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CB/OSP

LMSC
ADVANCED PROJECTS
QUARTERLY REPORT
JANUARY THROUGH MARCH 1970

Prepared: 15 April 1970

~~HANDLE VIA~~ [redacted]

CONTROL SYSTEM ONLY

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ADVANCED PROJECTS QUARTERLY REPORT MARCH 1970

SUMMARY

1.1 MISSION SUMMARY 1109

1.1.1 Mission 1109 consisted of the CR-10 payload, launched into orbit by the Agena 1657 on 04 March 1970. The first stage booster was a Thor, Serial 69-041.

1.1.2 Booster burn time was less than specified but separation events were normal.

1.1.3 Agena performance was normal.

1.1.4 The orbital parameters were as follows:

	(Rev. 28)
Inclination	88.00°
Apogee	159.32 N. Mi.
Perigee	94.60 N. Mi.
Period	88.93 Min.
Perigee Location	60.57° N (descending)

1.1.5 The first mission was 7 days, with 6302 frames exposed, returned by air catch on Rev. 115 on 11 March 1970. The second mission lasted 12 days, with 6060 frames exposed, with an air catch on Rev. 309 on 23 March 1970. Photographic performance of the forward and aft looking cameras for both missions was variable with the MIP given a rating of 110 for the -1 mission and 100 for the -2 mission. Quality of the forward looking camera was variable as in Mission 1108, and at magnification above 25X most imagery had an out of focus appearance. Quality was less variable on the aft looking camera, and at magnifications of 50X the imagery again experienced an out of focus appearance.

1.1.6 The A-to-B transfer occurred normally. The OSFG, PMU, clock system, instrumentation and command system operation were all normal.

1.1.6 (Cont'd)

The DISIC camera operation was normal.

1.1.7 The average temperatures during the first mission were 64°F on the master camera and 64°F on the slave camera. On the second mission, the master camera saw a temperature of 64°F and the average on the slave camera was 63°F. The thermal environment achieved with this system was near the pre-flight predictions.

1.1.8 The recovery performance of both missions was normal.

2.0 J-3 SYSTEM STATUS

2.1 ENGINEERING SUMMARY

2.1.1 Completed Engineering Drawing List (EDL) on CR-11 for Configuration Audit Purpose.

2.1.2 Completed vendor evaluation for Program Timer Procurement. [redacted] of Pasadena, California was selected.

2.1.3 Performed modification to the System Console to facilitate Command durations and DSR Word Monitoring.

2.1.4 Performed modifications to the secondary P/L Simulator for the [redacted] Secondary Payload.

2.1.5 Performed engineering for updating Payload Simulator S/N 05 for use on vehicle 1654.

2.1.6 Performing engineering for providing 400 H_z backup power to the HIVOS and system consoles.

2.1.7 Preparation of the Payload System Functional Schematic continuing.

2.1.8 Provided Launch Support for CR-11 and CR-10, and performed audits of CR-11, CR-10, and CR-12. Issued Thermal Tape Pattern requirements.

2.1.9 Issued Mass Properties Report for CR-11 and CR-10, plus Weight and Power Summaries for current payloads. Completed Analysis of Weights, measuring and recording procedures.

2.1 (Cont'd)

2.1.10 Completed design of thermal surface protective covers.

2.1.11 Completed facilities installation drawings for collimator, shaker, and weight and balance blocks in Sunnyvale facility. Also pressure bottle installation for test facility. Initiated mod to collimator lazy susan stop block.

2.1.12 Completed DISIC mount flatness studies, released drawing requirements for shimming.

2.1.13 Completed water seal and felt door location studies, P/L path.

2.1.14 Completed mods of Tilt Sling, Shop and Test Liaison support.

2.1.15 Completed mechanical E.D.L. for CR Systems Audit.

2.1.16 Completed deletion of N_2 line to S/C.

2.1.17 Completed orifice change of PMU on CR-10 and CR-11, also completed Vacuum Gauge Installation CR-13.

2.1.18 Completed review of Air Log/J-3 Dolly Mating Procedure.

2.1.19 Completed review of 55-Pin (Fairing) spinoff connector make-or-substitute trade-offs. Made record release of squib adaptor drawing.

2.1.20 Completed review of dynamic lift parameters. (Effort stopped when U.T.B. cancelled).

2.1.21 Initiated GHE Operational Manual Revision, and completed mechanical inputs to Training Manual Revision; mechanical, structural, thermal, PMU.

2.1.22 Initiated study of mod to J-3 shipping/mating dolly side platforms for use in Sunnyvale facility.

2.1.23 Performed review of proposed mod to parachute thermal cover.

2.2 J-3 SYSTEM PROBLEMS

2.2.1 Slit width clutches replaced by Boston after failure investigation revealed oil or grease contamination. First noted on CR-12, all units were tested in bell jar for flight certification.

2.2.2 The "A" SRV waterseal was relocated approx. 0.150 inches in CR-13 to prevent interference with main camera material. All systems were rechecked to verify proper clearance, indicating tolerance buildup associated with CR-13 only.

