

STATEMENT-OF-WORK: "Advanced Concepts of Onboard Medical
Care Facilities"

I. Introduction and Background:

Manned spaceflight missions of the future will involve larger numbers of onboard personnel and longer duration missions. In addition, as mission objectives broaden and vehicular size increases, it is quite likely that the character of onboard populations will gradually change to encompass a broader range of ages, both sexes, and scientists and other specialists who may be less physically qualified than our present astronauts. This will result in a growing need to provide increasingly comprehensive medical care aboard the spacecraft. Since an earth-space-earth "ambulance" vehicle may be practical only for severe emergencies in the case of long-term earth orbital missions, and may not be possible at all for more advanced missions, increasingly self-sufficient onboard diagnostic and therapeutic facilities will be required for missions of the future.

II. Objectives:

The purpose of this study is to develop sound guidelines on which to base planning and preparation to provide effective inflight medical care for flight programs of the post-Apollo period. The technique to be employed in this effort will be to establish requirements for a postulated "worst case" mission, then determine reductions of these requirements to reflect the less stringent demands of missions of this decade. The employment of this technique will enable the planning of inflight medical care to be accomplished as a long range continuum.

The contractor will develop a primary and alternative concepts of an optimal onboard clinical medical facility for an assumed post-1980 manned space flight. The term "facility" shall be understood to include conceptual design of the physical equipment, rooms, decor, and arrangements; definition of all medical procedures, techniques, and instrumentation; and definition of professional personnel requirements, supply and logistics requirements, patient-flow management, and onboard medical staff and patient personnel traffic patterns. These concepts are to be based on sound professional familiarity with up-to-date clinical practices, skilled actuarial analyses of probable incidence of diseases and injuries, factual evaluation of research trends in clinical diagnosis and therapy, and knowledgeable, yet imaginative, prognostication for the postulated mission. Concept definition will also include well-conceived estimates of power, weight, volume, cost, and other parametric specifications which the contractor may consider to be pertinent.

The study report will be so constructed as to provide well-founded guidance in the planning of onboard medical diagnosis and therapy and associated research and development for post-Apollo manned spaceflight programs antecedent to the postulated post-1980 mission.

III. Approach:

A. The contractor shall develop concepts of a clinical medical facility as described in this work statement for an assumed manned spaceflight mission having the following characteristics:

Mission: Time -- post-1980
Duration -- 3 years
Mode -- Either weightless or with vehicular rotation for artificial g. Contractor to assume both modes.
Power, Weight, and Volume -- assume all carefully considered requirements will be available, but all three will be held to minimum levels by the contractor.
Resupply -- No capability
Space "Ambulance" from Earth -- None
Onboard Environment and Mission Activities -- To be projected by contractor based upon current manned spaceflight experience and planning concepts.

Onboard Personnel:

Total Number -- One Hundred
Age Range -- 20 to 55
Sex -- Both male and female; some married couples
Physical Qualification --

Minimal (Passengers): -- No debilitating disease found on thorough physical examination by a qualified internist.

Maximal (Pilots and Flight Crew): -- Present astronaut requirements.

Training --

Minimal (Passengers): -- Abnormal responses to flying (Motion sickness, fear of flying, etc.) ruled out, but no special preflight indoctrination training provided; professional training commensurate with special duties.

Maximal (Flight Crew): -- Equivalent to present preflight astronaut training.

Medical & Paramedical Personnel --

Contractor to define number, types, qualifications, and training.

B. The specific tasks and task sequence which will be required to accomplish the work of this study are to be defined by the respondents to this Request for Proposal. The work required will include at least the effort outlined below, whether or not the bidder chooses to organize his approach into these specific tasks or the sequence presented:

1. Assess the probable incidence of diseases, injuries, symptoms and physical conditions which will require diagnosis and therapy aboard the postulated mission.
2. Assess the full diagnostic and therapeutic requirements.
3. Assess up-to-date diagnostic and therapeutic techniques and equipment to meet these requirements.
4. Assess the characteristics of the postulated manned spaceflight mission and define the requirements and

constraints imposed on the diagnostic and therapeutic techniques and equipment, logistics planning, traffic patterns, decor, and all aspects of the design and operation of the onboard clinical medical facility.

