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ACE-S/C MONTHLY PROGRESS REPORT

For Period From

15 January 1966 to 15 February 1966

CONTRACT NASw-410

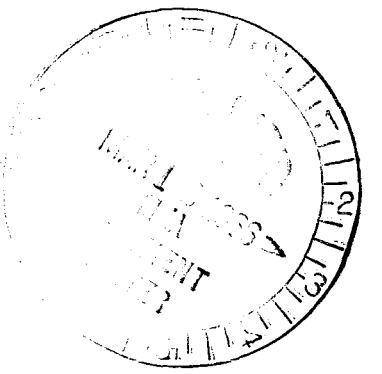
1 MARCH 1966

ASD APOLLO SUPPORT DEPARTMENT ● DAYTONA BEACH, FLORIDA

GENERAL ELECTRIC

ACCEPTANCE CHECKOUT EQUIPMENT—SPACECRAFT

MONTHLY PROGRESS REPORT



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"This document was prepared for the National Aeronautics and Space Administration/ Apollo Spacecraft Program Office under Contract NASw-410, Exhibit A, Section 11, Paragraph B.1.2.1. Preparation of this Type II document is required by paragraph 8.1 of Exhibit III to the existing contractual requirements."

1 March 1966

for J. F. Powers
J. F. Stafford, Manager
Contract Administration

L. M. Downes
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Apollo Support Department
Missile and Space Division
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FOREWORD

This Monthly Progress Report is prepared under Contract NASw-410, Exhibit A, Section II, paragraph B.1.2.1, and is submitted in accordance with paragraph 8.1, Exhibit III of the Statement of Work. This report covers progress for the period from 15 January 1966 to 15 February 1966 and plans for the period from 15 February 1966 to 15 March 1966.

SUMMARY

The DD-250 for spacecraft 012, Revision B, Software Verification was signed at NAA on 23 January 1966, four days ahead of schedule.

NAA Ground Station No. 3 was used three shifts, seven days for spacecraft 011 checkout; Ground Station No. 2 was used for spacecraft 008 checkout on a two-shift basis, five days per week; and Ground Station No. 1 was assigned to spacecraft 012 checkout.

Ground Station No. 2 at MSC completed acceptance testing and was declared operational on 6 February 1966, three weeks ahead of schedule.

GAEC utilized Ground Station No. 1 to complete the ACE-S/C Interleaver Validation. This was the first formal ACE-S/C test performed at GAEC which verified the ACE-S/C—Interleaver Interface.

Spacecraft 009 Countdown Demonstration test was completed during the reporting period utilizing MILA Ground Stations No. 1 and No. 2. Ground Station No. 1 performed as primary station, with Ground Station No. 2 in back-up. Both Ground Stations processed and displayed test parameters, but only primary Ground Station No. 1 was utilized to initiate test commands.

Flight Readiness Test, OCP-0028, was completed using MILA Ground Stations No. 1 and No. 2. Both Ground Stations were utilized for test, with Ground Station No. 2 as primary and Ground Station No. 1 in back-up. The two Ground Stations operated Downlink in parallel.

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ACE-S/C PROGRESS REPORT

1.0 NAA GROUND STATIONS

Ground Station No. 1 at NAA was used in support of the following tests during the reporting period:

1.	OCP-P-9548 Spacecraft 012	Downlink Program Tape Verification.
2.	OCP-P-9549 Spacecraft 012	Uplink Program Tape Verification.
3.	OCP-P-9026 Spacecraft 012	Guidance and Navigation Software Verification.
4.	TPS-010	DTCS Interface Test.
5.	TPS-012	C14-232 to DECOM, Verification of Spacecraft 012 D/L Data Compatibility with ACE-S/C DECOM.
6.	TPS-002 Spacecraft 012	Program Modification.
7.	TPS-233 Spacecraft 011	Calibration Data Update.
8.	TPS-231 Spacecraft 011	Calibration Data Update
9.	TPS-221 Spacecraft 011	Automatic Recovery Test.
10.	TPS-222 Spacecraft 011	Central Timing Test.
11.	TPS-223 Spacecraft 011	Central Timing Test.
12.	OCP-P-9024 Spacecraft 012	Provides a dynamic test of carry-on Uplink Control Programs and ACE-S/C Equipment.
13.	OCP-P-9027 Spacecraft 012	Verifies the Uplink to Downlink Guidance and Navigation Switching Matrix and the Stabilization Control System.

Ground Station No. 1 was utilized by General Electric programmers to debug, complete, and sell the spacecraft 012 program. The DD-250 for spacecraft 012, Revision B, Software Verification, was signed off on 23 January 1966, four days ahead of schedule.

Other utilization of Ground Station No. 1 at NAA consisted of sell-off of Unit 154, installation of Ampex FR-1400 remote control unit for Unit 154, generation of spacecraft 014 programs and utility programs and preventive maintenance.

