

VOYAGER	

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GENERAL 8 ELECTRIC

VOLUME 5 DATA MANAGEMENT STUDY

APPENDIX F CONTRACTOR DATA PACKAGE TEST (TE) AND MISSION OPERATIONS (MP)

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DATA MANAGEMENT AND CONTROL TASK

VOYAGER SPACECRAFT SYSTEM PROJECT

PREPARED FOR

JET PROPULSION LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY
4800 OAK GROVE DRIVE
PASADENA, CALIFORNIA

UNDER JPL CONTRACT No. 951112



P. O. Box 8555 • Philadelphia, Penna. 19101

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INTRODUCTION

This appendix presents the Contractor Data Package (Data Item Matrix, Data Requirement Descriptions, User Flow Diagram, Document Relationship Tree, and Frequency and Phasing Charts) for Test (TE) and Mission Operations (MP).

Test data are those used to obtain, verify, and provide test information for the evaluation of development objectives. Data within this category include plans and procedures for design verification tests, qualification tests, reliability demonstration tests, and flight tests directed at design qualifications. The development of checkout procedures and checkout test activity fall in this category. Tests required for flight operations and reliability demonstrations of Voyager hardware are considered to be in this category.

Mission Operations data include the requirements, plans, procedures, and activities required for mission operations from vehicle launch through recovery and post-flight operations. They reflect such areas as long-range plans for the tracking network and mission support, as well as specific mission requirements such as profiles of launches, mission objectives, and personnel assignments. They exclude the performance analysis aspects of flight tests, which are included under the Test category.

The complete list of Contractor Data Package appendixes is as follows:

Appendix A - Technical Description and System Engineering (SE)

Appendix B - Planetary Quarantine (PQ)

Appendix C - Manufacturing (MG)

Appendix D - Configuration Management (CM)

Appendix E - Quality Assurance (QA)

Appendix F - Test (TE) and Mission Operations (MP)

Appendix G - Reliability Assurance (RA)

Appendix H - Logistics and Support (LS)

Appendix I - Overall Management (MA), Scheduling (SC), Manning and Financial (MF)

Appendix J - Procurement and Contracting (PC)

Appendix K - Data Management (DM)

Appendix L* - Facilities (FA)

Appendix M^* - Safety (SA)

Appendix N* - Site Activation for Launch (AL)

Appendix O* - Science (SI)

Appendix P* - Related Project Interfaces (RP)

Appendix Q* - Advanced Missions (AM)

^{*} Appendixes L through Q prepared under Contract NAS 7-584.

	1 of 4	
DATA ITEM NUMBER	DATA ITEM	DESCR
	TEST	·
	MANUALS	
TE- 025	Manual, Test Facilities Description and Capabilities	A reference document relative to the te the Project.
	MINUTES	
TE- 024	*Minutes, Integrated Test Board (ITB)	Minutes of the considerations and action Board.
	PLANS	
TE- 001	Plan, Integrated Test	The overall test program plan and top d and control of the test program.
TE- 130	Plan, General Test	An overall plan for a major test phase of Functional approval (A), as appropriate
TE- 131	Plan, Detailed Test	Specific test plans for implementing a p Functional approval (A), as appropriate
TE- 112	Plan, Spacecraft Mission Opera- tions Test	Plans for evaluating and demonstrating readiness of the vehicle with the missio
TE- 013	Plan, Interface Test	Plans for evaluating the interface betwe
TE- 018	Plan, Operational Support Equip- ment (OSE) Certification	Plan for demonstrating and qualifying the flight hardware.
TE- 123	Plan, Special Test Equipment (STE) Verification Tests	Plan for validating special test equipme it.

^{*} KEY INFORMAL DATA

DATA ITEM LIST/USER MATRIX

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	T-	
DATA ITEM NUMBER	2 of 4 DATA ITEM TEST	DESCRIPT
	PLANS (Cont'd)	
TE- 157	Plan, Facilities Certification	Plan for demonstrating the suitability of fa
TE- 158	Plan, Software Certification	Plans for verifying the suitability of softwo
	PROCEDURES	
TE- 129	Procedure, Equipment Calibration and Checkout	Detailed procedures for the calibration and prior to use.
TE- 030	Procedure, Test Operating	Detailed procedures for conducting various operations.
TE- 125	Procedure, Facilities Operating	Detailed procedures for operating the varitest operations.
TE- 159	Procedure, Equipment (Spacecraft and Operational Support) Assembly and Handling	Procedures for the movement of the equipoperations.
TE- 160	Procedure, Operating, Integrated Test Board (ITB)	Detailed procedures related to the activitie operation of the Integrated Test Board.
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^{*} KEY INFORMAL DATA

DATA ITEM LIST/USER MATRIX

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DATA ITEM NUMBER	3 of 4 DATA ITEM TEST	DESCRIP
	RECORDS	
TE- 027	*Logbook, Test	A log of significant events, activities and test operations.
TE- 161	*Logbook, Cumulative Test Time	A log of operating time accumulated on c of the hardware.
TE- 028	Tape, Data Storage	Magnetic and paper tape records of data operations.
TE- 162	Film, Test Operation	Still and motion pictures of test operation
	REPORTS	
TE- 054	Report, Quick-Look Test	The initial evaluation of a test relative to
TE- 165	Report, Test	A report of the test results from a partic as appropriate.
TE- 167	Report, Test Phase Summary	A report summarizing the results of a te assembly and check-out.
TE- 046	Report, Cumulative Test Time	A report issued periodically which summ accumulated on various hardware section
TE- 056	Report, Daily Operations	A brief management report describing as on a daily basis.
TE- 163	Report, Integrated Test Board (ITB) Actions Summary	A periodic summary report of the action the Integrated Test Board.
TE- 166	Report, Test Program Summary	Final test program summary report.

^{*} KEY INFORMAL DATA

DATA ITEM LIST/USER MATRIX

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DATA ITEM NUMBER	4 of 4	DESCRIP
	TEST	
	SPECIFICATIONS	
TE- 164	Specification, Software Performance	Performance specification for compute
TE- 031	Specification, Special Test Equipment (STE) (System and Subsystem)	Performance and design requirements

^{*} KEY INFORMAL DATA

DATA ITEM LIST/USER MATRIX

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A - APPROVAL AUTHORITY

PM - PROJECT MANAGER AF

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DATA	1 of 1	
DATA ITEM NUMBER	DATA ITEM	DESCRI
	MISSION OPERATIONS	
	HANDDOOKS	
	HANDBOOKS	
MP- 001	Handbook, System Performance Reference	
	PLANS	
MP- 002	Plan, Mission Operations Support (Spacecraft)	
MP- 005	Plan, Flight Operation Diagnostic Computation	
	REPORTS	
MP- 004	Report, Operational Design Description	
	SPECIFICATIONS	
MP- 003	Specification, Mission Dependent Equipment (MDE)	Specifies the types of mission dependent the software requirements.
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^{*} KEY INFORMAL DATA

DATA ITEM LIST/USER MATRIX

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USER FLOW DIAGRAMS

Test (TE) data items have been included in the Engineering User Flow Diagrams. See Appendix A, Section 3.

Mission Operations (MP) user flow was not identified for study.

