RES-57

OFFICE OF MANNED SPACE FLIGHT

APOLLO PROGRAM

FINAL FLIGHT EVALUATION REPORT

APOLLO 7 MISSION

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NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FLIGHT EVALUATION REPORT - APOLLO 7 MISSION

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ABSTRACT

THIS DOCUMENT IS THE FINAL FLIGHT EVALUATION REPORT FOR THE APOLLO 7 MISSION. IT INCLUDES DATA FROM THE NASA CENTER 3 DAY, 15 DAY, 30 DAY AND 60 DAY MISSION REPORTS AS WELL AS THE SUBSYSTEMS MEETING OF OCTOBER 29, 1968, ANOMALY STATUS REPORTS FROM MSC AND THE APOLLO 8 FLIGHT READINESS REVIEW MEETING OF NOVEMBER 12, 1968. THE REPORT INCLUDES A SUMMARY OF THE MISSION, A SUMMARY OF MISSION ACCOMPLISHMENTS AND THE ANOMALIES ENCOUNTERED DURING THE MISSION. THE ANOMALIES ARE LISTED IN A SEPARATE SECTION AND NUMBERED ACCORDING TO SPACECRAFT, LAUNCH VEHICLE AND GROUND SYSTEMS.

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KEY WORDS

FLIGHT EVALUATION

MISSION REPORTS

ANOMALY

OBJECTIVES

1.0 INTRODUCTION

APOLLO 7 WAS THE FIRST MANNED FLIGHT OF THE APOLLO SPACECRAFT AND THE FIFTH FLIGHT OF THE SATURN IB LAUNCH VEHICLE. PREVIOUS MISSIONS HAVE SUCCESSFULLY TESTED THE PERFORMANCE OF THE LAUNCH VEHICLE AND SPACECRAFT COMBINATION INCLUDING THE PERFORMANCE OF THE COMMAND MODULE HEAT SHIELD AT LOW EARTH ORBITAL RE-ENTRY VELOCITY AND SIMULATED LUNAR RETURN VELOCITY.

APOLLO 7 (AS-205/CM-101) WAS A "C" TYPE MISSION DESIGNED TO DEMONSTRATE THE COMMAND SERVICE MODULE OPERATIONS AND THE CAPABILITY OF THE SPACECRAFT, CREW AND MANNED SPACE FLIGHT NETWORK SUPPORT FACILITIES TO CONDUCT AN EARTH ORBITAL MISSION WITH THE BLOCK II COMMAND AND SERVICE MODULE AND GROUND HARDWARE.

1.1 CARRY-OVER ANOMALIES FOR SUBSEQUENT FLIGHT READINESS REVIEWS

	APOLLO 7 ANOMALY	FRR MISSION EFFECTIVITY	REMARKS
2.1.1	MOMENTARY LOSS OF AC BUSES	SA-503 (APOLLO 8)	SEE P. 26 FOR DISCUSSION OF ANOMALY
2.1.2	LOW CHARGE RATE ON BATTERIES A AND B	SA-503 (APOLLO 8)	SEE P. 27 FOR DISCUSSION OF ANOMALY
2.1.3	UNDERVOLTAGE INDICATION ON D.C. BUSES A AND B	SA-503 (APOLLO 8)	SEE P. 28 FOR DISCUSSION OF ANOMALY
2.1.7	FUEL CELL EXIT TEMPERATURE DECREASE	SA-503 (APOLLO 8)	SEE P. 32 FOR DISCUSSION OF ANOMALY
2.1.13	INTERRUPTION OF VHF VOICE COMMUNICATION	SA-503 (APOLLO 8)	SEE P. 38 FOR DISCUSSION OF ANOMALY
2.1.15	WINDOW OBSTRUCTIONS TO VISION	SA-503 (APOLLO 8)	SEE P. 40 FOR DISCUSSION OF ANOMALY

1.2 MISSION SUMMARY

THE APOLLO 7 SPACE VEHICLE WAS LAUNCHED FROM LAUNCH COMPLEX 34 AT CAPE KENNEDY ON OCTOBER 11, 1968, AT 11:02:45 HRS., EDT. PRE-LAUNCH CONDITIONS WERE NOMINAL WITH ONE 2 MINUTE 45 SECOND HOLD AT T-6 MINUTES 15 SECONDS TO COMPLETE THE S-IVB THRUST CHAMBER JACKET CHILLDOWN. LAUNCH DAMAGE WAS LIGHT COMPARED WITH PREVIOUS LAUNCHES. ALL LAUNCH VEHICLE STAGES PERFORMED AS PLANNED WITH NO MAJOR PROBLEMS. ORBITAL INSERTION OCCURRED AT 10 MINUTES 27 SECONDS GET, WITH AN APOGEE OF 153.7 N.MI., A PERIGEE OF 123.3 N.MI., A PERIOD OF 89.7 MINUTES, AN INCLINATION OF 31.58 DEGREES AND AN INSERTION VELOCITY OF 25,553 FEET PER SECOND.

THE S-IVB PASSIVATION WAS NOMINAL. THE S-IVB MANUAL CONTROL TEST WAS COMPLETED ON SCHEDULE WITH EXCELLENT RESULTS. SEPARATION OF THE S-IVB AND CSM OCCURRED ON SCHEDULE AND THE CREW REPORTED ONE SLA PANEL NOT COMPLETELY DEPLOYED. SIMULATED DOCKING WAS ACCOMPLISHED AT 2 HRS., 55 MIN., WITH THE CREW MANEUVERING THE CSM TO WITHIN 4 TO 5 FEET OF THE S-IVB. TWO PHASING BURNS WERE ACCOMPLISHED USING THE SERVICE MODULE RCS TO SET UP THE PROPER PHASE FOR RENDEZVOUS WITH THE S-IVB. THE RENDEZVOUS WAS ACCOMPLISHED WITH TWO SPS BURNS AND RCS BRAKING TO WITHIN APPROXIMATELY 70 FT. OF THE TUMBLING S-IVB.

THE MISSION PROCEEDED WITH ONLY MINOR PROBLEMS INCLUDING CREW DISCOMFORT DUE TO MINOR HEAD COLDS. AT 190 HOURS INTO THE MISSION, ALL OBJECTIVES HAD BEEN ACCOMPLISHED EXCEPT THOSE ASSOCIATED WITH RE-ENTRY. TWO ADDITIONAL SPS BURNS WERE ACCOMPLISHED INCLUDING A MINIMUM IMPULSE BURN OF 0.50 SECONDS YIELDING AN ORBIT 89.1 X 156.7 N.MI., AND A 67 SECOND BURN, 36 SECONDS OF WHICH WERE CONTROLLED BY THE G&N SYSTEM AND THE LAST 31 SECONDS BY THE CREW MANUAL THRUST VECTOR CONTROLLER. THE BURN YIELDED A ΔV OF 1691 FPS AND AN ORBIT OF 89.1 X 244.2 N.MI. TESTS PERFORMED FOLLOWING THE FOURTH SPS BURN INCLUDED PASSIVE THERMAL CONTROL, COLDSOAK, LANDMARK TRACKING, IN ADDITION TO THREE MORE SPS BURNS, AS WELL AS THE FINAL DE-ORBIT BURN. TELEVISION PICTURES WERE BROADCAST FROM THE SPACECRAFT ON SEVEN OCCASIONS WITH ONLY ONE BAD BROADCAST PERIOD. THE DE-ORBIT SEQUENCE WAS INITIATED EAST OF HAWAII WITH RETRO-FIRE AT 259:39:16 HRS. FOLLOWED BY SEPARATION OF THE COMMAND MODULE FROM THE SERVICE MODULE, RE-ENTRY AND SPLASHDOWN IN THE ATLANTIC OCEAN AT 260:09:03 GET (7:11:30 HRS. EST) AT 27°32.5'N AND 64°4'W WITHIN 7.7 MILES OF THE PREDICTED LANDING POINT.

1.3 APOLLO PROGRAM IMPACT

THE GOAL OF THE APOLLO PROGRAM IS TO ENHANCE THE MANNED SPACE FLIGHT CAPABILITY OF THE UNITED STATES BY DEVELOPING, THROUGH LOGICAL AND ORDERLY EVOLUTION, THE ABILITY TO LAND MEN ON THE MOON AND RETURN THEM SAFELY TO EARTH. TO ACCOMPLISH THE GOAL OF LUNAR LANDING AND RETURN IN THIS DECADE, THE APOLLO PROGRAM HAS FOCUSED ON THE DEVELOPMENT OF A HIGHLY RELIABLE LAUNCH VEHICLE AND SPACECRAFT SYSTEM.

THE APOLLO 7 WAS THE FIRST MANNED APOLLO MISSION AND WAS DESIGNED TO VERIFY PROPER OPERATION OF THE COMMAND AND SERVICE MODULE (CSM) SYSTEMS AND OPERATIONAL CAPABILITIES OF THE CSM, CREW, AND MANNED SPACE FLIGHT NETWORK (MSFN) SUPPORT FACILITIES IN AN EARTH ORBITAL ENVIRONMENT.

THE APOLLO 7 MISSION WAS COMPLETED AS PLANNED WITH RECOVERY OF THE SPACECRAFT AND CREW IN THE ATLANTIC RECOVERY AREA ON THE 22ND OF OCTOBER 1968. SUFFICIENT DATA WAS OBTAINED TO VERIFY THAT ALL PRIMARY MISSION OBJECTIVES WERE SATISFIED ALTHOUGH SOME PORTIONS OF THE DETAILED TEST OBJECTIVES WERE NOT COMPLETED. SEVERAL DETAILED TEST OBJECTIVES WERE ADDED DURING THE MISSION AND WERE SUCCESSFULLY ACCOMPLISHED.

THE SUCCESS OF THIS MISSION QUALIFIED THE CSM AS MAN RATED, ENABLING THE PROGRAM TO PROCEED WITH MANNED SATURN V FLIGHTS AND FLIGHTS INTO A LUNAR ENVIRONMENT.

1.4 SUMMARY OF MISSION ACCOMPLISHMENTS

THE APOLLO 7 MISSION INCLUDED 51 DETAILED TEST OBJECTIVES. ALL OF THESE OBJECTIVES WERE EITHER SUCCESSFULLY ACCOMPLISHED OR ADEQUATELY DEMONSTRATED. IN ADDITION, THREE MORE OBJECTIVES WERE ADDED DURING THE MISSION AND THESE TOO WERE SUCCESSFULLY ACCOMPLISHED. AMONG THE MORE IMPORTANT ACCOMPLISHMENTS WERE A SUCCESSFUL RENDEZVOUS AND SIMULATED DOCKING WITH THE S-IVB, EIGHT SUCCESSFUL SPS BURNS AND SUCCESSFUL LIVE TELEVISION TRANSMISSION TO THE GROUND. IN ADDITION THE MISSION WENT THE FULL DURATION AS PLANNED WITH ONLY MINOR PROBLEMS. A LIST OF THE APOLLO 7 MISSION DETAILED TEST OBJECTIVES AS GIVEN IN THE MISSION IMPLEMENTATION PLAN REFERENCE 17 AND THE MISSION REQUIREMENTS DOCUMENT (SPD8-R-001) REFERENCE 18 ALONG WITH THEIR RESPECTIVE DEGREE OF ACCOMPLISHMENT ARE GIVEN BELOW.

	OBJECTIVE	ACCOMPLISHMENT
P7.19	TO OBTAIN DATA ON THE ENVIRONMENTAL CONTROL SYSTEM PRIMARY RADIATOR THERMAL COATING DEGRADATION.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED BETWEEN 92 AND 97 HOURS GET.
P7.20	TO OBTAIN DATA ON THE BLOCK II FORWARD HEAT SHIELD THERMAL PROTECTION SYSTEM.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED DURING ENTRY.
P1.7	TO PERFORM AN INTERNAL MEASUREMENT UNIT ORIENTATION DETERMINATION AND A STAR PATTERN DAYLIGHT VISIBILITY CHECK.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED.
P1.6	TO PERFORM INERTIAL MEASUREMENT UNIT ALIGNMENTS USING THE SEXTANT.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED.

	OBJECTIVE	ACCOMPLISHMENT
P1.13	TO PERFORM GUIDANCE NAVIGATION CONTROL SYSTEM CONTROLLED SPS AND RCS VELOCITY MANEUVERS.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED AT VARIOUS TIMES DURING THE MISSION.
P1.12	TO DEMONSTRATE GUIDANCE NAVIGATION CONTROL SYSTEM AUTOMATIC AND MANUAL ATTITUDE CONTROLLED RCS MANEUVERS.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED BY THE AUTOMATIC MODE PRIOR TO THE SPS BURNS AND THE MANUAL MODE THROUGHOUT THE MISSION.
P1.14	TO EVALUATE THE ABILITY OF THE GUIDANCE NAVIGATION CONTROL SYSTEM TO GUIDE THE ENTRY FROM EARTH ORBIT.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED DURING ENTRY.
P2.4	TO DEMONSTRATE THE STABILIZATION CONTROL SYSTEM AUTOMATIC AND MANUAL ATTITUDE CONTROLLED RCS MANEUVERS.	THIS OBJECTIVE WAS COMPLETED EXCEPT FOR TESTING THE HIGH AND AUTO RATE MODES.
P2.5	TO DEMONSTRATE CSM STABILIZATION CONTROL SYSTEM VELOCITY CONTROL CAPABILITY.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED.
P4.4	TO VERIFY THE LIFE SUPPORT FUNCTIONS OF THE ENVIRONMENTAL CONTROL SYSTEM THROUGHOUT THE MISSION.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED THROUGHOUT THE MISSION.
P4.9	TO DEMONSTRATE THE WATER MANAGEMENT SUBSYSTEMS OPERATION IN THE FLIGHT ENVIRONMENT.	THIS OBJECTIVE WAS ACCOMPLISHED THROUGHOUT THE MISSION ALTHOUGH THERE WAS A PROBLEM WITH THE CHLORINATION PROCEDURE AND SOME HARDWARE PROBLEMS.

	OBJECTIVE	ACCOMPLISHMENT
P2.3	TO MONITOR THE ENTRY MONITORING SYSTEM DURING SPS VELOCITY CHANGES AND ENTRY.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED DURING THE FIRST SPS BURN AND ENTRY.
P1.15	TO PERFORM STAR AND EARTH HORIZON SIGHTINGS TO ESTABLISH AN EARTH HORIZON MODEL.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED ON TWO OCCASIONS.
P20.11	TO OBTAIN DATA ON ALL COMMAND AND SERVICE MODULE CONSUMABLES.	THIS OBJECTIVE WAS ACCOMPLISHED THROUGHOUT THE MISSION.
P5.10	TO DEMONSTRATE FUEL CELL WATER OPERATIONS IN A ZERO-G ENVIRONMENT.	THIS OBJECTIVE WAS ACCOMPLISHED THROUGHOUT THE MISSION.
P3.15	TO PERFORM A SERVICE PROPULSION SYSTEM PERFORMANCE BURN IN THE SPACE ENVIRONMENT.	THIS OBJECTIVE WAS ACCOMPLISHED WITH SPS BURN NUMBER 5.
P20.10	TO DEMONSTRATE THE PERFORMANCE OF THE COMMAND AND SERVICE MODULE - MANNED SPACE FLIGHT NETWORK S-BAND COMMUNICATION SYSTEM.	THIS OBJECTIVE WAS ACCOMPLISHED THROUGHOUT THE MISSION. ALL REQUIRED MODES WERE TESTED.
P3.20	TO VERIFY THE ADEQUACY OF THE PROPELLANT FEED LINE THERMAL CONTROL SYSTEM.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED BY THE DEMONSTRATION OF NORMAL OPERATION AND THE COLD SOAK TEST.

	OBJECTIVE	ACCOMPLISHMENT
P1.16	TO OBTAIN INERTIAL MEASUREMENT UNIT PERFORMANCE DATA IN THE FLIGHT ENVIRONMENT.	THIS OBJECTIVE WAS ACCOMPLISHED THROUGHOUT THE MISSION IN CONJUNCTION WITH THE IMU ALIGNMENT CHECKS. TWO PULSE INTEGRATING PENDULOUS ACCELEROMETER BIAS TESTS WERE ALSO PERFORMED.
P3.14	TO DEMONSTRATE THE SERVICE PROPULSION SYSTEM MINIMUM IMPULSE BURNS IS A SPACE ENVIRONMENT.	THIS OBJECTIVE WAS ACCOMPLISHED WITH SPS BURNS 4 AND 6.
P1.8	TO PERFORM ONBOARD NAVIGATION USING THE TECHNIQUE OF THE SCANNING TELESCOPE LANDMARK TRACKING.	THIS OBJECTIVE WAS ACCOMPLISHED WITH THE DEMONSTRATION OF 3X3 AND 9x9 NAVIGATIONAL TRACKING.
P2.7	TO OBTAIN DATA ON THE STABILIZATION CONTROL SYSTEMS CAPABILITY TO PROVIDE A SUITABLE INERTIAL REFERENCE IN A FLIGHT ENVIRONMENT.	THIS OBJECTIVE WAS ACCOMPLISHED PRIOR TO SPS BURN NUMBER 4 AND PRIOR TO THE S-IVB SEPARATION.
P5.9	TO VERIFY AUTOMATIC PRESSURE CONTROL OF THE CRYOGENIC TANK SYSTEMS IN A ZERO-G ENVIRONMENT.	THIS OBJECTIVE WAS ACCOMPLISHED THROUGH OUT THE MISSION.
P5.8	TO OBTAIN DATA ON THERMAL STRATIFICATION WITH AND WITHOUT THE CRYOGENIC FANS OF THE CRYOGENIC GAS STORAGE SYSTEM.	TWO OF THE THREE STRATIFICATION TESTS WERE SUCCESSFULLY ACCOMPLISHED. PART OF THE THIRD TEST WAS ACCOMPLISHED, AND THE REST WAS DELETED. (SUFFICIENT DATA WERE OBTAINED)

	OBJECTIVE	ACCOMPLISHMENT
P6.7	TO DEMONSTRATE S-BAND UPDATA LINK CAPABILITY.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED THROUGHOUT THE MISSION.
P20.15	TO OBTAIN CREW EVALUATION OF INTRAVEHICULAR ACTIVITY IN GENERAL.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED THROUGHOUT THE MISSION.
P4.6	TO OBTAIN DATA ON OPERATION OF THE WASTE MANAGEMENT SYSTEM IN THE FLIGHT ENVIRONMENT.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED THROUGHOUT THE MISSION.
P4.8	TO OPERATE THE SECONDARY COOLANT LOOP.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED AND INCLUDED DAILY REDUNDANT COMPONENT TESTS.
P20.13	TO PERFORM A COMMAND AND SERVICE MODULE ACTIVE RENDEZVOUS WITH THE S-IVB.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED.
P2.10	TO ACCOMPLISH THE BACKUP MODE OF THE GYRO DISPLAY COUPLER-FLIGHT DIRECTOR ATTITUDE INDICATOR ALIGNMENT USING THE SCANNING TELESCOPE IN PREPARATION FOR AN INCREMENTED VELOCITY MANEUVER.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED ALTHOUGH THERE WAS A PROBLEM WITH THE FDAI IN THE LATER PART OF THE MISSION.

