Mars Reconnaissance Orbiter

Contract Plans and Documentation

EXHIBIT III

Jet Propulsion Laboratory
California Institute of Technology

DELIVERABLE DOCUMENTATION

The documentation deliverable under this Contract is summarized in the following Contract Data Requirements List (CDRL), which identifies the items to be delivered, when delivery is required, the frequency of issue, and in which phase to submit the documents. The Data Requirement Description (DRD) forms referenced in the CDRL describe the specific requirements for the item(s) to be delivered, reference documents, and other instructions as to content, format and preparation.

JPL intends to use, to the maximum extent practicable, Contractor documentations systems or processes that are equivalent to or meet the intent of JPL requirements.

The following shall apply to all submittals:
Non-Design Document Identification.
The Contractor shall display on the cover or title page of all deliverable non-design documentation (all documents except drawings) the following minimum information:

1. Document title
2. Contractor's name
3. Contract number
4. Document number (JPL and/or Contractor assigned)
5. Subsystem or support equipment name, if applicable
6. Approval signatures: Contractor and JPL; two (2) spaces for JPL signatures, as appropriate
7. Project identification: "MRO"
8. Documents containing information pertaining to a subsystem or its support equipment shall use the applicable subsystem or support equipment reference designation number
9. Date of issue or publication
10. CDRL line item and DRD numbers
11. Revision or change identification

NOTE TO ALL: The list should be a function of Project phase A/B, C/D and E as indicated in Block 10.

The CDRL is alphanumerically listed by the following disciplines:

AT	Assembly, Test and Launch Operations
CM	Configuration Management
ER	Environmental Requirements
LV	Launch Vehicle
MA	Mission Assurance
MO	Mission Operations
MP	Material and Processes
MS	Management System
RE	Reviews
SE	System Engineering
SW	Software

The following abbreviations are used in this Exhibit

ACON	After Completion of Negotiations
ADOC	After Date of Contract
ATLO	Assembly, Test and Launch Operations
CDR	Critical Design Review
DSN	Deep Space Network
DPA	Destructive Physical Analysis
EMC	Electromagnetic Compatibility
HRCR	Hardware Review and Certification Record
GIDEP	Government Industry Data Exchange Program
ICD	Interface Control Document
MIUL	Material Identification and Usage List
MOS	Mission Operations System
MRB	Material Review Board
NCMR	Non-Conformance Material Report
NEPA	National Environment Protection Act
PDR	Preliminary Design Review
PMSR	Preliminary Mission System Review
SECR	Support Equipment Review and Certification Record
SQA	Software Quality Assurance
SRCR	Software Review and Certification Record
VLC	Verification Load Cycle
WBS	Work Breakdown Structure

Approval Requirements

Documents requiring JPL approval are identified in Block 7, APPROVAL CODE, of the CDRL. The following codes are used to denote approval requirements:

A — JPL approval is required

X — JPL approval is not required

After receipt of a submittal, JPL reviews the Contractor's submittal and either provides written review comments or written approval from JPL. In the event JPL does not provide a formal disapproval of the submittal in a period of time designated in the Statement of Work, then the Contractor may assume the submittal has an approval as tendered, unless otherwise indicated on the CDRL or unless otherwise agreed.

The following requirements apply to all data deliverables submitted for JPL approval.

(1) The Contractor shall submit the document, as defined in MS-001, Communications and Information Exchange Plan.

(2) If the submitted document requires Contractor modification before JPL approval, the following steps shall be taken:

  (a) The required modifications will be transmitted or discussed between the cognizant parties.

  (b) The Contractor shall submit an updated document, containing the required modifications, within 10 working days (unless otherwise specified) after the modifications have been defined.

  (c) If the updated document is approved by JPL, JPL will transmit the signed cover or title page to the Contractor. The Contractor shall then prepare and deliver final copies as indicated in the CDRL.

Note: The requirements and approvals for data item revisions shall be the same as applied to the original data item submittal unless otherwise specified in the CDRL or DRD.

Due Date

Unless otherwise specified, all due dates identified in Block 9 of the CDRL are in working days. Documentation shall be delivered as early as available, but not later than the date specified in the CDRL.

Delivery Process

All data shall be indicated as delivered by a letter of transmittal (or by e-mail) to the JPL Contract Negotiator. All data shall be delivered to a "server" as defined in MS-001.

DRD List

Assembly, Test and Launch Operations (AT)

AT-001 Orbiter Integration, Test and Launch Operations Plan
AT-002 Inputs to Launch Site Support Plan

Configuration Management (CM)

CM-001 Configuration Management Plan
CM-002 Configuration Data
CM-003 Hardware End Item Data Package
CM-004 Software End Item Data Package
CM-005 Support Equipment End Item Data Package

Environmental Requirements (ER)

ER-001 Environmental Requirements Document
ER-002 Electromagnetic Compatibility Control Plan
ER-003 Subsystem and System-Level Environmental Test Plan(s)

Launch Vehicle (LV)

LV-001 Launch Vehicle Documentation Plan
LV-002 Inputs to Orbiter Requirements on the Launch Vehicle System
LV-003 Orbiter Dynamic Model

Mission Assurance (MA)

MA-001 Mission Assurance Plan
MA-002 Reliability Assurance Plan
MA-003 Reliability Data
MA-004 Problem/Failure Reporting Plan
MA-005 Problem/Failure Reports
MA-006 Quality Assurance Plan
MA-007 Electrostatic Discharge (ESD) Control Plan
MA-008 Material Review Board (MRB) Items
MA-009 Software Quality Assurance (SQA) Plan
MA-010 Software Safety/Hazard/Fault Analysis Plan
MA-011 Safety Plan
MA-012 Safety and Health Plan
MA-013 Incident Reports
MA-014 Inputs to Missile System Prelaunch Safety Package (MSPSP)
MA-015 Parts Control Plan
MA-016 Electronic Parts Data
MA-017 Contamination Control Plan

Mission Operations (MO)

MO-001	Orbiter Analysis and Operations Plan
MO-002	Orbiter Analysis Software Implementation Plan
MO-003	Orbiter Operations Handbook
MO-004	Command Dictionary
MO-005	Telemetry Dictionary
MO-006	Block Dictionary

Material and Processes (MP)

MP-001	Materials and Processes Control Plan
MP-002	Materials and Processes Data

Management System (MS)

MS-001	Communications and Information Exchange Plan
MS-002	Earned Value/Resource Management Plan
MS-003	Work Breakdown Structure and Dictionary, and Cost Account Structure Reports
MS-004	Baseline Earned Value, Cost, Schedule and Workforce Report
MS-005	Detailed Earned Value, Cost, Schedule and Workforce Status Reports
MS-006	Contract Status Report
MS-007	Monthly Splinter Meetings and Management Review Presentation Materials
MS-008	Risk Management Plan
MS-009	Subcontracting Reports for Individual Contracts
MS-010	Phase C/D Implementation Plan
MS-011	Phase E Implementation Plan

Reviews (RE)

RE-001	Review Plan

System Engineering (SE)

SE-001	Orbiter System Performance and Interface Specification
SE-002	Orbiter Fault Protection Design Specification
SE-003	Orbiter/Payload Interface Control Documents
SE-004	DSN Compatibility Test Plan and Report
SE-005	Orbiter Verification and Test Plan
SE-006	Inputs to Planetary Protection Documentation
SE-007	Inputs to the National Environment Protection Act (NEPA) Process
SE-008	Orbiter Testbed Implementation Plan

Software (SW)

SW-001	Software Management Plan
SW-002	Software Requirements Document
SW-003	Software Integration and Test Plan

1. CONTRACT NUMBER	2. CONTRACTOR	2a. PROJECT: Mars Reconnaissance Orbiter (MRO)	

3. ITEM NO.	4. DRD NO.	5. TITLE OR DESCRIPTION OF DATA	6. APPR. CODE	7. FREQUENCY	8. DATE DUE TO JPL	9. PROJECT: Phases A/B	C/D	E	10. REMARKS
	AT	**Assembly, Test and Launch Operations**							
	AT-001	Orbiter Integration, Test and Launch Operations Plan							
001		Draft	X	Once	2 months after CDR		Ö		
002		Final	A	Once	60 days prior to ATLO Readiness Review		Ö		
003	AT-002	Inputs to Launch Site Support Plan	X	As required	Per launch site integration schedule		Ö		
	CM	**Configuration Management**							
	CM-001	Configuration Management Plan							
001		Final	A	Once	2 months ADOC	Ö			
	CM-002	Configuration Data							
		Software Interface Control Documentation							
002		Initial	X	Once	15 days prior to PDR	Ö			
003		Final	A	Once	15 days prior to CDR		Ö		
		Interface Circuit Data							
004		Initial	X	Once	15 days prior to PDR	Ö			
005		Final	A	Once	15 days prior to CDR		Ö		
006		Engineering Change Request (ECR)	A	As required	2 days after generation	Ö	Ö	Ö	
007		Waivers	A	As required	2 days after generation	Ö	Ö	Ö	

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3. ITEM NO.	4. DRD NO.	5. TITLE OR DESCRIPTION OF DATA	6. APPR. CODE	7. FREQUENCY	8. DATE DUE TO JPL	9. PROJECT: Phases A/B	C/D	E	10. REMARKS
		Master Data List							
008		Initial	X	Once	2 months ADOC	Ö			
009		Updates	X	Quarterly	Quarterly	Ö	Ö	Ö	
	CM-003	Hardware End Item Data Package							Hardware Review and Certification Record (HRCR)
010		Spare Assemblies		Once	Launch plus 30 days		Ö		
011		Orbiter		Once	Launch plus 30 days		Ö		
	CM-004	Software End Item Data Package							Software Review and Certification Record (SRCR)
012		Per CSCI		Once	Launch plus 30 days		Ö		
	CM-005	Support Equipment End Item Data Package							Support Equipment Review and Certification Record (SECR)
013		Ground Support Equipment		Once	Launch plus 30 days		Ö		
	ER	**Environmental Requirements**							
	ER-001	Environmental Requirements Document							
001		Draft	X	Once	2 months ADOC	Ö			
002		Final	A	Once	2 months after PDR		Ö		
	ER-002	Electromagnetic Compatibility Control Plan							
003		Final	A	Once	2 months ADOC	Ö			
	ER-003	Subsystem and System-Level Environmental Test Plan(s)							One plan for each environment (dynamics, thermal vacuum, EMC)
004		Subsystem Final	X	Once	2 months after CDR		Ö		
005		System Final	A	Once	2 months after CDR		Ö		

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	LV	**Launch Vehicle**							
001	LV-001	Launch Vehicle Documentation Plan	A	Once	1 month prior to submittal of Phase C/D proposal	Ö			
001	LV-002	Inputs to Orbiter Requirements on the Launch Vehicle System	A	Once	28 months prior to launch		Ö		
	LV-003	Orbiter Dynamic Model							Model and associated documentation delivered via FTP or equivalent
003		Initial	X	Once	29 months prior to launch		Ö		
004		Update	X	Once	16 months prior to launch		Ö		
005		Final (for Verification Loads Cycle)	X	Once	9 months prior to launch		Ö		
	MA	**Mission Assurance**							
	MA-001	Mission Assurance Plan							It is the Contractor's option to develop an MA Plan that contains all of the plans listed in MA (as sections), or to issue the plans listed below separately (as they are currently called out)
001		Final	A	Once	1 month ADOC	Ö			
	MA-002	Reliability Assurance Plan							
002		Final	A	Once	2 months ADOC	Ö			
	MA-003	Reliability Data							
003		Preliminary	X	Once	8 weeks prior to CDR		Ö		
004		Final	X	Once	1 month after CDR		Ö		
005		Revisions	X	Once	2 weeks after design change		Ö		

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3. ITEM NO.	4. DRD NO.	5. TITLE OR DESCRIPTION OF DATA	6. APPR. CODE	7. FREQUENCY	8. DATE DUE TO JPL	9. PROJECT: Phases			10. REMARKS
						A/B	C/D	E	
	MA-004	Problem/Failure Reporting Plan							
006		Final	A	Once	2 months ADOC	Ö			
	MA-005	Problem/Failure Reports (P/FR)							Applies to each P/FR (except that initial Red Flag and Significant PFRs are due within 2 days); see the Mission Plan
007		Initial	X	Once	Within 2 weeks of occurrence	Ö	Ö	Ö	
008		Final	A	Once	Within 2 days of closure	Ö	Ö	Ö	
	MA-006	Quality Assurance Plan							
009		Final	A	Once	2 months ADOC	Ö			
	MA-007	Electrostatic Discharge (ESD) Control Plan							
010		Final	A	Once	2 months ADOC	Ö			
011	MA-008	Material Review Board (MRB) Items	X	As required	7 days after closure	Ö	Ö		Applies to each MRB
	MA-009	Software Quality Assurance (SQA) Plan							Required for Class A & B S/W
012		Final	A	Once	2 months ADOC	Ö			
	MA-010	Software Safety/Hazard/Fault Analysis Plan							Required for Class A S/W
013		Final	A	Once	TBD	Ö			
	MA-011	Safety Plan							
014		Final	A	Once	1 month ADOC	Ö			
	MA-012	Safety and Health Plan							
015		Final	A	Once	1 month ADOC	Ö			
016	MA-013	Incident Reports	X	Per occurrence	24 hours after occurrence	Ö	Ö	Ö	

