

R. Weir 5-2091
RS-32

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO See list below

FROM Manager, Mission Operations Office,
I-MO-MGR

SUBJECT AS-501 LIEF Operations Plan

DATE August 23, 1967
Memo #I-MO-184-67

Subject document is forwarded for your information and retention.

F. A. Speer
F. A. Speer

1 Enc:
a/s

cc:

- DEP-T, Dr. Rees
- DEP-T, Dr. Neubert
- R-DIR, H. K. Weidner
- R-RP-DIR, E. Stuhlinger
- R-OM-DIR, W. S. Fellows
- MS-CH, V. C. Sorenson
- MS-C, E. Hildreth (3)
- R-AERO-DIR, Dr. Geissler
- R-AERO-F, J. Lindberg
- R-AERO-FT, R. Benson
- R-AERO-FF, C. Hagood
- R-AERO-FF, J. Haussler
- R-AERO-YE, J. Kaufman
- R-AERO-FF, D. McNiel
- R-AERO-P, R. Teague
- R-AERO-FM, G. Wittenstein
- R-ASTR-DIR, Dr. Haussermann
- R-ASTR-DIR, H. Kroeger
- R-ASTR-S, J. Mack
- R-ASTR-S, F. Hammers
- R-ASTR-I, A. Beltran
- R-ASTR-IT, B. Adair
- R-ASTR-IM, J. Avery
- R-ASTR-IR, T. Barr
- R-ASTR-IE, D. Lowery

cc: (continued)

R-ASTR-IT, W. Threlkeld	R-P&VE-PT, Middleton
R-ASTR-E, W. Vann	R-P&VE-PP, J. Montgomery
R-ASTR-ES, C. Baldwin	R-P&VE-PA, V. Neiland
R-ASTR-EB, C. Burdine	R-P&VE-PP, W. Nelson
R-ASTR-ES, C. Cooper	R-P&VE-PP, W. Patterson
R-ASTR-ES, S. Erickson	R-P&VE-PP, Richard
R-ASTR-EA, D. Greer	R-P&VE-PA, R. Ryburn
R-ASTR-EA, R. Lewedag	R-P&VE-PA, C. Smith
R-ASTR-ES, J. E. Lewis	R-P&VE-PM, H. Smyly
R-ASTR-EA, A. O'Connor	R-P&VE-PT, T. Winstead
R-ASTR-EA, J. Partlow	R-P&VE-PT, L. Worland
R-ASTR-EA, C. Tankersley	R-P&VE-PM, F. Zurberg
R-ASTR-ES, R. Williams	R-P&VE-VOO, R. Sells
R-ASTR-NG, P. Nicaise	R-P&VE-VSA, J. Genter
R-ASTR-ND, R. Beckham	R-P&VE-VO, F. Jankowsky
R-ASTR-ND, J. L. Lewis	R-P&VE-VO, C. Lamb
R-ASTR-NF, H. Vick	R-P&VE-S, R. Hunt
R-ASTR-ND, J. Wolfsberger	R-P&VE-SS, P. Frederick
R-ASTR-B, B. Jones	R-P&VE-SJ, J. Furman
R-ASTR-BV, J. King	R-P&VE-SV, C. Gassaway
R-ASTR-BE, G. Barr	R-P&VE-SSM, J. Key
R-ASTR-BV, J. Robinson	R-P&VE-SLL, J. Moore
R-ASTR-BV, A. Spears	R-P&VE-SL, N. Showers
R-ASTR-BV, R. Tanner	R-P&VE-XSG, A. Clark
R-ASTR-G, L. Cook	R-P&VE-SXH, A. Gresham
R-ASTR-G, C. Gregg	R-P&VE-XSJ, R. Griner
R-ASTR-F, J. Blackstone	R-P&VE-XSC, L. Lawson
R-COMP-DIR, Dr. Hoelzer	R-P&VE-M, L. Zoller
R-COMP-RR, R. Cochran	R-P&VE-PPF, W. L. Askew
R-COMP-RR, D. Aichele	R-P&VE-PPF, R. M. Hoodless
R-COMP-RR, S. Tondera	R-P&VE-PPF, F. VanRensselaer
R-COMP-D, J. Felder	R-P&VE-PPF, J. Hughes
R-ME-DIR, W. R. Kuers	R-P&VE-PPF, J. Riquelmy
R-P&VE-DIR, Dr. Lucas	R-P&VE-PA, R. Rodgers
R-P&VE-XA, D. Burrows	R-P&VE-PA, R. Bledsoe
R-P&VE-P, T. Isbell	R-P&VE-PP, G. McKay
R-P&VE-PM, R. Burns	R-QUAL-DIR, D. Grau
R-P&VE-PM, J. Burson	R-QUAL-PC, T. McCrickard
R-P&VE-PA, K. Coates	R-TEST-DIR, K. L. Heimburg
R-P&VE-PM, W. Dunaway	R-TEST-S, Mr. Driscoll
R-P&VE-PT, F. Huneidi	R-TEST-S, Mr. Johnstone
R-P&VE-PM, W. Karigan	R-TEST-S, O. Driver
	R-TEST-S, C. Scarbrough

cc: (continued)

3

R-TEST-S, D. Hartley
R-TEST-S, J. Lundy
R-TEST-S, J. Pearson
R-TEST-S, R. Shaner
R-TEST-S, E. Ward
R-TO-DIR, L. Richard
R-TO-V, R. Baker
R-TO-V, R. Edwards
R-TO-V, F. Hunter
R-TO-V, A. Roth
R-TO-V, R. Smith
R-TO-V, G. Turner
I-DIR, General O'Connor
I-DIR, Dr. Hueter
I-DIR, Dr. Mrazek
I-S/AA-MGR, L. Belew
I-E-MGR, W. D. Brown
I-V-MGR, Dr. Rudolph
I-V-MGR, J. Murphy
I-V-MGR, J. B. Bramlet
I-V-T, W. Frye
I-V-F, A. Rowan
I-V-F, R. Barraza
I-V-E, L. Bell
I-V-E, R. Beaman
I-V-E, A. Conway
I-V-E, J. Crenshaw
I-V-E, N. Ginn
I-V-E, W. Houston
I-V-G, S. E. Smith
I-V-G, R. Etheridge
I-V-G, L. Marshall
I-V-G, L. Sommers
I-V-SIC, M. Urlaub
I-V-SIC, R. Abraham
I-V-SIC, M. Appling
I-V-SIC, C. Blevins
I-V-SIC, C. Bowen
I-V-SIC, C. Buist
I-V-SIC, E. Harris
I-V-SIC, B. Shultz
I-V-SIC, A. Way
I-V-SII, S. Yarchin

