Management and Organization

REPORT OF APOLLO 204 REVIEW BOARD

TO

THE ADMINISTRATOR

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APPENDIX E

APOLLO SPACECRAFT

The spacecraft (S/C) consists of a launch escape system (LES) assembly, command module (C/M), service module (S/M), and the spacecraft/lunar module adapter (SLA). The LES assembly provides the means for rapidly separating the C/M from the S/M during pad or suborbital aborts. The C/M forms the spacecraft control center, contains necessary automatic and manual equipment to control and monitor the spacecraft systems, and contains the required equipment for safety and comfort of the crew. The S/M is a cylindrical structure located between the C/M and the SLA. It contains the propulsion systems for attitude and velocity change maneuvers. Most of the consumables used in the mission are stored in the S/M. The SLA is a truncated cone which connects the S/M to the launch vehicle. It also provides the space wherein the lunar module (L/M) is carried on lunar missions.

TEST IN PROGRESS AT TIME OF ACCIDENT

Spacecraft 012 was undergoing a "Plugs Out Integrated Test" at the time of the accident on January 27, 1967. Operational Checkout Procedure, designated OCP FO-K-0021-1 applied to this test. Within this report this procedure is often referred to as OCP-0021.

TESTS AND ANALYSES

Results of tests and analyses not complete at the time of publication of this report will be contained in Appendix G, Addenda and Corrigenda.

CONVERSION OF TIME

Throughout this report, time is stated in Greenwich Mean Time (GMT). To convert GMT to Eastern Standard Time (EST), subtract 17 hours. For example, 23:31 GMT converted is 6:31 p.m. EST.

APPENDIX E

MANAGEMENT AND ORGANIZATION

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ORGANIZATION AND MANAGEMENT

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APPENDIX – E

ORGANIZATION AND MANAGEMENT –– APOLLO PROGRAM

1. INTRODUCTION

It is the purpose of this Appendix to outline in brief detail the established management organization within the National Aeronautics and Space Administration for the conduct of the Apollo Program. Only the major areas of responsibility are offered here for the various levels of management. Not obvious from the organizational elements outlined in this Appendix is the necessary interplay between the various field centers and their contractors in the performance of the Apollo Program. Nor can the outline detail the myriad interfaces created by a vast and complex program which geographically spans the United States, and involves literally hundreds of contractors and subcontractors, and thousands of individual scientists, engineers and space workers.

No attempt has been made to ascertain the actual working relationships as they currently exist between the various management levels.

Basic information for this Appendix has been supplied by the Apollo Management Organization and a review of pertinent organizational documents.

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OFFICE OF MANNED SPACE FLIGHT

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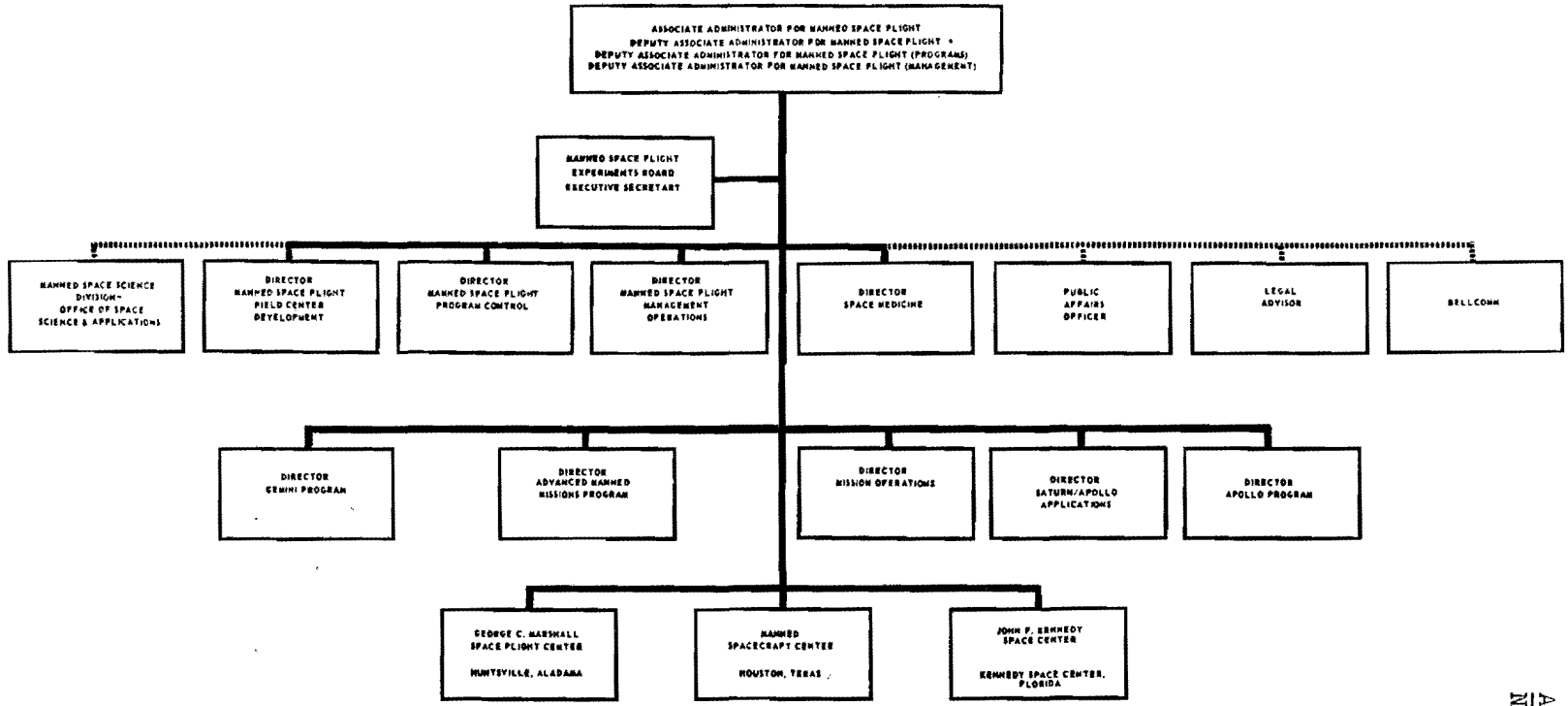
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

OFFICE OF MANNED SPACE FLIGHT



APPROVED: James E. Webb

DATE: Aug. 6, 1965

GPO 896-621

ATTACHMENT A
NMI 1138.1

ASSOCIATE ADMINISTRATOR--MANNED SPACE FLIGHT

The Associate Administrator for Manned Space Flight (AA/MSF) is responsible for the overall management and direction of all Manned Space Flight programs as defined and approved by the Administrator of NASA. He is also responsible for directing launch and flight operations through completion of each mission within a program. He provides policy quidance and direction to the Directors of three Manned Space Flight Centers (MSFC, MSC and KSC), the Apollo Program Director and the OMSF Mission Operations Direcotr.

An OMSF Management Council, consisting of the AA/MSF as Chairman and the Directors of each Manned Space Flight Center , establishes policy guidelines and plans for the MSF programs. For the Apollo Program specifically, the Apollo Program Director operates within these guidelines and broad plans and advises the Council each month of his program plans and status, potential program areas, cost status and requirements for additional resources. The Council ensures that adequate resources are available for the successful conduct of the program and that policy, progress and performance goals are being met.

The Program Management Council also acts as the Design Certification Board for examining the design of the total Apollo mission complex for proof of development maturity. It assesses (1) the design of the Space Vehicle for flight worthiness and manned flight safety, and (2) the design of the Launch Complex the Mission Control Center, Manned Space Flight Network and Launch Instrumentation for manned Apollo missions. A Mission Design Certification Document, executed by the Program Management Council serves as the approval authority for proceeding with specific flight missions designated for manned flight.

APOLLO PROGRAM DIRECTOR

The AA/MSF has assigned the responsibility for all aspects of the Apollo Program to the Apollo Program Director and has delegated him the authority for planning and schedules, budgets and cost control, systems engineering, design, development, test, and performance evaluation necessary to ensure the achievement of program objectives. This authority includes the mission descriptions, technical requirements, program specification, and reliability and quality standards. The Apollo Program Director is the NASA official authority for issuing Apollo Program Directives and imposing Apollo Program requirements on Field Centers. His line of authority for direction of program affairs at each of the MSF Centers is direct to the Apollo Program Manager within the respective Center.

The Apollo Program Development Plan dated January, 1966 prepared by the Apollo Program Director in accordance with NASA General Management Instruction 4-1-1, is the basic plan for execution of the program as defined and approved by the Deputy Administrator of NASA in the Apollo Projects Approval Document. The Program Development Plan defines directly, or by reference, the program organization, responsibilities, requirements, resources and time phasing of major actions required to accomplish program objectives. Overall requirements and responsibilities in each of the functional areas of Apollo Program management are described in eighteen sections of this plan. These requirments and responsibilities are more specifically defined in additional Apollo Program Office "Key Documents". It is the responsibility of the Apollo Program Managers at each MSF Center to insure compliance with the requirements of these "Key Documents" throughout the NASA and contractor organizations which they control.

MSF CENTER DIRECTORS

DIRECTOR, MANNED SPACECRAFT CENTER (MSC)

The AA/MSF has assigned the development of the Apollo Spacecraft and related ground support

equipment and support of manned space flight missions to the Director of the Manned Spacecraft Center. The Director is responsible for development, production, checkout and technical integrity of all Apollo spacecraft hardware and software. He retains this responsibility through all phases of activity, regardless of location of the hardware or software, from inception to program completion. The Director, MSC is also delegated the authority for Apollo flight operations and flight crew operations.

DIRECTOR, KENNEDY SPACE CENTER (KSC)

The AA/MSF has assigned the responsibility for Apollo Launch Operations, Facilities and Common Ground Support Equipment to the Director, Kennedy Space Center(KSC). He too, retains this assignment through all phases of activity, regardless of location of hardware or software, from inception to completion of the program.

Each Center Director assigns responsibility and delegates sufficient authority to his designated Apollo Program Manager to effectively manage his portion of the program.

CENTER PROGRAM MANAGERS, MSC AND KSC

The MSC and KSC Apollo Program Managers report organizationally to their respective Center Directors, but are responsive to program direction from the Apollo Program Director under overall direction of the Program Management Council. Each Apollo Program Manager is delegated the authority for overall coordination, planning and direction of all aspects of the Apollo Project assigned to his Center Director. This includes effective cost, schedule and technical performance management. He is required to establish project development plans, project specifications and subsidiary specifications, test and operating plans, mission descriptions and reliability and quality procedures consistent with and responsive to the direction and guidelines provided by Headquarters NASA, OMSF and the Apollo Program Director. Each Apollo Program Manager is the primary and official interface between NASA and the industrial contractors participating in his assigned project. He is responsible for supervision of the industrial contractors and other Center or NASA elements supporting his project.

INTER-CENTER RELATIONSHIPS, MSC AND KSC

TECHNICAL INTERFACES

Inter-Center Coordination Panels, acting under Co-chairmen from the two Centers involved, define and solve the technical interface problems between the spacecraft facilities and associated equipment. Basically, these panels are engineering and operational working groups responsible to a Panel Review Board (PRB) chaired by the Apollo Program Director. Eight panels and twenty-four sub-panels make available the technical competence of OMSF, MSFC, MSC, KSC and their contractors for the solution of interface problems. The panels and sub-panels function within specific assigned areas to: (1) initiate actions regarding design, analysis, study, test and operations. (2) identify and generate Interface Control Documents (ICDs) within established Program Requirements, and (3) recommend solutions of problems outside their assigned responsibility to the PRB for action by the proper panel and organization.

INTER-CENTER AGREEMENTS

The Directors of MSC and KSC have established documented agreements for inter-Center relationships concerning specific activities during the flow of hardware from manufacture and checkout through launch. Agreements also exist between the Directors of MSFC and KSC but are not deemed pertinent to the subject of this memorandum. The MSC Director retains technical design and performance responsibility for the Apollo Spacecraft at all times throughout the entire development and mission sequence.

PROGRAM REQUIREMENTS CHANGE CONTROL

Proposed changes to the established Program Requirements Baseline as defined by the Apollo Program Director. Procedures for the submittal, evaluation and approval of proposed changes are established for schedules, cost and technical performance.

Changes to the Apollo Program Development Plan are made in accordance with NMI 8020.5.

APOLLO PROGRAM DIRECTIVES

Apollo Program Directives are used to direct specific program actions and to document significant program decisions. These Program Directives, signed by the Apollo Program Director, provide a means for expediting documented direction to the Apollo Program Managers in each Center. The authority forApollo Program Directives is provided in NMI 8020.2.

APOLLO CONFIGURATION CONTROL BOARD DIRECTIVES

Additionally, Apollo Program direction is given to the Apollo Program Managers in the form of Apollo Program Office Configuration Control Board Directives. These directives, signed by the Apollo Program Director, implement the decisions of the Apollo Configuration Control Board on proposed changes to the Apollo Program Specification.

APPENDIX E

MANNED SPACECRAFT CENTER

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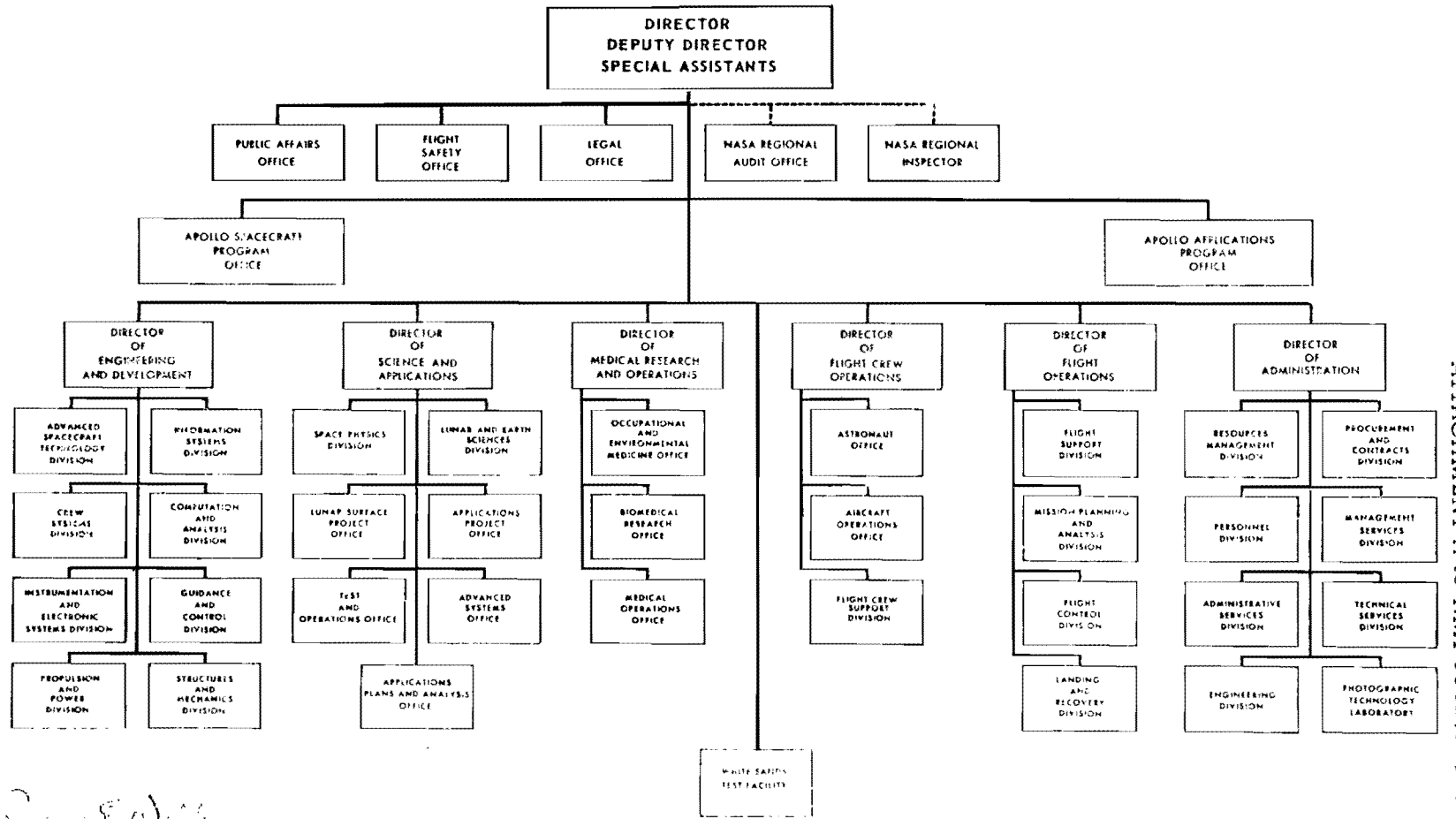
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MANNED SPACECRAFT CENTER

HOUSTON TEXAS



MANNED SPACECRAFT CENTER

HOUSTON, TEXAS

The function and authority for the Manned Spacecraft Center is defined in Manned Space Flight NMI 1142.1. The management of the Apollo Spacecraft Program is assigned to the Apollo Spacecraft Program Office by the Manned Spacecraft Center Director.

DIRECTOR, MANNED SPACECRAFT CENTER (MSC)

The AA/MSF has assigned the development of the Apollo Spacecraft and related ground support equipment and support of manned space flight missions to the Director of the Manned Spacecraft Center. The Director is responsible for development, production, checkout and technical integrity of all Apollo spacecraft hardware and software. He retains this responsibility through all phases of activity, regardless of location of the hardware or software, from inception to program completion. The Director, MSC is also delegated the authority for Apollo flight operations and flight crew operations.

MSC APOLLO PROGRAM MANAGER

The MSC Apollo Program Manager reports organizationally to the MSC Center Director, but is responsive to program direction from the Apollo Program Director under overall direction of the Program Management Council. The Apollo Program Manager is delegated the authority for overall coordination, planning and direction of all aspects of the Apollo Project assigned to the Center Director. This includes effective cost, schedule and technical performance management. He is required to establish project development plans, project specifications and subsidiary specifications test and operating plans, mission descriptions and reliability and quality procedures consistent with and responsive to the direction and guidelines provided by Headquarters NASA, OMSF and the Apollo Program Director. The Apollo Program Manager is the primary and official interface between NASA and the industrial contractors participating in his assigned project. He is responsible for supervision of the industrial contractors and other Center or NASA elements supporting his project.

APOLLO SPACECRAFT PROGRAM OFFICE

The ASPO (Apollo Spacecraft Program Office), under the direction of the Apollo Program Manager, is responsible for the planning, coordination, and direction of all aspects of the Apollo Spacecraft Program. This includes the supervision of industrial contractors within the scope of the contract and the direction and coordination with other elements of MSC or NASA Headquarters which are assigned parts of the program. Specific responsibilities include:

a. Development of the Apollo Spacecraft Program resources and scheduling plans, their integration and development into an overall program development plan and the control of the implementation of this plan.

b. Serving as the primary point of coordination and control of systems design, specification, and development for the Apollo Spacecraft Program.

c. Development or approval of spacecraft subsystems design requirements, the performance of trade-off studies, the definition and control of all interfaces between spacecraft subsystems and the spacecraft, interfaces between other related program elements, and the development and maintenance of all crew safety requirements.

d. Management of the detailed planning, implementation, and reporting of results for each major flight and integrated systems ground test.

e. Coordination and development of the test program plan, the development of the mission directive documents, the determination of instrumentation and measurement lists and requirements, the determination of engineering data acquisition and reduction requirements, the establishment of detailed schedules, and the determination of the adequacy of checkout procedures for each major flight and integrated systems ground test.

f. Development and standardization of requirements for reliability and quality assurance and the reliability apportionment between various elements of the Apollo spacecraft.

g. Management of contractor and subcontractor reliability and quality control efforts and the coordination of the inspection efforts of cognizant Government inspection organizations.

h. Development of the basic design of the lunar landing mission and the development of criteria for the training of the spacecraft crew for the lunar landing mission.

RESIDENT APOLLO SPACECRAFT PROGRAM OFFICES (RASPO)

The RASPO at the contractors' sites are responsible for the conduct of all operations involving NASA personnel stationed at, or visiting the contractor in connection with the Apollo Spacecraft Program. The RASPOs also provide "on-site" monitoring of the contractor's efforts.

PROGRAM CONTROL DIVISION

The Program Control Division is responsible for the development of the Apollo Spacecraft Program resources and scheduling plans, their integration into and development of an overall program development plan, and the control of the implementation of this plan. These responsibilities include the management of spacecraft contractor efforts related to production machinery and equipment, facilities, manufacturing, configuration management, and documentation; the preparation of MSC and NASA budgets for the Apollo Spacecraft Program; the preparation of Apollo Spacecraft Program reports to meet the needs of controlling the program; and the planning and implementing of conract negotiation.