Test Data Requirement Descriptions

		Test Data Requirement Descriptions	1 41 		
DRD					
Number		Title			
TE-001		Plan, Integrated Test			
TE-013		Plan, Interface Test			
TE-018		Plan, Operational Support Equipment (OSE) Certific	ation		
TE-024		*Minutes, Integrated Test Board (ITB)			
TE-025		Manual, Test Facilities Description and Capabilities	S		
TE-027		*Logbook, Test			
TE-028	when majorities, and	Tape, Data Storage		en e	
TE-030		Procedure, Test Operating		en e	
TE-031		Specification, Special Test Equipment (STE) (System	and Sub	system)	
TE-046		Report, Cumulative Test Time			
TE-054		Report, Quick-Look Test			
TE-056		Report. Daily Operations			
TE-112	- 500	Plan, Spacecraft Mission Operations Test			
TE-123		Plan, Special Test Equipment (STE) Verification Te	sts		
TE-125	100	Procedure, Facilities Operating			
TE-129		Procedure, Equipment Calibration and Checkout			
TE-130		Plan, General Test			
TE-131		Plan, Detailed Test			The State of the S
TE-157		Plan, Facilities Certification			
TE-158		Plan, Software Certification			
TE-159		Procedure, Equipment (Spacecraft and Operational Handling	Support) A	Assembly and	l
TE-160		Procedure, Operating, Integrated Test Board (ITB)			
TE-161	190me 5 1100 TE	*Logbook, Cumulative Test Time			
TE-162	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Film, Test Operation	THE MENT OF STATE		
TE-163		Report, Integrated Test Board (ITB) Actions Summa	ary		
TE-164		Specification, Special Test Equipment (STE) (System	n and Sub	system)	
TE-165		Report, Test			
TE-166		Report, Test Program Summary			
TE-167		Report, Test Phase Summary			

^{*}Key Informal Data

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DUTLINE OF CONTENTS:	
1.0 Introduction and scope	
The scope of the integrated test plan (ITP) includes all testing from part	ts and materials
qualification through top-level system and interface tests. It also cover	rs non-hardware
items such as computer programs, procedures, safety, test reporting p	provisions, etc.
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2.0 Summary	
2.1 Principal features of the program	

- Overall test program schedule 2.2
- 2.3 Test program summary

3.0 Requirements and approach

- Custom requirements 3.1
- 3.2 Approach
 - Test program approach and philosophy
 - Test program policies and ground rules.

(CONTINUE ON THIRD SHEET, IF NECESSARY, AND AFFIX TO THIS DRD.)

- 3.3 Requirements by generic test area such as:
 - a. EMI

e. Dynamics

b. Magnetics

- f. Separation
- c. Mass properties
- g. Life

d. Thermal

- h. Interface
- i. Etc.
- 4.0 Development test phase

This section shall contain the following relative to each development test including:

- a. Objectives and justification for the test
- b. Test hardware
- c. Test sequence and schedule
- d. Major resources required
- 5.0 Type approval test phase

See 4.0 above.

6.0 Flight acceptance test phase

See 4.0 above.

7.0 Combined system test phase

See 4.0 above.

8.0 Test program summary

This section shall contain a summary of the test program in a tabular form for easy reference and other information such as Operational Support Equipment (OSE) and Special Test Equipment (STE) utilization, facilities loading, etc.

- 9.0 Documentation requirements and provisions
 - 9.1 Documentation plan
 - 9.2 Review and buy-off
- 10.0 Test program management and control
 - 10.1 Integrated test board
 - 10.2 Test program responsibilities
- 11.0 Glossary of terms

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OUTLINE OF CONTENTS:

- 1.0 Introduction
- 2.0 Scope and summary
- 3.0 Test plans

The following shall be included for interface areas such as those listed below:

- a. Objectives
- b. Test hardware
- c. Location of tests and facilities
- d. Test equipment and special equipment
- e. Test sequence and plan
- f. Schedule
- 3.1 Spacecraft and capsule
- 3.2 Spacecraft, capsule or planetary vehicle and the launch vehicle
- 3.3 Tests with launch site facilities and equipments
 - a. Check-out facilities
 - b. Explosive safe facility
 - c. Vertical assembly building
 - d. Launch complex
 - e. Range support equipments

(CONTINUE ON THIRD SHEET, IF NECESSARY, AND AFFIX TO THIS DRD.)

- 3.4 Tests with Deep Space Network (DSN) Stations and Mission Operations System (MOS)
 - a. Planetary vehicle tests
 - b. Mission Dependent Equipment (MDE)
 - c. Software Tests at Deep Space Instrumentation Facility (DSIF) or Space Flight Operations Facility (SFOF)
- 4.0 References

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OUTLINE OF CONTENTS:

- 1.0 Introduction and scope
- 2.0 Requirements and objectives
 - a. Subsystem (OSE)
 - b. System Test Complex (STC)
 - c. Launch Complex Equipment (LCE)
 - d. Mission Dependent Equipment (MDE)
 - e. Assembly, Handling and Shipping Equipment (AHSE)
- 3.0 Test plan and sequence

A sequence of tests and checks shall be specified for each piece of equipment to indicate how it will be certified before use with flight hardware. This shall include:

- a. Breadboard tests (as applicable)
- b. Development tests
- c. Use of AHSE or other equipment with major test models
- d. Tests with TA and PTM hardware
- e. Interface tests
- f. Special tests
- g. Schedule
- h. Special equipment required
- 4.0 References

(CONTINUE ON THIRD SHEET, IF NECESSARY, AND AFFIX TO THIS DRD.)

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OUTLINE OF CONTENTS:

1.0 Introduction

2.0 Scope

This document is intended to provide general rather than specific information relative to each facility. For the facilities available, the following information should be provided:

- a. Identification of the facility.
- b. Location of the facility, building, room, etc.
 - 1) Size of access doors into the area.
 - 2) Adjacent assembly areas.
 - 3) Cleanliness conditions and potential.
- c. Size of test facility.
- d. Limits on size of test specimen.
- e. Capability of facility.
- f. Controls (as applicable).
- g. Access and penetrations (if applicable).
- h. Provisions for combined environmental tests.
- i. Special fixtures and instrumentation available.
- j. Safety considerations.
- k. Constraints and special considerations

3.0 Environmental test facilities

(CONTINUE ON THIRD SHEET, IF MECESSARY, AND AFFIX TO THIS DRD.)

- 3.1 For parts, components or assemblies
- 3.2 For systems.
- 4.0 Other test facilities

GE EXHIBIT DRD TE-027 DATA DATE: DRD APPROVED BY CATEGORY VOYAGER DATA REQUIREMENT DESCRIPTION DRD NO.: CONTRACT NO.: ORGANIZATION ORIGINATING REQUIREMENT: DRD PREPARED BY: CODE: OFFICE RESPONSIBLE FOR DRD. CODE DATE: TE B. Daniels 7/28/67 TE-027 DRL ITEM ORGANIZATION RESPONSIBLE TASK OR TITLE OF DOCUMENT: NO.: FOR DOCUMENT PREPARATION SUBTASK Test ORGANIZATION RESPONSIBLE DRI. NO. LEVEL NO. * LOGBOOK, TEST FOR DOCUMENT REPRODUCTION ORGANIZATION RESPONSIBLE FILE NO. FOR DOCUMENT DISTRIBUTION: TYPE OF DOCUMENT: **XINFORMATION** □ CONTROL DACTION DREFERENCE USE OF DOCUMENT: ORGANIZATION RESPONSIBLE NO. OF COPIES: FOR DOCUMENT STOWAGE: A comprehensive listing of the various activities 30 accomplished during a test and the test results in INFORMATION CUTOFF ESTIMATED MANHOURS FOR SINGLE PREPARATION: quantitative form. DATE OR MILESTONE! DATE DATA DUE ESTIMATED COST (\$) INTERRELATIONSHIP WITH OTHER DATA REQUIREMENTS: FOR SINGLE PREPARATION: TO USER! QA-002, Logbook, Vehicle TE-001, Plan, Integrated Test FREQUENCY OF ISSUE: PUBLICATION DATE: TE-161, Logbooks, Cumulative Test Time T ANNUALLY TE-165, Report, Test SEMI-ANNUALLY PDR QUARTERLY UPDATE (FREQUENCY BI-MONTHLY OR MILESTONE): MONTHLY Revise through J FACT SEMI-MONTHLY CLASSIFICATION: GROUP 1 BI-WEEKLY D SPECIAL HANDLING III SECRET WEEKLY ESTIMATED ☐ CONFIDENTIAL ☐ GROUP 3 ☐ NASA DISCREET \Box DAILY SECRET RESTRICTED DATA GROUP 4 DJPL DISCREET TOTHERWISE, AS SPECIFIED EXPIRATION DATE: D PROPRIETARY CONFIDENTIAL RESTRICTED DATA PROJECT DISCREET D PUBLIC DOMAIN □ NOFORN As required **WUNCLASSIFIED** REFERENCE DOCUMENTS: KIND OF DATA: FORM OF DATA: PRINTED DOCUMENT ☐ INSTRUCTION □ ABSTRACT □ LETTER ☐ CHART □ BROCHURE Mission Guidelines LIST D BULLETIN □ DIAGRAM K LOG DRAWING ☐ CATALOG MANUAL ☐ FILM (STATIC OR MOTION) ☐ CONTRACT ☐ DIRECTIVE ☐ MEMORANDUM D ILLUSTRATION MINUTES ☐ MODEL DISCLOSURE APPLICABLE STANDARDS ☐ RECORDING (TAPE OR DISC) D ENGINEERING CHANGE D PLAN ORDER ☐ PROCEDURE ☐ COMPUTER CARD ☐ REQUEST FOR ENGINEER- ☐ REGULATION ☐ COMPUTER TAPE ING CHANGE PROPOSAL | REPORT ☐ MICROFILM (W/OR W/O CARD) D ENGINEERING CHANGE D SCHEDULE □ OTHER ☐ SPECIFICATION PROPOSAL ☐ STANDARD ☐ HANDBOOK **DINDEX** □ VOUCHER REVIEWS AND/OR APPROVALS REQUIRED: (LIST IN ORDER OF SUBMITTAL) DATE DATE PREPUBLICATION PROOF DRAFT SUBMIT FOR REVIEW TO: BY SUBMIT FOR APPROVAL TO: Manager, Test

^{*} Key Informal Data

VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET

SPECIAL INSTRUCTIONS:

DRD NO.:

TE-027

Preprinted form may be used for the accumulation of information to be contained in this logbook. The information to be included are shown below, but the design of the form (or forms) is left to the contractor.

SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)

OUTLINE OF CONTENTS:

- 1. Hardware identification
 - a. Title or name
 - b. Identifying numbers and model
- 2. Date
- 3. Name of test and location
- 4. Page number
- 5. Test conditions (ambient temp., humidity, pressure, etc.)
- 6. Individuals participating
- 7. Space for recording significant events and data such as:
 - a. Installation or removal of hardware
 - b. Modifications
 - c. Inspections
 - d. Start and stop of tests and significant events within the test such as commands, etc.
 - e. Test equipment operation
 - f. Test facility conditions and changes
 - g. Failures and anomalies detected and resulting action.
 - h. Significant data items
- 8. Procedures used
- 9. Approval

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SPECIAL INSTRUCTIONS:

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OUTLINE OF CONTENTS:

- 1.0 Information on tape
 - 1.1 Data
 - 1.2 Time base
 - 1.3 Written
 - a. Specific vehicle
 - b. Time and date of test
 - c. Test identification
 - d. Test conductor
 - 1.4 Reference frequency (cycle lock)
- 2.0 Identifying file cards
 - 2.1 Vehicle No.
 - 2.2 Reel No.
 - 2.3 Test procedure
 - 2.4 Date
 - 2.5 Recorder No.
 - 2.6 Start and stop times
 - a. Specific paragraphs or item No. in test procedure
 - b. Remarks

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OUTLINE OF CONTENTS:	
1.0 Objectives and scope	
2.0 Requirements	
a. Personnel	
b. Configuration c. Equipment	
c. Equipment d. Instrumentation	}
e. Applicable documents	
f. Sequence	
3.0 Special instructions	
a. Safety and operational constraints	
b. Sign-off	
c. Other	
4.0 Preparation	
a. Preliminary and final preparations	
b. Special tests 5.0 Procedures	
6.0 Post-test operations	
7.0 Data sheets	

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OUTLINE OF CONTENTS:

- 1.0 Scope
- 2.0 Applicable documents
- 3.0 Requirements
 - 3.1 Functional characteristics
 - 3.2 Interfaces
 - 3.3 Special considerations (as applicable)
 - a. Mass and dynamics
 - b. Thermal
 - c. EMI control
 - d. Material restrictions for such things as:
 - 1) Magnetic considerations
 - 2) Cleanliness considerations
 - 3) Lubricants
- 4.0 Test and verification
 - 4.1 Inspection and test
 - 4.2 Verification requirements
- 5.0 Preparation for delivery
- 6.0 Notes

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This report may be prepared in either a tabular or graphical format.

SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)

OUTLINE OF CONTENTS:

- 1.0 Introduction and scope
- 2.0 Applicable documents and references
- 3.0 Information
 - 3.1 Hardware identification
 - a. Component or assembly and identifying number
 - b. Subsystem
 - c. System
 - 3.2 Operating time (in hours)
 - a. During component test
 - b. During subsystem test
 - c. During system test
 - d. Total time
 - e. Time from last failure
 - 3.3 Failure summary

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SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)

OUTLINE OF CONTENTS:

- Introduction and summary
 - A brief statement of:
 - a. What was tested.
 - b. When the test occured
 - Where the tests were conducted c.
 - Major events, number of tests, length of test, etc.
- 2. Objectives and apparent degree of satisfaction.
- Preliminary evaluation
 - a. Of the test
 - b. Of the data produced.
- Conclusions

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ITLINE OF CONTENTS:	
1.0 Identification of test and test hardware	
2.0 Summary Progress and schedule status versus planned	
3.0 Details	
a. Activities and status of hardware	
b. OSE Status	
c. Supporting facilities status (as applicable).4.0 Recommendations	

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VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET

SPECIAL INSTRUCTIONS:

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Detailed test plans shall be prepared for specific tests such RF compatibility tests between spacecraft and DSIF or MOS readiness demonstration tests.

SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)

OUTLINE OF CONTENTS:

- 1.0 Introduction and scope
- 2.0 Scope and summary
- 3.0 Test requirements

The following shall be included for each of the tests listed below:

- a. Objectives
- b. Test hardware
- c. Location of tests and facilities
- d. Test equipment and special equipment
- e. Test sequence and plan
- f. Schedule
- 3.1 Spacecraft and/or capsule with the DSIF
- 3.2 Planetary vehicle and MOS
- 3.3 MDE hardware and the DSIF and MOS
- 3.4 Software and the DSIF/SFOF/MOS
- 4.0 References

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GE EXHIBIT DRD TE-123 VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET DRD NO.: SPECIAL INSTRUCTIONS: TE-123 Verification plans shall be prepared for each major piece of special test equipment (such as a support fixture for the spacecraft system) to demonstrate its suitability for use with the hardware. SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW) OUTLINE OF CONTENTS: 1.0 Introduction and scope 2.0 Requirements and objectives

- a. Applicable STE specification
- b. Requirements
- 3.0 Test equipment and special fixture
- 4.0 Test sequence and plan
 - a. Check-out
 - b. Operation
 - c. Performance
- 5.0 Schedule
- 6.0 Special considerations such as safety, etc.

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VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET

SPECIAL INSTRUCTIONS:

TE-125

SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)

OUTLINE OF CONTENTS:

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Requirements for such items as:
 - a. Personnel
 - b. Instrumentation
 - c. Equipment
 - d. Applicable documents
 - e. Utilities
- 4.0 Special instructions
 - a. Safety and operational constraints
 - b. Sign-off
- 5.0 Preparations
 - a. Preliminary and final
 - b. Special tests
- 6.0 Detailed procedure
- 7.0 Post-test activities
- 8.0 Facility data sheets

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- d. Equipment
- e. Instrumentation
- f. Sequence (as necessary)
- 3.0 Special instructions
 - a. Safety of operational constraints
 - b. Sign-off
 - c. Other
- 4.0 Procedure
 - a. Preparations
 - b. Warm-up
 - c. Tests
 - d. Calibration runs
 - e. Post-test operations
- 5.0 Data sheets

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VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET

SPECIAL INSTRUCTIONS: General test plans shall be prepared for all major test models (or test phases). They shall include but not be restricted to tests such as the following:

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m TE-}130$

- 1. Thermal test model
- 2. Structural test model
- 3. Engineering development model spacecraft
- 4. Separation model
- 5. Attitude control test model
- 6. Antenna test model
- 7. Proof test model
- 8. Assembly and check-out
- 9. Combined system tests
- 10. OSE system tests
- 11. Etc.

SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)

OUTLINE OF CONTENTS:

- 1.0 Introduction
 - a. Requirements
 - b. Purpose
 - c. Objectives of test
- 2.0 Test hardware description
- 3.0 Instrumentation planned
- 4.0 Facilities usage
 - a. Set-up
 - b. Test time
 - c. Tear-down
 - d. Special requirements
- 5.0 Test equipment and special fixtures
- 6.0 Test sequence and plan
- 7.0 Schedule
- 8.0 Analysis and evaluation plan
- 9.0 Special considerations such as safety, etc.

