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3 March 1965

(23 Feb. 65 - day of meeting)

MEMORANDUM FOR THE RECORD

SUBJECT : Presentation of FULCRUM to the Land Panel

ATTENDEES: John A. McCone, DCI

Panel Members:

- Dr. Edwin Land - Chairman
- Dr. Donald Ling
- Dr. Richard Garwin
- Dr. Allen Puckett
- Dr. Joseph Shea
- Dr. Edwin Purcell
- Dr. James Baker
- Dr. Sidney Drell

Ex Officio Members:

- Dr. Eugene Fubini
- Dr. Brockway McMillan
- Dr. Albert D. Wheelon

Contractors Representing ITEK:

- Frank Madden
- Calvin Morser
- John Watson
- Kenneth Robinson
- Robert Shannon
- Robert Hills
- Robert Batchelder
- Morris Rubinson (Vidya)
- John Wolfe
- Walter Levison
- Richard Philbrick
- Frank Lindsay

Contractors Representing GENERAL ELECTRIC:

- Charles Hood
- Paul Petty

GROUP 1
Excluded from automatic
downgrading and
declassification

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Contractors Representing AVCO:

Clifford Berninger

Contractors Representing STL:

William Besserer
Thomas Grady
Emery Reeves

CIA Representatives:

Jackson Maxey
Leslie Dirks
John Crowley
John McMahon
John Meehan

[REDACTED]
Roderic Scott

[REDACTED]
John McNamara

TIME OF MEETING : 0900 to 1900 - 23 February 1965

PLACE OF MEETING: ITEK Burlington Facility

1. Mr. McCone held the Panel Members in executive session for the first hour, charging them with instructions. No details of his presentation are available to the writer.

2. Dr. Land formally opened the meeting at approximately 10:30 A.M. by stating to the Panel that it was their responsibility to arrive at a total understanding of the high coverage, low resolution systems which would be presented to them. In effect, Dr. Land went on, it was the Panel's responsibility to understand the character of the film and optics involved, the reliability, and the costs associated with the program so that they could make a meaningful interpretation of each program. He said that the Panel was a national committee which would meet during the next two days to determine what our satellite programs will be over the next few years. He commissioned the Panel to raise any question that they may have about any detail and not stop asking questions until they had satisfied their queries. He hoped that during the course of the

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presentation that it would be made clear to the Panel what was meant by resolution, so that there would be a common reference. As a time schedule, he said he hoped that sometime by the evening of the second, i.e., 24 February, the Panel would be able to finalize its report.

3. Dr. Wheelon then introduced the Agency presentation by stating that the FULCRUM program had been in the works, so to speak, in one way or another for the past year. It grew out of a clear requirement by the Intelligence Community to devise a system which could produce the CORONA coverage at GAMBIT resolution. Dr. Wheelon reminded the Panel members that the assignment was given to the Agency last June by the Panel to demonstrate the feasibility of the FULCRUM system. The results of that program, which has taken some five months, Dr. Wheelon said would be presented to the Panel today. Those participating would be representatives from CIA, various associated contractors and our systems engineers. He then introduced Mr. Maxey as the Agency official responsible for the conduct of this program.

4. During the course of the presentations of the day the following questions were asked:

BRIEFER: Jackson D. Maxey

Dr. Ling:

What is SE?

BRIEFER: Thomas Grady

Dr. Land asked about the statistical data employed in determining the outage on the TITAN II.

Dr. Shea & Dr. Ling: What are the reasons for errors or misfirings in earlier TITAN II's?

Dr. Shea: How many of the last 16 had something wrong with them?

Dr. Shea: What PG means and he questioned in detail the TITAN bending moment.

At this point Dr. Land interjected and stated that the Community must assure itself that everything that is said is at least an acceptable technical risk. If not, then we must return to our homework or redevelopment.

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BRIEFER: Charles Hood

Dr. Drell: What happens if the drag make-up fails?

Dr. Fubini: How long would the system last in a tumbling mode?

Several questions were asked by many Panel Members regarding watts and hours of power.

Dr. Shea asked if we had the G weights and queried the validity of comparison of proposed G weights and the eventual outcome as opposed to the redefinition of the G program weights and the eventual outcome.

Dr. Fubini suggested that if GE was to make a point at all, that they compare their weight prognosis over 4 or 5 projects and not just one.

BRIEFER: Dr. Petty

Dr. Land suggested that we check for CORONA discharge. He also suggested that we make sure that the emissivity in orbit does not change, because you cannot change it once launched.

