

## N O T I C E

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AVIONICS TEST BED Interim Report (Lockheed  
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**SOFTWARE SURVEY FOR THE  
AVIONICS TEST BED**



Prepared By

**Lockheed Engineering and Management Services Company, Inc.**  
Houston, Texas

Contract NAS 9-15800

For

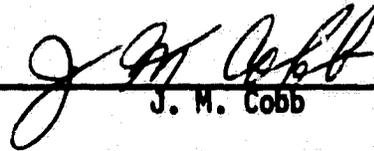
**AVIONICS SYSTEMS DIVISION**

LEMSCO-16941

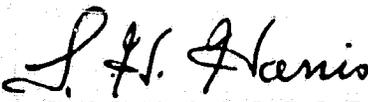
SOFTWARE SURVEY FOR THE  
AVIONICS TEST BED

Job Order 32-429

PREPARED BY

  
J. M. Cobb

APPROVED BY

  
L. H. Harris, Job Order Manager  
Power and Data Systems Engineering Section

Prepared By

Lockheed Engineering and Management Services Company, Inc.

For

Avionics Systems Division  
Engineering and Development Directorate

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
LYNDON B. JOHNSON SPACE CENTER  
HOUSTON, TEXAS

July 1981

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## 1. INTRODUCTION

A large space structures avionics test bed has been proposed for development at NASA JSC in building 16. The test bed will be used in the development of Shuttle attached or autonomous large space structures such as the proposed Space Operations Center (SOC). A comprehensive survey of the hardware presently available in building 16 and the computer software available at the NASA JSC site was required for the generation of the avionics test bed development plan. The survey in this report covers the computer software at NASA JSC which could possibly be useful in the development of the avionics test bed. The hardware in building 16 NASA JSC which could possibly be used in the development of the avionics test bed is listed in reference 1.

## 2. SOFTWARE SURVEY

Each individual program identified as a candidate for use in the avionics test bed is listed on a form in Appendix A. The form gives the software name of the program, a brief description of the program, a statement of purpose, and the computer systems on which the program is used. An estimate of the amount of time the program is currently used each week is listed. A physical description of the program is given with the number of lines in the program listing, computer memory requirements, and off-line storage requirements. The form includes space for listing any programs which may be used in support of the program being described. For additional information, spaces are provided for personnel to contact and reference documents to read.

### 3. REFERENCES

1. Hardware Survey for the Avionics Test Bed, Lockheed Engineering and Management Services Company, JSC-17451, LEMSCO-16838, June 1981.

**APPENDIX A**  
**SOFTWARE SURVEY**

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: FRISBE - Dynamic Response Program

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Calculates the dynamic response of an elastic structure using the modal characteristics.

COMPUTER SYSTEM(S): UNIVAC 1110; X-8

UTILIZATION (APPX. SUP-HRS/WEEK): 1-2 normal; 5-10 pre and post flight

SIZE:

1. LINES OF CODE: 4000
2. MEMORY REQUIREMENTS: 65K words
3. OFF-LINE STORAGE REQUIREMENTS: 50 tracks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): FITL - to calculate fitting loads between Shuttle major components. SLOPP - to merge various forcing functions into a single forcing function input sequence.

CONTACT: ES2

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: FOCAP - Force Calculations Program

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Integrates pressure distribution over flight vehicle surface to obtain elemental and total force coefficients.

COMPUTER SYSTEM(S): UNIVAC 1110 - X8

UTILIZATION (APPX. SUP-HRS/WEEK): 4/wk.

SIZE:

1. LINES OF CODE: FOCAP I - 8000 / FOCAP II - 6000
2. MEMORY REQUIREMENTS: 45K Demand-65K Batch/45K Demand-60K Batch
3. OFF-LINE STORAGE REQUIREMENTS: Variable to 2000 tracks/Variable to 2000 tracks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Requires specially formatted aero data base

CONTACT: E. Rios or D. Warrington - Lockheed/EMSCO

REFERENCE DOCUMENT: Being written

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: FITL - Fitting Loads Program

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

COMPUTER SYSTEM(S): UNIVAC 1110; X8  
\_\_\_\_\_  
\_\_\_\_\_

UTILIZATION (APPX. SUP-HRS/WEEK): 2 hrs./month (0.5 hrs./week)

SIZE:

1. LINES OF CODE: 2500
2. MEMORY REQUIREMENTS: 45K words demand; 65 batch
3. OFF-LINE STORAGE REQUIREMENTS: 40 tracks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: MSBLS Commissioning

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: These programs are used to process flight test data tapes: 1 Microwave Beam Landing System tape recorded onboard test aircraft and 1 Laser Radar tape that is recorded at fixed ground location. Time correlation is provided to compute position differences.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): \_\_\_\_\_

SIZE:

1. LINES OF CODE: 12,160
2. MEMORY REQUIREMENTS: \_\_\_\_\_
3. OFF-LINE STORAGE REQUIREMENTS: \_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

Note: This program was originally obtained from KSC, but is maintained and used at JSC for MSBLS evaluation. Modifications are made as required by JSC objectives.

CONTACT: Paul Harton

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: TLEVEL

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program computes the response of the Microwave Scanning Beam Landing System Navset (Receiver) to received signal level variations. A multipath model is included to determine effects of ground reflections.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): Terminal Time: 1/2 hr/wk

SIZE:

1. LINES OF CODE: \_\_\_\_\_
2. MEMORY REQUIREMENTS: \_\_\_\_\_
3. OFF-LINE STORAGE REQUIREMENTS: \_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: Paul Harton

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: MNOFTHZ, MNOFTEL, MNOFTDME

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: These programs predict Microwave Scanning Beam Landing System performance for Orbiter flights. Received signal levels are computed for no rain and for rainfall rates of 10, 20, 30, 40 and 50 min/hr. Error models are used to evaluate accuracy.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): Terminal Time: 2/wk

SIZE:

1. LINES OF CODE: 1187 for MNOFTAZ
2. MEMORY REQUIREMENTS: \_\_\_\_\_
3. OFF-LINE STORAGE REQUIREMENTS: Profile tape, Orbiter Antenna RDPs, Ground Station Antenna Patterns

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

GAZOFT                      TBRBN

AZALGN                     LRRBN

AZAGC                     IBRBN                     Similar for MNOFTEL and MNOFTDME

AZNOISE

REBIN/REVI

CONTACT: Paul Harton

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: BNTSTI

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program processes Microwave Scanning Beam Landing System Azimuth measurements and related data are collected on the JSC Radar Boresight Laboratory Range. Results are provided in the form of an error model that is used in predicting MSBLS performance.

COMPUTER SYSTEM(S): LSI 4/90 (Computer Automation)

UTILIZATION (APPX. SUP-HRS/WEEK): \_\_\_\_\_

SIZE:

1. LINES OF CODE: 359
2. MEMORY REQUIREMENTS: \_\_\_\_\_
3. OFF-LINE STORAGE REQUIREMENTS: Input data tape and output data tape

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: Paul Harton/483-3549

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: ANT12H

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program is used for data acquisition during tests of Microwave Scanning Beam Landing System tests in the JSC Radar Bore sight Laboratory Range.

COMPUTER SYSTEM(S): Computer Automation LSI 4/90

UTILIZATION (APPX. SUP-HRS/WEEK): 40 hours/wk. during test periods

SIZE:

1. LINES OF CODE: 1371
2. MEMORY REQUIREMENTS: \_\_\_\_\_
3. OFF-LINE STORAGE REQUIREMENTS: \_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: Paul Harton

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SAZ/1, SE/1, SD/1

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: These programs process Microwave Scanning Beam Landing System flight test tapes that are recorded onboard a test aircraft. Recorded data are combined with Navset (receiver) calibration data to evaluate MSBLS coverage and signal strength. Predicted signal levels are computed and compared with measured signal levels.

