

STATEMENT OF WORK: ORBITAL ASTRONOMY FACILITY, APRIL 4, 1966

ADVANCED SYSTEMS OFFICE, RESEARCH AND DEVELOPMENT OPERATIONS, GEORGE C. MARSHALL SPACE FLIGHT CENTER, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, HUNTSVILLE, ALABAMA

I. Scope

This work statement covers a 9-month study to derive an Earth Orbital Astronomy Support Facility concept that will enhance performance of a comprehensive, manned Astronomy/Astrophysics experiment program. The systems discussed in this work statement do not necessarily represent approved programs and this study will not necessarily lead to hardware projects; however, the results will provide technical information upon which management decisions can be based.

II. Background

Advanced mission and systems studies to date have established that the national manned space flight capability can significantly enhance a broad program of space research and experimentation. Specific analyses have delineated the scope and nature of such a manned experiment program and have identified the potential contribution to be gained by use of Earth orbital research laboratories in various scientific/technical areas.

Experimentation leading to the enlightenment and resolution of key scientific questions in Astronomy and Astrophysics is of major significance in the Earth orbital program in view of the unique opportunities for observations conducted from the vantage point of space. Earth-based observations are limited by atmospheric absorption of much of the electromagnetic spectrum; all but a few narrow bands in the visible, IR and radio regions of the spectra emitted by cosmic bodies are blocked and even in these narrow "windows" through the atmosphere, resolution capability of existing equipment is impaired by atmospheric turbulence. From a space-based observatory, the astronomer may observe uninhibited the emissions of interest with optical, UV, radio, x-ray, and Gamma-ray telescopes, and will also have the unique opportunity to make simultaneous, correlated observations with different sensors. Utilization of an Earth orbital research facility for continued and coordinated investigations into the fundamental questions of Astronomy/Astrophysics promises to increase by an order of magnitude man's knowledge and understanding of the universe.

The virtual absence of gravity in orbit permits less massive telescope structures and promises pointing accuracies of 0.01-0.02 seconds. It is visualized that the Earth orbital facility will eventually attain the flexibility and multi-use that a ground facility would provide.

Many separate and independent experiments and instrumentation related to Astronomy/Astrophysics have been proposed, particularly for the Apollo Applications Program. Studies have identified special areas of interest in this scientific discipline and have provided preliminary concepts of the instrumentation necessary to investigate each. Building on these efforts, this study will analyze the needs of a comprehensive manned Astronomy/Astrophysics experiment program and will delineate specific concepts of an Orbital Astronomy Support Facility that enhances the program's potential value by capitalizing on man's participation.

III. Objectives

The objectives of this study are:

1. To develop a logical and evolutionary plan for Earth-orbital facilities for Astronomy/Astrophysics observations and to derive the criteria and direction for the conceptual design of an Orbital Astronomy Support Facility.
2. To develop system concepts for a flexible Orbital Astronomy Support Facility(ies) which fully exploits man's presence and participation and which enhances equipment simplicity and flexibility.
3. To define the capability of each facility concept to satisfy the needs of a comprehensive, manned Astronomy/Astrophysics experiment program and the manner in which the program's objectives can be pursued.

IV. Guidelines

The following guidelines are provided. Where warranted, the Contracting Officer's Representative (COR) may revise the guidelines during the course of the study. Additional information and guidance will be provided at the contractor orientation meeting and during the course of the study as required.