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VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET

SPECIAL INSTRUCTIONS: Detailed test plans supplement the integrated test plan and general test plans by providing specific information relative to a particular test or tests on a particular component or assembly. Detailed test plans shall be prepared for items such as the following but may include other similar items:

DRD NO.: ${
m TE-}131$

- 1. Breadboard tests
- 2. Tests of engineering development models
- 3. Tests of development subsystems
- 4. Major tests in the cycle of the spacecraft models and systems such as:
 - a. Vibration Tests on the spacecraft test model (STM)
 - b. Thermal/Vacuum tests on the proof test model (PTM)
 - c. TLM calibration on the EDM, PTM, or flight spacecraft.
- 5. TA tests on each component or assembly.
- 6. FA tests on each component or assembly.

SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)

OUTLINE OF CONTENTS:

- 1.0 Specific requirements with appropriate references
- 2.0 Purpose and objectives
- 3.0 Test hardware description
 - a. Physical (including instrumentation)
 - b. Functional
- 4.0 Data requirements
- 5.0 Facilities and test equipment provisions.
- 6.0 Test plan
 - a. Sequence, flow plan and schedule
 - b. Test conditions
 - c. Expected results with quantitative predictions
 - d. Procedures (by reference if required).
 - e. Data reductions and presentations
- 7.0 Analysis and evaluation
 - a. Data processing required
 - b. Analysis plans
- 8.0 Special considerations
 - a. Special handling and set-up requirements
 - b. Protection against test equipment failures or mal-usage
 - c. Safety

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VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET

SPECIAL INSTRUCTIONS:

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TE-157

New facilities as well as existing facilities shall be certified as being capable of supporting Voyager with adequate safety margins.

SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)

OUTLINE OF CONTENTS:

- 1.0 Scope
- 2.0 Applicable documents
- 3.0 Requirements
 - 3.1 Definition of facilities to be certified
 - 3.2 Certification of facilities to include, but not be limited to:
 - a. Primary power margins and stability
 - b. RFI and EMI margins
 - c. Thermal control margins
 - d. Humidity control margins
 - e. Contamination control margins
 - f. Magnetic characteristics
 - g. Personnel and equipment safety feature operation
 - h. Dimensions of facility to include, but not be limited to:
 - 1) Inside dimensions and clearances
 - 2) Dimensions of doors
 - 3) Floor load capacity
- 4.0 Test equipment and special fixtures
- 5.0 Test sequence
- 6.0 Schedule

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1.0 Introduction and scope 2.0 Requirements and objectives 3.0 Test plan and sequence 3.1 Program verification plan a. Subroutine verification b. Interface checks c. Programs verification 3.2 Test sequence and procedures a. Logic and option checks b. Use of test cases 4.0 Schedules	

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VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET

SPECIAL INSTRUCTIONS:

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These procedures shall apply for disassembly and movement of the spacecraft or OSE equipments within the general test area as opposed to the handling procedures required for transporting the equipments to the launch site.

SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)

OUTLINE OF CONTENTS:

- 1.0 Introduction and Scope
- 2.0 Requirements
 - a. Personnel
 - b. Equipment
 - c. Applicable documents
- 3.0 Special instructions
 - a. Safety and other constraints
 - b. Sign-off
 - c. Other
- 4.0 Procedure
 - a. Preparations
 - b. Disassembly (as required)
 - c. Loading and moving
 - d. Assembly
 - e. Checkout

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1.0 Introduction 2.0 Scope	
3.0 Operations	
3.1 Integration	
a. Authority and function	
b. Membership c. Chairman	
d. Interfaces	
3.2 Meetings	
a. Stated	
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Attendance requirements	
b. Special	ļ
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JPL 2568-1 OCT 65

- 3.3 Actions and decisions
 - a. Operating procedures
 - b. Method of making decisions
 - c. Appeals
- 3.4 Records and minutes
 - a. Review and approval
 - b. Publication
 - c. Distribution
- 4.0 Notes

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VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET

SPECIAL INSTRUCTIONS:

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SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)

OUTLINE OF CONTENTS:

The logbook shall contain the following information:

- 1. Hardware identification
 - a. Name and identifying number(s)
 - b. Manufacturer's name
 - c. Maximum operating time limit (if applicable)
- 2. Installation History
- 3. Test Time History
 - a. Daily operating time
 - b. Cumulative time
 - c. Mode of operation
 - d. Type of test
- 4. Failure and maintenance history
 - a. Failures and fixes
 - b. Modifications
 - c. Breaks of inspection
- 5. Notes of significant events or remarks.

DATE DATA DRD APPROVED BY CATEGORY VOYAGER DATA REQUIREMENT DESCRIPTION DRD NO. CONTRACT OFFICE RESPONSIBLE FOR DRD: CODE DRD PREPARED BY: DATE ORGANIZATION ORIGINATING CODE: REQUIREMENT. TE-162 TE7/28/67 M. Shoemaker ORGANIZATION RESPONSIBLE DRL ITEM TASK OR TITLE OF DOCUMENT: SUBTASK: NO.: FOR DOCUMENT PREPARATION: Test FILM, TEST OPERATION LEVEL NO. ORGANIZATION RESPONSIBLE DRL NO. FOR DOCUMENT REPRODUCTION ORGANIZATION RESPONSIBLE DDL NO.: FILE NO. FOR DOCUMENT DISTRIBUTION: TYPE OF DOCUMENT: ☐ CONTROL DACTION DREFERENCE MINFORMATION USE OF DOCUMENT NO. OF COPIES: ORGANIZATION RESPONSIBLE FOR DOCUMENT STOWAGE: To provide a pictorial record of test operations and is used to evaluate procedures and /or results. INFORMATION CUTOFF ESTIMATED MANHOURS FOR SINGLE PREPARATION: DATE OR MILESTONE: DATE DATA DUE ESTIMATED COST (\$) INTERRELATIONSHIP WITH OTHER DATA REQUIREMENTS: FOR SINGLE PREPARATION: TO USER TE-030, Procedure, Test Operating FREQUENCY OF ISSUE PUBLICATION DATE: TE-131, Plan, Detailed Test CDR ANNUALLY SEMI-ANNUALLY QUARTERLY UPDATE (FREQUENCY BI-MONTHLY As required MONTH! Y SEMI-MONTHLY CLASSIFICATION: GROUP I BI-WEEKLY through launch ☐ SECRET O SPECIAL HANDLING WEEKLY O CONFIDENTIAL ESTIMATED D GROUP 3 O NASA DISCREET TI DAILY SECRET RESTRICTED DATA GROUP 4 DJPL DISCREET EXPIRATION DATE TX OTHERWISE AS SPECIFIED CONFIDENTIAL RESTRICTED DATA D PROPRIETARY □ PROJECT DISCREET PUBLIC DOMAIN **□ NOFORN** ₩ UNCLASSIFIED <u>One time</u> REFERENCE DOCUMENTS: KIND OF DATA: FORM OF DATA: ☐ PRINTED DOCUMENT □ ABSTRACT INSTRUCTION C CHART D BROCHURE D LETTER D LIST ☐ DIAGRAM D BULLETIN None ☐ DRAWING ☐ CATALOG □ LOG IN FILM (STATIC OR MOTION) □ CONTRACT ☐ MANUAL ☐ MEMORANDUM [] ILLUSTRATION F) DIRECTIVE D DISCLOSURE MINUTES APPLICABLE STANDARDS ☐ RECORDING (TAPE OR DISC) D ENGINEERING CHANGE ☐ PLAN ☐ PROCEDURE ☐ COMPUTER CARD ☐ REQUEST FOR ENGINEER- ☐ REGULATION COMPUTER TAPE ING CHANGE PROPOSAL TE REPORT ☐ MICROFILM (W/OR W/O CARD) D ENGINEERING CHANGE D SCHEDULE C) OTHER ☐ SPECIFICATION PROPOSAL ☐ HANDBOOK ☐ STANDARD I INDEX □ VOUCHER REVIEWS AND/OR APPROVALS REQUIRED: (LIST IN ORDER OF SUBMITTAL) DATE PREPUBLICATION PROOF DATE SUBMIT FOR REVIEW TO: SUBMIT FOR APPROVAL TO: Manager, Test

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OUTLINE OF CONTENTS:	İ
1. Negative and prints	
1.1 Security classification	
1.2 Title of subject	
1.3 Negative number	
a. Place	
b. Date	
c. Sequential number	
d. Real time (If applicable)	
1.4 Requestor and his operation	
 Special information Log book or identifying file cards include information shown in 	
paragraphs 1.1 through 1.5 above.	
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OUTLINE OF CONTENTS:

- 1.0 Scope
- 2.0 Applicable documents
- 3.0 Requirements
 - 3.1 Description of program
 - a. Function(s) to be performed
 - b. Features such as logic, options, decisions, timing, etc.
 - c. Inputs and outputs, volume of data, etc.
 - d. Form (i.e., tape, cards, assembly listings, etc.)
 - 3.2 Interfaces
 - 3.3 Equipment utilization
 - 3.4 Program restrictions and constraints
 - a. Accuracy
 - b. Tolerances
 - c. Timing and speed of operation
 - 3.5 Special considerations
 - a. Provisions for computer recovery
 - b. Alternate requirements for input/output handling

(CONTINUE ON THIRD SHEET, IF NECESSARY, AND AFFIX TO THIS DRD.)

