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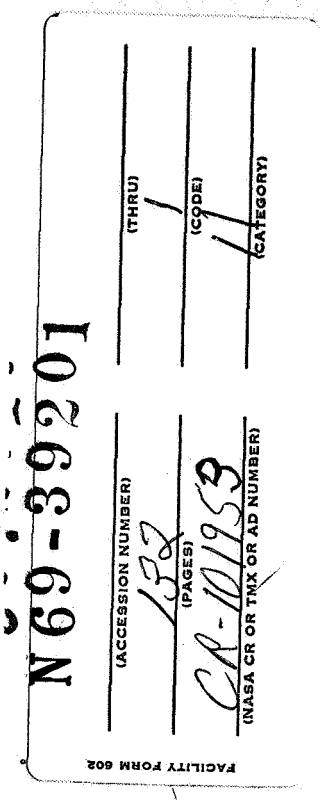
MISSION CONTROL CENTER
PROGRESS REPORT

FOR

1 JULY THRU 30 SEPTEMBER 1969

CONTRACT NAS 9-1261



PREPARED FOR

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MANNED SPACECRAFT CENTER

PHILCO Ford

PHILCO-FORD CORPORATION

Philco Houston Operations

PHILCO
PHILCO-FORD CORPORATION
Philco Houston Operations · WDL Division
1002 Gemini Ave
Houston, Texas 77058

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Prepared for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MANNED SPACECRAFT CENTER

Houston, Texas

Approved by: C. W. Abbitt

C. W. Abbitt
MCC Program Manager

PHILCO-FORD CORPORATION
PHILCO HOUSTON OPERATIONS
1002 GEMINI AVENUE
HOUSTON, TEXAS

PHILCO
PHILCO-FORD CORPORATION
Philco Houston Operations · WDL Division
1002 Gemini Ave.
Houston, Texas 77058

FOREWORD

The Quarterly Progress Report of the Mission Control Center (MCC) Program is submitted in accordance with Article X, Paragraph (a) of Schedule III, Modification No. 67 to Contract NAS 9-1261, as extended by Schedule III First Option Modification No. 80.

This report has been prepared and submitted by Philco Houston Operations (PHO) for the period from 1 July through 30 September and covers the remaining Schedules I, II, and III effort, as well as the current Schedule III First Option effort under Modification No. 80 to Contract NAS 9-1261.

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SECTION 1

PROGRAM SUMMARY

1.1 ACCOMPLISHMENTS DURING JULY, AUGUST, AND SEPTEMBER

A. Final Mission G simulations, pad tests and validation tests were successfully supported prior to launch on 16 July. During the flight, MCC systems operated at their highest level of performance. Only minor discrepancies were experienced, primarily in the pneumatic tube equipment and the converter slide files. No loss of critical data or vital communication was experienced.

Upon release of the third-floor system from Mission G on 28 July, reconfiguration for the H-1 mission was completed and tested. Installation of major MCC engineering orders during August delayed H-1 validation tests with outside systems until mid-September. Since then, numerous H-1 simulations, pad tests and validation tests have been completed successfully.

The second-floor display system remained in its final Mission G configuration, and on 3 September was powered down.

The MCC ALSEP system was operated through the 3 lunar days since EASEP deployment. Equipment in the MCC performed well with only minor discrepancies encountered. A review of MCC readiness for ALSEP I on 30 September revealed that equipment and personnel were prepared for the start of testing.

B. All digital television equipment design changes have been incorporated by Hazeltine. The DTE RTCC qualification test programming requirements are being defined. An overall implementation plan, detailing implementation and testing steps, will be finished by 1 November. Another status review is scheduled for 7-8 October at Hazeltine's plant.

The CCATS System Configuration Unit is progressing on a very tight schedule. System checkout progress on the first switch matrix set, the console and control rack, is favorable. Delivery of faulty printed circuit boards for the second switch matrix set caused a delay in projected shipping date from 24 November until 9 December.

During August, the ASCATS system was moved from Building 422 to Building 30 and successfully requalified. The MCC message center was moved to Room 226. ALSEP computer displays, console and peripherals were relocated to the RTCC for use with the 360/75. CCATS rearrangement and Console 79 reconfiguration were partially completed. All ALSEP equipment was back on-line prior to 17 August, the start of second lunar day, and the remaining moves were completed prior to 2 September, the H-1 simulation readiness date.

During the quarter, 94 EO's were received and 6 were cancelled. Nineteen Schedule II, 39 Schedule III and 2 Schedule III-1 EO's were completed, leaving 34 Schedule II, 201 Schedule III and 89 Schedule III-1 EO's in the system. Twenty-two Mission H-1 EO's were completed, leaving 17 H-1 EO's open.

C. All operational support tasks met scheduled milestones. The Flight Control advanced mission planning task and TLS task were completed. The three FCD tasks were consolidated into one task, under the Flight Control Department Manager, A. S. Davis.

D. Contractually, Schedule III First Option coverage remained as originally negotiated until 16 September, when redirection was received. Since that time, proposal development and renegotiation efforts have been carried out in parallel.

E. The readiness cycle for Mission H-1 and the status of mission-related EO's are attached.

MISSION READINESS

AS- 507 H1

PARA. NO.	TASK	SCHEDULE	ACTUAL	COMMENTS
IA7–A	DISPLAY AND TM RECONFIGURATION	7/29/69	7/28/69	
IA7–B	COMMUNICATION RECONFIGURATION	7/29/69	7/28/69	
IA7–C	ASCATS RECONFIGURATION	7/29/69	7/11/69	SDAR PCN-2
IA7–D	RECONFIGURATION TESTING	8/5/69	8/4/69	
IA7–F	MCC HARDWARE VALIDATION TEST MAN.	7/29/69	7/24/69	
IA7–G	PCM PROGRAM W/O DATA ROUTING	N/A	N/A	
IA7–H	M AND O OPERATING PROCEDURES	7/2/69	6/26/69	
IA7–I	PCM PROGRAM WITH DATA ROUTING	7/29/69	7/21/69	
IC2–F	TR 155 MASTERS	8/11/69	8/11/69	
IC4–A	MCC BASELINE HARDWARE CONFIGURATION	11/1/68	11/1/68	
IC4–D	PRIMARY LISTINGS	7/11/69	7/11/69	
IC4–E	SECONDARY LISTING	8/11/69	7/11/69	
IC4–F	TR 155	8/25/69	8/26/69	
IC4–G	CROSS CONNECT LISTS	7/11/69	7/11/69	
IC4–J	CONFIGURATION ORACT TEST LISTINGS	7/29/69	7/25/69	
IC4–K	CONFIG. ORACT TEST PACKAGE PROCED.	8/1/69	7/30/69	
ID1–B	QA SYSTEMS SURVEY REPORT	10/30/69		
II2–C	TM DATA FORMAT CONTROL BOOK	8/22/69	8/22/69	Rev. 3
	CMD DATA FORMAT CONTROL BOOK	9/12/69	9/12/69	Rev. 5
	TRK DATA FORMAT CONTROL BOOK	8/5/69	8/5/69	Rev. 4
II2–D	APCU PROGRAM SPECS	N/A	N/A	
	GSSC PROGRAM SPECS			
	SSB–400–GSSC GENERAL SPECS	10/7/69		Rev. A
	SSB–402–GSSC LM SPECS	7/3/69	7/3/69	Change 4
	SSB–401–GSSC SATURN SPECS	9/18/69	9/18/69	Rev. A
	SSB–403–GSSC CSM SPECS	7/25/69	7/25/69	
	SSB–404–GSSC DISPLAY SPECS	7/3/69	7/3/69	Change 2 due 10/9/69
II2–E	CCATS PROGRAM REQUIREMENTS	6/20/69	6/20/69	Change 1
II2–F	APCU PROGRAM	7/23/69	7/23/69	
II2–G	RSDP PROGRAM REQUIREMENTS – TM	6/15/69	6/15/69	Rev. 1, Change 3
II2–G	RSDP PROGRAM REQUIREMENTS – CMD	6/25/69	6/25/69	Rev. 1, Change 2
IIIC3–2	X–Y PLOTBOARD FORMATS	11/13/69		1 Complete
IIIC3–3	D/TV FORMATS	11/10/69		212 Complete

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MISSION READINESS

AS- 507 H1

PARA. NO.	TASK	SCHEDULE	ACTUAL	COMMENTS
IIIC3–4	PROJECTION PLOTTER FORMATS	11/13/69		4 Complete
IIIC3–6	D/TV SLIDES	11/10/69		4850 Complete
IIIC3–8	PROJECTION PLOTTER SLIDES	11/13/69		1 Complete
IIIC3–9	SHELLY DRK RETICLES	11/10/69		457 Complete
IIIC3–10	PROJECTION READOUT RETICLES	11/10/69		0 Complete
IIIC3–13	UPDATED MISSION APPENDICIES	12/14/69		
IIID–3	RTCC TRAJECTORY PROG. REQUIREMENTS	9/15/69	9/15/69	Change 92
	RTCC TM PROGRAM REQUIREMENTS	9/26/69	9/26/69	Change 83
	RTCC COMMAND PROG. REQUIREMENTS	8/28/69	8/28/69	Change 33
	RTCC OPERATIONAL SUPPORT PLAN	8/1/69	8/1/69	Change 4
IIIF3–A	PSRD	8/18/69	8/18/69	Rev. 17
IIIF3–B	DATA RECORDING FORMATS BOOK	N/A	N/A	Not required
IIIG–3	SIM DATA PACK – SECTION I	4/8/69	4/8/69	
	SIM DATA PACK – SECTION III	4/1/69	4/1/69	
	SIM DATA PACK – SECTION IV	4/9/69	4/9/69	
III 12	MISSION INSTRUMENTATION SUP. PLAN	9/10/69	9/10/69	Preliminary - Final 11/10/69

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ENGINEERING ORDERS

AS-507 H1

E.O. NO.	DESCRIPTION	I AND C	TEST
1668D	TAKE UP REELS ALL HSP - BL30	8/18/69	8/28/69
3121D	INSTALL STOP CLOCK - CSL88	10/31/69S	
3122D	ADD FC/M&O PBI TO CSL74	7/3/69	7/11/69
3140C	PROVIDE COMMUNICATION FOR EO-6180S RELOCATION		9/11/69
3294D	INSTALL 12 MSK's	9/5/69	
3297D	PROVIDE 2 CCATS RESTART MODULES	8/28/69	
3509D	A/C OUTLETS ON HSP - BL30	8/18/69	8/28/69
3515D	RECONFIGURE CSLS 29, 34, 81, 82 & 10	5/29/69	6/8/69
3517D	MODIFY TCM MODULE	6/4/69	6/11/69
3521D	INSTALL A D9/5B2 - CSL 76A	4/23/69	5/7/69
3522D	CHANGE EXISTING CLOCK DRIVE CIRCUIT - FLOOR 3	8/4/69	8/8/69
3524D	CHANGE EXISTING CLOCK DRIVE CIRCUIT - FLOOR 2	8/4/69	8/8/69
3526D	PROVIDE RESTART MODULE LOGIC POWER SUPPLIES - RTCC A & B CSLS	8/18/69	9/4/69
3540D	REMOVE T.V. CHANNEL READOUT DIFFUSERS	6/27/69	N/A
3542D	INSTALL 2 D9/5B2's - CSL 37	6/3/69	6/11/69
3543D	MODIFY MODULE 13 - CSL 11	6/27/69	7/10/69
3548D	INSTALL D9/5B2 IN CLS 11	5/29/69	6/8/69
3730C	REMOVE & RELOCATE BELL DATA MODEMS	9/9/69	9/26/69
3731C	REPLACE CAPACITORS ON A1, A2 & A3 CARDS	10/15/69S	
3739C	RELOCATE KEYSET IN CSL 18 (AMNDT #1)	9/2/69	9/3/69
6170S	G/ECL MODIFY & INSTALL - RM 102	8/15/69	
6180S	RELOCATE ASCATS FROM BLDG 422 TO BLDG 30	8/8/69	8/23/69
4001V	MOVE MESSAGE CENTER	8/28/69	9/4/69
4201D	REPLACE 2-BAY CSL 4 WITH A 4-BAY	9/5/69	

ENGINEERING ORDERS

AS-507 H1

E.O. NO.	DESCRIPTION	I AND C	TEST
4202T	INSTALL TERMINATERS ON DA'S IN ROOM 316	8/28/69	9/8/69
4203A	MODIFY CSL 86 TO CSL 22	10/3/69 S	
4204D	MODIFY & RELOCATE CSL 79	10/25/69S	
4205D	REMOVE & RELOCATE D9/5B2 - CSL 9	9/9/69	
4207D	PROVIDE 28 V POWER SUPPLY - CSL 79	8/27/69	8/30/69
4601C	INSTALL KEYSET - CSL 4	8/24/69	9/5/69
4602C	PROVIDE ADDITIONAL MONITORING CAPABILITY - CSL 81	8/27/69	8/27/69
4604C	INSTALL KEYSET - CSL 9	8/19/69	8/20/69
4606C	PROVIDE SUPPORT FOR MESSAGE CENTER MOVE	8/19/69	9/18/69
4610C	MOUNT J-BOX ADJ TO EVENT RECORDER #3	8/26/69	8/27/69
4613C	RELOCATE CCS 721 IN ROOM 219	8/29/69	9/9/69
4608C	RELOCATE CCS MSG CNTR (REF 4606)	8/18/69	8/22/69
4101D	PROVIDE CONSOLE 4 W/COMMAND CAPABILITY	8/26/69	9/5/69
4017V	PROVIDE VIDEO REQUIREMENTS FOR FSMR	IN NASA HOLD	
4109D	RECONFIGURE ROOMS 214 & 212A FOR FSMR	IN NASA HOLD	
4214T	CHANGE MSK CAPABILITY FOR FSMR	IN NASA HOLD	
4616C	RELOCATE VIP CONSOLE	IN NASA HOLD	
4617C	PROVIDE COMMUNICATIONS CAPABILITY FOR FSMR	IN NASA HOLD	
6203S	INSTALL FAF SYSTEM FOR FSMR	IN NASA HOLD	
1866G	PROVIDE PROPER ISOLATION BETWEEN BUILDING GROUND & TECH GROUND		

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Philco Operations - WDL Division
1002 Gemini Ave.
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1.2 ORGANIZATION

R. L. West replaced H. L. Edge as manager of Financial Operations; V. J. Romano replaced W. L. Moore as manager of Development Engineering. The organizational structure for Contract NAS 9-1261 is reflected in Figure 1-1.

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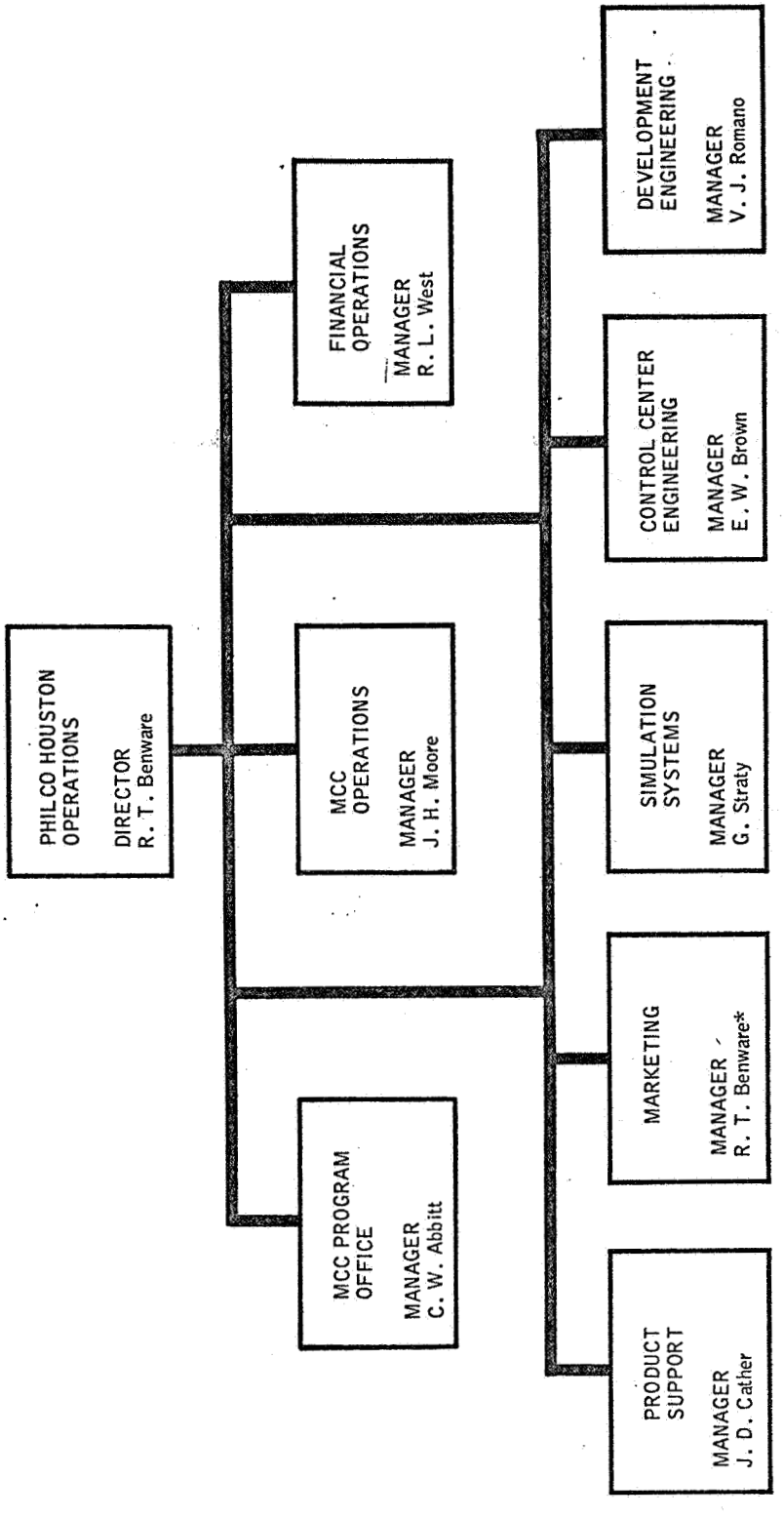
1002 Gemini Ave.
Houston, Texas 77058

ELECTRONICS GROUP



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SECTION 2

MISSION PREPARATION AND OPERATION

2.1 MAINTENANCE AND OPERATIONS

2.1.1 Progress During Quarter

2.1.1.1 MCC Reconfiguration

A. The third floor display system final Mission G configuration consisted of 1272 cross-connect changes and 2281 label changes. The final communications system Mission G configuration for the third floor consisted of 827 CCS PBI changes and 50 CCS label changes. During July, 50 CCS PBI changes were implemented. Installation of Mission G priority modifications was accomplished in accordance with the PHO implementation schedule; all milestones were met or bettered.

