



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO 11 MISSION EVALUATION PLAN

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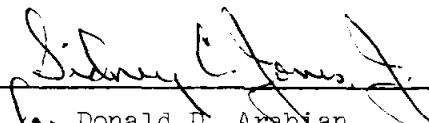
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
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APOLLO 11 MISSION EVALUATION PLAN

PREPARED BY:

Apollo Test Division

APPROVED BY:


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Chief, Test Division

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
June 1969

INTRODUCTION

This plan outlines the purpose, functions, and operational procedures of the personnel supporting the Apollo 11 Mission from the third floor of building 45. Additionally, the responsibilities of the key personnel are identified and defined. The interfaces to building 45 are also explained.

Comments concerning this document are invited and should be transmitted to Code PT2/Test Division, Apollo Spacecraft Program Office.

RESPONSIBILITIES

During the mission, the NASA and contractor engineering and system specialists on the third floor of building 45 will provide continuous (24-hour) real-time support to the Spacecraft Analysis (SPAN) room in building 30 and subsequently to the Mission Operations Control Room. This group will provide the system history knowledge as evolved through qualification programs, acceptance tests, and factory and launch site testing for resolving inflight problems. Further, this group will assist in preparing the postflight reports, which are the responsibility of the building 45 support teams.

The technical support from the NASA and contractor personnel in building 45 has been integrated and grouped into seven teams (fig. 1), supervised by team Leaders assigned from the Manned Spacecraft Center. Table I contains a listing of the teams and team leaders. The key positions are defined as follows:

- a. Building 45 Team Manager - Responsible to the Apollo Program Manager for the overall planning, direction, and coordination of all mission support activities in building 45. The Team Manager is also responsible for the postflight evaluation activities. The Team Manager is the single point of contact between the team and the Spacecraft Analysis Room.
- b. Assistant Team Manager - Responsible to the Team Manager for supporting the mission problem solving activity.
- c. Data Manager - Responsible to the Team Manager for all data processing, handling, and distribution of hard copy data supplied to the system specialists.

d. Contractor Senior Representative (NR/GAEC/MIT) - Responsible to the Team Manager for the effective utilization of all contractor resources.

e. Contractor Data Manager (NR/GAEC) - Responsible to the applicable Contractor Senior Representative and Team Manager for the coordination of data exchange with the contractor facility.

f. Engineering and Development Directorate Senior Representative - Responsible to the Team Manager for the effective utilization of the resources of the Engineering and Development Directorate.

g. Team Leader - Responsible to the Team Manager and Engineering and Development Directorate Senior Representative for directing and coordinating his team's problem-solving activities and also responsible for making recommendations to the Team Manager.

BUILDING 45 INTERFACES

The Building 45 Management Team (table II) will interface with the Spacecraft Analysis Room Management Team (table III) and with the Contractor Team in the Mission Support Rooms at Grumman Aircraft Engineering Corporation (Bethpage, New York) and at North American Rockwell (Downey, California). The primary points of contact between building 45 and the Spacecraft Analysis Room are the Team Manager and the Operations Manager, respectively. (Appendix A describes the procedure to be followed.) Data exchange from the building 45 activity and the contractor plant is the responsibility of the Contractor Data Manager.

DATA

The data available to the systems analysis personnel operating in the Mission Evaluation Room (room 320, building 45) is essentially that which is used by the flight control organization in the Mission Control Center. Typically, these data include the telemetry and voice information received by the Mission Control Center from the Manned Space Flight Network and Goddard Space Flight Center. The GOSS-conference loop and other voice channels are also linked to building 45.

Eight television (CRT) channels will be available in the Mission Evaluation Room. The various formats will be made available prior to the mission. For all mission times, other than lunar module activation, the command and service module formats will be given priority for display. Displays will be controlled by the Mission Control Center with adherence

to a priority and schedule to be published later. Special requests from building 45 will be honored when possible. The shift Data Manager will coordinate all special call-up data channel requests. Normally, each data channel will display the appropriate time reference.