- 4.0 Test and verification
 - a. Procedures for evaluating and functional routines
 - b. Performance standards for evaluation
 - c. Requirements for test cases
- 5.0 Preparation for delivery
- 6.0 Notes
 - a. Mathematical concepts or formulas
 - b. Definition of special terms

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OUTLINE OF CONTENTS:	
1.0 Introduction and summary a. Brief statement of the test.	
a. Brief statement of the test.b. Objectives and relative degree of satisfaction.	
c. Summary of results (with schedule as appropriate).	
d. Recommendations	
2.0 References 3.0 Test	
a. Hardware tested and instrumentation.	
b. Facilities and special equipment used.	
c. Test sequence	
1) Planned	
2) Actual 3) Detailed schedules	
4.0 Results	
Actual data as appropriate or references.	

Recommendation on third sheet, if necessary, and affix to this dro.)

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VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET

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OUTLINE OF CONTENTS:

1. Introduction and scope

Since this is the report which complements the integrated test plan, the scope of contents shall be comparable.

- 2. Summary
 - a. Test approach
 - b. Major events
 - c. Overall conclusions
- 3. Applicable documents
 - a. Specifications
 - b. Plans
 - c. Other
- 4. Development program
 - a. Parts and materials
 - b. Components
 - c. Major models
 - d. OSE
 - e. Etc.

(CONTINUE ON THIRD SHEET, IF NECESSARY, AND AFFIX TO THIS DRD.)

- 5. Type approval program
 - a. Parts and materials
 - b. PTM
- 6. Certification program
 - a. OSE
 - b. Softwares
 - c. Facilities
- 7. Flight acceptance program
 - a. Components and assemblies
 - b. Systems
- 8. Combined system tests
 - a. Spacecraft capsule
 - b. Planetary vehicle launch system
 - c. Planetary vehicle MOS
- 9. References
 - a. Test procedures
 - b. Test reports
- 10. Appendixes (as desired)

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OUTLINE OF CONTENTS:

- 1. Introduction
- 2. Abstract
 - a. Scope of report
 - b. Hardware tested and when
 - c. Objectives and summary of results
 - d. Recommendations
- 3. Tests
 - a. Hardware tested
 - b. Facilities and special equipment
 - c. Test sequences and schedules
- 4. Results (including failures and actions)
- 5. Recommendations
- 6. References

(CONTINUE ON THIRD SHEET, IF NECESSARY, AND AFFIX TO THIS DRD.)

Mission Operations Data Requirement Descriptions

DRD Number	<u>Title</u>
MP-001	Handbook, System Performance Reference
MP-002	Plan, Mission Operations Support (Spacecraft)
MP-003	Specification, Mission Dependent Equipment (MDE)
MP-004	Report, Operational Design Description
MP-005	Plan, Flight Operation Diagnostic Computation

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OUTLINE OF CONTENTS: 1. Introduction and scope	
2. Data/information sources	
a. Flight path and orbit data	
Description Formats	
b. Telemetry information	
(1) Total list	
Operational listing	
Diagnostic listing	
Link, frame, and subframe assignments Current calibration information	
(2) Operational TLM listing by operational mode	
(3) Information flow and TLM exposition diagrams	
(a) Functional schematics with:	
1) Sensor stimulation sources	
2) Signal characteristics3) Performance requirements	
(b) Related commands	

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(CONTINUE ON THIRD SHEET, IF NECESSARY, AND AFFIX TO THIS DRD.)

(c) Interfaces

MP-001

3. Event sequences

Separation

Engine firings

Orbit insertion

Capsule entry

4. Command listing

Description

Operational sequences and constraints

5. Software

Description and input instructions for operational computer programs Description of output listings

6. Failure mode operations

Description of possible modes

Related TLM functions and characteristics

Correlatable functions

Recommended actions

7. Analytical aids

Predicted expendable usage rates

Operability standards from ground test

Nomographs

Decision trees, etc.

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SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)						
outline of contents: 1. Scope						
2. Mission operations schedule						
a. Design requirements (operational) b. Training for operations						
(1) GE personnel						
(2) Custom or porconnel						

- (2) Customer personnel
- c. Interface tests
- d. Compatibility tests
- e. Personnel for the mission support team
- 3. Staffing of the mission support team
 - a. Number and type of people for the flight path analysis team (FPAT) and for the spacecraft performance analysis team (SPAT)
 - b. Duties and duty cycle at customer's system office
 - c. Duties at GE on system analysis
 - d. Assistance from subsystem people
 - e. Support command generation
- 4. Operational design requirements
 - a. GE operational inputs to the telemetry instrumentation report
 - b. Operational sequence of events

(CONTINUE ON THIRD SHEET, IF NECESSARY, AND AFFIX TO THIS DRD.)

- 5. Deep space net (DSN) compatibility test
 - a. Procedure, analysis, report
 - b. Facilities and equipment
 - c. Software
- 6. Interface tests
 - a. Procedure, analysis, report
 - b. Facilities and equipment
 - c. Software
- 7. Training
 - a. Improvement of human reliability
 - b. Lectures
 - c. Demonstrations
 - d. Rehearsals
 - e. Operational readiness tests
- 8. Notes

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VOYAGER DATA REQUIREMENT DESCRIPTION - 2ND SHEET	
	DRD NO.:
SPECIAL INSTRUCTIONS:	MP-003
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SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)	
OUTLINE OF CONTENTS:	
1. Scope	
2. Applicable documents	
3. Requirements	
a. Hardware	
(1) Command	
(2) Telemetry b. Software	
(1) Event generator	
(a) Tracking and orbit determination	
(b) Control of midcourse, orbit insertion, and orbit from maneuvers	
(c) DSN contact schedule	
(d) Control of payload operation	
(2) Telemetry processing software	
(a) Deep space instrumentation facility (DSIF) format and display	
(b) Telemetry processing station subroutine	
(c) 7044 Voyager input routine	
(d) 7094 Editor Voyager subroutine	
(3) Command processing software	
(b) Command processing solution	

(b) Command and message preparation and transmission (CONTINUE ON THIRD SHEET, IF NECESSARY, AND AFFIX TO THIS DRD.)

- (c) SFOF/DSIF Transmission verification
- (d) DSIF uplink transmission and verification
- (4) Vehicle command storage
- (5) Spacecraft status
- (6) Miscellaneous routines
- 4. Test and verification
- 5. Preparation for delivery (not applicable)
- 6. Notes
- 7. Appendixes

