Viking Orbiter Completion Mission and Viking Lander Monitor Mission

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This report covers from 1 December 1979 through 31 January 1980 and continues reporting on DSN Viking Tracking Support for the same period.

I. Viking Operations

A. Orbiter Completion Mission

On 6 November 1979, a Viking Mars Orbit Trim Maneuver officially terminated the Viking Survey Mission and moved the Project into a new phase of the Viking Mission termed the Viking Orbiter Completion Mission. The Viking Orbiter Completion Mission (VOCM) is the fifth phase of the Viking Mission and is currently scheduled to terminate on 30 June 1980.

1. **Mission objective.** The objective of the Orbiter Completion Mission is to obtain moderate resolution photographic coverage of Martian surface areas not previously photographed or inadequately covered during the earlier survey mission.

2. **Status.** During this reporting period the Orbiter 1 spacecraft continued to operate normally, collecting and returning weather data and moderate resolution Mars surface photos to Earth, as well as relaying data from the Lander 2 (VL-2) spacecraft.

B. Lander Monitor Mission

On 6 November 1979, along with the start of the Orbiter Completion Mission, the Lander-1 spacecraft became a separate mission of its own, termed the Lander Monitor Mission (LMM). Throughout the Lander Monitor Mission, the Lander-1 spacecraft will be in an automatic-mission mode, operating autonomously on the programs that have previously been stored in the on-board computers.

1. **Mission objectives.** The objectives of the Lander Monitor Mission are to: Obtain S-band ranging data from the surface of Mars periodically over a long time span for the conduct of radio science; and, obtain meteorology and imaging data from the surface of Mars periodically over a long time span to monitor and disseminate information relative to any significant changes with time.

2. **Status.** The Viking Landers continued to operate as expected during this reporting period. All Lander-1 essential subsystems are healthy as the spacecraft collects imaging and meteorology data for weekly transmission to Earth whenever a Deep Space Station (DSS) is available. All Lander 2 essential subsystems are healthy, except for the transmitter which supports transmission of telemetry data directly to Earth. All data from Lander-2 are transmitted to Orbiter-1, and then relayed to Earth using the Orbiter transmitter.

II. Radio Science

During this reporting period the only radio science activity has been the near-simultaneous Lander-Orbiter Ranging Experiment.

III. Ground Communication Facility Reconfiguration

Throughout the Viking Mission the low rate telemetry, command and radio metric data, collected at a DSS has been transmitted to the JPL Viking Mission Control and Computing Center over the Ground Communications Facility (GCF) 7.2 kb/s High-Speed Data Line encoded with an Error Polynomial Code (EPC) of 33 bits.

The Error Polynomial Code (EPC) is encoded into each 1200-bit high-speed data block as it leaves a DSS, and is then decoded upon receipt at JPL to verify that all data bits have been received correctly. As the GCF equipment was upgraded to support new projects, the EPC was changed to 22 bits. Older GCF equipment was maintained to continue supporting Viking with an EPC of 33 bits.

With the new extension of the Viking Mission out to 1 July 1980, and the need for additional space for new GCF equipment, a plan has been developed to convert the Viking Project over to the newer GCF equipment using an EPC of 22 bits. This requires a new cable interface between the Viking computers and the GCF equipment along with software changes in the Viking telemetry and command computers. Figure 1 shows the new GCF configuration scheduled to support Viking, starting on 3 March 1980.

IV. Network Support

Table 1 shows the DSN tracking support for the Viking Mission from August 1979 through January 1980. Since August, there has been a continual decrease in the requirements for tracking support. This is due to the reduction in overall tracking time required to return science data to Earth at the higher telemetry data rate made possible as Mars approaches opposition on 26 February 1980.