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						A/B	C/D	E	
	MA-014	Inputs to Missile System Prelaunch Safety Package (MSPSP)							
017		Draft	X	Once	2 months after PDR		Ö		
018		Final	A	Once	6 months prior to shipment		Ö		
	MA-015	Parts Control Plan							
019		Final	A	Once	2 months ADOC	Ö			
	MA-016	Electronic Parts Data							
020		Failure Analysis	X	As Generated		Ö	Ö	Ö	
021		DPA reports for lots that fail screening	X	As Generated		Ö	Ö	Ö	
022		GIDEP Alert Review and Status Report	X	As Generated		Ö	Ö	Ö	
023		Electronic Parts NCMR Action and Status Report	X	Monthly		Ö	Ö	Ö	
024	MA-017	Contamination Control Plan	A	Once	2 months ADOC	Ö			
	MO	**Mission Operations**							
	MO-001	Orbiter Analysis and Operations (OAO) Plan							
001		Draft	X	Once	1 month before MOS CDR		Ö		
002		Final	A	Once	Launch minus 6 months		Ö		

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	MO-002	Orbiter Analysis Software Implementation Plan							
003		Draft	X	Once	1 month before MOS PDR		Ö		
004		Final	A	Once	1 month before MOS CDR		Ö		
	MO-003	Orbiter Operations Handbook							
005		Draft	X	Once	1 month before MOS CDR		Ö		
006		Preliminary	X	Once	1 month before ATLO		Ö		
007		Final	A	Once	Launch minus 6 months		Ö		
	MO-004	Command Dictionary							Interim revisions to be posted on server per MS-001
008		Preliminary	X	Twice	1 month before project CDR, 1 month before ATLO		Ö		
009		Final	A	Once	1 month before Launch		Ö		
	MO-005	Telemetry Dictionary							Interim revisions to be posted on server per MS-001
010		Preliminary	X	Twice	1 month before project CDR, 1 month before ATLO		Ö		
011		Final	A	Once	1 month before Launch		Ö		
	MO-006	Block Dictionary							Interim revisions to be posted on server per MS-001

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012		Preliminary	X	Twice	1 month before project CDR, 1 month before ATLO		Ö		
013		Final	A	Once	1 month before Launch		Ö		
	MP	**Materials and Processes**							
	MP-001	Materials and Processes Control Plan							
001		Final	A	Once	2 months ADOC	Ö			
	MP-002	Materials and Processes Data							
002		MIULs, Preliminary	X	Once	1 month prior to PDR	Ö			
003		MIULs, Final	A	Once	1 month prior to CDR		Ö		
004		MIULs, Updates	A	As required	As required		Ö		
005		Contractor preferred fasteners list	X	Once	1 month prior to PDR	Ö			
006		Contractor fastener selection and traceability requirements	X	Once	1 month prior to PDR	Ö			
007		Materials Usage Agreements	A	As required	10 days after completion	Ö	Ö		
008		Failure Analysis Report	X	Per occurrence	1 week after completion of report	Ö	Ö	Ö	
	MS	**Management System**							
001	MS-001	Communications and Information Exchange Plan	A	Once	1 month ADOC	Ö			
002	MS-002	Earned Value/Resource Management Plan	A	Once	1 month ADOC	Ö			Earned value required during Phase C/D only

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						A/B	C/D	E	
	MS-003	Work Breakdown Structure and Dictionary, and Cost Account Structure Reports							
003		Initial (Phase A/B)	A	Once, plus after any changes	1 month ADOC	Ö			
004		Final (Phase C/D)	A	Once, plus after any changes	With C/D Implementation Plan	Ö			
005		Phase E	A	Once, plus after any changes	With Phase E Implementation Plan		Ö		
	MS-004	Baseline Earned Value, Cost, Schedule and Workforce Report							Earned value required during Phase C/D only
006		Initial (Phase A/B)	A	Once	4 months ADOC	Ö			
007		Final (Phase C/D)	A	Once	2 months after exercise of option		Ö		
008		Phase E	A	Once	2 months after exercise of option			Ö	
009	MS-005	Detailed Earned Value, Cost, Schedule and Workforce Status Reports	X	Monthly	10 days after close of fiscal month	Ö	Ö	Ö	Earned value required during Phase C/D only
010	MS-006	Contract Status Report	X	Monthly	10 days after close of fiscal month	Ö	Ö	Ö	
011	MS-007	MMR packages	X	Monthly	2 days prior to MMR	Ö	Ö	Ö	Nominally 2 weeks after close of Contractor fiscal month
012		MMR minutes	X	Monthly	Monday after MMR	Ö	Ö	Ö	
	MS-008	Risk Management Plan							
013		Final	A	Once	3 months prior to PDR	Ö			

1. CONTRACT NUMBER	2. CONTRACTOR	2a. PROJECT: Mars Reconnaissance Orbiter (MRO)	

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						A/B	C/D	E	
014	MS-009	Subcontracting Report for Individual Contracts	X	Quarterly	25th day of the month following the reporting period	Ö	Ö	Ö	
015	MS-010	Phase C/D Implementation Plan	A	Once	4 months prior to the start of Phase C/D	Ö			
016	MS-011	Phase E Implementation Plan	A	Once	5 months prior to start of Phase E		Ö		
	RE	**Reviews**							
001	RE-001	Review Plan	A	Once	3 months ADOC	Ö			
	SE	**System Engineering**							
	SE-001	Orbiter System Performance and Interface Specification							
001		Draft	X	Once	4 weeks prior to PDR	Ö			
002		Final	A	Once	4 weeks prior to CDR		Ö		
	SE-002	Orbiter Fault Protection Design Specification							
003		Draft	X	Once	4 weeks prior to PDR	Ö			
004		Final	A	Once	4 weeks prior to CDR		Ö		
	SE-003	Orbiter/Payload Interface Control Documents							
005		Draft	X	Once	4 weeks prior to PDR	Ö			
006		Final	A	Once	4 weeks prior to CDR		Ö		
	SE-004	DSN Compatibility Test Plan and Report							
007		Plan Draft	X	Once	2 months after CDR		Ö		
008		Plan Final	X	Once	1 month prior to test		Ö		
		DSN Compatibility Test Report							
009		Final	X	Once	2 weeks after test		Ö		

1. CONTRACT NUMBER	2. CONTRACTOR	2a. PROJECT: Mars Reconnaissance Orbiter (MRO)	

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						A/B	C/D	E	
010	SE-005	Orbiter Verification and Test Plan	A	Once	2 months prior to CDR		Ö		
	SE-006	Inputs to the Planetary Protection Documentation							
011		Draft	A	Once	PDR	Ö			
012		Pre Launch	A	Once	6 months prior to launch		Ö		
013		Post Launch	A	Once	6 weeks after launch			Ö	
014	SE-007	Inputs to the National Environment Protection Act (NEPA) Process	A	Once	6 weeks prior to PDR	Ö			
	SE-008	Orbiter Testbed Implementation Plan							
015		Draft	X	Once	1 month prior to PDR	Ö			
016		Final	A	Once	1 month prior to CDR		Ö		
	SW	**Software**							
	SW-001	Software Management Plan							
001		Final	A	Once	1 month prior to PMSR	Ö			
	SW-002	Software Requirements Document (one per CSCI)							Delivery per software management plan agreement
002		Final	A	Once	To be negotiated	Ö			
	SW-003	Software Integration and Test Plan (one per CSCI)							Delivery per software management plan agreement
003		Final	A	Once	To be negotiated	Ö			

Contract No.

Date: 042401, Page 1 of 1

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Orbiter Integration, Test and Launch Operations Plan	AT-001
USE: Also known as the Assembly, Test and Launch Operations (ATLO) plan, it describes the work to be performed to integrate test and launch the Orbiter at the system level.	PROJECT: MRO
INTERRELATIONSHIP: ER-001, ER-002, SE-005	

PREPARATION INFORMATION:

The Contractor shall prepare a plan containing but not limited to the following:

(1) Test Program requirements and objectives
(2) Description of the individual tests to be performed, their configuration, test objectives, special equipment, and requirements addressed by the test
(3) Organization of the test team including description of each team function, roles and relationships between functions, and required personnel qualification
(4) Description of the plan for safe conduct of operations
(5) Flight hardware contamination and environmental control requirements and implementation
(6) Flight hardware security requirements and implementation
(7) Requirements for handling deviations, exceptions, omissions, typographical corrections, and discrepancies during tests
(8) Listing of additional plans and procedures to be written in support of this plan including name, nomenclature, hazard level, and approval levels
(9) Transportation plan
(10) Plan for support equipment acceptance, checkout, installation, and configuration management
(11) Plan for control of Orbiter configuration during ATLO
(12) Plan for development of test procedures, including hazardous procedures
(13) Use of quality assurance
(14) Control and archive of controlled records (including test procedures)
(15) Network schedule with appropriate margin
(16) Receivables and deliverables for all flight hardware, flight software, ground support equipment, and documentation
(17) Integration, Test, and Handling constraints
(18) Facility requirements and floor plans for all facilities including Kennedy Space Center (KSC) and Cape Canaveral Air Station (CCAS)
(19) Environmental Test Plans and test levels per ER-001 and ER-002

Contract No.

Date: 042401, Page 1 of 1

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Inputs to Launch Site Support Plan	AT-002
USE:	PROJECT:
Define launch site support requirements	MRO
INTERRELATIONSHIP: LV-001	

PREPARATION INFORMATION:

(1) Describe launch site support requirements including but not limited to: Facility characteristics and requirements for orbiter processing, test and launch, including government-provided supplies and services
(2) Describe government-supplied transportation and handling support such as forklifts, trucks, transporters, storage space
(3) Describe government-supplied operational interface support such as power, communications lines including voice, data, and control, cranes, purges spin tables, etc. to be used in all orbiter-processing and launch facilities
(4) Describe requirements for government-supplied propellants, gases, etc.

Contract No.

Date: 042401, Page 1 of 1

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: CM-001
Configuration Management Plan	
USE:	PROJECT:
The Plan describes the methods and procedures used to manage the functional and physical characteristics of configuration items, and their interfaces and identification documents, during design, fabrication, assembly, and testing.	MRO
INTERRELATIONSHIP:	REFERENCES: JPL D-20386 *MRO Configuration Management Plan*

PREPARATION INFORMATION:

(1) The Contractor shall establish, within his organization, responsibility for implementing configuration management requirements as specified in this Contract. The responsibilities and methods needed to meet JPL requirements, plus any additional procedures the Contractor deems necessary to adequately manage the configuration, shall be documented in a Configuration Management (CM) Plan.

(2) The Contractor CM Plan shall meet the following specific requirements:

a. The plan shall describe the Contractor's configuration management organization and assign personnel responsibilities for meeting JPL's CM requirements.
b. The plan shall describe the Contractor's configuration identification system, including drawing and specification standards.
c. The plan shall accommodate the requirements of the Contract relative to JPL technical direction and approvals.
d. The plan shall describe the Contractor's change control system and shall include sample change documents. As a minimum, the plan shall require a change description for each revision letter of every document changed.
e. The plan shall define the interfaces between the Contractor's change control system and JPL.
f. The plan shall define the Contractor's expected time required for processing changes (assume 20 working days for JPL approval).
g. The plan shall define the Contractor's engineering data management activities (including archiving process), documentation approvals, release procedures, and categories of release.
h. The plan shall describe the Contractor's configuration status accounting system including samples of lists and reports used.
i. The plan shall describe the Contractor's approach to verification and configuration audit to ensure that performance and functional requirements have been achieved by the design.
j. The plan shall describe Contractor’s approach for using photographs as part of the Configuration Management/documentation process

Contract No.

Date: 042401, Page 1 of 1

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Configuration Data	CM-002
USE:	PROJECT:
To deliver product configuration data developed under the MRO PROJECT:	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

Prepare and update configuration data identified below:

(1) Software Interface Control Documentation for the flight software and SRU software including command and data flow diagrams, state and mode transition diagrams, protocols, build procedure, format and data management items.

(2) Interface Circuit Data defining end circuits, connector pin outs and cable diagrams for each deliverable item.

(3) Waivers to specified requirements shall be generated in accordance with JPL-approved Configuration Management Plan.

(4) Engineering Change Requests (ECRs).
Engineering change requests shall be processed for changes to the established baseline after deliverable hardware and software (if applicable) are placed under configuration management.

(5) Master Data List (MDL).
Contractor shall generate a MDL that documents Contractor-developed documentation, which will be made available to JPL per MS-001 and other means.

Contract No.

