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Copy 10 of 14
16 April 1971

MEMORANDUM FOR: Director of Special Projects

SUBJECT : Photo Reconnaissance Systems Report No. 88

I. CORONA

A. Accomplishments

1. Mission 1114 (CR-14) "B" bucket recovery was accomplished successfully 9 April 1971 using the "lifeboat recovery method". The film was processed and analyzed with a resultant assignment of an even higher MIP rating than that of the "A" bucket. The 125 MIP was the best ever assigned.

2. Post-flight reporting on Mission 1114-2 will be completed today with data-link transmission of the SRV tape recorder summary and SRV tape recorder frame ephemeris. An unusual amount of tape recorder processing problems have been encountered and have resulted in a two-to-three day delay in finishing the tape recorder reports.

B. Problems

Due to the failure of the LMSC vehicle orbital timer, Mission 1114 ended on day 16 rather than day 17, but its lifetime was significantly longer than the 6-10 days initially projected during the early orbital period when the gas use rate was especially high.

C. Projected Status

1. CR-15. R-25 backup status.

2. CR-16. Block test.

3. CR-8. HIVOS readiness.

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II. HEXAGON

A. General

1. The first Schedule IFWG since last September met at LMSC on 14 April. Discussions were held with Col. Buzard on the day previous in an attempt to resolve inter-Governmental differences. The midsection delivery date from LMSC to Perkin-Elmer is 15 July 1971, according to our contract, and 19 August 1971 under the SAFSP contract with LMSC. Perkin-Elmer has been asked to submit the cost and schedule impact of a 9 August delivery, that being the date Lockheed can meet without any cost impact.

The Project Office was successful in arranging a HEXAGON Program schedule which would permit a one month early delivery to the pad for SV-5, two months early for SV-6, and three months early for SV-7 and up, thus allowing a backup or pipeline vehicle beginning with SV-7. The above schedule would be completely consistent with the recently negotiated delivery schedule for the Perkin Elmer follow-on contract. It also includes A-2 chamber tests through SV-6, should the SPO and SSPO desire them beyond SV-2.

2. A review of the major constraints for SV-1 was held with the West Coast Project Office on 15 April. The conclusions were that the SSPO inputs to the software contractor are complete and accurate and, despite the fact that some minor modifications to the software data base may be needed, the hardware, software, and paper interfaces are all compatible. A TWX will be prepared to the SPO commenting on his recent message to the SOC on his version of the system constraints for SV-1.

3. Briefings were presented to the Naka Criteria Committee and to Dr. David and his staff on the use of HEXAGON and AXUMITE for quick reaction crisis systems. The briefings appeared to be well received and the questions asked indicated a good interest in both systems. Briefings are expected to be extended to Messrs. Helms and Packard and to Dr. McLucas next week.

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4. A tentative date of 26 April at 1:00 P.M. in Building 156 has been established for the SSPO review of the Sensor Subsystem Readiness for First Flight. This review is to cover all of the test results and problems encountered with S/N 003 from its delivery to the integration facility to readiness for shipment. All of the tests on S/N 003 have been completed and the performance is considered to be satisfactory for launch.

B. Advanced Planning & Management Support Activities

1. A procedure for a more efficient processing of DD-250's between SSC and Hqs. has been instituted.

2. Planning for the Joint Agency Color Symposium to be held in the Hqs. Auditorium on 27-28 April is continuing. A meeting with [redacted] of DIA, OSP/SS and PRS/MO was held for the purpose of assigning responsibilities; i.e., registration, parking, luncheon arrangements, security, etc.

3. Additional budget data was prepared for PPBB/OSP to support budget hearings scheduled for 20 April 1971.

4. Efforts continue on the derivation of the Block II Program Plan and presentation. The preliminary Program Plan is phased to take advantage of certain development programs within OSP and thereby minimize new developments which may be required for the Block II system.

C. Engineering

1. A TT&C IFWG Meeting was held at SVIC on 15 April. The following issues were considered:

a. The recommendations of the recent data signal subgroup were reviewed. The IFWG was in agreement that both SBAC and P.E. should modify their respective hardwares. P.E. had previously initiated a change to the Data Logic and Fuse (DL&F) box to eliminate the spurious "request" and "write" pulses at the

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interface (SV-3 effectivity). The SPO has not yet directed SBAC to eliminate the catastrophic failure mode in the frame counter portion of the Data Interface Unit (DIU). Effectivity of that change, if implemented now, would be SV-3.

b. As a result of a recent problem where the SV-1 chamber had to be repressurized in order to gain access to the sensor, P.E. and SBAC will look at the possibility of incorporating a camera relay reset command for ground test only. The problem is that, if vehicle power is removed from the camera while certain interface relays are in the "on" state, power cannot be reapplied until the relays are reset. At present, the only way to reset the relays is to reapply power. This is strictly a ground test and not an orbital problem.