SYSTEMS ENGINEERING DIVISION

The Systems Engineering Division establishes the preliminary design, identification of subsystems and the performance of analyses and tradeoff studies when more than one subsystem is involved. Further responsibilities include the responsibility for definition, implementation and configuration control of all systems design for the Command and Service Module (C&SM) and the Lunar Module (LM) and associated Ground Support Equipment (GSE) and for providing the interface between the C&SM, LM, Launch Vehicle (LV), Launch Complex (LC) and Spacecraft LM Adapter (SLA).

MISSION OPERATIONS DIVISION

The purpose of the Mission Operations Division is to act as the focal point of all ASPO activities relating to the definition and planning of the Apollo spacecraft development and lunar missions. This Division is also responsible for defining the requirements for flight test and mission planning, determining the system and subsystem mission related design requirements, and verifying that the mission requirements are within spacecraft capabilities.

C&SM PROJECT ENGINEERING AND CHECKOUT DIVISION

The C&SM Project Engineering and Checkout Division is responsible for Program Office technical monitoring of all Command and Service Module (C&SM) and Spacecraft Lunar Module Adapter, (SLA) and checkout activities, as follows:

a. Providing Project Engineers for each C&SM SLA and ground test vehicle;

b. Assuring end item scheduling, integration and statusing to support program milestones;

c. Reviewing, monitoring and concurring on hardware and specification changes that affect C&SM and SLA;

d. Serving as primary point of contact for all close-in spacecraft;

e. Chairing the post-flight editorial board;

f. Organizing and conducting Flight Readiness Reviews for each C&SM and SLA;

g. Monitoring for the Manager, ASPO, the progress of the spacecraft from initial manufacturing to launch and from recovery to final dispostion;

h. Assuring timely recognition of unique spacecraft problems and directing their respective solutions;

i. Assuring overall flight readiness of the vehicle, associated facilities, and supporting ground test programs for each spacecraft; and

j. Managing the detail test planning and test activities associated with C&SM ground test vehicles for thermal/vacuum demonstration. Managing NASA and contractor activities associated with accomplishment of test and approving changes or workarounds as required to maintain established schedules.

LM PROJECT ENGINEERING AND CHECKOUT DIVISION

The Lunar Module Project Engineering and Checkout Division is responsible for Program Office

technical monitoring of all LMs and checkout activities as follows:

a. Managing Grumman Aircraft Engineering Corporation (GAEC) activities during the final assembly and factory checkout operations of the vehicle at GAEC.

B. Maintaining the schedule of checkout operations as designated by the spacecraft operational test procedures (OTP).

c. Controlling spacecraft configurations as defined in Apollo Configuration Management Plan dated March 3, 1965.

d. Reporting status of the spacecraft to the manager, ASPO, and all other interested parties.

e. Developing hardware and procedural solutions to problems which arise during final assembly and checkout operations at the factory.

f. Carrying out the ASPO management functions during the checkout operations of the spacecraft at KSC prior to stacking.

g. Carrying out the MSC management function of the spacecraft portion of the space vehicle after stacking and prior to final launch countdown initiation.

h. Assuring that the spacecraft systems are adquately verified prior to launch.

i. Assisting the Flight Operations Directorate and Mission Operations Division, ASPO, during the spacecraft mission as requested.

j. Arranging for the Customer Acceptance Readiness Review (CARR) and closeout action items generated by these meetings.

RELIABILITY, QUALITY AND TEST DIVISION

The Reliability, Quality and Test Division has primary responsibility for developing and monitoring of policies and procedures for assuring the reliability and quality of Apollo spacecraft systems and components; establishes the reliability apportionments between element of the spacecraft; serves as the primary point of coordination and control for all manufacturing processes and quality control problems; is responsible for the certification and qualification requirements, and their buy-off, for all spacecraft hardware items, and assures proper resolution of all spacecraft, Ground Support Equipment (GSE) and Acceptance Checkout Equipment (ACE) failures.

MISSION SUPPORT DIVISION

The Mission Support Division responsibilities include the following:

Manage the activities relating to evaluation of preflight checkout data, program office real-time mission support, test data processing, and postflight evaluation and reports for all Apollo missions.

Develop a real-time support plan for each mission, including hardware, software, and manning requirements for Houston and the contractor plants. Direct the program office real-time support activities during each mission.

Plan the data acquisition and processing requirements for real-time and postflight analysis. Manage instrumentation transducer calibration activities. Direct the activities of contractor processing of mission data.

Manage mission analysis and evaluation activity at Houston and at the contractor plants. Manage spacecraft and equipment handling after recovery until mission evaluation is completed. Expedite the identification and resolution of all anomalies observed during the mission or form postflight test activities. Issue all required reports for the mission.

Assure that a satisfactory processing and analysis of data has been performed during the final acceptance tests on each spacecraft at the contractors plants and at KSC, and for thermal-vacuum spacecraft tests conducted at MSC. Expedite the identification and resolution of all anomalies observed during thermal-vacuum spacecraft tests.

APOLLO SPACECRAFT SUBSYSTEM MANAGEMENT

The ASPO, in implementing the MSC management philosophy to attain the maximum utlization of the available resources of MSC in furtherance of the Apollo Spacecraft Program, has assigned the management of the contractors' subsystem development efforts to Subsystem Managers within specific

divisions of the Engineering and Development Directorate of MSC. The Subsystem Manager is responsible to the Manager, ASPO, for development of his subsystem to given specifications within the cost and schedule constrainsts of the program.

MSC ORGANIZATION FUNCTIONS (APOLLO)

In addition to the subsystem management responsibilities, the Engineering and Development Directorate provides special testing and test support, spacecraft R&D instrumentation, and computation support. Also, the Crew Systems Division of Engineering and Development Directorate is responsible for the development and provision of crew spacesuits and EMU through industrial contracts.

The Flight Crew Operations Directorate through delegated authorities from the MSC Director is responsible for providing the Apollo crew training, crew procedures and flight crew operations.

The Director of Administration is responsible for providing contract management, procurement functions, facilities and technical services requested in support of the Apollo Spacecraft Program.

MSC -KSC INTERCENTER RELATIONSHIP

The Directors of MSC and KSC have established documented agreements for inter-Center relationships concerning specific activities during the flow of hardware from manufacture and checkout through launch. The MSC Director retains technical design and performance responsibility for the Apollo spacecraft at all times throughout the entire development and mission sequences.

Technical Interfaces

Inter-Center Coordination Panels, acting under Co-chairmen from the two Centers involved, define and solve the technical interface problems between the spacecraft, facilities and associated equipment. Basically, these panels are engineering and operational working groups responsible to a Panel Review Board (PRB) chaired by the Apollo Program Director. Eight panels and twenty-four sub-panels make available the technical competence of OMSF, MSFC, MSC, KSC and their contractors for the solution of interface problems. The panels and sub-panels function within specific assigned areas to: (1) initiate actions regarding design, analysis, study, test and operations, (2) identify and generate Interface Control Documents (ICD'S) within established Program Requirements; and (3) recommend solutions of problems outside their assigned responsibility to the PRB for action by the proper panel and organization.

APOLLO SPACECRAFT CONTRACTOR/SUBCONTRACTOR MANAGEMENT

The ASPO Program Manager is the primary and official interface between NASA and the industrial contractors participating in his assigned program. He is responsible for supervision of the industrial contractors.

APOLLO SPACECRAFT PROGRAM CONTROL

The Apollo Spacecraft Development Plan is prepared by the ASPO and is the basic plan for the execution of the spacecraft program within the overall framework of the Apollo Program Development Plan generated by the Apollo Program Director (MSF). The execution of the spacecraft program is implemented through the appropriate contracts and contract documents with the individual spacecraft development contractors. The contract baseline consists of the contract itself, defining the contractor's tasks and responsibilities, the spacecraft specifications, test plans, checkout requirements and hardware production requirements and schedules. The control of these requirements is accomplished through the contract change procedure and the Apollo Configuration Control Procedures set forth in NPC 500-1, Supplement No. 1. Cost control is maintained through the utilization of the NASA Form 533 procedure, and the more detail control method of "work packages", which provides visibility and control of the contractor's efforts.

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APPENDIX E

FLIGHT CREW MISSION OPERATIONS

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FLIGHT CREW MISSION OPERATIONS

The Flight Crew Director is designated by the Assistant Director for Flight Crew Operations and reports to him except during the mission period. During the mission period he reports directly to the Flight Director. During the prelaunch phase, the Flight Crew Director directs and assesses the preparations of the flight crews and their required equipment, and reports the status of these preparations and the final readiness to the Flight Director. He is responsible for scheduling the activities of the flight crew, providing the training and the training equipment, and insuring personal equipment necessary for the mission is provided. During a mission control phase, the Flight Crew Director is available to the Flight Director for assistance in flight control, if desired.

The functions reporting directly to the Flight Crew Director are the Flight crews, both primary and backup; the simulator operations section; and the flight crew activities support team. The personal flight equipment group of the Crew Systems Division and the flight surgeons of the Center Medical Office are responsive to the Flight Crew Director in order to carry out his assigned duties.

The primary and backup flight crews are assigned by the Assistant Director for Flight Crew Operations. During the prelaunch phase, both crews perform activities assigned by the Flight crew Director. During the mission control phase, the primary flight crew report to the Flight Director in accomplishing the flight plan in accordance with the mission rules and supplementary instructions from the Flight Director, or mission rules and supplementary instructions from the Flight Director, or perform such independent action as required in flight by contingency situations. The backup crew assists the Flight Crew Director during the mission control phase.

The simulator operations section is provided by the Flight Crew Support Division. This section maintains and operates the mission simulator and other necessary training devices.

The flight crew activities support team is also provided by the Flight Crew Support Division. This team is responsible for coordinating preflight crew training and briefings, providing in-flight assistance to the flight control team and flight crew as required, and conducting postflight crew debriefing. Preflight activities consist of aiding in training flight crews in spacecraft operation and scientific experiments. They are responsible for some in-flight experimental equipment and for flight crew training on all experiments. It is also their function to provide a flight plan which outlines activities to be performed by the crew during the mission. During the mission this team provides support to the Flight Director through the command communicator as specified in other documentation.

The personal equipment group is provided by the Crew Systems Division. This group is responsible for the care of flight ready equipment, suiting the crew for training sessions and flight, and aiding the crew during insertion and hookup for launch. The Crew Systems Division supplies the necessary pressure suits, hygiene equipment, rations, sensors, and other personal equipment required to support the mission.

The crew flight surgeons are designated by the Chief of the Center Medical Office. During prelaunch phases, the crew flight surgeons monitor and assess the phsiological status of the flight crews and report this status to the Flight Crew Director and Medical Director.

Upon recovery, the recovery flight surgeons accomplish postflight medical evaluation as directed by the Medical Director and scheduled by the Flight Crew Director.

Upon termination of flight, the flight crew technical debreifing team, appointed by the Assistant Director for Flight Crew Operations, is responsible for the planning and implementation of the technical and in-flight experiments debriefing of the flight crew. This team uses the crew debriefing document to acquire preliminary data. This document formulates a series of questions covering the areas of flight control, spacecraft systems, in-flight experiments, and recovery operations. They accomplish the required liaison with the program offices, flight operations directorate, and the in-flight experiments panel, to insure that these organizations have appropriate representation at MSC debriefing sessions. The debriefing team makes arrangements to be at the scene of the primary recovery site in order to accomplish the initial debriefing as soon as possible after recovery. They also develop plans required for debriefing the flight crews in the event of landing in a secondary or contingency site.

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JOHN F. KENNEDY SPACE CENTER

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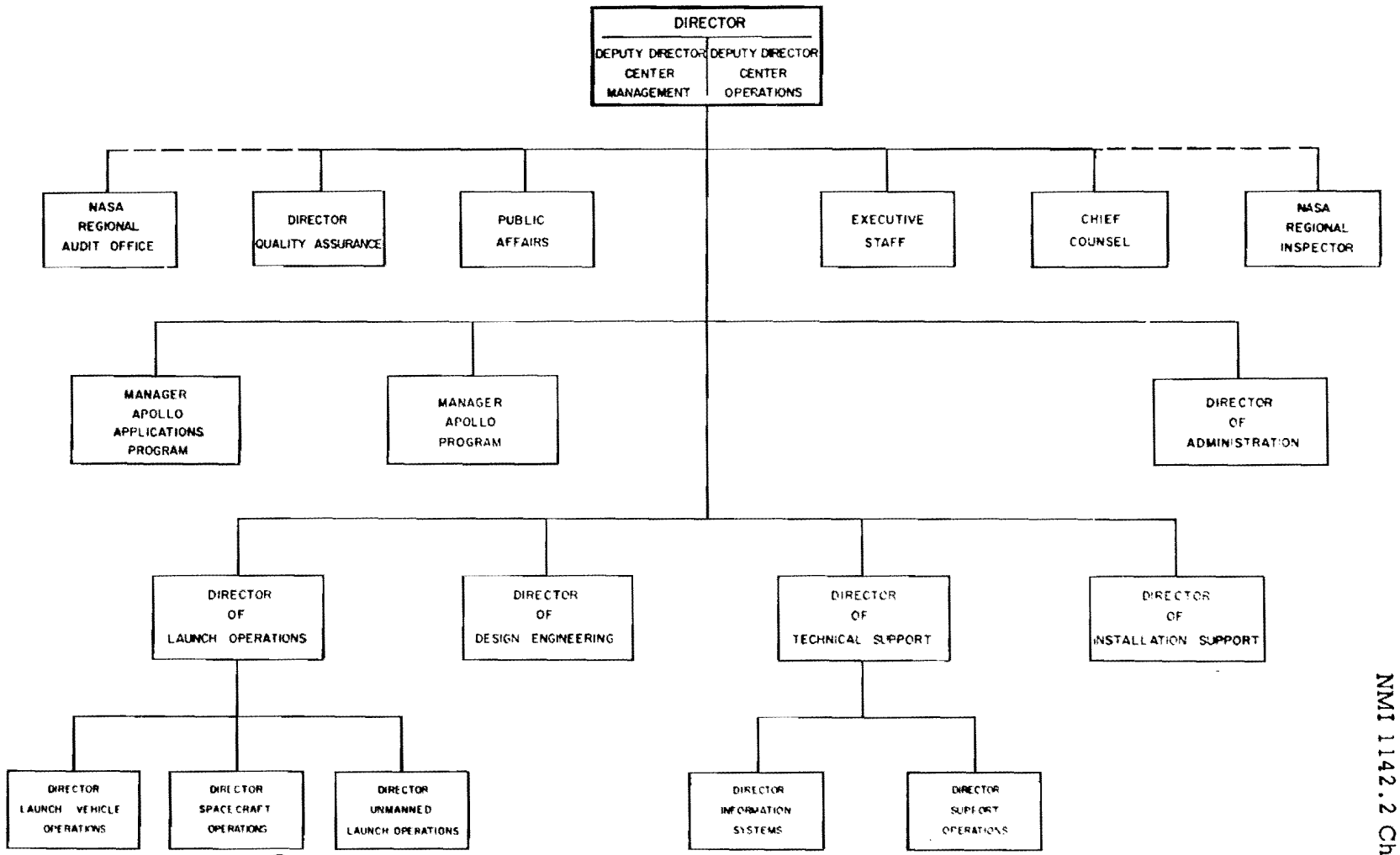
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

JOHN F. KENNEDY SPACE CENTER

FLORIDA



APPROVED James E. Webb
ADMINISTRATOR, NASA

DATE Feb. 28, 1967

INTRODUCTION

This report briefly summarizes the KSC Apollo organization and rsponsibilities. In each instance, the documented authority is referenced and included as enclosures.

The functioning of the office of the Center Director, Apollo Program Office, each of the four Directorates, plus additional detail in the area of Spacecraft and Launch Vehicle Operations is included.

GENERAL

The overall organizational structure of the Kennedy Space Center is shown in enclosure 1. Kennedy Space Center responsibilities are:

1. Development and construction of facilities to check out and launch space vehicles.
2. Assemble and integrate spacecraft, launch vehicles, and launch facilities.
3. Provide support services at Cape Kennedy Air Force Station and Kennedy Space Center, NASA.
5. Manage and master plan the Kennedy Space Center, NASA.

REF. AUTH. - Apollo Program Development Plan, M-DMA 500
- NMI 1142.2

DIRECTOR, KENNEDY SPACE CENTER

The Center Director is responsible to the Associate Administrator for Manned Space Flight. His responsibilities are:

1. Total responsibility for the entire KSC enterprise.
2. Establishment and/or approval of all basic internal KSC policies.
3. Personal involvement at specific critical points in key managerial processes and decisions
4. Delegate authority and responsibility to the senior levels of Center management.

REF. AUTH. – NMI 1142.2
– KN 1142.2

APOLLO PROGRAM MANAGER (KSC)

The KSC Apollo Program Manager is directly responsible to the Center Director and is responsive to program direction from the Apollo Program Director under overall direction of the Program Management Council. The KSC Apollo Program Manager is responsible for:

1. Official interface with other Manned Space Flight Centers and Office of Manned Space Flight.
2. Formulation of subsidiary specification, test and operating plans, mission description, program reliability and QA procedures and operating plans.
3. Translate requirements and schedules received from the Apollo Program Director and forward to line organizations for development into detailed plans.
4. Receive, review, validate and integrate plans for individual operating Directorates into KSC Apollo Program plans.
5. At a program commitment level, coordinate, monitor and track the execution of requirements and utilization of funds against approved plans, schedules and resources.
6. Approve the scope and changes in scope in the work of stage and spacecraft contractors.
7. Assure that the scope or change in scope of support contractors are consistent with Apollo Program requirements.
8. Maintain surveillance of stage and spacecraft contractors activities to assure optimum balance in performance, schedules, and cost.
9. Review development plans for KSC designed or furnished equipment and facilities. Assure performance and design criteria is proper and acceptable with all activities involved and are consistent with Apollo Program guidelines and available resources.

REF. AUTH. - KN 1142.2
- KN 1142.21

DIRECTOR OF LAUNCH OPERATIONS

The Director of Launch Operations reports directly to the Center Director and is responsible for:
1. Management and technical direction of preflight operations and integration, checkout, and launch of all Apollo space vehicles at KSC and ETR.
2. Installation, checkout, modification, maintenance and operation of all GSE provided as used by launch vehicle and spacecraft contractors.
3. Initiates, supervises and coordinates the preparation of preflight launch operations test plans and is responsible for the execution of them.
4. Assists the Kennedy Space Center Apollo Program Manager in his negotiating with, and receiving approval of, the cognizant development Centers concerning test and operational sequences, and methods and standards.
5. In accordance with program requirements received from the KSC Apollo Program Manager, develops operational support and resource requirements needed to execute the assigned mission within approved schedules and/or funding limitations.
6. Oversees the management of specific contractor efforts as appropriate to their mission, insure consistency, coordination and effective management.
7. Chair the Apollo Launch Operations Committee (ALOC).

REF. AUTH. - KN 1142.2
- KN 1142.22

DIRECTOR, SPACECRAFT OPERATIONS

The Director, Spacecraft Operations is responsible to the Director of Launch Operations for:
1. All operations and technical management functions relating to spacecraft contractors within the jurisdiction of KSC.
2. Management and technical integration of all KSC operations related to preparation, integ

integration modification, checkout and flight readiness of manned spacecraft.
3. Installation, checkout modification, maintenance, and operation of all GSE provided or used by the spacecraft contractors.
4. Develop operational support requirements for manned spacecraft checkout and launch at KSC
5. Establish a uniform and consistent program within the Directorate for configuration management, reliability, Q.A, logistics, and systems engineering based on the prescribed guidelines.
6. Review and approve (jointly) spacecraft test requirements.
7. Review and approve detailed spacecraft operational checkout plans and procedures.
8. Accept spacecraft test results.
9. Operational direction authority of spacecraft during the conduct of tests and checkout. Assure the coordination, consistency, and effectiveness of the spacecraft contractors during the KSC operational phase.
10. Develop detailed spacecraft checkout schedules prior to electrical SC/LC mate consistent with the overall milestones developed by the Apollo Program Manager.
11. Implement MSC approved spacecraft and GSE configuration changes. Certify changes are implemented per blueprint.
12. Assure the quality of contractor work performed at KSC.

REF. AUTH. - KN 1142.2
- KN 1142.8A
- KSC MSC Agreement
- See enclosures 2 7 5.