	OBJECTIVE	ACCOMPLISHMENT
P4.10	TO DEMONSTRATE THE POSTLANDING VENTILATION CIRCUIT OPERATION.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED AFTER LANDING.
P1.10	TO PERFORM OPTICAL TRACKING OF A TARGET VEHICLE USING THE SEXTANT.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED DURING RENDEZVOUS.
P20.8	TO PERFORM A COMMAND SERVICE MODULE - S-IVB SEPARATION; TRANSPOSITION AND SIMULATED DOCKING.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED.
P2.6	TO PERFORM A MANUAL THRUST VECTOR CONTROL TAKEOVER.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED WITH A VERY SMOOTH TRANSITION NOTED.
P3.16	TO MONITOR THE PRIMARY AND AUXILIARY GAUGING SYSTEM.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED WITH SPS BURN NUMBER 5.
P6.8	TO DEMONSTRATE A SIMULATED COMMAND SERVICE MODULE OVERPASS OF THE LUNAR MODULE RENDEZVOUS RADAR DURING THE LUNAR STAY	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED ON THE 48th REVOLUTION.
S7.24	TO OBTAIN DATA ON INITIAL CONING ANGLES WHEN IN THE SPIN MODE AS USED DURING TRANSEARTH FLIGHT.	THE FIRST OF THREE TESTS WAS ACCOMPLISHED. A PITCH CONTROL MODE WAS ALSO ACCOMPLISHED BUT WAS NOT PLANNED PRIOR TO LAUNCH. THE THIRD TEST WAS DELETED. (CREW OBJECTED, EXPECTED EXCESSIVE CROSS-COUPLING).

	OBJECTIVE	ACCOMPLISHMENT
S20.19	TO DEMONSTRATE COMMAND SERVICE MODULE VHF VOICE COMMUNICATIONS WITH THE MANNED SPACE FLIGHT NETWORK.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED THROUGHOUT THE MISSION AND DURING RECOVERY.
S3.17	TO OBTAIN DATA ON THE SERVICE MODULE REACTION CONTROL SUBSYSTEM PULSE AND STEADY STATE PERFORMANCE.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED THROUGHOUT THE MISSION.
S20.17	TO OBTAIN DATA ON PROPELLANT SLOSH DAMPING FOLLOWING SPS CUTOFF AND FOLLOWING REACTION CONTROL SUBSYSTEM BURNS.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED BY THREE TESTS PERFORMED DURING THE MISSION.
S20.14	TO VERIFY THAT THE LAUNCH VEHICLE PROPELLANT PRESSURE DISPLAYS ARE ADEQUATE TO WARN OF A COMMON BULKHEAD REVERSAL.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED.
S20.16	TO OBTAIN PHOTOGRAPHS OF THE COMMAND MODULE RENDEZVOUS WINDOWS DURING DISCRETE PHASES OF THE FLIGHT.	THE FIRST AND FOURTH OF FOUR SCHEDULED TESTS WERE COMPLETED, THE OTHERS WERE DELETED. (NO MAJOR CHANGE NOTED DURING MISSION)
S20.20	TO EVALUATE THE CREW OPTICAL ALIGNMENT SIGHT FOR DOCKING, RENDEZVOUS AND PROPER ATTITUDE VERIFICATION.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED THROUGHOUT THE MISSION AND IN CONJUNCTION WITH DEORBIT ATTITUDE.

	OBJECTIVE	ACCOMPLISHMENT
S20.9	TO PERFORM MANUAL OUT-OF-WINDOW COMMAND SERVICE MODULE ATTITUDE ORIENTATION FOR RETRO FIRE.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED WITH TWO TESTS.
S1.11	TO MONITOR THE GUIDANCE NAVIGATION CONTROL SYSTEMS AND DISPLAYS DURING LAUNCH.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED DURING LAUNCH.
S20.18	TO OBTAIN DATA VIA THE COMMAND SERVICE MODULE - APOLLO RANGE INSTRUMENTATION AIRCRAFT COMMUNICATIONS SYSTEMS.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED THROUGHOUT THE MISSION.
S20.12	TO PERFORM CREW CONTROLLED MANUAL S-IVB ATTITUDE MANEUVERS IN THREE AXES.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED.
S7.21	TO OBTAIN DATA ON THE SERVICE MODULE LM ADAPTER DEPLOYMENT SYSTEM OPERATION.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED.
S7.28	TO OBTAIN COMMAND SERVICE MODULE VIBRATION DATA.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED DURING BOOST, POWERED FLIGHT AND DEORBIT.
S005	TO OBTAIN SELECTIVE, HIGH QUALITY PHOTOGRAPHS WITH COLOR AND PANCHROMATIC FILM OF SELECTED LAND AND OCEAN AREAS.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED THROUGHOUT THE MISSION.

	OBJECTIVE	ACCOMPLISHMENT
S006	TO OBTAIN SELECTIVE, HIGH QUALITY, COLOR CLOUD PHOTOGRAPHS TO STUDY THE FINE STRUCTURE OF THE EARTH'S WEATHER SYSTEM.	THIS OBJECTIVE WAS SUCCESSFULLY ACCOMPLISHED THROUGHOUT THE MISSION.

TABLE I. APOLLO 7 SEQUENCE OF EVENTS

PRE-LAUNCH PHASE

EVENT	PLANNED	ACTUAL	DIFF.
START COUNTDOWN CLOCK (0500 10 OCT. 68)	HR:MIN:SEC:	HR:MIN:SEC:	HR:MIN:SEC:
LV POWER APPLICATION	-14:15		
SS MOVE TO PARK SITE	-06:50		
SIX-HOUR SCHEDULED HOLD 11:P.M. 10 OCT. TO 5:00 A.M. 11 OCT.			
LOX LOAD	-06:00	ALL TIMES	
LH_2 LOAD	-04:30	NOMINAL	
FLIGHT CREW CSM INGRESS	-02:25	EXCEPT FOR	
START TERMINAL COUNT PHASE	-00:50	UNSCHEDULED	
APOLLO ACCESS ARM RETRACT TO PARK POSITION	-00:33	2 MIN. 45 SEC	
LES ARM	-00:33	HOLD AT T-6 MIN.	
LV POWER TRANSFER	-00:31		
CSM TO INTERNAL POWER	-00:15		
AAA TO FULL RETRACT	-00:05		
BEGIN AUTOMATIC LAUNCH SEQUENCE	-00:02:43		
LV TO INTERNAL POWER	-00:00:28		
IGNITION COMMAND	-00:00:03		
LIFT-OFF (15:02:45.36 GMT)	00:00:00	00:00:00:00.36	

TABLE I (CONTINUED)

LAUNCH PHASE

EVENT	PLANNED HR:MIN:SEC:	ACTUAL HR:MIN:SEC:	DIFF. ± HR:MIN:SEC:
LIFT-OFF (15:02:45.36 GMT)	00:00:00.2	00:00:00.36	+ .16s
START PITCH AND ROLL	00:00:10.36	00:00:10.31	- .05s
MAX DYNAMIC PRESSURE	00:01:15.6	00:01:18.5	+ 2.90s
S-IB INBOARD ENGINE CUTOFF	00:02:20.28	00:02:20.65	+ .43s
S-IB OUTBOARD ENGINE CUTOFF	00:02:23.28	00:02:24.32	+ 1.04s
S-IB/S-IVB SEPARATION	00:02:24.58	00:02:25.59	+ 1.01s
S-IVB ENGINE IGNITION	00:02:25.98	00:02:27.06	+ 1.08s
S-IVB ULLAGE ROCKET JETTISON (3)	00:02:39.28		
ESCAPE TOWER JETTISON	00:02:43.28	00:02:46.54	+ 3.26s
GUIDANCE INITIATE	00:02:48.28	00:02:49.76	+ 1.48s
S-IVB ENGINE CUTOFF	00:10:14.80	00:10:16.76	+ 1.96s

TABLE I (CONTINUED)

ORBITAL PHASE

EVENT	PLANNED HR:MIN:SEC	ACTUAL HR:MIN:SEC	DIFF. ± HR:MIN:SEC
ORBITAL INSERTION	:10:24.80	:10:26.8	+ 2.0s
INITIATE S-IVB LOX DUMP	01:34:27.0	01:34:28.96	+ 1.96s
INITIATE COLD HELIUM DUMP	01:42:27	01:42:28	- 1.0s
TERMINATE S-IVB SAFING	01:46:28.0	01:46:29.96	- 1.90s
S-IVB "TAKEOVER ATTITUDE CONTROL"	02:29:55	02:30:49.1	+ 56s
CSM/S-IVB SEPARATION	02:54:55.17	02:55:02	+ 6.83s
FIRST PHASING MANEUVER (RCS) (17.3 SEC)	03:20:00	03:20:09.87	+ 9.87s
SECOND PHASING MANEUVER (RCS) (18.5 SEC)	ADDED (15.52)	15:52:00.9	- 0.9s
FIRST SPS BURN	26:24:55.2	26:24:55.68	+ 0.48s
SECOND SPS BURN	28:00:56.0	28:00:56.46	+ 0.46s
TERMINAL PHASE INITIATE (RCS)	29:18:34.0	29:16:33	- 02.01m
TERMINAL PHASE FINALIZE (RCS)	29:53:34	29:55:43	+ 02.09m
SEPARATION MANEUVER (RCS)	30:20:00	30:20:00	
LIVE TV	24:00	71:41	+ 47:41h
THIRD SPS BURN (SCHEDULED 91.42)	75:47:58.6	75:48 :00.29	+ 1.69m

TABLE I (CONTINUED)

ORBITAL PHASE (CONT.)

EVENT	PLANNED HR:MIN:SEC	ACTUAL HR:MIN:SEC	DIFF. ± HR:MIN:SEC
FOURTH SPS BURN	120:43:00	120:43:00.5	+ 0.5s
FIFTH SPS BURN (67.6 SEC)	165:00:00	165:00:00.5	+ 0.5s
SIXTH SPS BURN	210:08:00	210:08:00.47	+ 0.47s
SEVENTH SPS BURN	239:06:11	239:06:12	01s
EIGHTH SPS BURN	259:39:15.9	259:39:16.3	0.4s

TABLE I (CONTINUED)

ENTRY PHASE

EVENT	PLANNED HR:MIN:SEC	ACTUAL HR:MIN:SEC	±	DIFF. HR:MIN:SEC
CM/SM SEPARATION	259:43:33.8	259:43:33.8	-	
ENTRY INTERFACE (400 K)	259:53:26	259:53:27	-	1s
ENTER BLACKOUT	259:56:17	259:54:58	-	1m 19s
LEAVE BLACKOUT	259:59:14	259:59:46	+	32s
S-BAND CONTACT BY RECOVERY AIRCPAFT		260:02:00		
DROGUE DEPLOY	260:03:17	260:03:23	-	06s
MAIN PARACHUTE DEPLOY	260:04:14	260:04:13	-	01s
VHF CONTACT BY RECOVERY AIRCRAFT		260:05:00		
LANDING	260:08:58	260:09:03	+	5s
VISUAL SIGHTING BY RECOVERY AIRCRAFT	- -	260:32:00		
RADAR CONTACT BY ESSEX	- -	260:34:00		
FLOTATION COLLAR INSTALLED & INFLATED	- -	260:43:00		
CREW MEMBERS ABOARD ESSEX	- -	261:06:00		
SPACECRAFT ABOARD ESSEX	- -	262:03:00		

2.0 ANOMALY LISTING

THIS SECTION CONTAINS A LISTING OF ANOMALIES RESULTING FROM THE MISSION NUMBERED ACCORDING TO SPACECRAFT, LAUNCH VEHICLE AND GROUND SYSTEMS. AN ATTEMPT HAS BEEN MADE TO KEEP COMMAND SYSTEMS ANOMALIES TOGETHER.

2.1 MANNED SPACECRAFT CENTER (MSC)

2.1.1 MOMENTARY LOSS OF AC BUSES
2.1.2 LOW CHARGE RATE ON BATTERIES A AND B
2.1.3 UNDERVOLTAGE INDICATION ON DC BUSES A AND B
2.1.4 ELECTROMAGNETIC INTERFERENCE PROBLEMS
2.1.5 BATTERY MANIFOLD LEAK
2.1.6 BIOMEDICAL INSTRUMENTATION
2.1.7 FUEL CELL EXIT TEMPERATURE INCREASE
2.1.8 ERRATIC OPERATION OF WATER EVAPORATOR
2.1.9 CONDENSATION OF WATER IN CABIN
2.1.10 WATER GUN TRIGGER
2.1.11 LEAK AT WASTE WATER SYSTEM FITTING
2.1.12 LOSS OF PHASE MODULATED SUBCARRIER (LOSS OF PM S-BAND)
2.1.13 INTERRUPTION OF VHF VOICE COMMUNICATIONS
2.1.14 INADVERTENT PROPELLANT ISOLATION VALVE SWITCHING
2.1.15 WINDOW OBSTRUCTIONS TO VISION
2.1.16 FOOD BAG FAILURES
2.1.17 MOMENTARY FAILURE OF ROTATIONAL HAND CONTROLLER
2.1.18 SHIFT OF FLIGHT DIRECTORS ATTITUDE INDICATOR
2.1.19 ABNORMAL OPERATION OF ENTRY MONITOR
2.1.20 FAILURE OF FLIGHT QUALIFICATION COMMUTATOR
2.1.21 CRACKED GLASS ON MISSION EVENT TIMER
2.1.22 SLA PANEL DEPLOYMENT MALFUNCTION
2.1.23 WATER IN DOCKING TUNNEL
2.1.24 APPARENT FREE WATER IN SUIT SUPPORT HOSE
2.1.25 FAILED FLOODLIGHTS
2.1.26 VHF RECOVERY BEACON

2.2 MARSHALL SPACE FLIGHT CENTER (MSFC)

NO ANOMALOUS EVENTS HAVE BEEN LISTED.

2.3 KENNEDY SPACE CENTER (KSC)

ANOMALY REPORT

NO. 2.1.1 TITLE: MOMENTARY LOSS OF AC BUSES

SYSTEM: CSM MISSION: APOLLO 7

SUBSYSTEM: ELECTRIC POWER SYSTEM EVENT TIME: ORBIT

PROBLEM: AC BUS 1 DROPPED OUT AT 21:48 AND 57:00 GET. BOTH AC BUS 1 AND AC BUS 2 DROPPED OUT AT 61:15. IN EACH CASE, THE BUSES OPERATED NORMALLY AFTER BEING RESET. THE CAUSE WAS IDENTIFIED AS AN OVERVOLTAGE TRANSIENT WHICH OCCURS WHEN THE OXYGEN CRYOGENIC TANK FANS AND HEATERS CYCLE OFF IN THE AUTOMATIC MODE. AFTER A PROCEDURAL CHANGE WAS MADE TO PREVENT THE FANS IN BOTH TANKS FROM CYCLING OFF SIMULTANEOUSLY, THE PROBLEM DID NOT RECUR FOR THE REMAINING 200 HOURS OF FLIGHT.

ACTION: POST FLIGHT TESTS CONFIRM THAT THE CAUSE IS ASSOCIATED WITH ARCING OF THE MOTOR OPERATED SWITCH WHICH AUTOMATICALLY CONTROLS THE FANS AND HEATERS IN THE OXYGEN CRYOGENIC TANKS. THE MOTOR SWITCH IS ENVIRONMENTALLY SEALED RATHER THAN HERMETICALLY SEALED, THEREBY EXPOSING THE SWITCH CAVITY TO PRESSURES WHICH SUPPORT ERRATIC CORONA ARCING OF THE AC CONTACTS WHEN THE CONTROLS ARE OPENED TO TURN OFF FAN POWER. CORRECTIVE ACTION WILL BE A PROCEDURES CHANGE WHEREBY THE CRYO FANS WILL BE OPERATED MANUALLY. NO HARDWARE CHANGE WILL BE MADE.

