 5; report inconsistencies in guidelines to the appropriate PPR office(s).

b. Conduct, or assure that contractors conduct, maintenance requirements analysis in accordance with established priorities (paragraph 2.2.4.1) and criticality and complexity criteria. Procedures are detailed in Addendum "B" to Exhibit 2, Maintenance Requirements Analysis Procedures.

4.7.7 LOADING ANALYSIS. Conduct, or cause the contractor to conduct, a loading analysis to determine adequacy or inadequacy of maintenance equipment. Where shortages exist, initiate corrective action.

4.7.8 LOGISTICS REQUIREMENTS SUMMARIES.

a. Determine, either in-house or through contractor efforts, whether logistics products by site location are adequately identified in accordance with procedures outlined in Addendum "B" to Exhibit 2. If positive assurance can be made that all logistics products requirements have been determined, the development of End Item Reports (EIR's) and Site Logistics Requirements Summaries (SLRS's) may be waived.

b. Develop, or cause the contractor to develop, End Item Reports (EIR's) and Site Logistics Requirements Summaries (SLRS's) in those instances where identification of required logistics products is incomplete, inadequate, or the status cannot be determined.

4.7.9 LOGISTICS PRODUCTS REQUIREMENTS. From activities in paragraphs 4.7.4 through 4.7.8, design organizations, in coordination with the users, develop, or cause the contractor to develop, logistics products requirements.

4.7.10 REQUIREMENTS INTEGRATION AND RESOURCES COMPARISON.

a. Determine that logistics products requirements established by MSC and MSFC are adequately identified, appropriately documented, and available as scheduled. Where inadequacies are determined to exist, develop appropriate recommendations and submit to MSC or MSFC through PPR-1, 4, or 5 as appropriate.

b. Determine whether KSC-developed logistics products requirements are adequately identified, appropriately documented, and available as scheduled. Where inadequacies are determined to exist, advise appropriate KSC design organization of the additional requirements or information needed.

c. Compare requirements with available resources, utilizing surplus resources from other programs as well as Apollo/Saturn resources already procured or excesses remaining from site activiation phases.

d. After comparison advise MSC and MSFC through program channels and KSC design agencies, of voids, inadequacies or additional requirements.

4.7.11 MANAGEMENT VISIBILITY. Establish systematic review, control, and reporting procedures to assure continuous management visibility for surveillance of the logistics activities for which they have design and/or operating responsibilities.

4.7.12 EDP SUPPORT. Determine requirements for EDP support including:

a. Data elements and source(s) including MSC, MSFC and KSC organizations.

b. Develop recommended report requirements to include format, data content, and frequency.

c. Submit, through PPR-1, 4, or 5, for validation, to INS.

4.8 ASSISTANT DIRECTOR, INFORMATION SYSTEMS (INS)

In addition to the responsibilities enumerated in paragraph 4.7, INS has the following responsibilities for EDP support:

a. Perform EDP programming necessary to support logistics requirements validated by the appropriate Apollo/Saturn Systems Office, and concurred in by PPR-3.

b. Operate EDP equipment in support of KSC Apollo/Saturn logistics programs.

c. Provide professional guidance on utilization of EDP services.

4.9 ASSISTANT DIRECTOR, SUPPORT OPERATIONS (SOP)

In addition to the responsibilities enumerated in paragraph 4.7 as they apply to an operating organization, SOP has the following additional responsibilities:

4.9.1 MAINTENANCE AND SUPPORT SERVICES CAPABILITY. Assure that second level maintenance shop cabability is adequate to meet maintenance and support services requirements as developed from MSC, MSFC and KSC maintenance requirements analysis. If not adequate, initiate action to expand or, in coordination with applicable design organization (including MSC and/or MSFC) develop appropriate work-arounds or alternate method(s) of meeting the requirements.

4.9.2 CALIBRATION SERVICES. Provide calibration services required to meet Apollo/Saturn Program needs.

4.9.3 SUPPLY SUPPORT. Provide supply support of standard items to meet all KSC Apollo/Saturn Program requirements. SOP will be sole source for KSC for these items.

4.10 DIRECTOR, QUALITY ASSURANCE AND SAFETY (QAS)

4.10.1 QUALITY ASSURANCE PROGRAM. Establish implement, and monitor, in coordination with Operational Directorates, a quality assurance program. The program will insure that KSC-procured equipment, material, and spare parts, received and applied, satisfy established criteria and specification for technical format, content, and equipment compatibility.

4.10.2 SAFETY PROGRAM. Establish and monitor, in coordination with Operational Directorates, a safety program to ensure safety of personnel activities in performing support, operational and maintenance actions for the Apollo/Saturn Program at KSC.

SECTION V
EXHIBITS

5.1 GENERAL

The Exhibits incorporated in this section have been developed to provide direction and guidelines to responsible KSC organizations to meet the objectives of this plan. Each Exhibit delineates the KSC Apollo/Saturn logistics policy, requirements, and KSC organizational responsibilities in the designated functional area. Addenda to Exhibits are provided only when detailed procedures for accomplishment of functional tasks are required to assure uniformity of application. These Exhibits are illustrated in Figure 1-1, KSC Apollo/Saturn Logistics Documentation Requirements, and their content is summarized briefly in the following paragraphs.

5.2 EXHIBIT 1. KSC APOLLO/SATURN LOGISTICS MANAGEMENT INFORMATION SYSTEM

The logistics management information system establishes guidelines and procedures for the collection, analysis, display, and dissemination of pertinent information to the KSC Apollo/Saturn Program Manager and other KSC management personnel. The system provides visibility of status and trends, and permits identification of current and potential problem areas. It permits an analysis of the magnitude of problem areas, the assessment of impact on mission objectives, and the identification of the organizations responsible for resolution. It also provides a means for detailed evaluation of program support capabilities by logistics functional areas such as: spare parts and supplies, maintenance, technical support data, transportation, propellants and pressurants, ordnance, and EDP support. It permits identification of areas where logistics resources have not been provided.

In summary, this is a logistics tracking system which furnishes information for logical management action.

5.3 EXHIBIT 2. KSC APOLLO/SATURN MAINTENANCE REQUIREMENTS PLAN

This Exhibit was developed to provide an integrated approach to an effective maintenance management system at KSC. It identifies the major maintenance activities and specifies types and levels of maintenance to be performed. In addition to the elements common to all Exhibits (paragraph 5.1 above), it outlines the interfaces between KSC organizations, and MSC and MSFC. It outlines actions necessary to meet time-phased schedules. While definitive and directive in nature, this Exhibit does not restrict the initiative of responsible KSC organizations and/or their support contractors. Addenda will be published covering specific phases that require more detailed guidance or uniform application. Addendum "A" covers spare parts provisioning procedures and Addendum "B" covers maintenance requirements analysis procedures.

5.4 EXHIBIT 3. KSC APOLLO/SATURN SUPPLY SUPPORT REQUIREMENTS PLAN

The supply support management functions of stock control, accountability, inventory, and issue control provide the basic areas of accent within this Exhibit. Applied against these areas is a recommended implementation procedure which will provide a standardized approach for the management of Apollo/Saturn resources at KSC. Recognition is given to similar applications, currently in existence, and their degree of acceptability is left subject to individual responsible organization decisions. The adaptability of the proposed standardization to EDP programming and the economy of standardization is presented for consideration by the responsible organization.

5.5 EXHIBIT 4. KSC APOLLO/SATURN TRANSPORTATION REQUIREMENTS PLAN

The special requirements incident to movement of AVE components are covered in this Exhibit. Also included are the interchange points in arriving shipments and the points where KSC assumes responsibility. This Exhibit specifies actions to be taken in the receipt, intra-Center movement, and specialized handling of equipment, spacecraft, stages, and aerospace vehicles. In the revision, references to general motor pool practices, and provision of administrative transportation will be eliminated. This type information is adequately covered in KSC management instructions.

5.6 EXHIBIT 5. KSC APOLLO/SATURN PROPELLANTS REQUIREMENTS PLAN

This Exhibit describes methods and formats necessary to forecast, consolidate, approve, procure, store, and issue propellants and pressurants required in support of the Apollo/Saturn Program at KSC. It provides responsible organizations the necessary instructions, in functional flow sequence, to fulfill the program requirements. It covers transportation, safety and special handling considerations because of the nature of the commodities involved.

5.7 EXHIBIT 6. KSC APOLLO/SATURN ORDNANCE REQUIREMENTS PLAN

The organizational requirements generated by this Exhibit include the receipt, inspection, storage, withdrawal, and installation of ordnance and its applicable installation equipment. It includes the handling and management of such items as primacord, squibs, retrorockets, ullage rockets, explosive valves and bolts, linear-shaped charges, exploding bridgewire, igniters, and detonators. Accent has been given the safety measures applicable to the handling of ordnance items with particular emphasis given to those precautions which must be observed when maintenance is required subsequent to the installation of ordnance in the Apollo/Saturn space vehicle.

5.8 EXHIBIT 7. KSC APOLLO/SATURN EDP SUPPORT REQUIREMENTS PLAN

This Exhibit provides guidance to the management of responsible organizations to enable them to establish the requirements and criteria for utilizing an EDP system as an effective tool for logistics management. It applies the capabilities of an EDP system as a data bank, containing vast amounts of logistics information, to the management demands for support data for the compilation of reports, product improvement, or increases in material or manpower resources. Additionally, it demonstrates the flexibility and adaptability of an EDP system to the constantly changing status of logistics support for the Apollo/Saturn Program.

5.9 EXHIBIT 8. KSC APOLLO/SATURN TECHNICAL DATA REQUIREMENTS PLAN

Within this Exhibit are the requirements for the development and activation of a technical data management control system which will assure the availability of all technical documentation required to provide support for the Apollo/Saturn Program at KSC. Included are the requirements for updating plans for engineering drawings, operations and maintenance manuals, spare parts lists, etc., to maintain compatibility with end item configuration. Management visibility of technical data status, quick retrieval by application to EDP processes, and other effective methods of management control are also contained in this Exhibit. Interface between logistics and configuration management functions is also covered in this Exhibit.

EXHIBIT 1

KSC APOLLO/SATURN LOGISTICS MANAGEMENT INFORMATION SYSTEM

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EXHIBIT 1

KSC APOLLO/SATURN LOGISTICS
MANAGEMENT INFORMATION SYSTEM

EXHIBIT 1
KSC APOLLO/SATURN LOGISTICS MANAGEMENT INFORMATION SYSTEM

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LIST OF ILLUSTRATIONS

EXHIBIT 1
KSC APOLLO/SATURN LOGISTICS MANAGEMENT INFORMATION SYSTEM

SECTION I
CONCEPT

1.1 GENERAL

The logistics management information system developed within this Exhibit establishes a means of providing KSC Apollo/Saturn management the logistics products and services status information vital to program success. By the effective use of Electronic Data Processing (EDP) capabilities, it establishes a system whereby the responsible operating organizations having provided the essential input data, have the capability of tracking the day-by-day status of each logistics product and service required to support a Contract End Item (CEI). The same system provides information, by exception, which indicates the immediate actions they must initiate in order to preclude or correct problem areas or omissions which would have adverse impact on program schedules.

1.2 SYSTEM DESCRIPTION

The system described within this Section provides the design, operating/maintaining, and management elements of the KSC Apollo/Saturn Program with two essential capabilities. It develops the general requirements for tracking any logistics product or service and, additionally, provides the status displays required for management information. As prescribed, it utilizes standardized input source data to the EDP system described in Exhibit 7 of K-AM-02 and utilizes the output capabilities of the EDP system to present standardized reports. It reduces redundancy in existing reporting methods and reduces the manhours presently expended on report preparation, as well as providing a single source for vital information in lieu of the multiple sources used for current reports. The specific actions to be taken for the individual products or services, (e.g., maintenance, supply, transportation, propellants and pressurants, ordnance, and technical data are contained in Sections II through VII of this Exhibit).

1.2.1 SYSTEM ORIENTATION. The system is primarily mission-oriented and is based on a relative time line which begins with the selection of the Aerospace Vehicle Equipment (AVE) and continues through space vehicle launch. Each logistics support activity and/or function is sequentially positioned in order that the time of its completion shall assure a continuity of operations commensurate with program schedules. A corresponding capability will be developed to monitor and display the status of Real Property Installed Equipment (RPIE) on a systems-oriented basis. EDP-developed status reports provide the management information required to successfully control these activities. The functional flow of this system is detailed in the following paragraphs and illustrated in Figure 1-1, Logistics Information System Functional Flow.

The multiple sources required to identify, quantify, establish need times, and allocate the logistics products are detailed in K-AM-02 and its Exhibits and Appendices. They consist of the operations analysis (reference Section II, K-AM-02 and Appendix A), and the maintenance requirements analysis (reference Addendum "A" to Exhibit 2), and the provisioning procedures (reference Addendum "A" to Exhibit 3).

a. These sources provide the input data the operating organizations shall submit for EDP programming in reference to each CEI for which they have operational/

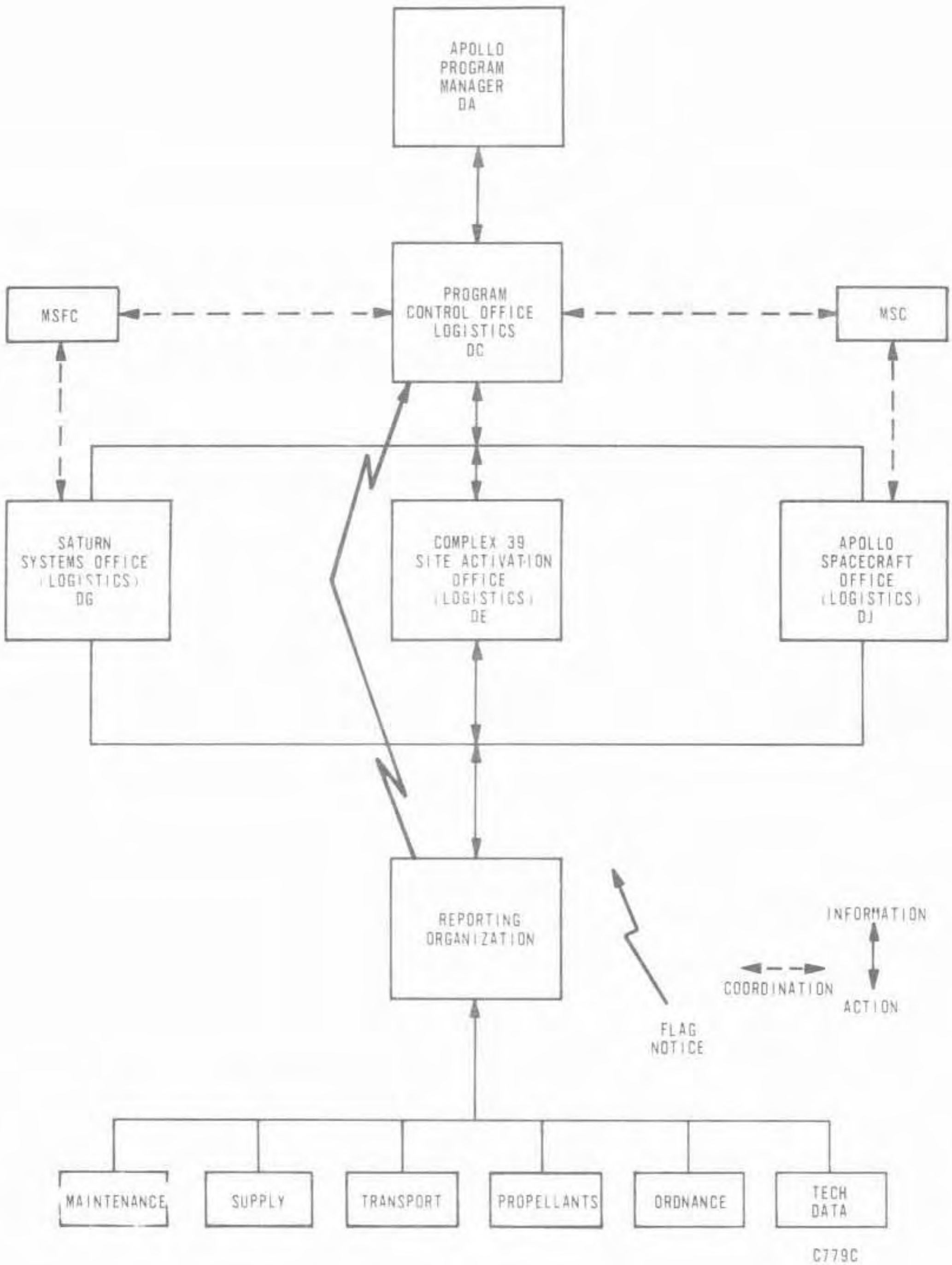

Figure 1-1. Logistics Information System Functional Flow

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maintenance responsibilities. Organizational responsibilities for providing source information for the management information system are enunciated in the appropriate Exhibits.

b. As each logistics function (spare parts list compiled, procurement action taken, delivery dates established, receipt acknowledged, etc.) is completed, this information shall be programmed into the EDP data bank. The step-by-step flow of this information for each logistics product is portrayed in Section II through VII of this Exhibit.

c. The accomplishment of these functions, within established due dates, shall result in routine reports from the EDP system to provide operational management visibility. The step-by-step development of EDP reports is described in Exhibit 7. Copies of routine EDP reports will be forwarded as required to the Saturn Systems Office (DG), Apollo Spacecraft Office (DJ), or Complex 39 Site Activation Office (DE), as applicable, as an indication of task completion.

d. DG, DJ, or DE shall review and present reports in summary form, at scheduled intervals, to the Program Control Office (DC) for inclusion in the Apollo Program management visibility displays.

e. In the event that due dates are not met, the EDP system shall, on the programmed date, initiate a flag notice. This will designate the function, the responsible organization, and due date that has not been met. A description of the types of flag notices to be provided for each product is included in Sections II through VII of this Exhibit.

f. The flag notice shall be expedited directly to the operating organizations and DG, DJ, or DE, as applicable, for immediate action, and to the Program Control Office for information and continued surveillance until the unsatisfactory condition has been corrected.

1.2.2 LOGISTICS PRODUCTS AND SERVICES ASSESSMENT SYSTEM. The above stated material assumes that the logistics products have been developed through the various analysis processes detailed in Section II of K-AM-02.

In the following paragraphs, consideration is given to the possibility that logistics products requirements have been identified but action that has been taken to procure the products and/or establish delivery schedules is inadequate or that there are CEI's against which insufficient analyses have been accomplished and no logistics products identified.

To preclude either of these possibilities and related program impact, the actions described in the following paragraphs, and graphically portrayed in Figure 1-2, CEI/ Logistics Products and Services Assessment System, shall be taken.

a. KSC shall develop a mission-oriented Contract End Item (CEI) inventory to include all CEI's for which they have design cognizance. Similar inventories shall be requested of MSC and MSFC.

1. The KSC organizational element using the CEI shall accumulate and sequentially arrange the inventory information.

2. The organizational CEI inventories shall be developed into a master CEI inventory framework.

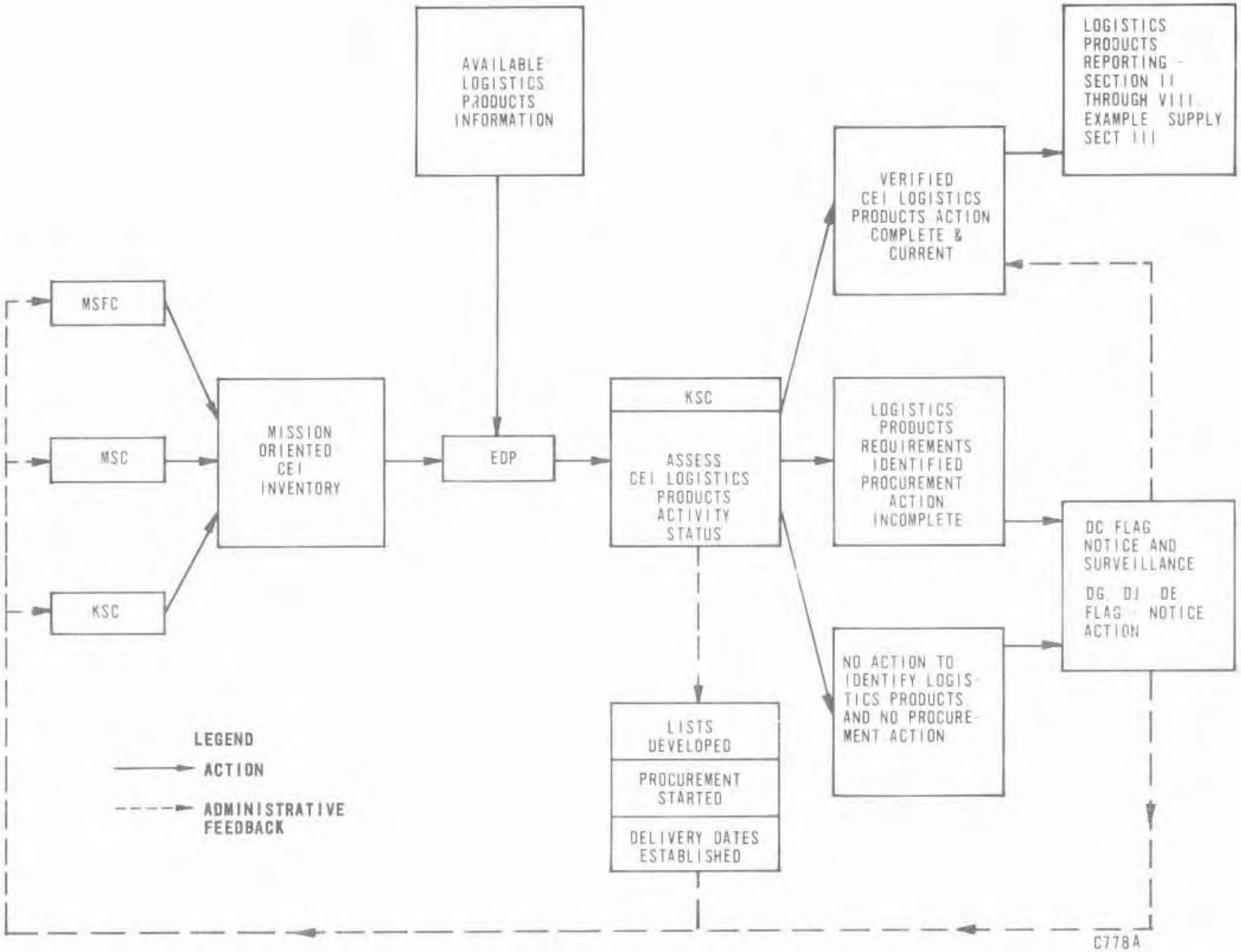

Figure 1-2. CEI/Logistics Products and Services Assessment System

3. The master CEI inventory shall be programmed as input data into the Apollo/Saturn EDP system. This master inventory must be maintained current, utilizing configuration management and other means.

b. All available logistics products information for each CEI will also be programmed against the master CEI inventory to activate an EDP assessment of CEI versus logistics products accomplishment (e.g., have spare parts lists been developed; have spare parts procurement actions been initiated; have spare parts delivery dates been established, etc.). The output of this comparative assessment will fall into the following three categories of essential management information:

1. Verification of completed CEI/logistics products relationships, by the processess described in Sections II through VII of this Exhibit.

2. An indication of the existence of a CEI for which logistics products requirements have been developed, but program-effective acquisition has not been taken.

3. An indication of the existence of a CEI for which logistics products requirements have not been identified.

c. Indication of conditions specified by subparagraphs b.2 or b.3, shall be immediately brought to the attention of DG, DJ, or DE by means of a flag notice. The applicable office (DG, DJ or DE) shall initiate immediate actions to correct the deficiency and continue to track until subsequent EDP comparative assessments indicate resolution of the problem.

1.3 DISPLAY CONCEPTS

The preceding paragraphs have accented the tracking capabilities of the logistics management information system. The display methods or visibility systems which shall also result from this same input data are of equal import to successful logistics management.

Capability is required for combined presentation of both mission-oriented and systems-oriented displays. Systems-oriented displays will generally be used to present the status of logistics support for specific Apollo/Saturn facilities and Real Property Installed Equipment (PRIE). Such media may be used to show items behind schedule, items on schedule, relative priorities, and contingency planning required.

Mission-oriented displays will generally be used to present the status of logistics support for AVE, OGE, and GSE against a specific Apollo/Saturn Mission activity-sequence. Such displays can be used to indicate activity-time-flow, mission milestones and the individual mission-schedule success path.

1.4 SYSTEM IMPLEMENTATION

The implementation of the logistics management information system will require specific accomplishments on the part of responsible organizational elements. The most evident of these are included in the following paragraphs.

1.4.1 MASTER CEI INVENTORY. The master CEI inventory has not been completed. Without this information, status assessment is difficult since a product omission or inadequacy may exist.

1.4.2 CEI INVENTORY UPDATING PROCEDURE. The CEI inventory must be kept current with all item, program, or mission changes in order to assure that the items and logistics products and services remain in consonance with configuration requirements.

1.5 LOGISTICS PRODUCTS DEVELOPMENT

This paragraph illustrates the natural flow in the development of information pertaining to the more critical areas of logistics management for the Apollo/Saturn Program at KSC. It additionally illustrates the two types of information that will be available through the EDP outputs developed in Exhibit 7 of this document. While not conceptual in itself, this information is included within this Section because of the impact of this development on all logistics products described in subsequent Sections.

1.5.1 LOGISTICS REQUIREMENTS SUMMARIES FLOW. Figure 1-3, Logistics Requirements Summaries, illustrates the development of the sources of logistics management information as a sequential operation. As source data accumulates, the EDP system records and assesses the information available and prints reports, either routine for the operating elements or flag notices for management.

The interface of the introductory tasks for this, and all flow figures within this Exhibit may be described as follows:

The identification of AVE (1A) and ACE (1B) for a specific mission by the design agencies provides input for the CEI inventory (1C).

Comparing the CEI inventory with the appropriate Logistics Baselines Cross-Reference Index (IG) items provides a summary of the availability (1)/non-availability (1F) of EIR data. Addition of the Logistics Baseline Activity Flow (2A) and data from Operations Analysis (2B) to the flow process provides a bases for Priority Assignment (2C).

1.5.2 DEVELOPMENT PROCESS. Each of the sources from which logistics products and services requirements are derived are described in detail in other portions of K-AM-02, or in other KSC Apollo/Saturn documentation. References to the Logistics Baseline Cross-Reference System and Logistics Baseline Activity Flow have been retained within this Exhibit to demonstrate the interface. The Logistics Baseline System is not now in use at KSC, but is in process of development (see Appendix "A" to K-AM-02).

a. CEI Inventory	K-AM-03, KSC Apollo/Saturn Configuration Management Plan.
b. Operations Analyses	K-AM-02, Section II.
c. Priority Assignment	K-AM-02, Section II and Exhibit 2.
d. Mission Schedule	K-AM-01, Apollo/Saturn Program Control Plan, Section II.
e. Site Logistics Requirement Summary (SLRS)	K-AM-02, Addendum "A" to Exhibit 2.
f. End Item Report (EIR)	K-AM-02, Addendum "A" to Exhibit 2.

1.5.3 LOGISTICS MANAGEMENT INFORMATION. The sequential development of the logistics management information system and the resultant reports shall be accomplished as follows:

TASK	REPORT
1A. Identification and development of AVE.	
1B. Identification and development of AGE, to include OGE and GSE.	
1C. CEI Inventory.	
1G. Log Baseline Cross-Reference Index.	1. Routine Report - End item report data summary.
	1F. Flag Notice - EIR data not available.
2A. Logistics Baseline Activity Flow.	2. Routine Report - Priority list (CEI vs. Maintenance Requirements Analysis).
2B. Operations Analysis.	
2C. Priority Assignment.	
3A. Mission Schedule.	
3B. Identify SLRS by CEI and establish EIR/SLRS Delivery Schedule.	3. Routine Report-SLRS inventory by CEI and EIR/SLRS schedule.
	3F. Flag Notice - Nonscheduled item list.
4A. EIR - Part I Delivery. (For an End Item in the quantity of one each).	4. Routine Report - EIR Part I document list and delivery status.
	4F. Flag Notice - Actual late delivery of EIR Part I.
5A. EIR - Part II Delivery. (Total number of one end item).	5. Routine Report - EIR Part II document list and delivery status.
	5F. Flag Notice - Actual late delivery of EIR Part II.
6A. SLRS Level 2 Delivery. (Refers to Maintenance Level 2).	6. Routine Report - SLRS Level 2 documentation list and delivery status.
	6F. Flag Notice - Actual late delivery of SLRS Level 2.

TASK	REPORT
7A. SLRS Level 1 Delivery. (Refers to Maintenance Level 1).	7. Routine Report - SLRS Level 1, document list and delivery status.
	7F. Flag Notice - Actual late delivery of SLRS Level 1.

1.6 ORGANIZATIONAL RESPONSIBILITIES

To develop and support the Management Information System established within this Section, the KSC design organization and the KSC operating/maintaining organizations must contribute basic input source data to assure the availability of complete and timely reports. Their responsibilities include:

1.6.1 DIRECTOR OF DESIGN ENGINEERING (MA)

a. Develop a CEI inventory for those items for which they have design cognizance.

b. Assure the development of maintenance requirements analysis, operations analysis, baseline activities flows, etc. in consonance with the priority system established in Section II of K-AM-02.

c. Assure the completion of the individual source data tasks, e.g., development of spare parts lists, spare parts delivery schedules, etc., as required by Exhibits 2 through 8 of K-AM-02.

d. Prepare the input information for inclusion in the EDP data bank and assessment system as described by Exhibit 7 of K-AM-02.

1.6.2 DIRECTOR OF LAUNCH OPERATIONS (HA)

1.6.2.1 Director Launch Vehicle Operations (JA)
Director Spacecraft Operations (KA)

a. Assure the availability of a CEI inventory for those items of equipment for which they have operating/maintaining responsibility.

b. Assure the availability of maintenance requirements analysis, operations analysis, baseline activity flows, etc., in consonance with the priority system established in Section II of K-AM-02.

c. Assure the completion of the individual source data tasks, e.g., development of spare parts lists, spare parts delivery schedules, etc., as required by Exhibits 2 through 8 of K-AM-02.

d. Provide Operations Analysis information as required for determining mission-activity flows.

e. Provide Operations Analysis information to support the identification of the logistics products and services portrayed by Figure 1-3 of this Section and their tracking and status monitoring as detailed in Sections II through VII of this Exhibit.

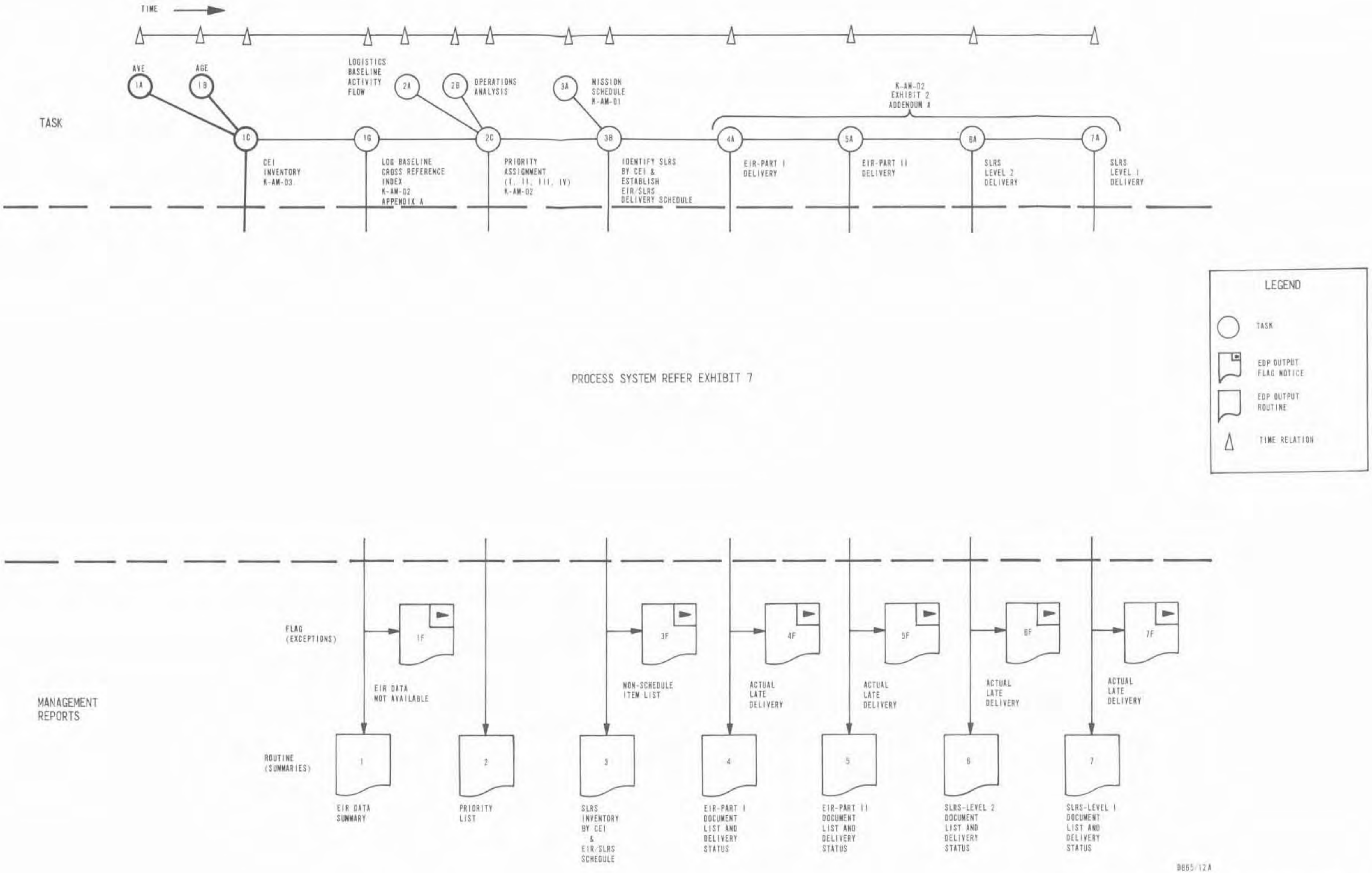

Figure 1-3. Logistics Requirements Summaries System

f. Prepare the input information for inclusion in the EDP data bank and assessment system as described by Exhibit 7.

1.6.3 DIRECTOR OF ADMINISTRATION (GA)

1.6.3.1 Procurement Office (GD).

a. Maintain status of logistics products requirements developed by MA and HA organizational elements for which procurement action is required.

b. Prepare the input information for inclusion in the EDP data bank and assessment system as described in Exhibit 7.

1.6.4 DIRECTOR OF TECHNICAL SUPPORT (NA)

1.6.4.1 Director Information Systems (PA)
Director Support Operations (QA)

a. Assure the availability of a CEI inventory for those items of equipment for which they have operating/maintaining responsibility.

b. Assure the availability of maintenance requirements analysis, operations, analysis, baseline activity flows, etc., in consonance with the priority system established in Section II of K-AM-02.

c. Assure the completion of the individual source data tasks by the KSC design organization on CEI's for which they have operating/maintaining responsibility.

d. Provide Operations Analysis information as required for determining mission-activity flows.

e. Provide Operations Analysis information to support the identification of the logistics products and services portrayed by Figure 1-3 of this Section and their tracking and status monitoring as detailed in Sections II through VII of this Exhibit.

f. Prepare the input information for inclusion in the EDP data bank and assessment system as described by Exhibit 7.

1.6.5 DIRECTOR OF INSTALLATION SUPPORT (RA)

1.6.5.1 Requirements and Resources Office (RB)

a. Assure the availability, and completion, of individual source data tasks pertaining to standard spare parts, standard tools and stages, spacecraft, GSE and personnel intra-KSC transportation as required by Exhibits 2 through 8 of K-AM-02.

b. Prepare the input information for inclusion in the EDP data bank and assessment system as described by Exhibit 7 of K-AM-02.

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SECTION II
MAINTENANCE

2.1 GENERAL

The development of the Maintenance Management Information System takes cognizance of the two types of maintenance (scheduled and unscheduled). In that each is developed from separate source data, separate flows and processes have been generated for their inclusion in the System. The EDP process to accommodate this System is included in Exhibit 7 of this document.

2.2 MAINTENANCE REQUIREMENTS

Figure 2-1, Maintenance Management Information, portrays the various tasks and their sources of data which must be sequentially accomplished to provide the routine and Flag Notice reports required by management. It is the timely receipt of these reports which permit logical decisions and/or actions to preclude schedule slippages.

2.2.1 SYSTEM DEVELOPMENT. Existing KSC Apollo/Saturn documentation contains the detailed information pertaining to the development of the task source data. Specifically, the following apply to this Section:

a. SLRS and EIR	K-AM-02, Addendum A to Exhibit 2.
b. Mission Schedule	K-AM-01, Apollo/Saturn Program Control Plan, Section II.
c. Work Orders, Unsatisfactory Condition Report, Maintenance Log and Failure Analysis.	K-AM-02, Section IX to Exhibit 2.

2.3 MAINTENANCE MANAGEMENT INFORMATION

The sequential development of the Maintenance Management Information System shall be accomplished as described on the following page.

TASK	REPORT

Scheduled Maintenance

TASK		REPORT	
1A.	SLRS and EIR		
1B.	Mission Schedule		
1C.	Scheduled Maintenance	1.	Routine Report - Maintenance schedule.
2A.	Issue Work Order		
2B.	Perform Scheduled Maintenance	2.	Routine Report - Maintenance activities accomplished.
		2F.	Flag Notice - Scheduled maintenance not accomplished.
3A.	Scheduled Maintenance Requirement		
3B.	Unsatisfactory Condition Noted		
3C.	System Checkout Interruption	3.	Routine Report - Summary of failures.
		3F.	Flag Notice - Notice of Sequence interruption.
4A.	Perform Unscheduled Maintenance	4.	Routine Report - Summary of unscheduled maintenance accomplished.
		4F.	Flag Notice - System failure report.
5A.	Maintenance Log Entry	5.	Routine Report - a. Maintenance record summary report. b. QAS summary report.
		5F.	Flag Notice - Excessive time required to perform maintenance. Program slippage.
6A.	Unsatisfactory Condition Report.	6.	Routine Report - Unsatisfactory condition report records summary report.
		6F.	Flag Notice - Equipment failure requires extensive recheck and test.
7A.	Failure Analysis	7.	Routine Report - Failure analysis reports.

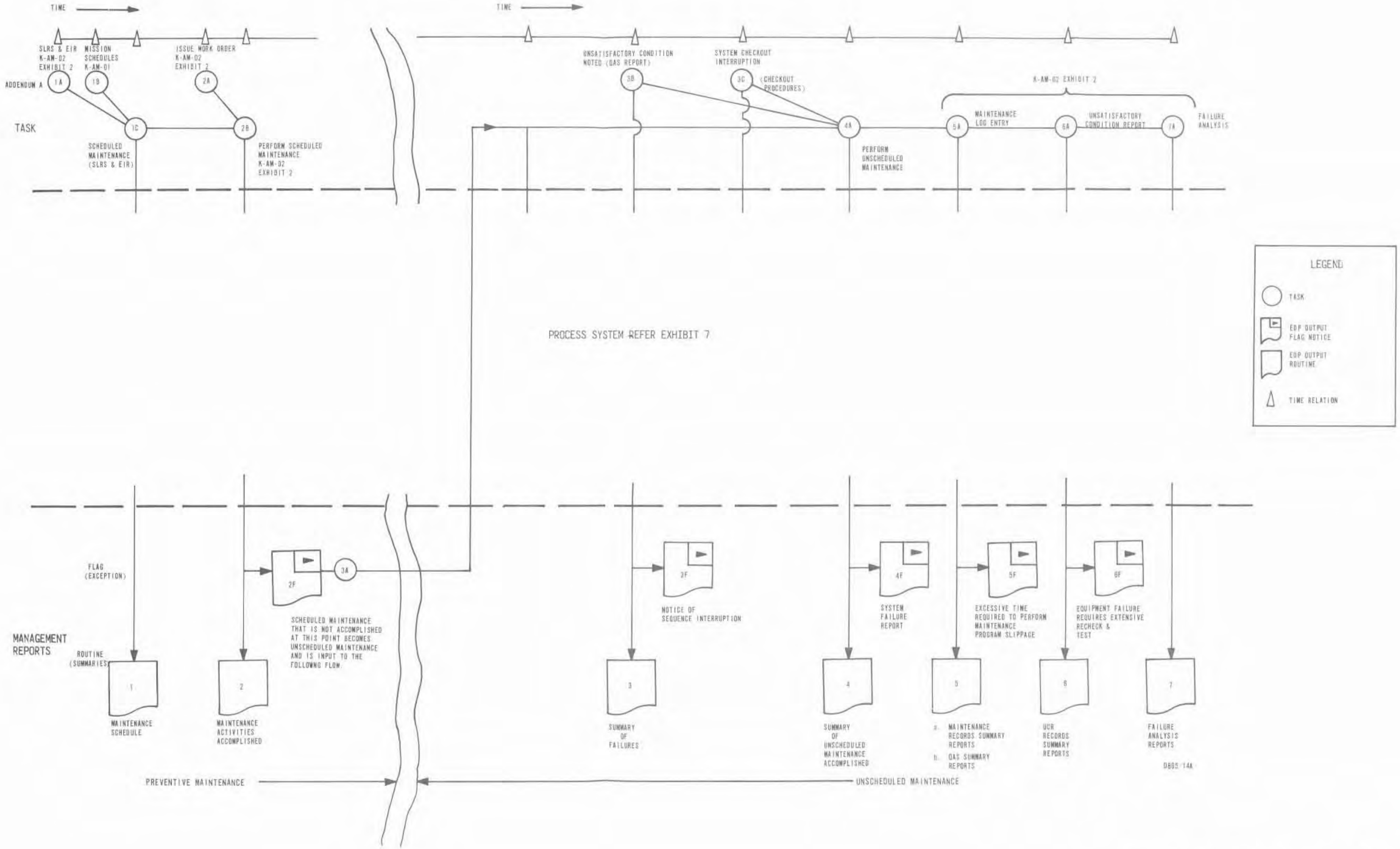

Figure 2-1. Maintenance Management Information System

SECTION III
SPARE PARTS

3.1 GENERAL

The Management Information System for spare parts status is an orderly procession of the tasks associated with the development of requirements, acquisition, control and replenishment of those parts required to support the Apollo/Saturn Program. It takes cognizance of the fact that there are multiple sources and both original and replenishment provisioning activities must be displayed for the benefit of management.

3.2 MANAGEMENT SYSTEM FLOW

Figure 3-1, Spare Parts Management Information System, depicts the processes which have been selected as sources of essential management information pertaining to spare parts. The introduction of the mission schedule into this system allows an assessment of the timeliness of spares arrival in support of critical activities in addition to the qualification requirements generated by other analytical methods. The application of these techniques to the EDP system assures rapid assimilation and retrieval. Exhibit 7 explains the EDP system and its report formatted outputs.

3.2.1 SYSTEM DEVELOPMENT. The information pertaining to the development of the sources of input data is detailed in existing KSC Apollo/Saturn documentation. Basically, this consists of:

a. CEI Inventory.	K-AM-03, Apollo/Saturn Configuration Management Plan.
b. Mission Schedule	K-AM-01, Section II, Apollo/Saturn Program Control Plan.
c. Provisioning Guidance Meeting.	Addendum A, Exhibit 3 to K-AM-02.
d. Spare Parts Interim Release.	
e. Recommended Spare Parts List Release.	
f. Spare Parts List Approval.	
g. Projected Delivery Dates.	
h. Priced Spare Parts List.	
i. Spare Parts Delivery.	
j. Spare Parts Consumption.	

3.3 SPARE PARTS MANAGEMENT INFORMATION

The sequential development of a spare parts management information system. capable of producing the required routine reports and Flag Notices, shall be accomplished as described on the following page.

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TASK		REPORT	
1A.	Identification and development of AVE.		
1B.	Identification and development of AGE, to include OGE and GSE.		
1C.	CEI Inventory.		
1D.	Mission Schedule.		
1E.	Provisioning Guidance Meeting.	1.	Routine Report - Spare parts required delivery schedule.
		1F.	Flag Notice - No spare parts provisioning has been initiated.
2A.	Spare Parts Interim Release	2.	Routine Report - Summary list of interim releases.
3A.	Recommended Spare Parts List Release.	3.	Routine Report - Index of recommended spare parts list.
		3F.	Flag Notice - No spare parts list delivery date established.
4A.	Recommended Spare Parts List Approved by Using Organization.	4.	Routine Report - Index of approved spare parts list.
		4F.	Flag Notice - Recommended spare parts list approval not accomplished.
5A.	Projected Delivery Dates of Spare Parts.	5.	Routine Report - Delivery Schedule Satisfactory.
		5F.	Flag Notice - a. Projected delivery dates not completely established. b. Late spare parts delivery forecast.
6A.	Priced Spare Parts List.	6.	Routine Report - Index of priced spare parts list.
		6F.	Flag Notice - Priced spare parts list not delivered on time.
7A.	Spare Parts Delivery.	7.	Routine Report - Delivery on schedule.
		7F.	Flag Notice - Spare parts delivery not on schedule.

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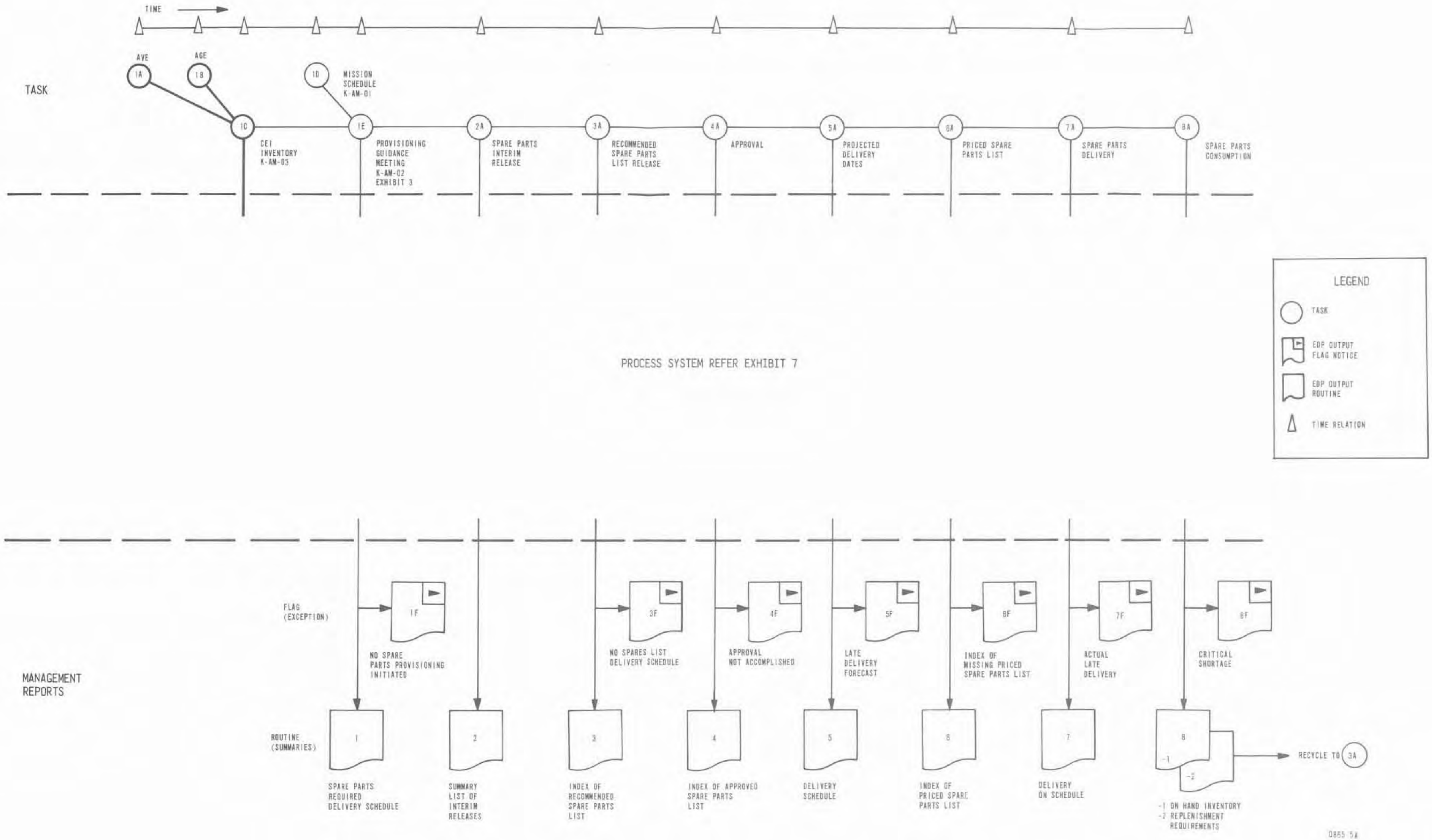

Figure 3-1. Spare Parts Management Information System

TASK	REPORT
8A. Spare Parts Consumption.	8-1. Routine Report - Inventory spare parts on hand.
	8-2. Routine Report - Replenishment levels established.
	8F. Flag Notice - Critical shortage below established replenishment levels.

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SECTION IV
TRANSPORTATION

4.1 GENERAL

The transportability of the various stages and modules of the space vehicle, developed as part of the design function and provided as data source information, as well as the special considerations which must be given to the transportation of the logistics support products, e.g., propellants, pressurants, ordnance, GSE, etc., requires the development of a method of timely transportation information for management. This Section leads only to the development of such an information system in relation to intra-KSC transportation.

4.2 TRANSPORTATION REQUIREMENTS SUMMARIES FLOW

As indicated by Figure 4-1, Transportation Management Information System, the impact on KSC Apollo/Saturn management begins with the development of the Transportation Summary Reports and remains of vital interest throughout the Program. Lack of transportation at critical points of the operational schedule could adversely impact mission accomplishment. The Flag Notices permit management to eliminate or preclude such voids.

4.2.1 DEVELOPMENT PROCESS. The detailed description of the development of source information essential to the Transportation Management Information System is contained within other portions of K-AM-02 or in other KSC Apollo/Saturn documentation. The following references are applicable to this Section:

a. CEI Inventory	K-AM-03, Apollo/Saturn Configuration Management Plan.
b. Logistics Baseline Cross-Reference Index	K-AM-02, Appendix A.
c. Mission Schedule	K-AM-01, Apollo/Saturn Program Control Plan, Section II.
d. Transportation Resources Inventory	K-AM-02, Exhibit IV.

4.3 TRANSPORTATION MANAGEMENT INFORMATION

The development of the Transportation Management Information System and its resultant Routine Reports and/or Flag Notices requires the development of an EDP system. The details of that system are contained in Exhibit 7 of this document. The sequential development of the basic source data to interface with, and provide inputs to the EDP system are as follows:

TASK	REPORT
1A. Identification of AVE.	
1B. Identification of AGE to support AVE.	
1C. CEI Inventory.	

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TASK	REPORT
1D. Logistics Baseline Cross-Reference Index	1. Routine Report - Transportation summary report.
2A. Logistics Baseline Activity Flow.	
2B. Establish Transportation Requirements.	2. Routine Report - Transportation requirements report.
	2F. Flag Notice - a. Transportation requirements not shown. b. Specification of transportation requirements not provided.
3A. Mission Schedule.	
3B. Establish Transportation Schedule.	3. Routine Report - Transportation requirements schedule.
	3F. Flag Notice - Schedule not accomplished.
4A. Transportation Resources Inventory.	4. Routine Report - Transportation resources allocation.
4B. Assign Transportation Resources.	
	4F. Flag Notice - a. Transportation requirement not satisfied. b. Transportation equipment not operational.
5A. Schedule Procurement of Transportation Resources Required.	5. Routine Report - Transportation resource procurement requirement schedule.
	5F. Flag Notice - Procurement schedule does not meet requirements schedule.
6A. Establish Delivery Dates.	6. Routine Report - Transportation resource delivery report.
	6F. Flag Notice - Late delivery projected.
7A. Transportation Resource Delivered.	7. Routine Report - Transportation resource inventory updated.
	7F. Flag Notice - Actual late delivery.

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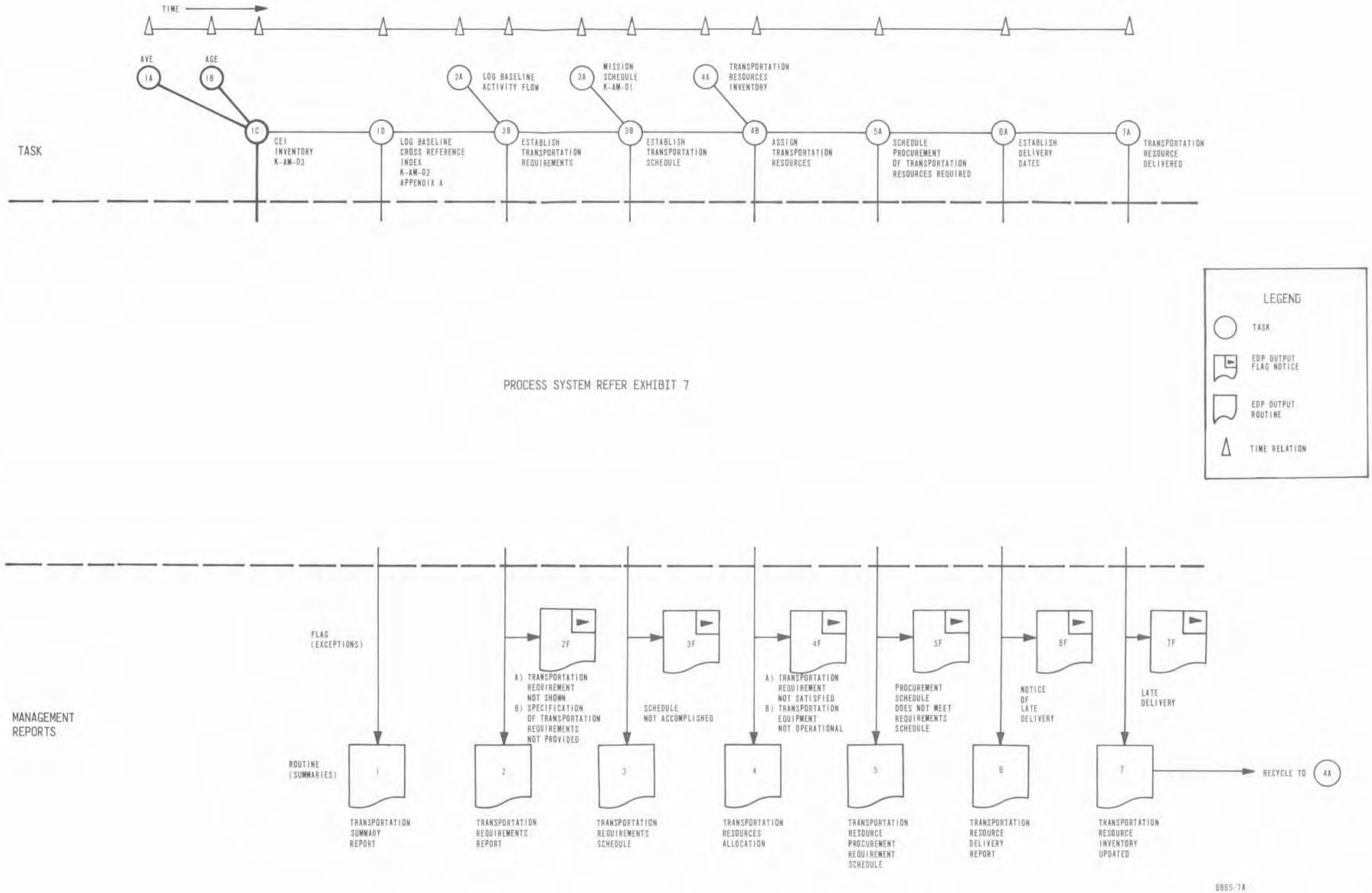

Figure 4-1. Transportation Management Information System

SECTION V
PROPELLANTS AND PRESSURANTS

5.1 GENERAL

The Management Information System developed for KSC Apollo/Saturn propellants and pressurants details, primarily, those tasks related to the requisitioning and supply functions. Those additional tasks relative to the maintenance and operational functions associated with propellants and pressurants are stipulated, as are all similar functions, in the information system established for maintenance (Section II of this Exhibit).

5.2 PROPELLANTS AND PRESSURANTS REQUIREMENTS

Figure 5-1, Propellants and Pressurants Information System, portrays the tasks and their related source documents which will provide management with timely and factual status information. It also portrays the normal sequencing of the tasks in accord with the mission schedule requirements. The EDP process to support the Management Information System and to develop the essential management reports is described in Exhibit 7 of this document.

5.2.1 SYSTEM DEVELOPMENT. Existing KSC Apollo/Saturn documentation contains the detailed information pertinent to the development of the source data for the Propellant and Pressurant Management Information System. Specifically, the following references apply to this Section:

a. Propellant and Pressurant Inventory, Projected Demand, Procurement and Receipt.	K-AM-02, Exhibit 5.
b. Mission Schedule.	K-AM-01, Apollo/Saturn Program Control Plan, Section II.

5.3 PROPELLANTS AND PRESSURANTS MANAGEMENT INFORMATION

The sequential processing of an information system development shall be accomplished as described on the following page.

TASK	REPORT
1A. Propellants and Pressurants Inventory.	1. Routine Report - Propellants and pressurants inventory listing.
2A. Logistics Baseline Activity Flow.	
2B. Projected Demand.	2. Routine Report - Projected requirements.
3A. Mission Schedules (K-AM-01).	3. Routine Report - Propellant and pressurant need dates.
3B. Projected Demand Schedule.	
4A. Initiate Procurement of Propellants and Pressurants.	4. Routine Report - Procurement initiated.
	4F. Flag Notice - Procurement not initiaated.
5A. Contract Release.	5. Routine Report - Requisitioning Commitments.
	5F. Flag Notice - Propellants and presurants not on contract.
6A. Contract Delivery Schedule.	6. Routine Report - Contract delivery dates.
	6F. Flag Notice - Contract delivery date not established.
7A. Delivery of Propellants and Pressurants.	7. Routine Report - Propellants and pressurants delivered.
	7F. Flag Notice - Propellants and presurants not delivered.
8A. Spacecraft and Vehicle Loading.	

Changed August 31, 1966

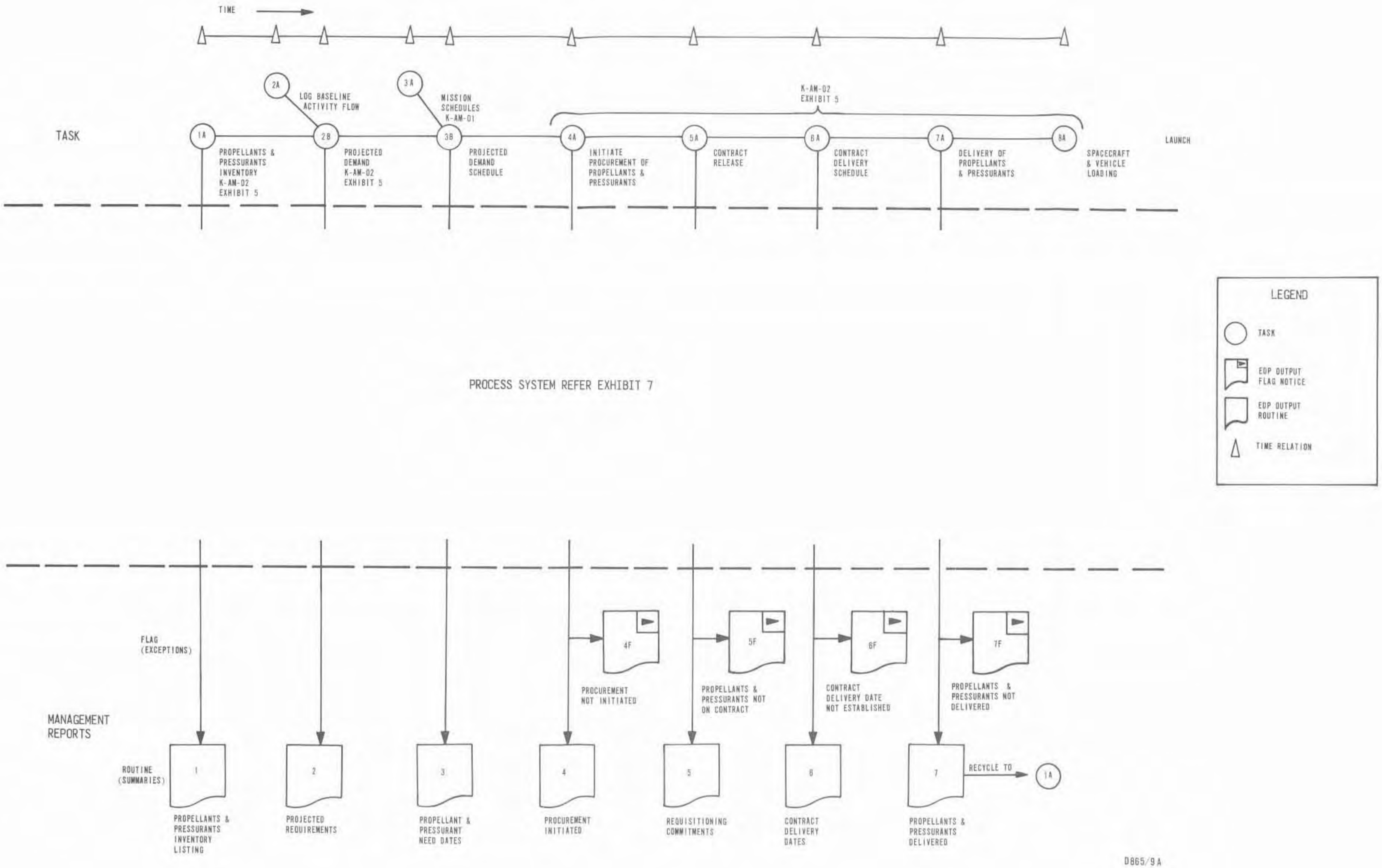

Figure 5-1. Propellants and Pressurants Information System

SECTION VI
ORDNANCE

6.1 GENERAL

The Management Information System for ordnance items and hardware is related primarily to reports concerning timeliness of arrival and test for condition. The combination of these two factors is, however, of prime importance to management because of the normally limited supply (two sets) available at KSC.

6.2 ORDNANCE REQUIREMENTS

Figure 6-1, Ordnance Information System, portrays the tasks associated with ordnance receipt, storage, control, testing and installation. These tasks develop the information essential to successful management and logical decisions pertaining to Apollo/Saturn ordnance requirements. Exhibit 7 of this document contains the details necessary for the EDP programming of this system.

6.2.1 DEVELOPMENT PROCESS. The details of the sources, from which the basic task information is developed, are contained in KSC Apollo/Saturn documents. Specifically, the following are applicable to this Section:

a. CEI Inventory	K-AM-03, Apollo/Saturn Configuration Management Plan.
b. Mission Schedule	K-AM-01, Apollo/Saturn Program Control Plan, Section II.
c. Receipt, Storage, Test and Installation	K-AM-02, Exhibit 6.

6.3 ORDNANCE MANAGEMENT INFORMATION

The successful application of an effective Management Information System requires that it be adaptable to EDP processing. The details of the EDP system are contained in Exhibit 7 of this document. The sequential development of the tasks and their associated sources of data are described on the following page.

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TASK	REPORT
1A. AVE Ordnance Requirements.	
1B. CEI Inventory.	
1C. Notice of Shipment.	1. Routine Report - List of items shipped.
	1F. Flag Notice - List of ordnance items and hardware not shipped.
2A. Receipt of Ordnance and Hardware.	2. Routine Report - Receipt inventory.
3A. Storage, Accounting and Inspection.	3. Routine Report - Inventory of usable items.
	3F. Flag Notice - Failed inspection.
4A. Selection Testing.	4. Routine Report - Inventory of usable items.
	4F. Flag Notice - Test results unsatisfactory.
5A. Installation and Systems Check.	5. Routine Report - System check results.
	5F. Flag Notice - Failed - system - check report.

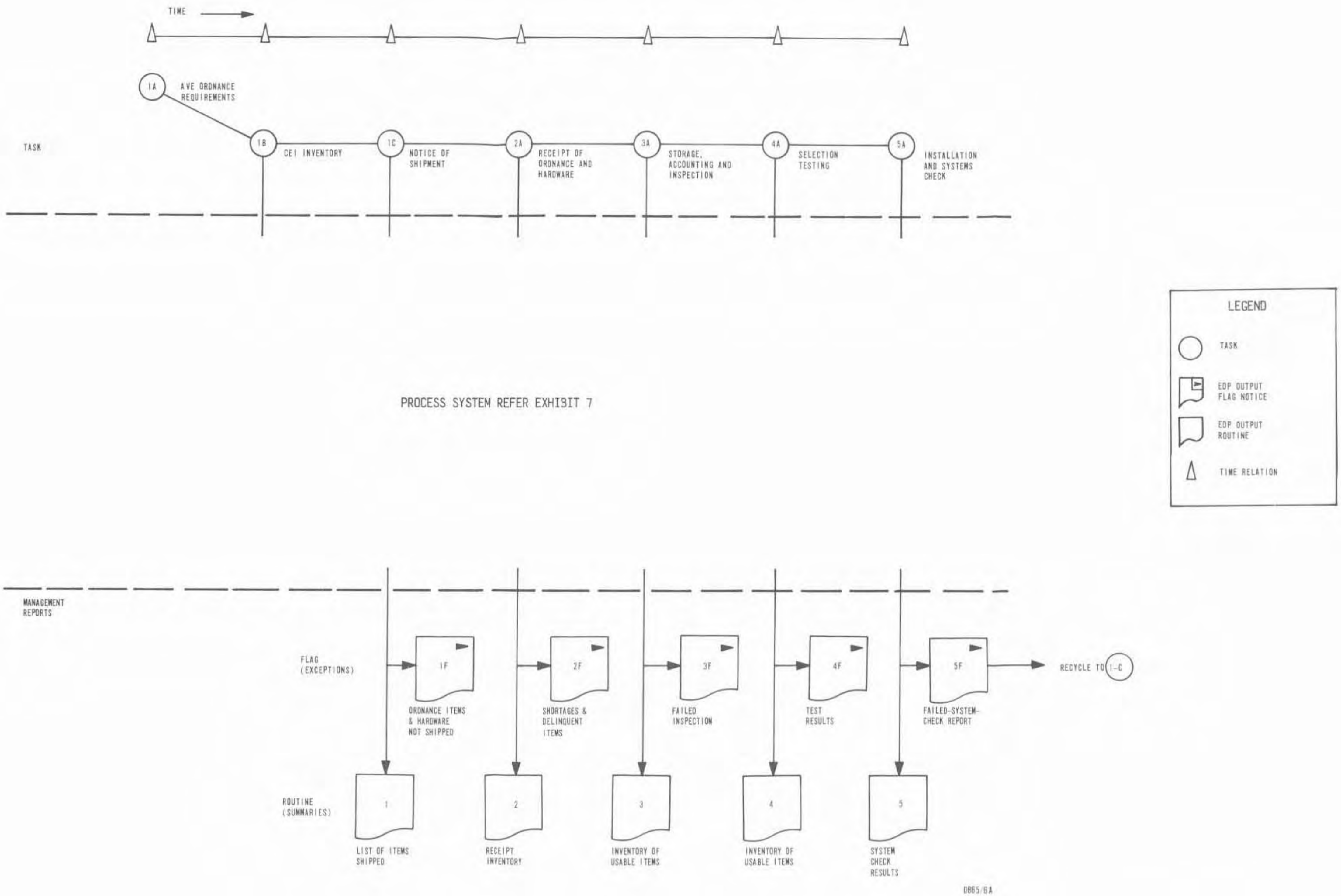

Figure 6-1. Ordnance Information System

SECTION VII
SYSTEM SUPPORT DATA

7.1 GENERAL

The details of the types of system support data associated with the Apollo/Saturn Program are a part of Exhibit 8 to K-AM-02. This section is devoted to the task accomplishments required to provide source data for management information and the sequential flow of report development.

7.2 SYSTEM SUPPORT DATA SUMMARIES FLOW

Figure 7-1, System Support Data Management Information, illustrates the interface and time phasing associated with the development of system support data requirements, the establishment of delivery schedules, recording of system support data delivery and the storage and distribution to the using organization. Also illustrated are the types of management reports which are to be rendered through utilization of the associated EDP system detailed in Exhibit 7 of this document.

7.2.1 DEVELOPMENT PROCESS. Each of the processes required to develop a flow commensurate with system support data information systems is detailed in this, or other KSC Apollo/Saturn documents. For this Section, the following references are applicable.

a. CEI Inventory	K-AM-03, KSC Apollo/Saturn Configuration Management Plan.
b. Logistics Baseline Cross-Reference Index	K-AM-02, Appendix A.
c. System Support Data Requirements	K-AM-02, Exhibit 8.
d. Mission Schedule	K-AM-01, Apollo/Saturn Program Control Plan, Section II.
e. Storage and/or Distribution of System Support Data	K-AM-02, Exhibit 8.

7.3 SYSTEM SUPPORT DATA MANAGEMENT INFORMATION

The sequential development of the System Support Data Management Information System, in order to assure the availability of the required reports, shall be accomplished as described on the following page.

Changed August 31, 1966

TASK	REPORT
1A. Identification of AVE.	
1B. Identification of AGE.	
1C. CEI Inventory.	
1G. Log Baseline Cross-Reference Index.	1. Routine Report - System Support data summary report.
2A. Operations Analysis.	
2B. Maintenance Requirement Analysis.	
2C. Establish System Support Data Requirements.	2. Routine Report - System Support data requirements report.
	2F. Flag Notice - System Support data required, not established.
3A. Mission Schedule.	
3B. Establish Delivery Schedule.	3. Routine Report - System Support data delivery schedule.
	3F. Flag Notice - No delivery date established.
4A. Delivery.	4. Routine Report - System Support data delivery status.
	4F. Flag Notice - Late delivery.
5A. Storage and/or Distribution to Using Organization.	5. Routine Report - System Support data location accounting.

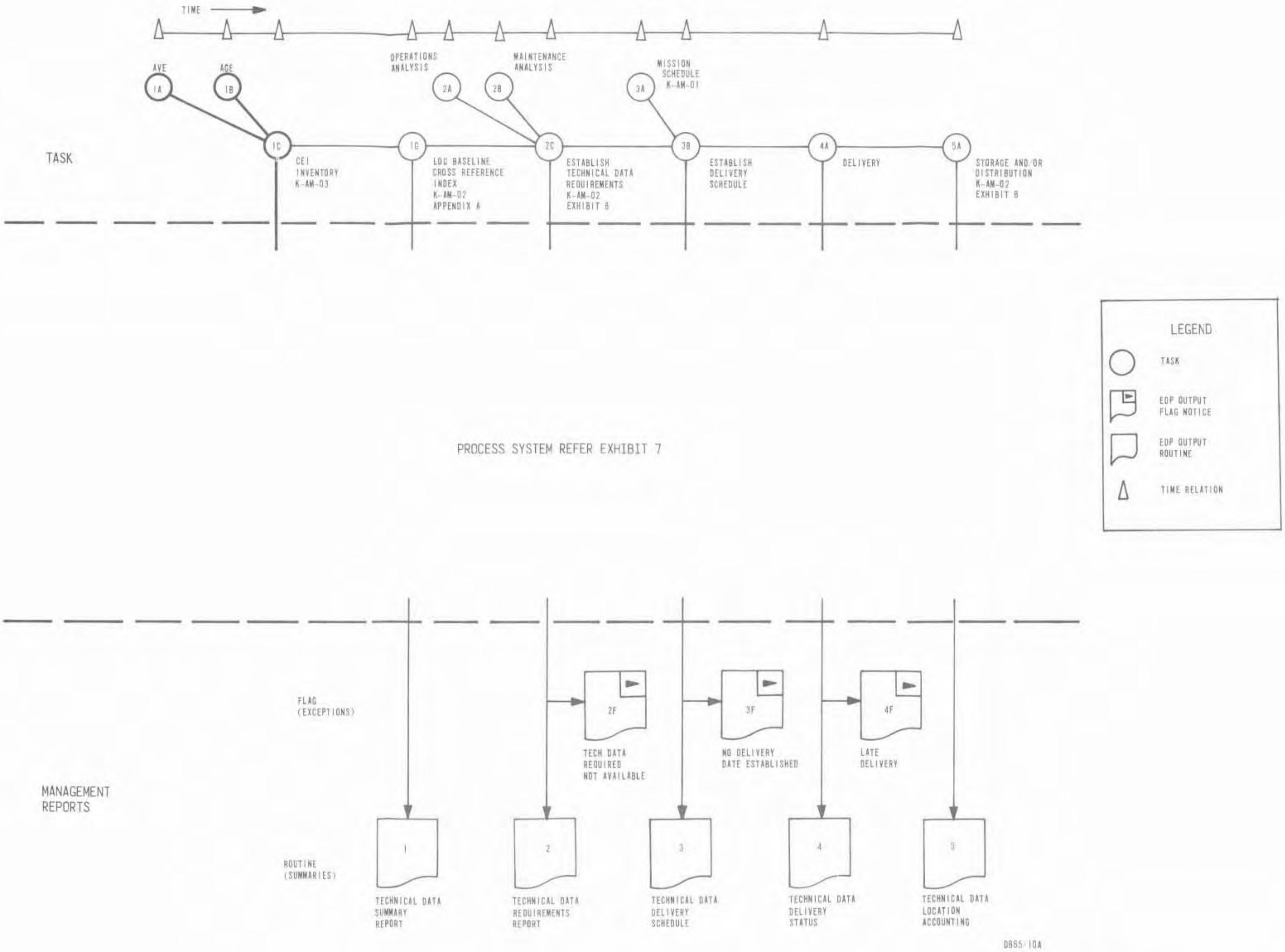

Figure 7-1. System Support Data Management Information System

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EXHIBIT 1
KSC APOLLO/SATURN LOGISTICS MANAGEMENT INFORMATION SYSTEM

FOREWORD

This Exhibit is a preliminary draft of the Logistics Management Information System. It has not been subjected to formal coordination, prior to publication, and is not to be considered as being in final form.

Exhibit 1 contains nine Sections: Concept, Maintenance, Supply, Transportation, Propellants and Pressurants, Ordnance, Data Management, Operations and Maintenance Manuals, and Training. Section III, SUPPLY, is outlined in greater detail to reflect those actions necessary from the initial selection of AVE through launch date. This Section was expanded because lack of spare parts is a critical issue at KSC at this time.

Publication of a revised Exhibit 1, in final form, is scheduled for September 1966.

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EXHIBIT 1

KSC APOLLO/SATURN LOGISTICS MANAGEMENT INFORMATION SYSTEM

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EXHIBIT 1
KSC APOLLO/SATURN LOGISTICS MANAGEMENT INFORMATION SYSTEM

SECTION I
CONCEPT

1.1 GENERAL

The logistics management information system developed within this Exhibit establishes a means of providing KSC Apollo/Saturn management the logistics products and services status information vital to program success. By utilization of EDP capabilities it establishes a system whereby the responsible operating organizations, having provided the essential input data, have the capability of tracking the day-by-day status of each logistics product and service required to support a Contract End Item (CEI). By the same system, management is provided information, by exception, which indicates the immediate actions they must initiate in order to preclude or correct problem areas or omissions which would have adverse impact on program schedules.

1.2 SYSTEM DESCRIPTION

The system described in this Section is conceptual in nature and will apply to the general requirements for tracking of any logistics product or service. The specific actions to be taken for the individual products or services, (e.g., maintenance, supply, transportation, propellants and pressurants, ordnance, data management, operations and maintenance manuals and training) are contained in Sections II through IX of this Exhibit.

1.2.1 SYSTEM ORIENTATION. The system is mission-oriented and is based on a relative time line which begins with the selection of the AVE and continues through space vehicle launch. Each logistics support activity and/or function is sequentially positioned in order that the time of its completion shall assure a continuity of operations commensurate with program schedules. EDP developed status reports provide the management information required to successfully control these activities. The functional flow of this system is detailed in the following paragraphs and illustrated in Figure 1-1, Logistics Information System Functional Flow.

The multiple sources required to identify, quantify, establish need times, and allocate the logistics products are detailed in K-AM-02 and its Exhibits and Appendices. They consist of the logistics baseline (reference Appendix A to K-AM-02), the operations analysis (reference Section II, K-AM-02 and Appendix A), and the maintenance requirements analysis (reference Addendum "B" to Exhibit 2), and the provisioning procedures (reference Addendum "A" to Exhibit 2).

a. These sources provide the input data the operating organizations shall submit for EDP programming in reference to each CEI for which they have operational/maintenance responsibilities.