2.2.3 Digital Shift Register failed in CR-11 Command Box. Failure traced to open resistor which was replaced and proper Digital Shift Register operation verified. Failure attributed to manufacturing error by resistor vendor. No history of similar problems and no further corrective action is required.

2.2.4 Switch Programmer S/N 213 failed due to improper output in relay matrix. Investigation revealed anomaly caused by spurious Haydon Timer output at time of power application. Failure occurs only after long (2 days) power off period. Same failure later occurred on another Haydon Timer. Development of a replacement item has begun with placement of development and production go-ahead given to [redacted] of Pasadena, California.

2.2.5 CR-11 launch was cancelled due to improper tracking associated with UTB. CR-10 replaced CR-11 in launch schedule. As a result of UTB tracking problems on CR-11, CR-12 and CR-13, all systems were converted to STB.

2.3 MANUFACTURING

2.3.1 CR-10 The switch programmer and aft T/M boxes were returned to Manufacturing for updating and rework. The felt door clearance and thermal taping mods were incorporated into the structures. All work was completed and the units were returned to Systems Test.

2.3.2 CR-11 The switch programmer and aft T/M box were returned to Manufacturing for updating and rework. The nitrogen valve installation and thermal taping mods were incorporated into the structures. All work was completed and the units were returned to Systems Test.

2.3 MANUFACTURING (Cont'd)

2.3.3 CR-12 The switch programmer and slope programmer were completed and delivered to Systems Test. The PCM and filter mods were incorporated into the aft T/M box and it was delivered to Functional Test.

2.3.4 QR-2 The switch and slope programmers were delivered to Systems Test. PCM and filter mods were incorporated into the aft T/M box and the box was delivered to Systems Test.

2.3.5 CR-13 The slope programmer was completed, switch programmer mods were incorporated and the PCM and filter mods were incorporated into the aft T/M box. The vacuum gage mount was installed in the main barrel. All units were returned to Systems Test.

2.3.6 CR-14 The system was CARTed to Q.A. on 9 January 1970.

2.3.7 CR-15 The system was CARTed to Q.A. on 16 Februa 1970. The switch programmer, command box, pyro box and current sensor were completed and delivered to Systems Test. The aft T/M and slope programmer have been delivered to Functional Test.

2.3.8 CR-16 All structures have been completed and the system is in Electrical Inspection for CART. Eight boxes have been installed in the system and the aft T/M, switch programmer, slope programmer and command boxes have been delivered to Functional Test.

2.3.9 CR-8 All mechanical work on the structures has beer completed. The harness fabrication was 85% complete. Five boxes were completed, the SL conditioner and transfer box were delivered to Functional Test and the aft T/M, slope progra mer, switch programmer, command and pyro boxes were in work.

2.3 MANUFACTURING (Cont'd)

2.3.10 SRV SUB SYSTEMS

Forebody retrofits were completed on QR-2 and CR-14. The main water seal slot of the aft cover of CR-13 "A" unit was modified.

2.3.11 SUB ASSEMBLIES

TUNA — The TUNA CR-13, CR-14, CR-15, CR-16 and CR-8 have been completed and three spare units are in work.

PRESSURE DIAPHRAGM — All systems completed.

PMU — CR-8 was completed mechanically and CR-16 and CR-8 were in the Electrical Shop.

2.3.12 AGE

Mechanical — T7-2180 Motorized Tilt Slings (2) were completed. Mods were also incorporated after functional check out.

Single-Channel Programmer Timer C/O Panel - Chassis and panel were completed.

Four-Channel Programmer Timer C/O Panel - Chassis and panel were completed.

Electrical — J-3 System Consoles - S/N 04 mods and rework were completed.

APC Consoles - S/N 03 mods were completed and the unit returned to AGE Test on 13 February 1970. S/N 05 mods were incorporated but the unit is being held for additional E.O.'s due for release 4 April.

PCM Test Panel was completed and delivered to Test on 28 January 1970.

Payload Simulator - S/N 02, 04 and 06 were updated to latest changes and delivered to AGE Test.

2.3 MANUFACTURING (Cont'd)

2.3.13 SPARE BOXES

The DSR and the first Silicon light pulse conditioner were received from SV. The second SLP is in work and will be completed by 15 June 1970. Both aft T/M boxes are in work at SV.

2.3.14 TAPE RECORDERS

[redacted] slipped the delivery schedule of the recorders as follows:

Qty.	Req'd Date	Ship Date
2	Feb. 20	April 20
2	April 3	July 1
2	May 15	Aug. 1

Since this schedule slippage, additional controls have been instituted at [redacted] to see that the present schedule is maintained. Work schedule has been adjusted to the new delivery schedule.

2.3.15 PCM'S AND COMMUTATORS

Five of the new [redacted] PCM's have been received, tested and found to be good units. Delivery dates for the balance of the PCM's is as follows:

S/N	ECD
006	April 8
007	April 22
008	April 29
009 & 010	No definite ECD available.