I-V-SII, H. Ashley
I-V-SII, T. Bledsoe
I-V-SII, H. Flake
I-V-SII, L. Guzinsky
I-V-SII, W. Johnson
I-V-SII, J. Odom
I-V-SII, E. Stluka
I-V-SIVB, J. McCulloch
I-V-SIVB, J. Darsey
I-V-SIVB, G. Deuel
I-V-SIVB, S. Hamner
I-V-SIVB, A. Higgins
I-V-SIVB, J. Jones
I-V-SIVB, G. Peters
I-V-IU, F. Duerr
I-V-IU, H. Hight
I-V-IU, T. McKay
I-V-IU, D. Mullin
I-V-IU, B. Ondrak
I-V-IU, R. Weir
I-E-F, F. Stewart
I-E-J, S. Morea
I-E-J, T. Ferrell
I-E-F, W. Halbrooks
I-MO-MGR, Dr. Speer
I-MO-F, C. Casey
I-MO-R, H. Golden
I-MO-R, G. Emanuel
R-AERO-Y, J. Scoggins
R-AERO-Y, C. Brown
R-AERO-Y, O. E. Smith
Rocketdyne, D. Sanchini (2)
Rocketdyne, P. Castenholtz (2)
Lockheed, P. Stewart
Lockheed, L. Gilcrest
Boeing, W. Jerominski (13)
NAA/S&ID, A. Aldred (9)
IBM, E. Smythe (11)
GE, J. Hull (5)
DAC, E. Scully (6)
TBC (GSE), E. Cowart
CCSD (GSE), W. Lambert
RCA, R. Pierce

cc: (continued)

MSF/MAO, J. McClanahan
MSF/MO, General Stevenson
MSF/MO-1, Mr. Schneider
MSF/MAO, Mr. Aller
KSC/LV, Dr. Gruene
KSC/AP, Admiral Middleton
KSC/LV-PLN, A. O'Hara
KSC/LV-PLN-1, M. Williams (5)
KSC/AP, Mr. Mathews
KSC/AP-OPN, Mr. Keck
KSC/I-K, Colonel Montgomery
KSC/I-K, Mr. Christensen
MSC/FA, C. Kraft
MSC/FC, Mr. Hodge
MSF/MAO, Captain Holcomb
MSC/FC, Mr. Lunney
I-V-SII, Mr. Godfrey



AS-501

GEORGE C. MARSHALL

**SPACE
FLIGHT
CENTER**

HUNTSVILLE, ALABAMA

LIEF OPERATIONS PLAN

National Aeronautics and Space Administration



August 23, 1967

AS-501 LIEF OPERATIONS PLAN

Prepared by: Fletcher Kuntz 8/23/67
Manager, Operations Office, I-MO-O

Approved by: F. Spier
Manager, Mission Operations Office
I-MO-MGR

LIEF OPERATIONS PLAN

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LIEF OPERATIONS PLAN

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to identify the support functions to be performed by MSFC through LIEF for AS-501 mission operations and the facilities required to carry out these functions. The LIEF Operations Plan also identifies subordinate documents required to carry out LIEF operations. This document is written in response to the AS-501 Launch Vehicle Mission Directive and Mission Operations Plan and is consistent with the AS-501 Flight Operations and Launch Plans.

1.2 REVISIONS

This document describes and controls only principal support functions and facility requirements, and therefore is not expected to require revision. However, it will be revised to reflect any major changes in support plans. Comments and/or corrections should be addressed to the Operations Office, I-MO-O.

1.3 LIEF DEFINITION

The LIEF (Launch Information Exchange Facility) encompasses those communications, data processing, display, and related facilities utilized to make support available to Apollo-Saturn mission operations from the launch vehicle design team at MSFC. Principal among these facilities are the Huntsville Operations Support Center (HOSC) and its

supporting communications. LIEF operations include use of the facilities for support of launch vehicle pre-launch checkout, launch operations, flight operations, and postflight data delivery and evaluation.

2.0 LIEF ORGANIZATION

2.1 MISSION PERIOD ORGANIZATION (AS-501)

Figure 2.1 shows the AS-501 Mission Period Organization, with the LIEF interface to that organization identified by the dashed lines. MSFC provides a supporting function to both the Launch Director and Flight Director through the channels indicated. The MSFC Launch Vehicle Representative during the terminal countdown has at his disposal the entire MSFC technical complex through LIEF. The Flight Director is supported directly by the MSFC Booster System Engineer who can also draw on LIEF for advisory support.

2.2 LIEF MISSION SUPPORT ORGANIZATION (AS-501)

The LIEF Mission Support Organization (Figure 2.2) is under the direction of the AS-501 LIEF Operations Manager, Dr. F. A. Speer, Manager, Mission Operations Office, I-MO. The organization required to support the AS-501 mission is planned by the Mission Operations Office, I-MO, which coordinates with other MSFC elements to establish adequate representation of all elements within the AS-501 support organization.

I-MO insures that all assigned personnel are properly informed and trained to perform their function during the assigned mission phases. Instructions are provided to the support personnel to identify their responsibilities, operating procedures, etc., and a series of training sessions are conducted prior to the launch operations.

The key functions within the LIEF Mission Support Organization as depicted in Figure 2.2 are briefly described below:

AS-501 MISSION DIRECTORS ORGANIZATION
(MSFC INTERFACE)