Ground Station No. 2 at NAA was used in support of the following tests during the reporting period:

1.	TPS-003	Incorporation of the Automatic Recovery Routine.
2.	TPS-004-010	Calibration Data Changes.
3.	OCP-P-9644	A sell run to prove the working compatibility of ACE-S/C Ground Station No. 2 with the GSE associated with the Electrical Power System of spacecraft 008 was conducted.
4.	OCP-P-9605 Spacecraft 008	Checkout operation of the Sequential Event Control System.
5.	OCP-P-9544 Spacecraft 008	To clear outstanding squawks.
6.	OCP-P-9539 Spacecraft 008	To clear outstanding squawks.
7.	OCP-P-9027 Spacecraft 008	Performs Dry and Sell Runs of Testing.
8.	TPS-037	Reverifies measurements. Red-lined in OCP-P-9027.
9.	TPS-011 and TPS-013	Updates Calibration Data.
10.	TPS-014 Spacecraft 008	Calibration Data Change.
11.	TPS-016 Spacecraft 008	Calibration Data Change.
12.	OCP-P-9605 Spacecraft 011	Verifies Integration of the ACE-S/C and GSE Systems.
13.	TPS-235	Modifies Spacecraft 011 Calibration Data.

Some General Electric utilization time was for incorporation of numerous calibration data changes and EO's to spacecraft 008. Preventive maintenance, alignment of Ampex FR-1400 to Ampex tapes and unscheduled modifications were also accomplished.

Ground Station No. 3 at NAA was used in support of the following tests during the reporting period:

1.	OCP-P-1112 Spacecraft 011	Provides detailed sequential steps for checkout of the Spacecraft's (CM and SM) Electrical Power Distribution and Conditioning System.
2.	OCP-P-5053 Spacecraft 011	Evacuation and fill of the water glycol system.
3.	TPS-004	Card deck reconfiguration.
4.	TPS-225	Calibration Data Change.
5.	TPS-290	Reverification of Sequence No. 15 (OCP-P-9605).
6.	OCP-P-112	Electrical Power System Distribution Checkout.
7.	OCP-P-8190	Spacecraft 011 Recorder System Checkout.

8.	OCP-P-8255	Spacecraft 011 Survival and Recovery Beacon Checkout.
9.	OCP-P-8187	C-Band Transponder Checkout.
10.	TPS-227	Calibration Data Change. (Makes new Test File Tape performed on Ground Station No. 1.)
11.	OCP-P-8253	S-Band System Checkout.
12.	TPS-006	Verify Performance of A14-087.
13.	TPS-226	Calibration Data Insertion.
14.	TPS-258	ACE-S/C General on Spacecraft 011.
15.	OCP-8195	CM-SM Telemetry System Checkout Verifies Flight Qualification of Commutators and TM Channels, and Balance of Strain Gages.
16.	OCP-8011	Up-Data-Link Test. Checkout of Up-Data-Link System as it receives from Non-CSM Equipment.
17.	TPS-228 Spacecraft 011	Program Modification.
18.	TPS-229 Spacecraft 011	Calibration Data Insertion.
19.	OCP-P-1036A Spacecraft 011	Verifies Operations of the Master Event Sequence Controller (MESC), a portion of the sequential events control system.
20.	OCP-P-4128 Spacecraft 011	Service Propulsion System (SPS) Electrical Verification.
21.	OCP-P-4225 Spacecraft 011	Reaction Control System (RCS) Electrical System Verification.
22.	OCP-P-8011 Spacecraft 011	Up Data Link.
23.	OCP-P-8195 Spacecraft 011	Command Module/Service Module. Flight Qualification Telemetry System Checkout.
24.	TPS-230	Modification No. 3 of Spacecraft 011 R-START Stimuli.
25.	TPS-234	Calibration Data Insertion for Spacecraft 011.
26.	TPS-237	Spacecraft 011 Decom Program Change.

Other utilization of NAA Ground Station No. 3 consisted of calibration changes in support of spacecraft 011, Control Room patching and configuration changes per TPS-228 and preventive maintenance as required.

General Electric received verbal direction from NASA/ASPO on 25 January to permit NAA to install the 15-Channel Intercomm in Control Room No. 1 and all three Computer Rooms. General Electric has also been informed that this is to be considered as a temporary installation only.

General Electric Engineering completed a study of the feasibility of cooling the Computer Room units at NAA by room air rather than by the closed loop cooling system. The results of the study indicate that this change is completely feasible. A report on the study was presented by NASA/MSC/CSB on 1 February for further action.

A revision status of all running lists has been published. This list shows which revision letter of the running list has been installed for each unit in all three NAA Ground Stations. The list will be periodically updated as retrofits are installed in the equipment.

All discrepancies have been cleared with Command Monitor Unit for Computer Room No. 1, and the completion form has been signed off.

Plans for the next reporting period include the following items:

1. The three Ground Stations will be used to support tests as required by NAA.
2. Complete Terminal Switch Phase II Testing.
3. Complete testing and checkout of Command Monitor Unit in Computer Room No. 2.
4. Conduct 3-station sell-off of terminal switch facility.