COMPUTER SYSTEM(S): \_\_\_\_\_

UTILIZATION (APPX. SUP-HRS/WEEK): Average terminal time: 1 hr/wk

SIZE:

1. LINES OF CODE: 455 for SAZ/1, about the same for SE/1 and SD/1
2. MEMORY REQUIREMENTS: \_\_\_\_\_
3. OFF-LINE STORAGE REQUIREMENTS: \_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: Paul Harton

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Antenna Radiation Pattern Analysis

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Computes Directivity, Polarization Loss, Total Losses, Electrical Boresight, Beam width, Pattern Ripple and Percentage Coverage above specified levels. Provides plots and 3-D projection plots.

COMPUTER SYSTEM(S): 1110 B12

UTILIZATION (APPX. SUP-HRS/WEEK): 10 hrs. - connect, 4 hr. - support

SIZE:

1. LINES OF CODE: 2000 lines
2. MEMORY REQUIREMENTS: 40K
3. OFF-LINE STORAGE REQUIREMENTS: RDP Tapes

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): 2030 Mag Tapes to 1110 SDF Files (Data Conversion Program)

CONTACT: J. Carl

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Array Design Program

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Computes input impedance for each element in a steerable array. Also computes antenna pattern and back scatter.

COMPUTER SYSTEM(S): 1110 B12

UTILIZATION (APPX. SUP-HRS/WEEK): 1 hr - connect, .1 support

SIZE:

1. LINES OF CODE: 2000
2. MEMORY REQUIREMENTS: 40K
3. OFF-LINE STORAGE REQUIREMENTS: None

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): None

CONTACT: J. Carl

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Array Radiation Pattern Prediction

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Predicts the radiation pattern obtainable from a steerable array for specified element type, number, and configuration and phase shift.

COMPUTER SYSTEM(S): 1110 B12

UTILIZATION (APPX. SUP-HRS/WEEK): 2 hrs - connect, .1 hr - support

SIZE:

1. LINES OF CODE: 400
2. MEMORY REQUIREMENTS: 30K
3. OFF-LINE STORAGE REQUIREMENTS: None

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): None

CONTACT: J. Carl

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Antenna Array Pattern Synthesis

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Designs an antenna array to provide a desired pattern shape.

COMPUTER SYSTEM(S): 1110 812

UTILIZATION (APPX. SUP-HRS/WEEK): 2 hrs. - connect, .1 hrs. - support

SIZE:

1. LINES OF CODE: 500
2. MEMORY REQUIREMENTS: 30K
3. OFF-LINE STORAGE REQUIREMENTS: None

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): None

CONTACT: J. Carl

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Interactive Graphics Orbit Selection (IGOS)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: IGOS is a tool for preliminary mission design which generates orbits which satisfy mission requirements specified by the user. Also generates individual and composite time of launch windows for deploy payloads (geo-synch and others).

COMPUTER SYSTEM(S): CDC-6500, CYBER-70, CYBER-73, VAX-11/780 (10/81)

UTILIZATION (APPX. SUP-HRS/WEEK): 2 CPU hrs/month

SIZE:

1. LINES OF CODE: 25,000 Fortran
2. MEMORY REQUIREMENTS: 400<sub>8</sub>K words
3. OFF-LINE STORAGE REQUIREMENTS: unknown

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): None

CONTACT: W. Redwine/624-40

REFERENCE DOCUMENT: IGOS User's Manual

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PROGRAM NAME: Shuttle Payload Integration and Cargo Evaluation (SPICE)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: SPICE is an interactive computer program for analyzing the feasibility of proposed shuttle flights. It produces a "level A" performance analysis, and calculates vehicle and cargo mass properties. Output from SPICE is used in production of the STS Flight Assignment Baseline (JSC-13000-X). SPICE utilizes the STS Master Data Base for data storage and retrieval.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 2

SIZE:

1. LINES OF CODE: 15,000
2. MEMORY REQUIREMENTS: AOK
3. OFF-LINE STORAGE REQUIREMENTS: 1 disk file for data base

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

1. DUMPDB - produces listing of data base
2. GARBAGECOL - performs garbage collection on data base

CONTACT: Barry E. Endsley

REFERENCE DOCUMENT: In preparation

AVIONICS TEST BED  
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PROGRAM NAME: TPSPLOT

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: PLØT/ANALYSIS program, uses  
output from CCT2WA and PRDAFL. Plots - data, gradients, heat rates, predicted,  
and flight data, data tabs and complete lists.

COMPUTER SYSTEM(S): 1110-6

UTILIZATION (APPX. SUP-HRS/WEEK): 20

SIZE:

1. LINES OF CODE: 30K
2. MEMORY REQUIREMENTS: 15K
3. OFF-LINE STORAGE REQUIREMENTS: Two data files (controlled by program)

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM):

"GNRATE" - auxiliary data file generation

CONTACT: Donald Hackler

REFERENCE DOCUMENT: None (lots of notes)

AVIONICS TEST BED  
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PROGRAM NAME: CCT2WA

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Converts CCTs to word-addressable files.

COMPUTER SYSTEM(S): 1110-6

UTILIZATION (APPX. SUP-HRS/WEEK): 8

SIZE:

1. LINES OF CODE: 1500
2. MEMORY REQUIREMENTS: 65K
3. OFF-LINE STORAGE REQUIREMENTS: None (except CCT)

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): "READ" - quick dump of word-addressable files;  
"WAREAD" - special dump for CCT2WA output files; "WAMERGE" - merges compatible  
output of CCT2WA; "REVAMP" - reformats certain quirky CCTs

CONTACT: Donald Hackler

REFERENCE DOCUMENT: User's Guide to CCT2WA

AVIONICS TEST BED  
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PROGRAM NAME: PRDAFL

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates and updates a big  
predicted data file, based on data from Rockwell/Downey - 2500 tracks. USED  
BY "TPSPLOT"

COMPUTER SYSTEM(S): 1110-6

UTILIZATION (APPX. SUP-HRS/WEEK): 1

SIZE:

1. LINES OF CODE: 1000
2. MEMORY REQUIREMENTS: 40K
3. OFF-LINE STORAGE REQUIREMENTS: 10K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): "DUMPRED" - Provides quick dumps of the predicted  
data file

CONTACT: Donald Hackler

REFERENCE DOCUMENT: None

AVIONICS TEST BED  
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PROGRAM NAME: 41-Node Transient Metabolic Man Program

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program consists of a 41-node model representing the thermoregulation system of the human body, and the shirt sleeves or suited environments. It is designed to simulate the heat transfer within a man, and the heat exchange between an astronaut and his environment.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 1 sup-hrs/week (average)

SIZE:

1. LINES OF CODE: 4000
2. MEMORY REQUIREMENTS: 40K
3. OFF-LINE STORAGE REQUIREMENTS: one program file

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): None

CONTACT: Ione Cook/Lockheed/B14

REFERENCE DOCUMENT: Program J196, LEC/672-23-030031

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PROGRAM NAME: Thermal Data Manager

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: The purpose of the Thermal Data Manager (TDM) is to catalog, archive and provide quick and easy access to the common types of data used in the engineering analysis process for the Shuttle. It has such functions as SEARCH, DELETE, INPUT, MODIFY, LIST (extended SEARCH), OVERVIEW (INSTRUCTIONAL FOR USE), EXECUTE (view runstreams of some of the thermal programs) and TRANSFER (archive data or put it on a foster device). It is designed to catalog prediction data, actual flight data, runstreams, data elements, and material properties.