ORGANIZATION: 5-2490

REFERENCES:
MSC 3 DAY REPORT P4
SPACECRAFT SUBSYSTEMS REVIEW MTG. 10-29-68
MSC 15-DAY REPORT P5
MSC 60 DAY REPORT 1-68 P 11-7
ANOMALY STATUS REPORT 11-19-68 P-7
APOLLO 7 ANOMALY REPORT MSC, Nov. 68 P-6

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

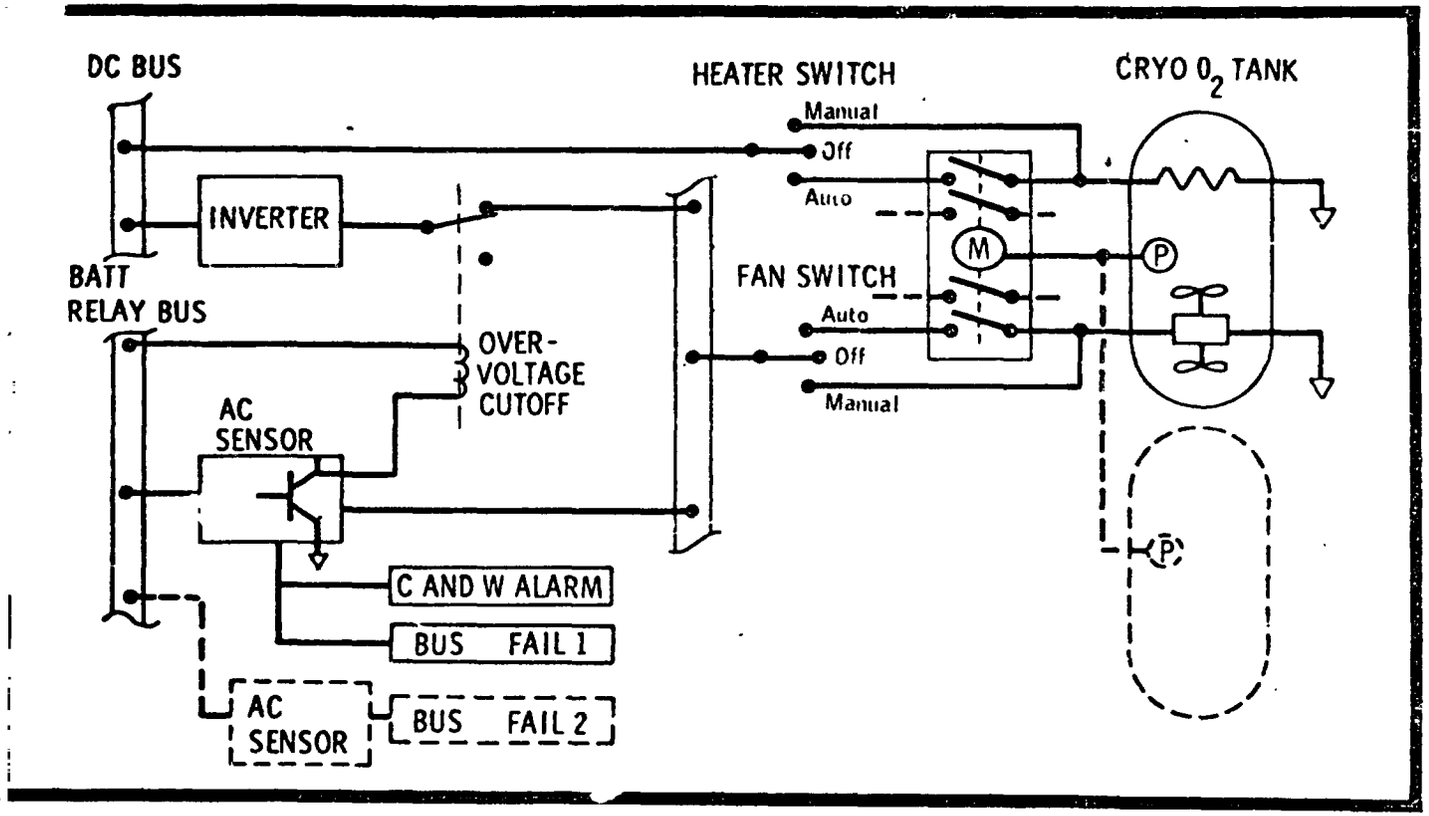

FIGURE 2.1-1 AC CIRCUIT FOR CRYO TANKS

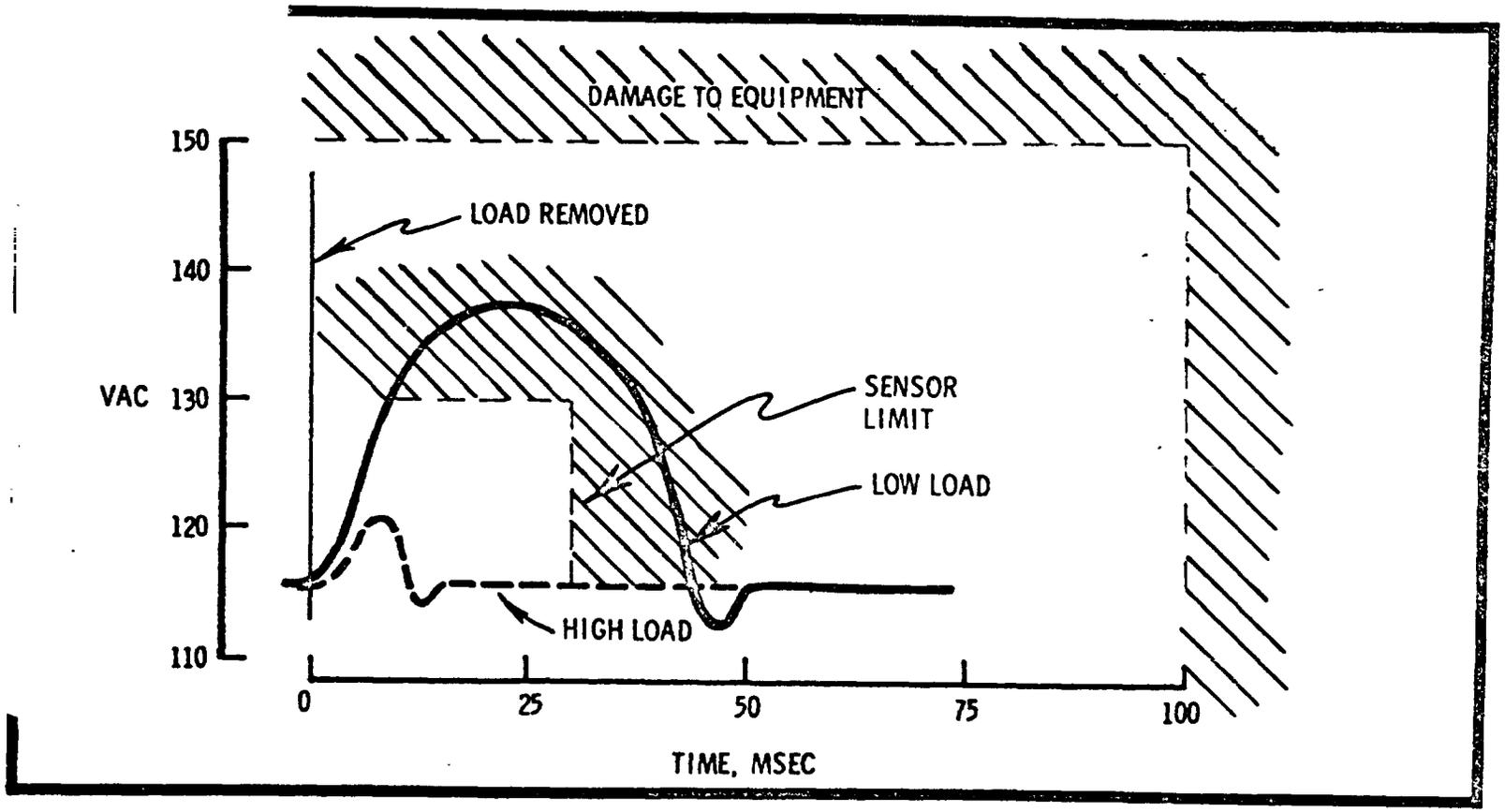

FIGURE 2.1-2 AC VOLTAGE CHARACTERISTICS FOR LOAD REMOVAL

ANOMALY REPORT

NO. 2.1.2 TITLE: LOW CHARGE RATE ON BATTERIES A AND B

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: ELECTRIC POWER SYSTEM EVENT TIME: ORBIT

PROBLEM: THE INFLIGHT CHARGES ON ENTRY BATTERIES A AND B RETURNED 50 TO 75 PERCENT LESS ENERGY TO THE BATTERIES THAN EXPECTED. THE RESISTANCE OF THE SPACECRAFT CHARGING CIRCUIT GREATLY AFFECTS THE ENERGY RETURNED TO THE BATTERIES, IN THAT THE CHARGING POTENTIAL IS REDUCED BY THE LINE LOSSES IN THE CIRCUIT. THIS RESISTANCE WAS DETERMINED ANALYTICALLY ON APOLLO 7. PREFLIGHT TESTS ON THE BATTERY CHARGING CIRCUITS WERE CONDUCTED ON A FUNCTIONAL BASIS, AND AN INTEGRATION TO DETERMINE ENERGY RETURNED WAS NOT ACCOMPLISHED.

ACTION: PREFLIGHT, INFLIGHT, AND POSTFLIGHT TESTS ON THE SPACECRAFT AND GROUND TESTS DURING THE MISSION, ALL CONDUCTED USING THE ACTUAL SPACECRAFT CIRCUIT RESISTANCES, SHOWED THE SAME CHARACTERISTICS AND RESULTED IN A LOW ENERGY RETURN TO THE BATTERY. ON FUTURE SPACECRAFT, INDIVIDUAL CHARGER CHARACTERISTICS WITH THE ASSOCIATED LINE DROP WILL BE CHECKED FOR SATISFACTORY BATTERY CHARGING.

ORGANIZATION: 5-2490

REFERENCES:
MSC 3 DAY REPORT P-5
SPACECRAFT SUBSYSTEMS REVIEW MTG. 10-29-68
MSC 15-DAY REPORT P 6-7
ANOMALY STATUS REPORT, 11-19-68 P-8
MSC ANOMALY REPORT, NOV. 68 P-7
MSC 60 DAY REPORT, 12-68 P11-8

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

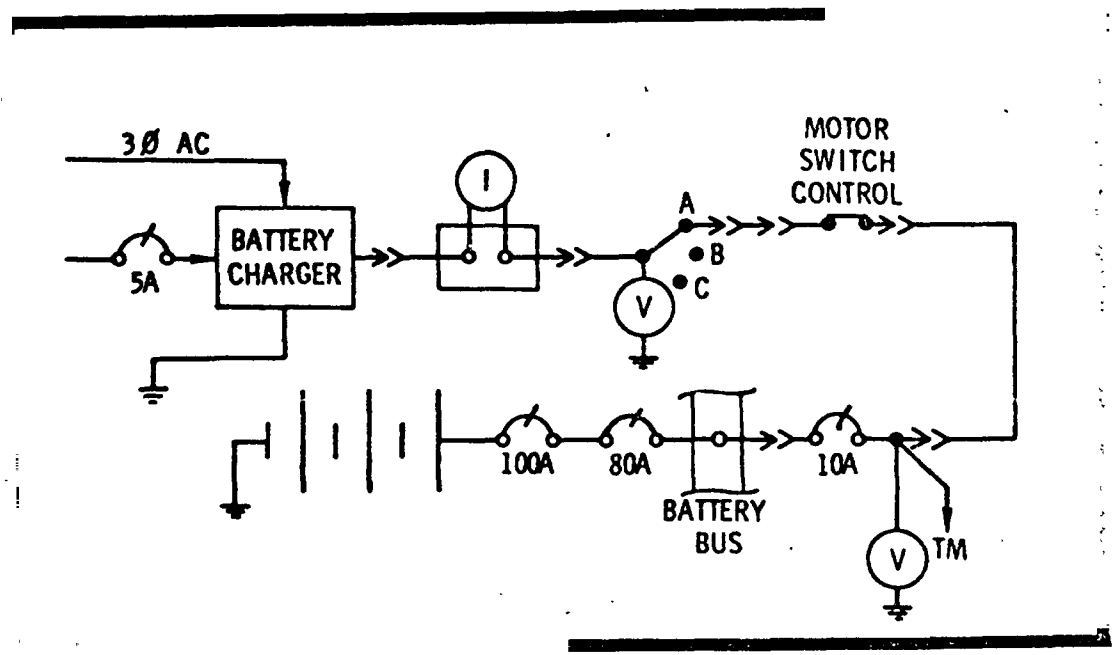

FIGURE 2.1-3 BATTERY CHARGING CIRCUIT

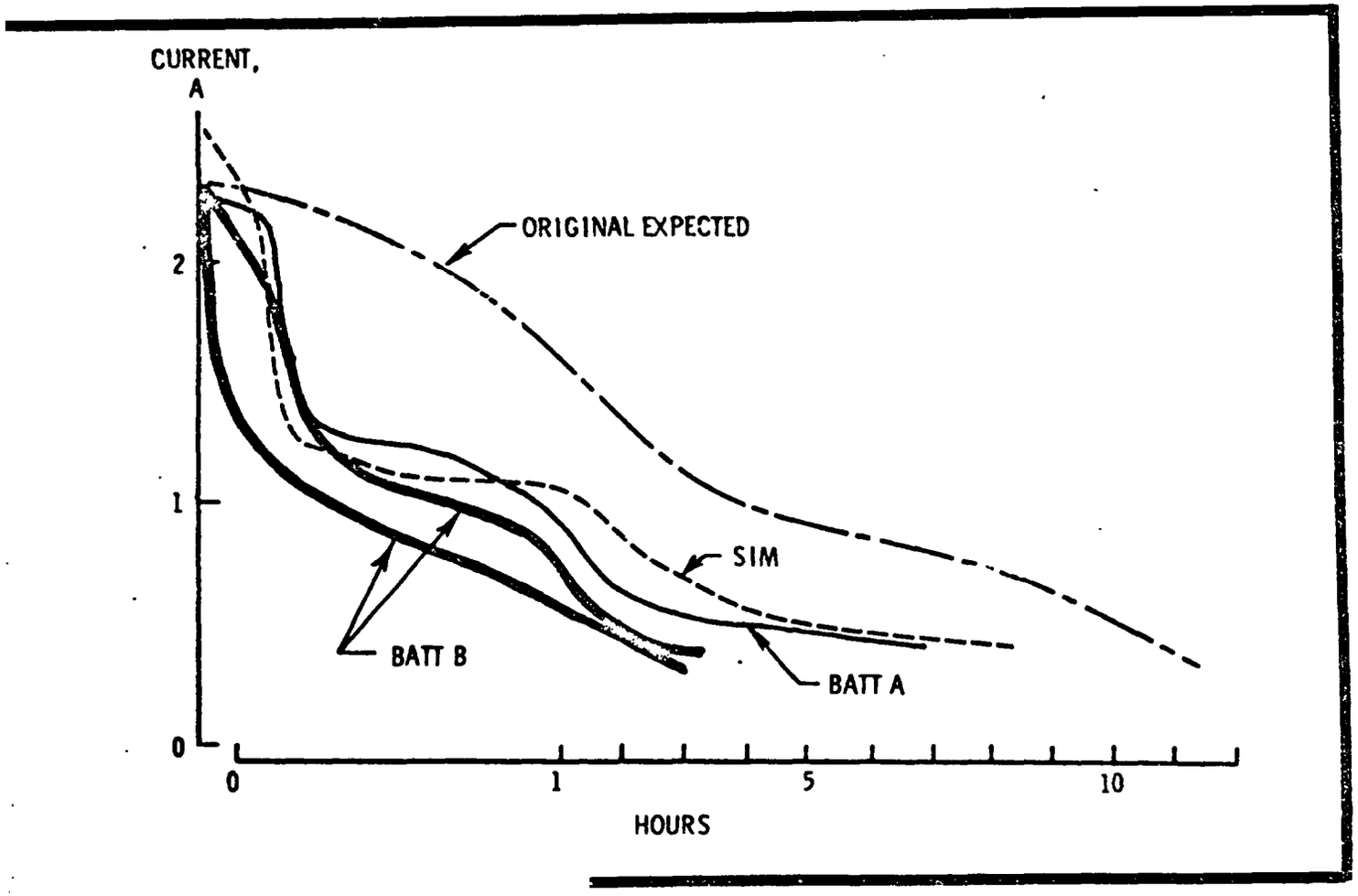

FIGURE 2.1-4 BATTERY CHARGER CHARACTERISTICS

ANOMALY REPORT

NO. 2.1.3 TITLE: UNDERVOLTAGE INDICATION ON DC BUSES A AND B

SYSTEM: COMMAND MODULE MISSION: APOLLO 7

SUBSYSTEM: ELECTRICAL EVENT TIME: CM/SM SEPARATION

PROBLEM: AT CM/SM SEPARATION THE MAIN DC BUS VOLTAGE FELL BELOW THE UNDERVOLTAGE ALARM LEVEL (25 VOLTS) AND THEN ROSE SLOWLY GOING ABOVE THE ALARM LEVEL (26.2V) IN ABOUT 5 MINUTES AND TO 27.0 VOLTS IN 20 MINUTES. THIS LOW VOLTAGE CONDITION RESULTED FROM THE MID RANGE STATE OF CHARGE, LOW TEMPERATURE AND THE DISPLACEMENT OF ELETROLYTE FROM CONTACT WITH THE PLATES BECAUSE OF THE ZERO-G ENVIRONMENT.

ACTION: FOR APOLLO 8, THE BATTERIES WERE TO BE WARMED PRIOR TO COMMAND MODULE/SERVICE MODULE SEPARATION BY PLACING THEM ON THE MAIN BUSES AND/OR BY SWITCHING INVERTER 3 ON THE AC BUS IN PLACE OF INVERTER 1 TO PROVIDE RADIANT HEATING. FUEL CELL 2 WAS REMOVED FROM THE BUSES PRIOR TO SEPARATION TO LESSEN THE TRANSIENT LOAD. FOR SUBSEQUENT MISSIONS, THE BATTERY SEPARATOR MATERIAL WILL BE CHANGED TO ABSORPTIVE CELLOPHANE MATERIAL TO REDUCE THE EFFECTS OF ZERO-G.

