

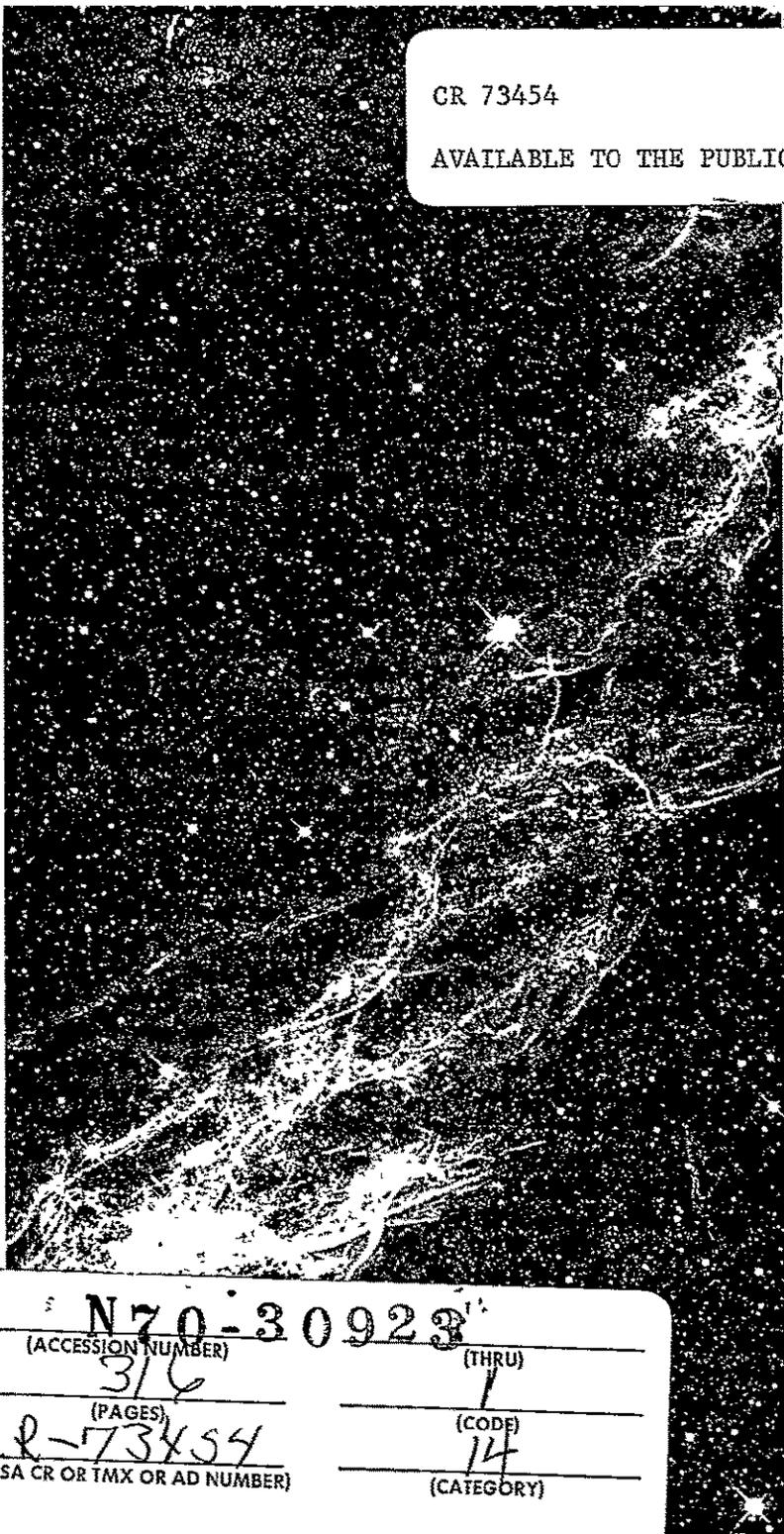
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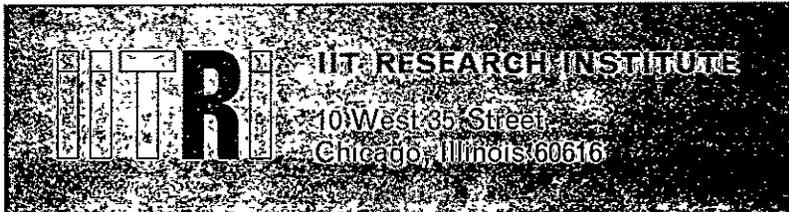