B. The third floor display system was released from the Mission G configuration on 28 July and installation of the Mission H-1 PHO-TR155 package began immediately. This configuration package, which consisted of 452 cross-connect changes and 600 label changes, was completed on 30 July. During August, PHO-TR155, Rev. A, consisting of 385 label changes and 320 color changes was installed. Implementation of PHO-TR155, Rev. B, which consisted of 32 label changes and 32 color changes, was accomplished during September. Current configuration totals 452 cross-connect changes, 1017 label changes, and 352 color changes. The communication system Mission H-1 configuration presently totals 1350 CCS PBI changes and 38 CCS label changes. Reconfiguration activity was as follows: July, 72 CCS PBI changes; August, 346 CCS PBI changes and 10 CCS label changes; September, 932 CCS PBI changes and 28 CCS label changes. Installation of Mission H-1 modifications is proceeding in accordance with the PHO implementation schedule.

C. The second floor display system was powered down 3 September. At this time, the system was in a Mission G configuration.

There was no display system reconfiguration activity. Standardization of digital display driver Rack 84 was completed with the installation of 2298 cross-connect changes during August. The second floor communications system was updated during July with the implementation of 60 CCS PBI changes; equipment not required for operational support will be powered down upon finalization of detailed deactivation procedures.

D. ASCATS is configured in accordance with the lunar landing mission SDAR, PCN 1 and 2. Relocation of ASCATS from Bldg. 422 to Bldg. 30 was completed during August, and system revalidation was accomplished in September.

E. A total of 56 EO's was implemented, tested, and signed off; 9354 man-hours were expended in this effort.

F. Four EWO's were implemented, tested, and signed off; 418 man-hours were expended in this effort.

2.1.1.2 Preventive Maintenance

A. All scheduled preventive maintenance routines were satisfactorily completed, PM logs annotated, and maintenance management audits performed.

B. Monthly test equipment calibration dates and custodial lists were prepared, distributed, and necessary calibration/repair action initiated. Test equipment is 78.5 percent in service with 90 items out for calibration or repair during September. July figures were 91.3 percent with 35 items out, and August figures were 87.4 percent with 42 items out for calibration or repair.

C. Ten minor industrial accidents were reported this quarter, resulting in six days lost time.

D. The M&O work order conformance monitor team inspected and approved 1373 Work Order/Discrepancy Reports. During September, the team was disbanded and their responsibilities and functions were transferred to the on-site Quality Control Section.

E. Fire and safety inspections were conducted in conjunction with NASA personnel. Discrepancies noted were minor in nature, and have been noted and submitted to NASA for resolution by the appropriate organization.

F. Eight new Preventive Maintenance Instructions (PMI) were added to the M&O maintenance program and 14 PMI's were revised to incorporate equipment changes and improved maintenance techniques.

G. Five Standard Maintenance Procedures (SMP) were revised to reflect improved methods of maintenance and operations.

2.1.1.3 Equipment Performance and Failures

A. Equipment performance was satisfactory and proper operational support was provided for scheduled tests, checkout activities, Mission G, and EASEP mission. Details of the mission support and specific equipment outages are discussed in the Mission G Performance Evaluation Report.

B. The D/TV converter slide file performance improvement program is continuing. Areas such as maintenance techniques, documentation, spares provisioning, and tool and test equipment adequacy are being evaluated and improvements implemented where appropriate.

C. M&O Maintenance Analysis Quick-Look Reports for May, June, July, and August, based on trend data extracted from Trouble and Failure Reports, were distributed. The September report is scheduled for completion 7 October. A total of 1668 Trouble and Failure Reports was prepared, analyzed and coded.

D. Twenty-five M&O change suggestions were submitted to PHO to improve the performance, reliability, and maintainability of MCC equipment.

2.1.1.4 Software Development

A. Prepared and delivered one revised Mission G PCM 102 program.

B. One new and five updated Mission H-1 PCM 102 programs were developed and delivered.

C. Prepared and delivered seven revised Mission H-1 MDD programs.

D. Developed and delivered a MODE qualification test program.

2.1.1.5 Operational Readiness Tests and Plans

A. Published Change 7 to the *MCC M&O Support Handbook*.

B. Reviewed Missions G and H-1 simulation and pad test support counts and submitted M&O comments to the FSD Operations Section.

C. Published MCC M&O Department, Mission G Quick-Look Report.

D. Published MCC M&O Mission G Performance Evaluation Report.

E. Prepared a new issue of the *Flight Support Operations Handbook*, Vol. III.

F. Prepared Change 6 for the *MCC Validation Testing and Support Manual*, Vol. II.

G. Initiated preparation of Change 8 to the *MCC M&O Support Handbook*.

H. Conducted M&O validation testing and checkout for Mission G M&O down time day on 13 July.

I. Conducted M&O checkout and validation testing for Mission H-1 reconfiguration on the third floor MOCR system.

J. Conducted 12 display ORACT and 10 open-loop ORACT tests for the third floor MOCR system.

K. Conducted five display ORACT and four open-loop ORACT tests for the second floor MOCR system.

L. Conducted eight ALERT tests for the ALSEP system.

2.1.1.6 Operational Support Provided

A. RTCC program development and checkout for Missions G, H-1, and H-2.

B. CCATS telemetry, command, and DGEN program development and checkout for Missions G, H-1, and H-2.

C. Missions G and H-1 ORACT program checkout.

D. GSSC and APCU program development and checkout for Missions G and H-1.

E. Missions G and H-1 and EASEP network validation testing.

F. Mission G simulations:

- One PD abort sim (math model)
- One CMS/LMS ASC/RNDZ/TEI sim
- One ASC/RNDZ sim (math model)
- One CMS TLI sim
- One CMS launch sim
- Two network sims
- Five ALSEP sims.

G. Mission G pad tests:

- Countdown demonstration test (wet)
- Countdown demonstration test (dry)
- Terminal count.

H. Mission G launch and mission activities.

I. EASEP mission support.

J. Mission H-1 simulations:

- One CMS LOI sim
- One CMS/LMS DOI/PD sim
- One CMS/LMS ASC/RNDZ sim
- One LMS PD abort sim
- One launch sim (M/M)
- One CMS launch sim
- One CMS TLC/LOI sim
- One CMS TLI sim
- One descent abort sim (M/M)
- One CMS/LMS descent sim.

K. Mission H-1 pad tests:

- Launch vehicle software integration test
- LM simulated flight
- Flight readiness test.

2.1.1.7 Training

A. Continued progress on the M&O certification program. Two personnel achieved certification in their primary positions and nine were cross-trained and certified for alternate positions. The current over-all M&O certification status is 98 percent.

B. Conducted 12 soldering recertification classes for M&O personnel. Currently, 150 M&O personnel are certified in accordance with the provision of NHB5300-4(3A). Of these, 38 require recertification. An additional six personnel have been identified to be certified in high-reliability soldering.

C. Completed the preliminary training plan for the System Configuration Unit (EO-3968).

D. Prepared the M&O training plan for MCC data flow, equipment interface, and power distribution classes.

E. Conducted the following classes for M&O personnel:

- Helicorder classes
- Telemetry introduction and PCM ground station classes
- D/TV classes
- Color television classes
- ALSEP classes
- Color eidophor on-the-job training during operations and modification installation periods.

F. Conducted M&O site drills.

G. Sponsored and coordinated a comprehensive series of classes on Bldg. 30 MOW interfaces and data flow for Philco, IBM, Univac, and NASA personnel. Instructors were provided by each of these organizations. One additional series of classes and a make-up series, if required, are planned prior to the Mission H-1.

H. Conducted orientation and MCC indoctrination for newly-assigned personnel.

2.1.1.8 Travel

G. Thomas traveled to Kennedy Space Center, Florida, to attend the control center communications meeting on 3-5 September.

2.1.2 Problem Areas

No major problems exist at this time.

2.1.3 Plans for Next Quarter

A. Support Mission H-1 Flight Control and Flight Support activities.

B. Support the Mission H-1.

C. Continue routine maintenance and support functions.

D. Continue proficiency and cross-training programs.

E. Conduct additional training classes on ALSEP and color television equipments and telemetry fundamentals.

F. Conduct wirewrap and soldering certification and recertification classes.

G. Publish the new issue of the *Flight Support Operations Handbook*, Vol. III.

H. Conduct additional classes on Bldg. 30 MOW interfaces and data flow.

I. Publish Change 6 to the *MCC Validation Testing and Support Manual*, Vol. II.

J. Publish Change 8 to the *MCC M&O Support Handbook*.

2.2 MAINTENANCE MANUAL REVISION

2.2.1 Progress During Quarter

A. Manual Edition Order No. 4, Schedule II. This effort is approximately 98 percent complete. The only deliverable item remaining is PHO-EM272, which is scheduled for delivery on 14 November. Preliminary copies of PHO-EM272 were delivered.

B. Manual Edition Order No. 2, Schedule III. This effort is approximately 95 percent complete. The only deliverable item remaining is PHO-SM104, which is scheduled for delivery on 14 November. Preliminary copies of PHO-SM102 were delivered.

C. Manual Edition Order No. 3, Schedule III. This effort is approximately 94 percent complete. There are three new manuals and one change manual remaining. The pacing manual is PHO-EM712, which is scheduled for delivery on 7 November. The following deliveries were made.

- PHO-EM711 - Preliminary
- PHO-EM712 - Preliminary
- PHO-SM701 - Final
- PHO-EM001 - Final change pages.

D. Manual Edition Order No. 1, Schedule III, Option 1. This effort is approximately 35 percent complete. There are four new manuals and ten change manuals remaining. The pacing manual is PHO-EM150, which is scheduled for delivery on 24 April. The following deliveries were made.

- PHO-SM105 - Review change pages
- PHO-EM218 - Review change pages
- PHO-EM221 - Review change pages

- PHO-EM229 - Review change pages
- PHO-EM255 - Review change pages
- PHO-EM626 - Review change pages.

E. Manual Edition Order No. 2, Schedule III, Option 1. Work has begun on this MEO. Three new manuals and 25 change manuals are included. The schedule for these manuals is currently being developed.

2.2.2 Problem Areas

No major problems exist at this time.

2.2.3 Plans for Next Quarter

Deliver the following manuals:

- PHO-EM272 - Final
- PHO-SM104 - Final
- PHO-EM711 - Final
- PHO-EM712 - Final
- PHO-EM713 - Final
- PHO-FAM001 - Final change pages
- PHO-SM102 - Final change pages
- PHO-SM105 - Final change pages
- PHO-EM218 - Final change pages
- PHO-EM221 - Final change pages
- PHO-EM229 - Final change pages
- PHO-EM255 - Final change pages

- PHO-EM258 - Final change pages
- PHO-EM273 - Preliminary
- PHO-EM274 - Final
- PHO-EM626 - Final change pages.

2.3 LOGISTICS FOR MCC SYSTEMS

2.3.1 Progress During Quarter

A. Completed 165 engineering orders.

B. Updated 543 line items in the Equipment List, PHO-TR107.

C. Completed 193 new parts lists and revised 339.

D. Researched and wrote 15,984 line items for the description file and deleted 2043 incorrect items.

E. Researched and added 1044 cross references to the interchangeability file.

F. Submitted 48,304 line items to keypunch.

G. Reviewed and determined the reparability code for 8409 line items.

H. Submitted the July and August Spares Status Report to NASA. The September report will be submitted on or before 1 October.

I. Submitted the July and August ASPL addendums to NASA. The September addendum will be submitted on or before 1 October.

J. Disposed of 8835 pounds of scrap to Ellington AFB.

K. Transferred 44 vacuum tubes to Ellington AFB for destruction and disposal.

L. Developed and circulated ten screening lists of surplus, excess, or obsolete material prior to plant clearance action.

M. Disposed of one plant clearance case.

N. Submitted 11 plant clearance cases to DCASO for disposition instructions.

O. Assumed accountability for property which was formerly GFE to NASA and located in Bldg. 422.

P. Submitted NASA Forms 1018, Report of Government-Owned Property in Possession of Contractor, for Contracts NAS 9-1261, NAS 9-6173, and NAS 9-9298 to the DCASO.

Q. Submitted the semi-annual ASPL and MOML to NASA.

R. We have acquired an additional 1700 square feet of storage space with the move of company stores to another building. This will provide additional storage space for Government-owned material and will assist in alleviating a severe storage problem.

S. The 1969 annual inventory of NASA-owned serialized (tagged) property will be submitted to DCASO on or before 1 October.

T. All master specialty switches have been disassembled and all piece parts identified and segregated.

U. Reparable spare parts are now moving through the system and out to the vendor.

V. The results of the third quarter cycle inventory of M&O spares and EO material will be submitted on or before 7 October to DCASO. The delay has been brought about by the shortage of personnel in the stores area.

W. Bldg. 30 replacement parts were as follows:

- 3972 items requested by M&O technicians
- 3928 items delivered to M&O technicians (99 percent)
- 3677 items issued from substores stock (93 percent)
- 291 items ordered from Logistics Distribution Center
- 181 items received from Logistics Distribution Center shelf stock (62 percent)

- 110 items backordered
- 44 items remain on backorder.

X. Bldg. 422 replacement parts are included in Bldg. 30, since all material moved to Bldg. 30 on the first week of August.

2.3.2 Problem Areas

No major problems exist at this time.

2.3.3 Plans for Next Quarter

A. Submit the October, November, and December Spares Status Report to NASA.

B. Submit the October and November ASPL addendums to NASA.

C. Submit the semi-annual ASPL to NASA.

D. Conduct a complete physical inventory of Bldg. 30 substores.

E. Complete warehouse rearrangement to take advantage of newly acquired space.

F. Continue to dispose of excess, surplus, and obsolete material.

G. Continue to parts list, spare, and add or update items in the Equipment List, PHO-TR107, as defined by engineering orders.

2.4 MCC OPERATIONAL CONFIGURATION DOCUMENTATION AND TESTING (ORACT)

2.4.1 Progress During Quarter

A. Operational Configuration Documentation (PHO-TR155)

1. Mission H-1

   a. Issued three PHO-TR155 change packages as a result of MRR's dated 11 July, 8 August, and 5 September.

   b. Provided PCN and revision updates to data packs as follows: CSB-3, ESB-Rev. D, FCOB-Rev. D, LSB-8, SLV-4, FDB-2, MOD-1, PCB-Rev. D, FSB-3, OSB-2, CSB-4, ESB-Rev. E, FCOB-4, LSB-9, SLV-5, FDB-3, MOD-2, PCB-Rev. E, FSB-4, OSB-Rev. D, CSB-5, ESB-Rev. F, FCOB-6, SLV-6, PCB-1, and FSB-5.

   c. Provided PHO-TR155 masters to Data Control for publication and distribution.

2. Mission H-2

   a. Provided PCN and revision updates to data packs as follows: FDB-1, CSB-Rev. E, FCOB-Rev. E, LSB-Rev. E, SLV-1, FDB-Rev. E, FSB-Rev. E, CSB-Rev. F, ESB-Rev. F, FCOB-Rev. F, LSB-Rev. F, FDB-Rev. F, MOD-Rev. F, PCB-Rev. F, FSB-Rev. F, and OSB-Rev. F.

   b. Issued preliminary card deck and listing to IBM.

3. Mission H-3. Provided baseline documentation for all data packs.

B. Configuration ORACT

1. Test status for Mission G was 100 percent at launch.

2. Delivered all Mission H-1 contractually deliverable items on time.

3. Delivered DTE test control requirements.

4. Worked with Display Systems Section on publication for DTE qualification testing.

5. Began work on amending 360/75 D/C ORACT specification for ORACT DTE testing.

6. Set up a schedule of complete ACIU interface tests.

7. Provided support for debug of ALSEP system when moved.

8. Provided support for test design and testing of CCATS SCU prototype card checkout.

9. Continued coordination of development of COST II. Delivery of this system has slipped to 29 October.

10. Developed requirements and system analysis of generating off-line programs to be run on the 360/20. The DDD generation program is in its final development stages.

11. A test of the new CCATS computer restart module will be incorporated into COST II. This unit will assume test responsibility.

12. Developed new series of tests for M&O use with D/C ORACT.

2.4.2 Problem Areas

No major problems exist at this time.

