

APOLLO PROGRAM DIRECTIVE NO. 47

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FROM: *Sam C. Phillips*
APOLLO PROGRAM DIRECTOR

SUBJECT : Apollo Inter-Center Interface Management

OFFICE OF PRIME RESPONSIBILITY (OPR): Apollo Program Control (MAP)

- REFERENCES:
- (a) Apollo Program Development Plan (M-D MA500, MA 001.000-1).
 - (b) Apollo Program Configuration Management Manual (NPC 500-1).
 - (c) Apollo Program Directive #6A - Sequence and Flow of Hardware Development and Key Inspection, Review and Certification Checkpoints.
 - (d) Apollo Program Directive #7 - Apollo Design Certification Review.
 - (e) Apollo Program Directive #8 - Apollo Flight Readiness Reviews.
 - (f) Apollo Program Directive #34 - Apollo Program CCB Controls and Requirements.
 - (g) Panel Review Board Minutes of meeting 63-2 dated November 7, 1963 and attachment "Panel Review Board Charter."

I. PURPOSE

The purpose of this Apollo Interface Management Program Directive is to more clearly define the requirements and systems for maintaining Inter-Center interface design compatibility between interfacing items. This provides the management tools for effective interface control in the design and development of systems and equipments that have physical, and related functional and procedural interface requirements.

II. SCOPE

The requirements and procedures herein define the Apollo Inter-Center Interface Management System. The contents supersede all previous OMSF/APO policies, requirements, authorities and responsibilities pertaining to Apollo Inter-Center Interface activities. This directive is applicable to all organizations and program elements affected by Inter-Center Interface Management requirements.

III. POLICY

- A. The Apollo Program Office shall establish all requirements of the Apollo Inter-Center Interface Management System.
- B. The Apollo Inter-Center Interface Management System is established to maintain design compatibility between interfacing end items, including effective control over changes to systems and equipment requirements which have physical, and related functional and/or procedural interface relationships.
- C. Interface Control Documents establish Inter-Center joint agreements for interface requirements and are "controlled" in that these interface requirements cannot be unilaterally changed. ICD's must be approved by Inter-Center Panel Co-Chairmen and be approved by the affected Center Level II Configuration Control Boards (CCBs) through officially issued Configuration Control Board Directives (CCBDs).
- D. Changes to ICDs (IRNs) which meet the Criteria for Level I Changes as defined by APD #34 shall be approved by the Level I CCB.
- E. All Interface Control Documentation shall comply with this directive. Existing ICDs need not be revised; however, when revisions to ICDs are prepared, they shall comply with this directive.
- F. All interface control documentation shall be Class I documentation as defined by MIL-D-70327.
- G. The Inter-Center Coordination Panels and Sub-Panels as shown in Figure 3 shall operate in accordance with the requirements and procedures herein. (See Attachment 1).

IV. GENERAL

- A. Interface - A region common to two or more elements, systems, projects or programs, characterized by mutual physical, functional and procedural properties. Specifically, and Apollo (Inter-Center) interface is restricted to Apollo/Saturn space vehicles and supporting equipment; is controlled by an Apollo Inter-Center Coordination Panel and affected Center Level II Configuration Control Boards (CCBs); and affects the concerned interfacing Centers and their contractors.
- B. Interface Control Documents - ICDs are either drawings or documentation that record the compatible design relationships between two or more interfacing end-item designs.
- C. Interface Revision Notice - An IRN is a standard form used to record changes to an approved ICD or IRN.
- D. Preliminary Interface Revision Notice - An IRN is "preliminary" (PIRN) until approved by Inter-Center Panel Co-Chairmen and by affected Center Level II CCBs through officially issued CCBs. It then becomes an official change to the parent ICD.
- E. Interface Management shall be accomplished in four distinct phases: Identification, Documentation, Implementation and Control.
1. The Identification phase consists of the determination of the existence and the necessity for control of an interface.
 2. The Documentation phase is the period in which ICDs are prepared. The interfaces shall be so defined as to assure complete design compatibility. The ICDs are to be prepared and released in accordance with procedures contained herein.
 3. The Implementation phase is that part of the program during which interface requirements, as defined by the ICDs and engineering change control requirements, are contractually imposed on design organizations and/or contractors to establish an interface baseline.