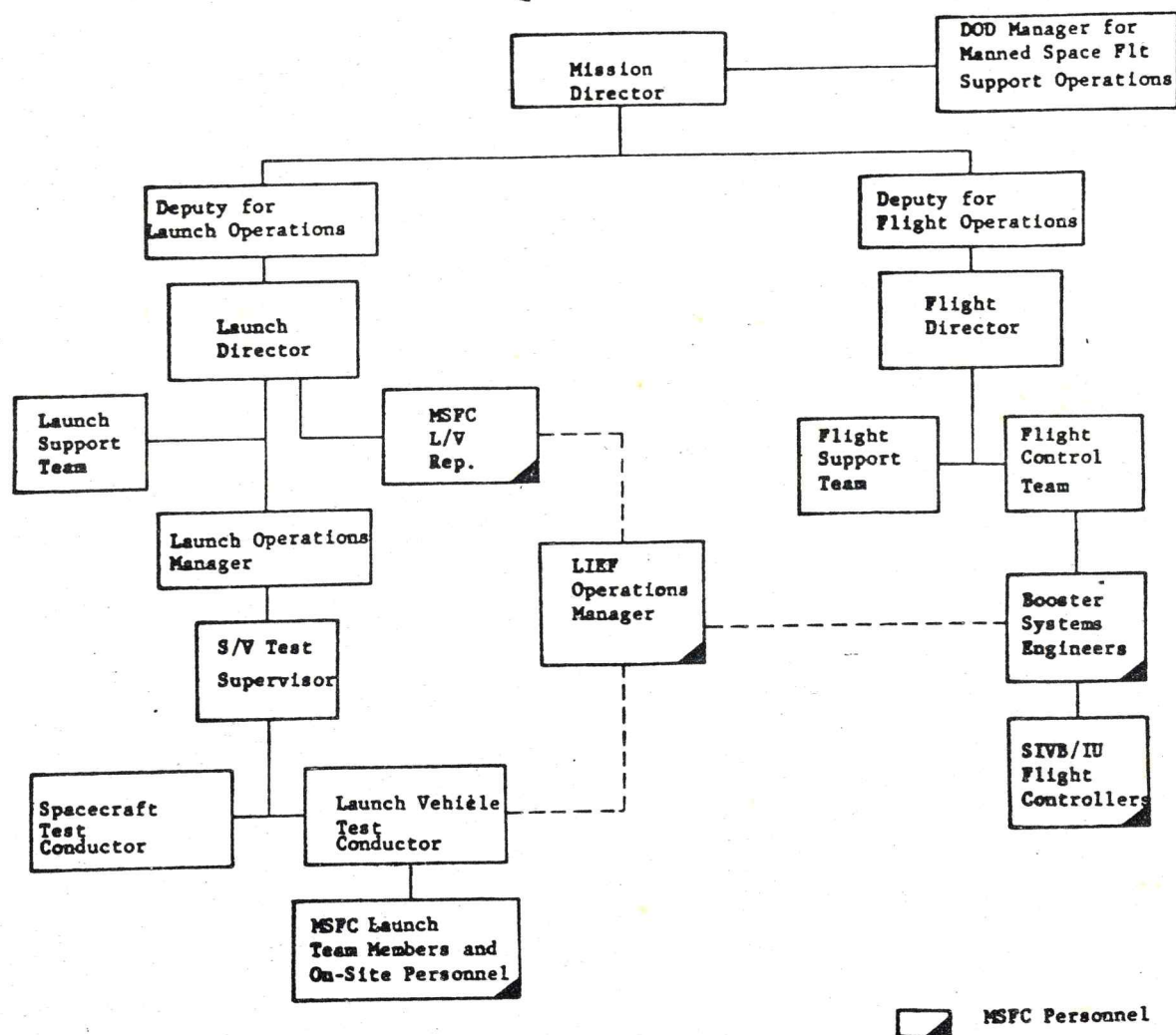


Figure 2.1

AS-501 MSFC OPERATIONS SUPPORT ORGANIZATION

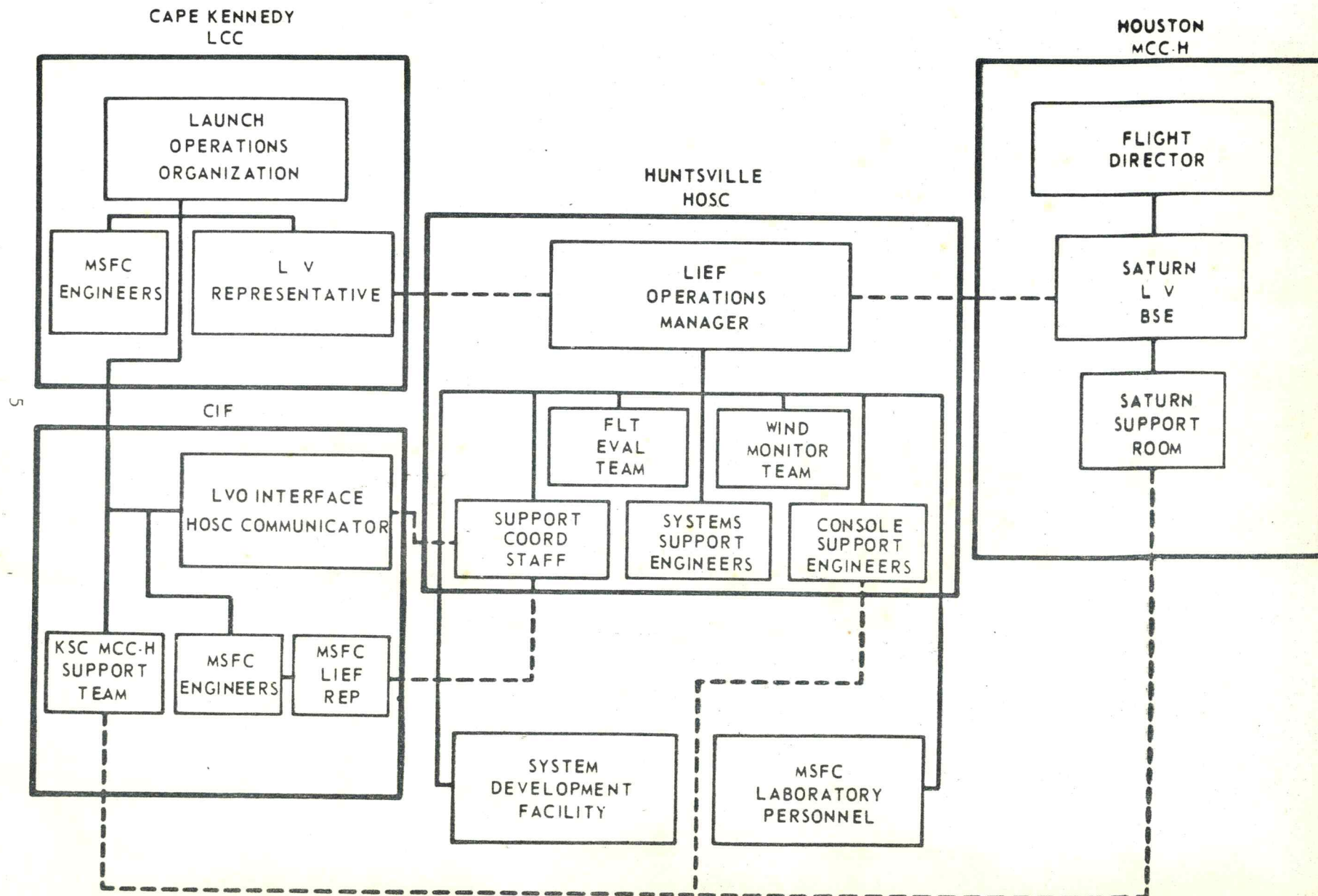


Figure 2.2

2.2.1 Launch Vehicle Representative

The Launch Vehicle Representative is the official MSFC spokesman to the Launch Director in any matters affecting the launch vehicle. During his presence in the launch complex he is also the spokesman for the MSFC operations support organization established at Huntsville. Dr. Arthur Rudolph, Manager, Saturn V Program, I-V-MGR, has been designated as the AS-501 Launch Vehicle Representative.

2.2.2 Support Coordination Staff

The LIEF Support Coordinator is responsible to track all support requests, assure satisfactory disposition of requests, and assure proper dissemination of information concerning such requests. He is assisted by the following personnel:

The Launch Vehicle Operations (LVO) communicator maintains voice communications with the HOSC communicator and the MSFC LIEF Representative located in the CIF Launch Support Room. He insures LIEF support engineers are kept informed of countdown status and coordinates TV coverage with the HOSC Communicator.

The Personnel Locator maintains cognizance at all times of the location of all Support Engineers, key MSFC management personnel, and other designated technical personnel; and assists in establishing conferences and direct calls between the LCC, CIF, and personnel requested by KSC.

The Main Conference Room Coordinators are stationed in the Main Conference Room to expedite the establishment of support conferences with MCR personnel and facilitate internal communications with and support of MCR personnel.