All electronics commutators have been received at A/F

2.4 MANUFACTURING PROBLEMS

2.4.1 Commutators

Four each of the 1464617-2 and -6 mechanical commutators have been refurbished to extend the LCL date. Four additional units, one -2 and three -6's were returned for LCL refurbishment on 17 March 1970. No ECD is available for these units at this time.

2.4 MANUFACTURING PROBLEMS (Cont'd)

2.4.2 [redacted] Timers

The four-channel timer is not available for QR2, CR15, CR16, and the two spare boxes. The first repaired unit was received 13 March 1970. This unit (S/N 109) was tested at A/P and found to be discrepant and can be used for test only. The remaining three units at [redacted] are due 10 April 1970.

2.4.3 Motor/Gearhead Assembly

All units were reworked and have been received.

2.5 TEST

2.5.1 SYSTEM STATUS

CR8	Instruments System being refurbished.
CR11	Storage Preps.
CR12	Storage Preps
CR13	Environmental Preps
QR2	Functional Test Phase
CR14	Receiving and Inspection completed. Holding for SRV
CR15	Receiving and Inspection Phase. Boston mods complete.

2.5.2 COMPONENT STATUS

All systems flight boxes are complete with the exception of:

QR-2	Aft T/M Switch Progammer - Waiting Engineering disposition on 109R [redacted] Timer.
CR-14	T/M (211) - Waiting for PCM and Commutator installation. Requires acceptance vibration.
CR-15	Aft T/M - No PCM and commutator. Slope Programmer - Post-Vib functional test.

2.5.2 COMPONENT STATUS (Cont'd)

CR-16 Command Box - In test post vib.
Aft T/M - In test - preshake.
Slope Programmer - To Mfg. - potting
Switch Programmer - In test - pre pot - no timer.

CR-8 Aft T/M - In test
Transfer Box - In Mfg.
Pyro Box - In Mfg.
Slope Programmer - In Mfg.
Switch Programmer - In Mfg.
Command DSR - In Mfg.
SLP Conditioner - In Test - preshake

PMU STATUS

QR-2 In re-shake after pressure transducer replacement.
CR-14 Awaiting Acceptance
CR-15 Awaiting Acceptance
CR-16 Awaiting Acceptance

TUNA STATUS

Complete thru QR-2
CR-14 In Post Shake Acceptance
CR-15 In Vibration
CR-16 Awaiting Acceptance

3.0 J-3 PROBLEMS

3.1 TEST

3.1.1 Time Lost

P/L	Days Required	Problems
CR10	20	HIVOS retest due to corona on Instrument No. 1. Slit drive and instrument ramp-up problems. Removed Instrument #1 scan head for special test. Completed scan head electronic special test. Removed Instrument #2 scan head and sent to [redacted] for pinning of slit width and filter pots. Ramp up and response time problems. P/L path verification check revealed P/L rubbir hard on bottom felt -

3.0 J-3 PROBLEMS (Cont'd)

3.1 TEST

3.1.1 Time Lost

P/L	Days Required	Problems
CR10	20	reworked felt door. Reshimmed Instrument #1.
CR11	16	Boston reworked No. 2 slit assembly, would not adjust to small enough slit width for block test. Problems in target drive syncronization on 60" targets. Replaced filters in Instrument #2. Reshimmed both instrument Completed block test. Completed lam adjustments and live run. Replaced 200 pps lamp. Boston changed slit control pots. Slit width cam adjustments and changes required 6 strobe tests. During operations P/L came o exit roller 3 times. During confidenc run at VAFB, P/L ran off exit roller. A special test was run at A/P to deter mine feasibility of continuing with UT P/L. System ran tracking tests after decision was made to use STB P/L on Block test required due to switch fron UTB P/L to STB P/L. (De-shimmed each instrument .0005").
CR12	35	Boston replaced phenolic drive gear o cam follower shaft of Instrument #2. Boston removed both high efficiency amplifiers because of creep problem high speed shutdown. New amplifier sent from Boston. Removed Instrume #1 A/O for repairs. Boston worked FEDR on slit width control on Instrument #2. Installed repaired A/O. Re moved both scan heads for slit width pot pinning. Ran reso test. Found filter trays installed in the wrong instruments. Reshimmed both instruments 3 times. High efficiency ampl fier adjustment and troubleshooting. Found rubbing on bottom side of felt door. Reworked felt door.

3.0 J-3 PROBLEMS (Cont'd)

3.1 TEST

3.1.1 Time Lost

P/L	Days Required	Problems
CR12	35	During running of cycle rates, P/L twisted and came off exit roller in Instrument #2 shearing pin. Tracking rerun required because of switch from UTB P/L to STB P/L. Re-block Test required due to switch in P/L. Scan head rework. Deshimming required; Instrument #1 and #2.
CR13	21	Tracking problems determining T/U offset and I/R attitude. Found warpe flange on'B' T/U, replaced with CR14 'B'. Also had problems with DISIC tracking, T/U offset, and P/L hitting W/S in cover. Moved W/S. During functional test the P/L folded over at Instrument #2 exit roller, prompting a retrack with UTB. Retracking. Completed 12 C & W's. IR reshimme Retracking required after decision to use STB P/L only. Replaced SLP he CTA rework to dual spring configuration. CTA removed for readjustment and reinstalled. Control package relay found not wired to latest FEWO on No. 1 side - reworked. Improper T/U on DISIC 35 mm. Demated and repaired.
QR2	9	Boston mods delayed start of Instr. Acceptance test. System holding for forebody fit and T/U acceptance. GE supplied dummy T/R in SRV with wr connector, which, when connected, damaged harness connector. Requir harness replacement. Sheared pin i hand cycling portion of tracking. Re moved instruments from barrel to replace shuttle on Instrument #2 that caused binding. Replaced T/U in SRV A; made strange noises. Drum dragging - found light shield rubbing repaired.