Date: 4/27/2001, Page 1 of 1

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: CM-003
Hardware End Item Data Package	
USE:	PROJECT:
Hardware Review & Certification Record (HRCR)	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

An end item data package shall be prepared for each deliverable assembly. The Contractor shall determine the form of the package. The contents of the package shall include, but not be limited to, the following information:

(1) As-Built data: "As-Built" hardware documentation is a compilation of items describing exactly the configuration of a fabricated serialized assembly including:
   a. Part number and revision letter of each item
   b. Part description (title) of each item
   c. Electronic part reference designation
   d. Manufacturer
   e. Procurement specification or Source Control Drawing (SCD) number and SCD revision letter.
   f. Parts and material lists with mass estimates, and material samples (when applicable)
   g. Actual part marking
   h. Traceability number (as assigned)
   i. Lot date code (when applicable)
   j. Test/screening lot numbers (when applicable)
   k. Wafer and wafer lot number (when applicable)
   l. Serial number (for serialized parts)

(2) A complete manufacturing and quality history of the deliverables, including all manufacturing travelers, descriptions of manufacturing environments, and documentation of any dry heat microbial reduction processes performed (when applicable).

(3) A complete shortage list which itemizes discrepancies between the subject hardware and the requirements of the detail specification. The list shall also itemize the documentation shortages.

(4) Operating time data on all major electronic assemblies and time sensitive items.

(5) A complete list of the tests performed including a compilation of test data and test results for each test.

(6) A copy of all action items generated against the equipment, including open or closed status.

(7) A copy of all problem/failure reports generated against the equipment, including open or closed status.

(8) A copy of all QA discrepancy reports generated against the equipment, including open or closed status.

(9) A summary of all deviations and waivers applicable to the deliverable items.

(10) A copy of all MRB's including open or closed status.

(11) Evidence of acceptance by Contractor QA.

(12) Environmental test report(s) applicable to the deliverable item, including thermal vacuum bake-out.

(13) Vendor parts and material certification forms (as applicable).

(14) Precap photographs for each assembly.

(15) A one time delivery, with updates as required:
   a. A copy of all Environmental Analysis.
   b. A copy of the Packaging Qualification Verification Report.
   c. A complete and up-to-date top assembly drawing of each type of delivery.
   d. A complete and up-to-date mechanical and electrical ICDs for each delivery.
   e. For electronic assemblies, a complete set of circuit schematics and circuit data sheets.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: CM-004
Software End Item Data Package	
USE:	PROJECT:
Software Review & Certification Record (SRCR)	MRO
INTERRELATIONSHIP:	REFERENCES:
SQA-001	MRO Mission Assurance Plan

PREPARATION INFORMATION:

A software end item data package or software release/delivery package shall be prepared for each software delivery. The Contractor shall determine the form of the package. The contents of the package shall include, but not be limited to, the following information:

(1) As-built product identification, including:
   a. Identification of software release by program id, phase, version, date, and build.
   b. Operating system name and version
   c. Programming language name, compiler name, and version.
   d. Supporting development environment name and version (if any)

(2) A Release Description Document (RDD) or equivalent which contains:
   a. Functional Requirements/Capabilities of this build
   b. Instructions or user manual to install and configure the software application, including special test equipment software which are required to support the primary software application (if any)
   c. Lists of all software deliverables in this build, including special test equipment software (if any)

(3) List of dates and versions of all required documents (under CM control).

(4) A list of all open/closed anomalies or liens against this delivery. All red-flag anomalies should be closed prior to this delivery review.

(5) Verification test procedures/results. For Class A/B software, Acceptance Test Plan/Procedures/Report shall be provided.

(6) Test Verification Traceability Matrix against software requirements.

(7) Executable code and source code

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: CM-005
Support Equipment End Item Data Package	
USE:	PROJECT:
Support Equipment Certification Record (SECR)	MRO
INTERRELATIONSHIP:	REFERENCES:
	MRO Mission Assurance Plan

PREPARATION INFORMATION:

An end item data package shall be prepared for each Support Equipment deliverable assembly. The contractor shall determine the form of the package. The contents of the package shall include, but not be limited to, the following information:

(1) As-Built data: "As-Built" hardware documentation is a compilation of items describing exactly the configuration of a fabricated serialized assembly including:
   a. Part number and revision letter of each item
   b. Part description (title) of each item
   c. Electronic part reference designation
   d. Manufacturer
   e. Procurement specification or Source Control Drawing (SCD) number and SCD revision letter.
   f. Traceability number (as assigned)
   g. Lot date code (when applicable)
   h. Serial number (for serialized parts)

(2) A complete manufacturing and quality history of the deliverables, including all manufacturing travelers, descriptions of manufacturing environments,

(3) A complete shortage list which itemizes discrepancies between the subject hardware and the requirements of the detail specification. The list shall also itemize the documentation shortages.

(4) A complete list of the tests performed including a compilation of test data and test results for each test.

(5) A copy of all action items generated against the equipment, including open or closed status.

(6) A copy of all problem/failure reports generated against the equipment, including open or closed status.

(7) A copy of all QA discrepancy reports generated against the equipment, including open or closed status.

(8) A summary of all deviations and waivers applicable to the deliverable items.

(9) A copy of all MRB's including open or closed status.

(10) Evidence of acceptance by Contractor QA.

(11) Vendor parts and material certification forms (as applicable).

(12) A one time delivery, with updates as required, of each item a through f listed:
   a. A copy of all Environmental Analysis.
   b. A copy of the Packaging Qualification Verification Report.
   c. A complete and up-to-date top assembly drawing of each type of delivery.
   d. A complete and up-to-date mechanical and electrical ICDs for each delivery.
   e. For electronic assemblies, a complete set of circuit schematics and circuit data sheets.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: ER-001
Environmental Requirements Document	
USE:	PROJECT:
To document environmental design and test requirements for the Orbiter and payloads	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

Environmental Requirements Document (ERD) shall define the overall environmental program policy and requirements and the environmental verification program. It shall define the environmental design and test requirements and program for the Orbiter system and assemblies/subsystems and payload instruments. It shall provide an environmental test and analysis matrix comprised of all Orbiter assemblies to the lowest environmentally tested unit and designate what environmental tests and analyses are to be performed. Designations will state what level of test is to be performed (e.g., Protoflight or flight acceptance, or Qualification).

Dynamics design and test levels, thermal design and test levels, EMC design and test levels, radiation design levels, and expected environments shall be designated. The number of thermal and mechanical test cycles shall be designated, when applicable.

The document shall include requirements for all formal environmental assembly and system tests. It addresses instrumentation requirements, test configuration and installation requirements, and equipment operating states during the environmental test activities. It also includes all environments (levels, durations, tolerances, and control parameters) that are to be verified by tests at the assembly and system level.

This document may be subdivided into design and test specification sections. Instruments shall be considered as Orbiter subsystems and interface environments shall be called out.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: ER-002
Electromagnetic Compatibility Control Plan	
USE:	PROJECT:
To define the philosophy, process, and methodology used to attain compatibility with the electromagnetic and magnetics environments and requirements associated with the mission	MRO
INTERRELATIONSHIP:	REFERENCES:
ER-001, ER-003	

PREPARATION INFORMATION:

This plan describes the methods by which the Contractor intends to achieve the required electromagnetic compatibility (EMC) and the organizational structure with the responsibility for compliance with EMC requirements. This plan provides an overview of the EMC test program and its specific applicability to flight hardware. Subcontractors' responsibilities for EMC control are also included.

(1) Define the EMC constraints on the Orbiter.
(2) Specify the EMC requirements to be fulfilled.
(3) Define the EMC design requirements.
(4) Define the EMC test/analysis program.
(5) Define the test/analysis, and reporting documentation to be delivered.
(6) Define how compliance to the EMC requirements is to be verified.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: ER-003
Subsystem and System Level Environmental Test Plan(s)	
USE:	PROJECT:
To document the planned methodology for performing subsystem and system level environmental tests.	MRO
INTERRELATIONSHIP:	REFERENCES:
ER-001, ER-003	

PREPARATION INFORMATION:

Environmental test plans for the following environmental tests are to be prepared that describe the details of the proposed subsystem and system level tests.

(1) Dynamics Tests: acoustics, random vibration, mechanical shock, sine burst
(2) Thermal Tests: thermal vacuum margin and thermal balance tests
(3) Electromagnetic Compatibility Tests:
    (a) Subsystem Radiated and Conducted Susceptibility and Emissions tests.
    (b) System Radiated Susceptibility and Emissions tests

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: LV-001
Launch Vehicle Documentation Plan	
USE:	PROJECT:
This plan describes the development plan for the orbiter/ launch vehicle interface documentation that will be prepared by the Contractor and delivered to the launch vehicle provider. It will be developed during Phase A/B with the documentation to be delivered during Phase C/D.	MRO
INTERRELATIONSHIP:	REFERENCES:
AT-001, AT-002, CM-002, LV-002, LV-003, MA-017	TBD Payload Providers' Manual

PREPARATION INFORMATION:

The Contractor shall prepare a plan that defines the approach and schedule for preparation, review, completion and delivery of launch vehicle interface related information per TBD requirements from TBD launch services provider. These documents with associated delivery information shall be listed with the Master Data list required in CM-002. The plan should address receivables from JPL and the launch services provider to the extent to which they are necessary for the Contractor to develop his deliverable documentation. For the purposes of this DRD, "spacecraft" refers to the Orbiter (spacecraft bus plus integrated science and engineering payloads).

A reference list of documentation to be developed and delivered includes, but is not limited to the following (may change when launch vehicle is selected):

(1) Inputs to Spacecraft Questionnaire
(2) Orbiter Structural Mathematical Model
(3) Launch Vehicle Mission Specification Comments
(4) Spacecraft Drawing
(5) Payload Fairing Requirements
(6) Flight Umbilical Wiring Requirements
(7) Mass Properties Statements
(8) Preliminary Mission analysis Requirements (Input)
(9) Program Requirements Document Input
(10) Spacecraft Compatibility Drawing Comments
(11) Wiring Requirements (GSE)
(12) Spacecraft-to-blockhouse Wiring Diagram Review
(13) Inputs to Detailed Mission analysis Requirements
(14) Spacecraft Launch Site Test Plan
(15) Spacecraft Integrated Test Procedure Input
(16) Spacecraft Launch Site Test Procedures
(17) Post-launch Orbit Confirmation Data
(18) Spacecraft Environmental Test Plan
(19) Spacecraft Environmental Test Summary

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: LV-002
Inputs to Orbiter Requirements on the Launch Vehicle System	
USE:	PROJECT:
To be used as inputs to the JPL-prepared MRO Launch Vehicle System Requirements Document	MRO
INTERRELATIONSHIP:	REFERENCES:
LV-001	TBD Payload Planners' Guide

PREPARATION INFORMATION:

The Contractor shall prepare the spacecraft requirements imposed on the TBD launch vehicle using the Table of Contents below. Guidance for additional details regarding the inputs to be developed shall be obtained from Section TBD of TBD. For the purposes of this DRD, "spacecraft" refers to the Orbiter (spacecraft bus plus integrated science and engineering payloads).

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: LV-003
Orbiter Dynamic Model	
USE:	PROJECT:
To assess stiffness of the spacecraft to support the launch vehicle/spacecraft coupled loads analysis, and to verify the launch vehicle/spacecraft loads.	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

The Contractor shall prepare a spacecraft mathematical dynamic model for use in coupled loads analysis. Acceptable forms include:

(1) A discrete model with associated mass and stiffness matrices OR
(2) A constrained normal modes model with modal mass and stiffness and the appropriate transformation matrices to recover internal responses.

Required model information such as specific format, degree of freedom requirements, and other necessary information will need to be supplied.

This model can either transmitted by FTP transfer or by providing a compatible magnetic media that can be read by the launch services provider.

Several MRO math models will be required during the life of the launch vehicle integration process, each with increasing fidelity. The MRO math model submitted for the final Verifications Loads Cycle (VLC), this model is expected to have been verified by the results of the MRO spacecraft dynamic testing.

For the purposes of this DRD, “spacecraft” refers to the Orbiter (spacecraft bus plus integrated science and engineering payloads).

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DATA REQUIREMENT DESCRIPTION

TITLE: Mission Assurance Plan	NUMBER: MA-001
USE: To define the requirements of a Mission Assurance Plan.	PROJECT: MRO
INTERRELATIONSHIP: CM-001, ER-001, ER-002, ER-003, ER-004, ER-005, MA-001, MP-001, MP-002, MP-003, MA-002, MA-004, MA-006, MA-007, MA-011, MA-012	REFERENCES:

PREPARATION INFORMATION

The JPL Mission Assurance Plan serves as the master Mission Assurance planning and control document.

The plan shall address the following topics:

(1) System Safety (per MA-011)
(2) Safety and Health (per MA-012)
(3) Planetary Protection (per specification)
(4) Reliability Assurance (per MA-002)
(5) Problem/Failure Tracking and Reporting (per MA-004)
(6) Environmental Assurance (per specification)
(7) Quality Assurance (per MA-006)
(8) Electrostatic Discharge Plan (per MA-007)
(9) Workmanship Standards/Handbook (per TBD)
(10) Electronics Parts Program (per MA-015)
(11) Materials and Processes (per MP-001)
(12) Contamination Control (per MA-017)
(13) Configuration Management (per CM-001)

At the Contractor's discretion they may generate either a single Mission Assurance Plan that addresses all of the DRD requirements or individual plans that address the DRDs separately.