DIRECTOR, LAUNCH VEHICLE OPERATIONS

The Director, Launch Vehicle Operations is responsible to the Director of Launch Operations for:

1. The management and technical integration of all KSC operations related to launch vehicles developed and provided by MSFC.
2. All operations and technical management of launch vehicle contractors.
3. Continuing analysis of the total Saturn systems, and assures total integration of the Saturn system, hardware and performance.
4. The development and execution of all test plans, schedules and procedures as related to the launch vehicle operations.
5. The monitoring and evaluating the quality, economy, and timeliness of launch vehicle stage contractor's performance.
6. Approving all procedures for launch vehicle tests and operations performed at KSC.
7. The development, coordination, validation of budget requirements and control of allocated resources.
8. A comprehensive Quality and Reliability Assurance Program for the receipt, preparation, prelaunch checkout, countdown and launch of the Saturn Launch Vehicle.

REF. AUTH. -KN 1142.12

DIRECTOR, TECHNICAL SUPPORT

The Director of Technical Support reports directly to the Center Director and is responsible for:

1. Provide or arrange all technical support involved in the conduct of KSC checkout and launch activities.

2. Manage and direct the maintenance and operation of test and launch complex facilities including all related equipment other than flight equipment and GSE.
3. Schedule and control all technical support services at KSC.
4. Maintain single point of NASA entry into AFETR concerning program requirements.

REF. AUTH.
- KN 1142.15
- KN 1142.17A
- KN 1142.2

DIRECTOR OF INSTALLATION SUPPORT

The Director of Installation Support reports directly to the Center Director and is responsible for:

1. General operation and maintenance of the installation, including such services as maintenance and minor rehabilitation services for all KSC buildings, permanent structures, and utilities except those technically defined elements of Launch Complexes.
2. Provision of operational and industrial safety program.
3. Provision of ocupational health program.
4. Provision of photographic, reproduction, transportation, supply and small purchase services.

Responsibility for administration of pad and flight safety programs for launches from complexes located on Cape Kennedy rests completely with ETR per a Webb-McNamara Agreement. This responsibility does not include safety of operation internally to a manned spacecraft and flight safety for launches from KSC.

REF. AUTH. - KN 1142.2
- KN 1142.13A

DIRECTOR OF DESIGN ENGINEERING

The Director of Design Engineering reports directly to the Center Director and is responsible for:
1. Design, development, fabrication and refurbishment of all KSC provided equipment and facilities with exception of the electronic systems and equipment installed in the Central Instrumentation Facility.
2. Provide standards and policies for operation and maintenance of KSC facilities and launch support equipment.
3. Develop concepts and perform studies for future mission launch equipment and facilities.
4. Serve as official KSC contact and interface with the U. S. Army Corps of Engineering based on prescribed guidelines.
6. Maintain direct but informal lines of communication with the design function of other NASA Centers.

REF. AUTH. - KN 1142.2
- KN 1142.11

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APPENDIX E

MANAGEMENT INTERFACE, MSC, KSC

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MANAGEMENT INTERFACE
BETWEEN
MANNED SPACECRAFT CENTER
AND
KENNEDY SPACE CENTER

A chronological listing of the intercenter correspondence on this subject follows as Attachment no. 1.

CHRONOLOGICAL LISTING OF
DOCUMENTED MSC/KSC OPERATIONAL AGREEMENTS

1. Debus/Gilruth Agreement dtd 12-21-64 Debus/Gilruth Agreement.
2. Debus datafax to Shea dtd 1-23-65
   Subject: Staffing of Resident MSC Office at KSC
   Provides for Resident MSC Office at KSC to start with minimum staff of 5 personnel, to expand to no more than 15-20.

   Function of Office to remain within 12-21-64 Debus/Gilruth Agreement.

   Provision for project engineering function, one for each spacecraft. Statement that MSC Program Office would retain function responsibility for approval of all configuration changes and hardware performance waivers.
3. Shea datafax to Petrone dtd 9-23-65
   Subject: KSC Operation Management Plan
   Proposal that KSC PPR take over and perform the functions of the MSC Resident Office at KSC.
4. Petrone datafax to Shea dtd 10-7-65
   Subject: KSC Operation Management Plan
   Accepts MSC Proposal for PPR to take over and perform MSC Resident Office function at at KSC. Statement that KSC understands MSC wants CCP established at KSC with authority to approve compatibility and make-work changes.

   Requests MSC to formally delegate overall direction of S/C contractors' activity at KSC to PPR in order to properly perform Resident Office function.

   Requests that the 5 MSC personnel in KSC Resident Office be transferred to PPR.
5. Shea letter to Petrone dtd 10-12-65
   Subject: KSC Operation Management Plan
   Officially transfers MSC Resident Office functions at KSC to PPR, effective 10-12-65.
   Accepts KSC request for contractor direction, establishment of CCP at KSC, and transfer of resident personnel to PPR.

   Statement that the agreements made were within the 12-21-64 Debus/Gilruth Agreement.
6. Shea letter to Shinkle dtd 10-21-66
   Subject: Chairman of CCP at KSC
   States that Mr. W. Kapryan was appointed MSC Assistant Program Manager.

   Request that Chairmanship of the KSC CCP be changed from PPR to Mr. Kapryan effective Nov. 1, 1966.

   Statement that this, in no way would alter PPR's present relationship with MSC spacecraft contractors.

   Requests that Mr. Kapryan be authorized to sign KSC Master Schedules.

7. Shinkle letter to Shea dtd 11-1-66

Subject: Chaimanship of CCP at KSC

Agrees with MSC request that CCP Chairmanship be transferred from PPR to Mr. W. Kapryan, MSC Resident Manager. Disapproves request for Mr. Kapryan to sign KSC Master Schedules.

Statement that PPR would retain responsibilities of CCP except the authority for make-work and compatibility changes. This retained responsibility (operational scheduling of approved MSC changes) would be handled by establishing a Spacecraft Change Implementation Board (SCIB) chaired by PPR.

WORKING RELATIONSHIP BETWEEN KENNEDY SPACE CENTER AND MARSHALL SPACE FLIGHT CENTER

TEST ACTIVITIES

Test Requirements, Test Specifications and Criteria - MSFC (prime stage contractors) establishes and levies minimum TEST Requirements and field Test Specifications on KSC after coordination between originator and user.

Test Catalog - KSC (stage contractor) generates the Test Catalog which gives the testing planned at KSC. MSFC approves the Test Catalog.

Test Procedures - KSC has authority and responsibility for generation and approval of Test Procedures fulfilling Test Catalog.

Test Results - KSC has authority and responsibility for accepting test results.

FLIGHT HARDWARE CONTRACTOR MANAGEMENT AT KENNEDY SPACE CENTER

KSC has supplemental contracts with the prime stage contractors for prelaunch operations and launch. KSC establishes scope of work and has responsibility and authority for directing the contractors.

WORKING RELATIONSHIP BETWEEN KENNEDY SPACE CENTER AND MANNED SPACECRAFT CENTER

Test Requirements - Beginning on Jan. 26, 1967, KSC had joint approval and authority with MSC for Test Requirements at Kennedy Space Center.

Test Catalog - N/A

Test Procedures - KSC has authority and responsibility for generation and approval of Test Procedures.

Test Results - KSC has authority and responsibility for accepting test results.

KSC has the responsibility to insure that the Contractor performs his job adequately.... where disagreements or impasses occur between KSC and contractor, KSC authority must be discharged through MSC to Contractor's home plant. KSC has operational direction authority (during conduct of test).

	MSC has the authority for determining the level of contractor manpower requirements. MSC has the authority to determine the scope of the Contractor's work effort.
FLIGHT CREW ACTIVITIES N/A	MSC has responsibility for all Crew related training at the Kennedy Space Center. MSC has all responsibility with respect to GFE Flight Crew equipment and/or any stowage of same flight hardware.
SCHEDULING KSC has the responsibility for developing the overall space vehicle schedule.	KSC has the responsibility for developing the overall space vehicle schedule.
CONFIGURATION CONTROL MSFC has the responsibility for establishing and managing LV configuration and MSFC designed GSE. KSC has the responsibility to implement control of MSFC designed hardware located at KSC. KSC has the responsibility for configuration control of KSC designed hardware. Changes to interface between KSC designed GSE and MSFC hardware (ICD) requires approval of both Centers (IRN).	MSC has the responsibility for establishing and managing the S/C and GSE (ACE included) configuration. KSC has the responsibility to implement the MSC approved S/C and GSE configuration. Changes to interface between KSC designed hardware and MSC GSE--require approval of both Centers.
INSPECTION KSC is responsible for the Quality of work which is performed at Kennedy Space Center.	KSC is responsible for the quality of work which is performed at Kennedy Space Center.

KSC is responsible for certifying that approved LV or GSE configuration changes are implemented per MSFC drawings and specifications

KSC is responsible for certifying that the approved S/C or GSE configuration changes are implemented per blueprint.

MSC approves the Quality Control Plan for the activities at KSC.

SAFETY AT THE KENNEDY SPACE CENTER

KSC has the responsibility and authority for implementation of Safety Procedures and Safety Standards.

KSC has the responsibility to approve hazardous testing.

KSC has the responsibility and authority for implementation of Safety Procedures and Safety Standards.

KSC has joint responsibility with MSC with respect to approval of hazardous testing. Example – Manned Altitude Chamber Testing.

KSC DESIGN OF GSE

KSC has responsibility and authority for design and fabrication of GSE such as; Propellant Facilities, launch accessories, swing arms, etc. as defined by Intercenter ICDs.

KSC has responsibility and authority for design and fabrication of GSE such as; Propellant Facilities, launch accessories, swing arms, etc. as defined by Intercenter ICDs.

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APPENDIX E

MARSHALL SPACE FLIGHT CENTER

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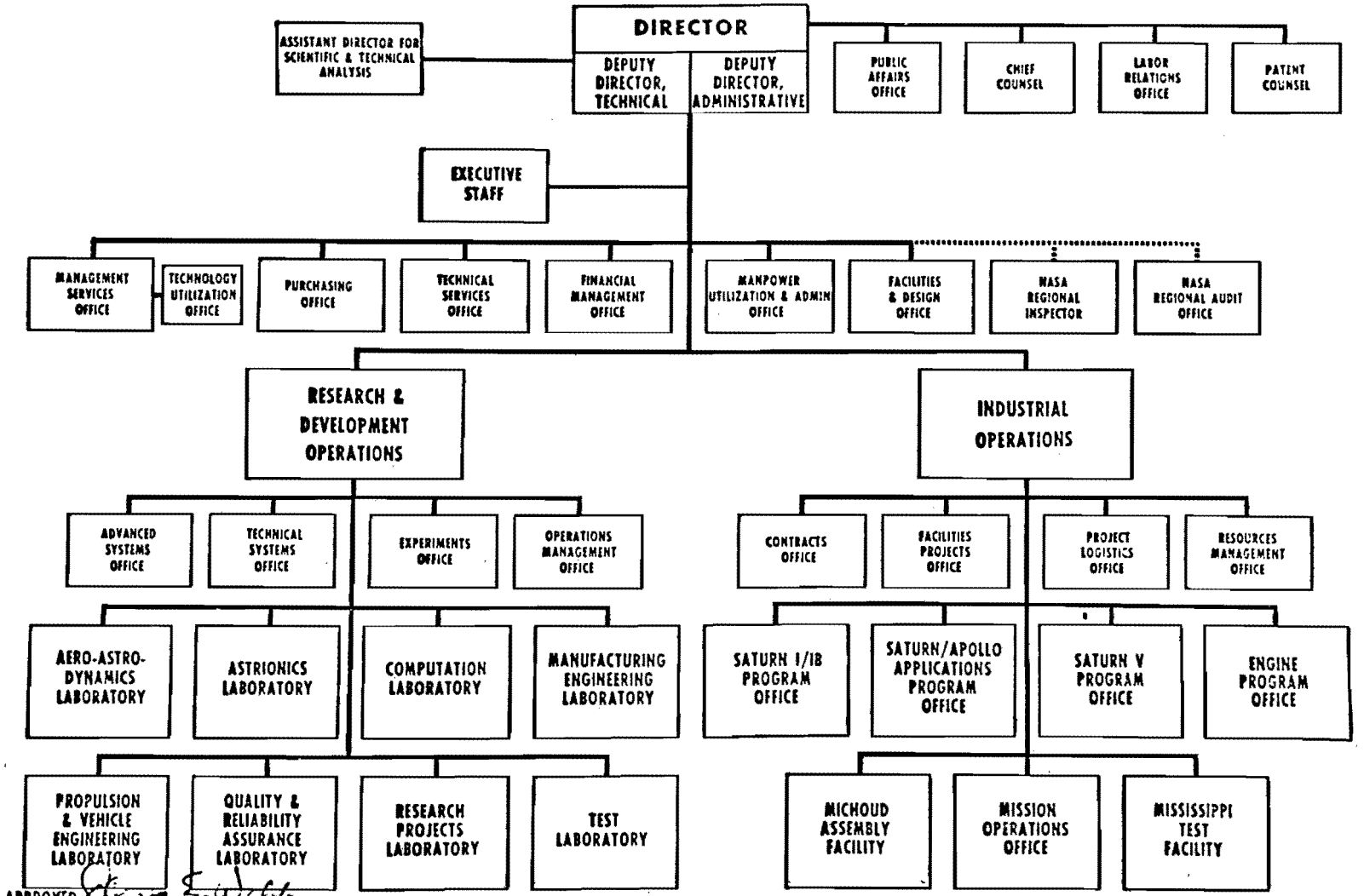
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER



APPROVED Wernher von Braun
DATE 10-21-1964

MSFC MANAGEMENT SUMMARY

In mid-1960, the period during which the Marshall Center was established and, incidentally, the Apollo program was approved by the President, the basic MSFC line organization was structured functionally by technical discipline, grouped within laboratories which reported to the Center Director. These laboratories at that time already embodied a veteran technical work force with in-depth competence in all disciplines relating to rocket, ballistic missile and launch vehicle research and development. Compared to the Apollo program management structure of today, this R&D work in 1960 had a primary in-house orientation, with design, much of the development, assembly, and test actually performed within these laboratories by government personnel. Contractors were used as suppliers, for sub-system development, and to assist the laboratories in carrying out in-house assignments. The focus for management of this contractor effort was in the laboratories. Superimposed on this laboratory system were project offices, which handled conventional programmatic functions such as budgets, schedules and reporting. Center staff organizations performed administrative support. Because the in-house Saturn I booster work was of such magnitude that it pervaded all organizational elements and required the commitment of such a large part of Center resources, the over-all management of the Saturn program was in fact performed at the very top of the Marshall organization by the Center Director.

As the approved Saturn program evolved from the two-stage Saturn I into a three-vehicle family consisting of the Saturn I, IB and V, it became apparent by late 1962 that the manpower and facility requirements of the program far exceeded the capacity of the laboratories to do the entire job in-house. The Marshall Center was forced to adjust its way of doing business to meet the demands of the total vehicle program for Apollo. MSFC did this by adopting the approach which is still followed today: each stage or system is contracted out to a major aerospace firm, such as Chrysler, Boeing, Douglas, North American, and IBM.

This management change, whereby more than ninety per cent of the Saturn job is performed by contractors, necessitated a major shift in activity within the Marshall organization. The primary task for Saturn was no longer one of in-house design, development, assembly and test; the main job was now one of managing the efforts of these major prime contractors.

This shift in emphasis was reflected in the major MSFC reorganization of November 1963 and still in effect today, when Industrial Operations(IO) was created as the MSFC program management organization with the primary job of managing the major contractors. The program offices in IO are structured along the same lines as the program offices in the NASA Headquarters Office of Manned Spaceflight and at the other Manned Spaceflight Centers.

At the same time, the laboratories with practically no change in function, continue under a Director, Research and Development Operations. These laboratories have retained their direct involvement in the program through continuous, across-the-board technical support to the program manager and supervision of contractor effort through IO program management channels. Thus the technical expertise carefully nurtured through the years continues to provide a reservoir of know-how to fully support technical program decisions.

Because Saturn/Apollo continues to be the top priority job of this Center commanding the lion's share of its resources in both laboratory and program office, center management, with appropriate support from the staff offices, continues to play the major role for the general supervision of the entire Apollo Program organization.

Enclosed you will find descriptions of the duties and responsibilities of each of the major MSFC organizational elements participating in Apollo. These materials should be reviewed within the context of the background stated in this summary.

GEORGE C. MARSHALL SPACE FLIGHT CENTER

FUNCTIONS

The George C. Marshall Space Flight Center is assigned the following functions:

a. Performing as assigned the research and development associated with large launch vehicle or space transportation systems and selected payloads, together with the related support equipment and facilities.

b. Porcuring launch vehiclx systems and subsystems, including related electrical and ground support equipment, according to assigned responsibilities; monitoring and directing contractor efforts; conducting acceptance tests; and approving all deviations and changes from contract specifications.

c. Providing or performing overall systems engineering, systems integration and production engineering for the launch vehicle or space transportation systems assigned.

d. Performing advanced studies, research, and planning in the general field of astronautics, including advanced space navigation techniques.

e. Developing and/or procuring engines for assigned support propulsion systems as well as those required to support launch vehicle and space transportation systems.

f. Porviding flight ready launch vehicle systems; insuring proper inflight functioning within the approved mission profile, and providing post-flight evaluation and analysis.

g. Providing support, according to assigned responsibilities, for the space program activities of other NASA Installations, Department of Defense elements or other Government agencies.

h. Performing in-house support research and management of research contracts with industry and universities for the advancement of the state-of-the-art in technologies associated with assigned programs.

i. Conducting operations in support of the Technology Utilization Program, including a continuing search for and reporting of new technology, including innovations in techniques, processes, materials, and devices evolved in the course of performing the functions outlined in this Instruction.

j. Providing a NASA in-house capability for pilot manufacturing, tooling, engineering and related technical disciplines; and investigating, in considerable depth, technical problems in all the above areas when requested.

k. Reporting on the status or projects and recommending changes or modifications to meet goals and schedules.

l. Exercising management responsibility of component installations, including Michoud Assembly Facility and Mississippi Test Facility.

m. Providing administrative and management support as required for carrying out assigned functions and programs.

INDUSTRIAL OPERATIONS

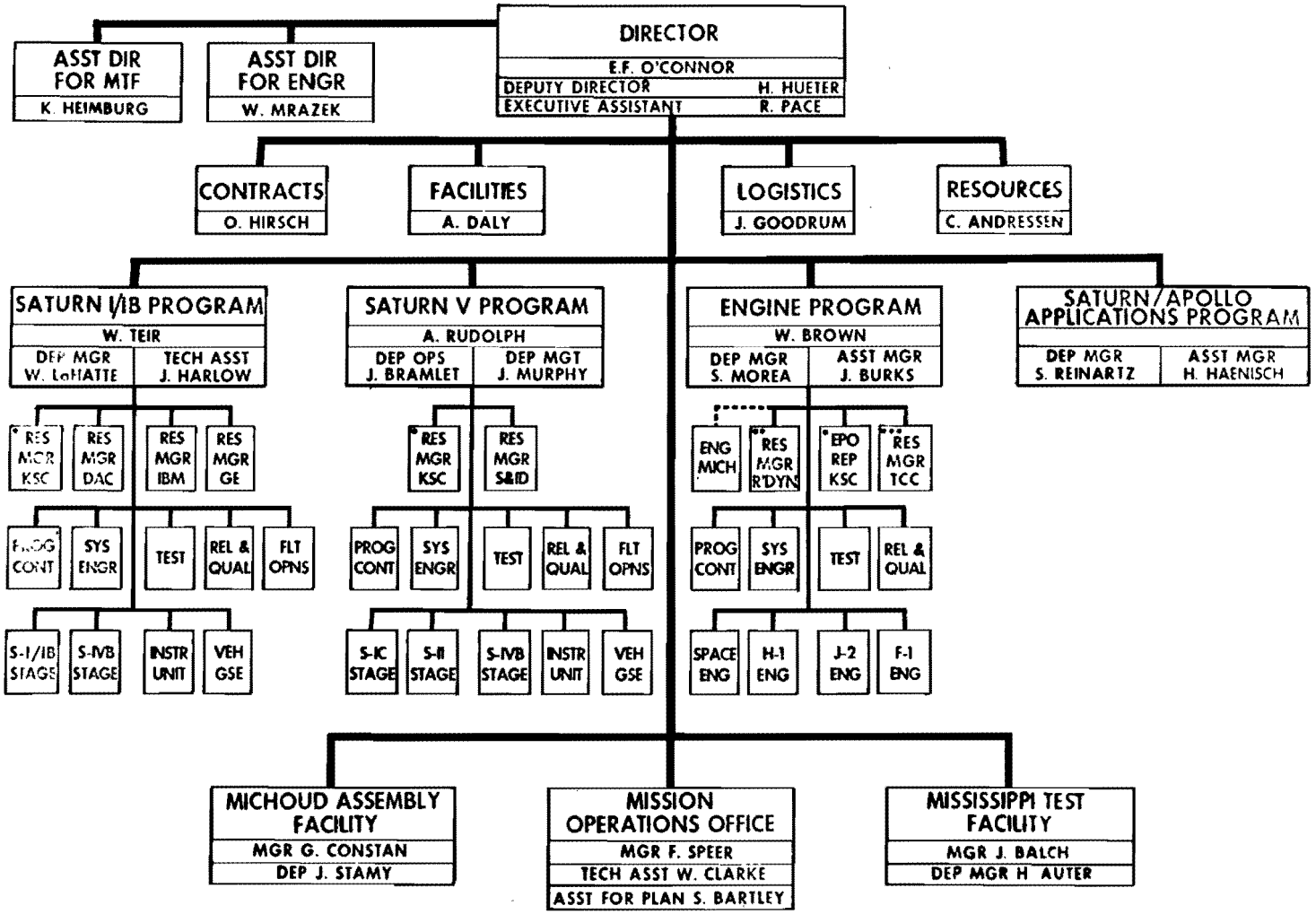
FUNCTIONS

Industrial Operations is assigned the overall responsibility for the conduct and management of the Saturn Launch Vehicle Systems Programs. In discharging these responsibilities, IO will perform the following functions:

1. Management of the Saturn Launch Vehicle Systems Programs including related GSE and MSFC assigned Saturn payloads. To take all actions necessary to ensure that the entire series of Saturn launch vehicle systems is successfully developed, produced, tested, delivered and launched to carry out the specified missions on the officially schedules dates and at the most reasonable cost to the Government within allotted funds. The term, "Saturn Launch Vehicle Systems" includes the complete launch vehicles (Saturn I, IB and V), MSFC assigned payloads, related GSE and software and all support, handling, and logistics requirements.

