BYE-7005-70
Copy 20 of 14
2 January 1970

MEMORANDUM FOR: Director of Special Projects

SUBJECT : Photo Reconnaissance Systems Report No. 21

I. CORONA

A. Accomplishments

Mission 1108 operational phase was concluded last week. The REACIN 31 report on 1108-2 indicates fair quality photography from the forward looking camera and good quality from the aft. An MIP rating of 100 was assigned. Also, the REACIN 31 stated that the best ground resolution of the SO-242 appears comparable to the best color provided by Mission 1106 (SO-121). This preliminary assessment is with a duplicate and a comparison of the original positive of the two missions may show SO-242 better, even though the duplicates compare equally. Because of the present limitation of the duping material, the NRO has been requested (Headquarters message 5296) to provide the 1108 PET with as much SO-242 original positive from Mission 1108 as possible.

B. Problems

1. "Dr. A" data (CR-11) Meeting at Headquarters on 5 January.

2. Switch programmer on CR-9. Analysis continuing.

C. Projected Status

1. CR-9 (Mission 1108). PET at NPIC on 13 and 14 January.

2. CR-10. Chamber on 5 January.

3. CR-11. Block test beginning 5 January.

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4. CR-12. Block preps.

5. CR-13. Tracking test.

6. QR-2. Acceptance.

II. HEXAGON

A. General

The draft RFQ for Follow-on Units 7 through 12 is in final typing as a result of the 30 December meeting involving the Project Office, SETS, and Contracts Branch/OSP. Contracts Branch is preparing the final version of the pricing and fixed price incentive features for Attachment II (Proposal Guide). Copies of draft versions of Contract End Item Specifications for the Mid-Section Assembly, Take-ups, and Forward Film Path Elements will accompany the RFQ.

B. Engineering Model

Initial EM tests were completed on 23 December, and the EM itself was removed from Chamber A on 29 December. Installation of the verification packages on the two Chamber A collimators will begin this week-end. Both EM cameras, operating in the coarse film transport mode only, have been repaired and will reenter Chamber A this week-end, also, to begin checkout, concurrent with the verification package installation, prior to obtaining additional thermal data on such areas as settling time resulting from launch transient effects.

C. Development Model

Progress

The supply was installed and checked out in Ready Room A. Ready Room A cabling has been checked. Pneumatics were installed and checked out. EM #1 take-up was installed in a dolly and will now serve as the Ready Room A forward section simulator.

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Projected Activities

P. E. will go to three shifts on 5 January 1970. Both film paths will be run, using AVE hardware, during the next week. The LSFS, film marking system, thermal data acquisition system (DDAS/ISCCU), and FM multiplexers will be checked for the first time in the next two weeks.

D. Flight Article #1

Progress

The "B-side" coarse film path, using take-up and supply simulators, has been checked. Film drives went through acceptance vibration with only minor workmanship anomalies. The PCM master multiplexer used with the EM has been reformatted and is ready to start Ready Room B testing. The major problem in starting Ready Room B tests has been the incompleteness of parts for the two-camera assembly.

Projected Activities

The sequencer should be received on 9 January 1970. The MFA, PCM mux, and SSTC telemetry data system will be integrated during the next week.

III. Administrative

A. Meetings Requiring Participation of Headquarters Personnel

Date	Subject	Attendees
HQS		
5 Jan	Results of CR-11 HIVOS UTB Tests	Patterson, [redacted] Kohler, Burks
8 Jan	HEXAGON SS Performance Spec Review	[redacted] Kohler

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Date	Subject	Attendees
Hqs.		
8 Jan	Near-Real-Time HEXAGON Capabilities, Generation III Sequencer, Brush Motors, and Regulator Proposals	Patterson, [redacted] Burke
P.E.		
5 Jan (AM)	McLucas, Naka Briefing	[redacted]
7 Jan (AM)	Bi-Weekly Schedule Review	
7 Jan (PM)	OTD Motor Production Review	
WCPO		
5 Jan	SCF TM Data Rate Capability	[redacted]
SAMSO		
5 and 7 Jan	"TBAT" and "TBALL" Software Software CDR's	[redacted]
7 Jan	Color Task Force Discussions	R. Kohler
LMSC		
7 Jan	Informal Field Ops Review	[redacted]

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Date	Subject	Attendees
NRO		
5 Jan (PM)	Naka Committee Meeting	

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Cy 10 - RB/OSP
Cy 11 - OSP/PRS/File
Cy 12 - OSP/PRS/Chrono
Cy 13 -
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FILE INFO 9 JAN 1970

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PRIORITY CHARGE INFO PRIORITY BIRD, PILOT

CORONA

FOR: [redacted] CHARGE [redacted] BIRD

RE EVALUATION OF CR-9 S/I FAILURE

SALIENT SYMPTOMS: LONGER THAN NORMAL CYCLE TIME FOR OPERATION 1A, BECOMING PROGRESSIVELY LONGER UNTIL FINAL FAILURE BETWEEN OPERATIONS 108B AND 109B. SUDDEN REDUCTION IN MOTOR VOLTAGE (FROM 3.5 TO 2.8V) BETWEEN OPERATIONS 108B AND 109B. ALL OTHER FUNCTIONS NORMAL.