5. Assess the status of research and technology in clinical diagnosis and therapy as related to the requirements of the postulated spaceflight mission; select promising trends; and realistically but imaginatively prognosticate the techniques and equipment to be recommended for the onboard clinical medical facility. Determine the approximate lead times required for the development and validation of all new techniques and equipment. (This segment of effort will require careful consideration of those techniques which lend themselves to reliable automation with consequent reduction of professional time and personnel requirements.)
6. Assess personnel, logistics, room, decor, and all design layout and operational requirements.
7. Design (to sketch level) the onboard clinical medical facilities for the postulated mission setting forth options and alternatives where applicable.
8. Evaluate and determine the effects on these requirements of less demanding characteristics of earlier spaceflight modes.

9. Design final report format to fulfill the objectives of this statement of work and prepare end product.

C. The product of this effort will be the final report. The format of this report will receive special attention. It is to be presented in "modular" fashion, i.e., organized in such a way as to permit the user to determine modifications of these concepts and requirements which would be engendered by the relatively limited characteristics of antecedent manned spaceflight missions (missions within the decade prior to the postulated mission). Examples of such characteristics are: reduction of mission duration, decreased numbers of onboard personnel, narrowed age range of onboard personnel, all male personnel, more stringent medical selection requirements and preflight training (not to exceed present astronaut requirements), availability of logistics flights, availability of a space "ambulance" capability, etc. Nomograms, tables, unique indexing, and/or other devices and techniques may be employed.

The final report shall contain at least the following, each accompanied by suitable discussion:

- a. List of diseases, injuries, symptoms, and physical conditions diagnosable and treatable within the capabilities of the onboard clinical medical facility. Probabilities of occurrence and anticipated frequency of occurrence shall be stated for each.

b. The diagnostic and therapeutic techniques recommended for each.

c. List and description of the equipment and instrumentation recommended for each of the techniques. Reasons for recommendations, current research trends where recommendations are beyond the present state of the art, and approximate lead times for development and validation of future techniques and instrumentation are to be included.

d. List of expendables (pharmaceuticals, reagents, dressings, etc.) denoting quantities required, and packaging and dispensing techniques.

e. Description of professional medical and paramedical personnel requirements.

f. Description of storage and logistics requirements.

g. Sketch level drawings and description of onboard clinical medical facility design, to include:

room layout

furnishings and equipment, instrumentation
consoles, etc.

decor

patient flow management

traffic patterns

provision for storage

provisions for waste

h. Definition and discussion of parametric requirements, i.e., power, weight, volume, etc.

IV. Management:

The study will be managed by the Bioresearch Division of Life Sciences, OMSF, NASA Headquarters. The Technical Monitor will be S. P. Vinograd, M.D., Director, Bioresearch Division (Code MMR).

V. Briefings and Reporting Requirements:

1. Monthly Letter Progress Report

Informal monthly letter progress report shall be submitted.

These reports shall include:

- (1) A description of overall progress;
- (2) Identification of any current problems, and proposed corrective actions; and
- (3) A discussion of the work to be performed during the next monthly reporting period.

2. Review Briefings

Review briefings will be held at times and places agreed upon between NASA and the contractor, the frequency of which will be determined by significant accomplishments of the study tasks, and/or the need to evaluate progress to assure adherence to the study objectives. An initial briefing will be held to exchange current information and to discuss details of the study

work. The contractor will present at the initial meeting, his estimate of manpower use and major milestone schedules.

3. Mid-Term Oral Briefing and Written Technical Report

Approximately six months after commencing work on the contract, on a date to be specified by NASA, the Contractor shall present to the NASA Headquarters, an oral, mid-term briefing of the significant results accomplished, problems remaining, and an outline of future work. One copy of all viewgraphs used shall be furnished to the NASA at the time of the briefing. In addition, the contractor will furnish a mid-term written technical report indicating the technical data and concepts derived during the first six months.

4. Preliminary Final Oral Briefing and Draft Final Report

Approximately one month prior to completion of contract, the contractor will present a preliminary oral briefing and a draft of the final report. This will provide the technical monitor the opportunity to review and critique the content of the final oral briefing and final written reports.

5. Final Oral Briefing

At the conclusion of the study, the Contractor shall present a final oral briefing at a place designated by the Technical Monitor. The briefing will be held at NASA Headquarters and possibly at a NASA Center.

6. Final Written Report

The completion of this contract will be evidenced by a final written report. This report shall be submitted at the time of the final oral briefing.