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DATA REQUIREMENT DESCRIPTION

TITLE	NUMBER MA-002
Reliability Assurance Plan	
USE To define in detail the Contractor's reliability assurance program in compliance with the MRO Mission Assurance Plan. The plan shall be imposed on all activities associated Contractor, subcontractors, and suppliers reliability assurance.	PROJECT: MRO
INTERRELATIONSHIP MA-001, MA-003	REFERENCES JPL D-5703

PREPARATION INFORMATION

The Contractor shall prepare a Reliability Assurance Plan in accordance with the Reliability Assurance conditions and requirements contained in the MRO Mission Assurance Plan. The plan shall describe the Contractor's reliability assurance activities, including references to applicable Contractor institutional policies, procedures, specifications, and instructions. It shall also include the following:

(1) Document Change Log
(2) Table of Contents
(3) List of applicable documents
(4) A description, including appropriate charts, of the reliability assurance organization, management, and responsibilities for accomplishing the various activities, and relationships to the elements of the Contractor's organization and its institutional organizations.
(5) A schedule of reliability assurance activities indicating their phase relationships with design, development, procurements, design reviews, hardware reviews, fabrication, system testing, and shipment.
(6) A description of responsibilities and techniques for accomplishing reliability assurance activities by or with subcontractors and suppliers.
(7) A description of how the Contractor will impose all requirements by appropriate documents on all subcontractors and suppliers.
(8) A description of the assumptions and preparation guidelines to be followed in generating the Reliability Analyses to be delivered per MA-003. These guidelines shall consider JPL D-5703, *Jet Propulsion Laboratory Reliability Analyses Handbook*.
(9) A matrix or table showing all design/reliability analyses to be performed to the assembly level or all assemblies. The responsible authority/engineer shall be noted for each analysis, along with scheduled completion date. Those analyses considered heritage from an existing design shall be called out.

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DATA REQUIREMENT DESCRIPTION

TITLE	NUMBER MA-003
Reliability Data	
USE To provide data for review and evaluation of design status and progress	PROJECT: MRO
INTERRELATIONSHIP MA-002	REFERENCES JPL D-5703 JPL D-8545

PREPARATION INFORMATION

Data to be submitted, as defined by the approved Reliability Assurance Plan (MA-002), in accordance with JPL D-5703, or other approved source:

(1) System fault tree analysis
(2) Electronic parts stress analyses (derating parameters from JPL D-8545 or other approved source)
(3) Thermal and structural stress analyses
(4) Worst case circuit analyses
(5) Worst case power supply analysis
(6) Single event effects (SEE) analyses, including single event upset, single event latchup, single event transient
(7) Electrical ground support equipment interface FMEAs
(8) Mechanical/electromechanical fault tree analyses
(9) Probabilistic Risk Analysis
(10) Matrix of all above analyses vs. assemblies/subsystems/system to which they apply, responsible authority/engineer, schedule for completion

The analyses shall envelope MRO thermal, radiation and life requirements.

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DATA REQUIREMENT DESCRIPTION

TITLE	NUMBER: MA-004
Problem/Failure Reporting Plan	
USE To document the Contractor's anomaly/problem/failure reporting and processing system for MRO review and concurrence	PROJECT: MRO
INTERRELATIONSHIP MA-001	REFERENCES

PREPARATION INFORMATION

The Contractor's anomaly/problem/failure reporting system shall be described and include, as a minimum, the following:

(1) Hardware and software to which this reporting system applies
(2) When the reports are initiated for hardware and software
(3) Whether or not the reports apply to engineering model or other non-flight hardware/software
(4) Describe the initiation and closure process, including who reviews and authorizes closure
(5) Risk rating process
(6) Subcontractor/supplier anomaly/problem/failure reporting system(s)
(7) Transmittal of reports to JPL (when, how, timeliness of)
(8) Availability of reports to Contractor management and to JPL
(9) Description of automated reporting system, if applicable
(10) Possible use of JPL on-line reporting system
(11) Availability of summary status reports of existing anomaly/problem/failure reports: open, closed, by subsystem, etc.

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DATA REQUIREMENT DESCRIPTION

Title	NUMBER: MA-005
Problem/Failure Reports (P/FR)	
USE	**PROJECT:**
To provide JPL with timely notice of anomalies, problems or failures with the Contractor's software or hardware. Also, to provide JPL with the data necessary to assess the adequacy of the analysis and corrective action, so as to prevent recurrence of anomalies, problem/failures and to assess the residual risk following corrective action.	MRO
INTERRELATIONSHIP	**REFERENCES**
MA-001, MA-002, MA-004	

PREPARATION INFORMATION:

Each anomaly/problem/failure report shall be submitted in accordance with the JPL approved Problem/Failure Reporting Plan, MA-004, and shall be responsive to the requirements of the MRO Mission Assurance Plan. The reports shall include but not be limited to the following:

(1) Complete identification of the hardware/software;
(2) Date the anomaly, Problem/failure occurred;
(3) Estimated operating hours and/or cycles at the time the problem/failure occurred;
(4) Location of the hardware at occurrence;
(5) Hardware environmental conditions when the problem/failure occurred;
(6) Test/operation being performed;
(7) A description of the problem/failure incident and the potential impact on the assembly/subsystem/system functional performance;
(8) A description of the problem/failure analysis, including impact on hardware/software;
(9) Cause of the problem/failure;
(10) A description of the corrective action taken;
(11) A description of the method used to verify that the corrective action was effective
(12) Safety rating;
(13) Numeric rating of the failure effect on the Contractor's hardware – NOTE: Redundancy shall not be considered in making this assessment;
(14) Numeric rating of the failure risk (confidence in the effectiveness of the corrective action) on the Contractor's hardware;
(15) Supporting material shall be provided to allow JPL to perform the mission risk assessment;
(16) Appropriate closeout signatures.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MA-006
Quality Assurance Plan	
USE:	PROJECT:
To define and describe the Quality Assurance (QA) Program	MRO
INTERRELATIONSHIP:	REFERENCES:
ER-001, ER-002, MP-001, MP-002, CM-001,CM-002	

PREPARATION INFORMATION:

The Plan shall include the following:

(1) Narrative explanations of the QA system's compliance with the intent of ISO 9001 including methods used, when they are applied, and who performs them.

(2) Indication in the plan of proper flow down of all customer requirements to sub-tier vendors to ensure they comply with intent of customer requirements.

(3) A description of existing applicable Contractor QA policies and instructions.

(4) Organization charts and narrative statements describing the functions, responsibilities, and relationships of each element in the Contractor's quality organization. Include procurement, engineering, fabrication, test, and quality control.

(5) A description of the QA interfaces between JPL and the Contractor, between the Contractor and its suppliers, and between Contractor interdivisional quality organizations.

(6) A description of Contamination Control Procedures utilized by the Contractor that address materials selection, corrosion prevention, cleaning, cleanliness maintenance, handling, packaging and storage of deliverable hardware and equipment.

(7) A description of QA support of Manufacturing Planning and Drawing Reviews, parts and materials screening.

(8) A listing and description of all workmanship standards used in support of all deliverable hardware and equipment.

(9) A description of QA support of support and test equipment

(10) A description of QA support of functional and environmental testing.

(11) A description of QA activities in support of procured hardware.

(12) A description of QA documentation and data.

(13) A flow chart of Inspection and test activities indicating potential customer hold points for customer approval.

(14) Indication in the plan for training and certification of personnel in critical processes. These include but are not limited to: plating, anodizing, heat treating, welding, soldering, polymeric applications, cleaning, die attachment, wire bonding, Magnetic particle inspection, ultrasonic inspection and liquid penetrant inspection

(15) Indication in the plan that sub-tier vendors are qualified in the above critical processes.

(16) All processes used such as Electro-Static Discharge control plan, workmanship standard, contamination control plan shall be qualified in accordance with NASA, JPL requirements or Contractors equivalent specifications.

(17) Indications in the plan for retaining of quality controlled records. These are records that furnish objective evidence of, activities performed or results achieved relating to fabrication, assembly, integration and test of hardware. These include drawings, manuals, specifications and other written documentation relating to the design development, manufacture and test or hardware.

(18) Indications in the plan to provide for proper handling, packaging, shipping and storage of critical hardware.

(19) Indications in the plan for proper segregation of non-conforming material. Provisions to prevent co-mingling of these parts with acceptable hardware will also be evident.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MA-007
Electrostatic Discharge (ESD) Control Plan	
USE:	**PROJECT:**
To describe the Electro static Discharge Damage prevention techniques utilized by the Contractor and their suppliers.	MRO
INTERRELATIONSHIP:	**REFERENCES:**
ER-001, ER-002, ER-003, ER-004, ER-005, MA-001, MP-001, MP-002, MA-002, MA-003, MA-004	JPL D-1348

PREPARATION INFORMATION:

The vendors ESD plan should comply with the intent of JPL D-1348. The plan shall address the following critical areas:

(1) Definition of minimum ESD workstation requirements.
(2) Personnel grounding system to be used.
(3) ESD protective clothing to be used.
(4) Bench grounding method to be used.
(5) Housekeeping requirements.
(6) Acceptable ESD control materials.
(7) Use of air ionizers, (if applicable).
(8) Proximity to high field devices such as computer displays.
(9) Grounding of metal work surfaces or use of ESD coverings (tablemats).
(10) Humidity constraints, minimum and maximum levels.
(11) Temperature and humidity record keeping requirements
(12) Personnel certification
(13) Verification records
(14) Wrist strap checks
(15) Bench checks
(16) Personnel grounding system checks
(17) Storage and handling devices and containers

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MA-008
Material Review Board (MRB) Items	
USE:	PROJECT:
To define what interaction is expected involving MRB items.	MRO
INTERRELATIONSHIPS:	REFERENCES:
ER-001, ER-002, MP-001, MP-002, CM-001, CM-002	

PREPARATION INFORMATION:

This is to document the minimum communicated items to JPL in regards to MRB items

MRBs not requiring JPL approval (changes not affecting form, fit, or function) will have the following information for each occurrence sent to JPL:

(1) Part number
(2) Serial number
(3) Nomenclature of part
(4) Date of MRB initiated
(5) Date MRB closure
(6) Reason for MRB action
(7) Disposition of parts
(8) MRB record number

MRBs requiring JPL approval (changes affecting form, fit, or function) will have the above information submitted prior to closure with the following exceptions:

(1) Date of MRB closure will be blank
(2) Disposition of parts will be accepted only after JPL approval.

JPL intends to approve appropriate MRB changes as an acting member of the MRB.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MA-009
Software Quality Assurance (SQA) Plan	
USE:	PROJECT:
To define and describe the Contractor's SQA Program	MRO
INTERRELATIONSHIP:	REFERENCES:
MA-001	MRO Mission Assurance Plan

PREPARATION INFORMATION:

The Contractor shall prepare a SQA Plan in accordance with the SQA requirements in MRO Mission Assurance Plan. The plan shall include the following:

(1) A description of existing applicable Contractor SQA policies, procedures, specifications, and instructions.

(2) Charts and narrative statements describing the functions, responsibilities, techniques, and relationships of each element in the Contractor's organization that implements the S/W quality program, including procurement, engineering, test, and quality control.

(3) A schedule of SQA activities indicating their phase relationships with requirement analysis, design, Implementation, integration and test, and S/W reviews throughout the S/W life cycle.

(4) A description of the SQA interfaces between JPL and the Contractor, between the Contractor and its suppliers, and between Contractor interdivisional quality organizations.

(5) A description of how the Contractor will impose all SQA requirements by appropriate documents on all subcontractors and suppliers.

(6) A description of the assumptions and preparation guidelines to be followed in generating the SQA analyses and review reports.

(7) A SQA compliance matrix showing compliance to and deviations (if any) from JPL SQA requirements in MRO Mission Assurance Plan.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MA-010
Software Safety/Hazard/Fault Analysis Plan	
USE:	PROJECT:
To define and describe the Contractor's software safety requirements and approach for JPL review and evaluation	MRO
INTERRELATIONSHIP:	REFERENCES
MA-001, MA-008, MA-010	

PREPARATION INFORMATION:

The Contractor shall prepare a Software Safety/Hazard/Fault Analysis Plan and Report in accordance with the SQA requirements in MRO Mission Assurance Plan.