Four of the channels, referred to as fixed channels, are reserved for constant display of the following systems:

- a. Guidance and Navigation
- b. Electrical Power System, Batteries
- c. Propulsion
- d. Environmental Control

These channels are slaved to and controlled by the Mission Control Center and will not be used for call-ups of special channels.

The remaining four channels will adhere to format schedules for other systems and are available for call-ups. In addition, these four will be principally for lunar module formats during periods of lunar module activation. Polaroid camera facilities will be available where fast hard-copies of the displays are needed.

The TWX summaries are tabular form printouts (SMEK rebroadcasts) and will be available throughout the mission. Preliminary copies of the various formats have been distributed and cardboard overlays will be available prior to the mission for reference by the various system personnel assigned to the evaluation room. The data will be sorted and delivered to the appropriate system groups. Prior to the mission, each team leader should inform the Data Manager of his requirements for summary message delivery. Essentially, the printed data will be delivered within minutes of its reception from the Manned Space Flight Network.

The Manned Space Flight Network data transmitted from Goddard Space Flight Center to the Mission Control Center will be processed by the Computation and Analysis Division and printed out in standard tab groups. These data will be delivered to the Data Library, validated and logged in, sorted and placed in system bins for use by the data analysts. They will generally be available within a few hours of real time. Standard tab groups are defined in the Data Processing Plan. Each Manned Space Flight Network tab group has one column of time tabs to enable time correlation of any data value. Tabulation of certain system tabs (spacecraft summary tabulations) are printed out every 4 hours by building 30. These will be available in the Data Library for use by the system analysts. For special events and particular problem times, printouts can be made of

the display TV formats by building 30. These will cover the complete format page once each second. Special requests for other than normal data from the Manned Space Flight Network should be submitted to the Data Manager. In general, special requests should be limited to those required to facilitate resolution of anomalies.

The Data Library (room 307, building 45) has on file all available documentation for Apollo 11 (table IV). Personnel are on duty continuously during the mission and during normal working hours during the evaluation period. A special package will be prepared for each system containing the most up-to-date pertinent documents. Each Team Leader will be notified when this package may be picked up prior to the mission. The package will contain the documents noted in table IV.

SECURITY REQUIREMENTS

Access to the third floor of building 45 will be restricted during the Apollo 10 Mission. All personnel requiring access on a continuing basis will be badged. The badging identification will be as follows:

- a. Mission Control Center green badges with names printed thereon authorize access to the third floor of building 45 and to room 320.
- b. Building 45 - third floor access badges (black on white) with black numeral 11 authorize access to the third floor of building 45.

The third floor of building 45 will be controlled by a security guard stationed at the elevators. The third floor stairway will be locked during the mission. At the request of the Team Leaders, the Team Manager or his designee, will arrange with the guard for access of technical specialists as the need for their support arises. The Team Leaders are responsible to the Team Manager to insure that the total number of personnel is held to a minimum to avoid an overcrowded and noisy condition.

MISSION REPORT REQUIREMENTS AND RESPONSIBILITIES

The Apollo 11 mission reports requirements are defined in Apollo Program Directive no. 19A.

GO/NO-GO MILESTONES

Prior to the following go/no-go milestone events, the Mission Evaluation Team in building 45 will provide SPAN personnel with a go/no-go status.

- a. Translunar injection
- b. Lunar orbit insertion
- c. Rev 5
- d. Undock separation
- e. Descent orbit insertion
- f. Lunar stay
- g. Egress
- h. Lift-off
- i. Transearth injection
- j. Entry

BUILDING 45 STATUS REPORTS

Approximately every 2 hours during the mission, the Mission Evaluation Team in building 45 will prepare a status report keyed to significant flight events.