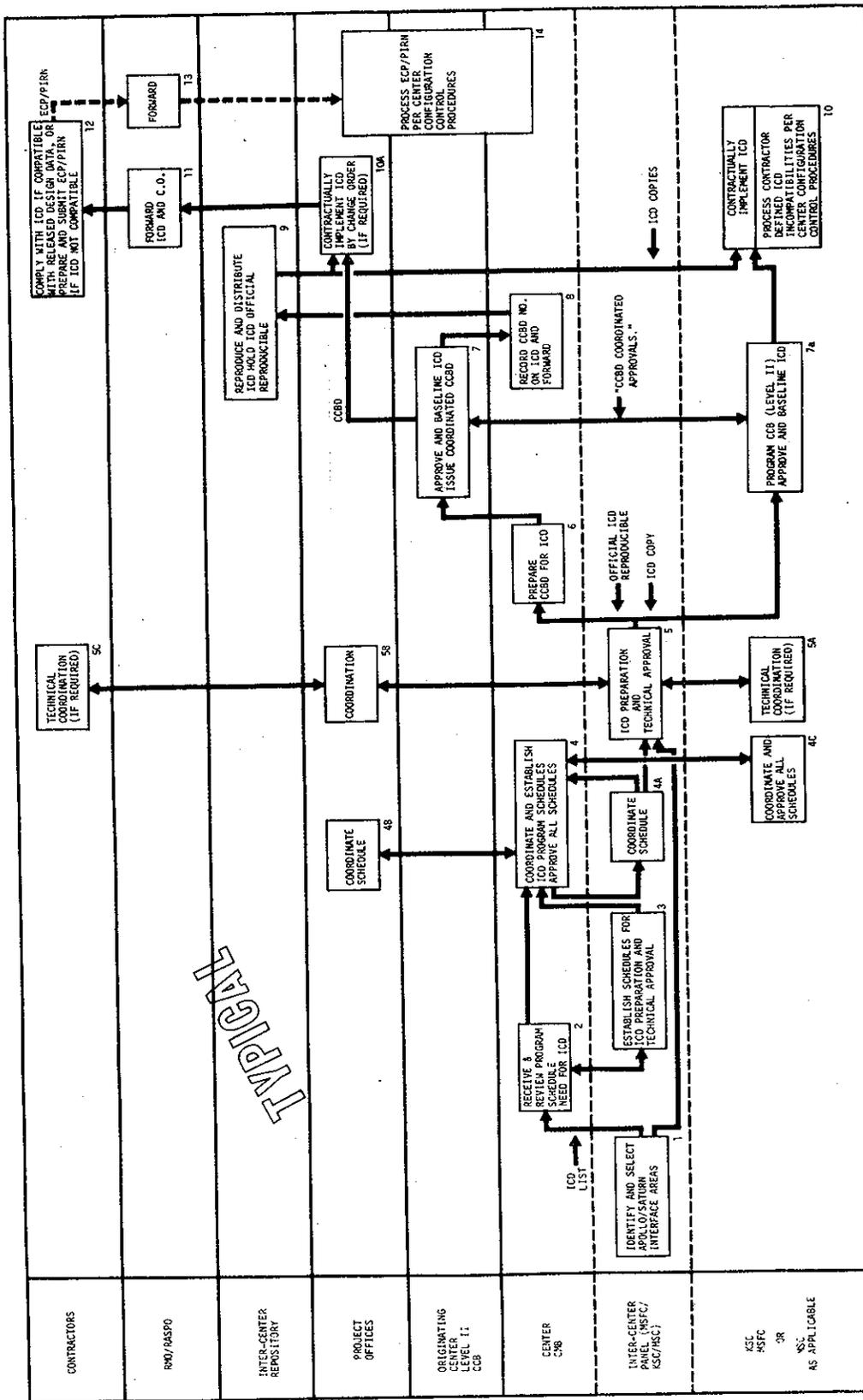
4. The Control phase is that part of the program which requires approval of proposed changes to interface requirements in order to prevent unilateral changes which could result in incompatible interfaces.
- F. Types of Interfaces - All physical interfaces, and related functional and procedural interface requirements are to be reflected within each interface area identified. Technical analysis of the conditions within each area shall determine the interfaces to be controlled. Types of interfaces are as follows:
1. Physical - Those interfaces involving the mechanical assembly and spatial relationship between interconnecting parts of Inter-Center Contract End Items (CEI's). The requirements include physical and clearance envelopes that are established to avoid interferences and to permit access.
 2. Functional - Those interfaces related to physical interfaces involving specific system design characteristics. The requirements include structural loads, fluid flows, and electrical circuit characteristics; as well as those interfaces involving the interaction or influence of conditions imposed by one system or component upon another, or from external sources, e.g., shock, vibration, heat transfer, acoustics, pressure, radiation, atmospheric aberrations, etc.
 3. Procedural - Those interfaces related to physical interfaces involving the sequence of events occurring in the assembly, alignment, service, maintenance, test and operation of related systems, hardware, and computer programs.
- G. Interface Areas - Apollo Inter-Center Interface Control Documents shall include but not be limited to the following interface areas:

G. Interface Areas (cont'd)

Launch Vehicle	to	Spacecraft
Q Ball	to	Spacecraft
Q Ball	to	Launch Complex
Spacecraft GSE	to	Launch Complex
Spacecraft	to	Launch Complex
Launch Vehicle	to	Launch Complex
Space Vehicle	to	Launch Complex
Spacecraft	to	LVGSE
Launch Vehicle	to	Manned Space Flight Network
Spacecraft	to	KSC Industrial Area
Launch Vehicle GSE	to	Launch Complex
Space Vehicle GSE	to	Launch Complex
Spacecraft GSE	to	Launch Vehicle GSE
Spacecraft	to	Manned Space Flight Network

H. Preparation - Interface Control Documentation or revisions thereto, shall be prepared so as to include only the essential information required to completely define the interface. The following criteria shall be used to define the necessary information to be included:

1. All design criteria and design requirements which establish the overall technical direction for hardware and software interface design, describing the general parameters and constraints, including limits and tolerances, under which the hardware and software must function.
2. Physical and functional design details, and operational and procedural requirements including their limits and tolerances, the changing of which will have an impact on other Center hardware or software, performance, cost or schedule accomplishment, (e.g., information that must be controlled at all affected Centers to assure that all sides of the interface are fully coordinated).
3. The ICD shall not include information such as operational or procedural requirements that by nature normally varies up until the launch date and does not make control practical or necessary.



