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**THE RAMO-WOOLDRIDGE CORPORATION**

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55 10058  
Cy 1 of 1  
Pg 1 of 3

*Page 2-*

**TO:** General B. A. Schriever    **CC:** Col. C. H. Terhune    **DATE:** November 22, 1955  
    Col. H. W. Norton  
    L. G. Dunn  
**SUBJECT** ARS Program                      B. D. Fried  
    R. F. Mettler                      **FROM:** Simon Ramo  
    A. K. Thiel

The following is a summary of R-W thinking on the above program written on the assumption that WDD is to take over responsibility for conduct of this program permanently, and that the problems before us include: (a) choice of date and extent to which WDD takes control from WADC where it is now centered, and (b) the early actions which should be taken by WDD when such control is accepted.

R-W thinking is based on the following major concepts:

1. The ARS program should be prosecuted vigorously but must not interfere with either ICBM or MRBM early capability. ✓
2. First ARS satellite launchings should be confined to use of the then available ICBM vehicles, with only the substitution of a new powered satellite orbiting nose cone for the ICBM instrumented re-entry nose cone. ✓
3. The many detailed subsystem techniques peculiar to a good intelligence and reconnaissance satellite, namely, data sensing equipment, data storage equipment, long life satellite-borne power supply, intelligence data handling equipment, communication links, and virtually all other aspects of the system, require substantial state of the art development. Equally important, the optimum combination of these techniques into a versatile intelligence and reconnaissance satellite represents a major systems engineering job, which it is premature to do at this time, without further development of the subsystem techniques.
4. This does not preclude having a highly limited intelligence or reconnaissance satellite as an early first step. ✓

With the above general concepts in mind, we note that the present program on ARS can be conveniently divided into two aspects. One part of the program is a series of tasks on subsystem, component, or technique state of the art development. These include some dozen relatively small study and

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ARS Program

- 2 -

November 22, 1955

hardware experimentations on orbiting attitude control, nuclear power supply, radio spectrum sensing, optical pick-ups, communication, etc. The other work presently being sponsored consists of three systems planning projects.

It would be our strong recommendation that the first action that is needed, and this should be taken as soon as possible, is to announce continuation of the first set of tasks on component state of the art development, and simultaneously to drastically alter the tasks of the second group conducting systems studies. This group has been asked to prepare a complete R&D plan for a sophisticated and major satellite system, a task which is considered to be premature, and which requires for its carrying out that the three contractor teams seek a great deal of information from ICBM contractors--a substantial interference to the ICBM project.

The redirection of these studies should, we believe, be as follows. They should be given by WDD/R-W a brief and succinct description of the ICBM vehicle below the nose cone and told to eliminate completely from their studies any other investigations of this vehicle understructure, boost, and trajectory. They then should be asked to prepare preliminary designs of a powered nose cone to be available for launching in the latter half of 1958 on present ICBM understructures and boost-trajectory. The purpose of this first series of flights would be merely to obtain orbiting experience. These first nose cones would contain an absolute minimum of instrumentation, except that associated with the control and tracking of the satellite to assure proper orbiting. The general weight of nose cone would be in the region of, say, three to ten thousand pounds and their studies would, of course, cover the complete package, including the additional rocket power and path control into the orbit, attitude control of the nose cone after reaching orbit, and the satellite-borne portion of the tracking instrumentation.

An additional task these three contractors should be asked to consider is what should be done as the next phase to alter the nature and complexity of the instrumentation carried in the satellite to where it has some minimum usefulness for reconnaissance or intelligence purposes.

Attacked in this way, the satellite program assures the development of techniques that will ultimately make possible the design of more sophisticated and versatile satellite systems. It will give the earliest possible flying experience (even conceivably making possible a backup for the IGY satellite if required), and probably even making possible the earliest possible attainment of some minimum militarily useful satellite.

To implement this program with the greatest of clarity and direction, while assuring the least assignment to WDD of what could be carried by others, it is recommended that WDD take control only of the systems study programs

ARS Program

- 3 -

November 22, 1955

and immediately effect this redirection, leaving the component development program under its present management for the time being. This latter program should, however, come under increasing scrutiny by WDD/R-W because it may require substantial later modifications or extensions, and the background to effect these should be sought as early as possible.

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Simon Ramo

(dictated but not read)

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