ORBITAL IMAGERY FOR PLANETARY EXPLORATION

VOLUME V

SUPPORT REQUIREMENTS FOR
PLANETARY ORBITAL IMAGING

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ORBITAL IMAGERY FOR PLANETARY EXPLORATION

VOLUME V

SUPPORT REQUIREMENTS FOR PLANETARY ORBITAL IMAGING

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NASA

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VOLUME V

SUPPORT REQUIREMENTS FOR PLANETARY

ORBITAL IMAGING

INTRODUCTION

This volume presents estimates of support requirements for planetary orbital imaging experiments. These support requirements represent the demands imposed upon spacecraft support subsystems by the experiment. That is, they describe quantitatively the important interfaces between the experiment subsystem and the remainder of the spacecraft. These requirements depend upon the purpose of the experiment, the design details of the imaging sensor system used to perform the experiment, and the orbit from which the experiment is performed. These influencing factors have been discussed in other volumes of this report series. Companion volumes to this document are:

Volume I- Technical Summary

Volume II- Definition of Scientific Objectives

Volume III- Orbit Selection and Definition

Volume IV- Imager Sensor System Scaling Laws

The purpose of this study has been to identify the requirements imposed upon spacecraft subsystems by the use of orbital imaging systems in unmanned planetary exploration. Those requirements are presented in this volume. Attention has been focused upon the 1975-1995 epoch and the planets Mars, Venus, Mercury, and Jupiter. Meaningful experiment support requirements must be based upon an appreciation of those bits of scientific knowledge which can be usefully acquired by imaging systems in planetary orbit. Volume II of this series

examines those planetary phenomena which can be observed by remote sensing techniques, and identifies those cases in which orbital imagery can be expected to contribute materially to an understanding of the planets and their history. Scientific Requirements for orbital imagery have been distilled into a table of image specifications presented in Volume I and reproduced here in Table 1 for the convenience of the reader. These specifications set forth, for each planetary phenomenon, the nature of the desired imagery in terms of ground resolution, ground area to be covered, planetary coverage, solar illumination, coverage repetition rate, etc. Table 1 provides nominal values for these image specifications. The nominal values do not represent the flexibility of the scientific requirements. Hence each nominal value is accompanied by a reference to a "worth curve" appearing in Volume I. Each worth curve defines the range over which the nominal value may be varied without appreciably degrading the scientific value of the measurement. For example, imaging experiments for the determination of surface elevations on the Moon should provide a nominal ground resolution of five kilometers. Reference to worth curve A7 will show that ground resolutions up to twenty kilometers are acceptable. The experiment support requirements presented in this volume are based on values selected from the worth curves, rather than the nominal values. That is, in each case, the sensor system design and orbit selection for each experiment has been based upon that value which would appear to result in the least demanding support requirements without seriously degrading the scientific value of the resulting imagery. In this sense, the experiment support requirements given here are for "minimal" experiments.

For each planet observable listed in Table 1, one or more spacecraft orbits at each planet has been selected. However, no orbits have been selected for lunar experiments and no lunar experiment support requirements have been estimated.