INTER-CENTER (LEVEL A) ICD FLOW DIAGRAM

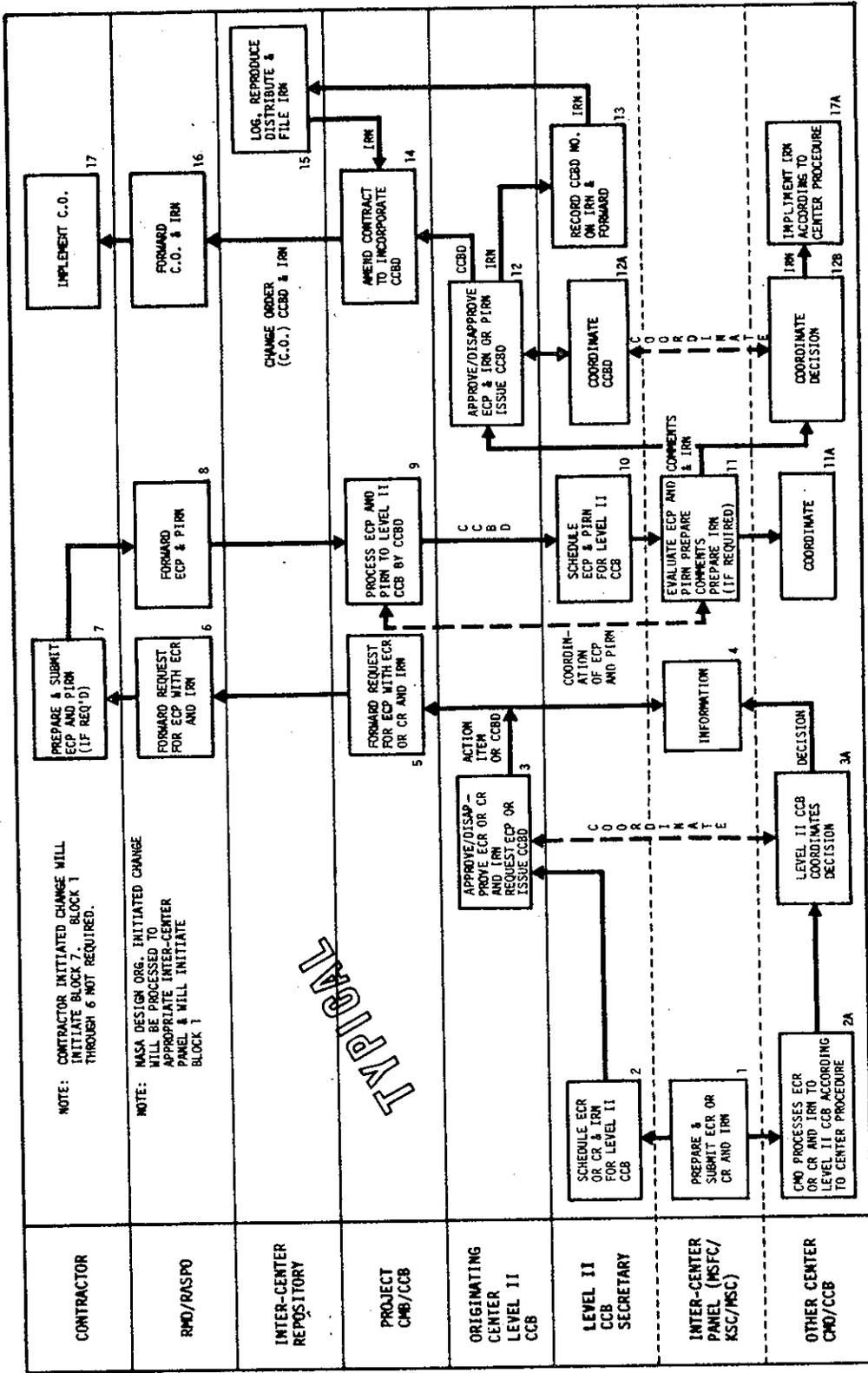
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- J. Origination - An Interface Control Document, or changes thereto, may be originated at any Center or by any of its contractors. When originated by a contractor it shall be a part of an Engineering Change Proposal (ECP) (See Figure 1).

NOTE: Preliminary Interface Revision Notices (PIRN's) will normally be received as part of an ECP change package. All PIRN's shall be routed with a copy of the ECP to the cognizant Panel Chairman or Co-Chairman (at the Center receiving the ECP) for review and evaluation. The change(s) shall be handled as a package.

- K. Effectivities for Inter-Center (Level "A") ICD's/IRN's shall be assigned to, and on, each ICD/IRN for the Apollo Program major end items for which the Center is responsible. These effectivities shall be as follows:
1. Launch Vehicle SA-503, SA-504, etc.
 2. Spacecraft
For CSM Boilerplates BP-9A, BP-13, etc.
For CSM Block II CSM-103, CSM-104, etc.
For Lunar Modules LM-3, LM-4, etc.
For Adapters 10, 11, etc.
For LES SC-103, SC-104, etc.
 3. Launch Complex 39
For Firing Room FR-1, FR-2, FR-3
For Mobile Launcher ML-1, ML-2, ML-3
For VAB-Hi-Bay VHB-1, VHB-2, VHB-3, VHB-4
For Pad PAD-A, PAD-B
For LVGSE SA-503, SA-504, SA-505, etc.
For SC GSE SC-103, SC-104, etc.
 4. Launch Complex 34, 37B
 5. Other
For Complex 16, Test Site Comp. 16
For MSOB MSOB
 6. When the effectivity of an ICD/IRN is meant to cover subsequent items, it shall be noted in the effectivity block as, e.g. SA-503 and subs, meaning all vehicles in the Saturn V Program. If the change were not to include SA-505, it would be written SA-503 thru SA-504 SA-506 and subs, or SA-503, 4, 6, and subs.

- L. Approval - Each Interface Control Document shall be submitted to the appropriate Panel Co-Chairmen or Senior Representatives. The Panel Chairman first receiving the original document will apply the Apollo Inter-Center Interface Control Document form (MSFC decal - Form 1916). He will denote his approval by signature and forward the ICD to others affected. Differences must be worked out by the Co-Chairmen until all concerned have evidenced their approval by signature, or the document is invalidated and returned to the originator with appropriate comment. The Panel Secretariat will forward approved documents to each affected Center Level II CCB(s) for approval/disapproval and implementation by CCBD.
- M. Implementation - Once approved by the affected Center Level II CCBs (and forwarded to the Repository for release) ICDs and approved changes (IRNs) thereto shall be unilaterally implemented by the appropriate Center/Project contracts office against the affected contractor(s). Contractor impact response shall be in the form of ECPs submitted to affected CCBs thru established contractual channels. Where major impacts might be expected, the Centers, unless implementation is directed by the Level I CCB, may request contractor(s) impact(s) in the form of an ECP(s) and resolve Inter-Center incompatibilities thru joint Center Level II CCB action or forward recommendations to the Apollo Level I CCB for resolution to implementation.
- N. Interface Revision Notice (IRN) Processing - Interface Revision Notices (IRN's) shall be used to document approved changes against an approved ICD. Technical and program approval of an IRN will result in incorporation of the IRN in a subsequent revision of the ICD. An IRN shall always be accompanied by an ECR, CR or ECP and is processed as part of a change package. (See Figure 2.)
1. Interface Control Document revisions shall be prepared to incorporate only approved IRN's in an ICD. Each revision shall be alpha-designated and shall indicate the identity of IRNs incorporated or canceled and the effectivity of the change.
 2. IRN's and revised ICD's shall be submitted for approval to affected CCBs in accordance with established change procedures and shall be reflected in the ICD Log after approval.