COMPUTER SYSTEM(S): UNIVAC 1110 Exec 8

UTILIZATION (APPX. SUP-HRS/WEEK): 5 (while testing)

SIZE:

1. LINES OF CODE: 7800 - 8000
2. MEMORY REQUIREMENTS: 19104(I)/26812(D)
3. OFF-LINE STORAGE REQUIREMENTS: 155 tracks for SYM, REL, ABS

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): None

CONTACT: Stephen John Damico

REFERENCE DOCUMENT: Requirements and Description of a Thermal Data Manager (LEMSCO-14592)

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Orbital Data Reduction Center Batch Plotting Program

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: The ODRC Batch Plotting Program provides a means of converting both the thermocouple data from a Shuttle flight which is recorded on a computer-compatible tape (CCT) in the ODRC and, the predicted temperature history data stored on a System Improved Numerical Differencing Analyzer (SINDA) output file, HSTFLO, to a word addressable format which is easier and faster to use. The program can then read these files, as well as the actual binary HSTFLO files, to generate plots and/or a numerical summary of the flight of the flight data or of a comparison of the flight and predicted data.

COMPUTER SYSTEM(S): UNIVAC 1110 EXEC 8

UTILIZATION (APPX. SUP-HRS/WEEK): 10 - 20 (while testing)

SIZE:

1. LINES OF CODE: 4500
2. MEMORY REQUIREMENTS: 28357(I)/74695(D)
3. OFF-LINE STORAGE REQUIREMENTS: 96 tracks for SYM, REL, ABS

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

Raw-to-Processed ODRC Program (RTOPOD) (LEMSCO-15063)

Raw-to-Processed SINDA Program (RTOPHS) (LEMSCO-14860)

Orbital Data Reduction Center Tape Build From SINDA Program (LEMSCO-15337)

CONTACT: Stephen John Damico

REFERENCE DOCUMENT: ODRC Batch Plotting Program User's Guide

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: G-189A Generalized Environmental/Thermal Control & Life Support  
Systems Computer Program

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Thermodynamic and heat transfer  
analyzer for closed loop gas and liquid flow circuits including heat exchangers,  
gas adsorption beds, fans, pumps, that may include automatic valves and other  
hardware commonly used for life support systems on spacecraft, includes routines  
for the physiological performance of crewmen. Primarily used for the design and  
analysis of environmental control/life support systems of spacecraft and spacesuit  
(portable) systems.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 1 sup-hr/wk (variable)

SIZE:

1. LINES OF CODE: approx. 10K
2. MEMORY REQUIREMENTS: 64K (with overlays)
3. OFF-LINE STORAGE REQUIREMENTS: program tape (1), data tape (1)

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): None

CONTACT: Dave Cook-Lockheed/EMSCO (713) 333-6431

REFERENCE DOCUMENT: MDAC-G2444, McDonnell Douglas Astronautics Company,  
September 1971, Contract NAS9-10330

AVIONICS TEST BED  
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PROGRAM NAME: TRASVS

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: TRASVS solves the radiation related aspects of thermal analysis problems. A math model is input and TRASVS provides internode radiation interchange data and incident and absorbed heat rate data from environmental radiant heat sources.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 15

SIZE:

1. LINES OF CODE: 50K
2. MEMORY REQUIREMENTS: 65K
3. OFF-LINE STORAGE REQUIREMENTS: 300 tracks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: Roberta Blackburn

REFERENCE DOCUMENT: TRASVS Users Manual

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SSFS Simulation Executive

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Provides a general purpose, time domain simulation capability for the design, implementation, and verification of guidance, navigation and control flight software.

COMPUTER SYSTEM(S): UNIVAC 1110, CYBER 174, HARRIS 135

UTILIZATION (APPX. SUP-HRS/WEEK): 20 SUP-HRS

SIZE:

1. LINES OF CODE: 6,972
2. MEMORY REQUIREMENTS: 18,561 words (w)
3. OFF-LINE STORAGE REQUIREMENTS: 204 tracks (365, 578w)\*

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): The following attributes use system services which may not be available on the Cyber and/or Harris.

- |  |  |
|--|--|
| <input type="checkbox"/> Time-of-Day clock and date          | <input type="checkbox"/> Aerodynamics data manipulation    |
| <input type="checkbox"/> CPU Timer                           | <input type="checkbox"/> programs given in ARØLØD          |
| <input type="checkbox"/> Ancillary error recovery logic      | <input type="checkbox"/> Validation software also required |
| <input type="checkbox"/> Add runstream capability (@ADD ...) |  |

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

\*Includes off-line storage requirements for symbolic and relocatable subprograms.

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SSFS Preprocessor

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Establishes flight software and environment math model configuration; establishes scheduling data for flight software; provides user with means of developing print, plot, and/or maximum/minimum parameter lists.

COMPUTER SYSTEM(S): UNIVAC 1110, CYBER 714, HARRIS 135

UTILIZATION (APPX. SUP-HRS/WEEK): 1 hr/wk

SIZE:

1. LINES OF CODE: 2,643
2. MEMORY REQUIREMENTS: 35,838 words
3. OFF-LINE STORAGE REQUIREMENTS: Program storage shown in SSES SIM. EXEC; otherwise approx. 50 tracks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

- Time-of-Day and Date routine
- Add runstream capability

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SSFS Plotters (PLOTER & SPDPLT)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Provides a means of plotting data generated during the simulation using the Space Shuttle Functional Simulator. PLOTER is the production plotter, while SPDPLT is the fast plotter.

COMPUTER SYSTEM(S): UNIVAC 1110, CYBER 174, HARRIS 135

UTILIZATION (APPX. SUP-HRS/WEEK): 10 hrs/wk

SIZE:

1. LINES OF CODE: 3,224\*
2. MEMORY REQUIREMENTS: 75,688 words (W)\*
3. OFF-LINE STORAGE REQUIREMENTS: Dependent on sim, Mass storage required is included in sim. system

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

- CALCOMP Library (in particular - plot, plots, symbol)
- FR80 Microfilm Plotter
- Printer plot package is compatible with all computer systems
- UNIVAC and CYBER versions use: CALCOMP, HARRIS uses CALCOMP compatible Versatec software

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

\*Totals include both plotter programs.

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: PPDD (Post Processor For Data Dumps)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Process a plot data file produced by the SSFS and generate a direct access file and/or a tab listing of the data.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): \_\_\_\_\_

SIZE:

- 1. LINES OF CODE: 1000
- 2. MEMORY REQUIREMENTS: 40K
- 3. OFF-LINE STORAGE REQUIREMENTS: None

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): None

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SSFS Ascent (MDAC)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: To perform design and verification of the ascent flight software for the Shuttle.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): \_\_\_\_\_

SIZE:

1. LINES OF CODE: 112,000
2. MEMORY REQUIREMENTS: 63,000
3. OFF-LINE STORAGE REQUIREMENTS: Unknown

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Unknown

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: MDAC Ascent SSFS

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: The MDAC version of the Ascent SSFS program contains the updated capabilities needed to generate an ascent trajectory for use in our stability analysis. This program is controlled and maintained by MDAC. We are merely users.

COMPUTER SYSTEM(S): 1110

UTILIZATION (APPX. SUP-HRS/WEEK): Two cases per mission

SIZE:

1. LINES OF CODE: \_\_\_\_\_
2. MEMORY REQUIREMENTS: \_\_\_\_\_
3. OFF-LINE STORAGE REQUIREMENTS: \_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: On-Orbit and Transition Flight Control System

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Provides functional verification of on-orbit and trans. DAP design requirements and propellant usage data for OFT flights.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 5

SIZE:

1. LINES OF CODE: 6000
2. MEMORY REQUIREMENTS: 37K TOT/AV
3. OFF-LINE STORAGE REQUIREMENTS: 1500 tracks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Supports programs included in 1 and 3 above.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SSFS On-Orbit Simulator

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: IGN&C software interfaced with SSFS system and environment math models for OPS 2 simulations to verify flight software and furnish SAIL support.

COMPUTER SYSTEM(S): UNIVAC 1110 - Exec 8

UTILIZATION (APPX. SUP-HRS/WEEK): 2.5 hrs/wk

SIZE:

1. LINES OF CODE: 14374
2. MEMORY REQUIREMENTS: 56000 wds
3. OFF-LINE STORAGE REQUIREMENTS: 6 mass storage files of 128 tracks each

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

MSID PROCESSOR

approx: 3000 lines of code

: core regts - 100 wds

: mass storage 10 tracks

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: ENTRY SSFS

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Functional simulation of the Space Shuttle during the atmospheric phase of a mission.