2. Assure the technical adequacy of the overall launch vehicle system and the successful integration of vehicle stages, engines, GSE, associated equipment and MSFC assigned payloads. Wherever possible, courses of action and final decision will be reached by mutual agreement between program and

GEORGE C. MARSHALL SPACE FLIGHT CENTER
INDUSTRIAL OPERATIONS



*ONE RESIDENT OFFICE; REPRESENTATION FROM SAT IB, SAT V AND ENGINE
**RESIDENT MANAGER OFFICES LOCATED AT CANOGA, NEOSHO AND EAFB
***THIOKOL CHEMICAL CORP., DENVILLE, N.J.

MSFC-67-IND [illegible]AH

project managers and R&DO senior responsible personnel involved.
3. Be the final authority on all program matters assigned by the foregoing paragraphs, as well as for the launch vehicle and GSE configuration, related software, test programs, and quality and reliability programs. IO will ensure that all program participants conform to established systems specifications and program requirements.
4. Direct all Government contracting activities for launch vehicle stages, program-related facilities, program logistics and MSFC-assigned Saturn payloads, except for those sub-systems and other Saturn-related elements which are assigned to R&DO.
5. Manage the off-site field operations of MSFC, including the Mississippi Test Facility, Michoud Assembly Plant, and Resident Management Offices and attached elements.
6. Manage MSFC program logistics activities, including spare parts, propellants and pressurants, transportation, equipment and facilities, and field operations.
7. Direct a facilities program to provide and maintain facilities and equipment required for the Saturn program.

INDUSTRIAL OPERATIONS

RESPONSIBILITIES

1. Plans and manages the MSFC Industrial Operations complex, providing management skills in the areas of program and fund control, contract negotiation and administration, cost control, program logistics and facilities, utilizing these skills in the integration of the management and technical capabilities of the Government and Industry into a unified force for the accomplishment of program objectives.
2. Manages the assigned Saturn Launch Vehicle System and payload programs including: the development of plans; and the execution of programs through the successful design, development, production, ground test program, vehicle systems integration and launch site test operations of launch vehicles and payloads in the achievement of an effective balance between technical performance, schedule and cost.
3. Assures technical adequacy of the overall vehicle system and the successful integration of assigned vehicle stages, engines and associated equipment into integrated, functioning launch vehicles in readiness to meet NASA/MSFC Apollo ojbectives. Wherever possible, courses of action and final decision will be reached by mutual agreement between program and project managers and R&DO senior responsible personnel involved.
4. Assures that the capabilities of R&D Operations are fully utilized in systems engineering; engineering and technical support; development of systems and sub-systems, engineering studies and analysis, and supporting research for assigned programs.
5. Manages the field operations of MSFC, to include the organizing, directing, coordinating and controlling of Mississippi Test Operations, Michoud Operations, and Resident Management Offices and attached elements.
6. Manages the formulation and execution of a program for the development of systems, components, techniques and processes applicable to multi-stage launch and space vehicles as contracted by Industrial Operations with industry.
7. Directs the formulation, development and execution of Project Development Plans and associated requirements; assigning responsibility for the development of hardware relating to launch vehicle and payload programs; and reviewing such assignments to determine that planning and execution are within established program objectives and authorizations.

8. Within the Apollo Program Office and MSFC guidelines, prepares and justifies total program budgets, receives and allocates funds to contractors, to R&DO, and to other participating agencies in accordance with program requirements.
9. Established integrated program requirements and controls over assigned programs at industrial contractors and with Research and Development Operations which will provide continuously for the evaluation and review of assigned programs.

10. Ensures that project vehicles remain with MSFC approved configuration during the industrial process and that contractors conform to established and approved systems specifications and engineering requirements.
11. Ensures contractor compliance with NASA and Center policies, standards and practices in the area of quality and reliability assurance.
12. Directs activities in the solicitation, negotiation, pre-award award, execution, notification, administraton and progress assessment of MSFC Industrial Operations contracts.
13. Organizes, directs, coordinates and controls MSFC Saturn program logistics activities to include propellants and pressurants, equipment and facilities, transportation of program hardware, and field operations.
14. Directs the establishment and maintenance of an active facilities program to provide modernization and/or new facilities and equipment to support the assigned missions of Industrial Operations.
15. Interprets MSFC policy as it applies to program objectives and establishes Industrial Operations policies.

SATURN I/IB PROGRAM OFFICE
I.O., MSFC

FUNCTIONS

1. To plan and direct the execution of the Saturn I and IB Programs within established technical, schedule and resources limitations.
2. To manage the composite MSFC/industry performance through the phases of program planning, coordination, and contractor managerial and technical direction in the design, engineering, integration, development, control, production, testing, delivery and pre-launch checkout of the Saturn I and IB vehicle and associated equipment.
3. To assure the technical adequacy of the overall vehicle system and the successful integration of vehicle stages and associated equipment within the assigned mission objectives of the Saturn I and IB Programs.

SATURN I/IB PROGRAM OFFICE
I.O., MSFC

RESPONSIBILITIES

1. Directs preparation and obtains approval of Saturn I and Saturn IB Project Development Plans as a basis for operations.
2. In conjunction with the Center Director and Director, Industrial Operations, represents the Saturn I and Saturn IB Programs at the Management Council Programs at the Management Council Program Review.
3. Assures that the capabilities and resources of the Research and Development Operations are fully utilized in Systems Engineering, development of systems and sub-systems, engineering studies, and supporting research in support of the Saturn I/IB Program.
4. Directs the Saturn I and Saturn IB Programs. Establishes requirements for, and assures adequacy of the systems engineering and systems integration efforts of the Saturn I and Saturn IB Programs, including specifications and drawings, performance and weight, automation, networks ESE and MSE, RF communications and instrumentation, dynamics, controls, guidance, interfaces and configuration control.
5. Directs, through the Contracting Officer, the negotiation, administration and obtaining of required approval for Saturn I/IB Program contracts.
6. Reviews and approves design, production, qualification, and test programs; and ensures that supporting contractors meet requirements of established schedules.
7. Reviews and approves contractor plans, schedules, budgets for obtaining facilities and tooling, and contractor development plans and specifications.

8. Establishes program requirements, determines program priorities, and directs a system of program scheduling and status analysis; provides MSFC and NASA top management with periodic overall program status reports, including status of applicable MSFC schedules; ensures effective implementation of Center management control systems; and establishes information channels with counterparts in NASA Headquarters and other Centers.
9. Approves vehicle system oriented technical directives which in turn will be issued to systems primce contractors through the appropriate state manager.
10. Approves technical baselines and exercises control over the technical progress of MSFC elements in attaining vehicle system objectives. Provides the chairman for the Saturn I/IB (Level II) Configuration Control Board.

SATURN V PROGRAM OFFICE
I.O., MSFC

FUNCTIONS

1. To plan and direct the execution of the Saturn V Program within established technical, schedule and resources limitations.
2. To manage the composite MSFC/industry performance through the phases of program planning, coordination, and contractor managerial and technical direction in the design, engineering, integration, development, control, production, testing, delivery and pre-launch checkout of the Saturn V vehicle and associated equipment.
3. To assure the technical adequacy of the overall vehicle system and the successful integration of vehicle stages and associated equipment within the assigned mission objectives of the Saturn V Program.

SATURN V PROGRAM OFFICE
I.O., MSFC

RESPONSIBILITIES

1. Directs preparation and obtains Center and MSF approval of Saturn V Project Development Plans as a basis for operations.
2. In conjunction with the Center Director and Director, Industrial Operations, represents the Saturn V Program at the Management Council Program Review.
3. Assures that the capabilities and resources of the Research and Development Operations are fully utilized in Systems Engineering, development of systems and sub-systems, engineering studies, and supporting research in support of the Saturn V Program.
4. Directs the Saturn V Program. Establishes requirements for, and assures adequacy of the systems engineering and systems integration efforts of the Saturn V Program, including specifications and drawings, performance and weight, automation, networks, ESE and MSE, RF communications and instrumentation, dynamics, controls, guidance, interfaces, and configuration control.
5. Directs, through the Contracting Officer, the negotiation, administration and obtaining of required approval for Saturn V Program contracts.
6. Reviews and approves design, production, qualification, and test programs; and ensures that supporting contractors meet requirements of established schedules.
7. Reviews and approves contractor plans, schedules, budgets for obtaining facilities and tooling, and contractor development plans and specifications.
8. Establishes program requirements; determines program priorities and directs a system of program scheduling and status analysis; provides MSFC and NASA top management with periodic overall program status reports, including status of applicable MSFC schedules; ensures effective implementation of Center management control systems; and establishes information channels with counterparts in NASA Headquarters and other Centers.
9. Approves vehicle system oriented technical directives which in turn will be issued to systems prime contractors through the appropriate stage manager.

10. Approves technical baselines and exercises control over the technical progress of MSFC elements in attaining vehicle system objectives. Provides the chairman for the Saturn V (Level II) Configuration Control Board.
11. Isolates major technical problems requiring attention of MSFC top management or higher authority, and recommends solution.
12. Participates in the activities of MSFC Working Groups and Inter-Center panels, as such activities relate to the technical integrity and interface relationships of stage-to-stage, vehicle-to-spacecraft, vehicle-to-GSE and vehicle-to-launch complex.

ENGINE PROGRAM OFFICE
I.O., MSFC

FUNCTIONS

1. To plan and direct the execution of engine projects within established technical, schedule and resources limitations.
2. To manage the composite MSFC/industry performance through the phases of program planning, coordination, and contractor managerial and technical direction in the design, engineering, integration, development, control, production, checkout, testing, and delivery of assigned engine projects and associated equipment.
3. To assure the technical adequacy and the successful integration of assigned engine projects and associated equipment, within mission objectives of the Engine Program.

ENGINE PROGRAM OFFICE
I.O., MSFC

RESPONSIBILITIES

1. Directs the Engine Program; establishes requirements for, and assures adequacy of the systems engineering and systems integration efforts for Engine Projects to include specifications and drawings, performance and weight, dynamics, controls, interfaces, and configuration control.
2. In conjunction with the Center Director and Director, Industrial Operations, represents the Engine Program at the Management Council Program Review.
3. Directos preparation and obtains necessary approval of engine Project Development Plans as a basis for operations.
4. Directs the negotiation and administration, and obtains required approval of Industrial Operations contracts for the Engine Program.
5. Approves engine design, production, qualification, and test schedules, and ensures that supporting contractors meet requirements of established schedules.
6. Approves contractor plans, schedules, budgets for obtaining facilities and tooling, and contractor development plans and specifications.
7. Directs and coordinates a system of program scheduling and status analysis; provides MSFC and NASA top management with perodic overall program status reports, including status of applicable MSF schedules; and establishes information channels with counterparts in NASA Headquarters and other Centers.
8. Determines program requirements and priorities; ensures establishment of program operations requirements and effective management control systems; and governs the emphasis on contractors' work objectives.
9. Approves technical baselines and exercises control over the technical progress of MSFC elements in attaining Engine Program objectives. Appoints the chairmen for Engine Projects Level III Configuration Control Boards.
10. Isolates major technical problems requiring attention of MSFC top management or higher authority, and recommends solution.

11. Participates in the activities of Boards, Working Groups, Committees, and Panels necessary in the accomplishment of the Engine Program mission.
12. Establishes, staffs, and maintains resident management offices at the contractors' plants as approved by Industrial Operations.
13. Assures that the capabilities and resources of the Research and Development Operations are fully utilized in Systems Engineering, development of systems and sub-systems, engineering studies, and supporting research in support of the Engine Programs.

MICHOUD ASSEMBLY FACILITY
I.O., MSFC

FUNCTION

To manage the administrative and industrial activities of the government-owned, contractor-operated Michoud plant, including contracts, programs, documentation, facilities, finance, support and computation services, quality control, and on-site supervision of contractor launch vehicle development, design, manufacture, and assembly.

MISSISSIPPI TEST FACILITY
I.O., MSFC

FUNCTIONS

1. To manage the administrative, industrial, and development activities of the Government-owned, contractor-operated Mississippi Test Facility, including contracts, programs, finance, safety, quality engineering, and on-site supervision of stage and support contractor's performance of assigned developmental and acceptance testing, checkout, refurbishment, and service support programs.
2. To assure the flight worthy quality of launch vehicle stages prior to delivery for launch missions.
3. To represent NASA/MSFC in Mississippi in matters relating to state and local affairs.

MISSION OPERATIONS OFFICE
I.O., MSFC

FUNCTIONS

To plan, coordinate and direct from one single centralized point all activities involved with accomplishing MSFC's mission operations role pertaining to manned and unmanned launch vehicles during space flight missions, flight tests or similar operations.

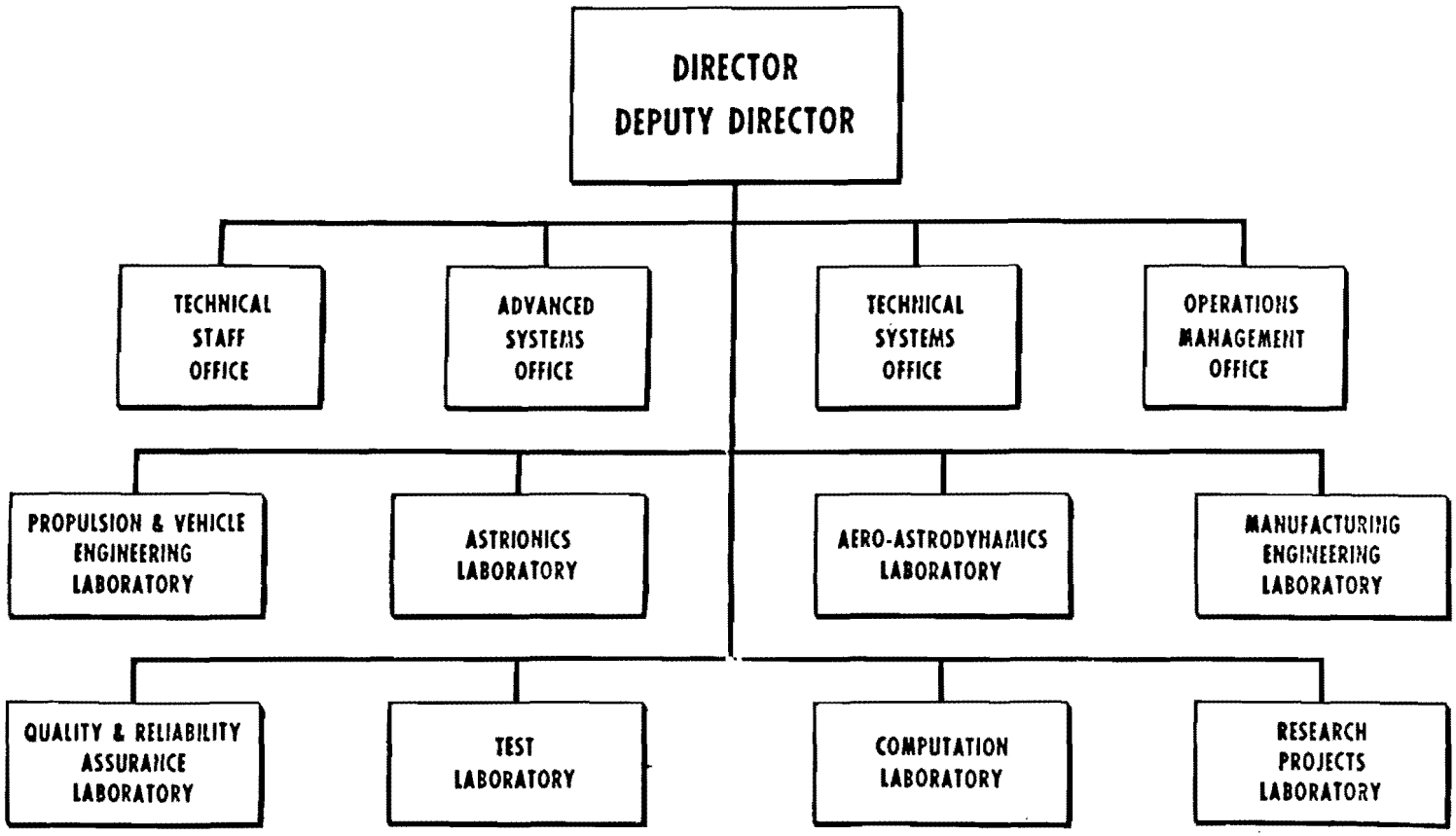
RESEARCH AND DEVELOPMENT OPERATIONS

FUNCTIONS

Responsibility for the establishment and management of the scientific and engineering capabilities of the MSFC Laboratories for the research and development of Launch Vehicle and Payload Systems, Supporting Research and Technology, and Advanced Studies rests with Research and Development Operations.

MARSHALL SPACE FLIGHT CENTER

RESEARCH AND DEVELOPMENT OPERATIONS



APPROVED _____
WERNHER von BRAUN
DIRECTOR, MSFC
DATE 31 January '66

RESEARCH AND DEVELOPMENT OPERATIONS

RESPONSIBILITIES

1. Performs research and development programs and projects within approved objectives, resources, and schedules; evaluates overall MSFC research and development objectives and recommends changes in program direction or solutions to major problem areas; develops R&D Operations requirements for inputs to overall MSFC budgets; develops annual plans for operations within authorized funds and manpower complement including supporting contractor participation.
2. Performs in support of Industrial Operations, a program of overall launch vehicle systems engineering associated with the overall integration of a system including MSFC assigned payloads, design compromise among sub-systems, definition of interfaces, analysis of sub-systems and supervision of systems testing, all to the extent required to assure that system concept and objectives are being met.
3. Manages a program which brings to bear the development capabilities of the laboratories (design; component, sub-system and whole system testing; fabrication, assembly and manufacturing engineering; quality and reliability assurance; static and dynamic analysis) to support Industrial Operations by providing the technical input with which Industrial Operations gives technical direction to its contractors.
4. Establishes a management system which will provide for a defined number of senior R&D Operations personnel and a limited number of specialists to continuously monitor their facets of the program to protect the technical adequacy of the launch vehicle system.
5. Directs and manages launch vehicle and engine projects activities for which Research and Development Operations has an assigned hardware responsibility or a developmental support commitment (quality assurance, system testing, etc.) in the Saturn I/IB, Saturn V and Engine Hardware programs.
6. Formulates and executes a program of research and development of components, systems, techniques and processes applicable to multistage launch and space vehicles. These efforts are directed toward development of back-up solutions, increases in reliability, performance and usefulness of the Saturn Launch vehicles, and in improved methods of analysis, manufacture, testing, etc.
7. Develops Center standards for quality assurance and provides technical support to the Industrial Operations to ensure contractor compliance with these standards.
8. Conducts scientific and engineering studies on Apollo follow-on programs, additional flight missions for existing Saturn Launch Vehicles, and additions and modifications to improve or extend the payload capabilities of existing Saturn Launch Vehicles.
9. Develops "Program Definition" systems specifications, engineering requirements and all technical plans for proposed projects and approved "new starts."
10. Prepares "program proposal packages" for submission to MSF Headquarters under cooperative arrangements developed with Industrial Operations.
11. Performs in-house studies and manages study contracts with industry to determine future space mission requirements and to develop launch and space vehicle concepts for fulfilling these requirements.
12. Formulates and manages a program of scientific research and advanced technology to advance the state-of-the-art in launch, space, and lunar surface vehicles and to maintain the MSFC technical proficiency in depth.
13. Establishes a system to continuously evaluate and improve the status of Research and Development Operations' manpower, technology base and facilities for fitness and compatibility with MSFC's immediate and long-range scientific/engineering objectives and goals.
14. Interprets MSFC policy as it applies to Research and Development objectives and establishes Research and Development Operations policies.
15. Ensures that the utilization of in-house support contractors is within the established MSFC policy.