TABLE I. SUMMARY OF MEASUREMENT SPECIFICATIONS

| OBSERVABLE | PLANET | GROUND RESOLUTION | IMAGE SIZE | POSITIONAL ACCURACY | PLANETARY COVERAGE | PLANETARY DISTRIBUTION | ACQUISITION TIME | | REPETITION RATE | | SENSOR REFERENCES | SENSOR TYPE | SPECTRAL REGION | BANDWIDTH | OVERLAP | SUN ELEVATION | SUPPORT MEASUREMENTS | COMMENTS | |
|-------------------------------------|---------|-------------------|--------------|---------------------|--------------------|-----------------------------|------------------|-------------|-----------------|-------------|-------------------|-------------|-----------------|-----------|---------|---------------|--------------------------|--|---|
| | | | | | | | IMAGE | COVERAGE | IMAGE | COVERAGE | | | | | | | | | |
| 1) Surface Elevations | Moon | 5 km A7 | 500 km B5 | 10 km C7 | 100% D1 | - | - | - | - | a,d,e,i | a Visible | 5750Å F3 | 1000Å G3 | 20% H1 | 20° | 11 | S/C Altitude, Local Time | Vertical resolution for all bodies is 1 km (11) except Jupiter which is 4 km (32). | |
| | Mercury | 5 km A7 | 500 km B5 | 10 km C7 | 100% D1 | - | - | - | - | b,c,e,g | b Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Mars | 5 km A7 | 1000 km B8 | 10 km C7 | 100% D1 | - | - | - | - | b,c,e,g | b Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Venus | 5 km A7 | 2000 km B11 | 10 km C7 | 100% D1 | - | - | - | - | b,c,e,g | b Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Jupiter | 50 km A8 | 20000 km B31 | 50 km C8 | 100% D1 | - | - | - | - | b,c,e,g | b Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| 2) Layering | Moon | 10 cm A1 | 1 km B2 | 10 m C2 | <1% D1 | Determined by prior mapping | - | - | - | a,d,f | a Visible | 5750Å F3 | 1000Å G2 | 20% H1 | 45° | 12 | - | - | |
| | Mercury | 10 cm A1 | 1 km B2 | 10 m C2 | <1% D1 | Determined by prior mapping | - | - | - | b,c,e,g | b Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 45° | 12 | - | - | |
| | Mars | 10 cm A1 | 1 km B2 | 10 m C2 | <1% D1 | Determined by prior mapping | - | - | - | b,c,e,g | b Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 45° | 12 | - | - | |
| | Venus | 10 cm A1 | 1 km B2 | 10 m C2 | <1% D1 | Determined by prior mapping | - | - | - | b,c,e,g | b Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 45° | 12 | - | - | |
| | Jupiter | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | Determined by prior mapping | - | - | - | b,c,e,g | b Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 45° | 12 | - | - | |
| 3) Contacts (Regional) | Mercury | 1 km A6 | 800 km B6 | 10 km C6 | 100% D1 | - | - | - | - | b,d,g,i,l,o | a Ultraviolet | 2250Å F1 | 500Å G1 | 20% H1 | 90° | 15 | - | - | |
| | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 100% D1 | - | - | - | - | b,d,g,i,l,p | a Visible | 2250Å F1 | 500Å G1 | 20% H2 | 90° | 15 | - | - | |
| | Venus | 1 km A6 | 2000 km B8 | 10 km C6 | 100% D1 | - | - | - | - | b,d,g,i,l,p | a Visible | 2250Å F1 | 500Å G1 | 20% H2 | 20° | 11 | - | - | |
| | Jupiter | 5 km A7 | 10000 km B10 | 50 km C9 | 5% D3 | Global | - | - | - | b,d,g,i,l,p | a Visible | 2250Å F1 | 500Å G1 | 20% H2 | 20° | 11 | - | - | |
| 4) (Local) | Moon | 100 m A5 | 100 km B4 | 1 km C4 | 100% D1 | - | - | - | - | a,c,e,i,k,n | g Infra-red | 1.75µ F7 | 0.1µ G2 | 20% H1 | 20° | 11 | - | - | |
| | Mercury | 100 m A5 | 100 km B4 | 1 km C4 | 10% D2 | See regional maps | - | - | - | b,d,g,i,l,o | g Infra-red | 1.75µ F7 | 0.1µ G2 | 20% H2 | 20° | 11 | - | - | |
| | Mars | 100 m A5 | 100 km B4 | 1 km C4 | 10% D2 | See regional maps | - | - | - | b,d,g,i,l,o | g Infra-red | 1.75µ F7 | 0.1µ G2 | 20% H2 | 20° | 11 | - | - | |
| 5) (Detailed) | Moon | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | a,c,e,i,k,n | g Infra-red | 120µ F12 | 20µ G9 | 20% H1 | 90° | 15 | - | - | |
| | Mercury | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | b,d,g,i,l,o | g Infra-red | 120µ F12 | 20µ G9 | 20% H2 | 90° | 15 | - | - | |
| | Mars | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | b,d,g,i,l,o | g Infra-red | 120µ F12 | 20µ G9 | 20% H2 | 90° | 15 | - | - | |