COMPUTER SYSTEM(S): UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 15-30

SIZE:

1. LINES OF CODE: 75K
2. MEMORY REQUIREMENTS: 86K
3. OFF-LINE STORAGE REQUIREMENTS: following files: AER0-21, ELAS-03, RCS-01, UNC-08, ULDM-01

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): SSFS Pre-processor, SSFS Plotter

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: GRTLS (mini entry) trajectory

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Simulation starts at ETSEP and continues until touchdown. Complete GN&C system is simulated with latest Env math models available, and plots/prints are generated. Performance summary and design analysis in detail is made possible with above simulation tool.

COMPUTER SYSTEM(S): UNIVAC 1110, Cyber and Harris (to be checked out)

UTILIZATION (APPX. SUP-HRS/WEEK): 12 hrs./wk.

SIZE:

1. LINES OF CODE: 5000 lines for FCS and Guidance routines
2. MEMORY REQUIREMENTS: 85K
3. OFF-LINE STORAGE REQUIREMENTS: several files as listed on next page

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): PPDD. Uses much the same software as entry.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: ARØLØD

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: A program to read a GE-MASS format magnetic tape containing aerodynamic data, rearrange the data, and write a mass storage file compatible with the Space Shuttle Functional Simulator (SSFS).

COMPUTER SYSTEM(S): UNIVAC-1110

UTILIZATION (APPX. SUP-HRS/WEEK): 0.006 (18 minutes per year)

SIZE:

1. LINES OF CODE: 2650
2. MEMORY REQUIREMENTS: 84000 locations (largest single-job configuration)
3. OFF-LINE STORAGE REQUIREMENTS: Mass storage files containing 220000 total words of data

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

Note 1: ARØLØD consists of five separate programs each of which writes a specific type of data file.

Note 2: Since ARØLØD requires an input magnetic tape in GE-MASS format, EX33 would have to provide the data on a CYBER 74 magnetic tape.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Generalized Attitude Control System (GACS)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: The GACS was developed as an aid in the design, synthesis, and analysis of the Space Shuttle ascent flight control system. The emphasis of the program capability is on the synthesis of a set of control system gains to provide specified closed-loop response characteristics. (essentially eigenvalues, eigenvectors, and steady-state response coefficients for step disturbances) for the multi-input-output system. The capability to analyze a given system and to generate attitude error profiles for various excitation conditions is also provided. A modular program structure is used to simplify its adaptation to other vehicles.

COMPUTER SYSTEMS: UNIVAC 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 0-1 depending on need. Estimate 0.1 average

SIZE:

1. LINES OF CODE: 21K
2. MEMORY REQUIREMENTS: 40K in segmented collection
3. OFF-LINE STORAGE REQUIREMENTS: 300 tracks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): A microfilm plotting package is an integral part of the program, but there is one primary subroutine (PLOTF) with some supporting subroutines which can be lifted from the GACS program and used with other programs.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: FLEXDYN

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program uses a modal data tape generated by NRDBOK and BUILD and a trajectory tape generated by the MDAC Ascent SSFS program as input. It calculates the dynamics matrix and right hand side vectors for the bare airframe equation used in stability analysis. This program is used with the Lambda Matrix Inversion program, Frequency Response Program, and Frequency Response Postprocessor program in a package.

COMPUTER SYSTEM(S): 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 50 to 100 cases per mission

SIZE:

1. LINES OF CODE: 3500
2. MEMORY REQUIREMENTS: 35K
3. OFF-LINE STORAGE REQUIREMENTS: \_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Used with NRDBOK, BUILD, Lambda Matrix Inversion Program, Frequency Response Program, and Frequency Response Program Postprocessor.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SUPERPOLYMES

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Takes a polynomial matrix and right hand side and roots the determinants of the numerators and denominators to solve for the system transfer functions. We used the program to solve for the bare airframe transfer functions for our stability analysis.

COMPUTER SYSTEM(S): CYBER

UTILIZATION (APPX. SUP-HRS/WEEK): \_\_\_\_\_

SIZE:

1. LINES OF CODE: 2400
2. MEMORY REQUIREMENTS: Variable 135<sub>0</sub>K to 330<sub>0</sub>K
3. OFF-LINE STORAGE REQUIREMENTS: \_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Control System Analysis Program (CSAP)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Simulates control system block diagram of any configuration, computes transfer functions, performs Z and W transforms, performs continuous or sampled data analysis including frequency response, transient response, and root locus, provides several types of plots. There are size limitations on system. This program is controlled and maintained by Dick Rosenkranz, we were merely users.

COMPUTER SYSTEM(S): 1110 and Cyber

UTILIZATION (APPX. SUP-HRS/WEEK): Infrequent at this time. We have not run it for over 6 months and currently have no plans to run it.

SIZE:

1. LINES OF CODE: 47K on 1110
2. MEMORY REQUIREMENTS: 40+K
3. OFF-LINE STORAGE REQUIREMENTS: 160 tracks source and reloc.

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: NRDBOK

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program uses a modal data tape generated by the Structures Group from a Rockwell generated modal data tape as input and creates a direct access file to be used by BUILD. This program is part of the NRDBOK, BUILD, FLEXDYN, LAMBDA MATRIX INVERSION FREQ. RESP. PROG. package used for stability analysis.

COMPUTER SYSTEM(S): 1110

UTILIZATION (APPX. SUP-HRS/WEEK): One case per new modal data tape (one or two cases per mission)

SIZE:

1. LINES OF CODE: 200
2. MEMORY REQUIREMENTS: 40K
3. OFF-LINE STORAGE REQUIREMENTS: \_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): BUILD, FLEXDYN, LAMBDA Matrix Inversion Prog. Freq. Resp. Prog. and Freq. Resp. Prog. Postprocessor

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Aerodynamic Data Generator (ADGEN)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program reads appropriate data from an EX aerodynamic data tape and writes it on a mass storage file for subsequent use by the Generalized Attitude Control System program.

COMPUTER SYSTEM(S): 1110

UTILIZATION (APPX. SUP-HRS/WEEK): approximately two cases per mission

SIZE:

1. LINES OF CODE: 150
2. MEMORY REQUIREMENTS: 8K<sub>10</sub> words (UNIVAC)
3. OFF-LINE STORAGE REQUIREMENTS: 128 tracks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): None

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: BUILD

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program is used with NRDBOK to process a modal data tape for use in a stability analysis.

COMPUTER SYSTEM(S): 1110

UTILIZATION (APPX. SUP-HRS/WEEK): one or two cases per mission

SIZE:

1. LINES OF CODE: 400
2. MEMORY REQUIREMENTS: 20K
3. OFF-LINE STORAGE REQUIREMENTS: \_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): NRDBOK, FLEXDYN, LAMBDA Matrix Prog., Freq. Resp. Prog. and Freq. Resp. Prog. Postprocessor.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: NET-2

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generalized network analysis and systems analysis program, with capability for solution of systems of simultaneous differential equations.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

COMPUTER SYSTEM(S): CDC Cyber series, available for IBM 360/370

\_\_\_\_\_  
\_\_\_\_\_

UTILIZATION (APPX. SUP-HRS/WEEK): \_\_\_\_\_

SIZE: \_\_\_\_\_

1. LINES OF CODE: 30,000

2. MEMORY REQUIREMENTS: 70K<sub>8</sub> + depending on problem size

3. OFF-LINE STORAGE REQUIREMENTS: Source, reloc. and absolute files, 500K words

\_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): None

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Lambda Matrix Inversion Prog. (still under development 5/81)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program calculates the eigenvalues and latent vectors needed to form the partial fraction expansion of the lambda matrix inverse. It also calculates the vectors needed for the partial fraction expansion form of the sensor output of the bare airframe system in a stability analysis.