Bibliography

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3. Gillette, R. L., "Viking Continuation Mission Support," in *The Deep Space Network Progress Report 42-48*, pp. 7-11, Jet Propulsion Laboratory, Pasadena, California, December 15, 1978.
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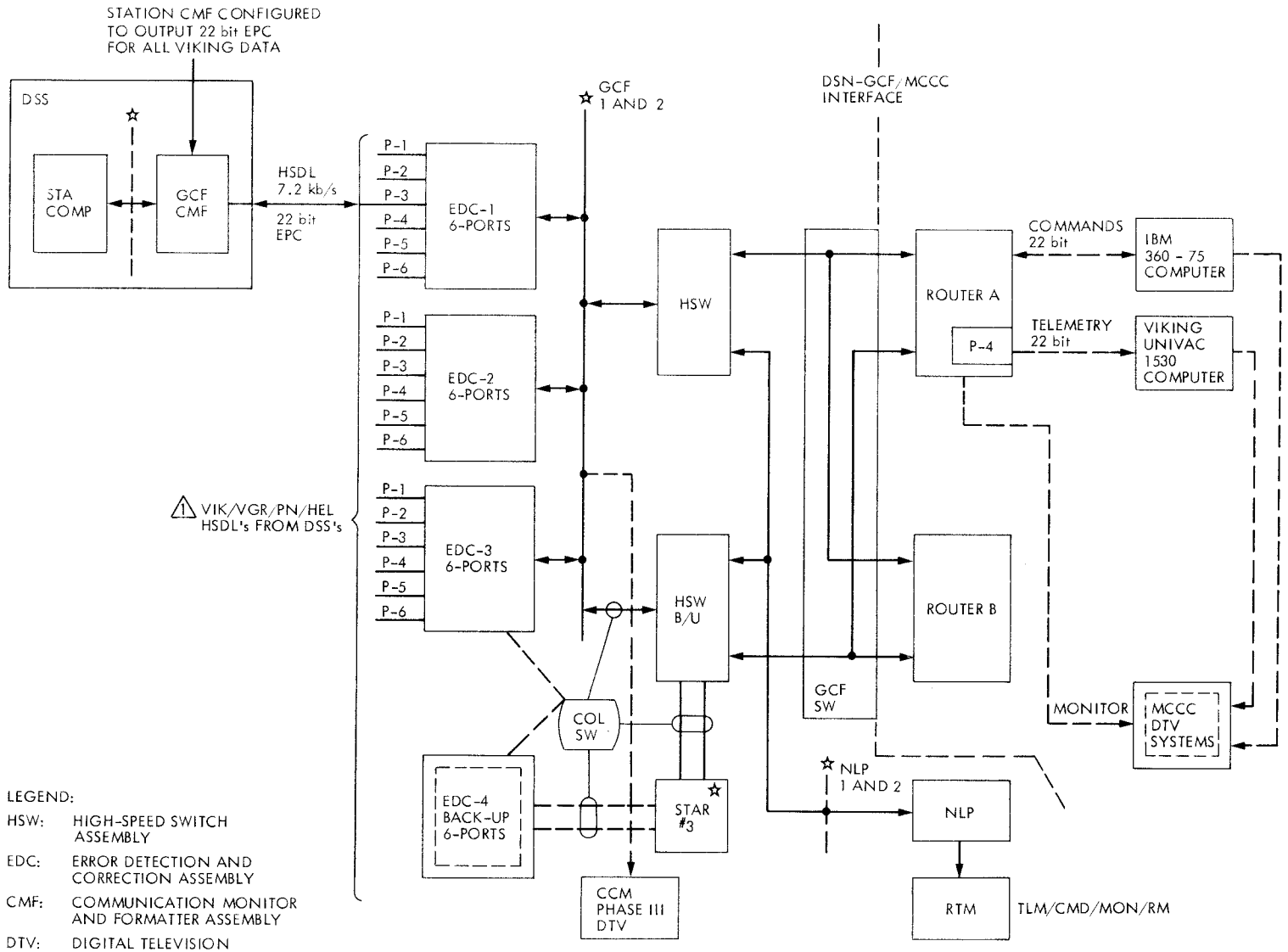
Table 1. DSN Viking Mission tracking support

DSS	1979 - 1980					
	Aug	Sept	Oct	Nov	Dec	Jan
11	[a] – [b]	1 6	1 3	2 11	–	2 15
12	–	–	–	–	–	–
14	22 91	15 65	12 62	8 64	6 52	2
42	1 5	2 10	–	–	–	–
43	1 5	1 1	1 6	–	2 13	2 8
44	4 18	–	3 12	–	–	
61	–	–	–	–	–	–
62	2 2	1 4	–	–	–	6 41
63	29 131	27 105	19 104	15 119	16 142	2 14
Total	59 252	47 191	36 187	25 194	24 207	14 78

[a]Total number of Viking tracks.

[b]Total Viking station support in hours.



LEGEND:

HSW:	HIGH-SPEED SWITCH ASSEMBLY
EDC:	ERROR DETECTION AND CORRECTION ASSEMBLY
CMF:	COMMUNICATION MONITOR AND FORMATTER ASSEMBLY
DTV:	DIGITAL TELEVISION
NLP:	NETWORK LOG PROCESSOR SUBSYSTEM
RTM:	REAL-TIME MONITOR
CCM:	CENTRAL COMMUNICATIONS MONITOR ASSEMBLY
COL:	COMPUTER OFF LINE
RM:	RADIO METRIC
TX:	TRANSMIT

NOTES:

1. ALL VIKING DATA TO BE TX FROM/TO DSS's VIA STANDARD DSN GCF 20-MCCC ROUTER INTERFACE CONFIGURED FOR 22 bit EPC

Fig. 1. Viking Orbiter Completion Mission and Viking Lander Monitor Mission