2. There were two actuation failures of the take-up deorbit pins during a recent acceptance test at RCA. This occurred on one of the two redundant solenoids when energized at the minimum voltage (18 volts). The failure was attributed to a high spot on the recessed slot on the pin. Based on these reports, the SPO became concerned about the delay in the actuation time of one of the deorbit pins on SV-1. The actuation time was 100 milliseconds vs a 500 millisecond spec. It was decided not to retrofit the pins on SV-1 because:

a. There was no failure on SV-1.

b. Actuation time was within spec.

c. Pin retrofit would result in a 2 1/2 week schedule slip.

d. The pin actuation time is to some extent a function of the test procedure used.

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e. A weight difference of 140 lbs. or less between A and B sides of the take-up would not require a deorbit pin actuation.

f. Under the most probable reentry conditions, only the dispersion area would be affected.

3. A Tech Cert meeting was conducted at SSC on 14 April 1971 covering the 5A3 (Steerer Power Supply) and 2A1 (Platen Servo) electronic boxes. The data package for these two boxes had been previously reviewed by both Hqs. and SETS and the comments transmitted to P.E. P.E. was ill-prepared for the Tech Cert, and they did not have the majority of our previously submitted questions answered; therefore, a list of open action items was left at P.E. and the Tech Cert certificates will be signed upon action item completion.

4. PSO and P.E. personnel reviewed the drawings for the SSTC spares in an effort to determine which items can be procured directly from the vendor by PSO. PSO will provide Hqs. with a full report; however, preliminary comments indicate that approximately 43 spec control drawing items can be obtained from vendors and approximately another 150 are vendor off-the-shelf items (the SCD items are those which have to have a certain amount of special conditioning performed).

5. EK was unsuccessful in their first effort to manufacture low relative humidity SO-255 (color film). The Project Office is planning to have the capability to fly SO-255 in SV-4 (S/N 005), and this material thus would have to be made available by approximately November 1971. P.E. has a considerable number of questions regarding SO-255 as does the Project Office, and a meeting is being planned to discuss some of these questions and problems with Kodak and P.E.

6. A meeting was held at Kodak on 15 April to discuss film taper, core pressure and other such items. The Project Office had provided to Kodak a recommended interim addition to the film specification. This was discussed at length and it is clear that the issue is not yet resolved although there is basic agreement. Until such a specification is agreed upon, Kodak will continue to wind the flight rolls as they have done for the first four flight rolls for SV-1. It is felt that an agreement can be reached on a specification within a week or two.

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The results of core pressure monitoring tests by P.E. and Kodak clearly indicate that the core pressure decreases as a function of time. The tests at P.E. on Watermelons (large test rolls) numbers 3 and 4 indicate that rolls with pressures of 250 to 300 psi can survive severe vibration.

During the process of winding the second flight backup roll, the core pressure was exceeded, and the flight core has taken a permanent set of 1.8 mils. The core must go back to P.E. for inspection and determination as to whether it should be flown or used for test. Kodak is winding the second backup roll now on another flight core while monitoring core pressure every 2,000 ft., previous core pressure having been monitored at 15K, 25K, 50K, and 112K foot intervals. In the above overstressed core, the pressure was exceeded between the 25K and 50K foot measurements.

The core delivery situation is still very tight. Of the 10 cores previously wound, only two can qualify for flight. If outer rings are required to make the cores flight worthy, the cost will be about $10,000 each and approximately six weeks schedule time.

Kodak provided the Project Office with a density trace across the film defect which was found in one of the SV flight rolls showing no density effect at all.

7. The Chamber "A-1" results on SV-1 were reviewed at a Thermal Subgroup Meeting on 15 April 1971 at SVIC. The raw data indicates that, in the event the cameras are operated in a "2 sigma cold" environment, the ICD constraints on temperature radiance will be violated. The concern for this is tempered by the fact that the test configuration had some adverse features which prevents the correct environmental simulation and increased the apparent radiance during the test.

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D. Operations and Systems Analysis

1. A working meeting was held at the WCPO to review detailed procedures and techniques for using electromechanical (EM) data to explain performance anomalies and included representatives of Hqs., WCPO, SSC and SETS. The purpose was to evaluate how well EM data correlated, in specific cases, with photographic data. Several performance anomalies noted on S/N 002, S/N 003 and S/N 004 were studied in detail. In summary, it was determined that the film-to-bar sync (FBS) and MC summed error signals correlated well with photographic data, even on a frame-to-frame basis.

The FBS data on the "resolution discontinuity" observed on S/N 002 at the 55° collimator position clearly showed that this was due to a highly irregular FBS signal over a large portion of the "plus" side of the "B" camera format, this signal changing its position slightly and, therefore, not always being in the view of the collimator. Using the FBS signal to determine image motion errors showed that these particular errors oscillated at rates as high as .15 inches/sec. This phenomena was also observed on the FBS data of S/N 004.