COMPUTER SYSTEM(S): 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 50-100 cases per mission at 6 min. per case (approx. .6 to 1.25 SUP-HRS/WEEK)

SIZE:

1. LINES OF CODE: 2600
2. MEMORY REQUIREMENTS: 46K
3. OFF-LINE STORAGE REQUIREMENTS: source only-15 tracks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): NRDBOK, BUILD, FLEXDYN, Freq. Resp. Prog., and Freq. Resp. Prog. Postprocessor. This program also uses the JSC EISPACK package. I have copies of the EISPACK routines source. The EISPACK source is included in the line and track estimates above.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Frequency Response Program (still under development 5/81)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program combines the bare airframe sensor output from FLEXDYN and the Lambda Matrix Inversion Program with the flight control system compensation filters to generate gains for a stability analysis.

COMPUTER SYSTEM(S): 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 50-100 cases per mission

SIZE:

1. LINES OF CODE: 1500
2. MEMORY REQUIREMENTS: 39K
3. OFF-LINE STORAGE REQUIREMENTS: \_\_\_\_\_

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): NRDBOK, BUILD, FLEXDYN, Lambda Matrix Inversion Program, and Frequency Response Program Postprocessor

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Frequency Response Program Postprocessor (under development 5/81)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This program is used to provide plots and summary print for a stability analysis using the Frequency Response Program.

COMPUTER SYSTEM(S): 1110

UTILIZATION (APPX. SUP-HRS/WEEK): 50-100 cases per mission - 3 min./case  
(.3 to .6 SUP-HRS/Week)

SIZE:

1. LINES OF CODE: 200
2. MEMORY REQUIREMENTS: 40K
3. OFF-LINE STORAGE REQUIREMENTS: 2 tracks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Uses DISSPLA. Used with NRDBOK, BUILD, FLEXDYN, Frequency Response Program, and Lambda Matrix Inversion Program.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: MSC/NASTRAN

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: General purpose structural analysis program.

COMPUTER SYSTEM(S): U1110

UTILIZATION (APPX. SUP-HRS/WEEK): Highly variable, anywhere between 1 and 15

SIZE:

1. LINES OF CODE: 800,000
2. MEMORY REQUIREMENTS: min 80<sub>10</sub>K (words) max = machine capacity
3. OFF-LINE STORAGE REQUIREMENTS: problem dependent/ 50 positions not unusual

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): This program is leased and the proper version can be leased from MacNeal Schwendler Corp. Note that COSMIC/NASTRAN is not adequate for large space structure type problems.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SAS

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Ascent/RTLS simulation executive program. Controls simulation execution and also models flight control and flight guidance execution and computations. The program provides all the data output capability for the simulation.

COMPUTER SYSTEM(S): E5

UTILIZATION (APPX. SUP-HRS/WEEK): 40 hrs/wk

SIZE:

1. LINES OF CODE: 25,350
2. MEMORY REQUIREMENTS: 70.4K
3. OFF-LINE STORAGE REQUIREMENTS: 8,687 Blocks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: K. Westley

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SES1

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: The program simulates the main engine forces and moments, SRB forces and moments, OMS forces and moments, linear and non-linear surface actuator and SSME, SRB engine actuator models for the Shuttle ascent simulation.

COMPUTER SYSTEM(S): SEL 32/S1

UTILIZATION (APPX. SUP-HRS/WEEK): 40 hrs/wk

SIZE:

1. LINES OF CODE: 5778
2. MEMORY REQUIREMENTS: 19.875K
3. OFF-LINE STORAGE REQUIREMENTS: 1396 Blocks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: D. Patel

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SES2

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: The program simulates the translational Eq. of Motion, Rotational Eq. of Motion, coordinate transformation, and the rate gyros and accelerometer sensors. The SES2 executive controls the remaining SES1 and SES3 computers.

COMPUTER SYSTEM(S): SEL 32/S2

UTILIZATION (APPX. SUP-HRS/WEEK): 40 hrs/wk

SIZE:

1. LINES OF CODE: 7362
2. MEMORY REQUIREMENTS: 18.75K
3. OFF-LINE STORAGE REQUIREMENTS: 1252 Blocks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: D. Le

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SES3

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: The program simulates the  
aerodynamics, mass properties, SLOSH and reaction control system for the  
shuttle ascent simulation. It also interfaces with the AD10 processor to  
obtain aerodynamic coefficients.

COMPUTER SYSTEM(S): SEL 32/S3

UTILIZATION (APPX. SUP-HRS/WEEK): 40 hrs/wk

SIZE:

1. LINES OF CODE: 19170
2. MEMORY REQUIREMENTS: 48.94K
3. OFF-LINE STORAGE REQUIREMENTS: 3396 Blocks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: D. Le

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: ADICHECK

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: ADICHECK is used to check data transfer between AD-10 and SEL-32-S3 as well as check the load of the AD-10 aerodynamic program. The program is run at the start of each shift.

COMPUTER SYSTEM(S): SEL 32/S3

UTILIZATION (APPX. SUP-HRS/WEEK): 1.5 hrs/wk

SIZE:

1. LINES OF CODE: 360
2. MEMORY REQUIREMENTS: 6.75K
3. OFF-LINE STORAGE REQUIREMENTS: 134 Block

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: Y. M. Kuo

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RECORDER

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: The program is used at the start  
of each operational shift to check out the D/A converter output as well as  
recorder response.

COMPUTER SYSTEM(S): SIGMA 5

UTILIZATION (APPX. SUP-HRS/WEEK): 1/2 hr

SIZE:

1. LINES OF CODE: 111
2. MEMORY REQUIREMENTS: 0.5K
3. OFF-LINE STORAGE REQUIREMENTS: 141 words

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: C. W. Dingell

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: COMMUNIC

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: To check communication between SIGMA-5 and SEL 32-S2 and G1. This program checks out the interrupts to the SEL computer as well as the data transfer between the computers.

COMPUTER SYSTEM(S): SIGMA-5

UTILIZATION (APPX. SUP-HRS/WEEK): 1.5 hrs/wk

SIZE:

1. LINES OF CODE: 184
2. MEMORY REQUIREMENTS: 3.31K
3. OFF-LINE STORAGE REQUIREMENTS: 158 words

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: B. Strassner

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: TESTVG

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This is an off-line test to check all the displays on Vector General 3400 system. This program is used during display development to verify the background format as well as the response to external data inputs.

COMPUTER SYSTEM(S): SEL 32/G1

UTILIZATION (APPX. SUP-HRS/WEEK): 1.5 hrs/wk

SIZE:

1. LINES OF CODE: 8820
2. MEMORY REQUIREMENTS: 26.625K
3. OFF-LINE STORAGE REQUIREMENTS: 1298 Block

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: P. Yang

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: KYBD

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: KYBD is used to check key strokes on the forward cockpit keyboards.

COMPUTER SYSTEM(S): SEL 32/G1

UTILIZATION (APPX. SUP-HRS/WEEK): 1.5 hrs/wk

SIZE:

1. LINES OF CODE: 100
2. MEMORY REQUIREMENTS: 24.0K
3. OFF-LINE STORAGE REQUIREMENTS: 158 Block

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

CONTACT: P. Yang

REFERENCE DOCUMENT:

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SPL

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: This is to check the interface  
between forward cockpit keyboards and scratch-pad-line (SPL) on VG or  
cockpit CRT's. The program is used to verify syntax checking and message  
decoding.

COMPUTER SYSTEM(S): SEL 32/G1

UTILIZATION (APPX. SUP-HRS/WEEK): 1 hr/wk

SIZE:

1. LINES OF CODE: 1386
2. MEMORY REQUIREMENTS: 30.375K
3. OFF-LINE STORAGE REQUIREMENTS: 376 Block

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: P. Yang

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RECORDER

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: To check interface between DACS and recorders through SEL 32/G1. The program is used to check the recorder interface for the shuttle entry simulation.