The Main Conference Room Information Manager insures that all pertinent information is relayed to Main Conference Room personnel and responds to requests for specific displays from MCR personnel.

2.2.3 Flight Evaluation Team (FET)

The FET represents the interface of the Flight Evaluation Working Group and its postflight evaluation efforts with the LIEF Operations organization. Members of the FEWG are absorbed throughout the organization to assist in real-time engineering analysis and to support the FEWG activities. The FEWG is formally represented to facilitate the LIEF support of FEWG postflight activities.

2.2.4 Console Support Engineers

Support is provided as required to launch and flight operations from HOSC engineering data consoles. The console support activities are coordinated by Console Managers who are I-MO personnel. The consoles are manned by systems engineers identified by MSFC Laboratories, who perform detailed system data monitoring and analysis, and coordinate support to the Saturn Launch Vehicle Staff Support Room in Mission Control Center - Houston (MCC-H) and engineer to engineer support to KSC. An observer from each launch vehicle stage contractor is also located at the consoles.

2.2.5 Systems Support Engineers

Systems Support Engineers are organized into preselected subsystem problem groups including technical and management personnel and will provide support in Launch Vehicle areas which may be the subject of a KSC or MSC request for analysis during terminal launch countdown and flight. Figures 2.3 through 2.6 show the AS-501 support engineer representation by major organizational elements and the problem groups defined for HOSC support. There are approximately 160 support engineers for the 55 problem groups listed. The Systems Support Engineers are composed of both MSFC and stage contractor personnel.

2.2.6 HOSC Communicator

The HOSC Communicator is a KSC Launch Vehicle Operations member who mans the LIEF console in the CIF during the terminal countdown and coordinates with the HOSC all requests for support on the Launch Vehicle from KSC launch vehicle operations personnel. He also provides launch vehicle status information during the countdown to the Launch Vehicle Operations Communicator and controls switching of operational TV to HOSC.

2.2.7 MSFC LIEF Representative

The MSFC LIEF representative is a member of the MSFC LIEF organization assigned to the Cape to coordinate MSFC support of Launch Operations. He is located in the CIF Launch Support Room during the terminal countdown and launch.

AS-501 HOSC SUPPORT ENGINEER REPRESENTATION

MISC., IU, & GSE PROBLEM GROUPS

PROBLEM GROUP	Ground Instr. Sys.	Vehicle Instr.	Wind Monitoring	Sequence & Interlocks	Orbital Support	EDS	Sys. Integ & DDAS	RCA-110	IU Elec. Ntwks.	IU Instrumentation	IU Env. Control	LVDC/LVDA	Flight Program	ST-124M Platform	Flight Control Comp.	IU GSE
R-ASTR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
R-P&VE			X	X	X	X					X					X
R-AERO	X	X	X			X				X			X			
R-TEST																
R-TO		X	X	X		X	X	X	X	X	X		X			X
I-E				X		X										
I-MO-R	X	X			X											
I-V-E	X	X	X	X	X	X	X			X			X			
I-V-F					X											
I-V-G							X	X								X
I-V-SIC							X									
I-V-SII																
I-V-SIVB					X											
I-V-IU					X				X	X	X	X	X	X	X	
Rktdyne				X		X										
TBC							X									
S&ID	X	X		X		X										
DAC	X	X		X	X	X										
IBM	X	X		X	X	X			X	X	X	X	X	X	X	X
GE							X									X
CCSD																X
RCA								X								

FIGURE 2.3

AS-501 HOSC SUPPORT ENGINEER REPRESENTATION

S-IC PROBLEM GROUP

ORG.	PROBLEM GROUP	SIC Elec. Ntwks.	SIC Instrumentation	SIC F-1 Engine	SIC Prop. Loading	SIC Fuel Sys.	SIC Oxidizer Sys.	Pneumatic Control Sys.	SIC Structures	SIC Ordnance	SIC Control Sys.	SIC Hydraulic Sys.	SIC Ground Spt Equip.				
	R-ASTR	X	X	X						X	X		X				
	R-P&VE		X	X	X	X	X	X	X	X		X	X				
	R-AERO		X								X						
	R-TEST			X		X	X	X				X	X				
	R-TO	X	X	X	X	X	X	X	X	X	X	X	X				
	I-E			X									X				
	I-MO-R																
	I-V-E																
	I-V-F																
	I-V-G												X				
	I-V-SIC	X	X	X	X	X	X	X	X	X	X	X	X				
	I-V-SII																
	I-V-SIVB																
	I-V-IU																
	Rktdyne		X	X				X		X		X	X				
	TBC	X	X	X	X	X	X	X	X	X	X	X	X				
	S&ID																
	DAC																
	IBM										X						
	GE												X				
	CCSD																
	RCA																

FIGURE 2.4

AS-501 HOSC SUPPORT ENGINEER REPRESENTATION

S-II PROBLEM GROUP

PROBLEM GROUP	SII Insulation	SII Elec. Ntwks.	SII Instrumentation	SII J-2 Engine	SII Prop. Loading	SII Fuel Sys.	SII Oxidizer Sys.	Pneumatic Control Sys	SII Structures	SII Ordnance	SII Control Sys.	SII Hydraulic Sys.	SII Ground Spt. Equip.			
R-ASTR		x	x	x						x	x		x			
R-P&VE	x		x	x	x	x	x	x	x	x		x	x			
R-AERO			x								x					
R-TEST	x			x		x	x	x				x	x			
R-TO		x	x	x	x	x	x	x	x	x	x	x	x			
I-E				x									x			
I-MO-R																
I-V-E																
I-V-F																
I-V-G													x			
I-V-SIC																
I-V-SII	x	x	x	x	x	x	x	x	x	x	x	x	x			
I-V-SIVB																
I-V-IU																
Rktdyne				x									x			
TBC																
S&ID	x	x	x	x	x	x	x	x	x	x	x	x	x			
DAC																
IBM											x					
GE																
CCSD													x			
RCA																

FIGURE 2.5

AS-501 HOSC SUPPORT ENGINEER REPRESENTATION

S-IVB PROBLEM GROUP

ORG. / PROBLEM GROUP	S-IVB Elec. Ntwks	S-IVB Instrumentation	S-IVB J-2 Engine	S-IVB Prop. Mgt.	S-IVB Fuel System	S-IVB Oxid. System	Pneumatic Control Sys.	S-IVB Structures	S-IVB Ordnance	S-IVB Control Sys.	S-IVB Hydraulic Sys.	Aux. Prop. Sys.	Environmental Control	S-IVB Ground Spt. Equip.
R-ASTR	X	X	X	X					X	X				X
R-P&VE			X	X	X	X	X	X	X		X	X	X	X
R-AERO		X		X						X				
R-TEST			X	X	X	X				X				X
R-TO	X	X	X	X	X	X	X	X	X	X	X	X	X	X
I-E			X											X
I-MO-R														
I-V-E		X												
I-V-F														
I-V-G														X
I-V-SIC														
I-V-SII														
I-V-SIVB	X	X	X	X	X	X	X	X	X	X	X	X	X	X
I-V-IU														
Rktdyne														X
TBC														
S&ID														
DAC	X	X	X	X	X	X	X	X	X	X	X	X	X	X
IBM										X			X	
GE														X
CCSD														
RCA														

FIGURE 2.6

2.2.8 Wind Monitoring Team

The actual flight wind environment during the terminal countdown is analysed as to acceptability for launch by a joint MSFC/MS Wind Monitoring Team and results reported to the Launch Director.