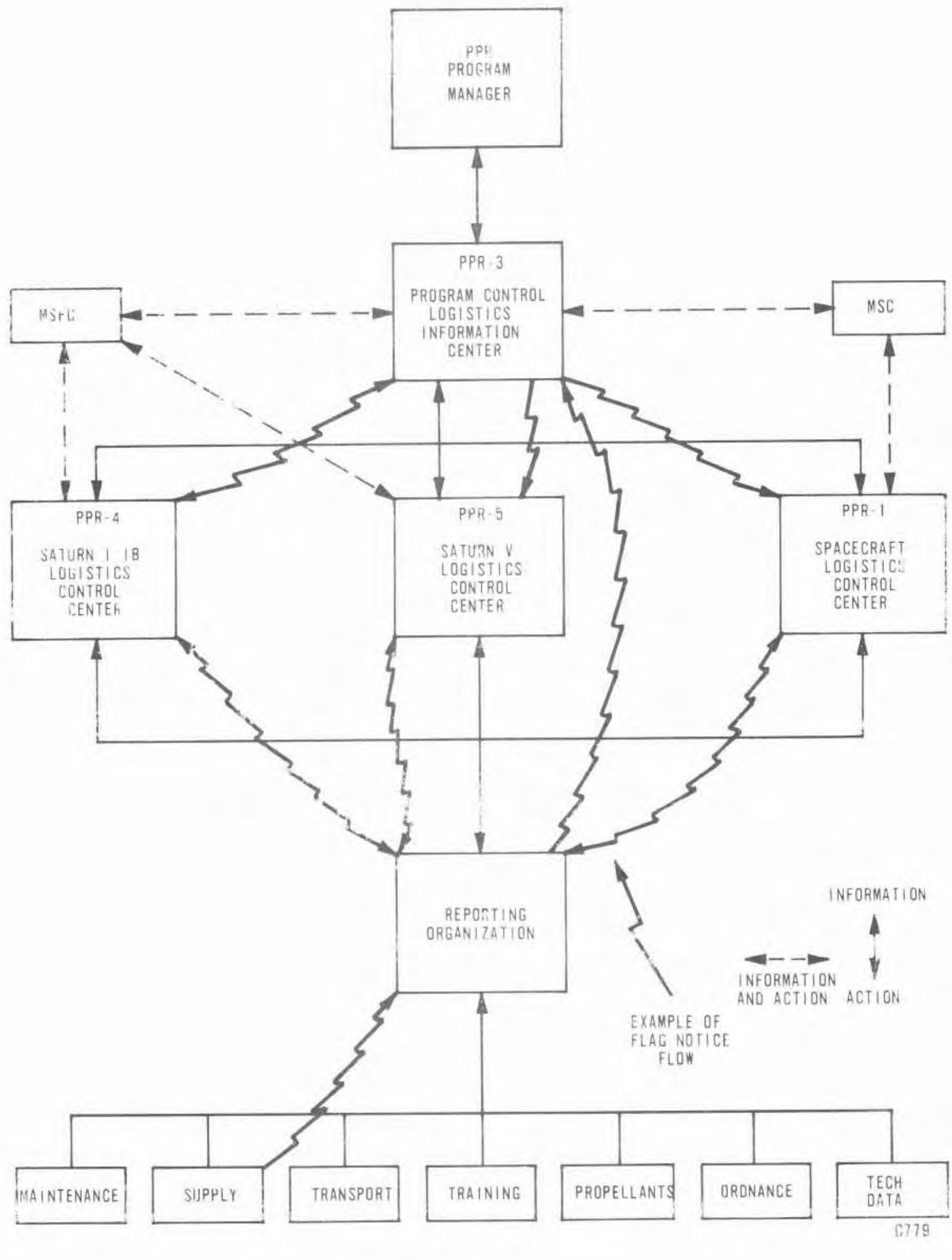

Figure 1-1. Logistics Information System Functional Flow

b. As each logistics function (spare parts list compiled, procurement action taken, delivery dates established, receipt acknowledged, etc.) is completed, this information shall be programmed into the EDP data bank.

c. The accomplishment of these functions within established due dates shall result in routine reports from the EDP system to provide the support for operational level management visibility. They will be forwarded to the applicable Systems Office (PPR-1, 4, or 5) as an indication of task completion.

d. The applicable Systems Office shall compile these routine reports and present them, in summary form, at scheduled intervals, to the Program Control Office (PPR-3) for inclusion in their management visibility display.

e. In the event that logistics function due dates are not met, the EDP system shall, on the programmed date, initiate a flag notice which designates the function, the responsible organization, and due date that has not been met.

f. The flag notice shall be expedited directly to the operating organization and the applicable Systems Office for immediate action, and to the Program Control Office for information and continued surveillance until the unsatisfactory condition has been corrected.

1.2.2 LOGISTICS PRODUCTS AND SERVICES ASSESSMENT SYSTEM. The earlier portions of this Section have developed concepts of application based on the premise that the logistics products required to support the Apollo/Saturn Program at KSC have been developed through the various analyses processes detailed in Section II of K-AM-02. In this portion, consideration is given to the possibility that logistics products requirements have been identified but unsatisfactory action has been taken to procure the products and/or establish delivery schedules, or that there are CEI's against which insufficient analyses have been accomplished and no logistics products identified.

To preclude either of these conditions existing and creating program delays, the actions contained in the following paragraphs, and graphically portrayed in Figure 1-2, CEI/Logistics Products and Services Assessment System, shall be taken.

a. Each NASA Center (MSC, MSFC, and KSC) shall develop a mission-oriented Contract End Item (CEI) inventory to include all CEI's for which they have design cognizance.

b. These inventories shall be accumulated and sequentially arranged by the KSC organization using the CEI.

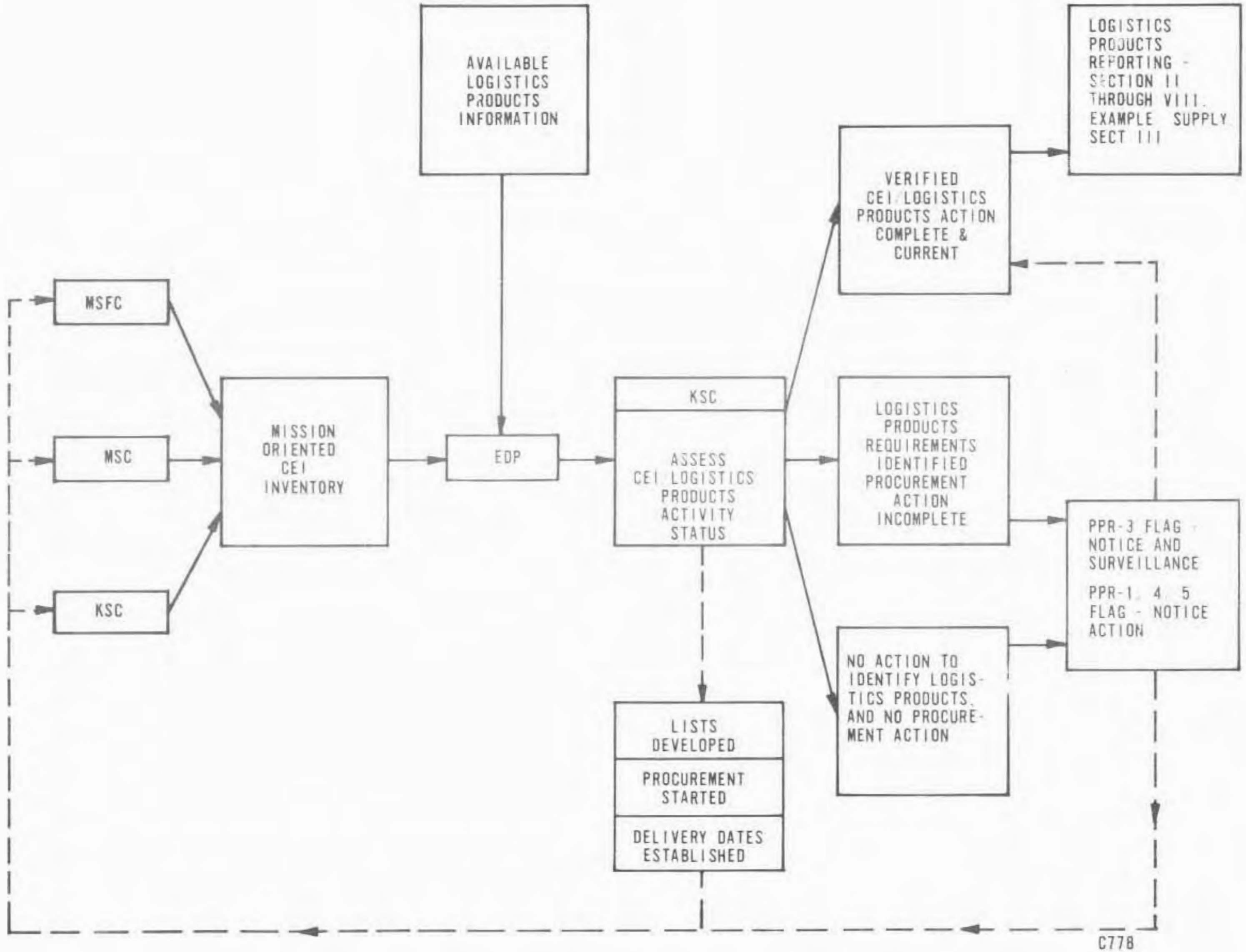

Figure 1-2. CEI/Logistics Products and Services Assessment System

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c. The organizational CEI inventories shall be developed into a master CEI inventory by coordination between the applicable Systems Offices (PPR-1, 4, or 5).

d. The master CEI inventory shall be programmed as input data into the Apollo/Saturn EDP system and maintained current by configuration management action.

e. All available logistics product information for each CEI will also be programmed against the master CEI inventory to activate an EDP assessment of CEI versus logistics products accomplishment (e.g., have spare parts lists been developed; have spare parts procurement actions been initiated; have spare parts delivery dates been established, etc.).

f. The output of this comparative assessment will fall into the following three categories of essential management information:

1. Verification of completed CEI/logistics products relationships, as described in relation to spare parts by Section III of this Exhibit and illustrated by Figures 3-1 and 3-2, Spare Parts Tracking System (Initial Provisioning).

2. An indication of the existence of a CEI for which logistics products requirements have been developed and against which unsatisfactory procurement action has taken place.

3. An indication of the existence of a CEI for which logistics products requirements have not been identified.

g. An indication of conditions specified by subparagraphs f-2 or f-3, shall be immediately brought to the attention of the Program Control Office (PPR-3) and the applicable Systems Office (PPR-1, 4, or 5) by means of a flag notice.

h. The applicable Systems Office shall initiate immediate actions to correct the deficiency and PPR-3 shall continue to maintain surveillance until subsequent (within time constraints established by program schedules) EDP comparative assessments, indicate the resolution of the problem.

1.3 DISPLAY CONCEPTS

The preceding paragraphs have accented the tracking capabilities of the logistics management information system. The display methods or visibility systems which shall also result from this same input data are of equal import to successful logistics management. Briefly, the following display concepts may be achieved.

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1.3.1 CRITICAL ITEMS DISPLAY. This display can be programmed as a separate EDP readout of the CEI spare parts lists. This would be presented on a board reserved for "criticals" and would be a patch-list-board with each item individually flagged and surveillance maintained until all associated logistics activities had been satisfactorily completed.

1.3.2 DETAILED PROGRAM SCHEDULE/MILESTONES. This display is perhaps the most versatile of the display concepts. It can be established against many program aspects including logistics products, baseline activity, or site activation. It would consist of flow networks and overlays to show task accomplishment or, in the event of unforeseen difficulties, contingency planning indicating alternate solutions, work arounds, and the relative priorities of task accomplishment.

In the early stages of its development, a more general, overall program schedules/milestones display with a basic bar graph presentation of timely logistics task accomplishment would provide a springboard to the detailed display discussed earlier. Such a display can also be maintained as status summary.

1.3.3 IMPACT CHARTS. The impact of unresolved logistics problems, as indicated by flag notices, which would result from delivery or maintenance delays, shortages, outages, or cost over-runs, would be displayed by cumulative bar charts and overlays. These would be a point of constant attention until the unsatisfactory condition had been eliminated by corrective action.

1.3.4 MANAGEMENT BRIEFINGS. From the information constantly available on the displays discussed in paragraphs 1.3.1 through 1.3.3 of this Section, accurate and timely logistics status briefings could be quickly assembled for presentation to top-level management. This elimination of the need for continuous, time-consuming research is an outstanding payoff of the management information system.

1.4 SYSTEM IMPLEMENTATION

The implementation of the logistics management information system will require specific accomplishments on the part of responsible agencies. The most evident of these are included in the following paragraphs.

1.4.1 MASTER CEI INVENTORY. The master CEI inventory has not, as yet, been developed. It is essential that it be developed, because no other source can provide a sequential listing of every CEI required to support the Apollo/Saturn Program at KSC. Without this inventory there is no basic comparison or assessment possible to assure that a logistics product omission or inadequacy does not exist which might seriously delay or jeopardize program success.

1.4.2 CEI INVENTORY UPDATING PROCEDURE. The CEI inventory must be kept current with all item, program, or mission changes in order to assure that the items and logistics products and services remain in consonance with requirements applicable to existing configuration. Constant surveillance by configuration management through the applicable Systems Offices is required.

1.4.3 GUIDANCE ON EDP UTILIZATION. Professional guidance to all operating organizations is essential to assure the inclusion of properly formatted input data to provide the EDP outputs required in support of the management information system.

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SECTION II
MAINTENANCE

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SECTION III
SUPPLY

3.1 GENERAL

The spare parts tracking system for initial provisioning provides an orderly flow of information which allows an automatic comparison and evaluation of the day-to-day operations. As long as the program is on schedule, only the normal reports will be issued. Flag notices are automatically issued whenever a discrepancy occurs. A flag notice contains the same information as the normal reports, but is used to alert the Program Control Office, PPR-3, of a problem, conflict, or delinquency.

3.2 SPARE PARTS TRACKING SYSTEM

Tracking of spare parts provisioning actions is considered in two phases:

a. Initial provisioning to provide provisioning status visibility up to site activation and through the initial launch.

b. Replenishment provisioning to provide provisioning (replenishment) status visibility for follow on support and for subsequent launches.

The spare parts tracking system for KSC procured end items differs from the system for MSC and MSFC procured end items since the KSC system also includes a spare parts approval cycle.

3.2.1 INITIAL PROVISIONING. The interrelationships between major tasks and reports associated with the spare parts tracking system (initial provisioning) for KSC procured end items are indicated on the planning network illustrated in Figure 3-1, and for MSC and MSFC procured end items in Figure 3-2. Tables 3-1 and 3-2 list the tasks with the data contained in EDP input and output reports, for KSC and MSC/MSFC procured end items respectively.

3.2.2 REPLENISHMENT PROVISIONING. (To be supplied later)

Table 3-1. KSC Procured End Items

Position	Task	Input/Output
1	Provisioning Guidance Meeting	EDP Input: a. Site activation hardware use date. b. Date of availability of spare parts delivery schedule.
2	Maintenance Requirements Analysis	EDP Input: None
3A	Interim Spare Parts Release	EDP Input: Part identification and quantities.
3B	Recommended Spare Parts List	EDP Input: Part identification and quantities.
4	Review, Approve, Release RSPL	EDP Input: Changes to part identification and quantities.
4A	Funding Data	EDP Input: None for tracking purposes.
5	Spare Parts Delivery Schedule	EDP Input: Provisioning list (same elements as paragraph 3.3, Addendum "A", Exhibit 2, and a delivery schedule).
6	Changes to Delivery Schedule	EDP Input: Notice of schedule changes.
6A	Firm Funding Data	EDP Input: None for tracking purposes.
7A	Receipt of Interim Release Items	EDP Input: Parts receipt data.
7B	Receipt of Balance of Spare Parts List	EDP Input: Parts receipt data.
8	Completion of Spare Parts Shipment	EDP Input: Parts receipt data.
9	Routine Replenishment Support	EDP Input: See paragraph 3.3 of this Section.
10	Storage of Future Delivery Dates in the KSC EDP Data Bank	EDP Output: None at this point in time.

Table 3-1. KSC Procured End Items (Cont.)

Position	Task	Input/Output
11	Interim Spare Parts Release (paragraph 2.3.1, Addendum "A", Exhibit 2)	EDP Output: Notification of Interim Release.
12	Recommended Spare Parts List Submittal (paragraph 2.4.1, Addendum "A", Exhibit 2)	EDP Output: Routine report to PPR-1, 4, or 5 as applicable.
13	Approval of the Recommended List of Spare Parts	EDP Output: Routine report of adds, changes, or deletes.
14	Parts Delivery Schedule (see paragraph 3.3.1, Addendum "A", Exhibit 2)	EDP Output: Flag notice of delinquent item delivery is sent to PPR-3. Routine report to PPR-1, 4, or 5.
15	Changes to Delivery Schedules (paragraph 3.2.1, Addendum "A", Exhibit 2)	EDP Output: Flag notice to PPR-3 for consideration of impact on program. Routine report to PPR-1, 4 or 5.
16	Delivery of Interim Released Item (see paragraph 3.4, Addendum "A", Exhibit 2)	EDP Output: Flag notice when deliveries are not received as scheduled.
17	Delivery of Parts Against the Spare Parts List (see paragraph 3.4, Addendum "A", Exhibit 2)	EDP Output: Flag notice to PPR-3 on delinquent items. Routine report to PPR-1, 4, or 5.
18	Complete Parts Delivery (see Exhibit 3)	EDP Output: Advice of shipment completion to PPR-1, 4, or 5.
19	Normal Replenishment and Reporting (see Exhibit 3)	

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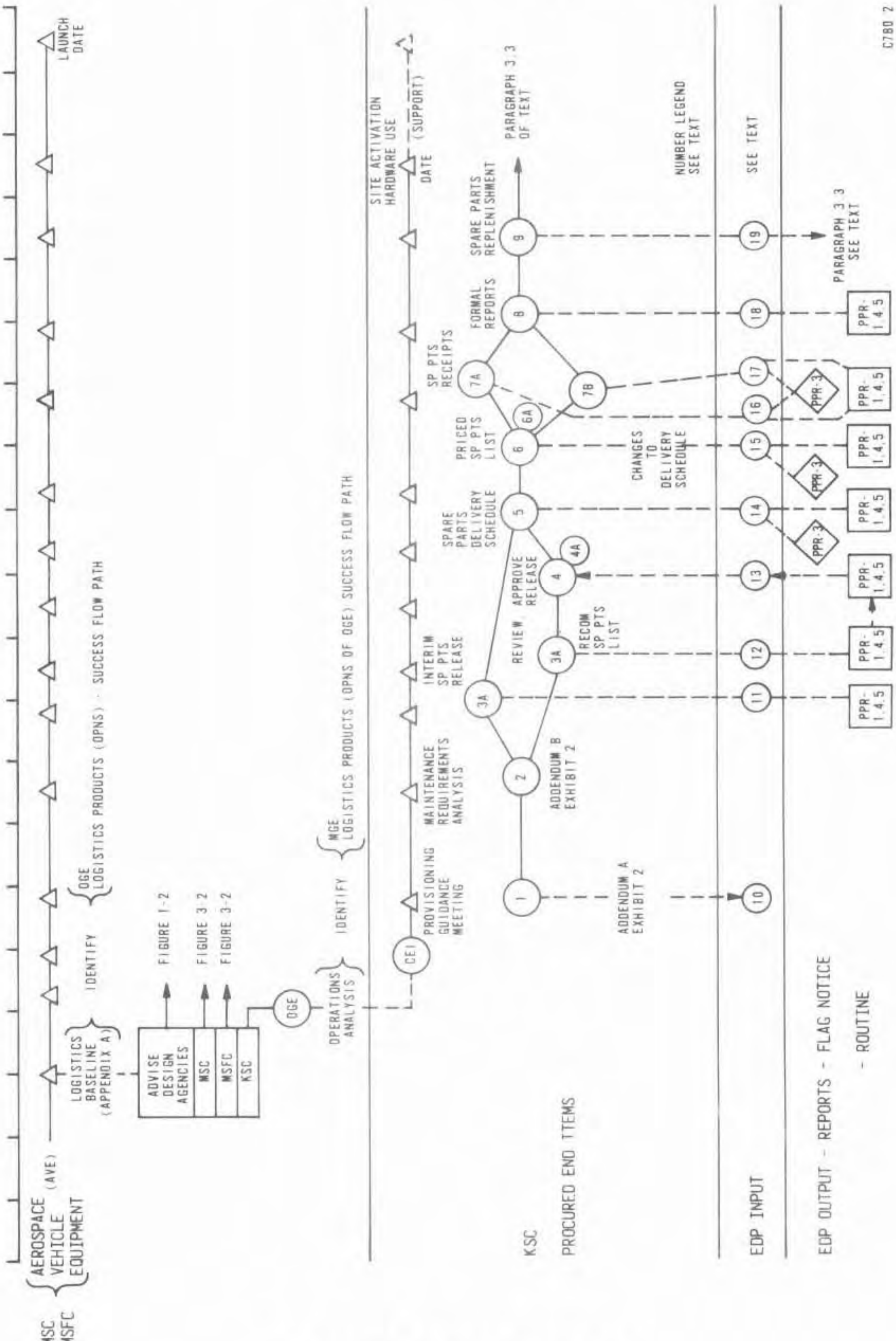

Figure 3-1. Spare Parts Tracking System (Initial Provisioning)
KSC Procured CEI

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Table 3-2. MSC/MSFC Procured End Items

Position	Task	Input/Output
1	Provisioning Guidance Meeting	EDP Input: a. Site activation hardware use date. b. Date of availability of spare parts delivery schedule.
2	Maintenance Requirements Analysis	EDP Input: No input to KSC.
3A	Interim Spare Parts Release	EDP Input: No input to KSC.
3B	Recommended Spare Parts List	EDP Input: No input to KSC.
3C	Standard Parts List Development	EDP Input: Standard parts identification for incorporation in the KSC base support system.
4	Review, Approve and Release RSPL	EDP Input: No input to KSC.
5	Establish Spare Parts Delivery Schedule	EDP Input: Provisioning list and delivery dates.
6	Changes to Delivery Schedules	EDP Input: Notice of schedule changes.
7	MSC/MSFC Consumed Spare Parts	EDP Input: None
7A	Shipment of Interim Release Items	EDP Input: Parts receipt data.
7B	Shipment of Balance of Spare Parts List	EDP Input: Parts receipt data.
8	Completion of Spare Parts Shipments	EDP Input: Parts receipt data
9	Routine Replenishment Support	EDP Input: See paragraph 3.3 of this Section.
10	Storage of Future Delivery Dates in the KSC EDP Data Bank	EDP Output: None at this point in time.

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Table 3-2. MSC/MSFC Procured End Items (Cont.)

Position	Task	Input/Output
11	Parts Delivery Schedule	EDP Output: Flag notice to PPR-3 when scheduled deliveries are later than site activation hardware use date. Same report to PPR-1, 4 or 5.
12	Changes in Schedule Dates	EDP Output: Flag notice to PPR-3 on schedule changes which are later than site activation hardware use date. Same report to PPR-1, 4 or 5.
13	Changes in Schedule Dates on Interim Release Items	EDP Output: Same as 12.
14	Delivery of Parts Against the Spare Parts List	EDP Output: Flag notice on delinquent deliveries to PPR-3. Same report to PPR-1, 4 or 5.
15	Delivery of Parts Against KSC Allocation	EDP Output: Routine report of completion of deliveries.

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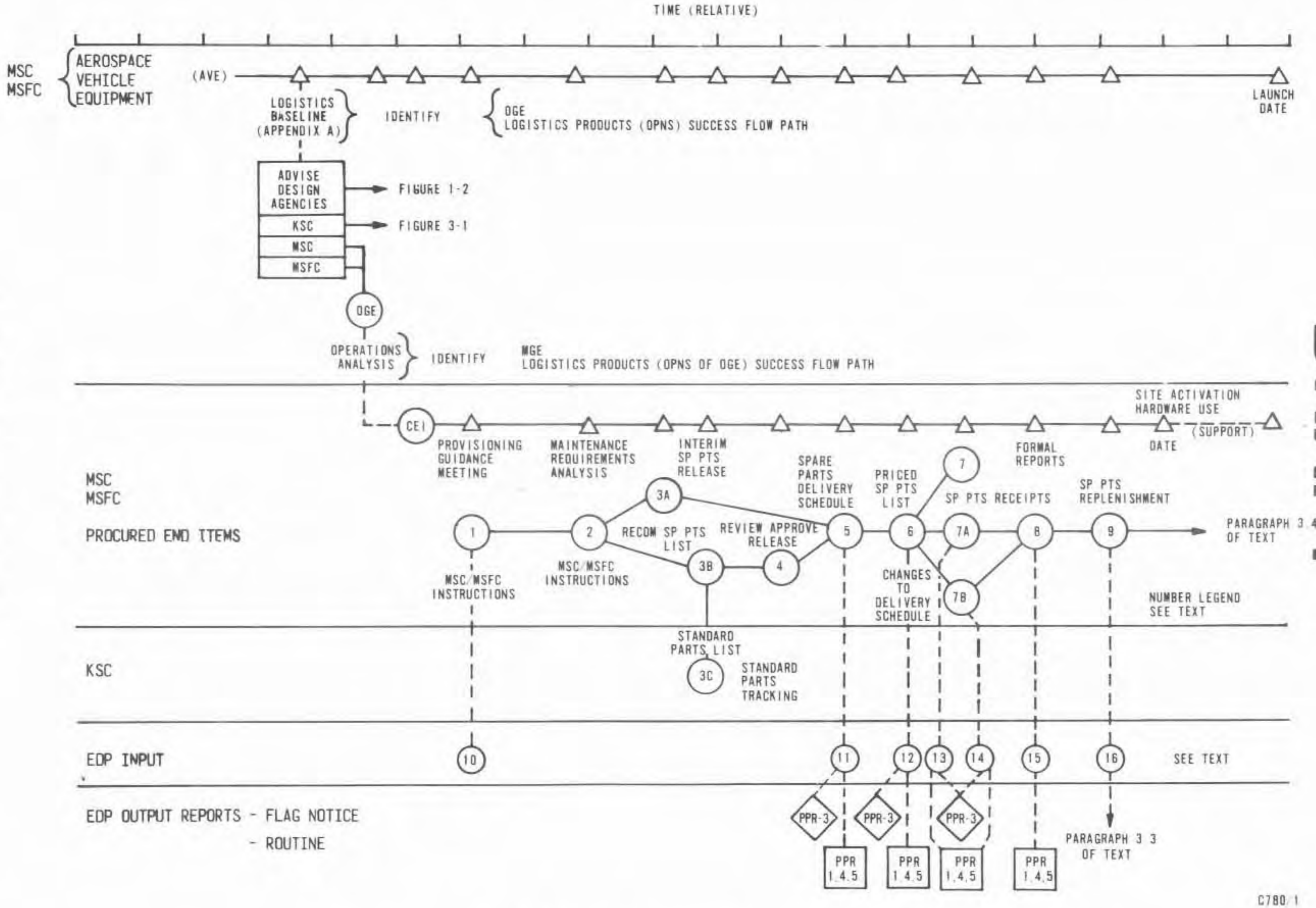

Figure 3-2. Spare Parts Tracking System (Initial Provisioning)
MSC/MSFC Procured CEI

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SECTION IV
TRANSPORTATION

SECTION V
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SECTION VI
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SECTION VII
DATA MANAGEMENT

SECTION VIII
OPERATIONS AND MAINTENANCE MANUALS

SECTION IX
TRAINING

(The above Sections to be published in the September 1966 revision)

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EXHIBIT 2

KSC APOLLO/SATURN MAINTENANCE

REQUIREMENTS PLAN

EXHIBIT 2
KSC APOLLO/SATURN MAINTENANCE REQUIREMENTS PLAN

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EXHIBIT 2
KSC APOLLO/SATURN MAINTENANCE REQUIREMENTS PLAN

SECTION I
INTRODUCTION

1.1 GENERAL

This Exhibit takes cognizance of the fact that the KSC organizations assigned the responsibilities of operating and maintaining the Apollo/Saturn equipment do so within the framework of a joint operator/maintainer concept. In delineating the KSC Apollo/Saturn maintenance policy and requirements, it is recognized that, in the majority of cases, the maintenance tasks will be accomplished by the equipment operator and that the maintenance management will be assumed by those managing the operational phase. It is the intent of this Exhibit, while recognizing organizational structure, to enumerate the functions peculiar to maintenance management which must be controlled and accomplished to assure that the Apollo/Saturn launch schedules are met.

Supplemental Addenda to this Exhibit detail specific phases or activities in the KSC Apollo/Saturn maintenance program. For example, Addendum "A", Spare Parts Provisioning Procedures, outlines the detailed requirements, responsibilities, and formats for developing spare parts lists, selecting spare parts, and utilizing this data for providing timely and economical spare parts support at KSC.

1.2 BACKGROUND

This Exhibit was developed to provide an integrated approach to the requirements for Apollo/Saturn Program maintenance management at KSC. It identifies the major maintenance elements necessary for maintenance support and provides guidance for the implementation of Apollo/Saturn maintenance management systems.

1.3 PURPOSE

The purpose of this Exhibit is to provide the maintenance management direction required to implement, integrate, and manage the Apollo/Saturn Maintenance Program at KSC.

1.4 APPLICABILITY AND SCOPE

The provisions of this Exhibit apply to all KSC organizations and their supporting contractors having a maintenance management responsibility in the KSC Apollo/Saturn Program. Its scope pertains to all spacecraft, stages, GSE, spare parts and facility maintenance functions performed in support of that program at KSC.

1.5 OBJECTIVES

The objectives of this Exhibit are to:

a. Identify the KSC organizations which have an assigned maintenance and maintenance management role in the Apollo/Saturn Program

b. Identify the specific responsibilities of the KSC organizations assigned a maintenance and maintenance management role in the Apollo/Saturn Program

c. Identify the maintenance functions which must be accomplished to assure an integrated system of directorate maintenance implementation plans in support of the Apollo/Saturn Program at KSC.

SECTION II
POLICY

2.1 GENERAL

The policies contained within this section are not to be construed as authority for a change in contract scope of work. Where a change in scope is felt to be required, it shall be brought to the attention of the appropriate Apollo/Saturn Systems Office (PPR-1, 4 or 5) for resolution.

All KSC Apollo/Saturn maintenance plans and actions of the implementing organizations shall be accomplished in accordance with the policies, procedures, methods and guidelines established by this Exhibit and the associated plans and Exhibits listed in Section V of this Logistic Support Requirements Plan (K-AM-02).

Organizational plans and procedures shall be reviewed by the responsible organization and revised as necessary to conform to the concepts established by this plan.

The KSC Apollo/Saturn maintenance system shall utilize existing practices wherever possible. Established internal operations of organizations concerned will not be changed except as might be required to achieve an integrated maintenance program.

Maintenance plans and procedures developed by contractors shall be reviewed and revised in the event of program changes or as a result of changes in maintenance responsibilities. Prior to implementation, such changes will be submitted to the Contracting Officer for approval, with concurrence by PPR-3.

All maintenance plans and procedures, and revisions thereto, developed by responsible organizations shall be reviewed by PPR-3 to assure conformance with the provisions of this Exhibit.

Any noted conflict between the provisions of this Exhibit and other KSC Apollo/Saturn documents shall be brought to the attention of PPR-3 where such conflicts shall be resolved on an individual basis.

2.2 MAINTENANCE POLICIES

2.2.1 PERSONNEL SAFETY. Personnel safety shall be a paramount consideration in all maintenance tasks performed on Apollo/Saturn equipment.

2.2.2 MAINTENANCE REQUIREMENTS ANALYSIS. The principal source of information for determining maintenance requirements will be the maintenance requirements analysis process defined in NHB 7500.1 and the maintenance requirements analysis addendum to this Exhibit.

2.2.3 PRIORITY SYSTEM. A priority system shall be established to determine order or precedence in the development of maintenance requirements analysis for end items of equipment requiring maintenance support. The following criteria shall be used in establishing priority:

a. Priority I - Equipment, the failure of which would result in vehicle loss and/or personnel hazard.

b. Priority II - Equipment, the failure of which would result in missing the planned launch window, failing to obtain mission data, and/or reduced personnel hazard.

c. Priority III - Equipment, the failure of which would result in partial countdown recycling and no personnel hazard

d. Priority IV - Equipment, the failure of which would result in no significant effect on vehicle or mission.

2.2.4 MAINTENANCE REQUIREMENTS ANALYSIS RESPONSIBILITY. Existing equipment shall be evaluated by the KSC organization having the responsibility for maintenance to determine the need for the design contractor to perform maintenance requirements analysis. The criteria established in paragraph 2.2.3 shall be used as the basis for such determination. Less complex systems and/or end items (slings, adapters, etc.) do not require a maintenance requirements analysis but do require a maintenance evaluation to assure the availability of logistic support.

2.2.5 MAINTENANCE RESPONSIBILITY. Apollo/Saturn system maintenance may be accomplished by the use of contractor personnel in accordance with contracts negotiated between the contractor and the appropriate NASA Center. Maintenance management is the responsibility of the assigned KSC Directorate to the extent stipulated by Section VII of this Exhibit, existing inter-center agreements, and the Apollo Operational Maintenance Plan (Draft).

SECTION III
MAINTENANCE PHILOSOPHY AND CONCEPT

3.1 MAINTENANCE PHILOSOPHY

The nature of the Apollo/Saturn Program is such that orderly, systematic, and timely task accomplishment between stage/spacecraft off-load at the KSC point of interface and space vehicle launch is necessary to assure program success. All functions directly related to the assembly, checkout, and preparation for launch of the vehicle are classified as operations functions, (inspections tests, checkout, vehicle movement, servicing, and assembly). As a result, the term "maintenance", as used within this Exhibit, describes the function of maintaining equipment in serviceable condition and/or restoring equipment to serviceable condition when it is in need of repair. Equipment modification fits neither description but the need for it is recognized and the conditions and limitations for its accomplishment are included within this Exhibit.

3.2 MAINTENANCE CONCEPT

The maintenance concept establishes the manner in which maintenance of Apollo/Saturn systems and/or equipment is to be accomplished. As no in-flight maintenance is planned for the Apollo spacecraft, the following information pertains solely to the prelaunch condition and environment. In general, the maintenance concept will be to remove and replace, to the functional component level, either on a scheduled basis as determined from design life characteristics, or on an unscheduled basis resulting from malfunction. This concept provides the basis for maintenance planning to insure that the maintenance actions of the responsible KSC organizations engaged in the Apollo/ Saturn Program are properly integrated and directed toward common program goals. Detailed maintenance requirements for the system and/or equipment are derived either by performing maintenance requirements analyses or utilization of similar techniques which identify the requirements for maintenance. Derivation of maintenance requirements will be influenced by equipment design and the inherent fault localization and verification capability of the system test and checkout equipment. Repair-in-place may be accomplished only when justified by the results of the maintenance requirements analysis, associated trade studies, and consideration of impact on launch schedules. Factors which must be considered for effecting repair-in-place are economy, time, size, and location of the failed item.

3.2.1 SCHEDULED AND UNSCHEDULED MAINTENANCE (TYPES OF MAINTENANCE)

a. Scheduled maintenance is any planned maintenance activity deemed necessary to enhance the functional success of the equipment.

b. Unscheduled maintenance is any corrective maintenance which is required as a result of failures regardless of the circumstances under which the failures are discovered. For example: maintenance required as a result of malfunctions noted during operations and/or a scheduled maintenance activity shall be identified as unscheduled maintenance. Verification of corrective maintenance shall also be considered unscheduled maintenance even though it entails repetition of previously accomplished operations or scheduled events.

3.2.2 LEVELS OF MAINTENANCE. The basic subdivisions of maintenance task accomplishment are classified as maintenance levels and all maintenance performed at KSC shall be accomplished as determined from repair instruction data.

3.2.2.1 First Level Maintenance. First level maintenance includes all maintenance accomplished directly on system installed hardware. It consists of fault isolation, component removal and replacement or repair-in-place (whichever is specified as most advantageous by the maintenance requirements analysis), servicing, replenishing, and inspection performed on a stage, spacecraft, the space vehicle, or an end item of ground support equipment. It may include demate or mate of the vehicle. Personnel in the quantity and skill level deemed necessary by the maintenance requirements analysis will perform these tasks. Additionally, Failure Reports, UCR's, etc., will be prepared on failed components removed or repaired-in-place during first level maintenance.

3.2.2.2 Second Level Maintenance. Second level maintenance includes all activities performed in direct support of first level maintenance. It involves disposition or repair of hardware removed during first level maintenance activities and the preparation and submission of Failure Reports, UCR's, consumption reports, etc. Second level maintenance is performed in maintenance shops located at KSC. Activities include fault isolation to lower equipment levels and repair based on the most effective use of the maintenance resources specified by the maintenance requirements analysis. Equipment modification may be accomplished in second level maintenance shops as justified by cost analysis, equipment availability, and certification capability.

3.2.2.3 Third Level Maintenance. Third level maintenance is essentially the same as second level but is expanded in scope to include complete rebuild. It is performed at remote locations such as contractor or vendor factories or Government repair and overhaul facilities. It generally involves maintenance support not normally available at second level maintenance facilities. Component replenishment costs versus repair costs, component availability, replenishment time versus repair time, frequency, safety, manpower skills, facility requirements, and verification ability are among the important considerations in assigning maintenance to a third level facility.

SECTION IV
MAINTENANCE PLANNING AND IMPLEMENTATION

4.1 MAINTENANCE PLANNING

Maintenance planning requires, and is based on, operations analyses and maintenance requirements analyses of the Apollo/Saturn stages, spacecraft, and ground support equipment. KSC organizations charged with the maintenance management responsibility, in accomplishing their maintenance planning, shall consider:

a. The location at which maintenance is to be performed.

b. The equipment on which maintenance shall be performed.

c. The type and level of maintenance to be performed at each location.

d. Economy of operation by avoidance of duplication of facilities and equipment.

4.2 MAINTENANCE REQUIREMENTS ANALYSIS

The maintenance requirements analysis shall provide source data for identification of logistics products which must support maintenance. This data is required to preclude or reduce contingencies which cause deviations from the systems' operational success path due to equipment malfunction.

The maintenance requirements analysis will normally be performed on the more complex systems and/or end items (consoles, testers, hydraulic/pneumatic servicing equipment, etc.), in consonance with the priorities systems established by paragraph 2.2.3 of this Exhibit. However, all systems/equipment requiring logistic support at KSC will require, as a minimum, a maintenance evaluation to provide the summary information described in paragraph 4.2.3 of this Exhibit.

4.2.1 ANALYSIS OF TASK COMPLEXITY. The analysis shall consider task complexity and provide a basis for determination of maintenance tools and verification equipment, spare parts to support the designated replacement/repair policy, technical support documentation, personnel numbers and skills, maintenance facilities, transportation, and consumables.

4.2.2 ANALYSIS OF ASSEMBLED SYSTEM. Analysis shall also be made of the assembled system under specific operational conditions. For example: the Apollo/Saturn system assembled and fueled on the launch pad. In addition this analysis shall also:

a. Provide the planning basis for allocation of spare parts, tools and test equipment, technical support documentation, transportation and trained personnel to support the system under each operational condition.

b. Consider the task time to provide test and launch management with decision making data to be used in case of a failure or malfunction during test or launch countdown.

c. Identify the types and levels of maintenance to be performed. The levels are based on cost-time trade studies which shall consider the available maintenance facilities of the respective sites in addition to the considerations prescribed in paragraph 4.1 of this Exhibit.

4.2.3 SUMMARY EVALUATION. Information derived from the maintenance requirements analysis will be compiled in summary form and will include the functional, physical, and use description of the end item in its intended operating environment, including the logistics products required to support the end item from on-dock through launch countdown at KSC.

4.3 MAINTENANCE PROGRAM IMPLEMENTATION

Upon completion of the analysis, each KSC organization charged with an operations/maintenance responsibility in support of the Apollo/Saturn Program, shall develop maintenance implementation plans. These plans shall be in consonance with requirements generated by paragraph 1.7.3 of K-AM-02.

SECTION V
MAINTENANCE MANAGEMENT

5.1 GENERAL

The primary function of maintenance management is to plan, schedule, and control the application of all available maintenance resources toward the economical and efficient accomplishment of maintenance tasks to permit the achievement of program launch schedules. To effect the functions of maintenance management in support of the Apollo/Saturn Program at KSC, the maintenance management system illustrated by Figure 5-1, Maintenance Functional Flow, shall be employed.

5.2 MAINTENANCE MANAGEMENT FUNCTIONS

To assure continuity of effort within the Apollo/Saturn maintenance program, the functions of maintenance management, as differentiated from organizational task responsibilities, are as indicated by the following paragraphs.

5.2.1 ESTABLISHMENT OF POLICY. The establishment of all policy pertaining to the Apollo/Saturn Program is a function of the Director, KSC, whose program management requirements are documented and formalized by the Director, Plans, Programs and Resources (PPR).

5.2.2 PREPARATION OF MAINTENANCE PLANS AND PROCEDURES. The KSC Program Control Office (PPR-3) prepares procedures in consonance with established Center policy. Additionally, PPR-3 maintains a surveillance function to assure that necessary logistics products are available to the operating organizations and that maintenance tasks are accomplished within the framework of approved plans and procedures.

5.2.3 IMPLEMENTATION OF MAINTENANCE PLANS AND PROCEDURES. The Apollo/Saturn Systems Offices, (PPR-1, PPR-4 and PPR-5) direct implementation of the maintenance plans and implementing procedures in their respective areas of interest. Additionally, it is a function of these offices to establish that maintenance tasks are accomplished in a manner which assures system integrity at all times.

5.2.4 CONTRACTUAL SUPERVISION. The contractual supervision of those contractor personnel engaged in the physical implementation of Apollo/Saturn maintenance plans and procedures is a function of the KSC Directorates assigned the operations/maintenance mission.

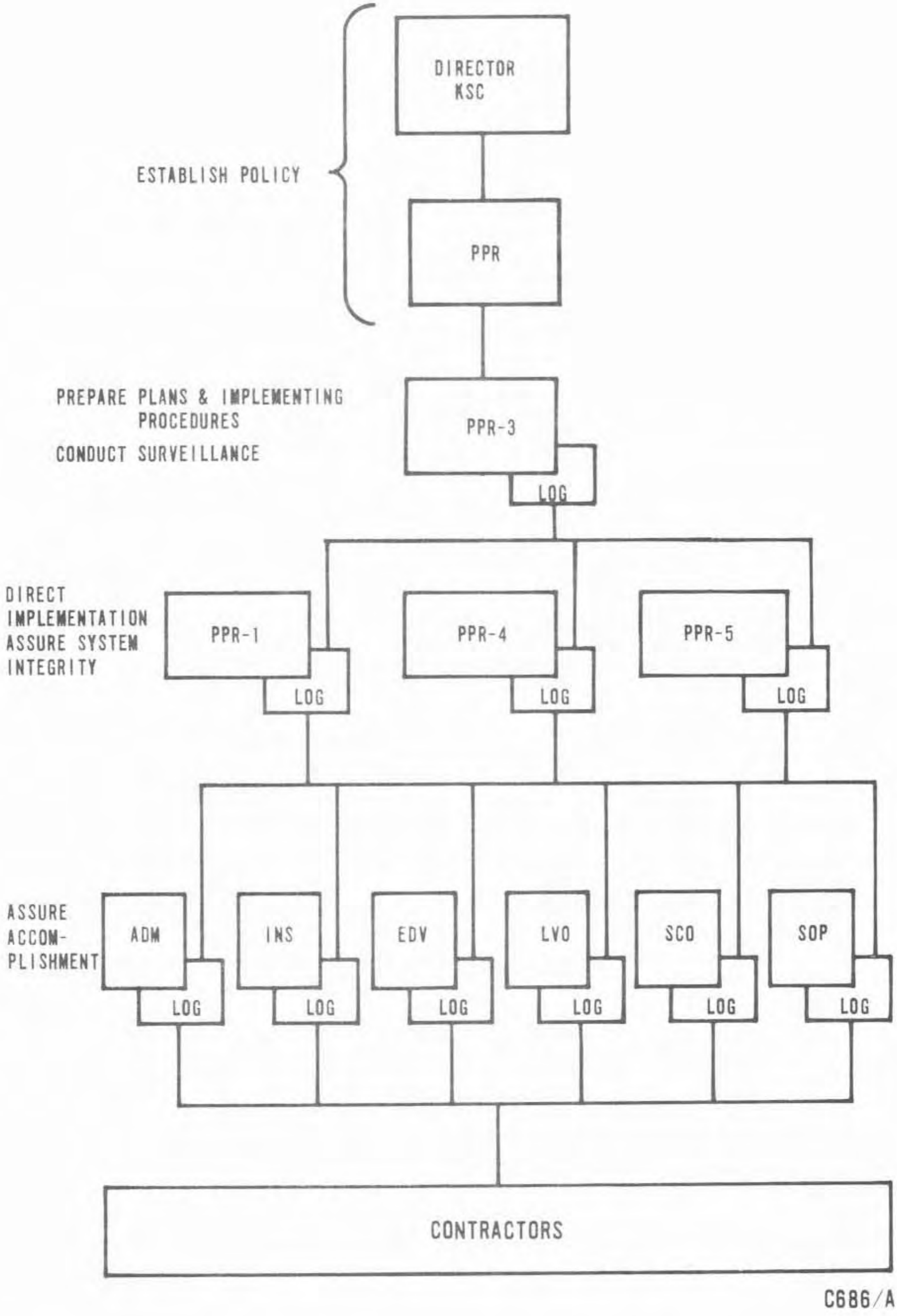

Figure 5-1. Maintenance Functional Flow at KSC

SECTION VI
MAINTENANCE MANAGEMENT CONTROLS

6.1 MAINTENANCE MANAGEMENT CONTROLS

In keeping with requirements established by the Apollo Logistics Requirements Plan, NHB 7500.1, November 1965, and the KSC Apollo/Saturn Logistics Support Requirements Plan, K-AM-02, 31 May 1966, each directorate charged with a maintenance support mission for the Apollo/Saturn Program at KSC shall develop a maintenance management system which includes the following control factors:

a. Visibility of each end item of equipment or system requiring maintenance support.

b. Validated spare parts lists for each end item of equipment or system with the spare parts designated in order of priority against the criteria established by paragraph 2.2.3 of this Exhibit.

c. Spare parts maintenance plans and updating procedures.

d. Special tools and test equipment required to support the maintenance performed on assigned end items of equipment.

e. Maintenance plans and procedures for special tools and test equipment.

f. Updating plans and procedures for special tools and test equipment.

g. Control procedures indicating technical support data required, available, not available, and due dates.

h. Updating procedures to assure end item configuration compatibility with technical support data.

i. Integrated operations/maintenance task-timed flows to assure realistic scheduling.

j. Integrated operations/maintenance contingency planning. The time restraints common to the performance of maintenance tasks in the Apollo/Saturn Program necessitate the development of maintenance "work arounds" or contingency plans. These are maintenance tasks which can be accomplished while the operational checkout or automatic sequencing is continuing, without degradation of system integrity. Considerations inherent to this type of planning include:

(1) Component and system interface.

(2) Time required for task accomplishment.

(3) Personnel safety.

(4) Depth of reverification or system re-test required.

(5) Total time saving by contingency action versus hold time.

k. Intra-directorate assignment of operations/maintenance responsibility for each end item of equipment or system.

l. Personnel procurement and availability information.

m. Personnel training programs to assure their meeting established proficiency standards.

n. Personnel evaluation systems consistent with skill code requirements.

o. Intra-KSC gate-to-launch transportation plans including:

(1) Description and configuration of item/system to be transported.

(2) Special vehicles required for item/system transportation.

(3) Special handling equipment/tools required.

(4) Technical support data required.

(5) Spares lists, maintenance procedures and updating plans for special vehicles and/or equipment.

(6) Personnel requirements by quantity and skill code.

p. Coordinated safety program for all personnel/equipment activities in the performance of maintenance functions.

q. Replacement items and components received from supply for first level maintenance shall be fully qualified and completely serviceable. They shall not require testing prior to installation. However, system verification after maintenance activities is required even though it may entail repetition of previously accomplished scheduled events. Operational verification will be accomplished at the optimum level (component, system, overall system, etc.) consistent with equipment operating time and criticality, mission criticality, launch schedule and other parameters at the discretion of the launch conductor.

All components repaired by second or third level maintenance shall be verified to the equivalent government or manufacturer's acceptance test specifications unless waived in writing by the design responsible Center.

SECTION VII
ORGANIZATIONAL RESPONSIBILITIES

7.1 RESPONSIBILITIES

The Apollo/Saturn Program responsibilities assigned to KSC include the conduct of launch vehicle integration and checkout, total space vehicle integration and checkout, and the conduct of launch operations. In order to discharge the assigned KSC operational mission, it is necessary that an integrated maintenance system be developed which will assure that adequate maintenance support is available. The requirements of each KSC organization, assigned a maintenance mission in the Apollo/Saturn Program are detailed in the following paragraphs.

7.2 THE ASSISTANT DIRECTOR FOR ADMINISTRATION (ADM)

7.2.1 TRANSPORTATION PLAN. Develop and implement a KSC Apollo/Saturn transportation plan to support maintenance requirements generated by this Exhibit and in consonance with requirements developed by NHB 7500.1 and the KSC Apollo/Saturn Logistics Support Requirements Plan, K-AM-02. The transportation plan will provide specific direction for:

7.2.1.1 <u>General Equipment</u>. Acquisition, control, storage, maintenance, and dispatch of general transportation vehicles in support of the assigned KSC Apollo/Saturn maintenance mission.

7.2.1.2 <u>Forms and Reports</u>. The proper utilization, by motor pool personnel, of the forms and reports required for transportation management to include:

a. Motor Vehicle Trip Ticket.

b. Daily Gasoline, Oil, and Wash Sheet.

c. Vehicle Work Order.

d. Biweekly Cost Summary.

e. Vehicle Delivery Report.

7.2.1.3 <u>Forms Collection and Processing</u>. The establishment of methods for the collection and processing of the transportation management forms. This includes their delivery to EDP on a biweekly schedule, for utilization as source documents for the formal EDP transportation outputs including transaction reports, vehicle transaction errors reports, vehicle reports by groups, and vehicle reports by owners (Government or leased).

7.2.2 MAINTENANCE TRAINING PLANS. Develop and monitor maintenance training plans and programs in consonance with the requirements developed by K-AM-06, Apollo/Saturn Training Plan.

To the extent possible, advantage will be taken of training requirements fulfilled by training generated as a result of contractual requirements.

Personnel evaluations performed by responsible directorates will be reviewed, to assure the quality of personnel performing maintenance is commensurate with the skill levels determined to be necessary by the end item maintenance analysis.

Personnel inadequacies will be corrected, where possible, by the establishment of additional training programs.

7.3 ASSISTANT DIRECTOR, ENGINEERING DEVELOPMENT (EDV)
ASSISTANT DIRECTOR, INFORMATION SYSTEMS (INS)
ASSISTANT DIRECTOR, LAUNCH VEHICLE OPERATIONS (LVO)
ASSISTANT DIRECTOR, SPACECRAFT OPERATIONS (SCO)

The design organizations of KSC have responsibilities peculiar to them as the only KSC organizations associated with the Apollo/Saturn Program charged with the procurement of GSE and facilities. As a result, they are responsible for the completion of the following functions:

7.3.1 MAINTENANCE REQUIREMENTS ANALYSIS. The accomplishment of a maintenance requirements analysis or maintenance evaluation, on the basis of the priorities established in paragraph 2.2.3 of this Exhibit, for each end item of equipment for which the directorate has design cognizance and on which maintenance is required.

7.3.2 TECHNICAL DATA PACKAGE. The development, and procurement, of a contract end item data package which includes operations and maintenance manuals, engineering drawings, spare parts list, special tools and equipment list, common (bulk) and standard parts list, and a personnel requirements (quantity and skill level) list for each end item or system.

7.3.3 CEI MAINTENANCE. The establishment of clearly delineated types of maintenance and levels of maintenance for each CEI.

7.3.4 SPARE PARTS PROVISIONING. The accomplishment of initial provisioning of spare parts and the special tools and test equipment in accordance with the provisions set forth by the Spare Parts Provisioning Procedure, Addendum "A" to this Exhibit.

7.3.5 UPDATING PROCEDURES. The development and establishment of updating procedures to maintain spare parts, and technical support data current with end item configuration.

7.3.6 CONTINGENCY PLANNING. The development, in coordination with the using organization, of maintenance "work arounds" (contingency planning) which can be accomplished while corrective maintenance is being accomplished during system test and/or countdown.

7.3.7 STANDARD PARTS LISTS. The providing, to SOP, the standard parts lists required for initial provisioning for each CEI in accordance with the Spare Parts Provisioning addendum to this Exhibit.

7.3.8 MANAGEMENT CONTROL PROCEDURES. The development of management control procedures for the analysis, corrective action, and processing of UCR's, Failure Reports, and Failure Analysis Reports in accordance with the provisions of K-AMP-5 (the KSC Quality Assurance Plan), and TSOP-2 (Generation, Preparation and Distribution of UCR's).

7.3.9 TRAINING PLANS AND PROGRAMS. The development and activation, in coordination with ADM, of training plans and programs to assure that personnel provided to perform maintenance have individual skills in consonance with those determined as necessary by the maintenance requirements analysis.

7.4 ASSISTANT DIRECTOR, LAUNCH VEHICLE OPERATIONS (LVO)

In addition to the responsibilities listed in paragraph 7.3, LVO is also responsible for the operation and maintenance of MSFC procured stages and GSE for the Apollo/Saturn Program and certain KSC procured systems. It is, therefore, the responsibility of LVO to:

7.4.1 PERSONNEL PROVISION AND DIRECTION. Contractually provide and direct operator/maintainer personnel and activities on MSFC procured stages and GSE.

7.4.2 MSFC EQUIPMENT MAINTENANCE. Maintain MSFC procured stages and GSE in accordance with the provisions of K-AM-02, this Exhibit, and the concepts and instructions furnished by MSFC.

7.4.3 MSFC EQUIPMENT MODIFICATIONS. Modify MSFC procured stages, GSE, and spare parts in accordance with the provisions of this Exhibit and instructions furnished by MSFC.

7.4.4 MSFC SPARE PARTS REPAIR AND DISPOSAL. Repair and dispose of MSFC procured spare parts in accordance with the provisions of this Exhibit and instructions furnished by MSFC.

7.4.5 REVIEW AND RECOMMEND CHANGES. Review and recommend changes (through PPR-4 and 5) to equipment and spare parts lists furnished by MSFC.

7.4.6 MSFC EQUIPMENT SPARE PARTS ACCOUNTABILITY. Assume secondary accountability for MSFC provided spare parts.

7.4.7 SYSTEM-SUBSYSTEM INSPECTION. Prescribe system-subsystem inspection and retesting in accordance with criteria furnished by MSFC.

7.4.8 ADDITIONAL MSFC TECHNICAL DOCUMENTATION REQUIREMENTS. Inform MSFC (through PPR-4 and 5) of requirements for additional technical documentation.

7.4.9 VERIFICATION OF TECHNICAL SUPPORT DATA. In conjunction with MSFC, verify technical support data.

7.4.10 FAILURE REPORTS ON MSFC EQUIPMENT. Document, control and distribute failure reports and UCR's on MSFC procured equipment in consonance with K-AMP-5 and MSFC direction.

7.4.11 RECEIVING INSPECTION ON MSFC EQUIPMENT. Perform receiving inspection on MSFC procured stages and GSE for shipment damage in accordance with instructions furnished by MSFC.

7.4.12 PROPELLANT AND PRESSURANT OPERATIONS AND MAINTENANCE PERSONNEL. Contractually provide and direct operations and maintenance personnel and activities on KSC provided propellant and pressurant storage and distribution systems on Launch Complex 34, 37 and 39.

7.4.13 PROPELLANT AND PRESSURANT CONTINGENCY PLANNING. Develop contingency planning for the propellant and pressurant storage and distribution systems.

7.4.14 RECORDS AND REPORTS SYSTEM. Develop and initiate a records and reports system as described in Section IX of this Exhibit.

7.4.15 PERSONNEL TRAINING PROGRAM. In conjunction with ADM, as stipulated by K-AM-06, develop and monitor personnel training programs for all equipment for which there is an assigned maintenance responsibility.

7.4.16 TRANSPORTATION PLAN. In conjunction with ADM, develop a transportation plan for the on-dock to launch movement of all equipment for which there is an assigned maintenance responsibility.

7.4.17 POSTLAUNCH COMPLEX INSPECTION AND REFURBISHMENT PLAN. In conjunction with SCO, SOP and EDV, develop and initiate a postlaunch complex inspection and refurbishment plan in accordance with Section VIII of this Exhibit.

7.4.18 MAINTENANCE MANAGEMENT VISIBILITY DISPLAY. Develop and initiate a maintenance management visibility display which accurately portrays the accomplishment of maintenance management assignments.

7.4.19 MAINTENANCE MANAGEMENT SYSTEM. Develop and activate a maintenance management system in consonance with the system outlined in Section V of this Exhibit.

7.5 ASSISTANT DIRECTOR, SPACECRAFT OPERATIONS (SCO)

In addition to the responsibilities detailed in paragraph 7.3 of this Exhibit, SCO is responsible for the operation and maintenance of MSC procured spacecraft and GSE for the Apollo/Saturn Program. In accordance with existing inter-center agreements between MSC and KSC, and requirements generated by this plan, SCO is responsible for:

7.5.1 PREFLIGHT CHECKOUT. Contractually direct spacecraft and GSE contractor personnel engaged in spacecraft preflight checkout/maintenance activities.

7.5.2 FAILURE ANALYSIS. Conduct failure analysis as directed by MSC.

7.5.3 SPACECRAFT AND GSE MODIFICATIONS. Incorporate authorized modifications to spacecraft and GSE.

7.5.4 REVIEW AND RECOMMEND CHANGES. Review and recommend changes (through PPR-1) to equipment and spare parts lists furnished by MSC.

7.5.5 MSC EQUIPMENT AND SPARES MAINTENANCE. Maintain equipment and spares in accordance with instructions furnished by MSC.

7.5.6 MSC EQUIPMENT REPAIR AND DISPOSAL. Repair, modify, and dispose of spare parts in accordance with instructions furnished by MSC.

7.5.7 ADDITIONAL MSC TECHNICAL DOCUMENTATION REQUIREMENTS. Inform MSC (through PPR-1) of requirements for additional technical documentation.

7.5.8 RECORDS AND REPORTS SYSTEM. Develop and initiate a records and reports system as described in Section IX of this Exhibit.

7.5.9 PERSONNEL TRAINING PROGRAM. In conjunction with ADM, as stipulated by K-AM-06, develop and monitor personnel training programs for all equipment and/or systems for which there is an assigned maintenance mission.

7.5.10 TRANSPORTATION PLAN. In conjunction with ADM, develop a transportation plan for the on-dock to launch movement of all spacecraft and GSE equipment for which there is an assigned maintenance responsibility.

7.5.11 POSTLAUNCH COMPLEX INSPECTION AND REFURBISHMENT PLAN. In conjunction with LVO, SOP, and EDV, develop and initiate a postlaunch complex inspection and refurbishment plan in accordance with Section VIII of this Exhibit.

7.5.12 MAINTENANCE MANAGEMENT VISIBILITY DISPLAY. Develop and initiate a maintenance management visibility display which accurately portrays the accomplishment of maintenance management assignments.

7.5.13 MAINTENANCE MANAGEMENT SYSTEM. Develop and activate a maintenance management system in consonance with the system outlined in Section V of this Exhibit.

7.5.14 HI PURITY LOX RECEIPT AND STORAGE. Receive and store hi purity LOX, as detailed in Exhibit 5.

7.6 ASSISTANT DIRECTOR, SUPPORT OPERATIONS (SOP)

SOP is the primary user of EDV designed and procured GSE and facilities. Additionally, SOP has critical procurement initiation responsibilities and support functions beyond the GSE and facility maintenance assignment. These responsibilities include:

7.6.1 STANDARD PARTS CONTROL. Procurement initiation, receipt, storage, control, issue, and accounting for all standard parts, required in support of maintenance functions for the Apollo/Saturn Program at KSC as prescribed in Addendum "A" to this Exhibit and in Exhibit 3.

7.6.2 OXIDIZERS, PROPELLANTS, AND PRESSURANT SUPPORT. The consolidation of forecast requirements from LVO and SCO, submission of requirements to PPR-7 for review and approval, procurement coordination, receipt, sampling and analysis (not including hypergols), storage (not including hi purity LOX) of the oxidizers, propellants and pressurants required to support the Apollo/ Saturn Program at KSC, as detailed in Exhibit 5.

a. The sampling and analysis of hypergols is accomplished by USAF Eastern Test Range Laboratories, as detailed in Exhibit 5.

b. The storage of hi purity LOX is an SCO responsibility.

7.6.3 OPERATIONS AND MAINTENANCE OF FACILITIES. The operations and maintenance of the EDV procured facilities and RPIE, except the launch complex propellant and pressurant distribution systems which are the responsibility of LVO.

7.6.4 MAINTENANCE SUPPORT. Providing support for Apollo/Saturn operations/ maintenance contractor (operating organizations) requirements, which are beyond their capabilities at KSC, by the establishment and activation of base shops and laboratory services to include: (Detailed listing and description of these shops is contained in KMI 8610.1, Support Services Handbook; KSC-GP-225, Materials Testing and Malfunction Investigation Capability; and Base Operations Shop and Heavy Equipment Capabilities Manual.

a. Electrical Shop.

b. Heavy Equipment and Rigger Shop.

c. Machine Shop.

d. Communication Shop.

e. Photography Laboratory.

f. Mechanical System Laboratory.

g. Measuring Laboratory.

h. RF Instrumentation Laboratory.

i. GYRO and Stabilizer Systems Laboratory.

j. Guidance and Control Test Support Area (LAB).

k. Instrument Calibration and Standards Laboratory.

l. Propellant Systems Component Laboratory.

7.6.5 MAINTENANCE SUPPORT PERSONNEL. Contractually provide and direct the personnel performing the assigned maintenance support tasks, and monitor their performance against the parameters demanded by contract delineation.

7.6.6 RECORDS AND REPORTS SYSTEM. Develop and initiate a records and reports system as described in Section IX of this Exhibit.

7.6.7 PERSONNEL TRAINING PROGRAMS. In conjunction with ADM, as stipulated by K-AM-06, develop and monitor personnel training programs for all equipment and/or systems for which there is an assigned maintenance mission.

7.6.8 TRANSPORTATION PLAN. In conjunction with ADM, develop a transportation plan for the intra-KSC movement of propellants and pressurants, and the human and material resources required to support the assigned maintenance mission.

7.6.9 POSTLAUNCH COMPLEX INSPECTION AND REFURBISHMENT PLAN. In conjunction with LVO, SCO and EDV, develop and initiate a postlaunch complex inspection and refurbishment plan in accordance with Section VIII of this Exhibit.

7.6.10 MAINTENANCE MANAGEMENT VISIBILITY DISPLAY. Develop and initiate a maintenance management visibility display which accurately portrays maintenance management accomplishment.

7.6.11 MAINTENANCE MANAGEMENT SYSTEM. Develop and activate a maintenance management system in consonance with the system outlined in Section V of this Exhibit.

7.6.12 RECORDS AND REPORTS SYSTEM. Develop and initiate a records and reports system as described in Section IX of this Exhibit.

7.7 ASSISTANT DIRECTOR, INFORMATION SERVICES (INS)

In addition to the responsibilities delineated in paragraph 7.3 of this Exhibit, INS as the organization charged with the operations and maintenance of its own designed and procured GSE, is responsible for the accomplishment of the following:

7.7.1 GSE OPERATIONS/MAINTENANCE PERSONNEL. Contractually providing and directing operations/maintenance personnel engaged in maintaining the GSE for which INS has the maintenance responsibility.

7.7.2 CONTINGENCY PLANNING. The development and utilization of contingency planning that will permit operational "work arounds" while maintenance is being performed.

7.7.3 RECORDS AND REPORTS SYSTEM. The development and utilization of a records and reports system as described in Section VIII of this Exhibit.

7.7.4 PERSONNEL TRAINING PROGRAMS. In conjunction with ADM, as stipulated by K-AM-06, the development and monitoring of personnel training programs for all equipment for which there is an assigned maintenance responsibility.

7.7.5 MAINTENANCE MANAGEMENT VISIBILITY DISPLAY. The development and initiation of a maintenance management visibility display which accurately portrays the accomplishment of maintenance management assignments.

7.7.6 MAINTENANCE MANAGEMENT SYSTEM. The development and activation of a maintenance management system in consonance with the system outlined in Section V of this Exhibit.

7.7.7 EDP PROGRAMMING. Perform EDP programming necessary to support task and priorities assigned by PPR-1, PPR-4, and PPR-5, as concurred in by PPR-3, to include (See Exhibit 7):

a. The establishment of a data bank to permit the rapid retrieval of specific maintenance task information (spare parts, engineering drawings, personnel requirements, etc.), detailed in Exhibit VII, to support maintenance which might be required at critical points in the launch sequence.

b. Professional guidance for the most effective utilization of EDP services and capabilities in support of the KSC Apollo/Saturn maintenance program.

7.8 DIRECTOR, QUALITY ASSURANCE AND SAFETY (QAS)

The Director, QAS, shall establish, implement, and monitor, in conjunction with the assistant directorates assigned a maintenance responsibility, a quality assurance program and a safety program in consonance with the requirements established in Section III, paragraph 3.3, of K-AM-02.

7.9 DIRECTOR, PLANS, PROGRAMS AND RESOURCES (PPR)

7.9.1 MANNED SPACECRAFT OFFICE (PPR-1) APOLLO/SATURN I/IB SYSTEMS OFFICE (PPR-4) APOLLO/SATURN V SYSTEMS OFFICE (PPR-5). Shall provide direction and control for that portion of the Apollo/Saturn Program at KSC for which they have program control responsibility, including:

a. The monitoring of implementing organizations' compliance with this Exhibit.

b. The establishment of feedback channels from implementing organizations to permit accumulation of task accomplishment data and problem area reporting.

c. The development and activation of a visibility display system to permit rapid assimilation of program status (see Exhibit 1).

7.9.2 PROGRAM CONTROL OFFICE (PPR-3). Shall coordinate the application of the KSC Apollo/Saturn Program maintenance concept and policy established by this Exhibit.

Shall develop the necessary procedures only as required to assure the uniformity of application of the KSC Apollo/Saturn maintenance policy and concept to systems assigned KSC organizations for maintenance as delineated by this Exhibit.

7.9.3 RELIABILITY AND QUALITY ASSURANCE OFFICE (PPR-6). Shall establish the reliability and quality assurance policies to assure established standards being sustained in the accomplishment of maintenance tasks assigned KSC organizations in support of the KSC Apollo/Saturn Program.

7.9.4 OPERATIONS SUPPORT OFFICE (PPR-7). Shall plan and develop KSC procedures and resources for support of Apollo/Saturn operations.

a. Shall perform liaison functions involving launch support operations with OMSF, other Centers and other Government agencies.

b. Shall function as Program Manager of operational support facilities with the exception of spacecraft and launch vehicle checkout and launch facilities.

c. Shall provide a single point-of-contact with ETR for KSC support of ETR requirements and the development of KSC/ETR relationships.

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SECTION VIII
POSTLAUNCH REFURBISHMENT

8.1 GENERAL

The postlaunch refurbishment of launch pad facilities and equipment is an essential part of overall Apollo/Saturn Program planning at KSC. Its accomplishment requires coordinated effort by the responsible organizations. This section delineates the responsibilities and the interfaces necessary to assure timely achievement.

8.2 OBJECTIVES

The objectives of postlaunch refurbishment planning are:

a. Insure minimum turn-around time following an Apollo/Saturn launch.

b. To establish case histories of repeated or interrelated problems.

c. To reduce operating costs by corrective action and to eliminate repetitive deficiencies which result in launch damage.

8.3 POSTLAUNCH FUNCTIONS

The postlaunch refurbishment of the launch area is a team function. Under no circumstances will the physical inspection begin until the area has been declared to be in a safe condition by representatives of QAS. They will assure that the following conditions have been satisfied:

a. All electrical systems have been returned to normal conditions and secured, except those required for testing.

b. All propellant systems are secured. Where hazardous gases exist, the lines shall be purged.

c. All pneumatic systems are secured. Where hazardous gases exist, the lines shall be purged.

d. Structural damage or additional hazards have been rectified.

8.3.1 ENGINEERING AND LOGISTIC SUPPORT. EDV support in these areas will include:

a. Drawings, specifications, and other engineering documentation.

b. Engineering consultant documentation packages for each item to be refurbished.

c. Initial spare parts provisioning.

d. The establishment of maximum/minimum stock levels in coordination with the users. (Inventories will be controlled and maintained by the users.)

8.3.2 INSPECTION AND REFURBISHMENT. This postlaunch activity shall be conducted by LVO/SCO with technical support from INS, SOP and EDV as required.

a. All damage noted will be documented and photographed.

b. Refurbishment which can be accomplished with the equipment in-place is the responsibility of LVO/SCO with required support by SOP.

c. Removal and reinstallation of equipment will be accomplished by LVO/SCO.

d. Refurbishment accomplished on equipment which has been removed is an EDV responsibility with shop support by SOP.

e. EDV is responsible for the accomplishment of acceptance testing of refurbished equipment prior to reinstallation.

f. Operational testing and checkout of refurbished equipment, subsequent to its reinstallation, is the responsibility of LVO/SCO.

8.4 DETAILED POSTLAUNCH INSTRUCTIONS

The detailed instructions and specific procedures to be followed in the accomplishment of postlaunch refurbishment are contained in K-IB-026, Postlaunch Inspection for Saturn I/IB, and K-V-056, Postlaunch Inspection for Saturn V.

SECTION IX
RECORDS AND REPORTS

9.1 MAINTENANCE FORMS MANAGEMENT

The successful administration of a maintenance management system requires source documents to substantiate procedural, quantitative, or qualitative changes which might be required to provide the maintenance support to meet operational launch schedules for the Apollo/Saturn Program. As a very minimum, the documents in the following paragraphs shall be maintained and/or implemented by personnel performing operations and maintenance tasks and the information made available to management as required by existing directives.

9.2 MAINTENANCE RECORDS

Maintenance records are a means of assuring continuity and uniformity of maintenance actions and as source documents to provide historical information for use in the development of present and future equipment. Among such records are:

9.2.1 WORK ORDERS. When maintenance support is required from second level shops or other organizations not normally working with the equipment requiring maintenance, a work order or comparable instrument will be initiated to obtain the necessary support. The work order will reflect the requirement for maintenance and the actions performed to accomplish the maintenance. Other pertinent information such as, date, time, organizations involved, location, and persons dispatched will be included.

9.2.2 MAINTENANCE LOGS. There are two types of maintenance logs which will be maintained on Apollo/Saturn equipment. Equipment maintenance logs will be maintained on each end item of equipment and a master log will be maintained on each total system as it is assembled and checked out. All requirements for maintenance will be entered in the applicable log at the time the requirements are discovered. The entries remain open until the actions are complete and the necessary quality control acceptance noted. The logs in this manner will provide a continual status of in process and completed maintenance actions.

9.2.3 EQUIPMENT AND PERSONNEL DISPATCH RECORDS. Each organization supporting maintenance efforts in areas other than its own, will maintain records of the equipment and personnel dispatched for maintenance purposes. The records will reflect such information as date, names of the persons, noun description and serial number of equipment, destination, time dispatched, and time returned. These records will be maintained for workload control and audit purposes.

9.2.4 SCHEDULED MAINTENANCE RECORDS. Records to reflect the requirements for, and the completion of, scheduled maintenance are required to assure that necessary actions are performed as scheduled. Periodic servicing and replacement of time and cycle sensitive components are examples of the maintenance actions which would be recorded.

9.3 MAINTENANCE REPORTS

Accurate and timely maintenance reporting is required for proper maintenance management and control. Maintenance reports will be required by the design cognizant center for the purpose of equipment improvement. The requirements for these reports and their content will be coordinated with the responsible Center through PPR 1, 4 or 5 and provided as required.

9.4 UNSATISFACTORY CONDITION REPORT (UCR)

The UCR (NASA-KSC Form 14-14) (Figure 9-1) will be used to report and record each unsatisfactory condition discovered in equipment/systems supporting the Apollo/Saturn Program in accordance with procedures outlined in KSC-TSOP-2. It provides a source for the following:

a. Documented history of failures by nomenclature, part number, functional system, etc.

b. Identification of potential problem areas by computerized readouts of repeated failures.

c. Source document to support requests for failure analysis.

d. Source document to support proposed quantitative changes to spare parts lists.

e. Source document to account for magnitude of effort by showing minimum hours required to correct unsatisfactory condition.

f. Source document to allow tracing of corrective action being taken to eliminate the unsatisfactory condition.

g. Recorded UCR information can be utilized to correct and eliminate similar conditions in related equipment.

h. UCR processing will be in accordance with procedures outlined in KSC-TSOP-2, Rev. March 10, 1964.

9.5 FAILURE ANALYSIS REPORTS

A failure analysis will be conducted on each malfunctioning component or on a selected sampling basis as directed by the Center furnishing the equipment. Failure analysis reports will be prepared to document the results of each failure analysis. Such reports will include, but not be limited to, description of the failed component, environmental and usage conditions at time of failure discovery, failure mode, cause of failure, peculiar circumstances which may have contributed to failure, and any recommendations for design change.

UNSATISFACTORY CONDITION REPORT

1. REPORT NO.	2. REF. REPORT NO.	3. DATE OF OCCUR. (MO.-DAY-YR.)	4. PREPARED BY	5. ORGANIZATION	6. FAILURE DISCOVERED DURING	FOD	7. M/I

8. ITEM NAME	9. ITEM PART NO.	REV	10. ITEM S/N	11. REF. DESIG./FIND. NO.	12. ITEM MFG'R.	13. MFG'R.
14. NEXT ASSY. NAME	15. NEXT ASSY. PART NO.	REV	16. NEXT ASSY. S/N	17. NEXT ASSY. REF. DESIG./ FIND. NO.	18. NEXT ASSY. MFG'R.	19. MFG'R.
20. REPLACEMENT NAME	21. REPLACEMENT P/N	REV	22. REPL. S/N	23. REPL. REF. DESIG./ FIND. NO.	24. REPLACEMENT MFG'R.	25. MFG'R.

26. PROGRAM
1. ☐ SATURN I
2. ☐ SATURN IB
3. ☐ SATURN V
4. ☐ TEST VEHICLE
5. ☐ OTHER ______

27. STAGE, GSE, S/C
1. ☐ SI
2. ☐ SIB
3. ☐ SIC
4. ☐ SII
5. ☐ SIV
6. ☐ SIVB
7. ☐ IU
8. ☐ GSE
9. ☐ PAYLOAD
10. ☐ SPARES
11. ☐ OTHER ______

28. VEHICLE NUMBER

29. COMPLEX NUMBER

OTHER

30. FUNCTIONAL SYSTEM

31. FAILURE ANALYSIS REQUESTED
1. ☐ YES 2. ☐ NO

32. SYSTEM

33. REL. USE ONLY

34. OPER. TIME, AGE OR CYCLES	35. PROCEDURE NO.	36. MEASUREMENT NO.	37. NUMBER OF DEFECTS	38. CRITICALITY CODE 1. ☐ MAJOR 2. ☐ MINOR	39. DEFECT CODE

40. REASON FOR REPORT
1. ☐ QUALITY PROBLEM
2. ☐ DESIGN PROBLEM
3. ☐ OPERATIONAL PROBLEM
4. ☐ PROGRAMMED REPLACEMENT
5. ☐ FAILED ITEM

41. REPAIR ACTION
1. ☐ REPAIRED IN PLACE
2. ☐ REPAIRED-REINSTALLED
3. ☐ ADJUSTED
4. ☐ ELIMINATED
5. ☐ USE AS IS
6. ☐ MODIFIED
7. ☐ REWORKED TO CONFIGURATION
8. ☐ REPLACED
9. ☐ CLEANED
10. ☐ NONE
11. ☐ OTHER ______

42. RECOMMENDATIONS
1. ☐ INVESTIGATE
2. ☐ REVISE DRAWING
3. ☐ REVISE PROCEDURE
4. ☐ MODIFICATION
5. ☐ ADHERE TO SPEC.
6. ☐ NONE
7. ☐ OTHER ______

43. DISPOSITION
1. ☐ HOLD FOR REPAIR
2. ☐ RETURN TO ______
3. ☐ RETURN TO VENDOR
4. ☐ RETURN TO REPAIR AREA
5. ☐ SCRAPPED
6. ☐ NONE
7. ☐ OTHER ______

44. REPAIR TIME	HOURS	MIN.
TIME TO LOCATE		
TIME TO REPAIR		
TOTAL DOWN TIME		

45. RESPONSIBLE NASA DESIGN ORG.	46. PHOTO NUMBERS	47. APPROVED BY	48. DATE (MO.-DAY-YR.)

49. DESCRIPTION OF CONDITION:

PROBABLE CAUSE:

REMARKS:

50. RC	51. QTY.	52. PARTS DEFECTIVE/REMOVED				53. PARTS INSTALLED			54. IDENTIFICATION	
		1. PART NAME	2. PART NUMBER	3. SERIAL NO.	4. MFG'R.	1. PART NUMBER	2. SERIAL NO.	3. MFG'R.	1. REFERENCE DESIG. FINDING NO.	2. MAJOR ITEM CODE

KSC FORM 14-14 (REV 8/64)

Figure 9-1. Unsatisfactory Condition Report (Sheet 1 of 2)

INVESTIGATION AND CORRECTIVE ACTION

55. DATE (MO.-DAY-YR.)	56. ORGANIZATION	57. LOCATION	58. NAME AND TITLE

59. A. INFORMATION SUPPLEMENTAL TO UCR B. INVESTIGATION AND FOLLOW-UP C. CORRECTIVE ACTION D. REMARKS

60. PREPARED BY	61. DATE (MO.-DAY-YR.)	62. APPROVED BY	63. DATE (MO.-DAY-YR.)	64. SUSPENSE DATE (MO.-DAY-YR.)

Figure 9-1. Unsatisfactory Condition Report (Sheet 2 of 2)

9.6 MAINTENANCE FAILURE SUMMARIES

Maintenance failure summaries will be periodically prepared by the agency performing the failure analyses. Such summaries will provide feedback information to permit updating of requirements for procurement and scheduling of the necessary logistics resources.

These summaries will include the major types of failure encountered, comment on causes of failure, identification of potential major problem areas, summary of design change recommendations, significant impact on program schedules, and a separate list of failures affecting high cost or long lead-time items.

9.7 REPORT STATUS SUMMARY

Summary reports will be prepared monthly to provide management visibility of the maintenance program. These reports will present a condensed version of the information contained in the maintenance failure summaries. Specific emphasis will be given to maintenance problems having significant impact on program costs and schedules as well as those failures necessitating major equipment design changes. Sufficient information will be provided in these periodic reports to permit management to effectively support the program.

ADDENDUM A

SPARE PARTS PROVISIONING PROCEDURES

EXHIBIT 2
ADDENDUM A
SPARE PARTS PROVISIONING PROCEDURES

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EXHIBIT 2
ADDENDUM A
SPARE PARTS PROVISIONING PROCEDURES

SECTION I
INTRODUCTION

1.1 GENERAL

This procedure, Addendum "A" to Exhibit 2, is derived from and supports the KSC Apollo/Saturn Maintenance Plan. It establishes detailed requirements, responsibilities, formats for developing spare parts data, and the utilization of such data in selecting spare parts.

1.2 APPLICABILITY AND SCOPE

This procedure applies to those end items delineated in any basic contract to which this exhibit is appended or to which it is later made contractually applicable. Negotiations may result in contract specifications which limit applicability to certain parts of this procedure. The requirements described in this procedure pertain to the postmanufacturing support of Apollo/Saturn KSC ground support equipment and KSC facilities. These shall include the provisioning of spare parts in support of assembly, checkout, test, refurbishment, maintenance, transportation, and operation of KSC-procured equipment and facilities.

1.3 OBJECTIVES

The objectives of this procedure are to assure that KSC Apollo/Saturn scheduled commitments are met in that adequate spare parts are procured and identified as to where, when, and in the quantity needed, and to prevent the procurement of unnecessary and excessive quantities of spare parts.