ANALYSIS OF PROPULSION SYSTEM MAJOR FIRINGS

Propulsion analysis personnel will be provided with real-time or near-real-time high bit rate data for assessment of propulsion system firings. Special procedures are also being implemented for the timely assessment of these data.

TABLE I.- APOLLO 11 TEAMS AND TEAM LEADERS IN BUILDING 45

Engineering and Development
Directorate

J. B. Lee, Team Leader
M. A. Silveira
P. Deans

MSFN Communications

H. Kyle, Team Leader
A. D. Travis
C. L. Royston

Crew Systems

P. F. Hurt, Team Leader
F. A. Samonski
W. W. Guy

Electronic Systems

L. E. Packham, Team Leader
M. G. Kingsley
E. E. Lattier

Propulsion and Power

R. B. Ferguson, Team Leader
R. McSheehy
R. Tauber

Guidance and Control

J. Hanaway, Team Leader
S. Bachman
E. Dickinson

Structures and Mechanics

P. D. Smith

Thermal Control

J. A. Smith, Team Leader
J. T. Taylor
R. G. Brown

TABLE II.- APOLLO 11 MISSION EVALUATION MANAGEMENT TEAM (BUILDING 45)

Position	Shift 1	Shift 2	Shift 3
Team Manager	D. Arabian	S. Jones	R. Malley
Deputy Manager	J. Dodson	J. Crockett	J. Mechelay
Assistant Team Manager	J. Lobb	T. Grace	T. Libby
Data Manager	B. Foster	W. Kelley	E. Gammon
MIT Senior Representative	D. Hoag	F. Martin	N. Sears
NR Senior Representative (Alternate)	D. Levine	R. Hartley A. Kehlet	R. Thomas
GAEC Senior Representative	G. Smith	Smith/Devaney	J. Devaney
NR Data Coordinator	W. Fitzpatrick	Fitzpatrick/Brittan	R. Brittan
GAEC Data Coordinator	R. Fox	Fox/Helman	R. Helman
E&D Senior Representative	J. Lee	M. Silveira	P. Deans

TABLE III.- APOLLO 11 SPACECRAFT ANALYSIS MANAGEMENT TEAM (BUILDING 30)

Position	Shift 1	Shift 2	Shift 3
SPAN Operations Managers	S. Simpkinson	O. Maynard	J. Tomberlin
(Pre-Lift-Off) (Alternate)	O. Maynard J. Tomberlin	A. Cohen Tomberlin/Morris	O. Morris
Mission Staff Engineer	J. Sevier J. Peacock	C. Glancy	R. W. Ward
Log Manager	G. Symons	B. Pratt	J. Wyner
Administration Support	R. Bailey	Bailey/Collins	C. Collins
SPAN Documentation	H. Tash	S. Weathersby	R. Phillips
NR Management Representative (Alternate)	G. Jeffs	M. Mucelic C. Feltz	G. Merrick
GAEC Management Representative	T. Kelly	Kelly/Wright	H. Wright
Flight Control Representative	M. Brooks	J. Roach	P. Frank
FCD (CSM)	N. Hutchinson	T. Loe	A. Aldridge/ W. Blair
FCD (LM)	F. Edelin/ J. Hannigan	C. Whitmore J. Craven	E. Keesler

TABLE IV.- MISSION DOCUMENT INDEX

Apollo Mission Failure Contingency Plan
 Apollo Operations Handbook
 Block II, Vol. 1 - Spacecraft Description
 Block II, Vol. 2 - CSM - Operational Procedure
 Apollo Operations Handbook
 Lunar Module LM-5 and Subs.
 Vol. 1 - Subsystems Data
 Vol. 2 - Operational Procedures
 *ASPO Test Division Mission Document Index
 *CSM Universal Systems Handbook
 *CDDT-CSM
 *CDDT-LM
 CARR Review/LM
 Data Acquisition Plan
 *Data Processing Plan
 *Flight Mission Rules
 Flight Operations Plan
 *Flight Plan (Preliminary)
 *Flight Readiness Test - CSM
 Vol. 1
 Vol. 2
 *Flight Readiness Test - LM
 Vol. 1
 Vol. 2
 Vol. 3
 *G.E. Baseline Data Book
 Launch Mission Rules
 *LM Systems Handbook
 Longlines Communications Guide
 Measurement Requirements - CSM
 Measurement Requirements - LM
 *Mission Evaluation Instructions
 Mission Requirements