GE EXHIBIT DRD MP-004 DATA DATE DRD APPROVED BY: CATEGORY VOYAGER DATA REQUIREMENT DESCRIPTION DRD NO. CONTRACT DRD PREPARED BY: ORGANIZATION ORIGINATING CODE: OFFICE RESPONSIBLE FOR DRD: CODE DATE NO.: REQUIREMENT: MP-004 MP J. Kotzar 7/28/67 TASK OR DRL ITEM ORGANIZATION RESPONSIBLE TITLE OF DOCUMENT: FOR DOCUMENT PREPARATION: SUBTASK NO.1 System Engineering ORGANIZATION RESPONSIBLE LEVEL NO. DRL NO. FOR DOCUMENT REPRODUCTION REPORT, OPERATIONAL DESIGN DESCRIPTION ORGANIZATION RESPONSIBLE FILE NO. DDL NO.; FOR DOCUMENT DISTRIBUTION: TYPE OF DOCUMENT: CONTROL DACTION DREFERENCE **EXINFORMATION** USE OF DOCUMENT: NO. OF COPIES: ORGANIZATION RESPONSIBLE FOR DOCUMENT STOWAGE: To provide Mission Support Team basis for spacecraft 50 performance analysis and for making command INFORMATION CUTOFF ESTIMATED MANHOURS FOR SINGLE PREPARATION: DATE OR MILESTONE: recommendations ESTIMATED COST (\$) DATE DATA DUE INTERRELATIONSHIP WITH OTHER DATA REQUIREMENTS: FOR SINGLE PREPARATION TO USER: MP-001 Handbook, System Performance Reference SE-032 Report, Spacecraft System Description FREQUENCY OF ISSUE: PUBLICATION DATE: SE-037 Report, Trade Studies SE-047 Report, Subsystem Design ANNUALLY HDR SEMI-ANNUALLY
QUARTERLY SE-054 List, Command UPDATE (FREQUENCY BI-MONTHLY SE-055 Report, Instrumentation and Telemetry MONTHLY SEMI-MONTHLY OR MILESTONE): As required through FACI CLASSIFICATION: GROUP ! BI-WEEKLY D SPECIAL HANDLING ☐ SECRET □ GROUP 2 WEEKLY NASA DISCREET CONFIDENTIAL □ GROUP 3 ESTIMATED DAILY GROUP 4 SECRET RESTRICTED DATA EXPIRATION DATE: OTHERWISE, AS SPECIFIED CONFIDENTIAL RESTRICTED DATA ☐ PROPRIETARY PROJECT DISCREET ₩ UNCLASSIFIED PUBLIC DOMAIN □ NOFORN One time REFERENCE DOCUMENTS: KIND OF DATA: FORM OF DATA: PRINTED DOCUMENT ☐ ABSTRACT ☐ INSTRUCTION O LETTER □ CHART D BROCHURE □ UST ☐ DIAGRAM O BULLETIN None ☐ LOG ☐ DRAWING ☐ CATALOG ☐ MANUAL ☐ FILM (STATIC OR MOTION) □ CONTRACT ☐ ILLUSTRATION □ DIRECTIVE □ MEMORANDUM MINUTES D MODEL ☐ DISCLOSURE APPLICABLE STANDARDS ☐ RECORDING (TAPE OR DISC) ☐ ENGINEERING CHANGE D PLAN ORDER COMPUTER CARD □ PROCEDURE COMPUTER TAPE ☐ REQUEST FOR ENGINEER- ☐ REGULATION ING CHANGE PROPOSAL SE REPORT None ☐ MICROFILM (W/OR W/O CARD) D SCHEDULE OTHER ☐ ENGINEERING CHANGE PROPOSAL ☐ SPECIFICATION T HANDBOOK ☐ STANDARD □ INDEX □ VOUCHER REVIEWS AND/OR APPROVALS REQUIRED: (LIST IN ORDER OF SUBMITTAL) DATE DRAFT DATE PREPUBLICATION PROOF SUBMIT FOR REVIEW TO: SUBMIT FOR BY BY APPROVAL TO: Manager, System Engineering

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SPECIAL INSTRUCTIONS:	DRD NO.: MP-004
SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)	
OUTLINE OF CONTENTS: 1. Scope	
2. Applicable documents	
3. Description a. System operations analysis	
(1) Performance modes	
(a) Perfect performance	
(b) Nominal performance (c) Degraded modes	
(d) Mission failure - termination	
(e) Loss of vehicle	
(2) Mission operations data and system performance analysis(a) System definition	
(a) System definition (b) Ground system definition	
(c) Flight system - ground system interfaces	
(d) Analysis of tests results - interface and compatibility tests	
(e) Flight analysis 4. Notes	
5. Appendixes	
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SPECIAL DISTRIBUTION: (IF DISTRIBUTION IS NOT COVERED BY AN EXISTING DDL WRITE IN DISTRIBUTION BELOW)	
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OUTLINE OF CONTENTS:	
1. Introduction	
2. Objectives Space are ft operation simulation for performance analysis are a real time.	
Spacecraft operation simulation for performance analysis - near real time 3. Math model development	
a. Rules and constraints	
b. Level of functions and interfaces	
c. Digital processing diagnostic model requirements	
(1) Priorities and sensitivities(2) Inputs and outputs	
(3) Logic design requirements	
4. Processing system description	į
5. Diagnostic computation requirements	

(CONTINUE ON THIRD SHEET, IF NECESSARY, AND AFFIX TO THIS DRD.)

a. System transfer functions, nominal

d. Mission sequence, nominal

e. Alternate sequences

b. Failure modesc. Failure effects

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- 6. Development Plan
 - a. Milestone definitions
 - b. Schedule
 - c. Development sequences
- 7. Organization responsibilities
 - a. Model development
 - b. Programming
 - c. Operation
- 8. Simulation interface
- 9. Documentation
 - a. Drawings and specifications
 - b. Programming
 - (1) Program maintenance
- 10. Appendixes (Lists, drawings, specifications, etc.)

DOCUMENTATION RELATIONSHIP TREES

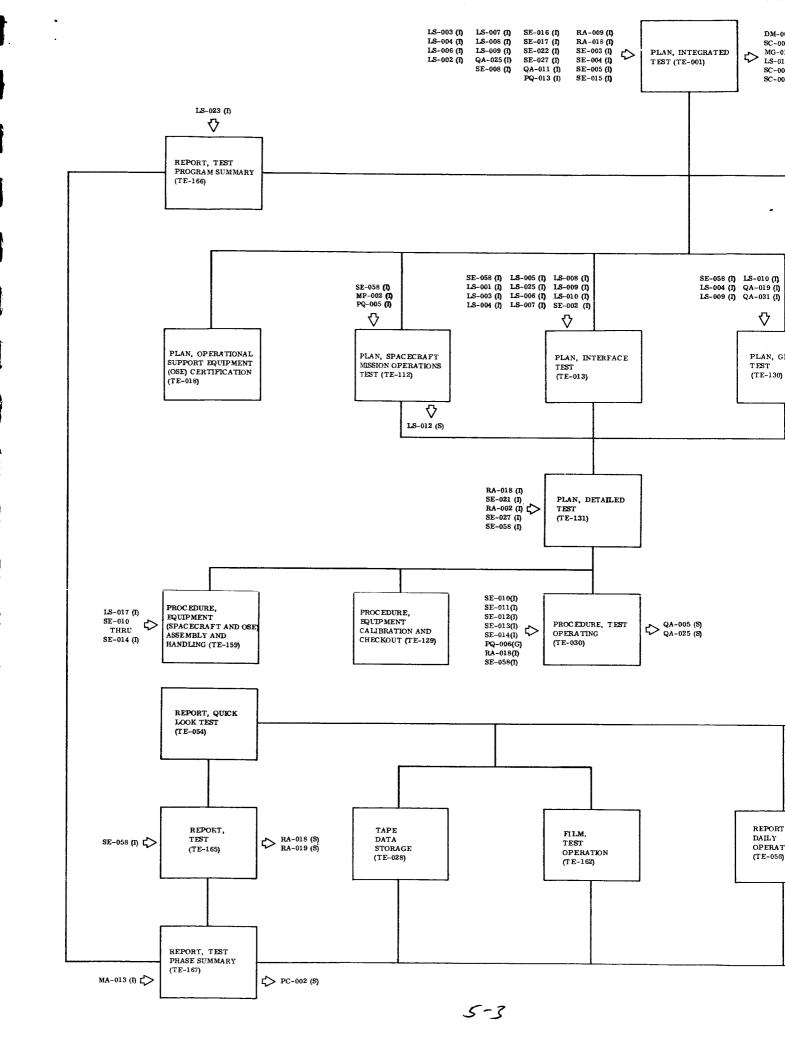
A documentation relationship tree has been prepared to show the relationships of data items within each functional category as well as their relationships across categories.