1.4 POLICY

This procedure shall be incorporated as a contractual requirement in all equipment and facility contracts negotiated by KSC after the effective date of this document. The requirements of this procedure shall be incorporated into existing contracts as follows:

a. In its entirety if this can be accomplished at no additional cost to the Government.

b. In its entirety if the data elements enumerated herein are covered in the present contract(s) and change in scope is limited to manual or EDP reprogramming costs.

c. To the degree necessary to insure uniformity of input and output data elements actually covered in present contract(s) and change in scope is limited to manual or EDP reprogramming costs and the intent of this addendum is accomplished.

Where the foregoing provisions cannot be accomplished within the provisions of current contract(s) without substantial changes in scope and attendant costs, the contract(s) shall be reviewed by the appropriate design organization and the Assistant Director for Administration (ADM) to determine changes and costs involved to accomplish the required task. The results of this review, together with appropriate recommendations, shall be forwarded to the appropriate Apollo/Saturn Systems Office (PPR-1, 4 or 5) by ADM for determination of action to be taken. The Program Control Office (PPR-3) shall be advised of the action taken by PPR-1, 4 or 5.

The design organization is responsible for processing these actions through the contracting officer, after coordination with the user and applicable PPR office.

1.5 PROVISIONING FUNCTIONS

The provisioning functions to be performed are as follows:

a. The selection of spare parts based on the maintenance requirements analysis to include spares quantities, allocations, and usage factor (programming, scheduling, etc.).

b. Spare parts documentation, funding, release, acquisition, distribution, and order control.

c. Spare parts preservation, packaging, packing, and marking.

d. Spare parts inspection and shipping.

e. Spare parts configuration control.

f. Preparation of spare parts provisioning records and reports.

g. Provisioning management.

1.6 RESPONSIBILITIES

In addition to those broad responsibilities delineated in (K-AM-02), and Exhibit 2, the specific responsibilities established by Addendum A are shown in Figure 1-1 Spare Parts Provisioning Responsibilities.

	PPR-3	PPR-1, 4 OR 5	DCD *	SOP	ADM	CONTRACTORS
PROVISIONING GUIDANCE MEETINGS						
CONVENES AND CHAIRS		1				
PROVIDES REPRESENTATION	X	1	X	X	X	X
CONTRACTS						
REVIEWS AND ANALYZES	X	1			X	
MAINTAINS VISIBILITY OF SPARE PARTS STATUS	X	1	1	2	X	1
PROVISIONING AND CONTROL PROCEDURES (WRITTEN)						
PREPARES						X
REVIEWS AND ANALYZES	X	1	1			
APPROVES		1			X	
PROVISIONING ACTIONS						
ESTABLISHES REQUIREMENTS, PERFORMS AND RELEASES						1
CONSOLIDATES			1			
APPROVES		1			X	
FUNDS						
PLANS AND ESTABLISHES REQUIREMENTS	X				X	1
REVIEWS (MONITORS)	X	1	1		X	1
DIRECT ADJUSTMENT RELEASE		1			X	
INTERIM RELEASE						
PERFORMS						1
REVIEWS	X	1	1		X	
STANDARD PARTS						
ESTABLISHES REQUIREMENTS						1
REVIEWS	X	1	1			
RELEASES		1		1		
PROCURES					X	
FSN SCREENING				X		
CONTRACTOR REPORTS						1
RECEIVES AND REVIEWS	X	1				
PROVIDES MANAGEMENT ASSISTANCE	X	1				
REVIEWS PPR-1, 4 AND 5 DECISIONS, ACTIONS, ETC.	X					

1 FOR APPLICABLE PROGRAM OR EQUIPMENT
2 KSC PROCURED AND STANDARD PARTS ONLY

*DCD-DESIGN COGNIZANT DIRECTORATE

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Figure 1-1. Spare Parts Provisioning Responsibilities

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SECTION II
PROVISIONING REQUIREMENTS

2.1 PRE-PROVISIONING ACTIONS

2.1.1 PPR GUIDANCE. A provisioning guidance meeting will be convened by the appropriate Apollo/Saturn System Office (PPR-1, 4 or 5) not more than 30 days after contract "go-ahead". "Follow-on" guidance meetings may be called by PPR-1, 4 or 5, whenever appropriate. The appropriate PPR office will chair the meeting and representation will be as follows: contractor, design organization, operational organization, SOP, SCO, ADM and INS.

The purpose of the meeting will be to:

a. Establish a milestone schedule for all provisioning actions.

b. Establish an overall delivery schedule compatible with the spare parts need date.

c. Determine the need for interim release based on the contractor's delivery forecasts and lead times. Approval for interim release will be granted if justified.

d. Provide the contractor with direction and interpretation on all questions pertaining to this procedure.

e. Establish the elements of information that will be required on all documents and reports to be provided.

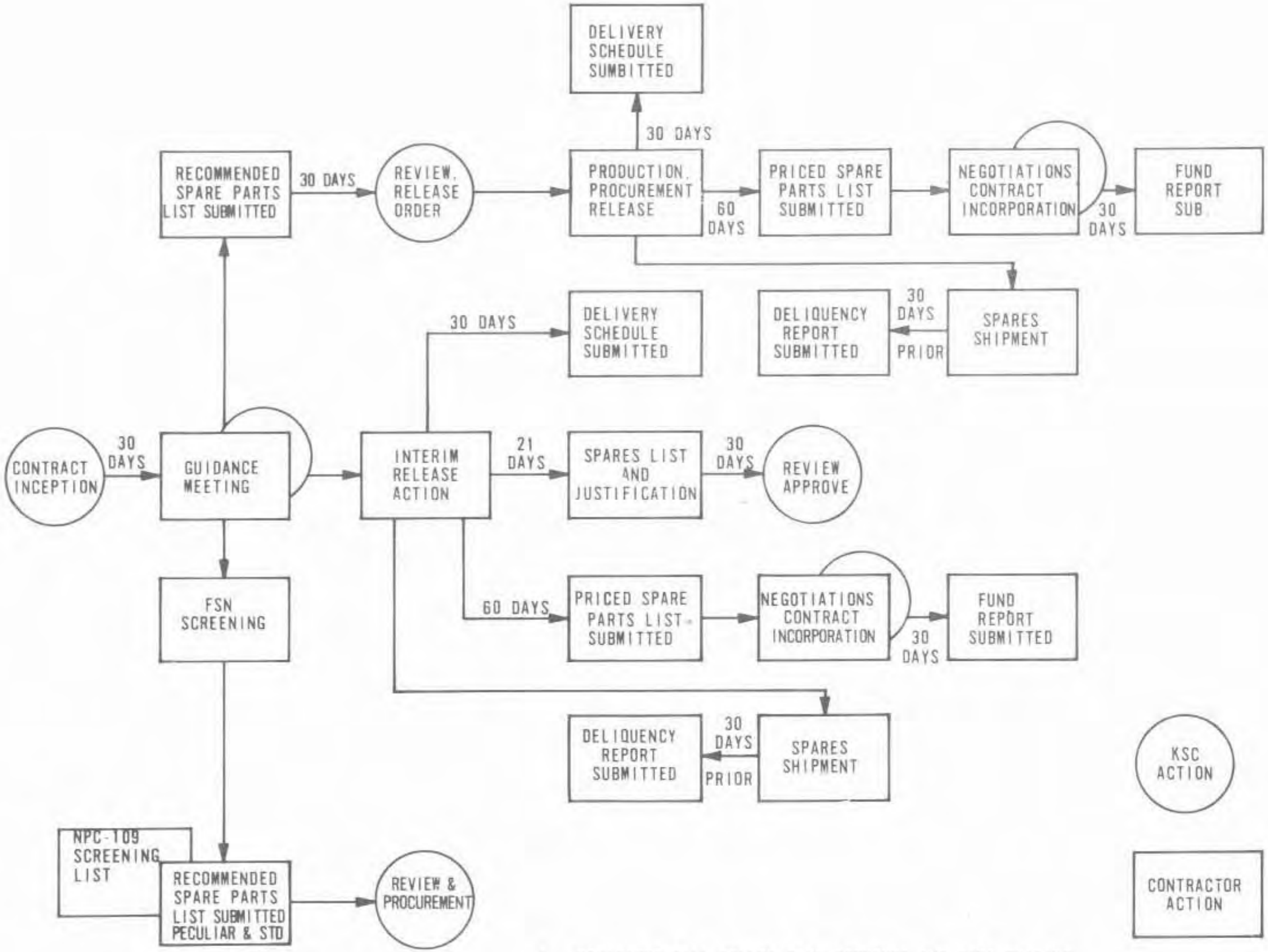
f. Review funding and release forecasts.

g. Provide the contractor with the program stockage objectives that will be required for quantification.

2.1.2 PROVISIONING PROCEDURES. The contractors shall make available to PPR-3 and the appropriate Systems Office (PPR-1, 4 or 5) through the design organization written procedures of their proposed plans for conducting provisioning actions and applying controls. These procedures will be requested of the contractors by ADM upon advice of PPR-1, 3, 4 or 5. The written procedures may be originated specifically for Apollo/Saturn GSE and facility provisioning or they may be existing procedures or excerpts of procedures that satisfy Apollo/Saturn GSE and facility requirements. These procedures shall be available no later than 30 days following the guidance meeting.

2.2 PROVISIONING ACTIONS

2.2.1 SPARES SELECTION. Spare parts shall be selected by each KSC GSE and facility contractor (Figure 2-1). Selection should be the result of a joint effort of the contractor's maintenance requirements analysis and spares provisioning engineering organizations. Selection of spare parts shall be



1. REVISIONS WILL FOLLOW SAME SEQUENCE AND TIME PHASING
2. PROBLEM REPORTS SHALL BE SUBMITTED ON AN 'AS REQUIRED BASIS'

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Figure 2-1. Flow of Major Provisioning Actions in accord with the results of the maintenance requirements analysis and trade-offs in which sound provisioning engineering principles are applied. Technical Data such as drawings, sketches, or technical descriptions, sufficient to identify the part, shall be provided with the Recommended Spare Parts List for peculiar parts.

2.2.2 QUANTIFICATION OF SPARE PARTS. Each KSC GSE and facility contractor shall accomplish quantification of recommended spare parts. Quantities recommended shall be documented on the Recommended Spare Parts (Provisioning) Lists. The lists shall reflect the minimum quantity of spare parts required to provide proper support to meet mission requirements at prescribed confidence levels. To make the necessary determinations, experienced provisioning engineers must carefully consider total program parameters provided at the guidance meeting and by the results of Systems Analysis (Operations Analysis and Maintenance Requirements Analysis) and the following factors:

a. Design stability and configuration change probabilities.

b. Part and end item population studies correlated with such parameters as frequency of launch or test operations.

c. Number of locations which may require simultaneous support considering both range and depth.

d. Duration of support periods by location.

e. Wearout, failure rate, and malfunction forecasts.

f. Replenishment cycle lead time.

g. Intra-site handling, repair cycle time, and attrition.

h. Pipeline quantity requirements.

2.2.3 PROVISIONING OF CONTROLLED ITEMS. The contractor shall establish as a part of his provisioning procedure (paragraph 2.1.2) a program to control and manage those items that fall within the following guidelines:

a. A unit cost of $200.00 or more.

b. A reorder lead time that will meet required support schedule and is essential for completion of the mission.

c. High probability of design change.

d. High cost but low probability of need will be covered by an emergency contractor plant supply capability.

e. Controlled and time phased procurement will be utilized to effect minimum dollar investment but insure program support in the required time frames.

2.3 PROCUREMENT OR PRODUCTION

Following receipt of the Spare Parts Order Release (authorizes contractor to procure) from ADM, through the design organization, the contractor shall proceed to release for fabrication or procurement all approved items and quantities of spare parts as shown except as specified in paragraph 2.3.2. The release shall be made in sufficient time to assure that the Apollo/Saturn scheduled activities are not jeopardized by a lack of spare parts. (Figure 2-2.)

2.3.1 INTERIM RELEASE. When interim release has been authorized at the guidance meeting, the contractor shall proceed, within funding limitations, to interim release those items and quantities of spare parts required for support in advance of completing these normal spares provisioning processes. However, the contractor shall, within 21 working days after initiating the interim release action, submit the following data through procurement channels to PPR-1, 4 or 5 as appropriate.

a. A documented analysis justifying the interim release action that will reflect an evaluation of lead time versus on-dock need date.

b. A spare parts (provisioning) list prepared in accordance with paragraph 5.2 of this Exhibit.

c. Technical data describing those spares which are interim released.

2.3.2 FUNDS RESTRICTIONS. The funds allocated for spare parts as evidenced in the respective contracts shall not be exceeded. If at any time the total price of spare parts selected for release exceed the dollar amount allocated, the contractor shall immediately advise PPR-1, 4 or 5, as appropriate, and the design organization, through contracting channels, of the amount of such excess, the circumstances, and the program impact. Within 10 days after receipt of such notification, PPR-1, 4 or 5 shall reply to the contractor, through ADM and the design organization, directing the extent of the release action to be subsequently transacted.

2.3.3 STANDARD PARTS. SOP is responsible for initiating procurement action on all standard parts, including provisioning and replenishment. The contractor shall not release standard parts for procurement unless so directed by PPR-1, 4 or 5. This direction will not be issued prior to coordination with SOP by PPR-1, 4 or 5, who shall also assure availability of necessary funds for initial provisioning.

2.3.4 GOVERNMENT FURNISHED EQUIPMENT (GFE) REQUIREMENTS. When GFE is required by the contractor for installation in spare parts, the contractor shall notify ADM and PPR-1, 4 or 5, as appropriate, through the design organization, immedi-

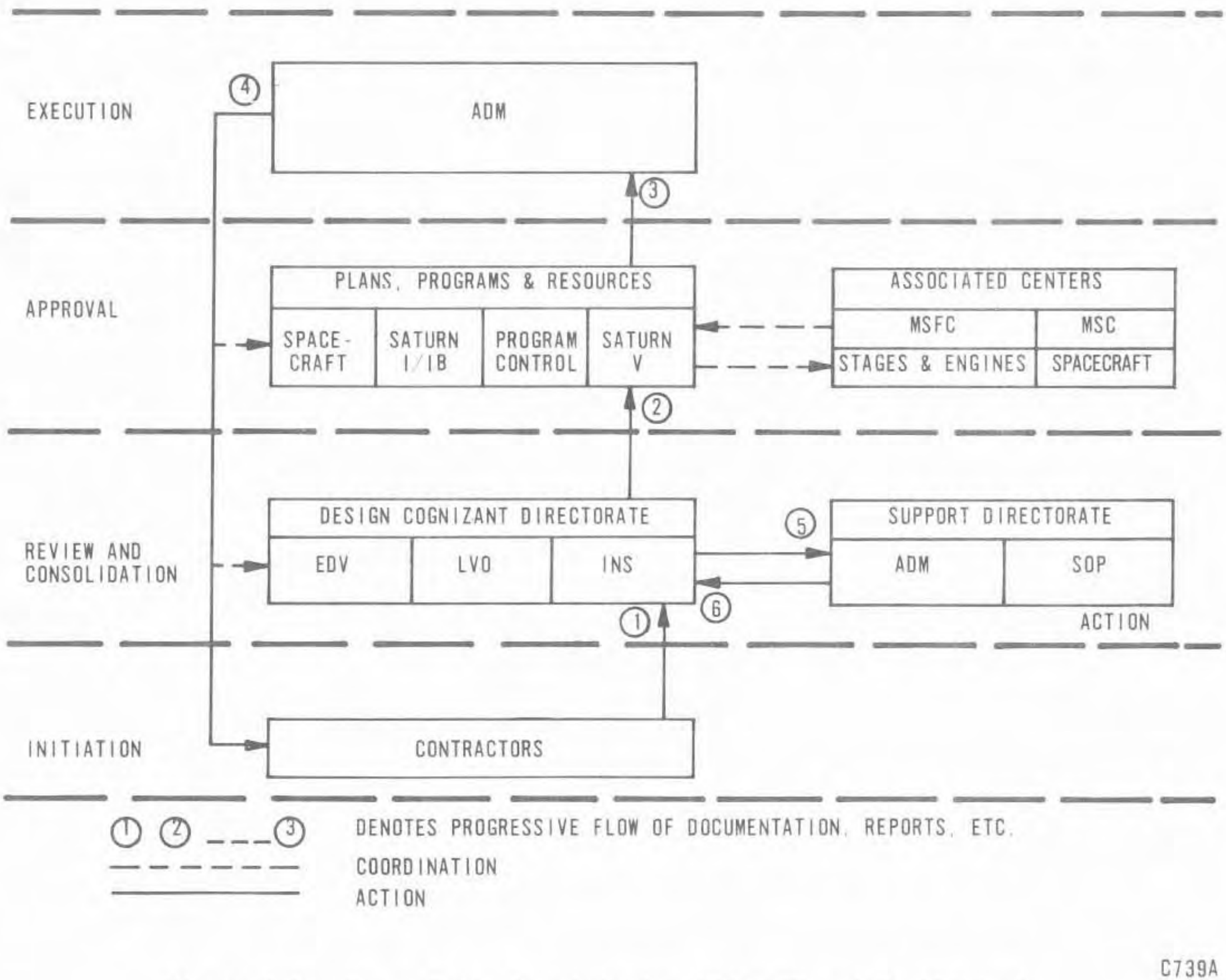

Figure 2-2. Spare Parts Provisioning (KSC GSE and Facilities)

ately upon the release of those spares of the items and quantities of GFE required. The notification shall include the shipping and marking instructions to be used on the shipment, the manufacturing schedule listing, the on-dock due date at the contractor's plant, and the remarks showing which part may or may not be logically shipped short of GFE components. If required GFE components are not to be furnished for installation in spare parts, the contracting officer will authorize the contractor to ship spare parts without GFE items. This authorization is to be given at least 30 days prior to the contractors on-dock date as listed in the GFE requirements notification.

2.3.5 GOVERNMENT FURNISHED EQUIPMENT END ITEM SPARE PARTS. GFE may be selected and quantified by the contractor as an end item spare part for accomplishing the contractual requirements for provisioning. When such GFE spare parts and quantities are identified, the contractor shall immediately notify ADM and PPR-1, 4 or 5, as appropriate, through the design organization of the items, item quantities, on-dock due date schedules, shipping, and the marking instructions to be used on the shipments.

2.3.6 REVISIONS TO SPARE PARTS ORDERS. When a design change occurs which affects spare parts on order the contractor will revise the spares order to deliver the items in the proper ratio. In revising the order the contractor will take into account the interchangeability of the superceded and superceding parts. The action taken will be reflected in a subsequent Spare Parts Change List submitted to PPR-1, 4 or 5 through ADM and the appropriate design cognizant directorate.

2.3.7 PRESERVATION, PACKAGING AND MARKING. Spares will be cleaned, preserved, packaged, and marked in accordance with NPC-500-1 and/or as specified by contract.

2.4 DOCUMENTATION

Types of documents and time flow requirements are shown in Table 2-1.

2.4.1 RECOMMENDED SPARE PARTS LIST SUBMITTAL. Recommended Spare Parts Lists which document all spare parts shall be submitted to PPR-1, 4 or 5, as appropriate, through ADM and the design organization, by the contractor concurrently (if possible) with the submittal of the Maintenance Requirements Analysis Summary. Spare Parts Interim Release shall be documented not later than 21 days following the interim release. The spare parts list may be tabulated by EAM/EDPE systems utilizing the data elements and format specified in Section V.

2.4.2 REVISIONS. The contractor shall submit to PPR-1, 4 or 5, as appropriate, through ADM and the design organization, at intervals not be exceed 30 days, those revision pages required to sustain, and update, the Spare Parts Lists. The revision pages shall incorporate design changes and reflect additions, deletions, and changes to the spare parts previously listed.

Table 2-1. Spare Parts Provisioning Documentation

DOCUMENTATION	PREPARED BY	DUE (FREQUENCY)	SUBMITTED	
			THRU	TO
1. Recommended Spare Parts List	Contractor	Within 30 days after critical dsgn. review	ADM/DCD	PPR-1, 4 or 5
2. Screening List per NPC-109	Contractor	Concurrently with 1	ADM/DCD	PPR-1, 4 or 5/ SOP
3. Approval Notice	PPR-1, 4 or 5	Within 20 days after receipt of 1. above		ADM
4. Spare Parts Order Release	ADM	Within 10 days after receipt of 3. above		Contractor
5. Priced Spare Parts List	Contractor	60 days after first spare part procurement/production, 60 days increments thereafter.	ADM/DCD	PPR-1, 4 or 5
6. Numerical Index	Contractor	Concurrently with 5. above	ADM/DCD	PPR-1, 4 or 5
7. Cancellation Addendum	Contractor	As required (concurrently with 5. above).	Procurement channels	PPR-1, 4 or 5
8. Release (Interim)	Contractor	Within 21 days after procurement/production action.	ADM/DCD	PPR-1, 4 or 5
9. Revisions (Change List)	Contractor	30 day intervals.	ADM/DCD	PPR-1, 4 or 5
10. Summary Sheet	Contractor	With each incremental or revision list.	ADM/DCD	PPR-1, 4 or 5

2.4.3 SPARE PARTS CATEGORIES. Spare Parts (Provisioning) Lists for each end article shall be segregated into the following categories:

a. Standard Part - Any part or item which is adequately defined by a recognized government or industry standard drawing and/or specification, and is normally available from commercial, GSA, and/or DSA sources. Examples of standard parts and items are: nuts, bolts, washers, screws, pins, keys, grommets, rivets, O-rings, clips, fasteners, clamps, fittings, standard electrical and electronic components, etc.

b. Peculiar Part - Any part which must be produced to order in accordance with a particular drawing and/or specification (other than government or industry standard). Any part requiring flight certification or traceability shall be classified peculiar. Also, standard parts that must be selectively accepted, to criteria different from the normal standard part requirements, shall be considered peculiar.

2.4.4 APPROVAL OF RECOMMENDED SPARE PARTS (PROVISIONING) LISTS. PPR-1, 4 or 5, will provide ADM with an approval notification within 20 days after receipt of the Recommended Spare Part (Provisioning) List. ADM will provide the contractor with a Spare Parts Order Release within 10 days after receipt of the Approval Notice from the PPR office. This Spare Parts Order Release will set forth the items and quantities which are approved for contractor release. If any items or quantities are not approved, the appropriate PPR office will convene a provisioning review meeting to resolve the discrepancies.

2.4.5 SCREENING FOR FEDERAL STOCK NUMBERS. In order to achieve cost-effective provisioning in the area of standard items (paragraph 2.4.3) a thorough screening for Federal Stock Numbers will be accomplished as follows:

a. The contractor will research all of his resources for available FSN's and reflect the available FSN's on the Recommended Spare Parts List for standard items.

b. Concurrently with the submittal of the Recommended Spare Parts List, the contractor will prepare and submit a screening list, in accordance with NPC-109, for all items lacking stock numbers.

c. It will be the responsibility of SOP to screen all items against the KSC catalogs for availability and update.

d. SOP will screen all non-stock numbered items through DSA/DLSC in accordance with NPC-109.

SECTION III
REPORTS

3.1 GENERAL

The four reports required are the Problem Report, Delivery Schedule, Delinquency Report, and Fund Status Report. Table 3-1 and the following paragraphs describe these reports in further detail.

3.2 PROBLEM REPORTING

The principle of management by exception shall be used to permit contractors to report to PPR-1, 4 or 5, as appropriate, through ADM and the design organization, those exceptional problems and anticipated problems that require the assistance and authority of PPR-1, 4 or 5, to solve.

3.2.1 CRITERIA. A problem, to be reportable, must be of such a nature as to result in one of the following conditions if not corrected:

a. Slippage or potential slippage of scheduled activity.

b. High expenditure of funds, manpower, and material.

c. Unusual hazardous and/or unsafe conditions during any phase of the Apollo/Saturn Program.

3.2.2 PROBLEM REPORT. A Spare Parts Problem Report shall be submitted to PPR-1, 4 or 5, as appropriate, through ADM and the design organization, by the contractor immediately upon determination that a reportable problem situation exists. Subsequent "follow-up" reports shall be submitted whenever significant additional information becomes available. Negative monthly reports shall be submitted to report no change in status of current problems. The initial report of an exceptional problem shall contain the following data:

a. A control number assigned for identifying a particular problem.

b. A description of the problem.

c. A statement of the effect of the problem upon the launch schedule or test schedule.

d. An estimated "get well" date.

e. Recommended solution(s) to the problem.

f. Action(s) currently being taken.

g. Estimated cost of solving the problem (increased manpower, overtime, premium materials, etc.).

Table 3-1 Reports Required

DOCUMENTATION	PREPARED BY	DUE (FREQUENCY)	SUBMITTED THRU	SUBMITTED TO
1. Problem Report	Contractor	As needed.	*	**
2. Delivery Schedule	Contractor	30 days after release (interim or normal) & 30 day intervals afterward.	*	**
3. Delinquency Report	Contractor	30 days prior to first scheduled delivery date, 30 day period.	*	**
4. Fund Status Report	Contractor	30 days after contractual incorporation of Spare Parts Provisioning Exhibit & every 30 days thereafter.	*	**

* ADM/Design Organization

** PPR-1, 4 or 5 as appropriate

h. Action(s) that PPR-1, 4 or 5, ADM, and/or the design organization, can take to assist in solving the problem or prevent like problems from recurring.

3.3 DELIVERY SCHEDULE

3.3.1 SCHEDULE PREPARATION AND SUBMITTAL. Within 30 working days after the first release of spare parts in accordance with this procedure and at 30 day intervals thereafter, the contractor shall prepare and submit, to PPR-1, 4 or 5, through ADM and the design organization, a Delivery Schedule for all spare parts released during that period. Spare parts deliveries shall be scheduled so that the full range of spare parts support is available for use at the site 15 to 30 days prior to the site activation hardware use date. When this is impractical, because of spare parts lead time, those spare parts shall be scheduled for delivery concurrently with the operations phase end item use date. For example, spare parts for the first item GSE to be installed during a complex activation shall be scheduled to the site supply prior to activation checkout of that item. The same time span will be allowed for the last item of GSE to be installed. This will assure that initial spare parts cover both equipment activation and subsequent operations.

3.3.2 DELIVERY SCHEDULE CONTENT. The Delivery Schedule shall be prepared in alpha-numeric part number order and include the following data:

a. Contractor's name and contract number.

b. Date of submittal.

c. Part number.

d. Nomenclature.

e. Quantity to be delivered by destination and delivery date.

f. Item number.

3.4 DELINQUENCY REPORTS

3.4.1 REPORT PREPARATION AND SUBMITTAL. Beginning not later than 30 days prior to the first scheduled spare parts delivery date and continuing monthly until completion of all deliveries of spare parts under the contract, the contractor shall prepare and submit, to PPR-1, 4 or 5, ADM, and the design organization, a Spare Parts Delinquency Report. All spare parts deliveries not in consonance with the Delivery Schedule shall be itemized as delinquent items as of the effective date of the report.

3.4.2 DELINQUENCY REPORT CONTENT. The Delinquency Report shall be prepared in alpha-numerical part number order and include:

a. Contractor's name and contract number.

b. Date of report.

c. Delinquent part number and nomenclature.

d. Quantity on order.

e. Quantity delinquent.

f. Quantity delivered, if any.

g. Reason for delinquency.

h. Projected schedule recovery date.

i. Item number.

3.5 FUND STATUS REPORTS

3.5.1 REPORT PREPARATION AND SUBMITTAL. The contractor shall prepare and submit, through ADM and the design organization (EDV, INS, LVO, etc.), to the appropriate Apollo/Saturn Systems Office, PPR-1, 4 or 5, a Funds Status Report within 30 days after the contractual incorporation of this Exhibit and at 30-day intervals thereafter. This report shall be compiled for each contractual end item (CEI). (For the purpose of this procedure, an end item is any component of equipment or combination of components which requires spare parts support and is identified as a separate item in the contract.)

3.5.2 FUND STATUS REPORT CONTENT. The following data shall be contained in the report:

a. A summary of contractor allocated and obligated funds for spare parts.

b. The accrued cost and number of line items of spare parts which have been released to production through the effective date of the report.

c. The estimated cost and number of line items of spare parts expected to be released during the 6-month period following the effective date of the report.

d. The estimated cost and number of line items of spare parts (subdivided by fiscal year) expected to be released to complete the program(s) over and above those cited in a. through c.

SECTION IV
PRICED SPARE PARTS LISTS

4.1 GENERAL

The contractor shall prepare and submit a Priced Spare Parts List. This list shall be used exclusively for the purpose of negotiating prices for spare parts hardware.

4.2 SUBMITTAL

The Priced Spare Parts List shall be submitted through ADM in increments as spare parts releases are made. The first list shall be due 60 days after the first spare parts release and subsequent lists shall be submitted at 60-day intervals thereafter.

4.3 LIST NUMBERING

A list numbering system shall be developed by the contractor to identify the initial and each succeeding increment. This list number shall be used to associate the incremental list with its subsequent revisions.

4.4 NUMERICAL INDEX

A Numerical Index shall be prepared as a separate section to the Priced Spare Parts List. This index shall be a part-number-to-item-number cross reference and shall be tabulated in alpha-numerical part number order.

4.5 PRICED SPARE PARTS LIST PREPARATION

The Priced Spare Parts List shall be tabulated in item number order utilizing the format of Figure 5-2 and may list the same elements of data as listed on the spare parts (provisioning) list so long as the unit price and extended unit price reflects the firm cost rather than the estimated cost. In no instance, however, shall less than the following elements of data be listed.

a. Item number.

b. Part number and nomenclature.

c. Quantity procured (Block 23).

d. Unit price (firm).

e. Extended unit price (firm).

f. Manufacturer's code.

g. List number.

h. Date of list.

i. Alphabetic revision letter (subsequent to the initial list).

4.6 SUMMARY SHEET

A Summary Sheet shall be included with each incremental list of revision of the Priced Spare Parts List. The Summary Sheet shall compile the total cost of all spare parts listed on that particular list. A statement shall be included defining the percentage of total cost and proration in the unit price of each item for the preservation, packaging, packing, and marking requirements.

4.7 REVISIONS

As revisions to Priced Spare Parts Lists become necessary, they shall be submitted showing the old listings of the items being changed, the new listing, and a summary sheet showing the impact of that revision to that particular list.

4.8 CANCELLATION COSTS

Cancellation charges and claims for payment of partial payment for items of spare parts, which are cancelled, shall be set forth in a separate section of the revision to the Priced Spare Parts List as a Cancellation Addendum. Cancellations may occur as a result of engineering changes (design organization initiated), program changes, or PPR approval action. The cancellation charges claimed for each item and the total cancellation charges claimed for all items shall be identified.

4.9 INCORPORATION

The Priced Spare Parts List shall be contractually negotiated and incorporated as a contract exhibit by contract amendment. At the time of the negotiations, the contractor shall have sufficient cost breakdown data available to substantiate the prices and charges set forth in the list. If the Priced Spare Parts Lists are not acceptable as submitted, prices and charges will be settled as an equitable adjustment under the appropriate clause of the contract. Any failure of agreement shall then be deemed a dispute concerning a question of fact within the scope of the clause of the contract entitled "Disputes". However, any such disputes shall be limited to the items upon which the parties cannot agree and shall not delay establishing the remainder of the list as an exhibit by contract amendment.

SECTION V
SPARE PARTS (PROVISIONING) LISTS

5.1 ELEMENTS OF DATA

The elements of data to be incorporated in the various provisioning documents are illustrated in Figure 5-1. Format of the list is shown in Figure 5-2.

5.2 PREPARATION INSTRUCTIONS

Detailed instructions for specified data entry on the appropriate list(s) are as follows:

Block Number in Figure 5-1	Title	Instruction
1	Type of Spare Parts List	Insert the type of spare parts list being prepared, "Recommended Spare Parts List", "Spare Parts Change List", "Priced Spare Parts List", "Spare Parts Numerical Index", "Spare Parts Cancellation Addendum".
2	Spare Parts Category	Insert the appropriate spare parts category, "Peculiar Parts" or "Standard Parts".
3	Item Number	The maximum number of characters shall be six. Each item submitted by the contractor for determination of quantitative requirements or approval shall be assigned a six character alpha-numeric sequence number. An example is provided below. Sequence numbers shall be assigned by the contractor in alpha-numerical part number order. A sequence number once assigned to an item will not be reassigned to another item under the same contract. In the event it is necessary to resubmit an item, the contractor shall use the sequence number originally assigned to that item and make appropriate reference to the correspondence under which it was previously submitted. In the alpha-numeric system, the alphabetic characters "I" (eye) and "O" (oh) shall <u>not</u> be used. Of the six characters allowed, the first four shall be the basic sequence number. The fifth character

BLOCK NUMBER	ELEMENTS OF DATA	RECOMMENDED SPARE PARTS LIST	SPARE PARTS CHANGE LIST	SPARE PARTS NUMERCIAL INDEX	PRICED SPARE PARTS LIST	CANCELLATION ADDENDUM
1	TYPES OF SPARE PARTS LIST	X	X	X	X	X
2	SPARE PARTS CATEGORY	X	X	X	X	X
3	ITEM NUMBER				X	X
4	MANUFACTURERS PART NUMBER	X	X	X	X	X
5	NOMENCLATURE	X	X	X	X	X
6	NEXT HIGHER ASSEMBLY	1	X			
7	QUANTITY PER ASSEMBLY	1	X			
8	QUANTITY PER END ITEM (ARTICLE)	X	X	X	X	X
9	SPARES QUANTITY (TOTAL)	X	X	X	X	X
10	UNIT PRICE	2	2		3	3
11	EXTENDED UNIT PRICE	2	2		3	3
12	PERIODIC REPLACEMENT OVERHAUL TIME	1	1			
13	ALLOCATION	X	X		X	X
14	RSCM (FEDERAL MANUFACTURERS CODE)	X	X	X	X	X
15	CONTROL ITEM INDICATOR	X	X		X	X
16	REPLACEMENT PART INDICATOR	1	X	X	X	X
17	INTERIM RELEASE INDICATOR	1	X	X	X	X
18	DESIGN ORGANIZATION	X	X			
19	MAINTENANCE ORGANIZATION	X	X			
20	UNIT PACK (QUP)	X	X			
21	UNIT OF ISSUE	X	X			
22	LEAD TIME (WEEKS)	1	1		X	X
23	SHELF LIFE (QUARTERS)	1	1		X	X
24	MEAN TIME BETWEEN FAILURE FAILURE RATE	1	1		X	X
25	GOVERNMENT FURNISHED EQUIPMENT	1	X	X	X	X
26	MAINTENANCE CODE	X	X			
27	FEDERAL STOCK NUMBER	X	X	X	X	X
28	EFFECTIVITY	1	1		X	X
29	PRIME CONTRACTOR PART NUMBER	1	X	X	X	X
30	CRITICALITY CODE	X	X			
31	FIRM SCHEDULE	X	X		X	X
32	CONTRACT NUMBER	X	X	X	X	X
33	NOMENCLATURE	X	X	X	X	X
34	MODEL OR TYPE NUMBER	X	X	X	X	X
35	CONTRACTOR	X	X			
36	PROGRAM ELEMENT NUMBER	1	X	X	X	X
37	DATE OF LIST	X	X	X	X	X
38	REVISION	X	X	X	X	X
39	PAGE NUMBER	X	X	X	X	X

1. NOT ENTERED ON STANDARD PARTS LISTS
2. ESTIMATED PRICE
3. FIRM PRICE

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Figure 5-1. Data Elements for Spare Parts Lists

PROVISIONING LIST

(1) ____________ TYPE OF P/L

(2) ____________ SPARE PARTS CATEGORY

(3) ITEM NO	(4) MANUFACTURERS PART NUMBER						(5) NOMENCLATURE						(6) NEXT HIGHER ASSEMBLY	(7) QTY PER ASSY	(8) QTY PER ART	(9) SPARES QTY	(10) UNIT PRICE	(11) EXTENDED UNIT PRICE	(12) PERIOD REPLAC OVHL TIME	(13) ALLOCATION				
																				A	B	C	D	E
(14) FSCM	(15) CONTROL	(16) REPLACE PART	(17) INT REL	(18) DESIGN ORGAN	(19) MAIN ORGAN	(20) DUP	(21) U/I	(22) L/T	(23) SHELF LIFE	(24) MTBF OR FR	(25) GFE	(26) MAIN	(27) FEDERAL STOCK NUMBER	(28) EFFECTIVITY			(29) PRIME CONTRACTOR PART NUMBER		(30) CRITIC CODE	(31) FIRM SCHEDULE				

(32) CONTRACT NUMBER | (33) NOMENCLATURE | (34) MODEL TYPE

(35) CONTRACTOR | (36) P E N NUMBER | (37) DATE OF LIST | (38) REVISION | (39) PAGE

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Figure 5-2. Spare Parts (Provisioning) List

Block Number in Figure 5-1	Title	Instruction
3 (cont.)		position will be utilized in the event additional items must be inserted into the parts list, under the same basic item sequence number. Consecutive numbers shall be assigned in the fifth character position. The sixth character position shall be reserved for cases in which there are alternate part numbers (alternate added items) and price changes. The numerals one (1) through six (6) in the sixth character position shall be used to denote an alternate added item and the numerals seven (7) through nine (9) shall denote a price change. Example of Sequence Numbering: A00100 = first possible sequence number and sequence number of first item listed. A00300 = sequence number of third item listed. A00310 = added item under same basic sequence number. A00301 = alternate for third basic item. A00311 = alternate added item. A00312 = second alternate added item. A00317 = price change on item added under same basic sequence number. A99900 = last basic number in "A" series. B00100 = first basic number in "B" series. Z99900 = last basic alpha-numeric sequence. 000100 = first wholly numeric basic sequence number.
4	Manufacturers Part Number	The maximum number of characters shall be 18. The number entered shall be the part number used to procure, ship and store, and by which the physical part shall be identified.
5	Nomenclature	The maximum number of characters shall be 22. The item nomenclature assigned by the manufacturer shall be shown in this block. Only the noun name may be abbreviated as necessary. Abbreviations shall conform to the requirements of MIL-STD-12.

Block Number in Figure 5-1	Title	Instruction
6	Next Higher Assembly	The part number of the next higher assembly of the item listed shall be inserted. The maximum number of characters shall be 22.
7	Quantity per Assembly	Enter the number of times the item is used on its next higher assembly (four characters maximum).
8	Quantity per End Item (Article)	Enter the number of times the item is used on its end item (four characters maximum).
9	Spares Quantity (Total)	Enter the total quantity of spare parts recommended for procurement (six characters maximum).
10	Unit Price	Enter the supplier's best estimated unit price (seven characters maximum). On the "Price Spare Parts List" and "Cancellation Addendum" the entry will be the firm price.
11	Extended Unit Price	Enter the total estimated cost (Block (9) times Block (10)). Seven characters maximum. On the priced spare parts list and cancellation addendum the entry will be the firm price.
12	Periodic Replacement/ Overhaul Time	Enter the time in months to indicate the time the item may remain installed before needing replacement and/or overhaul as applicable. (If applicable, the number of operating cycles will be used in lieu of time.)
13	Allocation	The maximum number of characters shall be 15, subdivided into five columns of three characters each. The originator of the provisioning list (contractor, etc.) shall assign columns (three characters each) A through E as required, to each of the locations which are to receive the spare part and show the location in reference to the assigned letter on the cover sheet of the provisioning list. Enter the quantity of spare parts recommended for each site. The total quantity of Block (13) shall equal the total recommended in Block (9).

Block Number in Figure 5-1	Title	Instruction
14	Federal Manufacturers Code (FSCM)	Enter the code from Federal Cataloging Handbooks H4-1 and H4-2, to identify the manufacturer whose part number appears in Block (4). The name and address of a manufacturer not having a federal code assigned shall be noted in Block (27), immediately below the next higher assembly.
15	Control	Enter a code "C" for a controlled item and a code "N" for a noncontrolled item. A controlled item is one which has a normal reorder lead time that will not meet the required support schedule, and is essential to completion of the mission, or which has an unit cost of $200.00 or more (Hi-Cost per FOM).
16	Replacement Part Indicator	Enter an asterisk (*) if the item listed replaces (due to obsolescence, engineering change, design change, etc.) a previously listed item.
17	Interim Release Indicator	Enter the letter "Y" to indicate that the part has been released as a long lead item. Enter "N" if release action has not been taken. (Under normal situations an entry in Block (15) should require an entry here.)
18	Design Organization	Enter the mailing office symbol of the KSC organization with design cognizance of the item. MSF or MSC as applicable shall be entered. (Maximum three characters.)
19	Maintenance Organization	Enter the mailing office symbol of the KSC organization responsible for maintaining the item (ADM, DLO, EDV, INS, LVO, PPR, QAS, SCO, SOP). Maximum characters shall be three.
20	Unit Pack (QUP)	Enter the number of units per package if the item is issued in multiples of unit of issue, i.e., if the item in question is wire, the unit of issue being feet and if it were issued in 50 foot rolls, the unit pack would be 50.
21	Unit of Issue	Enter the unit of issue (lb., ft., ea., etc.). Maximum characters two.

Block Number in Figure 5-1	Title	Instruction
22	Lead Time (Weeks)	Enter the time, expressed in weeks, between placing an order for the item and receipt (or delivery) of the item. (Maximum characters two.) This entry is not required for standard items.
23	Shelf Life (Quarters)	Enter the expected shelf life in quarters, i.e., four quarters equal one year, three months equal one quarter. If the shelf life on the item is indefinite (i.e., unlimited under reasonable care), enter IND. (Maximum characters three.)
24	Mean Time Between Failure/ Failure Rate	Enter as applicable, <u>Mean Time Between Failure (MTBF)</u>: Enter, in hours, the average time the item shall be expected to operate prior to failure. This is not required for standard items. If predicted failure is predicated upon launch cycles, leave blank. <u>Failure Rate (PR)</u>: Enter the ratio indicating probable failure per launch cycle, i.e., .3333 would indicate a probable failure in three launch cycles, .1000 would indicate a probable failure in 10 launch cycles. If the probability exists whereby no failure is predicted, enter RAN for random.
25	GFE	Enter the word "Yes" if the item is furnished to the contractor by the Government. Leave blank otherwise. The entry of the word "Yes" denoting that the item is furnished by the Government necessitates the "requestor" (contractor) to immediately notify the directorate to whom he is addressing the provisioning list of the item(s), item(s) quantities, on-dock date schedules and the shipping and marking instructions to be used on the shipments.

Block Number in Figure 5-1	Title	Instruction
26	Repair Code (Maintenance)	Enter one of the following codes: N - for nonreparable. Item is not capable of being repaired or reissued after failure. 1 - for reparable at first level of maintenance. First level maintenance shall be defined as that accomplished directly on the system installed hardware. This includes system fault isolation, repair in place, remove and replace subsystems or components, replenish, inspect, etc. 2 - for reparable at second level of maintenance. Second level maintenance shall be defined as that maintenance required in direct support of first level maintenance. This is accomplished in shop adjacent to first level maintenance. 3 - for reparable at third level of maintenance. Third level maintenance shall be defined as that which will be accomplished at the logistics supply support area or returned to the supplier or factory. It generally involves particular technical skills, tools, or equipment that are not economically practical at the second level maintenance site.
27	Federal Stock Number	Enter the Federal Stock Number, if available. If not, leave blank. (Maximum characters 22.)
28	Effectivity	Enter the unit serial number of the end item(s) on which part is used (for example, Units 0001 through 0005). (Maximum characters 12.)
29	Contractor's Part Number	Enter prime contractor's specification, control, drawing, or catalogue number, if different from the part number shown in Block (4) (maximum characters 15).

Block Number in Figure 5-1	Title	Instruction
30	Criticality	Enter one of the following codings, as applicable, for each part: 1. Failure of which would result in vehicle loss and personnel hazard. 2. Failure of which would result in costly or lengthy delay and reduced personnel hazard. 3. Failure of which would result in short launch delay and no personnel hazard. 4. Failure of which would result in no significant effect on vehicle or mission.
31	Scheduled on Site	Enter "need on site" date in month and year (assume the day to be first day of month).
32	Contract Number	Enter as appropriate.
33 & 34	Nomenclature and Model or Type Number	a. When the list covers peculiar parts, enter the name and model, type or part number of the GSE end item being supported. b. When the list covers standard parts required during maintenance, the name, model, type or part number of the GSE end item being supported shall be entered.
35	Contractor	Enter the name of the contractor preparing this spare parts provisioning list.
36	Program Element Number	Enter the program element number down to and including the level necessary to describe the element under consideration. (Maximum characters shall be 26.)
37	Date of List	Enter the date the list was prepared.

Block Number in Figure 5-1	Title	Instruction
38	Revision	Enter the symbol or serial number of this revision. (Use 0 for original issue.)
39	Page Number	The pages shall be numbered consecutively.

ADDENDUM B

MAINTENANCE REQUIREMENTS
ANALYSIS PROCEDURE

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EXHIBIT 2
ADDENDUM B

MAINTENANCE REQUIREMENTS ANALYSIS PROCEDURES

FOREWORD

This Addendum is a preliminary draft of The Maintenance Requirements Analysis Procedures. It has not been subjected to formal coordination, prior to publication, and is not to be considered as being in final form.

Addendum "B" has been included in this issue of K-AM-02 to familiarize the recipient with the reasons for performing maintenance requirements analysis and the approach used in documenting the results in end item reports and site logistics requirements summaries.

Publication of a revised Addendum "B", in final form, is scheduled for September 1966.

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EXHIBIT 2
ADDENDUM B
MAINTENANCE REQUIREMENTS ANALYSIS PROCEDURES

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SECTION I
INTRODUCTION

1.1 PURPOSE

This document is Addendum "B" to Exhibit 2, KSC Apollo/Saturn Maintenance Requirements Plan, of K-AM-02, Apollo/Saturn Logistics Support Requirements Plan. Its purpose is to summarize the techniques and procedures used in accomplishing maintenance requirements analyses in accordance with the intent of Apollo Logistics Requirements Plan, NHB 7500.1, as adapted to the operational environment by the KSC Apollo/Saturn Logistics Support Requirements Plan, K-AM-02. The purpose of these analyses is to provide logistics products data for End Item Reports (EIR) and Site Logistics Requirements Summaries (SLRS).

1.2 SCOPE

This addendum presents details of analytic techniques and procedures from which End Item Reports (EIR) and Site Logistics Requirements Summaries (SLRS) are developed. Its scope encompasses the logistics functions and activities needed to support the Apollo/Saturn Program at KSC.

The techniques and procedures described here are presented as guidelines, within which responsible organizations may adapt their own methods, to suit their individual circumstances. The material applies to all KSC organizational elements and contractors at KSC having logistics management responsibilities in the KSC Apollo/Saturn Program.

1.3 BACKGROUND

The need for this addendum is derived from the Maintenance Requirements Analyses and Logistics Requirements Summaries tasks as defined in K-AM-02 and paraphrased in the following paragraphs:

1.3.1 MAINTENANCE REQUIREMENTS ANALYSIS. Maintenance requirements analyses determine the logistics products needed for preventive and corrective maintenance on each end item identified by the logistics baselines and the operations analysis tasks. It considers all contingencies which could cause deviation from the successful operational flow path, and identifies maintenance activities required to minimize the effects of such deviation. A maintenance requirements analysis is a function of engineering judgment based upon detailed activities analysis sheets, requirements analysis sheets, trade studies, and timed flow analysis sheets. The results of the maintenance requirements analysis are documented in end item reports, by implementing the techniques and procedures outlined in this addendum.

1.3.2 SITE LOGISTICS REQUIREMENTS SUMMARIES. KSC Apollo/Saturn logistics products are consolidated and summarized for each location in site logistics requirements summaries. These are prepared for functionally related groups of end items for the spacecraft, the Saturn IB system and the Saturn V system. The detailed approach to be considered is outlined in this Addendum.

1.4 RESPONSIBILITIES

KSC operational/design Directorates are responsible for determining logistics products and services requirements, for both operational and maintenance support on all end items for which they have design responsibility. This responsibility will be effected through the preparation of End Item Reports (EIR) and Site Logistics Requirement Summaries (SLRS).

KSC support directorates are responsible for summarizing, in SLRS's, the logistics products and services requirements for those maintenance and supply locations under their jurisdiction. These SLRS's will be based upon SLRS's received from the operational/design directorates.

KSC systems offices will prepare SLRS's for the logistics product requirements for support of the Apollo/Saturn mission; with the Saturn Systems Offices (Saturn IB/Saturn V) consolidating the requirements established by the Spacecraft Systems Office with those of the vehicle. These SLRS's will be based upon SLRS's received from the operational/design Directorates and the support Directorates. A more detailed breakdown of responsibilities is contained in Section IV of K-AM-02.

1.5 PRIORITIES

Each end item of equipment is evaluated to determine the priority for performing its maintenance analyses. The priorities established in paragraph 2.2.4 of K-AM-02 are used to determine the order in which the maintenance requirements analyses are performed. The priorities are repeated as follows, for convenience.

a. Priority I - Equipment or system, the failure of which would result in vehicle loss and/or a personnel hazard.

b. Priority II - Equipment or system, the failure of which would result in missing the planned launch window, failing to obtain mission data, and/or a lesser personnel hazard.

c. Priority III - Equipment or system, the failure of which would result in partial countdown recycling and no personnel hazard.

d. Priority IV - Equipment or system, the failure of which would have no significant effect on the vehicle or mission.

1.6 APPROACH

The design of each end item of AVE and OGE, defined from the logistics baseline and the operation analyses efforts respectively, is evaluated to determine the maintenance activities required to maintain operation or to restore operation in the event of a failure. Once these activities are established, the logistics products and services required to perform them are determined. In the case of end items consisting of few components, simple construction, easily discernible malfunctions and repair methods, obvious logistics products requirements, and upon which maintenance experience is available; an End Item Report (EIR) can be prepared as discussed in Section II without completiong a set of detailed maintenance requirements analyses sheets as described in Section III. When an end item consists of many components in a complex arrangement, with the possibility of a malfunction occurring which is difficult to isolate and repair, the complete set of maintenance requirements sheets is required in substantiation of the EIR. Section III also describes an intermediate approach for justification of logistics products requirements listed in an EIR on those end items which are not complex enough to require the detailed approach listed in Section III.

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SECTION II
END ITEM LOGISTICS REQUIREMENTS SUMMARIES

2.1 END ITEM LOGISTICS PRODUCT SUMMARY

End item reports (EIR) are prepared for all Contract End Items (CEI) summarizing the logistics products requirements identified by the Logistics Baseline and Operations Analysis with those requirements identified in the Maintenance Requirements Analysis as described in Section III. The EIR is prepared in two parts, Part I considers one each of the end items and Part II totals requirements for all end items installed, by location.

2.2 END ITEM REPORTS, PART I

The EIR, Part I, summarizes information including the functional, physical and use description of the end item in its intended operating environment and the logistics resources necessary to support a population of one end item during operational use, and for scheduled and unscheduled maintenance. As a minimum, each EIR, Part I, contains sections covering each of the items as defined in the following paragraphs.

2.2.1 EQUIPMENT IDENTIFICATION. Provides a functional, physical, and use description, by OGE event, or support function, for which logistics support is being recommended.

2.2.2 END ITEM MAINTENANCE CONCEPT. Provides a brief summary of the general concept applicable to this end item, which was used as a constraint during the development of the maintenance analysis.

2.2.3 MAINTENANCE AND REPAIR. Lists the scheduled and unscheduled maintenance activities, location and gross performance times for first, second, and third level maintenance and repair. If the item contains time or cycle sensitive components, these should be discussed.

2.2.4 SPARES REQUIREMENTS. Itemizes the logical spares as identified by maintenance analysis. This list includes part nomenclature, part number, next higher assembly number, quantity per end item, maintenance action rate, maintenance level, quantity required to support the one end item for a 12-month period (or as defined by contract), and the part supplier with his part number. Each part will be classified as critical, prime, or non-critical. The spare list format used is defined in Addendum "A" to Exhibit 2.

2.2.5 PERSONNEL REQUIREMENTS. Defines the personnel, in terms of skills and quantities, required to use the end item and to perform the maintenance outlined in 2.2.3, above, for a population of one.

2.2.6 MGE/FACILITIES. Summarizes the MGE and facilities needed to support the maintenance tasks outlined in 2.2.3 above. Reference the design criteria sheets and/or standard equipment requirement sheet, by number and date, which specify in detail the item of AGE or facility.

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2.2.7 OPERATIONS AND MAINTENANCE INSTRUCTIONS. Provides a brief summary of the instructions needed to support the operation and maintenance of the end item. Identifies by type, use location(s) and source data reference.

2.2.8 LIQUIDS AND GASES. Identifies by type and quantity, any liquids and/or gases required to maintain service or otherwise make the end item ready for operational use.

2.2.9 TRANSPORTATION. Identifies by type, quantity, and purpose any transportation required to support the maintenance or servicing of the end item.

2.2.10 TRAINING. Summarizes those characteristics of design, use, and maintenance which will require training for the operation and maintenance personnel.

2.2.11 SPECIAL LOGISTICS CONSIDERATIONS. Summarizes any special considerations which should be given to the use, or maintenance, of this end item. These include time critical components, special procedures, etc.

2.3 END ITEM REPORTS, PART II

The EIR, Part II, is prepared from data contained in Part I. Part II summary information reports the quantity of those logistics elements identified in Part I, which are required to support, by site, the quantity of this end item presently on contract. The period of such support will be for one launch cycle, one test cycle, 12 months, or as defined by contract. This summary may be incrementally developed. As a minimum, each EIR, Part II, contains sections covering each of the logistics products requirements as defined in the following paragraphs.

2.3.1 QUANTITY OF END ITEMS ON CONTRACT. Identifies the number of end items presently on contract, by site and location. Provides the contract number under which the end items are to be delivered. Provides the delivery schedule.

2.3.2 SPARES REQUIREMENTS. Quantifies the spares identified in Part I to that level considered necessary to support the number of end items on contract (paragraph 2.3.1 above) for a 12-month period or such other time period specified by contract. Segregates by shipping destination. Provides shipping dates. The above data may be provided by including a copy of the spares list presented to the customer, complete with list number, date, and other identifying information.

A separate list shall be provided which enumerates those spares identified in Part I, which have a maintenance action rate greater than the 12-month, or other time period used. These spares, because of their maintenance action rate, would normally not appear on the 12-month list. Specific recommendations will be made relative to the spares on this list. All of the data elements required by Part I (paragraph 2.2.4) will be provided for the lists just defined. A separate list of consumables will be included, providing the quantity required and the purpose it serves.

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2.3.3 PERSONNEL REQUIREMENTS. Quantifies the personnel, by skill, proficiency, and site required to use and maintain the number of end items needed to support one launch cycle, or test cycle, as appropriate. Specify whether the personnel are to operate (use) or maintain the end item or whether the same personnel may both use and maintain the end item. Discusses the relationship of these personnel to the AVE or OGE events the end item is to support and their relationship to the maintenance and repair actions defined in Part I (paragraph 2.2.3). Summarize the rationale used in establishing the quantities recommended. Recommend a date by which the personnel should be on board at each of the sites.

2.3.4 MGE/FACILITIES. Quantifies, by site, the MGE/facilities, identified in Part I, which will be required to support one launch cycle or test cycle as appropriate. Summarize the action taken to date relative to each of the design criteria and standard equipment requirements sheets referenced in Part I. Identify the quantity of each that has been recommended for procurement.

2.3.5 MAINTENANCE AND REPAIR INSTRUCTIONS. Identifies the maintenance and repair procedures, being developed to support the end item, and references the contract under which they are being prepared. Summarizes the relationship between the content of the instructions and the operation and maintenance actions identified in Part I. Provides a status report of the operations and maintenance instruction program.

2.3.6 LIQUIDS AND GASES. Quantifies, by type, the liquids and gases required to maintain, service, or otherwise make ready for use, the number of end items needed to support one launch cycle, or test cycle, as appropriate. To qualify as a user of liquids or gases, the end item must consume or employ the liquid or gas in its support function, or must store the liquid or gas for later transfer to the AVE. Liquids or gases transferred directly to the AVE from the transport or storage means are chargeable to the AVE, rather than to the end item of LVGSE.

2.3.7 TRANSPORTATION. Discusses and quantifies the transportation required to support maintenance of the end items required for one launch cycle, or test cycle, as appropriate. Personnel transportation is excluded. Should the transportation of personnel be a problem, this shall be discussed separately.

2.3.8 TRAINING. Summarizes the training requirements identified in Part I and relates to the number of personnel identified in paragraph 2.3.3 above. Provides a status report of all actions, to date, with the customer relative to training courses and classes.

2.3.9 SPECIAL LOGISTICS CONSIDERATIONS. Summarizes any special considerations used in arriving at the quantities presented in Part II. When detailed sequencing of functions or actions is required to permit effective utilization of personnel, such sequencing is discussed.

2.4 LOGISTICS PRODUCT SUBSTANTIATION

The logistics products requirements summarized in the EIR's are established through engineering judgment substantiated by the detailed Maintenance Requirements Analysis discussed in Section III. The requirement for conducting a maintenance analysis may be waived in those cases where logistics products can be identified without conducting the analysis. Simplicity of design or previous experience with the equipment can be sufficient reason for exempting an end item or equipment within an end item from this analysis. The KSC organization responsible for conducting the Maintenance Requirements Analysis with the appropriate Apollo/Saturn Systems Office (PPR-1, 4 or 5) establishes the criteria for determining the degree of detail to which the Maintenance Requirements Analysis is performed. When a detailed analysis has not been required to identify the logistics products, it is so stated in the EIR with justification for the approach.

2.5 END ITEM REPORT UPDATING

The EIR Part I and Part II will be updated as indicated in the following two paragraphs.

2.5.1 END ITEM REPORT, PART I. Part I of the EIR will be updated only in the event of a change in the maintenance analysis or AVE event assignment, which makes the data within Part I invalid.

2.5.2 END ITEM REPORT, PART II. Part II of the EIR will be updated as the result of:

a. A change to Part I.

b. A change to quantities or skills considered necessary to support the end item of one launch cycle, one test cycle, or for the specified time period.

c. As management action occurs relative to any of the logistics resources.

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SECTION III
MAINTENANCE REQUIREMENTS ANALYSIS

3.1 GENERAL

Maintenance Requirements Analysis is performed by analyzing system and equipment design drawings to determine what maintenance activities are to be performed on a particular end item and to sustain its operation as established by the logistics baseline and operations analyses efforts, within the support system concepts and capabilities outlined in Exhibit 2. Types of design drawings analyzed include:

a. Systems and equipment electrical and mechanical schematics.

b. Mechanical layout and assembly drawings.

c. Wiring diagrams and parts lists.

d. Facility installation drawings.

The concept of a complete "maintenance activity loop" is applied to develop the maintenance activity flow. The loop consists of a sequence of maintenance tasks necessary to accomplish a repair or service cycle. For repair, it includes all actions necessary to isolate a fault, perform the repair task, and verify operation. For service, it includes all the preparation, servicing, and reactivation actions needed to keep the equipment in operating condition.

Analyses are performed to describe all identifiable equipment malfunctions which may occur during operation. The analysis identifies all maintenance actions necessary to correct malfunctions and return the equipment to operational condition. Identification of scheduled maintenance is accomplished and analysis performed to describe requirements for periodic servicing (grease, oil, adjustments, calibration, etc.). Scheduled replacement or rework of parts is necessary when the design life limit of those parts can be identified.

3.1.1 MAINTENANCE REQUIREMENTS ANALYSIS FUNCTIONS. The functions performed in accomplishing the Maintenance Requirements Analysis are as follows:

a. Establish the maintenance activity flow in functional terms to describe the maintenance activities loop as described under Maintenance Activities Analysis, paragraph 3.2.1.

b. Define the technical requirements imposed by the equipment's functions, and relate those requirements to equipment, facilities, and personnel, in accordance with either paragraph 3.2 or 3.3, as appropriate.

c. Define equipment and facility design parameters using design criteria or standard equipment requirements forms as described in Section V.

d. Conduct studies which systematically consider design and logistics alternatives. These trade studies are conducted as described in Section VI.

e. Depict the time base sequential and parallel relationship of the maintenance functions to determine equipment, facilities, and personnel utilization time, as required, in accordance with the maintenance activities time line discussed in paragraph 3.2.3.

3.2 DETAILED MAINTENANCE REQUIREMENTS ANALYSIS

The detailed maintenance requirements analysis is documented through completion of the following forms:

a. Equipment Maintenance Sequence (EMS).

b. Maintenance Requirements Analysis (MRA).

c. Maintenance Time Line Analysis (MTLA).

These sheets, based upon NHB 7500.1 formats, but adapted to the KSC environment, are described in the following paragraphs.

3.2.1 MAINTENANCE ACTIVITIES ANALYSIS FUNCTIONS. The maintenance activities analysis delineates, in sequence, all operations necessary to repair or service the equipment being analyzed. The maintenance activities generated are entered on the equipment maintenance sequence sheet (see Figure 3-1). The sheet serves as a flow diagram to the lowest maintenance activity level, and:

a. Identifies the item(s) of hardware to the necessary indenture (functional component) level.

b. Provides spares provisioning and maintainability data.

c. Identifies the need for maintenance instructions.

d. Identifies maintenance level, location, and type.

e. Lists functional component failure rate (maintenance action rate) information.

The establishment of maintenance activities loops are developed in completing the equipment maintenance sequence sheets.

3.2.1.1 Equipment Maintenance Sequence (EMS) Sheet. The EMS sheet is completed in accordance with the information listed below.

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Block Number	Title	Instruction
A-1	Program Element No./ OPS Activity No.	Program Element Numbers (PEN's) are assigned to end items and equipments. Functions are assigned Operations Activity Numbers. As the functional classification proceeds from the general to the more specific levels of detail, additional digits are added. PEN's provide a coding to associate hardware to a specific vehicle system. The Operations Activity Number provides a code to relate operational functions and is obtained from the KSC Logistics Baseline Reference System (K-AM-02 Appendix A) for the function being analyzed.
A-2	Part No. and Revision Letter	The part number, revision, and latest engineering orders (EO) are obtained for the end item from the applicable drawings. The entry is made in column A-2 and the lower right hand corner of the form. If revision status and EO listing is extensive, a special listing can be noted in the remarks column.
A-3	Line Item (Cross Reference)	This column provides a cross-reference to relate the other analysis sheets to the maintenance activities (Block E) identified on the EMS. Separate entries in sequential order are made for each activity of the maintenance loop.
A-4	Indenture Number	This number is used to indicate the installation and assembly levels for all systems and assemblies, which may require maintenance. The indenture level is indicated by the PEN system. The Maintenance Requirements Analysis is prepared, starting with the PEN level of the end item, and progresses to subassemblies and components, in numerical order. The 4 digit group is called indenture 1; each digit group following, separated by a decimal point, indicates a progressively larger indenture number.

Block Number	Title	Instruction
A-5	Nomenclature/Pen Identifier	Enter the name and the PEN of the item(s) of equipment for each identure which has been identified. The nomenclature entry for the end item being considered is also recorded at the bottom of the sheet. Use the name as identified on the applicable engineering drawing.
A-6	Mfg./Part No. and Revision No.	Enter the manufacturer's name or Federal code, the part number, and revision letter for components and parts involved in the maintenance action being defined. This information can be obtained from the applicable engineering drawings.
B	Maintenance Level	Three levels of maintenance are established in the KSC Apollo/Saturn maintenance concept, described in detail in Exhibit 2, of K-AM-02. These are:

Code Level	Description
1	Maintenance on installed equipment (in-line)
2	Out of system repair - local KSC shops
3	Out of system repair - off site (not at KSC)

Block Number	Title	Instruction
		Assignment of activities to those levels, will define the appropriate level allocation of all maintenance support elements.
C	Maintenance Location	Enter the alphanumeric identifier, which indicates the location, at which each maintenance operation is performed. The location codes applicable to KSC are listed on Table 3-1. The functions of the maintenance locations are covered in Exhibit 2, paragraph 7.6.4.
D	Scheduled/Unscheduled	An "S" (scheduled) is entered in Column D whenever maintenance must be performed on a periodic basis. Only the "prepare-service-reactivate" columns in the (E)

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Block Number	Title	Instruction
D (cont.)		section are used to designate scheduled maintenance activities. A "U" (unscheduled) is entered to indicate that the maintenance activities are corrective in nature and precipitated by failure.
E	Maintenance Activities	Maintenance activities are those actions which will be required to perform the repair cycle or the servicing loop. These tasks sometimes may be performed in an altered or shortened sequence. An "X" is inserted in the appropriate column to indicate maintenance activities necessary.
E-1	Repair Cycle	The repair cycle consists of those tasks needed to correct a malfunction. The tasks are defined as follows: 1. Localize - to diagnose the malfunction to the extent possible using only test, troubleshooting or inherent operational indication features built into the equipment, and/or by sensory check (sight, sound, smell). 2. Isolate - to diagnose the malfunction using necessary test equipment at designated test points. Some opening of the equipment may be necessary to gain access to the test points. 3. Disassemble - to remove the equipment from use or open it and remove any items necessary to make the failed item accessible. 4. Repair - to perform the operations necessary to remove the failed item, make disposition, acquire a replacement, and position and install the replacement. The replacement item could be the failed item if it has been reworked to acceptable limits within the repair time allowed. This action will also include repair in place when authorized.

Block Number	Title	Instruction
		5. Reassemble - to replace any items removed during the disassembly function and to close the equipment and return it to service.
		6. Align - to calibrate and adjust as necessary to return the equipment to the required operating condition.
E-II	Servicing	Servicing is any action necessary on a scheduled basis to assure proper operation of the unit. This includes replenishment of expendables, time replacement of items or material, inspections (functional and visual), and cleaning. Excluded is the accomplishment of any corrective action found necessary during a scheduled action.
		1. Prepare - to obtain the replenishment commodity in the proper form for use or application and to perform actions necessary (such as purge or clean) so that the equipment is ready to accept the commodity.
		2. Service - to introduce the commodity into the equipment in the prescribed manner and amount.
		3. Reactivate - to return the equipment to use and ascertain that equipment operation is normal.
	Other	The categories of maintenance activities listed above cover the majority of maintenance loops. However, certain loops may require other activities such as "SAFE" or "REFURBISH". When such activities are utilized, an "X" is marked in the OTHER column, and the appropriate action verb is entered in the REMARKS column.

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Block Number	Title	Instruction
E-II (cont.)		The "X" marked in each column for the selected function of the maintenance activity indicates a line item for detailed analysis on the Maintenance Requirements Analysis Forms (see paragraph 3.2.1.2).
F	Maintenance Activity Rate	The entry is made for each indenture level and it is either expressed as the reciprocal of Mean Time Between Failure (MTBF) or the elapsed time between scheduled maintenance activities. It is expressed in occurrences per thousand hours. For very low failure rate equipment, modify the column heading to include "$x10^{-3}$". This will then provide occurrences per million hours. In the event that the item under consideration is cycle rather than time sensitive, the average number of cycles per unit time must be predicted. This conversion is necessary so that a common time base can be used for system predictions. The conversion factors used for cycle limited items will be noted under REMARKS (L). The maintenance activity rate is used to obtain the comparative maintainability index as a measure of maintenance criticality, and for providing information for quantification of required logistics support elements. An example would be its use in quantification of personnel requirements for each end item or a combination of end items. The product of maintenance activity rate and personnel time per type is an expression of maintenance hours required of each personnel type per hour of equipment operation for each level of unscheduled maintenance. This expression is valuable in determining whole numbers of personnel to maintain the equipment.

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Block Number	Title	Instruction
F (cont.)		The maintenance activity rate is derived from equipment reliability factored to the operating environment, and entered in the "U" (unscheduled) column, or from the projected equipment design life and/or time between servicing and entered in the "S" (scheduled) column.
G	Maintenance Activity Duration	The entry is elapsed time to perform the repair or service being considered. This time is series-parallel summed and will account for all possible concurrent operations. It is computed on time line sheets based on the Maintenance Requirements Analysis Line Item/Opn. No. Data. This time is entered for each indentured item on the maintenance activities analysis sheet and expressed in hours and decimals. In addition to being used for time line analysis, it is combined with the maintenance activity rate (F) to obtain the comparative maintainability index (H). The maintenance analysis duration is also used as a criticality indicator against time-to-repair goals for critical points in the AVE flow such as launch countdown.
H	Comparative Maintainability Index	The product of (F) and (G) is entered in (H) and shows the relative criticality ranking of equipment components to be considered for maintainability action. The higher value should be considered as needing the most consideration. It is used to evaluate inherent equipment maintainability and possible need for more detailed trade-off examination using procedures established in Section VI.
J	Provisioning Planning Data	These entries, when used with the maintenance levels and locations, provide the Maintenance Requirements Analysis source information for the selection and recommandation of spare parts in

Block Number	Title	Instruction
J (cont.)		the proper quantities and at the proper locations to support the maintenance effort. Entries are made as follows:
J-1	Logical Spare	Any part required by maintenance which will be procured and placed in stock to support the maintenance effort is a logical spare. A part must be capable of being physically removed from, and replaced into, its next higher assembly in order to be considered a logical spare. Some of the factors to be considered by the analyst in making logical spare recommendations are function criticality of the part, replaceability, environment, and wear susceptibility. The decision as to whether or not a part will be a logical spare is not to be confused with quantity determinations. Long design life, high reliability, and low operating rate could result in a low quantity determination. The analyst enters an "X" in this column if it is deemed that the item is a logical spare. The entry will indicate to spares provisioning personnel, the requirement for a spare, and that provisioning action for the item is necessary. When a component is not deemed a logical spare, no entries will be made in the other column under the PROVISIONING PLANNING DATA heading.
J-2	Reparable	An "R" is placed in this column if the Maintenance Requirements Analysis indicates that the item under consideration can be reworked to acceptable limits or restored to an operating condition by repair at a higher level. A reparable item would then be subjected to maintenance requirements analysis to determine which components within the item are also logical spares for second or third level maintenance. This entry is used as a factor in quantity determination of the logical spares.

Block Number	Title	Instruction
J-3	Quantity/Assembly	Enter the number of times the spare part is used in the assembly.
J-4	Shelf Life	Shelf life identifies that period of time (quarter-years) an item may remain in spares stock in a serviceable condition. At the end of this time period, the item must be withdrawn from serviceable status for overhaul, repair, salvage or scrap. Corrective action may involve replacement of cure-dated parts, functional test, renewed packaging and/or preservation. If shelf life exceeds 12 quarters, an entry of "IND" for indefinite is made. The material composition of the item being considered is obtained from the applicable drawing. This information is used as a factor in determining storage location, quantity and replenishment spares data.
K	Tech Support Data	This entry indicates the probable requirements for maintenance and repair instructions and requires further analysis to determine detailed instruction material. An entry of "R" is made in (K) when the complexity or criticality of the maintenance action requires written instructions. This determination is based upon the personnel information analysis portion of the Maintenance Requirements Analysis sheet. "N" is entered when written instructions are not required.

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P.E.N./OPS ACTIVITY NO. 1 2251.33.02 | PART NO. & REV. LETTER 2 909181 | PREPARED BY ______ APPROVED BY ______

REV. LTR. ____

A. HARDWARE IDENTIFICATION: LINE ITEM (CROSS REF.) 3	INDENTURE 4	NOMENCLATURE/ P.E.N. IDENTIFIER 5	MFG. MODEL PART NO. AND REV. LETTER 6	B. MAINTENANCE LEVEL	C. MAINT. LOCATION	D. SCHED/UNSCHEDULED	E. MAINTENANCE ACTIVITIES I. REPAIR CYCLE: LOCALIZE 1	ISOLATE 2	DISASSEMBLE 3	REPAIR 4	REASSEMBLE 5	ALIGN 6	VERIFY 7	II. SERVICING: PREPARE 1	SERVICE 2	REACTIVATE 3		F. MAINT. ACTION RATE S	F. MAINT. ACTION RATE U x 10⁻³	G. MAINT. ACTIVITY DURATION	H. COMPARATIVE MAINTAINABILITY INDEX	J. PROVISIONING PLANNING DATA: LOGICAL SPARE 1	REPARABLE 2	QTY./ASSEMBLY 3	SHELF LIFE 4	K. TECH SUPPORT DATA	L. REMARKS
1	6	Portable Pneumatic Regulation Unit	(00502) 909181	1	A20	S											X	40		.98	39.2					2	Calibrate every 90 days
2				1	A15	S									X			80		1.11	88.8					3	Every 180 days
																			.10	11.49	.151	X	R	1	IND		
3				1	A15	U		X																		2	
-				1	A15	U			X																	2	
				1	A15	U				X	(SEE LOWER INDENTURE)																
5				1	A15	U					X															3	
6				1	A15	U							X													3	
	7	Gage Pressure 0-600 PSI	(00502) 900904																.024	1.57	.038	X	R	1	IND		
				1	A15	U		X												.14							
				1	A15	U			X											.04							
7				1	A15	U														1.18						3	
				1	A15	U														.03							
				1	A15	U														.18							

EQUIPMENT MAINTENANCE SEQUENCE (EMS)

SHEET ______ OF ______

ORIGINAL DATE ______

REVISION DATE ______

NOMENCLATURE REGULATION UNIT, PORTABLE PNEUMATIC

PART NO. & REV. LTR. 909181

P.E.N./OPS ACTIVITY NO. 2051.33.02

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Figure 3-1 Equipment Maintenance Sequence Sheet

Table 3-1. Maintenance Location Codes

Number/Letter	Code
A	KSC
B	Contractor Facility
1	Launch Control Center
2	High Bay in the VAB
3	Low Bay in the VAB
4	Pad
5	Mobile Launcher
6	Converter Compressor Facility
7	Mobile Launcher Servicing Platform Parking Area
8	High Pressure Gas Storage Building
9	Data Link Terminal Buildings
10	Electrical Shop
11	Heavy Equipment and Rigger Shop
12	Machine Shop
13	Communication Shop
14	Photographic Laboratory
15	Mechanical Systems Laboratory
16	Measuring Laboratory
17	RF Instrumentation Laboratory
18	Gyro and Stabilizer Systems Laboratory
19	Guidance and Control Test Support Area Laboratory
20	Instrument Calibration and Standards Laboratory
21	Propellant Systems Component Laboratory
22	Mobile Trailers
23	Battery and Power Supply Laboratory
24	VAB Clean Room Facility

3.2.1.2 Maintenance Requirements Analysis Form (MRA). The requirements analysis is used to identify and record the technical requirements for equipment, facilities and personnel tasks. (See Figure 3-2.) The line item or OPN No. provides a cross-reference between the requirements analysis sheet and the maintenance activities analysis sheet. For each operation, the requirements analysis sheet identifies the technical requirements imposed by the operation; the equipment and facilities recommended to fulfill these technical requirements; and the personnel requirements in the form of task, skill, and elapsed time information. The Maintenance Requirements Analysis (MRA) forms are completed as follows:

Block Number	Title	Instruction
A	Line Item/OPN No.	Entries in this column correspond to the line item entry on the EMS opposite the associated maintenance activity sheet.
B-1	Nomenclature	This entry is a listing of the equipment on which the analysis is being performed. It is taken from column A-5 of the EMS.
B-2	Maintenance Activity	This entry is the title of the maintenance activity for which the technical requirement is being identified, taken from column E of the EMS.
B	Technical Requirements	Entries under this heading functionally state the technical requirements to perform the maintenance activity. Only those functional technical requirements applicable to the specified operation are to be described. These technical requirements provide the basic design requirements, limitations, and any other essential characteristics imposed upon equipment and facility configuration by the operation. Entries cover such items as structural requirements, special power requirements, environmental conditioning, facilities space requirements, consumables, etc.
C-1	Equipment Nomenclature	This column contains the short form nomenclature of the existing item of equipment/consumables recommended to satisfy each technical requirement.

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Block Number	Title	Instruction
C-1 (cont.)		Where existing equipment must be modified or where new equipment is required, this column is left blank. The End Item Report (EIR) identifies and recommends the procurement of new or modified equipment. Often design specification of the EIR recommendation, identification information from the design criteria sheet is entered in this column.
C-2	Program Element Number	The Program Element Number (PEN), Design Criteria (DC), reference or Standard Equipment Requirements (SER) number for each of the items listed under equipment/facility nomenclature is included when available and/or assigned.
C-3	Facility	Facility information will be entered based on the approach outlined above for Equipment Nomenclature (C-1). The location code of an existing facility which will satisfy each technical requirement is entered. Location codes are listed in Table 3-1.
D-1	Personnel Tasks	This column contains the personnel tasks required to perform the maintenance functions. Entries are made in the form of statements sufficiently descriptive of each maintenance task to substantiate personnel numbers, types, and task durations. Emphasis should be placed on "what" a person must do rather than "how" he does it. Wherever a maintenance task could endanger the safety of either personnel or equipment, a note is included. The Note-Caution-Warning designation system of MIL-M-5475 is used for the preparation of these sheets.

Block Number	Title	Instruction
D-2	Type	The type of work and job skills necessary to perform each personnel task is shown. A three-digit code is used to identify type of personnel. The first digit is to indicate the personnel field, such as electrical or mechanical. The second digit is to indicate the specialty area, such as machinist or welder. The third digit is to indicate the job skill level, such as master, journeyman, or helper, and increases in proportion to the level of job skill. The lowest job skill level capable of performing the described task is to be assigned. Where more than one type is required to perform an activity, entries showing each type are made underlined, and summed for each Line Item/OPN No. Table 3-2 is adapted from the list of code numbers for fields and specialty areas, given in NHB 7500.1. As an example, a block D-2 coded 142 is interpreted as follows: The "1" indicates that an electrical man is required to successfully complete the described task. The "4" indicates the man is specialized in power systems and the "2" indicates he is a journeyman.
D-3	Elapsed Time	The estimated elapsed time (hours and decimals) to perform each personnel task is entered, and the aggregate series/parallel time to perform each operation of the activities is computed. Time flow sheets may be used, if helpful, to perform this computation. Enter and underline the aggregate time for each line item or operations number including the time required to transport spares, equipment and personnel. This information will be used in operability and maintainability trade studies and the time based flows.