Ground wind monitoring and the computation and analysis of real-time launch vehicle bending moments will also be performed in the HOSC for developmental purposes.

2.3 SUPPORTING DOCUMENTATION

The following documentation is prepared as a requirement of this LIEF Operations Plan to provide necessary definition and control of AS-501 LIEF operations. These documents and other technical documentation and historical information of the launch vehicle are available in the Systems Information Library during HOSC operations.

2.3.1 HOSC System Control Document

The System Control Document controls the HOSC display system hardware systems configuration and software programming and is jointly approved by I-MO-O and R-COMP. This document is modified as required to support a specific mission.

2.3.2 AS-501 HOSC Mission Display Plan

The Mission Display Plan specifies the nominal sequence of HOSC displays and their distribution during the mission. It is jointly approved by I-MO-O and R-COMP.

2.3.3 LIEF Communications Control Document

The LIEF Communications Control Document defines all communications services required by MSFC for support of LIEF operations and controls the configuration and operation of HOSC communications. Inserts are issued when required to update this document for mission peculiar items. It is jointly approved by I-MO-O and MS-C.

2.3.4 Laboratory Terminals

This document defines any special relationships and interfaces between the HOSC and laboratory terminals. For AS-501 the primary interface between the laboratories and HOSC is the Saturn V System Development Facility located in the Quality and Reliability Assurance Laboratory. This document is jointly approved by I-MO-O, I-V-G, and the laboratory organizations affected.

2.3.5 PSRD Inputs

LIEF/HOSC requirements for support provided by other NASA facilities are placed through the Program Support Requirements Document. This document is the designated NASA document for the identification of Manned Space Flight support requirements and is a consolidation of the Office of Manned Space Flight prelaunch, mission and post mission requirements. MSFC inputs are given through I-MO-R to OSRO for inclusion in the document.

2.3.6 AS-501 LIEF Procedures Handbook

This document established standard operating procedures (SOP) for use of LIEF communications and display systems and defines the mission specific duties, responsibilities, and operating procedures for LIEF Operations personnel and supporting elements. This document is issued by I-MO-O.

2.3.7 LIEF/HOSC Manning Plans

An AS-501 HOSC Manning Plan is issued in memorandum form by I-MO-O for each prelaunch test and for the launch to name those individuals required to support the test.

2.3.8 AS-501 HOSC Training and Briefing Memorandum

These memoranda identify the training and simulation exercises necessary for the operations staff and console support engineers to effectively operate the HOSC. They are issued by I-MO-O.

2.3.9 HOSC Countdown Manual

The HOSC Countdown Manual describes in detail the procedures and activities to be performed by HOSC Operational personnel during the Countdown Demonstration Test (CDDT) and terminal countdown and launch. This manual is issued by I-MO-O.

2.3.10 Logistics Plan

The Logistics Support Plan includes a comprehensive checklist of items relative to the operation of the HOSC facility that are not covered in other plans. Examples are: Supplies, furniture, food service, and janitorial service. This document is issued by I-MO-O.

2.3.11 Wind Simulation Plan

This document describes the AS-501 wind monitoring activities to be performed in the HOSC during the terminal countdown and shows the personnel manning required. This document is prepared by R-AERO-F and approved by I-MO.

3.0 OPERATIONS ACTIVITIES

3.1 PRELAUNCH ACTIVITIES

Prior to the terminal countdown and flight, LIEF voice and data circuits are used directly between individual MSFC Laboratories and Offices to support KSC and MSC on a routine basis. Approximately two weeks prior to launch, a MSFC Mission Status Room will be activated in the HOSC to provide MSFC elements the status of the mission and launch vehicle countdown and to provide an interface to the Mission Director's organization. The Mission Status Room is manned on a continuing basis until the terminal countdown.

In addition, the LIEF/HOSC provides support services to KSC and MSC during certain prelaunch tests as described in the following:

3.1.1 Prelaunch Test Locator Support to KSC

The HOSC provides a Personnel Locator Service to KSC for contacting MSFC Systems Support Engineers who will be on call during the Flight Readiness Test. These MSFC and Contractor Personnel are selected by their respective organizations to represent all major vehicle areas as Support Engineers for these prelaunch tests. Each Support Engineer is in turn able to locate any individual in his respective technical area whose advice may be needed.

The Personnel Locator contacts each Support Engineer to confirm the start time and duration of each test at such time as that information becomes available. The locator is in the HOSC, Building 4663, 30 minutes prior to the start of the test and maintains a log of the location

and telephone numbers where each Countdown Support Engineer can be reached at all times throughout each test.

The primary communications utilized by the Personnel Locator for KSC Prelaunch Test Support will be two voice lines between the HOSC and the LIEF console in the CIF via the LIEF switchboard. When support is requested by KSC, the cognizant Support Engineer is contacted by the Personnel Locator by telephone through the LIEF switchboard. Once contact is established, the Support Engineer is conferenced into the LCC LIEF line and at KSC discretion into LCC working circuits as required.

3.1.2 Countdown Demonstration Test (CDDT) Support

During the CDDT the HOSC is fully manned with Operations personnel and Support Engineers in full scale dry run preparation for the launch operations terminal countdown activities. Voice conferencing with LCC-39A is established, launch vehicle checkout test data monitored, and the Systems Development Facility (SDF) is on standby. In addition there is operations and checkout training with the Saturn Launch Vehicle (SLV) Flight Controllers at MCC-H.

3.1.3 Prelaunch Test Training and Facility Checkout Activities

The HOSC Operations Support Room (OSR) Engineering Consoles are manned during the following prelaunch tests for the purpose of training and facility checkout:

Umbilical-in Overall Acceptance Test (OAT)

Umbilical Eject Test

Systems Interface Test (SIT)

Flight Readiness Test (FRT)

Data is transmitted from the Central Instrumentation Facility (CIF) DATA-CORE to the HOSC during the tests and the tests are observed in conjunction with the Saturn Launch Vehicle (SLV) Flight Controllers at MCC-H for the purpose of voice communications training and familiarization, evaluation of the operational readiness of the HOSC data display systems, and checkout data observation.

3.2 TERMINAL COUNTDOWN, LAUNCH AND FLIGHT

3.2.1 MSFC Prelaunch Wind Monitoring

Prelaunch flight wind monitoring analyses and trajectory simulations are jointly performed by MSFC Laboratory personnel in conjunction with MSC personnel located at MSFC during the terminal countdown. Beginning at T-24 hours, actual wind data is electronically transmitted periodically from KSC to the HOSC. These data are used by the MSFC/MSFC wind monitoring team in vehicle flight digital simulations to verify the capability of the vehicle with these winds. Angle of attack, engine deflections, and structural loads are calculated and compared against vehicle limits. Simulations are made on either the IBM 7094 or B5500 computer and results are reported to the Launch Control Center (LCC) within 60 minutes after wind data transmission. At T-2 1/4 hours a go no-go recommendation is transmitted to KSC by the MSC/MSFC Wind Monitoring Team. A go no-go condition is also relayed to the LCC for LOX and LH2 loading.