COMPUTER SYSTEM(S): SEL 32/G1

UTILIZATION (APPX. SUP-HRS/WEEK): 1.5 hr/wk

SIZE:

1. LINES OF CODE: 300 line
2. MEMORY REQUIREMENTS: 5.6K
3. OFF-LINE STORAGE REQUIREMENTS: 80 Block

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: C. W. Dingell

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SCRT (SEL-CYBER Readiness Test)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: The purpose of this test is to check interface between SEL 32/G1 and CYBER 74. The program is used to check the integrity of the computer interface.

COMPUTER SYSTEM(S): SEL 32/G1

UTILIZATION (APPX. SUP-HRS/WEEK): 1 hr/wk

SIZE:

1. LINES OF CODE: 892
2. MEMORY REQUIREMENTS: 14.6K
3. OFF-LINE STORAGE REQUIREMENTS: 230 Block

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: D. Patel

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: FTEST

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Verify correct and complete communication between the SCI and the SEL 32/G1 computer, test all pushbuttons, switches, lights, and meters throughout their entire range in all modes of operation. Support the ascent/entry man-in-the-loop simulation capability.

COMPUTER SYSTEM(S): SEL 32/G1

UTILIZATION (APPX. SUP-HRS/WEEK): 2.5 hrs/wk

SIZE:

1. LINES OF CODE: 2850
2. MEMORY REQUIREMENTS: 17.25K
3. OFF-LINE STORAGE REQUIREMENTS: 568 Blocks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: C. W. Dingell

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: FTEST

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Verify correct and complete communication between the SCI, SEL 32/G1 computer, and the E5 computer. Test pushbuttons, lights, and meters that are required for the ASCENT Simulation.

COMPUTER SYSTEM(S): SIGMA 5

UTILIZATION (APPX. SUP-HRS/WEEK): 2.0 hrs/wk

SIZE:

1. LINES OF CODE: 2968
2. MEMORY REQUIREMENTS: 15.1K
3. OFF-LINE STORAGE REQUIREMENTS: 525 Blocks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: C. W. Dingell

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SESG1

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Simulation executive for the  
SEL G1 computer which interfaces with the forward cockpit through a digital  
interface and drives the VG 3400 graphics systems as well as recorders. The  
executive program interfaces with the SIGMA 5 for the ascent simulation and  
with the CYBER 74 for the entry simulation.

COMPUTER SYSTEM(S): SEL 32/G1

UTILIZATION (APPX. SUP-HRS/WEEK): 80 hrs/wk

SIZE:

1. LINES OF CODE: 11,988
2. MEMORY REQUIREMENTS: 21.2K
3. OFF-LINE STORAGE REQUIREMENTS: 2278 Blocks

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: D. Patel

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: D3

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: On Orbit Real Time Program -  
This program handles the calculations for the math models Target-Vehicle,  
Target Equations of Motion and Coordinate Transformations as well as the  
recording function. The recording is onto a magnetic tape using selected  
parameters.

COMPUTER SYSTEM(S): SEL 32/D3

UTILIZATION (APPX. SUP-HRS/WEEK): 40

SIZE:

1. LINES OF CODE: 8000 (incl 2268L OP/SFWR)
2. MEMORY REQUIREMENTS: 34K (recording) + 5K (math models) = 39K
3. OFF-LINE STORAGE REQUIREMENTS: 246K words, 438K words for DATABASE

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): GRD Software - 11600 lines

GNCRD - dump operator program

DATABASE - pool from which parameters are selected to form recording groups

SELECT - file containing the possible recording groups

READSELE - updates/creates file SELECT

WRTRDBDB - updates/corrects database

CONTACT: A. Lim

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: GNCRD

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Off line dumping (data reduction)  
If a magnetic tape was recorded during a simulation run, this program can be  
used to read the data of the tape, format it, then output it to the line  
printer in a readable fashion so that the data may be analyzed for purposes of  
trouble shooting and verification.

COMPUTER SYSTEM(S): SEL 32/D3

UTILIZATION (APPX. SUP-HRS/WEEK): 3 hrs/wk

SIZE:

1. LINES OF CODE: 1600
2. MEMORY REQUIREMENTS: 23K
3. OFF-LINE STORAGE REQUIREMENTS: 168K words

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

<u>GNCRD - dump: operator program</u>	<u>1600 lines</u>
<u>database - pool from which parameters are selected to form recording groups</u>	<u>9999 lines</u>
<u>SELECT - file containing the possible recording groups</u>	<u>150 lines</u>
<u>READSLE - updates/creates file SELECT</u>	<u>180 line</u>
<u>WRTRDBDB - updates/corrects database</u>	
	<u>11929 lines</u>

CONTACT: V. Voss

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SOS

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: On Orbit Real Time Software  
executive for SES simulation. Contains cockpit I/O, digital auto pilot  
software, GMS control system software, SEL 32-S2 I/O.

COMPUTER SYSTEM(S): SIGMA 5

UTILIZATION (APPX. SUP-HRS/WEEK): 40

SIZE:

1. LINES OF CODE: 28100 lines, FORTRAN
2. MEMORY REQUIREMENTS: 90K words
3. OFF-LINE STORAGE REQUIREMENTS: 22.6K words

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

CONTACT: R. Barb

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: ONOB1

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: ON ORBIT REAL TIME

1. Computations of external forces on the payload and orbiter
2. Write dacs

COMPUTER SYSTEM(S): SEL 32/S1

UTILIZATION (APPX. SUP-HRS/WEEK): 40

SIZE:

1. LINES OF CODE: 6200 lines, FORTRAN
2. MEMORY REQUIREMENTS: 27K words
3. OFF-LINE STORAGE REQUIREMENTS: 200K words including sources and binary objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Software/file management program - operator interface program used to maintain files on disk or magnetic tape. 2200 lines, FORTRAN compatible.

CONTACT: V. Yuen

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: ONOB2

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: ON ORBIT REAL TIME

1. Integration and initialization of state vectors of payload and orbiter
2. Interface with E5 and other SEL computers
3. Drive scene generator
4. Computation of mass properties

COMPUTER SYSTEM(S): SEL 32/S2

UTILIZATION (APPX. SUP-HRS/WEEK): 40

SIZE:

1. LINES OF CODE: 10100 lines, FORTRAN
2. MEMORY REQUIREMENTS: 39K words
3. OFF-LINE STORAGE REQUIREMENTS: 412K words including sources and binary objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Off line test programs - lines of code - 6737  
off line storage - 203K words

Software/file management program - operator interface program used to maintain files on disk or magnetic tape. 2200 lines, FORTRAN compatible

CONTACT: V. Yuen

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: ONOB3

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: The program simulates the HUGHES RENDEZVOUS RADAR MODEL. It is used in support of STS-5 and later mission testing on SES.

COMPUTER SYSTEM(S): SEL 32/S3

UTILIZATION (APPX. SUP-HRS/WEEK): (in development)

SIZE:

1. LINES OF CODE: 2200 lines, FORTRAN
2. MEMORY REQUIREMENTS: 33K words
3. OFF-LINE STORAGE REQUIREMENTS: 158K words including sources and binary objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Software/file management program - operator interface program used to maintain files on disk or magnetic tape. 2200 lines, FORTRAN compatible.

CONTACT: V. Yuen

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RMS (Real Time)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Remote Manipulator System  
environment support programs; end effector model, geometry, torque summation,  
malfunction. 40 millisecond execution rate in communication with SEL 32/R3  
and SEL 32/L1 via 8K of shared memory, in communication with AD10 via 2K of  
interface RAM, in communication with SEL 32/S1, SEL 32/S2, and SEL 32/D3 via  
8K of shared memory.

COMPUTER SYSTEM(S): SEL 32/S3

UTILIZATION (APPX. SUP-HRS/WEEK): 40

SIZE:

1. LINES OF CODE: 1200 lines, FORTRAN
2. MEMORY REQUIREMENTS: 31.2K words
3. OFF-LINE STORAGE REQUIREMENTS: 473K words including sources and  
binary objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): Software/file management program - operator  
interface program used to maintain software files on disk or magnetic tape.  
2200 lines, FORTRAN compatible.