ORGANIZATION: 5-2490

REFERENCES: SPACECRAFT SUBSYSTEMS REVIEW MTG. 10-29-68
MSC 15-DAY REPORT P7
ANOMALY STATUS REPORT 11-19-68 P-8
MSC ANOMALY REPORT, NOV. 1968 P-7
MSC 60 DAY REPORT 12-68 P 11-8

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

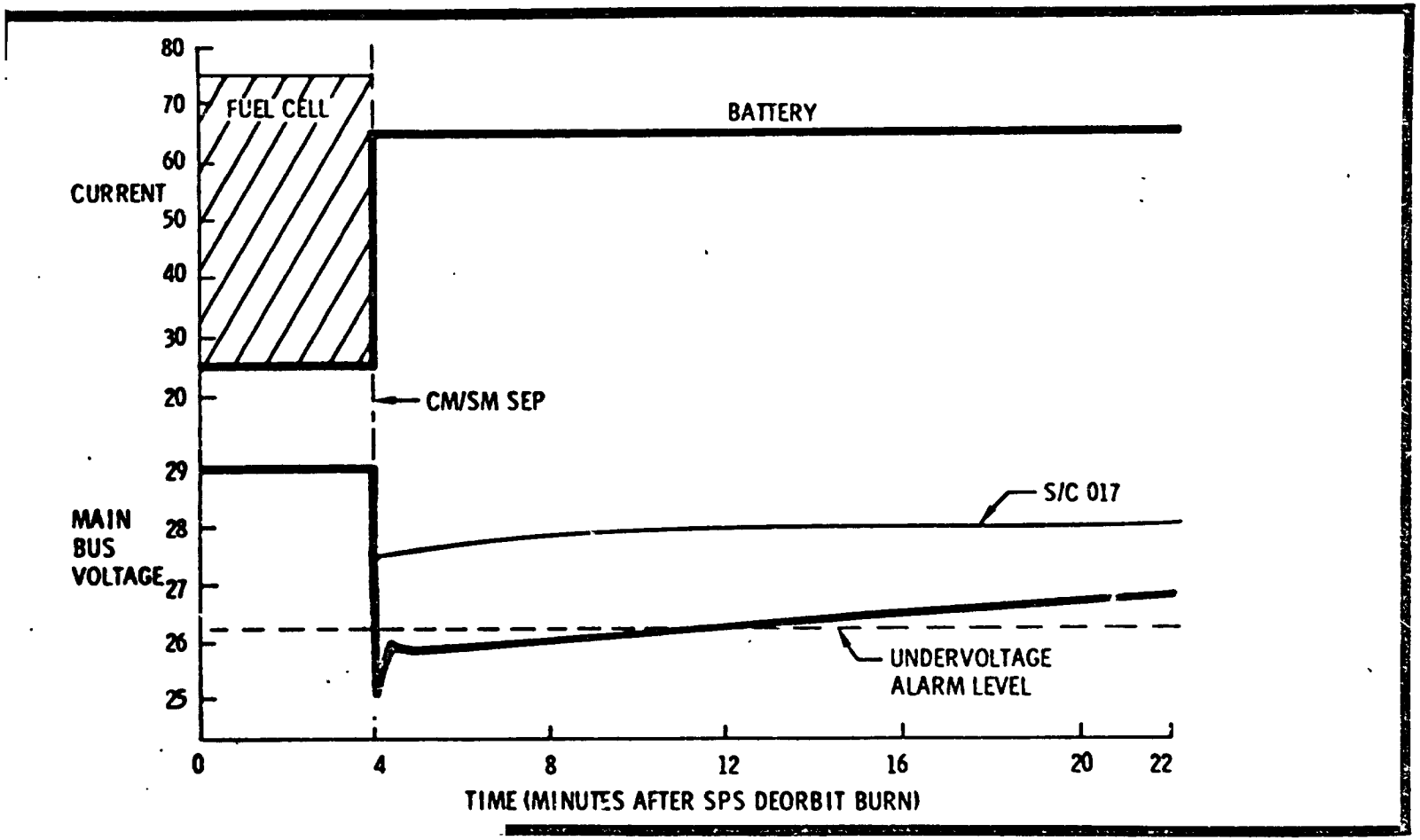

FIGURE 2.1-5 MAIN BUS UNDERVOLTAGE

ANOMALY REPORT

NO. 2.1.4 TITLE: ELECTROMAGNETIC INTERFERENCE PROBLEMS

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: ELECTRIC, ELECTRONIC AND TIMING EVENT TIME: ORBIT

PROBLEM: VARIOUS PROBLEMS DURING THE MISSION APPEAR TO BE THE RESULT OF ELECTROMAGNETIC INTERFERENCE;

1. THE MISSION EVENT TIME STARTED INADVERTENTLY, COINCIDENT WITH AN OXYGEN FAN CYCLE.
2. WHEN THE INTERIOR LIGHTS WERE BRIGHTENED AFTER BEING DIMMED TO CHECK THE VISIBILITY OF THE EXTERIOR LIGHTS, A COMPUTER PROGRAM ALARM EXISTED.
3. CENTRAL TIMING INDICATED THAT A RESET HAD OCCURRED AT 11:25:17 GET.

ACTION: NO CHANGES ARE EXPECTED TO BE MADE ON APOLLO 8. ANALYSIS OF EMI PROBLEMS ASSOCIATED WITH THE APOLLO 7 MISSION IS CONTINUING. NO CONCLUSIONS OR CORRECTIVE ACTION CAN BE DETERMINED AT THIS TIME. THESE CONDITIONS ARE A NUISANCE FOR THE CREW BUT DO NOT DEGRADE SYSTEM PERFORMANCE.

ORGANIZATION: 5-2490

REFERENCES: MSC 3-DAY REPORT, P-8
MSC 15-DAY REPORT, P-11
APOLLO 8 FRR MTG., 11-12-68
ANOMALY STATUS REPORT, 11-19-68
MSC ANOMALY REPORT, NOV. 68, P-12
MSC 60 DAY REPORT, 12-68, P11-14

RESOLUTION: CLOSED

DATE: 1-30-69

REV:

ANOMALY REPORT

NO. 2.1.5 TITLE: BATTERY MANIFOLD LEAK

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: BATTERY MANIFOLD EVENT TIME: ORBIT

PROBLEM: THE ENTRY BATTERY MANIFOLD PRESSURE INCREASED TO CABIN PRESSURE OF 5 PSIA, INDICATING A LEAK FROM THE CABIN INTO THE BATTERY MANIFOLD. THE LEAK RATE DURING POSTFLIGHT TESTS WAS WITHIN SPECIFICATION (B-NUT FITTINGS TO THE BATTERY CASES WERE NOT INCLUDED SINCE THE BATTERIES HAD BEEN INADVERTENTLY REMOVED.) SIMILAR LEAKAGE WAS NOTED ON SPACECRAFT 2TV-1 AND WAS CAUSED BY UNDERTORQUED B-NUTS (BELOW SPECIFICATION VALVE).

ACTION: ON FUTURE SPACECRAFT, THE B-NUTS WILL BE TORQUED TO THE SPECIFICATION VALUES. NO HARDWARE CHANGE IS REQUIRED SINCE THE CREW HAS MANUAL CONTROL OF THE MANIFOLD OVERBOARD VENT.

ORGANIZATION: 5-2490

REFERENCES: MSC ANOMALY AND FAILURE LISTING REPORT
MSC ANOMALY STATUS REPORT 9/19/68
MSC 60 DAY REPORT, 12-68, P11-12

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.6 TITLE: BIOMEDICAL INSTRUMENTATION

SYSTEM: BIO-MED MISSION: APOLLO 7

SUBSYSTEM: ASTRONAUT HARNESS EVENT TIME. 16:23 GET

PROBLEM: TWO DISCREPANCIES WERE ENCOUNTERED WITH THE BIOMEDICAL INSTRUMENTATION EQUIPMENT. FIRST, A WIRE WAS BROKEN AT THE CONNECTOR TO THE EKG SIGNAL CONDITIONER ON EACH OF TWO HARNESSES. IN ADDITION, THE PIN CONNECTORS TO THE SENSORS PERIODICALLY BECAME DISCONNECTED. SECOND, THE DC-DC CONVERTER USED TO SUPPLY POWER TO THE BIOMEDICAL SIGNAL CONDITIONER ON THE SUIT HARNESS, WAS REPORTED TO BE PHYSICALLY HOT.

POSTFLIGHT INSPECTION REVEALED BROKEN SENSOR WIRES AND A GREEN FOREIGN SUBSTANCE IN THE ELECTRICAL CONNECTIONS ON EACH END OF THE CONTROL HEAD OF THE BIOMEDICAL/ COMMUNICATIONS CABLING. DC-DC CONVERTER NORMAL OPERATION APPROXIMATELY 108°F WITH LOCAL HOT SPOTS OF 116°F.

ACTION: CORRECTIVE ACTIONS TAKEN TO MINIMIZE WIRE BREAKAGE INVOLVE

(1) REPLACEMENT OF TEFLON WIRE WITH THE MORE FLEXIBLE POLYVINYL CHLORIDE WIRE.
(2) REPLACEMENT OF HARD POTTING WITH SOFT POTTING MATERIAL.
(3) DELETION OF IN-LINE CONNECTORS.

COMPONENT, SYSTEM AND COMMAND MODULE LEVEL TESTING HAVE BEEN COMPLETED AND NO MALFUNCTIONS WERE FOUND.
TESTS OF THE GREEN SUBSTANCE ATTRIBUTE IT TO CORROSION FROM SEA WATER.
THE APOLLO 8 CREW HAVE PARTICIPATED IN DEMONSTRATIONS WITH DC-DC CONVERTER TEMPERATURES OF 120° AND 135°F. CREW WILL INSPECT ELECTRICAL CONNECTORS FOR CLEANLINESS PRIOR TO MATING. THE UNIT WILL BE REMOVED, AS ON APOLLO 7, IF TEMPERATURES BECOME UNBEARABLE.

ORGANIZATION: 5-2490

REFERENCES:
MSC 3 DAY REPORT P-10
SPACECRAFT SUBSYSTEM REVIEW MTG. 10-29-68
MSC 15-DAY REPORT P14
ANOMALY STATUS REPORT, 11-29-68 P-2-3
MSC ANOMALY REPORT, NOV. 68 P-1
MSC 60 DAY REPORT, 12-68 P-11-2

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

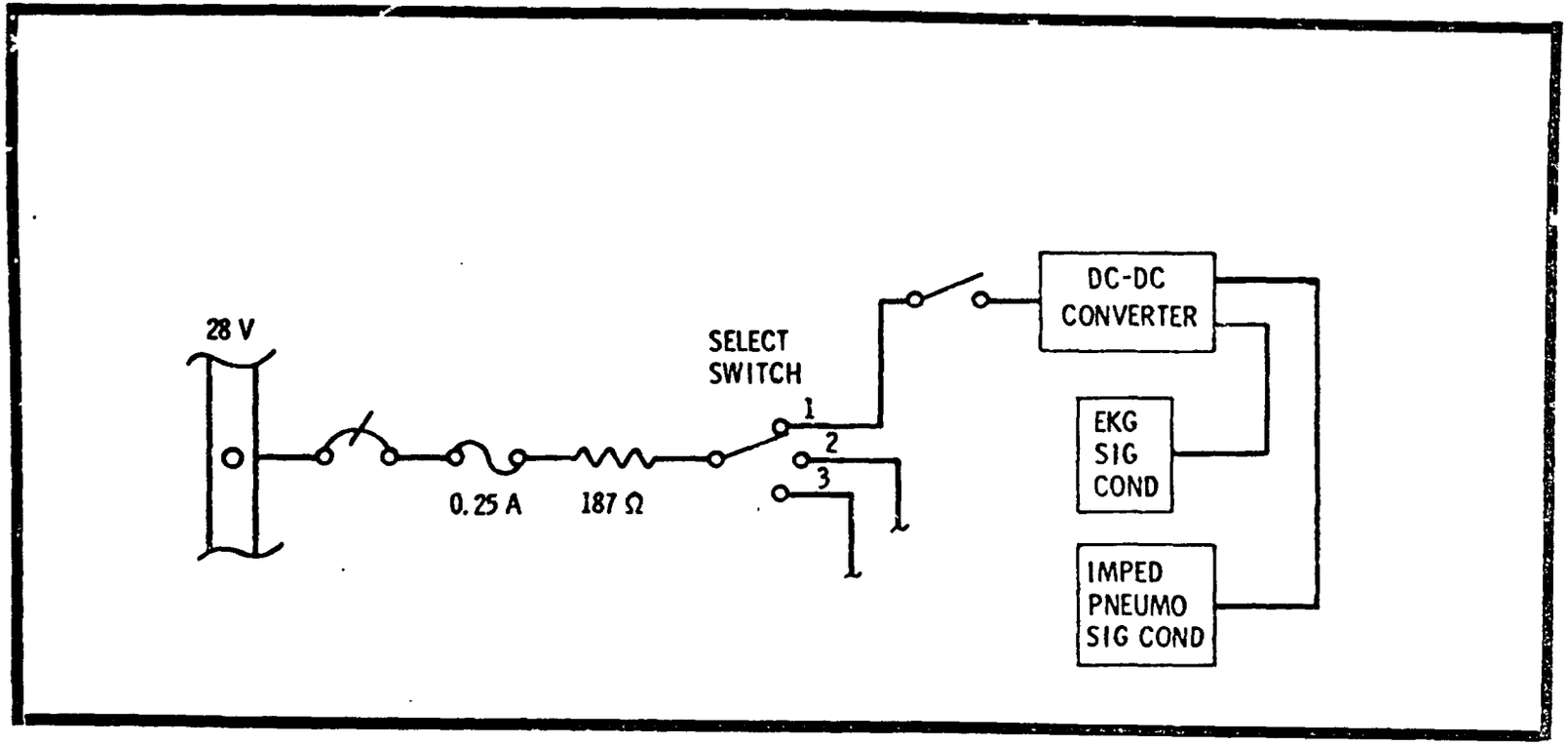

FIGURE 2.1-6 BIOMEDICAL INSTRUMENTATION

ANOMALY REPORT

NO. 2.1.7 TITLE: FUEL CELL EXIT TEMPERATURE INCREASE

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: ELECTRICAL POWER SYSTEM EVENT TIME: 164:50

PROBLEM: PRIOR TO THE FIFTH SERVICE PROPULSION MANEUVER, THE CONDENSER EXIT TEMPERATURE OF FUEL CELL 2 INCREASED TO 180°F (NOMINAL IS 155° TO 165°F). THE ELECTRICAL LOAD WAS REMOVED FROM THE FUEL CELL FOR APPROXIMATELY 54 MINUTES TO PERMIT COOLING PRIOR TO THE SERVICE PROPULSION MANEUVER. DURING THIS PERIOD, THE FUEL CELL 1 CONDENSER EXIT TEMPERATURE INCREASED TO 175°F; HOWEVER, THE TEMPERATURE RETURNED TO THE NORMAL OPERATING LEVEL AFTER FUEL CELL 2 WAS RETURNED TO THE BUS. FUEL CELL 1 OPERATED SATISFACTORILY FOR THE REMAINDER OF THE MISSION.

FOUR DAYS LATER, THE ELECTRICAL LOAD WAS AGAIN REMOVED FROM FUEL CELL 2 FOR A SHORT PERIOD OF TIME TO INSURE PROPER PERFORMANCE DURING THE DEORBIT MANEUVER. AFTER THE FIFTH SERVICE PROPULSION MANEUVER, EVERY TIME THE FUEL CELL LOADS WERE INCREASED, THE FUEL CELL 2 EXIT TEMPERATURE INCREASED TO A LEVEL BETWEEN 180° and 190°F.

FLIGHT DATA INDICATE THAT THE ABNORMAL OPERATION WAS CAUSED BY MALFUNCTIONS IN THE RESPECTIVE SECONDARY BYPASS VALVES. AFTER THE FLIGHT, SIMILAR ERRATIC OPERATION OF THE SHUTTLE VALVE WERE DEMONSTRATED WITH CONTAMINANTS INTENTIONALLY INTRODUCED INTO THE SYSTEM.

ACTION: ON APOLLO 8, THE RADIATOR HALF OF THE COOLING SYSTEM WAS DRAINED, FLUSHED, AND RESERVICED AS A PRECAUTIONARY MEASURE. ADDITIONALLY, STUDIES ARE BEING MADE CONCERNING THE NECESSITY OF ADDING A FILTER UPSTREAM OF THE BYPASS VALVE OR MODIFYING THE SYSTEM SUCH THAT THE VALVE IS AFFORDED BETTER PROTECTION. THE OUTCOME OF THE STUDY WILL DETERMINE WHAT CAN BE DONE PRACTICALLY TO ALLEVIATE THE CONTAMINATION PROBLEM ON SUBSEQUENT SPACECRAFT.

ORGANIZATION: 5-2490

REFERENCES:
MSC 3 DAY REPORT P4
MSC 15-DAY REPORT P6
ANOMALY STATUS REPORT, 12-17-68, P7
MSC ANOMALY REPORT, NOV. 68, P-8
MSC 60 DAY REPORT 12-68, P11-9