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APPENDIX E

NORTH AMERICAN AVIATION, INC

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I. ORGANIZATION AND MANAGEMENT OF APOLLO CSM PROGRAM

A. CORPORATION

The Space and Information Systems Division (S&ID), which is responsible for the Apollo CSM and Saturn II Programs is one of seven NAA operating divisions supported by corporation adminstrative organizations. Each division is headed by a division president who is also a vice president of the corporation responsible to NAA President, J. L. Atwood. Mr. Atwood is also Chairman of the NAA's Board of Directors. The corporation establishes and administers the broad policies which constitute the framework within which each operating division functions. Chart "X" shows the NAA corporate organization.

B. S&ID

S&ID is headed by Division President, H. A. Storms. This division is responsible for the Apollo CSM and Saturn II Programs which are being carried out under separate program managers. The Apollo CSM Program is directed by Apollo CSM Program Manager and S&ID Vice President, H. A. Storms. Advanced Programs Development, and Research, Engineering and Test furnish special technical support as needed. Other S&ID functions provide administrative support.

The Apollo CSM Program Manager, D. D. Myers, is assisted by Deputy Program Manager, C. H. Feltz and four Assistant Program Managers. Directors of four functional areas report directly to the Program Manager. The Director of Quality and Reliability Assurance is responsible to thePro-Manager in technical matters although reporting administratively to the S&ID Director of Quality and Reliability Assurance. The Director of Apollo CSM Operations, Florida, J. L. Pearce, is responsible to the NAA General Manager of the Florida Facility. W. S. Ford. This organizational plan gives the Apollo CSM Program Manager direct control and responsibility over all phases of the Program including all subcontracting.

D. FLORIDA FACILITY

The Apollo CSM Florida Director, J. L. Pearce is supported by three managers, the Chief Project Engineer , R. W. Pyle, and the Technical Support Chief, R. E. Franzen. The three managers have separate areas of responsibility: Test Operations, J. M. Moore; Test Sites, R. E. Barton; and Quality and Reliabilty Assurance, J. L. Hansel. Very close liaison and control between Downey and Florida Apollo CSM operations is maintained.

II. PROGRAM HARDWARE RESPONSIBILITY

S&ID is responsible, with NASA concurrence, for the overall development, design, manufacture, and test of Apollo CSM hardware.

A. SPACECRAFT CONFIGURATION

S&ID is responsible for the command and service modules, the launch escape system, the spacecraft/lunar module adapter, and most subsystems pertaining to these modules. S&ID is responsible for coordinating the physical and operating interfaces of these modules and systems with Associate Contractors and NASA.

B. GROUND SUPPORT EQUIPMENT (GSE)

NAA supplies GSE as directed by NASA to support Apollo CSM test and checkout operations at all test sites. This GSE consists of checkout equipment, auxiliary equipment, servicing, and handling equipment. NAA is responsible for the design, manufacture, and checkout of this GSE.

C. SUBSYSTEMS

The following Apollo CSM subsystems and modules are being produced inhouse at NAA:

SUBSYSTEM OR MODULE	DIVISION
Command and Service Modules (Complete)	S&ID
SLA (Complete)	S&ID
Launch Escape System Structure	Los Angeles Division
Sequencer System	Autonetics
Command Module Reaction Control System	Rocketdyne

Units that are made at other NAA divisions are designed, manufactured, and tested under S%ID supervision and control.

D. SUBCONTRACTORS

Major and minor subcontractors are selected with NASA concurrence by S%ID, and are under S%ID surveillance. The subsystems they fabriacte are designed, manufactured, and tested under S%ID supervision and control.

E. SUPPLIERS

S%ID buys hardware for the Apollo CSM Program directly from over 12,000 first tier suppliers of which 9,600 represent small business; and the remainder, large business. All such hardware must be bought from S%ID approved sources and the hardware must be certified and tested as required to meet applicable specifications. Suppliers of these first tier suppliers represent many thousands of additional firms.

III. PROGRAM CONTROL PROCEDURES

A. The baseline for NASA and NAA management of the program is contained in the contract. The particular control baselines are the technical, master end item and specific end item specifications, the contract plans, and contract change notices which become incorporated into the baselines by specification and supplemental agreements. The controlling plans are the Manufacturing Plan, the Quality Control Plan, the Configuration Management Plan, the Ground Operations Requirement Plan and the Reliability Plan.

B. Control Tools-Cost, Schedule and Quality. Program control procedures are implemented only after formal Joint NASA/NAA interface agreements. These interfaces consist of contractual, technical and schedule meetings and documentation. Contractual direction is given by NASA to NAA through (bilateral) Supplemental Agreements and Contract Specification Change Notices and through (unilateral, by NASA) Contract Change Authorizations, Technical direction is given by NASA through Program Management Meetings, letters and wires to the NAA contracting officer and in formal reviews and Interface Control Documents. Formal joint reviews are Preliminary and Critical Design Reviews (PDR's and CDR's), First Article Configuration Inspection (FACI), Customer Acceptance Readiness Reviews (CARR) and Flight Readiness Reviews (FRR).

Through the S%ID Apollo CSM Program Manager's Office, control is exercised over CSM program costs, schedule and quality. The control media include the following.

1. COST CONTROL is provided primarily through Joint NASA/NAA negotiated and approved "work packages" with individula work package managers assigned to control costs, schedule achievements and quality. The choice of work package breakdown structure has enabled individual cost control of functional elements within S%ID as well as major subcontractors which supply CSM subsystems. NASA, NAA division and corporate policies assure proper make or buy decisions, subcontractor bid selection and the like.

2. SCHEDULE CONTROL, is provided by use of a "Master Development Schedule," a formal schedule change system, a PERT reporting system of scheduled milestones and formal critical problem reports. Major schedule changes receive concurrence of the NASA Program Manager prior to NAA implementation. The selection of schedule milestones, monitored by PERT are also identified in the cost control work packages, yielding an integrated cost/schedule measuring device.

3. CONTROL OF QUALITY is provided by (a) jointly approved hardware qualification test-selection, criteria, test surveillance and test report approval, (b) Joint NASA/NAA mandatory inspection point assignments and surveillance, and (c) step/by/step inspections (NASA/NAA) through manufacture, checkout and pre-launch operations. A failure reporting system assures follow-up on potentially discrepant hardware. Control of subcontractor quality is provided in a similar fashion,

C. MANAGEMENT CONTROL DOCUMENTS-Management control documents for Apollo CSM hardware exist at both the program level and at the first-line level of NAA S%ID management. The

top documents serve to record design and product certification and flight readiness. These are the jointly approved minutes of PDR, CDR, FACI, CARR, Design Certification Review (DCR) and FRR.

The first-line level management control documents are:

1. DESIGN - Master Change Records (MCR), drawings, process specification interface control documents and measurement lists.
2. MANUFACTURING - Fabrication and inspection record tickets, planning tickets, tool orders and parts replacement requests.
3. MATERIAL (PURCHASING) - Purchase order, purchase order change notice and specification control documents.
4. TEST AND OPERATIONS - Operational test plan, operational checkout procedure, not satisfactory report, test preparation sheet, development test procedure.
5. QUALITY AND RELIABILITY ASSURANCE- Inspection test instructions, material review disposition and quality control specifications.

D. CONFIGURATION MANAGEMENT - Configuration Management is practiced through compliance with the NASA Apollo ConfigurationManagement Manual and NAA Division Policies as implemented by the Apollo CSM Change Control Board, chaired by the Assistant Program Manager. Configuration changes with major program impact are resolved at Joint Change Control Board meetings between the NASA and S%ID Program Managers.

Changes imposed on program baseline originate from both NASA and NAA. NASA directed changes are processed by Contracts through the Change Control Board for preparation of proposals. In-house changes are processed by the Apollo CSM chief project engineer also through the Board for evaluation and direction. Change control documentation is in the form of a Master Change Record (MCR) which defines the change and is the basis of an order to the functional departments to provide cost and schedule information for necessary evaluation, prior to final implementation. The MCR can be used, as above, to determine details of a change prior to implementation; however for urgent changes the purpose of the MCR is to initiate action, which is accomplished upon MCR approval by Program Management for "Release to Production".

Configuration records are maintained in records of released engineering drawings and specifications. These records provide indentured drawing lists, parts lists and alpha-numeric parts or drawing lists. The manufacturing planning system assures drawings and engineering order (E.O.) compliance utilizing Fabrication and Inspection Records (FAIR) and a Change Verification Record (CVR) for each end item. The FAIR provides both fabrication instructions and inspection verification; the CVR provides E.O. records and verification of compliance.

During Downey, Houston and Florida Testing, a Test and Inspection Record (TAIR) system provides identical configuration and inspection information.

E. Subcontractor control baseline consist of (a) approved design specifications, drawings, components, qualification test plans and reports, acceptance test plans, critical process specifications, and component failure histories. A FACI is conducted for complex (major) procurements by S%ID with a NASA audit. Other procurements are subjected to FACI at NAA, utilizing subcontractor data. All baselines are re-verified to NASA at the SC 101 (Block II lunar capable vehicle) FACI.

Conformance of the subcontractors is controlled by "freezing" component changes at FACI, strict part number control, identification and reidentification, source or receiving inspection to formally approved drawings and baselines and component reapir or overhaul, controlled to the configuration specified in the approved baseline.

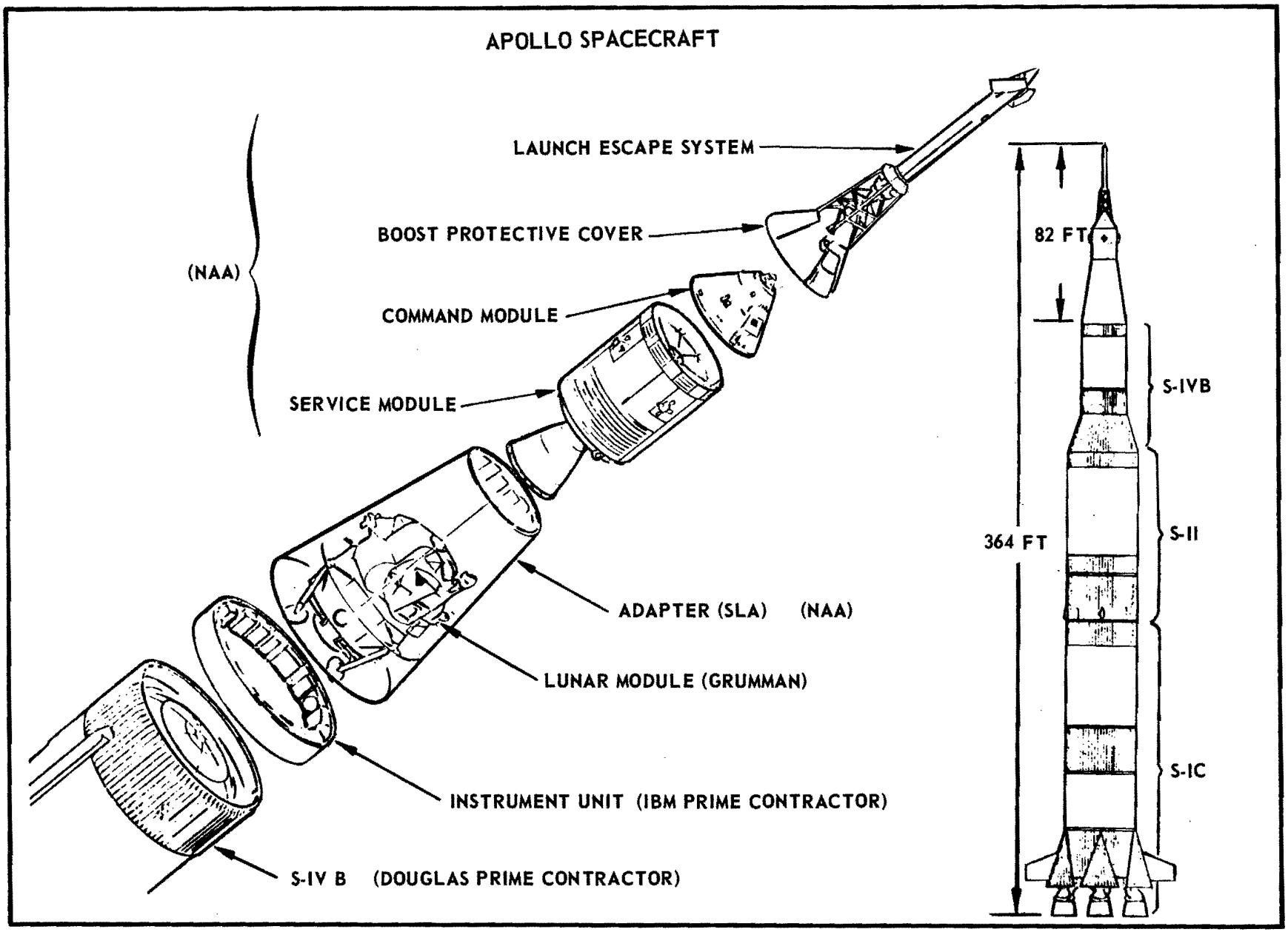
Changes are justifiable only for NASA or NAA requirements modiciations; failure in qualification, during production or in operational tests; or for significant cost reduction. Change controls parallel the NASA-S%ID change control procedures. This method of subcontractor control is in effect at such major subcontractors as Honeywell, AiResearch, Beech and Pratt % Whitney.

F. Field Site Control - Apollo CSM Program Field Site efforts with activities at Florida, MSC-Houston, White Sands, New Mexico and El Centro, California, are managed as are similar efforts in Downey. The management differences are caused by the fact that hardware at field sites has usually been transferred to NASA-owned, and also is governed by NASA field site management procedures, rather than NAA or NASA-MSC.

Hardware flow through the field site is controlled by the Ground Operations Requirement Plan (GORP) contractual document, as modified by operational changes and deviations approved by the NASA-KSC or other field site change board.

Hardware changes evolving from NASA and NAA sources, identified previously, are processed through the Downey system for incorporation in a similar manner to other changes.

APOLLO SPACECRAFT



APPENDIX E

MSC-KSC INTERFACE DOCUMENTATION

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MSC-KSC RELATIONSHIPS

The following series of documents establishes the working relationships between the MSC Apollo organization, and its counterpart at the Kennedy Space Center. Indluded in the documents are the delegations of authority from the Apollo Spacecraft Program Office to the KSC Director of Plans, Programs & Resources. Due to subsequent reorganizations, the names of the organizational elements have been changed during the formulation of the MSC-KSC interface, though it is believed that the same individuals are essentially involved in the intra-center working relationships.

SUBJECT:

KSC-MSC Relationships at the Cape

A. The overall policy and relationships which exist between MSC and KSC for those spacecraft activities occuring at the Cape are defined in the agreement on KSC-MSC Cape Relationships, signed by the Director, Manned Spacecraft Center, and the Director, John F. Kennedy Space Center, dated December 12, 1964.

B. Additional definitization of relationships between ASPO and KSC is contained in the following documents, which are incorporated in this chapter.

1. MSC datafax to KSC, dated September 23, 1965, subject: Proposed Apollo Spacecraft Program Office KSC Operations Management Plan.
2. Message from KSC, dated October 5, 1965, subject as above.
3. TWX to KSC from Manager, ASPO, dated October 12, 1965.
4. Memorandum from Manager, ASPO, subject: Apollo Spacecraft Program Office Operation Plan at KSC, dated October 18, 1965.
5. Memorandum from ASPO, Program Control Division to PPR1, Mr. G. McCoy, subject: "Change of Management Interface", dated March 15, 1966.
6. Memorandum from KSC/PPR, subject: "Apollo Program Directive No. 14", dated February 4, 1966.
7. Memorandum from Program Manager, subject: "Apollo Spacecraft Program Office and Kennedy Space Center Management Interface", dated March 23, 1966.

C. An on-site engineering evaluation group from NAA has been physically relocated to KSC to provide a closer cognizance of the spacecraft subsystems performance during checkout tests. Specific duties of this team and of the ATO data support personnel, and the detailed KSC operational information are included in the memorandum from PM/Chief, Checkout and Test Division, dtd. Feb. 3, 1966, which is included in this chapter.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

KSC-MSC CAPE RELATIONSHIPS

This paper establishes the overall policy and relationship which shall exist between MSC and KSC for those spacecraft activities occurring at the Cape. The following relationship shall exist:

1. MSC shall be responsible for the determination and control of the configuration of the spacecraft and all spacecraft contractor-supplied GSE, including ACE. MSC shall be responsible for approval of all changes in configuration.

2. MSC shall establish overall checkout standards and plans. These standards and plans shall set the broad parameters for checkout and inspection for all spacecraft checkout and inspection for all spacecraft checkout form the factory through Cape checkout. MSC shall establish detailed factory checkout procedures; KSC shall review and advise MSC on these procedures. KSC shall develop Cape checkout plans for review and approval by MSC as a part of the overall spacecraft checkout plan; KSC shall develop detailed checkout procedures shall be adopted which are not concurred in by MSC.

3. MSC shall conduct technical reviews, inspection, and checkout acceptance activities at the spacecraft contractors' plants; KSC shall provide checkout personnel to serve as observers and advisors; KSC shall conduct detailed Cape checkout of spacecraft, securing MSC approval of necessary performance and checkout procedure waivers or inspection deviations; KSC shall conduct the actual countdown and launch activities. This includes direction of those MSC spacecraft contractor personnel engaged in preflight checkout activities at the Cape.

4. MSC shall provide to KSC performance data, systems or subsystems specifications, or test results which are needed or requested by KSC.

5. MSC shall provide data requirements for format and or reduction requirements for pre-mission, real-time mission, real-time mission support, or post-mission evaluation.

6. MSC shall determine the disposition and place of failure analysis of all failed components after removal from the spacecraft; KSC shall conduct failure analyses as requested by MSC and make recommendations for corrective action as applicable.

These aranagements relate to all KSC-MSC relationships for activities conducted at MILAand the ETR.

7. MSC shall retain responsibility for all astronout activities; KSC shall provide necessary housing and logistical support as required.

8. MSC shall prepare all on-board experiments which are intimately associated with the astronaut; KSC shall prepare those experiments intimately associated with the spacecraft.

9. KSC shall participate as a Board Member of the Acceptance Review Board in conducting formal pre-delivery reviews of spacecraft at the contractors' plants and on the MSC Spacecraft Readiness Review Board; MSC shall participate as a Board Member in launch readiness reviews and shall participate in preflight and post-launch debriefings of launch crews conducted by KSC. MSC shall conduct necessary post-mission tests of spacecraft.

10. MSC shall establish minimum readiness specifications or lift-off rules for spacecraft systems; KSC shall conduct necessary integrated space vehicle checkouts.

11. KSC shall provide MSC such administrative and housekeeping support for personnel assigned to the MSC Resident Offices as may be necessary.

12. KSC shall serve as the agent of MSC in conducting Gemini spacecraft checkout, inspection, and testing at the Cape. This function shall be delegated to the Deputy Director for Launch Operations, KSC, who shall be directly responsible to MSC for these activities. The Directors, KSC and MSC, shall periodically discuss any problems which may arise relating to staffing levels assigned to the Gemini Program. (This arrangement shall be reviewed prior to GT-6).

13. KSC shall make the KSC Deputy Director for Launch Operations available to function as the agent for MSC in providing local direction (at the Cape) to the Air Force 6555th Test Wing in its preparation, checkout, and launch of the Gemini launch vehicle and the Atlas-Agena target vehicle.

(ORIGINAL SIGNED BY ROBERT R. GILRUTH)
Robert R. Gilruth, Director
Manned Spacecraft Center
December 21, 1964
Date

(ORIGINAL SIGNED BY KURT H. DEBUS)
Kurt H. Debus, Director
John F. Kennedy Space Center
December 21, 1964
Date

PROPOSED
APOLLO SPACECRAFT PROGRAM OFFICE
KSC OPERATIONS MANAGEMENT PLAN

1. General:

The KSC-MSC relationship signed by Dr. K. Debus and Dr. R. Gilruth on December 21, 1964, assigns certain responsibilities to MSC for the Apollo Spacecraft operations at KSC. It is the purpose of this plan to delegate a limited number of these responsibilities to KSC for execution and to delineate other of these responsibilities that KSC shall refer to MSC-ASPO for action.