POSSIBLE SIGNIFICANCE OF SYMPTOMS: LONGER THAN NORMAL CYCLE TIMES CAN RESULT FROM: 1) EXCESSIVE SYSTEM FRICTION LOAD, 2) INCORRECT FREQUENCY OF DC/AC INVERTER OUTPUT VOLTAGE, OR 3) REDUCED MOTOR TORQUE CAPABILITY RESULTING FROM ERRATIC DC/AC INVERTER OPERATION. SUDDEN REDUCTION IN OUTPUT VOLTAGE FROM 3.5 TO 2.8V WITHOUT FURTHER DEGRADATION INFERS AN OPEN CIRCUIT ON ONE SIDE OF THE PUSH-PULL INVERTER DRIVE.

1) TESTS HERE HAVE PROVEN THAT EXCESSIVE FRICTION LOAD DOES NOT INCREASE STRESS ON DC/AC INVERTER COMPONENTS. THEREFORE, IF SUCH CONDITION EXISTED, IT WOULD NOT HAVE RESULTED IN THE

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EVENTUAL FAILURE OF THE INVERTER PRIOR TO OPERATION 109B.

2) HAD INVERTER FREQUENCY SUFFERED A SIMPLE FREQUENCY SHIFT, THE POSSIBILITY OF THAT FREQUENCY VARYING WITH CONTINUED OPERATION IS ADMISSIBLE, BUT SUCH VARIATION WOULD NOT ACCOUNT FOR THE REDUCTION IN OUTPOUT PRIOR TO OPERATION 109B.

3) ERRATIC FREQUENCY CHANGES OF SUCH NATURE AS TO CAUSE "BREAK-UP" OF THE INVERTER OUTPUT VOLTAGE CAN CAUSE BOTH LOSS OF MOTOR SYNCHRONOUS OPERATION AND FINAL DESTRUCTION OF ONE SIDE OF THE PUSH-PULL OUTPUT DRIVERS DUE TO EXCESSIVE SWITCHING OVER-DISSIPATION. SUCH "BREAK-UP" IS CHARACTERIZED BY ADDITIONAL SWITCHING COMPONENTS (OTHER THAN THE 400 CPS FUNDAMENTAL) APPEARING AT THE INVERTER OUTPUT.

PROBABLE FAILURE: PRODUCTION OF FINAL POWER OUTPUT TO THE MOTOR INVOLVES A TUNING FORK OSCILLATOR, PULSE SHAPING CIRCUITS AND POWER OUTPUT STAGES. THE MOST LIKELY COMPONENT FAILURES CAUSING ERRATIC OUTPUT ARE THOSE ASSOCIATED WITH THE OSCILLATOR AND PULSE SHAPING CIRCUITS. A NUMBER OF INDIVIDUAL COMPONENT FAILURES COULD GIVE RISE TO SUCH FAILURE. INASMUCH AS NO INVERTER-INTERNAL T/M IS AVAILABLE, IT IS IMPOSSIBLE TO PINPOINT WHICH CIRCUIT IS RESPONSIBLE, LET ALONE WHICH COMPONENT.

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THERFORE, IT CAN BE CONLUDED ONLY THAT AN INTERNAL INVERTER FAILURE, RESTRICTED TO APPROXIMATELY 1/2 OF ALL INVERTER COMPONENTS, OCCURRED.

PROBABLE CAUSE OF FAILURE: IT IS NOTED THAT SYMPTOMS OF MALFUNCTION OCCURRED FROM THE VERY FIRST OPERATION. A CONFIDENCE TEST OCCURING PRIOR TO MISSION WAS NORMAL. IT WOULD BE REASONALBE TO ASSUME THAT ENVIRONMENTAL CONDITIONS ASSOCIATED WITH LAUNCH WERE RESPONSIBLE FOR THE INITIAL COMPONENT FAILURE OR DEGRADATION WHICH GAVE RISE TO THE EVENTUAL INVERTER FAILURE. OF THESE ENVIRONMENTS, THERE IS LITTLE DOUBT THAT VIBRATION CONSTITUTES THE MOST SEVERE STRESS CONDITION.

CORRECTIVE ACTION: IT IS RECOMMENDED THAT INVERTERS BE SUBJECTED TO RELATIVELY HIGH LEVEL VIBRATION TESTS PRIOR TO USE. THE LEVELS SHOULD BE OF SUFFICIENT MAGNITUDE TO ASSURE THAT THEY EXCEED THE HIGHEST LEVELS ENCOUNTERED DURING LAUNCH.