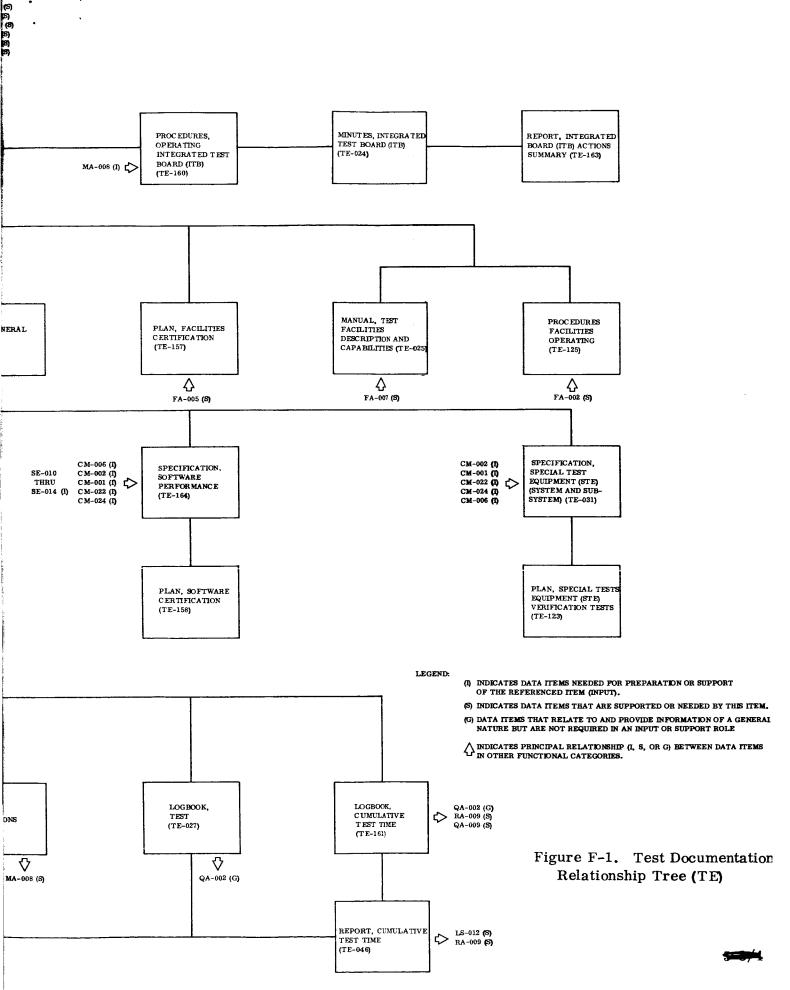
Relationships within each functional category are shown by constructing a tier pattern beginning with the top-level (or governing) data item and relating in descending order all data items within the category to this top-level data item. (The location of a data item at a given level on the diagram does not necessarily indicate the importance of that specific item but identifies and defines its relation to all other data items in that category.)

Relationships between data items in one category and data items in other functional categories are shown by (1) shaded arrows to indicate the direction of the relationship and (2) an alphabetic code to indicate the nature of the interrelationship as follows:

- a. Data items needed for preparation and/or support of the referenced item. (I)
- b. Data items that are supported or needed by this data item. (S)
- c. Data items that relate "to" and provide information of a general nature but are not required in an input or support role. (G)

Each data item appearing on the Data Item List (DIL) was examined and evaluated with respect to its contribution to, or dependence upon, data items appearing in other categories and is included in the diagrams. Additionally, certain data elements indicated in the user flow diagrams (but currently not identified as individual data items) have been shown within a dashed rectangle to clarify relationships.





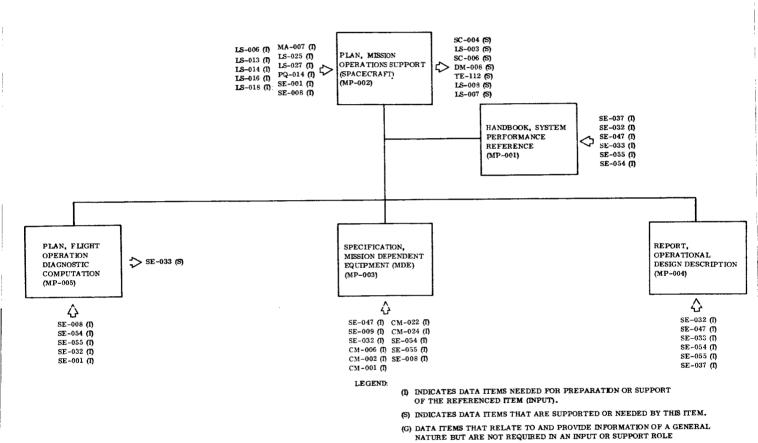


Figure F-2. Mission Operations
Documentation Relationship
Tree (MP)

 Δ indicates principal relationship (i, s, or g) between data items in other functional categories.

DATA ITEM PHASING/FREQUENCY

The Test Data Item Phasing and Frequency Matrix, Figure F-3, reflects the estimated data item requirements resulting from spacecraft test and operations and shows major project review periods.

These estimates encompass all phases of the testing function and include those plans, reports, and procedures, etc., associated with site activation, test and checkout, as well as those data items directly associated with spacecraft testing. Data items to be prepared by associate contractors have been included. Revised data items have been considered as new issues.

The estimates are a composite of Company experience from similar space programs of lesser size and complexity and from results of studies and analyses of the Voyager Spacecraft as currently envisioned.

Basic assumptions are:

- a. A total of eight equivalent spacecraft will be constructed (breadboards, engineering development model, thermal test model, structural test model, proof test model and two flight vehicles).
- b. Two sets of OSE will be produced.
- c. Requirements will exist for:
 - 1. System test and checkout
 - 2. Subsystems test and checkout. (Number of subsystems estimated at 14.)
 - 3. Interface testing. (Major interfaces estimated at 12.)
 - 4. Flight acceptance testing
 - 5. Facilities test, checkout and certification

Distribution and average density of data item occurrence by months during the contract period is graphically presented in Test Data Item Density Profile, Figure F-4. Relationships between formal and Key Informal Data Items are also shown.

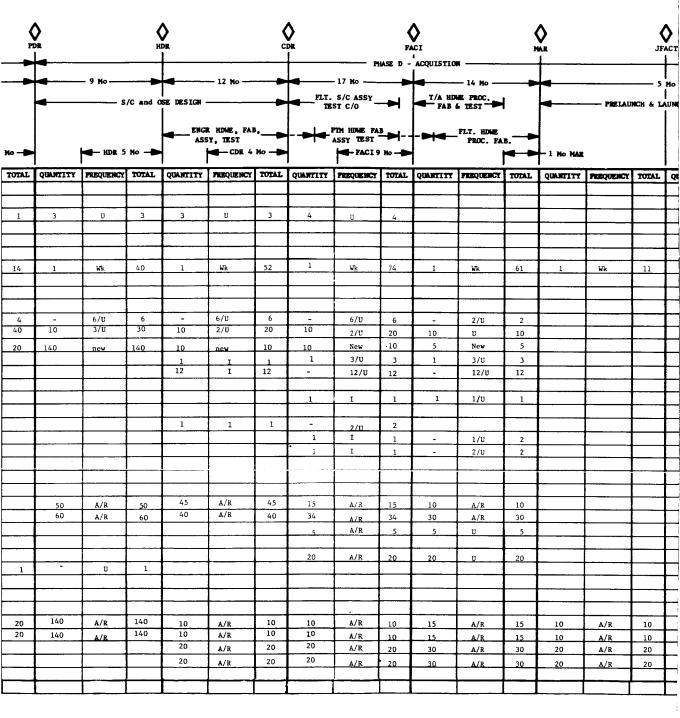
Figure F-5, Mission Operations Data Item Phasing and Frequency Matrix, shows the phasing by major project review period and frequency of preparation of data items within the Mission Operations functional category.

Figure F-6, Mission Operations Data Item Density Profile, shows the requirements for data item preparation per major project review period. As requirements for data items in this category are small, the totals by project periods are shown.