Table 3-2. Codes for Fields, Specialty Areas and Skill Levels (D-2)

Field	Specialty Area	Job Skill Level
1 - Electrical	0 - Telemetry Systems	1 - Helper
	1 - Communication Systems	2 - Journeyman
	2 - Computer Systems	3 - Master
	3 - Radar Systems	
	4 - Power Systems	
	5 - Instrumentation	
2 - Fluid Mechanics	0 - Pneudraulic	
3 - Mechanical	0 - Sheet Metal and Structures	
	1 - Welders	
	2 - Machinist	
	3 - Mechanic	
4 - Ordnance	0 - Pyrotechnician	
	1 - Mechanic	
	2 - Electronic Technician	
5 - Transportation & Handling	0 - Rigger	
	1 - Vehicle Operator	
	2 - Handling Equipment Operator	
6 - Support Services	0 - Supply	
	1 - Facility Maintenance	
7 - Safety	0 - Hypergolics	
	1 - Industrial	
	2 - Electrical	
8 - Operations	0 - Cryogenic	
9 - Quality Control	0 - Inspector	
	1 - Calibration Standards	

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Block Number	Title	Instruction
D-4	Quantity	Enter the minimum number of each personnel type necessary to perform each task. The aggregate quantitative personnel requirements for each operation is entered at the line item level. This item is used for manning and training estimates and as source data for the logistics requirements summary information.
D-5	Task Proficiency Level	This column is an expression, in human oriented terms, of fundamental, generalized skill requirements. The three skill areas to be estimated are perception, judgment, and manual dexterity (motor skill). Task codes are shown in Table 3-3. <u>Perception</u> refers to sensory processes, of which vision and audition are of primary use in maintenance actions. Other potentially useful modes, or channels of information, would include olfaction (smell), kinesthesis (limb position), and the sensing of temperature and vibration. <u>Judgment</u> refers to central, intellectual processes. It can range from a simple matter of <u>knowing how to make</u> a simple, practiced response to a static, unequivocal stimulus - to a very complex matter of <u>creating</u> a new response to an extremely ambiguous complex of multiple and changing stimuli. Judgment implies decision making. <u>Manual dexterity</u> refers to motor skills, the precision and speed with which movement and placement of the body is accomplished. For maintenance actions, interest will be restricted generally to control of the hands.

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Table 3-3. Codes For Task Proficiency Level (D-5)

Relative Level	Perception	Judgment	Manual Dexterity
Low Demand	Single, static stimulus; no comparison or integration required.	Simple coordination of response to stimulus; little decision necessary; no technical knowledge needed.	Relatively nonprecise; simple, single response movement required; proficiency possessed by any normal person.
Medium Demand	Variable stimulus, or two stimuli; some integration required.	Some monitoring of stimulus or comparison of two stimuli required; simple decisions in choice of response necessary; some technical knowledge needed.	Fairly precise; some integration of movement required; proficiency demands some training and practice.
High Demand	Multiple and variable stimuli; complex integration required.	Difficult comparison of multiple and variable stimuli; difficult decisions necessary in choice of many alternative responses; extensive technical knowledge needed.	Very precise; highly coordinated, integrated movement sequence required: proficiency demands extensive training and practice.

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Block Number	Title	Instruction
D-6	Performance Criticality	Entries indicate the effect on the system of non-performance or improper performance of each maintenance task. The following code letters are used as appropriate: Code A - Little or no effect on the mission success. B - Could result in some degradation of equipment, but would probably not affect mission success. C - Mission success will be compromised to an unacceptable degree. It should be noted that tasks identified as simple, or low demand, in job or personnel skill requirements may be rated as "C" in criticality because of the nature of the task and the time at which it is performed. During scheduled maintenance, failure to throw a switch might be rated "A". Failure to throw the same switch during unscheduled maintenance in the launch cycle might be rated "C" because delay past the launch window time constraint could result. Tasks rated as "A" should be evaluated to determine their necessity. This entry is used to provide an order of rank relative to human or equipment malfunction on system performance or mission success. It allows for selection of tasks which need to be stressed through training, or procedural data, or re-evaluation of the man-machine interface.

3.2.1.3 Maintenance Time Line Analysis (MTLA). The MTLA form is used to determine system downtimes for all scheduled and unscheduled maintenance. Time lining involves sequencing and paralleling function (and/or task) times to determine optimum usage of personnel, equipment and facilities. The results of time line analysis may be used to complement the EMS and MRA sheets during maintenance loading. It encompasses all functions to be per-

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A. LINE ITEM (CROSS REF)	B TECHNICAL REQUIREMENTS		C EQUIPMENT/FACILITY IDENTIFICATION			D PERSONNEL INFORMATION					
							PERSONNEL REQUIREMENTS				
	NOMENCLATURE	MAINTENANCE ACTIVITIES	EQUIPMENT NOMENCLATURE	PROGRAM ELEMENT NO.	FACILITY	PERSONNEL TASKS	TYPE	ELAPSED TIME	QUANTITY	TASKPROF LEVEL	PERF CRIT
A.	1	2	1	2	3	1	2	3	4	5	6
	Regulation Unit Portable, Pneumatic 909181 (00502)					16 Alignment of Portable Pneumatic Regulation Unit					
		ALIGN				ALIGN	203 201	.98	1 1	333 111	A
	A. A requirement exists to provide a pressure source of GN_2 at 0 to 6000 $\pm$ 0.01% PSIG with zero flow.			2311.07.01	MILA Pneumatic Pressure Facilities	a. Open Bleed Valve to insure that the system is depressurized.	201	.01	1	111	A
			Pressure Calibrator Set	2277.07.01		b. Remove the attaching screws (4) holding the panel assembly in place.	201	.02	1	111	A
						c. Remove the panel assembly from the case.	201	.01	1	111	A
						d. Loosen or remove as necessary, the rigid tubing between Inlet Shutoff Valve, Bleed Valve and cross connection fitting on back of gage.	201	.03	1	111	A
						e. Remove the cross connection fitting from back of gage.	201	.01	1	111	A
						f. Remove the Bexel Holding Screw from bottom of gage.	201	.01	1	111	A
						g. Remove the Bexel from gage.	201	.01	1	111	A
						h. Remove gage mounting screws and nuts (3).	201	.02	1	111	A
						i. Remove gage from panel assembly.	201	.01	1	111	A
						j. Connect the gage to the calibration standard in a vertical operating position.	203	.30	1	113	A
			(Entries in column C-1, C-2 and C-3 are simulated for this sample								

MAINTENANCE REQUIREMENTS ANALYSIS FORM (MRA) SHEET ______ OF ______

ORIGINAL DATE ______________ REVISION DATE ______________

PREPARED BY ______________ APPROVED BY ______________

PART NO. & REV. LTR. ______________
P.E.N./OPS ACTIVITY NO. ______________

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Figure 3-2 Maintenance Requirements Analysis Form formed from initial fault indication until the maintenance equipment is returned to its initial dispatch point. The time involved in accomplishing a maintenance task is the time the maintenance personnel and equipment are otherwise unavailable.

Figure 3-3 is a sample MTLA form. The procedures for filling out the form are as follows:

Title	Instruction
Job Identifier	Enter the PEN/OPS activity number or equipment part number of the Maintenance Requirements Analysis being performed.
Type of Maintenance	Enter "scheduled" or "unscheduled" in this column to indicate the type of maintenance involved.
	Source - Enter the nomenclature from column A-5 of the MRA.
Cross Reference	Enter the page number and line item of each activity/operation/task listed from the Maintenance Requirements Analysis sheet.
Location	Enter the location code involved from the EMS.
Maintenance Operations	Enter the title of each maintenance activity and the appropriate personnel tasks in the proper sequence.
Hours	Analyze the personnel tasks necessary to perform each operation to determine if portions of separate activities can be performed simultaneously. The time required to perform each maintenance activity is entered on the bar graph in Figure 3-3. Each bar is aligned on the graph to show the series or parallel relationship between operations, taking into consideration instances of the same personnel performing consecutive activities.

3.3 ABBREVIATED MAINTENANCE REQUIREMENTS ANALYSIS

The design of some of the equipment used in the Apollo/Saturn Program, coupled with the use of experienced personnel, does not necessitate performing as complete an analysis as discussed in paragraph 3.2 for all systems.

When justified by systems design, an abbreviated Maintenance Requirements Analysis may be conducted utilizing the form shown in Figure 3-4. Essentially, this MRA sheet combines the information listed on the EMS and the MRA sheet discussed in paragraph 3.2. It contains the information necessary for inclusion in the EIR. Sheets are prepared for all items or equipments within an end item. Line item numbers are assigned sequentially for all equipment requiring maintenance. These equipments are identified by name and drawing number.

The columns are filled out on this MRA form as indicated below.

Title	Instruction
Assembly Nomenclature	Enter a line item number and the official title of the assembly being analyzed.
Drawing Number	Enter the specification or assembly drawing number for the equipment being analyzed.
Location	Enter the code for the location where the maintenance indicated is performed. This is the alphanumeric code listed on Table 3-1.
Quantity Per Location	The quantities of identical assemblies located at the location identified is entered in this column.
Type of Maintenance	The type of maintenance, scheduled or unscheduled, is indicated by an entry under the "S" or "U" column, as appropriate.

S An entry in column "S" will indicate requirements for scheduled or preventive maintenance and the entry will be a code to indicate recommended frequency.

These codes are:

1/m	once per month
1/w	once per week
1/1	once per launch cycle

U An "X" in column "U" indicates requirements identified are in support of unscheduled or corrective maintenance.

Type of Spare	When unscheduled maintenance is indicated, the type of spare required to support that maintenance is identified under the appropriate column (assembly, subassembly or part).

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MAINTENANCE TIME LINE ANALYSIS

JOB IDENTIFIER	TYPE OF MAINTENANCE	PREPARED BY	APPROVED BY
40M05609	UNSCHEDULED		

SOURCE	CROSS REFERENCE	LOCATION	MAINTENANCE OPERATIONS	HOURS (.1 .2 .3 .4 .5 .6 .7 .8 .9)
1-HO-01-001 METER CIRCUIT	SHEET 1 LINE 4	A1	ISOLATE	.1
	SHEET 1 LINE 5		DISASSEMBLE	.2
	SHEET 1 LINE 6/7		REPAIR/REASSEMBLE	.3
			OBTAIN PART	.2
			INSTALL PART	.1
	SHEET 1 LINE 8		ALIGN	.4
	SHEET 1 LINE 9		VERIFY	.5
1-HO-01-001 CONNECTORS	SHEET 1 LINE 15		ISOLATE	.02
	SHEET 3 LINE 21		DISASSEMBLE	.4
			OBTAIN PARTS AND TOOLS	.2
			REMOVE FAULTY PARTS	.3
	SHEET 3 LINE 22/23		REPAIR/REASSEMBLE	.22
			CRIMP PIN TO WIRE	.02
			REPLACE PIN	.2
	SHEET 3 LINE 24		VERIFY	.02

MAINTENANCE TIME LINE ANALYSIS (MTLA)

ORIGINAL DATE 21 OCTOBER 1965

REVISION DATE

Figure 3-3 Maintenance Time Line Analysis Form

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SYSTEM NOMENCLATURE ____________

SPECIFICATION NUMBER ____________ LOCATION ____________ DATE ____________

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ASSEMBLY NOMENCLATURE	DRAWING NUMBER	LOCATION	QTY. PER LOC.	TYPE OF MAINT.		TYPE OF SPARES			MGE REQUIRED	OTHER REQUIREMENTS OR REMARKS
				S	U	ASSY.	SUBASSEMBLIES	PARTS		

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PREPARED BY ____________ REVISION SHEET ____ OF ____

Figure 3-4 MRA Sheet - Short Form

Title	Instruction
Assembly	If the entire assembly identified for the line item is to be spared, an "X" is entered in this column.

Subassemblies If repair can best be accomplished by removal and replacement of a failed subassembly, it is identified in this column by the appropriate drawing number. Subassemblies so listed are listed as line items on other MRA sheets compiled for the second level location where the subassembly is repaired.

Parts If repair is accomplished by replacement of piece parts, an "X" is entered in this column.

NOTE

In those instances where repair is accomplished by a combination of subassembly and/or piece part replacement, entries are made in both columns. This indicates all malfunctions, not associated with the subassembly or subassemblies listed, will be effected by piece part replacement.

MGE Required	Entries in this column identify the maintenance ground equipment needed to perform maintenance on the line item listed. Entries in this column include sufficient criteria to select the equipment necessary to perform the required function. These criteria will be specified from the technical requirements indicated by the system or equipment characteristics.
Other Requirements or Remarks	These entries identify the need for special facilities required to accomplish maintenance, development of technical support data or special training. If special facilities, technical support data or training is not needed, it will be indicated. Entries are also made in this column to identify any special or unusual considerations which affect the maintenance in question or the logistics products to support it.

NOTE

Requirements identified for MGE or facilities which cannot be satisfied from existing or readily available sources require preparation of a design criteria sheet as described in

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SECTION IV
SITE LOGISTICS REQUIREMENTS SUMMARIES

4.1 GENERAL

Site Logistics Requirements Summaries (SLRS) consolidate the listing of logistics products and services for each group of end items (which fall within a common category of support responsibility) at a particular operational or support location as established in Exhibit 2. The SLRS's are prepared by consolidating summary data on each type of logistics product or service, that is listed in Part II of the EIR's for groups of end items selected, at a particular location. They are organized by operational mission as well as location. Several types of SLRS's required are:

a. SLRS's for each functionally related group of operational ground equipment.

b. SLRS's for each operational location.

c. SLRS's for each second level maintenance location listed in Table 3-1.

d. SLRS's for the spacecraft.

e. SLRS's for Saturn IB vehicle.

f. SLRS's for Saturn V vehicle.

g. SLRS's for Apollo/Saturn IB system.

h. SLRS's for Apollo/Saturn V system.

4.2 SITE LOGISTICS REQUIREMENTS SUMMARY CONTENT

The SLRS's should contain, as a minimum, the information listed in the following paragraphs.

4.2.1 MISSION OR SYSTEM DESCRIPTION. Provide a brief description of the mission or system the family of end items is to support. Identify differences in the mission or system because of its site location.

4.2.2 MISSION OR SYSTEM END ITEMS REQUIRED. Provide a list, by nomenclature, program element number and supplier, of the different end items comprising the family of end items required to support the mission or system defined in paragraph 4.2.1 above.

4.2.3 LOGISTICS PRODUCTS. Provide the results of integrating the composite logistics resources at mission or system level. These results include logistics resources derived from EIR's prepared by MSC and/or MSFC. This integration will be performed to eliminate redundant resources, minimize resource quantities and to maximize personnel effectiveness for the support of the family of end items defined in paragraph 4.2.2 above. The results of this integration will be segregated into the logistics products areas covered in Part II of the appropriate end item reports. The products are listed below with reference to the applicable paragraphs of Section II.

a.	Spare Parts	(paragraph 2.3.2)
b.	Maintenance Equipment	(paragraph 2.3.4)
c.	Facilities	(paragraph 2.3.4)
d.	Technical Support Data	(paragraph 2.3.5)
e.	Personnel	(paragraph 2.3.3)
f.	Training	(paragraph 2.3.8)
g.	Propellants and Pressurants	(paragraph 2.3.6)
h.	Ordnance	(paragraph)
i.	Transportation	(paragraph 2.3.7)

4.2.4 CONCLUSIONS. Conclusions relative to each of the logistics products listed under paragraph 4.2.3 will be presented. In arriving at these conclusions, consideration will be given to the following:

a. Procurement and/or management action taken by the responsible agency as reported in Part II of the end item reports.

b. Results of integration as related to quantities.

c. Procurement policy and other influencing factors.

4.2.5 RECOMMENDATIONS. Make specific recommendations for the procurement of each logistics product covered under paragraph 4.2.3. These recommendations will be based on the conclusions reached as discussed in paragraph 4.2.4 above and the results of an inventory search to determine the existence and availability of the resource within existing inventory.

4.3 SLRS UPDATING

The SLRS's will be updated as required to adequately reflect:

a. Changes to Part II of the end item report which result in changes to resources, quantities or location.

b. Management action relative to any of the logistics resources.

c. Changes in the operational mission requirements.

4.4 MANAGEMENT APPLICATION

The SLRS's described in this Exhibit provide a convenient means for monitoring the development, justification and quantification of each logistics resource required to satisfy the Apollo/Saturn logistics responsibility. The SLRS's while recommending procurement action, are not procurement documents. They do, however, provide visibility helpful in making the required management decisions relative to the normal procurement documents.

4.5 ELECTRONIC DATA PROCESSING (EDP)

Electronic Data Processing (EDP) is a useful tool employed in totalizing these quantities of logistics products in the SLRS. The application of EDP to the SLRS is covered in Exhibit 7, KSC Apollo/Saturn EDP Support Requirements Plan.

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SECTION V
EQUIPMENT REQUIREMENTS

5.1 GENERAL

Design criteria for unique and standard equipment are prepared to satisfy the technical requirements identified by the Maintenance Requirements Analysis sheets. The design criteria sheet, described in paragraph 5.2, is required for each prime equipment/facility contract end item, modified and unmodified inventory equipment item, engineering critical component or identification item. Standard equipment requirements sheets, described in paragraph 5.3, are used for commercial or contractor standard or Federal stock listed standard tools, test equipment, and bulk material.

5.2 DESIGN CRITERIA SHEETS

Design criteria sheets are completed in the format shown in Figure 5-1, utilizing source information from the Maintenance Requirements Analysis sheet. This sheet, required for each new design, is included in Section 3 of the Contract End Item Detail Specification. It is completed as defined below.

Block Number	Title	Instruction
A	SC Number	Enter the serial number of the design criteria sheet. This number is to be assigned by the originator/contractor. The number is followed (in parenthesis) by one of the three letters indicated below. These designate the classification of the design criteria: (N) Indicates a requirement for manufacture or procurement of a new end item of AGE or facility. (M) Indicates a requirement to modify an existing end item of OGE, MGE or facility. (V) Indicates that the operations, or maintenance, analysis verifies that an existing end item of AGE will adequately fulfill its system requirements.
B	Revisions	Entries in this section are made whenever a change occurs to an approve design criteria sheet. Enter the revision symbol (A to Z) in column B1. A brief description of the change and

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Block Number	Title	Instruction
B (cont.)		a reference to the configuration control document authorizing the change is entered in column B2. Enter the date of the revision in column B3, and the signature of the person responsible for authorizing the change in column B4.
C	Reference	Enter "Maintenance Analysis" to identify the origin of the requirement. Enter the maintenance task number, the PEN number, the Maintenance Requirements Analysis sheet number, and technical requirement line item identifier.
D	Requirements	This section specifies the limiting functional characteristics of the end item. This includes performance characteristics which are established by, and are the product of, analysis. It contains detail design information which can be used in the procurement of the detail design effort. Performance requirements entries in this section are expansions of the technical requirements established on the Maintenance Requirements Analysis sheet, paragraph 3.2.1.2, Block "B". This section specifies design requirements for the contract end item by: a. Providing the "design to" forcing function for engineering design of new and modified equipment and facilities. b. Providing validation of unmodified inventory equipment, facilities and identification items. c. Providing specific numerical values, limits, ranges and tolerances.

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NOTE

Contract end item design requirements are specified in accordance with detail specification format applicable to the CEI category (e.g., prime equipment, facility, etc.), as required by K-AM-03 adaptation of NPC 500-1. The types of constraints to be specified for the design recommended to satisfy the technical requirement are as follows:

Power -	Limitation regarding the type or quantity of power (electrical, hydraulic, pnumatic, etc.) which is available to the equipment, is stated.
Physical -	Any physical constraints upon the design of the equipment such as maximum size, maximum weight or portability, is stated.
Interface -	Any requirements for mechanical or electrical interface with other equipment(s) is stated.
Environmental -	Definitive statements regarding the environment which the equipment must be capable of withstanding shall be made in the following categories, as applicable: a. Ambient - Covers natural and/or controlled environment to which the equipment will be exposed and includes maximum and minimum temperatures, air pressure, humidity and natural phenomena. b. Dynamic - Covers movement and/or forces which the equipment must withstand, including vibration, shock, acceleration, etc.
Monitoring -	Requirements for equipment monitoring, i.e., electrical, signal pressure, etc., shall be included.
Operating Life -	The design objective for operating life shall be specified. In the event time cannot be specified, cycle of operation is noted.

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Safety Considerations -	Any condition which could result in injury to personnel or damage to equipment is identified and requirements to preclude occurrence shown.
Operability and Maintainability -	This sub-topic covers any special features and/or requirements imposed by trade studies and analysis evaluation, to ensure the operability and/or maintainability of the equipment. It includes human engineering requirements, packaging requirements, fault isolation provisions, accessibility, etc.
Reliability -	This paragraph states the reliability considerations imposed on the equipment and includes the factors of ground operating environment, human performance effects, cycling effects, etc.

Block Number	Title	Instruction
E	Originator/ Contractor	Enter the originator's office symbol or contractor's company name.
F	Original Date	Enter the date that the design criteria sheet is originally released by the originator/contractor.
G	Engineer	This entry is the signature of the engineer who prepared the design criteria sheet.
H	Checked	Enter the initials of the lead engineer who checked the design criteria sheet.
J and K	Approved	Enter the initials of supervising engineer.
L	Submitted	Enter the signature of the contractor representative responsible for preparation and submittal of the design criteria sheet.
M	Approved	This entry is the signature of the designated representative of the NASA technical organization responsible for design of the contract end item.

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Block Number	Title	Instruction
N	Nomenclature	Enter the short form nomenclature of the contract end item defined by the design criteria.
O	Type	Enter the category of equipment abbreviation; i.e., AVE, OGE, MGE or facility equipment.
P	CEI Category	Enter the CEI specification category of the end item; i.e., prime equipment, facility, identification item, requirement item or critical component, as defined by K-AM-03.
Q	CEI or Critical Code Number	Enter the CEI or critical component code identification and detail specification number assigned to the contract end item. These numbers are assigned in accordance with the requirements in K-AM-03.
R	MFG. Model/ Part Number	Enter the manufacturer's identification of the end item by its model or part number when it becomes available.
S	NASA Technical Organization Responsible	Enter the name or symbol of the NASA organization which has the design responsibility for the end item.
T	Project/System Designation	Enter the project and major end item.
U	Program Element Number	The program element number of the end item which will satisfy the requirements is entered when it becomes available from the equipment management system list.
V	Detail Specification Number	Enter the detail specification number of the contract end item when it becomes available.
	Title Block	Enter the complete name of the NASA Center responsible for the design of the end item.

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Title	Instruction
Technical Requirement Origin	Enter "Maintenance Analysis" to identify the origin of the requirement. Enter the maintenance analysis task number, the PEN number, and the MRA sheet line item and requirement identifier (number of letters). Data for this entry is obtainable from applicable Maintenance Requirements Analysis sheets.
Technical Requirements	Enter a description of the functional requirement for the end item. This information is an expansion of the technical requirements shown on applicable Maintenance Requirements Analysis sheet. Items to be considered are similar to those listed under technical requirements, for the design criteria sheet in paragraph 5.2.

5.3 STANDARD EQUIPMENT REQUIREMENTS SHEETS

Standard equipment requirements sheets utilizing source information from the Maintenance Requirements Analysis sheets are prepared in the format shown in Figure 5-2. A sheet is needed for each item of equipment or material which is a commercial or contractor standard part, Federal stock listed tools or test equipment, or Federal stock listed materials. This sheet is appended to, and becomes a part of, Section 3 of the contract end item detail specification. A guide to the completion of a standard equipment requirements sheet is as follows:

Title	Instruction
Nomenclature, FSC and PEN	Enter the short form nomenclature of the standard equipment contract end item and the program element number of the end item.
Federal Class Code	Enter the Federal stock classification code number of the item from DSA Handbook H 4-1.
P/N	Enter the commercial or contractor's standard part number.
MFR Code	Enter the manufacturer's Federal code number from DSA Handbook H 4-1.
Quantity	Enter the quantity of equipment required or indicate the locations where needed, as appropriate.

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DESIGN CRITERIA SHEET

A DC 6001 (N)

B REVISIONS

1 SYM	2 DESCRIPTION	3 DATE	4 APPROVAL
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C REFERENCE	D REQUIREMENTS
Maintenance Analysis PEN 2251.33.02 Sheet 5 Align: 1-A	General The Pressure Calibrator Set shall provide the means to statically test and calibrate pneumatic pressure sensing and indicating devices. 1.0 Performance The Pressure Calibrator Set shall have the capability to perform as a tester and secondary standard calibrator for pneumatic pressure gages during MILA shop maintenance of the Portable Pneumatic Regulation Unit. 1.1 Functional Characteristics The Pressure Calibrator Set shall provide a variable pneumatic pressure source utilizing gaseous nitrogen as the pressurant. The device shall provide calibration pressures ranging from 0 to 6000 psig with the smallest indicated increment 1.0 psi. The accuracy of the device shall equal or exceed $\pm$ 0.05% of reading. The device shall be provided with valves, tubes and fittings which are capable of meeting the cleaning requirements of MSFC-SPEC-164. 1.2 Operability 1.2.1 Reliability: This end item shall be designed in accordance with the reliability considerations included in paragraph 3.3.1 of "General Criteria for Saturn V MGSE" Document D5-16196. 1.2.2 Maintainability: Design for minimum maintenance, and design to preclude incorrect connection of plumbing connections. 1.2.3 Useful Life: 6 years.

ORIGINATOR/CONTRACTOR E	NOMENCLATURE CALIBRATOR SET, PRESSURE N	KENNEDY SPACE CENTER National Aeronautics and Space Administration
ORIGINAL DATE F		NASA TECH ORGN RESP S R-P&VE-VM
ENGINEER G / CHECKED H	TYPE O MGE	PROJECT SYSTEM DESIGNATION T SATURN V
APPROVED J / APPROVED K	CEI CATEGORY P DSRPIE	PROGRAM ELEMENT NO U 2277.07.01
SUBMITTED L	CEI CRITICAL CODE NO Q CF (TBD)	DETAIL SPEC NO V TBD
APPROVED M	MFG MODEL PART NO R TBD	W SHEET 1 OF 2

Figure 5-1. Design Criteria Sheet Completed (Sheet 1 of 2)

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DESIGN CRITERIA SHEET (cont.)

DC 6001 (N)

C REFERENCE	D REQUIREMENTS
	1.2.4 Natural Environment: T=80 ± 5°F, RH=60%
	1.2.5 Transportability: This end item shall be packaged for ease of transportation and handling by mechanical handling devices.
	1.2.6 Human Performance: No critical skills involved.
	1.2.7 Safety: Reference MIL-S-38130.
	1.2.8 Induced Environment: Not applicable.
	2.0 <u>CEI Definition</u>
	2.1 Interface Requirements: Adapters included in kit shall adapt to and be compatible with the Portable Pneumatic Regulation Unit, PEN 2251.33.02, pressure gage and pressure regulator plumbing connections.
	3.0 <u>Design and Construction</u>
	3.1 General Design Features: The Pressure Calibrator Set shall provide the means to calibrate and test, both statically and dynamically pneumatic pressure gages and regulators.
	3.2 Selection of Specifications and Standards: Selection shall be in accordance with MSFC Approved Specifications and Standards and as noted elsewhere in this Design Criteria.
	3.3 Materials, Parts and Processes: Materials and construction shall be at the discretion of the supplier, provided compatibility with equipment defined by paragraph 2.1 of this Design Criteria is maintained.
	3.4 Standard and Commercial Parts: AN, modified AN, MS or AND standard parts shall be used wherever possible.
	3.5 Moisture and Fungus Resistance: Kit shall resist environment per Specification MIL-E-5272C.
	3.6 Corrosion of Metal Parts: Kit shall resist salt spray environment per Specification MIL-E-5272C.
	3.7 Interchangeability and Replaceability: Supplier shall assign a specific part number to CEI. All replacement parts shall be physically and functionally interchangeable.
	3.8 Workmanship: Workmanship shall be in accordance with requirements of NPC 200-3.
	3.9 Electromagnetic Interference: Not applicable.
	3.10 Identification and Marking: Identification and marking shall be in accordance with MIL-STD-130B.
	3.11 Storage: Minimum storage time of two years; ambient storage conditions 0° - 125°F and 100% RH.

SHEET 2 OF 2

Figure 5-1. Design Criteria Sheet Completed (Sheet 2 of 2)

Note: The missing pages: E1- ii and E2- B- ii

Title	Instruction
Item Description/ Remarks	Enter a brief description of the end item. A particular end item such as a milliammeter might be described as follows: a. Portable type, metal case, d.c. direct application, scales 0-1 ma, 0-10 ma, 0-50 ma, 0-500 ma, each with 50 scale divisions, overall dimensions 4"x8" excluding handles; accuracy ±2% full scale, sensitivity 100 mv drop across terminals; meter self-contained. b. Recommend allocation to - (list shops and quantities) if applicable. c. Enter the applicable CEI detail specification category; e.g., identification items or requirements items.

STANDARD EQUIPMENT REQUIREMENTS	FEDERAL CLASS CODE	FEDERAL ITEM IDENT NUMBER
NOMENCLATURE: **PRELIMINARY DRAFT** P.E.N.:	P/N: MFR. CODE:	

LOCATION:	LCC	AGCS/ML	SUPPORT SHOPS			OTHER AREAS
			TRAILER LC 34 & LC 37	KSC SHOPS	OPERATIONS SUPPORT BLDG	
QUANTITY:				X		

ITEM DESCRIPTION REMARKS:

Machinists bench vise, solid jaw, swivel base, jaw width 4 inches, jaw opening 6 inches, no-mar jaws.

TECHNICAL REQUIREMENT ORIGIN	TECHNICAL REQUIREMENT
Maintenance Analysis Regulation Unit, Portable Pneumatic 2251.33.02	I Functional Requirements The requirement exists to support regulator valve during disassembly, reassembly and testing.
Sheet 16 Disassemble: 12-A Sheet 17 Reassemble: 14-A Sheet 18 Verify: 15-A	II Design Constraints Capability - the vise jaws must open at least 5 1/2 inches and clamp with enough force to withstand 1000 foot pounds of torque. Vise must be provided with round face, soft jaw adapters.

Figure 5-2. Standard Equipment Requirements Sheets

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SECTION VI
TRADE STUDIES

6.1 GENERAL

Trade studies are used to evaluate various design and logistics products alternatives. Utilizing all of the system parameters involved, a list of proposed solutions to a particular problem (or proposed methods of accomplishing a particular task) is prepared. Numerical indexing is assigned for each alternative in order to establish its relative advantage. Using the trade study results facilitates decision making on which an alternative solution is most appropriate.

6.2 TRADE STUDY COMPARISON SHEET

Trade study comparison sheets are used as a means for referencing the technical requirements of the function under consideration and for identifying and rating the alternate approaches. A separate sheet is used for each approach considered. A sample sheet is shown in Figure 6-1. A guide to its completion follows.

Title	Instruction
End Item	Enter the designation of the end item.
System	Enter the nomenclature of the system which is, or contains, the problem being considered.
PEN/OPS Activity No.	For cross-reference, the PEN/OPS activity number is obtained from the applicable requirements analysis form which establishes the technical requirements and is entered on this line.
Effectivity	The designation of the space vehicles or spacecraft which could reflect the incorporation of the study results is entered.
Proposed Solutions	A brief narrative description of the alternate approaches being considered on this sheet is entered in engineering terms.
Trade-Off No.	Identification number assigned to the trade study comparison sheet.

PRELIMINARY
DRAFT

Title	Instruction
Parameters	All parameters which could be affected by the proposed solution are determined and entered in this column. The types of parameters to be considered in trade studies are: Performance, Schedules, Safety, Reliability, Maintainability, Operation & Maintenance, Instructions, Equipment, Spares, Weight, Human Factors, Producibility, Personnel & Skills, Cost, Other
Effect of Proposed Solution	Enter the proposed solution's effect on each listed parameter as determined by personnel best qualified to perform the evaluation.
Relative Weighting	Enter a weighting value which reflects the relative importance of each parameter selected. A value of unity is assigned to the least important parameter, and higher whole numbers are assigned the others corresponding to their relative importance.
Desirability Rating	The system effect of the proposed solution must be rated for each parameter by personnel best qualified in that area. A common rating scale is used which evolves around zero (no effect) with +100 as a necessary rating and -100 as unacceptable. Enter the appropriate rating in this column. A maximum rating will be considered as a selection constraint.
Weight Desirability Rating	The Relative Weighting and Desirability Rating is multiplied and the product entered in this column.
Totals	The Relative Weighting and Desirability Rating Columns are algebraically summed and entries made.
Average Net Desirability Rating	The total of the Weighted Desirability Rating is divided by the Relative Weighting total and entered. Positive ratings are desirable and negative ratings are not. A compilation of the associated Trade Study Comparison sheets is used to determine which alternate proposed solution is to be recommended. As the average net desirability rating becomes more positive, desirability increases.
Relative Rank	The Weighted Desirability Rating of all proposed solutions are ranked in order, with the most desirable solution rated as 1.

PRELIMINARY
DRAFT

END ITEM ____________________

SYSTEM ____________________

PEN/OPS ACTIVITY NO. ____________________

EFFECTIVITY ____________________

PROPOSED SOLUTION ____________________

TRADE STUDY COMPARISON SHEET

TRADE-OFF NO: ____________

DATE: ____________

PARAMETERS	EFFECT OF PROPOSED SOLUTION	RELATIVE WEIGTTING	DESIRABILITY RATING	WEIGHTED DESIRABILITY RATING
			TOTALS	

AVERAGE NET DESIRABILITY RATING ____________

RELATIVE RANK ____________

C781

Figure 6-1 Sample Trade Study Comparison Sheet

EXHIBIT 3

KSC APOLLO/SATURN SUPPLY

SUPPORT REQUIREMENTS PLAN

EXHIBIT 3

KSC APOLLO/SATURN SUPPLY SUPPORT REQUIREMENTS PLAN

FOREWORD

This Exhibit is substantially a reprint of Section I, MATERIAL SUPPORT PLAN, of K-AM-02, 13 December 1965. Some limited editing has been performed to eliminate redundant material (such as definitions which are included in Appendix D to this edition of K-AM-02). This exhibit in its present format is included herein to permit supersession of the 13 December 1965 issue of K-AM-02. Further, that issue had a much more limited distribution than the present document.

Recipients are advised that a revision to this Exhibit is in process not only to reformat it but also to update the material included herein. Publication date of the revised Exhibit 3 is July 1966.

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EXHIBIT 3
KSC APOLLO/SATURN SUPPLY SUPPORT REQUIREMENTS PLAN

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EXHIBIT 3
KSC APOLLO/SATURN SUPPLY SUPPORT REQUIREMENTS PLAN

SECTION I
INTRODUCTION

1.1 GENERAL

The Material Support Plan for the Apollo/Saturn Programs is designed to:

a. Provide methods for obtaining material support for program operation;

b. Identify the organizations and define the responsibilities for providing material support; and

c. Establish the policy for developing procedures pertinent to the operation of a material supply and distribution system.

This plan provides KSC and Contractor personnel with information about the material support services available for each of the following categories of equipment:

a. Spares for MSFC-procured stage, launch vehicle and ground support equipment

b. Spares for MSC-procured spacecraft and ground support equipment

c. Spares for KSC-procured ground support equipment

d. Spares for facilities and real property installed equipment

e. Common materials

f. Tools and tooling.

This arrangement permits discussion of all the functions essential to servicing each category from provisioning to disposition in consecutive order.

1.2 SCOPE

The scope of this plan includes the functions necessary to provide material support for the categories identified in paragraph 1.1. These functions are provisioning, procurement, receiving, inspection, distribution, accountability, storage, maintenance and modification, disposition and salvage. It provides guidance and direction to the KSC organizational elements and the contractors engaged in the operations applicable to Apollo/Saturn programs. It identifies the interfaces through which organizational elements and contractors can achieve coherent material support within the provisions of their charter or contract. It does not provide detailed procedures but does identify organizational responsibilities for development antennas. It consists of two towers 1,000 feet apart. A two-story control tower (approximately 20 feet high and 20 feet square),(M7-867), supports the position fixtures, and spacecraft mock-up and radar module. The radar target fixture is supported on a 50 feet high tower (M7-863).

2.6 ORDNANCE LABORATORY (M7-1417)

2.6.1 FUNCTION. The Ordnance Laboratory is for disassembling, checking, testing, and storage of small pyrotechnic devices.

2.6.2 LOCATION. This laboratory (See Figure 2-9) is located adjacent to and west of the Pyrotechnic Installation Building in the KSC Industrial Area on Tenth Street. This facility is isolated from other for safety reasons.

2.6.3 DESCRIPTION. The Ordnance Laboratory contains two test cells, control room, laboratory, washroom and machine shop. The test cells are approximately 400 square feet each. The building is air-conditioned and has fans to remove combustion gases from the test cells. The control room is constructed with blast-resistant walls to protect the operators from explosion hazards.

2.7 ORDNANCE STORAGE FACILITY (M7-1472)

2.7.1 FUNCTION. This facility provides storage and machine shop area for pyrotechnic devices and for launch escape towers.

2.7.2 LOCATION. The Ordnance Storage Building (See Figure 2-10) is located adjacent to and east of the Pyrotechnic Installation Building in the KSC Industrial Area on Tenth Street.

2.7.3 DESCRIPTION. This building contains approximately 3,780 square feet of storage, machine and utility space. About 3,240 square feet of the total space is for ordnance storage. The building is environmentally controlled for storage of pyrotechnic devices and solid fuel motors used on the spacecraft. A crane is provided for handling ordnance items and the aligned launch escape towers. Crane hook height is about 18 feet.

2.8 PYROTECHNIC INSTALLATION BUILDING (M7-1469)

2.8.1 FUNCTION. This facility is for weighing, balancing, and determining the center of gravity of the spacecraft and for optical alignment of certain pyrotechnics.

2.8.2 LOCATION. The Pyrotechnic Installation Building (See Figure 2-11) is located in the KSC Industrial Area on Tenth Street.

2.8.3 DESCRIPTION. This building contains approximately 18,000 square feet. An area measuring 80 feet by 150 feet by 110 feet high and two service areas of 20 feet by 150 feet will be used for optical alignment of certain critical

FUNCTION / CATEGORY	ESTABLISH REQUIREMENTS	INITIAL PROVISIONING	PROCUREMENT	RECEIVING	DISTRIBUTION	RECEIVING INSPECTION	ACCOUNTABILITY	STORAGE AND ISSUE	STOCK REPLENISHMENT	DISPOSITION AND SALVAGE
SPARES FOR MSFC-PROCURED STAGE AND LAUNCH VEHICLE	A	A	A	G	G	E	R	E	A	A
SPARES FOR MSFC-PROCURED GROUND SUPPORT EQUIPMENT	A	A	A	G	G	E	R	E	A	A
SPARES FOR MSC-PROCURED SPACECRAFT AND GSE	B	B	B	K	G	E	R	E	BK	B
SPARES FOR SPACECRAFT MISSION TEST GSE	C	CW	J	H	H	T	P	W	W	V
SPARES FOR KSC-PROCURED GROUND SUPPORT EQUIPMENT	C	CS	J	H	H	T	P	S	CS	V
SPARES FOR FACILITY AND RPIE	D	DS	J	GH	H	T	P	H	SH	V
COMMON MATERIALS EXCEPT CONSUMABLES	H	H	J	GH	H	T	P	H	H	V
CONSUMABLES EXCEPT FREON	E1* H2	E1* H2	E1 J2	E1 GH2	E1 H2	E1 T2	E1 P2	E1 H2	E1 H2	V
HAND AND POWER TOOLS	H	H	J	GH	H	T	P	H	H	V
STANDARD TEST EQUIPMENT	H	H	J	GH	H	T	P	H	H	V
SPECIAL TOOLS-KSC-PROCURED MSFC-PROCURED MSC-PROCURED	C A B	C A B	J A B	GH G K	H G G	T E E	P R R	S E E	S E E	V LV KV

See Appendix D for definition of function terms
* See paragraph 4.1.1.3

NOTE: The information on this page has not in all cases been confirmed and officially imposed upon the organizational elements indicated. Resolution is in process and questions regarding this information should be directed to PPR-3.

LEGEND

A - Marshall Space Flight Center

B - Manned Spacecraft Center

C - KSC Design Responsible Office (EDV, LVO-1, INS)

D - Facilities and Construction Engineering Division

E - Contractor (Stage and Module)

F - Vendor

G - Trans. Freight Traffic Section

H - Material Support Branch

J - Procurement Division

K - Spacecraft Operations

L - Launch Vehicle Operations

M - Base Operations Division

N - Information Systems

P - Property Officer

R - Property Administrator

S - Operating Organization

T - Quality Assurance Division

U - Materials, Testing and Calibration Division

V - Disposition Review Board

W - Launch Support Operations Division

1 - Saturn IB Program Only

2 - Saturn V Program Only

Dual Entry Indicates Joint Coordinated Effort

Figure 1-1. Material Support Responsibility

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SECTION II
SPARES SUPPORT

2.1 SPARES SUPPORT FOR MSFC-PROCURED STAGES, LAUNCH VEHICLE AND GROUND SUPPORT EQUIPMENT

This category of equipment includes MSFC in-house manufactured equipment provided as GFP to KSC or to contractors operating at KSC; and MSFC contractor manufactured equipment operated at KSC by KSC or a contractor. The material support provided by KSC is limited to the following functions:

a. Review of, and concurrence in, recommended spare parts lists

b. Receiving material from the carrier, examination for shipping damage and verification of shipping documents

c. Distribution to using organization

d. Allocation of acceptable warehousing facility

e. Secondary accountability control

f. Intra-KSC transportation

g. Packaging, preservation, and shipping

h. Reporting of spares stock status and consumption

i. Providing common material (See Section IV).

Policy for performance of these services is developed through the KSC/MSFC Apollo/Saturn Program Managers.

2.1.1 PROVISIONING AND PROCUREMENT. The effectivity of the policy and practices described herein assumes the start of post-activation operations. Residual support from the installation and checkout phase may be taken into consideration if appropriate to the KSC responsibilities. Any deviations from the policy or practices expressed, require the joint approval of the KSC and MSFC Program Managers.

2.1.1.1 Stage and Launch Vehicle Spares. The spares provisioned for this support are those parts and assemblies which are peculiar to specific stages or to the launch vehicle as a unit. The initial selection of these parts and assemblies was performed by the respective stage contractors for their individual stages and the interface portion assigned to them by contract. The selection was presented to MSFC in the form of a recommended spare parts list. KSC/LVO participated in the initial provisioning with recommendations for support of planned KSC test and launch operations. KSC is responsible for presenting to MSFC any recommendations for provisioning adjustment resulting from actual test and launch experience or as a result of modifications. (See Figure 2-1.)

MSFC is responsible for reviewing the KSC recommendations and authorizing transfer or procurement action to adjust the KSC material support.

2.1.1.2 Ground Support Equipment. This equipment includes active, passive or support items which have been manufactured by MSFC and provided as GFP to KSC or to contractors operating at KSC; and items procured by MSFC through contracts with contractors for use at KSC. The initial provisioning and procurement of spares to support this equipment was accomplished by MSFC. Upon receipt of the equipment KSC is responsible for recommending any reprovisioning adjustment to MSFC.

MSFC is responsible for reviewing these recommendations and effecting procurement or transfer action to compensate for deficiencies.

2.1.2 RECEIVING AND DISTRIBUTION. Spare parts shipped to KSC by commercial carrier for support of MSFC-procured stages and GSE are received by KSC at the KSC Central Receiving and Shipping area of the Central Supply Building. Here, a representative of Transportation/Freight Traffic Section (TPN-22) examines the documentation and checks the freight for count, condition, packaging, etc. Discrepancies are noted and endorsed with, and by, the carrier. TPN-22 then directs the carrier to the consignee's area for unloading and acceptance of the shipment (Figure 2-1). TPN-22 assists the consignee in preparing appropriate reports of damage or shortage.

Shipments arriving by mail are received by Administrative Services Office (ASO) and forwarded to Material Support Branch (SOP-23) Base Operations Division (BOD) who distributes to the addressee.

Intra-KSC transportation of spare parts is supplied through TPN-22.

Receiving inspection is performed by LVO and/or the using stage contractor. The contractor may request assistance for the inspection function from KSC Quality Assurance Division (QAS-12). KSC provides laboratory assistance for testing parts and material where such tests are a part of the receiving inspection.

2.1.3 ACCOUNTABILITY. Primary accountability for equipment in this category is a responsibility of MSFC. Secondary accountability is maintained by KSC for items designated for such control by MSFC. Spares are considered expended when the KSC using elements verifies their consumption or permanent installation.

2.1.4 STORAGE AND ISSUE. KSC/BOD allocates and monitors for proper utilization, warehousing and storage space to LVO for storage of MSFC-procured spares assigned to KSC. For support of the Saturn IB Program the space is located in the Apollo Warehouse, Hangar AF, Hangar R, and Complexes 34 and 37, all at CKAFS. Similar support for the Saturn V program is assigned in the Central Supply building at the Industrial Area and in the VAB on Complex 39. LVO, in turn, assigns a portion of these areas to each contractor for storage of the stage, vehicle and/or GSE spares within his control. LVO maintains technical surveillance of the total facility.

Issue of these spares is under the control of the individual contractors and monitored by LVO. Usage and consumption reports are compiled by LVO from data supplied by the contractors. These reports are forwarded to MSFC.

2.1.5 MAINTENANCE AND DISPOSITION. The maintenance of MSFC-procured spare parts at KSC is a responsibility of LVO. The stage contractors perform the tasks for LVO as applicable to the spares within their control. MSFC provides specifications for proper maintenance. Limitations are observed for storage in controlled environment, calibration periods and shelf life.

2.1.5.1 Calibration. The Launch Vehicle Operations Division, through the stage contractors, calibrate flight hardware and components to assure that such spares are maintained within acceptable limits. Measuring devices that require "marriage" calibration are provided as matched sets. A blue line calibration curve for spares requiring calibration must be enclosed with, or attached to, the pertinent spare. KSC provides reference standards and calibration services for transfer standards and commercial test equipment through the Material Testing and Calibration Division (SOP-4). (Refer KSC APOLLO PROGRAM DIRECTIVE NO. 1 for KSC Apollo Calibration Policy.)

2.1.5.2 Shelf Life. Items with limited shelf life are issued in a rotation sequence so that the oldest unit is issued ahead of like units with later expiration dates. Units which have passed their expiration date and which cannot be considered acceptable for use are removed from stock.

2.1.5.3 Modification. Spare units affected by modification to the stages, launch vehicle, or GSE are considered unacceptable for use until they have been modified to an acceptable configuration. Such units are removed from serviceable stock at KSC by the contractor operating the storage area in which the units are located. MSFC is responsible for providing KSC with replacement spares in the correct configuration.

The removed spares are transferred to the KSC Central Receiving and Shipping for packaging, preservation, and shipment in accordance with stage contractor criteria. The contractor is responsible for providing MSB with packaging and preservation specifications and shipping instructions. The contractor also provides MSB with reusable containers which may have been received with the parts. MSB provides the equipment and personnel to accomplish the packaging, crating, and preservation. For parts requiring special care MSB will provide personnel and equipment to perform the packaging and crating within the contractor's assigned area.

TPN supplies transportation and shipping support. KSC may perform modification of these parts upon request by MSFC with the coordinated approval of KSC/MSFC Program Managers.

2.1.5.4 Replenishment of Stock. The replenishment of spare parts in this category is the responsibility of MSFC upon notification of requirements by KSC.

2.1.5.5 Disposition. Spare parts for MSFC-procured stages, launch vehicle or GSE which are removed from stock at KSC as unacceptable for use are reported to MSFC. Further disposition and the issuance of disposition instructions is the responsibility of MSFC.

2.1.6 DOCUMENTATION AND REPORTS. The logistic documentation for MSFC-procured spares at KSC is provided by MSFC. This documentation includes the technical support data needed to supplement the design engineering drawing set and provide procedural guidance for material support. As requirements for this technical support data are identified, MSFC submits the requirements to KSC/LVO for review and concurrence before the start of preparation. Verification of the documentation is a joint effort by KSC/MSFC. The KSC portion of the verification is performed by LVO. Only verified documentation is used at KSC. Changes to existing documentation are incorporated by MSFC who assures that the KSC records are supplied with current and accurate data.

KSC/LVO provides data reports for the spares at KSC provided by MSFC. These reports include information pertinent to inventory stock status, usage data, modification and repair status. Additional reports, required by either center, must have the joint concurrence of the KSC/MSFC Program Managers prior to implementation.

2.2 SPARES SUPPORT FOR MSC-PROCURED SPACECRAFT AND SPACECRAFT GROUND SUPPORT EQUIPMENT

This category of equipment includes MSC in-house manufactured equipment provided as GFP to KSC or to contractors operating at KSC; and MSC contractor manufactured equipment operated at KSC by KSC or a contractor. The material support provided by KSC is limited to the following:

a. Review of and concurrence in recommended spare parts list

b. Assist in preparation of shipping damage reports by request

c. Distribution to using organization

d. Allocation of acceptable warehousing facility

e. Secondary accountability control

f. Intra-KSC transportation

g. Packaging, preservation and shipping

h. Reporting of spares stock status and consumption

i. Providing common material. (See Section IV.)

Coordination of these services is conducted through the KSC/MSC Apollo/ Saturn Program Managers.

2.2.1 PROVISIONING AND PROCUREMENT. The effectivity of the policy and practices described herein assumes the start of post-activation operations. Residual support from the installation and checkout phase may be taken into consideration, if appropriate to the KSC responsibilities. Any deviations from the policy or practices expressed require the joint approval of the KSC and MSC Program Managers.

2.2.1.1 Spacecraft Spares. The spares provisioned for this support are those parts and assemblies which are peculiar to the spacecraft or to the space vehicle as a unit. The initial selection of these parts and assemblies was performed by the respective spacecraft contractors for their individual sections and the interface portion assigned to them by contract. The selection was presented to MSC in the form of a recommended spare parts list. KSC/SCO participated in the initial provisioning with recommendations for support of planned KSC test and launch operations. KSC is responsible for presenting to MSC any recommendations for provisioning adjustment resulting from actual test and launch experience or as a result of modifications.

MSC is responsible for reviewing the KSC recommendations and authorizing transfer or procurement action to adjust the KSC material support. The transfer action is accomplished from other stock owned or controlled by MSC. Procurement action is taken by MSC with its supplying contractor.

2.2.1.2 Ground Support Equipment. This equipment includes active, passive, or support items which have been manufactured by MSC and provided as GFP to KSC or to contractors operating at KSC; and items procured by MSC through contracts with spacecraft contractors for use at KSC. The initial provisioning and procurement of spares to support this equipment was accomplished by MSC. Upon completion of the installation and checkout phase and the start of post-activation operations KSC is responsible for recommending and reprovisioning or provisioning adjustment to MSC.

MSC is responsible for reviewing these recommendations and effecting procurement or transfer action to compensate for deficiencies.

2.2.2 RECEIVING AND DISTRIBUTION. Spare parts shipped to KSC by MSC or its contractors via common carrier are received by SCO. The shipment is examined for transportation damage or shortage and the shipping documentation is verified to the shipment. If damage or shortage is noted, TPN-22 assists the consignee in preparing appropriate reports.

Shipments arriving by mail are received by ASO and forwarded to SOP-23 who distributes to the addressee.

Intra-KSC transportation of spare parts is supplied through TPN-4.

Receiving inspection is performed by SCO and/or the using spacecraft contractor. The contractor may request assistance for the inspection function from QAS-12. KSC also provides laboratory assistance for testing parts and material where such tests are a part of the receiving inspection.

2.2.3 ACCOUNTABILITY. Primary accountability for the MSC-procured spares at KSC is a responsibility of MSC. Secondary accountability is maintained by KSC for items designated for such control by MSC. Spares are considered expended when the KSC using element verifies their consumption or permanent installation.

2.2.4 STORAGE AND ISSUE. KSC provides and monitors for proper utilization a storage facility for MSC-procured spares in the Spacecraft Spares and Equipment Building at KSC. It is located in the Industrial Area immediately south of the Manned Spacecraft Operations building. Control of this storage is vested in SCO and functions through the MSC spacecraft contractors.

SCO also controls a specialized storage area in the Parachute Building located in the central section of KSC. This facility provides bonded storage for parachutes and their related parts.

The issue of these spares is controlled by SCO. The spacecraft contractors are the principal users and personnel authorized to withdraw stock are so designated.

Usage and consumption reports are compiled by SCO from data supplied by the spacecraft contractors. These reports are submitted to MSC by KSC for evaluation and procurement action to support the stock at KSC.

2.2.5 MAINTENANCE AND DISPOSITION. The MSC-procured material at KSC in support of the spacecraft and spacecraft GSE is maintained by KSC, both in quality and quantity. KSC/SCO, through the reports to MSC, indicates the spares utilization so that MSC may replenish as necessary.

Quality maintenance is accomplished through adherence to specifications provided by MSC and KSC Spacecraft Operations covering environment controlled storage, calibration, shelf life and modification.

2.2.5.1 Calibration. Calibration Spacecraft Operations, through the spacecraft contractors, calibrate flight hardware and components to assure that such spares are maintained within acceptable limits. Measuring devices that require "marriage" calibration are provided as matched sets.

A blue line calibration curve for spares requiring calibration must be enclosed with, or attached to, the pertinent spare. KSC provides reference standards and calibration services for transfer standards and commercial test equipment through SOP-4. (Refer KSC Apollo Program Directive No. 1 for KSC Apollo Calibration Policy.)

2.2.5.2 Shelf Life. Items with a limited shelf life are issued in a rotation sequence so that the oldest unit is issued ahead of like units with a later expiration date. Units which have passed their expiration date and which cannot be considered acceptable for use are removed from stock.

2.2.5.3 Modification. Spare units affected by modifications to the spacecraft, space vehicle, or GSE are considered unacceptable for use until they have been modified to an acceptable configuration. Such units are removed from serviceable stock at KSC by SCO. MSC is responsible for providing KSC with replacement spares in the correct configuration.

Normally, the removed spares are packaged by the cognizant spacecraft contractor for return to the contractor's home plant. MSB provides packing and preservation support. It also, upon request, provides packaging assistance. TPN supplies transportation and shipping support. KSC may perform modification of these parts upon request by MSC and/or the cognizant spacecraft contractor with the coordinated approval of KSC/MSC Program Managers.

2.2.5.4 Replenishment of Stock. The replenishment of spare parts in this category is the responsibility of MSC.

2.2.5.5 Disposition. MSC-procured spare parts which are removed from stock at KSC as unacceptable for use are reported to MSC. Further disposition and the issuance of disposition instructions is the responsibility of MSC.

2.2.6 DOCUMENTATION AND REPORTS. The logistic documentation for MSC-procured spares at KSC is provided by MSC. This documentation includes the technical support data needed to supplement the design engineering drawing set and provide procedural guidance for material support. As requirements for this technical support data is identified, MSC submits the requirement to KSC/SCO for review and concurrence before the start of preparation.

Verification of the documentation is a joint effort by KSC/MSC. The KSC portion of the verification is performed by SCO. Only verified documentation is used at KSC.

Changes to existing documentation are incorporated by MSC who assures that the KSC records are supplied with current and accurate data.

KSC/SCO provides data reports for the spares at KSC provided by MSC. These reports include information pertinent to inventory stock status, usage data, modification and repair status. Additional reports required by either Center must have the joint concurrence of the KSC/MSC Program Managers prior to implementation.

2.3 SPARES SUPPORT FOR KSC-PROCURED GROUND SUPPORT EQUIPMENT (GSE)

The GSE procured by KSC for support of the Apollo/Saturn program consists of active, passive and support end items. The active items are those which interface with the space vehicle as typified by the swing arms and the propellant loading system. The passive end items support launch operations but do not actively participate in, or feed back to, the vehicle system of test. The support end items are special purpose equipment essential to launch operations but which do not directly connect to the vehicle. All of these types are designed and operated by KSC.

The material support for these end items is within the management control of KSC. The organizational resources of KSC are employed to assure the integrity of the installation and operation of the equipment. The organizations which have design cognizance of the equipment and those who operate the equipment have vital management responsibilities in connection with the functions comprising a complete material support program.

Design cognizance is identified with the following organizations and groups of equipment:

a. Engineering and Development Directorate

Launch Support Equipment, Mechanical and Electrical
Facilities and Real Property Installed Equipment (RPIE)

b. Launch Vehicle Operations (LVO)

LCC Telemetry GSE (excluding PCM/FM, TRS-1)
Flight Combustion Monitoring System Display Equipment
VAB Measuring GSE
LCC Measuring GSE
PTCR Measuring GSE
VAB RF Checkout GSE (excluding CCS)
Range Safety Command System GSE
Antenna GSE

c. Information Systems (INS)

Central Computer Complex
Data Display System
Flight TV Ground System
Ground Telemetry
Facilities Measurement
Geophysical Measurement
KSC Timing and Launch Countdown
UDOP-ODOP

Operating responsibility is identified with the following organizations to the equipment indicated:

a. Launch Support Operations Division (LSOD) - Launch support equipment within the definition of passive and support which is operated within the launch complex. Certain exceptions to this responsibility are noted in responsibility of LVO

b. Launch Vehicle Operations (LVO) - All equipment indicated above under LVO design cognizance plus propellant loading system pneumatics distribution system on mobile launcher downstream from and including the regulator panel. The purge portion of this system is operated by LSOD

c. Information Systems (INS) - All equipment indicated under INS design cognizance.

2.3.1 PROVISIONING AND PROCUREMENT. - The provisioning of spares to support this category of equipment reflects only consideration of the operational and maintenance requirements. The selection of parts and quantities includes recognition of any installation spares excess from the installation operation. When feasible, the provisioning action includes a maintainability evaluation by the design cognizant organization for the item. LSEED,in coordination with the operating organization,develops the initial provisioning list for each end item or system using data obtained from maintainability evaluation, maintenance analysis, vendor-recommended spare parts lists, etc. All of these sources of information are not necessarily available for every item. The following criteria is applicable to the selection of spare parts:

a. Components are provisioned rather than whole assemblies where the malfunctioning components are accessible. Specific selection of a component or assembly includes, in addition to accessibility, consideration of the integrity of the applicable system or subsystem

b. Selection of detail parts is considered only when it is feasible to repair a malfunctioning component within KSC. Gaskets, seals, crush washers, nuts, bolts, etc., used in repair of fluid or gas system connections are typical of the detail parts provided to facilitate quick repair on site

c. The components selected are capable of being tested and accepted independently of its next assembly

d. Attaching hardware,required for replacement of spared components or assemblies,is provisioned on the basis of 110% of that required for initial installation of each. Additional attaching hardware is provisioned for those components or assemblies for which multiple removal and replacement for test and/or calibration is anticipated

e. Tubing and fittings are provisioned to exact GSE documentation to avoid the need for waivers or substitutes. It is stored in bulk form to allow on-site fabrication

f. Measuring devices that require "marriage" calibration are provided as matched sets

g. A blue line calibration curve for spares requiring calibration is enclosed with or attached to the pertinent spare. Reproducibles of these calibration curves are supplied to the KSC documentation control office

h. Spares support for electrical networks consists of relays, relay modules, diodes, resistors, hookup wire, plastic sleeving, lacing cord, terminals, etc. Distributors, panels, patch racks, etc., are not normally replaced during repairs and are, therefore, not provisioned

i. GSE cables and wiring harnesses are supported by connectors plastic sleeving, lacing cord, terminals, wire, potting compound, etc. The cables and harnesses are not provisioned as assemblies

j. Provisioned electrical components include inverters, power supplies, sequencers, plug type junction boxes, timers, etc,

k. Support of DDAS assemblies consists of spare components which are readily installed. These components include multiplexers, analog-to-digital converters, synchronizers, power supplies, etc.

l. Special provisioning consideration is given to the support of items within the heat and blast envelope. Items afforded protective covering are provisioned to a ratio based on anticipated repair or recovery. Items with little or no protection are considered for replacement after each launch.

2.3.1.1 Procurement. The provisioning lists with complete identification and source data for each part are compiled by LSEED for equipment within their cognizance and by the operating organizations for equipment which was not designed by LSEED. These lists are forward to the BOD Material Support Branch (SOP-23) who reviews it to determine if any items can be supplied from general stock. Such items are deleted from the list and treated as indicated in Section IV. After this screening the remainder of the list is priced and totalled.

If the total cost of the final list is under $1000, the list is submitted to the Financial Management Division (FIN). FIN is the monitoring agency for providing correct accounting charge numbers and charge identification data.

Lists compiled by LSEED are returned to that organization who effects procurement. All other lists are returned to SOP-23.

When the total amount of the list is over $1000, SOP-23 submits the list to Plans, Program, and Resources (PPR) for funding approval and forwarding to FIN.

With funding established, MSB prepares procurement requests for the items.

Quality Assurance Division (QAS-1) reviews the procurement requests and designates on the requests those items which require receiving inspection.

The Transportation Office, Procurement Traffic Advisory Branch, reviews the procurement requests and recommends the FOB terminology and the mode of transportation which will meet the desired delivery data at the most economical cost.

2.3.2 RECEIVING AND DISTRIBUTION. All KSC-procured GSE spares shipped via carrier other than U.S. Mail are received at Central Receiving Facility. U. S. Mail shipments are received by ASO and forwarded to SOP-23 as in Figure 2-2.

TPN-22 performs the following receiving support at the Central Receiving Facility:

a. Checks document from carrier against the documentation record for the shipment

b. Takes tally of packages in shipment

c. Notes condition of packages

d. Records discrepancies in quantity or condition of packages and annotates with carrier acknowledgment

e. Directs carrier to off-loading point.

MSB (SOP-23) operates the Central Receiving Facility where all shipments in this category are received from TPN-22. The shipment is unpacked by MSB and tallied against the shipping and ordering documents.

Quality Assurance (QAS-12) is responsible for performing receiving inspection on items which are so specified on the procurement documentation. This responsibility includes arranging for any tests performed by laboratories which are not a part of the Quality Assurance organization. Items which successfully pass receiving inspection are endorsed for acceptance as Government property and returned to MSB for distribution.

2.3.2.1 Distribution. The spares peculiar to the KSC-procured GSE are distributed to the custody of the organizations responsible for operating and maintaining the end items. MSB is responsible for effecting the correct distribution. TPN is responsible for providing the transportation.

2.3.3 ACCOUNTABILITY. Accountability records are maintained in accordance with NASA Regulation 20-18 and NASA Appendices B (NPC 105A) and C (NPC 400). The KSC Property Officer has prime accountability for those items which qualify for accountability control. These items are considered accountable when their acquisition cost is between $50 and $199.99. Such items are charged to operating costs upon issue.

2.3.4 STORAGE AND ISSUE. The storage for KSC-procured spares is provided as near as feasible to the intended area of use. This storage facility is operated by the organizations responsible for the O&M of the item. KSC provides these storage facilities to the operating organizations and includes any environment control necessary to protect the equipment. The use of these storage areas is limited to the GSE peculiar items which were provisioned.

2.3.4.1 Issue. The issue of parts from these specialized stores is controlled by the cognizant operating organization. Personnel are authorized to make withdrawals from this stock in accordance with the procedures established by the controlling organization.

2.3.5 MAINTENANCE AND DISPOSITION. The maintenance of spares stock to support KSC-procured GSE includes both quantity and quality. The quantity is monitored by the operating organization. Replenishment procurement requests are originated by the cognizant operating organization and processed in a manner similar to that for initial provisioning. A decision to replenish the stock of a specific spare includes consideration of the usage, reliability, and obsolescence of the item.

The maintenance of stock quality assumes that units indicated by stock records as available are serviceable and ready for use. The maintenance controls, therefore, include consideration of environmental control, shelf life, calibration review, inspection and modification.

2.3.5.1 Disposition. The disposal of GSE spare parts which have been accepted as government property is accomplished within the controls imposed by Government, NASA, and KSC procedures and regulations. Any component or assembly removed from an end item as unserviceable or any spare removed from stock because it is not considered suitable for issue is a subject for disposition action. The four principal causes for such rejection are damage or wear, obsolescence, malfunction, and the warranty provisions of the contract which protect the rights of the Government against latent defects.

The operating organization having control over the part is responsible for determining if the part can be restored to serviceable condition. If the decision is affirmative and economically feasible, it initiates appropriate action to accomplish the restoration. If the decision is negative, the part is referred to Quality Assurance for preparation of a rejection report. Items under accountability control are reported to the Property Officer. Relief of accountability is not effected until final disposition is accomplished. (See Figure 2-3.)

Material scheduled for disposition is transferred to MSB. Such material undergoes a further review to determine if a possible utilization exists. As an aid in this review, the MSB may request the technical assistance of the Disposition Review Board, a group of technicaly qualified personnel appointed by the Director, KSC. This Board evaluates all the data pertinent to the rejected material under review and provides a disposition decision. Material consigned to salvage and scrap is delivered to the Salvage Officer, Eastern Test Range. If applicable, relief of accountability is obtained through the KSC Property Officer.

2.3.6 DOCUMENTATION AND REPORTS. The logistic documentation for KSC-procured spares is provided by KSC. This documentation includes the technical support data needed to supplement the design drawing set and provide procedural guidance for material support. The technical support data is generated within KSC by the KSC division having operational and maintenance responsibility for the applicable equipment.

Changes to existing documentation are incorporated by the cognizant KSC division responsible for assuring the KSC records are supplied with current and accurate data.

Each KSC division with provisioning, storage, and issue responsibility for the spare parts in this category provides reports containing information pertinent to inventory stock status, usage data, modification and repair status. Additional reports required by other KSC organizations must have the concurrence of the KSC Apollo/Saturn Program Manager prior to implementation.

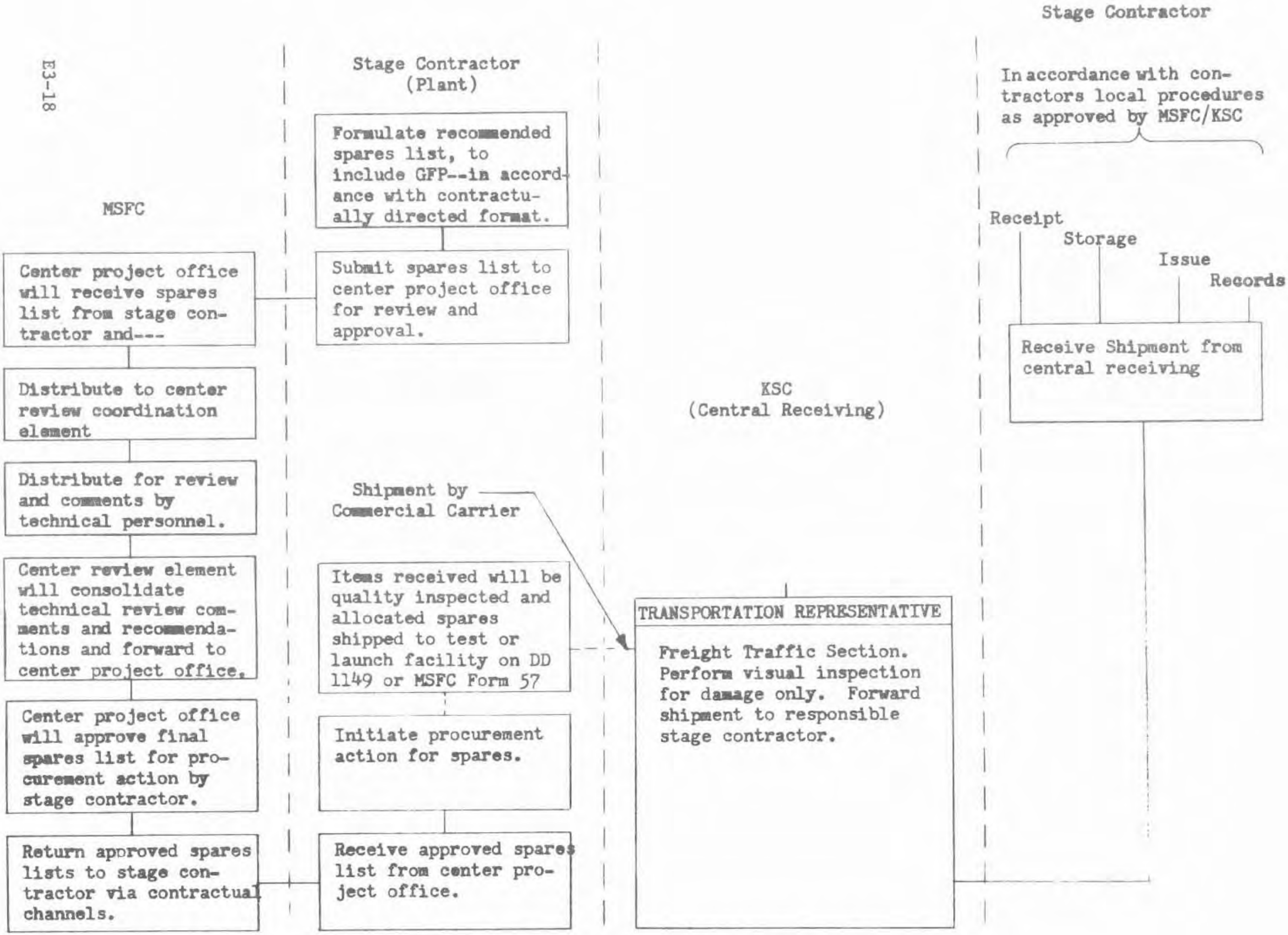

Figure 2-1. Provisioning and Flow of Logistics Spare Parts and Components

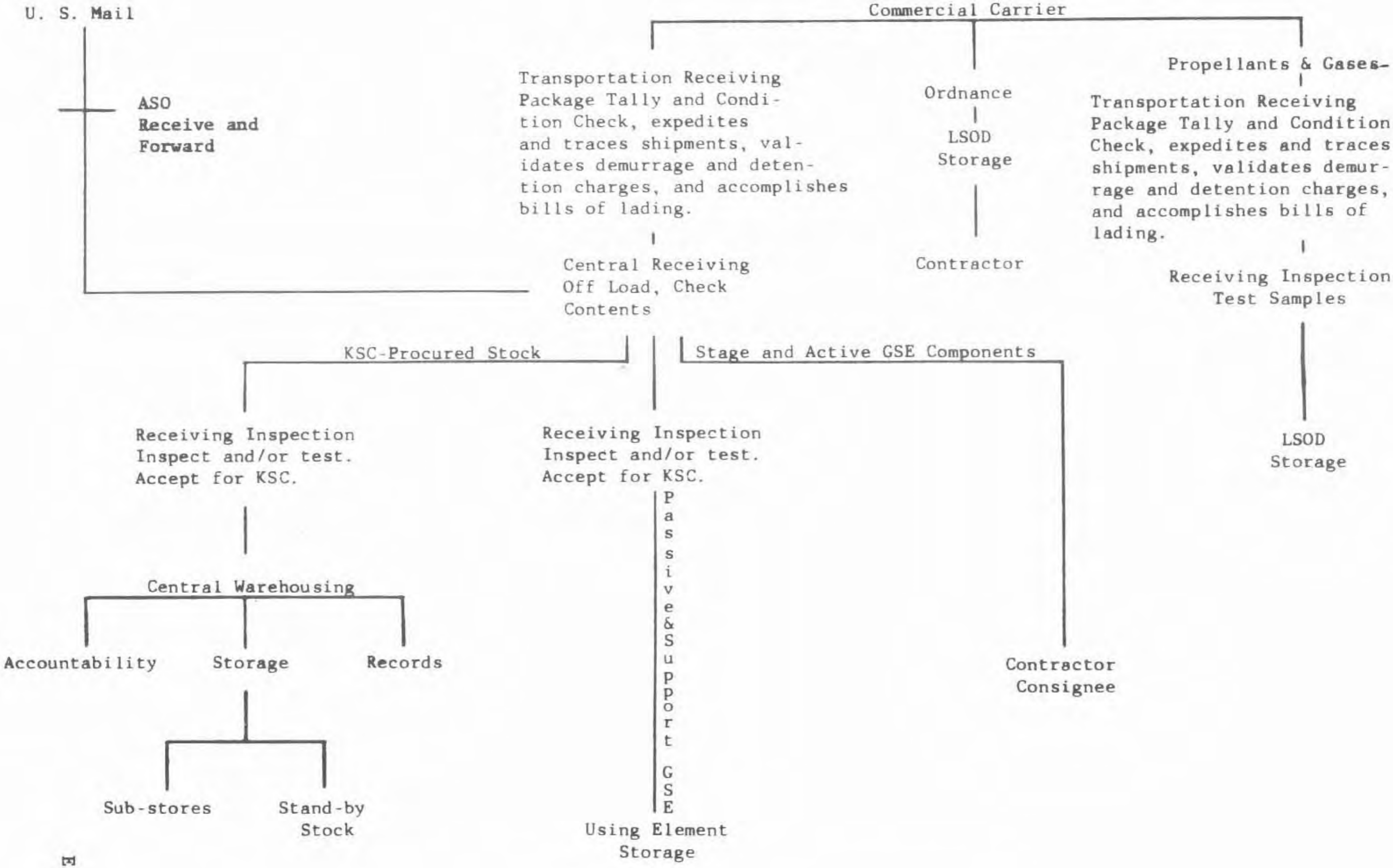

Figure 2-2. Receiving and Distribution

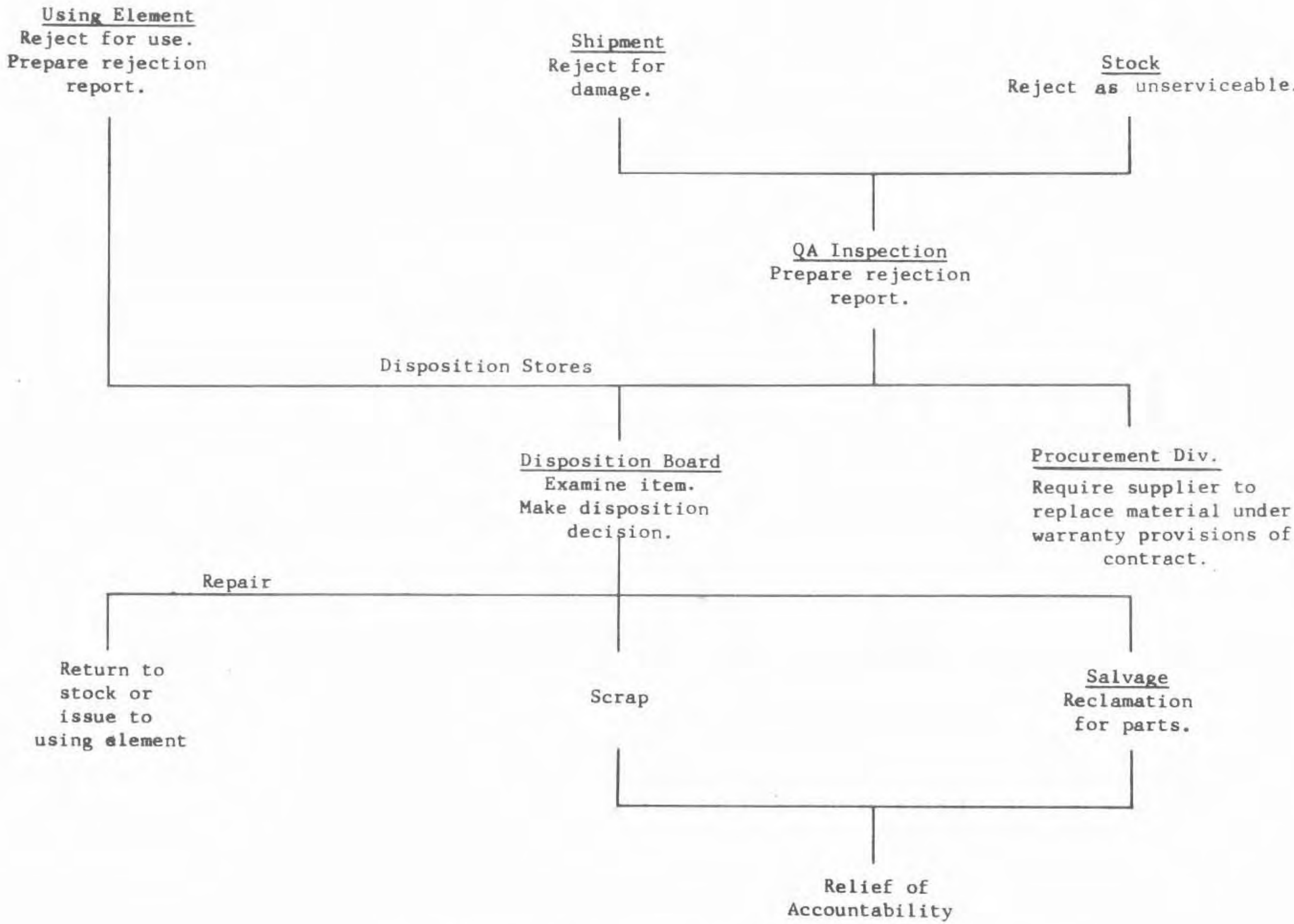

Figure 2-3. Disposition and Salvage

SECTION III
KSC FACILITY SPARES

3.1 GENERAL

Spares in this category are limited to those items which are part of the real property installed equipment (RPIE) or the mechanical and electrical equipment installed in buildings. These spares are not normally provided as common stock items. They are frequently off-the-shelf items from the manufacturer, but are components of a system or equipment which has been designed or procured against a specification to meet KSC or program requirements. Because of these specifications, they are not interchangeable with similar items of common stock. For purposes of this Exhibit, discussion is limited to those facilities which are primarily in support of the Apollo/Saturn program.

3.1.1 PROVISIONING AND PROCUREMENT. RPIE systems are permanently installed to provide distribution systems for KSC-supplied utilities. They are designed and built to meet program requirements. The components have been selected to meet specification criteria and spares support must be consistent with the criteria in order to maintain the integrity of the system. The piping, tubing and cabling are included in the provisioning plan only when evidence exists that replacement may be necessary. The interface or connecting items, particularly those with control functions and operating mechanisms, are considered vulnerable to the need for periodic replacement. Typical of these are valves, pumps, gages, motors, switches, etc.

The selection of components for spares provisioning is the responsibility of the KSC organization with operational and maintenance cognizance. For those systems operated by one organization and maintained by another, the maintenance organization compiles the list of selected spares and submits it to the operating organization for concurrence and approval. (See Figure 3-1.)

These selected items are identified by a "find" number. This "find" number is cross-referenced with the full identification of the item, including nomenclature, vendor part number, vendor and specification. All pertinent identification is included on the provisioning list to assist procurement action. Further explanation of the "find" number system is found in paragraph 3.1.6.

Many of these selected items are complete assemblies. As such, they are within the repair capability of KSC shops. A review of these assemblies is conducted with the various shops for the provisioning of components used to support repair. The vendor's recommended spare parts list is used as a guide for this purpose.

The completed provisioning list, including the detail repair parts, is forwarded to the KSC Material Support Branch, who reviews it against the KSC stock of common and interchangeable parts. Items which can be supplied from

KSC common stock are deleted from the provisioning list and are treated as indicated in Section IV of this Exhibit. At completion of this final screening, the list is ready to enter the procurement cycle.