2.0 MSC GROUND STATIONS

Ground Station No. 1 at MSC was used in support of the following tests during the reporting period:

1.	TPS-66-1-014 (TON DCS-011)	Playback of MMU Test for No. 1 data.
2.	TPS-66-1-020 (TON DCS-012)	ACE-S/C to NAA Unit C14-240 Interface Test.
3.	TPS-66-1-025 (TON DCS-013)	Support NAA PCM Monitor (C14-386) Checkout on 24 January 1966
4.	TPS-66-1-037 (TON DCS-016, OCP-B-9678)	NAA ACE-S/C Downlink Systems Test.
5.	TPS-66-1-028 (TON DCS-014)	ACE-S/C to NAA C14-231 Interface Testing.

Other General Electric utilization of MSC Ground Station No. 1 consisted of Category I Software Support, Category II Maintenance and Pre-operation Testing, and preventive and corrective maintenance.

The Final Acceptance Test of MSC Ground Station No. 2 was successfully completed on 6 February at 0838 hours, three weeks ahead of schedule. For the Acceptance

Test, the memory access cables were recabled to channels 1, 3, 5, 7, and 9 (site FCN No. 710). One installation FTP, No. 6 (cooling), is still open as of 15 February. The air conditioning systems supplying the equipment cooling are being rebalanced in an effort to satisfy the FTP. The signing of the DD-250 is being delayed pending completion of air conditioning balancing.

The Downlink Parameter Preparation Program (DLPARAMO) has been modified to accept and handle two additional processing categories. They are Category Y, Analog Transient Indicator, and Category Q, Fuel/LOX Quantity.

The following items are included in the plans for the next reporting period:

1. Use MSC Ground Stations No. 1 and No. 2 to support tests as required for NASA.
2. Complete NAA ACE-S/C to GSE Testing.
3. Take necessary action to complete DD-250 for Ground Station No. 2.

3.0 GAEC GROUND STATIONS

During the reporting period, GAEC Ground Station No. 1 was used to support the following test:

OCP-4 1000	ACE-S/C Interleaver Validation.

General Electric utilization included programming effort, maintenance, computer program preparation, FCN installation, and unscheduled retrofits.

The programming activity consisted of program preparation of ESI software and processing CORPAL G programs to obtain CORPAL listings for ESI-2 testing.

GAEC utilized Ground Station No. 1 to complete OCP-4 1000, the first formal ACE-S/C test performed at Bethpage which verified the ACE-S/C—Interleaver Interface.

Phase II EMI testing was completed on Ground Station No. 1. A preliminary review of test results indicate that although EMI levels are somewhat higher than previously measured, all readings are well within the limits specified for EMC.

Control Room No. 2 was reconfigured for support of ESI-2 testing. CORPAL G was utilized on site with excellent results. Only a few errors resulted, and these were primarily errors in the library listing tapes.

A Control Data Corporation trial ECO to correct the 169 external scanner problem was installed by Control Data. Having installed the new MOD and cables restored to their correct configuration, the system was tested for 12 hours, utilizing FTP-40. The original "hang-up" problem did not occur. The problems that did occur could not be attributed to the external memory scanner. A decision was made to observe the system under ordinary operating conditions before concluding that the MOD had cleared the problem.

General Electric utilization of GAEC Ground Station No. 2 consisted of the following:

1. Informal test of GSE using work-around cables.
2. Category I—Software support and program preparation for ESI and processing of library tape.
3. Category II—Pre-operation tests after shutdown and maintenance.
4. Computer programming, preventive maintenance, and unscheduled retrofits.

The Channel Response Monitor Modification was completed on both stations by the Control Data MOD team during the report period.

Plans for the next reporting period include the following items:

1. Use GAEC Ground Stations to support tests as required by NASA and GAEC.
2. Conduct ESI—I-II Tests.

4.0 MILA GROUND STATIONS

Ground Station No. 1 at MILA was used to conduct the following tests during the reporting period:

1.	OCP-0005	Launch Complex 34—Integrated Test with Launch Vehicle Simulator.
2.	OCP-0004	Spacecraft—Launch Vehicle Electrical Mate and Interface Test.
3.	OCP-0036	EDS System Test.
4.	OCP-0031	Spacecraft—Launch Vehicle Malfunction Test.
5.	9910	Software Verification TF-SC-600-00-09.
6.	0006	Launch Complex 34 Space Vehicle Plugs In Integrated Test.
7.	0021	Launch Complex 34 Space Vehicle Plugs Out Integrated Test.
8.	0037	Launch Complex 34 Space Vehicle Electrical Mate Test.

9.	None	Spacecraft—Launch Vehicle RCA-110 Interface Test.
10.	OCP-0021A	Launch Complex 34 Space Vehicle Plugs Out Integrated Test.
11.	OCP-0033	Launch Complex 34 Countdown Demonstration Emergency Detection System Test—5-Minute Switch Demonstration Test.
12.	OCP-0028	Flight Readiness Test.
13.	OCP-4098	Hypergolic Load (Part of OCP-008).