| 6) Structure of Features (Regional) | Mercury | 1 km A6 | 800 km B6 | 10 km C6 | 100% D1 | - | - | - | - | b,d,g,i,l | a Visible | 5750Å F3 | 1000Å G2 | 20% H1 | 20° | 11 | S/C Altitude, Local Time | Vertical resolution same as horizontal | |
| | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 100% D1 | - | - | - | - | b,d,g,i,l | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Venus | 1 km A6 | 2000 km B8 | 10 km C6 | 100% D1 | - | - | - | - | b,d,g,i,l | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Jupiter | 10 km A7 | 20000 km B11 | 200 km C10 | 5% D3 | Global | - | - | - | b,d,g,i,l | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| 7) (Local) | Moon | 100 m A5 | 100 km B4 | 1 km C4 | 100% D1 | - | - | - | - | a,d,e,i,l | a Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H1 | 20° | 11 | S/C Altitude, Local Time | Vertical resolution same as horizontal | |
| | Mercury | 100 m A5 | 100 km B4 | 1 km C4 | 10% D2 | See regional maps | - | - | - | a,d,e,i,l | a Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Mars | 100 m A5 | 100 km B4 | 1 km C4 | 10% D2 | See regional maps | - | - | - | a,d,e,i,l | a Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Venus | 100 m A5 | 100 km B4 | 1 km C4 | 10% D2 | See regional maps | - | - | - | a,d,e,i,l | a Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Jupiter | 100 m A5 | 100 km B4 | 1 km C4 | 10% D2 | See regional maps | - | - | - | a,d,e,i,l | a Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| 8) (Detailed) | Moon | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | a,d,e,i,l | k Radar | 50 cm F18 | - | 20% H1 | - | - | - | - | |
| | Mercury | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | b,d,g,i,l | k Radar Stereo | 50 cm F18 | - | 20% H2 | - | - | - | - | |
| | Mars | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | b,d,g,i,l | k Radar Stereo | 50 cm F18 | - | 20% H2 | - | - | - | - | |
| | Venus | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | b,d,g,i,l | k Radar Stereo | 50 cm F18 | - | 20% H2 | - | - | - | - | |
| 9) Surface Topography (Regional) | Mercury | 1 km A6 | 800 km B6 | 1 km C12 | 100% D1 | - | - | - | - | b,d,g,i | a Visible | 5750Å F3 | 1000Å G3 | 20% H1 | 20° | 11 | S/C Altitude, Local Time | Vertical resolution: (Regional) - 1 km (11) for all except Jupiter at 4 km (32) (Local) - 50 m (35) (Detailed) - 10 m (14) | |
| | Mars | 1 km A6 | 1000 km B6 | 1 km C12 | 100% D1 | - | - | - | - | b,d,g,i | a Visible | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Venus | 1 km A6 | 2000 km B8 | 1 km C12 | 100% D1 | - | - | - | - | b,d,g,i | a Visible | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Jupiter | 10 km A7 | 20000 km B11 | 200 km C10 | 5% D3 | Global | - | - | - | b,d,g,i | a Visible | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| 10) (Local) | Moon | 100 m A5 | 100 km B4 | 1 km C3 | 100% D1 | - | - | - | - | a,d,e,i | a Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H1 | 20° | 11 | S/C Altitude, Local Time | Vertical resolution: (Regional) - 1 km (11) for all except Jupiter at 4 km (32) (Local) - 50 m (35) (Detailed) - 10 m (14) | |
| | Mercury | 100 m A5 | 100 km B4 | 1 km C3 | 10% D2 | See regional maps | - | - | - | a,d,e,i | a Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Mars | 100 m A5 | 100 km B4 | 1 km C3 | 10% D2 | See regional maps | - | - | - | a,d,e,i | a Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Venus | 100 m A5 | 100 km B4 | 1 km C3 | 10% D2 | See regional maps | - | - | - | a,d,e,i | a Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| | Jupiter | 100 m A5 | 100 km B4 | 1 km C3 | 10% D2 | See regional maps | - | - | - | a,d,e,i | a Visible Stereo | 5750Å F3 | 1000Å G3 | 20% H2 | 20° | 11 | S/C Altitude, Local Time | | |
| 11) (Detailed) | Moon | 1 m A3 | 1 km B2 | 1 m C1 | <1% D1 | See local maps | - | - | - | a,d,e,i | j Radar Stereo | 50 cm F18 | - | 20% H1 | - | - | - | - | |
| | Mercury | 1 m A3 | 1 km B2 | 1 m C1 | <1% D1 | See local maps | - | - | - | b,d,g,i | j Radar Stereo | 50 cm F18 | - | 20% H2 | - | - | - | - | |
| | Mars | 1 m A3 | 1 km B2 | 1 m C1 | <1% D1 | See local maps | - | - | - | b,d,g,i | j Radar Stereo | 50 cm F18 | - | 20% H2 | - | - | - | - | |
| | Venus | 1 m A3 | 1 km B2 | 1 m C1 | <1% D1 | See local maps | - | - | - | b,d,g,i | j Radar Stereo | 50 cm F18 | - | 20% H2 | - | - | - | - | |
| 12) Surface Appearance (Regional) | Mercury | 1 km A6 | 800 km B6 | 10 km C6 | 100% D1 | - | - | - | - | b,e,h | a Visible | 5750Å F3 | 1000Å G2 | 20% H1 | 20° | 11 | - | - | |
| | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 100% D1 | - | - | - | - | b,e,h | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - | |
| | Venus | 1 km A6 | 2000 km B8 | 10 km C6 | 100% D1 | - | - | - | - | b,e,h | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - | |
| | Jupiter | 10 km A7 | 20000 km B11 | 200 km C10 | 5% D3 | Global | - | - | - | b,e,h | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - | |
| 13) (Local) | Moon | 100 m A5 | 100 km B4 | 1 km C4 | 100% D1 | - | - | - | - | a,d,g | d Visible Color | 5750Å F3 | 1000Å G2 | 20% H1 | 20° | 11 | - | - | |
| | Mercury | 100 m A5 | 100 km B4 | 1 km C4 | 10% D2 | See regional maps | - | - | - | b,e,h | d Visible Color | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - | |
| | Mars | 100 m A5 | 100 km B4 | 1 km C4 | 10% D2 | See regional maps | - | - | - | b,e,h | d Visible Color | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - | |
| | Venus | 100 m A5 | 100 km B4 | 1 km C4 | 10% D2 | See regional maps | - | - | - | b,e,h | d Visible Color | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - | |
| | Jupiter | 100 m A5 | 100 km B4 | 1 km C4 | 10% D2 | See regional maps | - | - | - | b,e,h | d Visible Color | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - | |
| 14) (Detailed) | Moon | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | a,d,g | d Visible Color | 5750Å F3 | 1000Å G2 | 20% H1 | 20° | 11 | - | - | |
| | Mercury | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | b,e,h | d Visible Color | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - | |
| | Mars | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | b,e,h | d Visible Color | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - | |
| | Venus | 1 m A3 | 1 km B2 | 10 m C2 | <1% D1 | See local maps | - | - | - | b,e,h | d Visible Color | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - | |
| 15) Variable (Reg) | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 10% D2 | Mars and poles | 5 min D6 | 100 hrs E11 | 1 day E13 | 25 yr E16 | a,b | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - |
| | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 10% D2 | Mars and poles | 5 min D6 | 100 hrs E11 | 1 day E13 | 25 yr E16 | a,b | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - |
| | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 10% D2 | Mars and poles | 5 min D6 | 100 hrs E11 | 1 day E13 | 25 yr E16 | a,b | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - |
| 16) Surface (Local) | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 10% D2 | Mars and poles | 5 min D6 | 100 hrs E11 | 1 day E13 | 25 yr E16 | a,b | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - |
| | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 10% D2 | Mars and poles | 5 min D6 | 100 hrs E11 | 1 day E13 | 25 yr E16 | a,b | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - |
| | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 10% D2 | Mars and poles | 5 min D6 | 100 hrs E11 | 1 day E13 | 25 yr E16 | a,b | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - |
| 17) Appearance (Det) | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 10% D2 | Mars and poles | 5 min D6 | 100 hrs E11 | 1 day E13 | 25 yr E16 | a,b | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - |
| | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 10% D2 | Mars and poles | 5 min D6 | 100 hrs E11 | 1 day E13 | 25 yr E16 | a,b | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - |
| | Mars | 1 km A6 | 1000 km B6 | 10 km C6 | 10% D2 | Mars and poles | 5 min D6 | 100 hrs E11 | 1 day E13 | 25 yr E16 | a,b | a Visible | 5750Å F3 | 1000Å G2 | 20% H2 | 20° | 11 | - | - |
| 18) Surface Winds (Regional) | Mercury | 10 km A7 | 800 km B6 | 10 km C7 | 100% D1 | - | | | | | | | | | | | | | |

TABLE I. SUMMARY OF MEASUREMENT SPECIFICATIONS (Continued)

| OBSERVABLE | PLANET | GROUND RESOLUTION | IMAGE SIZE | POSITIONAL ACCURACY | PLANETARY COVERAGE | PLANETARY DISTRIBUTION | ACQUISITION TIME | | REPEITION RATE | | SENSOR REFERENCE | SENSOR TYPE | SIGNAL. RESOLV. | BANDWIDTH | OVERLAP | SWT. EFFICIENCY | SUPPORT MEASUREMENTS | COMMENTS | | |
|---|---------|-------------------|-------------|---------------------|--------------------|------------------------|------------------|----------|----------------|----------|------------------|-------------|-------------------------|-----------|----------|-----------------|----------------------|----------|------------|---|
| | | | | | | | IMAGE | COVERAGE | IMACS | COVERAGE | | | | | | | | | | |
| 21) Surface Thermal Anomalies (Regional) | Moon | 1 km | A6 500 km | E5 | 10 km | C6 100% D1 | 1 hr | E7 | 10 hr | E10 | a, c, f | a IR | 50, 100, 200 | F12 | 10 μm | G9 | 20% H2 | - | - | Desired Temperature Resolution: Moon Mercury 2% Mars 2% Venus 2% Jupiter 2% |
| | Mercury | 1 km | A6 800 km | E6 | 10 km | C6 100% D1 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12 | 10 μm | G9 | 20% H2 | - | - | |
| | Mars | 1 km | A6 1200 km | E6 | 10 km | C6 100% D1 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12 | 10 μm | G9 | 20% H2 | - | - | |
| | Venus | 1 km | A6 2000 km | E6 | 10 km | C6 100% D1 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12 | 10 μm | G9 | 20% H2 | - | - | |
| | Jupiter | 1 km | A7 10000 km | E10 | 100 km | C9 100% D1 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12 | 10 μm | G9 | 20% H2 | - | - | |
| 22) (Local) | Moon | 100 m | A5 100 km | E6 | 1 km | C4 5% D3 | 1 hr | E7 | 10 hr | E10 | a, c, f | a | 50, 100, 200 | F12, 18 | 10 μm | G18 | 20% H2 | - | - | |
| | Mercury | 100 m | A5 100 km | E6 | 1 km | C4 5% D3 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12, 18 | 10 μm | G18 | 20% H2 | - | - | |
| | Mars | 100 m | A5 100 km | E6 | 1 km | C4 5% D3 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12, 18 | 10 μm | G18 | 20% H2 | - | - | |
| | Venus | 100 m | A5 100 km | E6 | 1 km | C4 5% D3 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12, 18 | 10 μm | G18 | 20% H2 | - | - | |
| | Jupiter | 1 km | A7 10000 km | E10 | 100 km | C9 100% D1 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12, 18 | 10 μm | G18 | 20% H2 | - | - | |
| 23) (Detailed) | Moon | 1 m | A3 1 km | E2 | 10 m | C2 1% D4 | 1 hr | E7 | 10 hr | E10 | a, c, f | a | 50, 100, 200 | F12, 18 | 10 μm | G18 | 20% H2 | - | - | |
| | Mercury | 1 m | A3 1 km | E2 | 10 m | C2 1% D4 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12, 18 | 10 μm | G18 | 20% H2 | - | - | |
| | Mars | 1 m | A3 1 km | E2 | 10 m | C2 1% D4 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12, 18 | 10 μm | G18 | 20% H2 | - | - | |
| | Venus | 1 m | A3 1 km | E2 | 10 m | C2 1% D4 | 1 hr | E7 | 10 hr | E10 | b, d, e | a | 50, 100, 200 | F12, 18 | 10 μm | G18 | 20% H2 | - | - | |
| 24)* Atmos. Thermal Anomalies (Regional) | Mars | 10 km | A7 1200 km | E8 | 20 km | C8 100% D1 | 1 hr | E7 | - | - | a, b, d | a | IR Microwave | F11 | 8 μm | G7 | 20% H2 | - | - | Desired Temperature Resolution: Same as above |