Software Safety/Hazard/Fault Analysis Plan shall include the following:

(1) Purpose, scope, and techniques used
(2) Interpretation of applicable safety requirements and methods of implementation
(3) Functions, responsibilities, and relationships to system level safety and fault analyses
(4) Software Safety/Hazard/Fault Analysis Schedules
(5) Software Safety/Hazard/Fault Analysis Reporting
(6) Mitigation identification, tracking, and verification

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DATA REQUIREMENT DESCRIPTION

TITLE: Safety Plan	NUMBER: MA-011
USE: To define and describe the Contractor's Safety Policy and Safety Data requirements	PROJECT: MRO
INTERRELATIONSHIP:	REFERENCES: JPL D-560; MRO PROJECT: Safety Plan

PREPARATION INFORMATION:

The Contractor shall comply with the requirements of the MRO Safety Plan in addition to the Safety and Health requirements as specified in the Additional General Provisions (AGP) of this Contract and the following:

Safety Plan

The Safety Plan shall assure adequate safety for personnel, critical hardware, and ground support equipment. The safety plan shall address assembly, inspection, handling (including shipping), test, and operations conducted in all facilities (Contractor, subcontractor, JPL, NASA centers, university, Government or others). In general, the Contractor's Safety Plan shall be in keeping with the complexity and risk tolerance of the contract and shall clearly specify the level and scope of hardware safety to be implemented. The plan shall include, as appropriate:

(1) Purpose and scope
(2) Interpretation of applicable safety requirements and methods of implementation
(3) System Safety Program (including all safety tasks)
(4) Organization (including Systems Safety reporting)
(5) System Safety Schedules
(6) System Safety outputs (including deliverable data)
(7) Hazard Analyses (when requested)
(8) Hardware protection methods (e.g., contamination, ESD, transportation, etc.)
(9) System Safety Assurance
(10) Training
(11) Audit Program
(12) Mishap Reporting and Investigation
(13) Safety oversight at subcontractors
(14) Facility and Operations safety surveys
(15) Transportation safety surveys

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DATA REQUIREMENT DESCRIPTION

TITLE: Safety and Health Plan	NUMBER: MA-012
USE: To define and describe the Contractor's Personnel Safety Policy and Reporting requirements	PROJECT: MRO
INTERRELATIONSHIP:	REFERENCES: JPL D-560; MRO Safety Plan

PREPARATION INFORMATION:

The Contractor shall comply with the requirements of the MRO Safety Plan in addition to the Safety and Health Additional General Provisions (AGP) of this Contract.

Prepare and submit, for JPL approval, a Safety and Health Plan in accordance with the AGP.

The Contractor's Plan shall address the process of reporting illness, incidents, and injury as required by the AGP.

The Contractor's Plan shall address all hazardous operations as required by the AGP.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MA-013
Incident Reports	
USE:	PROJECT:
Provides immediate notice concerning any major/incident classified as a lost time, or which results in property loss of $25,000 or more.	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

Incidents reports shall be generated any time there is an occurrence which has or could have resulted in hardware failure or damage or in personal injury. These reports will be reviewed to insure that a similar instance under slightly different conditions does not cause damage or injury.

DATA REQUIREMENT DESCRIPTION

TITLE: Inputs to Missile System Prelaunch Safety Package (MSPSP)	NUMBER: MA-014
USE: To define and describe the Flight System/ Sub-systems in detail and provide hazards analysis for each.	PROJECT: MRO
INTERRELATIONSHIP:	REFERENCES: JPL D-560; MRO Safety Plan

PREPARATION INFORMATION:

The Contractor shall comply with the requirements of EWR 127-1 *Eastern and Western Range Safety Requirements*. The MSPSP shall include the following information:

(1) Format: Contractor's format is acceptable provided the information described below is provided.
(2) Table of Contents and Glossary.
(3) Introduction: The Introduction shall address the scope and purpose of the MSPSP.
(4) General Descriptions: Provide an overview of the launch vehicle or payload as a prologue to the subsystem descriptions. The following information shall be included in this section:
   a. Physical dimensions and weight
   b. Nomenclature of major subsystems
   c. Types of motors and propellants to be used
   d. Sketches and/or photographs of the launch vehicle or payload
   e. Synopsis of each hazardous and safety critical system
(5) Flight Hardware Subsystem descriptions: At a minimum, the Flight Hardware Subsystems Sect. Shall include the following information:
   a. Subsystem overview
   b. Nomenclature of major subsystems
   c. Function of the subsystem
   d. Types of motors and propellants to be used
   e. Location of the subsystem
   f. Operation of the subsystem
   g. Subsystem design parameters and test requirements
   h. Subsystem operating parameters
   i. Summaries of any Range Safety required hazard analyses conducted
(6) Ground Support Equipment including the following information:
   a. Subsystem overview
   b. Nomenclature of major subsystems including function of the subsystem and location
   c. Subsystem design parameters and test requirements
   d. Subsystem operating parameters
   e. Summaries of Range Safety required hazard analyses conducted
(7) Compliance Checklist: A compliance checklist of all design, test, analysis, and data submittal requirements as specified in EWR 127-1. The checklist shall indicate for each requirement if the proposed design is compliant, non-compliant but meets intent, non-compliant (waiver required) or non-applicable. The following items shall be included in this section:
   a. Criteria/requirement
   b. System
   c. Compliance, non compliance, not applicable
   d. Resolution
   e. Reference
   f. Copies of all Range Safety approved non-compliances including deviations, waivers and formal meets intent certifications.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MA-015
Parts Control Plan	
USE:	PROJECT:
To define the parts control activities.	MRO
INTERRELATIONSHIP:	REFERENCES:
MA-001	MR0 Mission Assurance Plan (JPL D-20327)

PREPARATION INFORMATION

The Contractor shall develop a Parts Control Plan that meets the requirements of the MRO Mission Assurance Plan

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MA-016
Electronic Parts Data	
USE:	PROJECT:
To provide data on electronic parts for the proposed design.	MRO
INTERRELATIONSHIP:	REFERENCES:
MP-001, MA-002, MA-006	MR0 Mission Assurance Plan

PREPARATION INFORMATION:

The Contractor shall submit technical data as defined by the Parts Control Plan, which covers item selection, application status and problems/concerns during selection, procurement, design/development, fabrication and testing. These data shall consist of the following as an example:

(1) Failure Analysis reports on catastrophic screening failures
(2) DPA reports for lots that fail screening
(3) GIDEP Alert Review and Status Report
(4) Electronic Parts Non-Conforming Material Report (NCMR) Action and Status Report

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MA-017
Contamination Control Plan	
USE:	PROJECT:
Describes the requirements, documentation, analyses, evaluation and testing of the contamination control methods used for flight hardware.	MRO
INTERRELATIONSHIP:	REFERENCES:
MA-001	MR0 Mission Assurance Plan (JPL D-20327)

PREPARATION OF INFORMATION:

The Contractor shall prepare a Contamination Control Plan in accordance with the requirements in the MRO Mission Assurance Plan. The plan shall describe the Contractor's contamination control methods including references to Contractor's applicable institutional policies, procedures, specifications, and instructions.

It shall also include the following:

(1) Document Change Log
(2) Table of Contents
(3) Purpose, scope, and applicability of plan
(4) List of applicable documents
(5) A description of requirements, sources of requirements, and methodologies selected for implementing them.
(6) A description of the Contractor Contamination Engineer's authority and responsibility with respect to meeting the Contamination Control Requirements delineated in JPL D-20327.
(7) A description of fabrication, testing, storage, and shipment environments to be encountered by the deliverable hardware
(8) A description of techniques and contamination control activities necessary for accomplishing Contamination Control Requirements
(9) A schedule describing reviews, fabrication, maintenance, testing, certification, acceptance, and shipment of hardware
(10) A description on the time allocation for contamination control activities
(11) A description of how the Contractor will impose all requirements by appropriate documents on all subcontractors and suppliers including the assignment of responsibilities.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Orbiter Analysis and Operations (OAO) Plan	MO-001
USE:	PROJECT:
To define the operating and analysis plan, schedule, interfaces and processes for the Orbiter analysis and operations support unit provided by the Contractor. This document also defines the plan for cruise Orbiter and instrument checkout and calibration activities.	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

This document describes the OAO unit operating and analysis plans. The following shall be addressed:

(1) Unit organization, structure and staffing profile
(2) Unit operating policies, guidelines and constraints
(3) Unit milestone schedule
(4) Unit operational process and interfaces with other elements of MOS/GDS and the required external interfaces of the Orbiter algorithms
(5) Unit training and certification plans
(6) Systems and subsystems Orbiter performance analysis plans. Identify specific analysis to be performed, telemetry measurements used, algorithms used, etc.
(7) Orbiter and operational contingency plans
(8) Description of activities to support cruise Orbiter and instrument checkout and calibrations.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MO-002
Orbiter Analysis Software Implementation Plan	
USE:	PROJECT:
To define the software implementation plan, schedule, process and resources.	MRO
INTERRELATIONSHIP:	REFERENCES:
SW-001, SW-002, SW-003	

PREPARATION INFORMATION:

This document will describe detailed orbiter analysis software implementation plan following the requirements of SW-001, 002 and 003. The plan shall call out:

(1) Schedule and resources
(2) Documentation plan including as built design documentation
(3) Review plan
(4) Users guide
(5) Delivery process

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Orbiter Operations Handbook	MO-003
USE:	PROJECT:
To define the operating procedures, restrictions, lessons learned from ATLO, and other detailed Orbiter operations characteristics.	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

This document will describe detailed Orbiter operations procedures including:

(1) Systems and subsystems operations procedures
(2) Detailed Orbiter operations characteristics
(3) Flight rules and constraints of the operations, idiosyncrasies
(4) Rules identification, description and rationale
(5) Impact of violation
(6) Applicable area—Orbiter, payload, mission ops including the identification of subsystems
(7) Commands/blocks affected
(8) Method of enforcement of detection, removal
(9) Related ancillary information
(10) Detailed Orbiter operations interfaces
(11) Orbiter Hardware and Software Architecture
(12) Operational and Commandable Modes
(13) Data Architecture, Modes and Rates
(14) Command Sequencing Architecture
(15) Data Management and Transport
(16) Fault Protection, Backup, Redundancy, Backup Operational Modes
(17) Resource and Performance Limitations

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Command Dictionary	MO-004
USE:	PROJECT:
To define the attributes of the orbiter commands	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

This document will describe general on board commanding process and detailed orbiter and payload commands including the following attributes:

(1) Command name
(2) Command op code
(3) Command parameters
(4) Applicable subsystems
(5) Telemetry effects including confirming telemetry for command verification
(6) Whether this command is a restricted command or not (Restricted commands are commands which if executed improperly could result in permanent damage to the orbiter)
(7) Whether this command can be sent as immediate command
(8) Whether this command can be used in block/sequence
(9) Whether this command can be treated as non-interactive command, i.e., execute this command will not change the state of the power or thermal of the orbiter

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Telemetry Dictionary	MO-005
USE:	PROJECT:
To define the attributes of the orbiter telemetry.	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

This document will describe general on board telemetry process and detailed orbiter and payload telemetry including the following attributes:

(1) Telemetry identifier
(2) Subsystems to which the measurement belongs
(3) Description
(4) Length in bits
(5) Type of telemetry (analog, discrete)
(6) Type of data when it is downlinked or derived on the ground (floating point, signed integer)
(7) Engineering unit
(8) Sample rate
(9) Sample type: type of data when the data is sampled (double precision, floating point)
(10) Polynomial coefficients used in converting the measurement to engineering unit

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Block Dictionary	MO-006
USE:	PROJECT:
To define a set of orbiter and payload sequence of events.	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

A “block” is a series of time tagged commands stored on board that perform specific functions over a preset time period.

This document should contain a general description of the block construction philosophy and for each block, the following characteristics; including, but not limited to:

(1) Block description
   a. Block title
   b. ID
   c. Description
(2) Command listing of events required to achieve the block goal along with relative timing, constraints, and expected telemetry
(3) Ancillary information such as the time of initiation, required configuration, inputs, constraints and conditions that the blocks can be performed

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MP-001
Materials and Processes Control Plan	
USE:	PROJECT:
Describes the requirements, documentation, analyses, evaluation and testing of the materials and processes used for flight hardware.	MRO
INTERRELATIONSHIP:	REFERENCES:
MA-001	

PREPARATION OF INFORMATION:

The Contractor shall prepare a Materials and Processes Control Plan in accordance with the Materials and Processes requirements in the MRO Mission Assurance Plan. The plan shall describe the Contractor's materials and process requirements and practices, including references to Contractor's applicable institutional policies, procedures, specifications, and instructions. It shall also include the following:

(1) Document Change Log
(2) Table of Contents
(3) Purpose, scope, and applicability of plan
(4) List of applicable documents
(5) A description of the materials and processes engineering/assurance organization, management, approach, and responsibilities for accomplishing the various activities, as well as relationships to the elements of the Contractor's organization and its institutional organizations.
(6) A description of the means for selection (including sources) of materials and processes, including criteria for qualification/evaluation plans.
(7) A description of contents, use, and schedules for Materials Identification and Usage Lists (MIULs) and classifications of listed items; descriptions of the contents and use of Materials Usage Agreements (MUAs) and waivers; and templates for each of these forms.
(8) A description of requirements, including sources, materials and processes selection criteria, and guidelines for implementation.
(9) A schedule of materials and processes engineering/assurance activities indicating their phase relationships with design, development, procurements, design reviews, hardware reviews, fabrication, system testing, and shipment.
(10) A description of responsibilities and techniques for accomplishing materials and processes engineering/assurance activities by or with subcontractors and suppliers.
(11) A description of how the Contractor will impose all requirements by appropriate documents on all subcontractors and suppliers.