General Electric utilization of Ground Station No. 1 at MILA consisted of Computer Programming and Verification, preventive and corrective maintenance, station verification, and software support.

Ground Station No. 2 at MILA was used to conduct the following tests during the reporting period:

1.	OCP-0004	Spacecraft—Launch Vehicle Electrical Mate and Interface Test.
2.	OCP-4612	Static Firing—Non-flight C/M RCS (FWDT).
3.	OCP-0005	Integrated Test with Launch Vehicle Simulator.
4.	OCP-0036	EDS System Test.
5.	OCP-9910—OCP-9871	Launch Complex 34 Spacecraft 009 Tape Verification (Revision No. 10).
6.	None	Spacecraft—Launch Vehicle—RCA-110 Interface Test.
7.	OCP-0021	Launch Complex 34 Space Vehicle Plugs Out Integrated Test.
8.	OCP-0033	Launch Complex 34 Countdown Demonstration (Test Support) 5-Minute Switch Demonstration Test.
9.	OCP-0028	Flight Readiness Test.
10.	OCP-9868	Site Activation Tape.

General Electric utilization of MILA Ground Station No. 2 included corrective and preventive maintenance, pre-operation test, software support, program preparation and debugging, and Computer Program Verification.

Spacecraft 009 Countdown Demonstration Test, OCP-0033, was completed during this reporting period utilizing Ground Stations No. 1 and No. 2. Ground Station No. 1 performed as primary station with Ground Station No. 2 in back-up. Both Ground Stations operated Downlink in parallel, but Uplink commands were initiated only on primary Ground Station No. 1.

Flight Readiness Test, OCP-0028, was completed. Both Ground Stations were utilized for test, with Ground Station No. 2 as primary and Ground Station No. 1 in back-up. The two Ground Stations operated Downlink in parallel.

Powering up for portions of Hypergolic Load Test, OCP-0038, started 13 February utilizing Ground Station No. 1.

Primary activity for both stations was continued testing of spacecraft 009 mated to the Saturn 201 Launch Vehicle at Launch Complex 34. The operational interface of the ACE-S/C computer with the Launch Vehicle Computer was successful after several attempts. Troubleshooting of the problems encountered is continuing, but has not held up spacecraft testing.

A procedure was published during the reporting period for switching Decom from interleaved to Airborne Data at approximately T-0 with a minimum loss of information. A successful demonstration was performed on 21 January 1966.

The General End Item Test Plan, Appendix I for MILA Ground Station No. 3, dated 9 November 1965, was reviewed and approved by NASA.

Testing of MILA Ground Station No. 3 is proceeding on schedule in the STF. All unit tests, power switching tests, and multi-unit tests are complete. The Computer Room Single-Thread Test is also completed, and preparation is continuing for the Dynamic Logic Tests. The only major shortage consists of the approved printed circuit cards from CCC for the CMU for this station. The unit was operated successfully with the old standard cards while awaiting arrival of the approved cards.

General Electric Engineering has completed the revisions to the Computer Room interconnection cabling diagrams for the MILA 5 Ground Station. These diagrams have

been submitted to CDC for their approval. Engineering effort is presently being expended on the preparation of installation drawings for the MILA 5 Ground Station, and the updating of the installation drawings for the MILA 3 and MILA 4 Ground Stations.

Revisions to MILA Ground Stations No. 3 and No. 4 ICD's outlining the recently revised A/C design have been submitted to NASA/KSC. All MILA Ground Station No. 5 ICD's describing ac power and air conditioning have been submitted to NASA/KSC for review and approval. These documents had previously been reviewed by NASA/MSC/CSB.

Manufacturing is progressing on schedule for MILA Ground Station No. 4 and is approximately 46 percent complete.

Plans for the next period include the following items:

1. Use MILA Ground Stations No. 1 and No. 2 for supporting testing as required.
2. Continue factory testing of MILA Ground Station No. 3.
3. Publish ACE-S/C Peripheral (LCC 39-1) Activation Plan.

5.0 ACE-S/C MILA PERIPHERAL EQUIPMENT

During the reporting period, Blockhouse 34 participated in the following tests:

1. OCP-0033 — Countdown Demonstration.
2. OCP-0028 — Flight Readiness Test.

The following ICD was received signed off from NASA/KSC:

63D708181—BH 37 Cabling.

The equipment cooling ICD for LCC 39 was revised at the request of NASA/MSC/CSB to clarify the location at which air conditions are specified. It was submitted to NASA/KSC/SCO on 2 February.

The LCC 39—Firing Room No. 1 manufacturing schedule has been revised, due to the extended metal parts delivery cycle. The manufacturing effort on Firing Room No. 1 is approximately 55 percent complete.

The delivery of the Alphanumeric System for MILA Peripheral LCC 39-2 will be late June or the first part of July.

The Digital Communications Control Unit from CDC for MILA Peripheral Blockhouse 37 has been quoted as six- to seven-months delivery. Negotiations are underway to improve this cycle.