TABLE IV.- MISSION DOCUMENT INDEX - Concluded

Operational Consumable Analysis
Postflight Test Requirements
Recovery Operation Procedures Manual
Recovery Requirements
LM Abort and CSM Rescue Plan
Spacecraft Operational Data Book
 Vol. 1 - CSM Data Book
 Vol. 1 - Part 2 - Launch Mission Rules Redlines
 Vol. 2 - LM Data Book
 Vol. 2 - Part 2 - Launch Mission Rule Redlines
 Vol. 3 - Mass Properties
 Vol. 4 - EMU Data Book
 Vol. 5 - ALSEP Data Book
Spacecraft Operational Trajectory
*TWX Summary Message Formats
Alternate Mission Plan
Stowage List for Apollo 11
LM Descent/Ascent Summary Document,
 Mission G and subsequent

*Included in data package for team management;
others available in Test Division Data Library,
building 45, room 307.

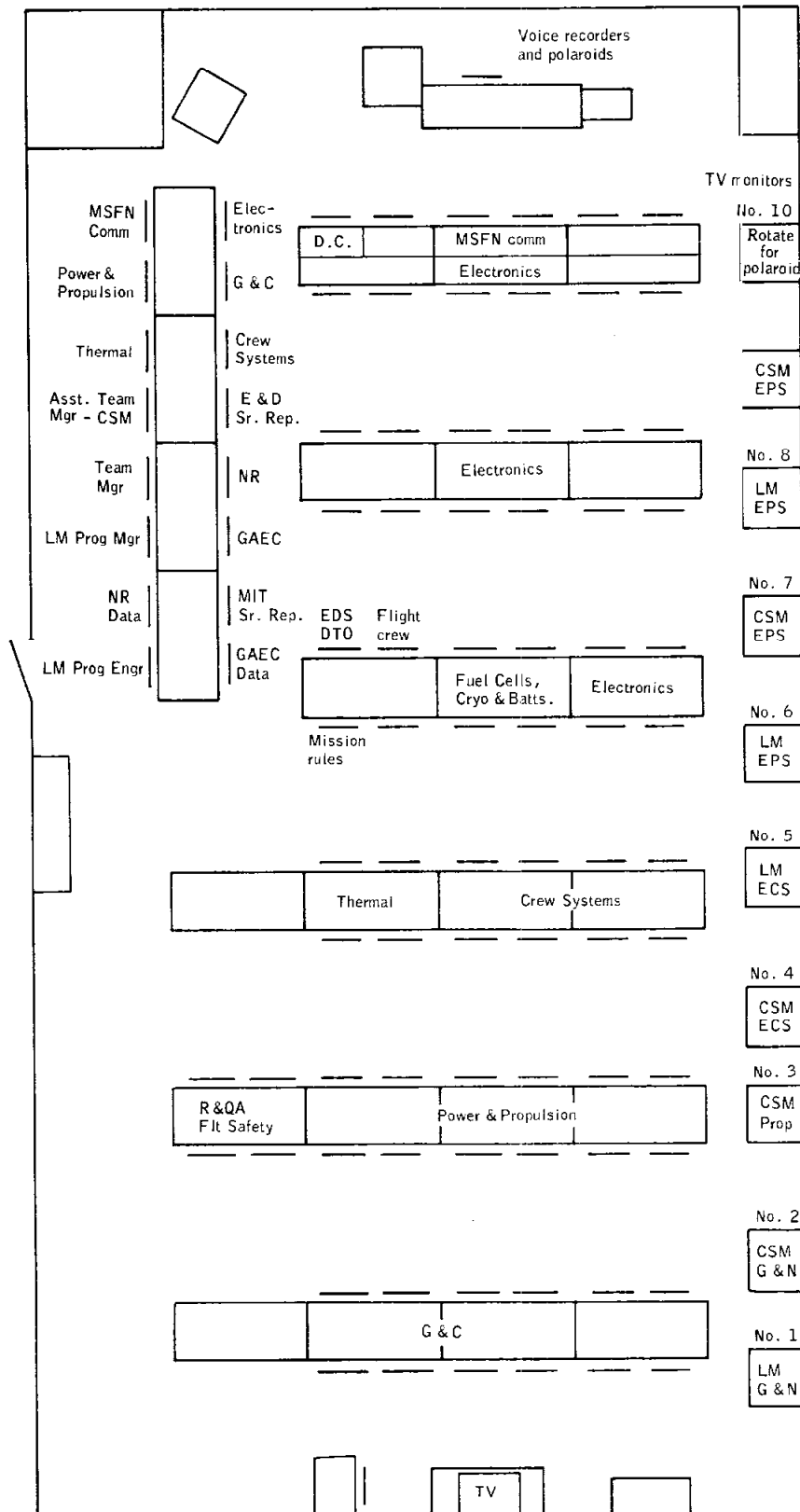


Figure 1. - Mission Evaluation Room (Room 320, Building 45).

APPENDIX

BUILDING 45/SPAN ACTION REQUEST/RESPONSE FORMS

The SPAN/Mission Evaluation Request forms (figs. A-1 through A-3) shall be the official coordinating documents for action requests and responses between building 45 and SPAN mission monitoring personnel. Since the forms are self-explanatory, no special instructions are required for their preparation.

SPAN / MISSION EVALUATION ACTION REQUEST