In the event of marginal wind conditions contingency wind data balloon releases are made by KSC on an hourly basis after T-2 1/2 hours

and a go no-go recommendation transmitted to KSC for each contingency release. This contingency data is provided MSFC in real-time via CIF/ DATA-CORE and trajectory simulations are performed on-line to expedite reporting to KSC.

Ground wind monitoring activities are also performed by AERO and P&VE Laboratory personnel for developmental tests of displays. Wind anemometer and strain gauge data are received in real-time and bending moments computed and compared with similar bending moment displays in CIF.

These activities are centralized in the wind simulation, trajectory and orbit analysis room located in the HOSC (See Figure 4.1)

3.2.2 Launch and Flight Operations Support

During the prelaunch period, primary support is directed to KSC. Voice communications are also maintained between the HOSC consoles, the Saturn Launch Vehicle Staff Support Room (SLV/SSR) at MCC-H, and the KSC MCC-H support engineers in CIF to coordinate preparations for the flight phase and answer any support request.

At lift-off primary support transfers from KSC to the MCC-H. The HOSC engineering consoles provide support as required to the SLV/SSR for S-IVB/IU orbital operations by monitoring detailed instrumentation for the evaluation of system in-flight and dynamic trends, assisting in the detection and isolation of vehicle malfunctions, and providing advisory contact with vehicle design specialist. This support is normally provided from lift-off through the active launch vehicle post spacecraft separation phase approximately $T + 6$ hours, or until LIEF Mission Support Termination.

Following completion of the active launch vehicle support activities, data is recalled as required for more detailed analysis and initial preparation made to provide support to postflight evaluation.

The LIEF Operations Manager submits a report of LIEF activities and support to the Mission Director within two hours after LIEF mission support termination.

3.3 POST FLIGHT EVALUATION SUPPORT

The LIEF staff and facilities continue to support the Flight Evaluation Working Group in postflight evaluation records review and recall flight data which was transmitted to the HOSC in real-time for further analysis. The primary LIEF support functions to post flight evaluation are the electronic transmission of postflight data, utilization of the HOSC/MCR for Flight Evaluation Working Groups Meetings, and utilization of the HOSC display system for data display and analysis.

3.4 PRELIMINARY MISSION FAILURE INVESTIGATION

As defined in the MSFC Apollo/Saturn Mission Failure Investigation Plan, in the event a failure occurs that apparently results from a technical area or action within the cognizance of MSFC, MSFC will conduct an investigation. This investigation will be initiated immediately after the failure occurs by the LIEF Operations Manager.

The failure investigation group makes a preliminary determination of the events leading up to the failure based upon real-time data available in the HOSC.

The findings of this early investigation are reported to MSFC top management not later than 4 hours after termination of the mission. The LIEF Operations organization is disbanded after the preliminary mission failure investigation and the LIEF capability is made available for any further requirements as defined in the MSFC Apollo/Saturn Mission Failure Investigation Plan.

4.0 FACILITIES DESCRIPTION

4.1 HUNTSVILLE OPERATIONS SUPPORT CENTER (HOSC)

The HOSC is physically located in the west end of A-wing, Building 4663, on Martin Road. The main entrance is at the west end of A-wing. The Operations Area is located on the first and second floors with additional area in the basement for communications equipment and storage. A brief description of the areas shown in Figure 4.1 is given in the following paragraphs:

4.1.1 Main Conference Room (MCR)

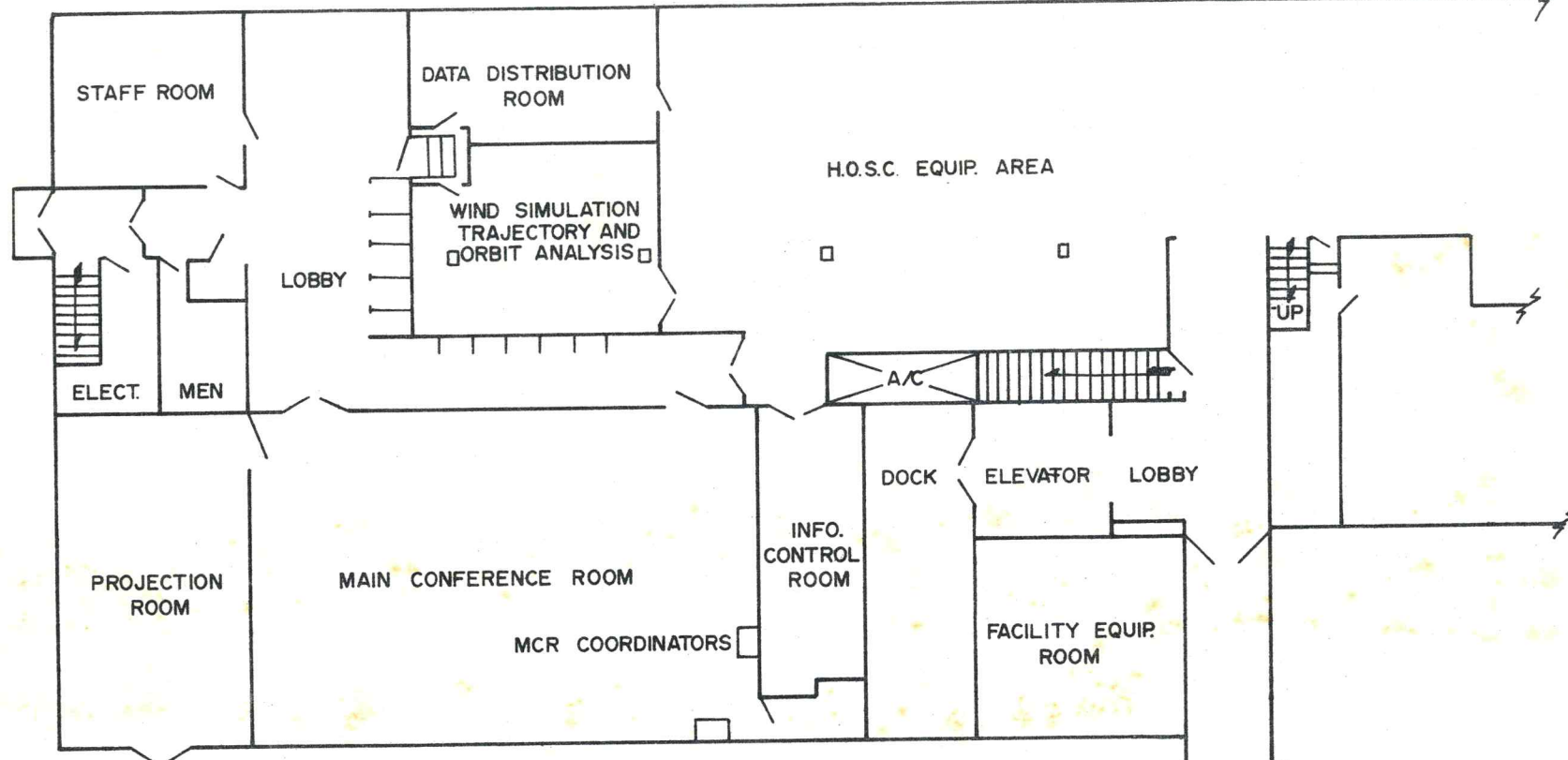
The MCR has space for approximately 150 people during operational periods in an auditorium type arrangement. The MCR is equipped with: a public address system; sound reinforcement; audio pickup and recording; variable lighting; rostrum with remote controls for projection equipment; three 6' x 8' Rear Projection Screens; and sliding corkboard for mounting data records, schematics, and other static displays. Associated with the MCR is the Projection Room where TV, 16 mm movie, slide projectors (2" x 2" and 3 1/4" x 4") and viewgraphs will be mounted. A spiral staircase is provided in the rear of the MCR to expedite the movement of problem groups to the LIEF Control Room and operations area.