The provisioning of spares to support the installed building equipment follows a similar pattern. Typical of such equipment are cranes, elevators, transformers, power-operated doors, heating and air-conditioning systems, etc. Some of this equipment is supported by the manufacturer, either for a warranty period or for an indefinite time. The selection of component spares to support these installations is based on a review of the manufacturer's recommended spare parts list, plus application of data gained from maintenance experience with similar equipment. It is modified by any responsibility the manufacturer may have under a warranty or contract agreement. BOD is responsible for selecting the component spares support. The selection includes the detail parts needed by KSC repair shops for the repair of component assemblies. In the Complex 37 area, for those items assigned by LSOD to BOD for maintenance, the provisioning list compiled by BOD is reviewed and endorsed by LSOD prior to release for procurement.

As in the case of RPIE, MSB conducts a review of the selection for possible availability of items from KSC common stock. Such items are deleted and the list is released to the procurement cycle.

Spares support for serviceable facilities, such as furniture and office equipment, is limited to that hardware which the BOD maintenance shop requires to repair furniture. Office equipment spare parts are not required. Repair of this equipment is accomplished through a service contract with the vendor or a service contractor.

3.1.1.1 Procurement. The procurement of facility spares to support the Apollo/Saturn Program is limited to those items which can be specifically identified with the program. Facility spares which are identified with general base support are exempt from consideration in this plan.

MSB is responsible for initiating procurement requests (PR) for the items on the approved provisioning list. The PR's contain complete identification and estimated cost.

Quality Assurance reviews the PR and indicates thereon if receiving inspection and/or test is required for the item. The PR is returned to MSB.

The Transportation Office, Procurement Traffic Advisory Branch, reviews procurement requests and recommends the FOB terminology and the mode of transportation which will meet the desired delivery date at the most economical cost.

MSB compiles the estimated cost of the items on the PR. When total cost is under $1000, the PR is forwarded to the Financial Management Division (FIN). When the estimated cost equals or exceeds $1000, the PR is submitted to the Director, Plans, Programs and Resources (PPR) for program control evaluation.

This evaluation includes the applicability of request as a program funding responsibility and the availability of funds for obligation to this purpose. This office may, if deemed necessary, request further clarification and/or justification of this procurement as a program charge from the provisioning organization. Final concurrence and endorsement by PPR releases the PR to FIN.

FIN is responsible for establishing account designations by which the costs obligated from the PR may be correctly segregated. FIN also monitors the commitments and disbursements to prevent overrun of obligated funds. The completion of accounting controls permits the release of the PR to the Procurement Division (PRO).

PRO reviews the PR, considers the sources recommended by the provisioning organization and selects the vendors considered best able to provide the requested items in compliance with specifications, schedules, etc. PRO also selects the appropriate method, i.e., open bid or single source, and issues purchase orders in accordance with existing procedures, regulations and statutes.

3.1.2 RECEIVING AND DISTRIBUTION. Facility spares, being KSC-procured, are received at KSC by TPN-22. This organization inventories the packages for shipping damage, and prepares, or assists in preparing, discrepancy or damage reports. Accepted shipments are forwarded to the central receiving facility operated by MSB (Figure 2-2).

At the central receiving facility, the shipment is off-loaded and the packages opened. MSB inventories the contents and arranges for QAS inspection.

QAS inspects in accordance with the information on the PR and the established procedure for the item. If testing is required, QAS either performs the test or arranges for, and monitors the test when performed by other organizations. Final acceptance for KSC is the responsibility of QAS.

3.1.2.1 Distribution. MSB distributes facility spares in accordance with instructions contained in the record for the item. If an immediate requirement exists for a part, it is transferred to the requisitioning organization. Items for which no immediate requirement exists are distributed to the appropriate facility spares storage area.

3.1.3 ACCOUNTABILITY. Facility spares are accountable under the provisions of NASA Regulations 20-18 and NASA Appendices B (NPC 105A) and C (NPC 400). Accountable items are those for which custodial responsibility is fixed to assure effective usage. To be so classified, an item must meet all of the following criteria:

a. Have an estimated service life of one year or more

b. Have an initial unit acquisition cost of $50 or more

c. Retain its identity when put to use

d. Will not be consumed during an experiment.

Equipment items with a unit acquisition cost of $50 to $199.99 are charged to operating costs by the using organization, either upon direct receipt from vendor or upon issue from stores stock. Equipment with a unit cost of $200 or more is capitalized and included in fixed assets. The KSC Property Officer is responsible for prime accountability of KSC-procured items. Secondary accountability may be assigned through the Property Management Area System.

3.1.4 STORAGE AND ISSUE. The storage of facility spares is controlled by BOD through the central supply complex. Warehousing space is assigned in both the general warehouse building and the central supply facility. On Complexes 34, 37 and 39, secondary storage is provided through the substore system, operated by BOD/MSB. This storage is limited to those spares needed to support the facility systems maintained by BOD for SOP.

3.1.4.1 Issue of Facility Spares. Authorization to withdraw spares from stock is controlled by KSC Administrative Regulation 20-8. This regulation covers issues from both the central warehouse facility and the MSB substores. The procedure to obtain authority to request issue is also contained in this regulation.

3.1.5 MAINTENANCE AND DISPOSITION. Facility spares indicated on the records as "in stock" are considered to be serviceable and ready for use. The maintenance of stock quantities is controlled through stock replenishment procedures. Maintenance of stock quality is controlled through inspection, environment control, shelf life control, calibration, and modification.

3.1.5.1 Replenishment of Stock. This action is accomplished either by:

a. Automatic reorder of items classified for minimum/maximum stock controls. These items are used on a continuing basis and reorder occurs when stock reaches minimum quantity. Action responsibility belongs to BOD/MSB

b. Monitoring of item for usage, reliability and obsolescence. The organization which provisioned the item initially, is responsible for the monitoring and the ordering of replenishment stock.

3.1.5.2 Inspection. Quality Assurance Division (QAS-1) is responsible for developing and issuing the inspection procedures applicable to stored items of facility spares. These procedures are developed with the assistance of BOD and LSOD.

QAS-1 is also responsible for performing inspections on stored material or for authorizing personnel of other organizations to perform inspections where certification is required. Routine examination of stock for expired serviceability does not require an authorized inspector; however, any units found in this condition are referred to an authorized inspector for certification or disposition.

3.1.5.3 Environmental Control. KSC provides controlled environment for the storage of parts which contain ingredients or material subject to deterioration when stored under ambient climatic conditions. BOD is responsible for insuring that the correct environment is provided and maintained for the storage of facility spares.

3.1.5.4 Shelf Life Control. Shelf life is that period of time an item may remain unused in storage, without deterioration effect on its serviceability. Typical of this are items containing seals or gaskets made of material which may dry out or shrink under storage conditions. Stock management practice uses a rotation sequence to issue older units ahead of units with a later expiration date. BOD provides procedures for controlling issues within this practice and is responsible for removing items from stock when they have passed their expiration date. Such items are submitted for authorized inspection. They may be dispositioned by recertification, reconditioning or salvage.

3.1.5.5 Calibration. Items requiring periodic calibration to ensure serviceability are controlled in a manner similar to that for shelf life control. Each unit has the latest date when calibrated and the calibration expiration period indicated on the package or attached to the unit. Also included with the unit is a blue line calibration curve. BOD is responsible for monitoring the calibration status of stored facility spares. Units with expired calibration periods are removed from stock and delivered to the Materials Testing and Calibration Division (SOP-4) for recalibration and certification.

3.1.5.6 Disposition. Facility spares rejected for use for any reason are reviewed by BOD to determine preliminary disposition action. First consideration is to restore serviceability by repair, calibration, or any other method readily available through KSC services. If such restoration is not considered feasible, the item is recommended for evaluation by MSB and the disposition review board. When no further use is apparent for the item, the board classifies it for salvage and/or scrap (Figure 2-3). MSB arranges for relief of accountability, if applicable.

3.1.6 DOCUMENTATION. The engineering documentation for facility systems consists of "as built" drawings. On these drawings, the items selected for spares support are identified with a "bubble" containing a "find" number. This number is an arbitrary selection by KSC and serves only to identify the item in the logistic documentation.

The logistic documentation cross-references the "find" number to the items identification and its location in the system. This positive relationship provides rapid identification for replacement and minimizes the chance for error. Additional documentation selects the "find" items which can be repaired from the vendor's parts list.

The documentation for building equipment consists of the manufacturer's manuals, drawings and recommended priced spare parts list, provided with the equipment.

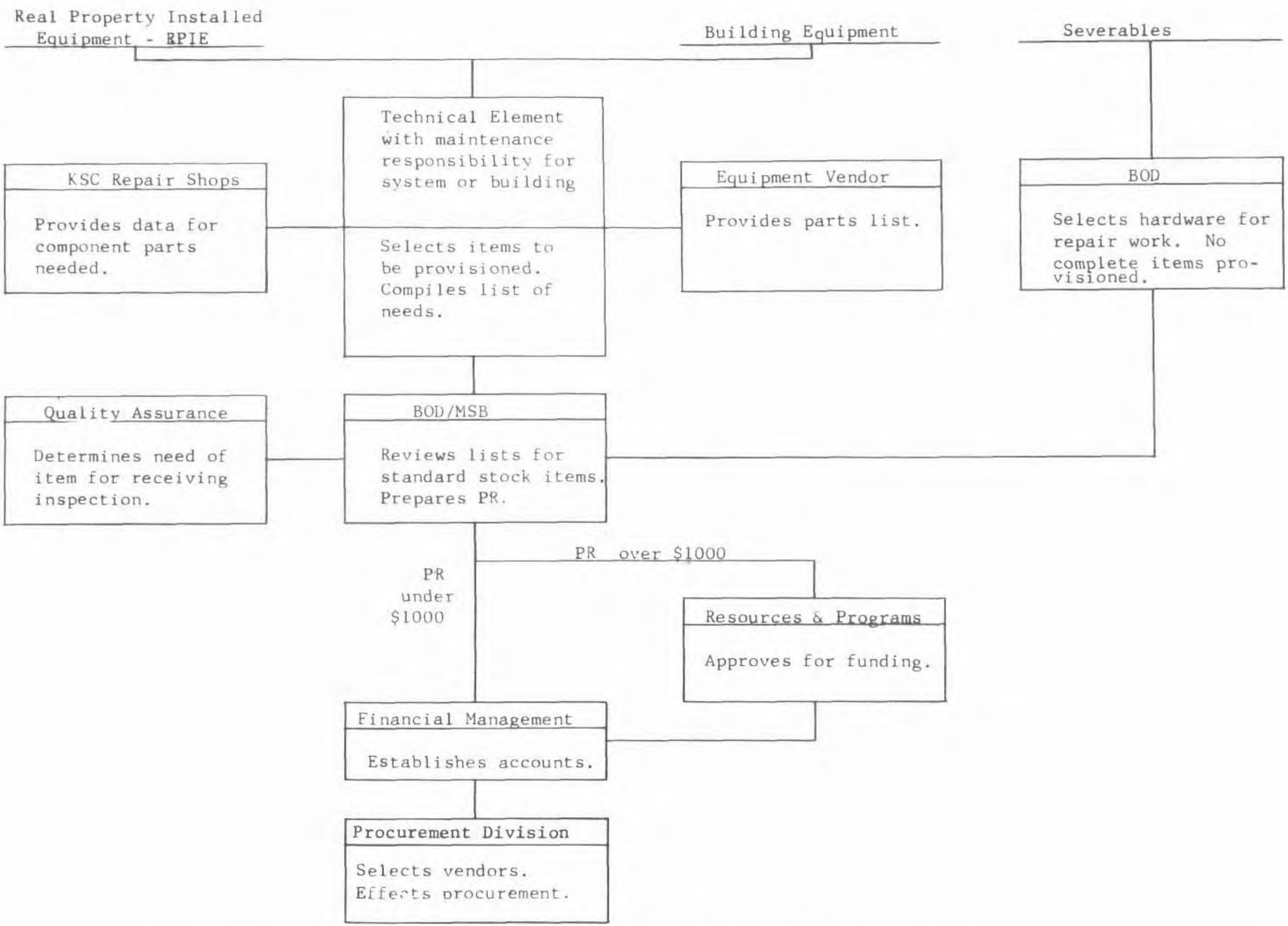

Figure 3-1. Provisioning and Procurment Facility Spares

SECTION IV
COMMON MATERIALS

4.1 GENERAL

At KSC these items are considered as items of general use which are procured as an off-the-shelf product to a commercial or military standard specification. Included are industrial stock, interchangeable spares, office supplies, and consumable products, such as paints, oils, lubricants and industrial chemicals. KSC provisions, procures and stocks these items for general purpose requisitioning by NASA/KSC organizations and authorized NASA contractors. The authorization for a contractor to requisition these materials is contained in the contract defining the contractor's operation at KSC. The contract also identifies any exceptions or limitations applicable to these requisitions.

4.1.1 PROVISIONING AND PROCUREMENT. The KSC policy for common materials is a recognition of the economic advantages attendant to consolidated procurement, handling and storage methods. It is applied to:

a. Consolidation of multiple requests for like items into single procurement request

b. Cross-relation of contractor-identified parts to standard specification and deletion of these items from special procurement contracts

c. Use of competitive bid technique

d. Price benefits through greater quantity per order.

The control of provisioning common materials is vested with BOD/MSB. Selection of items for stock and the maximum/minimum quantities to be maintained is determined by usage. KSC and contractor organizations may request that an item be stocked. MSB makes decision whether usage will justify stocking the item or satisfy requirement by special purchase or substitute (Figure 4-1).

4.1.1.1 Industrial Stock and Interchangeable Spares. Industrial stock consists of raw or bulk material which can be used for fabrication of specific items. It is generally provided in bar, sheet or bolt form against a standard specification. Typical of such stock is tubing, metal bars, steel, plastic or glass plate, fabric or metal netting, and cable.

Interchangeable spares are fabricated or machined parts manufactured to standard specifications for general purpose application. Typical of such parts are AN Standard and Military Standard items. Provisioning of industrial stock is developed from an analysis of the requirements from KSC shops and laboratories which are engaged in fabrication, repair or modification functions, and by engineering functions interested in fabrication of experimental or prototype items. Selections are made from the specifications provided by a variety of vendors compatible with the requirements of the using organizations. Quantity is limited as the items are generally available in vendors' stock and usage does not involve production runs of the fabricated items.

Industrial stock selection is developed from composite requisitions from using organizations; usage data and extractions of these items from recommended provisioning lists developed for GSE and facility spares support. Quantities are established from usage data and to support a maximum/minimum stock control technique.

BOD/MSB is responsible for preparing the Procurement Requests (PR) for the items required and including all data pertinent to identification, specification and potential sources.

Quality Assurance Division (QAS-1) is responsible for reviewing the requirements and indicating on the PR if receiving inspection is required for the item.

Program Control Office (PPR-3) is responsible for assuring that funding is available to support procurement.

Financial Management Division (FIN) is responsible for establishing account controls within the funding provisions.

Procurement of the PR items is the responsibility of the KSC Procurement Division (PRO). This organization procures in accordance with existing procedures, regulations and statutes.

Transportation Office (TPN) assists PRO by providing traffic management analyses, recommending FOB terminology and selecting modes of transportation.

4.1.1.2 Office Supplies. These are items commonly expended on office tasks. Typical examples are paper, pencils, paper clips, stencil masters, office machine tapes, typewriter ribbons, etc.

Provisioning of these items consists of establishing basic stock quantities with automatic reorder levels. Stock levels are determined from past usage records. BOD/MSB is responsible for establishing items and stock levels, and is also responsible for requisitioning those items available from Government stock. This organization procures in accordance with existing procedures, regulations and statutes.

4.1.1.3 Consumable Supplies. This group includes items which are consumed or are unrecoverable in the course of use. Except as noted, KSC provides these items to KSC and contractor organizations engaged in operations requiring their use. On Complexes 34 and 37, for the Saturn IB Program, the operating contractors provide the paints, oils, lubricants and industrial chemicals except freon which is provided by BOD/MSB. Similar items used on Complex 39 and KSC industrial area for the Saturn IB and Saturn V Programs are provisioned by BOD/MSB.

Motor fuel, which includes gasoline, diesel and aircraft fuel, is provisioned by three methods: fuel to support the motor vehicle pool operated by GSA; fuel to operate the stationary gasoline engines and those vehicles controlled and operated by KSC, is provided by GSA. Diesel fuel is provided by BOD. Aircraft fuel is provided by AFETR.

Procurement action for items procured by KSC is implemented by PRO. Items showing continuous usage are procured in accordance with existing procedures, regulations and statutes.

4.1.1.3.1 Propellants, Gases and Ordnance. These consumables are not considered a part of this plan. Information about their management is in other sections of the Logistics Plan.

4.1.2 RECEIVING AND DISTRIBUTION. Inbound shipments of common materials procured by KSC are received at the central receiving area in the Central Supply Facility (Figure 2-1).

A TPN representative examines the shipment for shipping damage and verifies the shipment to the shipping documents.

BOD/MSB off-loads the shipment from the carrier. Full carrier loads of an item destined for storage other than the central warehousing facility may be directed to the appropriate storage area for off-loading. MSB also unpacks the shipment and arranges for receiving inspection of those items so indicated previously by QAS.

Receiving inspection and certification is accomplished by QAS, using the applicable sampling plan of MIL-STD-105.

4.1.3 ACCOUNTABILITY. The accountability for KSC-procured common material is maintained by the KSC Property Officer. The governing regulations are NASA/KSC 20-18 and Appendices B (NPC 105A) and C (NPC 400). Common material is considered accountable only while stored in the central warehousing facility or the substore system. They are considered expended when issued to shop or bench stock.

4.1.4 STORAGE AND ISSUE. The storage of common material is divided among several storage areas, depending on the type of material and its storage requirements.

Industrial stock, except bulk electrical cable, is stored in the central warehousing facility. Cable is stored in the communications storage facility, located in the south central portion of the KSC industrial area.

Interchangeable spares are stored as follows: Small non-electrical items are stored in the general warehouse; spares for support of the communication systems are stored in the communication storage facility; electronic communication items are kept in 4000 square feet of dehumidified area in the same building; general purpose electronic spares are stored in a dehumidified area of 5000 square feet in the central supply building.

The substores operated by MSB in close proximity to work areas carry small stocks of selected items in this category. The selection is made from data provided by the technical organization served by the substore. Electronic items are distributed only to those substores with a suitable storage environment.

Office supplies are stored in the central warehousing area. Substores servicing office areas carry limited stocks of these supplies.

Consumable supplies are stored in the Paint and Oil (P & O) Building, located between B and C Avenues and 4th and 5th Streets. This building is operated by MSB. It is designed for the storage of flammable and hazardous materials, excluding nuclear products, propellants, gases, fuel and ordnance. For the Saturn IB Program, the consumable items provided by the contractor for use at Complexes 34 and 37 are stored separately in the contractor's allotted facility. No gasoline is permitted in this facility.

Secondary storage areas for P & O items in support of Apollo/Saturn Programs are provided convenient to points of use. One such is the P & O Building on the west side of the VAB, opposite the low bay structure. This area also includes facilities for dispensing, mixing and processing the P & O materials used on Complex 39. A second area is provided for solvent storage at the Propellant Systems Component Laboratory, located at Wilson, north of State Road 402 and west of Merritt Island Road.

Storage for automotive fuel is provided at the vehicle maintenance facility, operated by GSA. BOD stores automotive fuel in a mobile tank truck for servicing stationary equipment.

A bulk fuel oil storage tank, with a capacity of 173,000 gallons is operated by BOD at the central heating plant, located on the northwest corner of Third Street and C Avenue.

4.1.4.1 Issue of Common Materials. Withdrawal of material from the central warehousing facility or the substores is controlled by MSB under the provisions of Administrative Regulation 20-8. This same regulation also provides the procedure to obtain authority to request issue.

4.1.5 MAINTENANCE AND DISPOSITION. The maintenance of stock quantities is accomplished through an automatic replenishment order system, operated by BOD/MSB. The system includes maximum/minimum stock levels for items reflecting continuous usage. It covers both central supply and substore stocks, and a regular review of usage records permits stock adjustment compatible with variations in requirements.

The quality maintenance is a less significant facet, since the parts involved seldom require more than a suitable environment. MSB and QAS jointly collaborate on a program of inspection to monitor stock condition.

Disposition of unserviceable or obsolete stock is accomplished through a review and formal rejection by QAS. The conditions leading to the rejection guide MSB in determining final disposition. When no acceptable use for material can be found, it is consigned to salvage or scrap.

4.1.6 DOCUMENTATION. Common materials used at KSC are documented through the Federal Cataloging Program. BOD/MSB maintains a reference library consisting of Federal cataloging handbooks and supply catalogs, DOD and NASA supply catalogs and Federal, Military and Industrial specifications.

Selected segments of this identification media are maintained by technical organizations. These segments are limited to the material classifications most frequently used in their operation.

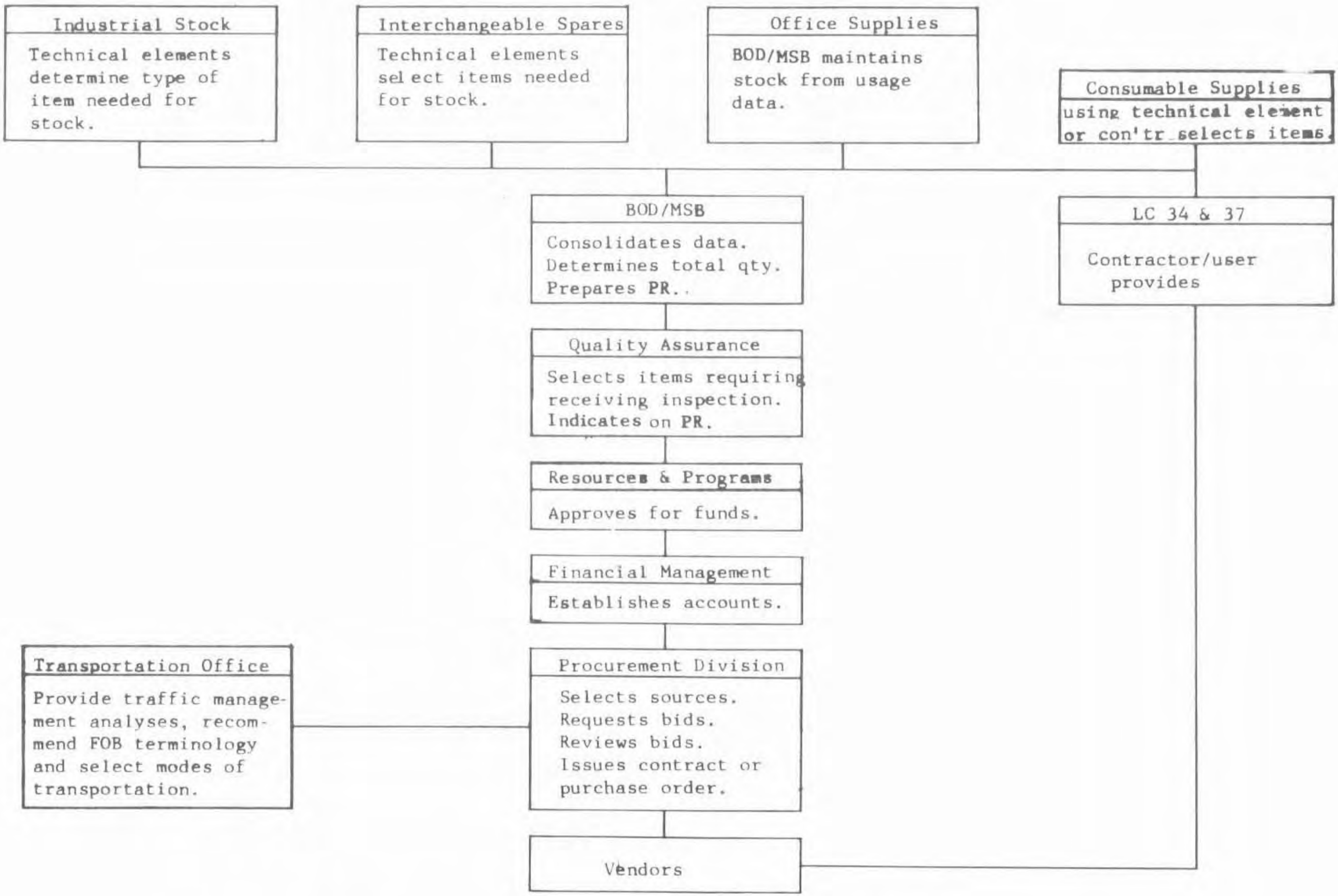

Figure 4-1. Provisioning and Procurement Common Materials

SECTION V
TOOLS AND TEST EQUIPMENT

5.1 GENERAL

The support of tool and test equipment requirements provided by KSC is applied within the following three categories:

a. Expendable hand tools and test equipment. - These are tools of relatively low acquisition cost and are vulnerable to wear, breakage or loss in the course of use. Typical of such tools are screwdrivers, pliers, cutters, saw blades, light hammers, files, etc. When damaged, they can seldom be repaired and their low cost recommends replacement rather than to process through the repair cycle.

Expendable test equipment items include low accuracy VOM's, voltmeters, ammeters, ohmmeters, etc., which are used for checking circuitry and troubleshooting. These instruments are extremely vulnerable to misuse and breakage.

b. Bench-type laboratory test equipment and power tools. - These items include a wide variety of general purpose laboratory test equipment and power tools. Most items in this category are classed as capital equipment and their cost justifies repair whenever feasible.

c. Special tools designed by LSEED. - These are special purpose items, which were not identified as end items, but which are provided as Government-furnished property (GFP) for use by a contractor.

5.2 EXPENDABLE TOOLS AND TEST EQUIPMENT.

Provisioning of these items is the responsibility of MSB. Each KSC organization and contractor defines the tools needed by their technicians. MSB consolidates these requirements, applies a replacement factor based on utilization experience, and establishes a basic stock requirement. Limitations applied to test equipment items are influenced by the item shelf life and vulnerability to deterioration. The PR is prepared by MSB, and QAS indicates the need for receiving inspection (Figure 5-1).

Procurement action is similar to that for common stock items. These tools are available off-the-shelf from several vendors and are produced to relatively standard specifications.

FIN and PPR-3 exercise the same financial control as for common material.

5.2.1 RECEIVING AND DISTRIBUTION. Receiving action is performed at the central receiving facility and QAS performs receiving inspection. When indicated, MSB distributes to central storage or local tool cribs, according to authorized needs.

5.2.2 ACCOUNTABILITY. Accountability of these items is maintained by the Property Officer while the item is in storage.

5.2.3 STORAGE AND ISSUE. MSB maintains principal storage in a section of the central warehousing area and secondary storage in a system of tool cribs located in the principal work area.

Issue of these tools is controlled by MSB, in accordance with NASA/KSC regulations. KSC personnel and KSC-approved contractors, upon proper authorization, are eligible to use this service.

5.3 POWER TOOLS AND TEST EQUIPMENT.

These items are provisioned by the Materials Support Branch (SOP-23) directly from the consolidated input of the technical organizations and the KSC contractors, or by SOP-4 through SOP-23. This stock of equipment and tools supports the operational requirements through an issue and maintenance system. This relieves the individual organizations from provisioning and maintaining their own power tools and that test equipment not required for daily use in the individual laboratories.

5.3.1 RECEIVING AND DISTRIBUTION. Receiving and distribution are similar to that described in paragraph 5.2.1.

5.3.2 ACCOUNTABILITY. Accountability for these items is maintained by the KSC Property Officer. The majority of these items are capital equipment by virtue of meeting all of the following criteria:

a. Have an estimated service life of one year or more

b. Have an initial unit acquisition cost of $200 or more

c. Retains its identity when put to use

d. Will not be consumed during an experiment.

5.3.3 STORAGE AND ISSUE. Storage for power tools is provided by SOP-23 through the tool cribs. Issue is controlled through a loan system to authorized organizations and personnel. General purpose test equipment will be issued from a common load pool by SOP-4.

5.4 SPECIAL TOOLS AND TOOLING.

Items in this category which have been designed by KSC/LSEED are supplied as GFP to the using organization. Provisioning of spares support for such items is the responsibility of LSEED (Figure 5-1).

Distribution of such spares is made to the organization using the tool.

Items which have been designed and built by MSFC or MSC or by a contractor under their contract cognizance, are supported by spares provisioned by either MSFC or MSC. Upon receipt at KSC, these spares are distributed, stored and issued in the same manner as stage or spacecraft spares.

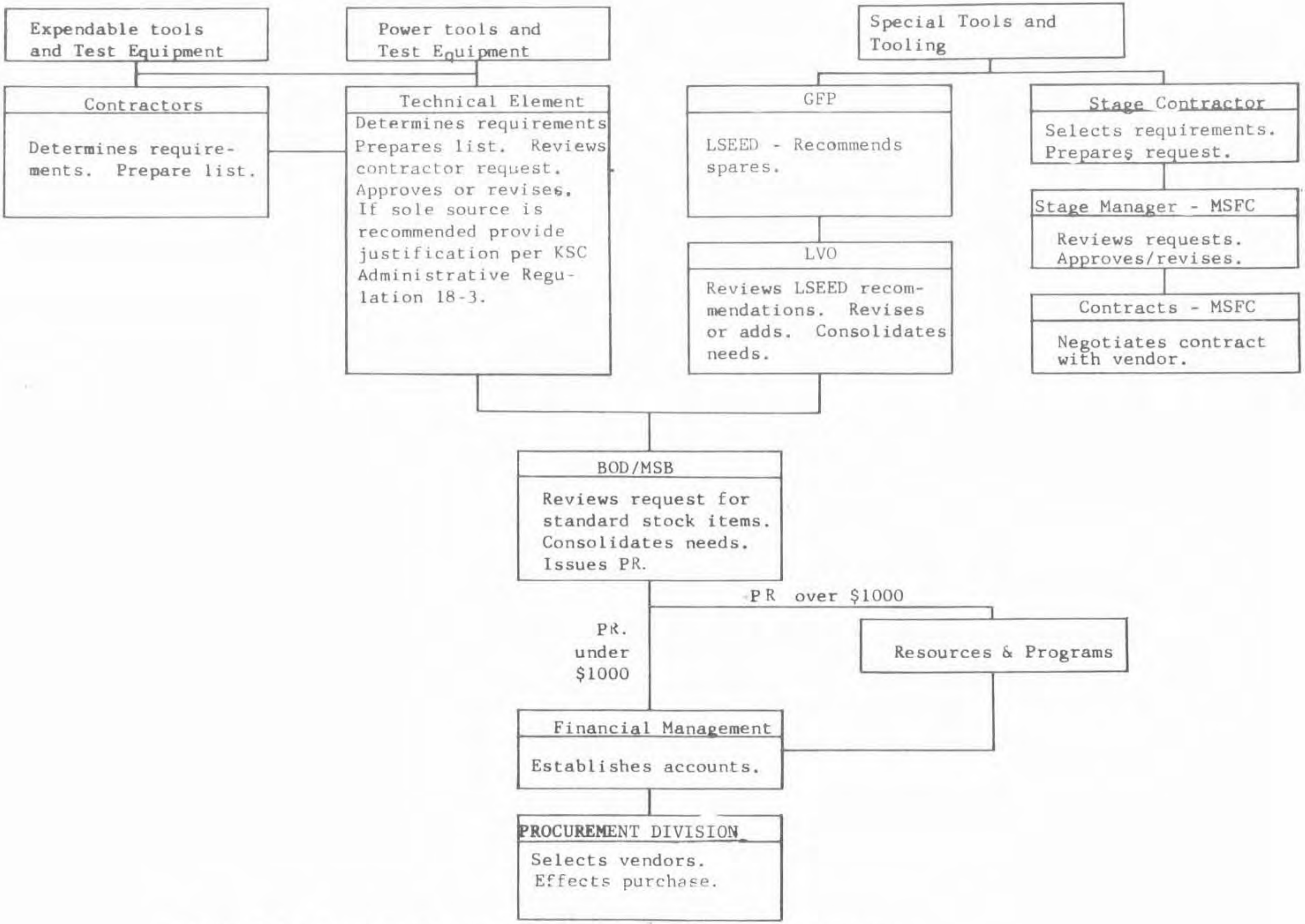

Figure 5-1. Provisioning and Procurement Tools and Test Equipment

EXHIBIT 4

KSC APOLLO/SATURN TRANSPORTATION

REQUIREMENTS PLAN

EXHIBIT 4

EXHIBIT 4
KSC APOLLO/SATURN TRANSPORTATION REQUIREMENTS PLAN

FOREWORD

This exhibit is substantially a reprint of Section IV, APOLLO/SATURN TRANSPORTATION PLAN, of K-AM-02, 13 December 1965. Some limited editing has been performed to eliminate redundant material (such as definitions which are included in Appendix D to this edition of K-AM-02). This exhibit in its present format is included herein to permit supersession of the 13 December 1965 issue of K-AM-02. Further, that issue contained a much more limited distribution than the present document.

Recipients are advised that a revision to this Exhibit is in process not only to reformat it but also to update the material included herein. Publication date of the revised Exhibit 4 is August 1966.

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EXHIBIT 4
KSC APOLLO/SATURN TRANSPORTATION REQUIREMENTS PLAN

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EXHIBIT 4
KSC APOLLO/SATURN TRANSPORTATION REQUIREMENTS PLAN

SECTION I
INTRODUCTION

1.1 GENERAL

This transportation plan is concerned with the plans, policy, responsibility, and interfaces required to support the Apollo/Saturn programs at KSC.

The plan provides for the off-loading and movement of the various stages of launch vehicles and the spacecraft. It also contains the management tools for assuring that the general and special transportation requirements of the Apollo/Saturn programs are met.

1.2 SCOPE

All functional activities of the Apollo/Saturn programs at KSC requiring transportation support are covered in this plan. The plan further establishes the policies and fixes the responsibility for the acquisition of vehicles and the control of the transportation activities.

1.3 POLICY

The following policy statements are designed to establish and clarify those areas within the transportation field where interfaces could cause difficulty or delay. They also establish the guidelines and define the areas of operation.

1.3.1 GENERAL TRANSPORTATION POLICY. The Motor Vehicle Coordinator will be responsible for all vehicle activities within his division or office. This includes screening and validating all requests for vehicles as well as acknowledging receipt of permanently assigned vehicles.

All vehicle requirements will be submitted at the beginning of the first and third fiscal quarters to the KSC Transportation Office for approval. When a change in the program requires a major change in transportation support, the vehicle needs must be submitted to the Chief, Transportation Office 90 days in advance.

The General Services Administration (GSA) will maintain and supply all general purpose vehicles to be used by NASA business within the Cape Kennedy Air Force Station and Kennedy Space Center.

Some special purpose vehicles and heavy equipment will be requisitioned and maintained by BOD. Normally, these are considered to be equipment. In some cases only the vehicle portion but not the heavy equipment portion will be maintained by BOD.

Vehicle mileage will be recorded daily by the user. Official assigned vehicles on a permanent basis will report this mileage on GSA Form 494, "Monthly Motor Vehicle Use Record" to GSA on the first work day following the close of each month. User of vehicles on temporary dispatch will complete KSC Form 7-38, Motor Vehicle Trip Ticket, and deliver this to the dispatcher when the vehicle is returned.

Transportation may be provided for NASA personnel officially participating in public ceremonies and other public affairs activities. Also, certain qualified groups may be transported when such transportation is in the interest of public and community relations and is approved by the Director of KSC.

Vehicles will be furnished stage and mission contractors in performance of their contracts on Cape Kennedy Air Force Station and Kennedy Space Center, when justification is developed jointly between the contractor, COR, and Operations/Program Manager, in accordance with existing KSC procedures. The results will be submitted to the Transportation Office, who will evaluate and determine how the requirements will be filled, then notify the COR of action to be taken.

A Shuttle Bus Service will be operated for the express purpose of transporting personnel on official businesss between work areas within the Cape Kennedy Complex. This service will be utilized, whenever practicable, in lieu of other government furnished services.

Vehicles on permanent dispatch that become idle and for which no immediate need (one work week) is anticipated, should be made available for temporary dispatch.

The Transportation Office is designated to control all commercial transportation and related services. This same office will arrange for travel by MATS, Commercial Charter, NASA aircraft and air taxi.

A central shipping and receiving facility will be maintained which will prepare and process all the required documentation to assure proper delivery and accounting of material arriving or departing KSC. This facility will provide the personnel who handle each incoming and outgoing item.

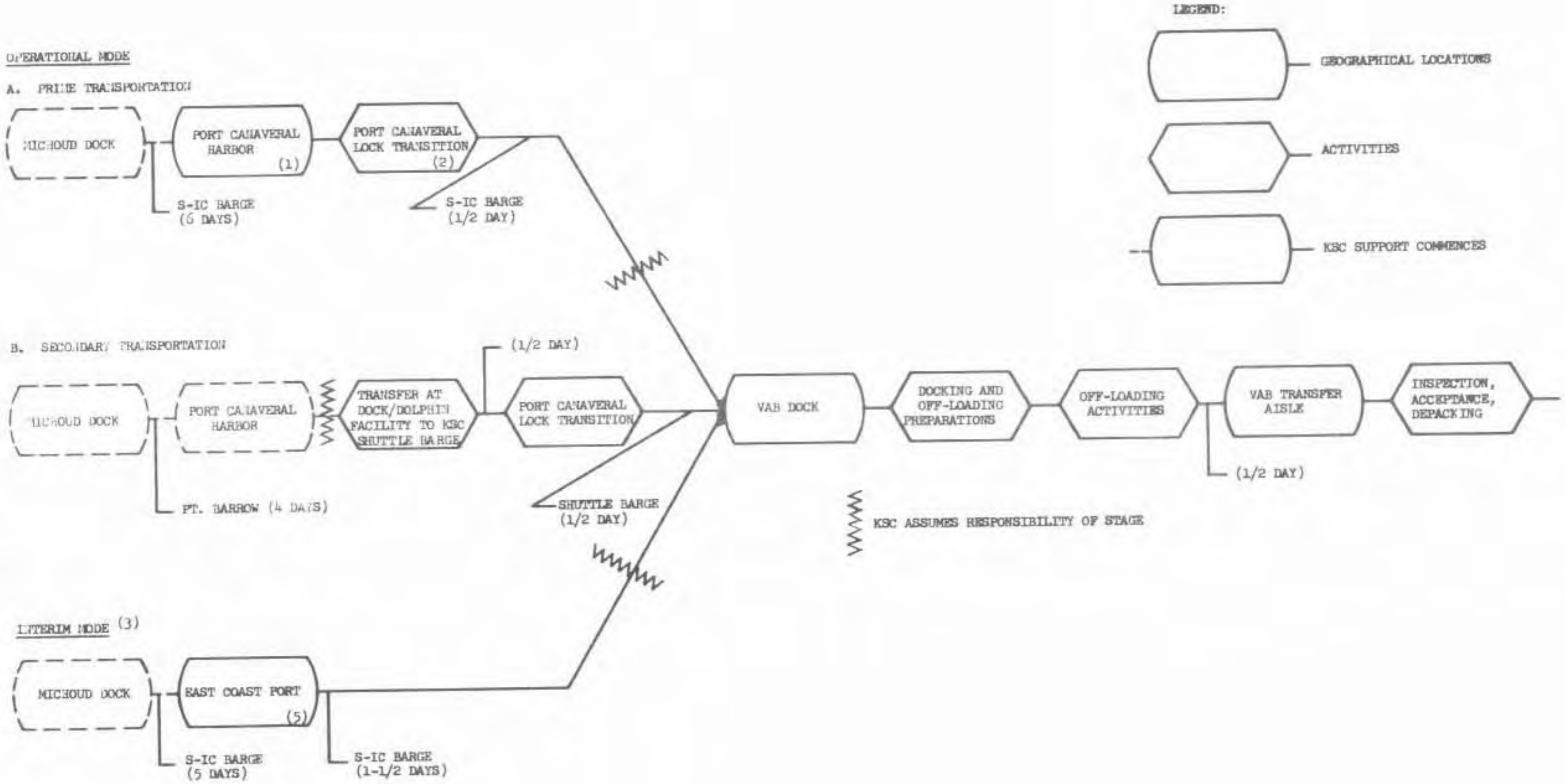
1.3.2 STAGE TRANSPORTATION AND HANDLING POLICY. Daily progress reports on the movement of all stages, the IU and spacecraft will be forwarded to the Chief, Transporation Office at KSC who will notify all interested personnel. This action will be performed regardless of whether transportation responsibility is with the stage contractor or NASA.

The support necessary to assist the responsible agency in the off-loading operation will be furnished by KSC. The Mechanical and Propulsion Systems Division of LVO in conjunction with the Transportation Office will arrange for all required support.

Stage acceptance by NASA will be conducted at the contractor's plant unless transportation to KSC CKAFS is a contractor responsibility. When the contractor is responsible for transportation, the stage will be accepted at KSC by NASA after a visual inspection to check for physical damage due to shipment, to ascertain that all major subassemblies are present, and to ascertain that the necessary documentation is present. This acceptance is the responsibility of KSC and the visual inspection will be performed by KSC/LVO personnel. NASA acceptance of the stage should be completed prior to the beginning of stage preparation at KSC CKAFS.

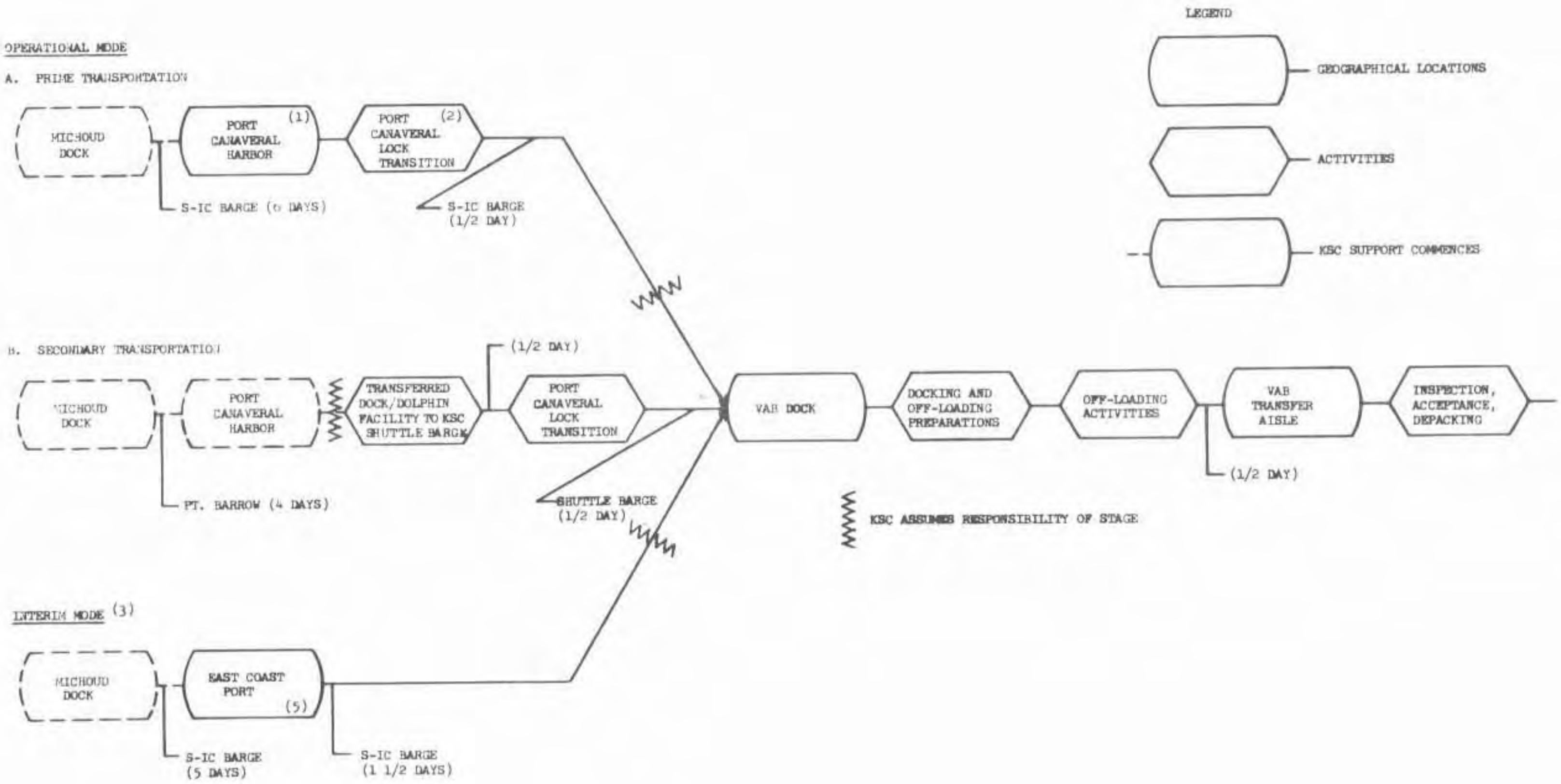
Table 3-1. S-IC, S-II, S-IVB, IU Stage Transportation Activities

FUNCTIONS	RESPONSIBLE ORGANIZATION
1. Coordinate Delivery	Apollo/Saturn V Systems Office and Transportation Office
2. Provide Towing services and/or KSC Shuttle Barge, Port Canaveral to Saturn Dock or VAB Turning Basin	Transportation Office
3. Overall Technical Direction	DLO
4. Approve Plans, Procedures, Instructions, Schedules and Arrange Support	Mechanical & Propulsion System Division LVO
5. Direct Support Operation	LSOD
6. Schedule and Direct Facility Maintenance	LSOD
7. Perform Receiving Inspection	LVO with participation of Quality Assurance Division KSC and Transportation Office KSC
8. Provide Communications Support Provide Photographic Support	Technical Services Division
9. Provide Traffic Management and Policy	Transportation Office
10. Provide Transportation Support and Movement Coordination	Transportation Office
11. Provide Heavy Equipment and Material Support	BOD/LSOD
12. Provide Security, Traffic Control and Escort	Coordinated through LSOD
13. Perform Facility Maintenance	BOD/LSOD
14. Prepare and Enforce Safety Procedures	Safety Office
15. Prepare Off-Loading and Onward Movement Procedure	Stage Contractor/LSOD/LVO
16. Perform Off-Loading Operation	Stage Contractor/LSOD/LVO
17. Arrange for Pickup and Return of Recoverable Shipping Containers, Instrumentation and Covering	Transportation Office
18. Analyze Shipping Data	MSFC



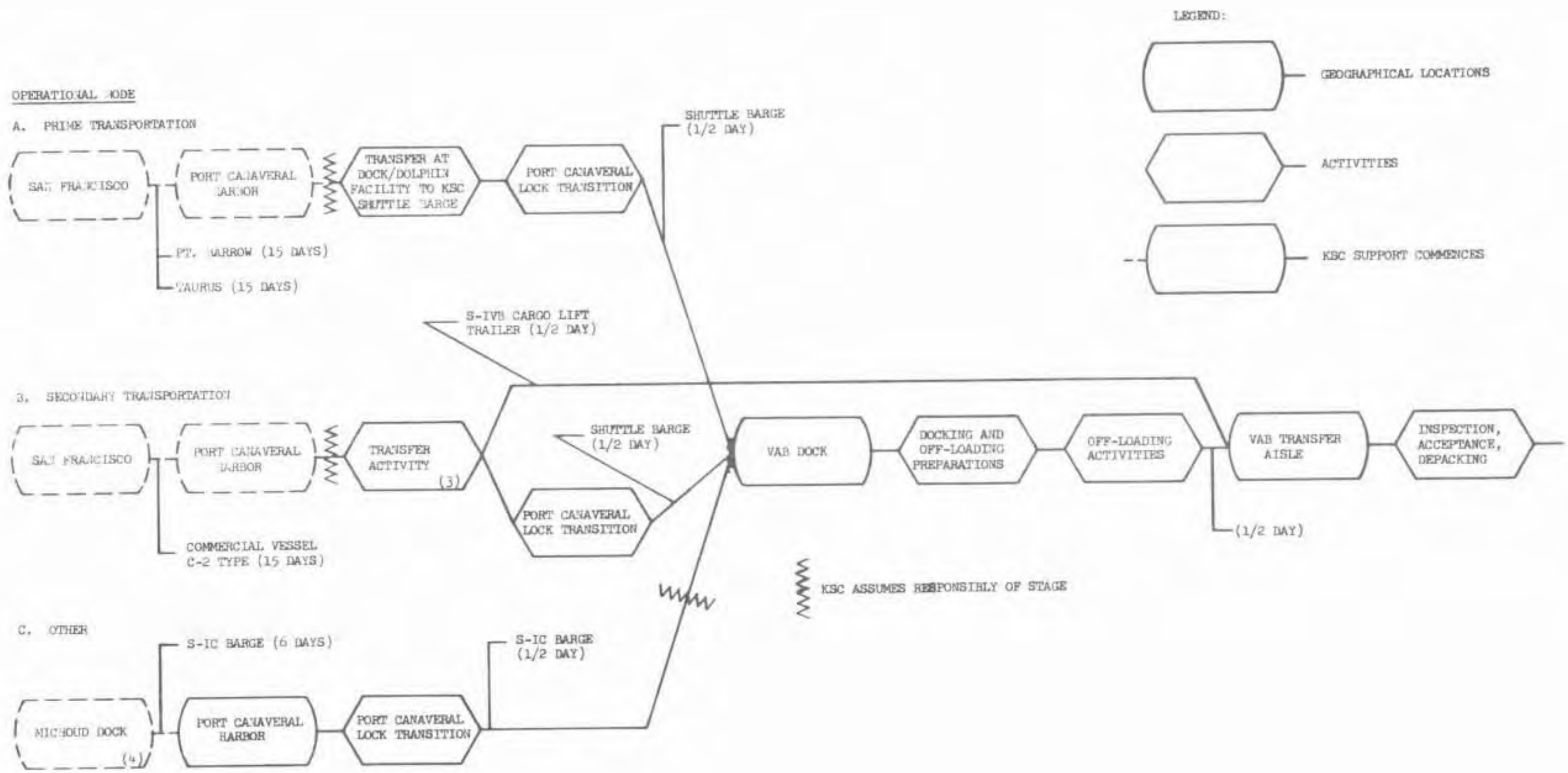
NOTES:
1. KSC SUPPORT COMMENCES WITH CHANGE OF TUGS OFFSHORE.
2. PORT CANAVERAL LOCK OPERATIONAL DATE JULY 1965.
3. REQ'D ONLY IF OPERATIONAL DATE OF LOCK SLIPS BEYOND PROGRAMMED SHIPMENT OF FIRST S-IC STAGE (S-IC 501, JUNE 1966).
4. ALL MARINE EQUIPMENT INDICATED TO BE OPERATIONAL FOR FIRST S-IC.
5. PORTS UNDER CONSIDERATION BY KSC, IN ORDER, INCLUDE:
   - PALM BEACH HARBOR
   - PORT EVERGLADES.

Figure 3-1. S-IC Stage Transportation Flow



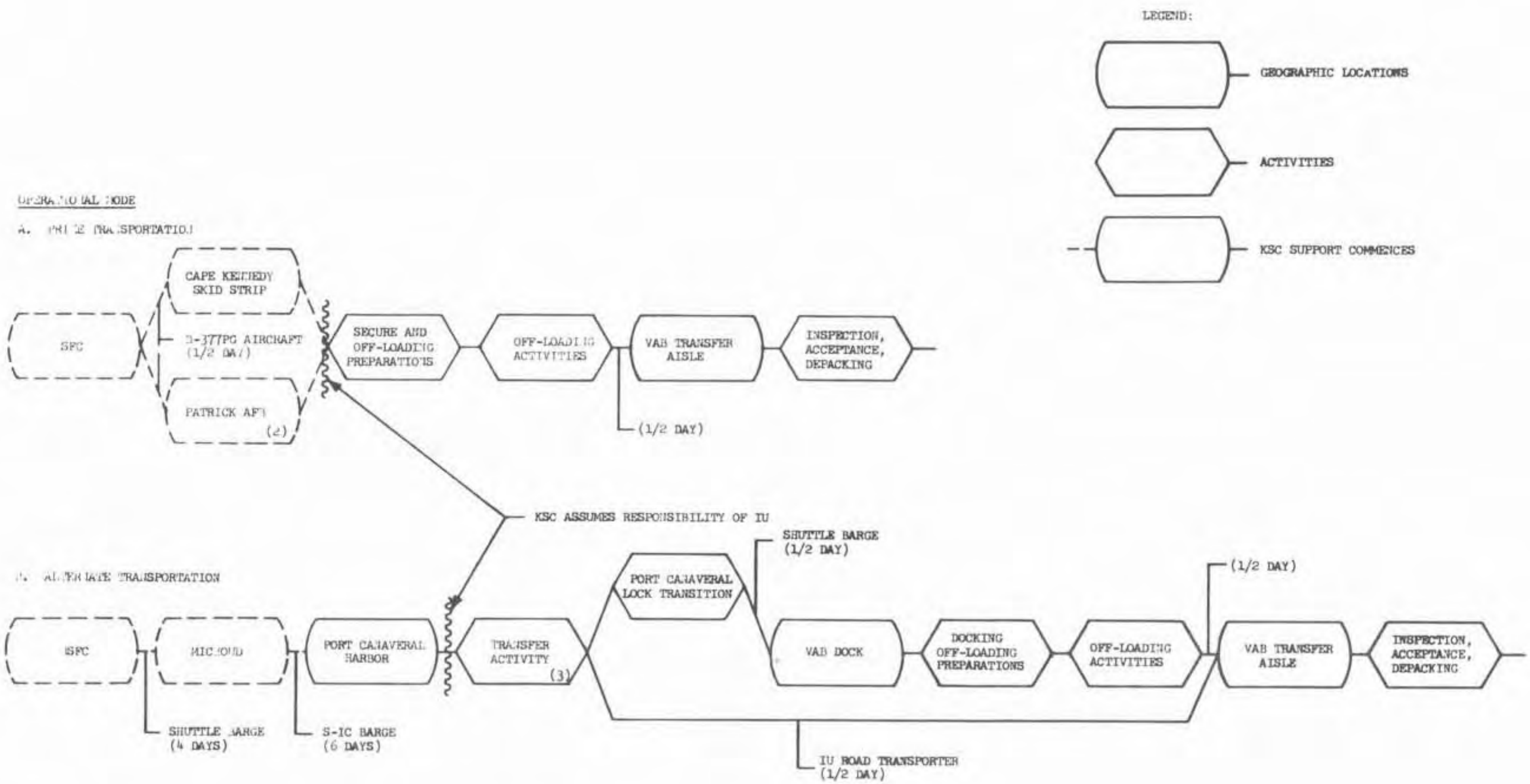
NOTE:
1. KSC SUPPORT COMMENCES WITH CHANGE OF TUGS OFFSHORE.
2. PORT CANAVERAL LOCK OPERATIONAL DATE JULY 1965.
3. REQUIRED ONLY IF OPEN DATE OF LOCK SLIPS BEYOND PROGRAMMED SHIPMENT OF FIRST S-II STAGE (S-II FAC, JANUARY 1966).
4. ALL MARINE EQUIPMENT INDICATED TO BE OPERATIONAL FOR FIRST S-II.
5. PORTS UNDER CONSIDERATION BY KSC, IN ORDER, INCLUDE:
   . PALM BEACH
   . PORT EVERGLADES

Figure 3-2. S-II Stage Transportation Flow



NOTES:
1. PROGRAMMED SHIPMENT OF FIRST S-IVB STAGE (501, JUNE 1966).
2. EAST COAST PORT (i.e., PALM BEACH/PORT EVERGLADES NOT REQUIRED FOR USE BY S-IVB.
3. CRANE OFF-LOAD TO SHUTTLE BARGE OR TO ROAD TRANSPORTER ON DOCK.
4. BASED ON JOINT S-II AND S-IVB SHIPMENT TO MICHOUD FROM WEST COAST AND TRANSLOAD S-IVB TO KSC-BOUND S-IC BARGE.

Figure 3-3. S-IVB Stage Transportation Flow



NOTES: 1. TRANSPORTATION, B-377PG (PREGNANT GUPPY), IS PRESENTLY OPERATIONAL.
2. PATRICK AFB WILL BE UTILIZED WHEN ALTERNATE FIELD, CAPE KENNEDY SKID STRIP, IS CLOSED FOR OPERATIONS AND DURING HOURS OF DARKNESS.
3. CRANE OFF-LOAD TO SHUTTLE BARGE OR TO ROAD TRANSPORTER ON DOCK.
4. PROGRAMMED SHIPMENT OF FIRST IU (501-IU), JULY 1966.

Figure 3-4. Instrument Unit Transportation Flow

SECTION II
TRANSPORTATION

2.1 STAGE HANDLING

Stage handling consists of those activities required to transport a stage, the IU, or the spacecraft from its site of manufacture or test to a seagoing primary or secondary carrier, then to the desired location on KSC. This includes the transfer to a shuttle barge at Port Canaveral if required, the off-loading operation, all ground movement, and the activity required to position the unit for mating or pre-mating checkout.

2.2 PERSONNEL MOVEMENT

These activities consist of the movement of all KSC or contractor personnel on or within a 50-mile radius of the KSC Headquarters. These transportation activities include the dispatching of conventional carriers either on a scheduled or unscheduled basis, the processing of transportation requests allocation of vehicles for uses such as medical, safety, security and photo services, and control of special air and ground conveyances.

2.3 MATERIAL MOVEMENT

These activities consist of the movement of all material under the control of KSC. In addition to supplying the prime movers, such activities as maintaining current loading diagrams and procedures, processing shipping documents, classification of freight, determining the mode of transportation, handling of tracing, assigning priority, funding and charge preparation, and providing of material handling equipment, such as fork lifts, mobile cranes, etc. are included.

2.4 SPECIAL TRANSPORTATION

Special transportation activities in most cases are concerned with conveyances that are designed to do a particular task and whose utility is limited to that task. Some examples of this would be propellants and gases carriers, ordnance and instrumentation vehicles, and the astronaut transporter. The activities that involve the rail, water, and air conveyances required to support the KSC operations are also considered to be special transportation.

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SECTION III
TRANSPORTATION PLANS

3.1 STAGE TRANSPORTATION

KSC assumes the responsibility for stage transportation when the unit arrives at a KSC terminal or is transloaded to a shuttle barge at Port Canaveral. Three terminal points, the Barge Terminal Facility adjacent to the VAB, the Docking Facility behind Hangar AF, and the Cape Kennedy Skid Strip are presently designated for all Apollo/Saturn space vehicle and spacecraft major components. The activities involving transportation from the arrival at the terminal until handover to operations are covered in this plan.

Detail procedures in compliance with these policies and plans will be prepared by the responsible organization to assure each operation is fully supported.

3.1.1 TERMINAL FACILITIES.

3.1.1.1 KSC Barge Terminal Facility. The barge terminal facilities consist of an access canal, a barge turning basin, dock, barge slips, and hard ramp area adjoining the dock. The facilities are located adjacent to the VAB.

a. Access Canal - An access canal is provided for marine barge vessels. These vessels will deliver launch vehicle stages and related components as well as other extremely large pieces of equipment and bulky materials to the VAB area of Complex 39. This canal runs generally west from the upper limits of the Banana River. It terminates in a turn basin and dock facility, adjacent to the VAB.

b. Turn Basin - This facility is the terminal point for the barge vessels. It is 1200 feet across and will be maintained to a depth of ten feet.

c. Dock Facility - The dock facility is provided to receive and support barge vessels and their cargoes of vehicle stages, related equipment components, large pieces of equipment, and bulky materials. The facility consists of: (1) barge slip to off-load launch vehicle stages and heavy equipment; (2) 1500 feet of docking space around the north and west periphery of the basin for material unloading; and (3) a hard surfaced area around the basin from which roads lead to all major areas of the Launch Complex. Operations and maintenance of this facility is the responsibility of LSOD.

3.1.1.2 CKAFS Docking Facility. This facility consists of a dock, the barge slip, and a turning basin. The facility is located approximately one-half mile west of Hangar AF on Cape Kennedy. Access to the turning basin and docking slip, which are dredged to a depth of eight to eight and one-half feet, is from the Banana River. Located within the basins are 19-pile and 7-pile dolphins for barge tie up.

The dock is 60' long and 49.5' wide and is capable of receiving the Saturn IB stages and all associated handling equipment. The land approaches to the dock area are hard surfaced and capable of supporting any forecast load.

The mechanical and propulsion division of LVO controls the use of this facility. The Air Force contractor on CKAFS performs the maintenance functions necessary to prevent deterioration of the facility.

3.1.1.3 Cape Kennedy Skid Strip Terminal Point. This is a 10,000' hard surface strip capable of receiving any of the aircraft planned for support of the Apollo/Saturn Program. The strip is located one-half mile southeast of the Cape Kennedy Industrial Area. The Skid Strip is the property of the USAF and is maintained by that organization or its contractor.

The arrival of Apollo/Saturn stages or material at the Skid Strip is coordinated by the Mechanical and Propulsion Division of LVO in conjunction with the KSC Transportation Office. The KSC Transportation Office will assure that the support items such as lights and power are in place.

3.1.1.4 Port Canaveral. Canaveral Harbor will provide a protected area for the transfer of a stage from a seagoing vessel to the KSC Shuttle Barge. The harbor will also be utilized to replace the seagoing tug which tows the YFNB Barge with two locally leased river tugs. The Port Canaveral facilities will be used to off-load a stage with its ground transporter if such a requirement should arise.

3.1.2 SATURN V TRANSPORTATION. This section presents a complete statement of the functional activities of transportation of the Saturn V stages (S-IC, S-II, and S-IVB), spacecraft by module, and the Instrument Unit (IU), together with clear designations of associated responsibilities. It is to be noted that movement of the stages and IU within the VAB and beyond for launch (e.g., from VAB to launch pad) is in the KSC Operations Plan. Spacecraft movement is contained in detail in the Operations Plan for each vehicle.

3.1.2.1 Off-Loading and Ground Movement. This activity encompasses the operations of docking or aircraft tie down, off-loading preparations, off-loading of the stage and components, and movement to the VAB. Upon arrival at the terminal, the vessel (aircraft) will be positioned and secured at the unloading point. The ballast and trim will be adjusted to provide the required barge level relative to the dock for unloading.

Concurrent with these activities, off-loading task force crews, dock-side and aboard, will conduct off-loading preparations. These activities are the culmination of pre-arrival planning and preparations by the numerous responsible offices of NASA and the stage contractor. The off-loading operation commences with the removal of the stage components, that were removed for shipment, to make way for the withdrawal of the stage. The roll-off of the stage from a barge will be accomplished by a prime mover, of the M-26 class. Off-loading of a stage from an aircraft will be accomplished with a truck-mounted winch withdrawing the stage onto a cargo lift trailer.

3.1.2.1.1 S-IC Stage. The S-IC stage will arrive at the KSC Barge Terminal adjacent to the VAB aboard a Navy type YFNB barge, oceangoing, or the KSC Shuttle Barge. Port Canaveral will be utilized for the transfer operation or the exchange of tugs. The Propulsion and Vehicle Systems Branch of LVO in conjunction with the Transportation Office will make all necessary arrangements for the arrival and off-loading of each stage. The off-loading operation will be performed by the stage contractor under the direction of LVO representatives.

The procedures for the off-loading and subsequent movement to the receiving and inspection area in the VAB will be prepared by the stage contractor and approved by LVO. The KSC organizations and the functions they will perform in the movement of the S-IC are shown in Table 3-1. Figure 3-1 shows the possible modes of transportation of the stage to KSC as well as the flow of activities following arrival in the KSC area.

3.1.2.1.2 S-II Stage. The activities of off-loading and ground movement for this stage are the same as described in the previous paragraph 3.1.2.1.1 for the S-IC stage. The activities as shown in Table 3-1 apply to the S-II stage movement. Figure 3-2 shows the possible modes of transportation of the stage prior to its arrival at KSC as well as the flow of activities following its arrival in the KSC area.

3.1.2.1.3 S-IVB Stage. The activities of off-loading and ground movement for this stage are the same as described for the S-IC in paragraph 3.1.2.1.1. Figure 3-3 shows the flow of activities that concern movement of the S-IVB stage from its point of origin to its final acceptance at KSC.

3.1.2.1.4 Instrumentation Unit (IU). The Cape Kennedy Skid Strip is designated as the terminal point for the Instrumentation Unit. The unit will be shipped in three sections with each section being mounted with adapters in a shipping container. Figure 3-4 shows the flow of activities that concern movement of the IU from its point of manufacture to its final acceptance at KSC.

The activities for off-loading and ground movement for the IU are the responsibility of the contractor and approved by LVO. The procedures for off-loading will be prepared by the contractor and approved by LVO. The support activities concerning movement of the IU are shown in Table 3-1.

3.1.2.1.5 Spacecraft. The modules of the spacecraft will arrive at the Cape Kennedy Skid Strip and will be off-loaded and transported to the following areas for receiving, inspection, and preparation for test:

a. Launch Escape System (LES)- Pyrotechnic Installations Building.

b. Command Module - Hypergolic Systems Test Facility.

c. Service Module - Service Propulsion System - Pad 16 - Reaction Control System - Hypergolic Facility.

d. LEM Adapter - Operations and Checkout Building.

North American Aviation will prepare the off-loading and transportation procedures for Spacecraft Operations (SCO) approval. SCO Engineering will, in conjunction with TPN, coordinate the activities required in the off-loading and onward movement of the spacecraft and will arrange with KSC for the reqired support.

An operations requirements document will be prepared for each vehicle that will define the transportation requirements as well as all other operational activities.

3.1.3 SATURN IB. The functional activities of transportation of the Saturn IB stages, S-IVB, IU, and spacecraft are presented in this section.

3.1.3.1 Off-Loading and Ground Movement. This activity encompasses the operation of docking (tie down for aircraft), off-loading preparation of the stage and components, and movement to the SAB (Hangar AF).

Concurrent with the docking or tie down operation, off-loading crews will make the necessary preparations to remove the stages and/or components from the carrier and to transport them to the SAB.

3.1.3.1.1 S-IB Stage. The S-IB Stage will arrive at the Cape Kennedy dock aboard a Navy type YFNB barge. The stage is shipped on its ground transporter and is towed onto the dock with an M-26 prime mover. The procedure for off-loading is prepared by the stage contractor and approved by LVO.

The functions performed by each KSC organization during off-loading and ground movement are shown in Table 3-2.

3.1.3.1.2 S-IVB Stage. The activities of off-loading and movement of this stage are the same as those outlined in paragraph 3.1.3.1.1 (S-IB).

3.1.3.1.3 Instrumentation Unit (IU). The IU will arrive at the KSC Skid Strip. The IU is shipped in three sections, each of which is mounted with adapters in a shipping container. The functions and the responsible organization for each operation are shown in Table 3-2.

3.1.3.1.4 Spacecraft. The spacecraft will arrive at the KSC Skid Strip and will be unloaded and transported in the same manner as the S-V spacecraft. (See paragraph 3.1.2.1.5.)

3.2 GENERAL TRANSPORTATION

3.2.1 SERVICES. The KSC Transportation Office is the centralized organization which will service the material and personnel transport requirements for all NASA elements and authorized contractor organizations operating at KSC. Authorized contractors will be furnished general purpose and special purpose vehicles, material handling equipment, and transportation services by NASA/KSC when in performance of their contracts on KSC CKAFS. Contractors will furnish their own transportation services and equipment necessary for activities outside of KSC CKAFS. Contractors' requirements will be furnished to KSC in advance to allow for action to be taken which will insure the availability of transportation services and equipment when needed.

The integrated transportation system provides traffic management, guidance in the traffic management analysis and guidance in procurement matters; shipping and receiving of freight by all commercial modes of transportation; supervisory control of a motor pool to provide local transportation service; passenger travel service, and other services as deemed necessary. The transportation organization will determine the scope of transportation facility needs, establish a budget to meet those needs, and also determine the types and quantities of facilities and equipment needed by KSC to meet future requirements.

Traffic procurement and management assures compatibility of NASA, GAO, ICC, and carrier's regulatory procedures. This activity serves as point of contact for KSC and other NASA elements at the ETR for all transportation contact action relating to transportation and traffic management procedures required for purchasing transportation services, and for the movement of material based upon the most economical and efficient mode of transportation.

Assistance and technical supervision is provided on all matters pertaining to special air mission transportation and securing transportation for persons via air, rail, or water, using common carrier or Government owned and/or operated equipment and facilities. The air coordinator schedules MATS, commercial charter and "air taxi" operations, coordinates the arrival and departure of aircraft at the various local airport facilities, computes air mileage of trips, coordinates passenger transportation and billing, coordinates cargo shipments as required, disseminates weather information, and assists in aircraft evacuation when required. In addition, the air coordinator maintains statistical reports and data on the executive aircraft, relative to utilization, costs, maintenance and scheduling. Passenger travel services are provided to assist in arranging commercial passenger transportation, issue KSC travel orders and issue transportation requests. The function also includes arranging for hotel and motel accommodations, air shuttle service and coordination of car rentals.

The NASA central shipping and receiving facility is operated by the Freight Traffic Section with the Assistance of contact personnel who perform the actual handling of incoming and outgoing items. Shipping personnel process shipping document requests from the Materials Support Branch for items being shipped from KSC to any destination. Freight classification, shipping rates, mode of transportation, authorization, and funding charges are determined for each shipment.

Government Bills of Lading or other shipping documents are prepared and distributed for accounting and other record purposes. KSC shipping personnel order carrier equipment and supervise contractor personnel in loading, to comply with applicable laws and regulations. Priority shipments are expedited with the carrier concerned. Receiving personnel handle incoming shipments received by all modes of transportation. Government Bills of Lading are prepared on collect shipments marked for conversion for direct Government payment to the carriers.

Receiving personnel coordinate with the Materials Support Branch on shipments that are damaged, over, or short, and file appropriate claims. Records and data are maintained as required by GSA, NASA, and other appropriate regulations. Rate and route personnel determine proper freight classifications, rates, charges, and applicable rules and regulations on inbound and outbound shipments. They also administer a loss and damage program to assure that Government shipments are properly handled and transported. These personnel also prescribe procedures for emergencies such as embargoes, equipment shortages, traffic congestion, etc. They review and evaluate demurrage, storage and other charges assessed by carriers.

Transport Services are concerned with railroad operation, barge and marine operation, and the motor pool. The railroad operation is performed by contract personnel under the supervision of the KSC transportation activity. The railroad will transport freight, including cyrogenics, to the KSC area and will perform such functions as spotting freight cars at proper sidings, switching cars to make up outgoing trains, and other appropriate functions as required.

The motor pool operation is performed by GSA personnel under the supervision of the KSC transportation activity. Passenger cars are available for transportation of personnel to any authorized destination in Central Florida. The major portion of personnel transportation is within the present KSC areas and nearby communities. Trucks of various sizes are also dispatched through the motor pool facility. The sizes and types of trucks permit any anticipated load to be handled.

3.2.2 VEHICLE ALLOCATION AND ASSIGNMENT. The Transportation Office approves and determines the total KSC vehicle and driver requirements. These requirements are then levied on GSA who provides all the general purpose vehicles for use on KSC.

Each KSC Assistant Director will submit a memorandum to the Chief, Transportation Office at the beginning of the first and third quarters of each fiscal year stating the Directorate's particular transportation needs. These memorandums will be analyzed to determine the total vehicle requirements for the following quarter.

Vehicles are assigned permanently to an organization when it is not economical to return the vehicles daily to the GSA motor pool or when the activity has a continuing day to day mission which requires the use of vehicles. To obtain permanent assignment of vehicles, a request is forwarded from the Assistant Director or equivalent to the Chief, Transportation Office who will then coordinate with GSA for the vehicles and services required.

Vehicles are also available for general dispatch, taxi service, and U-Drive from the GSA motor pool.

3.2.3 GENERAL SERVICES ADMINISTRATION (GSA).

3.2.3.1 Motor Pool. The GSE maintains a central motor pool on Cape Kennedy and sub-pools near the O & C Building, the VAB, Melbourne Airport, and on McCoy Air Force Base to serve the vehicle needs of KSC. These pools are used for maintenance and servicing by GSA of all general purpose vehicles and provide parking for those vehicles not on permanent dispatch.

3.2.3.2 Vehicle Acquisition. GSA acquires all the general purpose vehicles used by KSC. The vehicle users submit their needs to the Chief, Transportation Office who then determines the number and types of vehicles and drivers GSA must provide. Each major division and office has a vehicle coordinator who determines that division's vehicle needs and submits these to the Chief, Transportation Office at the beginning of each fiscal quarter.

3.2.3.3 Vehicle Dispatch. Vehicles are dispatched on a permanent or temporary basis. The vehicle coordinator screens and validates all requests for vehicles in this particular office or division. This includes those vehicles to be furnished that division or offices (contractor(s). For permanent dispatch, he prepares a letter that must be approved by the Chief, Transportation Office before submission to GSA. For temporary dispatch, he validates the requests which go directly to GSA.

3.2.3.4 Scheduled Bus Service. GSA in conjunction with the KSC Transportation Office provides a scheduled bus service. The traffic analysis section of the Transportation Office determines the routing and anticipated loads. GSA assigns the vehicles and drivers according to the published routes and schedules. In addition, GSA provides vehicles and drivers for group passenger movement and bulk cargo transport.

3.2.3.5 Taxi Service. GSA maintains a fleet of vehicles and drivers that are on-call for official utilization during operational hours.

3.2.3.6 Vehicle Accounting. KSC and MSC purchase mileage by vehicle type from GSA through the Chief, Transportation Office. Mileage is accounted for on permanently dispatched vehicles by completing the "Monthly Motor Vehicle Use Record", GSA Form 494. Users of vehicles on temporary dispatch turn in mileage on the "Daily Motor Vehicle Trip Ticket", GSA Form 312.

3.2.4 HEAVY AND SPECIAL EQUIPMENT. The Base Operations Division (BOD) programs and requisitions heavy and special equipment for KSC. All KSC and MSC users of heavy and special equipment submit their needs, with required justification, to BOD who then initiates the action for its acquisition.

BOD provides a pool of heavy and special equipment which it maintains and services. The equipment is dispatched to the using organization on request. BOD also has a pool of trained operators available for dispatch with the equipment if the user requires such service.

SECTION IV
KSC TRANSPORTATION RESPONSIBILITIES

4.1 GENERAL

This part of the plan covers the KSC organizational responsibilities of all aspects of transportation. These include movement of the Saturn stages, spacecraft, and IU from the terminal point at KSC to the Vehicle Assembly Building (VAB) or the Spacial Assembly Building (SAB) and all material and personnel movement required to support the Apollo/Saturn Programs.

4.2 STAGE TRANSPORTATION RESPONSIBILITIES

4.2.1 APOLLO/SATURN V AND IB SYSTEMS OFFICES. These offices are the KSC focal points of responsibility and authority for activities connected with the Apollo/Saturn Programs. Pertinent to Intra-KSC transportation of the launch vehicle stages and the IU, these offices schedule the delivery of launch vehicles working closely with the MSFC Saturn Project Office and the pertinent KSC operating offices having responsibility or related interest in this subject.

4.2.2 MECHANICAL AND PROPULSION SYSTEMS DIVISION. Propulsion and Vehicle Systems Branch - This Branch is responsible for preparation of plans, procedures, instructions, schedules, and arrangements for support services pertinent to the arrival, movement, and departure by marine, ground, and air transport of the vehicle stages and the IU. Arrangements for support services will include as required: communications, electrical power, water, safety, fire protection, security, traffic escort and control, support personnel, prime movers, specialized handling equipment, ground transportation, etc. Off-loading and loading operations, Intra-KSC movement, and depackaging operations will be supervised by and be the responsibility of this branch. Off-loading operations of stages, by the responsible stage contractor, will be conducted only in the presence of representatives of this branch who will exercise authoritative control and direction of these activities. This branch will review and approve off-loading procedures and instructions prepared in part by the respective responsible stage contractor. This branch will be responsible, after inspection and acceptance of the stages dockside, for movement of the stages to the transfer aisle of the VAB or SAB and the depackaging operation.

In performance of these responsibilities, this branch will coordinate and work in conjunction with the Apollo/Saturn Systems Offices and the other responsible KSC operating offices. Final authority for any and all movements of launch vehicle stages and IU is reserved to LVO.

4.2.3 LAUNCH SUPPORT OPERATIONS DIVISION. It is the responsibility of this Division to provide all transportation and direct support required for launch operations activities. This support includes maintaining the facility and support features of the launch complex in a state of readiness, available for any operation as may be requested. The support of Intra-KSC transportation of the launch vehicle is principally associated with the arrival, movement, depackaging, inspection, etc.

4.2.4 QUALITY ASSURANCE DIVISION. The Systems Analysis Office of this Division participates in the receiving and inspection of launch vehicle stages with the receiving agents for the Government. They also perform inspection jointly with LVO, and accept for KSC, all launch vehicle stages and the IU.

4.2.5 TECHNICAL SERVICES DIVISION. Communications Branch - Support requirements for administrative type phone services in support of Intra-KSC transportation of the stages and the IU will be satisfied by this Branch of Technical Support Operations.

Photo Operations - This Branch of Technical Support Operations will provide the necessary photographic services upon request in support of Intra-KSC transportation of the stages and the IU.

4.2.6 TRANSPORTATION OFFICE. This office is responsible for performing functions relative to transportation matters embracing all modes of transportation applicable to the inbound and outbound shipment of launch vehicle stages, the IU components, associated equipments and materials. This office acts in the capacity of responsible authority on matters for KSC and interfaces with MSFC. In the performance of these duties, it is the responsibility of this office to establish and maintain current stage and IU transportation schedules (shipping dates, mode, etc.) and to coordinate closely with the Apollo/Saturn LVO and other pertinent parties. The Transportation Office is responsible for providing, scheduling, and operating the shuttle barge and/or tug services for effecting movement of the stages between the transfer point and the KSC unloading facility. This office will also provide the required personnel, material, and vehicle equipment upon request of LSOD (SOP-1) to support the Intra-KSC transportation of the launch vehicle stages, IU, related equipment, supplies, tools, materials, etc.

4.2.7 SECURITY GUARD STAFF. This organization is responsible for security and related security transportation of the launch vehicle stages and IU:

a. Physical guard services.

b. Shipment security.

c. Traffic control, escort, and enforcement.

Matters of security, pertinent to transportation of the launch vehicle, requiring liaison with federal, state, and local agencies, is reserved for action by the Security Office, Administrative Division.

4.2.8 BASE OPERATIONS DIVISION. The Maintenance and Operations Branch provides support, upon request of LSOD, to the Intra-KSC transportation phase in the form of maintenance and operation of utilities, fire prevention and protection services, facilities, etc., except as otherwise assigned. Preventative maintenance of the VAB docking facilities and the barge is included as the responsibility of this branch.