2.4.3 Plans for Next Quarter

A. Operational Configuration Documentation (PHO-TR155)

1. Issue PHO-TR155 revisions for Missions H-1, H-2 and H-3 as a result of MRR's.

2. Update mission data packs as required for Missions H-1, H-2 and H-3.

B. Configuration ORACT

1. Begin debug of COST II and acceptance of this system.

2. Debug and validate Missions H-1 and H-2.

3. Continue coordination with IBM and Display Systems Section on development of DTE qualification testing.

4. Continue development of off-line programs on the 360/20.

5. Continue investigation of new test methods.

6. Support M&O and EO testing as required.

2.5 QUALITY ASSURANCE AND RELIABILITY

2.5.1 Progress During Quarter

2.5.1.1 Quality Assurance

A. PHO Facility Activities

1. Material Review Activities. Made disposition on 410 RMR's and 507 TFR's.

2. Receiving Inspection. Inspected 2417 line items representing a total of 613,839 component parts.

3. Supply Requisitions. Reviewed, coded, and processed 1419 SR's.

4. In-Process Inspection. Performed inspection to 6 cabinet/console assemblies, 62 drawer/module assemblies, 22 cable assemblies, 603 printed circuit assemblies, and 1702 piece parts.

5. Calibration Control. Initiated request on 109 pieces of equipment and completed calibration on 73 pieces of equipment. Inspected and "verified" 245 special process tools.

6. Design Reviews. Participated in six final, five conceptual, and seven interim design reviews.

7. Corrective Action Requests. Initiated 10 CAR's; took corrective action on 11.

8. Costing Meetings. Attended eight costing meetings.

9. NASA Alerts. Received 40 NASA alerts, transmitted 40, and closed 26.

10. Acceptance Tests. Performed 43 acceptance tests.

11. Documentation Review. Reviewed 37 specifications for final signoff.

B. Site Activities

1. Modification Completion and Validation Report (MCVR) Status. Completed 46 MCVR's.

2. Test Witnessing and Workmanship Inspections

a. Performed 121 tests with satisfactory results for the following EO's: 6176, 3637, 3265, 3535, 3319, 3325, 3311, 3648, 3658, 3702, 3744, 3726, 3741, 3289, 1858, 3326, 3664, 3311, 3732, 3256, 3290, 1848, 2952, 3520, 3543, 3153, 3740, 3326, 3142, 3672, 3146, 3317, 3543, 3321, 3322, 3331, 3694, 3136, 3724, 4607, 3066, 3312, 3314, 3520, 3170, 6172, 3290, 3535, 3737, 3720, 3124, 6180, 4604, 3524, 3522, 6180, 4608, 3172, 4602, 4610, 3526, 3145, 3509, 1668, 1844, 4204, 4207, 4606, 4601, 3739, 4103, 4101, 3528, 3552, 3140, 4202, 4613, 3723, 3101, 3312, 3124, 3321, 4603, 4103, 4205, 3049, 3548, 1848, 1820, and 1856.

b. Made 332 in-process inspections to 99 EO/TO's.

c. Made 77 final inspections to 74 EO's and accepted workmanship.

d. Made three final inspections to three EWO's and accepted workmanship.

e. Issued 15 DN's, closed 24, and 45 are outstanding.

f. Issued 76 RMR's, closed 56, and 11 are outstanding.

g. Made disposition on 1094 TFR's.

3. Receiving Inspection. Performed 5 inspections with acceptance granted to 5256 line items.

4. Shipping Inspection. Performed 18 inspections with shipping authority granted to 688 line items.

5. MRB Action. Held 23 formal and 28 informal material reviews.

6. Maintenance. Inspected and accepted workmanship on 756 maintenance work orders.

7. Reconfiguration. Performed 171 inspections to 31,870 configuration changes to the communication main distribution frame. Performed 29 inspections to 13,848 changes in the cable termination cabinets.

8. Personnel Certification. Recertified 38 M&O personnel to perform hand soldering.

9. Critical Equipment Access Control. Performed 83 inspections.

10. Auditing. Performed one audit of the logistics stores area within the MCC facility.

C. Special Activities

1. Selected vendors for calibration program.

2. Released the SPEC control matrix for master specialties indicators and indicator switches through Data Control.

3. Granted permission to Fabrication to perform silver braze (torch) in fabricating modules. Concurrence was based on compliance with requirements established and adherence to sound shop practices.

4. Reviewed and approved with minor comments Hazeltine's material review procedure and the training and certification procedure outline.

5. Wrote a letter to Manufacturing alerting them not to use alcohol for cleaning painted surfaces. It will damage the finish.

6. Investigated the problem of DIP's being damaged by rework. Manufacturing was instructed to ground their soldering irons when soldering DIP's.

7. Completed fabrication of destructive test rig for evaluation of "adhesives in fastening and joining of metals."

8. Evaluated a double-sided adhesive tape made by 3M Company for use with identification labels. The tape may be used to attach labels to cabinets, consoles, chassis, etc., but not for front panel designation purposes. Wrote a letter approving it for this use.

9. Initiated investigation of cross-connect wire in storage area with the coating peeling off. Conclusion not yet available.

10. Investigated the diode wire attachment problem. Two methods for attaching the AWG 12 size wire to the anode terminal are soldering and mechanical fastening. Both methods have merits and drawbacks. QE will make a recommendation on the preferred method.

11. Expended several man days to inspect and seal the "powered-down" consoles associated with the MCC second floor equipment. This effort is an interim measure, pending results of TO-3107.

12. Assumed the responsibilities previously assigned to the M&O conformance monitors. All work orders and discrepancy reports are now reviewed by Quality Control prior to closure.

13. Received and initiated review of Hazeltine's preliminary AT plan/procedure.

14. Issued a new disapproved suppliers list.

15. Received samples of Brolite paint manufactured by Andrew Brown Company and test panels printed by PHO paint shop. Advised Material Services that QA had no objections to the paint. The product is MIL Specification.

D. Travel. Thirteen local and four distant trips were made.

2.5.1.2 Reliability Engineering

A. Completed the report on the reliability/maintainability trade-offs between the "mini-pak" and the "4-D micrologic." The results were documented in PHO-TN297.

B. Completed an evaluation of a component part replaced during hardcopier preventive maintenance. This evaluation was initiated as a result of MRB action against TFR EO-3413. PHO-TN299 contains the results of the evaluation.

C. Continued participation in ad-hoc committee meeting, and monitoring of the unapproved parts lists continues.

D. Initiated a physical failure analysis of two GAST air compressors from the PDU subsystem. The failure modes of the air compressors are covered in TFR's 62391 and EO-0265.

E. Continued development of the PERP system. The frame-work system computer programs including the input edit, file maintenance, cumulative performance, and operating group performance report generators, have been checked out with a limited test data package. Modifications and debugging with more extensive test data is in process.

F. Continued work on the PERP reference files. Partial master, O.A. and chassis reference files have been reformatted and placed on tape. Work continues on expanding these files.

G. Completed modifications to the PACER program to provide for generation of PERP files. The file generator has been used to generate PERP module add file input cards for the 4-D logic modules, 45 logic power supplies, and part of the Philco logic cards. The add file input cards have been generated for all PERP files for the CCATS computer restart control module.

H. The reliability predictions for all Philco 4-D modules have been updated using integrated circuit failure rates based on the data given in the latest RADC handbook.

I. Completed revisions to the TFR form and coordinated with Quality Assurance. Revisions to the TFR procedure to handle these changes have been started.

J. Generated a modified version of the GPA tag document to provide a check-off list for the physical inventory of equipment model and serial numbers. Coordination effort has been continued with logistics and initiated with engineering support to reconcile discrepancies in equipment tags based on the output from the physical inventory.

K. Processed approximately 1350 TFR's constituting primary electrical failure to provide the equipment performance summaries for the months of June, July, and August. Screened approximately 925 TFR's constituting nonprimary electrical failures.

L. Coded TFR's submitted during August and punched in the current two-card format in preparation for the new failure data base for PERP.

2.5.2 Problem Areas

No major problems exist at this time.

2.5.3 Plans for Next Quarter

2.5.3.1 Quality Assurance

A. Obtain NASA approval of the PHO workmanship standards that will apply to the contract.

B. Attend final design review of the DTE equipment at Hazeltine.

C. Conduct evaluation and testing of various adhesives utilized in the bonding of metal to metal.

2.5.3.2 Reliability Engineering

A. Continue EO support.

B. Continue checkout and debugging of PERP.

C. Continue TFR processing.

D. Continue failure investigations and baseline development.

2.6 INSTALLATION OF MCC SYSTEMS MODIFICATIONS AND RELATED INSTALLATION TASKS

2.6.1 Progress During Quarter

A. Design

1. Completed and released 152 installation design packages for installation tasks on 73 EO/EWO's.

2. Forwarded final installation design documentation to Drafting, Data Control, and/or Configuration Control for 77 EO/EWO's.

3. Generated and released 10 reconfiguration cross-connect listings for Missions G and H-1.

4. Released information for revising and updating 246 master cable and CTC cross-connect terminations lists.

5. Forwarded monthly inputs to Configuration Control to update tab runs for PHO-TN121 through PHO-TN125.

6. Received 54 new EO's for installation. In addition, 30 Schedule III EO's were reassigned to Schedule III-1 with new charge numbers. Installation cost estimates were prepared for 68 EO/EWO's.

7. Generated and released EI's and task statements for seven EO's.

B. Implementation

1. Completed installation tasks for 43 EO/EWO's.

2. Partially completed installation tasks on 19 additional changes.

2.6.2 Problem Areas

No major problems exist at this time.

2.6.3 Plans for Next Quarter

Continue implementation of approved EO's as equipment deliveries and operational commitments allow.

SECTION 3

ENGINEERING

3.1 MCC SUPPORT

3.1.1 General TO-820, FSD General Task

A. Document Management

1. TO-820 Documents Update. The efforts performed to accomplish this task are outlined below:

   - Number of EO's reviewed and reported in EO/EWO Status Report - 199
   - Number of EO's cleared of manual requirements - 46
   - Number of EO's reported, Categories L and R - 80
   - Number of IP's published - 58
   - Number of IP's submitted for engineering review - 24
   - Number of manual change/revision quotes required for EO's that exceed the 100-hour writing time limit for generation of change pages - 45
   - Number of EO's (effects of) incorporated in final manual deliveries - 31
   - Number of vendor manuals reviewed - None.

2. TO-820 Documents Deliveries. This effort is 100 percent complete. The following were delivered during the quarter:

   - PHO-SM202 Change Pages - Review
   - PHO-SM205 Change Pages - Final

- PHO-SM204 Change Pages - Final
- PHO-SM601 Change Pages - Review
- PHO-EM112 Change Pages - Final
- PHO-EM116 Change Pages - Final
- PHO-EM118 Change Pages - Final
- PHO-EM143 Change Pages - Final
- PHO-EM214 Change Pages - Final
- PHO-EM227 Change Pages - Final
- PHO-EM233 Change Pages - Final
- PHO-EM234 Change Pages - Final
- PHO-EM241 Change Pages - Final
- PHO-EM254 Change Pages - Final
- PHO-EM257 Change Pages - Final
- PHO-EM260 Change Pages - Final
- PHO-EM262 Change Pages - Review
- PHO-EM266 Change Pages - Review
- PHO-EM617 Change Pages - Final
- PHO-EM622 Change Pages - Final

B. CML Control and Status. Twenty-eight out-of-scope material requests (PHO Form 4730) were submitted during the quarter.

C. FSD Advanced Planning. The current effort entails defining a task which will maximize the use of current MCC facilities and equipments as advantageously as possible within the 1972-1976 time frame. Specific such tasks will become definitive once the overall task is appropriately defined and bounded.

D. CAD System Analyst

1. Prepared and delivered the monthly Computer Usage Reports, Computer Status Reports, and the estimated CAD computer hours required by Philco for NASA for fiscal 1970.

2. Coordinated the printing of 15,000 pages of the Parts List for the Logistics System with CAD.

3. Coordinated the end-of-year scheduling with CAD.

4. Conducted class on the Level 6.5 EXEC II operating system for Univac 1108.

E. Wire Listing Program Maintenance and Coding. There was no program maintenance in this quarter. Coding activity included the following:

- DW-12445, Rev. 1, completed
- DW-12194, Rev. 1, completed
- DW-12191, Rev. 1, completed
- DW-12197, Rev. 1, completed
- DW-12188, Rev. 1, completed
- DW-12173, Rev. 1, completed
- DW-12184, Rev. 1, completed
- DW-12284, Rev. 1, completed
- DW-12322, Rev. 1, completed

- DW-12276, Rev. 1, completed
- DW-12234, Rev. 1 and 2, completed
- DW-12280, Rev. 1, completed
- DW-12229, Rev. 1, completed
- DW-14155 original is being coded.

3.1.2 Specific TO's

None.

3.1.3 Engineering Orders

A. EO-1870. The EO is in Category D, awaiting completion of the MCVR.

B. EO-1871. The EO was received from PMO on 12 August. The Task Statement (EI No. 1) was forwarded to PMO on 26 September. The EO is now Category 3.

C. EO-1872. The Task Statement (EI No. 1) was released through Data Control on 5 September. The EO is now Category 3.

D. EO-1874. The Task Statement (EI No. 1) was released through Data Control on 12 September. The EO is now Category 5.

E. EO-1877. The EO was received on 23 September. Task Statement (EI No. 1) was released on 26 September. There is no procurement required; the EO is being installed.

F. EO-3100. The EO is awaiting completion of manual updates.

G. EO-3101. The EO is awaiting completion of drawing revisions.

H. EO-3102. The EO is awaiting completion of the R/T.

I. EO-3123. The EO is awaiting completion of the R/T.

3.2 SYSTEM ENGINEERING

3.2.1 General TO-3000, Display Engineering

A. General. Continuous on-site engineering was provided during the Apollo 11 mission. Assistance was provided in resolving Display Systems problems as they occurred. System performance was evaluated to identify possible problem areas requiring engineering action prior to Apollo 12. Engineering evaluation of the MCC color television system including its interfaces and video cables to other facilities was also completed.

B. Engineering Studies

1. DS-002, Slide File Reliability Study

a. CSF Modifications. EI No. 3 was released on 5 September for costing of the following modifications:

- Modification to existing upper retainer springs to improve their performance.
- Replacement harnesses incorporating a counter to record CSF cycles.
- Modified cover and filter assemblies to aid in eliminating the heat in the CSF.

b. Slide Blade Specifications. Two CSF slide blade specifications are in the approval cycle. PHO-SP09251 is for the basic slide blade stamped from SAE 1095 Blue Clock spring steel, and PHO-SP09252 is for the electroless nickel plating of the basic slide blade.

c. Drawing Update. The following is the status of the drawing update as of 30 September:

	New	Revisions	Total
• Released:	27	225	252
• In Check:	14	51	65
• Ready for Check:	14	0	14

d. Revised Maintenance Procedures. The preliminary copies of the revised maintenance procedures are being checked for accuracy of all part numbers prior to release.

e. Automatic Tester. The design of the 225-cycle automatic tester is complete and drawings were expected to be ready for check by 1 October.

2. DS-004, Hardcopier Reliability Study. Recommended modifications were submitted to NASA for consideration. All effort was completed on this study in July.

3. DS-020, D/TV Video Quality. The camera was received from the vendor in September. Evaluation of the camera is currently in progress.

4. DS-025, Television Monitor Study. This study is still in progress. The performance of solid state high voltage rectifiers installed in selected precision monitors is currently being evaluated.

5. DS-027, Television Projector Cooling Study. All effort was completed in July. This study is now closed.

6. DS-028, CRT Procurement and Evaluation. All effort was completed in July. This study is now closed.

C. Specific TO's

1. TO-3001, Plotboard Vacuum Pump Study. This study was received on 14 July. A vacuum pump was ordered under EO-4010 and is currently being evaluated. This study will be completed in October.

2. TO-3002, XY Plotboard Connector Improvements. This study was received on 24 July. Due to higher priority efforts, PHO has requested cancellation of this task order.

3. TO-3003, Eidophor Ozone Study. This study is currently in progress and is expected to be completed prior to 1 November.

4. TO-3004, Plotting Display Equipment Improvement Study. Due to higher priority projects in progress and a current lack of manpower, this study will be conducted in November and December.

5. TO-2006, GFE Hardcopier Installation. PHO has requested an extension of this EO to 31 December due to the slip in schedule of the GFE hardcopier. Evaluation of the monitor and the CRT is currently in progress.

6. TO-2012, D/TV Circuit Modifications. The final report (TN375) was submitted to NASA on 11 July. This effort is now complete.

7. TO-2014, D/TV Study. The circuit analysis report was received for Philco review on 3 July. All comments have been submitted to NASA. This effort is complete.

8. TO-2017, Plotting Display Equipment Malfunctions. This study was submitted to NASA on 14 July. This effort is now complete.

9. TO-2020, Recovery Room Improvements. An extension has been requested to 31 November due to higher priority projects and the lack of available manpower.

D. Specific EO's

1. EO-4001, Relocation of Television Monitors. EI No. 1 was released on 14 July. This EO was completed and tested on 4 September.

2. EO-4002, Relocation of Building 45 Video Equipment. EI No. 1 was released on 17 July. The EO was scheduled for completion on 15 September but is still in progress due to non-arrival of cable.

3. EO-4003, Reconfiguration of Room 118B. EI No. 1 was released on 11 July. The EO was completed on 5 September.

4. EO-4015, Time Display for Building 48. This EO was received on 4 September. EI No. 1 was released on 16 September. Installation is currently in progress.

5. EO-4017, FSMR Video. This EO was received on 29 August and is in a NASA hold.

6. EO-4019, Interim AVSM Reconfiguration. EI No. 1 was released on 23 September. Installation will be completed prior to 30 September.

7. EO-4106, Camera and Mount. This EO was received on 3 July and was completed on 12 September.

8. EO-3110, Installation of GFE Typewriter Console. This EO was completed and tested on 10 July. All engineering effort is complete.

9. EO-3111, Color Television System. The required interim configuration was completed prior to Apollo 11 and R/T's were successfully conducted on the entire system on 11 and 13 July. Construction of the horizontal focus sub-chassis for the color Eidophor has been completed and installation of the sub-chassis is under way. EO No. 7 which completes the antenna installation for the RF system and provides UHF capability was released on 19 September. EI No. 8 which provides for a video interface and monitor cabinet for the color Eidophor was released on 22 September. The preparation of additional EI's for the color system is in progress.