SIGCEN NOTE: PILOT ADDED INFO ADDEE PER BIRD REQ.

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16 January 1970

MEMORANDUM FOR: Director of Special Projects

SUBJECT: Photo Reconnaissance Systems Report No. 23

I. CORONA

A. Accomplishments

1. The UTB Evaluation meeting was held at Headquarters on 9 January. UTB will be flown on CR-11. LMSC and Itek will attempt to hold the camera temperature between 70 and 80 degrees F. The launch time may have to be held within close limits to insure an orbit that will provide this temperature range.

2. CR-10 completed HIVOS testing with no major problems. The data is now in evaluation.

3. The PET meeting on Mission 1108 was held at NPIC on 13-14 January 1970.

B. Problems

1. A minor tracking problem has been experienced with CR-13. The nature of the problem is not unusual; that is, getting the film to pass through the cutter so a clean cut will result during the cut and wrap sequence. It is called a minor problem on CR-13 because the RV and instrument alignment in the integrated system is causing more aggravation than usual.

2. A meeting at the AP is planned for 16 January to determine the optimum thermal paint pattern for CR-11 and the necessity for supply cassette heaters. Launch window considerations will also be discussed.

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C. Projected Status

1. CR-10. Storage Preps.

2. CR-11. Flight Preps.

3. CR-12. Block Preps.

4. CR-13. Tracking Test.

5. QR-2. Boston modifications being accomplished.

II. HEXAGON

A. General

1. Headquarters, SETS, and SSC met to derive a test/test procedure schedule reporting format which will be viable and will be used as a guide for scheduling test procedure reviews, attendance at selected tests, and the conduct of acceptance/qualification certification meetings. Ironically, this type of information existed in several different groups within SSC, but the groups were not communicating to provide the consolidated picture.

2. SSC is about to release the revised Qualification Test Plan (PM-1188-X-A), the Development Model Test Plan (TL-0087A), and the P-1 Model Test Plan (TL-0105). These plans have been delayed because of uncertainties resulting from the incorporation of certain qualification tests in the P-1 Model. The dynamic nature of the test program because of technical, policy and schedule problems creates significant problems in test planning as well as test documentation.

3. The upcoming AP move and installation of the 360/65 computer was negotiated with LMSC on 14 January. A detailed report will be made in the Monday Staff Meeting.

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SUBJECT: Photo Reconnaissance Systems Report No. 23

4. The RV IFWG was held on 13 January at Lockheed. The last major controversial item was resolved with the signing of the RV/SS and RV/SBA Active Thermal changes to the Thermal ICD's. The SPO has initiated a system with Lockheed and McDonnell in which an ROM is to be presented before the signing of any ICD or IRN. As a result, five minor IRN's, which were agreed upon, were not signed. Considerable negotiation between the SPO and the contractors also took place in the meeting. McDonnell reported a weight increase of 255 lbs. over the maximum ICD weight. Taking this in conjunction with the weight contingency of 236 lbs. in the sensor system over the ICD maximum SS weight, the total system weight problem is apparently becoming more serious. However, the contingency that SSC reports is unrealistic as they are carrying large subcomponents as calculated weights (which permits a large contingency to be carried) when they have actually been weighed. This will be corrected in the February weight report.

5. Eastman-Kodak was requested to send 1,200 ft. of SO-242 to WPAFB for initial testing. A test program will be outlined later this month at WPAFB to include air bar sticking, outgassing rate, and other physical characteristics tests.

6. An informal review was held at Perkin-Elmer on the operational characteristics of the GFE in the Danbury photo lab. It appears that the Project Office has been getting somewhat erroneous information regarding the amount of maintenance which has been required by the machines. The machines are working satisfactorily, and all four are in operation. Effort is underway at Perkin-Elmer to produce a master calibration tool (density wedge and focus target) which will be used to correlate the automatic microdensitometer and the Mark 2 microdensitometer.

7. It appears from some of the curves that have been produced so far in the evaluation program that the present modified versamat B processing chemistry will penalize system resolution in the neighborhood of 40 or 50 lines/mm. The new 641 chemistry, which is being considered as an alternate, reportedly will give better resolution. A presentation on the comparison of the two chemistries will be given at Perkin-Elmer by

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Kodak on 20 January. However, there is a possible problem that the versamats cannot handle the 641 because of its higher gamma. Currently the versamats operate in the neighborhood of 18 to 22 feet per minute and the processing lab at Perkin-Elmer has managed to control the gamma very well indeed, but if the higher gamma 641 causes an increase in machine speed over 22 feet per minute, this is beyond the capability of versamats.