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DATA REQUIREMENT DESCRIPTION

TITLE: Materials and Processes Data	NUMBER: MP-002
USE: Lists and provides data, plans, and reports pertaining to the materials and processes that are to be used in the design and fabrication of flight hardware.	PROJECT: MRO
INTERRELATIONSHIP: MA-001	REFERENCES: MRO Mission Assurance Plan, JPL D-20327

PREPARATION INFORMATION:

Prepare and submit data in accordance with the following:

(1) Materials Identification and Usage Lists (MIULs) for all mechanical parts, electronic parts, materials and processes that are to be used in the design and fabrication of flight hardware. Information that shall be provided in the MIULs is described in JPL D-20327. The evaluation and selection of materials and processes for inclusion in the MIULs shall be according to the requirements and guidelines of JPL D-20327. The Contractor shall prepare the form using the attached MIUL template or the Contractor's equivalent document
(2) Contractor preferred fasteners list
(3) Contractor fastener selection and traceability requirements
(4) Materials Usage Agreements (MUAs) or waivers that pertain to material and process issues, and all associated back-up information. The Contractor shall prepare the form using the attached two-page MUA form template or the Contractor's equivalent document
(5) Failure analysis reports, which involve material and process issues
(6) Contractor applicable documents requiring JPL approval for equivalence

Attached: Sample template for MIULs; sample template for MUAs.

MATERIALS USAGE AGREEMENT		USAGE AGREEMENT NO.		REVISION	PAGE OF
PROJECT:		SUBSYSTEM		ORIGINATOR	ORGANIZATION: JPL
DETAIL DRAWING(S)		USING ASSEMBLY(S)		ITEM DESCRIPTION	ISSUE
MATERIAL		TRADE NAME		SPECIFICATION	MANUFACTURER
THICKNESS	WEIGHT	EXPOSED AREA	LOCATION	ENVIRONMENT	
			HABITABLE	PRESSURE	TEMPERATURE / MEDIA
			NONHABITABLE		
APPLICATION					
RATIONALE					
ORIGINATOR FLIGHT MATERIALS AND PROCESSES ENGINEERING, JPL		PROGRAM MANAGER		DATE	
MATERIALS ENGINEERING EVALUATION					

STRESS CORROSION EVALUATION FORM

(1) PART NUMBER _____

(2) PART NAME _____

(3) NEXT ASSEMBLY NUMBER _____

(4) MANUFACTURER _____

(5) MATERIAL _____

(6) HEAT TREATMENT _____

(7) SIZE AND FORM _____

(8) SUSTAINED TENSILE STRESS-MAGNITUDE AND DIRECTION _____

(9) PROCESS RESIDUAL _____

(10) ASSEMBLY _____

(11) DESIGN, STATIC _____

(12) SPECIAL PROCESSING _____

(13) WELDMENTS

a. ALLOY FORM, TEMPER OF PARENT METAL _____

b. FILLER ALLOY IF NONE, INDICATE _____

c. WELDING PROCESS _____

d. WELD BEAD REMOVAL - YES ( ), NO ( ) _____

e. POST-WELD THERMAL TREATMENT _____

f. POST-WELD STRESS RELIEF _____

(14) ENVIRONMENT _____

(15) PROTECTIVE FINISH _____

(16) FUNCTION OF PART _____

_____

(17) EFFECT OF FAILURE _____

_____

(18) EVALUATION OF STRESS CORROSION SUSCEPTIBILITY _____

_____

(19) REMARKS: _____

_____

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Communications and Information Exchange Plan	MS-001
USE:	PROJECT:
To provide the format and forum requirements for communications and information exchange between JPL and the Contractor	MRO
INTERRELATIONSHIP:	REFERENCES:
All other MS DRDs	JPL D-20454

PREPARATION INFORMATION:

(1) The Contractor shall establish, within his organization, responsibility for implementing the communications and information exchange requirements specified in this Contract. The responsibilities and methods needed to meet these requirements, plus any additional procedures the Contractor deems necessary to adequately manage the communications and information exchange, shall be documented in a Communications and Information Exchange Plan, or equivalent. The Contractor may submit his organization's existing Plan for JPL approval if he feels it meets the intent of the requirements herein.

(2) The Contractor shall meet the following specific requirements:
   a. Submit all documents, data and reports in electronic format, and hard copy where applicable.
   b. Where possible, submit documents, data, and reports in formats consistent with JPL D-20454.
   c. Provide electronic access to all MRO documents, data, and reports.
   d. Provide and use video conferencing capabilities to the extent practicable TBN with JPL for communications and information exchange. Specific formats, e.g. Netmeeting, Meeting Place or similar software, TBN with JPL.
   e. Describe their process for posting photographs to the server and provide a list of what photographs are available to JPL.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Earned Value/Resource Management Plan	MS-002
USE:	PROJECT:
Provides an overview of the management processes for work organization and for schedule cost planning and control; provides the documentation required to demonstrate compliance with JPL's Earned Value Management requirements.	MRO
INTERRELATIONSHIP:	REFERENCES:
All other MS documents	

PREPARATION INFORMATION:

(1) The responsibilities and methods needed to meet these requirements, plus any additional procedures the Contractor deems necessary to adequately manage its Earned Value and Resources, shall be documented in an Earned Value/Resource Management (EVRM) Plan, or equivalent. While the EVRM Plan shall cover Phases A–E, the Contractor is required to implement Earned Value during Phase C/D only.

(2) The Contractor shall describe the management system to be used to:
   a. Organize and clearly describe the work to be performed to meet the Contractual requirements;
   b. Schedule and budget the work; and
   c. Monitor and control cost performance and schedule progress during the Contract.

(3) Specifically, the Contractor's EVRM Plan shall include, but not be limited to:
   a. A narrative description of the following processes:
      i) Work Definition/Organization
      ii) Scheduling
      iii) Budgeting and Baseline Change Control
      iv) Work Authorization
      v) Actual Cost Collection
      vi) Monthly Earned Value measurement and assessment
      vii) Reporting of monthly EVM data to internal management (Phase C/D only)
      viii) Subcontract monitoring and material cost control

As appropriate provide graphic examples, i.e., flow charts, diagrams, report formats, etc., of the processes described above.

   b. Specific discussion of Item (3)(a)(iii) above to include:
      i) The processed used to integrate the Project Schedule (milestones and activities) with the Baseline Cost Estimate;
      ii) The lowest applicable Work Breakdown Structure (WBS) level at which cost and schedule integration occurs in the Contractor's EVM system;
      iii) The establishment and use of a Budget Transaction Log;
      iv) The processes and controls used to establish and distribute Undistributed Budget and Management Reserve;
      v) The processes and controls used to implement authorized Contract changes into the Baseline Cost Estimate.

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Earned Value/Resource Management Plan	MS-002
USE:	PROJECT:
Provides an overview of the management processes for work organization and for schedule cost planning and control; provides the documentation required to demonstrate compliance with JPL's Earned Value Management requirements.	MRO
INTERRELATIONSHIP:	REFERENCES:
All other MS Documents	

PREPARATION INFORMATION (cont.):

c. Specific discussion of Item (3)(a)(vi) above to include:
   i) The methods for computing earned value at the lowest applicable WBS level, and the criteria for their usage (Phase C/D only);
   ii) The policy which requires establishment of discrete means of earned value measurement for all appropriate tasks, and which limits the level-of-effort method of earned value measurement to only those tasks which cannot be measured discretely (Phase C/D only);
   iii) The methods used to identify and implement corrective actions in response to variances;
   iv) The methods used to project the Contract cost Estimate-At-Completion (EAC) for both direct and indirect costs.

d. Specific discussion of Item (3)(a)(viii) above to include:
   i) The method used for scheduling subcontract and material procurements;
   ii) The method used for subcontract and material cost budgeting;
   iii) The method used for subcontract and material earned value measurement (Phase C/D only);
   iv) The method used to recognize subcontract and material actual costs;
   v) The procedure for analyzing material price and usage variances; and
   vi) The procedure for analyzing subcontract cost and schedule variances.

e. Identification of personnel (either by name or by functional title) who are responsible for planning the work and reporting work progress. Also identify individuals responsible for reviewing reported accomplishments, monitoring the EVM activities (Phase C/D only), and verifying earned value calculations.

After initial JPL approval, the Earned Value / Resource Management Plan shall be modified only with the prior consent of JPL.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Work Breakdown Structure and Dictionary, and Cost Account Structure Reports	MS-003
USE:	PROJECT:
To provide the framework and structure for planning, managing and controlling resources.	MRO
INTERRELATIONSHIP:	REFERENCES:
All other MS documents	

PREPARATION INFORMATION:

(1) The Contractor shall establish, within his organization, responsibility for implementing the Work Breakdown Structure (WBS) and Cost Account Structure (CAS) requirements specified in this Contract. The responsibilities and methods needed to meet these requirements, plus any additional procedures the Contractor deems necessary to adequately manage WBS and CAS, shall be documented in MS-002.

(2) The Contractor shall deliver the following reports:

a. Program Work Breakdown Structure (WBS) and Cost Account Structure (CAS)
   i) Depicting all work activities and procurements under this Contract
   ii) Complying with a JPL provided numbering scheme supplied with this RFP.

b. WBS Dictionary
   i) For each WBS element identified in Item (2) a. above
   ii) Briefly describing the scope of the work to be performed within each WBS element.

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Baseline Earned Value, Cost, Schedule and Workforce Report	MS-004
USE:	PROJECT:
To provide baseline detailed earned value, cost, schedule and workforce data against which progress will be assessed.	MRO
INTERRELATIONSHIP:	REFERENCES:
All other MS documents	

PREPARATION INFORMATION:

(1) The Contractor shall establish, within his organization, responsibility for implementing the baseline earned value, cost, schedule and workforce report requirements specified in this Contract. The responsibilities and methods needed to meet these requirements, plus any additional procedures the Contractor deems necessary to adequately report the baseline earned value, cost, schedule and workforce, shall be documented in an Earned Value/Resource Management Plan, or equivalent. The Contractor is required to implement Earned Value during Phase C/D only.

(2) The Report shall include the following:

a. Basis of Estimate for each Cost Account planned

b. Schedule

i) CPM program detailed master network schedule comprising tasks and milestones that depict all work activities and procurements under this Contract.

- Identified schedule margins (slack) in accord with JPL D- 17868
- In JPL-provided MS Project 98 or 2000 templates
- Identified predecessor-successor task relationships ("receivables/deliverables") where such relationships cross WBS boundaries
- Including tasks which are identified as "receivables" or "deliverables" from external sources such as instrument or GFP providers

ii) Program Level 1/2 rollup schedule in TBN electronic format

iii) Other data used for managing and reporting baseline schedules to internal management

c. Detailed Earned Value/Cost Estimates

i) In tri-service validated, industry standard Earned Value native software program format such as Welcom Cobra, Microframe Program Manager, or equivalent

ii) In ANSI X12 format,

iii) For each of its Work Packages and Cost Accounts.

iv) Integrated with the schedule, work activities and procurements under this Contract.

v) Other data used for managing and reporting baseline EVM/cost estimates to internal management

d. Workforce

i) Planned Full Time Equivalents (FTE)

e. Bill Of Material indicating the major TBS subcontracts

i) Supplier name,

ii) Estimated price, and

iii) Estimated definitization dates.

f. Long-lead items to be procured during Phase A/B

i) Supplier name,

ii) Estimated price, and

iii) Estimated definitization dates.

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Baseline Earned Value, Cost, Schedule and Workforce Report	MS-004
USE:	PROJECT:
To provide baseline detailed earned value, cost, schedule and workforce data against which progress will be assessed.	MRO
INTERRELATIONSHIP:	REFERENCES:
All other MS documents	

PREPARATION INFORMATION (contd.):

g. Budget Reserve
   i) Budget reserves expenditure plan
   ii) Recommended budget reserves and rationale therefor for each subsystem element.

h. Schedule Margin
   i) Schedule Margin expenditure plan
      - In accord with JPL D- 17868
   ii) Recommended schedule margin and rationale therefor for each subsystem element.

i. The Phase C/D Baseline Earned Value, Cost and Schedule Report shall include an Integrated Baseline Review (IBR) at the Contractor's facility. This Review shall be conducted informally as an in-depth "table top" "peer" review. Topics shall include Items a–h above. Contractor participants shall include, as a minimum, representatives from Finance, Planning, and contracts. Subsystem cognizant technical representatives shall participate in the Review during discussion of their subsystems.

