CORONA/ARGON

[redacted]
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4 May 1962

MEMORANDUM FOR : Chief, Development Branch, DPD

SUBJECT : Trip Report

1. PURPOSE: Attended an ARGON meeting in Boston 2 May and the Systems Engineering briefing on CORONA/LANYARD on 3 May.

2. ARGON: An informal meeting was held in a room at the Charterhouse in Newton to discuss general problem areas on the ARGON program. Representatives were there from Headquarters, SSD, and LMSC. The following is an outline of the general discussion:

a. Instrument Status: Instrument # 5 is the primary payload for the current 16 May mission with Instrument # 6 as back-up. A message has been received from [redacted] verifying that the recent post-patio tests on these items placed them both within specification, which was the final action required for flightreadiness certification. Serial # 9 has been examined by FCIC in their Long Island plant and found to be flightworthy after a few emulsion build-up areas were removed, and is presently waiting shipment back to LMSC. It was decided in this meeting that there was no present urgency in returning SN-9 to LMSC, therefore, # 9 will remain in its packing case at FCIC until after Mission 9034A. The primary reason for leaving the instrument in Long Island is to provide a potential source of an acceptable lens for one of the new instruments if necessary. There is no need to expedite SN-9 to the West Coast unless Mission 9034A is a failure and/or another ARGON mission is planned for the near future. In the new order of ARGON instruments, serial numbers 10, 11, and 12, one of these items is going to be a month late due to fabrication of a new lens assembly by [redacted] It is felt that this is of no significance since we will in essence complete the ARGON program with three spare instruments. On the other hand if an ARGON mission is scheduled earlier than the present September date, it would be desirable to use one of the new instruments with several reliability improvements rather than SN-6 or 9, as schedules permit.

b. Data Flow: The group was informed that the reports control manual would be published in the near future. This will take care of most of the data flow problems up to and during actual mission. The following loose ends, however, were uncovered:

1. Ephemeris and other data. The CORONA program and also the ARGON program have a series of exchanges of computer data outside the current capability of communications systems (card decks, magnetic tapes, specific calibration data, books and drawings). It was previously set up between LMSC and [redacted] that [redacted] would supply the magnetic tape ephemeris for use on the IBM 704 or 709 computer as soon as it was available after a flight. [redacted] has been and will be at least for Mission 9034A (unless it is otherwise determined by COMOR) the recipient of this tape and the repository for calibration data on the instrument. It was previously arranged that [redacted] would supply a photo plot of coverage to all users. This problem, as well as the general specification for producing reproductions of ARGON material (including priorities and numbers of copies) is now the responsibility of [redacted] and NPIC in coordination with directives received from COMOR.

c. Data Feed Back: A requirement was stated by LMSC for an early feed back of actual plotted ephemeris from the ARGON product to verify and assist in the evaluation of guidance systems and control of space vehicles. [redacted] has stated that quick evaluation of this type could not be produced, rather, LMSC would have to wait a number of months until the majority of geodetic positioning had been extrapolated through their automatic readout system. There appears to be an incompatibility of design in the type of readout produced by the [redacted] equipment in conjunction with the requirement as stated by LMSC. Undoubtedly, a black box could be designed to extract the data required by LMSC from the [redacted] equipment, however, this would take time and money. [redacted] felt that ACIC could produce this data in a timely fashion and accepted the action item to investigate this possibility.

d. Model: LMSC has worked up a plastic model of the ARGON angular relationships between the stellar and terrain camera on orbit. They feel that this may be a useful tool for exploitation. [redacted] plans to bring this item down to show to NPIC at an early date.

e. Selectivity of Injection Angles: When any injection angle other than the normal polar orbit is used, there are problems of available star field for the stellar camera. Also, there are times when the stellar camera may be in an unfavorable relationship to the sun. Rather than discuss this at this meeting, it is suggested that LMSC submit any such data or proposals through Lt. Colonel Murphy to the operations people at Headquarters for analysis of this concept. Also involved in this area of discussion was the R-19 vs. the R-35 readiness requirements. [redacted] stated that the requirement for maintaining an R-19 in the ARGON program is still in effect.

3. CORONA/LANYARD: This is the first official meeting on this subject that I attended. It is apparent that the design parameters, production schedules and program plans have reached a relatively stable position. [redacted] was surprised to find the earliest flight date to be the first of March 1963 instead of the 23rd of January 1963. Itek was asked to explain this apparent difference in a memorandum for Dr. Charyk. I feel personally, that this difference is primarily caused by the difference in the optimistic proposal and the realistic schedule. Even this 1 March date is predicated on no serious problems, therefore, I believe it relatively safe to assume that our first flight will probably occur the first part of April 1963.