CONTACT: G. Mooreman

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RMS (Real Time)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Remote Manipulator System  
Dynamics model. 2 second execution rate in communication with SEL 32/S3 and  
SEL 32/L1 via 8K of shared memory.

COMPUTER SYSTEM(S): SEL 32/R3

UTILIZATION (APPX. SUP-HRS/WEEK): 40

SIZE:

1. LINES OF CODE: 8000 lines, FORTRAN
2. MEMORY REQUIREMENTS: 40K words
3. OFF-LINE STORAGE REQUIREMENTS: 399K including sources and binary  
objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): Software/file management program - operator  
interface program used to maintain software files on disk or magnetic tape.  
2200 lines, FORTRAN compatible.

CONTACT: G. Mooreman

REFERENCE DOCUMENT: LEMSOC-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: LOADS (Real Time)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Remote Manipulator System hinge forces and moments model 40 millisecond execution rate in communication with SEL 32/R3 and SEL 32/S3 via 8K words of shared memory.

COMPUTER SYSTEM(S): SEL 32/L1

UTILIZATION (APPX. SUP-HRS/WEEK): 24

SIZE:

1. LINES OF CODE: 13000 line, FORTRAN
2. MEMORY REQUIREMENTS: 28978 words
3. OFF-LINE STORAGE REQUIREMENTS: 351K words  
sources and binary objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Software/file management program - operator interface program used to maintain software files on disk or magnetic tape.  
2200 lines, FORTRAN compatible.

CONTACT: L. C. Clay

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Numerous Application Files

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Support creating, editing,  
assembling, loading, and operating AD10 RMS software.

COMPUTER SYSTEM(S): PDP11-6

UTILIZATION (APPX. SUP-HRS/WEEK): 20

SIZE:

1. LINES OF CODE: 10000 lines, PDP assembly
2. MEMORY REQUIREMENTS: meaningless (50K incl sys/sftw)
3. OFF-LINE STORAGE REQUIREMENTS: 1600 blocks on DEC storage disk

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: J. VanValkenburg

REFERENCE DOCUMENT: Various

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RMS (Real Time)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Remote Manipulator System Servo  
model and dynamics state integration programmed in AD10 assembly language.  
2 millisecond execution rate with I/O to SEL 32/S3 at 40 millisecond rate.

COMPUTER SYSTEM(S): AD10

UTILIZATION (APPX. SUP-HRS/WEEK): 40

SIZE:

1. LINES OF CODE: 14800, AD10 assembly
2. MEMORY REQUIREMENTS: 18000 words
3. OFF-LINE STORAGE REQUIREMENTS: 227 blocks (load modules and CMD file)

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

Miscellaneous Test and Utility Files

1000 lines

500 mfm words

20 blocks

CONTACT: J. VanValkenburg

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: STS2 HST

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Scene software used in support of  
STS-2 mission testing in SAIL and SES. Generates out-the-window and CCTV  
views as commanded from SEL 32/S2. 40 millisecond execution rate.

COMPUTER SYSTEM(S): Scene Generator, HOST, VISUAL, and COLLISION

UTILIZATION (APPX. SUP-HRS/WEEK): 10.0

SIZE:

1. LINES OF CODE: 5500
2. MEMORY REQUIREMENTS: 80000<sub>10</sub> bytes (3 computers)
3. OFF-LINE STORAGE REQUIREMENTS: 2500 blocks on DEC storage disk

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: G. Vandergrift

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: S1 EXEC (Non-real time)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: AD10 RMS software emulator. RMS servo model and state vector integration emulation, in FORTRAN, of AD10 real time simulation program. One-tenth the real time execution rate (2 millisecond iteration in 20 milliseconds). Used in conjunction with SEL 32/S3 and SEL 32/R3 as RMS software development tool.

COMPUTER SYSTEM(S): SEL 32/S1

UTILIZATION (APPX. SUP-HRS/WEEK): (As required)

SIZE:

1. LINES OF CODE: 1100
2. MEMORY REQUIREMENTS: 2K words, FORTRAN
3. OFF-LINE STORAGE REQUIREMENTS: 2K words including sources and binary objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: G. Moorman

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RMS (Non-real time)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Equivalent to RMS support modules for real time simulation. The only difference is communication with servo model emulated on SEL 32/S1. One-tenth the execution rate (40 milliseconds in 400 milliseconds). Slowed to keep pace with servo model on S1. Used for RMS software development.

COMPUTER SYSTEM(S): SEL 32/S3

UTILIZATION (APPX. SUP-HRS/WEEK): (As required)

SIZE:

1. LINES OF CODE: 12000 lines, FORTRAN
2. MEMORY REQUIREMENTS: 31.2K words
3. OFF-LINE STORAGE REQUIREMENTS: 473K words including sources and binary objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Software/file management program - operator interface program used to maintain software files on disk or magnetic tape. 2200 lines, FORTRAN compatible.

CONTACT: G. Moorman

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RMS (Non-real time)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Equivalent to RMS dynamics real time simulation model. One-tenth of real time execution rate (2 seconds in 20 seconds) to keep pace with other non-real time RMS programs.

COMPUTER SYSTEM(S): SEL 32/R3

UTILIZATION (APPX. SUP-HRS/WEEK): (As required)

SIZE:

1. LINES OF CODE: 8000 lines, FORTRAN
2. MEMORY REQUIREMENTS: 40K words
3. OFF-LINE STORAGE REQUIREMENTS: 399K words including sources and binary objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE CR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Software/file management program - operator interface program used to maintain software files on disk or magnetic tape. 2200 lines, FORTRAN compatible.

CONTACT: G. Moorman

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RMS (Real Time/Stand Alone)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Equivalent to RMS real time simulation support module. 40 millisecond execution rate. Used in conjunction with SEL 32/R3 and AD10 as a stand alone RMS real time development tool

COMPUTER SYSTEM(S): SEL 32/S3

UTILIZATION (APPX. SUP-HRS/WEEK): (As required)

SIZE:

1. LINES OF CODE: 12000 lines, FORTRAN
2. MEMORY REQUIREMENTS: 31.2K words
3. OFF-LINE STORAGE REQUIREMENTS: 473K words including sources and binary objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Software/file management program - operator interface program used to maintain software files on disk or magnetic tape. 2200 lines, FORTRAN compatible.

CONTACT: G. Moorman

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RMS (Real Time/Stand Alone)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Equivalent to RMS real time simulation models. 2 second execution rate of RMS dynamics model. Used in conjunction with SEL 32/S3 and AD10 as a real time RMS development tool.

COMPUTER SYSTEM(S): SEL 32/R3

UTILIZATION (APPX. SUP-HRS/WEEK): (As required)

SIZE:

1. LINES OF CODE: 8000 lines, FORTRAN
2. MEMORY REQUIREMENTS: 40K words
3. OFF-LINE STORAGE REQUIREMENTS: 399K words including sources and binary objects

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Software/file management program - operator interface program used to maintain files on disk or magnetic tape.

2200 lines, FORTRAN compatible.

CONTACT: G. Moorman

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: COCKPIT

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Aft cockpit readiness test is used to check all cockpit displays and controls daily prior to data operations.

COMPUTER SYSTEM(S): Sigma 5

UTILIZATION (APPX. SUP-HRS/WEEK): 2.0

SIZE:

1. LINES OF CODE: 2000 lines, FORTRAN
2. MEMORY REQUIREMENTS: 6K words
3. OFF-LINE STORAGE REQUIREMENTS: .5K words including source and object

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: R. Burr

REFERENCE DOCUMENT: LEMSCO-14065A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RMS AD10

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Isolated joint test used for unit test, readiness testing, and diagnostic testing of RMS servo model or AD10.