8. A contamination problem has become evident in the beryllium supply cores occurring above serial numbers 20. Perkin-Elmer has received to date 32 supply cores. The vendor, American Beryllium, is at Perkin-Elmer today to investigate this problem. It is suspected that some sort of contamination is leaking out of the vent holes of the compliant layer and causing a corrosive type build-up on the face of the core. The source of this problem is suspected to be the vendor's cleaning process. Prior to core serial number 20, American Beryllium had an outside vendor do this cleaning. It is thought that, from number 20 on, they performed this cleaning process in-house. Of the total order of 36 supply cores, 14 have been subjected by E.K. to overpressure conditions beyond the yield point of beryllium, which means that they are unsuitable for flight use. In addition, 6 of these 14 and two more were improperly heat treated in manufacture, making a total of 16 not flightworthy. They all can, however, be used for ground test, provided they are not overstressed again. A meeting is being held at Kodak on 21 January to examine the data on their new film spooling parameters in an effort to decide what parameters will be used from now on such that no further overpressure conditions will occur.

9. A cursory review of film requirements at Perkin-Elmer indicates that they are going to ask for six 26,000 foot rolls per model test as opposed to the original two. In addition, they are expected to increase their requirements for forward section build-up film needed on the West Coast.

B. Development Model

1. Difficulties were experienced during the week with the sequencer and film tracking. The sequencer was sent to RadInc for fault isolation,

but as of this time RadInc has not been successful. Testing is continuing, using the velocity test box, but the sequencer will become the pacing item over the weekend. P.E. is playing a shell game with the Qual, Engineering, Development, and Flight sequencers to solve this problem. The alignment problem has been traced to misalignment between the film drive and crossover and between the two rollers in the film drive portion of the twister. The film drive-to-crossover alignment was improved with marked decrease in film lateral oscillations, and a pair of yokes was installed on the film drive twister rollers. If these yokes improve the film tracking during testing to be conducted today, they will be incorporated into the reference design and installed on all units. They will be installed on both film paths of the "D" Model prior to qual vibration.

2. DM #2 take-up has completed vibration testing in all three axes. The encoder survived, even though it had previously been reported that this encoder was not epoxied to the shaft as required. Previously experienced problems occurred again, i.e., micro switches shifted, and the builder roller cage mechanism jammed. While not impacting on the DM #2 delivery slip themselves, the necessity to expend considerably more effort on curing these problems on subsequent take-ups is emphasized.

C. Flight Article #1

1. Camera B was run at Vx/h increasing from .018 to .054 at 120° scan in the recycle mode. A loss of tension occurs at Vx/h of approximately .048. The tension loss is thought to be due to a lack of torque capability of the Camera B metering capstan. It is planned to replace the metering capstan during the TCA retrofit cycle. The commutation track on the B-side platen encoder is out. As a result, the platen is nonoperative.

2. An operator error during test resulted in a high tension on the B-side film path. One roller was fractured and a number of others have brinelled bearings. The fractured roller was replaced and the system is working again. The film path will be checked in detail during the retrofit cycle.

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3. Camera A film drive has been completed and mounted on the TCA. Camera A coarse film path and platen are working. The fine film path is being tested.

4. The supply assembly is proceeding well. Supply completion is now scheduled for 4 February versus an 11 February need.

5. SBAC has defined the schedule for the structural modifications of the midsection as a result of the SPO decision not to have a controlled shutdown of the first stage. They have indicated it will take 10 days (24 hours per day) starting on 28 January. P.E. is replanning their midsection work to be compatible with the defined SBAC requirement. The midsection is the critical path. The midsection modification will result in an additional schedule delay of the delivery of the flight article sensor to the SBAC facility, beyond the 11 May date previously agreed on.

III. Administrative

Meetings Requiring Participation of Headquarters Personnel

Date	Subject	Attendees
LMSC		
19 Jan	Building 156 and A/P Tour	[redacted] Lundahl, [redacted]
TRW		
19-21 Jan	MPE/MPR CDR's	Webb, [redacted] Johnson
PERKIN-ELMER		
20 Jan	Processing Chemistry Meeting	[redacted]
BOLLER & CHIVENS		
22 Jan (AM)	Facility Review	[redacted]

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Date	Subject	Attendees
P.E. AEROSPACE		
22-23 Jan	P.E. Aerospace Production Capability Review	Crowley, Patterson, [redacted]
ITEK		
22 Jan	"Special Studies" Contract Review	[redacted]
23 Jan	SI Camera Payload Information Meeting (PIM)	Kohler
SAMSO		
22 Jan	Managers' Meeting	Patterson
EASTMAN-KODAK		
21 Jan	Film Spooling Meeting	[redacted]
RCA		
20 Jan	DM-2 Buy-Off	[redacted]
UNIVERSITY OF ARIZONA		
19 Jan	Photo Performance Briefing	Kohler

[redacted]
PMO/PRS/OSP

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