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

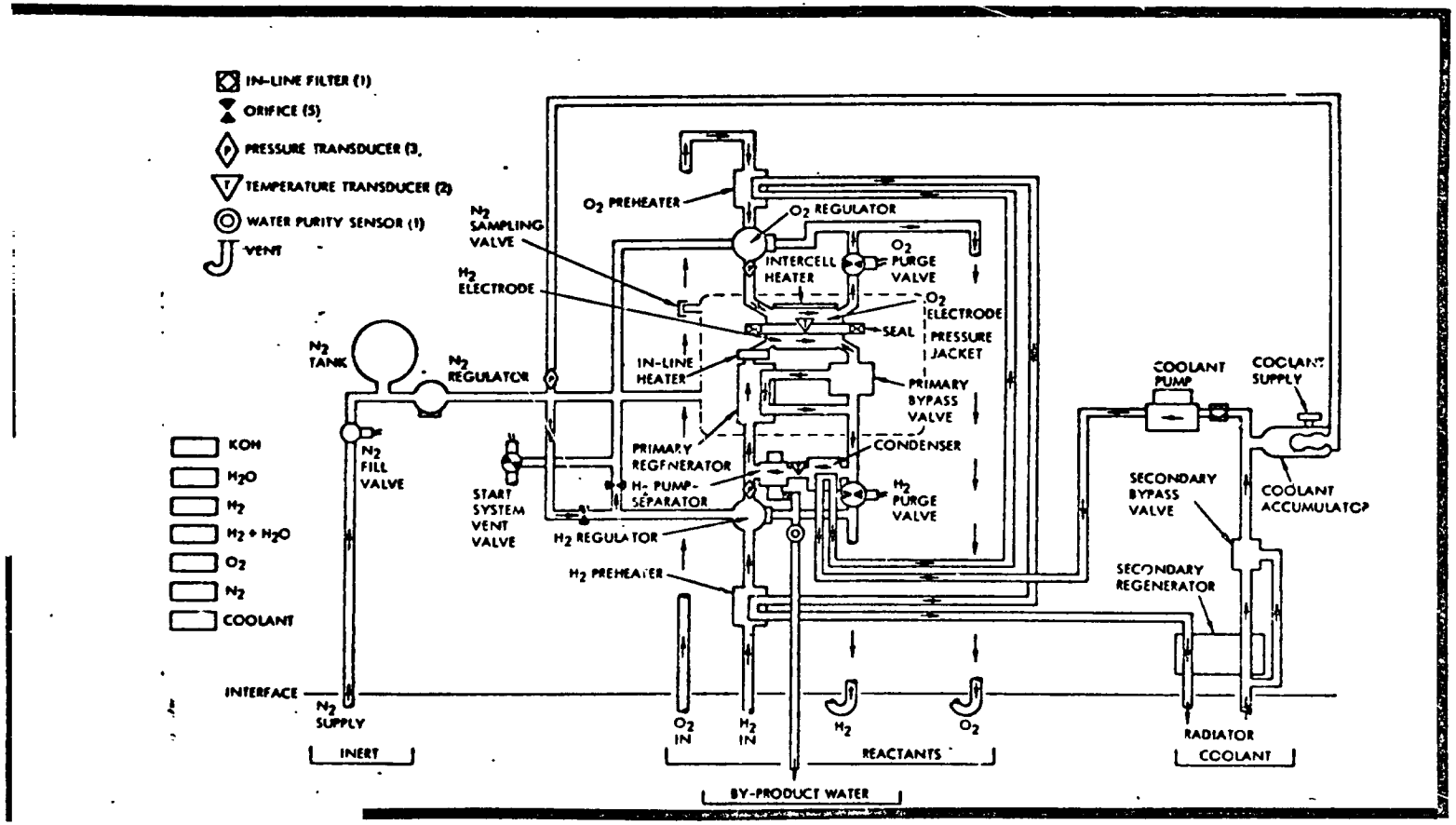

FIGURE 2.1-7 APOLLO FUEL CELL POWERPLANT MODEL PC3A-2 FLOW SCHEMATIC

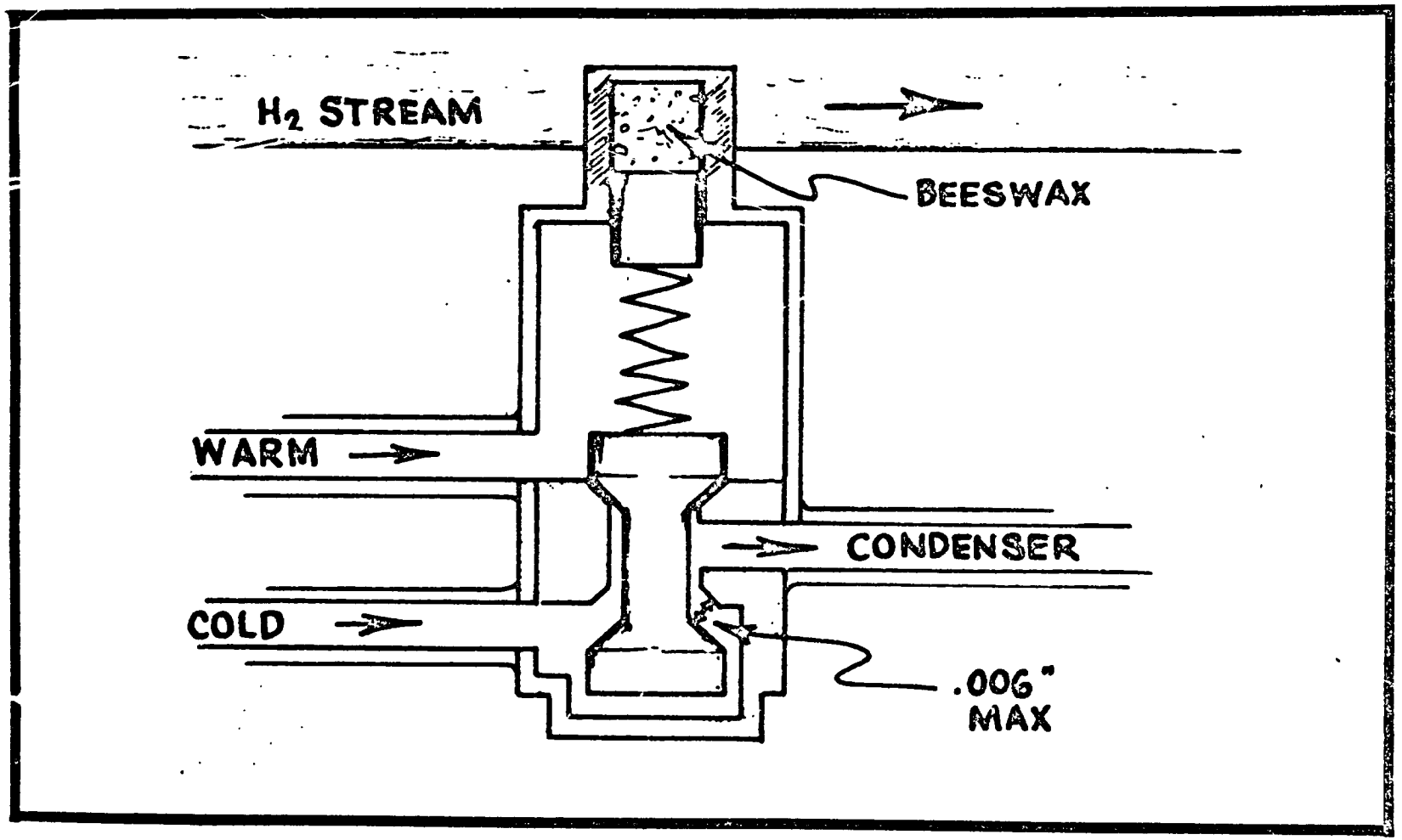

FIGURE 2.1-8 BYPASS VALVE

ANOMALY REPORT

NO. 2.1.8 TITLE: ERRATIC OPERATION OF WATER EVAPORATOR

SYSTEM: ENVIRONMENTAL CONTROL SYSTEM MISSION: APOLLO 7

SUBSYSTEM: WATER BOILER EVENT TIME: 11:30 GET

PROBLEM: UNDER THE LOW, VARIABLE HEAT LOADS WHICH EXISTED, THE PRIMARY EVAPORATOR OPERATED ERRATICALLY IN THE AUTOMATIC MODE, CAUSING WHAT APPEARED TO BE WICK DRYING AND SUBSEQUENT FLASH FREEZING. THE EVAPORATOR WAS FREQUENTLY SERVICED WITH WATER IN AN ATTEMPT TO KEEP IT OPERATING UNDER THESE CONDITIONS, BUT IS WAS SUBSEQUENTLY TURNED OFF.

THE AUTOMATIC CONTROL THERMODYNAMICS ARE SUCH THAT THIS SITUATION CAN BE EXPECTED, AS WAS DEMONSTRATED WITH A SIMILAR EXAPORATOR OPERATING UNDER SIMULATED FLIGHT CONDITIONS.

ACTION: POSTFLIGHT TESTS WITH THE FLIGHT EVAPORATOR VERIFIED THE CHARACTERISTICS OBSERVED IN FLIGHT. REMOVAL OF SOME OF THE SPONGE MATERIAL IN THE AREA OF THE SENSORS WHICH CONTROL OPERATION OF THE EVAPORATOR PREVENTED DRYOUT UNDER THE LOW, CYCLIC HEAT LOADS. THIS MODIFICATION HAS ALREADY BEEN EMPLOYED ON THE EVAPORATORS FOR COMMAND MODULE 106 AND SUBSEQUENT. IN EFFECT, THE REMOVAL OF THE SPONGE MATERIAL FROM THE TEMPERATURE SENSORS LOCATED IN THE BOILER WICKS INCREASES THE RESPONSE OF THE SENSORS TO THE CONDITIONS IN THE WICK BY ELIMINATING THE INFLUENCE OF THE WET SPONGE. UNDER HIGHER HEAT LOADS, WHEN THE EVAPORATOR IS ACTUALLY REQUIRED, THE SYSTEM DID NOT DRY OUT IN THE POSTFLIGHT TEST.

ORGANIZATION: 5-2490

REFERENCES:
MSC 3 DAY REPORT, P9
MSC 15-DAY REPORT, P13
APOLLO 8 FRR MTG., NOVEMBER 12, 1968
ANOMALY STATUS REPORT 11-19-68, P-9
MSC ANOMALY STATUS REPORT, NOV. 68, P-9
MSC 60 DAY REPORT, 12-68, P11-11

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.9 TITLE: CONDENSATION OF WATER IN CABIN

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: ENVIRONMENTAL CONTROL EVENT TIME: THROUGHOUT MISSION

PROBLEM: MOISTURE CONDENSED ON APPROXIMATELY 200 INCHES OF COOLANT LINES WHICH WERE NOT THERMALLY INSULATED. THESE LINES RAN FROM THE RADIATOR TO THE ENVIRONMENTAL CONTROL UNIT AND FROM THE ENVIRONMENTAL CONTROL UNIT TO THE INERTIAL MEASUREMENT UNIT.

ACTION: THE CONDENSATION WAS ANTICIPATED, AND IT WAS DUMPED OVERBOARD BY THE CREW USING THE URINE TRANSFER HOSE AND CABIN ENRICHMENT PURGE ASSEMBLY. THE SAME CONDITION WAS EXPECTED TO OCCUR ON APOLLO 8. THE URINE TRANSFER HOSE IS ACCEPTABLE FOR REMOVING FREE WATER. ON SPACECRAFT 106 AND SUBSEQUENT, THE LINES ARE INSULATED AND THIS CONDITION SHOULD NOT OCCUR.

ORGANIZATION: 5-2490

REFERENCES: MSC 3 DAY REPORT, P9-10
SPACECRAFT SUBSYSTEM REVIEW MTG., 10-29-68
MSC 15-DAY REPORT, P13
ANOMALY STATUS REPORT, 11-19-68, P-10
MSC ANOMALY REPORT, NOV. 68, P-10
MSC 60 DAY REPORT, 12-68, P11-11

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.10 TITLE: WATER GUN TRIGGER

SYSTEM: CSM MISSION: APOLLO 7

SUBSYSTEM: WATER MANAGEMENT EVENT TIME: 165:31

PROBLEM: DURING THE LATER PART OF THE MISSION THE WATER GUN BECAME DIFFICULT TO OPERATE.

ACTION: POST FLIGHT TESTING HAS SHOWN THAT THE METERING O-RING INCREASED IN OUTSIDE DIAMETER. A NEW O-RING WAS INSTALLED AND TRIGGER ACTUATING FORCES RETURNED TO NORMAL. THE NEOPRENE O-RING IS NOT COMPATIBLE WITH CHLORINE AND TENDS TO SWELL.

NO EFFECT ON APOLLO 8. THE "O-RING" HAS BEEN REPLACED WITH ONE OF ETHYLENE PROPYLENE. THE O-RING MATERIAL WILL BE CHANGED ON ALL FUTURE MISSIONS. TESTS TO DATE INDICATE THE NEW O-RING MATERIAL IS COMPATIBLE WITH SODIUM HYPOCHLORATE. ACTIVATION FORCES WITH THE NEW O-RING ARE LESS THAN THOSE WITH THE NEOPRENE O-RING.

ORGANIZATION: 5-2490

REFERENCES:
MSC 3 DAY REPORT P-10
SPACECRAFT SUBSYSTEM REVIEW MTG 10-29-68
MSC 15-DAY REPORT P14
ANOMALY STATUS REPORT, 12-17-68, P-3
MSC ANOMALY REPORT, NOV. 68, P-2
MSC 60 DAY REPORT 12-68, P 11-2

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

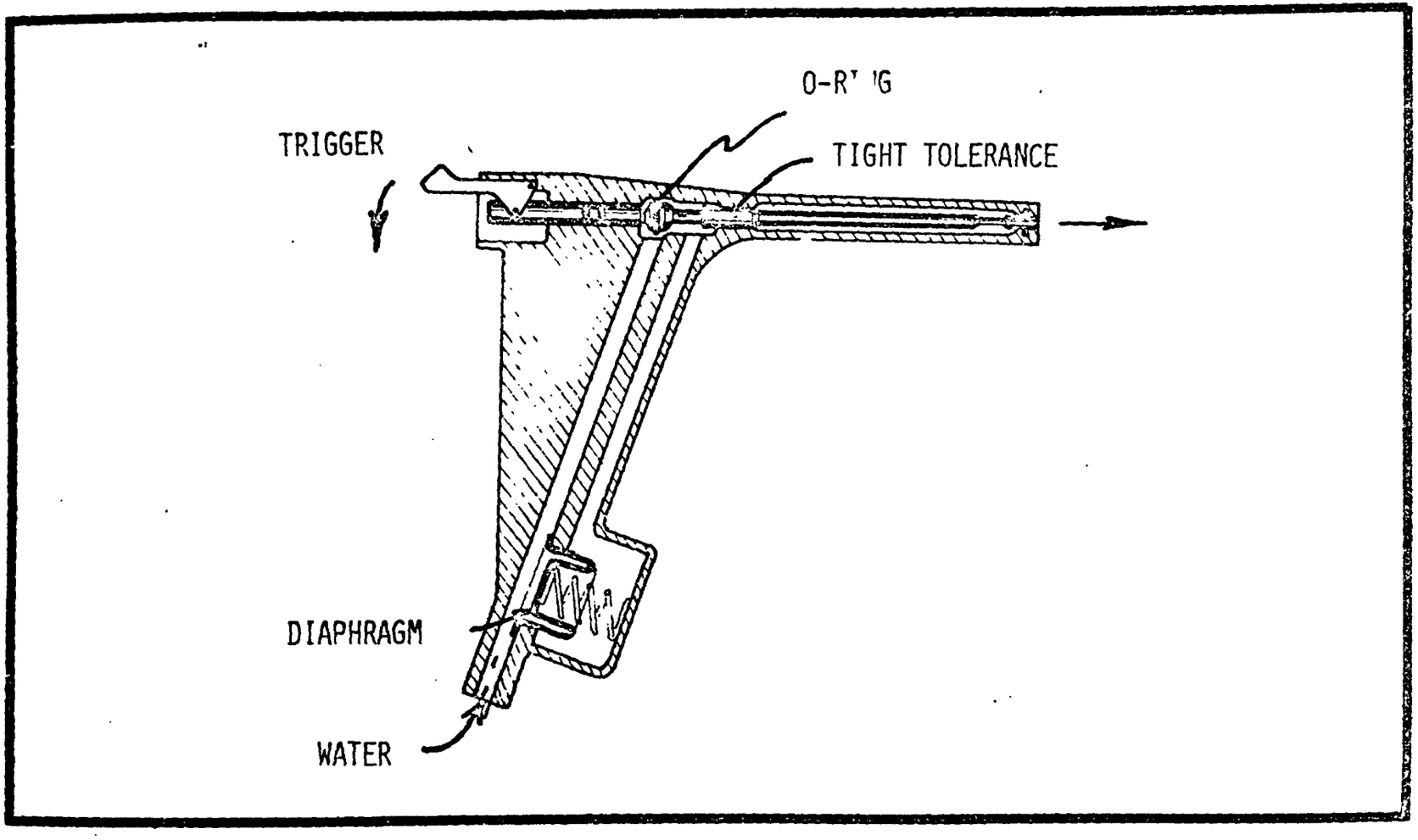

FIGURE 2.1-9 WATER GUN CUTAWAY

ANOMALY REPORT

NO. 2.1.11 TITLE: LEAK AT WASTE WATER SYSTEM FITTING

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: ENVIRONMENTAL CONTROL SYSTEM EVENT TIME: ORBIT

PROBLEM: A WATER LEAK WAS OBSERVED AT THE B-NUT CONNECTION TO THE QUICK DISCONNECT DURING OVERBOARD DUMPS. THE LEAK WAS THE RESULT OF A POOR METAL-ON-METAL SEAL AT THE B-NUT CONNECTION TO THE WATE WATER OVERBOARD QUICK DISCONNECT.

ACTION: THE DESIGN ON APOLLO 8 AND SUBSEQUENT HAS AN O-RING INSTEAD OF THE METAL-ON-METAL SEAL WHERE THE LEAK OCCURRED.

ORGANIZATION: 5-2490

REFERENCES:
MSC 3 DAY REPORT P-10
MSC 15-DAY REPORT P-13
APOLLO 8 FRR MTG., NOVEMBER 12, 1968
ANOMALY STATUS REPORT, 11-19-68, P-7
MSC ANOMALY REPORT, NOV. 68, P-6
MSC 60 DAY REPORT 12-68, P 11-7

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.12 TITLE: LOSS OF PHASE MODULATED SUBCARRIER (LOSS OF PM S-BAND)

SYSTEM: COMMUNICATIONS MISSION: APOLLO 7

SUBSYSTEM: PM S-BAND EVENT TIME: 65:00:00

PROBLEM: THE PCM AND VOICE SUBCARRIERS WERE LOST AT APPROXIMATELY 65:00:00 ON THE SECONDARY S-BAND TRANSPONDER. REAL-TIME TELEMETRY, DATA STORAGE EQUIPMENT PLAYBACK, AND TELEVISION WERE TIME-SHARED ON THE DOWNLINK S-BAND FM MODE UNTIL THE CREW MANUALLY SWITCHED TO THE ALTERNATE TRANSPONDER. DOWNVOICE WAS TRANSMITTED BY MODULATION OF THE PM CARRIER (BACKUP DOWNVOICE).

FAILURE CHARACTERISTICS WERE:

A. DROP IN GROUND-RECEIVED PM SIGNAL STRENGTH
B. LOSS OF PM SUBCARRIER
C. LOWER THAN EXPECTED TRANSPONDER-RECEIVED SIGNAL STRENGTH

ACTION: NO OTHER ABNORMALITIES WERE DETECTED. THE ONLY COMPONENTS WITHIN THE S-BAND SYSTEM WHICH COULD HAVE FAILED AND CAUSED ALL THESE SYMPTOMS ARE THE PANEL SWITCH FOR SELECTING THE PRIMARY OR SECONDARY TRANSPONDER AND THE WIRING WHICH CONTROLS THIS FUNCTION. THE SWITCH WAS X-RAYED AND FUNCTIONALLY TESTED POSTFLIGHT WITH NO ABNORMALITIES NOTED. THE TRANSPONDER WAS TESTED IN THE COMMAND MODULE AND ON THE BENCH, INCLUDING VIBRATION AND TEMPERATURE ACCEPTANCE TESTING, AND THE RESULTS WERE ALL NEGATIVE.

WHEN THE SELECTED SWITCH IS CHANGED FROM ONE TRANSPONDER TO THE OTHER, A MOMENTARY HESITATION IN THE OFF POSITION IS REQUIRED TO ALLOW LATCHING RELAYS TO RESET. SWITCHING WITHOUT THIS HESITATION CAN CAUSE BOTH TRANSPONDERS TO BE ON AND WILL CREATE ALL THE SYMPTOMS OF THE FAILURE.

NO FURTHER ACTION IS REQUIRED.

ORGANIZATION: 5-2490

REFERENCES:
MSC 15-DAY REPORT P8
APOLLO 8 FRR MTG., NOVEMBER 12, 1968
MSC ANOMALY REPORT, NOV. 68, P-1
ANOMALY STATUS REPORT, 12-17-68, P2
MSC 60 DAY REPORT, 12-68, P 11-1

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.13 TITLE: INTERRUPTION OF VHF VOICE COMMUNICATION

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: TELECOMMUNICATIONS EVENT TIME: 00:07

PROBLEM: ABOUT 7 MINUTES AFTER LIFT-OFF, VOICE COMMUNICATIONS BECAME GARBLED AND ERRATIC.