3.0 J-3 PROBLEMS (Cont'd)

3.1 TEST

3.1.1 Time Lost

P/L	Days Required	Problems
CR14	-	Boston mods. Receiving and inspectic found brake voltage on No. 1 T/U to b marginal. Reworked T/U.

3.2 AGE

3.2.1 Electrical AGE

P/L Simulator	S/N 04 in use in test set-up per SV request. Purpose of test is to isolate the cause of the noise triggered write complete pulse noted in our set-up at A/P using a simulatc with a system C/O console, and to determine if the removal of CR23 dioc in the simulator is an acceptable fix. This would be dependent on the fact that the test set-up at A/P is in effect more sensitive than the Agena, P/L simulator set-up as used at SV VST.
	S/N 06 C/O completed 3/24/70. Q.A buy-off and system closed up 4/2/70.
	S/N 05 in Mfg. for rework Mfg. ECD 5-1-70. S/N 02 in VST - SV. S/N 03 at VAFB.
System C/O Console	S/N 02, 04, and 05 in use in System test at this time. S/N 03 in Mfg. for rework, ECD 4-7-70. S/N 01 in AGE area, in use in test set-up as indicate under P/L simulator S/N 04.
Secondary P/L Simulator	No change; S/N 001 in SV; S/N 002 at VAFB; S/N 003 awaiting C/O in AGE area.
Auto Prog. Console	S/N 103 - additional mods being performed in the AGE area at this time - ECD 4-3-70. S/N 104 in System at this time. S/N 105 in Mfg. for rewor ECD 4-8-70.
HIVOS Console	Preliminary portions of checkout con pleted. "H" timer installed and all functions verified. Remaining item t be verified is [redacted] timer in the re covery section (unit reworked 4-1-7(Unit to be reinstalled and check completed 4-6-70.

4.0 PAYLOAD INTEGRATION

4.1 DESIGN AND TEST INTEGRATION

4.1.1 Released the following SDRD's:

073-1, -2	Removal of vacuum gage from CR10 and installation on CR13.
079-1	Delete N_2 purge at S/C.
080-2	Blossom T/M frequency change.
085-3	Switch Programmer noise suppression.
088-1, -2	P/L Simulator modifications.
089	Reflected ripple filter for DC-DC converter.
090-2, -3, -4	[redacted] Timer testing & replacement.
091-1, -2	Disable MCD & PMU level switchover for CR10 and CR11.
092	DSR subsystem compatibility test.
093, -1	Delete DSR signal return.
094	Reconfigure all systems to STB.
095, -1	Pinpuller torque value change.
096	PCM test data output change.
097	Switch Programmer configuration change for CR10.
098	400 H_Z power back-up for system consoles.
099	Component S/N vs Dash Number assignments.
100	Reassignment of system dash numbers.
101	Deletion of Test Procedure CR 1210.

4.1.2 Completed CR-9 Post Flight review and prepared summar of anomalies. Presented post flight briefing to [redacted] Program Manager.

4.1.3 Provided technical support to CR-11 flight preps and failure analysis. Prepared and presented R-7 briefing at VAFB and conducted customer buy-off meeting.

4.1.4 Completed pre-launch audits on CR-10 and provided technical support during flight preps. Conducted storage audit meeting and customer buy-off meeting. Prepared and presented R-7 briefing at SAMSO and R-1 at VAFB.

4.1.5 Completed Systems Integration Audit, black box screening and CSE Audit of CR-10 and CR-11. Completed Systems Integration Audit on CR-12.

4.0 PAYLOAD INTEGRATION (Cont'd)

4.1 DESIGN AND TEST INTEGRATION

4.1.6 Began audit check of schematics being prepared for the Systems Functional Schematic Book.

4.1.7 Completed updating of SOP's in support of Configuration Management Plan and submitted for review and release.

4.1.8 Began preparation of addendum to J-3 Training Manual to reflect system changes incorporated since original release of manual.

4.1.9 Coordinated special DSR subsystem compatibility test with Agena 1659 to verify corrective action for an SGLE/DSR ground loop. Test demonstrated satisfactory performance of a proposed design change. Deletion of a DSR signal return was then authorized.

4.1.10 Completed revision of the Boston/AP Interface Specification to incorporate SCN's and clarify and standardize nomenclature.

