

Draft -1

March 19 1970

JOINT MEMORANDUM OF UNDERSTANDING

On Wednesday, March 18, 1970 representatives of the Land Panel and the Fubini Panel met at 400 Army-Navy Drive, Arlington, Virginia, and prepared this joint memorandum of understanding.

1. With the understanding that the details of the solid state array system, as described, were examples to establish feasibility and not hard and fast design choices, the two panels agree:

a. The selection of a primary mirror having a  diameter is not necessarily a final design choice. Satisfactory designs of a solid state array system can be established with smaller diameter optics by trading off altitude of operation, better optical quality in the smaller optics, or better sensitivity or longer integration time in the sensors.

b. It is desirable to attempt to accommodate the  diameter mirror in the initial system to achieve a given level of quality of the product. This would permit system growth as the state of the art in fabricating large diameter optics improves and would avoid the expensive subsequent development of a spacecraft to handle this larger size diameter optics.

c. It is possible to design solid state array systems with smaller than  diameter optics or optics equal in size to those possible in film scanning or tape storage. This could be accomplished by accepting the same signal-to-noise performance in the solid state array system as provided by the other two systems. This compromise would enable the reduced system to be available sooner than the full capability solid state array system. The value of the higher signal-to-noise possibilities of the solid state array has not been proven—this question is being explored.

d. The two contractors fabricating the sensors and associated solid state array components have demonstrated that they will be able to produce arrays of sensors with the required performance.

e. The design choices for sensor packaging and the associated electronics to assure the desired reliability, though feasible, have yet to be made. We expect the inherent chip reliability to be adequate.

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f. Redundancy in the [ ] provides a reasonable way to achieve the desired reliability.

g. Image reconstruction, using a subarray of sensor chips, has been accomplished in an off-line laboratory demonstration. The demonstration included the functions of reformatting, compensation of the variations in the sensitivity of individual sensors, modulation transfer function correction, and random sensor failure restoration.

h. The feasibility of real-time reconstruction is not in question; however, a choice between non-real-time and real-time image restoration should be made and the selected type of system designed.

i. While there are a number of technological problems in the components of the data relay satellite system (for example, the antenna, transmitter, driver, and receiver), all of them are capable of being solved. There is a little confidence in obtaining an IOC in mid-1974 of a data relay satellite system operating at [ ] having two satellites per booster. Further, there is an excessively high degree of concurrency in the early stages of the program with the necessity for all basic decisions to be completed by October 1970.

2. The two panels were also in agreement on the following conclusions regarding systems other than the solid state array:

a. The tape storage camera has technological problems, each of which seem to be solvable in time.

b. If perfected, the tape storage camera system would have a greater sample density in the focal plane and a larger maximum target-taking capability per pass at constant scale than a solid state array system. The system would have inherent storage, a minimum readout delay of a few seconds (compared to no delay possibility in the solid state array), and would permit simplification in the data relay satellite system.

c. On the other hand, many of the features of the tape storage camera can be obtained in other non-storage systems by the addition of an on-board recorder. Further, the smaller optics now available and adequate for a tape storage camera system could also be used by the solid state array system if the present indication of the sensitivity of the sensors is maintained in production. This trade of increased sensitivity is one of the trades mentioned previously.

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d. While systems built on film scanners might be developed in three or four years, it is not considered desirable to pursue this approach.

e. Systems based upon other sensors such as vidicons or photoconductive tape might be feasible but have not been pursued enough to warrant consideration for systems development. Any work pursued should be accomplished as part of a broadly based research and development program.

3. Both panels recommend that the next phase of work in solid state array systems over the next nine to twelve months should attempt the following:

a. Accomplish trade-off studies between alternative system parameters and mission profiles.

b. Provide for completion of technological developments and demonstrations.

c. Derive a set of general system specifications.

d. Define a schedule and tentative cost estimates.

e. Plan for an IOC in January 1975. This appears technically feasible.

f. In order to provide for the possibility that the developments in the next few months or the results of the next phase (including resolution of issues in the data relay system) indicate an earlier IOC is possible, no steps in budget or other actions should be taken to preclude this option.

g. The schedule for the data relay system should provide a longer period of time for trade-off studies than now provided.

h. The technology program and system studies should be examined around December 1970 to determine whether the schedule of the data relay satellite system should be extended.

i. In summary, there is a real need for the solid state array system to move into more extensive system studies. The purpose of these studies is to define general systems specifications by means of trade-offs based upon the knowledge gained from the technology program.

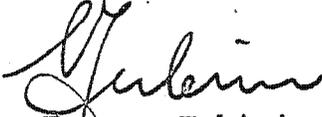
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4. Both panels recommend:

a. No work be done on film systems.

b. Tape storage camera efforts be oriented toward demonstrating the performance of a camera using a tape instead of a drum.



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Richard L. Garwin  
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