General Electric Engineering received two action items from the LC 37 DC Power Distribution System Meeting, both of which affect the control and display panel located in Unit 13 (Test Conductors' Console). These actions are:

1. General Electric will replace the load power supply momentary switches with maintained switches.
2. General Electric will investigate the possibility of providing two switches for control of concurrent usage of power supply No. 1 by the CSM and LEM.

A possible approach to these items is to use a slightly modified version of the panel designed for LCC 39.

6.0 ISD SUPPORT

The report on the results of the air conditioning test run at GAEC-1 was completed and submitted to NASA/MSC/CSB. With the equipment cooling and comfort air conditioning systems turned off, there were failures in the SGS, false verifies in the R-STARTS and also over-temperature indications. However, these all occurred after more than five minutes, and it appears, therefore, that the ACE-S/C equipment is capable of operating long enough to provide an "orderly hold" in the checkout should a cooling failure occur.

The testing and analysis of the DTVC data was completed. Impedance characteristics reflections, and maximum driving length without repeaters were checked. A final report has been issued. No abnormal problems were encountered in the test of the system.

The current Program Requirements Process Specifications and the Master Measurements Lists for present and future event display requirements were analyzed, and a report was submitted to NASA/MSC/CSB summarizing the compatibility of event display requirements and capacity of the Event Signal Distribution Unit hardware.

The first weekly meeting with the Requirements Group of NASA/MSC/CSB was held during this reporting period. Three action items upon ISSO resulting from that meeting are as shown on the following page.

1. Determine, from the Program Requirements Process Specifications for AF 011 and AF 012 at KSC and Downey, the order of magnitude of reconfiguration of the ACE-S/C Ground Station required as the operation progresses from test to test, from airframe to airframe and from site to site.
2. Summarize the ACE-S/C-to-GSE configurations at all sites, pointing out in particular any major differences that would affect measurement effectivity.
3. Define the cost trade-off between time saved by minimization of station reconfiguration through measurement standardization versus the additional hardware required to accomplish standardization.

ISSO Engineering completed the final purchase specification for the A2A Simulator Unit in General Electric format for processing through Daytona Beach.

At the request of NASA/MSC/CSB, ISSO personnel initiated an analysis of the utilization of tone transmitters and receivers at MILA. The purpose is to determine if better utilization can be accomplished in lieu of installing additional transmitters and receivers.

7.0 CHECKOUT SYSTEMS EXPERIMENTAL FACILITY—MSC

The Unit 153 cabinet from MSC Ground Station No. 1 was installed in the Experimental Station. A study is being made of components that are available to make the unit operational. The breadboard CDT from MSC Ground Station No. 1 has also been transferred to the CSEF.

The replacement call-up box for the prototype CRT analog plotter was received from Daytona Beach. It has been installed in the plotter control panel and will allow calling up of an analog display without running the alphanumeric page call-up thumbwheel back to zero each time.

At the request of NASA/MSC/CSB, a purchasing package was assembled for the procurement of a full ACE-S/C set of timing generators and translators for the Experimental Station.

Other activities at the Experimental Facility consisted of:

1. Supported testing of DCCU output signal noise problem.
2. Modified SGS re-sync circuit for possible correction to 74 G operational problem.

3. Installed DTCS audio communication units with sets located at Unit 153 and DCCU.
4. Installed and approved various Engineering Change Orders.

8.0 TECHNICAL ACTIVITIES

General Electric Engineering used the alphanumeric system in MILA Ground Station No. 3 (Station No. 10) for the purpose of completing the evaluation of the newly proposed DDI cards. However, it was discovered that this particular system does not exhibit any character jitter. Therefore, the cards will be shipped to MSC for final evaluation where this problem did exist. General Electric Engineering conducted a study investigating the possibility of alternate methods of protecting the DDI 041 card. Some circuit design changes are being recommended to DDI. Their use would eliminate the need for the card saver circuit proposed by DDI.

A higher-than-usual number of Computer Parity Errors is being experienced in both computers at MILA. A survey has been initiated noting the frequency of occurrence of CPE's at all sites and the STF to determine the extent and possible cause of the problem.

The first shipment of Con-Avionics Power Supply Over-Voltage Modules was received by General Electric Engineering. They are being assembled into the power supplies for MILA Ground Station No. 3. A number of deficiencies were encountered during the assembly process which were discussed with Con-Avionics, who currently is acting upon General Electric's recommendations.

In response to NASA direction (EB5-E/5-66-No. 15), General Electric Engineering will establish a noise level agreement with all associate contractors and with NASA/MSC and NASA/KSC, at an acceptable level. When ICD's are signed reflecting the acceptable level, a formal request for waiver of the requirements of PPO-45 will be submitted to the Contracting Officer.

The GAEC Memory Scanner problem, detected during the sell-off of GAEC Ground Station No. 2, has occurred at NAA. It is significant that this problem occurred after the installation of FCN 53. One of the purposes for FCN 53 was: "Gate Resume 2 from memory only on a Read Operation to prevent spurious resumes when exiting to RNI from a store instruction." The symptoms experienced here were identical to those of GAEC No. 2 and the problem was solved by recabling the memory access channels.