INTER-CENTER (LEVEL A) ICD CHANGE (IRN) FLOW DIAGRAM

3. The following key functions are required to complete the cycle for processing Interface Revision Notices. Details involved in carrying out these functional responsibilities are as follows:
- a. Initiation - Changes to ICD's may be originated by any of the following:
 - (1) Apollo/Center Technical Activity
 - (2) Contractor
 - (3) Apollo/Saturn Inter-Center Panels (or Sub-Panels).
 - b. Review
 - (1) Contractor proposed solutions (ECP's/PIRN's) to interface problems. The Panel/Sub-Panel shall prepare an IRN, assign an IRN number and route for technical review with the ECP's.
 - (2) Government proposed solutions to interface problems. The Panel/Sub-Panel shall prepare an ECR or CR/IRN, assign an IRN number and route ECR or CR/IRN for technical review.
 - c. Evaluation - The Panel/Sub-Panel shall obtain and coordinate review comments as necessary and evaluate the resultant proposed IRN. Panels/Sub-Panels technical approval/disapproval and recommendations, together with justifications and technical backup, shall be submitted to the appropriate Level II CCB(s) in accordance with the affected Centers' procedures.
 - d. Authentication - All IRN's shall be approved by the Panel Chairman/Co-Chairman (C/C-C) at the Center which originated the change and shall be signed prior to being sent to the other Center C/C-C impacted by the interface. The C/C-C at the impacted Center will review the IRN's and if in technical agreement approve the proposed change, and transmit a reproducible copy of the technically approved IRN to the originating C/C-C.

- e. Handling of IRN's - IRN's shall be coordinated between Centers in the most expeditious manner during the review and approval cycle.
 - f. Decision - Each responsible CCB, after Inter-Center coordination, shall make the final program decision on the proposed change (IRN) after evaluating the recommendations of the Panel, the CMO, and the CCB members. The CCB(s) issue a CCBD(s) signed by the Chairmen publishing the decision and in the case of approval, direct implementation of the IRN thru appropriate channels. In the event one Center disagrees, both Centers shall forward the proposed change to the Apollo Level I CCB for resolution in accordance with the requirements of NPC 500-1.
 - g. Implementation - An IRN is released only by an authorizing CCBD. The IRN shall reference CCBD numbers assigned by the interfacing Centers. The responsible contracts officer(s) shall issue instructions to the appropriate contractor(s) directing implementation of the direction contained in the CCBD. Contractual direction for implementation shall be given as stated in the CCBD. In no case shall implementation be unilateral by any Center without other Center CCB concurrence.
4. ICD Revisions - A revision to an ICD shall be made to incorporate approved IRNs when a maximum of six approved IRNs are outstanding or any IRN is outstanding for 90 days.
- O. Specification Incorporation - Interface Control Documentation shall be included in Part I of the CEI specification in accordance with the requirements of NPC 500-1. At the Centers option it may be included by reference. In any event, ICD shall be so referenced that the contractor(s) are required to conform to the ICD/IRN as a contractual design requirement.
 - P. Design Reviews, Inspections, and Certifications - The requirements of Exhibit XIV of NPC 500-1 and applicable Apollo Program Directives shall be followed with respect to interface verification at applicable design reviews, inspections and certifications.

- Q. Change Control - By direction of the Apollo Level I CCB or upon approval by the affected Center Level II CCB(s) an approved ICD/IRN is baselined and shall be subject to formal Class I Change Control as defined in Exhibit IX of NPC 500-1 (including ANA Bulletin 445 referenced therein).

V. RESPONSIBILITIES AND AUTHORITIES

- A. The Apollo Program Director - The Apollo Program Director thru the Inter-Center Coordination Panel Executive Secretariat supervises the activities of, and acts as an appeal board thru the Level I CCB for, the Inter-Center panels.
- B. The Apollo Program Office shall:
1. Provide overall direction to and monitor Center Interface Management activities;
 2. Monitor reporting systems for Inter-Center interface status as required;
 3. Thru the Level I CCB resolve and be the final authority on Inter-Center interface problems which cannot be settled at Center level and process those ICD/IRN changes which meet the criteria of APD #34;
 4. Approve internal operating procedures of and monitor the Inter-Center Repository at MSFC to ensure efficient and effective procedures and their implementation for control and release of Inter-Center ICD's;
 5. Monitor Inter-Center Coordination Panel activities;
 6. Review major technical problems to establish any impact on programs and schedules;
 7. Establish or abolish Inter-Center Interface Coordination Panels as required, assign specific areas of technical responsibility; and establish procedures for the panels.
 8. Establish administrative and technical jurisdiction between the Apollo Program Directorates as required to effectively establish and maintain adequate support to the Interface Management Program established by these Requirements and Procedures.