Dr. Purcell questioned the pressure in the spacecraft and what effect the viewport had on it.

BRIEFER: Mr. Emery Reeves

Drs. Land, Puckett, Ling and Shea asked several questions on the attitude control system design, which one we were planning to use, and how far along on each we were.

Dr. Purcell queried as to the PRF of the ACS and the duration of each pulse.

Dr. Shea suggested that we take a look at the "Q" of the structure and asked if the jet exhaust can disturb the view.

Dr. Drell wondered what disturbances in GAMBIT had we noticed from the attitude control system.

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Dr. Shea wondered if there was a need to put in redundant ACS thrusters.

BRIEFER: Dr. Berninger

Dr. Fubini asked what was the foot print for recovery to chute deployment.

Dr. Drell asked why we arrived at the present referenced design.

Dr. Purcell wondered about the air bars in the film chutes and where the air would go.

Dr. Land asked about the possibility of CORONA discharge occurring in the R/V section, stating that CORONA late is just as bad as CORONA early.

Dr. Garwin asked if the spacecraft had to be reoriented prior to retro.

BRIEFER: Mr. John Wolfe

Dr. Baker asked what are the number of chromotisms?

Dr. Fubini asked what was meant by the film velocity stability.

Dr. Land wanted to know how long it took to rewind.

Dr. Purcell asked if the invar bars take all the axial load?

Dr. Fubini said he was confused as to how the invar bars could be stiff enough to handle the load yet not transmit vibration throughout the payload. He also asked if the weight numbers were valid, and does CORONA discharge occur within a range of pressure.

Dr. Garwin asked if anyone had run film at 200 inches per second in a Bell Jar to see if there is CORONA discharge.

Dr. Drell said that he thought the CORONA discharge problem was due to film drying out.

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Dr. Baker wondered about the gradient thermal condition on only one invar bar or one end of the camera system being cooler than the other.

BRIEFER: Mr. John Watson

Dr. Fubini asked what the temperature gradient and temperature differences were across the surface of the primary mirror from one side to the other.

Dr. Drell wanted to know what the stop determination was.

Dr. Wheelon, at this point, explained the differences between the Eastman-Kodak and Itek aim curve.

Dr. Fubini asked what would film thickness differences do to variation error.

Dr. Baker asked if we had allowed for scattered light and its effect, and what percent of scattered light do we think there would be.

BRIEFER: Mr. Calvin Morser

Dr. Drell asked how many stations and how many measurements were taken in the Ashenbrenner test.

Dr. Fubini asked if it was run in a vacuum.

Dr. Land asked if we had run the Ashenbrenner test on the drum only, i.e. place the film on the drum without rollers.

Dr. Fubini asked if he was not correct in stating that the brassboard tests were not as good as the breadboard.

Dr. Purcell asked if a helium bar had been used in a 100-micron ambient and have you used gas other than helium.

Dr. Land wanted to know what the velocity accuracy requirement was for rewind.

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Dr. Fubini asked how many rollers in the breadboard vs. how many would be required in the actual model.

Dr. Fubini wondered what the film shrinkage percentage was.

Dr. Fubini stood up to observe the chart depicting the experimentation for the film scan velocity and synchronization.

Dr. Garwin asked how many measurements were taken and how long was the film roll.

A query was also raised as to the effect of vibration during the task and whether there was any random reaction.

Dr. Fubini asked if the error budget should include the frequency of vibration.

Dr. Purcell asked if it would not be wise to use gas bars on both sides of the film coming across the platen in order to hold it flat.

Dr. Fubini asked how many slip rings were involved in the torquerers and how wide is the pulse.

BRIEFER: Mr. Leslie C. Dirks

Dr. Fubini

How lousy are the edges on each scan?

Dr. Garwin, in referring to the redundancy versus synchronous period chart, suggested that we plot duplication as a function of coverage.

Dr. Drell asked how we get the current weather input into the camera system. He then asked does the camera state-of-the-art permit it to observe weather conditions for its own use.

(Note: There was considerable discussion concerning the weather chart).

Dr. Garwin asked in computing the fuel requirements for the attitude control system, did we include the

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the R/V fuel. He then asked regarding the thermal conditions involved during injection into orbit.

Dr. Fubini re-raised the slip ring question.

Dr. Ling asked what problems there were re reliability.

JOHN N. McMAHON

Distribution:

- 1 - Maxey
- 1 - Dirks
- 1 - Crowley
- 1 -
- 2 - File

O/DDS&T/SPS:JNMcMahon:amp:7905 (4 March 1965)

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