4.1.11 Conduct CR-12 post chamber critique and began preparations for pre-storage audit.

4.1.12 Provided normal technical direction and support for all systems in test.

5.0 OPERATIONS AND ANALYSIS STATUS

5.1 MISSION PROGRAMMING AND OPERATIONS

5.1.1 The Mission Programming and Operations group was occupied during the subject report period mainly with supporting the CR-10/1109 flight and with preparations for the move to Building [redacted]

5.0 OPERATIONS AND ANALYSIS STATUS (CONT'D)

5.1 MISSION PROGRAMMING AND OPERATIONS

5.1.2 CR-10 Flight Support

Successful support was provided throughout the flight to achieve mission objectives which included the following:

5.1.2.1 Excellent ramp-to-orbit match.

5.1.2.2 Satisfactory use of the 7 DMU rockets carried for the mission.

5.1.2.3 Adequate and timely updates and reports.

5.1.3 An additional requirement for this mission was to provide the Army Topographical Command with precision clock correlation and transmit beacon data. Considerable computer programming effort was required to provide a listing of the transit beacon station acquisition times and the beacon status (on or off) during the acquisition period.

5.1.4 Building [redacted] Computer Phase-Over

Some effort was made during this report period in coordinating the group's move to Building [redacted] Initially, assurance was made that all flight support computer programs will compile on the 360/50, using the version 16 FORTRAN compiler which is the same version used on the 360/65.

5.2 SYSTEM PERFORMANCE ANALYSIS

5.2.1 CR-10 Support - Completed flight activity. Telemetry Analysis Report in progress. Clock correlation in progress. PET meeting preparation in progress.

5.2.2 CR-11 Support - Completed retracking. Completed Block test analysis.

5.2.3 CR-12 Support - Completed block test analysis. Prestorage analysis in progress.

5.2.4 CR-13 Support - Pre-Chamber analysis in progress.

5.2.5 QR-2 Support - Completed tracking test analysis in the functional test.

5.0 OPERATIONS AND ANALYSIS STATUS (Cont'd)

5.3 COMPUTER OPERATIONS & APPLICATIONS

5.3.1 [redacted]

[redacted]

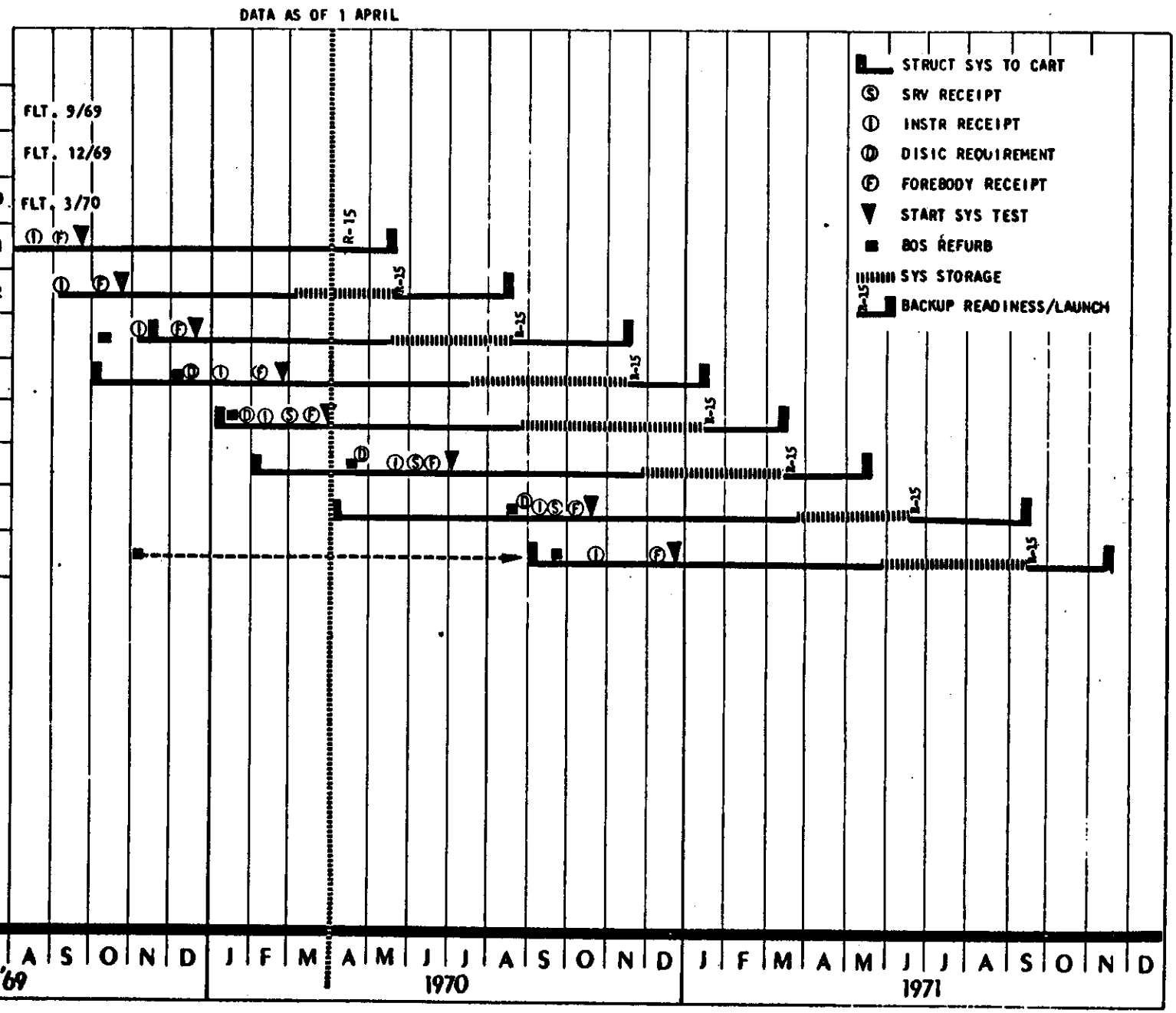
5.3.2 Area History File (AHF)