4.2.9 INDUSTRIAL SAFETY ENGINEERING OFFICE. Preparation and enforcement of safety procedures and standards associated with each applicable operation of Intra-KSC transportation of launch vehicle stages and the IU will be the responsibility of this office. Safety personnel will perform spot inspections and surveys to detect unsafe procedures or conditions, and will specify necessary corrective action. When required, this office will establish and participate in safety training programs to include: certification of equipment operators (overhead cranes, prime movers, etc.); familiarization with special equipment hazards (airboats, helicopters, patrol boats, etc.); toxic hazards, etc. Responsibility for establishing and conducting the KSC training program is reserved to the Training Branch, Administrative Division.

4.2.10 STAGE CONTRACTORS. This part of the plan covers the stage contractor responsibilities at KSC of all aspects of transportation of the launch vehicle stages of the Apollo/Saturn including the interfaces of operational activities and responsibilities.

The in-transit movement of a stage, after test and refurbishment, to KSC on a Government furnished marine vessel, will be the responsibility of the stage contractor.

The operation of off-loading the stage at KSC is carried out by the responsible stage contractor. Representatives of Launch Vehicle Operations will be present during off-loading to exercise authoritative control and direction of vehicle movements. The off-loading operation, which involves many KSC organizations discussed earlier in this section, requires detailed planning, pre-arrival preparations and coordination. The stage contractor will be responsible to NASA for contributing to the preparation of those detailed procedures and instructions required for the operations and activities involved with stage pre-arrival preparations and off-loading. These procedures and instructions involving vehicle preparation for movement and transfer to the receiving inspection area receive prior approval of K-V before any movement of the stage takes place. The final authority on stage movement is reserved to K-V which will include as required: electrical power, special handling equipment, communications, water, safety, fire protection, prime movers, ground transportation, traffic escort and control, support personnel, etc.

Upon arrival of the stage in the transfer aisle of the VAB, the stage contractor will commence the depackaging operation. This operation is conducted in accordance with detailed procedures and instructions prepared by the stage contractors that have received prior approval of PPR-4, -5. Representatives of PPR-4, -5 will be present during this operation. This operation encompasses the removal of shipping covers and shipping instrumentations.

The stage contractor is responsible for the performance of a receiving inspection at dockside which will be done concurrently with the receiving inspection performed by representatives of LVO/QAS-1. LVO/QAS-1 will jointly represent KSC in the acceptance and transfer of custodial responsibility of the property from MSFC to KSC.

4.3 GENERAL TRANSPORTATION RESPONSIBILITIES

4.3.1 KSC TRANSPORTATION OFFICE. This office is designated as the controlling agency for all general transportation utilized in support of the Apollo/Saturn Programs. As the controlling organization, the office will be responsible for traffic management and policy, procurement, traffic advisory services, and transportation services. Additional responsibilities will be to:

a. Provide liaison between all operating divisions of KSC and the General Services Administration and provide coordination of transportation matter between KSC and NASA Headquarters, MSFC, and other centers.

b. Determine the total vehicle and driver requirements to support the Apollo/Saturn Programs.

c. Develop, consolidate, and define budget estimates for all transportation costs chargeable to KSC for the personnel and vehicle services provided by GSA.

d. Provide technical assistance and advise on transportation matters related to procurement during all contractual phases; establish and maintain close liaison with carriers and contractors on shipment of NASA material from contractor facilities.

e. Establish auxiliary parking areas and subpools in coordination with GSA to minimize travel between the central GSA motor pool and distant work projects that require constant vehicular support.

f. Provide travel service for passengers arriving or departing KSC on regular commercial transports or by special conveyance by NASA or other government organizations. Operate and maintain assigned executive aircraft, schedule and coordinate commercial charter and other Government aircraft.

g. Provide transportation services and vehicles, as validated and recommended by the Directors and Assistant Directors or Operations, and, under the signature of the contracting officer, for NASA contractors in performance of their contracts on KSC.

h. Provide schedules and operating procedures to assure efficient operation and maximum utilization of the rail and marine transportation controlled and/or utilized by KSC.

i. Establish the routes and maintain schedules as necessary to assure a smooth flow of automobiles, trucks, busses, and transports within the boundaries of KSC.

j. Operate the central shipping and receiving facility.

4.3.2 DIVISION AND OFFICE CHIEFS. Each division and office chief, in order to assure that the general transportation needs of their organizations are met, are responsible for the following functions:

a. The safe, efficient, and economical management, operation and utilization of motor vehicles used by personnel under their control.

b. The determining of their current and projected needs for vehicular support and the submission of these requirements to the Chief, Transportation Office on a timely basis.

c. The assigning of one person as Vehicle Coordinator to handle all vehicle activities within their organization.

EXHIBIT 5

KSC APOLLO/SATURN PROPELLANTS

REQUIREMENTS PLAN

EXHIBIT 5

EXHIBIT 5
KSC APOLLO/SATURN PROPELLANTS REQUIREMENTS PLAN

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EXHIBIT 5
KSC APOLLO/SATURN PROPELLANTS REQUIREMENTS PLAN

SECTION I
INTRODUCTION

1.1 GENERAL

This Exhibit delineates the policies and procedures by which the Apollo Program's propellant and pressurant requirements are to be identified, integrated, and satisfied at KSC.

1.2 APPLICABILITY AND SCOPE

The provisions of this Exhibit apply to all KSC NASA, and contractor organizations having a management, operational, or maintenance responsibility in support of the propellant and pressurant functions at KSC. Its scope includes the identification of propellant and pressurant requirements, the acquisition, testing, storage, application, maintenance, and management of the human and material resources of the program's propellant and pressurant activities.

1.3 OBJECTIVE

The objective of this Exhibit is to establish the policies and implementing procedures pertaining to the management and accomplishment of the propellant pressurant functions in support of the Apollo/Saturn Program at KSC.

1.4 POLICY

All implementing plans and procedures, developed by the organizations responsible for the accomplishment of propellant and pressurant tasks shall be in consonance with this Exhibit and the provisions of K-AM-02.

Any conflict noted between the provisions of this plan and other KSC Apollo/Saturn documents shall be brought to the attention of the Director, PPR, through PPR-3, where such conflicts will be resolved on an individual basis.

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SECTION II
MANAGEMENT PROCESS

2.1 PROPELLANT AND PRESSURANTS MANAGEMENT FUNCTIONS

Each KSC organization assigned an active role in support of the propellants and pressurants requirements shall develop a management system to assure the accomplishment of the following functions (as applicable):

a. The determination of propellant and pressurant requirements at KSC.

b. The identification of the most advantageous source for propellants and pressurants required at KSC.

c. The provisioning for the propellant and pressurant requirements at KSC includes evaluating program needs and forecasts covering the elements of propellant type, quantity, quality, and schedule.

d. The procurement of the required propellants and pressurants including all those steps necessary for contract or agreement preparation and administration, for manufacture, transportation, and acquisition.

e. The evaluation of propellant and pressurant transportation requirements including carrier types and capacities, routes, schedules, and delivery methods to, and within, KSC and CKAFS.

f. The receipt, sampling and analysis, recording and documentation activities to include the development and establishment of management visibility, to assure that the quantity and quality of the propellants and/or pressurants is in compliance with the procurement document, and to assure the movement of the product to the appropriate storage location as required for launch schedule success.

g. The intermediate and permanent storage of propellants and pressurants and the designation of the organizational elements responsible for the handling and movement of propellants and pressurants into storage.

h. The maintenance and operation of propellant and pressurant storage facilities and systems including the determination of the adequacy of existing facilities and/or the development of requirements for additional or future facilities to assure the ability of meeting programmed launch schedules.

i. The development and establishment of propellant and pressurant handling procedures which assure safe and economical product handling in accordance with the provisions of DOD publication, "The Handling and Storage of Liquid Propellants", dated January 1963.

j. The establishment and implementation of an Apollo Program Propellant Safety Surveillance Program designed to preclude unsafe propellant transportation storage and handling actions.

k. The establishment of appropriate personnel training programs and personnel evaluating systems to develop and maintain skill levels and abilities commensurate with task assignments.

l. The assurance of the availability and proper maintenance of personnel protective (SCAPE) clothing and equipment in support of propellant operations.

2.2 PROPELLANT AND PRESSURANTS MANAGEMENT - PROVISIONING

The provisioning of necessary propellants and pressurants entails more than the initial provisioning defined in the glossary of K-AM-02. It includes the determination of requirements, forecasting, source selection, and contracting on a continuing basis. Figure 2-1 illustrates the functional flow of these activities.

2.2.1 REQUIREMENTS DETERMINATION. The determination of propellant and pressurant requirements at KSC entails the establishment of program needs in terms of type, quantity, quality and schedule. The needs are determined from evaluation of the program's checkout and launch schedules, review of launch vehicle and spacecraft needs, GSE and facility checkout requirements, and analysis of the use/loss-rates-experience on current and past programs. The organizational elements of KSC which use the propellants and pressurants, or which operate and maintain the equipment and systems necessary to provide direct propellant support, are responsible for the preparation of the forecasted requirements.

Propellant and pressurant forecasts shall be prepared by Launch Vehicle Operations (LVO), Spacecraft Operations (SCO), Support Operations (SOP), and Engineering Development (EDV). Stage and support contractor inputs will be included in the responsible directorate forecasts. The directorate's forecast requirements shall be consolidated by SOP and forwarded to PPR-7 for review and approval. When approved, the consolidated requirements (NASA Form 558, Materials Requirements Report) (Figure 2-2) shall be returned to SOP for initiation of procurement action. Requirement forecasts will be prepared to cover both long range planning needs (primarily for provisioning) and operational planning needs (primarily for effective ordering-acquisition implementation) as follows:

a. Long Range Planning - This forecast will be issued at six-month intervals. It covers a three-year period, by quarters, and identifies propellant or pressurant type, specification, quantity and source.

b. Operational Planning - This forecast will be issued monthly. It covers the immediate four-month period with the first month forecasted on a weekly basis. This forecast includes the propellant or pressurant type specification and quantity requirement.

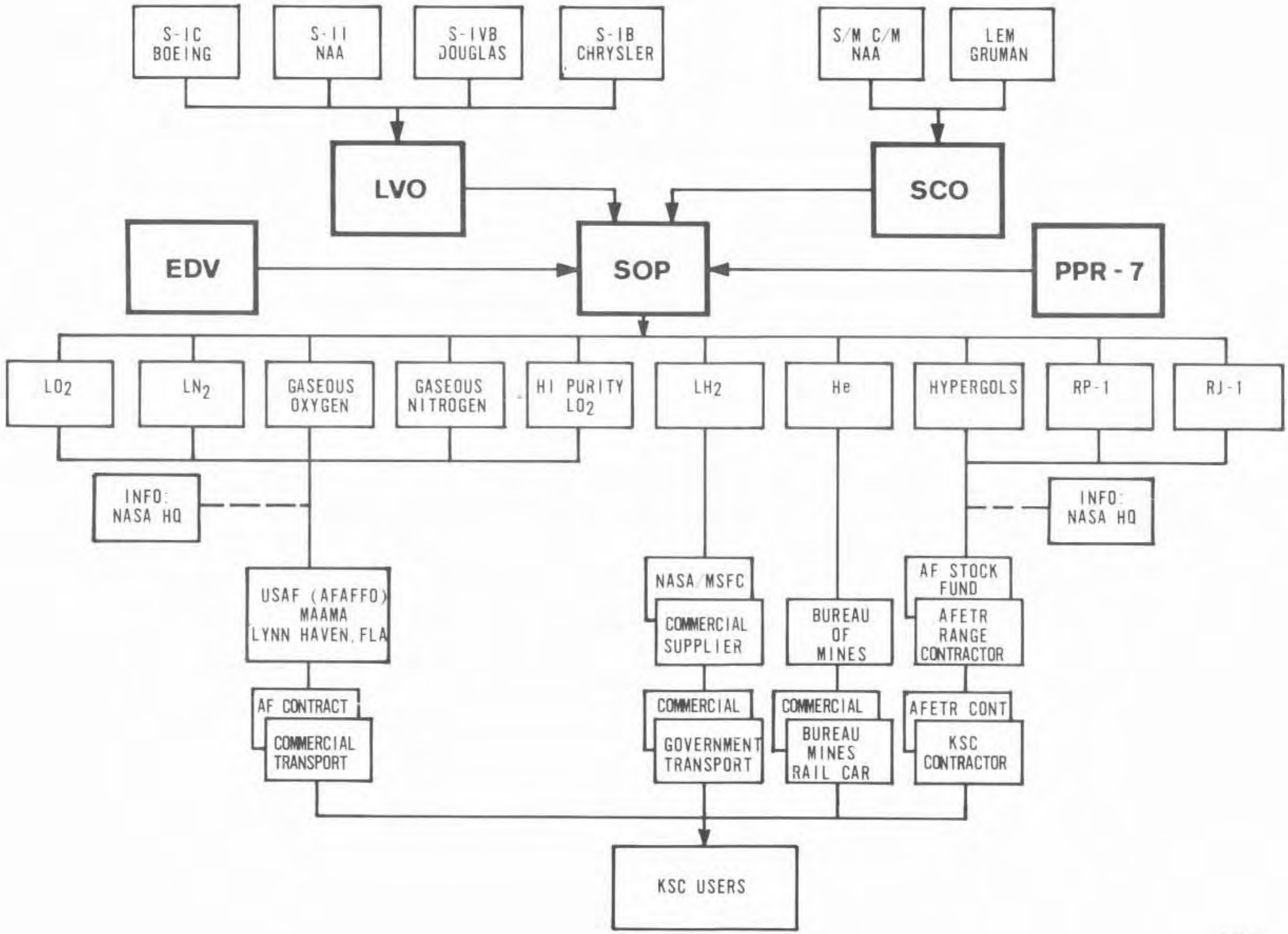

Figure 2-1. Propellant and Pressurant Provisioning Functional Flow

MATERIALS REQUIREMENTS REPORT

DATE PREPARED		
TO: *(Name of office to which report is being submitted)*	FROM: *(NASA Field Installation or Headquarters Program office submitting report)*	PREPARED BY
MATERIAL BEING REPORTED	UNIT OF MEASURE	OFFICE CODE / TELEPHONE

[1] CONTRACT NO., PROGRAM, PROJECT, AND TASK OR END USE-CONTRACTOR AND LOCATION OF USE	[2] SOURCE	CALENDAR YEAR [3]19 ___		CALENDAR YEAR 19 ___		CALENDAR YEAR 19 ___		CALENDAR YEAR 19 ___		CALENDAR YEAR 19 ___		CALENDAR YEAR 19 ___	
		___ QTR	___ QTR	___ QTR	___ QTR	___ QTR	___ QTR	___ QTR	___ QTR	___ QTR	___ QTR	___ QTR	___ QTR

[1] Identify each entry by (a) Contract No., (b) Program, (c) Project, (d) by specific Task within the project or by End Use when not associated with a named project, (e) by contractor, and (f) by the location of use of the material *(shipping destination)*. *Specific attention is directed to reporting requirements for* **Helium**. In addition to the above information, Helium requirements will be further classified as follows: (a) Missile Systems and Astronautics, (b) Aerology *(includes weather research)*, (c) Aeronautical Research *(includes wind tunnels)*, (d) Welding and (e) Other *(identify specifically)*.

[2] CODES

- C - Commercial
- A - Army
- N - Navy
- AF - Air Force
- DP - Defense Petroleum Supply Center
- BM - Bureau of Mines
- U - Undetermined
- X - Other *(Specify)*

[3] Report first six months by months, balance by quarters.

NASA FORM 558 (REV. FEB 64) PREVIOUS EDITIONS ARE OBSOLETE.

GPO 872-585

Figure 2-2 NASA Form 558 - Materials Requirements Report

c. Forms 3-24 (Figure 2-3) and 50-H (Figure 2-4) are both used to forecast for a four-month period. The Form 3-24 is used internally to assist in meeting KSC support requirements, and the Form 50-H is derived from the former, and is used by the AFETR in establishing propellant delivery schedules.

2.2.2 PROVISIONING AND ACQUISITION. Provisioning and acquisition includes the establishment of the procurement source, contractual or agreement developments between KSC and the providing source, and the methods for formal placement of orders to acquire necessary propellants and pressurants.

2.2.2.1 Source Selection. Commercial and government owned facilities are available as sources for the procurement of propellants and pressurants. Commercial sources will be used only when the government agencies cannot fulfill the necessary requirements. In consonance with direction contained in the NASA Headquarters message, Interim LO_2 and LN_2 Procurement, dated April 28, 1966, the procurement of LO_2, LN_2, Gaseous Oxygen, Gaseous Nitrogen, and Hi Purity LO_2, will be through the Air Force, specifically AFAFFO at MAAMA, Lynn Haven, Florida. An information copy of the consolidated requirements (NASA Form 558) will be furnished NASA Headquarters. Alternate sources will be identified to assure adequate propellant and pressurant supply in the event of a strike, emergency, or disaster at the prime source.

NOTE

> MSFC Project Logistics Office has full operational responsibility for management, supply and logistics support of liquid hydrogen for all users east of the Mississippi River. These users include NASA, DOD, and all Government contracted organizations. (Reference: Letter, dated March 24, 1965, from Director MSF Management Operations to Director MSFC, Subject: Management of East Coast LH_2 Resources.)

2.2.2.2 Contracts and Agreements. KSC is authorized to contract with Governmental and commercial sources to a limit established by NASA policy for the acquisition of propellants and pressurants in support of the Apollo/Saturn Program.

Contracts and agreements negotiated by KSC will assure that the quantity, quality, and costs of propellants and pressurants meet KSC specifications, and that procurement and transportation costs are proper.

2.2.2.2.1 Transportation. Transportation of propellants and pressurants from the point of acquisition to KSC will be arranged by contract. These contracts will be either with the producer-supplier (e.g. Bureau of Mines rail cars for transport of He) or with an independent carrier. Transportation for redistribution within KSC will be provided by SOP.

FOUR MONTH PROPELLANT, GAS AND CHEMICAL REQUIREMENT FORECAST

1. CENTER	2. DATE
3. PROGRAM TITLE	4. PROGRAM CODE
5. PREPARED BY	6. TELEPHONE
7. OFFICE CODE	

8. ITEM NO.	9. PRODUCT	10. SPECIFICATION NUMBER	SOURCE	11. UNITS					12. QUANTITY REQUIRED								13. POINT OF DELIVERY OR NOTES
				TONS	SCF	LBS	GALS	10^n	1st MONTH WEEKLY ESTIMATE 1	2	3	4	5	2nd MONTH	3rd MONTH	4th MONTH	
								n									
1	AEROZINE 50					x											
2	ARGON GAS				x												
3	DEIONIZED WATER						x										
4	DISTILLED WATER						x										
5	ETHYL ALCOHOL						x										
6	ETHYLENE GYLCOL						x										
7	FLOURINE (LIQUID)					x											
8	HELIUM (GAS) GHe				x												
9	HELIUM (LIQUID) LHe																
10	HYDRAZINE					x											
11	HYDROGEN (GAS) GH_2				x												
12	HYDROGEN (LIQUID) LH_2					x											
13	HYDROGEN PEROXIDE - 90%					x											
14	IRFNA					x											
15	LIQUID AIR						x										
16	MONOMETHYL HYDRAZINE - MMH					x											
17	NITROGEN (GAS) - GN_2				x												
18	NITROGEN (LIQUID) - LN_2			x													
19	NITROGEN TETROXIDE					x											
20	OXYGEN (LIQUID) - LO_2			x													
21	OXYGEN (GAS) - GO_2				x												
22	RP-1						x										
23	UDMH					x											
24																	
25																	
26																	
27																	

14. REMARKS (GENERAL):	15. DISTRIBUTION	16. APPROVAL SIGNATURE(S)

KSC FORM 3-24 (REV 12/64)

Figure 2-3 KSC Form 3-24 - Four Month Forecast

1. SECURITY CLASSIFICATION	2. PAGE
	3. DATE
	4. REPLACES PAGE(S)

FOUR-MONTH MISSILE PROPELLANT, GASES AND CHEMICAL FORECAST

5. PROGRAM TITLE	6. PROGRAM REQUIREMENT CODE	7. SYSTEM CODE	8. CONTRACTOR	DATED

10. ITEM NO.	11. NAME DESIGNATION	12. MILITARY SPECIFICATION NUMBER	13. UNITS: TONS	SCF	POUNDS	GALLONS		X 10 X	14. RUF OR RF	15. QUANTITY REQUIRED MONTHLY: 1ST	2ND	3RD	4TH	16. LOCATION AND REMARKS
	DEIONIZED WATER					X								
	DISTILLED WATER					X								
	ETHYL ALCOHOL					X								
	FLUORINE (LIQUID)				X									
	HELIUM			X										
	HYDRAZINE				X									
	HYDROGEN (LIQUID)		X											
	HYDROGEN (GAS)			X										
	HYDROGEN PEROXIDE - 35%				X									
	HYDROGEN PEROXIDE - 90%				X									
	IRFNA				X									
	NITROGEN - LIN (LIQUID)		X											
	NITROGEN - GAN (GASEOUS)			X										
	NITROGEN TETROXIDE				X									
	OXYGEN - LOX (LIQUID)		X											
	RP - 1					X								
	UDMH				X									
	UDMH/HYDRAZINE													

AFMTC FORM 50H NOV 61 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE.

1. SECURITY CLASSIFICATION	9. REVISION NO.

Figure 2-4 AFMTC Form 50-H Four Month Forecast

2.2.2.2.2 Purity specifications. Purity specifications for these propellants and pressurants will be determined by NASA specifications and agreements between KSC and the stage contractor or responsible agency. For example:

a. The following are considered to be within the area of MSFC responsibility:

1. Hydrogen, liquid and gaseous

2. Oxygen, liquid and gaseous

3. Nitrogen, liquid and gaseous

4. Hydrocarbon fuels

5. Helium, gaseous

6. Other propellants and pressurants primarily associated with launch vehicles.

b. MSC is responsible for the following specifications:

1. Nitrogen Tetroxide

2. Hydrazine-Unsymmetrical Dimethylhydrazine

3. Monomethylhydrazine

4. Other propellants and pressurants associated with manned spacecraft.

SECTION III
ORGANIZATIONAL RESPONSIBILITIES

3.1 GENERAL

To accomplish the propellant and pressurant tasks in a manner and time frame commensurate with Apollo/Saturn Program goals, the total KSC responsibility has been sub-divided into organizational responsibilities. These are detailed in the following paragraphs and summarized in Table 3-1.

3.2 RESPONSIBILITIES

3.2.1 PROGRAM CONTROL OFFICE (PPR-3)

a. The preparation of plans and implementing procedures for the management, operations, and maintenance functions pertaining to propellants and pressurants for the Apollo/Saturn Program at KSC.

b. The coordination to achieve the application of the propellant and pressurant policies and procedures developed by this plan for the Apollo/Saturn Program at KSC.

c. The conduct of a surveillance effort to assure compliance with existing policies and procedures relating to propellants and pressurants for the Apollo/Saturn Program at KSC.

3.2.2 MANNED SPACECRAFT OFFICE (PPR-1), APOLLO/SATURN I/IB SYSTEMS OFFICE (PPR-4), APOLLO/SATURN V SYSTEMS OFFICE (PPR-5)

3.2.2.1 Shall provide direction and control for that portion of the KSC Apollo/Saturn Program for which they have responsibility:

a. Direct implementing organizations compliance with KSC Apollo/Saturn propellant and pressurant plans and procedures.

b. Establish feedback channels from implementing organizations to permit accumulation of task accomplishment data and problem area reporting.

c. Develop and activate a visibility display system to permit rapid assimilation of program status.

3.2.3 RELIABILITY AND QUALITY ASSURANCE OFFICE (PPR-6)

a. The establishment of reliability and quality assurance policies to assure established standards being sustained in the accomplishment of assigned propellant and pressurant tasks.

Table 3-1 Propellants and Pressurants Responsibilities Summary

TASKS	PRR 3	PRR 1-4-5	PRR 6	PRR 7	SOP	LVO	SCO	EDV	ADM	QAS
Preparation of Plans and Procedures	*									
Management Surveillance	*									
Direct Implementation		*								
Reliability and Quality Assurance Policies			*							
Design and Provide Facilities and Systems								*		
Forecast Requirements (Including Systems Losses)					*	*	*	*		
Consolidate Forecast Requirements					*					
Review and Approve Requirements				*						
Develop Quality Standards					*					
Contract Coordination					*					
Contract Release									*	
Receiving					*					
Sampling and Analysis					*	*	*			
Storage					*	*	*			
Maintain and Clean Transporter Tanks and Running Gear					*					
Ops. and Maint. Hi-Pressure Gas Supply Systems					*					
Pumping GHe					*					
Conversion of LN_2 to Gas for VAB and Pad Storage Batteries					*					

Table 3-1 Propellants and Pressurants Responsibilities Summary

TASKS	PRR 3	PRR 1-4-5	PRR 6	PRR 7	SOP	LVO	SCO	EDV	ADM	QAS
Filling GHe and GN_2 Tube Bank Trailers					*					
Maint. and Ops. of Launch Pad Propellant Storage Systems						*				
Develop Personnel Proficiency and Safety Training Programs					*	*	*		*	*
Develop Safety Surveillance Programs					*	*	*			*

3.2.4 OPERATIONS SUPPORT OFFICE (PPR-7)

a. The review of the consolidated propellant and pressurant requirements to support the Apollo/Saturn Program at KSC.

b. When approved, the return of the consolidated requirements to SOP for the initiation of procurement action.

3.2.5 ASSISTANT DIRECTORATE FOR LAUNCH VEHICLE OPERATIONS (LVO)

a. The preparation of long range planning needs and operational planning needs for propellants and pressurants based on support contractor inputs and systems losses, and the submission of these forecasts to SOP.

b. The establishment and execution of implementing instructions for assigned operations and maintenance responsibilities, including chemical analysis and sampling, pertaining to propellants and pressurants.

c. The maintenance and operations of launch pad propellant systems.

d. The storage of propellants on LC-34, 37 and 39.

e. The establishment of management information feedback systems to permit rapid assimilation of status.

f. The development and establishment of personnel training programs to assure personnel capabilities in the handling of propellant and pressurant systems and products.

g. The establishment of a Propellant and Pressurant Safety Surveillance Program to assure safe handling of propellants and pressurant systems and products.

3.2.6 ASSISTANT DIRECTORATE FOR SPACECRAFT OPERATIONS (SCO)

a. The preparation of long range planning needs and operational planning needs for propellants and pressurants, based on support contractor inputs and systems losses, and the submission of these forecasts to SOP.

b. The establishment and execution of implementing instructions for assigned operations and maintenance procedures, including chemical analysis and sampling, pertaining to propellants and pressurants.

c. The storage of hi-purity LOX.

d. The development and establishment of personnel training programs to assure personnel capabilities in the handling of propellant and pressurants products and systems.

e. The establishment of a Propellant and Pressurant Safety Surveillance Program to assure safe handling of propellant and pressurant systems and products.

3.2.7 ASSISTANT DIRECTORATE FOR SUPPORT OPERATIONS (SOP)

a. The accumulation of program propellant and pressurant requirements from using organizations plus support contractor and operating organization inputs from analysis of use/loss-rates-experience for consolidation into long range and operational planning needs forecasts for submission to PPR-7 for review and approval. NOTE: SOP must include losses of all organizations in the event they are not included in individual forecasts.

b. The development of propellant and pressurant quality standards based on specifications established by MSC and MSFC.

c. The coordination on contracts for the procurement and transportation of propellants and pressurants.

d. The receipt, sampling and analysis, and storage of propellants and pressurants not specifically assigned as responsibilities of other KSC organizations.

e. The maintenance and cleaning of propellant transporter tanks and running gear.

f. The operation and maintenance of high pressure gas supply systems.

g. The pumping of GHe.

h. The conversion of LN_2 to gas for VAB and launch pad storage batteries.

i. The filling of GHe and GN_2 tube bank trailers.

j. The establishment and execution of implementing instructions for the accomplishment of assigned propellant and pressurant tasks.

k. The establishment of management information feedback systems to permit rapid assimilation of status.

l. The development and establishment of personnel training programs to assure personnel capabilities in the handling of propellants and pressurants and their respective systems.

m. The provisioning and maintenance of personnel protective (SCAPE) clothing and equipment in support of propellant operations.

n. The establishment of a Propellants and Pressurants Safety Surveillance Program to assure safe handling of propellant and pressurant systems and products.

o. The preparation of, and submittal to, LVO, SCO and EDV on a monthly basis, current usage reports to assist them in forecasting requirements.

3.2.8 ASSISTANT DIRECTORATE FOR ADMINISTRATION (ADM)

a. Coordinate with SOP in developing contract requirements for the procurement and transportation of KSC Apollo/Saturn propellants and pressurants.

b. Negotiate and issue the contracts for the procurement and transportation of propellants and pressurants.

c. In conjunction with the operating organizations, develop and initiate training programs for personnel associated with the handling of propellant and pressurant products and systems.

3.2.9 ASSISTANT DIRECTORATE FOR ENGINEERING DEVELOPMENT (EDV)

a. Design, provide, and modify to satisfy changes in program requirements, the facilities and systems for the storage, pumping, and transfer of propellants, pressurants and high pressure gases.

b. The preparation of long range planning needs and operational planning needs for propellants and pressurants based on system test requirements and system losses, and the submission of these requirements to SOP.

3.2.10 DIRECTORATE FOR QUALITY ASSURANCE AND SAFETY (QAS)

a. In conjunction with the operating organizations, establish and conduct a Propellant and Pressurant Safety Surveillance Program to assure the safe handling and operations of propellant systems and products.

b. In conjunction with the operating organizations, and ADM, establish and conduct safety training programs for personnel engaged in the handling of propellants and pressurants.

EXHIBIT 6

KSC APOLLO/SATURN ORDNANCE

REQUIREMENTS PLAN

EXHIBIT 6

EXHIBIT 6
KSC APOLLO/SATURN ORDNANCE REQUIREMENTS PLAN

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EXHIBIT 6
KSC APOLLO/SATURN ORDNANCE REQUIREMENTS PLAN

SECTION I
INTRODUCTION

1.1 GENERAL

This Exhibit delineates the policies and procedures for the responsible KSC organizations in establishing and managing an effective ordnance support system for the Apollo/Saturn Program at KSC.

1.2 APPLICABILITY AND SCOPE

The provisions of this Exhibit pertain to all KSC NASA, and contractor organizations having an operations or management function in the area of ordnance items and equipment in support of the Apollo/Saturn Program. Its scope includes the receipt, inspection, test, storage, assembly, transportation, installation, and control of ordnance items and equipment. Included among the Apollo/Saturn ordnance items and equipments are: primacord, squibs, retrorockets, ullage rockets, explosive valves and bolts, linear-shaped charges, exploding bridge wire (EBW), igniters and detonators, and the attaching hardware.

1.3 OBJECTIVE

The objective of this Exhibit is to establish the policies and procedures which will assure the accomplishment of the Apollo/Saturn ordnance operations and management functions as an integrated portion of the overall program.

1.4 POLICY

a. Ordnance items and equipment shall be provided to KSC by MSFC and MSC through the responsible stage and spacecraft contractor.

b. The Assistant Directorate for Support Operations (SOP) shall provide the handling and storage procedures for ordnance items at KSC. These shall be reviewed and approved by SCO, LVO, PPR-1, 4, 5 and concurred in by PPR-3 for consonance with this Exhibit and K-AM-02.

c. Any conflict noted between the provisions of this Exhibit and other KSC Apollo/Saturn documents shall be brought to the attention of PPR-3, where such conflicts shall be resolved on an individual basis.

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SECTION II
MANAGEMENT PROCESS

2.1 ORDNANCE MANAGEMENT FUNCTIONS

Each KSC organization assigned specific tasks in support of ordnance requirements shall develop a management system to assure the accomplishment of the following functions (as applicable).

a. The receipt of ordnance items and equipment.

b. The intra-KSC transportation of ordnance items and equipment.

c. The storage of ordnance items and equipment.

d. The accounting and control of ordnance items and equipment.

e. The assembly and testing of ordnance items and equipment.

f. The withdrawal for installation of ordnance items and equipment.

g. The installation of ordnance hardware and items on stages and spacecraft.

h. The checkout of space vehicle ordnance systems on an integrated, scheduled basis.

i. The maintenance and operation of ordnance storage facilities. This function includes the appraisal of existing facilities for adequacy and/or the development of requirements for additional or future facilities.

j. The establishment and implementation of an Apollo/Saturn Ordnance Safety Program to preclude unsafe transportation, storage, and handling actions.

k. The development and implementation of appropriate personnel training programs and evaluation procedures to develop and maintain skill levels and abilities commensurate with task assignments.

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SECTION III
ORGANIZATIONAL RESPONSIBILITIES

3.1 GENERAL

The accomplishment of ordnance tasks is an integration of operations, maintenance, and management functions. The following paragraphs delineate the responsibilities of the individual KSC organizations in the achievement of the total ordnance support effort. The physical responsibilities are summarized by Figure 3-1.

3.2 RESPONSIBILITIES

3.2.1 PROGRAM CONTROL OFFICE (PPR-3).

a. The development of policies and procedures for the management, operations, and maintenance functions pertaining to ordnance items and equipment for the Apollo/Saturn Program at KSC.

b. The coordination to achieve the application of the KSC Apollo/Saturn ordnance policies and procedures developed by this Exhibit.

c. The conduct of a surveillance effort to assure compliance with approved policies and procedures for the accomplishment of the Apollo/Saturn ordnance support at KSC.

3.2.2 MANNED SPACECRAFT OFFICE (PPR-1), APOLLO/SATURN I/IB SYSTEMS OFFICE (PPR-4), APOLLO/SATURN V SYSTEMS OFFICE (PPR-5).

a. Provide direction and control of implementing organizations and their compliance with KSC Apollo/Saturn ordnance policies and procedures.

b. Establish feedback channels from implementing organizations to permit accumulation of task accomplishment data and problem area reporting.

c. Develop and activate a visibility display system to permit rapid assimilation of ordnance mission status.

3.2.3 RELIABILITY AND QUALITY ASSURANCE OFFICE (PPR-6).

a. The establishment of reliability and quality assurance policies to assure established standards being maintained in the accomplishment of assigned Apollo/Saturn ordnance tasks.

3.2.4 ASSISTANT DIRECTORATE FOR LAUNCH VEHICLE OPERATIONS (LVO).

a. Develop and implement, in conjunction with stage contractors, approved ordnance implementing procedures detailing the receipt, storage, inventory control, testing, assembly, transportation, installation and checkout of ordnance items and equipment for the Apollo/Saturn stages.

b. Provide contractual supervision of contractor personnel performing ordnance tasks on Apollo/Saturn stages.

c. Initiate and provide information feedback channels to PPR-4 or 5 which will permit rapid assimilation of ordnance status.

d. Develop and establish, in conjunction with ADM, personnel training programs which will assure achieving and maintaining the skill levels required to handle ordnance items and equipment efficiently and safely.

e. Maintain special equipment required for handling of Apollo/Saturn launch vehicle ordnance.

f. Maintain ordnance hardware and inspect launch vehicle ordnance items in storage.

g. Develop and establish, in conjunction with QAS, an ordnance safety program to assure safe practices and procedures by personnel associated with Apollo/Saturn ordnance tasks.

3.2.5 ASSISTANT DIRECTORATE FOR SPACECRAFT OPERATIONS (SCO).

a. Develop and implement, in conjunction with spacecraft and module contractors, detailed implementing procedures for the receipt, storage, inventory control, testing, assembly, transportation, installation and checkout of ordnance items and equipment for the Apollo/Saturn spacecraft.

b. Provide contractual supervision of contractor personnel performing ordnance tasks on the Apollo/Saturn spacecraft and modules.

c. Initiate and provide information feedback channels to PPR-1 which will permit rapid assimilation of ordnance status.

d. Develop and establish, in conjunction with ADM, personnel training programs which will assure achieving and maintaining the skill levels required to efficiently handle ordnance items and equipment.

e. Develop and establish, in conjunction with QAS, an ordnance safety program to assure safe practices and procedures by personnel associated with Apollo/Saturn ordnance tasks.

f. Provide and maintain the equipment for testing and inspection of spacecraft ordnance items.

g. Maintain ordnance hardware and inspect spacecraft ordnance items in storage.

h. Maintain special equipment required for handling Apollo/Saturn spacecraft ordnance items.

3.2.6 ASSISTANT DIRECTORATE FOR SUPPORT OPERATIONS (SOP).

a. Coordinate with LVO, SCO, ADM and QAS for the receipt of ordnance items and equipment for the KSC Apollo/Saturn Program.

b. Provide, maintain and control Apollo/Saturn space vehicle ordnance storage facilities at LC-39.

c. Supply, calibrate and maintain U.S. Bureau of Mines approved test equipment for Apollo/Saturn launch vehicle ordnance items.

d. In accordance with requirements generated by LVO or SCO, prepare for tests of Apollo/Saturn launch vehicle ordnance items.

e. Enforce safety regulations developed in conjunction with QAS, pertaining to the storage, handling and transportation of Apollo/Saturn ordnance items.

f. Provide special and standard vehicles for intra-KSC transportation of Apollo/Saturn ordnance items and equipment.

g. Release ordnance items and equipment for test or installation upon receipt of proper authorization from LVO or SCO.

h. Develop and establish, in conjunction with ADM, personnel training programs which will assure achieving and maintaining the skill levels required to efficiently handle ordnance items and equipment.

3.2.7 ASSISTANT DIRECTORATE FOR ADMINISTRATION (ADM).

a. In conjunction with LVO, SCO, SOP and QAS, develop and initiate receiving procedures, including the visual inspection for shipping damage, for Apollo/Saturn ordnance items and hardware.

b. In conjunction with LVO, SCO and SOP, develop and initiate personnel training programs which will assure achieving and maintaining the skill levels required to handle ordnance items and equipment efficiently and safely.

3.2.8 DIRECTORATE FOR QUALITY ASSURANCE AND SAFETY (QAS).

a. In conjunction with LVO, SCO and SOP, develop and monitor an Apollo/Saturn ordnance safety plan and program to assure safe practices and procedures by personnel associated with the handling, storage, testing, transporting, installing and checking ordnance items and systems.

FUNCTIONS	LVO	SCO	SOP	ADM	QAS (MONITOR)
RECEIVING	*	*	*	*	*
INTRA-KSC TRANSPORTATION			*		*
STORAGE			*		*
MAINTENANCE AND INSPECTION	*	*			
MAINTAIN TEST EQUIPMENT		*	*		
MAKE PREPARATIONS FOR TESTS			*		
CONDUCT TESTS	*	*			*
AUTHORIZE WITHDRAWALS	*	*			
PERFORM INSTALLATION	*	*			*
PERFORM CHECKOUT	*	*			*

Figure 3-1. Apollo/Saturn Ordnance Support Physical Responsibilities Summary

EXHIBIT 7

EXHIBIT 7

KSC APOLLO/SATURN EDP SUPPORT REQUIREMENTS PLAN

EXHIBIT 7
KSC APOLLO/SATURN EDP SUPPORT REQUIREMENTS PLAN

SECTION I
INTRODUCTION

1.1 GENERAL

This Exhibit delineates the policies, procedures, and responsibilities which govern the utilization of Electronic Data Processing (EDP) to provide KSC with logistics information and management visibility on maintenance activities, spare parts, transportation, propellants and pressurants, ordnance, and technical support data.

References to the Logistics Baseline Cross-Reference System and the Logistics Baseline Activity Flow have been retained in this exhibit to demonstrate the interfaces. The Logistics Baseline System is not now in use at KSC, but is in process of development.

1.2 APPLICABILITY AND SCOPE

The provisions of this Exhibit apply to all KSC organizations having Apollo/Saturn logistics operational or management responsibility which requires EDP support for adequate and effective control. It will apply to contractors as provided for in Section I, K-AM-02. Its scope includes the identification of input needs, standardization of EDP programs, and management and operating reports.

1.3 OBJECTIVE

The objective of this Exhibit is to establish the policies and requirements pertaining to the management and implementation of the EDP system in support of logistics for the Apollo/Saturn Program at KSC.

1.4 POLICY

All implementing plans and procedures developed by the organizations responsible for the accomplishment of logistics tasks requiring EDP shall be in consonance with this Exhibit.

1.5 MANAGEMENT ADVANTAGES

The application of electronic data processing, in support of both peculiar and standard spare parts, for example, provides management with a highly flexible, quick response source of information. This information can then be used for management visibility of spare parts status, historical consumption, and failure data for subsequent provisioning or product improvement actions. Proper programming for logistics EDP results in the availability of topic data such as: inventories, utilization data, failure information, cost information, mean time between failure determination, system or component reliability, trends, and percentages.

1.6 MANAGEMENT FUNCTIONS AND REPORTS

To assure accomplishment of the functions defined in paragraphs a. through g. below, each KSC organization assigned an active role in support of the logistics EDP system, shall develop a management system which provides for:

a. The determination of the suitability of EDP for data control and reporting needs beyond the requirements of this Exhibit.

b. Submission of requests for EDP services to Data Systems Division (PB).

c. The determination of EDP input data elements and their source.

d. The determination of the logistics reports required for management visibility.

e. The identification of information elements to be contained in the reports.

f. The scheduling of the frequency of reports.

g. Submittal of data required to meet program established minimum data requirements.

1.7 ORGANIZATIONAL RESPONSIBILITIES

The organizational responsibilities which must be executed to provide KSC with an EDP system which is commensurate with Apollo/Saturn Program needs are outlined in the following paragraphs, and are summarized in matrix form in Figure 1-1, EDP Support Responsibility Summary.

1.7.1 PROGRAM CONTROL OFFICE (DC).

a. Preparation of plans and implementing procedures for the management of an EDP system for logistics products and services.

b. Coordination to achieve the application of the plans and procedures for an EDP system at KSC.

c. Determination of the minimum information required by Apollo/Saturn Program management to evaluate the effectiveness of the EDP support.

d. Continuing surveillance and periodic assessment of the EDP system and the effectiveness of each phase.

e. In conjunction with item d., above, recommendations relative to the scope of data available from each design organization and operational element.

f. Concurrence in input data elements designated as necessary for any input format.

1.7.2 SATURN SYSTEMS OFFICE (DG), APOLLO SPACECRAFT OFFICE (DJ)

a. Direct implementation of procedures for the management of an EDP system.

b. Identify program management information required by DJ, DG.

c. Review the adequacy of the data made available from other centers, and formally approve the input or provide specific recommendations for improvement.

d. Assure the development of adequate and timely reports from contractors to the design or operating element.

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TASK	ORGANIZATION							
	DC	DG/DJ	QA/RA	JA	MA	PA	KA	GA
Preparation of Plans and Procedures	*	*						
Direct Implementation		*						
Coordinate System	*							
Forecast Uses of EDP			*	*	*	*	*	
Establish Management Reports	*	*	*	*	*	*	*	*
EDP System Design						*		
Consolidate EDP Programs						*		
Conduct Surveillance	*	*						
Maintain Input Status						*		
Develop Minimum Program Criteria	*	*						
Approval of Scope of Data	*	*						
Support MSC & MSFC				*			*	
Secure Other Center Data				*			*	
Assure Data Input			*	*	*	*	*	
Concur in Other Center Data		*						
Concur in Data Elements	*							
Storage & Visibility of Data			*	*	*	*	*	
Review of System Operation		*						
Contract Review								*
Contract Coordination								*
Contract Release								*
Designation of Input Data Sources		*	*	*	*	*	*	

Figure 1-1. EDP Support Responsibility Summary

e. Review and validate EDP input requirements for completeness of coverage.

f. Review the EDP system for effectiveness.

g. Identify input data elements and specify the sources of these elements.

1.7.3 DESIGN AND OPERATING ORGANIZATIONS.

a. Forecast uses for EDP applications in anticipation of operating needs or where KSC has contract obligation to specific contractors for EDP services. Such forecasts will be brought to the attention of DC through DJ, or DG, by means of an abstract of the proposed EDP service.

b. Assure the availability and insertion of the input requirements specified in paragraph 1.2 of this Exhibit.

c. Maintain current EDP files including:

1. One set of each applicable current EDP report.

2. One set of each applicable preceeding EDP report.

3. An abstract of each type of report comprised of distribution of copies, frequency of report, number of copies issued, identification of data contributors, sample form of raw data input, and a statement of use.

d. Designate contributors of input data. All categories of hardware shall be considered though it may not be necessary for all contractors, vendors or suppliers to participate in the EDP system.

1.7.4 DIRECTORATES FOR: SPACECRAFT OPERATIONS (KA) AND LAUNCH VEHICLE OPERATIONS (JA).

a. Submit reports as may be needed to satisfy requirements for MSC and MSFC respectively.

b. Secure copies of EDP logistics support data produced by MSC and MSFC in accordance with the existing inter-Center agreements; assess the data for adequacy and submit it with comments to DJ and DG for further action as required to assure effective Program support.

1.7.5 DIRECTORATE FOR INFORMATION SYSTEM (PA).

a. Develop EDP programs to support this Exhibit.

b. Provide a machine program consolidation for use by contractors or other centers and for uniform data input and standard report format.

c. Maintain a status report of data inputs from all KSC organizations, and notify DJ, DG, DE of significant deviations from the expected volume of inputs.

1.7.6 DIRECTORATE FOR ADMINISTRATION (GA).

a. Review existing contracts to ascertain KSC commitments for EDP support to contractors. Advise DG and DJ of such commitments.

b. Negotiate and issue the contracts for the procurement of data required by the EDP system when requested by the NASA Technical Representative.

c. Review the necessity for the inclusion of suitable data for the EDP system in all future contracts where logistics products and services are involved in support of the Apollo/Saturn Program.

1.8 SUPPORT OF THE LOGISTICS MANAGEMENT INFORMATION SYSTEM

1.8.1 GENERAL. These paragraphs expand on the EDP functions delineated in Exhibit 1, Management Information System. They consider the reports required to support that system and describe the sequential machine functions which provide the required data.

1.8.2 EDP SYSTEM TECHNIQUE. The EDP system function, in support of the Management Information System, is primarily one of accounting for important data, comparing requirements to schedules, monitoring the progress of events and the utilization of materials. By this method, there is a basic source of data and reference against which accounting and assessment may take place.

1.8.3 SYSTEM INPUT. The basic sources of data are prepared as input to the EDP system in the form of machine processing tapes, card decks or other machine devices or on a similar type of machine loading form. The tasks required to provide input data and the management reports to be derived by the EDP are identified for each logistics product in the subsequent sections of this Exhibit. These are elaborations of the descriptions provided by Exhibit 1 of this document.

1.8.4 EDP SYSTEM OPERATION. The EDP support to the Management Information System is derived from the use of a common data bank. By a system of comparisons and selection of exceptions, the key information is prepared for reports to management. The total information in the data bank is also utilized in generating reports for the operating organization and in providing convenient and accurate records.

1.9 LOGISTICS REQUIREMENTS SUMMARIES FLOW

The service provided by electronic data processing is an accounting procedure, dealing with the following:

a. Contract end item inventory.

b. Logistics baseline cross-reference index.

c. Priority assignments to important maintenance summaries.

d. Delivery schedule of End Item Reports (EIR) and Site Logistics Requirements Summaries (SLRS).

e. Summaries.

f. Receipt data for delivery of EIR and SLRS.

Information elements are extracted, prepared for machine processing, processed and stored in an active data file and used for future comparison. The follow-up inputs to the system become stimuli for updating the data file and provide a means of comparison between the original input and the new information.

The updated file is then sorted for exceptions which deviate from the established requirements and a Flag Report is generated for immediate management use. The total data is then utilized to generate a routine report to the Saturn Systems Office (DG) or Apollo Spacecraft Office (DJ).

1.9.1 EDP INPUT REQUIREMENTS. The input data is specified in Table 1-1 and is shown in proper input sequence in Figure 1-2, Logistics Requirements Summaries Management Information System page E7-9. The reference numbers on Table 1-1 are directly related to positions of the same number on Figure 1-2.

1.9.2 EDP SYSTEM REQUIREMENTS. The prime requirement of EDP capability is one of comparison. In this Section, comparison must be made between the following information sources:

a. CEI inventory vs logistics baseline cross-reference index.

b. Logistics baseline references vs priority assignment.

c. Priority assignments vs EIR delivery.

d. Priority assignments vs SLRS delivery.

Common machine language must be used for all programs to permit a high degree of utilization by participating agencies. Uniform codes, field lengths, and term definition must be used throughout the program. The codes and terms established in K-AM-02 will be used to achieve the required uniformity.

1.9.3 EDP PROCESSING SYSTEM. The processing technique will be selected by a systems analysis performed by the Data Systems Division (PB).

Table 1-1. EDP Inputs/Outputs Logistics Requirements Summaries Management Information System

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
1D	List of CEI's	CEI inventory	
1H	List of CEI's on which EIR's have been prepared	Logistics baseline cross-reference index	
1			1. a. List of CEI's on which EIR's may be required. b. List of EIR's which have been prepared.
1F			1F. List of CEI's for which EIR's are not available.
2D	Assignment of Priority I, II, III or IV to each CEI	Priority assignments	

Table 1-1. EDP Inputs/Outputs Logistics Requirements Summaries Management Information System (Continued)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
2			2. a. Priority I, List of CEI's. b. Priority II, List of CEI's. c. Priority III, List of CEI's. d. Priority IV, List of CEI's.
3C	a. Identify required SLRS's and associated CEI's b. Required completion dates for SLRS's and EIR's	Identify SLRS by CEI and establish EIR/SLRS delivery schedules	
3		SLRS inventory by CEI and EIR/SLRS schedule	3. a. List of EIR's Part I with required delivery b. List of EIR's Part II with required delivery dates. c. List of SLRS's (Level 1) with required delivery dates. d. List of SLRS's (Level 2) with required delivery dates.
3F		Non-scheduled Item List	3F. List of required EIR's, Part I, EIR's Part II, SLRS's (Level 1) and SLRS's (Level 2) with no schedule delivery date.
4B	Actual delivery date of EIR Part I	EIR, Part I delivery	
4		EIR Part I document list and delivery status	4. a. List of EIR's part I delivered and delivery dates. b. List of EIR Part I not delivered.
4F		Actual late delivery	4F. List of EIR's Part I with late delivery.
5B	Actual delivery date of EIR Part II	EIR Part II delivery	

Table 1-1. EDP Inputs/Outputs Logistics Requirements Summaries Management Information System (Continued)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
5		EIR Part II document list and delivery status	5. a. List of EIR's Part II delivered and delivery dates. b. List of EIR's Part II not delivered.
5F		Actual late delivery	5F. List of EIR's Part II with late delivery.
6B	Actual delivery date of SLRS, Level 2	SLRS Level 2 delivery	
6		SLRS, Level 2, document list and delivery status	6. a. List of SLRS Level 2 delivered and delivery dates. b. List of SLRS Level 2 not delivered.
6F		Actual late delivery	6F. List of SLRS Level 2 with late delivery.
7B	Actual delivery date of SLRS Level 1	SLRS Level 1 delivery	
7		SLRS Level 1 document list and delivery status	7. a. List of SLRS Level 1 delivered and delivery dates. b. List of SLRS Level 1 not delivered.
7F		Actual late delivery	7F. List of SLRS Level 1 with late delivery.

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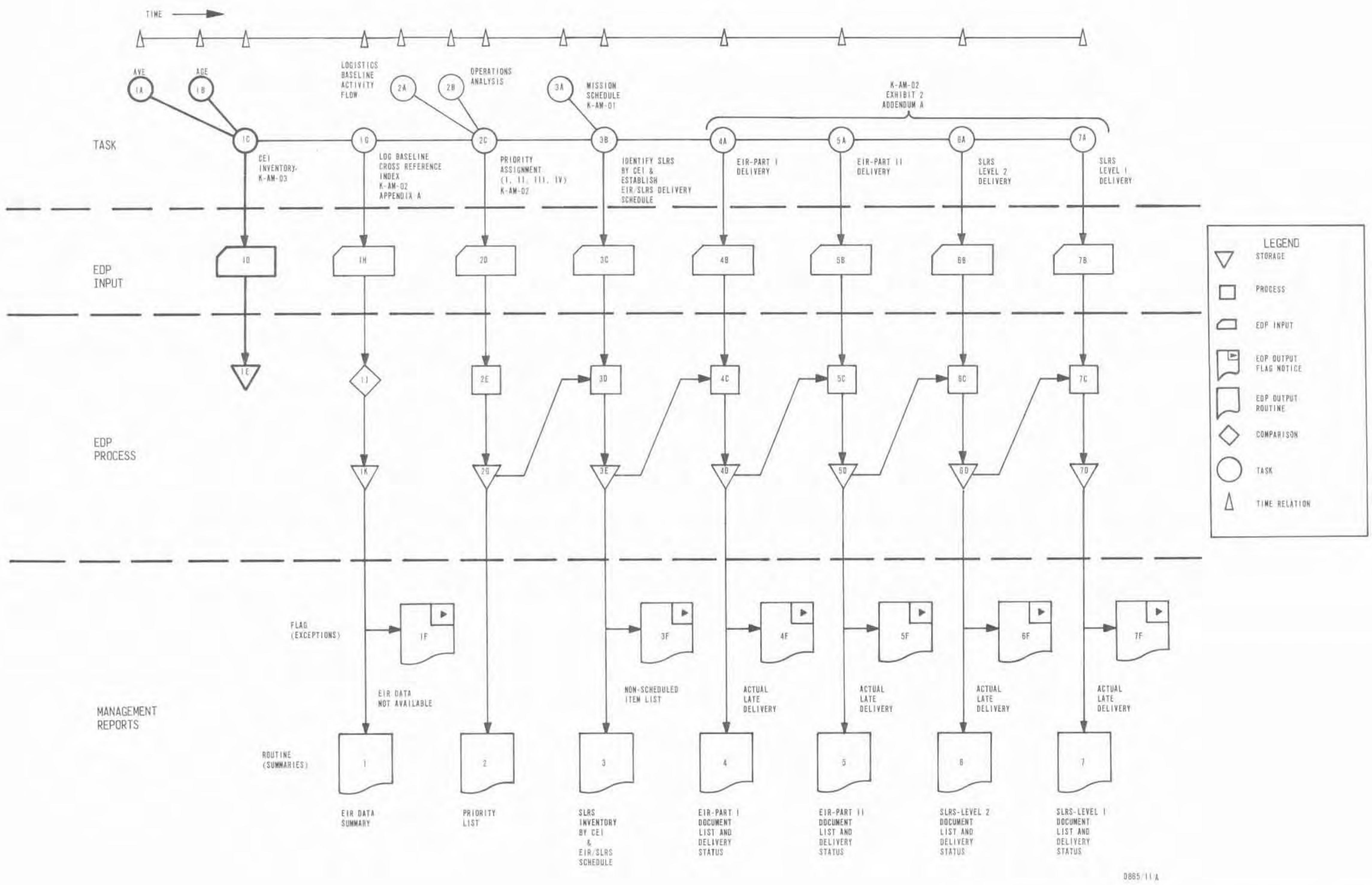

Figure 1-2. Logistics Requirements Summaries Management Information System

SECTION II
SUPPORT OF MAINTENANCE ACTIVITIES MANAGEMENT INFORMATION

2.1 GENERAL

The EDP service provides an accounting procedure, dealing with the following:

a. Contract End Item (CEI) inventory.

b. Logistics baseline cross-reference index.

c. Priorities.

d. ission schedules.

e. Maintenance functions.

f. System checkout.

g. Unscheduled maintenance.

h. Unsatisfactory Condition Report (UCR).

i. Failure analysis.

Information elements are extracted, prepared for machine processing, processed, stored in an active data file, and used for future comparison. The follow-up inputs to the system become stimuli for updating the data file and performing a comparison between the original input and the new information. The updated file is then sorted for exceptions which deviate from the established requirements and a flag notice is generated. The total data is utilized to generate a routine report.

2.2 EDP INPUT REQUIREMENTS

The input data is specified in Table 2-1 and is shown in proper input sequence in Figure 2-1. The reference numbers on Table 2-1 are directly related to positions of the same number on Figure 2-1.

2.3 EDP SYSTEM REQUIREMENTS

The prime requirement of EDP capability is one of comparison. In this Section, comparison must be made between the following sources:

a. CEI inventory vs logistics baseline cross-reference index.

b. Scheduled maintenance vs maintenance accomplished.

c. System checkout sequence vs sequence accomplishment.

d. Mission schedule vs maintenance log entry.

Common machine language must be used for all programs to permit a high degree of utilization by participating agencies.

Uniform codes, field lengths, and term definition must be used throughout the program. The codes and terms established in K-AM-02 will be used to achieve the required uniformity.

2.4 ELECTRONIC DATA PROCESSING SYSTEM

The processing technique used will be selected by a system analysis performed by the Data Systems Division (PB).

Table 2-1. EDP Inputs/Outputs for Maintenance Activities Management Information System

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
1D	Scheduled maintenance activities, in sequence with mission schedule	Scheduled maintenance	
1			1. Maintenance schedule. List of scheduled maintenance activities in time sequence to be performed.
2C	Indication schedule maintenance was performed. Time to perform, when performed, corrective maintenance required.	Perform scheduled maintenance	
2			2. Maintenance activities accomplished. a. List of scheduled maintenance activities performed. b. Summary of times required to perform scheduled maintenance. c. List of unscheduled maintenance requirements.
2F			2F. Schedule maintenance not complete. List of scheduled maintenance not accomplished.
3D	Corrective maintenance required as determined from scheduled maintenance	Schedule maintenance requirements	

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Table 2-1. EDP Inputs/Outputs for Maintenance Activities Management Information System (Continued)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
3E	Corrective maintenance required as determined by Quality Assurance reports	Unsatisfactory condition notice	
3G	Corrective maintenance required as determined during checkout procedures	System checkout interruption	
3			3. Summary of failures. List of failures which have occurred.
3F			3F. Notice of sequence interruption. Notice that the operation has been interrupted due to failure.
4B	Corrective maintenance action accomplished, with time required	Perform unscheduled maintenance	
4			4. Unscheduled maintenance activities accomplished. a. List of unscheduled maintenance activities performed. b. Summary of times required to perform unscheduled maintenance.
4F			4F. System failure report. List of unscheduled maintenance with delayed completion.
5B	Notice of system down. The notice identifies the system and estimates the length of time to repair	Entry in the maintenance log	
5F			5F. Excessive time required to perform maintenance.

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Table 2-1. EDP Inputs/Outputs for Maintenance Activities Management Information System (continued)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
			A report which identifies the down system and tells the impact on the mission schedule.
5			5. Maintenance records summary. QAS report summary. Summary of maintenance records. Summary of QAS reports.
6	Unsatisfactory condition report. Lists part number CEI, system, and problem	Unsatisfactory condition	6. Unsatisfactory Condition Report (UCR) records summary.
6F			6F. Report of an unsatisfactory condition, indicates mission impact, system part and CEI affected.
7B	Report on the cause of failure. Identifies the part number, system CEI and failed condition	Failure analysis	
7			7. Report summary of failure analysis. Indicates trend and pattern failures.

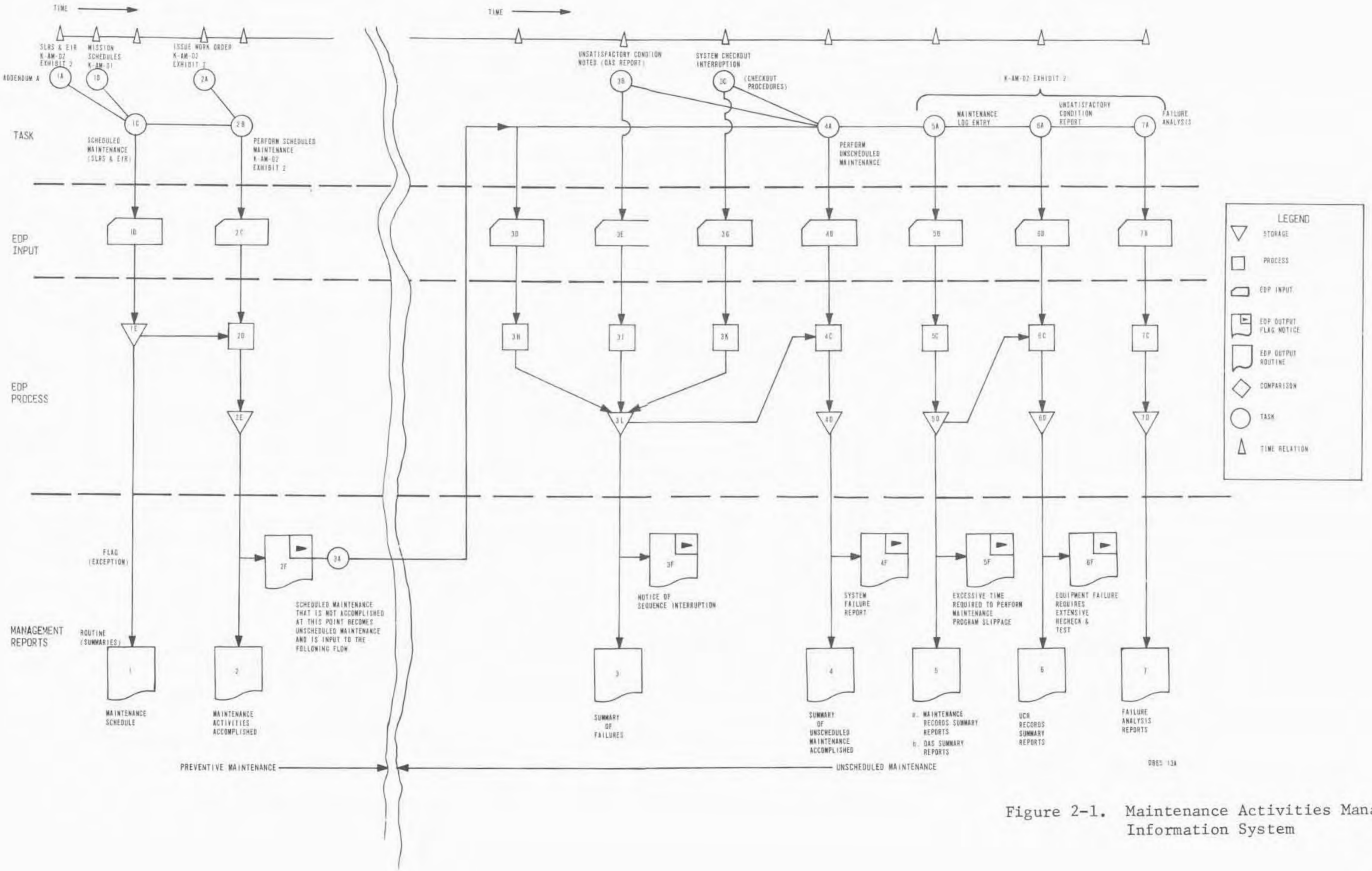

Figure 2-1. Maintenance Activities Management Information System

SECTION III
SUPPORT OF SPARE PARTS

3.1 GENERAL

This Section describes the EDP system which provides the support required for logistics management of spare parts. The advantage gained by application of the system, in addition to the many reports and other outputs required by design and operating elements, is primarily in providing visibility to management.

3.2 EDP INPUT REQUIREMENTS

Specific EDP inputs are required to provide the output information needed for management and user reports. The inputs originate at the KSC design organization, Director for Design Engineering (MA). In addition, data inputs required for KSC management reports and KSC Center operations originate at other NASA Centers and are forwarded for inclusion in the KSC EDP system. Input requirements are identified in paragraphs 3.2.1 through paragraph 3.2.3. This data is specified in Table 3-1 and is shown in proper sequence in Figure 3-1, Spare Parts Management Information System. The reference numbers on Table 3-1 are directly related to position of the same number on Figure 3-1.

3.2.1 SPARE PARTS LIST. The spare parts list is derived from the maintenance analysis. It is reviewed and concurred in by the using organization. Included in this basic list are the following:

a. Peculiar spare parts list (descriptive and quantitative).

b. Standard parts list (descriptive and quantitative).

c. Government Furnished Parts (GFP) list (descriptive and quantitative).

d. Critical items list (launch critical).

e. Identification of next higher assembly.

3.2.2 DUE-IN AND RECEIPTS. Due-in information is available from spare parts contracts and includes items, quantities, prices, and delivery schedules. Spare parts receipts, when matched against contractual data, provide information to show delivery status, milestones achieved, or milestones not achieved.

3.2.3 CONSUMPTION DATA. This is derived from daily maintenance reports and includes the following:

a. Peculiar spare parts used (descriptive and quantitative).

b. Standard parts used (descriptive and quantitative).

c. GFP used (descriptive and quantitative).

d. Critical items used (descriptive and quantitative).

e. Reason for replacement (time requirement or failure).

f. Item operating time.

3.2.4 EDP SYSTEM REQUIREMENTS. The prime requirement of EDP capability is one of comparison. In this Section, comparison must be made between the following sources:

a. CEI inventory vs logistics baseline cross-reference index.

b. Provisioning guidance meeting agenda vs CEI inventory.

c. Spare part release lists vs CEI inventory.

d. Recommended spare parts list vs CEI inventory.

e. Lists of approved items vs CEI inventory.

f. Delivery dates vs mission schedule.

g. Priced spares list vs CEI inventory.

h. Parts consumption vs stock inventory.

3.3 EDP OUTPUTS

The outputs of the logistics EDP system are sufficiently versatile to permit their adaptation to the many reports required. The following paragraphs define these reports.

3.3.1 MANAGEMENT REPORTS. The management reports will show the status of the initial provisioning. Where established milestones or requirements are not being met, these reports are categorized as exception (Flag Notice) reports. The following paragraphs define these management reports (refer to Figure 3-1, this Section).

3.3.1.1 Report on CEI/Spares Provisioning. Routine reports result from a comparison of the CEI inventory list to the list of CEI's for which a provisioning guidance conference has been held. All CEI's which have not been worked through a provisioning guidance conference are exceptions and are printed on the Flag Notice (1F) until notification of a spare parts delivery schedule is received.

3.3.1.2 Report on Spares List Delivery Date. This report results from a comparison of the RSPL releases to the total CEI inventory list. All CEI's which have no spares list delivery date forecasted are exceptions and are printed on the Flag Notice, (3F).

3.3.1.3 RSPL Approval. This routine report results from a comparison of the list of RSPL's submitted to a list of those not reflecting approval action. Those with no approval action are printed on the Flag Notice, (4F).

3.3.1.4 Late Delivery Forecast. This report results from a comparison of the projected delivery date of spare parts for each CEI to a list of the on-site need dates for each CEI. The mission schedule described within Section II of K-AM-01 is the basic reference for the on-site need dates. All deliveries which are set beyond the items need date are printed on the Flag Notice, (5F).

3.3.1.5 Spares Cost Summary. This routine report results from an accumulation of the program spares cost as approved on the priced spare parts list. Totals by CEI are printed out as well as a total spares cost (Report 6).

3.3.1.6 Late Deliveries. This Flag Notice results from a comparison of projected delivery dates to the past-due delivery dates (Flag Notice 7F).

3.3.1.7 Critical Shortage Report. This Flag Notice results from a comparison of critical items stock balance against the established minimum stock level, (Flag Notice 8F).

3.3.1.8 Operating Organization Reports. The differences in the information required by the operating organizations from that required by program management are in the type and details of these reports.

3.3.1.9 Types of Spares Listings. The complete detailed reports provided are:

a. Spare parts list.

b. Standard parts list.

c. Peculiar items list.

d. Government furnished items list.

e. Critical items list.

f. Parts indenture system.

3.3.1.10 Stock Activity Reports. In addition to the basic spares listings, a series of reports are required to control the receipt, storage, issue and reorder of spare parts. These are:

a. Spare parts stock action report.

b. Inventory and usage report.

c. Spare parts shortage report.

d. Spare parts receiving report.

e. Spare parts consumption cost report.

3.4 LOGISTICS TRACKING SYSTEM FOR SPARE PARTS

A spare parts tracking capability is an integral part of the EDP system. It will reflect status at critical check points and flag delinquent deliveries. The spare parts systems tracking critical check points are:

a. Required on-dock dates.

b. Recommend spare parts lists due date.

c. Approval notice due date.

d. Spare parts delivery schedule.

e. Priced spare parts list delivery status.

3.5 EDP SYSTEM MINIMUM REQUIREMENTS

Consideration is given to the fact that the NASA Centers, organizational elements, and contractors involved in supply support may have special or peculiar requirements. There is, however, a set of minimum reports and data elements which are both common and necessary from a program control standpoint.

3.5.1 MINIMUM REPORTS. The following are reports which are felt to be the minimum required by Apollo/Saturn Program contractors to operate, control and manage the spare parts under their jurisdiction.

a. Spare parts provisioning list.

b. Priced spare parts list.

c. Standard items list.

d. Peculiar items list.

e. Government furnished items list.

f. Critical items list.

g. Total inventory list.

h. On hand and due-in asset list.

   1. Delivery schedule.

   2. Delinquency report.

i. Accountable records system.

   1. Input data transaction/error list.

   2. Master transaction ledger.

   3. Spare stock activity report.

   4. Spare inventory/usage report.

   5. Spare shortage report.

   6. Daily receiving report.

   7. Spares consumption cost report.

   8. Effectivity surplus report.

   9. Inactive ledger report.

j. Validity error list.

k. Shelf life report.

l. Year to date receipts and issues.

3.5.1.1 <u>Input Forms</u>. All of the machine loading forms used for this system are KSC approved, and carry form numbers. All organizations required to load the same data should utilize these KSC forms. Other data may be submitted on data processing cards, tapes or as a by-product of an operating function. The following are EDP machine loading forms available to fill current needs:

a. Master Transaction Sheet (Figure 3-2).

b. Master Transaction Sheet B (Figure 3-3).

c. Alternate P/N Transaction Sheet (Figure 3-4).

d. System Transaction Sheet (Figure 3-5).

e. Item Sequence No. Transaction Sheet (Figure 3-6).

f. Usage Transaction Sheet (Figure 3-7).

g. Release Number Transaction Sheet (Figure 3-8).

h. Schedule Date Transaction Sheet (Figure 3-9).

i. Delivery Transaction Sheet (Figure 3-10).

j. Accountable Records New Item Input Sheet (Figure 3-11).

k. Saturn V Accountable Records Transation Data Input Sheet (Figure 3-12).

3.5.1.2 The processing techniques used will be developed from a system analysis performed by Data Systems Division (PB).

Table 3-1. EDP Inputs/Outputs For Supply Management Information System

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
1D	List of CEI's	CEI inventory	
1H	Required date for delivery of spares and spare lists	Provisioning guidance meeting	
1			1. Spare parts required delivery schedule. a. List of CEI's for which spare parts are required. b. Required dates for delivery of spares lists. c. Required dates for delivery of spares.
1F			1F. No spare parts provisioning initiated. a. List of CEI's for which required spares delivery dates have not been established.

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Table 3-1. EDP Inputs/Outputs For Supply Management Information System (Continued)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
			b. List of CEI's for which required spares lists delivery have not been established.
2B	List of interim release spares by CEI	Spare parts interim release	
2			2. a. Summary list of interim release. b. List of CEI's for which interim spares have been released and approval is required.
3B	Submittal date for spares list by CEI	Recommend spare parts list release	
3			3. Index of recommended spare parts list. a. List of CEI's for which recommended spare parts list has been submitted with submittal dates. b. List of CEI's for which recommended spare parts list has not been submitted.
3F			3F. a. No spares list delivery schedule. b. List of CEI's for which recommended spare parts list is late.
4B	Approval dates for recommended spare parts list and interim released spare parts	Approval	
4			4. Index of approval spare parts list. a. List of CEI's for which recommended spare parts list is approved.

Table 3-1. EDP Inputs/Outputs For Supply Management Information System (Continued)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
			b. List of interim spare parts list that has been approved.
4F			4F. Approval not accomplished. a. List of CEI's spare parts list not approved. b. List of interim release spare parts not approved.
5B	1. Spares scheduled delivery dates 2. Quantities required, minimum - maximum	Projected delivery dates	
5		Delivery schedule	5. Delivery schedule. a. List of spares to be delivered with delivery dates. b. List of dates and spares to be delivered each date. c. List of spares no delivery date scheduled.
5F			5F. a. Late delivery forecast. b. List of spares scheduled for late delivery.
6B	Spare parts cost data	Priced spare parts list	
6			6. a. Index of priced spare parts list. b. List of CEI's for which spares have been priced.
6F			6F. a. Index of missing priced spare parts list. b. List of CEI's for which spares have not been priced.
7B	Date of spares delivery	Spare parts delivery	
7			7. Delivery on schedule. a. List of spares delivered with dates of delivery.

Table 3-1. EDP Inputs/Outputs For Supply Management Information System (Continued)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
			b. List of spares not delivered.
7F			7F. a. Actual late delivery. b. List of spares delivered late.
8B	Spare part deletion from inventory	Spare parts consumption	
8-1		On-hand inventory	List of spare parts on hand.
8-2		Replenishment required	List of spare parts to be ordered.
8F			8F. a. Critical shortage. b. List of critical spares parts quantity below critical level.