9. Maintain on a current basis thru the Executive Secretariat, the Inter Center Panel Membership Directory.
- C. The Executive Secretariat - The Executive Secretariat consists of four members: one representing APO, who shall act as Chairman, and one representing each of the Centers. They are designated by their organizations, and confirmed by the APO. Members shall be of such stature as to have ready access to top management levels in their organizations. The Executive Secretariat will:
1. Prepare and arrange for required meetings at mutually convenient times;
 2. Prepare and distribute agendas at least two weeks prior to meeting date;
 3. Assure that documents promptly reach the action offices;
 4. Follow-up action items resulting from decisions;
 5. Maintain a current knowledge of the organization and activities of all Panels, giving special attention to areas of possible duplication and/or incompatibility between Panels;
 6. Prepare and issue minutes after each meeting, assuring that the inputs of all participants are impartially recognized.
 7. Establish and maintain detail procedures for Identification, Documentation, Implementation and Control of Inter-Center Interfaces.
- D. Inter-Center Coordination Panels: - The Coordination Panels have the responsibility to coordinate, maintain, and technically approve all Inter-Center interfaces between affected NASA Centers. The Panels are charged with initiating the original preparation of, and preparing all revisions to, Interface Control Documents. The Panels must assure technical compatibility for physical, functional and procedural interface aspects from the contractors through the appropriate NASA Centers. The Panels are formed to make available the technical competence of APO, MSFC, KSC, MSC, GSFC, OTDA, JPL and their contractors, for the solution of the interface problems of the launch vehicle, the spacecraft, facilities, and associated equipment. Each Panel, within its defined area of responsibility, has the following authority to:

1. Resolve interface problems and initiate actions regarding design, analysis, study, test and operations by employing the line organizations of the Centers, the headquarters staff organization, or the various program contractors through the respective APO, MSFC, KSC, MSC, GSFC, OTDA or JPL Project Offices. This specifically includes technical liaison between Panel Chairmen and Members.
 2. Establish Sub-Panels to facilitate actions as required.
 3. Recommend solution to problems outside the authority of the Panel to the appropriate Center management, Apollo Program Office, or to the proper organization for action.
 4. Identify Inter-Center Interfaces, prepare ICD's and IRN's and provide ICD's and IRN's as required to document the interface.
 5. Provide the executive secretariat thru the Center secretariat members on a keep current basis, the Membership of all Panels.
 6. Provide technical support to the Apollo Center Level II CCBs and the Level I CCB when required in accordance with panel technical responsibilities.
- E. The Apollo Center Program Manager will:
1. Place contractual requirements upon each contractor affected by Inter-Center ICD's/IRN's to the extent necessary to ensure that the contractors internal documentation system: identified the interface points; indicates they are controlled; that documentation or hardware controlled by the ICD may not be changed unless a Class I change as defined by NPC 500-1 and APD 34 thereto has been approved; and that hardware/software is compatible with the ICD.
 2. Direct Center Apollo Interface activities in response to this directive and the Apollo Program Office;
 3. Implement and maintain an Interface Management program at their Centers and with their contractors;
 4. Coordinate as required with the Apollo Program Office and other Centers;

5. Establish and maintain an Apollo Inter-Center Interface Status Reporting System, required by the APO to include: An ICD/IRN open item status weekly, Contractual Status monthly, and Baseline Status by flight mission as ICD's and IRN's are implemented;
6. Provide ICD and IRN status as required by the Apollo Program Offices;
7. Coordinate and cooperate with the Inter-Center Interface Documentation Repository at MSFC in establishing and documenting detail procedures for releasing ICD's and IRN's.

F. Center (Level II) Configuration Control Boards (CCB's) shall:

1. Provide for control and implementation of Apollo interface requirements by directing placement of these requirements against hardware drawings and specifications, as appropriate.
2. Establish and maintain procedures for control and implementation of Inter-Center ICD's/IRN's in accordance with NPC 500-1 requirements, this direction and established CCB operating requirements (i.e., forward change packages affecting Level A ICD's which cannot be resolved at Center level to the Level I CCB for decision, implement Level I CCB's etc.).
3. Coordinate with the CCBs of other affected Centers in resolution of changes to ICD's (IRN's) and review and approve/disapprove changes to ICD's (IRN's) by issue of a CCBD;
4. Refer any ICD's/IRN's on which one or both Center Level II CCB's disagree to the Apollo Level I CCB for resolution in accordance with the requirements of NPC 500-1;
5. Refer ICD/IRN changes which meet the criteria of APD #34 to the Level I CCB.