a. Yaw Control: Itek presented several possible solutions to controling yaw during flight. Briefly, the 66 inch focal length combined with a relatively low orbit (80 to 140 NM) and an f/5 lens system with a 1/250 second shutter speed presents image motion due to earth rotation. This could be attacked by IMC control of the mirror portion of the optics but this procedure is not recommended due to complications of the system and the potential degradation if this technique is not exactly correct. A more practical approach would be to utilize the vehicle control system to actually yaw the satellite of orbit to correct for "drift". This is the procedure recommended by LMSC, however, it was felt that the personnel in the tracking stations would be able to interpret this maneuver as one associated with photography. [redacted] took the action item to investigate this with Security with a requirement to obtain approval, if possible, to devise a

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logical cover story , and perhaps consider clearing about 20 additional people from the tracking stations and VAFB in order to plug any possible conjecture.

b. Film Type: Itek stated that SO-132 was required to get the maximum from the primary camera subsystem. SO-130 would permit higher shutter speeds and reduce the yaw effect mentioned above, but would limit the system capability from a resolution standpoint. In order to obtain the optimum lens film combination, the film promised by Eastman-Kodak which lies between these two emulsions in speed and resolution is optimum. I accepted the action to put pressure on Ed Green to produce this material.

c. Indexing Attitude Camera: This is the new terminology for the auxiliary frame camera in combination with a stellar camera. The integration of the E-5 system into the CORONA recovery bucket necessitated a rotation of the takeup spool for the primary camera 90°. This causes no problem with the primary camera system but does present some problems in the film path for the auxiliary frame camera. LMSC states that the film path for the auxiliary frame camera will have to be turned 90° to the present configuration with appropriate rollers rather than allowing this item to track in a straight film path to the takeup cassette. Since this item is already tension sensitive this may cause considerable reliability problems. Since LMSC was going to have to relocate the takeup spool for this item anyway, they proposed to increase the film load to 570 feet at the same time. This would permit continuous photography from the indexing attitude camera on every pass during the four day operation, regardless of whether the primary camera was operating or not. This increase in size of the takeup spool presents a number of interface problems within the recovery bucket including possible relocation of the battery and at least move the T/M beacon. Captain Johnson felt that this would necessitate re-qualification of the recovery system. In addition, it is obvious that the entire indexing attitude camera would have to be enlarged to take care of the additional supply spool. The tension problems associated with moving a larger mass for a longer period of time through the camera system could adversely affect reliability. Due to all of these potential problems, it was

determined that [redacted] would discuss the requirement for an increase in film capacity through customer channels to COMOR. It was left that the film capacity of the indexing attitude camera would remain at approximately 130 feet unless a new requirement was submitted from COMOR to the Configuration Control Board.

d. Programmer: The basic E-5 system contains an on-orbit command control capability for selective coverage of five positions (30° left, 15° left, vertical, 15° right, and 30° right). In addition, the E-5 system has a stereo or a mono mode. It is evident that the requirement in the "L" system for pre-programming of all of these parameters will definitely require precise selection of targets considerably ahead of launch date. In addition, while there will be some capability for adjustment of start pass positions, an ability to obtain precise predetermined orbits will be mandatory. The alternative to selecting various selected targets is to program a relatively longer portion of the pass in a single mode of operation. Also the question of stereo vs. mono coverage becomes relative. Coverage is cut down to approximately one half in the stereo mode and we are limited by the recovery system to approximately 7800 feet of film. The stereo photographs will be eight frames forward and eight aft, along the vehicle flight path and there will be a dead zone between photographed areas equal in length to the length of the target photographed. The current proposal has the stereo mode as primary and the monoscopic mode as secondary. I feel, and [redacted] concurred, that the monoscopic mode will probably be the primary mode of operation due to basic system limitations inaccuracy coupled with the necessity to pre-program targets. The decision on these items of operational usage rightfully belonged to COMOR and the operations staff rather than to the Configuration Control Board. This is an area which requires early decision and [redacted] agreed to submit a letter to Mr. Reber from Dr. Charyk. [redacted] will discuss this with NPIC.

e. Alignment: There is presently only a rough order of magnitude on the alignment of the indexing stellar camera to the main instrument. [redacted] accepted the action item to discuss this requirement with NPIC and submit a letter to the Configuration Control Board on the precision required from a customer standpoint for exploitation purposes.

f. Summary: Detailed minutes of the CORONA/LANYARD meeting will be forwarded by Systems Engineering (S.E.), therefore, this trip report only covers the most important highpoints. As we begin to analyze the basic LANYARD system, I can not help but wonder if the MURAL 2 proposal for a 48 inch scaled-up model might not be a more reliable and less costly approach. These are first thoughts, however, and will require further study. Obviously, the increase in focal length of LANYARD with the same payload capability is going to cut down the area covered on the ground considerably while offering only about 2 feet more of ground resolution if they resolve the potentially more hazardous IMC problems.

[redacted]

Major USAF

cc: NPIC

Distribution:

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DPD/DB/[redacted]

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General System

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