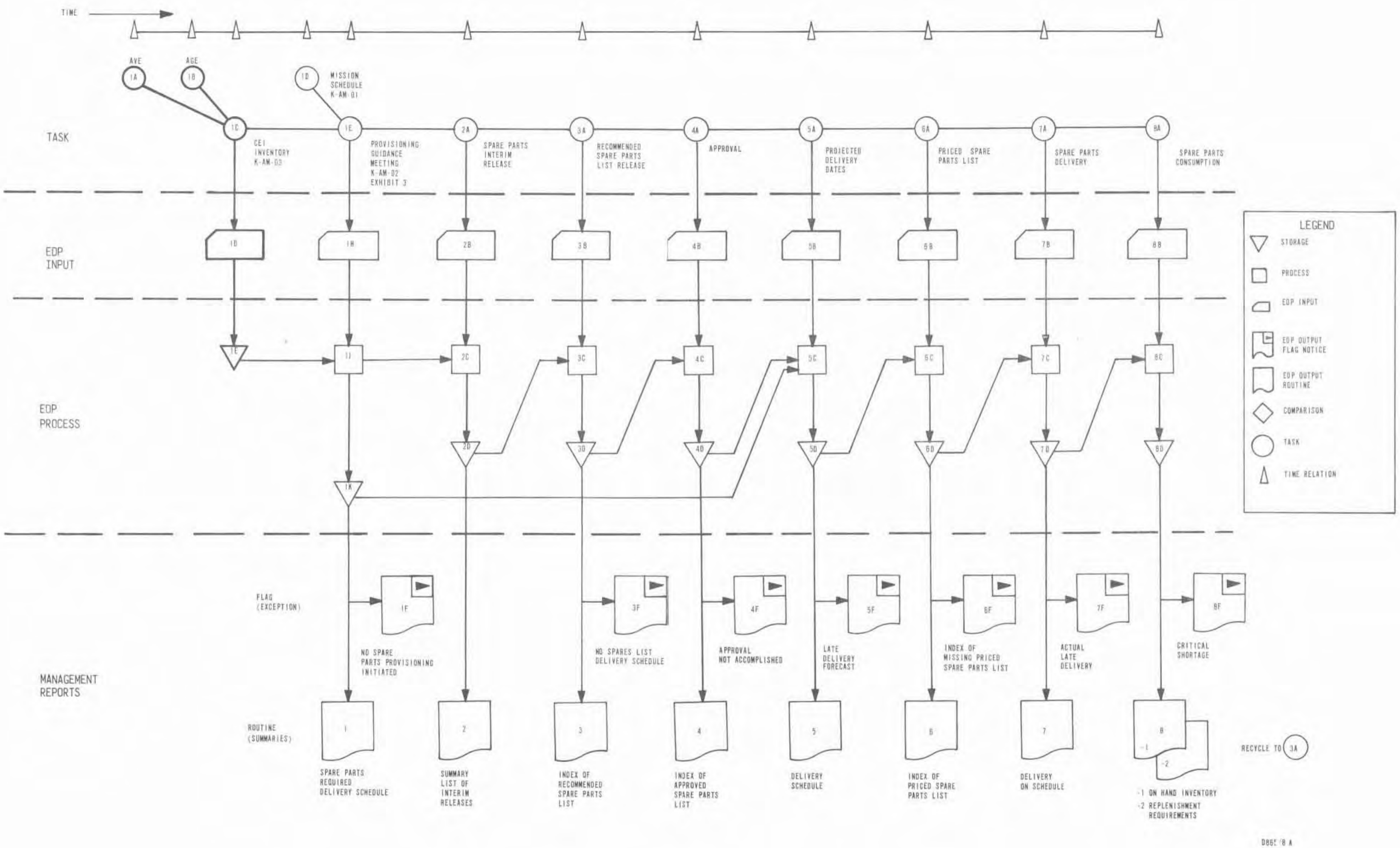

Figure 3-1. Spare Parts Management Information System

MASTER TRANSACTION SHEET

PART NUMBER

A PART NUMBERS
B ALTERNATE PART NUMBERS
C SYSTEMS
D ITEM SEQUENCE NUMBERS
E USAGE
F RELEASE NUMBER
G SCHEDULE DATES
H DELIVERIES
I INVENTORIES

CTR CDE: 1 — B
CONTROL FIELD: 2 3 4 5 6 7 8 — A
TRAN DATE: 15 16 17 18 19 20
TRN CDE: 21

CRD CDE: 22 — A
PART NUMBER: 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
LOT NO: 43 44
REV LTR: 45 46 47 48
EO OR ECP NUMBER: 49 50 51 52 53 54 55 56 57 58 59 60
VENDOR PART NUMBER: 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

CRD CDE: 22 — B
VENDOR CODE: 23 24 25 26 27
ESTIMATED PRICE: 28 29 30 31 32 33 34 35
CST CAT: 36
MNT LEV: 37
TYP ITM: 38
LEAD TIME: 39 40
MKE BUY: 41
FEDERAL STOCK NUMBER: 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
REPAIR KIT NUMBER: 57 58 59 60 61 62 63 64 65 66

CRD CDE: 22 — C
NOUN: 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

CRD CDE: 22 — D
OPER MIN QTY: 23 24 25 26 27
OPER MAX QTY: 28 29 30 31 32
REFURB MIN QTY: 33 34 35 36 37
REFURB MAX QTY: 38 39 40 41 42
UNIT ISS: 43 44
QTY U/P: 45 46 47
MAINT LOC: 48 49 50
REPR CYCL TIME: 51 52 53
SHELF LIFE: 54 55 56

CRD CDE: 22 — G
SYSTEM CODE: 23 24 25 26 27 28 29
EFF CODE: 30 31 32 33
PRI CDE: 34
INT CDE: 35
SUPERSEDED SUPERSEDING PART NO: 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55
PROV LIST #: 56 57 58 59
REV CDE: 60
OPER HOURS: 61 62 63 64 65
CAL FREQ: 66 67 68 69 70
FAIL RATE: 71 72 73 74 75

CRD CDE: 22 — I
ITEM SEQ NO: 23 24 25 26 27 28
IND CDE: 29
NEXT HIGHER ASSY PART NUMBER: 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
QTY NHA: 50 51 52 53 54
QTY SYS: 55 56 57 58 59
FIND NUMBER: 60 61 62 63 64
REF DESG NUMBER: 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

KSC FORM 21-85(8/66) C750/1

Figure 3-2. Master Transaction Sheet

MASTER TRANSACTION SHEET-B

PAGE OF

Card	Field	Card Columns
	CTR CDE	1
	CONTROL FIELD	2–8 (A)
	DATE TRAN	15–18
	AN	19–20
	TRN CDE	21
G	CRD CDE	22
G	SYSTEM CODE	23–29
G	EFF CODE	30–33
G	PRI CDE	34
G	INT CDE	35
G	SUPERSEDED SUPERSEDING PART NUMBER	36–55
G	PROV LIST #	56–59
G	REV CDE	60
G	OPER HOURS	61–65
G	CAL FREQ	66–70
G	FAIL RATE	71–75
H	CRD CDE	22
H	INSTALL CONTR	23–27
H	QTY ON ORDER	28–32
H	QTY RECD	33–37
H	QTY ON HAND	38–42
H	QTY IN REP	43–47
I	CRD CDE	22
I	ITEM SEQ NO	23–28
I	IND CDE	29
I	NEXT HIGHER ASSY PART NUMBER	30–49
I	QTY NHA	50–54
I	QTY SYS	55–59
I	FIND NUMBER	60–64
I	REF DESG NUMBER	65–80
J	CRD CDE	22
J	RELEASE NUMBER	23–29
J	W O NUMBER	30–36
J	EXHIBIT ITEM NO	37–42
J	PURCHASE REQUEST NUMBER	43–52
J	PURCHASE ORDER	53–67
J	REL DATE	68–73
J	RELEASE QTY	74–78
K	CRD CDE	22
K	SCHED DATE	23–28
K	EOD DATE	29–34
K	REV	35
K	SCHED QTY	36–40
K	STORE RECEIPT #	41–50
K	RECEIVED DATE	51–56
K	ALT P/N	57
L	CRD CDE	22
L	DEST	23–27
L	DD 250 NUMBER	28–37
L	SYS CODE	38–44
L	EXHIBIT ITEM NUMBER	45–50
L	DD 250 DATE	51–56
L	DD 250 QTY	57–61
L	ALT P/N	62
L	SHIPPER NUMBER	63–72
M	CRD CDE	22
M	STORE LOC	23–27
M	QTY ORD	28–32
M	QTY REC FROM ORD	33–37
M	QTY REC FROM REP	38–42
M	QTY REC OTHERS	43–47
M	TOT QTY O/H	48–52
M	TOT QTY IN REP	53–57
M	ALT P/N	58

KSC FORM 21-85 A (8/66)

C750/2

Figure 3-3. Master Transaction Sheet B

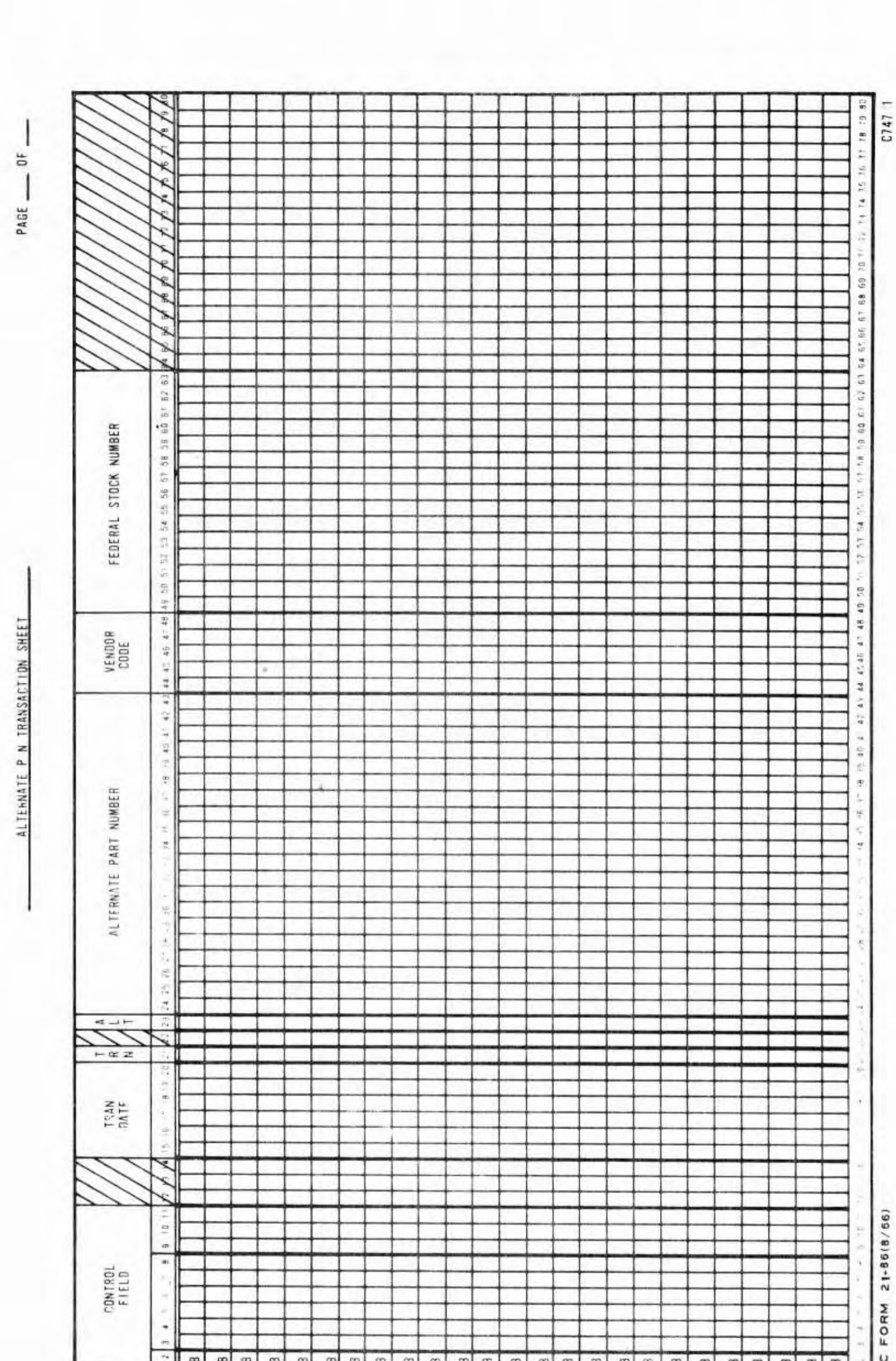

Figure 3-4. Alternate P/N Transaction Sheet

SYSTEM TRANSACTION SHEET

PAGE ___ OF ___

CTR	CONTROL FIELD		TRAN DATE	TRN	CRD	SYSTEM CODE	EFF CODE	PRI	INT	SUPERSEDED SUPERSEDING PART NUMBER	PROV LIST #	REV	OPER HOURS	CAL FREQ	FAIL RATE	
1 2	3 4 5 6 7 8 9 10 11	12 13 14	15 16 17 18 19 20	21	22	23 24 25 26 27 28 29	30 31 32 33	34	35	36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55	56 57 58 59	60	61 62 63 64 65	66 67 68 69 70	71 72 73 74 75	76 77 78 79 80
C C					1											
C C					1											
C C					1											
C C					1											
C C					1											
C C					1											
C C					1											
C C					1											
C C					1											
C C					1											
C C					1											
C C					1											

CTR	CONTROL FIELD		TRAN DATE	TRN	CRD	INSTALL CONTR	QTY ON ORD	QTY REC'D	QTY ON HND	QTY IN REP	
1 2	3 4 5 6 7 8 9 10 11	12 13 14	15 16 17 18 19 20	21	22	23 24 25 26 27	28 29 30 31 32	33 34 35 36 37	38 39 40 41 42	43 44 45 46 47	48–80
C C					2						
C C					2						
C C					2						
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C C					2						
C C					2						
C C					2						

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Figure 3-5. System Transaction Sheet

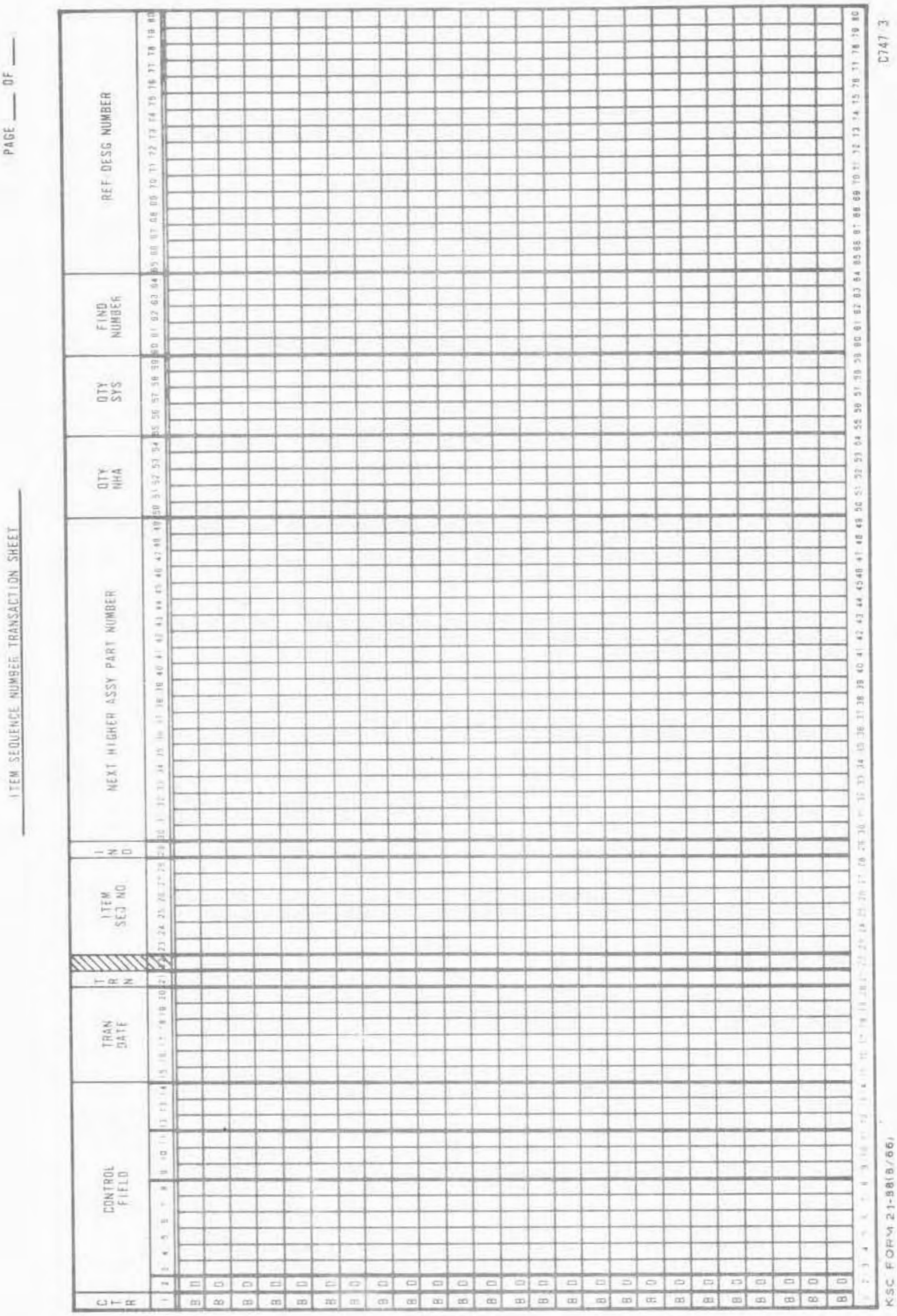

Figure 3-6. Item/Sequence Number Transaction Sheet

PAGE ___ OF ___

USAGE TRANSACTION SHEET

CTR	CONTROL FIELD	TRAN DATE	TRN	USAGE TRAN DATE	TRAN QTY	RET STK SERV	RET STK UNSERV	VOUCHER NUMBER	TYPE ISS CODE	UCR NUMBER	
E											

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C747.4

Figure 3-7. Usage Transaction Sheet

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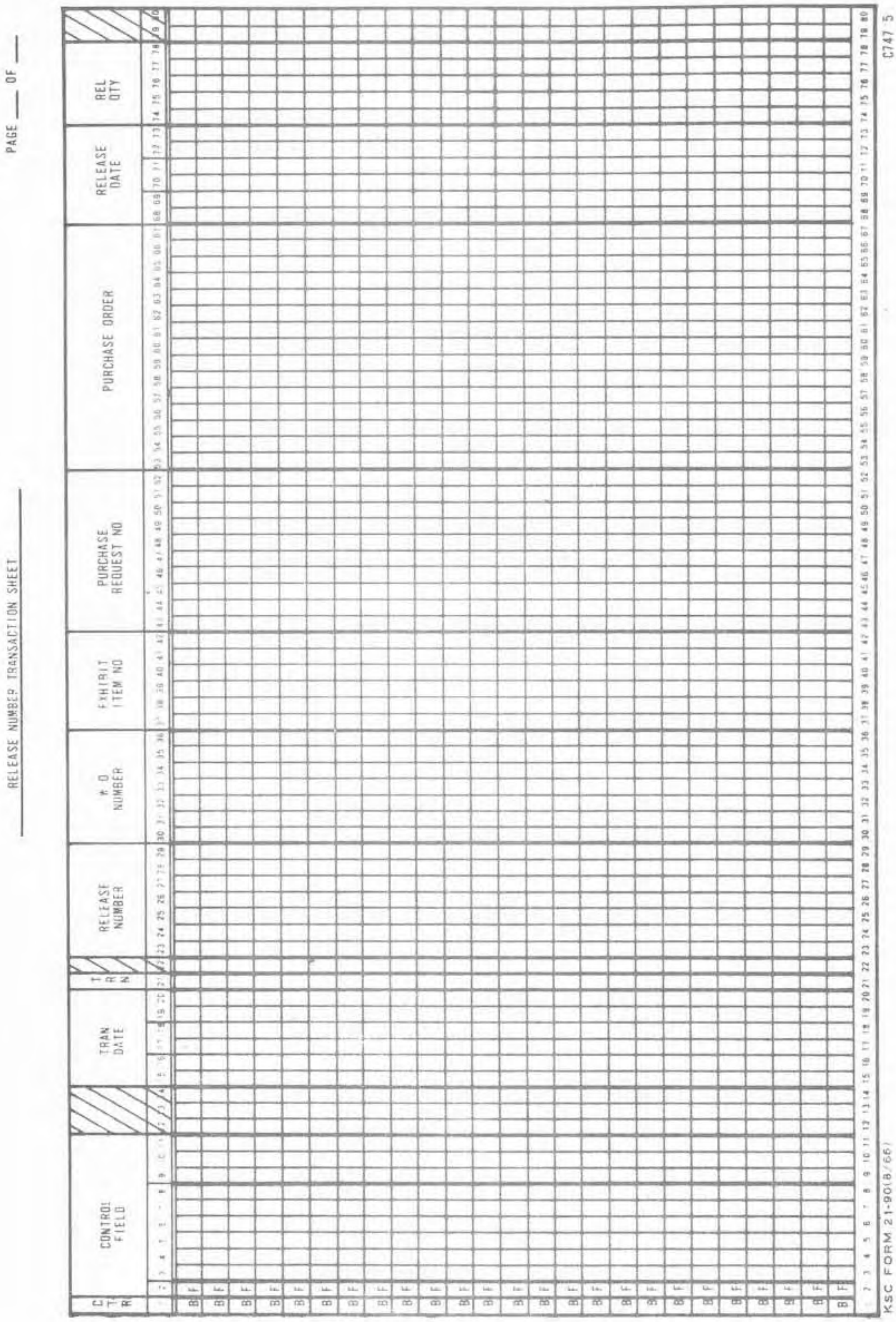


Figure 3-8. Release Number Transaction Sheet

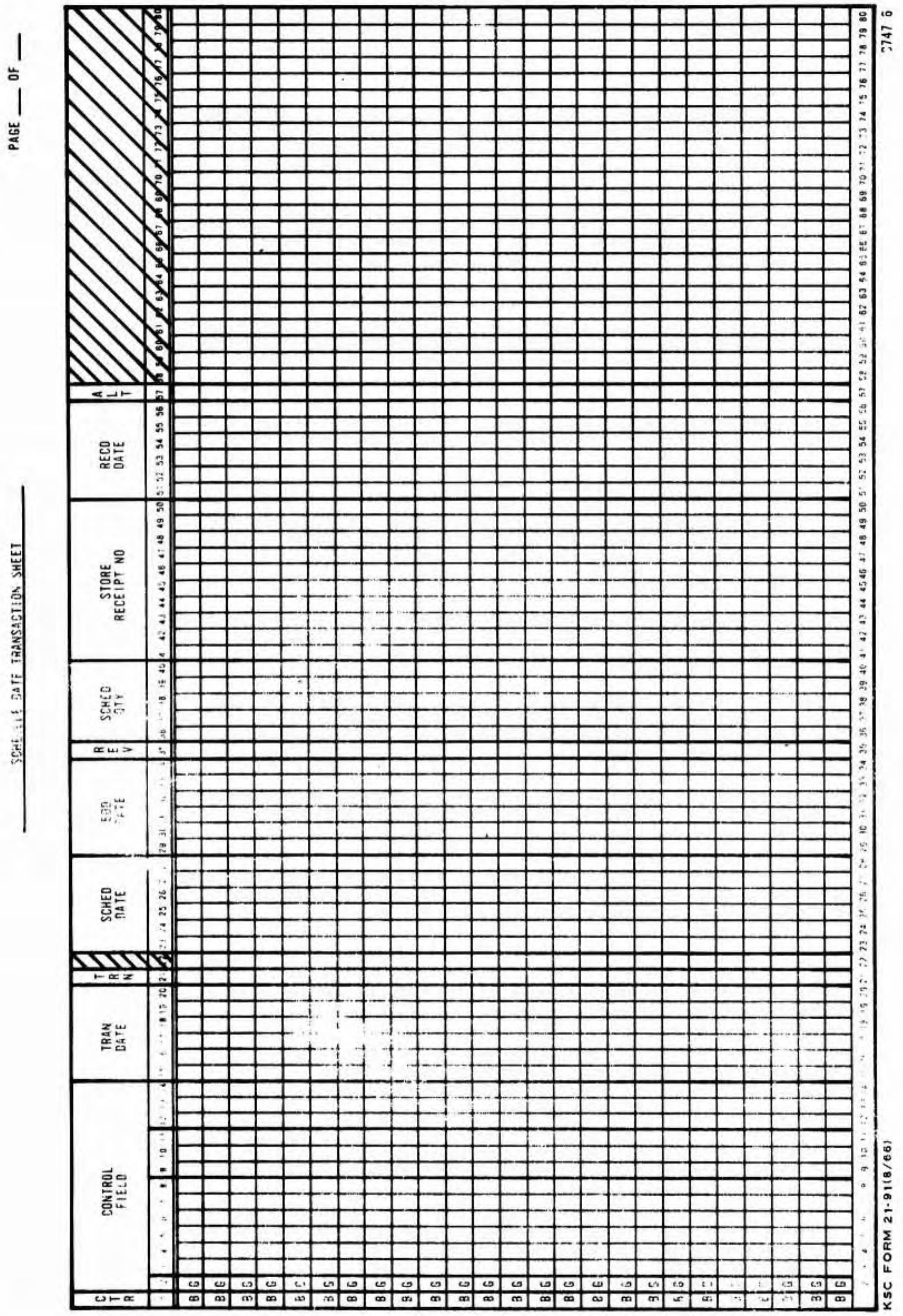
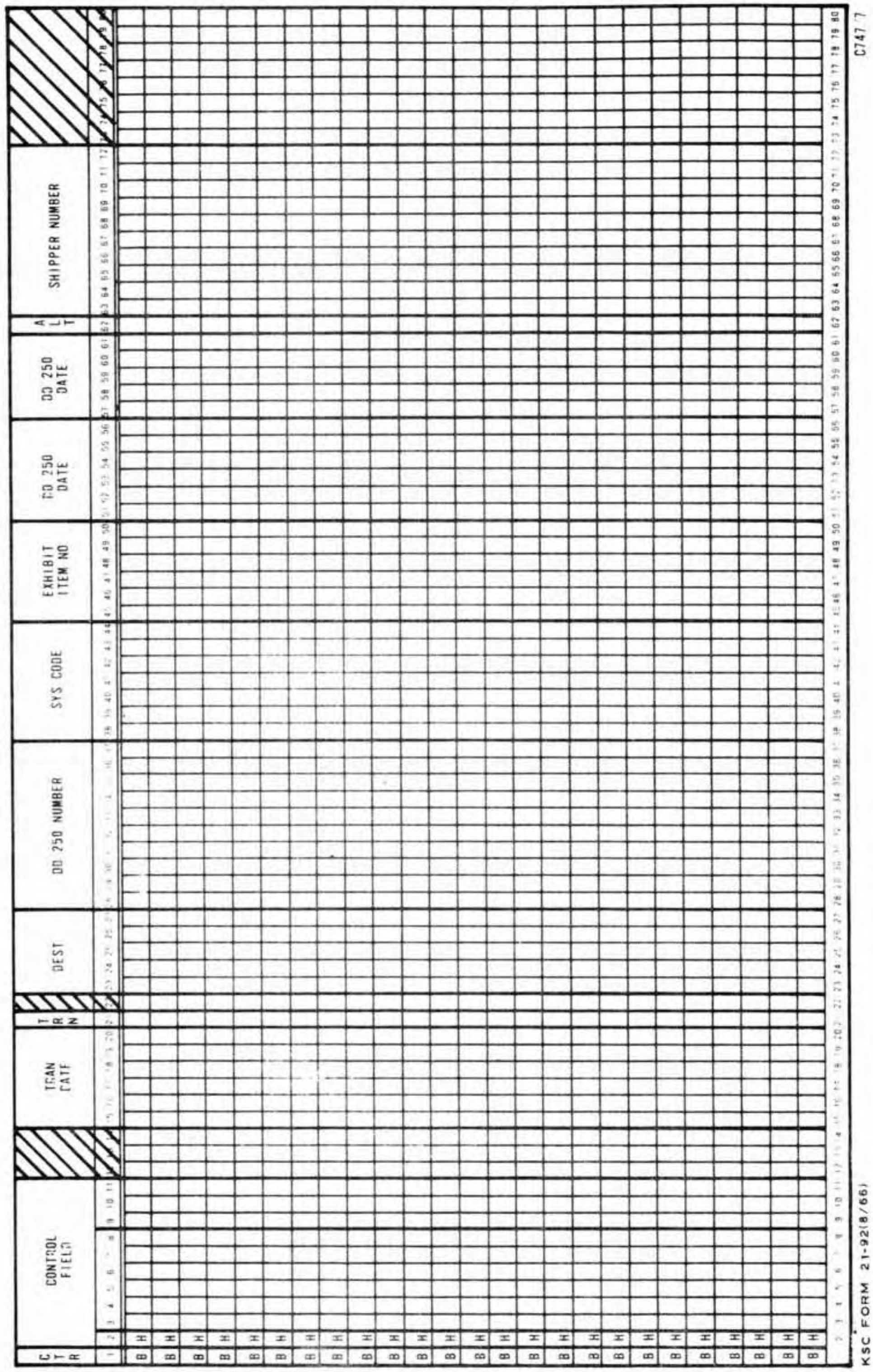


Figure 3-9. Schedule Date Transaction Sheet


DELIVERY TRANSACTION SHEET

PAGE ___ OF ___

C T R	CONTROL FIELD		TRAN CATF	T R N		DEST	DD 250 NUMBER	SYS CODE	EXHIBIT ITEM NO	DD 250 DATE	DD 250 DATE	A L T	SHIPPER NUMBER	
B	H													

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C747 7

Figure 3-10. Delivery Transaction Sheet

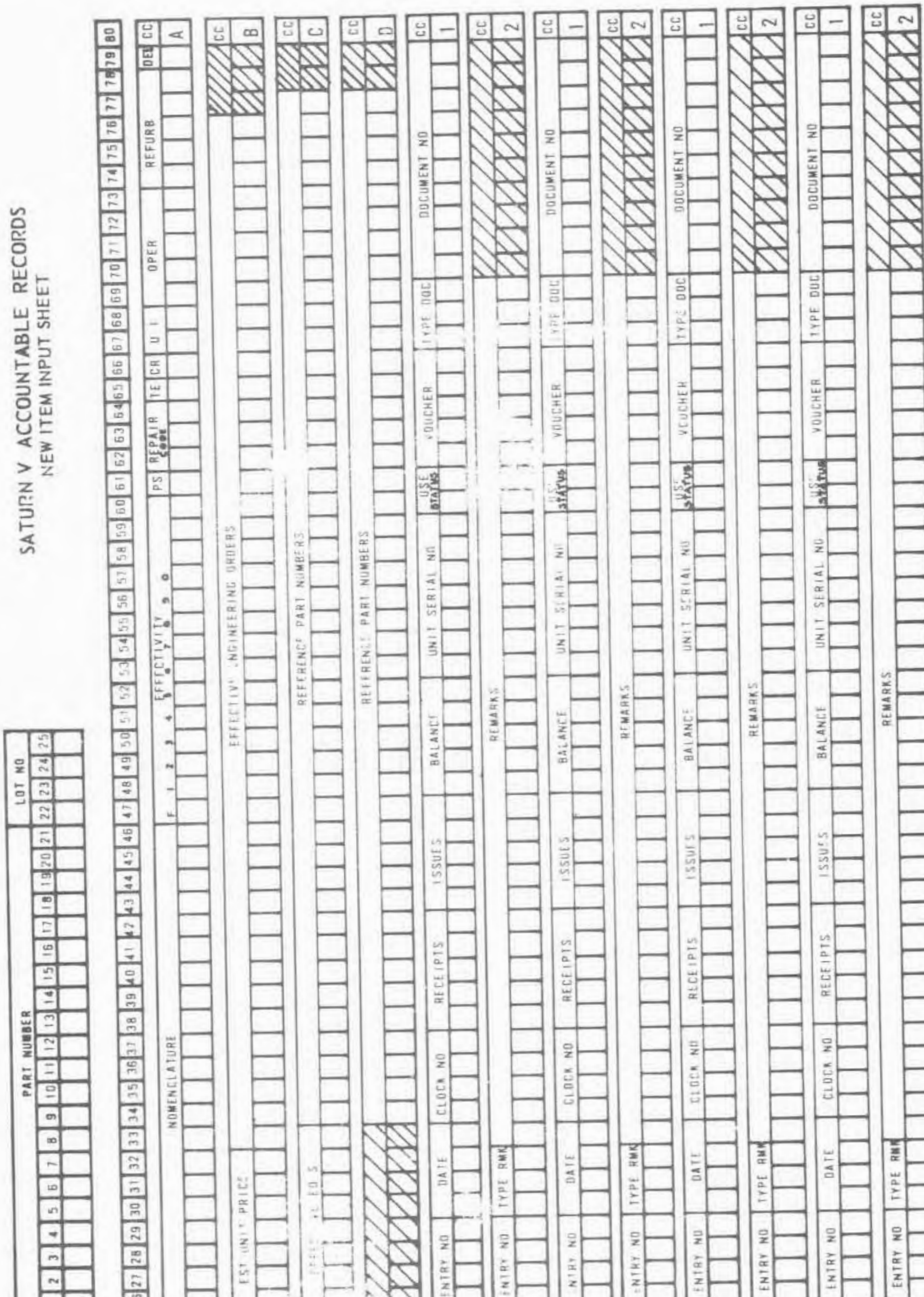
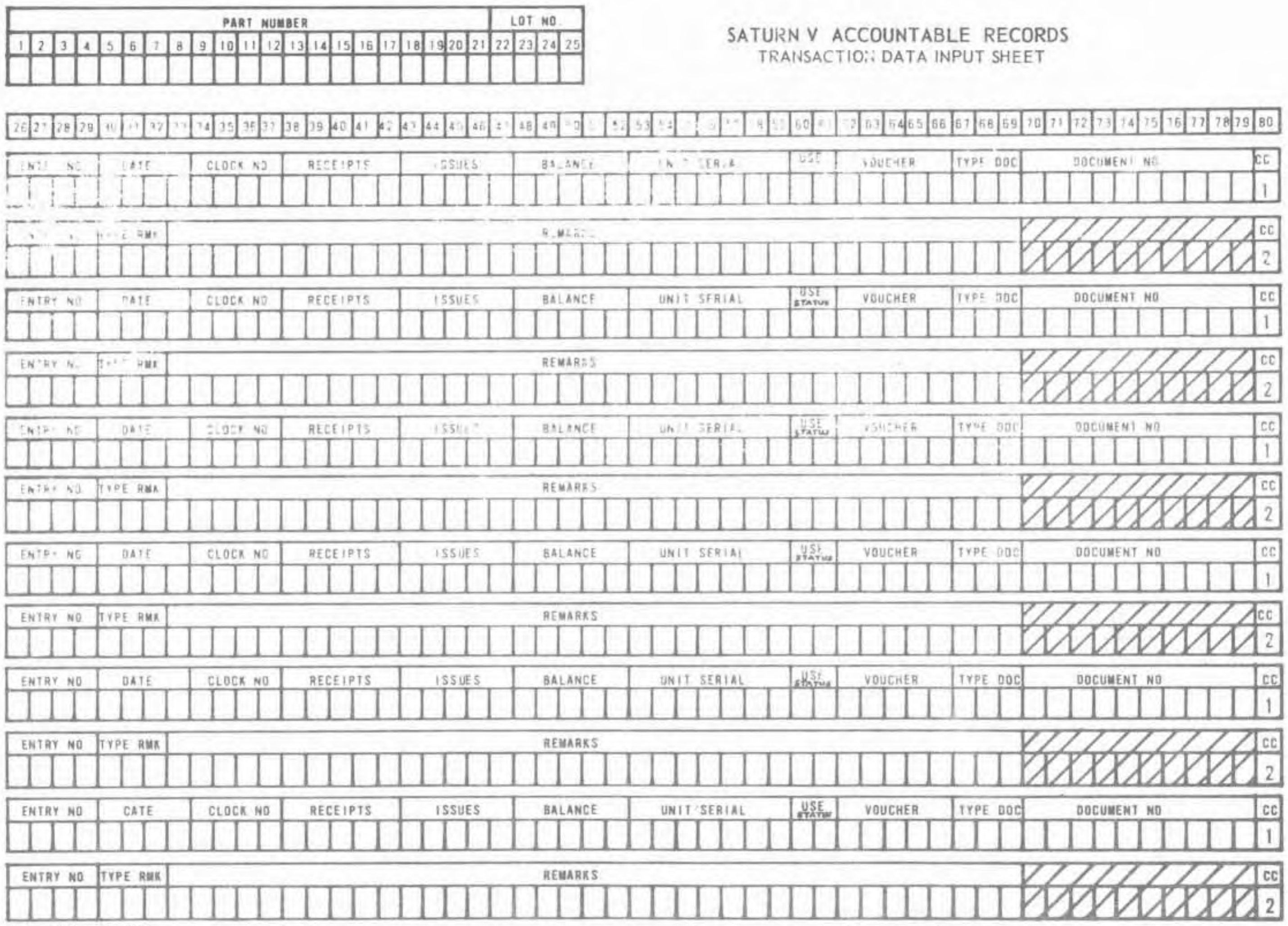


Figure 3-11. Saturn V Accountable Records, New Item Input Sheet



SATURN V ACCOUNTABLE RECORDS
TRANSACTION DATA INPUT SHEET

PART NUMBER	LOT NO
1–21	22–25

Card columns 26–80

ENTRY NO	DATE	CLOCK NO	RECEIPTS	ISSUES	BALANCE	UNIT SERIAL	USE STATUS	VOUCHER	TYPE DOC	DOCUMENT NO	CC 1

ENTRY NO	TYPE RMK	REMARKS	CC 2

(The two card rows above repeat six times each, alternating CC 1 and CC 2.)

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Figure 3-12. Saturn V Accountable Records, Transaction Data Input Sheet

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SECTION IV
TRANSPORTATION

4.1 GENERAL

The EDP service provides an accounting procedure, dealing with the following:

a. Contract end item inventory.

b. Logistics baseline cross-reference index.

c. Established transportation requirements.

d. Mission schedule.

e. Resource procurement and delivery.

Key elements of information are extracted, prepared for machine processing, processed, stored in an active data file, and used for future comparison. The follow-up inputs to the system become stimuli for updating the data file and performing a comparison between the original input and the new information. The updated file is then sorted for exceptions which deviate from the established requirements and a Flag Notice is generated for Apollo Program management use. The total data is utilized to generate routine reports.

4.2 EDP INPUT REQUIREMENTS

The input data is specified in Table 4-1 and is shown in proper input sequence in Figure 4-1, Transportation Management Information System. The reference numbers on Table 4-1 are directly related to positions of the same number on Figure 4-1.

4.3 EDP SYSTEM REQUIREMENTS

The prime requirement of EDP capability is one of comparison. In this Section comparison must be made between the following information sources.

a. CEI inventory vs logistics baseline cross-reference index.

b. Logistics baseline reference vs transportation requirements.

c. Transportation requirements vs transportation resources.

d. Mission schedule vs resource delivery dates.

Common machine language must be used for all programs to permit a high degree of utilization by participating agencies.

Uniform codes, field lengths, and term definition must be used throughout the program. The codes and terms established in K-AM-02 will be used to achieve the required uniformity.

4.4 EDP PROCESSING SYSTEM

The processing technique used will be selected by a systems analysis operation performed by the Data Systems Division (PB).

Table 4-1. EDP Inputs/Outputs for Transportation

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
1E	List of CEI's	CEI inventory	
1G	List of CEI's on which EIR's have been prepared	Logistics baseline cross-reference index	
1			1. Summary list of transportation activities.
2C	List of transportation requirements	Transportation requirement	
2F			2F. List of requirements on the logistics baseline which are not scheduled.
2			2. List of transportation equipment which is not provided. Total list of transportation requirements.
3C	Transportation activities scheduled	Schedule	
3F			3F. List of transportation activities not scheduled.
3			3. List of transportation activities scheduled.
4C	List of resources assigned to schedule	Assign transporttion resources	
4F			4F. a. List of requirements not satisfied. b. List of resources not operational.
4			4. List of allocated resources.
5B	Schedule of transportation procurement action	Procurement schedule	
5F			5F. List of scheduled procurement actions which do not meet mission requirements.
5			5. List of all transportation resources scheduled for procurement.

Table 4.1 EDP Inputs/Outputs for Transportation (Continued)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
6B	List of delivery dates	Establish delivery dates of procured resources	
6F			6F. Notice of late projected deliveries.
6			6. List of resources to be delivered.
7B	Delivery documentation	Delivery of resources	
7F			7F. Late delivery.
7			7. Updated resource inventory.

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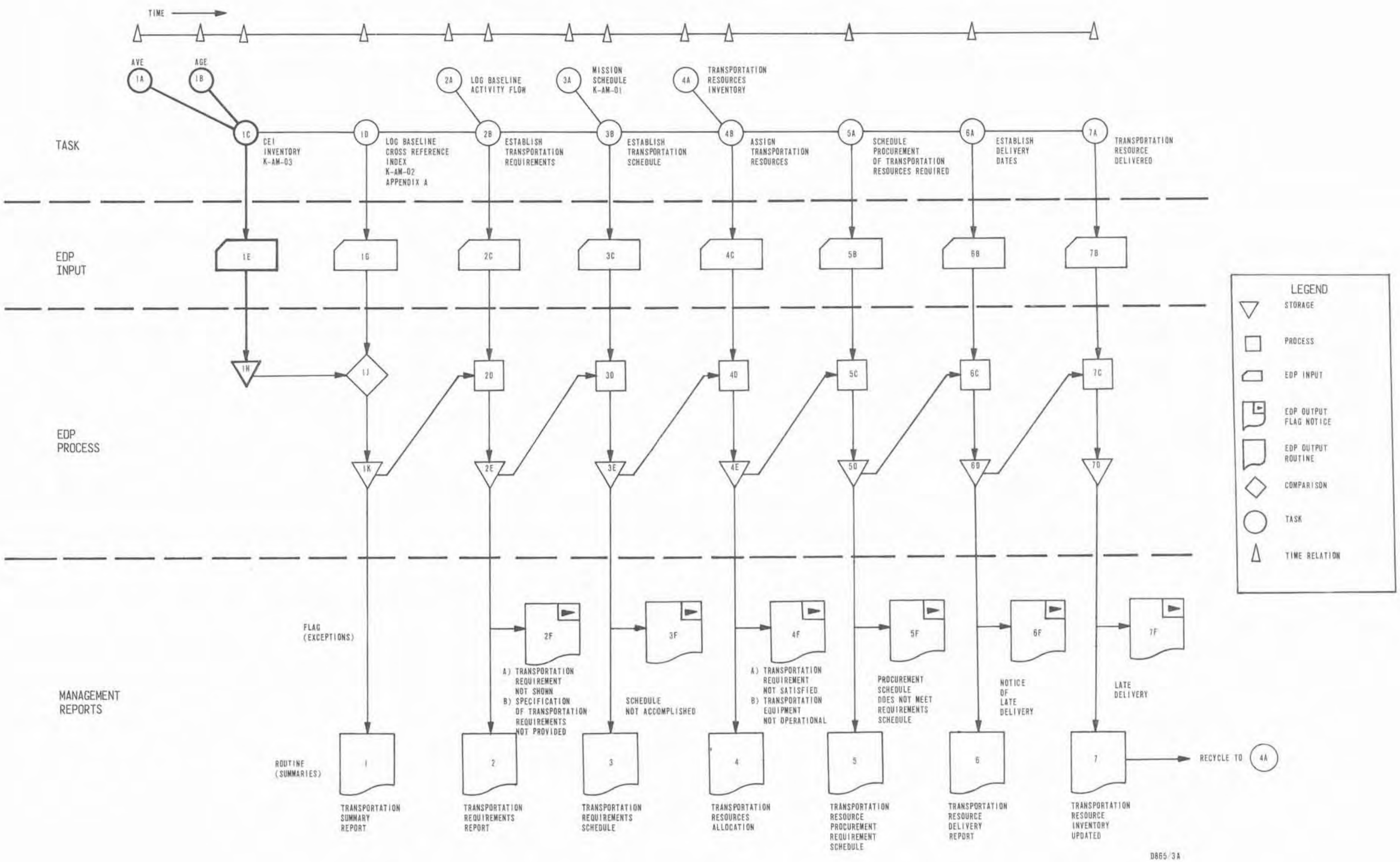

Figure 4-1. Transportation Management Information System

SECTION V
PROPELLANTS AND PRESSURANTS

5.1 GENERAL

The EDP service provides an accounting procedure, dealing with the following:

a. Propellant and pressurant inventory.

b. Logistics baseline activity flow.

c. Mission schedule.

d. Mission requirements.

e. Contract release.

f. Delivery schedules.

g. Receipt documentation.

Key elements of information are extracted, prepared for machine processing, processed, stored in an active data file, and used for future comparison. The follow-up inputs to the system become stimuli for updating the data file and provide a means of comparison between the original input and the new information.

The updated file is then sorted for exceptions which deviate from the established requirements and a Flag Notice is generated for Apollo Program management use. The total data is then utilized to generate routine reports.

5.2 EDP INPUT REQUIREMENTS

The input data is specified in Table 5-1 and is shown in proper input sequence in Figure 5-1, Propellants and Pressurants Management Information System. The reference numbers on Table 5-1 are directly related to positions of the same number on Figure 5-1.

5.3 EDP SYSTEM REQUIREMENTS

The prime requirement of EDP capability is one of comparison. In this Section, comparison must be made between the following information sources:

a. Propellant and pressurant inventory vs mission requirements.

b. Mission schedule vs contracted delivery schedule.

c. Delivery data vs scheduled delivery date.

d. Mission requirements on contract vs requirements not on contract.

Common machine language must be used for all programs to permit a high degree of utilization by participating agencies.

Uniform codes, field lengths, and terms definition must be used throughout the program. The codes and terms established in K-AM-02 will be used to achieve the required uniformity.

Changed August 31, 1966

5.4 EDP PROCESSING SYSTEM

The processing technique used will be related by a systems analysis operation performed by the Data Systems Division (PB).

Table 5-1. EDP Inputs/Outputs For Propellant & Pressurants Management Information System

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
1B	List of propellants and pressurants with quantity of each on hand	Propellants and pressurants inventory	
1			1. List of propellants and pressurants on hand with quantity.
2C	Propellants and pressurants needed with quantity of each required by CEI	Projected demands	
2			2. List of propellants and pressurants with quantity required per CEI.
3C	Date delivery needed for each propellants and pressurants	Projected demand schedule	
3			3. Delivery schedule requirements for each propellant and pressurant.
4B	Date of procurement initiation for each propellants and pressurants	Initiate procurement of propellants and presurants	
4			4. List of propellants and pressurants for which procurement has been initiated.
4F			4F. List of propellants and pressurants for which procurement has not been initiated.
5B	Date contract was released for propellants and pressurants and Contracting Vendor	Contract release	

Changed August 31, 1966

Table 5-1. EDP Inputs/Outputs for Propellant & Pressurants Management Information System (Continued)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
5			5. a. List of propellants and pressurants on contract by Vendor and date. b. List of Vendors delivering propellants and pressurants.
5F			5F. List of propellants and pressurants by CEI required but not on contract.
6A	Date propellant and pressurants items are scheduled for delivery	Contract delivery schedule	
6			6. a. List of delivery dates established per propellants and pressurants. b. List of propellants and pressurants contract delivery dates not established.
6F			6F. List of propellants and pressurants scheduled for late delivery.
7B	Delivery date of propellants and pressurants items	Delivery of propellants and	
7			7. List of propellants and pressurants delivered.
7F			7F. List items not delivered.

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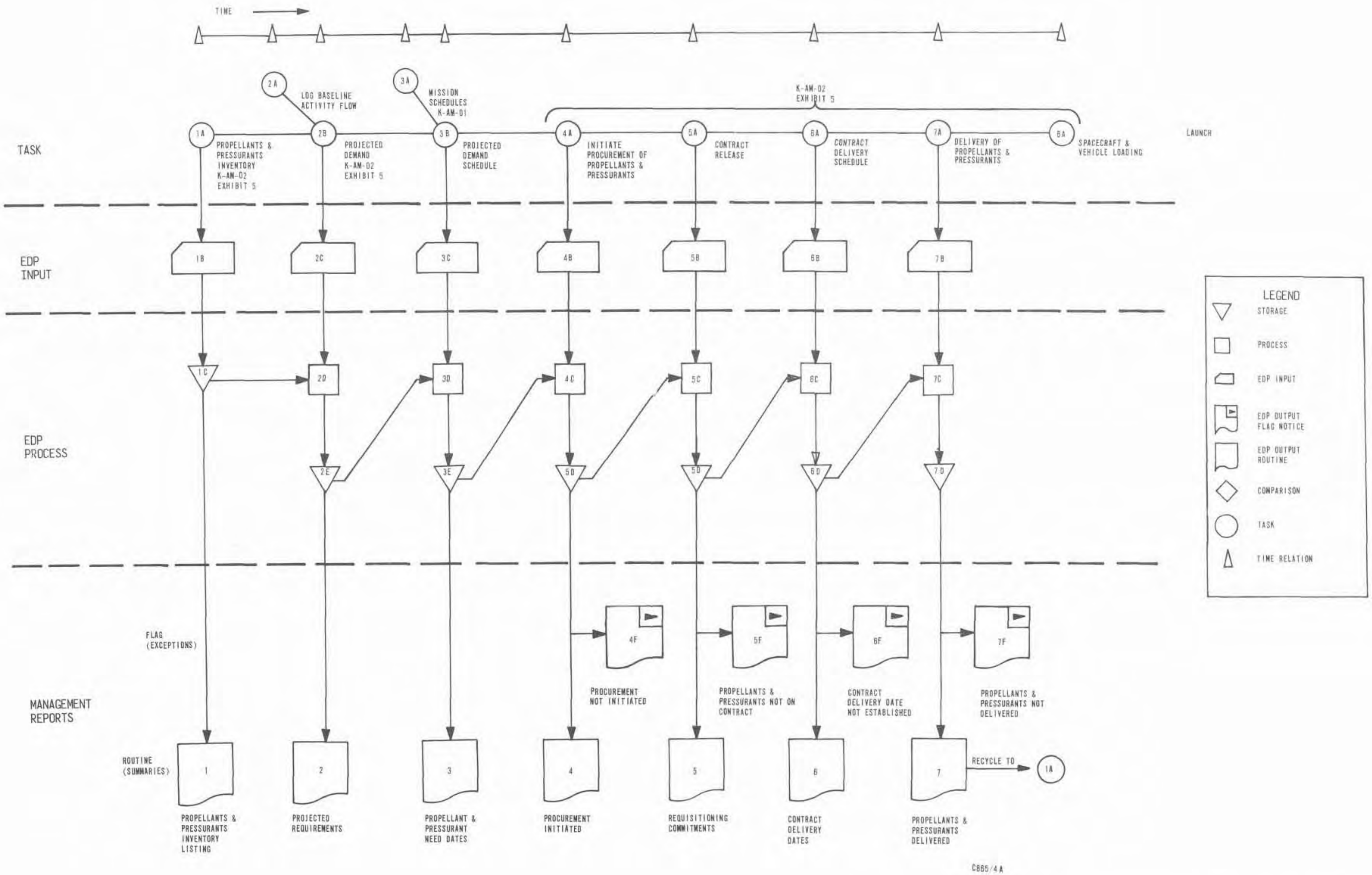

Figure 5-1. Propellants and Pressurants Management Information System

SECTION VI
SUPPORT OF ORDNANCE ACTIVITIES

6.1 GENERAL

The EDP service provides an accounting procedure, dealing with the following:

a. AVE Ordnance Requirements.

b. CEI Inventory.

c. Shipping Documents.

d. Receiving Documents.

e. Inspection and Test Reports.

Key elements of information are extracted, prepared for machine processing, processed, stored in an active data file, and used for future comparison. The follow-up inputs to the system become stimuli for updating the data file and provide a means of comparison between the original input and the new information.

The updated file is then sorted for exceptions which deviate from the established requirements and a Flag Report is generated for Apollo Program management use. The total data is then utilized to generate routine reports.

6.2 EDP INPUT REQUIREMENTS.

The input data is specified in Table 6-1 and is shown in proper input sequence in Figure 6-1, Ordnance Management Information System. The reference numbers on Table 6-1 are directly related to positions of the same number on Figure 6-1.

6.3 EDP SYSTEM REQUIREMENTS

The prime requirement of EDP capability is one of comparison. In this Section comparison must be made between the following information sources:

CEI Inventory vs Notice of Shipment.

Notice of Shipment vs Receipt Documentation.

Storage and Test Results vs AVE Ordnance requirements.

Common machine language must be used for all programs to permit a high degree of utilization by participating agencies.

Uniform codes, field lengths, and term definition must be used throughout the program. The codes and terms established in K-AM-02 will be used to achieve the required uniformity.

6.4 EDP PROCESSING SYSTEM

The processing technique used will be selected by a systems analysis operation performed by the Data Systems Division (PB).

Table 6-1. EDP Inputs/Outputs for Ordnance Management Information System

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
1D	List of CEI's	CEI inventory	
1G	List of ordnance items and hardware shipped. Showing part number, CEI, source and date	Shipping	
1F			1F. List of items required but not shipped.
1			1. Total list shipped.
2B	Receiving documentation showing part number, CEI, source and date received	Receiving	
2F			2F. List of items not received per shipping document and items not received on scheduled date. List shows part number, CEI, & source and due-in date.
2			2. Complete list of items received in a given shipment. Elements same as above.
3B	Inventory count and inspection data. Input includes quantity by part number and CEI, and identification of the inspection requirements met	Storage	
3F			3F. List of missing or deteriorated items.
3			3. List of usable items. Both lists showing full identification data.
4B	List of test results referencing inspection performed and results on each item by part number and CEI	Testing	
4F			4F. List of items that failed the inspection showing part number and CEI.

Table 6-1. EDP Inputs/Outputs for Ordnance Management Information System (Cont.)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
4			4. List of all usable ordnance items.
5B	Listing of system checkout results by part number and CEI	Installation & checkout	
5F			5F. List of systems which failed checkout by part number and CEI.
5			5. List of all systems which have been checked out and the results of the check-out by part number and CEI.

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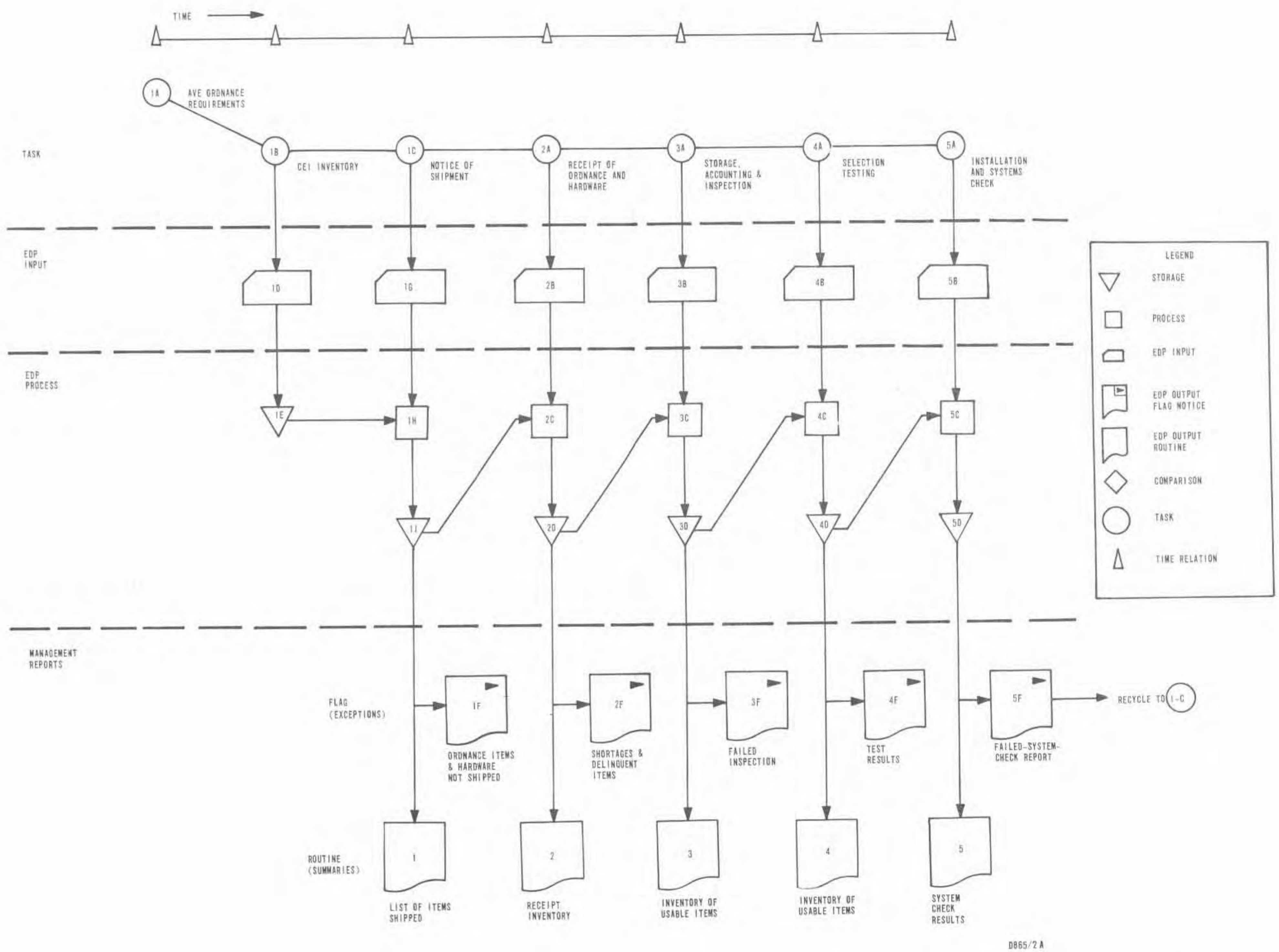

Figure 6-1. Ordnance Status Management Information System

SECTION VII
SYSTEM SUPPORT DATA

7.1 GENERAL

The EDP service is an accounting procedure, dealing with the following:

a. Contract End Items Inventory.

b. Logistics Baseline Cross Reference Index.

c. Technical Data Requirements.

d. Mission Schedule.

e. Data Delivery Schedule.

f. Delivery Receipt Documentation.

Key elements of information are extracted, prepared for machine processing, processed, stored in an active data file and used for future comparison. The follow up inputs to the system become stimuli for updating the data file and provide a means of comparison between the original input and the new information. The updated file is then sorted for exceptions which deviate from the established requirements and a Flag Report is generated for Apollo Program management use. The total data is then utilized to generate routine reports.

7.2 EDP INPUT REQUIREMENTS

The input data is specified in Table 7-1 and is shown in proper input sequence in Figure 7-1, Technical Data Management Information System. The reference numbers on Table 7-1 are directly related to positions of the same number on Figure 7-1.

7.3 EDP SYSTEM REQUIREMENTS

The prime requirement of EDP capability is one of comparison. In this section comparison must be made between the following information sources.

CEI Inventory vs Logistics Baseline Cross Reference Index

Logistics Baseline Cross Reference Index vs System Support Data available

Apollo/Mission Schedule vs System Support Data Delivery Schedule

Data Delivery vs Data Delivery Schedule

Common machine language must be used for all programs to permit a high degree of utilization by participating agencies. Uniform codes, field lengths and term definition must be used throughout the program. The codes and terms established in K-AM-02 will be used to achieve the required uniformity.

7.4 EDP PROCESSING SYSTEM

The processing technique used will be selected by a system analysis operation performed by the Data Systems Division (PD).

Table 7-1. EDP Inputs/Outputs for System Support Data Management Information System

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
1D	List of contract end items	CEI inventory	
1H	List of CEI's on which technical data has been provided	Logistics baseline cross-reference index	
1			1. a. List of CEI's on which technical data may be required. b. List of technical data already prepared.
2D	List of CEI's for which technical data is required	Establish technical data requirements	
2F			2F. List of CEI's requiring technical data and technical data not available.
2			2. a. List of CEI's for which technical data is required. b. List of technical data requirements.
3C	Delivery dates for technical data required	Establish delivery schedule	
3F			3F. List of technical data scheduled for late delivery or no delivery date established.
3			3. List of technical data to be delivered with scheduled delivery dates.
4B	Technical data delivery date	Delivery	
4F			4F. Technical list of data delivered late.
4			4. a. List of technical data delivered by CEI and date. b. List of technical data not delivered.

Table 7-1. EDP Inputs/Outputs for System Support Data Management Information System (Continued)

REFERENCE NUMBER	EDP INPUTS	FUNCTION	EDP OUTPUTS
5B	Location and/or distribution of each item of technical data	Storage and/or distribution	
5			5. List of technical data with location and/or distribution of each item.

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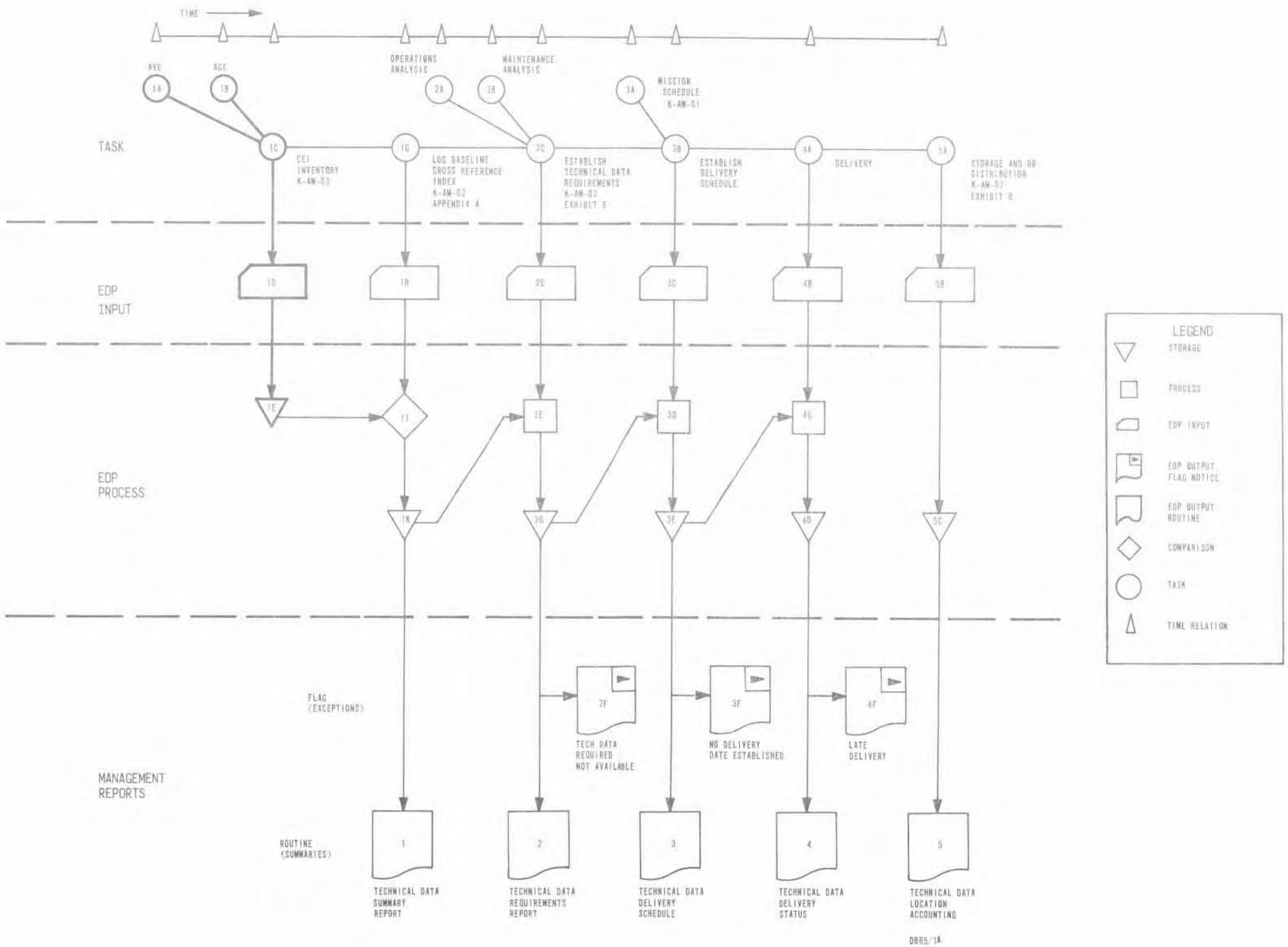

Figure 7-1. System Support Data Management Information System

EXHIBIT 8

EXHIBIT 8

KSC APOLLO/SATURN TECHNICAL

DATA REQUIREMENTS PLAN

PRELIMINARY DRAFT

EXHIBIT 8
KSC APOLLO/SATURN TECHNICAL DATA REQUIREMENTS PLAN

FOREWORD

This Exhibit is a preliminary draft of the technical data requirements plan. It has not been subjected to formal coordination, prior to publication, and is not to be considered as being in final form.

Exhibit 8, in this form, is incomplete. Specific responsibilities are omitted from Section IV. Additional detailed requirements information will be included in revision now in process of preparation.

Publication of a revised Exhibit 8, in final form, is scheduled for September 1966.

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EXHIBIT 8
KSC APOLLO/SATURN TECHNICAL DATA REQUIREMENTS PLAN

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EXHIBIT 8
KSC APOLLO/SATURN TECHNICAL DATA REQUIREMENTS PLAN

SECTION I
INTRODUCTION

1.1 GENERAL

This Exhibit has been designed to supplement the requirements set forth in NPC 500-6, The Apollo Documentation Instruction, and K-AM-04, The Apollo/ Saturn Data Management Policy and Instruction. In addition, only that technical data having a direct impact on the logistics management system will be covered and hereinafter referred to as Technical Logistics Data.

1.2 BACKGROUND

This Exhibit was developed to provide an integrated approach to the requirements for effective Apollo/Saturn Program technical logistics data management at KSC. It identifies the major elements necessary for the timely, effective, and economical operations and maintenance support and provides guidance for the implementation of Apollo/Saturn technical logistics data management systems.

1.3 PURPOSE

The purpose of this Exhibit is to provide the direction required to implement, integrate, and manage the Apollo/Saturn technical logistics data program at KSC.

1.4 APPLICABILITY

The provisions of this Exhibit apply to all KSC organizations and their supporting contractors having a technical logistics data management responsibility in the KSC Apollo/Saturn Program.

1.5 OBJECTIVES

The objectives of this plan are to:

a. Identify the KSC organizations which have an assigned technical logistics data management role in the Apollo/Saturn Program.

b. Identify the specific responsibilities of the KSC organizations assigned a technical logistics data management role in the Apollo/ Saturn Program.

c. Identify the technical logistics data requirements necessary to fulfill the logistics support mission in the Apollo/Saturn Program.

d. Identify and define the types and levels of technical logistics data required for the Apollo/Saturn Program.

SECTION II
TYPES OF TECHNICAL LOGISTICS DATA

2.1 GENERAL

Technical logistics data are the means for communication of concepts, plans, descriptions, requirements, and instructions relating to technical projects, materiel, systems, and services. These may include specifications, standards, engineering drawings, associated lists, manuals, and reports, including scientific and technical reports; they may be in the form of documents, displays, sound recordings, punched cards, and digital or analog data. Technical logistics data and information may be required for definition of a NASA/KSC requirement, program definition, technical monitoring, design and development, test and evaluation, configuration control, prototype manufacturing, procurement, production, processing, cataloging, standardization, training, operation, maintenance, repair, and emergency remanufacturing.

Technical logistics "data" are constituted of the primary source documents which influence and often govern decisions and support actions in the following areas:

a. Research and development.

b. Production, procurement, and initial support (includes provisioning) of material.

c. Maintenance.

d. Standardization.

e. Specification and requirements improvement programs.

f. Protecting the technical integrity of supply support items.

g. Controlling the entry of new items and item reduction in the supply system.

h. Increasing competitive procurement and breakout of end items, equipments, spares, and spare parts.

i. Logistic support.

Technical logistics data is a basic management tool which provides the vital link essential to maintenance of a closed loop effort between the several phases of the Apollo/Saturn Program at KSC. There is a logical progression by which the pervasive influence of data extends to embrace configuration management. When technical logistics data is applied and used in an orderly fashion, following a defined series of procedural steps and decision rules to end in a design decision, a configuration has been established. Configuration is therefore the complete technical description required to fabricate, test, accept, operate, maintain, and logistically support a system, end item, or equipment. It is made up of specifications (general, equipment, item, and material specification), engineering drawings, test reports and other applicable data.

When a formal set of management and procedural concepts are applied to configuration, so that there is configuration identification, configuration control, and configuration accounting, then, "configuration management" has been achieved. Technical logistics data when finally prepared and documented, can be categorized into the following functional areas of:

a. Program control.

b. System engineering.

c. Procurement and production.

d. Test and operations.

In summation, technical logistics data is a common and indispensable element influencing decision in every phase of Apollo/Saturn program management. Its clear importance demands complete management attention.

2.2 TIME PHASING

Time phasing of data requirements and data acquisition packages depicted in Figure 2-1, Data Acquisition Packages, relates to the phases in which they are acquired. It should be noted that:

a. Engineering and technical logistics data overlies every significant phase and milestone.

b. The nine identified data packages are completed at discrete points in time to satisfy the Apollo/Saturn Program needs.

c. NASA's needs for data are peaked early in the initial procurement and production stage.

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DATA PACKAGES RELATED TO
THE 'PHASE' IN WHICH ACQUIRED

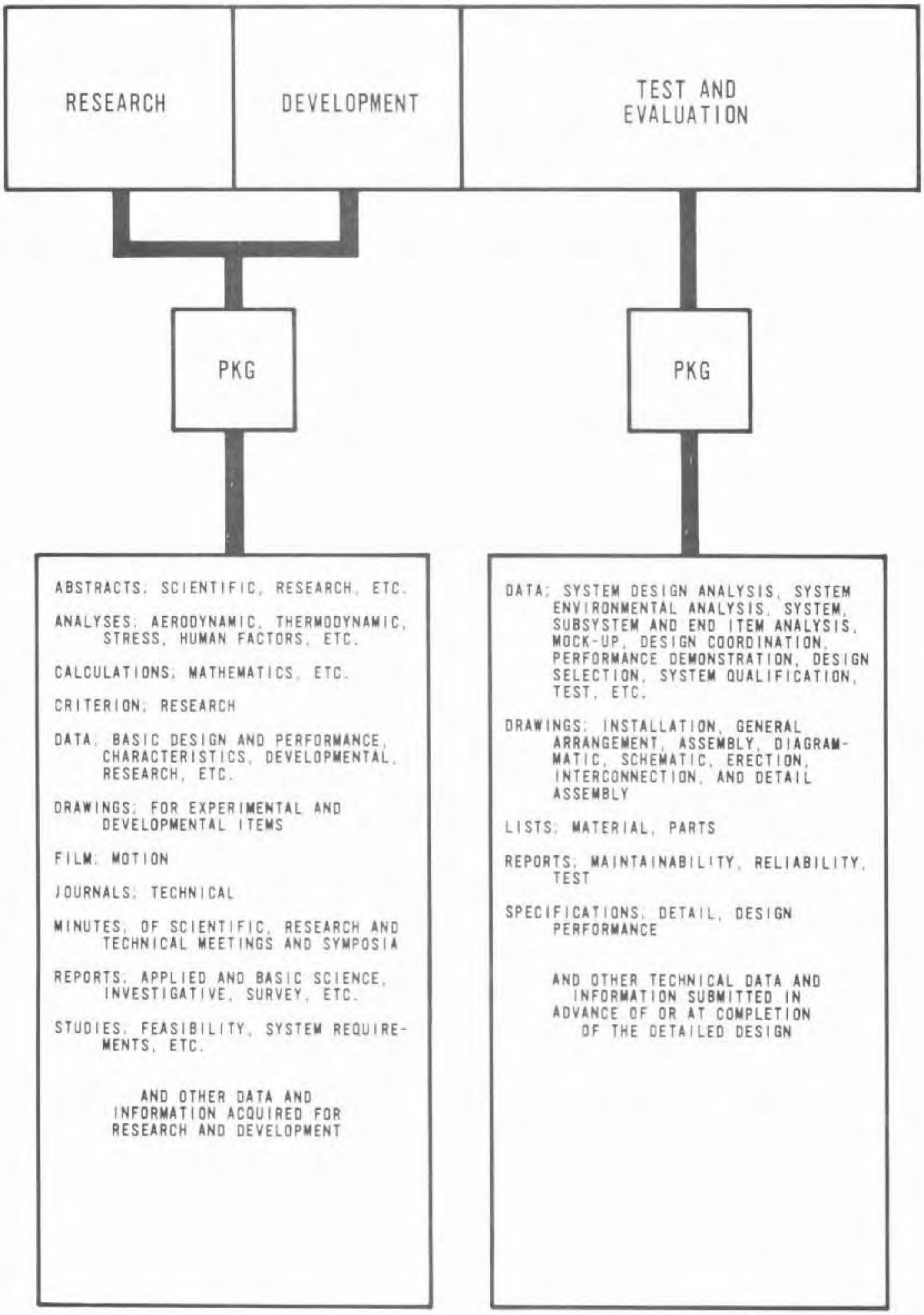

Figure 2-1 Data Acquisition Packages (Sheet 1 of 5)

DATA PACKAGES RELATED TO
THE 'PHASES' IN WHICH ACQUIRED

INITIAL PROCUREMENT AND PRODUCTION	QUALITY ASSURANCE
PKG	PKG

INITIAL PROCUREMENT AND PRODUCTION — PKG

PROGRAM MASTER PLAN: INCLUDES MASTER SCHEDULE

PROGRAM PLANNING REPORT; INCLUDES DESIGN, DEVELOPMENT, PROTOTYPE, SERVICE AND TEST, EVALUATION, AND PRODUCT IMPROVEMENT PHASES

DATA; CHARACTERISTICS, PERFORMANCE, DESIGN, ENVIRONMENTAL, HUMAN ENGINEERING, COMPLETE SYSTEM AND END ITEM ANALYSIS

DRAWINGS; INSTALLATION, GENERAL ARRANGEMENT, ASSEMBLY, DIAGRAMMATIC, SCHEMATIC, ERECTION, INTERCONNECTION, DETAIL ASSEMBLY, DETAIL, SPEC CONTROL, SOURCE CONTROL, ETC.

LISTS; PARTS LISTS, BILLS OF MATERIAL, INDEX LISTS, DATA LISTS

REPORTS; MAINTAINABILITY, RELIABILITY, TESTS

SHEETS; ITEM REQUIREMENTS, DATA, PROCESS

SPECIFICATIONS; GENERAL, DETAIL, DESIGN, AND PERFORMANCE FOR SYSTEMS, END ITEMS, PARTS AND MATERIAL

STANDARDS

AND OTHER DATA ADEQUATE FOR INITIAL PROCUREMENT AND PRODUCTION

QUALITY ASSURANCE — PKG

ACCEPTANCE-REJECTION CRITERIA

ANALYSES; FAILURE

CLASSIFICATION OF DEFECTS

DATA; ACCEPTANCE, CALIBRATION, DEMONSTRATION

DRAWINGS; ENGINEERING

HANDBOOKS; QUALITY ASSURANCE, SELECTION

INSTRUCTIONS; INSPECTION AND QUALITY CONTROL

PROCEDURES; INSPECTION AND QUALITY CONTROL, TEST

REPORTS; MAINTAINABILITY, RELIABILITY, TEST, ETC.

SPECIFICATIONS

STANDARDS

AND OTHER DATA DESCRIBING QUALITY CHARACTERISTICS TO ASSURE CONTINUED PRODUCTION AND MAINTENANCE OF REQUIRED QUALITY AND RELIABILITY

Figure 2-1 Data Acquisition Packages (Sheet 2 of 5)

DATA PACKAGES RELATED TO
THE 'PHASES' IN WHICH ACQUIRED

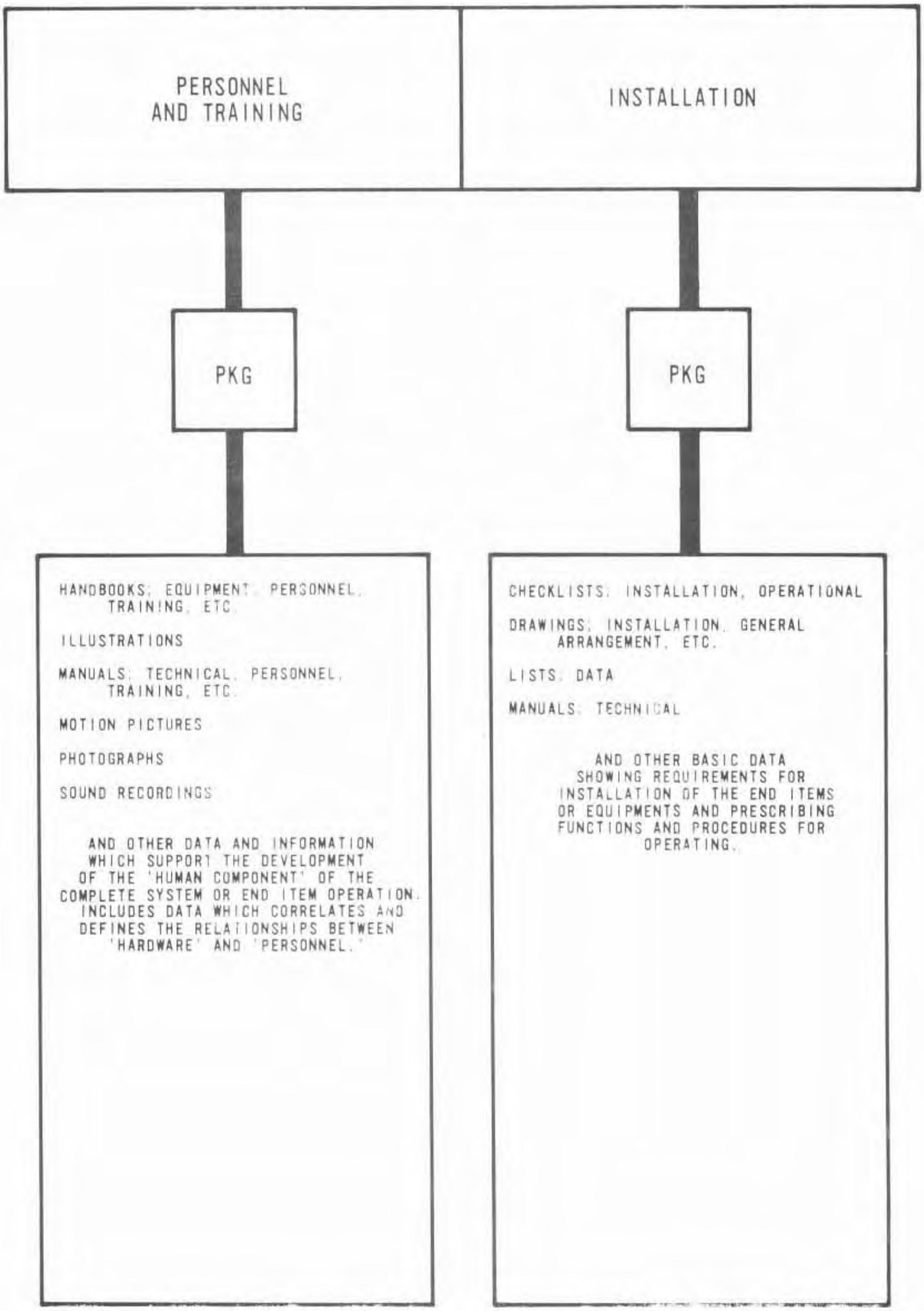

Figure 2-1 Data Acquisition Packages (Sheet 3 of 5)

DATA PACKAGES RELATED TO
THE 'PHASES' IN WHICH ACQUIRED

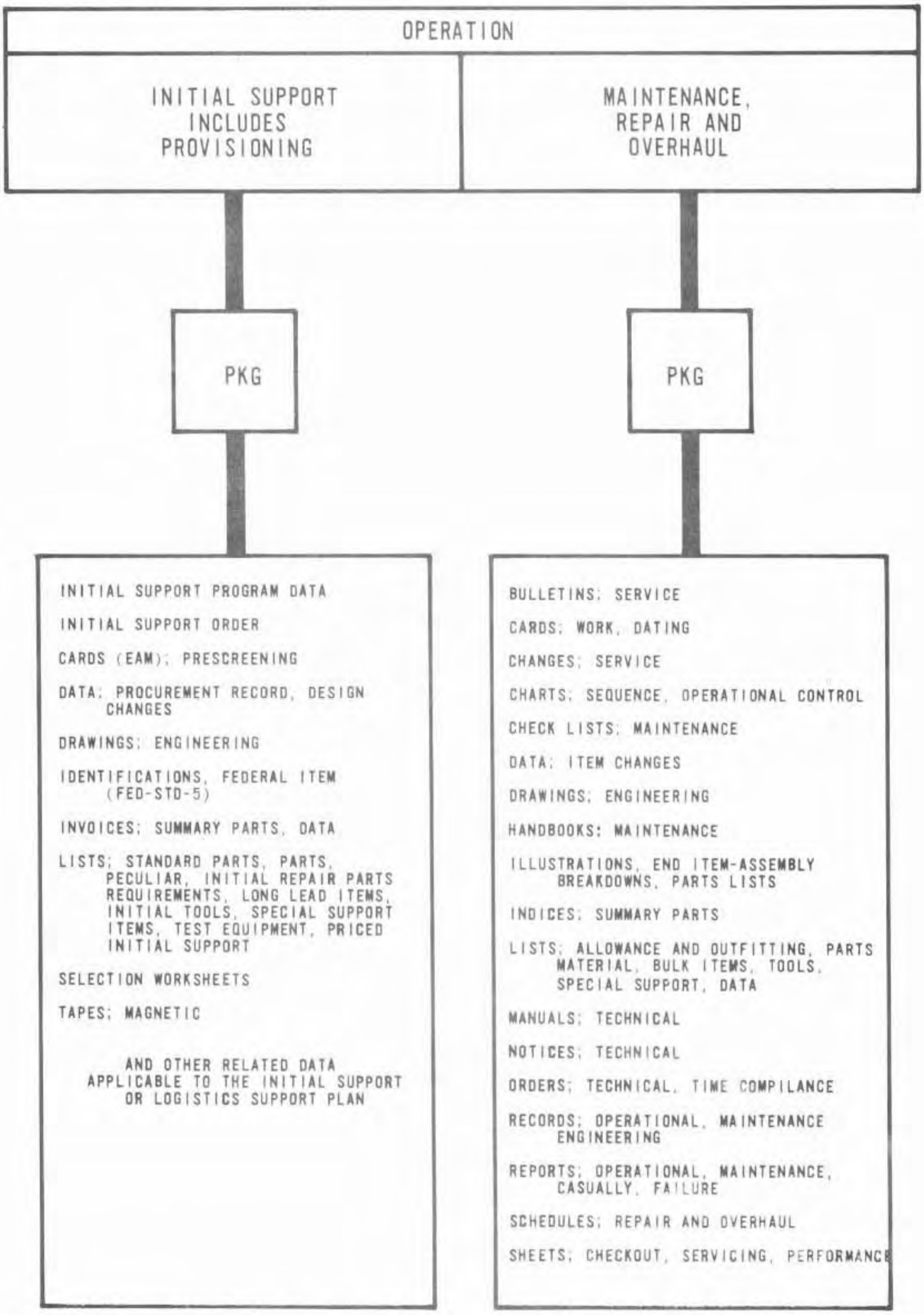

Figure 2-1 Data Acquisition Packages (Sheet 4 of 5)

DATA PACKAGES RELATED TO
THE 'PHASES' IN WHICH ACQUIRED

FOLLOW-ON
PRODUCTION AND
REPROCUREMENT

PKG

PROCUREMENT DATA PACKAGES ARE SOURCE DOCUMENTATION PREPARED AND CORRELATED EXPRESSLY TO THE PROCUREMENT OF A SPECIFIC SYSTEM, END ITEM, EQUIPMENT, COMPONENT OR ITEM. THE PRINCIPAL TYPES OF PROCUREMENT DATA ARE:

SPECIFICATIONS

PURCHASE DESCRIPTIONS

DRAWINGS

PARTS LISTS

A PROCUREMENT DATA PACKAGE MUST ALSO PROVIDE ALL NECESSARY DATA REQUIRED TO CONTROL THE DESIGN, ENGINEERING, PERFORMANCE AND QUALITY OF THE ITEM. ADDITIONALLY, IT MUST INCLUDE ALL OTHER PERTINENT DATA TO SUIT THE TOTAL REQUIREMENTS OF:

DESIGN APPROVAL AND EVALUATION

PROCUREMENT AND PRODUCTION

QUALITY ASSURANCE

PERSONNEL AND TRAINING

INSTALLATION AND OPERATION

INITIAL SUPPORT (INCLUDING PROVISIONING)

MAINTENANCE, REPAIR AND OVERHAUL

Figure 2-1 Data Acquisition Packages (Sheet 5 Of 5)

The principal data needs of KSC may be directly related to the time-phasing illustrated in Figure 2-1.