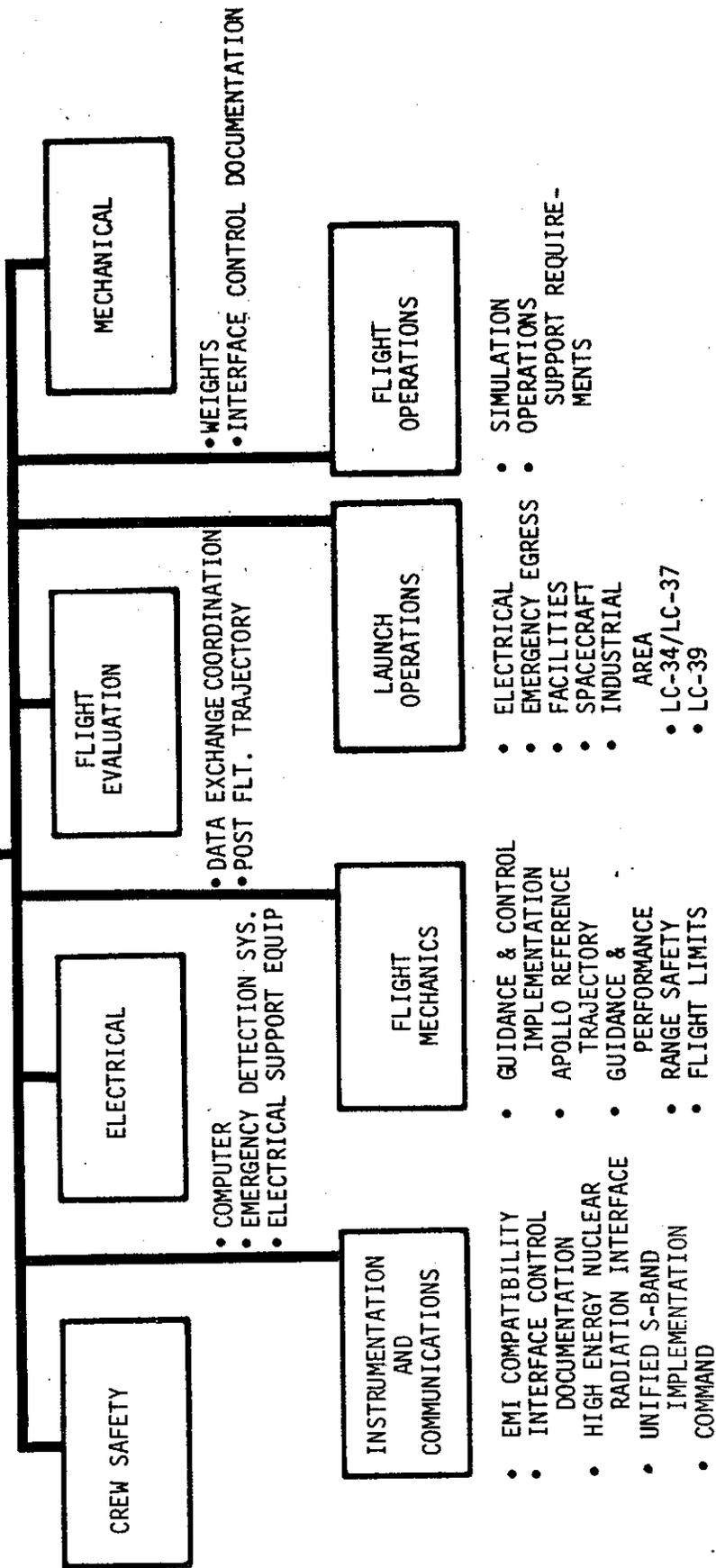
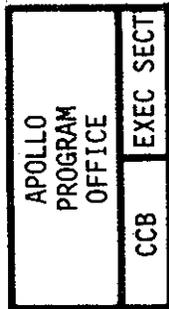
G. The Inter-Center Repository shall:

1. Receive, record, reproduce, and distribute all Apollo Inter-Center ICD's/IRN's approved by the Coordination Panels and cognizant Center Level II CCB's.

2. The Repository shall make a non-technical review of the documents for completeness and reproducibility;
3. Prepare detail procedures in consonance with the direction herein for reviewing, recording, sorting reproducing and distributing approved ICD's and IRN's; these procedures shall have APO approval;
4. Inform the Panel Chairmen of any document problems that arise.
5. Microfilm, reproduce, and file the "Repository Issue" of ICD's and IRN's and maintain a complete set of reproducibles.
6. Compile and issue monthly an Interface Control Document Log (ICDL) for each major Apollo/Saturn space vehicle configuration which lists all Inter-Center Interface Control Documents and changes thereto. The IC DL shall contain identification numbers, titles, vehicle and other applicable effectivity designations, preparation responsibility, and change information for each of the ICD's and IRN's. The ICD Log shall serve as a current and continuous record of the ICD activities of the Apollo Program.

ATTACHMENT 1INTER-CENTER INTERFACE PANEL ORGANIZATION AND RESPONSIBILITIES

- A. The Inter-Center Panel organizations are depicted pictorially in Figure 3. Each Panel's responsibility is described in the following paragraphs:
1. The Crew Safety Panel responsibilities are to determine the space vehicle emergency conditions and the required crew safety action prior to and during flight through spacecraft separation. The panel is specifically concerned with the following:
 - a. The emergency detection system (EDS) and its design specifications for the launch vehicle; this includes parameters to be monitored, type of signals and displays and resulting manual or automatic action.
 - b. The crew safety system interface problems between the launch vehicle and spacecraft.
 - c. The spacecraft emergency conditions affecting the launch vehicle flight.
 - d. The impact of range safety on crew safety.
 - e. The ground and flight qualification test plans for the space vehicle emergency detection and escape system prior to manned flight.
 - f. The crew safety ground monitoring requirements and crew safety action to be taken from the ground during the launch phase.
 - g. The results of EDS flight test evaluations.
 2. The Electrical Panel is specifically concerned with the following:
 - a. Define, analyze, and implement the requirements for electrical system design compatibility in view of systems checkout during stage mating, final checkout and launching, and streamline the design of the checkout system to fit into the overall scope of operations.



APOLLO INTER-CENTER COORDINATION PANEL ORGANIZATION

- b. Establish overall electrical systems compatibility.
 - c. Define and resolve electrical interface problems involving launch vehicle, spacecraft, LVGSE and spacecraft electrical GSE.
 - d. Establish requirements for proper utilization of electrical equipment for checkout and launch operations.
 - e. Define range safety electrical design requirements connected with the overall electrical system.
 - f. Establish documentation requirements for electrical system standards, specifications, and preferred hardware list.
3. The Flight Evaluation Panel responsibilities are to define the principal responsibilities of KSC, MSC, MSFC and GSFC postflight evaluation in the following specific areas:
- a. Coordinate the interfaces between Centers in the evaluation of the performance of the launch vehicle and spacecraft.
 - b. Resolve the cause of flight malfunctions and deviations that are not confined to either the launch vehicle or the spacecraft.
 - c. Develop procedures for adequate and timely exchange of selected raw and reduced data and/or results of analyses.
 - d. Evaluate all mutual problems of the flight instrumentation as they affect flight evaluation and review all associated requirements documents for adequacy for flight evaluation.
 - e. Determine responsibilities for evaluation reports to be published separately, and/or jointly by KSC, MSC, and MSFC.