4.1.2 Information Control Room (ICR)

The ICR is located at the rear of the Main Conference Room. ICR features include: a 4' raised floor, with window between ICR and MCR, a 12 section console, and one equipment rack.

The ICR is utilized for overall HOSC display and audio control

HOSC FIRST FLOOR
A-WING BUILDING 4663



HOSC SECOND FLOOR
A-WING BUILDING 4663

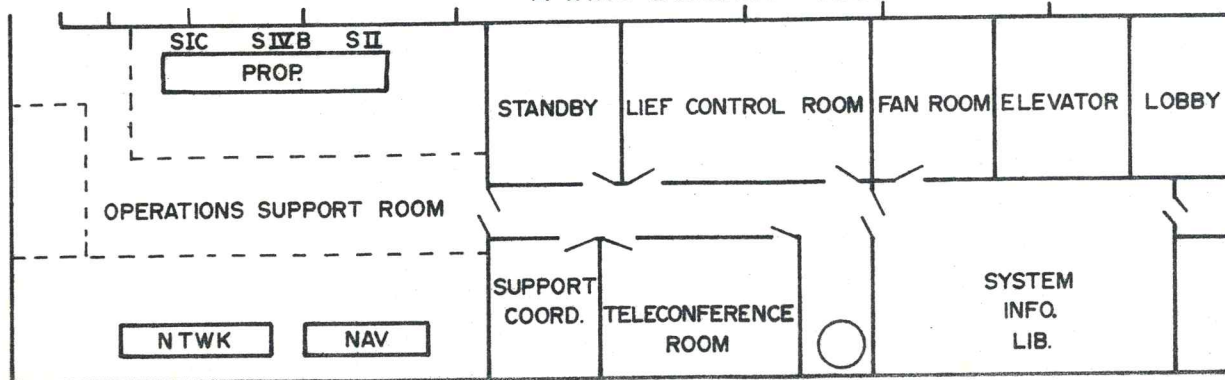


FIGURE 4

which is performed by the Main Conference Room Information Manager, Display Controller, and Display Technician.

4.1.3 LIEF Control Room (LCR)

The LIEF Control Room is the focal point for the provision of HOSC support to the Launch Vehicle Representative. The LIEF Operations Manager is located in this room and it is utilized as the primary room for support conferences by the HOSC problem groups. The room is equipped with audio facilities for voice conferencing between MSFC, KSC, and MSC; and TV monitors for information and data display. In addition, rapid access slide display of technical and historical information available in the Systems Information Library is available for problem group analysis and discussions.

4.1.4 Teleconference Room (TCR)

The Teleconference Room, in addition to normal facilities for small conferences, is equipped with audio facilities for voice conferences between MSFC, KSC, and MSC, and with TV monitors for information display. The TCR will house key MSFC support representatives, during the terminal countdown.

4.1.5 Support Coordination Room

The support coordination room contains the Support Coordinator, Personnel Locator, and LVO coordinator and is equipped with communications consoles for the support coordination staff. It is located such that the staff has visual access to all rooms of the operations area.

4.1.6 Operations Support Room (OSR)

The Operations Support Room provides an operations area for the vehicle systems engineers who supply the remote technical support to KSC for launch support and to the MCC-H for Apollo Flight Control Support.

Engineering consoles in the Operations Support Room display vehicle systems performance data in real-time. TV monitors in the Operations Support Room provide general status information remoted from the Main Conference Room displays.

4.1.7 HOSC Equipment Area

The HOSC Equipment Area contains the B5500 Computer, telemetry ground station, and other equipment for data receipt, data processing, and display generation.

4.1.8 Teletype Room and Vault

A teletype room and vault are located in the basement directly below the main floor of the HOSC. A message lift allows quick passage of information between the basement and first floor of the HOSC. The vault is used for storage of flight test data and vehicle models.

4.1.9 Telephone Patch Panel Room

A patch panel for programming the internal HOSC communications system is located in the HOSC basement adjacent to the vault and TTY room.

4.1.10 Wind Simulation, Trajectory and Orbit Analysis Room

This room is utilized for inflight and ground wind monitoring activities by the joint MSFC/MSC Wind Monitoring Team and real-time event and trajectory analysis.

4.1.11 Systems Information Library (SIL)

The Systems Information Library provides technical documentation and historical information of the launch vehicle. The library is located on the second floor for direct access to the problem conferencing area.

4.2 COMMUNICATIONS

The basic AS-501 LIEF Communications circuits are summarized for information purposes in the following paragraphs. A more definitive description of LIEF Communications is given in the AS-501 LIEF Communications Control Document, which takes precedence over this document for control of communications configuration.

4.2.1 Voice

4.2.1.1 KSC

Primary voice support circuits to KSC are:

OIS-1	}	Two blockhouse operational intercom
OIS-2		
LVO-C		Support coordination circuit to HOSC Communicator in CIF

Saturn Launch Vehicle Representative (SLVR)

Launch Support Room (CIF/LSR)

There are also four KSC Exchange Dial Circuits on the LIEFBOARD. The four circuits are a rotary group beginning with telephone number 877-8175.

4.2.1.2 MSC

There are five voice circuits to MSC. One is a direct line from the HOSC to the Booster Systems Engineer #1 (BSE#1). One is a direct line between the Mission Director's Console in the MCC-H and the HOSC Manager in the HOSC. The other three are from the HOSC Engineers to the SSR Engineers, and are conferenced at MSC with circuits from the KSC Launch Support Room (LSR).

4.2.1.3 GSFC

There are two voice circuits to GSFC, one each to the Headquarters Mission Status Room, and the Ground Operational Support System (GOSS) Network monitor.

4.2.2 Facsimile

Facsimile will be provided on the Western Union 600 System. One circuit will be available between the LCC-39A and the HOSC. One circuit conferenced at the New Orleans switch will connect the HOSC, the SLV/SSR in MCC-H, and the KSC/MCC-H Support Team in the CIF.

4.2.3 Teletype

Classified teletype is provided between KSC and MSFC. Teletype is also used from GSFC to MSFC to provide tracking data for flight evaluation, and from MCC-H to HOSC for Launch Vehicle Remote Site Summary Messages and Trajectory Vector Messages.

4.2.4 Data

40.8 Kbs data circuits are used between the DATA-CORE (KSC) and the real-time computer (HOSC) and between U-1004 tape transceivers at the CIF and HOSC.

4.2.5 TV

Real-time launch coverage TV from LC-39A is provided from approximately T-8 hours until orbital insertion.

4.3 HOSC INFORMATION SYSTEMS

The HOSC Information Systems are shown in Figure 4.2 and are generally described below for information purposes. A more definitive description is given in the AS-501 Mission Display Plan and HOSC Systems Control Document, which takes precedence over this document for the control of the display system configuration.

4.3.1 Data Processing System

The primary data processing elements in the HOSC are the Collector/Distributor (DDP-224) and the Burroughs B5500 Computers. The Collector/Distributor computer exercises control over the data and display distribution by collecting the real-time data received from DATA-CORE and distributing it to the B5500 and the end items of the display system. The B5500 receives and records for permanent record all data sent by the Collector/Distributor, performs all primary calculations and outputs to display devices via the Collector/Distributor computer.

HOSC INFORMATION SYSTEMS

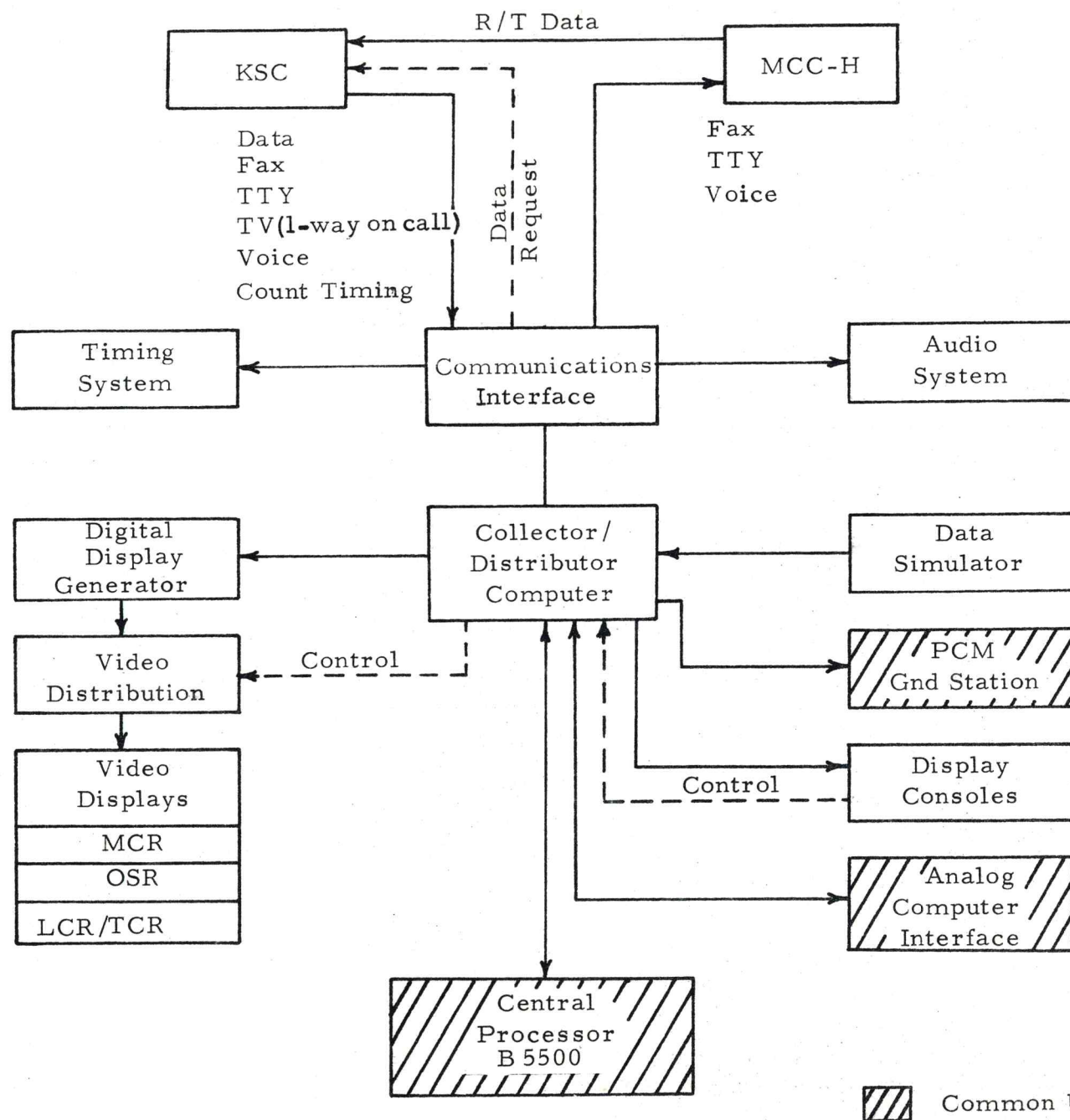


Figure 4.2

4.3.2 Display System

The TV Matrix Switch is a key element at the HOSC display system controlling the variety of available television displays. The inputs to the system are internal HOSC camera pickups, four digital-to-TV display generators and external television signals. The outputs will include a variety of regular monitors mounted throughout the HOSC area and three Eidophor large screen TV displays located in the Main Conference Room.

The Operations Support Room contains three engineering consoles for the monitoring of propulsion, navigation, and electrical networks data. Each console will have analog meters, discrete lights, and eight channel strip recorder, and TV displays.

In addition, all areas of the HOSC are served by a Voice Communications System (VCS) and a Timing System.

4.4 LABORATORY FACILITY INTERFACES

4.4.1 General

LIEF voice and data circuits are regularly utilized by the individual MSFC laboratories and offices in the day-to-day coordination between MSFC, KSC, and MSC. The locations of primary LIEF voice and data circuit terminals at MSFC are summarized below:

Voice:

Saturn V System Development Facility (Breadboard)

R-AERO-F

R-COMP-D

R-COMP-RR (Data receiving station)

Data (U-1004 Tape-to-Tape)

R-COMP-R (Building 4663)

Saturn IB System Development Facility (Breadboard)

4.4.2 LIEF-HOSC/Saturn V System Development Facility (SDF)

Interface

A special interface between the LIEF-HOSC facilities and the Saturn V SDF located in Building 4708 permits two-way communications with the Saturn V SDF Intercom system through the LIEFBOARD.

Communications between the Launch Complex at KSC and the Saturn V SDF can be conducted through this interface.