The SGS and alphanumeric scopes were tested in the STF to determine the maximum driving distance of the SGS without deterioration of the scope display and a test report was issued.

A Progress Report, with a Milestone Schedule and approved Facility Layout Drawing for the Tape Verification Facility was submitted to NASA/ISD at the Design Review Meeting held during the reporting period. Highlights include:

1. Location and layout of facility have been selected and approved.
2. Facilities drawings are in process.
3. Engineering is now writing purchase specifications for the tape cleaner, degausser, and tape rewinder.
4. Design activities have started on the drop-out detector, counter, reel cleaner, storage racks, and cabinet dollies.
5. Logistics plan is complete.

The results of a study regarding the cooling of Computer Room equipment at NAA with the comfort air conditioning system air were submitted to NASA/ISD at the Design Review Meeting. The report specifies that, from an equipment standpoint, it is possible and practical to transfer an appreciable part of the closed loop cooling load to the room air comfort cooling system. However, the primary limiting factor for this conversion will be the capability of the comfort system to handle the additional load.

An investigation of the decom failures is still underway. A preliminary conclusion as to the cause of memory "avalanche" failures has been reached. Details of the decom failure analysis will be available in a Reliability Improvement Program report to be published early in the next reporting period.

ACE-S/C Operator Class No. 41 was completed at MILA with 12 Computer Associates Inc., (CAI), nine NAA, two MIT, one STV, and one GAEC test engineers in attendance.

ACE-S/C Operator Class No. 42 completed training at NAA on 4 February 1966.

ACE-S/C Operator Class No. 43 started at Bethpage, 7 February 1966, with 18 GAEC, two Raytheon, and five A/C Electronic Division (ACED) test engineers.

ACE-S/C Operator Class No. 45 started at MILA, 7 February 1966, with six NASA, seven CAI, six NAA, and one ACED test engineers.

9.0 GENERAL ACTIVITIES

Recommended revisions to the Decom Acceptance Test were evaluated by the Radiation representative at MSC. No major discrepancies were noted. NASA/ISD indicated that they will discuss the inclusion of these tests in Radiation's procedure during the next report period. Preparation of the necessary punched program tapes began at the Experimental Station.

The computer program to be used during acceptance testing of the DTVC Switching Equipment has been prepared and the companion FTP is being completed. Arrangements are being made to have the program verified by local NASA for issuance to the field site.

The following meetings were held in Daytona Beach during the reporting period:

1. The 23rd Monthly ACE-S/C Design Review.
2. The 28th ACE-S/C Monthly Management Meeting.

The following documents were submitted to NASA during the reporting period:

1. ACE-S/C Documentation List Change Pages, dated 17 January 1966.
2. Transmittal of Contract Specifications, dated 20 January 1966.
3. Radiation/General Electric Installation Interface Plan for ACE-S/C Ground Station MILA No. 3, dated 18 January 1966.
4. ACE-S/C Program Monthly Financial Management Report for December 1965, (14 January 1966), dated 18 January 1966.
5. Transmittal of Preliminary End Item Test Plan for Spacecraft Test Programs (15 December 1965) (NASw-410-30-13-124), dated 21 January 1966.
6. Quarterly Summary of Quality Program Performance Audits—Fourth Quarter, 1965, dated 20 January 1966.
7. Minutes of Failure Review Board, dated 21 January 1966.
8. GFE Configuration Status Report, dated 21 January 1966.
9. ACE-S/C Repetitive Failure Report, dated 24 January 1966.
10. Logistic Status Charts, dated 26 January 1966.
11. ACE-S/C Program Performance Charts for December 1965, dated 26 January 1966.
12. Transmittal of Engineering Change Proposal (ECP) Report, dated 26 January 1966.
13. Support Materials List—ACE-S/C Ground Station (1 January 1966), dated 27 January 1966.

14. ACE-S/C Reliability Weekly Failure Report (Magnetic Tape), dated 28 January 1966.
15. Monthly Index of Computer Programs, Revision date 21 January 1966, dated 28 January 1966.
16. Revision No. 1 to Approved End Item Test Plan for the ACE-S/C Terminal Switching Facility, dated 28 January 1966.
17. Transmittal of Interface Control Documents (ICD's), dated 28 January 1966.
18. Minutes of Failure Review Board, dated 28 January 1966.
19. FTP-A-1240, Revision D, Acceptance Test Procedure for Terminal Switch, dated 31 January 1966.
20. Field Test Procedure D-1240—Phase II Acceptance Test, Revision A, dated 27 January 1966—GAEC Terminal Switch Facility, dated 1 February 1966.
21. Monthly Quality Status Report, dated 31 January 1966.
22. Qualification of ACE-S/C Parts and Equipment Supplement No. 3, dated 1 February 1966.
23. GFE Configuration Status Report, dated 2 February 1966.
24. ACE-S/C Equipment Sub-Itemization for ACE-S/C Ground Station MILA 4, dated 2 February 1966.
25. Transmittal of ACE-S/C PERT Network Drawing, dated 3 February 1966.
26. Minutes of Failure Review Board, dated 3 February 1966.
27. Maintenance Test Equipment (Common and Special) and Special Tools for ACE-S/C Sites, dated 4 February 1966.
28. ACE-S/C Reliability Weekly Failure Report (Magnetic Tape), dated 4 February 1966.
29. Transmittal of Proposed Revisions to the General End Item Test Plan for ACE-S/C Ground Stations for Approval (NASw-410-30-13-108), dated 4 February 1966.
30. Weekly Status Report, dated 4 February 1966.
31. Transmittal of Data Entry Trend Charts, dated 7 February 1966.
32. Transmittal of Interface Control Document, MH01-08001-400, Signed Revision Sheet (Revision A), dated 8 February 1966.
33. ACE-S/C Performance and Resources Status Review Meeting, dated 9 February 1966.
34. Transmittal of Engineering Change Proposal (ECP) Report, dated 10 February 1966.
35. ACE-S/C Qualification Status List (QSL), dated 10 February 1966.