4. The Flight Operations Panel is specifically concerned with the following:
 - a. Specify and monitor all mission control requirements and operations associated with the launch vehicle with emphasis on the S-IVB/IU during orbital checkout, orbital mission control operations, escape burn and through spacecraft separation.
 - b. Define and coordinate the ground monitoring of the status and performance of the launch vehicle (other than crew safety aspects) during the launch phase, and of the crew safety operations aspects in orbit during escape burn and through spacecraft separation.
 - c. Define and coordinate MSFC/KSC participation and support for these mission control operations and their preparation.
 - d. Identify and coordinate all necessary MSC-MSFC-KSC data and information flow for mission control and coordinate all associated requirement documents.
 - e. Coordinate and integrate all procedural and mission documentation required for Apollo Mission Control Operations associated with the launch vehicle.
 - f. Define requirements for and coordinate the performance of flight operations simulations of the launch vehicle with emphasis on the S-IVB/IU orbital and post-orbital operations.
5. The Flight Mechanics Panel responsibilities are to coordinate interface considerations from the standpoint of the flight mechanics, dynamics, guidance and control and shall cover the following specific areas:
 - a. Aerodynamics, including static and dynamic aerodynamic characteristics, static and transient air loads, heating and acoustic environment, and wind tunnel testing of the launch vehicle-spacecraft combinations.

- b. Performance and trajectories, including nominal, alternative, and abort trajectories, range safety analysis and special trajectory shaping with various constraints for completion of specified missions.
 - c. Flight dynamics and control, including abort dynamics and the associated emergency detection system design criteria, dynamic testing, stage/payload separation, docking and transposition maneuvers, attitude holding capability, and composite launch vehicle-spacecraft aeroelasticity characteristics.
 - d. Navigation and guidance, accuracy requirements, launch vehicle-spacecraft back-up guidance techniques, and guidance system influence on space vehicle performance and trajectories.
 - e. Natural space environment, including terrestrial atmospheric wind, wind shear, gust and reference atmosphere, space environment, astrodynamics constants, and other natural environments that influence the space vehicle design, performance and operational characteristics.
6. The Instrumentation and Communications Panel is specifically concerned with the following:
- a. Establish space vehicle and respective ground instrumentation and communication systems compatibility.
 - b. Define and resolve problems associated with onboard and respective ground systems instrumentation interfaces.
 - c. Define and resolve problems associated with radio frequency interfaces, including frequency allocation.
 - d. Ensure a compatible space vehicle electromagnetic program, including the interface with GSE, launch facilities, and ground station.
 - e. Define and resolve problems associated with high energy nuclear radiation.

- f. Ensure mutual exchange of instrumentation and communications information.
7. The Launch Operations Panel is specifically concerned with the following:
- a. Ensure the operational compatibility of the space vehicle, facilities, including power supplies, ground support equipment, and launching accessories.
 - b. Ensure that adequate space and facilities are available at the launch site for checkout and mating of the launch vehicle and spacecraft.
 - c. Define and resolve interface problems between space vehicle, GSE and launch facilities.
 - d. Review all areas of the space vehicle for compatibility and possible interface problems with launch operations.
 - e. Ensure that engineering, equipment and facilities support space vehicle launch and flight safety requirements.
 - f. Determine impact on ground safety plan of new or modified Inter-Center interfaces.
8. The Mechanical Panel is specifically concerned with the following:
- a. Define and resolve mechanical interface problems between launch vehicle and spacecraft and between LV mechanical GSE and spacecraft GSE.
 - b. Analyze requirements and recommend safe handling procedures connected with propulsion, explosives, and other similar problems as they affect the overall space vehicle and launch procedures.
 - c. Define and resolve spacecraft-launch vehicle mechanical and procedural interface problems, associated with mating, checkout, materials, propellants, fluids, gases, environmental conditioning, alignment, servicing and access.

- d. Define and resolve overall space vehicle configuration interface problems associated with structural design loads and structural problems imposed on either the spacecraft or launch vehicle, including those of abort propulsion and in-flight venting.
- e. Define and resolve problems of scheduling, transportation and handling associated with hardware delivery between the Centers.
- f. Define and resolve problems associated with overall space vehicle weights, mass characteristics and mass distribution.
- g. Define the integrated space vehicle ground and flight sequence of electro-mechanical operations.

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Dr. Debus

Subject: Addendum 1 to Apollo Program Directive No. 47

9/8/12

Attached is a copy of Addendum 1 to Apollo Program Directive No. 47, "Apollo Inter-Center Interface Management." The basic document provides a means of controlling the design and development of systems and equipment that have physical and related functional and procedural interfaces to assure their operational compatibility. The addendum recognizes the maturity of the program and hardware in reducing the effort required to exercise adequate control.

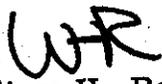
Specific changes introduced by this addendum are:

- a. The terminating of monthly reproductions of the Interface Control Document Log and the initiation of change pages, at monthly intervals as required.
- b. The reduction in the number of panels from eight to three.
- c. The appointment of intercenter points of contact for the accomplishment of the duties of the abolished panels.

A draft of the addendum was circulated for comment among KSC directorates and offices in May. No objections were raised and no adverse impact on KSC is anticipated.

Mr. Willard L. Halcomb, AA-MFP, is nominated as the KSC point of contact for coordination of matters formerly the purview of the abolished panels.

Addendum 1 to APD No. 47 will be given the usual distribution to first and second level directorates and subordinate elements having a need for copies.


William H. Rock

Attachment: a/s

APOLLO PROGRAM DIRECTIVE NO. 47, ADDENDUM 1

TO: DISTRIBUTION

FROM: *Robert E. Allen*
PROGRAM DIRECTOR, ASTP

SUBJECT: Addendum 1 to Apollo Program Directive No. 47,
Apollo Intercenter Interface Management

OFFICE OF PRIME RESPONSIBILITY (OPR): ASTP Engineering (MAE)

I. PURPOSE

This addendum revises the method of issuance of an ASTP Interface Control Document Log and the Intercenter Interface Panel Organization to meet ASTP requirements.