COMPUTER SYSTEM(S): SEL 32/S3

UTILIZATION (APPX. SUP-HRS/WEEK): 2.0

SIZE:

1. LINES OF CODE: 830 lines, FORTRAN
2. MEMORY REQUIREMENTS: 3.5K words
3. OFF-LINE STORAGE REQUIREMENTS: 5.6K words including source and object

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): None

CONTACT: J. VanValkenburg

REFERENCE DOCUMENT: None

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Coordinate System

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates the state vectors,  
positions of parameters, etc. in the various coordinate systems used by SAIL.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 3K
2. MEMORY REQUIREMENTS: 4K
3. OFF-LINE STORAGE REQUIREMENTS: 16K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Drive and unit test case drivers (2K).

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: LEC-12287A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Equations of Motion (EOM)

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Program generates the Equations of Motion of the vehicle. Rotational and translational EOM are computed.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 2K
2. MEMORY REQUIREMENTS: 3K
3. OFF-LINE STORAGE REQUIREMENTS: 11K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

CONTACT:

REFERENCE DOCUMENT: LEC-11614A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Mass Properties

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Program calculates the mass  
properties of the SRB, OV, ET, and OMS phases of the vehicle. Moments of  
Inertia, Mass, center of gravity, structure, dumps, etc. are calculated.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 6K
2. MEMORY REQUIREMENTS: 8K
3. OFF-LINE STORAGE REQUIREMENTS: 17K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): 6K in Unit Test Case Drivers are used in  
support of this program.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: LEC-11891A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: R704 Operational Program

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Transfers data between the VDS,  
FS, TOC, FWD ROS, AFT ROS, and the MMES. It also has the NSP math model.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 6K
2. MEMORY REQUIREMENTS: 6K
3. OFF-LINE STORAGE REQUIREMENTS: 30K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): 29K of off line code for diagnostic

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Gravity/Gravity Gradient

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates the components of gravity and gravity gradient.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1/2K
2. MEMORY REQUIREMENTS: 1K
3. OFF-LINE STORAGE REQUIREMENTS: 2K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): 2K off line c/o program.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11666A/11380B

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Atmosphere

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Calculates atmospheric data from 0 to 600K. It also generates flight path angle, angle of attach, sideslip, Mach number, etc.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1K
2. MEMORY REQUIREMENTS: 1K
3. OFF-LINE STORAGE REQUIREMENTS: 3K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): 1K off line c/o program

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11665A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Winds and Gusts

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates winds and gusts as a function of altitude.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1K
2. MEMORY REQUIREMENTS: 2K
3. OFF-LINE STORAGE REQUIREMENTS: 3K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Two off line programs to store the data on the disc after reformatting and to generate a printed output as a function of internally generated altitude.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11889

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Turbulence

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates the turbulence.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

COMPUTER SYSTEM(S): SEL 32 (SDS)

\_\_\_\_\_  
\_\_\_\_\_

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1/2K

2. MEMORY REQUIREMENTS: 1K

3. OFF-LINE STORAGE REQUIREMENTS: 2K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11620A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Aero

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates aerodynamic coefficients and hinge moments. Simulated on V1 SEL and the AD10.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 128K
2. MEMORY REQUIREMENTS: 128K
3. OFF-LINE STORAGE REQUIREMENTS: 130K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Off line checkout program requires 129K.

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 12198B

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: ME F&M

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates the thrust from the chamber pressure and then the F&M from the engine gimbals and thrust.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1/2K
2. MEMORY REQUIREMENTS: 1/2K
3. OFF-LINE STORAGE REQUIREMENTS: 2K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): off line c/o 1K

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11670B

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: SRB F&M

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates the SRB F&M from the thrust and SRB gimbals angles.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1/2K
2. MEMORY REQUIREMENTS: 1/2K
3. OFF-LINE STORAGE REQUIREMENTS: 1K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

CONTACT:

REFERENCE DOCUMENT: 11669A

C-2

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: OMS F&M

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates the OMS thrust and forces and moments.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1/2K
2. MEMORY REQUIREMENTS: 1/2K
3. OFF-LINE STORAGE REQUIREMENTS: 1K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11654A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RCS F&M

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates the RCS F&M

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1K

2. MEMORY REQUIREMENTS: 1K

3. OFF-LINE STORAGE REQUIREMENTS: 2K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11612A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Slosh

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates the sloshing F&M in the  
ET.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1K
2. MEMORY REQUIREMENTS: 1K
3. OFF-LINE STORAGE REQUIREMENTS: 2K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11667C

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Tail Wag Dog

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates the Tail-Wag-Dog F&M.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1/2K
2. MEMORY REQUIREMENTS: 1/2K
3. OFF-LINE STORAGE REQUIREMENTS: 1K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11664B

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RCS/Aero Interaction

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Generates the RCS/Aerodynamics  
Interaction F&M.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1K
2. MEMORY REQUIREMENTS: 1K
3. OFF-LINE STORAGE REQUIREMENTS: 2K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11575

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Initialization

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Initializes the simulation, gives the input from cards, provides the disc IC and transforms input data to the used coordinate system.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 5K
2. MEMORY REQUIREMENTS: 8K
3. OFF-LINE STORAGE REQUIREMENTS: 18K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 12205

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: IMU

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Provides the flight system with three IMU outputs. Program generates IMU data, provides error terms (drift, scale) and allows faults to be inserted.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 4K
2. MEMORY REQUIREMENTS: 5K
3. OFF-LINE STORAGE REQUIREMENTS: 15K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11611A

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Star Tracker

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Provides two star tracker LRU's.

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COMPUTER SYSTEM(S): SEL 32 (SDS)

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UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 2K

2. MEMORY REQUIREMENTS: 5K

3. OFF-LINE STORAGE REQUIREMENTS: 8K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

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CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11571D

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: TACAN

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Provides TACAN outputs to the FS.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 2K
2. MEMORY REQUIREMENTS: 3K
3. OFF-LINE STORAGE REQUIREMENTS: 6K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

CONTACT: 11568B

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: MSBLS

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Provides MSBLS outputs to FS.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 2K
2. MEMORY REQUIREMENTS: 3K
3. OFF-LINE STORAGE REQUIREMENTS: 6K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11566B

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RALT

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Provides Radar Altimeter  
Outputs to the FS.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1/2K
2. MEMORY REQUIREMENTS: 1/2K
3. OFF-LINE STORAGE REQUIREMENTS: 1K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11567B

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: ADS

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Provides Air Data System  
outputs to the FS.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1K
2. MEMORY REQUIREMENTS: 1K
3. OFF-LINE STORAGE REQUIREMENTS: 2K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT  
OF THE ABOVE NAMED PROGRAM): \_\_\_\_\_

CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: 11890

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: RMS

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Provides the RMS simulation

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COMPUTER SYSTEM(S): SEL 32 (SDS)

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UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 60K

2. MEMORY REQUIREMENTS: 75K

3. OFF-LINE STORAGE REQUIREMENTS: 100K

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SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM): Off line program to provide engineering support and modification requires 60K and 100K off line storage.

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CONTACT: \_\_\_\_\_

REFERENCE DOCUMENT: \_\_\_\_\_

AVIONICS TEST BED  
SOFTWARE SURVEY

PROGRAM NAME: Target/Payload

BRIEF DESCRIPTION AND STATEMENT OF PURPOSE: Payload model for the RMS simulation.

COMPUTER SYSTEM(S): SEL 32 (SDS)

UTILIZATION (APPX. SUP-HRS/WEEK): 112

SIZE:

1. LINES OF CODE: 1K
2. MEMORY REQUIREMENTS: 1K
3. OFF-LINE STORAGE REQUIREMENTS: 2K

SUPPORT PROGRAMS (IF RUN AS SEPARATE PROGRAM TO REDUCE OR PROCESS DATA IN SUPPORT OF THE ABOVE NAMED PROGRAM):

CONTACT:

REFERENCE DOCUMENT: