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SNAP 19 VIKING PROGRAM

Bimonthly Technical Progress Report

. TES-32066-8

December 1980-January 1981

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MASTER**TELEDYNE ENERGY SYSTEMS**

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SNAP 19 VIKING PROGRAM
BIMONTHLY TECHNICAL PROGRESS REPORT

TES-32066-8

December 1980 - January 1981

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Prepared for
The U. S. Department of Energy
under Contract DE-AC01-80ET32066

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DESIGN AND SYSTEM ENGINEERING

Accomplishments

1. Monitoring of power systems performance data for Pioneer 10 and Pioneer Saturn spacecrafts continued through the reporting period. The net power output for either system during mid-January of 1981 was 112 watts. Telemetry signal strength remains satisfactory. Both power systems are performing without anomaly.

Pioneer 10 will complete its 9th year in space on March 2, 1981. Pioneer Saturn is 13 months behind. Power degradation on the system level has, for several years, been stable between 4 and 5 watts per year. Of that approximately 1.5 watts are due to fuel decay. The balance is ascribed to thermoelectric material degradation and the shift in voltage and temperature operating points due to decreases in generator thermal inventory and the design characteristics of the on-board voltage regulators. As to trends, the thermoelectric degradation will continue to diminish in response to lower operating temperatures and a purer environment, but efficiency will fall off at increasing rates to eventually cause the power/time curves to bend down from their current, linear characteristics.

2. Viking 1 Lander data acquisition has been resumed following the conclusion of Saturn encounter activities for the Voyager 1 spacecraft in the fall of 1980. Figures 1 through 6 show power system parameters for two recent SOL days, Mission days 1600 and 1608. The RTG series power range as measured at the PCDA was 62 to 64 watts at fin root temperatures between 257 and 302 °F. The data shown are for January 1981.

Figures 7 through 12 show the Mars Lander 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. System performance remains satisfactory.

3. This report is the final report under the current DOE contract.

FIGURE 1 VIKING LANDER CAPSULE NO. 1

RTG S/N 111 MARS DAY/NIGHT PERFORMANCE CYCLE

SOL DAY 1600

SHEET 1 OF 3

*CALCULATED PARAMETERS AT RTG OUTPUT RECEPTACLE

TELEDYNE ENERGY SYSTEMS

FIGURE 2

VIKING LANDER CAPSULE NO. 1

RTG S/N 112 MARS DAY/NIGHT PERFORMANCE CYCLE

*CALCULATED PARAMETERS AT RTG OUTPUT RECEPTACLE

TELEDYNE ENERGY SYSTEMS

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

SOL DAY 1600

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 1608

SHEET 3 OF 3

FIGURE 7
VIKING LANDER CAPSULE NO. 1
RTG S/N 111 PERFORMANCE

SHEET 1 OF 2

FIGURE 2
VIKING LANDER CAPSULE NO. 1
RTG S/N 111 PERFORMANCE

SHEET 2 OF 2

FIGURE 9
VIKING LANDER CAPSULE NO. 1
RTG S/N 112 PERFORMANCE

SHEET 1 OF 2

SHEET 2 OF 2

FIGURE 11
VIKING LANDER CAPSULE NO. 1
RTG SERIES PERFORMANCE

SHEET 1 OF 2

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

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
RTG FLIGHT SYSTEM PERFORMANCE