2. Responsibilities delecated to KSC, plans, programs and resources office:

A. Provide the interface with the MSC Apollo spacecraft program office manager for activities at KSC involving support of the Apollo spacecraft program.

B. Accomplish technical management of ASPO contractor(s) at KSC within the scope of defined con-contractor tasks and coordinate with the app Apollo spacecraft tasks.

C. Provide appropriate ASPO contractor performance reviews to MSC.

C. Provide appropriate ASPO contractor performance reviews to MSC.

D. Be responsible for the configuration management of the Apollo Spacecraft, GSE, and ACE AT KSC in accordance with the specifications furnished with the delivery of the equipment and MSC Apollo CCP or CCB Directives. Changes in this established configuration initiated at KSC, including compatibility or make work, shall be referred to this chairman of the cognizant MSC MSC Spacecraft Configuration Control Panel for approval action. Action on these configuration changes shall be handled in the most expeditious manner, TWX or telephone. The cognizant contractor shall be responsible for documenting all changes in accordance with the Apollo Spacecraft Program Office "Apollo Configuration Management Manual, MSC Suppliment no. 1 (to NPC-500-1), Exhibit IX".

E. Provide to MSC-ASPO daily status reports on Apollo Spacecraft work, including overall schedule performance compliance, EO's worked and other pertinent program information.

F. KSC shall provide facilities and general service for the MSC personnel such as project and systems engineers, GSE, site activation, quality, checkout, and subsystem managers assigned by ASPO

S

E. Provide to MSC-ASPO daily status reports on Apollo Spacecraft work, including overall schedule performance compliance, EO's worked, and other pertinent program information.

F. KSC shall provide facilities and general service for the MSC personnel, such as project and Systems Engineers, GSE, site activation, quality, checkout, and subsystem managers assigned by ASPO th specific hardware or functions that are being handled by KSC for MSC. KSC shall provide internal working interface arrangements for these individuals in support of the accomplishment of the tasks.

3. A more detailed level or assigned responsibility is contained in the following list. The notation "KSC" indicates those activities in which responsibility for primary accomplishment is delegated to KSC, plans, programs, and resources; the notation "MSC" indicates that primary responsibility is to remain with MSC (ASPO); and the notation KSC/KSC refers to those accomplishments in which reciprocal activijies are required.)

DETAILED MSC-KSC INTERFACE ACTIVITIES FOR APOLLO SPACECRAFT ACTIVITIES AT KSC

KSC 1. Change coordination
- A. SC configuration
- B. GSE configuration
- C. ACE configuration

MSC 2. GORP

MSC 3. Failure analysis designation (SC, GSE, and ACE) - PE

KSC/MSC 4. OCP Review (field to factory and reverse)

KSC/MSC 5. Checkout results documentation

MSC 6. Supporting test results to KSC

KSC/MSC 7. Calibration coordination (MSC requirements)

KSC 8. Launch support requirement generation

KSC 9. ACE program material elaborate ref.

KSC 10. Site Activation - Board Chairman (Dir. contractor) ORD's SAND's

MSC 11. Subsystem manager coordination - PE

MSC 12. ALOC representation for countdown - PE

KSC 13. ICD and IRN review for adequacy and coordination with co-chairman

MSC 14. Approve deviations to subsystem performance requirements and resolution of anamolies granted by KSC

KSC 15. ASPO Contractor and NASA Visitor Control

KSC 16. Logistic, travel, meeting arrangements with KSC for MSC (Apollo)

KSC 17. Provide SC, GSE, and ACE failure and anomoly data that is timely and compatible with ASPO system

UNITED STATES GOVERNMENT

Memorandum

TO: MANNED SPACECRAFT CENTER
MANAGER, APOLLO SPACECRAFT PROGRAM OFFICE, PA

DATE:

FROM: DIRECTOR, PLANS, PROGRAMS & RESOURCES, PPR
MANNED SPACECRAFT OFFICE, PPR-1

MSC NO. 19
RECEIVED: OCT 5 – 4:59 PM 1965
NASA COMMUNICATIONS CENTER

SUBJECT:

1. YOUR PROPOSAL THAT KSC, PLANS, PROGRAMS, & RESOURCES PERFORM THE FUNCTIONS OUTLINED IN YOUR DATAFAX DATED SEPTEMBER 23, 1965, IS ACCEPTED.

2. OUR BASIC COMMENTS ON THE DATAFAX ARE AS FOLLOWS:

   (a) IT IS ASSUMED THAT THE ACTIVITIES, ENUMERATED IN PARAGRAPH "F" WILL BE CARRIED OUT IN KEEPING WITH THE INTENT OF PARAGRAPH A AND B.

   (b) IT IS UNDERSTOOD FROM MY RECENT TELEPHONE CONVERSATION WITH YOU THAT A KSC CCP WILL BE ESTABLISHED IN ACCORDANCE WITH THE APOLLO SPACECRAFT PROGRAM CONFIGURATION MANAGEMENT PLAN. IT IS UNDERSTOOD THAT THE SCOPE OF KSC DELEGATED CHANGE AUTHORITY WILL BE LIMITED TO COMPATIBILITY OR MAKE IT WORK CHANGES.

   (c) PARAGRAPH 3 OF THE PROPOSAL IS A GENERAL GUIDELINE WHICH WILL REQUIRE AMPLIFICATION AND SOME DETAILED MODIFICATION AS THIS PLAN DEVELOPS.

3. IN ORDER TO CARRY OUT THE ABOVE, IT IS REQUESTED THAT ASPO TAKE ACTION TO:

   (a) FORMALLY DELEGATE OVERALL DIRECTION OF SPACECRAFT CONTRACTORS ACTIVITIES (NAA, GAEC, GE/ACE, AND MIT) AT KSC TO THE KSC, PLANS, PROGRAMS, AND RESOURCES OFFICE.

   (b) TRANSFER THE PERSONNEL AND POSITIONS PRESENTLY ASSIGNED TO THE LOCAL MSC OFFICE TO KSC.

s/t ROCCO A. PETRONE

cc:
W. BLAND, PH

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : DIRECTOR, PLANS, PROGRAMS & RESOURCES, PPR
MANNED SPACECRAFT OFFICE, KSC

DATE:

FROM : MANAGER, APOLLO SPACECRAFT PROGRAM OFFICE, PA
MANNED SPACECRAFT CENTER

SUBJECT:

THE APOLLO SPACECRAFT PROGRAM OFFICE – KSC OPERATION MANAGEMENT PLAN PROPOSED BY THIS OFFICE ON SEPTEMBER 23, 1965, AND ACCEPTED BY YOU ON OCTOBER 5, 1965, IS THEREFORE CONSIDERED IMPLEMENTED AS OF OCTOBER 12, 1965. I AM NOW TAKING ACTION TO PRONOUNCIATE THIS PLAN BY:

(1) ANNOUNCING TO THE ASPO CONTRACTORS A DELEGATION OF AUTHORITY TO YOU TO DIRECT CONTRACTOR WORK AT KSC.

(2) TRANSFER THE PERSONNEL ASSIGNED TO THE FIELD TEST OFFICE TO KSC.

(3) ESTABLISH AN ASPO CONFIGURATION CONTROL PANEL AT KSC WITH YOU APPOINTED AS CHAIRMAN WITH POWER OF DELEGATION.

THE FOLLOWING IS IN REFERENCE TO YOUR COMMENTS ON THE AGREEMENT:

(a) THE ACTIVITY IN PARAGRAPH "f" WILL BE IN KEEPING WITH THE INTENT OF PARAGRAPHS "a" AND "b".

(b) THE AUTHORITY OF THE SPACECRAFT CCP AT KSC WILL BE LIMITED TO COMPATIBILITY AND MAKE WORK CHANGES. THE SCOPE WILL BE AS SHOWN IN THE ENCLOSURES.

(c) I AGREE, THE GENERAL GUIDELINES OF PARAGRAPH 3 WILL REQUIRE FURTHER DEVELOPMENT. IT IS FELT THAT THIS WILL BE DONE AS NECESSARY DURING THE ACCOMPLISHMENT OF THE INTERFACE TASKS LISTED. AS WE PROGRESS, MODIFICATION AND ADDITIONS WILL BE MADE TO THIS LIST.

SINCE THIS AGREEMENT IS WITHIN THE SCOPE OF THE KSC-MSC RELATIONSHIP SIGNED BY DR. K. DEBUS AND DR. R. GILRUTH OF DECEMBER 21, 1965, ITEMS NOT SPECIFICALLY COVERED SHALL BE IN ACCORDANCE WITH THE BASIC DOCUMENT.

FURTHER ADJUSTMENTS NOT PREVIOUSLY MENTIONED WILL BE WITHDRAWING OF MSC PROJECT ENGINEERING SUPPORT FOR THE FACILITY VERIFICATION VEHICLE AT KSC AND THE ASSUMPTION OF THE GSE-GE SUPPORT AT KSC BY KSC, BEFORE OCTOBER 15, AND NOVEMBER 1, 1965, RESPECTIVELY, UNLESS YOU ASK FOR FURTHER CONSIDERATION.

ENCLOSURES

/s/ JOSEPH F. SHEA

9010-108

10/12/65

APOLLO SPACECRAFT CONFIGURATION CONTROL PANEL AT KSC

The configuration control procedure outlined in the "Apollo Spacecraft Program Office Configuration Management Plan," March 1965, has been adopted by ASPO and is being followed to process all engineering changes to Apollo Spacecraft hardware. As stated in this plan, the Configuration Control Board consists of the "Board" (CCB), and several panels (CCP's). These panels (CCP's) are an integral part of the CCB and function under the jurisdiction of, and with delegated authorities from, the Chairman of the CCB.

Director Plans Program and Resources, KSC, will establish and chair an Apollo Spacecraft CCP at KSC to consider and process engineering changes to Apollo Spacecraft and associated hardware undergoing checkout and test at KSC. The ASPO Configuration Management Plan is being revised to reflect this action. The authority of this CCP shall be restricted to the review of end item hardware (including GSE) and software configuration changes to determine if the change is mandatory in conduct of tests at KSC, and the approval of the contractor's plan for making the mandatory change to specific Apollo hardware end items at KSC. Where the spacecraft cannot be restored to its original configuration once a change has been incorporated, approval of the change shall be concurred in by the KSC assigned Project Engineer. Changes that cannot be removed without major schedule purturbation (24 hours) shall also be referenced to the MSC-PE. All mandatory changes are by definition either "compatibility" or "make work" changes. Compatibility changes are those required to correct a design deficiency that is directly attributable to the con-

tractor. Make work changes are those required to correct deficiencies for which the contractor did not have design responsibility. Concurrent with the implementation of mandatory changes to the spacecraft or associated hardware, the appropriate contractor will prepare an Engineering Change Proposal (ECP) covering the change and submit it to ASPO-MSC for processing in accordance with the procedure outlined in the ASPO Configuration Management Plan. Review and approval of the ECP by the ASPO CCB will cover the requirement for the inclusion of the change in other end items and will insure documentation of the test site change.

The operating procedures for processing changes through the Apollo Spacecraft CCP at KSC should be coordinated with the Secretary of the ASPO CCB, Mr. A.L. Brady. These procedures should show how Type A TPS's, EO's, etc., are generated, signed off and processed.

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MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : See list attached

DATE: Oct 18, 1965
In reply refer to;
PHI2:JJS:ibr

FROM : PA/Manager, Apollo Spacecraft Program Office

SUBJECT: Apollo Spacecraft Program Office
Operation Plan at KSC

An operation management plan has been developed within the scope of the KSC-MSC Relationships agreement of December, 1964, whereby the Director of Plans, Programs, and Resources Office at Kennedy Space Center is delegated the authority to fulfill limited MSC ASPO responsibilities at the KSC. The present ASPO test office at KSC has been transferred to KSC to assist in the accomplishment of these tasks.

A general summary of the functions that will be performed for ASPO are:

(a) Provide the interface with KSC for the MSC ASPO
(b) Accomplish technical management of ASPO Contractors at KSC
(c) Establish an ASPO Configuration Control Panel at KSC

Operational details of the plan are being developed as necessary. Information concerning your area of assigned responsibility may be obtained from the Staff Office of the Checkout and Test Division, extension 5221.

/s/ Joseph F. Shea

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS 77058

IN REPLY REFER TO:

PP

TO: PPRI/Mr. E. McCoy
Chief, Manned Spacecraft Office

FROM: PP/Chief, Program Control Division
Apollo Spacecraft Program Office

SUBJECT: Change of Management Interface

You are no doubt aware of the recent re-orientation of the MSC Apollo Spacecraft Program Office, but perhaps not fully aware of the minor change this creates in the existing working interfaces.

Effective March 10, 1966, the ASPO Program Control Division, specifically Gordon J. Stoops, was named as the Individual responsible for the management interface with your office. The interface for the solution of technical problems is the LEM and CSM Project Engineering and Checkout Division; Owen Morris and R. Lanzkron Division Chiefs, respectively.

We are looking forward to continuing our relationship with the same success as enjoyed prior to the re-orientation of our organization.

J. Thomas Markley

cc:
PA/W. Lee
PA/J. Kotanchik
PD/Chief
PE/Chief
PF/Chief
PM/Chief
PR/Chief

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS 77058

IN REPLY REFER TO:

PPR-36 Feb 4, 1966

TO: Manned Spacecraft Center
Apollo - Office of Program Manager
Attention: Dr. Joseph Shea, PA

FROM: Director, Plans, Programs and Resources, PPR

SUBJECT: Apollo Program Directive No. 14

To facilitate compliance with the subject Directive and in accordance with the MSC ASPO-KSC Operation Management Plan implemented October 12, 1965, Mr. H.E. McCoy, Chief, Manned Spacecraft Office, PPR-1, is designated as the prime KSC contact. All requests for delivery of MSC equipments to KSC with "open" work will be concurred in by Mr. McCoy or his designated representative prior to shipment to KSC.

To avoid unnecessary delays in coordination, it is suggested that the KSC Manned Spacecraft Office, PPR-1, be advised of possible problems two (2) weeks prior to scheduled shipment. It is also recommended that representatives of the KSC Manned Spacecraft Office, PPR-1, attend MSC/Contractor Configuration reviews when it is known or expected that equipment will not be in the design configuration when shipped to KSC. Upon determination that equipment will require "open" work to be accomplished at KSC, MSC/Contractors shall immediately provide KSC with a detailed "open" work status. The status shall define the work required and the scheduled MSC/Contractor dates for providing KSC with the equipment/engineering necessary to close the work. This information shall be documented on the "Material Inspection and Receiving Report", Form DD-250 (or MSC equivalent).

/s/ Rocco A. Petrone

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : See Distribution DATE:

FROM : PA/Manager, Apollo Spacecraft Program Office

SUBJECT: Apollo Spacecraft Program Office and Kennedy Space Center Management Interface

Effective immediately the following management interfaces are established to minimize Apollo direction channels to KSC:

R.W. Lanzkron - Chief, CSM Project Engineering and Checkout Division
O.G. Morris - Chief, LEM Project Engineering and Checkout Division
J.T. Markley - Chief, Program Control Division
A. Cohen - Chief, Systems Integration Branch, Systems Engineering Division

All correspondence of non-policy nature directed to KSC shall be submitted to one of the above for signature. Dr. Lanzkron will sign all technical correspondence specifically pertaining to the CSM, CSM site activation, and CSM checkout. Mr. Morris has the same signature authority for LEM. Mr. Cohen is responsible for establishing and approving all changes to all Interface Control Documents (ICD's) with KSC and will sign all correspondence relating to ICD's. All other correspondence whose subject is not specifically CSM, LEM, or ICD oriented will be submitted to the Program Control Division for signature.

The establishment of this interface and the attendant signature authority does not alter the existing functions and authorities of the Launch Operations Panel.

/s/ Joseph F. Shea

Distribution

Feb 3, 1966
In reply refer to:
PN/N-98-66

PN/Chief, Checkout and Test Division

Apollo Spacecraft Checkout at KSC

During the Flight Readiness Review for S/C 009, it became apparent that a closer cognizance of the spacecraft subsystems performance during the check-out tests was needed. To implement this need the North American Aviation Apollo Test Operations have instituted an onsite engineering evaluation group. This group consisting of eight engineers from Downey who have been physically relocated to KSC to participate in the checkout with the operational personnel of both NAA F/F and KSC.

Provisions have been made for MSC subsystem managers or their representatives to participate at KSC with the NAA engineering evaluation group. Contact should be made with A.E. Morse, PPR-12, KSC, who will establish the operational interface with NAA through Stan Taylor, NAA-F/F. An orientation will describe the facilities, procedures, and information available for the visiting personnel.

Following the briefing, personnel will participate in a pre OCP Review (including Post Test Data Requirements), the OCP itself, and the OCP Results Review.

To provide the necessary visibility for effective interfacing with the current NAA/KSC analysis effort, detailed KSC operational information is presented. (Attachment 1.)

Specific duties of the NAA analysis team as well as those of ATO data support personnel have been defined by NAA F/F. (See attachment 2.)

/s/William N. Bland, Sr.

Enclosures

PH6:REMcKann:sml

Attachment I

The post-test pre-flight data generated by the ACE station at KSC is in the format of strip charts and ACE tapes. Additional data is available from the Communications Ground Station which records data from the FM links on an open or closed loop basis. The ACE tapes are presently stored by General Electric in the computer room area. The strip charts are stored in a Data Evaluation Room under the cognizance of the Information Systems Directorate (INS) of KSC. INS has no authority to edit, annotate, or otherwise ammend these records other than to provide a storage, record, and check-out function. INS has a further, separate function to reduce data on an "off-line" basis, as required, based on a previously negotiated and validated requirement and for which a program has been prepared.

The spacecraft system engineers of NASA,KSC, Spacecraft Operations Directorate (SCO) usually submit their requests for data processing through their spacecraft contractor representatives (NAA for S/C 009). NAA has a central point of contact for all their NAA F/F or NAA-Downey representatives' request for data. A direct interface has been established between NAA and INS, however this interface is subject to SCO review and approval if required. Additional, separate requests for data processing may be imposed on INS directly by SCO.

SCO does not at this time have data group directly responsible for data control (i.e. cross referencing, editing, reduction of redundent data, compilation of data reports for systems review) although they have been asked to establish such a group by the KSC Program Office. For their own purposes SCO had not previously established such a group because their systems people were intimately familiar with the test details by personal review of the real time events and past test data review as required.

It is the requirement for data to be made available for other than KSC-SCO and NAA F/F personnel that makes the requirement for a data control group mandatory. NAA-Downey, integrating their requirements and review with their NAA F/F counterpart, requires an NAA effort of this type but due to their "on the spot" efforts they may not provide a formal report and records sufficient to satisfy other requests. NAA F/F cannot integrate the requirements of MSC and NAA-Downey althrough this effort would be beneficial to consolidate analysis of the problem and the specific data requirement.

The KSC Manned Spacecraft Program Office is the official interface through which the MSC requests for data are processed. At the moment, until a data evaluation team or office is established at KSC, this office has no operational control of the original data without specific coordination with the SCO engineers on a per request basis. This effort is being pursued by the KSC Program Office with the support of General Electric personnel. Because of the time required to pursue these individuals requests, a quick "turn-around-time" cannot be presently supported.

Prior planning and submission of specific types of data for the pre-launch checkout has been accomplished to some degree through the PSRD. This information relates primarily to the flight PCM data recorded by KSC-INS. Data records are available at KSC but no known pre-flight post-test MSC requests are presently programmed in the PSRD. All data reduced from these tests would be voluminous. Like other data generated by ACE, copies of data for specific time intervals should be requested.

The underlying problem throughout the quest for data for engineers external to KSC is the volume of data available and the difficulty in anyone not familiar with the records and their annotation in obtaining that specific piece of data required. Also requests for all data pertaining to a certain event or function requires a detailed analysis of the the total data to determine the complete cross referencing of data on ACE tapes, or strip charts, or ground telemetry station records. Only a system engineer, versed in the OCP preparation, format, and operation can coordinate, readily, requests of this type.

Due to the limited time remaining in the pre-flight checkout of S/C 009, it is strongly recommended that the most expeditious method of obtaining the required system data is for personal visits to be made to KSC. The advantages of this intermediate solution to the problem of being versed on the proper operation of the spacecraft systems are that the interfaces established by the NAA-Downey system evaluation team can be readily assimilated and that coordinated review of the problems and data required can be made with the NASA and NAA engineers. The KSC Program Office and the NAA test team have promised their full cooperation in providing whatever information and support they can in making this endeavor successful.