Studies were also made of the MC summed error with changes in the DC level (F-knob) of film speed. SSC has been claiming, on S/N 004, that the F-knob changes caused changes in the AC film-synchronization error. Since an F-knob change was made on S/N 002 after acceptance, it was thought that this might show the same effect. However, such was not the case. In fact, the AC level got somewhat better after the F-knob change, just the opposite of S/N 004.

A detailed report of this work will be issued under separate cover.

2. In preparation for incorporating a resolution (GRD) requirement for HEXAGON, the Air Force has added an equation to their software that calculates GRD for the center of each target/WAC cell. They use the basic camera system resolution supplied by this office as a function of solar altitude and scan angle and convert to GRD by considering

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the scale of photography and a fudge factor, K_c. This factor is intended to account for non-optimal photographic conditions such as poor haze or target reflectance and is to be supplied for each WAC cell by the SOC. The SOC will obtain the K_c factor from a pre-mission CRYSPER run. A meeting was held at SAMSO on 14 April between [redacted] (SAMSO), Major C. Lehman (SOC), [redacted] (OSP) and M. Luther (TRW) to discuss their resolution equation and the required fudge factor. The significant results of the meeting were as follows:

a. The Air Force will work on a gradual cut-off equation (i.e. something like cosine/2 + .5) for future incorporation to the software.

b. The Air Force will have TRW add one significant figure to their program (making it 2) to cover the K_c range required in the increments necessary.

c. CIA/PRS will modify CRYSPER to aid Major Lehman in determining the K_c factor.

E. WCPO

1. Two decisions of the SPO were announced at the Ops IFWG. The first was the decision by the SPO to reset the programmer clock with the resulting momentary telemetry dropout after liftoff, because the LMSC PADPACS software could not verify launch readiness if it were done just before launch. The second decision by the SPO was to recover the heat shield on RV-2 which would be allowed to contain a fully loaded take-up. This appears to be much less desirable than doing it on RV-4 and follow-up comments are being prepared.

2. A command sequence to wind all exposed film on the take-up being recovered, prior to the transfer and wrap sequence, caused some comment by the SPO and [redacted] offices. The sequence was to permit the wind, transfer and wrap to occur within a station contact. The comments ranged from "don't wind it all" to "use the existing constant velocity sequence to wind before the station pass". Further discussion is scheduled.

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3. Command checking exercises being held at the STC this week are providing opportunity for the SSC command checkers to gain more familiarity with checking 'TUNITY-generated commands. Nothing of particular significance has resulted from the exercises thus far.

4. The SETS personnel assigned to the "HOPE" software effort spent 14 and 15 April at the WCPO. The purpose was to check out the latest "HOPE" modules and support the "HOPE" rehearsal by SSC/WCFO. While some minor difficulties have been encountered, for the most part the check-out and the rehearsal have been very successful.

5. The HEXAGON Orbit Generator (HOG) software, which builds the orbit file for in-flight look-ahead, is in the final stages of checkout with documentation underway. However, the latest version of the Reports Control Manual now indicates "HOG" input will be DORBEL elements instead of BREAKWELL as previously agreed between WCPO, SOC, and SCF personnel. Evaluation of effect of this change on "HOG" readiness for SV-1 is now underway.

F. Model Status

1. SDV-III (Development Model)

SDV-III was returned to SVIC on 9 April. The shroud is being removed at this time, and SDV-III will be available for SSC to remove their components on 21 April.

2. SV-1 (S/N 003)

SV-1 is undergoing pre-ship horizontal baseline testing. Vertical baseline testing was scheduled to commence today, but will probably be delayed until LMSC can fix the gyro in the attitude reference module.

3. SV-2 (S/N 002)

All functional testing of the forward section has been successfully completed. The F/S is undergoing final inspection and should be ready for mate on 18 April. R&I of midsection has been completed, and it is ready for mate.

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4. SV-3 (S/N 004)

S/N 004 is still plagued with "A" side tracking problems. P.E. will remove the film drive and replace it with one which has no twister in an effort to further isolate the problem. It appears that this exercise will add at least one week to the earlier 8 May 1971 ship date.

5. SV-4 (S/N 005)

The TCA and supply have both been installed in the midsection, and take-up alignment is in process. MFN 3.05 has commenced, and P.E. expects to pull film through the system for the first time next week. The system is scheduled to go into Chamber "A" 21 May assuming six days for midsection vibration.

III. Meetings Requiring Participation of Headquarters Personnel

Date	Subject	Attendees
HQS		
19 April	DCI QRC Briefing	Patterson, [redacted]
20 April	DD/S&T "H" & "C" Budget Review	Patterson
NPIC		
20-21 April	CORONA PET Meeting	[redacted] Kohler, [redacted]
22 April	NPIC Operations Briefing	Brownman, Kohler
RCA		
20 April	Take-Up P5-1 Buy-Off	[redacted]

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IV. TRAINING

[redacted] will attend the Systems Engineering Conference being held at the Hotel Sonesta 19 - 23 April.

Donald W. Patterson
D/PRS/OSP

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