7. Executive Summary Written Report

In addition to a general technical summary in the final report, the contractor shall prepare a separate condensed summary report. This report shall be from ten to twenty pages in length, and shall be adapted from the following outline:

- a. Introduction
- b. Study Objective
- c. Method of Approach and Principal Assumptions
- d. Basic Data Generated and Significant Results
- e. Indicated Research and Environment
- f. Conclusions

This report shall be submitted at the time of the final oral briefing.

VI. Report Distribution:

NASA Scientific and Technical Information Facility

Reproducible and two copies of Monthly Letter Progress Report

Reproducible and two copies of Mid-Term Written Technical Report

Reproducible and two copies of Final Report

Reproducible and two copies of Executive Summary

Report Distribution (cont'd)

New Technology Representative, Code KT

One copy of Monthly Letter Progress Report

One copy Mid-Term Written Technical Report

One copy of Final Report

One copy of Executive Summary

NASA Headquarters, Attn: Dr. S. P. Vinograd, Code MMR

Ten copies of Monthly Letter Progress Report

Ten copies Mid-Term Written Technical Report

Thirty copies of Final Report

Fifty copies of Executive Summary

VII. Period of Performance:

The period of performance will be one year.

VIII. Expected Results:

This study is designed to bring a combination of professional authority and imagination to bear on the issue of providing optimal clinical medical care onboard manned spaceflight missions of the near and distant future. The end products of this study will be utilized by NASA as a valuable source of guidance in the planning and preparation for manned spaceflights of this decade as well as the next.

RECOMMENDED SOURCE LIST FOR
ADVANCED CONCEPTS OF ONBOARD MEDICAL CARE FACILITIES

MIT Instrumentation Laboratory
Cal Tech
Stanford Research Institute
A. D. Little
IITRI
Bolt Beranek Newman
Battelle
Rand

Desire strong university medical school involvement

Discourage air frame contractors

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROCUREMENT REQUEST (See Instructions on reverse of Copy No. 4)

1. DATE OF THIS REQUEST

2/17/71

2. TO:

DHC

3.

FROM:

A. NAME OF PERSON INITIATING REQUEST

S. P. Vinograd

B. OFFICE CODE

MMR

C. OFFICE PHONE

26011

4A. PROGRAM AND PROJECT TITLE

Advanced Studies

B. DATE APPROVED BY ADMINISTRATOR

2/2/71

5. WILL CONTRACT INVOLVE ACCESS TO CLASSIFIED MATTER? ☒ NO ☐ YES (If "Yes", attach NASA Form 466)

ITEM NO.	QUANTITY	DESCRIPTION (Use additional sheets, if necessary)	DELIVERY SCHEDULE	ESTIMATED COST
		Study contract for Advanced Concepts of Onboard Medical Care Facilities	1 year	\$125,000
		Fixed price contract recommended		

I. TO BE COMPLETED BY INITIATING OFFICE

6. FUNDING DATA		7A. ACCEPTANCE POINT	
A. INSTALLATION NASA Headquarters		<input type="checkbox"/> CONTRACTOR'S PLANT <input type="checkbox"/> DELIVERY DESTINATION	
B. APPROPRIATION SYMBOL (Indicate Year) & ESTIMATED COST		B. DELIVER TO NASA Headquarters Code MMR	
(AO C OF F 80X 0107 ())			
R & D 80X0108 (71)		C. INSPECTION POINT	
TOTAL \$125,000		<input type="checkbox"/> CONTRACTOR'S PLANT <input type="checkbox"/> DELIVERY DESTINATION	
C. PROGRAM ACCOUNT CODE		B. PREVIOUS PROCUREMENTS OF THIS ITEM	
981-60-10-26		A. FR NO(S).	
COST ELEM.		B. CONTRACT NO(S).	
10. ATTACHMENTS HERETO		9. TYPED NAME OF ALTERNATE TECHNICAL CONTACT.	
YES	NO	A. OFFICE CODE	
X		B. OFFICE PHONE	
	X	11. SIGNATURE OF INITIATOR	
	X	B. Johnson	
	X	P. Culbertson	
	X	12. APPROVED	
	X	3-3-71	
	X	3-3-71	

II. FOR FINANCIAL MANAGEMENT OFFICE USE

13. I CERTIFY that funds are available.	14. <input type="checkbox"/> FUNDS ARE NOT AVAILABLE (Return PR to Initiator)	15. SIGNATURE OF FR NO.
3/3/71		10-1001

III. FOR PROCUREMENT & SUPPLY OFFICE USE

16. ASSIGNED	17. DATE COPY FWD TO INITIATOR
A. TO	B. BY
	C. DATE