Attachment 2

EXPECTED DUTIES OF ANALYSIS TEAM

1. Review OCP in advance of its performance.
2. Define in advance those sequences of specific interest.
3. Specify what data is desired and what format it should be in.
4. Review data pertinent to your system.
5. Prepare a summary report giving analysis of your system's performance during a given OCP.
6. Review data from tests already performed and write summary report.
7. On special tests of a troubleshooting nature, participate directly by being in the ACE Control Room, or wherever the work is being accomplished.
8. During performance of OCP's specify times when access to control room is desired to monitor testing first hand.
9. Close coordination with your ATO Systems counterpart is expected (at least initially) to interpret what is actually going on during specific sequences of an OCP.

NOTES a) Where data (other than hand written values) is required as permanent documentation, special requests for additional playbacks or reproduction of existing data must be made. All raw data at this facility generated by ACE or NASA support facilities belongs to KSC.

b) For personnel who are not familiar with the area, a tour of the facilities is recommended so they may better appreciate working conditions under which tests are performed.

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APPENDIX E

SYNOPSIS OF APOLLO CONTRACT WITH NORTH AMERICAN

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SYNOPSIS OF APOLLO CONTRACT WITH NORTH AMERICAN INCORPORATED

TOTAL PROGRAM:

The portion of the Apollo Program contracted with North American Aviation Incorporated started on December 21, 1961, and will extend through completion of the Program in 1969.

Major Contractual Phases are:

Time Period	Contract Type	Prime Document
21Dec 61 - 13 Aug 63	Letter	Letter Contract NAS 9-150
21Dec 61 - 1 Oct 65	CPFF	Contract NAS 9-150
3 Oct 65 - 3 Dec 66	CPIF	S/A 115 to NAS 9-150
4 Dec 66 - Onward	Letter	S/A 220 to NAS 9-150

DEC 61 TO OCT 65 CPFF:

During the CPFF period 21 December 1961, through 4 October 1965, North American furnished design, development, manufacturing and field services including 19 mockups, 19 boilerplates, 4 spacecraft (001, 004, 007 and 009), GSE valued at 156.6M and spare parts valued at 32.6M. The North American plants were at Downey, California, and Tulsa, Oklahoma, with the bulk of the effort at Downey. The field services were furnished at WSTF, MSC, and KSC and involved site activation, vehicle checkout and test operation. The total estimated cost of the CPFF effort through October 2, 1965, was settled as %1.47 billion with a fee of %78 million.

OCT 65 to DEC 66 CPIF - S/A 115:

Supplemental Agreement 115, for the conversion to CPIF, was written in the form of a total contract that summarized the contractual agreements under the CPFF portion and presented in effect a complete new contract for the CPIF portion. It covers the period from 5 October 1965, through 3 December 1966 and includes Development, Manufacturing, and Test under an "Interdependency" incentive; GSE Manufacturing under a "Cost" incentive; Spare Parts Manufacturing under a "Cost" incentive; and a very limited amount of provisioned overhaul, repair, and facility activation under a cost plus fixed fee arrangement.

DEC 66 ONWARD:

Letter Amendment designated Supplemental Agreement No. 220 extend the contract through December 30, 1966. Subsequent amendments to S/A 220 have extended coverage through 1 April 1967. The contract presently under negotiation, has essentially the same features and incentive conditions as S/A 115. There are moderate differences in the method of applying incentives on checkout and flight, the management incentive is dropped, a FY 67 cost incentive is added and there are differences in the sharelines and weightings given the various incentive measurements.

S/A 115 CONTRACT ROAD MAP

The index to Part 1 Schedule is on page II of the schedule. The index to the entire S/A 115 is on page 91 of the schedule. The contract is:

Part I Schedule

In addition to special provisions such as Government Furnished Tooling, Make or Buy, Security, Overtime, Contractor Pricing Data, etc. Part I includes extensive provisions for the operation of the incentives under Article V, "Consideration and Payment" and Article XXIX, "Special Incentive Provisions."

Part II Statement of Work

The Statement of Work covers the task to be performed throughout the scope of the entire program. It covers the full range of goods and services from initial design trhou

It covers the full range of goods and services from initial design through post flight analysis of the last spacecraft.

Part III NASA Tasks

This covers NASA responsibilities for supplying data, interfaces, equipment, facilities, etc.

Part IV Hardware and Delivery Requirements

This specifies the hardware to be delivered with appropriate specification references and with the delivery schedule. Since the S/A 115 includes all previous effort, this part specifies the program totals from the beginning of the CPFF phase through the total contracted mockups, boilerplate, and spacecrft. To determine the items to be delivered in the October 65-December 66 CPIF period, one should deduct the items delivered prior to Octob er 1965 and those scheduled for delivery past December 1966.

S/A 115 called for the delivery of 1 boilerplate and 14 spacecraft during the Oct 65-Dec 66 period. The boilerplate was cancelled; two spacecraft were cancelled; 10 spacecraft were delivered; and 2 remained undelivered.

Exhibit E-GSE

This is a reference list of S/A's that are priced GSE lists.

Exhibit F-Spare Parts

This is a reference list of S/A's that are priced Spare Parts lists.

Exhibit G-GFP/GFE

This is the list of GFP/GFE to be furnished by the Government. Its index is on Figure III of exhibit G and it is broken down into GFP at the manufacturers' plants, GFE for incorporation in hardware and base support to be furnished the contractor in his operations at MSC, KSC, WSTF and El Centro.

Exhibit H-Make or Buy List

Exhibit I-Documentation

This exhibit lists all documentation to be furnished by NAA, including CSM data packages, test reports, checkout plans, training materials, security plans, etc., specifying the frequency and the approval level for changes. (Type I documents require NASA approval before implementating. Type II documents are issued with information copies furnished for NASA surveillance. Type III documents are all others.)

Exhibit L-PERT

This defines Pert and cost procedures used on this program.

Exhibit M-Off Site Test Programs Work Statement

This is the statement of work for NAA activity at KSC, WSTF, and MSC.

Exhibit N-Facility/GSE Site Activation Subcontracting

This exhibit is a reference of S/A's that list subcontracted site activation at WSTF, MSC and Downey.

Exhibit O-Common Usage Requirements

This exhibit specifies requirements for implementing common usage of equipment within the Apollo Program.

Exhibit P-Deviations to Contracted Language

Exhibit Q-Miscellaneous Hardware List

This list covers items authorized by the Contracting Officer for contractor procurement in the lieu of Base Support.

Exhibit R-Incentive Exhibit

This exhibit contains the measurement criteria by which incentive performance points are earned and a table of rates for computing earned fee.

Exhibit S- Flight Operations Support Program

This exhibit lists additional personnel to be furnished at KSC and MSC in direct support of flight operations.

Exhibit T-Work Packages

This exhibit is in support of a unique arrangement occasioned by the cutoff date of December 3. The NAS 9-150 Statement of Work covers all effort through the end of the program. This effort is limited to work through December 3rd by S/A 115. In order to ascertain that the work negotiated was performed in the contract period (5 October through 3 December) and thus assure that the recorded costs were for the work negotiated, a more detailed definition of the work to be accomplished in this specific period was spelled out in Exhibit T, "Work Packages".

A recommended order for reading the contract would be:

Page 91 of the schedule-index Part I
Page 11 of the schedule-index contract
Page II Statement of Work
Part II Statement of Work
Part IV Hardware Delivery Requirements
Part III NASA Tasks
Exhibit M Off Site Test Programs
Exhibit S Flight Operations Support
WExhibit T Work Packages
Exhibit R Incentive Provisions
Part I, Article XXIX Special Incentive Provisions
Part I, Article V Consideration and Payment
Charts A, B and C - Following Part I
Other portions of Part I of interest
Other exhibits of interest

S/A 115 CPFF AND CPIF:

The portions of work in S/A 115 that are under CPFF, Cost Incentive, and Interdependent Incentive are:

THE OVERHAUL, REPAIR AND FACILITY ACTIVATION portion has an estimated cost of $3.9M *and a fixed fee of $0.2M.

The SPARE PARTS target cost is $12,000,000* , and is on a CPIF cost sharing basis which is specified on page 16 of S/A 115's schedule (Article V7(i)(z)). Exhibit F of S/A 115 lists the supplemental agreements that price the spare parts. Approximately 70% of the spare parts have been delivered as of December 3, 1966, cutoff data does not apply to the separately provisioned and priced spare parts.

The GSE TARGET COST is $43,427,668 *and is on a CPIF cost sharing basis which is specified on page 15 of S/A 115's schedule (Article V7(i)(1)). Exhibit E of S/A 115 lists the supplemental agreements that price the GSE. Approximately 90% of the GSE has been delivered. As in the case of the spare parts, the December 3, 1966, cutoff date does not apply to these separately provisioned and priced items.

The DEVELOPMENT, MANUFACTURING AND TEST EFFORT has a target cost of $561, 649,000* and is under interdependent incentives on cost and performance.

*These target values are the latest value reflecting the most current supplemental agreemental
*These target values are the latest value reflecting the most current supplemental agreements and are therefore different from the values originally specified in DS/A 115.

S/A 115 INTERDEPENDENCY INCENTIVE:

The interdependency can be described as a family of fee-cost sharlines. The highest fee-cost shareline is assigned to a performance rating of 1000 points. Progressively lower fee-cost sharelines are established for lower performance ratings down to a minimum performance of 500 points. The fee earned by the contractor is thus subject to two parameters, cost and performance. For illustration purposes, Charts A, B and C following page 93 of the S/A 115 schedule depict fees at representative levels of performance points and cost. Maximum fee for best cost and best performance is approximately 15%. There is a base fee of 4½% of target. Fee at target cost and maximum performance is approximately 12%.

Performance points in S/A 115 are measured in the areas of Pre-dilivery Mission Sequence Runs, Deliveries, Qualification, Ground Test, Pre-Flight Checkout and Launch, Flight Test, Block II Space-

Performance points in S/A 115 are measured in the areas of Pre-delivery Mission Sequence Runs, Deliveries, Qualification, Ground Test, Pre-Flight Checkout and Launch, Flight Test, BLlock II Spacecraft Manufacturing and Management. The cost-fee-performance arrangement is specified in Article V7 (i) (3) on page 16 of S/A 115 schedule. This in turn references a table in Exhibit R OF S/A 115 that specifies rates of fee decrease for each performance point from 1000 to 500 points. Exhibit, specifies the measurement criteria by which performance points are earned in each of the above areas as well as the table of rates for computing earned fee decreases.

In addition, the administration and scoring of the performance incentives are subject to a number of provisions relating to availability of government furnished items, methods of notation of points scored, pretest conditions, etc., which are specified in Article XXIX of the schedule. Also the scoring of the cost portion is subject to a work package adjustment. The work packages are defined in Exhibit T and the mechanism by which the final cost for fee purposes is adjusted for differences in work accomplished versus the work defined in the work packages is specified in Article XXIX (r) on page 84 of S/A 115 schedule.

In summary, Exhibit R and Article V, Part 1, specify the measurement criteria for performance and cost. However, both measurements are further refined by adjustments made according to provisions in Article XXIX of the schedule and Exhibit T.

HARDWARE SCHEDULES:

The hardware delivery schedules are specified in Part IV. To assist the overview of the contract, attached are summary delivery charts that show the effort plotted against time:

Attachment 11-2-26 shows boilerplates delivered during the CPFF portion of the contract.

Attachment 11-2-27 shows spacecraft (Block I) delivered as of September 64, the end of the CPFF portion of the contract.

Attachment 11-2-46 shows Block I spacecraft delivered as of December 66, the end of the S/A 115 portion of the contract.

Attachment 11-2-49 shows Block II spacecraft and mockups delivered as of December 66.

Attachment 11-2-55 shows the deliveries of Spacecraft LM Adapters through SC 109 as of December 66.

Attachment 11-2-56 shows the delivery schedule for Spacecraft LM Adapters for SC 110 through 115.

It should be noted that the Block II program extends through Spacecraft 115. The contract at present covers the program through Spacecraft 112. The addition of Spacecraft 113, 114, and 115 is currently under negotiation. Relative to effort beyond December 3, 1966, negotiations have been underway since October 66 for the definitization of the program from 4 December 66 through Spacecraft 112's launch and postflight analysis which is expected in mid-1969. The addition of effort related to SC 113, 114, and 115 will extend the expected completion to late 1969.

SCHEDULE RESPONSIBILITY S/ THOMAS MARKLEY

STATUS RESPONSIBILITY S C. L. TAYLOR

MANNED SPACE FLIGHT SCHEDULE
APOLLO MANUFACTURING & DELIVERY SCHEDULE
BOILERPLATES

3 LEVEL

PROJECT: Apollo

SCH'D NO: 3-1411-2a

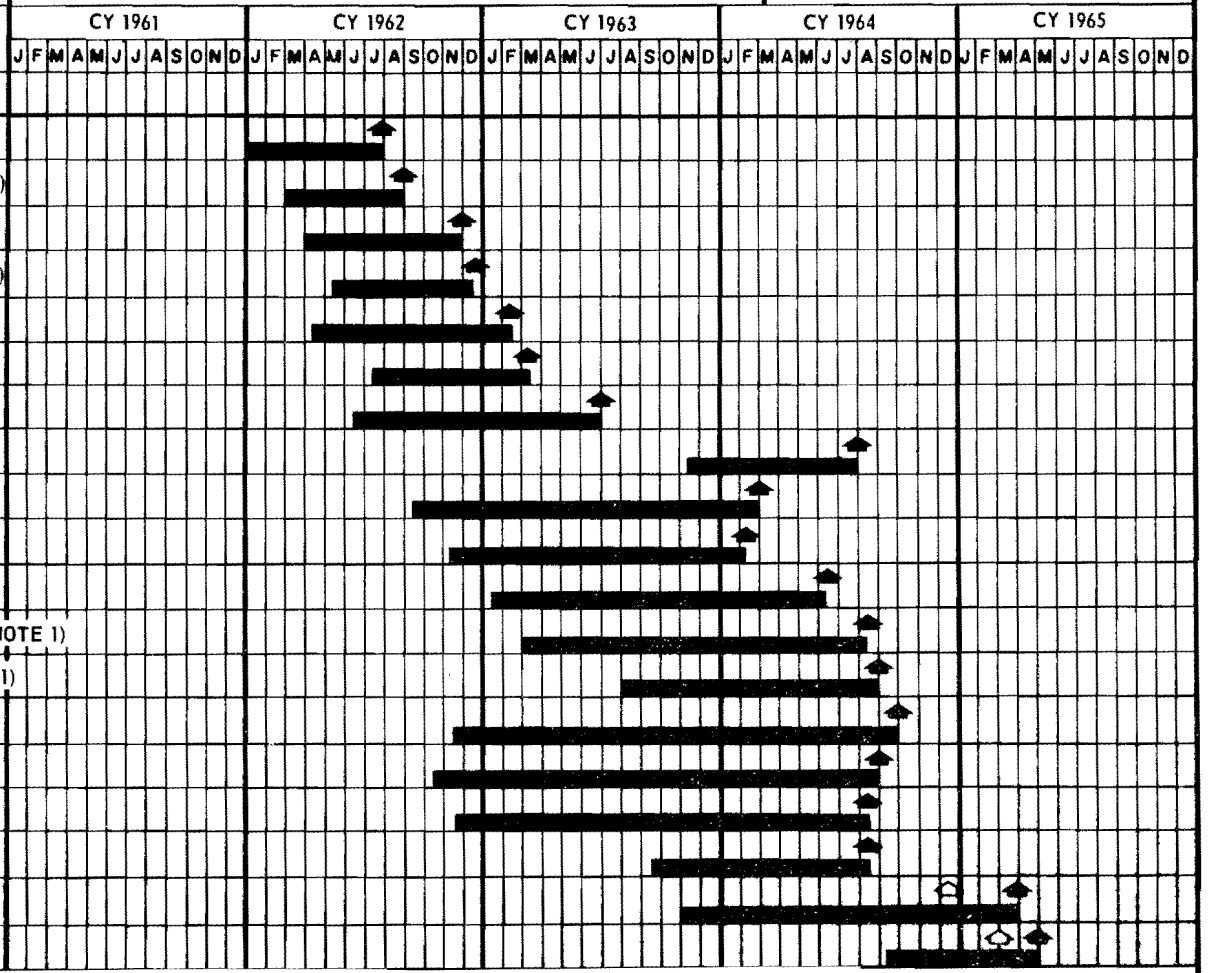
CONTRACTOR:

ORIGINAL SCHEDULE APPROVAL 2/8/63 (Date)

LAST SCHEDULE CHANGE JAN 65 (2) (Date)(No.) (Initials)

STATUS AS OF SEPT. 30, 1965 (Date) (Initials)

	MILESTONES
1	
2	BP-25CM FLOATATION & HANDLING (MSC)
3	BP-1CM LAND & WATER IMPACT (NAA) (NOTE 3)
4	BP-3CM PARACHUTE DROP TEST (N-V)
5	BP-2CM LAND & WATER IMPACT (NAA) (NOTE 3)
6	BP-19CM PARACHUTE DROP TESTS (N-V)
7	BP-9CSM DYNAMIC TESTS (MSFC)
8	BP-6CM PAD ABORT #1 (WSMR)
9	BP-6A PARACHUTE RECOVERY TEST (N-V)
10	BP-12CSM TRANSONIC LES DEV (WSMR)
11	BP-13CSM APOLLO DEVELOPMENT (KSC)
12	BP-15CSM APOLLO DEVELOPMENT (KSC)
13	BP-16CSM MICROMET EXP APOLLO DEV (KSC)(NOTE 1)
14	BP-26CSM MICROMETEOROID EXP (KSC) (NOTE 1)
15	BP-23CSM HI Q ABORT (WSMR)
16	BP-14CSM HOUSE SC #1 (NAA) (NOTE 3)
17	BP-28CM EARTH IMPACT TEST (NAA)
18	BP-27CSM DYNAMIC TEST (MSC) (NOTE 2)
19	BP-22CSM HI ALT ABORT DEV (WSMR)
20	BP-29CM FLOATATION TEST (MSC)



NOTES
1. SN AND ADAPTER DELIVERED TO MSFC FOR MODIFICATION.
2. BP-27 DELIVERED TO MSFC ON 2-1-65, AFTER MODAL TESTS AT KSC.
3. DELIVERY NOTED IS TRANSFER FROM MFG TO ENGR.

CSM STRUCTURE FOR LEN ALONG FLIGHT IS IDENTIFIED AS BP-30.
MFG & DELIVERY SCHED FOR BP-30 IS SHOWN ON PAGE 30.

