

MONTHLY PROGRESS REPORT  
(September 1, through September 30, 1985)

on

SPACE STATION LONG-TERM  
LUBRICATION ANALYSIS  
NAS8-36655

Prepared for

GEORGE C. MARSHALL SPACE FLIGHT CENTER  
Marshall Space Flight Center, Alabama 35812

October 15, 1985

by

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INTRODUCTION

The objectives of this program are (1) to perform a complete tribology survey of every point of contact in the space station subject to relative motion regarding the materials, environment, and operation characteristics, (2) to review each point of relative motion regarding the selected materials and lubricants from the standpoint of the required operating characteristics and environmental conditions, (3) to make recommendations for improvements where the lubricants and/or materials are not considered optimum, and (4) to perform or recommend simulated or full-scale tests on components where problems are possible or likely because of new designs, significant design extensions beyond current practice, or sensitivity of other components to problems with a particular point of contact. The project is to be conducted over a 3-year time frame in two phases. Phase I will be a preliminary analysis conducted during the preliminary design phases of the Space Station. Phase II will be a more detailed analysis conducted during the period when the design becomes more established.

PROGRESS DURING SEPTEMBER, 1985

The task activities during this reporting period have included:

- Completing the preliminary work breakdown structure of Space Station,
- Identifying the preliminary candidate MMA set,
- Identifying the contracts and NASA personnel associated with MMA set,
- Developing the preliminary tribology survey form,
- Reviewing the computer options for data tape development/implementation, and
- Continuing the efforts on the literature review.

Preliminary Space Station Work Breakdown Structure

Documentation for the Space Station IOC configuration has been reviewed to complete the preliminary work breakdown structure (WBS). The relevant documentation and WBS formats were discussed in the August progress report. The subsystems evaluated during this reporting period included the Guidance, Navigation, and Control; Thermal Control System; Environmental Control Life Support; and Communication and Tracking. The preliminary WBS will be updated during Phase I as system/subsystem definitions and designs are completed.

Selected of Candidate Moving Mechanical Assembly (MMA) Set

A candidate MMA set has been selected from the preliminary Space Station WBS. The WBS for each subsystem was reviewed to identify

the assemblies and components having major moving parts. A listing of the preliminary candidate MMA set which has been categorized by work packages. Using this format, responsible NASA centers for each component are identified which facilitates identifying applicable contracts and project technical managers.

From a review of Space Station contracts supplied by MSFC and JSC procurement offices and the contract awards documented in the Commerce Business Daily, related NASA contracts, NASA personnel, and contractors have been identified for each work package center. The project technical manager for each contract has been contacted by telephone to discuss project objectives, schedule, and milestones and to request documentation, i.e., progress reports, briefing packages, drawings, etc. For contracts under NASA centers other than MSFC, formal requests for information from MSFC to the responsible NASA center organization are necessary and plans for establishing the communications have been discussed with Mr. Fred Dolan. Request for the MSFC Phase B Space Station preliminary definition data packages of Boeing Aerospace Company and Martin Marietta have been made to Mr. Fred Dolan.

#### Development of Preliminary Tribology Survey Form

A preliminary tribology survey form has been developed by SRS Technologies and submitted to Battelle for approval. It has been structured to provide a comprehensive listing of a component's description, materials involved, operating conditions, and environmental conditions.

#### Definition of Computer Options for Data Tape Development and Implementation

The computer options have been reviewed during this reporting period to identify the computer system options, data manipulation and

entry software requirements, and data storage media options. At the Orientation Briefing, the following options were presented:

- Computer Systems Options
  - UNIVAC/Class VI
  - HP 1000
  - DEC/PRO 380
  - Space Station VAX-IBM-XT
  
- MSFC Data Manipulation and Entry Software
  - Fortran
  - Pro/Datatrieve Data Base Management
  - RIM-6/RBASE 5000
  
- Data Storage Media Options
  - UNIVAC Tape (1600 BPT, 9 Track)
  - DEC-RX 8 in. or 5 1/4 in. Floppy Diskette

Based on discussions with Mr. Fred Dolan, a definition of the computer options is being held open to determine the type of computer system which is adaptable to existing MSFC computer systems and data bases.

#### Literature Review

The efforts on the literature review have continued with procuring and reviewing pertinent articles.

#### PROBLEMS

No significant problems were encountered during this reporting period.

SCHEDULE STATUS

Work is progressing on schedule with all tasks accomplished as outlined on the work flowchart for Phase I presented in last month's progress report.

ANTICIPATED WORK

During the next reporting period, the following tasks will be addressed:

- Review and synthesize related information from Phase B data packages for Boeing and Martin Marietta,
- Identify Space Station Phase B and related contract's milestones,
- Continue assessment of computer options,
- Review related Space Station contracts' data packages as received, and
- Continue the literature review.

FINANCIAL SUMMARY

The total cumulative costs incurred as of September 30, 1985, were \$19,075.37 (including fee). The estimate of costs to complete the project is \$253,924.63 (including fee).

The estimated percentage of physical completion is 7 percent, while the cumulative costs are approximately 7 percent.