BOTH GRAND BAHAMA AND BERMUDA WERE PATCHED TO AIR-TO-GROUND 1 FROM 7 MINUTES TO ABOUT 8 MINUTES; THIS IS AN IMPROPER PROCEDURE. FROM 8 TO 10 MINUTES, VHF DOWNLINK WAS REMOTED TO THE MISSION CONTROL CENTER THROUGH BERMUDA ONLY, AND THE VOICE WAS STILL GARBLED. AT 10 MINUTES, S-BAND DOWNLINK VOICE WAS PATCHED TO NETWORK 1, AND QUALITY WAS GOOD. HOWEVER, UPLINK TRANSMISSIONS WHICH THE CREW EXPECTED ON VHF WERE NOT RECEIVED. FROM 12 TO 13 MINUTES, USNS VANGUARD WAS REMOTING VHF VOICE OT THE MISSION CONTROL CENTER AND THE TRANSMISSION WAS READABLE. AT 13 MINUTES, VANGUARD WAS REQUESTED TO REMOTE S-BAND, AND NO VOICE WAS RECEIVED. VOICE QUALITY WAS ALSO GARBLED AFTER HANDOVER TO CANARY ISLANDS. SIMPLEX-A WAS THEN SELECTED AT 19 MINUTES, AND THE QUALITY WAS SATISFACTORY. DUPLEX-B WAS SUCCESSFULLY REVERIFIED AT ABOUT 07:20:00.

ACTION: THESE PROBLEMS RESULT FROM IMPROPER PROCEDURES AND/OR MALFUNCTIONING RECEIVERS AT THE GROUND STATIONS. PATCHING OF VOICE TO THE MISSION CONTROL CENTER DURING APOLLO 7 WAS EFFECTED BY THE NETWORK SITES. TO PRECLUDE THE PROCEDURAL PROBLEMS ASSOCIATED WITH THIS TECHNIQUE, PATCHING OF THE VOICE TO THE MISSION CONTROL CENTER WILL BE ACCOMPLISHED AT A SINGLE POINT AT GODDARD SPACE FLIGHT CENTER DURING FUTURE APOLLO MISSIONS.

ORGANIZATION: 5-2490

REFERENCES:
MSC 3 DAY REPORT, P-6
MSC 15-DAY REPORT, P-8
APOLLO 8 FRR MTG., NOVEMBER 12, 1968
ANOMALY STATUS REPORT, 11-19-68, P-9
MSC ANOMALY REPORT, NOV. 68, P-9
MSC 60 DAY REPORT, 12-68, P11-10

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.14 TITLE: INADVERTENT PROPELLANT ISOLATION VALVE SWITCHING

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: RCS EVENT TIME: POSTFLIGHT

PROBLEM: DURING POSTFLIGHT TESTING OF THE RELIEF VALVES FOR THE COMMAND MODULE REACTION CONTROL SYSTEM, A HIGH AMOUNT OF LEAKAGE WAS OBSERVED THROUGH THE CLOSED PROPELLANT ISOLATION VALVES. WHEN VOLTAGE WAS REMOVED, THE OXIDIZER ISOLATION VALVE OPENED, AND THE POSITION INDICATOR SWITCH VERIFIED THE CHANGE. THE PROPELLANT ISOLATION VALVE IS SPRING-LOADED CLOSED WITH A BELLOWS PRELOAD AND SHOULD REMAIN CLOSED WHEN VOLTAGE IS REMOVED. IT IS SUSPECTED THAT THE BELLOWS WAS DAMAGED FROM HYDRAULIC HAMMERING DURING SYSTEM ACTIVATION, THUS CAUSING THE VALVE TO OPEN WHEN THE VOLTAGE WAS REMOVED. THE PROPELLANT ISOLATION VALVES WERE CLOSED AT SYSTEM ACTIVATION, A CONDITION FOR WHICH THE VALVES HAVE NOT BEEN QUALIFICATION TESTED.

ACTION: USE OF THE PROPER PROCEDURE - OPENING THE ISOLATION VALVES BEFORE ACTIVATION OF THE COMMAND MODULE REACTION CONTROL SYSTEM - WILL PRECLUDE RECURRENCE OF THE PROBLEM. THE CHECKLIST AND THE APOLLO OPERATIONS HANDBOOK HAVE BEEN CHANGED ACCORDINGLY, AND THE CREWS WILL ALSO BE INSTRUCTED.

ORGANIZATION: 5-2490

REFERENCES: MSC ANOMALY AND FAILURE LISTING REPORT, NOV 68
MSC ANOMALY STATUS REPORT, 12-17-68, P8
MSC 60 DAY REPORT, 12-68, P11-9

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.15 TITLE: WINDOW OBSTRUCTIONS TO VISION

SYSTEM: COMMAND MODULE

MISSION: APOLLO 7

SUBSYSTEM: WINDOWS

EVENT TIME: 47:49 HRS GET

PROBLEM: DURING FLIGHT, WINDOWS 1,3, AND 5 SHOWED SOME FOGGING OR FROSTING FROM AN OILY FILM AND/OR EXTERIOR DEPOSITS. A SMALL AMOUNT OF GRAY FILM FROM THE TOWER JETTISON MOTOR AND/OR THE SEPARATION BOLTS WAS DEPOSITED AT THE EDGES OF WINDOWS 2 AND 4 WITHOUT IMPAIRING VISIBILITY. AFTER LANDING, WHILE THE COMMAND MODULE WAS IN STABLE II POSITION, WINDOWS 1,3, AND 5 FILLED WITH WATER BETWEEN THE HEAT SHIELD AND PRESSURE VESSEL. SEA WATER REMOVED ANY EXTERIOR DEPOSITS SUCH AS THOSE RELATED TO URINE AND WASTE WATER DUMP. INSULATION FILLS OR PARTIALLY FILLS THE SPACE BETWEEN THE CREW COMPARTMENT HEAT SHIELD AND THE PRESSURE VESSEL. AROUND WINDOWS 2 AND 4, THE INSULATION IS PACKED RATHER TIGHTLY, ACCOUNTING FOR WINDOWS 2 AND 4 NOT FILLING WITH WATER. THE EDGES OF THE INSULATION AROUND EACH WINDOW OPENING ARE SEALED WITH TAPE AND RTV. THE INTERIOR ALUMINUM FRAME FOR EACH HEAT SHIELD WINDOW WAS TO HAVE BEEN COVERED WITH INSULATION MATERIAL BUT HAD PARTIALLY EXPOSED METAL.

ACTION: THE OILY FILM ON THE INSIDE OF THE HEAT SHIELD WINDOWS WAS A PRODUCT OF THE OUTGASSING OF THE RTV. A TRACE OF THE OILY FILM WAS FOUND ON WINDOWS 2 AND 4, A GREATER AMOUNT ON WINDOWS 1 AND 5, AND A CONSIDERABLE AMOUNT ON WINDOW 3.

THE ROOM-TEMPERATURE-CURED PARTS ARE TO BE REPLACED ON FUTURE SPACECRAFT BY PARTS WHICH HAVE BEEN PRE-CURED IN VACUUM AT ELEVATED TEMPERATURES (SIMILAR TO THE GEMINI MODIFICATION). THE CHANGE IS BEING VERIFIED BY GROUND TESTS AND WILL BE IMPLEMENTED ON COMMAND MODULE 104.

ORGANIZATION: 5-2490

REFERENCES: SPACECRAFT SUBSYSTEMS REVIEW MTG. 10-29-68
APOLLO 8 FRR MTG., NOVEMBER 12, 1968
ANOMALY STATUS REPORT 12-17-68, P-6
MSC ANOMALY REPORT, NOV. 68; P-4
MSC 60 DAY REPORT 12-68, P.11-64

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

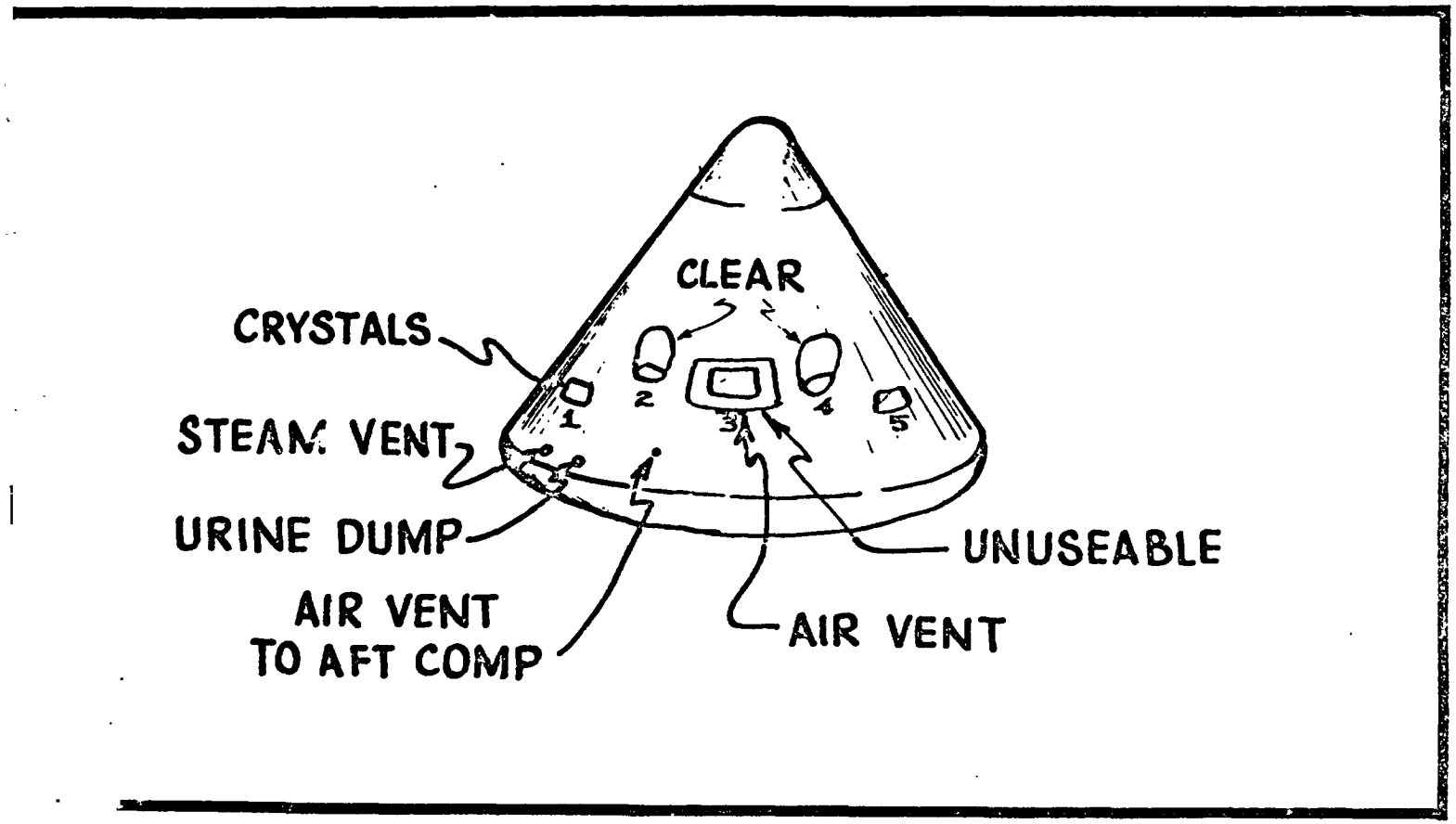

FIGURE 2.1-10 CM WINDOW ARRANGEMENT

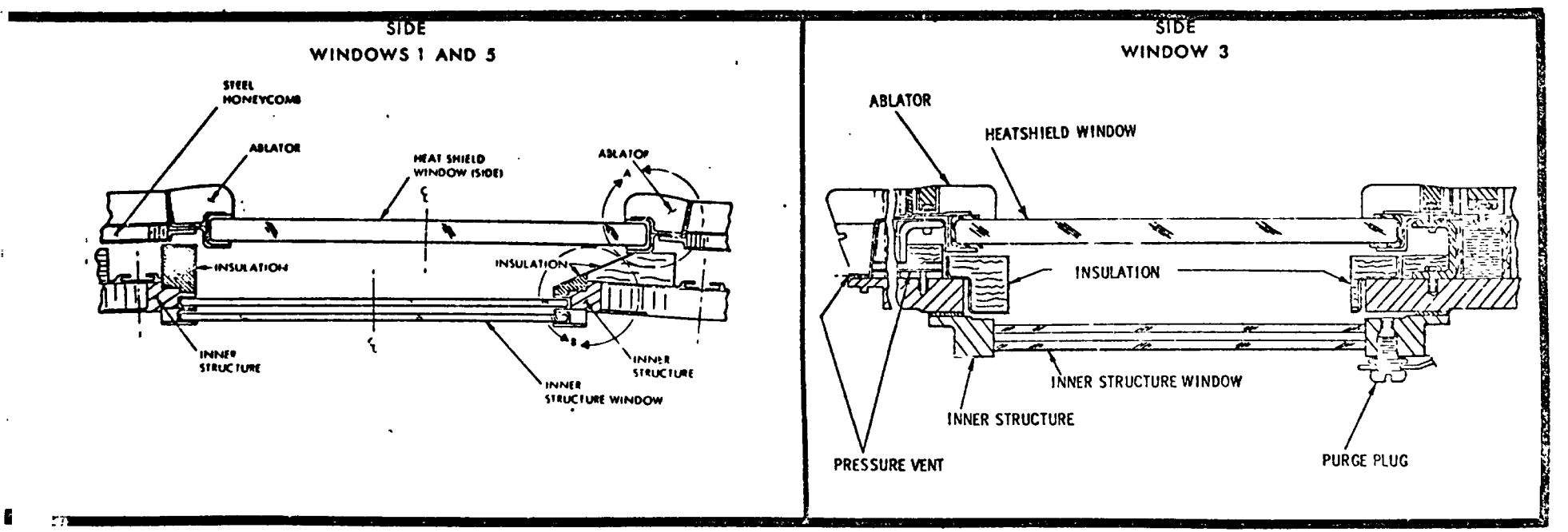

FIGURE 2.1-11 COMMAND MODULE WINDOW INSTALLATION

ANOMALY REPORT

NO. 2.1.16 TITLE: FOOD BAG FAILURES

SYSTEM: CSM MISSION: APOLLO 7

SUBSYSTEM: EVENT TIME: ORBIT

PROBLEM: THERE HAVE BEEN SEVERAL FOOD BAG FAILURES DURING THE MISSION. A SEAM ON THREE FOOD BAGS SPLIT, AND THE CREW REPORTED SOME OF THE FOOD CRUMBLED BADLY.

ACTION: BAGS WILL BE INSPECTED FOR DEFECTS AND THE MENU WILL BE CHANGED PRIOR TO APOLLO 8.

ORGANIZATION: 5-2490

REFERENCES: SPACECRAFT SUBSYSTEM REVIEW MTG 10-29-68
MSC ANOMALY STATUS REPORT, 11-19-68
MSC ANOMALY AND FAILURE LISTING REPORT, NOV. 68
MSC 60 DAY REPORT, 12-68, P11-11

RESOLUTION: CLOSED

DATE 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.17 TITLE: MOMENTARY FAILURE OF ROTATIONAL HAND CONTROLLER

SYSTEM: CONTROL MISSION: APOLLO 7

SUBSYSTEM: HAND CONTROLLER EVENT TIME: 82:10

PROBLEM: ROTATION HAND CONTROLLER NO. 2 FAILED TO GENERATE THE SECOND OF A SERIES OF MINUS PITCH, MINIMUM IMPULSE COMMANDS. THE MINUS PITCH REACTION CONTROL ENGINES FIRED WITH NO HAND CONTROLLER MOVEMENT WHEN THE CONTROL MODE WAS SUBSEQUENTLY SWITCHED TO ACCELERATION COMMAND. AFTER SEVERAL HOURS, THE CONTROLLER WAS CHECKED AND OPERATED PROPERLY, AND IT CONTINUED TO PERFORM CORRECTLY FOR THE REMAINDER OF THE MISSION. THE SYMPTOMS REPORTED WOULD OCCUR IF A HAND CONTROLLER BREAKOUT SWITCH TEMPORARILY FAILED TO OPEN WHEN THE CONTROLLER WAS RETURNED WITHIN THE DETENT.

THE CONDITION HAS NOT BEEN REPRODUCED POSTFLIGHT. THE CONTROLLER HAS BEEN SUCCESSFULLY SUBJECTED TO ACCEPTANCE TEMPERATURE AND VIBRATION TESTS AND TO VISUAL AND MECHANICAL CHECKS AT SUCCESSIVE STAGES OF DISASSEMBLY. THE MICROSWITCH HAS BEEN OPENED, AND NO EVIDENCE OF CONTAMINATION OR OTHER ABNORMALITY WAS FOUND.

ACTION: ROTATION HAND CONTROLLERS OF THIS DESIGN HAVE EXHIBITED A TENDENCY FOR STICKY CAM OPERATION IN THE PAST. THIS CONDITION COULD HAVE CAUSED THE REPORTED SYMPTOMS. THE CONTROLLERS ON SPACECRAFT 103 AND SUBSEQUENT ARE OF A MORE RECENT DESIGN; AMONG OTHER THINGS, THE LATER DESIGN CONTAINS AN IMPROVEMENT THAT WILL REDUCE THE LIKELIHOOD OF A BREAKOUT SWITCH PROBLEM. TWO HAND CONTROLLERS ARE CARRIED ONBOARD, AND SUFFICIENT REDUNDANCY AND SWITCHING FLEXIBILITY IS AVAILABLE TO PREVENT LOSS OF SYSTEM CAPABILITY FOR A SINGLE FAILURE OF THIS TYPE. NO FURTHER ACTION IS REQUIRED.

ORGANIZATION: 5-2490

REFERENCES:
MSC 3-DAY REPORT P8
APOLLO 8 FRR MTG., NOVEMBER 12, 1968
MSC ANOMALY STATUS REPORT, 12-17-68, P4
MSC ANOMALY AND FAILURE LISTING REPORT, NOV. 68
MSC 60 DAY REPORT 12-68, P 11-3

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.18 TITLE: SHIFT OF FLIGHT DIRECTOR ATTITUDE INDICATOR

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: FDIA EVENT TIME: ORBIT APPROX 172 HRS

PROBLEM: THE TOTAL ATTITUDE DISPLAYED ON FLIGHT DIRECTOR ATTITUDE INDICATOR NO. 1 CHANGED APPROXIMATELY 160 DEGREES IN THE PITCH AXIS WHEN THE ATTITUDE SOURCE WAS SWITCHED FROM THE GUIDANCE AND NAVIGATION SYSTEM TO THE STABILIZATION AND CONTROL SYSTEM. THE FIRST SHIFT WAS NOTED BY THE CREW APPROXIMATELY 1 MINUTE AFTER SWITCHING. ON SUBSEQUENT SWITCHING ATTEMPTS, THE SHIFT WAS IMMEDIATE. OPERATION WAS NOMINAL IN THE NORMAL ATTITUDE DISPLAY CONFIGURATION (GUIDANCE AND NAVIGATION SYSTEM ATTITUDE ON INDICATOR NO. 1 AND STABILIZATION AND CONTROL SYSTEM ATTITUDE ON INDICATOR NO. 2).