(PLEASE USE BLACK BALLPOINT PEN)

45	TIME (T- MINUS /GET)	REQUEST ORGANIZATION	RESPONSE ORGANIZATION	CONTROL NUMBER
ACTION REQD BY (TIME /DATE):				
REQUEST :			APPROVAL	
			TEAM LEADER	
			CONTRACTOR SR REP	
			ME MANAGER	
			TIME :	
			SPAN MANAGER	
			TIME :	
REQUESTOR				
45			CONCURRENCE	
			FDD REP	
			SPAN	
			TIME :	
			TEAM LDR	
			CONTRACTOR SR REP	
RESPONSOR				
45		ME MANAGER	CONTRACTOR SPAN REP	SPAN MANAGER
		TIME :		TIME :

Figure A-1.- Sample action request form for use in Building 45.

SPAN / MISSION EVALUATION ACTION REQUEST

(PLEASE USE BLACK BALLPOINT PEN)

30	TIME (T- MINUS/GET)	REQUEST ORGANIZATION	RESPONSE ORGANIZATION	CONTROL NUMBER
	ACTION REQD BY (TIME/DATE) :			
	REQUEST :			APPROVAL
				FOD REP
				TIME :
30				SPAN MANAGER
	REQUESTOR			
30	RESPONSE			CONCURRENCE
				TEAM LEADER
				CONTR SR REP
				ME MGR
				TIME :
30				SPAN MGR
				TIME :
	RESPONDOR			
	FOD REP	CONTRACTOR SPAN REP	SPAN MANAGER	
			TIME :	

Figure A-2.- Sample action request form for use in SPAN room.

SPAN / MISSION EVALUATION ACTION REQUEST
(CONTINUATION SHEET)

(PLEASE USE BLACK BALLPOINT PEN)

TIME (T-MINUS/GET)	REQUEST ORGANIZATION	RESPONSE ORGANIZATION	CONTROL NUMBER

Figure A-3.- Sample action request continuation form.