2.3 DATA REQUIREMENTS

Specific requirements for data shall be established as early as practicable. Information available from prior planning should be used in decision making to determine follow on or logistical data requirements. Data requirements shall be determined on the basis of the intended use of the data, giving careful consideration to the immediately planned and probable future use of the Apollo/Saturn systems, material, or service to which the data relates.

Consideration shall be given to materiel readiness and operational planning factors which led to generating the requirements for a specific system, end item, equipment material, or service to which the required data relates.

Other considerations pertinent to the determination of intended uses are as follows:

a. The item is for a single NASA installation with no reprocurement envisioned (generally requires only maintenance data).

b. The item is for a specific KSC need with limited reprocurement envisioned (generally requires only maintenance data).

c. The item is a "one-of-a-kind" type such as a breadboard or experimental model with no planned development or production (generally requires development disclosure data).

d. The item is one that could progress from the "breadboard experimental" stages through the "developmental prototype" stages to final production (generally requires developmental disclosure data during and after the experimental stage and full design disclosure data during and after the development stage).

e. The item, with modifications, is one planned for multi-year usage and will involve several supply production contracts (generally requires full design disclosure data).

f. Item "breakout" for an end item or equipment is required to facilitate a broader base for procurement under prime contracts or subcontracts (generally requires full design disclosure data).

g. The item may be procured only from a single source because the design data which can be made available will not insure procurement of an identical item of the requisite quality from other than the original source.

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h. The item is commercially available from a number of sources and identical items are not required. In such cases, the item may be bought by use of performance specifications.

i. The item is of commercial design modified to suit specific Apollo/Saturn operational requirements. Reprocurement of follow on quantities of the item will involve multiple-source procurement and competition. In such cases, the item may be bought by use of performance specifications and/or drawings and additional data.

Upon determination of the intended use and application of the complete system, end item, equipment, material or service supported by the data, the intended uses of the data will be established by selection from the following list:

Intended Use	Data Generally Needed
Research and Development	Data adequate for definition, evaluation, and disclosure of the design criteria and performance parameters to be used as goals in research and development. Data for this purpose may include drawings, specifications, and other data for a service test and evaluation.
Design Approval and Evaluation	Design data and information adequate to permit evaluation of performance and to verify conformance to requirements. Data for this purpose is normally delivered prior to proceeding with detail engineering and in any event prior to release for production.
Quality Assurance (Including Inspection)	Final data describing quality characteristics to assure continued production and maintenance of required quality and reliability. Includes acceptance and rejection criteria, acceptable tolerances, reference to standards, tests and inspection procedures, process controls, quality and reliability levels, inspection lists, and classification of defects.
Installation, Training, Operation, Maintenance, or Repair and Overhaul	Engineering data and information adequate to enable installation, training, maintenance, or repair and overhaul without assistance from the original contractor or supplier.

Intended Use	Data Generally Needed
Emergency Manufacture for Repair and Overhaul	Engineering data and information adequate to enable emergency manufacture by KSC. Emergency manufacture is not a common practice at KSC and is resorted to only when items and parts are not immediately available from either commercial or NASA sources of supply to effect timely overhaul or repair work.
Development of Performance Specifications	Proposed performance specifications or design data and information adequate for engineers to develop performance specifications, sufficient to permit interchangeable equipment or suitable substitutes to be procured competitively. (This use does not extend to developing interchangeable components and parts.)
Development of Component Parts Specifications	Design data and information adequate for engineers to develop design specifications sufficient to permit component parts and materials obtainable from a number of known sources to be procured competitively. In general, such parts are of standard design configuration or have commercial equivalents.
Design and Interchangeability Control	Data necessary to control and maintain design integrity with interchangeability of parts, components, and end items. Data is required in sufficient completeness to maintain engineering and design changes or revisions, cost control, material standardization, performance, reliability, and safety.
Provisioning	Provisioning data which is to be used primarily for the identification of items of supply, determination of initial requirements to support and maintain items for an initial period of service, the establishment of data for catalog, technical manual, and allowance list preparation, and the preparation of data to assure delivery of necessary support items with related end items.

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Intended Use	Data Generally Needed
Procurement or Manufacture of Items and Parts for Stock, Repair, or Replacement (Whether Routine or for Mobilization Purposes)	Description or illustration of items, materials, or parts, fully adequate to enable subsequent procurement from a competent supplier or manufacturer by a Government facility so as to assure the requisite safe, dependable, and effective operation of the equipment. Necessary data is to be provided for proper identification as to performance ratings, primary dimensional features, electrical power and voltage ratings, resistance values, mechanical and electrical connections, physical characteristics, primary identity of chemical composition, tests and evaluation, or other necessary design features not included above, to fully identify the items. For components, items, and materials which are commercially available or which are described in Government or industry specifications or standards, data requirements shall be held to that minimum essential described in Specification MIL-D-1000.

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SECTION III
TECHNICAL LOGISTICS DATA

3.1 GENERAL

This section defines the requirements necessary to provide complete support in the areas of technical logistics data at KSC.

3.2 TECHNICAL LOGISTICS DATA FOR MSFC PROCURED STAGES, INSTRUMENT UNIT, AND GROUND SUPPORT EQUIPMENT

This category of equipment includes MSFC in-house manufactured equipment provided as GFE to KSC or to contractors operating at KSC. It also includes MSFC contractor manufactured equipment operated at KSC by KSC or a contractor. The technical logistics data support provided by KSC includes the following functions:

a. Review and coordination of the data acceptance packages.

b. Review and coordination of operation and maintenance manuals and/or instructions.

c. Receipt and distribution to the using organization.

d. Reporting on the lack of, or inadequacy of, data.

e. Reproduction, storage, and distribution as required.

f. Assuring the availability of current data at all times.

3.3 TECHNICAL LOGISTICS DATA FOR KSC PROCURED FACILITIES AND GROUND SUPPORT EQUIPMENT

a. Identification of essential data.

b. Documentation justification of all data requirements.

c. Definition of each item of data in terms of preparation, content, and format.

d. The data requirements list is contractually covered as an exhibit to the contract.

e. Data submittals by the contractor shall be evaluated and accounted for as a product of the Center's documentation management information system.

f. Establishment of a system for distribution, storage, and retrieval.

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SECTION IV
RESPONSIBILITIES

4.1 MANAGEMENT RELATIONSHIPS

The Program Control Office is responsible to the Manager, Apollo Program, and responsible to the Director of Launch Operations, the Director of Design Engineering, the Director of Technical Support, and to the Director of Installation Support, for the overall establishment, implementation, and surveillance of the technical logistics data system.

The Directors for Launch Operations, Design Engineering, Technical Support, and Installations Engineering are responsible for the adequacy, receipt, storage, retrieval, and use of technical logistics data by their support contractors. They are responsive to, and cooperative with, the Program Control Office and the overall KSC technical logistics data management system.

4.2 ORGANIZATIONAL RESPONSIBILITIES

(To Be Provided)

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APPENDICES

APPENDIX A

LOGISTICS BASELINE
REFERENCE SYSTEM

PRELIMINARY DRAFT

APPENDIX A
KSC APOLLO/SATURN LOGISTICS BASELINE REFERENCE SYSTEM

FOREWORD

This Appendix is a preliminary draft of the Logistics Baseline Reference System. It has not been subjected to formal coordination prior to publication and is not to be considered as being in final form.

Appendix A has been included in this issue of K-AM-02 to familiarize the recipients with the reasons for, and the tasks associated with, the development and utilization of a Logistics Baseline Reference System.

Publication of a revised Appendix A, in final form, is scheduled for September 1966.

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APPENDIX A

KSC APOLLO/SATURN LOGISTICS BASELINE REFERENCE SYSTEM

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LIST OF ILLUSTRATIONS

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APPENDIX A
KSC APOLLO/SATURN LOGISTICS BASELINE REFERENCE SYSTEM

A.1 INTRODUCTION

A logistics baseline is a systematic presentation of information which identifies the logistics products and services required to support Aerospace Vehicle Equipment (AVE) in a specific sequence of operational activities. Its most obvious advantage to KSC Apollo/Saturn logistics management is that it identifies all of the AVE logistics products not only on a quantitative and allocation basis, but on a "lead-time" and "need-time" basis. As a result of this combination, management at all levels may more closely monitor program development, anticipate and take actions to preclude problem areas, plan for the arrival of limited life span AVE equipment and spares so as to take full advantage of their operational usefulness, and assure the availability of trained personnel and adequate facilities. Specifically, the logistics baseline information will identify the following:

a. The operational flow within all AVE programmed activities, from receipt to launch, in their determined sequence of accomplishment.

b. The time flow of the AVE operations and the identified activities.

c. The AVE systems specifications and other technical documentation.

d. The facilities required to support the operations of the AVE.

e. The Operational Ground Equipment (OGE) required to support the AVE activities.

f. The type and quantity of personnel required to perform the operational activities on the AVE/OGE.

g. The transportation required to move the human and material resources supporting the AVE.

h. The ordnance items and hardware required to support the operational activities.

i. The propellants and pressurants required to support the operational activities.

A.1.1 BASELINE IMPACT. The logistics baseline is the first step in a series of analyses which are required to identify the complete logistics support products. Section II, Integrated Logistics Support, of K-AM-02 describes the interface between the data derived from the logistics baseline, the operations analysis of the OGE, and the maintenance requirements analysis performed on the Maintenance Ground Equipment (MGE) and OGE. Figure 2-1, Logistics Products Development Flow Diagram, within that Section, presents a graphic portrayal of that interface.

A.2 PURPOSE

The purpose of this Appendix is to present the guidelines for organizing the KSC Apollo/Saturn logistics baseline data into a common reference indexing system. This system will provide the information outlined in paragraph A.1 of this Appendix in an organized and sequentially arranged manner, as a basis for planning and managing logistics support in all areas. It will preclude:

a. Independent documentation systems being maintained by individual KSC organizations as the only source of information.

b. Areas of overlap, omissions, or equipment/documentation incompatibilities occurring because coordination and interface of documented problem areas has not been effected between KSC organizations or NASA Centers.

c. Areas, in which exist unknown or undisclosed problems, due to the lack of coordination or interface.

A.3 SYSTEM APPROACH

This Appendix takes cognizance of the fact that at this stage of the Apollo Program, much of the baseline type data has been, or is being, developed. This data presently conforms to format and content requirements developed by the responsible Centers, contractors, or individual organizations. In order to provide a logistics baseline reference system capable of identifying the support required for the Apollo/Saturn Program at KSC, the baseline data developed or being developed by individual organizations, must be integrated into a common baseline reference system. The integrated logistics baseline reference system will provide the means for identifying existing baseline data and determining the specific location of the data. This will be accomplished by the following:

a. Indexing the existing baseline data, by category and location, into a baseline reference system.

b. Organizing the reference information into a format whose content sequence is in consonance with the AVE operations flow.

c. Analyzing the baseline data information for completeness and, where omissions or duplications are found to exist, generating the requirements for responsible organization actions to correct or supplement the data.

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A.4 SYSTEM DESCRIPTION

The logistics baseline reference system referred to in paragraph A.3 of this Appendix consists of three major components: a Documentation Reference Index, an Activity Flow Diagram, and an Activity Reference Index. These three components, their interface within the reference system, and their means of implementation are described in the following paragraphs and graphically presented in Figure A-1, Logistics Baseline Reference System Generation.

A.4.1 DOCUMENTATION REFERENCE INDEX. The Documentation Reference Index provides the means of identifying all known documentation containing logistics baseline type data. An integrated KSC Apollo/Saturn logistics baseline can be assembled from documentation associated with all activities and operations performed on the AVE as it is processed through KSC. These activities will, in general, consist of transporting, handling, assembly, mating, checkout and launch operations. The types of documentation which reflect these operations include, but are not limited to, the following:

a. Ground operations requirements plans.

b. Ground operations support plans.

c. Operational checkout procedures.

d. Operational analysis documentation.

e. Activity flow diagrams.

f. Time bar charts.

g. Sequence of events charts.

h. Vehicle-stage transportation documentation.

i. Propellants and gases handling and use documentation.

j. Operational training manuals.

k. Vehicle test catalogs.

l. Test operation plans.

m. AVE systems specifications.

A.4.1.1 <u>Reference Index Development</u>. Documentation in these categories has been, or will be, produced by the various contractors or NASA organizations which build or operate the support equipment and flight hardware connected with the Apollo/Saturn Program, much of it reposing in their individual data files. Reference information for this data and its location will be

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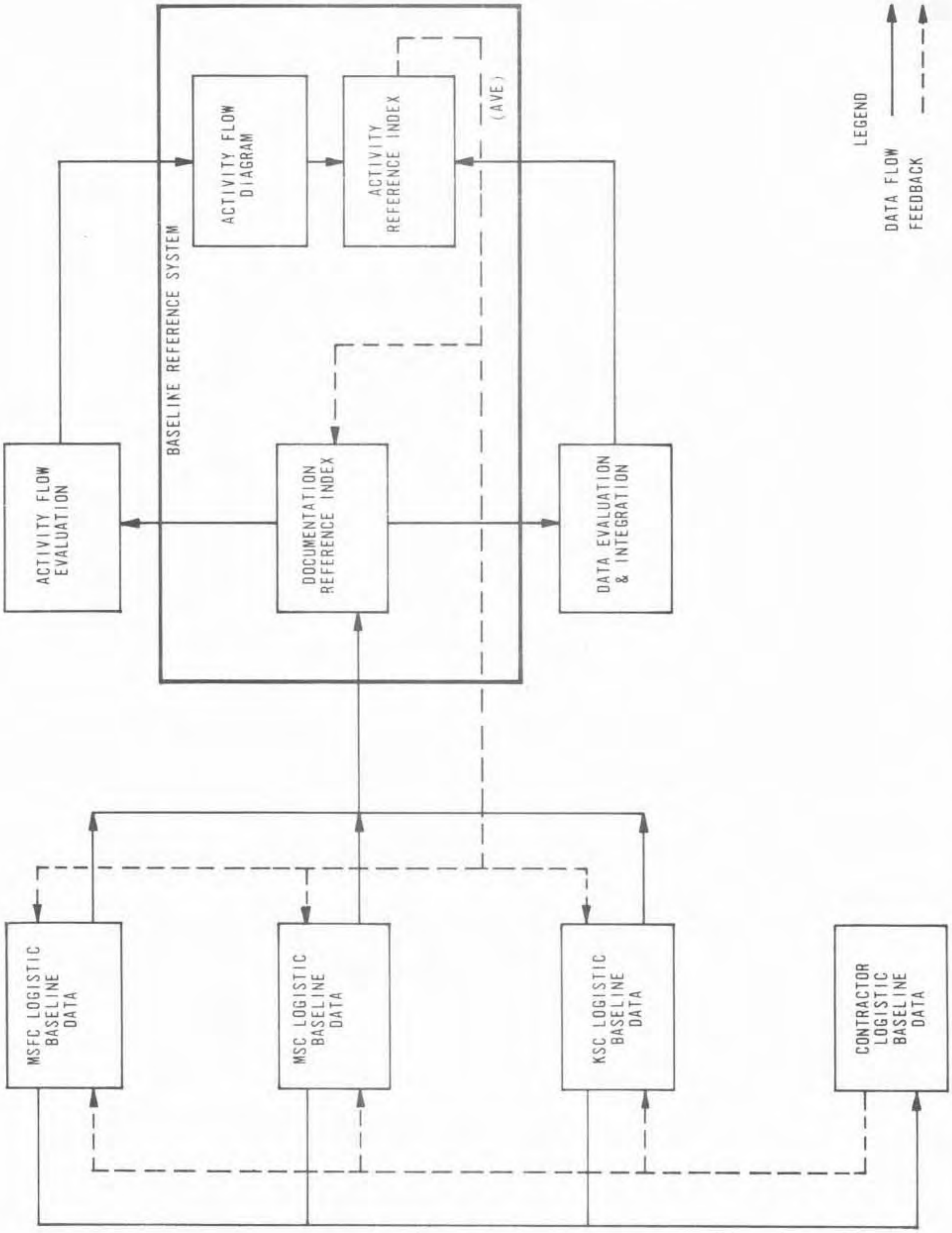

Figure A-1. Logistics Baseline Reference System Generation

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gathered together as the foundation for an integrated KSC baseline by documenting the results of a systematic search through KSC NASA/contractor data files. To aid in the control and handling of this reference data, the Documentation Reference Index will be set up to show the following information:

a. Document title.

b. Document originator.

c. Date (latest revision).

d. Contractor document number.

e. Secondary identification number.

f. Chronological index number.

g. Documentation location code.

A Sample Format, Figure A-2, is given for a cross-reference index of this type and an explanatory note is presented in each column, covering column content.

A.4.1.2 Reference Index Maintenance. This index is maintained by using EDP card sort-tabulate techniques (Reference Exhibit 7, EDP Support Requirements Plan) which may be used to provide additional lists of documentation by actual location, by contractor number, etc. A section of a Working Documentation Index is also attached for reference (Figure A-3).

A.4.2 ACTIVITY FLOW DIAGRAM. An Activity Flow Diagram of KSC operations is essential to the further development of a KSC Integrated Logistics Baseline because it is the common element which ties all KSC operations, support functions, analyses and time studies into a systematic framework.

A.4.2.1 Activity Flow Diagram Development. This flow diagram will be developed from an activity flow evaluation of the data referenced in the Documentation Reference Index. It will show the sequence of activities at KSC required to prepare the AVE for its planned mission. Each activity will have an identifying code number which will provide the means of entry into the Activity Reference Index. A section of a typical Activity Flow Diagram is presented in Figure A-4.

A.4.3 ACTIVITY REFERENCE INDEX. In order to insure that the information contained in the documentation index satisfies the requirements of a logistics baseline, an evaluation of the documentation must be made and a logistics baseline Activity Reference Index established and maintained. The information entered into this system shall be accomplished in such a manner that the Activity Reference Index shall organize the various data into a format which will provide the continuity necessary for a baseline.

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DOCUMENTATION REFERENCE INDEX

DOC LOC CODE	DOCUMENTATION LOCATION CODE B - BASELINE REFERENCE LIBRARY C - CONTRACTOR DATA FILE L - LVO - NASA DATA FILE S - SCO - NASA DATA FILE K - KSC LIBRARY
CONTRACTOR NO.	INDIVIDUAL CONTRACTOR DOCUMENTATION NUMBER
DATE	LATEST REVISION DATE
ORIG.	ORGANIZATION GENERATING DOCUMENT
TITLE	FULL TITLE WITH ABBRV.
TIC NO.	SECONDARY IDENTIFICATION NO.
ACQUISITION NO.	CHRONOLOGICAL NUMBER ASSIGNED TO DOCUMENT AS RECEIVED.

Figure A-2. Documentation Reference Index

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035 1	23819	APOLL/LEM FACILITIES PLAN LEM REQS FOR	GAEC	051564	LPL 2-1B	B
035 2		LAUNCH COMPLEX 37 A ETR			LPL 2-1B	B
036		APPOLO/SAT V ACTIVITY RESPONSIBILITY IND	DSC	110365		B
037	20953	LEM SUPPORT MANUEL TRANS AND HANDLING	GAEC	021065	LMA790-5-LTA2	B
038		PAD OPS ASSY C/O AND LAUNCH SAT V MILA	TBC	102865	D5 16001-124	B
039	22865	LEM FAMILIARIZATION MANUEL	GAEC	031565	LMA790-1	B
040	21848	LEM FAC PLAN APOLLO/LEM REQ LC39 AT MILA	GAEC	012665	LPL-2-1B APP.1	B
041		LAUNCH SUPPORT EQUIP ENG. DIV. LOG. PLAN	LSEE	12 65		B
042	11490	CAT. OF SYSTEM TESTS FOR S-11 FLIGHT STG	NAA	071663	SID 63-907	B
043	27158	APOLLO/SAT IB LAUNCH OPERATIONS PLAN 201	KSC	112965	600-39-004	B
044		APOLLO/SATURN LOGISTICS PLAN	KSC	121365	K-AM-02	B
045		SEQ OF EVENTS TIME BAR C/O LAUNCH SAT V	MSFC	012466	D5-16001-911	B
046 1		APOLLO CONTROLLED MILESTONES AND	NASA	092165		B
046 2		HARDWARE QUANTITIES CHANGE APPROVED				B
048 1		APOLLO/LEM FACILITIES PLAN LEM REQS FOR	GAEC	121563	LPL 2-1B APP 3	B
048 2		MSO BLOG AT ETR			LPL 2-1B APP 3	B
049	27558	APOLLO/SATURN 1B LAUNCH PLAN AS-202	KSC	121065	K-1B/2	B
050		APOLLO LOGISTICS REQUIREMENTS PLAN	NASA	11 65	NHB 7500.1	B
051		DOCUMENTATION LIST FOR SAT STAGE S-11	NAA	101265	SID 62-430	B
052		APOLLO MANNED MISSIONS VERIFICATION SUM	GE	121365	ASD/RE-12-65-3	B
053		SAT V L/V DESIGN REFERENCE MISSION	NASA	121065	10M30601	B
054		MODEL SPECS FOR S-II STAGE GSE VOL.II	NAA	090163	SID 61-362	B
055		APOLLO/SAT V GSE RESPONSIBILITY MATRIX	TBC	050765		B
056		APOLLO/SAT 201 OPERATIONAL WORK SCHEDULE		120765		B
057		TEST OP PLAN FOR S-II-F STAGE AT KSC	NAA	101565	SID 65-1265	B
058		S/M RCS TANKING/DETANKING LE-34	NAA	012266	K-4700-SC009	B
059	28576	S/C FAC OP PLAN LC 34 A/F 011	GE	123065		B
060		APOLLO HANDLING GSE FLOW DIAGRAMS	NAA			B
061		PROG ORIENTED AND OP RELATED DOCUMENT		123165		B
062		GSE LIST AND BLK DIAG OF SUSYSTEM TESTS	GE	112064		B
063		MSFC/KSC RELATIONS-LOGISTIC		07 65		B
064		MSFC/KSC RELATIONSHIPS	KSC	082464		B
065	26998	SPACECRAFT FAC OPS PLAN VOL V AF 009	GE	090165		B
066	26157	S/C FAC OP PLAN PROP TEST FAC A/F 009	GE	071565		B
067	26158	S/C FAC OP PLAN HYPER TEST FAC A/F 009	GE	073065		B
068		LEM GRD OP REQTS PLAN VOL I AND II	GAEC	06 65	LPL 610-3C	B
069	28578	S/C FAC OP PLAN HYPER TEST FAC A/F 011	GE	121565	SK56137-8-549	B
070	26998	S/C FAC OP PLAN LC 34 A/F 009	GE	090165	SK56137-8-459	B
071	28577	S/C FAC OP PLAN CRYOGENIC FAC A/F 011	GE	121565	SK56137-8-549	B
072		S/C FAC OP PLAN INTEGRATED FAC A/F 009	GE	081565	SK56137-8-459	B
073		S/C FAC OP PLAN PROP TEST FAC A/F 011	GE	121565	SK56137-8-549	B
074		S/C FAC OP PLAN ALT CHAMBER FAC A/F 009	GE	081565	SK56137-8-459	B
075	25694	COMPLEX CONTROL CENTER OP PLAN VOL 1	GE	093064		B
076		FLA OPERATIONS FLOW PLAN S/C 011		070965		B
078		LOX/LH2 AUTOMATIC LOADER	NASA	013166	6-LLVIB-203A	B
079		L/V COUNTDOWN DEMO TEST (DRY)	NASA	013166	7-LSVIB-215	B
080		L/V COUNTDOWN DEMO TEST AS 201	NASA	012466	7-LSVIB-201	B
081		SAT IB FLIGHT READINESS TEST AS 201	NASA	021066	OCP-K-41002-20	B
082		KSC TOP SPECIFICATION TREE				B
083		SAT IB CONSOLIDATED INSTRUMENTATION PLAN	NASA	013166	K-1B-029	B
084		S-II PROPULSION SYSTEMS C/O MANUEL	NAA	060163	SID 63-6	B
085		SAT IB MISSION RULES AS 201 LAUNCH RULES	NASA	121765	170-48-0001	B
086		VEH PLAN FOR BLK II FLT S/C GRD OP PLAN	NAA	022566	SID-65-308-2	B
087		SAT V L/V GSE LOGISTIC IMPLEMENT PLAN	NASA	011066		B
088		TOTAL LIST OF OCPS TO SUPPORT S/C 009		020266		B
089		CLARIFICATION AND IMPLEMENT INSTRUCTIONS		081164		B

Figure A-3. Sample Machine Run - Documentation Reference Index

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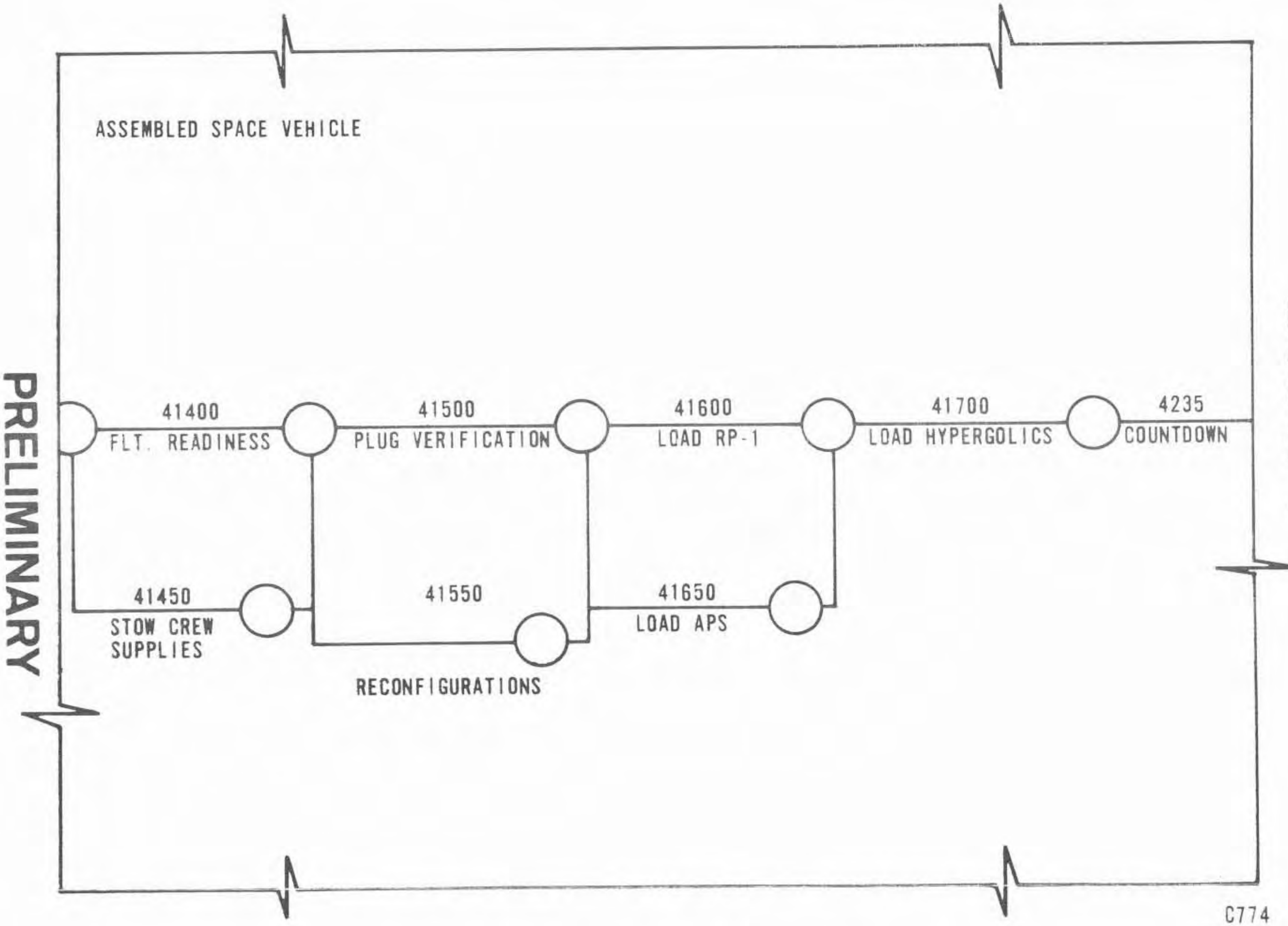

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Figure A-4. Activity Flow Diagram (Sample Section)

A.4.3.1 Purpose. This cross-reference index shall be for the purpose of locating baseline data in the available documentation, identifying its place in the sequence of events which make up a baseline activity flow diagram, and identifying the type data (operation, OGE, time flow, etc.) as well as indicating the status of the data. This shall be accomplished by sorting the available data into the information categories, which make up the KSC baseline, and listing them under their identifying activity number which is obtained from the Activity Flow Diagram.

The categories of information which should be included in the Activity Reference Index and a typical format is presented in paragraph A.1 of this Appendix.

A.5 SYSTEM APPLICATION

This section describes a typical application of the Logistics Baseline Reference System. Figure A-5, Baseline Reference System Flow Diagram, is a graphic presentation of this application. To determine what logistics baseline information is available for a particular KSC activity the following sequence must be followed:

a. Obtain the activity code number for that particular activity from the Activity Flow Diagram.

b. Use the code number to locate the activity in the Activity Reference Index.

c. All the detailed operations which make up the activity will be found listed under the activity.

d. Under each operation the following logistic's baseline data headings will be found listed:

- OGE.
- Operational personnel.
- Facilities.
- Time flow.
- AVE systems specifications and engineering documentation.

e. Under each of the items listed in this Activity Reference Index there will be found referencing data which will locate, in the Documentation Reference Index, the detailed logistics baseline information for each item.

A.5.1 ACTIVITY REFERENCE INDEX FORMAT. A typical example of Activity Reference Index format, with a description of its information content, is presented in paragraph A.6 of this Appendix. The Activity Flow Diagram (Figure A-4), the Activity Reference Index, (Figure A-6) and the Documentation Reference Index (Figure A-3), have been completed, using typical

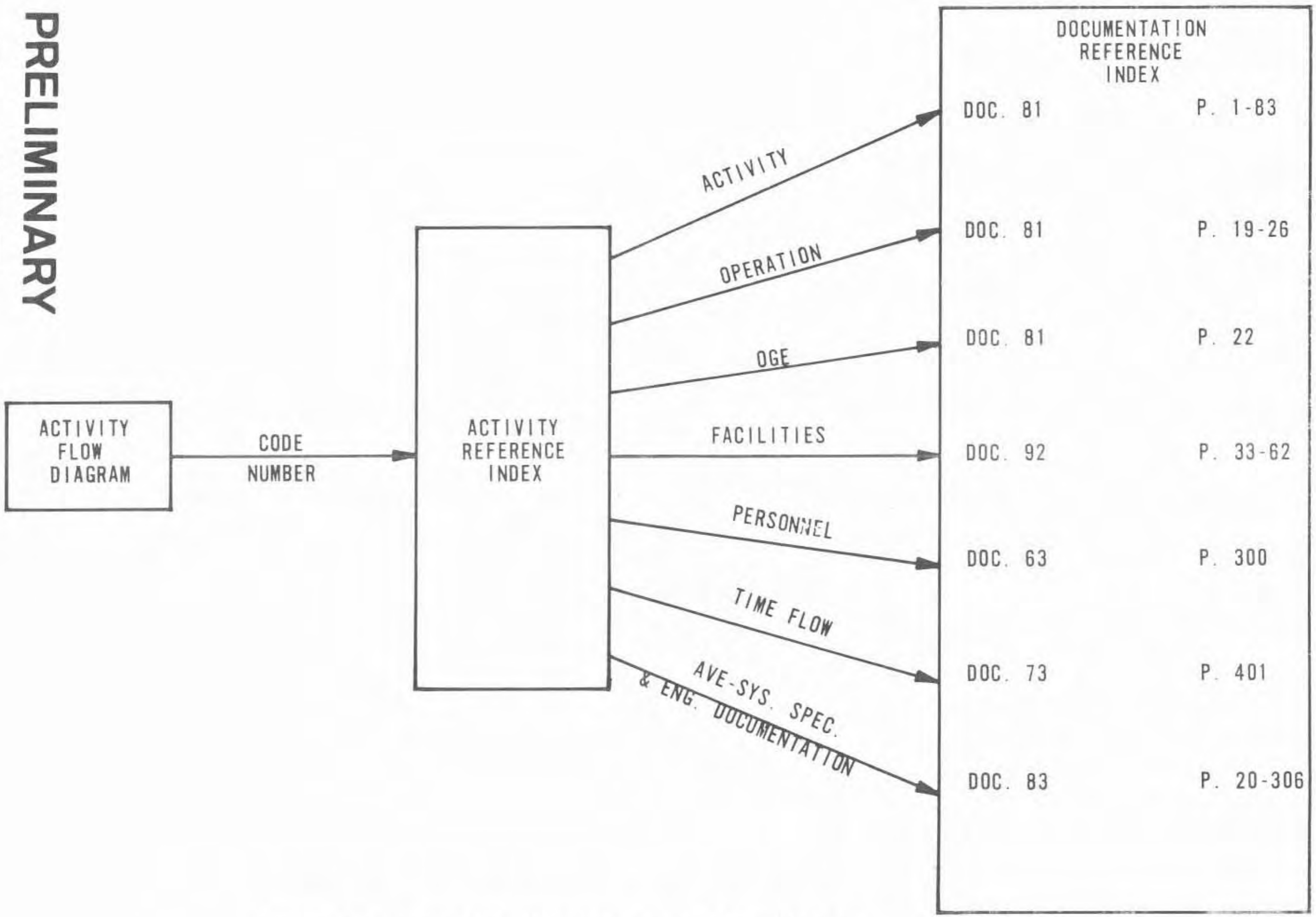

Figure A-5. Baseline Reference System Flow Diagram

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baseline type data. They represent an example of reference system usage. The activity selected for the example was the Space Vehicle Flight Readiness Test. The steps in using the system are as follows:

a. From the Activity Flow Diagram (Figure A-4), the activity code number 41400 was located.

b. Under code number 41400 in the Activity Reference Index (Figure A-6) the following information is located - the activity is a Check-out Test, accomplished at LC-34 by NAA-DLO. The activity is fully described in documents 56 and 81 of the Document Reference Index. This index reveals these documents to be the Apollo/Saturn 201 Operational Work Schedule dated 12-7-65 and Saturn IB Flight Readiness Test AS-201 dated 2-10-66.

c. All the operations which make up this activity are then found listed under the activity, with the same information being referenced. Under each operation all the baseline data listed in paragraph A.5 "d" is indexed with accompanying reference information. Information gaps in the referencing columns indicate baseline omission which must be filled to complete the baseline.

A.6 ACTIVITY REFERENCE INDEX FORMAT

This section presents an example of a typical format (Figure A-6) suggested for cross-reference indexing of logistics baseline data. The following describes the type of information that should be tabulated in each column of the Index.

Column	Heading	Description
1	Activity no.	The number as assigned to an activity on the Activity Flow Diagram.
2	Line no.	Sequential numbers of all lines/EDP cards containing information pertinent to an activity.
3	Category	The Category column utilizes a numbered code to indicate the type of data being tabulated as follows:

Code	Category
1	Activity (includes AFS)
2	Operation (includes OFS)
3	Operational Ground Equipment (OGE)
4	Operational personnel
5	Facilities
6	Time flow
7	AVE system specifications and engineering documentation

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ACTIVITY NO. 1*	LINE NO. 2*	CATEGORY 3*	TITLE OR DESCRIPTION 4*	TYPE FUNCTION 5*	LOCATION RESP. 6*	CONTRACT RESP. 7*	NASA RESP. 8*	STATUS 9*	DOCUMENT 10* LIST NO.	DOCUMENT 10* PAGE
41400	0001	1	A/S IB FLT. READINESS TEST	COT	A1	NAA		1	56	NA
41400	0002	1	A/S IB FLT. READINESS TEST	COT	A1	NAA		1	81	
41400	0003	2	OPERATING PROCEDURE	CO	A1	NAA		1	81	9
41400	0004	3	OGE	CO	A1	NAA		0	0	0
41400	0005	4	OPERATIONS PERSONNEL	CO	A1	NAA		0	0	0
41400	0006	5	FACILITIES	LNCH	A1	NAA		0	0	0
41400	0007	6	TIME FLOW	CO	A1	NAA		1	81	9
41400	0008	7	AVE. SYS. SPECIFIC. ENG. DOC.	DS	A1	NAA		0	0	0
41400	0009	2	SYSTEMS VERIFICATION	CO	A1	NAA		1	81	9-12
41400	0010	3	OGE	CO	A1	NAA				
41400	0011	4	OPERATIONS PERSONNEL	CO	A1	NAA		0	0	0
41400	0012	5	FACILITIES	LNCH	A1	NAA		0	0	0
41400	0013	6	TIME FLOW	CO	A1	NAA		1	81	9-12
41400	0014	7	AVE. SYS. SPECIFIC. ENG. DOC.	DS	A1	NAA		0	0	0
41400	0015	2	GRND. COMM./CM-SM SEPARATION	CO	A1	NAA		1	81	13-14
41400	0016	3	OGE	CO	A1	NAA				
41400	0017	4	OPERATIONS PERSONNEL	CO	A1	NAA		0	0	0

*COLUMN NUMBER

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Figure A-6. Activity Reference Index

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Column	Heading	Description
4	Title or description	Activities and operations titles will be listed as given in descriptive documentation. Other categories will be listed at least once for each operation by the titles shown in category paragraph (above).
5	Type of function	For each activity and operation the type of function being performed will be indicated as: ASSY — Assembly CO — Checkout TX — Test COT — Checkout-test HDLG — Handling TRP — Transportation LNCH — Launch PP — Propellant loading and Pressurization DS — Design
6	Location area/facility	Utilizing as a basis the letter codes for area and number codes for facilities as presented on pages 39 and 40 of NHB 7500.1, the location of the performance of an activity/operation will be designated. These codes will be expanded as necessary and appropriately documented with this index.
7	Contractor responsible	List the contractor responsible for an overall operation in support of NASA.
8	NASA responsible	List the office code of the NASA agency responsible for each operation.
9	Status	The status of all categorized data will be numerically indicated as follows: 1 — Complete 0 — not complete Blank — no information available
10	Document list no.	The documents containing the logistics baseline data will be compiled and numbered in conjunction with this index. The number accordingly assigned will be listed in this column.
	Page	The appropriate page numbers of a designated document will be listed.

A.7 IMPLEMENTATION

The implementation of the KSC Apollo/Saturn Logistics Baseline Reference System will require the cooperation and coordination of all KSC organizations and their supporting contractors. To accomplish this task, the policy guidelines established by K-AM-02 shall be adhered to. To the extent possible, full advantage shall be taken of existing documentation and individual reference or index systems. Assessment of the available baseline reference data, as the system develops, will reveal the revisions and improvements necessary to provide the degree of data coverage essential to program success.

A.8 ORGANIZATIONAL RESPONSIBILITIES

The following paragraphs detail organizational responsibilities for the development, implementation, and maintenance of the KSC Apollo/Saturn Logistics Baseline Reference System. These responsibilities are graphically presented in Figure A-7, Responsibilities Matrix.

A.8.1 PROGRAM CONTROL OFFICE (PPR-3).

a. Develop, and coordinate, the policies and guidelines pertaining to development, implementation, and maintenance of the KSC Apollo/Saturn Logistics Baseline Reference System.

b. Conduct surveillance of the reference system.

c. Resolve individual problems of organizational information overlap, duplication, or omission which may be referred by the Systems Offices (PPR-1, 4 or 5).

d. Establish feedback channels which are capable of receiving management reports to provide visibility of accomplishment, potential problem areas, critical shortages, etc., and to respond to specific management queries pertaining to actions being taken by implementing organizations to correct discrepancies.

e. Coordinate on priorities established for the inclusion of the logistics baseline reference data into the Apollo/Saturn EDP system.

A.8.2 MANNED SPACECRAFT OFFICE (PPR-1), APOLLO/SATURN I/IB SYSTEM OFFICE (PPR-4) AND APOLLO/SATURN V SYSTEM OFFICE (PPR-5).

a. Direct the implementation of the baseline reference system within the particular areas of interest and responsibility.

b. Assure and coordinate the assessment of logistics baseline data source documentation by the responsible implementing organizations.

c. Assist in the procurement of documentation, not presently available, essential to the establishment, implementation and maintenance of the

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TASK	ORGANIZATION							
	PPR 3	PPR 1,4,5	SOP	LVO	EDV	INS	SCO	ADM
DEVELOP THE POLICIES AND GUIDELINES.	*							
CONDUCT SURVEILLANCE	*							
RESOLVE INDIVIDUAL PROBLEMS	*							
ESTABLISH FEEDBACK CHANNELS	*							
COORDINATE EDP PRIORITIES	*							
DIRECT IMPLEMENTATION		*						
ASSURE AND COORDINATE DOCUMENTATION ASSESSMENT		*						
ASSIST IN THE PROCUREMENT OF DOCUMENTATION.		*						
ASSURE THE DEVELOPMENT OF OPERATIONS ACTIVITIES FLOW DIAGRAMS.		*						
EFFECT INTER-SYSTEM OFFICE COORDINATION		*						
ASSURE PROPER UTILIZATION OF EDP CAPABILITIES.		*						
ASSURE THE PROCESSING OF MANAGEMENT ESSENTIALS REPORTS AND INFORMATION		*						
DEVELOP, IMPLEMENT, AND MAINTAIN A LOGISTIC BASELINE REFERENCE SYSTEM			*	*	*	*	*	*
REVIEW AND ASSESS SOURCE DOCUMENTATION			*	*	*	*	*	*
INITIATE REQUEST FOR UNAVAILABLE DATA			*	*	*	*	*	*
INITIATE ACTION TO ELIMINATE DUPLICATION AND OVERLAP OF DATA			*	*	*	*	*	*
DEVELOP OPERATIONAL ACTIVITIES FLOW			*	*	*	*	*	*
DEVELOP AN INDEXING METHOD			*	*	*	*	*	*
ASSURE ADEQUACY OF SYSTEM BY EDP ADAPTION			*	*	*	*	*	*
MAINTAIN CONSTANT UPDATING CONTROL			*	*	*	*	*	*
PROCESS OF MANAGEMENT ESSENTIAL REPORTS AND INFORMATION			*	*	*	*	*	*
DEVELOP, IMPLEMENT AND MAINTAIN A VISIBILITY SYSTEM			*	*	*	*	*	*
PROGRAM INPUT DATA						*		
DEVELOP AND SCHEDULE THE MANAGEMENT REPORT INFORMATION						*		
ASSURE UPDATING DATA IS PROGRAMMED INTO EXISTING DATA BANK						*		

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Figure A-7. Logistics Baseline Reference System Responsibilities

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Apollo/Saturn Logistics Baseline Reference System as requested by the implementing organizations.

d. Assure the development of operations activities flow diagrams within the areas of responsibility of the implementing organizations.

e. Effect inter-systems office coordination to assure adequacy of reference documentation, completeness of operations activity flow diagrams, and to eliminate areas of overlap or omission.

f. Assure the proper utilization of EDP capabilities in the development and implementation of the quick retrieval methods essential to the success of a logistics baseline reference system.

g. Assure the processing of management essential reports and information through established feedback channels.

A.8.3 ASSISTANT DIRECTORATES FOR: ADMINISTRATION (ADM)
LAUNCH VEHICLE OPERATIONS (LVO)
SPACECRAFT OPERATIONS (SCO)
ENGINEERING AND DEVELOPMENT (EDV)
INFORMATION SYSTEMS (INS)
SUPPORT OPERATIONS (SOP)

a. Develop, implement, and maintain a logistics baseline reference system within the respective areas of Apollo/Saturn Program assigned responsibility.

b. Review and assess the available logistics baseline data source documentation for adequacy, overlap, or areas of omission.

c. Initiate, through applicable system office, requests for necessary data source documentation not presently available.

d. Initiate, in coordination with associated implementing organizations and supporting contractors, actions to eliminate areas of duplication and/or overlap in data source documentation.

e. Develop, in conjunction with support contractors, operational activities flow covering all AVE functions and tasks in all areas of responsibility.

f. Develop an indexing method, in accordance with the format shown in Figures A-2 and A-3.

g. Assure the adequacy of the logistics reference system by applying its EDP adaption to the flow illustrated by Figure A-5, Baseline Reference System Flow Diagram.

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h. Maintain constant updating controls to assure that changes in AVE configuration, operations functional changes, program changes, etc., are reflected in the logistics baseline reference documentation and data.

i. Process management essential reports and information through established feedback channels.

j. Develop, implement, and maintain a logistics baseline visibility system to indicate task accomplishment, potential or existing problem areas and corrective action taken.

A.8.4 ASSISTANT DIRECTORATE FOR INFORMATION SERVICES (INS). In addition to the organizational responsibilities outlined in paragraph A.8.3 of this Appendix, INS shall provide professional guidance for the most effective utilization of EDP services, in support of the KSC Apollo/Saturn Logistics Baseline Reference System to include:

a. Programming the individual organizational input data in sequence to coincide with the program AVE operations activity flow in order to provide a single source, quick retrieval system of logistics baseline information.

b. In coordination with the applicable Systems Office (PPR-1, 4 and 5) and the Program Control Office (PPR-3) develop and schedule the management report information essential as source data for the intra-Center and inter-Center logistics baseline data reports.

c. Assure that updating data received from responsible KSC organizations is programmed into existing data bank information. This insures that logistics support requirements identified by the baseline reference system are compatible with the program mission and AVE configuration.

APPENDIX B

REFERENCES

APPENDIX B

REFERENCES

DOCUMENT NUMBER	TITLE	ORIGINATOR	DATE
NPC 109	NASA Federal Cataloging Provisioning Screening Procedures	NASA	Mar. 1965
NPC 500-1	Apollo Program Configuration Management Manual	OMSF	May 18, 1964
NPC C 500	Apollo Program Development Plan	OMSF	Jan. 15, 1965
NHB 7500.1	Apollo Logistics Requirements Plan	OMSF	Nov. 1965
NPC 000 (1 thru 9)	Support Program Provisions for Space Systems Contracts	NSIA/NASA	Nov. 1, 1965
KMI 1142.1	Organization and Functions-KSC	KSC	Sep. 30, 1965
KMI 1052.1	KSC/AFETR Joint Operating and Support Agreement	KSC/AFETR	Mar. 9, 1965
KMI's 4000 Series	Government Equipment and Supply Instructions	KSC	June 29, 1965
K-PM	Apollo Project Development Plan	KSC	
K-PM-0	Apollo/Saturn V Development/ Operations Plan	KSC	Oct. 1, 1965
K-IB-0 (Draft)	Apollo/Saturn IB Development/ Operations Plan	KSC	
K-AM-0 (Draft)	Apollo/Saturn Program Management and Support Plan	KSC	
K-AM-02	Apollo/Saturn Logistics Plan	KSC	Dec. 13, 1965
K-AM-03	Apollo/Saturn Configuration Management Plan	KSC	Jan. 26, 1966
K-AM-05	Apollo/Saturn Reliability & Quality Assurance Plan	KSC	
K-AM-06	Apollo/Saturn Training Plan	KSC	Jan. 17, 1966
K-AM-061	Apollo/Saturn Training Implementation Plan	KSC	Jan. 1966

DOCUMENT NUMBER	TITLE	ORIGINATOR	DATE
K-AM-0611	Apollo/Saturn Training Course Catalog	KSC	Oct. 20, 1965
Draft	Apollo Operational Maintenance Plan	OMSF	
MSC-A-D-66-1	Apollo Spacecraft Logistics Requirements Plan	MSC	Jan. 3, 1966
(None)	MSFC Logistics Support Requirements Plan	MSFC	Jan. 5, 1966
(None)	Saturn V Maintenance Concept	MSFC	Dec. 15, 1965
(None)	Saturn V (LVGSE) Logistics Implementation Plan	MSFC	
(None)	MSFC/KSC Agreements	MSFC/KSC	Aug. 11, 1964 Mar. 9, 1965
(None)	MSFC/KSC Relations-Logistics	MSFC/KSC	July 1965
(None)	MSFC/KSC Relations-Quality and Reliability Assurance	MSFC/KSC	Aug. 27, 1965
(None)	MSFC/KSC Relations-Configuration Management	MSFC/KSC	Sep. 15, 1965
(None)	MSC/KSC Memorandum of Agreement	MSC/KSC	Dec. 21, 1964

APPENDIX C

ABBREVIATIONS

APPENDIX C

ABBREVIATIONS

ADI	Apollo Documentation Index
ADM	Assistant Director for Administration, KSC
AGE	Aerospace Ground Equipment
ASO	Administrative Services Office, KSC
AUD	NASA Regional Audit Office at KSC
AVE	Aerospace Vehicle Equipment
BOD	Base Operations Division, SOP, KSC
CCB	Configuration Control Board
CEI	Contract End Item
CG	Center of Gravity
DCD	Design Cognizant Directorate; the KSC Organizational Element Which Has Primary Design Responsibility for KSC Procured Hardware and Related Software
DIR	Director, Kennedy Space Center
DLO	Director Launch Operations, KSC
DLSC	Defense Logistics Service Center
EAM	Electrical Accounting Machine
EBW	Exploding Bridge Wire
ECP	Engineering Change Proposal
EDPE	Electronic Data Processing Equipment
EDV	Assistant Director for Engineering and Development, KSC
EDV-1	Launch Support Equipment Engineering Division, KSC
EDV-2	Facilities Engineering and Construction Division, KSC
EIC	End Item Criteria

ESE	Electrical Support Equipment
FECD	Facilities Engineering and Construction Division, EDV-2, KSC
FIN	Financial Management Division, ADM, KSC
F.O.B.	Free on Board
GBL	Government Bill of Lading
GFE	Government Furnished Equipment
GFP	Government Furnished Property
GHe	Gaseous Helium
GIE	Ground Instrumentation Equipment
GN_2	Gaseous Nitrogen
GSA	General Services Administration
GSE	Ground Support Equipment
I-K	MSFC Resident Office at KSC
INS	Assistant Director for Information Systems, KSC
IU	Instrument Unit
I-V	MSFC Saturn V Program Office
I-V-E	MSFC Saturn V Engineering and Logistics Management Office
KSC	Kennedy Space Center
LCC	Launch Control Center
LEM	Lunar Excursion Module
LH_2	Liquid Hydrogen
LHe	Liquid Helium
LN_2	Liquid Nitrogen
LO_2 (LOX)	Liquid Oxygen
LSEED	Launch Support Equipment Engineering Division, EDV-1, KSC
LSOD	Launch Support Operations Division, SOP-1, KSC

LUT	Launch Umbilical Tower (ML - Mobile Launcher)
LVO	Assistant Director for Launch Vehicle Operations, KSC
MCD	Maintenance Cognizant Directorate; the KSC Organizational Element Which Has Primary Responsibility for Maintaining Apollo/Saturn Equipment at KSC
MGE	Maintenance Ground Equipment
MILA	Merritt Island Launch Area
ML	Mobile Launcher (LUT - Launch Umbilical Tower)
MMH	Monomethylhydrazine
MSA	Management Systems Analysis Office, ADM, KSC
MSC	Manned Spacecraft Center
MSFC	Marshall Space Flight Center
MSRP	Mission Support Real Property
MTBF	Mean Time Between Failures
MTO	Mississippi Test Operations - NASA
NASA	National Aeronautics & Space Administration
NMI	NASA Management Instruction
N_2O_4	Nitrogen Tetroxide
NOI	Not Otherwise Indexed
OCD	Operational Cognizant Directorate; the KSC Organizational Element Which Has Primary Responsibility for Operating Apollo/Saturn Equipment at KSC
OGE	Operational Ground Equipment
PAO	Public Affairs Office, KSC
PAT	Patent Counsel and Technology Utilization Officer, KSC
PDP	Program Development Plan
P'DP	Project Development Plan
PEN	Program Element Number

PER	Personnel Division, ADM, KSC
PNR	Pre-negotiation Review
P and P	Propellants and Pressurants
PPR	Director Plans, Programs and Resources, KSC
PPR-1	Manned Spacecraft Office, PPR, KSC
PPR-2	Advanced Programs Office, PPR, KSC
PPR-3	Program Control Office, PPR, KSC
PPR-4	Apollo/Saturn I/IB Systems Office, PPR, KSC
PPR-5	Apollo/Saturn V Systems Office, PPR, KSC
PPR-6	Reliability and Quality Assurance Office, PPR, KSC
PPR-7	Operations Support Office, PPR, KSC
PRO	Procurement Division, ADM, KSC
QAS	Director Quality Assurance and Safety, KSC
QC	Quality Control
R&D	Research and Development
R&DO	MSFC Research and Development Operations
RIO	NASA Regional Inspections Office at KSC
RF	Radio Frequency
RFP	Request for Proposal
RP-1	Kerosene
RPIE	Real Property Installed Equipment
SACTO	Sacramento Test Operations
SCAPE	Self Contained Atmospheric Protective Ensemble
SCO	Assistant Director for Spacecraft Operations, KSC
SEC	Security Office, ADM, KSC
SOP	Assistant Director for Support Operations, KSC
SOP-1	Launch Support Operations Division, SOP, KSC

SOP-2	Base Operations Division, SOP, KSC
TPN	Transportation Office, ADM, KSC
UCR	Unsatisfactory Condition Report
UDMH	Unsymetrical Dimethylhydrazine
VAB	Vehicle Assembly Building

APPENDIX D

GLOSSARY OF TERMS

APPENDIX D

GLOSSARY OF TERMS

Acceptance - The act of an authorized representative appointed by the Government which approves specific services, or acknowledges that certain specified articles are in conformity with requirements. (Non-action by an authorized individual where acceptance or rejection within a specified time period is required can be construed to be acceptance if the authorized individual does not specifically accept or reject within the time period.)

Accessibility - The relative ease with which a component or an assembly can be approached to be repaired, replaced, or serviced.

Accountability - See Property Accountability.

Adjust - To manipulate controls to return equipment to prescribed operating tolerances.

Aerospace Ground Equipment - All equipments required on the ground to make an aerospace system operational in its intended environment. AGE includes OGE and MGE.

Aerospace Vehicle Equipment - Flyable equipment which is part of the manned or unmanned vehicle which ultimately operates in the aerospace environment.

Apollo - A term generally used to describe the NASA Manned Lunar Landing Program, but specifically used to describe the effort devoted to the development test and operation of the space vehicle for long duration Earth orbit, circumlunar, lunar landing and return flights.

Apollo Program - The program providing for manned exploration of the moon.

Apollo Program Center - A NASA Field Center performing a major function in the management of the Apollo Program.

Apollo Program Development Plan - Description of the Apollo mission and of the efforts required to support the Apollo mission.

Apollo Program Element - A NASA organization, office, etc., that has a recognized Apollo Program responsibility.

Approve - To give formal or official sanction.

Assembly - A removable and/or repairable element of a component which performs functions necessary to the operation of the component as a whole.

Baseline - The prerequisite information which serves as a foundation for accomplishing subsequent activities.

Bill of Lading, Commercial (CBL) - A nonnegotiable document by which a transportation line acknowledges receipt of freight and contracts for its movement. Generally, this document is used by Government contractors for prepayment of freight charges under F.O.B. destination delivery terms.

Bill of Lading, Government (GBL) - The GBL is a limited liability contract covering transportation of property from one place to another. It is a receipt, identifies the consignee, serves as proof the shipment was delivered to consignee, and serves as a basis for collection and audit of charges.

Bulk Item - See Spare Part.

Calibration - The act of setting or adjusting equipment, to perform within specified limits, by use of primary or secondary standards, in the calibration laboratory or at equipment location.

Certificate of Public Convenience and Necessity - Authority or certificate granted by the Interstate Commerce Commission to common carriers transporting by motor vehicle, water and freight forwarders to operate in interstate commerce.

Certify (Certification) - The act of a qualified NASA or contractor inspector attesting that verification has been completed.

Checkout - A sequence of operational and calibration tests needed to determine the condition and status of a required operational function.

Command Module - The personnel and control vehicle of the Apollo spacecraft, containing command and communication facilities, and crew provisions.

Common Carrier - A person or company engaged in the business of transporting persons or property for compensation on an impartial basis.

Common Part - See Spare Part.

Component - A functional part of an end item or subsystem that is essential to operational completeness. A component is a combination of units or parts that together may be functionally independent of, or an independent entity within, a complete operating end item or subsystem but which provides a self-contained function necessary for end item or subsystem operation.

Concealed Damage - Damage to the contents of a package which is in good order externally.

Concur - To agree with an action or plan proposed by another person.

Configuration - The technical description required to fabricate, test, accept, operate, maintain and logistically support systems or equipment.

Configuration Accounting - The act of reporting and documenting changes made to systems/equipment, subsequent to the establishment of a baseline configuration in order to maintain a configuration status.

Configuration Control - The systematic evaluation, coordination, approval or disapproval of all changes to the baseline configuration.

Consignee - A receiver of freight.

Consignor - A shipper of freight.

Contract Carrier - A person or company other than a common carrier who, under special and individual contracts and agreements, transports passengers or property for compensation.

Contract End Item - (See end item.)

Contract End Item Data Package - A collection of technical documentation developed as a result of the maintenance analysis. These documents are necessary to assure the proper provisioning of personnel material and technical instructions for the operation and maintenance of the CEI.

Critical Component Detail Specifications - Detail specifications which are required for components which have been identified in a contract end item detail specification as "engineering critical components" and/or "logistics critical components."

Critical Task - A task involving a substantial probability of human error that may result in injury to personnel, damage to the system, degradation of mission success or substantial time loss.

Cross Hauling - The shipment of material of the same kind in reverse directions, a practice which results in the dissipation of transportation funds and the nonproductive use of transportation resources.

Cross Training - The technical training that one Apollo organization or contractor requires from, or provides to another Apollo organization or contractor.

Cryogenics - A liquid whose chemical elements or molecular combinations of elements have been converted from a gaseous to a liquid state by the application of intensive refrigeration. The boiling point or condensation points of these liquids, that is the temperatures at which they will physically change from a liquid to a gas or from a gas to a liquid depending on whether heat is applied or withdrawn, are - 297°F for liquid oxygen, - 320°F for liquid nitrogen and - 423°F for liquid hydrogen.

CSM System - A combination of the command, service and lunar excursion modules which, when integrated, comprise a grouping or interconnection of subsystems or other functional entities capable of performing a specific operational function or functions.

Data Storage and Retrieval System - An automated library system in which the data is stored and/or indexed in such a manner that on request, a systematic rapid search will be accomplished to identify the material demanded. (Copy of requested data is delivered by some systems.)

Days - Calendar days.

Demurrage - A penalty charge levied on cars, vehicles or vessels held by, or for, consignors or consignees for loading or unloading, for shipping instructions or for any other purpose. (Ordinarily, adequate time for loading, unloading, etc., is allowed prior to the time demurrage takes effect.)

Diversion - A change in destination and/or consignee effected while material is enroute.

End Article/End Item - A physical element of the Apollo Program Space Vehicle System (spacecraft module, flight stage, launch vehicle AGE, etc.). It is a functional entity physically related and selected for the purpose of system development, procurement, and logistics. The following criteria shall be used in the identification of an end item:

a. An end item shall be procurable by the Government to a single specification.

b. An end item shall be identified by a single top drawing which has been prepared in conformance with appropriate Government specifications.

c. An end item shall be identified by a separate and distinct part number and serial number.

d. The physical and functional characteristics of an end item shall be such that its configuration can be controlled and documented economically regardless of the number of changes approved and/or incorporated therein.

e. The location of the distinct/separate parts of an end item normally should be such that they are not remotely located with respect of one part to another, i.e., black boxes should be located in the AVE system compartment, same maintenance area, etc.

f. By definition, magnetic tapes and card decks used with checkout equipment are classified as end items and subject to change control.

Engineering Change - Configuration changes to previously released engineering definition.

Engineering Definition - The complete engineering requirements for fabrication, inspection, evaluation, and identification of all details, assemblies, and units of the finished product.

Environmental Conditioning - The conditioning or adapting processes by which equipment or materials are made to conform to the enviroment(s) in which they are to be used.

Environmental Constraints - Limitations or requirements imposed by environment.

Equipment - One or more assemblies, or a combination of items, capable of independently performing a complete function.

Facility - A real property improvement, e.g., buildings or structures. This includes its Real Property Installed Equipment. Facility includes: (1) Mission Support Real Property, which is system peculiar and required for direct mission support (VAB, LCC, fuel storage), and (2) Administrative and Support Real Property which are not critical to the mission (cafeterias, warehouses). As used in this plan, the term facility means Mission Support Real Property.

Factory-to-Launch Sequence of Events - The operations involving the Stage, S/C, IU, GSE, and components from the time they initially leave the factory until launch.

Failure - An occurrence, produced by sudden or gradual deterioration, which causes equipment performance to deviate from specified limits.

Failure Analysis - An analytical process to identify failure patterns, causes, effects, mean time between failures, and means of elimination.

Failure Rate - The average number of failures occurring per unit time in a specified piece of equipment.

Fault Isolation - The process of determining the cause of failure within a given system.

FOB Destination - The destination at which supplies are to be delivered to the consignee at the expense of the contractor.

FOB Origin - The point at which the contractor is responsible for loading the supplies on the carrier's vehicle, wharf or freight station in the same or nearest city providing the service specified by the Government.

Fragility - The quality or characteristic of delicacy of material or construction which requires careful handling.

Government-Furnished Equipment - Equipment furnished to a contractor by the Government.

Ground Support Equipment - All nonflight implements or devices required to inspect, test, adjust, calibrate, appraise, gage, measure, repair, overhaul, assemble, disassemble, transport, safeguard, record, store, actuate, or otherwise perform a function in support of the space vehicles during (1) tests at factory subsequent to manufacturing completion, (2) prelaunch, launch, and postlaunch operations at test sites, and (3) major development tests such as house spacecraft tests, propulsion tests, and environmental tests. This includes equipment required to support ground support equipment as defined herein.

Ground Support Equipment (GSE), Active - That equipment which interfaces with or is part of the vehicle system and which actively participates in the system operation and/or test.

Ground Support Equipment (GSE), Passive - That equipment which interfaces with the vehicle but does not actively participate in, or feed back to, the vehicle system operation and/or test.

Handling - Includes the functions of disassembly and reassembly, covering and uncovering, intra-plant movement, loading and unloading, blocking and bracing, tie down depackaging and depreserving and inspection which takes place during manufacturing and test, loading and delivery phases of the transportation cycle.

Hardware - The physical object, as distinguished from its capability or function (actual engines, cases, pumps, the guidance system, or other components of the space vehicles or GSE). The term is also used in regard to a stage of development, e.g., the passage of a device or component from the design or planning stage into the hardware stage as the finished product.

Identification - The term referring to a controlled serial or lot number which relates the part, assembly, model, etc., to a particular lot of raw material, manufacturing process, manufacturer, manufacturing data, cure date, receiving date, purchased lot, historical data, assembly process, matched equipment, or expiration date.

Induced Environment - The environment created to safely transport an item within the allowable limits of temperature, humidity and shock.

Initial Provisioning - See Provisioning.

Inspect - The process of measuring, examining, testing, gaging, or otherwise comparing the unit or product with the applicable requirements. (This term will be used to define those maintenance operations which are exploratory; such as determining fluid leaks, corrosion, filter contamination, dents or other equipment degradation.)

Instrument Unit (IU) - The structural interstage between the third stage of the Saturn V vehicle and the payload, containing the electronic guidance unit for the Saturn V stages.

Integrated Logistic Support - Integrated logistic support is a composite of the elements necessary to assure the effective and economical support of a system or equipment at all levels of maintenance for its programmed life cycle. The elements of integrated logistics support are:

a. Planned Maintenance - The philosophy, plan and procedures related to the management, accomplishment, and quality control of preventive and corrective maintenance at each level to retain material in a serviceable condition or restore it to an operable condition once it has failed. Planned maintenance includes servicing, repair, inspection, corrosion control, testing, calibration, overhaul, modification, handling, and storage. (See Reference (c) for additional guidance.)

b. Logistic Support Personnel - Qualitative and quantitative skill, performance requirements, and standards; training requirements, standards, curricula and devices; human factors, engineering requirements; personnel protection, including safety, survival, clothing, escape and rescue and stress pertaining to the system or equipment under development.

c. Technical Logistic Data and Information - Includes, but is not limited to, production and engineering data, prints and drawings: documents such as standards, specifications, technical manuals: changes and modifications; inspection and testing procedures: performance and failure data; or other forms of technical logistic data and information acquired from contractors, or obtained from other Government Departments and Agencies.

d. Support Equipment - Equipment such as special purpose vehicles, power units, maintenance stands, test equipment, special tools, and test benches used to facilitate or support maintenance actions, detect or diagnose malfunctions, or monitor the operational status of systems, subsystems, or equipments.

e. Spares and Repair Parts - Spares are components or assemblies used for maintenance replacement purposes in major end items of equipment. Repair parts are those "bits and pieces", e.g., individual parts or nonrepairable assemblies required for the repair of spares or major end items.

Interface - The point at which responsibility for a continuing function changes from one authority to another, or the demarcation line between two physical elements which must have continuity of form, fit, or function.

Inventory Management - A system established and operated to insure that sufficient serviceable logistics materials are available at the sites to meet established stock levels.

Life Cycle List - Control, operating time or design life, recalibration, retest and rebuild data of consolidated spare parts whose characteristics change or are subject to change with age and/or use.

Limited Life Item - An item which requires replacement at the end of a specified time period or cycles due to chemical or physical characteristics which limit its reliability life span.

Line Haul - Movement of personnel or material over the routes of a transportation line from one town or city to another town or city. Does not include local movements, drayage or intraplant movements.

Logistics Products and Services - Those items or activities identified and developed during maintenance requirements analysis which include the following:

a. Spare parts and lists.

b. Technical data.

c. Training requirements.

d. Personnel requirements, quantitative and qualitative.

e. Tools and test equipment.

f. Calibration equipment and services.

g. Transportation requirements and services.

h. Propellants and pressurants.

i. Ordnance material.

Long Lead Items - This term is normally used to identify an item which requires an extensive acquisition time cycle due to such factors as design complexity and/or scarce material supplies, limited production capability, lengthy manufacturing and/or test processes. These items usually require early or special procurement action to make projected schedules.

Lunar Excursion Module - The two-man vehicle which will land on the moon after the Apollo spacecraft enters lunar orbit.

Maintainability - The quality of the combined features of equipment design and installation which facilitates the accomplishment of inspection, test, servicing, repair and overhaul with minimum time, skill and resources.

Maintenance - The function of retaining material in or restoring it to operating condition. It includes repair cycle activities at any level as well as the servicing cycle.

Maintenance Activities - The maintenance actions required to restore a system or equipment to a serviceable condition (i.e., localize, isolate, remove and replace, etc.).

Maintenance Ground Equipment - The ground support equipment which is used in support of maintenance operations for vehicle, payload, stages, OGE, facilities, or other MGE.

Maintenance Levels - Maintenance levels as they apply to this program are defined as follows:

First Level Maintenance - Those maintenance actions which are accomplished directly on the system installed hardware. This includes system fault isolation, repair in place, remove and replace subsystems or components, replenish, inspect, etc.

Second Level Maintenance - Those maintenance actions which are required in direct support of First Level Maintenance. This involves disposition and/or repair of First Level Maintenance items and is accomplished in shops at KSC.

Third Level Maintenance - This maintenance is essentially the same as Second Level Maintenance; however, it is accomplished in a remote location (factory or overhaul facility). It generally involves particular technical skills and/or equipment which are not economically practical at the First Level Maintenance site.

Major Project Contractors - Contractors performing design fabrication, test, development, operations and maintenance on major AVE and AGE systems such as:

a. Launch Vehicles - Stages and instrument units.

b. Payloads - Spacecraft and significant subsystems.

c. Operational Ground Equipment - Mechanical and electrical equipment used to support the vehicle operations.

d. Engines - Vehicle, spacecraft primary propulsion systems.

Mean Time Between Failures - The average operating hours between failures when the system/equipment is used in its intended environment.

Modification - A change in the design of an item effected in order to correct a design deficiency, to facilitate production, or to improve operational effectiveness.

Modification Kit - An item composed of a group of articles which is issued as a unit for accomplishing an alteration to an equipment.

Module - Command module, service module, lunar excursion module, etc.

Monitor - To observe the operation of equipment through sensory perception.

National Motor Freight Classification - A publication that classifies articles which move by truck, and establishes ratings from which freight rates are determined.

On-dock Due Date - The date on which materiel must arrive at the consignee's receiving facility.

Operability - The condition of being capable of proper operation.

Operate - To activate, regulate or change equipment performance by manipulation of controlling devices.

Operating Authority - The written authority issued by the Interstate Commerce Commission which specifies the types of commodities a carrier can handle and the routes over which a carrier is authorized to operate.

Operation - The lowest level element in an activity which generates support requirements.

Operational Ground Equipment - A functional part of the ground system which operates with, or in direct support of, the aerospace vehicle or end item as an essential mission element.

Operations and Maintenance Instruction - Data specifically organized to cover assembly and checkout, test, operating and maintenance of vehicle system/equipment. This includes items commonly known as technical manuals, support manuals, operation & maintenance (O & M) manuals, handbooks or data packages.

Outsize Cargo - Any item of material or equipment which exceeds 8 feet in height or 8 feet in width, or 32 feet in length or 11,200 pounds, including its packaging and packing.

Packaging - The cleaning, drying, preserving methods, protective wrapping, cushioning, interior containers, and identification markings required to meet specifications.

Packing - The blocking, bracing, cushioning and weatherproofing of exterior shipping containers to assure adequate protection against damage during shipment.

Part - The smallest subdivision of a system; an individual piece having an inherent functional capability, but unable to function without the interaction of other parts or forces, and ordinarily not subject to disassembly without destruction. See Spare Part.

Peculiar Parts - See Spare Part.

Personnel Requirements Information - Personnel data used in planning for system personnel use and training.

Personnel Task - The least increment of an operation involving human action.

Physical Constraints - Limiting physical parameters or requirements.

Premium Transportation - A means or method of transportation other than the one that would provide transportation at the minimum cost. Such services are air freight, air express and REA express.

Preparation for Delivery - Includes the functions of cleaning, drying, preserving, packaging, packing, working and inspection which must be satisfied to protect end items against physical damage, loss, deterioration, corrosion, degradation and substitution.

Pressurant - An inert chemical used to pressurize and inert space vehicle propellant tanks. Pressurants generally are used in the gaseous state but frequently are delivered and stored in the liquid state.

Preventive Maintenance - The systematic care, servicing, and inspection of equipment for the purpose of maintaining it in serviceable condition, and detecting and correcting incipient failure.

Prime Equipment End Item - The more complex contractor designed contract end items that require extensive functional tests while in the assembled condition.

Prime Spares - These are spares which are used to perform First Level Maintenance activities and for which a supply is maintained at the site location.

Proficiency Level - The level of skill with which personnel perform prescribed tasks.

Program Critical Item - A part for which the lack of immediate issue on-call at the demand source would adversely affect program schedules, safety or reliability.

Program Element Number - A number assigned to all functional systems, equipment, and components thereof on the Apollo Program. The program element number provides the key to the management accounting system. (Details of assignment of numbers, the indenture system, their requirements and use are incorporated in Appendix E, NHB 7500.1, November 1965.)

Program Integration Contractor - A contractor with mission contract responsibility to support a program by the evaluation, monitoring and general technical and program integration of major program elements toward a common goal.

Propellant - The oxidant and fuel expanded to obtain propulsion or thrust.

Property Accountability - The responsibility imposed upon an individual or organization for keeping an accurate record of property subject to audit. The individual or organization having accountability of property may or may not have actual custody or supervision of the property itself.

Property Responsibility - The obligation placed upon, and assumed by, a person or organization for the proper custody, care and safe keeping of property entrusted to his possession or under his supervision.

Provisioning - Establishing and insuring the initial availability and identification of spare parts, major components, special test equipment, and special repair tools.

Quantification - The determination, expression, or measurement of a quantity.

Reactivate - To return the equipment to use and ascertain that equipment operation is normal.

Real Property Installed Equipment - Government owned or leased equipment that is physically attached to, integrated into, or built into NASA property and normally is procured through the NASA construction program and installed as part of the construction effort.

Reconsignment - Any change, other than a change in the route, made in a consignment before the arrival of goods at their billed destination; or any change made in a consignment after the arrival of goods at their billed destination when the change is accomplished under conditions which made it subject to the reconsignment rules and charges of the carrier.

Refurbishment - The cleaning, repair, replacement of parts, and other renovation activities required to restore equipment or a facility to usable condition.

Repair - The necessary actions to insure that the failed items are restored to a usable and acceptable condition.

Repair Turn-Around Time - The total accumulated time required to package and ship an item to the repair facility, accomplish the repair, and return the repaired item to the supply system.

Repairable - A spare part capable of being repaired or overhauled; which, because of unit cost, lead time, physical characteristics, and/or other considerations, is deemed technically and economically feasible to repair.

Replenishment - To maintain spare parts or stocks of supplies at an approved level.

Routing - The designation of the mode, carrier and course of direction a shipment shall move.

Scheduled Maintenance (Preventive Maintenance) - Any planned maintenance actions deemed necessary to enhance the functional success of the item.

Sequence of Operations - The sequence of all functions necessary to transport, assemble and checkout, test and launch the aerospace vehicle.

Shelf Life - The anticipated time during which an unused item retains its capacity to operate normally.

Spare Part - An item capable of separate supply and replacement which is required for the manufacture, maintenance, overhaul, or repair of the article for which it was provisioned. Spare parts are classified by type:

a. Standard Part - Any part or item which is adequately defined by a recognized Government or industry standard drawing and/or specification, and is normally available from commercial, GSA, and/or DSA sources. Examples of standard parts and items are: nuts, bolts, washers, screws, pins, keys, grommets, rivets, O-rings, clips, fasteners, clamps, fittings, standard electrical and electronic components, etc.

b. Peculiar Part - Any part which must be produced to order in accordance with a particular drawing and/or specification (other than Government or industry standard). Any part requiring flight certification or traceability shall be classified peculiar. Also, standard parts that must be selectively accepted, to criteria different from the normal standard part requirements, shall be considered peculiar.

Standard and peculiar parts may be further subdivided by characteristics or usage:

a. Bulk items - Raw materials and semifabricated items (standard or peculiar) such as: hoses, electrical wire and cable, wire rope, tubes, sheets, bars, rods, extrusions; adhesives and tapes; and lubricants, paints, protective coatings, and preservative compounds.

b. Common Part - A part or item (standard or peculiar) that is used by more than one contractor supplying equipment for the system. The principal use for this term is to identify items that may be included on a system common parts list. It is frequently, but erroneously, used synonymously with standard part.

Spares Allocation - The proposed distribution of spare parts to the locations of actual consumption (or for back-up stocks) determined during the initial provisioning process; it considers the density of the CEI at all locations, the complexity and cost of the individual spare parts, and the maintenance levels to be supported.

System - Any combination of parts, assemblies and sets joined together to perform a specific operational function or functions.

Technical Data - All documentation, formal or informal, required in the logistic support of an end item or system; this includes, but is not limited to, the following:

a. *Specifications.

b. *Engineering drawings.

*NOTE: Can also be deliverable CEI's.

c. Maintenance documentation and engineering notes.

d. Operations manuals.

e. Maintenance manuals.

f. Calibration standards.

g. Spare parts lists.

Trade Studies - Studies conducted to evaluate or compare alternative parameters, materials, or procedures.

Traffic Management - The direction, control and supervision of all functions incident to the effective and economical obtainment and use of freight and passenger transportation services.

Transit Privileges - A service granted on a shipment enroute, such as storage, refining, fabrication, etc., where a through rate is applied instead of a combination of rates plus the addition of an in-transit charge.

Transportability - The capability of efficiently and effectively transporting an end item of equipment or component thereof, over existing or planned railways, highways, waterways, oceans and airways, either by carrier, towed, or by self-propulsion and includes consideration of the sensitive or dangerous nature of the item as offered for transport.

Transportation Mode - A type of transportation such as rail, truck, air, water, etc.

Uniform Freight Classification - A publication that classifies articles which move by rail, and establishes ratings from which freight rates are determined.

Unit - Anything considered as complete in itself, but functioning as a part of a higher indenture of equipment.

Unscheduled Maintenance (Corrective Maintenance) - Any maintenance which is required as a result of malfunction, regardless of the circumstances under which these malfunctions were discovered.

Utility-Type Manuals - Low cost paperback manuals which have been produced in a manner such as blue lines, to be used as working copies during verification.

Validate (Validation) - The act of an authorized NASA or contractor official giving sanction to use an item for the purpose for which it was designed.

Verification - An effort conducted by the contractor and approved by NASA agencies to confirm that all technical requirements of the program have been satisfied. Equipment, facilities, operations and maintenance instructions, trained personnel and equipment, and human performance are evaluated during verification in order to substantiate system performance. This evaluation will confirm design or lead to redesign and refinement of techniques and procedures.

APPENDIX E

DOCUMENT CATEGORIES

APPENDIX E
DOCUMENT CATEGORIES

APOLLO/SATURN LOGISTICS SUPPORT REQUIREMENTS PLAN

Category	Brief Description of Related Contents	Emphasis Pri.	Emphasis Sec.	See Page(s)
06-LS Logistics	This document establishes policy, identifies requirements, sets forth guidelines and assigns responsibilities for implementation of a realistic and effective Apollo/Saturn logistics support program at the John F. Kennedy Space Center.	X		All

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