DURING GROUND TESTS ON ANOTHER SYSTEM, THE CONDITION WAS REPRODUCED BY INHIBITING THE TRANSFER OF ONE OF A PAIR OF SWITCHING RELAYS WHICH SELECT THE SINE AND COSINE RESOLVER OUTPUTS FROM THE RESPECTIVE ATTITUDE SOURCES.

ACTION: THE MALFUNCTION COULD NOT BE REPRODUCED WITH THE FLIGHT HARDWARE IN THE SPACECRAFT OR AT THE SUBSYSTEM AND COMPENT LEVEL. THE ELECTRONIC DISPLAY ASSEMBLY, WHICH CONTAINS THE RELAYS, WAS SUBJECTED TO ACCEPTANCE TEMPERATURE AND VIBRATION TESTS, WITH NOMINAL RESULTS. THE MODULE CONTAINING THE RELAY WAS THEN REMOVED, AND A LIFE CYCLE TEST WAS SUCCESSFULLY PERFORMED ON THE RELAY. FINALLY, THE RELAY WAS OPENED AND VISUALLY INSPECTED. A TIN/SILVER SOLDER BALL WAS FOUND, AND IT WAS LARGE ENOUGH TO HAVE CAUSED THE CONDITION NOTED, EXCEPT THE 1-MINUTE DELAY REPORTED BY THE CREW.

THE RELAY IS OF A TYPE WHICH WAS THE SUBJECT OF AN EXTENSIVE SWITCHING LOGIC ANALYSIS IN 1967. ONE OF THE FAILURE MODES OF CONCERN AT THAT TIME WAS A FAILURE OF THE RELAY TO TRANSFER. AS A RESULT OF THIS AND OTHER FAILURES, ALL RELAYS INVOLVED IN CRITICAL SWITCHING FUNCTIONS WERE MADE REDUNDANT. NO FURTHER ACTION IS REQUIRED.

ORGANIZATION: 5-2490

REFERENCES:
MSC 3 DAY REPORT P-8
MSC 15-DAY REPORT P11
MSC ANOMALY AND FAILURE LISTING REPORT, NOV. 68
MSC ANOMALY STATUS REPORT, 12-17-68, P3
MSC 60 DAY REPORT, 12-68, P11-3

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.19 TITLE: ABNORMAL OPERATION OF ENTRY MONITOR

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: ENTRY SYSTEM EVENT TIME: PRE-LAUNCH & ORBIT

PROBLEM: BOTH THE DELTA V AND THE RANGE COUNTER CIRCUITS IN THE ENTRY MONITOR SYSTEM MALFUNCTIONED PRIOR TO LIFT-OFF; NO OTHER PROBLEMS WITH THE SYSTEM WERE ENCOUNTERED DURING THE MISSION. THE FIRST PREFLIGHT FAILURE INVOLVED THE RANGE COUNTER PERFORMANCE DURING A SELF-TEST. THE SYSTEM REPEATEDLY FAILED THIS TEST, BOTH PREFLIGHT AND INFLIGHT. DESPITE THIS CONDITION, THE UNIT WAS ACCEPTED FOR FLIGHT BECAUSE OF ITS LACK OF INFLUENCE ON CREW SAFETY OR MISSION SUCCESS.

A DELTA V COUNTER MALFUNCTION, TOTALLY INDEPENDENT OF THE RANGE COUNTER FAILURE, WAS NOTED JUST PRIOR TO LIFT-OFF, DURING THE PRELAUNCH SETUP OF THE DELTA V COUNTER. A "NINE" APPEARED IN THE MOST SIGNIFICANT DIGIT OF THE COUNTER WHEN THE CREW SWITCHED THE FUNCTION SELECTOR TO THE DELTA V SET POSITION. THE SETUP WAS NORMAL DURING A REPEAT OF THE PROCEDURE; THEREFORE, NO ALARM WAS ISSUED. THE MALFUNCTION OCCURRED SEVERAL TIMES IN FLIGHT, IN ALL BUT ONE INSTANCE COINCIDENT WITH A SWITCHING OPERATION.

ACTION: THE MALFUNCTION HAS BEEN REPEATED TWICE POSTFLIGHT BY APPLYING PRESSURE TO AN INTERNAL WIRE CRIMP CONNECTION. THE APPLIED PRESSURE APPARENTLY CLEARED THE POOR CONNECTION BECAUSE SUBSEQUENT ATTEMPTS TO CAUSE THE PROBLEM HAVE FAILED. A LABORATORY ANALYSIS OF THE CRIMP HAS ALSO BEEN INCONCLUSIVE, POSSIBLY BECAUSE THE CONDITION WAS CORRECTED BY THE APPLIED PRESSURE.

THE FAILURES ENCOUNTERED APPEAR TO BE QUALITY PROBLEMS AND HAVE NOT GENERALLY BEEN EXPERIENCED ON OTHER UNITS. IN ADDITION, ALL UNITS HAVE NOW BEEN SUBJECTED TO MORE EXTENSIVE ACCEPTANCE TESTING INCLUDING THERMAL CYCLING. THEREFORE, UNLESS A MATERIAL OR MANUFACTURING DEFICIENCY IS DISCOVERED, NO FURTHER ACTION IS REQUIRED.

ORGANIZATION: 5-2490

REFERENCES: SPACECRAFT SUBSYSTEMS REVIEW MTG, 10-29-68
MSC 15-DAY REPORT, P11
MSC ANOMALY AND FAILURE LISTING REPORT, NOV. 68
MSC ANOMALY STATUS REPORT, 12-17-68, P4
MSC 60 DAY REPORT, 12-68, P11-4

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.20 TITLE: FAILURE OF FLIGHT QUALIFICATION COMMUTATOR

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: INSTRUMENTATION EVENT TIME: CM/SM SEPARATION

PROBLEM: THE HIGH-LEVEL COMMUTATOR IN THE COMMAND MODULE FAILED APPROXIMATELY 5 MINUTES AFTER IT WAS TURNED ON PRIOR TO COMMAND MODULE/SERVICE MODULE SEPARATION. APPROXIMATELY 15 MINUTES OF ENTRY DATA ARE NOT RECOVERABLE. THE COMMUTATOR EXHIBITED A LOSS OF TIME-SEQUENCING AND WAS CYCLING THROUGH ONLY EIGHTEEN OF THE NINETY CHANNELS OF DATA.

ACTION: THE HIGH-LEVEL COMMUTATOR IS NOT USED ON ANY FUTURE COMMAND AND SERVICE MODULES; HOWEVER, IT WILL BE USED ON LUNAR MODULE 3. THE UNIT PERFORMED SATISFACTORILY DURING POSTFLIGHT TESTING ON THE COMMAND MODULE. NO ACTION REQUIRED FOR APOLLO 8. VIBRATION, TEMPERATURE AND VACUUM TESTS WERE PERFORMED WITH NO ANOMALOUS OPERATION OF THE COMMUTATOR. ALL ADDITIONAL TESTING TO DATE HAS NOT DUPLICATED THE FLIGHT ANOMALY OR CAUSE ABNORMAL OPERATION. THIS TESTING HAD INCLUDED ABNORMAL VOLTAGE, VIBRATION, ACCELERATION, TEMPERATURE, CORONA, VACUUM (7 DAYS AT 100,000 TO 300,000 FEET) AND ELECTROMAGNETIC INTERFERENCE ACCEPTANCE TESTS. THIS INSTRUMENTATION IS NOT MONITORED DURING THE FLIGHT AND, THEREFORE, ONLY AFFECTS POSTFLIGHT ANALYSIS IF A FAILURE SHOULD OCCUR.

ORGANIZATION: 5-2490

REFERENCES:
MSC 15-DAY REPORT P9
SPACECRAFT SUBSYSTEMS REVIEW MTG 10-29-68
APOLLO 8 FRR MTG., NOVEMBER 12, 1968
ANOMALY STATUS REPORT, 12-17-68, P6
MSC 60 DAY REPORT, 12-68, P 11-6
ANOMALY STATUS REPORT, 1-28-69, P3

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.21 TITLE: CRACKED GLASS ON MISSION EVENT TIMER

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: CONTROLS AND DISPLAYS EVENT TIME: ORBIT

PROBLEM: THE GLASS ON BOTH MISSION EVENT TIMERS CRACKED SOMETIME DURING THE MISSION. THE CRACKED GLASS DID NOT AFFECT THE OPERATION OF THE TIMERS ON APOLLO 7. FOR APOLLO 8, TRANSPARENT TAPE WAS PLACED OVER THE GLASS.

ACTION: HAIRLINE CRACKS WERE FOUND IN AREAS WHERE THE CERAMIC BOND BETWEEN THE GLASS AND FRAME WAS NOT SUFFICIENT TO PRECLUDE GLASS-TO-METAL CONTACT. THE CRACKS WERE THE RESULT OF FACE GLASS MISALIGNMENT AND THERMAL EXPANSION DURING THE FABRICATION PROCESS.

TIMERS THAT ARE INSTALLED IN SPACECRAFT WILL BE COVERED WITH TRANSPARENT TAPE. VENDOR PROCEDURES HAVE BEEN CHANGED TO INSURE PROPER ALIGNMENT AND SUFFICIENT BONDING MATERIAL. ADDITIONALLY, THE GLASS EDGES WILL BE ROUNDED TO A FULL RADIUS.

ORGANIZATION: 5-2490

REFERENCES:
MSC ANOMALY AND FAILURE LISTING REPORT, NOV. 68
MSC ANOMALY STATUS REPORT, 12-17-68, P9
MSC 60 DAY REPORT, 12-68, P11-12
MSC ANOMALY STATUS REPORT, 1-28-69, P4

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.22 TITLE: SLA PANEL DEPLOYMENT MALFUNCTION

SYSTEM: SLA MISSION: APOLLO 7

SUBSYSTEM: DEPLOYMENT SYSTEM EVENT TIME: 2:50 GET

PROBLEM: PHOTOGRAPHS TAKEN DURING THE SECOND REVOLUTION SHOWED THAT THREE OF THE ADAPTER PANELS WERE OPENED TO ABOUT 45 DEGREES, BUT THE REMAINING PANEL (+Y) WAS OPEN ONLY ABOUT 25 DEGREES. PHOTOGRAPHS TAKEN DURING REVOLUTION 19 SHOWED ALL FOUR PANELS OPEN AT THE NORMAL ANGLE OF ABOUT 45 DEGREES. STILL PHOTOGRAPHS TAKEN DURING THE SECOND REVOLUTION SHOW THAT THE TWO ATTENUATOR CABLES ATTACHED TO THE LOWER CORNERS OF THE PANELS WERE SLACK ON THE PANEL WHICH WAS NOT FULLY DEPLOYED, INDICATING THE PANEL HAS GONE TO THE FULL-OPEN POSITION AND RETURNED TO THE OBSERVED PORITION. THE OUTSIDE RETENTION CABLE, DESIGNED TO PREVENT PANEL REBOUND AFTER OPENING, IS VISIBLE ON THREE PANELS BUT NOT ON THE +Y PANEL IN THE PHOTOGRAPH FROM REVOLUTION 2; HOWEVER, THE CABLE ON THE +Y PANEL IS VISIBLE IN THE REVOLUTION 19 PHOTOGRAPHS.

ACTION: THE ROLL RATE OF ABOUT 7 DEG/SEC DURING THE 19TH REVOLUTION WAS NOT SUFFICIENT TO COMPRESS THE HONEYCOMB IN THE ATTENUATORS (A ROLL RATE OF ABOUT 120 DEG/SEC WOULD BE REQUIRED). THEREFORE, AS INDICATED BY THE SLACK ATTENUATOR CABLES IN THE FIRST PHOTOGRAPHS, THE PANEL DID FULLY DEPLOY INITIALLY BUT THEN REBOUNDED BECAUSE THE RETENTION CABLE WAS CAUGHT IN THE CHANNEL. THE ROLL RATE WAS, HOWEVER, SUFFICIENT TO MOVE THE PANEL TO THE FULL OPEN POSITION. WHEN THE RETENTION CABLE LATER RELEASED, PRIOR TO REVOLUTION 19, THE SLACK WAS PROPERLY REELED IN, AND THE PANEL WAS THEN RETAINED OPEN.

ALL FOUR PANELS ARE TO BE JETTISONED ON FUTURE MISSIONS AND DO NOT HAVE THE RETENTION CABLE WHICH CAUSED THE PROBLEM. NO HARDWARE CHANGES ARE REQUIRED.

ORGANIZATION: 5-2490

REFERENCES: MSC 24 HR REPORT. P3
SPACECRAFT SUBSYSTEMS REVIEW MTG, 10-29-68
MSC ANOMALY STATUS REPORT, 11-19-68
MSC ANOMALY AND FAILURE LISTING REPORT, NOV. 68
MSC 60 DAY REPORT, 12-68, P11-5

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

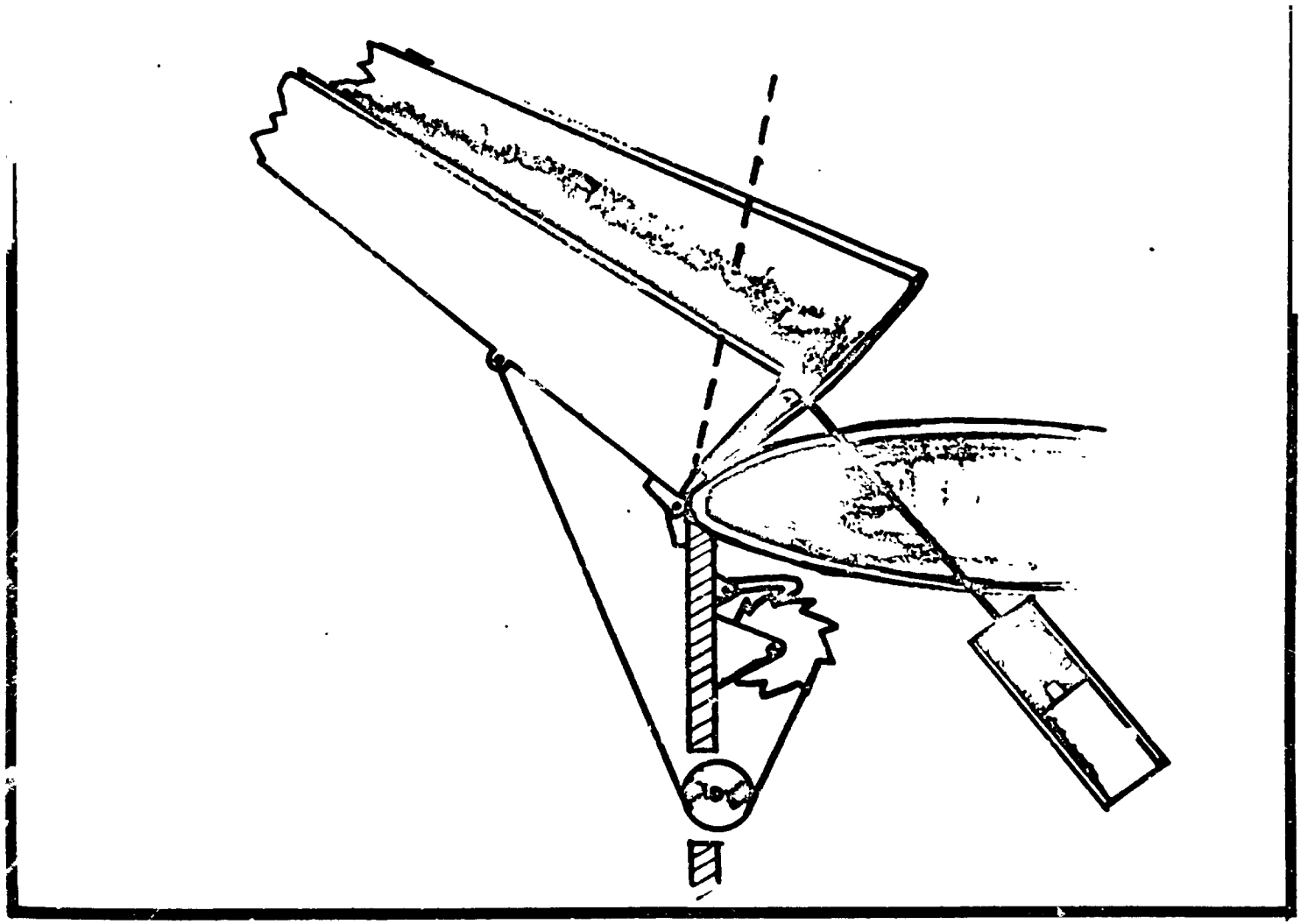

FIGURE 2.1-12 SLA PANEL EXTENDED

ANOMALY REPORT

NO. 2.1.23 TITLE: WATER IN DOCKING TUNNEL

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: DOCKING TUNNEL EVENT TIME: POSTFLIGHT

PROBLEM: APPROXIMATELY 290 POUNDS OF WATER WAS FOUND IN THE DOCKING TUNNEL. POSTFLIGHT TESTS SHOW THAT THE UPPER HATCH VENT VALVE LEAKAGE RATE WITH THE HATCH IN THE STABLE I POSITION WAS BETWEEN 0.5 AND 3.0 GALLONS PER MINUTE. THE LEAKAGE RATE WITH THE HATCH ROTATED 100 DEGREES FROM THE STABLE I POSITION WAS 120 cc/MIN. CHEMICAL ANALYSES OF THE WATER DID NOT PROVIDE CONCLUSIVE EVIDENCE AS TO THE TYPE OF WATER, ALTHOUGH ALL ANALYSES DID INDICATE A HIGH CONTENT OF SEA WATER.

ACTION: IT SHOULD BE NOTED THAT ALL OF THE STRUCTURE AND SEALS WERE IN SATISFACTORY CONDITION TO PREVENT ANY LEAKAGE OTHER THAN THROUGH THE MAKESHIFT BALL CHECK VALVE WHICH WAS INSTALLED IN THE TOP HATCH. THE NORMAL VALVE WHICH CONTROLS PRESSURE IN THE TUNNEL HAD BEEN RENDERED INOPERATIVE. NO OTHER SPACECRAFT HAS THIS PECULIARITY.