Sighting Interval Distribution (SID) and Photographic Age Distribution (PAD) completed and sent to Headquarters. Programming completed on Mission Performance Summary (MPS) and final checkout started.

Manufacturing & System Test

[SCHEDULE]

SRV 1	SRV 2	CONFIG.	INSTR. 1	INSTR. 2	
743R	744R	J-1	216	217	J-46
817	818	J-3	316	317	CR-9
819	820	J-3	320	321	CR-10
821	822	J-3	322	323	CR-11
823	824	J-3	324	325	CR-12
825	826	J-3	326	327	CR-13
827	828	J-3	300	301	QR-2
829	830	J-3	328	329	CR-14
831	832	J-3	330	331	CR-15
833	834	J-3	332	333	CR-16
815	816	J-3	318	319	CR-8



ADVANCED PROJECTS

ADMINISTRATION AND CONTROLS

HANDLE VIA [redacted] RIL 1, 1970

J1·J3 Flight Schedule · contracted

	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
FLIGHT SYSTEM	J46 FLOWN			CR-9 FLOWN			CR-10 FLOWN		CR-11			CR-12			CR-13
R-15 BACKUP								CR-11	CR-12	CR-12	CR-12	CR-13	CR-13	CR-13	QR-2
STORAGE								CR-12	CR-13			QR-2			CR-14 CR-15
MISSION	1052			1108			1109		1110			1111			1112
VEHICLE	1653			1655			1657		1656			1654			1659

'69 1970

	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
		QR-2		CR-14		CR-15				CR-16		CR-8							
	QR-2	CR-14	CR-14	CR-15	CR-15	CR-16	CR-16	CR-16	CR-16	CR-8	CR-8								
		CR-15		CR-16		CR-8													
		1113		1114		1115				1116		1117							
		1658		1660		1661				1662		1663							

1971 1972

NOTE: 1655 AND SUBSEQUENT VEHICLES WILL USE SOLAR ARRAYS AND SGLS FOR COMMAND AND T/M.

o UNNEGOTIATED MATERIAL COSTS

AWA NO.	CHANGE	PLANNED PRICE
[redacted]	GFE COMPUTER OPERATION	[redacted]
[redacted]	TIMERS	[redacted]
	ROM TOTAL	[redacted]

* APPROVED AWA TO BE NEGOTIATED AT A LATER DATE. PARTIAL COSTS INCLUDED IN ACTUALS.

RELOCATION

AWA	PLANNED COST	FUNDED COST	ACTUAL EXPENDED AND COMITTED
* -5 FACILITIES	[redacted]	[redacted]	[redacted]
** -8 VAULT STORAGE THIRD FLOOR	[redacted]	[redacted]	[redacted]
** -10 CONFERENCE ROOM PRODUCT ROOM	[redacted]	[redacted]	[redacted]
** -12 STORAGE AREA SECOND FLOOR	[redacted]	-	-
PENDING RELOCATION COSTS	[redacted]	-	-
TOTAL	[redacted]	[redacted]	[redacted]

* NEGOTIATED (NON FEE BEARING)

** PENDING AWA'S (NON FEE BEARING)

PROGRAM OFFICE
ADMINISTRATION & CONTROLS
OPS & ANAL, ENGRG & INTEG
MANUFACTURING & TEST
QUALITY ASSURANCE

LEVEL OF EFFORT - FY '70 - - - - - CONTRACT SUMMARY

TOTA

HOURS

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	32,989	28,193	27,433	35,385	24,978	21,911	27,996	29,845	28,065	33,239	26,541	26,910
PLANNED (cum)	32,989	61,182	88,615	124,000	148,978	170,889	198,885	228,730	256,795	290,034	316,575	343,48
ACTUAL (mo)	26,170	23,075	26,297	40,743	28,075	26,739	33,195	27,963	25,268			
ACTUAL (cum)	26,170	49,245	75,542	116,285	144,360	171,099	204,294	232,257	257,525			

DOLLARS (000) (price/cost-fee)

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	[redacted]											
PLANNED (cum)	[redacted]											
ACTUAL (mo)	[redacted]											
ACTUAL (cum)	[redacted]											

* Total Planned Price - [redacted]