DATA REQUIREMENT DESCRIPTION

TITLE: Detailed Earned Value, Cost, Schedule and Workforce Status Reports	NUMBER: MS-005
USE: To provide the Detailed Earned Value, Cost, Schedule and Workforce periodic reporting criteria.	PROJECT: MRO
INTERRELATIONSHIP: All other MS documents	REFERENCES:

PREPARATION INFORMATION:

(1) The Report shall include the following:

a. Schedule
   i) CPM program detailed master network schedule comprising tasks and milestones that depict all work activities and procurements under this Contract.
      - Identified schedule margins (slack) in accord with the JPL D- 17868
      - In JPL-provided MS Project 98 or 2000 templates
      - Identified predecessor-successor task relationships ("receivables/deliverables") where such relationships cross WBS boundaries
      - Including tasks which are identified as "receivables" or "deliverables" from external sources such as instrument or GFP providers
   ii) Program Level 1/2 rollup schedule in TBN electronic format
   iii) All other schedules generated for managing and reporting status to internal management.

b. Schedule metrics
   i) Milestone trend charts, format TBS
   ii) Slack tables, format TBS,
   iii) Critical path tables, format TBS,
   iv) Schedule margin plan vs. consumption,
   v) All other schedule metrics generated for managing and reporting status to internal management.

c. Significant schedule changes
   i) Schedule slack,
   ii) Critical path

d. Schedule recovery plans

e. Earned Value/Cost Management
   i) Detailed EVM/Cost Management
      - in tri-service validated, industry standard Earned Value native software program format such as Welcom Cobra, Microframe Program Manager, or equivalent.
      - in ANSI X12 format,
      - for each of its Work Packages and Cost Accounts.
      - integrated with the schedule, work activities and procurements under this Contract.
   ii) All other EVM and Cost Management reports generated for managing and reporting status to internal management.
   Discussion of JPL-approved changes to Contractor's baseline EVM/Cost plan.

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Detailed Earned Value, Cost, Schedule and Workforce Status Reports	MS-005
USE:	PROJECT:
To provide the Detailed Earned Value, Cost, Schedule and Workforce periodic reporting criteria	MRO
INTERRELATIONSHIP:	REFERENCES:
All other MS Documents	

PREPARATION INFORMATION (cont.):

f. Earned value/Cost Management metrics for each Cost Account
   i) Cost Variance,
   ii) Schedule Variance (Phase C/D only),
   iii) Schedule Performance Index (Phase C/D only),
   iv) Cost Performance Index, To-Complete Performance Index (Phase C/D only),
   v) All other Earned Value metrics generated for reporting to internal management.

g. Significant EVM/Cost Management changes
   i) In EVM/Cost Management metrics as identified in “f” above.

h. Earned Value/Cost Management recovery plans

i. Workforce
   i) Plan vs. actual Full Time Equivalents (FTE)

j. Bill Of Material indicating the status of major subcontracts
   i) Supplier name,
   ii) Estimated vs. actual price,
   iii) Negotiations status, and
   iv) Estimated definitization dates

k. Long-Lead items to be procured during Phase A/B
   i) Supplier name,
   ii) Estimated vs. actual price,
   iii) Negotiations status, and
   iv) Estimated definitization dates

l. Budget Reserve
   i) Budget reserves remaining vs. estimated cost-to-go

m. Liens/Threats list
   i) Soft
      - identifying known or perceived programmatic and technical risk items
      - including a ROM cost for each item, should it occur
      - including a ROM probability of its occurrence (low, medium or high).
   ii) Hard
      - Identifying item to which reserves were applied
      - Identifying the defintized, time-phased allocated cost

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Contract Status Report	MS-006
USE:	PROJECT:
To provide commitment, cost, and overhead cost information for performance measurement and evaluation.	MRO
INTERRELATIONSHIP:	REFERENCES:
All other MS Documents	NASA Form 533Q

PREPARATION INFORMATION:

(1) The Report shall include:

a. A NASA Form 533Q completed in accordance with the instructions on the reverse side of the form and submitted monthly.

NOTE: Unless otherwise noted in this Contract, the 533Q shall be submitted for each subsystem level (level 3) Report Item in the Work Breakdown Structure. Other reporting levels will be submitted as required by JPL. The reporting categories on the 533Q shall be elements of cost, e.g. direct labor, direct materials, subcontracts, burden or overhead, G&A expense, etc. Column 7b shall reflect actual costs incurred for the month being reported and Column 7c shall reflect cumulative actual costs incurred through the month being reported.

b. A monthly Overhead Report submitted with the 533Q report which provides the following information:
   i) A listing of the latest bidding, billing, and actual incurred overhead and G&A rates by cost centers.
   ii) A copy of, or comments regarding, any new rate approvals by the cognizant DCAA office.
   iii) A delineation of the rates, by cost centers, used in preparation of the 533Q report.

c. A monthly total commitment and total cost profile.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Monthly Splinter Meetings and Management Review Presentation Materials	MS-007
USE: Provides monthly status briefing and materials to identify and resolve technical, business and management issues.	PROJECT: MRO
INTERRELATIONSHIP: MS-001, MS-002, MS-004, MS-005, MS-006	REFERENCES:

PREPARATION INFORMATION:

The MMR shall include a presentation by each subsystem or equivalent (nominally WBS level 3) consisting of, as a minimum, the following:

(1) Progress during past reporting period vs. plan
(2) Discussion of activities not accomplished
(3) List of activities planned for next reporting period
(4) Brief discussion of problems/concerns
(5) Schedule status and variance from baseline discussion, including Gantt schedules and slack tables (showing previous data, current data and delta Total Float)
(6) Cost discussion including comparison of actual and planned cost, earned value analysis, and an explanation of variances that exceed 10% or $25,000 at the cost account level
(7) Technical/design status, including key requirements, expected performance and design margins; major trade studies and progress; design verification activities (analyses, breadboards, testbeds, etc.); major technical issues; interface definition progress and issues; parts selection, approval and procurement progress; reliability analyses progress and issues; test results, summary of new and open waivers and ECRs against orbiter specification; and problem/failure report status
(8) Implementation progress including procurement and subcontract status and issues
(9) Summary of current risk items and potential mitigations
(10) Splinter meeting highlights and action items as applicable
(11) Informal ROM estimate to complete

In addition, the MMR shall include program management and mission assurance summaries addressing as appropriate the above themes; and a contract status summary including deliverables status, items requiring JPL approval, contract modifications status, authorized level-of-effort tasks, status and hours balance, contract issues and problems and Contractor billing and JPL payment status.

The Contractor shall also prepare minutes of the MMR including:

(1) Modifications, corrections or revisions to presented material
(2) Significant material or data presented but not covered in the handouts
(3) Significant statements of policy or procedures; or commitments made by JPL or Contractor management
(4) Updated action item list reflecting closures and new items identified in the MMR

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: MS-008
Risk Management Plan	
USE:	PROJECT:
This document describes the approach to managing risk.	MRO
INTERRELATIONSHIP:	REFERENCES: *MRO Risk Management Plan*, JPL D-20380

PREPARATION INFORMATION:

This plan shall contain a description of the Contractor's approach to manage risk on a recurrent basis throughout the contract life for all work elements of the contract. The plan shall include the tasks, functions, and activities necessary to accomplish effective risk management. This plan will describe the process through which the risks will be identified, evaluated, prioritized and mitigated. Specifically the plan will include:

(1) Purpose, scope, assumptions, constraints, and policies pertaining to risk management.
(2) Overview of the process and a description of how risk management is integrated into MRO management processes
(3) Organization, roles and responsibilities for risk management
(4) Methods and tools to be used.
(5) Schedule and milestones for risk management activities. Resources required to implement risk management
(6) How will risks be identified, documented, maintained and dispositioned.
(7) Descope strategies, related to MRO objectives

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Subcontracting Report for Individual Contracts	MS-009
USE:	PROJECT:
Provides data on the implementation of the Contractor's Small Business/Small Disadvantaged Business Subcontracting Plan	MRO
INTERRELATIONSHIP:	REFERENCES:
	Standard Form 294

PREPARATION INFORMATION:

Prepare a Subcontracting Report for Individual Contracts (Standard Form 294) in accordance with the instructions on the reverse side of the Form.

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Phase C/D Implementation Plan	MS-010
USE:	PROJECT:
The Plan provides the basis for Contractor's delta cost proposal for Phase C/D	MRO
INTERRELATIONSHIP:	REFERENCES:
MS-004	

PREPARATION INFORMATION:

The Contractor shall prepare a Phase C/D Implementation Plan that describes the Contractor's approach to completing orbiter design, fabricating and verifying the flight orbiter, integrating the science and engineering payload and completing orbiter acceptance testing and subsequent launch operations and post-launch checkout.

The implementation plan shall be correlated to the WBS (MS-003) and shall identify cost and schedule plans, plus deltas, with rationale from the initial baseline for Phase C/D (MS-004).

The Plan shall include as a minimum the following:

(1) Technical and programmatic changes in Phase A/B that impact Phase C/D cost and schedule (identify each change and its impact on cost and schedule).
(2) Orbiter summary description, including key or driving requirements
(3) Key open issues and plan for resolution, including payload accommodation
(4) Plan for completing reliability analyses including schedule, staffing, and phasing with design and implementation activities.
(5) Electronics parts procurement and screening plan, and phasing with implementation activities. In particular, long lead or high-risk parts should be identified and include a discussion of how schedule and technical risk will be managed.
(6) Implementation approach for flight hardware subsystems and assemblies including
    a. Key requirements
    b. Make or buy approach, including Contractor division and facility or subcontractor at which assemblies will be manufactured
    c. Changes to originally planned cost and schedule with rationale and basis
    d. Surveillance provisions, including meetings and reviews, to insure that technical, mission assurance and program requirements and constraints are met
    e. Summary test and verification plan
    f. Summary delivery and end item data package requirements
(7) Implementation approach for flight software, including key requirements and functions, make or buy approach, use of simulators, testbeds and the flight system for test and verification.
(8) Plan for verifying payload interfaces with Orbiter using testbeds and/or simulators.
(9) ATLO flow plan and description, facility requirements (including Contractor-provided facilities for payload processing), support equipment development & verification approach.
(10) MOS development and support plan, including MOS and DSN compatibility testing, and end-to-end test.
(11) Plan for initial in-flight checkout of Orbiter
(12) Phase C/D organization and staffing plan
(13) Risk items eliminated in Phase A/B, identified risk items for C/D and mitigation measures
(14) Transition plan from Phase A/B into Phase C/D

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Phase E Implementation Plan	MS-011
USE:	PROJECT:
The Plan provides the basis for Contractor's delta cost proposal for Phase E	MRO
INTERRELATIONSHIP:	REFERENCES:
MS-004	

PREPARATION INFORMATION:

The Contractor shall prepare a Phase E Implementation Plan that describes the Contractor's approach to providing post-launch mission operations support.

The implementation plan shall be correlated to the WBS (MS-003) and shall identify cost and schedule plans, plus deltas, with rationale from the previous baseline.

The Plan shall include as a minimum the following:

(1) Technical and programmatic changes that impact Phase E cost (identify each change and its impact on cost and schedule)
(2) Baseline MOS support description, including key or driving requirements
(3) Plan for maintaining testbeds at JPL and Contractor's facilities
(4) Plan and approach for monitoring routine in-flight telemetry and assessing Orbiter health
(5) Key open issues and plan for resolution
(6) Plan for initial in-flight checkout of Orbiter
(7) Phase E organization and staffing plan
(8) Risk items and mitigation measures
(9) Transition plan from Phase C/D into Phase E

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Review Plan	RE-001
USE:	PROJECT:
Used to negotiate the specifics for the Contractor's review plans, approach and contents.	MRO
INTERRELATIONSHIP:	REFERENCES:
	JPL D-20453

PREPARATION INFORMATION:

A review plan shall be prepared identifying the Contractor and the sub-contracted reviews in accordance with the MRO Review Plan, JPL D-20453. The approach shall address system- and subsystem-level reviews for the orbiter and both Contractor-developed and subcontracted-delivered items. The plan shall provide review purpose, scope, convening authority, data contents and data package delivery schedules. Also the plan shall describe the process for creating and closing out action items.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: SE-001
Orbiter System Performance and Interface Specification	
USE:	PROJECT:
This document describes the orbiter system and subsystem design and its interfaces.	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

This document shall contain the system and subsystem functional and performance description, which is responsive to the Orbiter Requirements in Exhibit I of the contract. Functional requirements will be allocated to subsystems where their implementation will be described. Interfaces between the orbiter and the launch vehicle, the GFP, and the MOS will be described. Subsystem interfaces will be described. Orbiter capabilities for accommodating the science and engineering payloads and supporting their operations will be described. This document will include:

(1) Design criteria, design constraints and a definition of the general philosophy to be used
(2) System level derived requirements and constraints affecting subsystem design
(3) Functions that the subsystems perform
(4) Subsystem boundaries and interfaces in sufficient detail so that identification with cognizant design groups can be made and interface control maintained
(5) Limits and tolerances within which the subsystem must perform consistent with requirements and vendor specifications
(6) Allocation of system resources such as mass, power, pointing, memory, I/O
(7) Important characteristics of each subsystem such as functional block diagram, subsystem requirements
(8) The grounding policy and design requirements
(9) Mechanical configuration information such as available mounting surfaces, envelopes and fields of view for the GFP; lengths of booms and appendages, Orbiter configuration for launch, cruise and mapping; mass property requirements and allocations to subsystems
(10) The design and constraints on system level operations from a power point of view such as type of regulation, allowable transients, fusing, power interfaces, power on reset
(11) Approach to science and engineering payloads alignment and verification
(12) Approach to system level requirements verification and validation
(13) System level operational scenario for each mission phase
(14) Fault protection feature description and allocation to subsystems

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: SE-002
Orbiter Fault Protection Design Specification	
USE:	PROJECT:
Document the orbiter system fault protection requirements and design	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

This document describes the fault protection system and subsystem level requirements and implementation. The implementation will show the requirement flow from the system FMECA to subsystem FMECA and the fault protection detection and correction algorithms. This document includes:

(1) Description of how the system and subsystem fault protection, reliability and operability requirements are being implemented.
(2) Description of the fault protection design philosophy, architecture and implementation approach
(3) Description of all fault protection algorithms.
(4) Listing and description of all fault protection parameters.