SCHEDULE RESPONSIBILITY: S J. THOMAS MARKLEY

STATUS RESPONSIBILITY: S C. L. TAYLOR

MANNED SPACE FLIGHT SCHEDULE
SPECIAL SUMMARY
APOLLO MANUFACTURING & DEL SCHED
CSM-BLOCK I

3 LEVEL

PROJECT: Apollo

CONTRACTOR: NAA

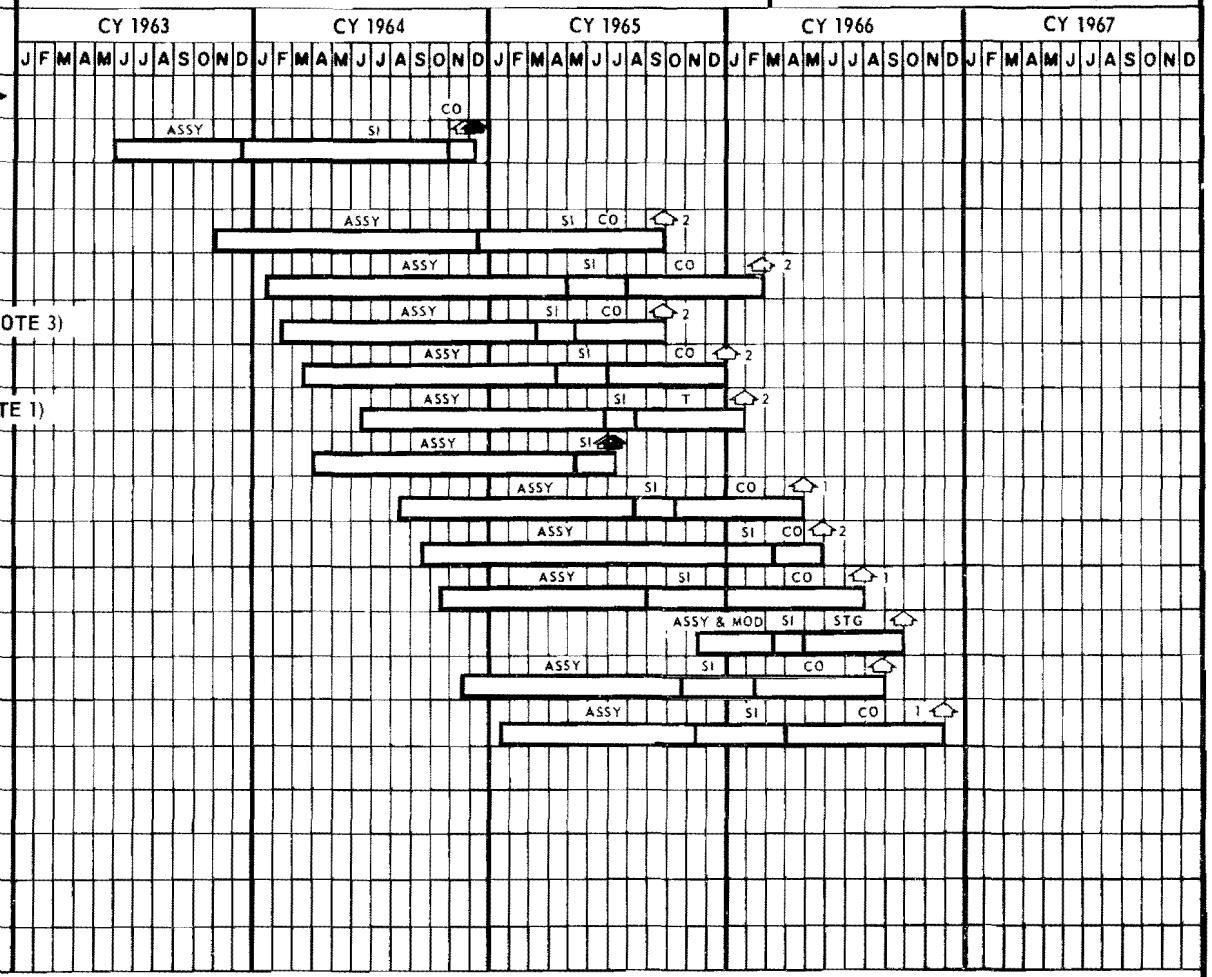
SCH'D NO:

ORIGINAL SCHEDULE APPROVAL: FEB 8, 1963 (Date)

LAST SCHEDULE CHANGE: JAN 65 (2) (Date)

STATUS AS OF: SEPT. 30, 1965 (Date) (No) (Initials) (Initials)

	MILESTONES
1	
2	SM 001 PROPULSION TEST (WSTF)
3	
4	CSM 009 SUPERCIRCULAR REENTRY (KSC)
5	CSM 008 T.V. TESTS (MSC)
6	CSM 002 INTERMEDIATE ALT ABORT (WSTF) (NOTE 3)
7	CSM 011 SUPERCIRCULAR REENTRY (KSC)
8	CSM 007 ACOUSTIC & FLOATATION TESTS (NOTE 1)
9	CSM 004 STRUCTURAL TESTS (NAA)
10	CSM 012 MANNED FLIGHT (KSC)
11	CSM 010 BACKUP FOR 002 (WSTF)
12	CSM 014 MANNED FLIGHT (KSC)
13	BP-30 LEM DEVELOPMENT (KSC)
14	CSM 017 SUPERCIRCULAR REENTRY (KSC)
15	CSM 020 SUPERCIRCULAR REENTRY (KSC)
16	
17	
18	
19	
20	



NOTES

ASSY–ASSEMBLY
SI –SUBSYSTEMS INSTALLATION
CO –FACTORY CHECKOUT
STG –STORAGE

SCHEDULED SHIP
T TEST
SHIPPED

1. END DATE IS DEL TO MSC FOLLOWING ACOUSTIC TESTS AT NAA
3. CHANGED TO AGREE WITH PAGE 29.

SCHEDULE RESPONSIBILITY /S/ J. MC CLINTOCK

STATUS RESPONSIBILITY /S/ R. C. HOOD

MANNED SPACE FLIGHT SCHEDULE
SPECIAL SUMMARY
APOLLO MANUFACTURING & DEL SCHED
CSM–BLOCK I

3 LEVEL

PROJECT: Apollo

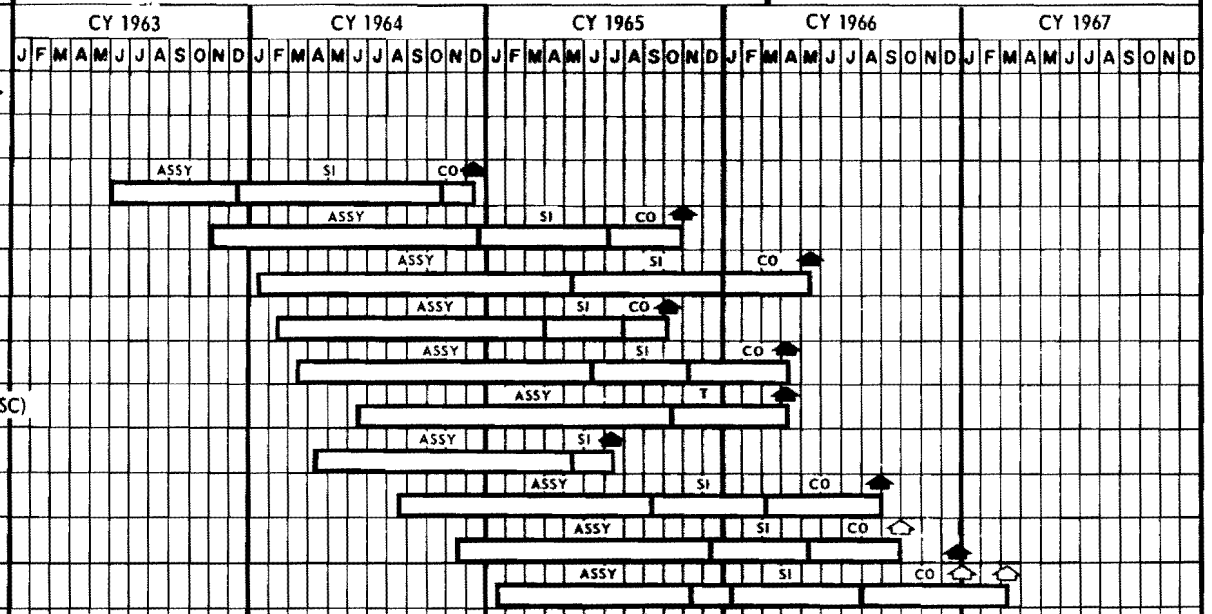
CONTRACTOR: NAA (NAS 9–150) SCH'D NO:

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE 12-9-65(1) RRG (Date) (No) (Initials)

STATUS AS OF DEC. 31, 1966 (Date) _____ (Initials)

	MILESTONES
1	
2	
3	SM 001 PROPULSION TEST (WSTF)
4	CSM 009 SUPERCIRCULAR REENTRY (KSC)
5	CSM 008 T.V. TESTS (MSC)
6	CSM 002 INTERMEDIATE ALT ABORT (WSTF)
7	CSM 011 SUPERCIRCULAR REENTRY (KSC)
8	CSM 007 ACOUSTIC & WATER IMPACT TESTS (MSC)
9	CSM 004 STRUCTURAL TESTS (NAA)
10	CSM 012 SPACECRAFT MISSION
11	CSM 017 SUPERCIRCULAR REENTRY (KSC)
12	CSM 020 SUPERCIRCULAR REENTRY (KSC)
13	
14	
15	
16	
17	
18	
19	
20	



NOTES
ASSY–ASSEMBLY
SI –SUBSYS INSTAL
CO –FACTORY C/O
STG –STORAGE

SCHED SHIP
T TEST
SHIPPED

THE COMPLETION OF ASSEMBLY BAR IS NOW DEFINED AS TRANSFER TO SYSTEMS INSTALLATION AREA. COMPLETION OF SYSTEM INSTALLATION IS NOW DEFINED AS TRANSFER TO SYSTEM TEST.

NASA FORM 796 REV. SEP. 63

11-2-46

SCHEDULE RESPONSIBILITY 'S/ J. MC CLINTOCK

STATUS RESPONSIBILITY 'S/ R. C. HOOD

MANNED SPACE FLIGHT SCHEDULE
SPECIAL SUMMARY
APOLLO MFG. & DEL. SCHED.
CSM BLOCK II

3 LEVEL

PROJECT: Apollo

CONTRACTOR: NAA (NAS9-150)

SCH'D NO:

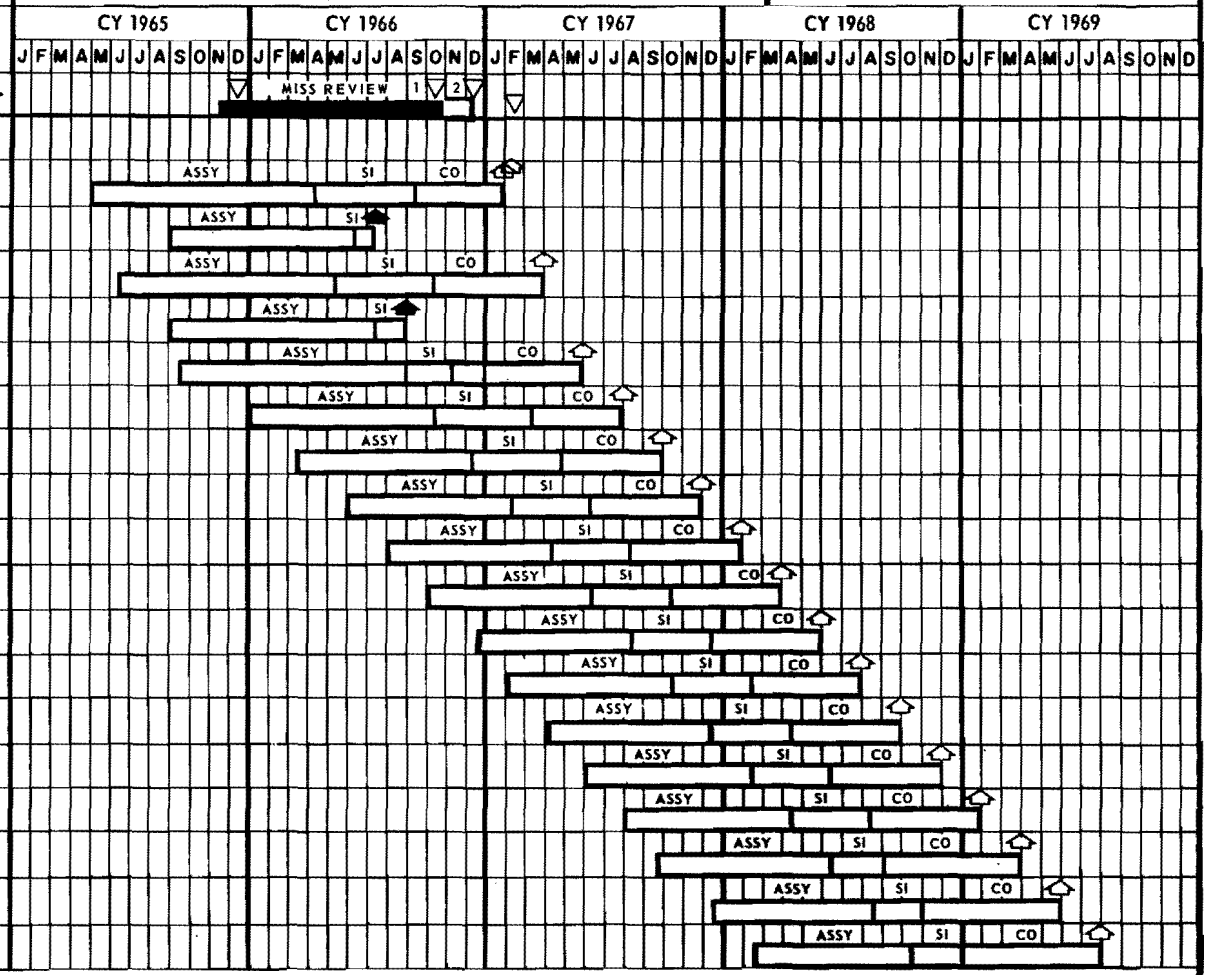
FEB. 8, 1963

ORIGINAL SCHEDULE APPROVAL (Date)

LAST SCHEDULE CHANGE 12-9-65(1) RRG (Date) (No) (Initials)

STATUS AS OF DEC. 31, 1966 (Date) (Initials)

	MILESTONES
1	BLOCK II HARDWARE INSPEC. & REV.
2	
3	2TV-1 T.V. TESTS (MSC)
4	2S-1 CM IMPACT TESTS
5	CSM-101, SPACECRAFT MISSION (KSC) (NOTE 1)
6	2S-2 STATIC STRUCTURAL TESTS
7	CSM-102, SPACECRAFT MISSION (KSC)
8	CSM-103, SPACECRAFT MISSION (KSC)
9	CSM-104, SPACECRAFT MISSION (KSC)
10	CSM-105, SPACECRAFT MISSION (KSC)
11	CSM-106, SPACECRAFT MISSION (KSC)
12	CSM-107, SPACECRAFT MISSION (KSC)
13	CSM-108, SPACECRAFT MISSION (KSC)
14	CSM-109, SPACECRAFT MISSION (KSC)
15	CSM-110, SPACECRAFT MISSION (KSC)
16	CSM-111,SPACECRAFT MISSION (KSC)
17	CSM-112, SPACECRAFT MISSION (KSC)
18	CSM-113, SPACECRAFT MISSION (KSC)
19	CSM-114, SPACECRAFT MISSION (KSC)
20	CSM-115, SPACECRAFT MISSION (KSC)



NOTES THE COMPLETION OF ASSEMBLY BAR IS NOW DEFINED AS TRANSFER TO SYSTEMS INSTALLATION AREA. COMPLETION OF SYSTEM INSTALLATION IS NOW DEFINED AS TRANSFER TO SYSTEM TEST.

1. RESCHEDULED DELIVERY DATE APPROVED BY APD-CCB #68,8-16-66

ASSY–STRUCTURAL ASSEMBLY
SI –SYSTEMS INSTALLATION
CO –FACTORY CO
⌂ –DELIVERY SCHEDULED

SCHEDULE RESPONSIBILITY S/ J. MC CLINTOCK

STATUS RESPONSIBILITY /S/ R. C. HOOD

MANNED SPACE FLIGHT SCHEDULE
APOLLO MFG. & DEL. SCHEDULE
ADAPTER

3 LEVEL

PROJECT: Apollo

CONTRACTOR: NAA (NAS 9-150)

SCH'D NO:

ORIGINAL SCHEDULE APPROVAL FEB. 8, 1963 (Date)

LAST SCHEDULE CHANGE 2-28-66(2) RRG (Date)

STATUS AS OF DEC. 31, 1966 (Date) (No) (Initials)

	MILESTONES
1	CSM DELIVERIES
2	ADAPTER 19 (SC110) (KSC)
3	ADAPTER 20 (SC111) (KSC)
4	ADAPTER 21 (SC112) (KSC)
5	ADAPTER 22 (SC113) (KSC)
6	ADAPTER 23 (SC114) (KSC)
7	ADAPTER 24 (SC115) (KSC)
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

CY 1967 | CY 1968 | CY 1969 | CY 1970 | CY 1971

J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

110 111 112 113 114 115

NOTES

SCHEDULE RESPONSIBILITY S J. MC CLINTOCK

STATUS RESPONSIBILITY /S/ R. C. HOOD

MANNED SPACE FLIGHT SCHEDULE
APOLLO MFG. & DEL. SCHEDULE
ADAPTER

3 LEVEL

PROJECT: Apollo

CONTRACTOR: NAA (NAS-9-150)

SCH'D NO:

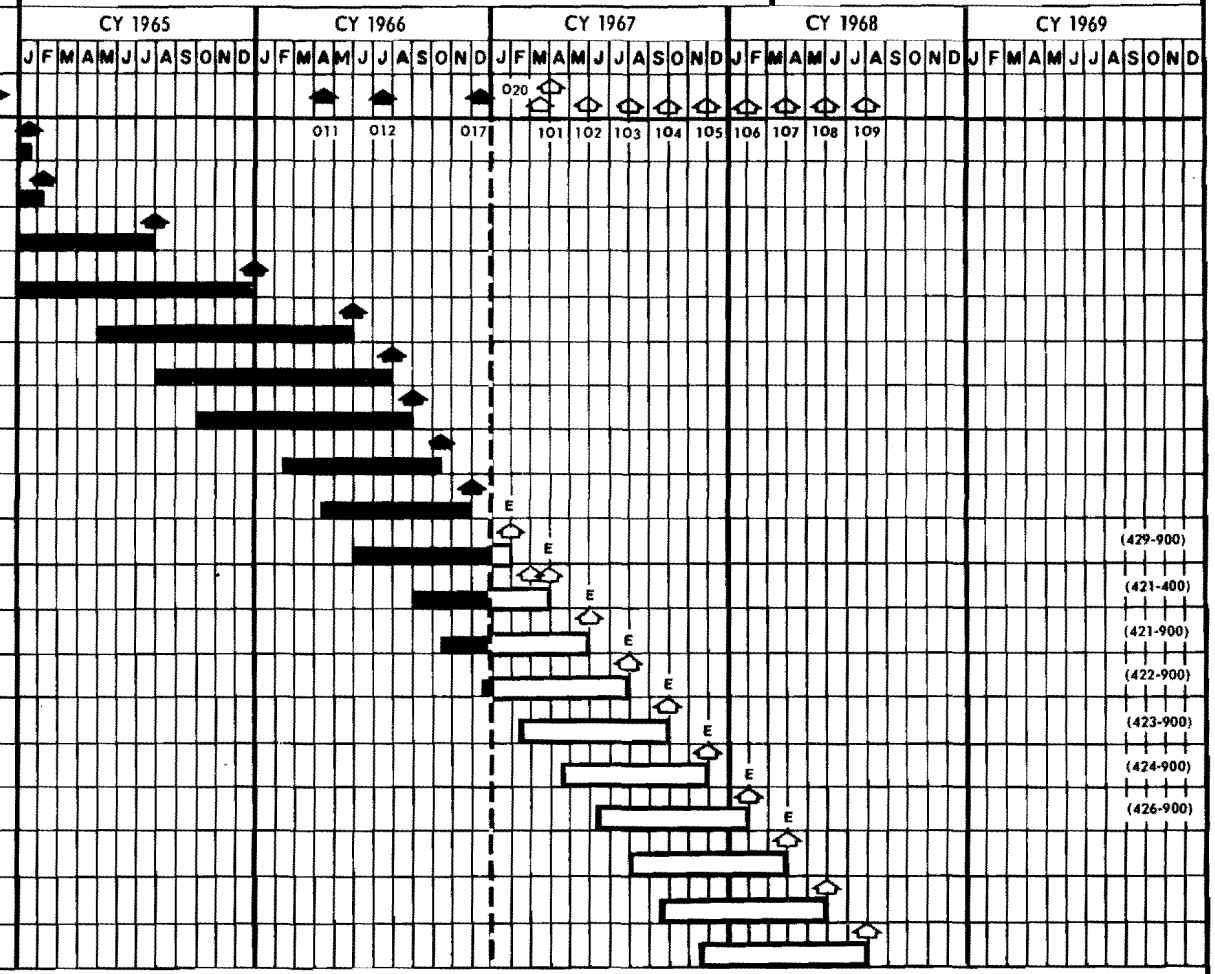
FEB. 8, 1963

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE 2-28-66(2) RRG (No) (Initials)

STATUS AS OF DEC. 31, 1966 (Date) _____ (Initials)

	MILESTONES
1	CSM DELIVERIES
2	ADAPTER 1 (BP-27) (MSFC)
3	ADAPTER 1 (STRUCT TEST)(TULSA)
4	ADAPTER 3 (CSM009) (KSC)
5	ADAPTER 4 (CSM011) (KSC)
6	ADAPTER 5 (CSM012)(KSC)
7	ADAPTER 6 (CSM014)(KSC)
8	ADAPTER 8 (CSM017) (KSC)
9	ADAPTER 7 (LM ENCL #1)(KSC)
10	ADAPTER 9 (CSM020)(KSC) (NOTE 1)
11	ADAPTER 7A (LM ENCL #2)(KSC)
12	ADAPTER 10 (SC101) (KSC)
13	ADAPTER 11 (SC102) (KSC)
14	ADAPTER 12 (SC103) (KSC)
15	ADAPTER 13 (SC104) (KSC)
16	ADAPTER 14 (SC105) (KSC)
17	ADAPTER 15 (SC106) (KSC)
18	ADAPTER 16 (SC107) (KSC)
19	ADAPTER 17 (SC108)(KSC)
20	ADAPTER 18 (SC109) (KSC)



NOTES

1. DO 250 SIGNED. SLA PLACED IN STORAGE AT TULSA. TO BE SHIPPED AT LATER DATE.