HANDLE VIA [redacted]
CONTROL SYSTEM ONL

LEVEL OF EFFORT - FY '70 - - - - - CONTRACT SUMMARY

PROGRAM OFFICE
ADMINISTRATION & CONTROLS
OPS & ANAL, ENGRG & INTEG
MANUFACTURING & TEST
QUALITY ASSURANCE

HOURS

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	825	686	654	858	617	584	701	610	581	763	581	610
PLANNED (cum)	825	1,511	2,165	3,023	3,640	4,224	4,925	5,535	6,116	6,879	7,460	8,070
ACTUAL (mo)	650	388	603	646	528	446	843	665	644			
ACTUAL (cum)	650	1,038	1,641	2,287	2,815	3,261	4,104	4,769	5,413			

DOLLARS (000) (price/cost-fee)

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	[redacted]											
PLANNED (cum)	[redacted]											
ACTUAL (mo)	[redacted]											
ACTUAL (cum)	[redacted]											

* Total Planned Price - [redacted]

HANDLE VIA [redacted]
CONTROL SYSTEM ONLY

PROGRAM OFFICE
ADMINIS & CONTROLS
OPS & ANAL, ENGRG & INTEG
MANUFACTURING & TEST
QUALITY ASSURANCE

LEVEL OF EFFORT - FY '70 - - - - - CONTRACT SUMMARY

HOURS

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	1,833	1,525	1,743	2,287	1,507	1,298	1,576	1,372	1,307	1,715	1,307	1,372
PLANNED (cum)	1,833	3,358	5,101	7,388	8,895	10,193	11,769	13,141	14,448	16,163	17,470	18,842
ACTUAL (mo)	1,641	1,295	1,417	2,015	1,425	1,362	1,745	1,581	1,365			
ACTUAL (cum)	1,641	2,936	4,352	6,367	7,792	9,154	10,899	12,480	13,845			

DOLLARS (000) (price/cost-fee)

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	[redacted]											
PLANNED (cum)												
ACTUAL (mo)												
ACTUAL (cum)												

*Total Planned Price - [redacted]

~~HANDLE VIA~~ [redacted]
CONTROL SYSTEM ONLY

~~TOP SECRET~~/C

PROGRAM OFFICE
ADMINISTRATION & CONTROLS
OPS/ANAL-ENG/INTEG
MANUFACTURING & TEST
QUALITY ASSURANCE

LEVEL OF EFFORT - FY '70 - - - - - CONTRACT SUMMARY

HOURS

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	11,181	9,330	8,977	11,544	8,190	7,759	10,430	9,896	9,620	12,137	9,622	9,897
PLANNED (cum)	11,181	20,511	29,488	41,032	49,222	56,981	67,411	77,307	86,927	99,064	108,686	118,583
ACTUAL (mo)	9,739	8,230	8,356	11,778	8,276	8,900	10,968	9,834	10,147			
ACTUAL (cum)	9,739	17,969	26,325	38,103	46,379	55,279	66,247	76,081	86,228			

DOLLARS (000) (price/cost-fee)

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	[redacted]											
PLANNED (cum)	[redacted]											
ACTUAL (mo)	[redacted]											
ACTUAL (cum)	[redacted]											

* Total Planned Price - [redacted]

~~TOP SECRET~~/C

HANDLE VIA [redacted]
CONTROL SYSTEM ONLY

PROGRAM OFFICE
ADMINISTRATION & CONTROLS
OPS & ANAL, ENGRG & INTEG
MANUFACTURING & TEST
QUALITY ASSURANCE

LEVEL OF EFFORT - FY '70 - - - - - CONTRACT SUMMARY

HOURS

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	16,335	13,680	13,225	17,193	12,131	10,018	12,484	14,547	13,245	14,849	12,016	11,939
PLANNED (cum)	16,335	30,015	43,240	60,433	72,564	82,582	95,066	109,613	122,858	137,707	149,723	161,662
ACTUAL (mo)	11,806	10,848	13,199	22,216	14,655	13,330	15,822	12,636	10,497			
ACTUAL (cum)	11,806	22,654	35,853	58,069	72,724	86,054	101,876	114,512	125,009			

DOLLARS (000) (price/cost-fee)

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	[redacted]											
PLANNED (cum)	[redacted]											
ACTUAL (mo)	[redacted]											
ACTUAL (cum)	[redacted]											

* Total Planned Price - [redacted]

[redacted]

PROGRAM OFFICE
ADMINISTRATION & CONTROLS
OPS & ANAL, ENGRG & INTEG
MANUFACTURING & TEST
QUALITY ASSURANCE

LEVEL OF EFFORT - FY '70 - - - - - CONTRACT SUMMARY

HOURS

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	2,815	2,972	2,834	3,503	2,533	2,252	2,805	3,420	3,312	3,775	3,015	3,092
PLANNED (cum)	2,815	5,787	8,621	12,124	14,657	16,909	19,714	23,134	26,446	30,221	33,236	36,328
ACTUAL (mo)	2,334	2,315	2,722	4,088	3,191	2,701	3,817	3,247	2,615			
ACTUAL (cum)	2,334	4,649	7,371	11,459	14,650	17,351	21,168	24,415	27,030			