PHASE C - SYSTEM DEFINITION TEST (TE) DATA ITEM TITLE QUANTITY PREQUENCY TOTAL QUANTITY PREQUENCY MANUALS TE-025 Manual, Test Facilities Desc. & Capabil MUNUTES TE-024 *Minutes, Integrated Test Board(ITB) Wk PLANS 3/U TE-001 Plan, Integrated Test 10 3/5 TE-130 Plan, General Test TE-131 Plan, Detailed Test 20 new TE-112 Plan, Spacecraft Mission Operation Test TE-013 Plan, Interface Test TE-018 Plan, Operational Support Equipment (OSE) Certification TE-123 Plan, Special Test Equipment (STE) Verification Tests TE-157 Plan, Facilities Certification TE-158 Plan, Software Certification PROCEDURES TE-129 Procedure, Equip.Calibration& Checkout TE-030 Procedure, Test Operating TE-125 Procedure, Facilities Operating TE-159 Procedure, Equipment (Spacecraft & Operational Support) Assembly & Handling TE-160 Procedure, Operating, 0/T Integrated Test Board RECORDS TE-027 *Logbook, Test 20 TE-161 *Logbook, Cumulative Test Time A/R 20 TE-028 Tape, Data Storage TE-162 Film, Test Operation (continued on page 2)

*Key Informal Data

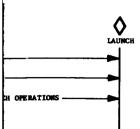
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Figure F-3. Test Data Item Phasing and Frequency Matrix (Sheet 1 of 2)

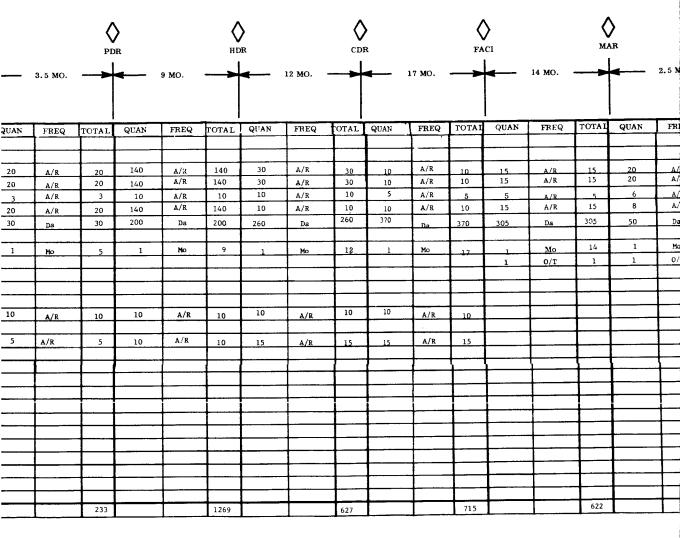
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TE-165 Report, Test				
TE-167 Report, Test Phase Summary				
TE-046 Report, Cumulative Test Time				
TE-056 Report, Daily Operations			Ι .	Γ
TE-163 Report, Integrated Test Board (ITB)				
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*Key Informal Data

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MO	Monthly	I/U	One Update
B/W	Bi-Weekly	DA	Daily
B/M	Bi-Monthly	Q	Quarterly



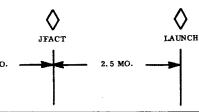
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New and Revised
System Design Review
Preliminary Design Review
Hard Design Review

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Critical Design Review
First Article Configuration Inspection
Mission Acceptance Review
Joint Flight Acceptance
Composite Testing



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Figure F-3. Test Data Item Phasing and Frequency Matrix (Sheet 2 of 2)

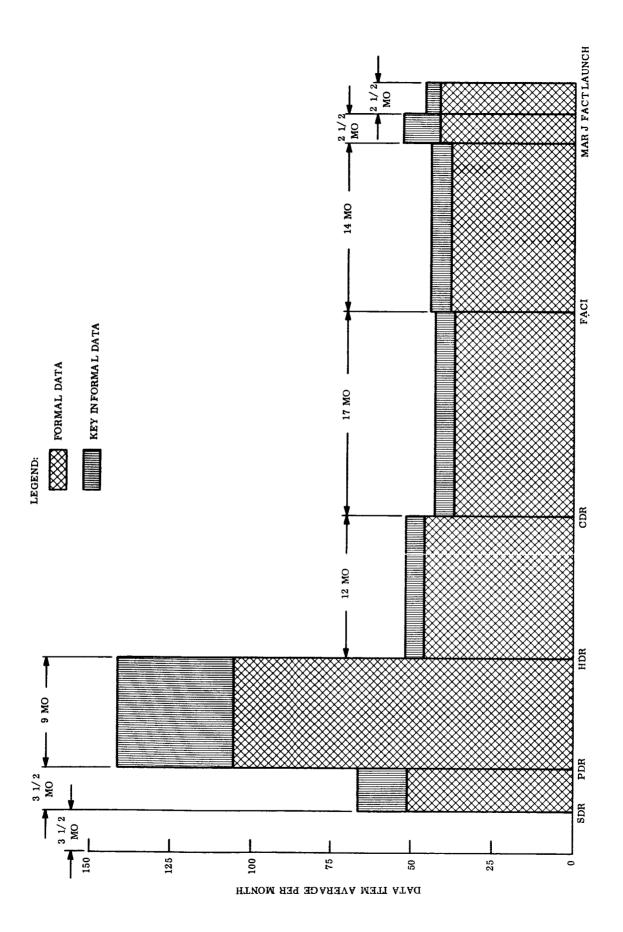


Figure F-4. Test Data Item Density Profile

MISSION OPERATIONS
(MP)

DATA ITEM
TITLE

QUANTITY FREQUENCY TOTAL QUANTITY FREQ
HANDROOKS

MP-001 Handbook, System Performance Reference

FLANS

MP-002 Plan, Mission Operations Support (S/C)
MP-005 Plan, Flight Operation Diag, Computation

REPORTS

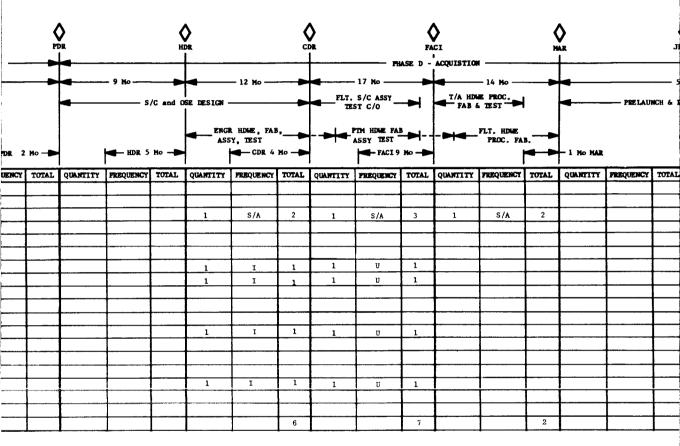
MP-004 Report, Operational Design Description

SPECIFICATIONS

MP 003 Specification, Mission Dep. Equip. (MDE)

*Key Informal Data

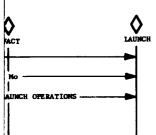
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B/M	Bi-Monthly	Q	Quarterly	HDR



Initial
Final
New and Revised
System Design Review
Preliminary Design Review
Hard Design Review

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Critical Design Review
First Article Configuration Inspection
Mission Acceptance Review
Joint Flight Acceptance
Composite Testing



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Figure F-5. Mission Operations Data Item Phasing and Frequency Matrix

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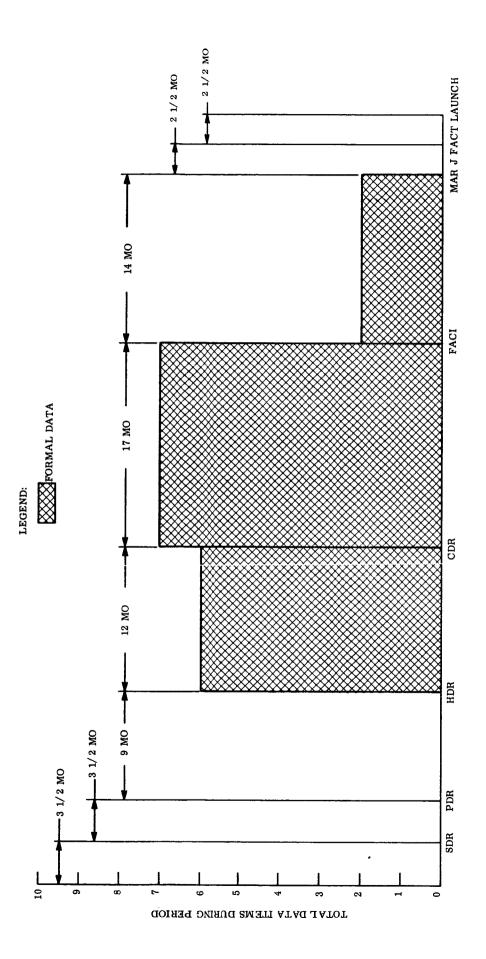


Figure F-6. Mission Operations Data Item Density Profile