10. EO-3112, Removal of Reference Slide Files. All reference slide files were removed prior to the Apollo 11 Mission. Installation of blank panels will be completed in October.

11. EO-3120, Alphanumeric Display Unit. EI No. 1 was released on 18 September to provide material for the engineering prototype. Logic and mechanical design efforts are in progress. EI No. 2 will be released in October to provide task statements for final assembly.

3.2.2 General TO-3100, Timing and Control Engineering

A. Specific TO's

1. TO-2217, Readout Evaluation Study. Last of required parts received 15 September. Parts are being mounted and wired. Report is in progress.

2. TO-3101, Complete Isolation of All Dual-Floor MSK's. Thirty-day extension to 29 September has been requested.

3. TO-3102, Study of High Cost of CIM Documentation Revisions. Extension to 15 October requested on 18 September; 40 percent complete.

4. TO-3103, Solution for Removal of MOC-CIM -26 V dc from CSL-CIM Interface. 70 percent complete.

5. TO-3104, Solution to DDD Drawer Voltage Variation. Submitted to NASA on 23 September.

6. TO-3106, Study To Organize and Prepare a Set of MCC Interface Documents. This TO was received on 15 September and was submitted to NASA on 8 October.

7. TO-3107, Plans and Procedures for Deactivating the MCC Second-Floor MOCR, SSR, and Associated Equipment Groups. The TO was received by the Data Handling Systems Section on 15 September and submitted to NASA on 3 October.

B. Specific EO's

1. EO-3121, Stopclock on Console 88 and One for Engineering Spares. The TO was received 4 June; Amendment 1 was received 3 July. EI No. 1 was released 3 July; EI No. 2 was released 23 July; EI No. 3 was released 20 August. EO is on schedule.

2. EO-4101, Command Capability for Console 4, Both Floors. EO received 8 July. EI No. 1 was released to PMO on 29 July. Operational need date 1 September, for Mission AS-509. Third-floor installation completed 20 August. Third-floor testing complete 5 September. Second-floor installation depends on EO-4201, second-floor installation, and is scheduled for February 1970.

3. EO-4102, Reassignment of MOC-CIM Encoders and Removal of Isolation Modules in Item 85. EO received, 8 July; NASA need date, 1 September; EI release date, 21 August; waiting I & C schedule.

4. EO-4103, Implement CS455, Modifying RTA's 5 and 6. EO was received 8 July; EI No. 1 released 31 July; EI No. 2 released 18 August. Installation was in August. Second floor was tested 5 September, and third floor 15 September.

5. EO-4104, Reconfigure DDD/SDD Power. EO was received 3 July. EI No. 1 was released 25 August. EI No. 2 writing in progress. Awaiting need date reschedule from NASA due to long lead time on parts.

6. EO-4108, BCD Time from MITE to SCUHSP. EI No. 1 released on 2 September. It included logic drawings, TCM schematics, and cost sheets.

7. EO-4109, Reconfiguration of Room 214 and Consoles 81 and 82, Room 212. EI receive date, 1 September; EI release date, 5 September (frozen); NASA need date, 30 September; waiting for redirection from NASA for development of EI No. 2.

3.2.3 General TO-3280, Telemetry Engineering

A. Specific TO's

1. TO-2304, Event Recorder Paper Capacity Problem Study. Awaiting proposal from vendor to complete task. Both PMO and Procurement have taken action to solicit this proposal from vendor.

2. TO-3201, 6-Bit Main Frame Word Study. This TO was completed and submitted to NASA 27 August.

3. TO-3202, Brush Recorder Paper Take-Up Reel Motor Protective Cover Modification Study. Received 11 July. Expected completion date, early October.

4. TO-3203, Console Shelf Modification. The report was submitted on 29 September.

5. TO-3205, Cost and Downtime Requirements for Change Suggestions 421, 489, 519, and 531. Report submitted 5 September.

6. TO-3206, Isolation of Univac Computer Wiring Within Console 79. Report submitted to NASA on 30 September.

B. Specific EO's

1. EO-3122, Removal of FC/M&O PBI from Flight Director's Console to Console 73. EI No. 1 released 13 June. Second floor was tested on 11 July and third floor was tested on 22 September.

2. EO-3124, Relocation of ALSEP Console 84 Computer Controller Console, Chart Recorder and Overhead Monitors from Room 242 to Room 112. This EO was received on 17 June. EI No. 1 released 1 July. Per EAN 9 July, operational need date was extended to 1 September. Console 84 installed in the RTCC and tested with second-floor equipment. No console problems encountered. Recorder No. 5 installed 12 August. Overhead monitors

were installed 14 August. Testing was performed on the monitor and recorder on 18 August and 19 August.

3. EO-3135, Reduce RFI to ALSEP Seismic Drum Recorders in Room 314-B. This EO was cancelled by EAN dated 22 September.

4. EO-4201, Modification to Consoles 2, 4, 20, 23, 24, and 31. EO received 8 July. EI was released to PMO 28 July. Operational need date AS-507. Third-floor consoles 4 and 24 installation complete. The TTY has been moved and recorder has been installed. Third-floor CCATS test was completed 17 September. Third-floor RTCC test is being scheduled.

5. EO-4202, Terminators to DAC's in Room 316. This EO was received on 8 July. EI was released to PMO 29 July. Operational need date 1 September. Installation completed 28 August. Testing completed 8 September.

6. EO-4203, Removal of Four Modules in Console 86, Installation of MSK in Console 86, and Renumbering Console 86. EO received 8 July; interim installation completed 12 September; final installation completed 29 September. EI No. 2 released to PMO 1 August. Operational need date was 1 September.

7. EO-4205, Reconfiguration of Consoles 8, 9, 31, and 32, Third Floor Only. This EO was received 8 July. EI No. 1 was released to PMO 1 August. This EO in hold per EAN 18 August. CSL 9 released from hold per Rev. 1, 28 August. EI No. 2 released 5 September. CSL 9 reconfigured on 10 September. Open-loop testing completed on 19 September.

8. EO-4206, Relocation of Console 85 and Overhead Monitors. EO received 8 July. EI No. 1 was released to PMO 8 August. Operational need date not scheduled. CSL 85 moved and cabled. Installation complete on 9 September. Final R/T performed on 24 September.

9. EO-4207, Redundant Power Supplies for Console 79. Received on 5 August. Operational need date 1 September. Power supplies reworked in manufacturing, tested, delivered, and installed in the console on 26 August. Testing completed on 30 August.

10. EO-4210, Routing of Data Intended for the FM/FM System Through the PCM System. EO received 8 September. EI No. 1 in progress.

11. EO-4211, Replacement of Regulator Circuits on Console Power Supplies. NASA need date 29 December. EO received 11 September. EI No. 1 in progress.

12. EO-4213, Installation of Indicator Module on Both Consoles 11. EO received 9 September. NASA need date 29 December. EI No. 1 submitted to PMO 26 September. EAN dated 24 September from NASA cancels second-floor portion. The third-floor effort remains in progress.

13. EO-4214, MSK Reconfiguration for Consoles 26, 76B, 81, and 82. Partial EI No. 1 released to PMO 8 September. Awaiting redirection from NASA. In hold status.

14. EO-4219, Modification to PCMGS to Accept New 6-Bit Sync Words. EO received 17 September. EI No. 1 in progress.

3.2.4 General TO-3400, Digital Television Engineering

A. General. Efforts are continuing with DTE procurement under EO-3401 and design of the alphanumeric display under TO-2402. Parts and materials for the alphanumeric display are being procured under EO-3120.

B. TO-2402, Alphanumeric Display Cluster Design. EO-3120 has authorized purchase of material for the two-channel engineering prototype to be fabricated in the system evaluation facility at NASA. Logic and mechanical design is currently in progress and on schedule.

C. Specific EO's

1. EO-3401, DTE Procurement. The current Hazeltine PERT Charts indicate a slip of the DTE ship date of 23 January 1970 to 6 February. All design changes requested by NASA have been reviewed and negotiated with Hazeltine. The next design review at the Hazeltine facility is scheduled for 7 and 8 October. The DTE RTCC Qualification Test programming requirements are presently being defined with a preliminary requirement document to be released by 1 October. A detailed implementation plan to include all installation requirements, Hazeltine Facility acceptance test procedure, and MCC on-site qualification test procedures are being generated with a scheduled release date of 1 November.

2. EO-3402, Video Switch Matrix Buffer Multiplexer (VSMBM). Minor modifications requested by NASA have been completed. Acceptance testing is currently scheduled for 15 October. Installation and testing on site is scheduled to be completed by 5 November.

3.2.5 General TO-3600, Communications Engineering

A. Specific TO's

1. TO-2608, Development of TLM Card. Three prototype TLM cards have been successfully demonstrated to NASA FSD. The cards are now available for NASA FDS demonstration to other NASA areas.

2. TO-2612, WBD Switch Replacement. NASA requested that PHO investigate the need for a larger WBD Switch. During the past three months PHO has been collecting and preparing data for an engineering presentation (based on past experience, present requirements and future needs), on the possible need for a larger switch.

3. TO-3600, Modification of FACS/ASCATS Interface. Investigation has started to study the cost and effort required to remove the HSD and WBD MODEMS being used in the interface between FACS and ASCATS. Comm Engineering aided ASCATS Engineering (EO-6204) in determining that the MSFN MODEMS can easily be removed at a cost saving to NASA.

4. TO-3600, FACS Memory/Printer System. An informal presentation has been prepared proposing that a memory/printer system be built in the FACS area to provide a means of printing information being sent or received on HSD or WBD circuits for detailed analysis.

5. TO-3600, WBD Recording Modification. Engineering analysis recommendations generated by CS's received, i.e., pre-amplifier changeout (CS No. 473), audio amp fusing (CS No. 529), vacuum pump run interlock (CS No. 407), three-way transfer capability (CS No. 387), fuse accessability (CS No. 317) and possibly a requirement for a decoder to be installed for recorder checkout assistance on MSFN lines.

6. TO-3600, FACS-SCU Interface Implementation. Preliminary studies have commenced to implement the HSD and WBD interface cabling, modification of HSD patch bay, and the WBD switch, in conjunction with EO-3968, the System Configuration Unit.

7. TO-3601, Noise Study in CCS. TO requests PHO to study sources of noise pickup within the CCS and recommend corrective action. Tests were conducted in September, 1969, to secure the required data; a report is in preparation.

B. Specific EO's

1. EO-4605, New CCATS PA Zone. EI No. 1 has been released to provide temporary solution and procure material for permanent fix. EI No. 2 will install a permanent system.

2. EO-4606, Message Center and ASCATS Data Relocations. Installation and testing completed, and EO signed off.

3. EO-4611, CCS Power Regrade. EI No. 1 has been released to order the necessary cabling and provide instructions for installing new distribution cabling. EI No. 2 will provide the necessary power bay modifications.

4. EO-4614, Decoders for MSFN Transmit Lines. This EO was received and EI's have been released. PHO is now awaiting material purchases and implementation schedule. EO should be completed by early November.

5. EO-4617, Communications for Flight Support Management Room. This EO would provide communication keysets and theater chair jacks for the new FSMR in Room 214. EI No. 1 has been issued; EO is now in hold by NASA.

6. EO-3140, ASCATS Comm Relocation to Bldg. 30. This EO was implemented on a priority basis, and has been completed and signed off.

7. EO-3144, ALSEP Interface Unit. Equipment installed, tests completed and EO signed off.

8. EO-3156, Installation of Maintenance Loop Jackboxes. This EO provided jackboxes from which M&O personnel can converse without disturbing operational loops or operational personnel. The jackboxes were installed temporarily,

with the understanding that a permanent mounting would be designed and implemented under separate EO. NASA and PHO (Engineering and Q.A.) have agreed on a permanent fix, replacing ac receptacles with jack panels.

3.2.6 TO-3900, Data Format Control Book

3.2.6.1 Progress During Quarter

A. *Telemetry Data Format Control Book* (TDFCB)

1. Deliverables

a. H-1 TDFCB, Revision 2. Due on 11 July. The following items were delivered 8 July:

- Master and two copies
- Tapes and discrepancies
- CCATS decom update cards
- HS and WB requirements
- Index listing

b. H-1 TDFCB, Revision 2 Master Tape List. This was delivered on the date due, 14 July.

c. Compares Between Mission G TDFCB, Revision 4, and H-1 TDFCB, Revision 2. The following items were delivered on the due date, 22 July:

- Master tape compare
- Air-to-ground compare
- CCATS/RTCC and CCATS/PCM G. S. compare
- FCDAR compare

d. Illustrations of unusual measurements on TDFCB master tape were delivered 22 July.

e. Checked MCC master measurement list and delivered on 16 July.

f. H-1 TDFCB, Revision 3. Due on 2 September. The following were delivered on 22 August.

- Master and one copy
- Tape discrepancy letter
- CCATS decom update cards and two listings
- HS and WB requirements
- Index listing
- FC listing
- Six copies of master tape
- Two copies of fmt. print tape
- One copy of A/G print tape.

g. H-2 TDFCB, Revision 1. Due 2 September. The following were delivered 22 August:

- Master and two copies
- HS and WB requirements
- Index listing
- FC listing
- CCATS decom update cards and two listings
- RTCC update cards

- Six copies of master tape
- Two copies of fmt. print tape
- One copy of A/G print tape
- One copy of KSC print tape
- Tape discrepancy letter

h. Checked TR-155 against Mission H-1 TDFCB PCM Ground Station, and delivered 14 and 20 July, 8 August and 10 September.

i. Prepared high-speed Format 30 description.

j. Delivered H-2 TDFCB CCATS decom cards 14 August.

k. Prepared new high-speed data Format 14.

l. Updated TDFCB master tape specifications and delivered 12 September, the due date.

m. Checked H-2 TDFCB, Revision 1, against LM data pack.

n. Prepared EMOD assignments for ALDS.

o. Prepared and delivered H-1 TDFCB, Revision 4, CCATS decom card updates on 23 September.

2. ACTEF Programs

a. High-speed Format 30 list program modification, due to redefinition, has been completed.

b. Index has been modified to include high-speed Format 30.

c. FC list program was modified to include run number on print.

d. FMT/REV modification, to correct date on trailer line so that it does not appear on print after page is cut down, has been completed and checked out.

e. CCATS/REV modification to move asterisk on header and trailer line further to the right, correct flagging when a buffer is resequenced, and correct flagging of blank lines when the last parameter in buffer is flagging, has been completed and is in checkout.

f. IU/S4B program modification completed to handle redefinition of IU/S4B asterisk.

g. FCDAR print compare modification to include run series and change line spacing is completed.

h. Format 30 print compare program completed.

i. Make 90 modification to include Format 30 completed.

B. *Command Data Format Control Book* (CDFCB)

1. Deliverables

a. Delivered master and four copies of the master command program tape specification 11 July; it was due on 15 July.

b. The master command program tape copy and dump, due on 31 July, were delivered 24 July.

c. A master and four copies of CDFCB, Revision 4, were delivered on the due date, 12 September.

2. Programs. Program to generate SLV, CSM, and LM RTC lists for CDFCB completed.

C. *Tracking Data Format Control Book* (TRK DFCB). A master and two copies of TRK DFCB, Revision 4, due on 5 August, were delivered on that date.

3.2.6.2 Problem Areas

No major problems exist at this time.

3.2.6.3 Plans for Next Quarter

A. TDFCB

1. Prepare and deliver revisions as required to the H-1 and H-2 TDFCB's.

2. Prepare and deliver the AS-509/SC-110/LM-8 TDFCB and associated outputs, due on 1 January 1970.

3. Programming in progress for program to combine XPAND-720, IU/S4B, duplicate channel, format double defines, and make A/G and C/S generations.

4. Decom Rev. is to be modified to add an additional sort and delete compare of measurement number.

5. A/G Rev. program is to be modified to correct the deletion of a parameter in the SIC alpha list.

6. Maintain up-to-date ACTEF programs.

7. Continue work to identify existing ACTEF program errors, beneficial program modifications, and better organizations of system.

8. Continue study of AAP telemetry downlink formats.

B. CDFCB

1. Develop a model Remote Site Program that will generate the octal uplink via a program stored in core using a three- or four-octal character input.

2. Prepare and deliver revisions and changes as required to the CDFCB and ALSEP CDFCB.

3. Maintain up-to-date master command program, documentation and specifications.

4. Prepare and deliver master command program tapes as required.

5. Maintain TTY test data program and documentation.

6. Prepare and deliver TTY test data as required.

C. TRK DFCB. Prepare and deliver revisions to the TRK DFCB as required.

3.2.7 TO-3925, RSDP Programming Requirements

3.2.7.1 Progress During Quarter

A. The following Page Change Requests (PCR's) were coordinated and written by the RSDP Unit:

- PCR No. 10, H-1 TLM - Changes special function set assignments
- PCR No. 12, H-1 TLM - Implements the TDFCB, Revision 3
- PCR No. 1, H-2 TLM - Implements the TDFCB, Revision 1
- PCR No. 2, H-2 CMD - Provides an automatic site status CAP
- PCR No. 4, H-2 CMD - Provides for AVP and CRP processing of the SIVB downlink.
- PCR No. 3, ALSEP - Removes RTC 072 and 073 from the critical storage area.

B. The following documentation was produced by the RSDP Unit:

- H-1 Telemetry Test Procedures
- H-2 ALSEP Test Procedure

- DAP, Annex E-1, Change 3
- DAP, Annex E, Vol. 1, App. 507, Change 3
- DAP, Annex E, Vol. 1, App. 507, Change 4

C. The following activities were supported by the RSDP Unit:

- AS-506 Telemetry Countdown Demonstration on 1 July
- ALSEP computer room activity on 20 July during EASEP deployment
- MCC/RSDP Command Validation Test on 15 September
- MCC/RSDP Telemetry Validation Test on 23 September

3.2.7.2 Travel

A. John Poffinbarger and Wayne Jolley traveled to GSFC 29 June to 3 July to check out the H-1 RSDP Command Program.

B. Tom Hiser traveled to GSFC 7-11 July to check out the H-1 RSDP Telemetry Program.

C. Tom Hiser and Wayne Jolley traveled to MILA 2-9 September to check out the H-1 RSDP Telemetry Program.

3.2.7.3 Problem Areas

No major problems exist at this time.

3.2.7.4 Plans for Next Quarter

A. Provide checkout support for the H-1, H-2, and ALSEP RSDP programs.

B. Develop test procedures for H-2.

C. Develop and coordinate RSDP program requirements for the following missions:

- H-1
- H-2

- AS-509
- ALSEP
- AAP

D. Initiate changes to DAP, Annex E and Annex E-1, as required.

3.2.8 TO-3950, CCATS Software Support

3.2.8.1 Progress During Quarter

A. Program Development Unit

1. Mission G-1. Provided central processor console support for network testing, simulations, and the G-1 mission. Provided CCATS operations console support for program errata checkout and validation.

2. General

   a. Provided review and inputs for the Version IV and H-1 requirements documents to the Program Requirements Documentation Unit.

   b. Provided NASA monitor with a summary of the CCATS AAP requirements (based on a wet workshop) that have been defined to date.

   c. Attended a meeting at Goddard Space Flight Center to discuss the proposed repacking of high-speed fixed site tracking data on the wideband interface to MSC. This new method will require half the bandwidth of the present method and lessen the load on the wideband interface.

   d. Provided NASA monitor with review and comments to the Version IV design specification.

   e. Provided review of unit test specifications and monitor support for unit testing for the Version IV Program.

f. Continued effort to define the interface requirements for a proposed CCATS D/TV (alphanumeric) display system for use in a programming study to be performed by Univac.

g. Developed updates to the display section of the CCATS Version IV program requirements.

h. Provided review and inputs for the restart section of the CCATS Version IV program requirements.

B. Program Requirements Documentation

1. Program Configuration Requirements, H-1. Change 1 to this document was delivered to users on 9 July.

2. *CCATS Processor Operators Handbook* (CPOH). Revision A of this document delivered to users on 23 July. A revised Data Formats Annex was delivered to users on 22 August.

3. *GSFC/MSC Communications Program Interface Control Document* (CPIC). Change 1 to this document delivered to users on 23 July. Change 2 was delivered to users on 23 September.

4. Program Requirements, Version IV. Change 2 to this document delivered to users on 17 September.

5. Program Configuration Requirements, H-2. The original issue of this document was delivered to users on 24 September.

C. Maintenance and Operations

1. CCATS Computer Utilization Account System (CCUAS). Development of the CCUAS has continued during this reporting period. The eight CCUAS programs are designed and decoded. They are P1A (Statistical Sort and Edit), P1B (Text Data Generator), P2A (Update Program), P3A (Generic Master Tape Generator), P4A (Monthly Computer Utilization Print Program), P4B (CUR Text Writer), P4C (Flight Operations Scheduling Office Card Generator), and P4D (Quarterly CUR Print Program). Checkout testing

and program documentation (program specifications and unit test specifications) are complete for seven of the programs; documentation was submitted to NASA for review and comments on 24 September. For P4D, testing is 10 percent complete and documentation is 50 percent complete. The system tape is complete for seven of the programs, and the CCUAS system specification is 50 percent complete.

2. 8-Month Usage Projection Reports. The CCATS 8-Month Usage Projection Reports were compiled and delivered to NASA as scheduled.

3. Operations Direction. Developed updated for the CCATS Operations Directive document.

4. Mission Support Personnel Certification Criteria. Developed updates for the CCATS mission support personnel certification criteria document.

5. CCATS/System configuration Unit (CCATS/SCU) Operational Training Curriculum. Delivered the CCATS/SCU operational training curriculum to NASA.

6. CCATS/SCU Operational Confidence Testing Specification. Continued effort to develop the CCATS/SCU operational confidence testing specification document.

7. CCATS/SCU Standard Configuration Criteria. Continued effort to develop the CCATS/SCU standard configuration criteria document.

3.2.8.2 Travel

C. L. Taylor traveled to GSFC 9 and 10 July to discuss the proposed repacking of fixed-site high-speed tracking data. It was agreed that two messages will now be contained in each 600-bit NASCOM data block under certain conditions.

3.2.8.3 Problem Areas

No major problems exist at this time.

3.2.8.4 Plans for Next Quarter

A. Program Development

1. Provide continuing review and coordination for CCATS program requirements.

2. Continue effort to define CCATS derived displays and interface requirements for the proposed CCATS D/TV display system.

3. Analyze display requirements for future users of the proposed CCATS D/TV display system.

B. Program Requirements Documentation

1. Continue to update requirements for existing documents.

2. Publish Section 11, "Restart," for addition to Version IV of the CCATS program requirements document.

3. Publish a Change 1 to the CCATS program configuration document for Mission H-2.

4. Complete the *Automated Documentation Program Users' Guide* for NASA delivery on or before 15 October.

C. Maintenance and Operations

1. Deliver the CCATS computer utilization accounting system to NASA.

2. Deliver to NASA the monthly CCATS 8-month usage projection reports.

3. Provide support for FOSO scheduling and planning meetings as required.

4. Provide updates for the CCATS operation directive document as required.

5. Provide updates for the CCATS mission support personnel certification criteria document as required.

6. Provide review copies of the CCATS training requirements forecast, the CCATS mission training plan, and the CCATS certification book to NASA for review and comments.

7. Provide updates for the CCATS computer center emergency and disaster plan document.

8. Deliver the CCATS/SCU operational confidence testing specification document to NASA.

9. Deliver the CCATS/SCU standard operational configuration criteria document to NASA.

3.2.9 TO-3960, CCATS Hardware Support

A. Specific EO's

1. EO-3170, Modification to Hardware in the HS Teleprinter Unit. The TPS was completed on 4 August and all engineering effort is now complete.

2. EO-3172, Removal and Relocation of CCATS Equipment per TO-2961. Relocation of the CCATS HS printers, Uniscopes, and other equipment associated with this EO is complete. The TPS was completed on 16 September. Work associated with the removal of the SCS activity indicator risers cannot be completed, however, until the SCS activity indicator modules being modified under EO-4204 are installed in the "C" system portion of the console. This is scheduled for 10 October.

3. EO-4903, Five Additional HS Printer Heads. This EO was received on 20 August. EI No. 1 is being released on 30 September. The AMR's required for procurement are being prepared by drafting.

4. EO-4904. The EO was received on 16 September. Task statements (EI No. 1) were released on 23 September. The EO is now Category 3, awaiting completion of parts procurement.

B. Specific TO's

1. TO-3961, High Speed Printer Survey. This TO was received on 21 July. It requires that a market survey be performed to find a HS-printer that would be a suitable replacement for the one presently in use but no longer commercially available, and preparation of a procurement specification and statement of work based on the results of the market survey. The preliminary specification and statement of work were submitted to NASA for comments. Verbal direction has been received that further effort on this TO will be cancelled as the required printers are being procurred under EO-4903.

3.3 SUPPORT SYSTEMS

3.3.1 General TO-5110, Simulation Programming

3.3.1.1 Progress During Quarter

A. SIM ALDS. The SIM ALDS program was modified to accept inputs from the Cape trainers via the 40.8 ALDS data link. In addition, the program was augmented to provide processing of SLV parameters via the 36kbs data stream.

B. System Programming. The 418-1218 assembly program was completed and released during this quarter. The EXEC 18 coding was also completed during this quarter.

C. PRE SIM. A basic PRE SIM program package was completed during this quarter.

D. MODE Qualification Test. A program was written to be used as an acceptance test for the MODE.

3.3.1.2 Problem Areas

No major problems exist at this time.

3.3.1.3 Plans for Next Quarter

A. SIM ALDS. The SIM ALDS program will be reconfigured for Mission H-2. Work will commence to convert SIM ALDS to run on 1218.

B. System Programming. System programming in the next quarter will be limited to providing utility programs needed on the U494.

C. PRE SIM. The PRE SIM program will not be augmented since it is expected that the U418 will be taken out at the end of the first quarter, 1970.

D. MODE Qual Test. No specific plans for next quarter.

3.3.2 General TO-5111, Simulation Programming (DIP)

3.3.2.1 Progress During Quarter

A. DIP Test 1. Design was completed and the control portion of DIP Test 1 was coded and debugged.

B. DIP Test 4. Work was stopped on DIP Test 4 with the move from Building 422 to Building 30.

C. DIP Test 6. Several new displays were implemented and a log/delog capability was added to DIP Test 6.

D. DIP Test 8. The SLV switch selector processing was implemented for 40 switch selectors.

3.3.2.2 Problem Areas

No major problems exist at this time.

3.3.2.3 Plans for Next Quarter

A. DIP Test 1. DIP Test 1 will be converted to run on the U494 in time to provide testing for the H-2 version of SAP.

B. DIP Test 4. No plans have been made for DIP Test 4 this quarter.

C. DIP Test 6. Work will start to convert DIP Test 6 to run on U494.

D. DIP Test 8. Work will start to convert DIP Test 8 to run on U494.

3.3.3 General TO-5120, SSB Requirement Generation

3.3.3.1 Progress During Quarter

A. Published Change 1 to SSB-300 (APCU Program Specification).

B. Published Change 2 to SSB-400 (GSSC General).

C. Published Rev. A to SSB-401 (GSSC, SLV Model).

D. Provided PHO Technical Publications with Rev. A to SSB-400 (GSSC General).

E. Provided PHO Technical Publications with Change 2 to SSB-404 (GSSC, D/TV Displays).

F. Participated in testing and checkout of GSSC, APCU and DIP programs.

G. Prepared requirements for GSSC, APCU and DIP programs.

3.3.3.2 Problem Areas

No major problems exist at this time.

3.3.3.3 Plans for Next Quarter

A. Publish Rev. A to SSB-400 and Change 2 to SSB-404.

B. Prepare Change 1 to SSB-400 Rev. A.

C. Prepare Change 3 to SSB-404.

D. Continue with testing and checkout of GSSC, APCU and DIP programs.

E. Continue generation of GSSC, APCU and DIP program requirements for Missions H-1 and H-2.

3.3.4 General TO-5130, Support Systems Programming Requirements

3.3.4.1 Progress During Quarter

A. Completed design of a CISS Ground Script System.

B. Completed coding on four of the six programs in the CISS Ground Script System.

C. Coded 50 percent of one of the two remaining programs.

D. Assembled, debugged and checked out three of the programs.

E. Generated and verified a parameter ID test tape.

3.3.4.2 Problem Areas

No major problems exist at this time.

3.3.4.3 Plans for Next Quarter

A. Complete coding, testing and debug of the complete CISS Ground Script System of programs.

B. Generate, validate and deliver to NASA a set of Mission H-1 Ground Script tapes.

C. Code and check out new changes to the Mission H-2 Apollo Confidence Tape programs as required by SCF's 268 and 270.

D. Generate, validate and deliver to NASA the Mission H-2 Confidence Tapes.

3.3.5 TO-5131, PEAK CCATS Support Tasks

3.3.5.1 Progress During Quarter

A. CCATS Support Tasks

1. Implemented and debugged data reduction programs.

2. Presently conducting AAP evaluations.

B. Data Reduction and Analysis for the RTCC D/TV System

1. Completed data reduction for Missions F, C and A (AS-502). The reports are in Technical Publications.

2. Completed data reduction for Mission G.

3. Delivered the D/TV analysis for Mission D (PHO-TN367) to NASA.

4. The Performance Evaluation Programs (PEP) are in the functional design phase.

3.3.5.2 Problem Areas

No major problems exist at this time.

3.3.5.3 Plans for Next Quarter

A. Continue Performance Evaluation Program design.

B. Continue AAP evaluations.

3.3.6 TO-5132, Support Systems Programming

3.3.6.1 Progress During Quarter

A. Supported all EASEP simulations.

B. Completed coding and debug of the three new experiments on ALSEP I (SIDE, SWS, and LSM).

C. Completed ALSEP I system debug in preparation for the first ALSEP simulation on 1 October.

D. Ran and analyzed validation tests for power and thermal parameters.

E. Ran interface tests with the APCU and ARTC computers.

3.3.6.2 Problem Areas

No major problems exist at this time.

3.3.6.3 Plans for Next Quarter

A. Support all scheduled ALSEP I simulations.

B. Complete validation testing.

C. Complete documentation on ALSEP I programs.

D. Begin design work on new experiment programs required for ALSEP 3.

3.3.7 TO-5140, Systems Test Development and Operations

3.3.7.1 Progress During Quarter

A. Mission H-1 (Rev. 1 and 3) CADFISS telemetry data base tapes were generated and validated for the D-GEN system.

B. The following D-GEN data base tapes were maintained, updated, and validated.

1. SIC Data

2. Mission G CCATS and CADFISS Telemetry Data

3. Mission G Command and Communications Data

4. Mission H-1 CCATS Telemetry Data

5. Mission H-1 Command, Tracking and ALSEP Data

6. Mission H-2 Command, Tracking and ALSEP Data

C. Twelve DR's were closed during this quarter.

D. Section personnel provided approximately 450 hours of computer support for various NASA and Univac tests.

3.3.7.2 Problem Areas

No major problems exist at this time.

3.3.7.3 Plans for Next Quarter

A. Build and verify the Mission H-2 CCATS and CADFISS telemetry data base tapes.

B. Update and verify the Mission H-1 and H-2 telemetry, command, and SIC data base tapes as required by NASA.

C. Continue to provide D-GEN computer support as required by the 494 computer schedule.

3.3.8 TO-5150, TO-5160, TO-5170, GSSC/APCU/SSP Programming Specifications

A. GSSC Programming Specifications (TO-5150)

1. SSB-400, Change 2, GSSC, General, was delivered 3 July.

2. SSB-402, Change 4, LM Model, was delivered 3 July.

3. SSB-403, Rev. 1, CSM Model, was delivered 24 July.

4. SSB-400, Change 3, GSSC, General, was delivered 25 August.

5. SSB-401, Rev. A, GSSC, SLV Model, was delivered 18 September.

6. SSB-400, Rev. A, GSSC, General, underwent review and was scheduled for delivery the first week in October.

7. First inputs were received for SSB-404, Change 2, GSSC, Displays. Delivery was scheduled for 9 October.

B. APCU Programming Specifications (TO-5160)

1. Sections 9 and 10 of SSB-300, Revision 1, APCU Programming Specifications, were delivered 6 August.

2. The remaining sections of SSB-300, Revision 1, were delivered 29 September.

C. SSP Programming Specifications (TO-5170)

1. SSB-200. SSB-200, Change 6 was delivered 10 September. Twenty-one SCF's which affect documentation were incorporated into Sections 2, 4, 9 and 11. These revised sections are presently in Engineering review. The ALDS Simulations Program and the ALSEP Simulation Program were documented as Sections 5 and 12, respectively, and are currently in Engineering review.

2. SSB-201. SSB-201, Rev. 2, CCATS Interface Simulation System, was delivered 19 August. Change 1 to SSB-201, Rev. 2, was delivered 3 September.

3.3.9 General TO-5180, APCU

3.3.9.1 Progress During Quarter

A. APCU

1. Delivered updates to PHO-TR257, APCU Programming documentation for Mission G, to NASA.

2. Programmer and GACC operator support for Mission G simulations and checkouts ended on 13 July.

3. Completed Mission H-1 system testing on Source B GO-TAPES 130 and 28, which were delivered to NASA on 23 July. The Source C GO-TAPES 190 and 178 were system tested and delivered to NASA on 16 September and are currently being used to support Mission H-1 simulations and checkouts.

4. Provided inputs for publication of the last *APCU Monthly Progress Report* (PHO-TR455) covered under Contract NAS9-6173.

5. Provided NASA with bi-weekly updates to the Mission H-1 and H-2 Development Plans.

6. Provided NASA with resource requirements estimates (computer usage) on a monthly basis covering the following 8-month period.

7. Updated the APCU PRE SIM program to include a GSSC/APCU and U418/U494 interface test. Also revised the switch action tests to make them independent of keyboard wiring changes.

8. Generated ACF 797, which covers the software additions to the APCU interface requirements (Section 5 of SSB-300).

9. Completed the display and command initialization for the Mission H-2 Program Package.

10. Implemented 12 new requirements in the Mission H-1 Program Package.

B. DIP 2 (APCU Display Test)

1. Completed the original set of Generic Requirements which have been sent to NASA for review action.

2. Completed generation of modifications to the DIP 5 Executive and Test Control required by DIP 2.

3. Development and testing of DIP 2 is in a hold state and is scheduled to restart in the fourth quarter.

C. DIP 3 (APCU Telemetry Test)

1. Completed integration of DIP 3 and DIP 5 Executive and Control Programs. The DIP 3 Load Program has been revised to allow selecting *Telemetry Data Format Control Book* (TDFCB) revision at load time.

2. Continued design, coding, and implementation of special processing routines.

D. DIP 5 (APCU Command Test)

1. Completed design of the Mode I Test (last of the four major tests comprising DIP 5); however, coding and implementation is in a temporary hold state.

2. Supported APCU Mission H-1 system testing with the DIP 5 Load Test, Execute Test, and Uplink Test. The DIP 5 Command Test was also used to verify the APCU Degraded Mode System.

3. Reviewed and corrected the Generic Requirements as published in Change 6 of SSB-200.

E. D-GEN Tape Build Program

1. Reviewed and corrected the D-GEN Tape Build Specifications (SCF 258) to be published in SSB-200.

2. Generated test procedures for validation of program changes. Implemented and verified SCF's 200, 218, and 219 along with Discrepancy Reports PDB-1 and 2.

F. Confidence Tape Validation Program

1. Generated test procedures to be used in verifying the Confidence Tape Validation Program.

2. Completed the design and coding phase for the validation of the CMC, LGC, and AGS Computer Summaries using the Script Tape. Implementation is over 95 percent complete.

3.3.9.2 Problem Areas

No major problems exist at this time.

3.3.9.3 Plans for Next Quarter

A. APCU

1. Complete Mission H-1 programming documentation updates.

2. Continue programmer and GACC operator support of Mission H-1 simulations.

3. Complete development of the Mission H-2 program based on current requirements, and start system testing of the program package.

4. Complete Mission H-2 test plans and procedures and deliver to NASA.

5. Continue bi-weekly updates to the Mission H-1 and H-2 program development plans.

6. Complete analysis of EXEC changes for operation on CCATS "C" System and start implementation of necessary changes.

7. Start implementation of the APCU Event History processor for trouble analysis.

8. Continue updating of APCU background programs (i.e., Linkage Editor, BLAST, JIFI, Confidence Tape Validation, Delog, etc.).

B. DIP 2

1. Start conversion of the current DIP 2 Program from U418 to U494.

2. Continue development.

C. DIP 3

1. Complete Mission H-2 initialization and use program to support APCU Mission H-2 Telemetry System testing.

2. Continue program development and start conversion of DIP 3 from the U418 to the U494.

D. DIP 5

1. Complete Mission H-2 initialization and use program to support APCU Mission H-2 Command System Testing.

2. Continue implementation of MODE I test, and start conversion of DIP 5 from the U418 to the U494.

E. D-GEN Tape Build

1. Complete documentation of the program.

2. Implement and verify SCF's 201 and 246.

F. Confidence Tape Validation Program

1. Complete implementation of the computer summaries using the script tape.

2. Start design and coding of the LVDC Script Tape validation.

3. Continue documentation.

3.3.10 General TO-5100, ASCATS System Engineering

A. General

1. M&O Change Suggestions. Five change suggestions have been forwarded to PMO during this time frame.

2. M&O Support. Approximately 130 hours of engineering effort were provided to the M&O team in support of ASCATS hardware.

B. TO-5201, CST/ASCATS Interface Study. Study effort to determine the most cost-effective approach to effecting this interface is approximately 50 percent complete.

C. Specific EO's

1. EO-6201, STREU "C". Drawings have been submitted reflecting the necessary modifications. Manufacturing cycle is on schedule, and work on A/T procedures, rack, wire list, and QA procedures is underway.

2. EO-6202, Building 5-MCC Trainer. EI has been released. Waiting on logic cards (8 weeks ARO). RCVR from Cape received, and several QA discrepancies noted. These are being corrected.

3. EO-6203, FSMR Implementation. This effort is being held in abeyance pending further NASA direction.

4. EO-6204, MTRR-APCU MSFN Interfaces. All engineering efforts on this EO are complete. The QT procedure is currently being written.

3.4 INFORMATION SYSTEMS DIVISION

3.4.1 TO-7702, Analysis of Communications System Capabilities for MCC Communications Support

3.4.1.1 Progress During Quarter

A. Engineering Support for Space Communications. Investigation was continued into the detection and elimination of impulse noise. Several methods of eliminating impulse noise were considered and investigated, including delta modulation and delay line techniques. Circuit design modifications were made to the input of the TRW FM test set subcarrier discriminators. Also, the operating characteristics of a television video digitizer were investigated. This investigation included the design of a low-pass filter for use with digital TV video information. Several band-elimination filters for color TV testing were also designed and evaluated.

B. Lunar Mission Document (LMD) Support. Seventy-five additional copies of the document *A Communications Performance Evaluation for the Reference Lunar Landing Mission* (EB69-2004-U) were published. The delivery of these documents completed the work effort for this project and the corresponding action document was closed out on 9 July.

C. Apollo S-Band Communications Test Predictions. Theoretical test predictions were generated in direct support of the LM compatibility test program. These test predictions continue to be coordinated with NASA (EE-8) on a daily basis. The following work was performed and incorporated into reports delivered to NASA (EE-8) on the dates indicated:

- Final calibration predictions for EVCS, S-Band, and hardline biomed (less plots), 24 July.
- Working copy of the final calibration predictions for LM, EVCS, S-Band down-link telemetry, 7 August.

- Revised LM down-link Combination 8 EVCS and hardline biomed final calibration predictions, 19 August.
- Final calibration predictions for LM down-link EVCS relay and S-Band voice only, 21 August.
- Initial calibration predictions for LM television, 21 August.
- Final calibration predictions for LM EVCS, S-Band down-link telemetry, 21 August.
- Revised LM down-link Combination 8 EVCS and hardline biomed final calibration predictions (without voice), 22 August.

The preparation of a final comprehensive test prediction document was initiated. This document will incorporate all of the final predictions that were made during the LM Phase III tests.

D. Extravehicular Communications System (EVCS) Analysis Project. The successful operation of the EVCS during Apollo 11 indicated that no further action was required under this project. The corresponding action document was closed out on 6 August.

E. Communications Channel Capability Analysis. The communications channel capability analysis project was completed with an oral presentation (first week of March) and the initial minimum requirements report *Minimum Earth Orbital Space Station Communications Requirements*, dated 21 March. The work effort was extended for the purpose of obtaining new information applicable to this and other projects. A review was completed of the applicable communication documents obtained from the MSC library. The information obtained from these documents will be utilized in the space station and/or space transportation system communications projects. The action document for this project was closed out on 17 July.

F. Analog Signal Design Analysis. The analog signal design analysis project has been superseded by a new project

entitled "Space Vehicle Communications System Signal Design Analysis." The new project concerns the space transportation system communications system. The information obtained from the analog signal design analysis project will be directly applicable to the new project. The action document for the analog signal design analysis project was closed out on 17 July.

G. Space Vehicle Communications System Signal Design Analysis. A project was initiated on 15 July for the purpose of determining the communications requirements for links between a space transportation system (STS) vehicle and a ground terminal, and links between a STS vehicle and other earth orbiting vehicles. Signal design studies will also be performed for communications systems which satisfy the established communications requirements.

A study was made of the various existing and proposed STS communication system ground rules. A tabulation of proposed ground rules was prepared and submitted to NASA (EE-8) as informal working notes. Also a listing of proposed STS RF communication links, including link services, was presented along with the ground rules.

An investigation of various analog signal modulation and demodulation techniques was initiated for the STS communication system. Required values of bandwidth and signal-to-noise ratio were calculated for the case of baseband PCM telemetry and subcarrier voice. Various combinations of AM, FM, and PM were considered. An investigation of digital modulation schemes was also initiated.

A study of aircraft communication systems and RF supported navigation and landing equipment was initiated for the purpose of obtaining information related to the communications that would be required for a STS vehicle to perform FAA approved airport landings. A technical memorandum, entitled "FAA Requirements and Current Operational Categories as Related to the Communications of the Space Transportation System," was completed and delivered to NASA (EE-8).

H. Frequency Translation Repeater Design and Analysis. This project was terminated after Phase I was completed, pending a reevaluation and reorientation of the Data Relay Satellite program. The information obtained from this project will be retained for future use in conjunction with the space station and/or space transportation system communications projects. The action document was closed out on 18 July.

I. RF Hardware Study. The action document entitled "RF and Optical Hardware Study" was revised to define in more detail the parameter boundaries of the RF hardware study and to delete the optical hardware portion of the present study effort. The new action document was entitled "RF Hardware Study."

A space base communications system technical memorandum entitled "RF Hardware Study, 1 to 40 GHz" was completed and delivered to NASA (EE-8). A final report entitled *RF Hardware Study, 1 to 40 GHz* (PHO-TN377) was published and delivered to NASA (EE-8) on 20 August. The purpose of this report was to present a listing of currently available and experimental types of RF hardware for the frequency range of 1 to 40 GHz, subject to the parameter limitations defined in the action document. This report completed the work effort and the action document was closed out on 20 August.

J. Attenuation and Noise Study. The final report, "Results of Investigation of Man-Made Urban Noise Levels," was completed and delivered to NASA (EE-8) on 2 July. The report contained information on the measurement and specification of noise, and discussed various noise sources in the categories of functional and incidental sources. The action document was closed out on 7 July.

K. COMSIM Calculations for LM Mode 8. A task was initiated on 10 July for the purpose of performing EVA and non-EVA calculations for LM Mode 8. The COMSIM program was utilized for these calculations. The Mode 8 circuit margin computer runs containing S-Band (only) and dual EVCS were completed and delivered to NASA (EE-8). A review of the LM Mode 8

computer runs indicated that the calculations were satisfactory. Since no further calculations were required, the action document was closed out on 19 September.

L. Advanced RF and Optical Hardware Study. A task was initiated on 20 August to perform a study of advanced RF and optical hardware. The study considered present state-of-the-art and projected (1980 launch date) spacecraft receiver/transmitter hardware that is dependent upon frequency in the RF range of 1 to 300 GHz, and in the optical wavelength range of 0.1 to 100 microns. Other limiting specifications were listed in the action document.

Applicable hardware companies were contacted for communication equipment specification sheets. Also, reports and documents were studied for projected hardware development. A technical memorandum entitled "Advanced RF and Optical Hardware Study, 1 to 300 GHz and 0.1 to 100 μ" was completed and delivered to NASA (EE-8) on 8 September. The contents of this memorandum are being incorporated into a final report.

3.4.1.2 Problem Areas

No major problems exist at this time.

3.4.1.3 Plans for Next Quarter

A. Engineering Support for Space Communications. The investigation of a delta modulator for use as an impulse noise eliminator will continue. Design of special purpose circuit elements will continue.

B. Apollo S-Band Communications Test Predictions. Theoretical predictions based on the NASA (EE-8) Unified S-Band math model will continue to be generated on an "as required" basis for the LM test program. Daily coordination will continue in order to provide as near to "real-time" support as possible. The preparation of a final comprehensive document incorporating all of the previously delivered final predictions will continue.

C. Space Vehicle Communications System Signal Design Analysis. Engineering investigations of signal modulation and demodulation techniques will continue. Digital modulation schemes will be studied.

D. Advanced RF and Optical Hardware Study. The final report for this project will be completed. The report will be entitled *Advanced RF and Optical Hardware Study, 1 to 300 GHz and 0.1 to 100* μ.

3.4.2 TO-7706, Systems Engineering and Evaluation

3.4.2.1 Progress During Quarter

A. Specified ARIA Unified S-Band System Characteristics

1. All engineering effort on the *Update of Measured and Specified ARIA Unified S-Band System Characteristics* was completed. Fifteen final copies of this document were delivered to NASA (EE-7) on 11 August.

2. All analysis of the *GFE Command and Service Module Manned Space Flight Network Signal Performance and Interface Specification* has been completed. A review copy of this document with the latest updates is being reviewed jointly by NASA and PHO. Additional research may be required before this document is ready for final publication, since changes are expected/

B. Special PCM Test Data Analysis. The evaluation and analysis of the special PCM tests performed in the ESCF was completed. The conclusions and recommendations of these test results were included in a document entitled *Consolidated Apollo PCM Telemetry Test Report*. Fifteen final copies of this document were delivered to NASA (EE-7) on 15 August and this task was closed out.

C. *Apollo Communication Configuration Handbook* Updates. The changes to this handbook were reviewed in draft form jointly by NASA (EE-7) and PHO. Final refinement was made and 100 copies of Rev. 1 were delivered to NASA (EE-7) on 21 August. Fifty additional copies of this handbook were requested by NASA (EE-7) and printing is in progress.

D. LM Communication Summary. A summary defining LM5 communication operational characteristics was completed and provided to NASA (EE-7). This task involved the research of LM5 operational modes, antenna usage, site coverage, and recommending changes when necessary.

E. Bit Transition Density Tests. The LM/MSFN transition density test results were incorporated in the *Consolidated Apollo PCM Telemetry Test Report* and this task was closed out.

F. VHF Predictions. The calibration and final operational predictions were completed and delivered to NASA (EE-7) for inclusion in the *VHF Math Models and Resultant Prediction* document. This document included mathematical equations used in the calculation of the predictions, along with the calculated parameter. This task was completed on 29 July.

G. MSFN/LM Up-Data Link Back-Up Voice Status Report. Evaluation of the EVCS-LM-MSFN EKG and PAM tests was completed and the results submitted to NASA (EE-7) in a status report. This phase of the MSFN/LM tests was completed on 11 July. The second phase of this task was inactive pending completion of up-data link tests in the ESCF.

H. Space Base/Station Intercom Study. A report containing the preliminary system concepts and requirements applicable to the development of the Intercommunications System was completed on 11 September. This report, *Space Base Intercommunication System Ground Rules and Concepts Study Report*, was delivered to NASA (EE-7). The objectives of this report were to develop ground rules and develop system and subsystem concepts and intercommunication requirements applicable to the definition of the space base intercommunications system.

I. Audio Lab Characteristics Report. Analysis of the Audio Lab equipment was completed and a final report was delivered to NASA (EE-7) on 5 September as the *Audio Facility Familiarization Handbook*, describing the functions, characteristics, and capabilities of the Audio Laboratory.

J. PAM Synchronization Study. A study was initiated this quarter to determine what effect the controls on the Stellarmetrics data formatter had on sync acquisition, duration of synchronization, and data accuracy. An outline of this study was delivered to NASA (EE-7).

K. FM Threshold Communication System Study. An outline on FM threshold was completed and delivered to NASA (EE-7) on 22 August. The purpose of this study is to examine the threshold region and develop a math model that will predict FM demodulator performance satisfactorily both above and below threshold. Tese results from the four basic FM detectors will be compared to the math model with an attempt to clarify any discrepancies between the actual data and the math model.

L. Voice Channel Specifications. The objective of this task is to develop a measurement technique (complete with recommended test equipment model numbers and configuration) for testing the voice links to determine if specifications are met. Task requirements have been defined, a schedule of the task activity has been completed, and organizational and facilities interfaces have been defined.

M. Advanced Intercom Systems Study. This is a follow-up study to the "Space Base/Station Intercom Study," expanding the conceptual design to include sketches of substations, exchanges, logic, modulators, demodulators, power, weight, and volume with performance specification and reliability consideration. The task requirements, organizational, and facilities interfaces have been defined. Research of available documents concerning intercom systems has commenced.

3.4.2.2 Travel

Larry Hirsh and Charles Dopson traveled to the Bell Telephone Laboratory, Holmdel, New Jersey, 29-31 July, to discuss RF and Hardline intercom systems with Bell Lab personnel.

3.4.2.3 Problem Areas

No major problems exist at this time.

3.4.2.4 Plans for Next Quarter

A. Specified ARIA Unified S-Band System Characteristics. Research all available SCN's for changes in the command and service module performance and interface specifications. Incorporate changes in the *GFE Command and Service Module Manned Space Flight Network Signal Performance and Interface Specification* and deliver a final copy.

B. *Apollo Communication Configuration Handbook* Updates. Research the Apollo color television camera and update the handbook. Provide NASA (EE-7) with Rev. 2 this quarter.

C. LM Communication Summary. Research and analyze all LM 6 communication checklists and provide NASA (EE-7) with a summary recommending changes to the LM 6 communication operational configuration.

D. MSFN/LM Up-Data Link Back-Up Voice Status Report. Evaluate the test results from the S-Band voice and VHF relay voice tests performed in the ESCF. Prepare and deliver a report with test results and test conclusions.

E. PAM Synchronization Study. Research and analyze all available documentation on PAM synchronization. Provide NASA (EE-7) with a draft of this study.

F. FM Threshold Communication System Study. Prepare test procedures and test configurations for determining the correlation of relevant parameters to FM demodulation performance below threshold. Analyze the test data from these tests and compare the results with available math models. Complete the development of all math models and provide NASA (EE-7) with these math models, along with test results above and below threshold.

G. Voice Channel Specification. Research MIL standard 188B, Bell Telephone, and DCA specifications for possible application to the measurement technique for voice channel specification. Determine what parameters to specify which will assure acceptable performance for the type of voice links/channel that are predicted for the space station/base and STS.

H. Advanced Intercom System Study. Collect new intercom system ground rules and refine the present configured system concepts for the space station/base and STS. Commence the development of operational and functional requirements for the space station/base and STS voice communication system based on crew organization, vehicle configuration, and mission functions. Provide NASA (EE-7) with monthly briefing on the status and progress of the intercom system.

3.4.3 TO-7607B, Conceptual Design and Tradeoff Studies for MSC Systems Development

3.4.3.1 Progress During Quarter

- Developed and published the space base data system concept
- Updated the existing Appendix A with additional control functions
- Prepared and gave a briefing to Information Systems Division staff concerning space base data system concept
- Performed preliminary investigation into shuttle data system requirements.
- Currently preparing operational analysis to determine display/control requirements for space base command center.

3.4.3.2 Problem Areas

No major problems exist at this time.

3.4.3.3 Plans for Next Quarter

Develop shuttle data system concept and prepare space base command center display/control requirements.

3.4.4 TO-7708, Raster Converter/Hardcopy System for the DTDS

3.4.4.1 Progress During Quarter

The final documentation package has been delivered. M&O training classes were being conducted and were scheduled to be completed 8 October.

3.4.4.2 Problem Areas

No major problems exist at this time.

3.4.4.3 Plans for Next Quarter

All tasks defined under TO-7708 were scheduled to be completed by 8 October.

3.4.5 TO-7709, Raster Converter/DTDS Integration Project

3.4.5.1 Progress During Quarter

The Systems Status Review is 40 percent complete, including the following sub-tasks:

- Re-establishment of RCS operation.
- Integration of the RCS into single console DRAFT II program checkout efforts.
- A review of the original DPSS design.
- Update of a complete set of documentation to conform with the master *DTDS Maintenance Manual*.

3.4.5.2 Problem Areas

Scheduled time available for determining system operational problems was inadequate. Availability of the DTDS and the 360/44 was limited to 30 hours during the month of September.

3.4.5.3 Plans for Next Quarter

All tasks defined under TO-7709 have been terminated by direction of the NASA/ISD task monitor. A new TO is expected to be released immediately authorizing man-hours required to perform the raster converter acceptance testing.

3.5 SCHEDULE III EO's

3.5.1 General EO's, FSD General Tasks

A. EO-1806. All effort has been completed and documented. Waiting delivery of parts for storage in the radar van. Promised delivery of 10 October.

B. EO-1820. This EO calls for rewiring the automatic MOCR P-tube stations and replacing vector boards with PCB's. TPS completed 16 September.

C. EO-1826. All areas are installed. The EO is Category D, awaiting workmanship inspection.

D. EO-1832. The EO is Category N, awaiting delivery of IBM equipment.

E. EO-1842. Requires NASA action.

F. EO-1846. The EO is Category 5. Scheduled delivery of the modification kit to the site is 3 November.

G. EO-1848. The EO is installed, the R/T was performed, and the EO is Category R.

H. EO-1849. The EO is Category 4. Scheduled delivery of modification kit to the site is 7 October.

I. EO-1850. Final installation is dependent on NASA approval of Form 4730. An interim barrier was installed prior to Apollo 10.

J. EO-1851. The EO is Category N, "hold all effort."

K. EO-1856. The final tasks of installation are in process. The expected completion of installation was 3 October.

L. EO-1857. The EO is in Category D, awaiting workmanship inspection.

M. EO-1861. The EO is Category N, "hold all effort."

N. EO-1866. The EO is in Category 6, with implementation in process. Access to some areas will possibly delay implementation prior to the H-1 mission.

3.5.2 Display Engineering

A. Specific EO's

1. EO-3047, Seismic Recording System (ALSEP). This EO has been completed. Documentation and write-up of performance specification in progress.

2. EO-3049, Optical Exposure Head. Installation and testing of this EO was completed on 17 September.

3. EO-3050, Modification to Projector Plotter Illuminator Igniter. Igniter test set was completed and the TPS was performed on 18 April. Twenty-two igniters have been modified and accepted by 15 September. Others will follow as available from NASA.

4. EO-3056, Installation of Two Analog Strip Chart Recorders. The original phase of the EO is complete. AMR procurement of amplifiers released 6 June. Parts have been received. Chart recorders modification completed by 29 September.

5. EO-3058, Eidophor Status Panel. Installation is currently in progress and was scheduled to be complete by 3 October. Additional effort will be required to complete modification of the second-floor projectors.

6. EO-3059, D/TV Buffer Clear. Installation is proceeding on a non-interference basis.

7. EO-3061, Modification to ACPD's and D/TV Power Supplies. Installation is proceeding on a non-interference basis.

8. EO-3063, Installation of GFE Hardcopiers. This EO is currently awaiting delivery of the GFE hardcopiers. A NASA schedule for additional effort on this EO is required.

9. EO-3066, Hardcopier Clutch Replacement. All six units have been modified. Testing was completed on 15 July. Final documentation is in progress.

10. EO-3067, Refurbishment of GFE D/TV Equipment. Refurbishment is currently in progress on mechanical and paint discrepancies on a non-interference basis.

11. EO-3502, Capability of Timeline Switches for Hardcopy, Both Floors. A design has been completed. Fabrication complete 27 June. Installation of this EO is in progress but contingent upon M&O schedule. Installation is stopped by FC during simulations for next mission.

12. EO-3509, Modification to the Motorola High-Speed Printer; Addition of an ac Outlet, Interlock and Collar Slack Bail Arms, Buildings 30 and 422. EO received 9 January. NASA need date open. EI No. 2 released 9 May. All units modified in Building 30. Building 422 equipment has been transferred to Building 30. All units were completed and testing was completed on 28 August.

13. EO-3520, Rewiring to SIM Control Areas, Console 62, 63, 64, and 65, Both Floors. EO received on 4 February. NASA need date 6 July. EI No. 1 prepared and released. EI No. 2 released 28 May. Second-floor effort completed on 11 August. Third-floor effort in progress, but dependent upon installation schedule and Flight Control simulations for upcoming mission.

14. EO-3522, Reconfiguration of Clock Circuits in MOC-CIM, Room 216. EI release date, 22 June; IPS completed on 8 August.

15. EO-3524, Reconfiguration of Clock Circuits in MOC-CIM, Room 316. EI release date, 22 June; IPS completed on 8 August.

16. EO-3523, Documentation Correction to XY Plotboards. EI release 11 April; drawing release completed on 3 July.

17. EO-3526, Restart Logic Power Supplies for More Reliable Operation (Console 48A and 48B). Assemblies were shipped 14 July, installed in August after the mission, and tested 27 August and 4 September.

18. EO-3532, Means to Select TCM Times. This EO was cancelled 9 September.

19. EO-3537, Power Switch for the MITE Master Control Rack. Acceptance test completed at the PHO manufacturing facility on 10 September. Installation date was 27 September.

20. EO-3542, Installation of Two D9/5B2 Modules in Console 37, Both Floors. EO received on 17 April. NASA need dates 28 June and 31 October. EI No. 1 released on 20 May. Third-floor installation and testing complete on 11 June. Second-floor installation complete on 3 September. Awaiting D.C. ORACT test time for final R/T.

21. EO-3548, Installation of D9/5B2 Modules in Console 18, Both Floors. EO received on 6 May. NASA need dates 28 June and 31 October. EI released 22 May. Third floor complete on 8 June. Second-floor installation complete on 20 August. Final testing on second floor completed on 19 September.

22. EO-3552. The EO is Category 7, awaiting completion of drafting effort.

B. Other Display EO's. None.

3.5.3 Timing and Control Engineering

A. Specific EO's

1. EO-3263. Piece-part data input to PACER is continuing to be updated to reflect current EI's on all ALSEP equipment.

2. EO-3294, MSK Standardization. EO received 27 January. No NASA need date necessary. EI No. 1 released 26 February, and provides for manufacturing of 12 MSK's, six universal-type and six existing type. EI No. 2 released 11 April provides for replacement of relay sockets on all G type MSK's. All MSK's have been shipped to site. Installation and checkout is completed. Third-floor R/T has been written; requires scheduled computer time for final test.

3. EO-3297, CCATS Restart Control Modules and Associated Equipment. System was acceptance tested in August and shipped to site. Installation was completed 10 September. Checkout was completed 20 September. To be tested in October.

B. Other Timing and Control EO's. None.

3.5.4 Telemetry Engineering

A. Specific EO's

1. EO-3305, 16 New Channels from the DAC to Chart Recorders. Coordination between Engineering and Drafting is required. Received PMO, 1 July 1968; EI No. 1 released, 9 August 1968; EI No. 2 released, 7 November 1968 (Amendments 1 & 2); implementation complete, 19 November 1968; A.T. complete, 12 December 1968. Documentation remains in progress.

2. EO-3312, DACIU for ALSEP. Digital oscillator presently on RMR to use 300 kc and return to vendor within 1 year for repair. Phase IV complete on 21 May. Performance specifications are being prepared. The MITE drivers have been changed, from -1 volt Adjustable Line Driver No. 150500 to -2 volt Adjustable Line Driver No. 150505. Documentation remains open. EI No. 4 completed 11 September.

3. EO-3313, Two DACU's and One Patch Assembly for ALSEP. Documentation being updated.

4. EO-3314, DDDIU for ALSEP. Phase IV was completed on 12 May. EI No. 6 and No. 7, a modification to the error circuits, tested on 9 July. Documentation remains in progress.

B. Other Telemetry EO's

EO-1668, Take-Up Reels for Motorola High Speed Printers in Building 30 and 422. Building 30 completed and tested 20 April. All units are complete and final testing completed 28 August.

3.5.5 Communications Engineering

A. Specific EO's

1. EO-3635, Final Installation of Patch Equipment, Rm. 118, Building 45. Battery box holder for Wheatstone bridge fabricated and unit reinstalled in FACS area. Due to bridge not being calibrated, final testing is being held up until calibration has been completed. Final testing should be completed by end of this quarter or first week of the next quarter.

2. EO-3670, Install Bulk Order CCS. This EO is now proceeding on a non-interference basis. Work was temporarily deferred so that all manpower could be devoted to expected completion of priority EO-3140. Estimated completion date for EO-3670 is now 17 October.

3. EO-3672, A/G Comm Tech VU Meter Panel. This EO was signed off in early July and is complete.

4. EO-3684, A/G Power Modification. This job was installed and is operational; however, problems associated with keying from the Comm Tech Console manifested themselves when this EO was put in. A subsequent EI will correct the keying problems.

5. EO-3720, Repair of Storm Damage & Modification of A/D Converter. Resistors for modification of A/D Converters received, installed, tested and EO signed off.

6. EO-3723, Interface DEGEN and CCATS with DCU-T/R. The DCU/R's have been tested and the cabling of the DCU/T checked out. NASA has signed off on this job; however, the IBM portion has not been accomplished as of this date.

7. EO-3724, Procurement and Installation of a Digital-to-Teletype Unit. Installation was completed on AS-506 splashdown, and testing completed. EO has been signed off.

8. EO-3727, CCS Assets Inventory. This EO requests inventory of CCS assets and establishment of a system for documenting and controlling the changeable elements of the system. All required forms are available, all affected departments have been tasked and the physical inventory is 60 percent complete.

9. EO-3730, Relocation of Bell Modems & Provision of Loop-back Switching Capability. EO received, EI's released, panel fabricated and installed, but before testing could be completed an EAN was received which required EI No. 3 to be written and additional parts to be ordered. Final installation of EI No. 3 and final testing has not been completed at this time. The telephone company is also having some trouble in connecting and making operational the new 303G's for ALDS. Best estimate for completion is mid-October.

B. Other Communications EO's

EO-1756, Jackboxes in Building 16. The patch panel for Building 16 was received, but at NASA direction was not installed. The job is now considered complete as originally installed.

3.5.6 CCATS Hardware Engineering

A. Specific EO's

1. EO-3963, Installation of Two HS Printers for the "C" System CP. This EO was received on 30 April and EI No. 1

was released on 13 June. On 18 June, it was placed in a "hold" status by NASA to await the results of the study to identify a suitable replacement for the printers no longer in production under TO-3961. Subsequently it has been decided to cancel this effort and re-direction will be provided in EO-4903.

2. EO-3964, Installation of Protective Covers for Translator Control Buttons. This EO was received on 19 February. EI No. 2 was released on 3 July. The brackets for this effort have been fabricated and the eyelets which are being made by NASA's Technical Services are now due on 1 October.

3. EO-3968, System Configuration Unit Implementation. The EO was received 21 April and EI No. 1 released 2 June. EAN receipt dates were 3 June and 8 July. EI No. 2 was released 15 July; EI No. 3 on 9 September, and EI No. 4 is in preparation. Design specification SD09047 was updated to reflect the present design requirements, and copies were released for review 15 September. The preliminary implementation plan was released on 19 September. Switch matrix No. 1, along with the SCU control cabinet and associated console are in checkout. Delivery of the equipment is scheduled for 24 November, with checkout and qualification testing to be complete by 1 January 1970.

4. EO-3969. All items completed 24 September.

3.5.7 ASCATS System Engineering

A. Specific EO's

1. EO-6157, MODE. Both MODE's have passed on-site checkout and will be qualified concurrently with EO-6170 within a week.

2. EO-6170, G/SCATS ECL Implementation. The G-ECL has completed final checkout and is awaiting requalification with 6157 and the 1218.

3. EO-6172, Rate Change. This EO has been completed.

4. EO-6178, ECL MODEM Interface. The G-ECL has been modified and will be requalified following MODE requalification.

5. EO-6180, ASCATS Move. The basic ASCATS move was completed on schedule. Three amendments have been received. Concerning Amendment No. 3, the analog patch on the floor in Manufacturing needs OND to modify its priority ranking. ALSEP-STREU interface installation has been completed. Currently undergoing testing and debug on interface problems.

B. Other ASCATS EO's. None.

3.6 SCHEDULE II EO'S

There are 34 Schedule II EO's which have not been certified as complete. One remains to be tested; 1 is in drafting for drawing update; 2 require logistic work sheet completion; 1 remains for study report submission; the remaining 29 require manual revisions which are being accomplished under Schedule III and Option 1.

SECTION 4

OPERATIONAL SUPPORT

4.1 FLIGHT CONTROL

4.1.1 Progress During Quarter

A. Mission Operations

1. Supported Mission H-1 simulations as INCO, procedures, and comm support.

2. Supported val Test 501 for ASCATS verification.

3. Submitted inputs to the final flight mission rules for Mission H-1.

4. Submitted inputs to the *Comm Console Handbook*.

5. Attended communications theory and Apollo tracking network classes.

6. Attended a communications system review for Mission H-1.

7. Reviewed and submitted comments to the Medical Research and Operations Directorate *AAP Requirements Document*.

8. Submitted comments to the *Cluster Requirements Specifications Document*.

B. Experiments System

1. Completed support of the EASEP real-time Flight Control task.

2. Completed work on preparation of sections of the *ALSEP 1 (Mission H-2) Console Handbook* covering real-time Flight Control procedures for the passive seismic solar wind

lunar surface magnetometer and super thermal ion detector experiments.

3. Completed work on an EASEP post-flight report.

4. Completed preparation of chart recorders overlays for use during the ALSEP 1 mission.

C. Mission Control Software

1. Participated in Mission H MCC/ALDS, 1040-3, and MCC/MILA, 1041.3 validation tests.

2. Reviewed EU computer printout from FSD of data programmed on the AC tape.

3. Submitted ALSEP III AC tape requirements to FSD.

4. Submitted Mission H-2 AC tape requirements to FSD.

5. Reviewed Mission H-1 and ALSEP operational calibration curve printout.

6. Supported Mission H, FRT, LM sim flight, and LV SIT.

7. Reviewed ALSEP 1, Mission H printer formats for downlink word and calculated parameter format locations.

8. Submitted Rev. A to H-1, H-2 and H-3 and ALSEP network support document.

D. Qualification Program Unit and Mission Simulation

1. Continued to update and maintain CST trainers.

2. Continued to develop CST requirements in support of AAP.

3. Continued logistics and PI administration.

4. Conducted command module CST Phase I and II training exercises in support of H mission.

5. Conducted lunar module CST Phase I and II training exercises in support of H mission.

6. Completed development of CST mission-oriented launch phase script.

7. Prepared script material in support of CST malfunction procedure exercises.

8. Prepared synopsis of H mission simulation scripts.

9. Prepared outlines for H mission simulation scripts.

10. Prepared script material for H mission simulations.

11. Manned and operated simulation consoles at MCC and MILA during H mission simulations and checkouts.

12. Conducted a repeat cap com briefing in support of H mission.

13. Conducted a 4-hour class on MSFN tracking to FCD personnel.

14. Participated in an interview for PAO with regards to how FCD simulations utilize magnetic tape.

15. Continued cross-training effort of Qualification Program personnel and Mission Simulation Unit personnel in the respective areas of responsibility.

E. CSM Systems

1. Participated in Mission H-1 sims.

2. Prepare redlines for Mission H-1 ECS.

3. Consolidated branch technical files.

4. Made Mission G post-mission analysis to justify Mission H-1 guidelines.

5. Reviewed G&N Olivetti programs for Mission H-1 application.

6. Reviewed AAP documentation.

7. Attended classes on ALSEP.

8. Prepared PCN for Mission H-2 data pack.

9. Reviewed Mission H-1 mission rules.

10. Reviewed Mission H-1 malfunction procedures.

F. LM Systems

1. Worked on Mission G post-mission analysis.

2. Reviewed Mission H mission rules.

3. Reviewed Mission H LM crew check lists.

4. Completed updates to *LM Systems Handbook*.

5. Completed updates to *LM Console Handbook*.

6. Participated in Mission H simulations.

7. Reviewed SCS malfunction analysis.

8. Worked on Mission H-1 data pack.

9. Reviewed LM EPS crew malfunction procedures.

10. Participated in critical design review (CDR) for lunar module modified program (LM-10).

11. Participated in LM sim flight and FRT.

12. Attended classes on LM introduction, ECS, and EPS.

G. Flight Control Simulations Requirements

1. Reviewed and revised the ASCATS voice communications system requirements because of the move of ASCATS equipment from Bldg. 422 to Bldg. 30.

2. Continued development work on the Mission H and ALSEP calibration curve data.

3. Discontinued work on the SDAR per direction from NASA effective 1 July. All SDAR requirements will be included in PHO-TR155.

4. Provided operational support for the simulation network, booster, and communications consoles for Missions G and H FCD simulation exercises.

H. Flight Control Requirements Documentation

1. Updated Rev. A to the *Directory of Standard Nomenclature (DSN)*, which is a replacement to the existing DSN and obtained a computer run. Delivery is scheduled for 1 October.

2. Delivered the mission rules final document for Mission H-1 on 13 September.

3. Produced the *Flight Control Operational Handbook (FCOH)* using EDP for the first time for Mission H-1. The document was delivered on 9 September for production.

4. Received final inputs for the SLV time-line for Mission H-1 on 9 September. A change in the format was made at the request of MSFN and the document delivered on 12 September.

5. Wrote a report defining the time required to produce these documents with the use of EDP. The report was submitted to MCRB.