II. ASTP INTERFACE CONTROL DOCUMENT LOG (ICDL)

The Apollo ICDL, issued monthly in the Apollo and Skylab Programs, will be terminated with the issue of July, 1974. Delta change revisions, on a page by page basis, will be issued at monthly intervals after that date until the end of the Program.

III. INTERCENTER INTERFACE PANEL ORGANIZATION

The Crew Safety Panel, the Launch Operations Panel, and the Flight Operations Panel (now designated "ASTP Operations Panel") will be maintained for ASTP. The following Intercenter Interface Panels are abolished:

Electrical Panel
Flight Evaluation Panel
Mechanical Panel
Instrumentation & Communications Panel
Flight Mechanics Panel

The duties of the abolished Panels will be accomplished by Center ASTP Program personnel with Intercenter points of contact established by the Program Offices. Interface Control Documents (ICDs) will continue to require the approval of Center Configuration Control Boards (CCBs).



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JOHN F. KENNEDY SPACE CENTER.
KENNEDY SPACE CENTER, FLORIDA 32899



REPLY TO
ATTN OF: AA-MFP-1 (74-8-1)

AUG 10 1974

MEMORANDUM

TO: Distribution

FROM: AA/Manager, Sciences, Applications, Skylab and
ASTP Programs

SUBJECT: Addendum 1 to Apollo Program Directive No. 47

Attached is Addendum 1 to Apollo Program Directive (APD) No. 47, "Apollo Intercenter Interface Management," which is being sent for your information or use, as appropriate. Changes to the basic APD, resulting from the addendum, are described in my briefing note to Dr. Debus, a copy of which is attached.

William H. Rock
William H. Rock

Attachment:

1. Addendum 1
2. Note to Dr. Debus

Distribution:

Skylab-ASTP Distribution M

AUG 8 1974

Dr. Debus

Subject: Addendum 1 to Apollo Program Directive No. 47

9/8/12

Attached is a copy of Addendum 1 to Apollo Program Directive No. 47, "Apollo Inter-Center Interface Management." The basic document provides a means of controlling the design and development of systems and equipment that have physical and related functional and procedural interfaces to assure their operational compatibility. The addendum recognizes the maturity of the program and hardware in reducing the effort required to exercise adequate control.

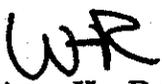
Specific changes introduced by this addendum are:

- a. The terminating of monthly reproductions of the Interface Control Document Log and the initiation of change pages, at monthly intervals as required.
- b. The reduction in the number of panels from eight to three.
- c. The appointment of intercenter points of contact for the accomplishment of the duties of the abolished panels.

A draft of the addendum was circulated for comment among KSC directorates and offices in May. No objections were raised and no adverse impact on KSC is anticipated.

Mr. Willard L. Halcomb, AA-MFP, is nominated as the KSC point of contact for coordination of matters formerly the purview of the abolished panels.

Addendum 1 to APD No. 47 will be given the usual distribution to first and second level directorates and subordinate elements having a need for copies.


William H. Rock

Attachment: a/s

APOLLO PROGRAM DIRECTIVE NO. 47, ADDENDUM 1

TO: DISTRIBUTION

FROM: *Robert C. Allen*
PROGRAM DIRECTOR, ASTP

SUBJECT: Addendum 1 to Apollo Program Directive No. 47,
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UNITED STATES GOVERNMENT

Memorandum

JMU
ES

DATE: JAN 23 1969

TO : See Distribution

FROM : Apollo Program Manager, AP

SUBJECT: APD #47, "Apollo Inter-Center Interface Management"

Reference: Briefing Note to Dr. Debus from AP, dated January 20, 1969, subject as above, with attachment: APD #47, "Apollo Inter-Center Interface Management"

1. APD #47 has been reviewed by AP. The KSC impact is summarized in the reference, see attached copy.
2. Since APD #47 is a reiteration of the Panel Review Board Charter and existing Inter-Center Interface Control Documentation management procedures, no new compliance actions by KSC appear necessary. Therefore, APD #47 is forwarded for your information only.
3. Comments you may have pertinent to the present KSC posture in regard to APD #47 should be directed to the Chief, AP-SYS, prior to February 15, 1969.

R.O. Middleton
R. O. Middleton
Rear Admiral, U. S. Navy

Attachment: As stated

Distribution:
STDL-B

cc:
Dr. Debus, CD
Mr. Murphy, EX



Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

JAN 20 1969

BRIEFING NOTE TO: Dr. Debus

SUBJECT: APD #47, dated December 16, 1968, "Apollo Inter-Center Interface Management"

1. APD #47 references the Panel Review Board Charter that originally established the Panel type management system for insuring inter-center interface design compatibility between the spacecraft, launch vehicle, associated GSE, and supporting facilities. The Panel type system for inter-center interface management has been continued under APD #47. Guidance and direction provided by APD #47 is described briefly below:

a. Establishes policy for operation of the "Apollo Inter-Center Interface Management System."

b. States the authority, duties, and responsibilities of the Program Offices, the Executive Secretariat, the Panels, the CCB's, and the ICD Repository.

c. Recognizes the Configuration Control Boards as the current authority for implementation/appeal of Panel decisions.

d. Describes the interface types and areas to be controlled and what is to be included and excluded in ICD's.

e. Portrays the flow (typical) for initiation, review evaluation, authentication, approval, and implementation of ICD's and changes (IRN's) thereto.

f. Directs that ICD's/IRN's be placed on contract by inclusion or reference in Part I of CEI Specifications and that they be used at design reviews, inspections, and certifications.

g. Contains instructions to the Center's and NASA Repository for reporting ICD/IRN status to Headquarters.

2. Implementation of APD #47 should not have any impact on KSC management or operations since it is a reiteration of the PRB Charter and existing inter-center ICD management procedures.

3. Limited distribution of this APD will be made to key KSC personnel along with a copy of this briefing note.



R. O. Middleton
Rear Admiral, U. S. Navy