Contractor has the option of including SE-002 as a section in SE-001.

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DATA REQUIREMENT DESCRIPTION

TITLE: Orbiter/Payload Interface Control Documents	NUMBER: SE-003
USE: Describe and control the complete interface between the orbiter and the science/engineering payloads.	PROJECT: MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

These documents describe the requirements and detailed implementation of all interfaces between the orbiter and the payload to a level of detail sufficient to fabricate compatible hardware and software to support instrument operations. This document includes both flight hardware and ground test interfaces and integrates all information to fully describe both sides of all interfaces. These documents will include a description of the following interfaces [where applicable] connectors, power, data, software, mechanical mounting, fields of view, thermal, environmental, flight operations, ground operations, test, handling, installation, ground support equipment, services, documentation and interface verification.

A separate document will be created for each of the science and engineering payloads.

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DATA REQUIREMENT DESCRIPTION

TITLE: DSN Compatibility Test Plan and Report	NUMBER: SE-004
USE: To define the tests required to verify the compatibility of the telecommunications subsystem with the Deep Space Network (DSN).	PROJECT: MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

This plan establishes the tests and documentation required demonstrating the compatibility between the telecommunications subsystem and the DSN. The plan includes descriptions for all receiver, transmitter, command, telemetry and radiometric tests and test configurations. Test facilities and dates shall be described.

The Contractor shall complete a report that fully documents the results of the testing.

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Orbiter Verification and Test Plan	SE-005
USE:	PROJECT:
Describes the Contractor's approach for Orbiter Verification and Test	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION:

Prepare and submit an Orbiter Verification Plan that defines the approach and methods the Contractor will implement to verify the Orbiter meets the requirements in Exhibit I. The plan is must describe how orbiter functional, performance and reliability requirements will be verified at all levels (orbiter, subsystem, assembly, etc) as well as a function of design and implementation maturity (breadboards, engineering models, flight hardware and system/orbiter integration & test, and post launch). The plan should address how orbiter interfaces and functions with external mission interfaces will be verified, including science and engineering payloads, launch vehicle, mission operations system and Deep Space Network.

Where verification and test information required herein are provided in separate and prior delivered CDRL(s), the applicable sections may be referenced and supplemented herein as appropriate.

The plan requires the following as a minimum:

(1) Verification matrix of Contractor-generated requirements with traceability from Exhibit I to all contract specifications (partitioned from system-level to subsystems, assemblies, payload interfaces, etc) identifying verification methods for each requirement.
(2) Detailed flow chart(s) of all planned test verification activities from assembly to Orbiter-level, and including test interrelationships, functional verification, dynamic and environmental test, inspections, analyses, and other activities planned by the Contractor and subcontractors to verify compliance with all requirements.
(3) For requirements that will not be verified by test or calibration on the flight Orbiter (such as fault protection, margin testing, etc), describe the methods by which these requirements will be validated. Where testbeds, analyses, engineering model hardware will be utilized, provide a description of what will be done to validate that such approaches provide a suitable representation of the flight system as the work evolves over the pre-launch life of the contract.
(4) The plan requires descriptions of the following:
    a. Description of all hardware and configurations during verification activities
    b. Test levels and durations (as applicable)
    c. Pass/Fail criteria for all verification activities
    d. Method of testing, facilities (including location), instrumentation and controls used.
    e. Test data and analysis methodology.
    f. Plans and approach for development measurement uncertainties for verification test (as applicable).
    g. Contractor's plans for Test Readiness Reviews and/or post-test result reviews
    h. Safety issues and concerns
    i. Summary schedule of verification activities.

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: SE-005
Orbiter Verification and Test Plan	
USE:	PROJECT:
Describes the Contractor's approach for Orbiter Verification and Test	MRO
INTERRELATIONSHIP:	REFERENCES:

PREPARATION INFORMATION (cont.):

(5) The plan must specify the applicability of all verification activities to engineering model, structure/thermal model, protoflight hardware, spares, testbeds and all support equipment and ground handling fixture deliverables.

(6) Where analyses verify requirements, the plan must specify the analysis methodology, verification procedures, and uncertainties. Also, the plan must specify the source and method of collection and verification of data supplied to the analyses.

(7) Identify all parameters requiring calibration. Include required calibration uncertainties and methodology and plan for establishing and verifying calibration errors.

(8) Where appropriate, the plan specifies the relationships, interdependencies and planned calibration activities.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: SE-006
Inputs to Planetary Protection Documentation	
USE:	PROJECT:
To provide materials that assist in demonstrating compliance with the NASA planetary protection requirements.	MRO
INTERRELATIONSHIP:	REFERENCES:
	NPG 8020.12B

PREPARATION INFORMATION:

The plans/reports describe the actions taken to meet the NASA planetary protection requirements. The Contractor provides inputs to those plans/reports that pertain to their effort in this area. Three specific inputs are required:

(1) Planetary Protection Control Plan Inputs.
These describe the Contractor's plan to maintain class 100,000 contamination control for the Orbiter, from the beginning of final assembly until encapsulation in the launch vehicle fairing. Additionally these inputs describe the plan for detailed surface cleaning of all exposed surfaces and subsequent bioassays and protection from recontamination after assay.

(2) Prelaunch Planetary Protection Analysis Report Inputs.
These describe the results of the Contractor's contamination control plan for meeting the planetary protection requirements, including any deviations. These inputs include an inventory of bulk organic materials including any organic material of mass greater than 100 grams, used in the construction of the Orbiter and describe the type, mass, and location of the material. These inputs include the results of the bioassays.

(3) Post launch Planetary Protection Analysis Report Inputs.
These update the prelaunch analysis report by describing the final results through launch of the Contractor's contamination control plan, including any deviations. Any updates to the organic inventory are included. The Orbiter reliability analysis is updated, if required, to reflect any Orbiter anomalies that occur after launch.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: SE-007
Inputs to the National Environment Protection Act (NEPA) Process	
USE:	**PROJECT:**
To provide materials that assist in demonstrating compliance with the National Environment Protection Act.	MRO
INTERRELATIONSHIP:	**REFERENCES:**

PREPARATION INFORMATION:

The plans/reports describe the actions taken to meet the requirements of the National Environment Protection Act. The Contractor provides inputs to those plans/reports that pertain to their effort in this area. Specific inputs include a description of the Orbiter including an accounting of hazardous and explosive materials/propellants and an assessment of the probability of release in the event of a launch accident.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: SE-008
Orbiter Testbed Implementation Plan	
USE:	PROJECT:
Functional Design Requirements for orbiter testbed used for system development and mission operations	MRO
INTERRELATIONSHIP:	

PREPARATION INFORMATION:

(1) Describe functional requirements for testbeds(s) to adequately represent the flight orbiter
(2) Describe design requirements for testbed hardware and software for each testbed
(3) Describe requirements for data interchange between testbed(s) and orbiter
(4) Describe validation plan to demonstrate and document the capabilities and characteristics of each testbed with respect to the flight orbiter periodically through orbiter development and mission operations
(5) Document Interface Control Documents (ICD) between orbiter testbeds and the Mission Operations/Ground Data Systems (MOS/GDS)
(6) Document orbiter testbed users guide and related information

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: SW-001
Software Management Plan	
USE:	PROJECT:
The Plan establishes and governs the software development processes and products for MRO software.	MRO
INTERRELATIONSHIP:	REFERENCES:
	JPL D-15378, JPL D-17868

PREPARATION INFORMATION:

The Contractor S/W development organization shall provide a Software Management Plan (SMP) describing the approaches and processes to be used in all MRO software development. This SMP shall also show deviations from the applicable JPL Flight System "Design, Verification/Validation and Operations Principles for Flight Systems" (D-17868) and the JPL Software Development Process Description (D-15378). The document shall focus on approaches, plans, and process monitoring.

Elements of this plan may be published as separate documents providing that the same delivery and approval requirements apply to those documents.

For the software, the SMP shall define, but should not be limited to:

(1) Software development organization
(2) Use of controlling S/W standards and guidelines
(3) Definition of classes of software and process adjustments for the different classes
(4) Itemized assignment of all CSCIs to software classes
(5) S/W development life cycle phases, reviews, and products
(6) S/W documentation suite, including documents contained in the Master Document List
(7) Use of developer-level peer reviews or walkthroughs
(8) Approach for flight software integration (prior to delivery to flight hardware integration)
(9) Approach for flight software acceptance test (after delivery to flight hardware integration)
(10) Approach for software delivery and post-delivery software maintenance
(11) Definition of and use of software development environments and testbeds
(12) S/W configuration management approach, including commencement of design/code control, tools, baselining and change procedures, software build and delivery procedures, and coordination with Orbiter CM activities
(13) Flight S/W problem reporting (SPR) and tracking for defects found prior to integration with the flight article
(14) S/W risk management approach, including responsibilities, identification, contingencies (events and times), and risk mitigation activities
(15) Extent of training activities required to support various elements of the software development process
(16) Use of software management and engineering tools to support various elements of the software development process
(17) Collection and use of metrics and other techniques in improving the software development process
(18) JPL D-17868 (applicable items) compliance matrix
(19) JPL D-15378 compliance matrix

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: SW-002
Software Requirements Document	
USE:	PROGRAM
Definition of software requirements in sufficient detail to execute and verify a software design effort	MRO
INTERRELATIONSHIP:	REFERENCES:
SW-001	

PREPARATION INFORMATION:

The Software Requirements Document shall contain requirements allocated to the software as well as those derived at this level.

For interfaces between CSCIs, the controlling CSCI should document the interface with the other CSCI(s) referencing that material. Alternatively, separate Interface Control Documents may be generated as separate documents providing that the delivery and approval requirements are contained in an approved Software Management Plan (SW001).

Note that there is a Software Requirements Document for each CSCI.

Topics to be addressed in the SRD shall include but not be limited to the following:

(1) CSCI description,
(2) Functional requirements, including nominal, fault protection/response, and "fault mode" operations requirements,
(3) Interface requirements, including content, format, data source/sink, protocols, data rates,
(4) Performance requirements,
(5) (For flight CSCIs) commanding and command validation requirements,
(6) (For flight CSCIs) telemetry requirements,
(7) Reliability, maintainability, and related requirements,
(8) Delivery, installation, and environmental requirements,
(9) Design and implementation constraints,
(10) Traceability matrix showing a two-way trace of software requirements to and from system/subsystem requirements.

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DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER: SW-003
Software Integration and Test Plan	
USE:	PROGRAM
Provides the overall philosophy and plans for integrating and testing the CSCI.	MRO
INTERRELATIONSHIP:	REFERENCES:
SW-001, SW-002	

PREPARATION INFORMATION:

The Contractor shall prepare a plan to integrate (demonstrate that the finished software meets the software requirements, generally prior to h/w integration) and acceptance test (demonstrate that the software in the containing system meet the goals of the operational and failure mode scenarios) the CSCI.

Note that there is a Software Integration and Test Plan for each CSCI.

Elements of this plan may be published as separate documents providing that the delivery and approval requirements for those documents are contained in an approved Software Management Plan (SW-001).

Topics to be addressed in the Software Integration and Test Plan shall include but not be limited to the following:

(1) Overall software integration and test process,
(2) Policy determining which verification process(es) are to be used (i.e., inspection, analysis, test, audit),
(3) Mechanism for tracing tests back to SRD and other controlling documents,
(4) Testing policies determining which test types are to be used (e.g., stress, thread, regression),
(5) Test policies covering test execution (e.g., starting, stopping, re-testing),
(6) Integration and acceptance test priorities and order,
(7) Test environment definition and, if needed, development plans,
(8) Coordination with other testing and testbed activities,
(9) Test tracking and progress reporting approach, including metrics reporting,
(10) Software problem reporting (SPR) and tracking approach, including coordination with system-level problem/failure reporting (P/FR) system,
(11) Integration test requirements and procedures development plans,
(12) Integration test execution and report documentation plans,
(13) Acceptance test requirements and procedures development plans,
(14) Acceptance test execution and report documentation plans.