MARS OBSERVER

TDS Mgr: M. R. Traxler
NOPE: T. Howe

Project Mgr: D.D. Evans
Mission Mgr: S. Dallas

Launch Date: September 16, 1992
Projected SC Life/DSN Support: 5 years/5 years

Project Responsibility: Jet Propulsion Laboratory

Source: SIRD and Mission Plan
Sponsor: OSO

A. MISSION DESCRIPTION

The Mars Observer mission will deliver a single spacecraft to Mars for an extended orbital study of the planet surface, atmosphere, and gravitational and magnetic fields.

B. FLIGHT PROFILE

The spacecraft will be launched during the September-October 1992 Mars opportunity using a Titan-TOS launch vehicle. The best mass performance for the 1992 opportunity is obtained with a long interplanetary trajectory, with a transit time to Mars of approximately one year. Insertion of the spacecraft into orbit at Mars will be accomplished by a sequence of propulsive maneuvers. The mapping mission will be conducted from a mapping orbit that is nearly circular at low altitude (378 km) and sun synchronous at the desired solar orientation. Repetitive observations of the planet's surface and atmosphere will be conducted throughout the primary mission, which extends for one Martian year (687 days from start of Mapping Phase).

C. COVERAGE

1. Coverage Goals

Coverage goals for the launch, cruise, orbit insertion, and mapping phases are listed below:

Mission Phase	Period	Passes/ Month	Antennas
Launch Continuous Coverage 30 days	9/16/92 - 10/9/92	2 60	26m 34m HEF
Early Cruise	10/92 (15 days)	60 4	34m HEF 70m
Cruise	10/92 - 2/93	35 4	34m HEF 70m
Gravity Wave	3/93 - 4/93	60 4	34m HEF 70m
Approach Phase	5/93 - 6/93	60 15	34m HEF 70m
Close Approach Phase	7/93	90 30	34m HEF 70m
MOI	8/93	90 12	34m HEF 70m
Orbit Insertion	9/93 - 12/15/93	90	34m HEF
Mapping Phase	12/16/93 - 4/94	30 10	34m HEF 70m
Mapping Phase	5/94	58 28	34m HEF 70m HEF
Mapping Phase	6/94	40	34m HEF 70m
Mapping Phase	7/94 - 12/94	40	34m HEF
Mapping Phase	1/95	58 28	34m HEF 70m
Mapping Phase	2/95 - 9/24/95	40	34m HEF
MBR Phase	9/25/95 - 11/19/95	30 30	34m HEF 70m
Mars '94 Landed Packages	11/20/95 - 2/3/96	30	HEF

2. Network Support

The support provided by the DSN in the launch phase and in the early cruise phase is indicated in the following table:

System	Goldstone	Canberra	Madrid
	14 15 16	43 45 46	63 65 66
X-band TLM	P	P	P
X-band CMD & Radio Metric Data	P	P*	P

NOTES: P = Prime
* 26-m X-band support for initial acquisition

The support provided by the DSN in the cruise phase through EOM is indicated in the following table:

System	Goldstone	Canberra	Madrid
	14 15 16	43 45 46	63 65 66
X-band TLM	P P	P P	P P
X-band TLM (CP)	P	P	P
X-band CMD & Tracking Data	P	P	P
X-band TRK	P	P	P

NOTES: P = Prime
(CP) = Critical Periods

3. Compatibility Tests

Compatibility testing will be supported by CTA 21 and MIL 71. Prelaunch support will be provided by MIL-71, starting at launch minus 5 months.

D. FREQUENCY ASSIGNMENTS

Frequencies assigned to the Mars Observer Spacecraft are given in the following table:

System	Uplink (MHz)	Downlink (MHz)	Polarization
Command	X-band	--	RCP (low-gain antenna)/ (high-gain antenna)
Transponder	7164.624229	--	
Telemetry	--		RCP
Transponder	--	8417.716050	
USO		8423.148147	
Radio Metric	X-band	X-band	RCP
ΔDOR	--	8423.14814	RCP

E. SUPPORT PARAMETERS

The support parameters for the Telemetry, Command, and Support Systems are listed below:

(1) Telemetry

Data Streams	1
Modulation	PCM (NRZ-L)/PSK/PM
Subcarrier	320 kHz, 21.333 kHz
Science and engineering data plus Reed-Solomon encoding (Symobs/Sec)*	4, 8, 16, 21.3334, 32, 40, 42.6677, 64, 80, 85.3334 kb/s
Engineer data (bits/sec)	10, 250, 2000, 8000, 16,000, 32,000
Coding	Convolutional (R=1/2; K=7)
Mod Index	Selectable

*Convolutional coding is also added, which will double the symbols transmitted to the ground.

(2) Command

Modulation	PCM/PSK/PM
Subcarrier Frequency	16 kHz
Bit Rates	500, 250, 125 (Nominal), 62.5, 31.25, 15.6, or 7.8125 b/s (emergency)

(3) Support

DSN Transit Power	20 kW
Angular Rate	Planetary, except for initial near-Earth requirements and cruise
ΔDOR and ΔDOD	Yes
Radio Science	Planetary occultations (687 days) and mass gravity information from radio metric data

F. TRACKING SUPPORT RESPONSIBILITY

The allocation of responsibilities for tracking support is listed in the following table:

Mission Phase	Support Responsibility
Launch (Titan/TOS)	Launch Vehicle
Injection	DSN
Cruise/Planetary	DSN

(This page intentionally left blank.)