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SNAP 19 VIKING PROGRAM
BIMONTHLY TECHNICAL PROGRESS REPORT

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DESIGN AND SYSTEM ENGINEERING

A. Accomplishments

1. Monitoring and evaluation of Viking 1 Lander power system data continued. Figures 1 through 6 show typical SOL day cycles for Mission Days 1145 and 1175. The RTG series power range as measured at the PCDA was 65 to 68 watts at fin root temperatures between 280°F and 310°F. The data shown are in October and November of 1979.

Figures 7 through 12 show the Mars landed performance history of Viking 1. These data include both the minimum and maximum data for each of the SOL days plotted to show the range of performance experienced on the Martian surface.

2. Monitoring and evaluation of Viking 2 Lander power system data continued. Figures 13 through 18 show typical SOL day cycles for Mission Days 965 and 1000. The RTG series power range as measured at the PCDA was 71 to 72 watts at fin root temperatures between 230°F and 260°F. The fin root temperatures remain below predicted limits. Available maximum power data is slightly higher than predicted.

Figures 19 through 24 show the Mars landed performance history of Viking 2. These data include both the minimum and maximum data for each of the SOL days plotted to show the range of performance experienced on the Martian surface.

3. The length of the Martian year corresponds to approximately 22.6 months on earth. This cycle can be observed in temperature measurements, and in measurements which respond to the changes in RTG temperature, the pressure, and the current and power. Observed fin root temperature variations between Martian summer and winter were between 35 and 50°F. Loss of hot junction temperature over the 23 months period was 8-10°F for each generator, and due primarily to isotopic fuel decay. The performance of both power systems continues to be very satisfactory.
4. Power system performance data for Pioneer 10 and Pioneer 11 spacecraft were monitored through the reporting period and are shown in Figure 25. After adjusting for the telemetry characteristics, the estimated RTG system net power was 116 watts for Pioneer 10 and 118 watts for Pioneer Saturn. The September 1 encounter with Saturn appears to have had no deleterious effect on the RTG's of the spacecraft power system. The telemetry signals from both spacecrafts remain satisfactory.

FIGURE 1

VIKING LANDER CAPSULE NO. 1

RTO S/N 111 MARS DAY/NIGHT PERFORMANCE CYCLE

FIGURE 2

VIKING LANDER CAPSULE NO. 1

RTG S/N 112 MARS DAY/NIGHT PERFORMANCE CYCLE

FIGURE 3
VIKING LANDER CAPSULE NO. 1
RTG SERIES MARS DAY/NIGHT PERFORMANCE CYCLE

SOL DAY 1145

SHEET 3 OF 3

FIGURE 4

VIKING LANDER CAPSULE NO. 1

RTG-S/N 111 MARS DAY/NIGHT PERFORMANCE CYCLE

*CALCULATED PARAMETERS AT RTG OUTPUT RECEPTACLE

TELEDYNE ENERGY SYSTEMS

FIGURE 5

VIKING LANDER CAPSULE NO. 1

RTG S/N 112 MARS DAY/NIGHT PERFORMANCE CYCLE

FIGURE 6
VIKING LANDER CAPSULE NO. 1
RTG SERIES MARS DAY/NIGHT PERFORMANCE CYCLE

SOL DAY 1175

SHEET 3 OF 3

SHEET 1 OF 2

FIGURE 8
VIKING LANDER CAPSULE NO. 1
RTG S/N 111 PERFORMANCE

SHEET 2 OF 2

NOTE - THE MARS LANDED DATA INCLUDES BOTH
THE DAILY MINIMUM AND MAXIMUM DATA

■ CALCULATED PARAMETERS AT RTG POWER OUTPUT RECEPTACLE

TELEDYNE ENERGY SYSTEMS

SHEET 1 OF 2

FIGURE 10
VIKING LANDER CAPSULE NO. 1
RTG S/N 112 PERFORMANCE

SHEET 2 OF 2

*CALCULATED PARAMETERS AT RTG POWER OUTPUT RECEPTACLE

TELEDYNE ENERGY SYSTEMS

FIGURE 11
VIKING LANDER CAPSULE NO. 1
RTG SERIES PERFORMANCE

SHEET 1 OF 2

FIGURE 12 VIKING LANDER CAPSULE NO. 1 RTG SERIES PERFORMANCE

SHEET 2 OF 2

NOTE - THE MARS LANDED DATA INCLUDES BOTH
THE DAILY MINIMUM AND MAXIMUM DATA

FIGURE 13

VIKING LANDER CAPSULE NO. 2

RTG S/N 113 MARS DAY/NIGHT PERFORMANCE CYCLE

SOL DAY 965

SHEET 1 OF 3

FIGURE 14

VIKING LANDER CAPSULE NO. 2

RTG S/N 114 MARS DAY/NIGHT PERFORMANCE CYCLE

FIGURE 15
VIKING LANDER CAPSULE NO. 2
RTG SERIES MARS DAY/NIGHT PERFORMANCE CYCLE

SOL DAY 965

SHEET 3 OF 3

FIGURE 16

VIKING LANDER CAPSULE NO. 2

RTG 3/N 113 MARS DAY/NIGHT PERFORMANCE CYCLE

*CALCULATED PARAMETERS AT RTG OUTPUT RECEPTACLE

TELEDYNE ENERGY SYSTEMS

FIGURE 17

VIKING LANDER CAPSULE NO. 2

RTG-S/N 114 MARS DAY/NIGHT PERFORMANCE CYCLE

*CALCULATED PARAMETERS AT RTG OUTPUT RECEPTACLE

TELEDYNE ENERGY SYSTEMS

FIGURE 18
VIKING LANDER CAPSULE NO. 2
RTG-SERIES MARS DAY/NIGHT PERFORMANCE CYCLE

SOL DAY 1000 -

SHEET 3 OF 3

CURRENT (AMPS)

VOLTAGE AT PCDA*
(VOLTS)

POWER AT PCDA*
(WATTS)

LOCAL LANDER TIME (HOURS)

GMT 6/28/79 ←

SHEET 1 OF 2

FIGURE 20
VIKING LANDER CAPSULE NO. 2
RTG S/N 113 PERFORMANCE

SHEET 2 OF 2

*CALCULATED PARAMETERS AT RTG POWER OUTPUT RECEPTACLE

TELEDYNE ENERGY SYSTEMS

FIGURE 21
VIKING LANDER CAPSULE NO. 2
RTG S/N 114 PERFORMANCE

SHEET 1 OF 2

FIGURE 22
VIKING LANDER CAPSULE NO. 2
RTG S/N 114 PERFORMANCE

SHEET 2 OF 2

NOTE - THE MARS LANDED DATA INCLUDES BOTH
THE DAILY MINIMUM AND MAXIMUM DATA

*CALCULATED PARAMETERS AT RTG POWER OUTPUT RECEPTACLE

TELEPHONE ENERGY SYSTEMS

FIGURE 23
VIKING LANDER CAPSULE NO. 2
RTG SERIES PERFORMANCE

SHEET 1 OF 2

FIGURE 24 VIKING LANDER CAPSULE NO. 2 RTG SERIES PERFORMANCE

SHEET 2 OF 2

NOTE - THE MARS LANDED DATA INCLUDES BOTH
THE DAILY MINIMUM AND MAXIMUM DATA

FIGURE 25
RTG FLIGHT SYSTEM PERFORMANCE