DOLLARS (000) (price/cost-fee)

	J	A	S	O	N	D	J	F	M	A	M	J
PLANNED (mo)	[redacted]											
PLANNED (cum)												
ACTUAL (mo)												
ACTUAL (cum)												

* Total Planned Price - [redacted]

HANDLE VIA [redacted] CONTROL SYSTEM ONLY

[redacted] - FY '70

APRIL 1, 1970

[redacted]

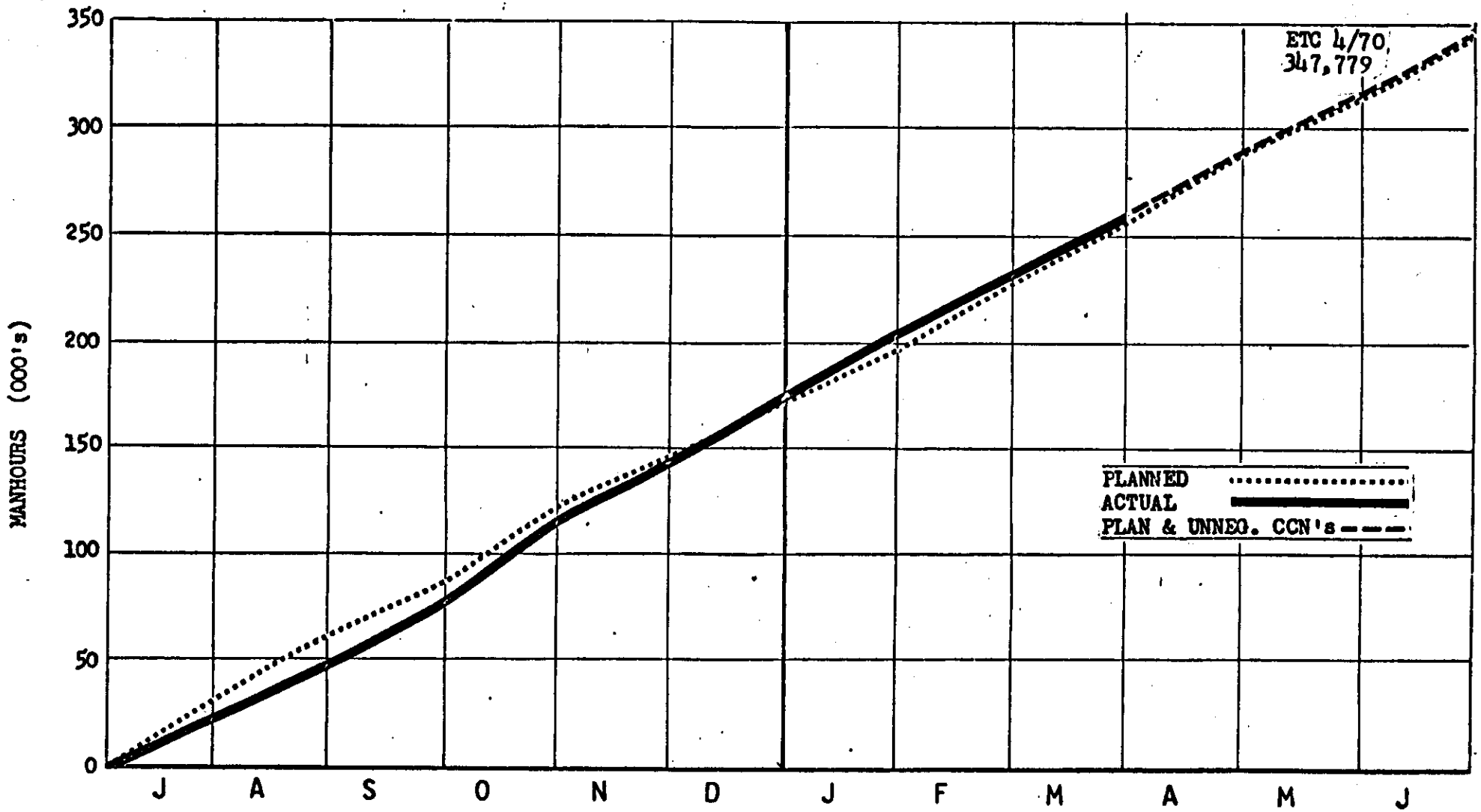
PLANNED (CUM)	
ACTUALS (CUM)	

* Includes [redacted] Non-Fee Bearing Cost as Negotiated on AWA (Relocation)

HANDLE VIA CONTROL SYSTEM ONLY

LOE ESTIMATED/ACTUAL HOURS - FY 70
TOTAL AP - SV - APC

APRIL 1, 1970



PLANNED BUDGET (CUM)	32,989	61,182	88,615	124,000	148,978	170,889	198,885	228,730	256,795	290,034	316,575	343,485
ACTUALS (CUM)	26,170	49,244	75,542	116,285	144,365	171,099	204,294	232,257	257,525			