ORGANIZATION: 5-2490

REFERENCES: MSC ANOMALY AND FAILURE LISTING REPORT, NOV. 68
MSC ANOMALY STATUS REPORT, 11-29-68, P8
MSC 60 DAY REPORT, 12-68, P11-13

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.2A TITLE: APPARENT FREE WATER IN SUIT SUPPLY HOSE

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: ENVIRONMENTAL CONTROL SYSTEM EVENT TIME: ORBIT

PROBLEM: THE CREW REPORTED HEARING A GURGLING SOUND, WHICH INDICATED FREE WATER IN THE SUIT SUPPLY HOSE. AT LEAST TWO AUTOMATIC CYCLIC ACCUMULATOR CYCLES WERE MISSED BECAUSE THE SWITCH WAS IN THE MANUAL POSITION. THE PROBLEM WAS NOT SEVERE ENOUGH TO CAUSE ANY DISCOMFORT TO THE CREW OR HAZARD TO THE MISSION.

ACTION: POSTFLIGHT TESTS OF THE SEPARATOR HAVE SHOWN THE FLOW RATE TO VARY FROM 0.2 TO 15 LB/HR. THE CAUSE OF THIS ERRATIC FLOW RATE IS UNKNOWN AT THIS TIME AND IS BEING STUDIED.

DURING THE MISSION, THE CYCLIC ACCUMULATOR WAS FREQUENTLY IN THE MANUAL RATHER THAN THE AUTOMATIC MODE. IMPROPER CYCLING IN THE MANUAL MODE WOULD CAUSE EXCESS WATER IN THE SYSTEM.

ON FUTURE FLIGHTS, THE PROCEDURE WILL BE TO OPERATE ACCUMULATORS IN THE AUTOMATIC MODE, AND THE MANUAL MODE WILL BE USED ONLY IF THE AUTOMATIC SYSTEM FAILS.

ORGANIZATION: 5-2490

REFERENCES: MSC 3-DAY REPORT, P10
MSC 15-DAY REPORT, P13
APOLLO 8 FRR MTG, NOVEMBER 12, 1968
MSC ANOMALY REPORT, NOV. 1968, P12
ANOMALY STATUS REPORT, 11-29-68, P5
MSC 60-DAY REPORT, 12-68, P11-13

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.25 TITLE: FAILED FLOODLIGHTS

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: DISPLAYS AND CONTROLS EVENT TIME: ORBIT

PROBLEM: SOMETIME DURING THE MISSION, BOTH OF THE PRIMARY LAMPS FAILED IN THE LOWER EQUIPMENT BAY FLOODLIGHTS. POSTFLIGHT INVESTIGATIONS REVEALED THAT THE LAMP FILAMENTS (CATHODES) HAD COMPLETELY VAPORIZED, WHICH CAUSED A DIODE TO SHORT IN EACH LAMP DRIVER.

A NEW LAMP HAS A START-UP VOLTAGE OF ABOUT 500 VOLTS. AS THE LAMP AGES, THE CATHODE DETERIORATES, THUS INCREASING THE START-UP VOLTAGE, WHICH CAN GO AS HIGH AS 1800 VOLTS. THE DIODE IS RATED AS 700 VOLTS; THEREFORE, IT WOULD BURN OUT. THE RATE OF CATHODE DETERIORATION IS DEPENDENT ON THE OPERATING VOLTAGE. MAXIMUM DETERIORATION RATE OCCURS WHEN THE DIMMING RHEOSTAT IS HALFWAY BETWEEN THE FULL-DIM AND FULL-BRIGHT POSITIONS.

ACTION: TESTS ARE IN PROGRESS TO ESTABLISH LAMP LIFE AT THE CRITICAL OPERATING VOLTAGE. NORMALLY, THESE LAMPS SHOULD OPERATE 2000 HOURS.

PROCEDURAL CHANGES ARE BEING MADE TO USE ONLY THE SECONDARY LAMP ON FULL BRIGHT DURING GROUND TESTS, AND CONSIDERATION IS BEING GIVEN TO INSTALLING FLIGHT LAMPS JUST PRIOR TO THE COUNTDOWN DEMONSTRATION TEST.

A NEW LAMP WAS OPERATED WITH THE DIMMING RHEOSTAT AT THE CRITICAL POINT FOR MAXIMUM CATHODE EXPENDITURE FOR 480 HOURS WITHOUT FAILURE. FOR FUTURE VEHICLES, FLOODLIGHT USAGE PRIOR TO FLIGHT WILL BE LIMITED TO LIGHTING EVALUATION REQUIREMENTS AND FOR CLOSED-HATCH OPERATIONS. USE OF FLOODLIGHTS WITH OPERATING TIME IN EXCESS OF 100 HOURS WILL REQUIRE APPROVAL PRIOR TO FLIGHT.

ORGANIZATION: 5-2490

REFERENCES:
MSC 15-DAY REPORT, P10
APOLLO 8 FRR MTG., NOVEMBER 12, 1968
MSC ANOMALY REPORT, NOV. 1968, P12
ANOMALY STATUS REPORT, 12-17-68, P8
MSC 60 DAY REPORT, 12-68, P11-12
ANOMALY STATUS REPORT, 1-28-69, P3

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.1.26 TITLE: VHF RECOVERY BEACON

SYSTEM: CM MISSION: APOLLO 7

SUBSYSTEM: VHF RECOVERY BEACON EVENT TIME: LANDING

PROBLEM: RECOVERY FORCES REPORTED THAT THE VHF RECOVERY BEACON SIGNAL WAS NOT RECEIVED WHILE THE SPACECRAFT WAS DESCENDING ON THE MAIN PARACHUTE. THE CREW REPORTED THAT THE BEACON WAS TURNED ON AT APPROXIMATELY 9000 FEET, TURNED OFF WHILE THE SPACECRAFT WAS IN STABLE II AFTER LANDING, AND TURNED ON AGAIN WHEN STABLE I WAS ACHIEVED. THE RECOVERY FORCES REPORTED RECEPTION OF THE BEACON ONLY AFTER THE SPACECRAFT RETURNED TO STABLE I POSITION.

ACTION: THE BEACON AND ANTENNA SYSTEM OPERATED PROPERLY DURING POSTFLIGHT TESTING. HOWEVER, THE ANTENNA WAS BENT AND MAY NOT HAVE DEPLOYED PROPERLY UNTIL AFTER RETURN TO STABLE I. THERE IS NO CONCLUSIVE EVIDENCE AS TO WHY THE BEACON WAS NOT RECEIVED FROM 9000 FEET TO LANDING.

ORGANIZATION: 5-2490

REFERENCES: MSC ANOMALY AND FAILURE LISTING REPORT, NOV. 68
MSC ANOMALY STATUS REPORT, 12-17-68, P-9
MSC 60 DAY REPORT, 12-68, P11-13

RESOLUTION: CLOSED

DATE: 1-30-69

REV: A

ANOMALY REPORT

NO. 2.3.1 TITLE: OUTAGE OF 115KV TRANSMISSION FEEDER

SYSTEM: GROUND SUPPORT EQUIPMENT MISSION: APOLLO 7

SUBSYSTEM: ELECTRICAL EVENT TIME: T-33 MIN (APPROX)

PROBLEM: AT APPROXIMATELY 1027 HOURS ON OCTOBER 11 THE 115KV TRANSMISSION FEEDER EXPERIENCED AN OUTAGE FROM THE FLORIDA POWER AND LIGHT CO., KENNEDY STEAM PLANT, TO INDUSTRIAL SUB-STATION. THE POWER FAILURE WAS CAUSED WHEN A CONSTRUCTION CONTRACTOR ALLOWED A CRANE BOOM TO COME IN CONTACT WITH OVERHEAD 115KV FEEDERS. BREAKER RELAY OPENED THE LOOP SYSTEM FOR APPROXIMATELY 3 MINUTES BEFORE SYSTEM WAS RESTORED. MOMENTARY OUTAGES WERE REPORTED AT MARGO, UTILITY ANNEX BOILER FAN, AND CHILLER AT THE MSO BUILDING.

THE POWER SURGE CAUSED LOSS OF THE FOLLOWING INSTRUMENTATION:

WHEN THE S-IB HYDRAULIC PUMPS WERE TURNED ON AT T-4 MINUTES 30 SECONDS, THE CIF BETA RECORDER (B13), LOX CAVITY RECORDER (B12) AND CHAMBER PRESSURE RECORDER (B14) DID NOT RESPOND AND WERE INOPERATIVE DURING THE REMAINDER OF THE COUNT AND INTO PLUS TIME.

ACTION: CONCERNING FUTURE MISSIONS, CLOSE COORDINATION AND COOPERATION WILL BE EXERCISED BETWEEN FLORIDA POWER & LIGHT CO. AND KSC IN ORDER TO PREVENT LAUNCH DELAYS DUE TO POWER OUTAGE.

ORGANIZATION: 5-2490 RESOLUTION: CLOSED DATE: 1-28-69

REFERENCES: KSC-3 DAY REPORT P-3
KSC FAILURES AND ANOMALIES LISTING REPORT 11-7-68
KSC 60 DAY REPORT 12-2-68 P. 5-10

REV: A

ANOMALY REPORT

NO. 2.3.2 TITLE: OUTAGE OF OPERATIONAL INTERCOMMUNICATIONS SYSTEM CHANNELS

SYSTEM: OPERATIONAL INTERCOMMUNICATION

MISSION: APOLLO 7

SUBSYSTEM: MODEM*

EVENT TIME: T-73 HOURS

PROBLEM: AN OUTAGE OF ALL OPERATIONAL INTERCOMMUNICATIONS SYSTEM CHANNELS FROM THE MSOB* WAS EXPERIENCED AT APPROXIMATELY T-73 HOURS IN THE MISSION. THIS OUTAGE EXTENDED FOR A PERIOD OF APPROXIMATELY TEN MINUTES. ENGINEERING INVESTIGATION INTO THE CAUSE OF THIS OUTAGE REVEALED THAT MODEM #44 SHORTED OUT IN SLOT #6 OF THE RF-OIS MODEM RACKS AT THE MSOB.

ACTION: REPLACEMENT OF THE FAILED MODEM RESTORED THE SYSTEM TO NORMAL. THE ABOVE DESCRIBED FAILURE MODE HAS BEEN UNDER INVESTIGATION FOR SOME TIME AND A CHANGE APPROVED TO REPLACE THE MODEM RACK IN THE MSOB WITH EQUIPMENT OF AN IMPROVED DESIGN. (CHANGE REQUEST HQ-0941)

*MODEM - SWITCHING JUNCTION
*MSOB - MANNED SPACECRAFT OPERATIONS BUILDING

ORGANIZATION: 5-2490

REFERENCES: KSC 30-DAY REPORT 11/7/68
KSC 60-DAY REPORT 12-2-68 P. 5-12

RESOLUTION: CLOSED

DATE: 1-28-69

REV: A

ANOMALY REPORT

NO. 2.3.3 TITLE: EGRESS ELEVATOR FAILURE

SYSTEM: GROUND SUPPORT EQUIPMENT MISSION: APOLLO 7

SUBSYSTEM: EGRESS ELEVATOR EVENT TIME: COUNTDOWN

PROBLEM: AFTER EGRESS OF THE CLOSE-OUT CREW AT THE BOTTOM LANDING, THE EGRESS ELEVATOR FAILED TO REMAIN AT THE NORMAL EGRESS POSITION WHICH IS THE 220' LEVEL. PRELIMINARY INVESTIGATION REVEALED TWO (2) COILS ICX AND ICY TO BE OPEN. NO DELAY IN THE MISSION RESULTED.

ACTION: CAUSE OF THE FAILURE IS BEING INVESTIGATED ON UCR KSC 332600.
PAD 34 WILL NOT BE USED FOR FUTURE APOLLO FLIGHTS.

ORGANIZATION: 5-2490

REFERENCES: KSC-3 DAY REPORT P-3
KSC FAILURES AND ANOMALIES REPORT 11-7-68
KSC 60-DAY REPORT 12-2-68 P. [illegible]-8

RESOLUTION: CLOSED

DATE: 1-28-69

REV: A

ANOMALY REPORT

NO. 2.3.4 TITLE: SELF ACTUATION OF WATER SYSTEM

SYSTEM: WATER SYSTEM MISSION: APOLLO 7

SUBSYSTEM: FIREX SYSTEM EVENT TIME: T+7 SECONDS

PROBLEM: SELF ACTUATION OCCURRED AT APPROXIMATELY T+7 SECONDS WHICH CAUSED WATER TO FLOW ON ALL LEVELS OF THE TOWER. THE WATER WAS STOPPED BY ACTUATING THE LCC CONTROL SWITCH TO THE "OFF" POSITION. SUBSEQUENT INVESTIGATION INDICATES THE CONTROL PUSH BUTTON ON THE 60' LEVEL WAS ACTUATED BY THE SAME LIFTOFF BLAST PRESSURE WHICH BROKE THE GLASS COVERING IT.

ACTION: IN KEEPING WITH THE CONTINUED INTEREST IN PRECLUDING INADVERTENT ACTUACTION OF LAUNCH FACILITY WATER SYSTEMS, THIS ANOMALY IS BEING REPORTED TO APOLLO APPLICATIONS PROGRAM MANAGEMENT FOR FURTHER INVESTIGATION. UCR KSC 332602 HAS BEEN ISSUED.

ORGANIZATION: 5-2490

REFERENCES: KSC 30-DAY REPORT 11/7/68
KSC 60-DAY REPORT 12-2-68 P. 5-8

RESOLUTION: CLOSED

DATE: 1-28-69

REV: A

ANOMALY REPORT

NO. 2.3.5 TITLE: BATTERY RELIEF VALVES - IMPROPER OPERATION

SYSTEM: GROUND SUPPORT EQUIPMENT MISSION: APOLLO 7

SUBSYSTEM: HIGH PRESSURE BATTERY FACILITY EVENT TIME: T-72 HR. HOLD

PROBLEM: AT 2140 HOURS EDT OCTOBER 7, 1968 (T-72 HOUR HOLD) RELIEF VALVES IN THE NITROGEN STORAGE BATTERY WERE FOUND TO BE RELIEVING PRESSURE BELOW THEIR PRESCRIBED SETTING (6400 ± 100 PSIG). AN OUTAGE OF THE VEHICLE NITROGEN SYSTEM WAS REQUESTED AND RECEIVED. SUBSEQUENTLY THE THREE RELIEF VALVES (A14550, A14551, AND A14572) WERE REPLACED. TWO OF THE NEW VALVES FAILED ON RE-PRESSURIZATION AND WERE AGAIN REPLACED. THE BATTERY WAS BROUGHT BACK TO 6000 PSIG AT 0906 HOURS EDT ON OCTOBER 8, 1968. OPERATING PARAMETERS WERE CHANGED FROM 6000 PSIG MAXIMUM TO 5800 PSIG MAXIMUM IN AN ATTEMPT TO KEEP THE FAILURE RATE DOWN. AT T-20 MINUTES THE PRESSURE WAS RAISED TO 6000 PSIG TO INSURE THAT MAXIMUM VOLUME WAS AVAILABLE FOR VEHICLE USAGE. FAILURES OF THIS TYPE OF COMPONENT HAVE OCCURRED REPEATEDLY.

ACTION: UCR'S KSC 325746, 326241, AND 326361 HAVE BEEN ISSUED TO INVESTIGATE THE RELIABILITY OF THIS COMPONENT.

ORGANIZATION: 5-2490
REFERENCES: KSC 60-DAY REPORT P. 5-4

RESOLUTION: OPEN

DATE: 1-2-69

REV: A

ANOMALY REPORT

NO. 2.3.6 TITLE: LOSS OF IP COORDINATION VOICE CIRCUIT

SYSTEM: GROUND SUPPORT EQUIPMENT MISSION: APOLLO 7

SUBSYSTEM: LAUNCH DATA SYSTEM EVENT TIME: T-10 MIN. THRU LAUNCH

PROBLEM: THE IP COORDINATION VOICE CIRCUIT GP58201 WAS UNUSABLE FROM T-10 MINUTES TO END OF LAUNCH PHASE. THIS MADE COORDINATION WITH THE RTCF IMPOSSIBLE DURING THIS TIME.

ACTION: PAD 34 WILL NOT BE USED FOR FUTURE APOLLO FLIGHTS.

ORGANIZATION: 5-2490

REFERENCES: KSC 60-DAY REPORT P. 5-14

RESOLUTION: CLOSED

DATE: 1-2-69

REV: A

3.0 REFERENCES

1. APOLLO 7 MISSION, MISSION DIRECTORS 24-HOUR REPORT NASA-MSC OCTOBER 22, 1968
2. APOLLO 7 (AS-205) MISSION 3-DAY REPORT, NASA-MSC REPORT NO. MSC-PA-R-68-14 OCTOBER, 1968
3. AS-205 3 DAY REPORT NASA-MSFC TWX NO. R-AERO-F OCTOBER 16, 1968
4. APOLLO 7 (AS-205) QUICK-LOOK ASSESSMENT REPORT, NASA-KSC DATA FAX OCTOBER 16, 1968
5. AS-205 FLIGHT RESULTS - -DAY REPORT, NASA-MSFC R-AERO-F OCTOBER 26, 1968
6. APOLLO SPACECRAFT 101 SUBSYSTEMS REVIEW MEETING (MSC) OCTOBER 29, 1968
7. APOLLO 7 15-DAY REPORT, NASA-MSC NOVEMBER 5, 1968.
8. APOLLO ANOMALY STATUS NASA-MSC, NOVEMBER 5, 1968.
9. APOLLO 8 FRR MEETING, NOVEMBER 12, 1968.
10. KSC FAILURES AND ANOMALIES LISTING REPORT, NOVEMBER 7, 1968
11. MSC FAILURES AND ANOMALIES LISTING REPORT, NOVEMBER 21, 1968
12. MSC ANOMALY STATUS REPORT, NOVEMBER 19, 1968
13. MSC ANOMALY STATUS REPORT, NOVEMBER 29, 1968
14. KSC 60-DAY FINAL REPORT, DECEMBER 2, 1968
15. MSC 60-DAY REPORT, DECEMBER 1968
16. ANOMALY STATUS REPORT, JANUARY 28, 1969
17. MISSION IMPLEMENTATION PLAN FOR APOLLO 7, AUGUST 21, 1968
18. MISSION REQUIREMENTS "C" TYPE MISSION, JULY 29, 1968

REVISIONS

REV. SYM	DESCRIPTION	DATE	APPROVED
A	Complete revision based on NASA center 60 day reports	1-30-69	R.H. Campbell 2-7-69

ACTIVE SHEET RECORD

SHEET NUMBER	REV LTR	ADDED SHEETS				SHEET NUMBER	REV LTR	ADDED SHEETS			
		SHEET NUMBER	REV LTR	SHEET NUMBER	REV LTR			SHEET NUMBER	REV LTR	SHEET NUMBER	REV LTR
Pages 1-58 (11-68) (Init.Rel)		Pages 59-72	A								
Pages 1-58 (1-30-69)	A										