6. Reviewed seven D/TV formats for Mission H-1.

7. Reviewed 18 D/TV formats for Mission H-2.

8. Reviewed seven D/TV formats for Mission H-3.

J. Travel

1. J. Fanelli traveled to GSFC for a network operations directive document review.

2. D. Siglinger traveled to KSC in support of H mission CMS simulations on 16-19 September.

3. W. Weber traveled to KSC in support of H mission CMS simulations on 21-25 September.

4. H. Perkins traveled to Bethpage, New York on 7-11 September.

4.1.2 Problem Areas

No major problems exist at this time.

4.1.3 Plans for Next Quarter

A. Mission Operations

1. Participate in simulations for Mission H-1.

2. Provide inputs to communication documents for Mission H-1.

B. Experiments System

1. Participate in extensive simulations for the ALSEP 1 mission.

2. Participate in extensive planning for the ALEM and ATM programs.

3. Conduct a study of the ALSEP 1 systems and identify single-point failure areas.

C. Mission Control Software

1. Update Mission H scripts for employment with network simulations.

2. Formulate data flow scripts for Mission H-2.

3. Assist Flight Control in all tests that are Flight Control-supported for Missions H-1 and H-2.

4. Continue to review and submit comments on all Flight Control requirements for all missions.

D. Qualification Program and Mission Simulation

1. Continue development of scripts for H mission.

2. Man and operate assigned consoles in support of all scheduled H mission simulations and checkouts.

3. Continue maintenance and updating of CST trainers.

4. Continue to conduct training exercises on both CSM and LM cockpit trainers.

5. Continue development of CST mission-oriented scripts.

6. Continue cross training effort.

7. Continue PI administration and logistics.

8. Participate in the planning of Mission H-2 simulations scripts.

9. Continue to develop CST requirements in support of AAP.

E. CSM and LM Systems

1. Mission H preparation.
2. Participate in Mission H simulations.
3. Participate in Mission H CDDT.
4. Review Mission H-2 crew check lists.
5. Review Mission H-2 mission rules.

F. Flight Control Simulations Requirements

1. Continue development work on sim cal curve data.
2. Perform work developing simulated network and booster requirements.
3. Provide operational support for the sim network, booster, and communications consoles during Mission H.

G. Flight Control Requirements Documentation

1. Provide revisions to the following documents:
   - Mission Rules
   - FCOH
   - SLV Time-Line
   - DSN
2. Review data packs and D/TV formats as required.
3. Continue development of SR's as required.

4.2 DISPLAY FORMAT AND SLIDE PRODUCTION

4.2.1 Progress During Quarter

4.2.1.1 Mission Support

A. H-1. 93 percent complete.

B. H-2. 88 percent complete.

C. H-3. 55 percent complete.

D. Publications. Published the following documents:

- PHO-TR147, Rev. C, Change 1
- PHO-TR170B, Vol. I, Revs. 39 and 40
- PHO-TR170B, Vol. II, Revs. 15 and 16
- PHO-TR170B, Vol. III, Rev. 5
- PHO-TR407B, Vol. I, Rev. 3.

E. ALSEP

- ALSEP I, complete
- ALSEP II, complete
- ALSEP III, 90 percent complete.

F. DSCOP. Approximately 90 percent of the displays for Mission H-1 have progressed to the final approval stage.

G. DRAFT

1. Change 1 to PHO-TR409 has been distributed for review and comment. This change identifies the DDS and other programming requirements. Additional programming requirements for DRAFT II are being documented and will be included either in this change or later changes.

2. Removal of the 360/44 computer and DTDS to Bldg. 15 has been proposed as 1 October.

3. Informal operational checkout of DRAFT II system has been delayed temporarily.

4. Design engineers are making progress on the development of operational procedures for building various types of displays with DRAFT II.

H. Gerber. Support is being provided the Gerber representative in the installation of the O.E.H. A number of minor problems developed with the 1032 table; progress has begun and the tapes with diagnostic displays can possibly be plotted the week of 15-19 September. During this period, the training of Gerber operators will continue.

4.2.1.2 Special Support

A. Special Group Display. Artwork has been delivered to a vendor to have proof and prints made. Expected turnaround time is 3 to 4 weeks.

B. D/TV Slide File Lens Coating. Research was initiated on vacuum depositing a thin layer of gold on converter slide file lens to reduce the transfer of heat from the D/TV slide file projection bulb.

C. Projection Plotting Splashdown Slide Sets. A request from our NASA task monitor for 25 sets of 10' x 20' Apollo 11 post-splashdown slides was completed.

D. Eidophor Mirror Coatings. Research was conducted on feasibility of recoating eidophor mirrors. The experiments were successful and mirror coatings should begin next month.

4.2.1.3 Production Summary

A. Designed 343 D/TV formats.

B. Designed 46 projection plotting formats.

C. Designed 41 X-Y formats.

D. Designed two high-speed printer formats.

E. Designed 10 reference slide files.

F. Designed 269 DRK subformats.

G. Produced and statistically checked out 13,835 D/TV slides.

H. Produced 171 projection plotting slides.

I. Produced 522 DRK reticles.

J. Produced 24 projection readout reticles.

K. Produced seven IEE reticles.

L. Made 237 vacuum depositions.

M. Cleaned 24 hardcopy heads.

4.2.2 Problem Areas

New equipment is needed to increase our capabilities in high-vacuum support. A preliminary approval to seek funding for this equipment has been given by our NASA task monitor.

4.2.3 Plans for Next Quarter

A. Complete all planned mission D/TV, P/P, and X-Y plotboard formatting and production requirements.

B. Publish revisions to PHO-TR170B.

C. Publish Change 2 to PHO-TR147, Rev. C.

D. Continue training one to three operators on Gerber 1032 automatic drafting machine. Begin operational use of the Gerber 1032 system in the development of displays.

E. Continue providing programming requirements for DRAFT II and continue informal checkout of DRAFT II system.

F. Continue development of operational procedures for building various types of displays with DRAFT II.

4.3 REAL-TIME COMPUTER COMPLEX PROGRAM

4.3.1 Progress During Quarter

A. RTCC Command Program Requirements. Published Changes 29, 30, and 31 to PHO-TR170A, Vol. 4, Rev. 1. These changes affected the F and G type missions.

B. RTCC Trajectory Program Requirements. Published Changes 89, 90, 91, and 92 to PHO-TR170A, Vol. 2. These changes affected the F type missions.

C. RTCC Operations Support Plan. Prepared, for NASA publication, Changes 2, 3, and 4 to MSC Internal Note No. 69-FS-2 (Mission G Support Plan).

D. ALSEP Application Software Requirements. Published Changes 7 and 8 to PHO-TR407A. These changes made minor documentation corrections.

E. Apollo Guidance Computer Program Requirements for AAP Missions. Published the original issue and Change 1 to PHO-TR442, Vol. 1 (CMC Program Requirements).

4.3.2 Problem Areas

No major problems exist at this time.

4.3.3 Plans for the Next Quarter

A. RTCC Command Program Requirements. Continue in the coordination, correlation, compilation, documentation, and publication of RTCC command program requirements.

B. RTCC Trajectory Requirements. Continue in the coordination, correlation, compilation, documentation, and publication of RTCC trajectory program requirements.

C. RTCC Operations Plan

1. Continue in the coordination, correlation, compilation, documentation, and preparation for NASA publication of the RTCC Support Plan.

2. Specifically, next quarters work will involve Change 5 (Mission H-2) of the MSC Internal Note No. 69-FS-2 (G and subsequent missions).

D. ALSEP Applications Software Requirements. Continue in the coordination, correlation, compilation, documentation, and publication of the ALSEP Applications Software Requirements.

E. Apollo Guidance Computer Program Requirements for AAP Missions

1. Continue in the coordination, correlation, compilation, documentation, and publication of the AAP AGC Program Requirements Document.

2. Specifically, next quarter's work will be the completion of the basic document, which will then be updated as necessary.

4.4 MCC FLIGHT OPERATIONS SCHEDULING

4.4.1 Progress During Quarter

A. Operations Scheduling

1. Provided planned test activities for the G, H, and EASEP missions consisting of 31 major interface tests using 903 hours of MCC support.

2. Attended test management team meetings and priorities conferences.

3. Reviewed H missions countdowns.

B. Schedule Formulation

1. Formulated and updated daily the ASCATS schedule consisting of 1302 tests.

2. Typed and distributed 92 daily updates.

3. Arranged in order, typed, and distributed 9200 copies of the master schedule consisting of 3746 tests and 517 test additions.

4. Began hands-on training of CROSS.

C. Schedule Control

1. Provided G mission station status and release of station from launch minus 10 days to splashdown. There were 884 status messages posted and 171 release messages prepared.

2. Maintained the operations documentation section.

3. Provided daily updates to the master schedule and added 517 tests in real time.

4. Began hands-on training of CROSS.

5. Began a procedure for the keeping of network station status during simulations.

D. Statistics

1. Completed 42 statistical equipment utilization reports.

2. Maintained and entered all tests into the central statistical file.

3. Continued work on the *Remote-Site Equipment Configuration Guide*.

4. Updated the *MCC Equipment Configuration Guide*.

5. Completed 246 time-line reports.

6. Completed special reports for the *Quarterly MCC Equipment Utilization Report*.

4.4.2 Problem Areas

No major problmes exist at this time.

4.4.3 Plans for Next Quarter

A. Provide H missions test planning.

B. Continue management of the master schedule.

C. Provide updates, typing, and distribution of the MCC master schedule.

D. Continue ASCAT schedule formulation and updating.

E. Maintain the *MCC and Remote-Site Equipment Configuration Guides*.

F. Maintain the central statistical and documentation files.

G. Prepare equipment utilization reports.

4.5 PROGRAM SUPPORT REQUIREMENTS DOCUMENTATION

4.5.1 Progress During Quarter

A. Completed Revision 17 to the *Apollo Saturn V PSRD*. This is the final PSRD revision presently scheduled in support of Mission H-1 and contains major changes in MSC MSFN instrumentation requirements.

B. Provided engineering liaison and data services support to the Mission G ASPO mission evaluation team.

C. Assisted in the generation of Flight Support requests required in support of Missions G and H-1.

D. Coordinated the distribution of Missions G and H-1 required documentation to appropriate MSFN stations (S/C Operational Trajectory, DAP Annexes, LM Systems Handbook, Mission G Network Controller Mission Report).

E. Revised distribution lists established for DAP documents to reflect current Mission H-1 requirements.

F. Completed a technical review of GSFC, DOD, and KSC Missions G and H-1 support response documents to ascertain MSC requirements compliance.

G. Assisted MSC with the intercenter integration of operational ground support requirements established in support of Mission H-1.

H. Completed and delivered to the NASA task monitor a study detailing simultaneous AAP, ALSEP, and lunar mission MSFN support.

I. Completed and delivered to the NASA task monitor a summary of MSFN USB station operational capability and a current listing of Apollo and AAP onboard communications links.

J. Attended a technical review convened to identify MSC inputs to Mission H-1 NOD Mission Supplements and another to review MSC inputs to NOD Annex C (ALSEP Operations).

K. Completed the MSC input to the GSFC Mission H-1 Documentation Briefing Report.

4.5.2 Problem Areas

No major problems exist at this time.

4.5.3 Plans for Next Quarter

A. Complete Revision 18 to the *Apollo Saturn V PSRD*.

B. Complete Revision 1 to the *AAP PSRD*.

C. Assist in the generation of flight support requests required in support of Mission H-1.

D. Provide engineering liaison and data services support to the Mission H-1 ASPO mission evaluation team.

E. Revise and update distribution lists established for PHO TR and NASA DAP documents to reflect current requirements.

F. Continue to administer and coordinate the distribution of mission related documentation to MSFN stations.

G. Complete a listing and status of Mission H-1 requirements levied on MSC by external agencies via the PSRD.

H. Continue with the technical review of applicable support documents prepared in response to Mission H-1 PSRD-established operational ground support requirements.

I. Complete a present study intended to identify possible station conflicts that may develop when providing simultaneous MSFN support to AAP, ALSEP, and lunar missions.

4.6 TERMINAL LANDING SYSTEM DEVELOPMENT

4.6.1 Progress During Quarter

A. Relocated equipment vans to NASA MSC.

B. Completed all programs and modifications.

C. Completed the updating of all documentation:

1. Distributed PHO-TR311 and PHO-TR349 updates.

2. Published PHO-TR260 updates. Distribution will be made in mid-October.

D. Stored program tapes, card decks, and listings in the TLS equipment van.

E. Stored spare parts in the van.

F. Stored a "Shutdown Notebook" in the van.

4.6.1 Problem Areas

No major problems exist at this time.

4.6.2 Plans for Next Quarter

All tasks have been completed for the termination of TLS support effort.

4.7 INSTRUMENTATION OPERATIONS

4.7.1 Progress During Quarter

A. Tests Supported

1. Supported 31 tests for the G and H missions totaling 903 hours.

2. Continued EASEP support.

B. Training

1. Certified all G mission console operators in accordance with the console operator qualification program. Mission H-1 operator certification is in progress.

2. Conducted classes for scheduling personnel on status board maintenance and interpretation of status messages.

3. Conducted 21 classes on command, telemetry, and tracking.

4. Conducted three classes on ALSEP for IOD personnel.

5. Coordinated and conducted the H-1 mission briefing.

6. Conducted one class on ASCATS for IOD personnel.

7. Conducted a class of approximately 50 hours on MCC systems and internal interfaces.

8. Conducted cross training on the CPC, display, and computer supervisor consoles.

C. Documentation

1. Printed and distributed the following changes to the *Support Count Handbook:*

   - Change 5 (SC-5, SC-6, SC-7, and ALSEP PC-5)
   - Change 6 (PC-3)

- Change 7 (NC-3 and PC-1)
- Change 8 (SC-2 through SC-7)
- Change 9 (SC-1).

2. Completed and distributed the final Instrumentation Support Plan (ISP) and Changes 1 and 2 for the G mission.

3. Printed and distributed the preliminary ISP for the H-1 mission. An errata sheet to the ISP was printed and distributed.

4. Completed and distributed Mission Documentation Changes (MDC) 1 and 2 to the *Generic Flight Support Operations Handbook (FSOH)* for the G mission.

5. Printed and distributed Change 2 to the FSOH.

6. Printed and distributed Change 1 to the *Data Acquisition Plan*, Annex F.

7. Updated, printed, and distributed the operations activity plan on a weekly basis.

D. General Mission Preparation

1. Participated in Test Management Team (TMT) activities for the G and H-1 missions.

2. Participated in the review of the FCOH and FSOH for the H-1 mission.

3. Participated in the review of the basic NOD and the H-1 mission NOD supplement.

4. Continued work on a comm configuration manual. This manual will contain comm configuration for all operational support activity.

5. Participated in G mission PHO safety review committee activity.

6. Attended numerous special meetings to develop and review nominal and contingency operating plans for all lunar landing mission high activity phases.

7. Completed telemetry DGEN and confidence tape requirements for the H-2 mission.

8. Submitted the confidence tape requirements for ALSEP-3.

E. Travel

1. D. Flippin, J. Pride, and O. Allen traveled to GSFC in September to participate in the NOD review.

2. W. Boatman traveled to MILA in September to participate in RSDP program checkout.

3. D. Snyder traveled to KSC in September to participate in the inter-communications conference.

4.7.2 Problem Areas

No major problems exist at this time.

4.7.3 Plans for Next Quarter

A. Provide operational support for the H-1 mission.

B. Participate in all scheduled validation testing, simulations, and pad tests.

C. Provide ALSEP support as required.

D. Participate in final H-1 mission documentation reviews and updates and continue future mission preliminary preparation.

4.8 LLTV OPERATIONS

4.8.1 Progress During Quarter

A. Tests Supported. Conducted the following operations:

- Flights - 23
- Simulated missions - 1.

The LLTV, NASA 951, was damaged in the hangar on 14 July, thereby severely restricting the planned flight/training schedule. The flight test program of NASA 952 did not begin as planned.

B. Supported all flight operations with proficiency drills for Flight Control personnel. Training was conducted as follows:

- Flight Control simulations - 124 hours
- Mission rules and checklist reviews, analysis and discussion of hypothetical flight situations - 160 hours.

At NASA's request, the Training Section began a complete review and reorganization of the LLTV ground school previously conducted by the vehicle contractor. Eight hours instruction will now be provided to each pilot.

D. Documentation. Published *The Handbook of Controllers Operations Procedures* on 20 August. *The LLTV Systems Handbook* was completed on 30 September and delivered to NASA for review and publication.

E. General Mission Preparation. Certified all reserve flight controllers. Completed reconfiguration of Flight Control consoles in both control vans on 20 August. Studies were conducted and recommendations presented to NASA regarding the conversion of the LLTV Flight Control complex to an all digital system.

4.8.2 Problem Areas

No major problems exist at this time.

4.8.3 Plans for Next Quarter

A. Continue maintenance of flight controller proficiency; awaiting the return of NASA 951 to flying status, and the beginning of the flight test program for NASA 952.

B. Complete the course of instruction for the LLTV ground school.

PHILCO
PHILCO-FORD CORPORATION
Philco Houston Operations · WDL Division
1002 Gemini Ave.
Houston, Texas 77058

SECTION 5

SUBCONTRACT STATUS REPORT
(1-30 September 1969)

SUBCONTRACTOR	ORDER NUMBER	DESCRIPTION	DATE APPROVED (NASA)
Hazeltine	PHO-1-330 Amend. 2	Design Changes	9/22/69
Fisk	PHO-1-361 Amend. 1	Labor Hour and Equipment Rental	9/16/69
Powers Regulator	PHO-1-364 Amend. 1	Increase Scope of Work	N/A
Purchase Orders			
IBM	HD-33939-A	Extend Period of Performance	9/9/69
Blanket Orders			
Amp	PHO-B-95 Changes 3 and 4	P/N Change & Increase in Limitation of Payments	8/18/69