36. ACE-S/C Reliability Weekly Failure Report (Magnetic Tape), dated 11 February 1966.
37. Minutes of Failure Review Board, dated 11 February 1966.
38. Proposed Revision 2 to the Terminal Switching Facility End Item Test Plan (NASw-410-30-13-117) dated 11 February 1966.
39. Weekly Status Report, dated 11 February 1966.
40. ACE-S/C Program Performance Charts (January 1966), dated 11 February 1966.
41. ACE-S/C Program Monthly Financial Management Report for January 1966, dated 11 February 1966.
42. ACE-S/C Acceptance Test for the PCM Decommutators, dated 15 February 1966.

10.0 CONTRACT CHANGES

The following Contract Change Authorizations (CCA) were received from NASA/MSC/ASPO during the reporting period:

CCA Number	Description
85	Exhibit 1 of the ACE-S/C System Description dated 3 August 1964 be revised as follows: Add paragraph 1.5.2.4.1: Improve Cardioscope Performance and Control (ECP No. 1168). Revise Purchase Specification 63A107645 to improve Cardioscope performance and control as follows: (1) Reduce the sensitivity of the trace position control. (2) Replace the present 26 cm graticule with a 25 cm graticule. Effectivity MILA 1, 2, and 5. 2. Exhibit IX System Description, ACE-S/C MILA Peripheral Equipment (Blockhouses 34 and 37, and LCC 39) dated 1 September 1965 be revised as follows: Add: After paragraph 3.2f as specified in page A-18 of Exhibit IX: Revise purchase specification 63A107645 to improve Cardioscope performance and control as follows: (1) Reduce the sensitivity of the trace position control. (2) Replace the present 26 cm graticule with a 25 cm graticule. Effectivity Blockhouses 34, 37, and LCC 39.

CCA Number (Cont.)	Description (Cont.)
86	1. Exhibit 1 of ACE-S/C Systems description dated 3 August 1964 is revised as follows: At the end of paragraph 4.2.3.2.1 add: Revise the Specification associated with Alphanumeric Display Equipment for MILA No. 5 and LC 39—Firing Room No. 2 to incorporate the latest vendor design improvements. Overall Revision "AB" covers the changes to Specification 6J64 attached hereto.
87	Exhibit 1 of the ACE-S/C Work Description dated 3 August 1964 is revised as follows: Add the following sub-paragraph numbered 4.1.2.3.2c: The equipment cooling air return system at MILA will be modified to remove overhead air conditioning return ducts in the Signal Distribution Room and the five Computer Rooms. Flooring and equipment cabinets will be modified as necessary to accommodate the removal of these ducts.
88	Exhibit 1 of ACE-S/C Work Description dated 3 August 1964 be revised by adding the following sub-paragraph: 4.1.25 Additional Power Requirements for Unit 250 KSC Timing Equipment (ECP No. 1180)—Increase the ac power capability of Unit 250 in MILA 3 and 4. Provide necessary components in Unit 250 and add circuits between the systems power panel in the SDR and Units 250A1 and 250A2. Alter power entry circuits as required.
89	Revise Exhibit IX of the ACE-S/C Work Description entitled System Description, ACE-S/C MILA Peripheral Equipment (Blockhouses 34, 37, and LCC 39) dated 29 September 1965, as follows: Add sub-paragraph 3.5.1: Hazardous Gas Monitoring Panel and Protection System Provide the capability for monitoring and control of the hazardous gas protection system from Unit 13 of MILA peripheral equipment groups at Blockhouses 34 and 37. Add sub-paragraph 3.4.1: Hazardous Gas Monitoring Panel and Protection System Provide the capability for monitoring and control of the hazardous gas protection system from Unit 12 of MILA peripheral equipment groups at Blockhouse 39, Firing Rooms No. 1 and No. 2. Revise Exhibit 1 of the ACE-S/C Work Description entitled System Description ACE-S/C dated 13 August 1964 as follows: Add sub-paragraph 4.1.26: Hazardous Gas Monitoring Panel and Protection System

CCA Number (Cont.)	Description (Cont.)
89 (Cont.)	Provide hazardous gas system status display at the Test Conductor Console (Unit 10) and the Fuel Cell and Cryogenics Console (Unit 2) in all MILA ACE-S/C Station Control Rooms. This change excludes sub-paragraph 2 of paragraphs I and III of attachment II to ECP 1320.
32 (Rev. 1)	Sub-paragraph "a" of CCA 32 is amended to read as follows: Modify Specification 63A107645 and NASA-ESD-106036 as they relate to MILA 1, MILA 2, MILA 5, Blockhouses 34, 37, and 39, Firing Rooms No. 1 and No. 2, as follows.

During the reporting period, the following Engineering Change Proposals (ECP) were submitted by NASA/MSC/ASPO Letter of Technical Direction:

ECP Number	Description
1152	Documentation Requirements for Interchangeability of R- and C-STARTS Documentation Changes for identification of interchangeable locations and capabilities resulting from providing additional R- and C-STARTS for interchangeability.
1174	Add a PIPA Patch Panel and Cable to MILA Unit 245
1176	Improve Alphanumeric Display Equipment Circuit Protection Three separate design improvement items: (1) Revise signal coupler. (2) Add thermal cutout safety switch. (3) Provide a monitor test panel for maintenance use.
1190	Change Power Supply in Unit 2 of Blockhouses Change power supply from -20 volt, 750 milliamperes to -20 volt, 1.5 amperes to insure supply will not fail if an overload condition occurs.
1191	Insulate Static and Signal Ground Buses at MSC Compatibility change completed at MSC No. 1; zipper tubing was installed at MSC No. 2 during pre-installation. Both required by tight under-floor clearance.
1192	Reduction of Crosstalk—Noise Fix for Unit 21 Add, delete, and reroute several wires in the ground lines to Unit 21 wire-wrapped logic assemblies.

ECP Number (Cont.)	Description (Cont.)
1195	Improve Protective Grid Over Blower Housing, in CICA in Blockhouses Remove existing protective screen and mount a 10 1/2- by 16 3/4-inch screen with mesh size 3/16- by 3/16-inch squares on top of Blower B1 of Unit 2, ACE-S/C—L/V CICA.
1202	Add Head Usage Meters to Ampex FR-1400 Recorders Install Head Usage Meters in the Ampex FR-1400 Tape Recorders in NAA No. 1 and No. 2. NAA No. 3 and subsequent conform.
1204	Change Purchase Specification 6J64 Change specification for procurement of Alphanumeric Display Equipment for MILA 5 and LCC 39 Firing Room No. 2 to improve reliability, maintainability, and accessibility of the alphanumeric display modules.
1207	Provide a Replacement Decom Computer Interface Unit Provide a Decom Computer Interface Unit with MILA 4 to replace the unit delivered to NASA for the Experimental Station now at MSC, Houston.
1318	Improve Communications Signal-to-Noise Ratio at GAEC Provide 28 volts dc power to the Intercomm Headsets at GAEC No. 1 and No. 2 (Units 1 to 8, 10 to 16, 18, 19, 154) as follows: Add a pair of No. 20 stranded wires to the communications cable assembly (total of eight new wires per unit) in each console containing an intercomm unit. Modify headset connector plates to accept screws to mount the cap chains and affix the headset to the writing surface.

During the reporting period, the following Engineering Change Proposals (ECP) were approved by NASA/MSC/ASPO Letter of Technical Direction:

ECP Number	Description
1156:R1	Modify Shelf on Communications Console at MILA.
1165	Provide 90-Degree Connector for Patch Cable, Unit 208, at MSC.
1166	DTVC, DCCU Serial Signal Uniformity.
1167	Remove Reactive Filters in Ampex Recorders.
1177	Alphanumeric Display—Power Supply Changes.

ECP Number (Cont.)	Description (Cont.)
1186	Add guard on Unit 13 at Blockhouse 34.
1187	Cardiometer Changes at Blockhouse 34.
1188	Con-Avionics Power Supply Drift Problem.
1189	Replace 50A Fuse Holders in Alphanumeric SGS P/S.
1190	Change Power Supply in Unit 2 of Blockhouses Change power supply from -20 volt, 750 milliamperes to -20 volt, 1.5 amperes to insure supply will not fail if an overload condition occurs.
1191	Insulate Static and Signal Ground Buses at MSC Compatibility change completed at MSC No. 1; zipper tubing was installed at MSC No. 2 during pre-installation. Both required by tight under-floor clearance.
1198	Replace SGS Convenience Outlet

The following RECP was received from the NASA/ASPO during the reporting period:

RECP Number	Description
1323	At MSC Ground Stations No. 1 and No. 2 reduce the present five intercomm trunk lines and four point-to-point trunk lines to three intercomm trunk lines and four point-to-point trunk lines in accordance with attached marked-up ICD. Provide additional interface points on four consoles and add intercomm unit cabling to Units 22 and 25.

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