| | Venus | 10 km | A7 2000 km | E8 | 20 km | C8 100% D1 | 1 hr | E7 | - | - | a, c, e | a | IR Microwave | F11 | 8 μm | G7 | 20% H2 | - | - | |
| | Jupiter | 10 km | A7 20000 km | E11 | 200 km | C10 100% D1 | 1 hr | E7 | - | - | a, c, e | a | IR Microwave | F11 | 8 μm | G7 | 20% H2 | - | - | |
| 25)* (Detailed) | Mars | 1 km | A6 100 km | E4 | 10 km | G6 10% D2 | 1 hr | E7 | 1 day | E13 | a, b, d | a | Multi-band | F11, 15 | 4 bands | G18 | 20% H2 | - | - | |
| | Venus | 1 km | A6 200 km | E4 | 10 km | G6 10% D2 | 1 hr | E7 | 1 day | E13 | a, c, e | a | Multi-band | F11, 15 | 4 bands | G18 | 20% H2 | - | - | |
| | Jupiter | 1 km | A6 2000 km | E9 | 20 km | G6 20% D2 | 1 hr | E7 | 1 day | E13 | a, c, e | a | Multi-band | F11, 15 | 4 bands | G18 | 20% H2 | - | - | |
| 26) Global Cloud Coverage | Mars | 10 km | A7 1200 km | E8 | 50 km | C8 100% D1 | 15 min | E8 | 1 day | E13 | - | - | - | - | - | - | - | - | - | Polar regions |
| | Venus | 10 km | A7 1200 km | E8 | 50 km | C8 100% D1 | 15 min | E8 | 1 day | E13 | - | - | - | - | - | - | - | - | - | |
| | Jupiter | 10 km | A7 20000 km | E11 | 200 km | C10 100% D1 | 2 min | E8 | 1 day | E13 | - | - | - | - | - | - | - | - | - | |
| 77)* Convective Cells and Turbulence (Regional) | Mars | 10 km | A7 1000 km | E6 | 50 km | C8 100% D1 | 1 hr | E7 | - | - | a, b, c, d | a | UV Visible (UV & color) | F2 | 1000A | G1 | 20% H2 | Day 16 | - | |
| | Venus | 10 km | A7 1000 km | E6 | 50 km | C8 100% D1 | 1 hr | E7 | - | - | a, b, c, d, e, f | b | UV Visible (UV & color) | F3 | 1000A | G2 | 20% H2 | Day 16 | - | |
| | Jupiter | 10 km | A7 10000 km | E10 | 100 km | C9 100% D1 | 1 hr | E7 | - | - | a, b, c, d, e, f | c | IR | F6 | 8 μm | G7 | 20% H2 | Day 18 | - | |
| 28)* (Detailed) | Mars | 1 km | A6 100 km | E4 | 5 km | G5 20% D2 | 1 hr | E7 | 1 day | E13 | a, b, c, d | a | IR | F11 | 8 μm | G7 | 20% H2 | - | - | |
| | Venus | 1 km | A6 100 km | E4 | 5 km | G5 20% D2 | 1 hr | E7 | 1 day | E13 | a, b, c, d, e, f | b | IR | F11 | 8 μm | G7 | 20% H2 | - | - | |
| | Jupiter | 1 km | A6 1000 km | E9 | 10 km | G6 20% D2 | 1 hr | E7 | 1 day | E13 | a, b, c, d, e, f | c | IR | F11 | 8 μm | G7 | 20% H2 | - | - | |
| 29)* Cloud Formation | Mars | 1 km | A6 1000 km | E5 | 10 km | G6 20% D2 | 1 min | E5 | 10 min | E6 | a, b, c, d, e | a | UV Visible (UV & color) | F2 | 1000A | G1 | 20% H2 | Day 16 | - | |
| | Venus | 1 km | A6 1000 km | E5 | 10 km | G6 20% D2 | 1 min | E5 | 10 min | E6 | a, b, c, d, e, f | b | UV Visible (UV & color) | F3 | 1000A | G2 | 20% H2 | Day 16 | - | |
| | Jupiter | 10 km | A7 10000 km | E10 | 100 km | G9 20% D2 | 2 min | E8 | 2 min | E8 | a, b, c, e, f | c | IR | F6 | 8 μm | G7 | 20% H2 | Day 18 | - | |
| 30)* Precipitation Rate | Mars | 10 km | A7 1000 km | E6 | 50 km | C8 100% D1 | 1 min | E5 | 10 min | E6 | a | a | Radar | F15 | 2.5 cm | G17 | 20% H2 | - | - | |
| | Venus | 10 km | A7 1000 km | E6 | 50 km | C8 100% D1 | 2 min | E5 | 10 min | E6 | a, b | b | Radar | F15 | 2.5 cm | G17 | 20% H2 | - | - | |
| | Jupiter | 10 km | A7 10000 km | E10 | 100 km | C9 100% D1 | 10 min | E5 | 10 min | E6 | a, b | b | Radar | F15 | 2.5 cm | G17 | 20% H2 | - | - | |
| 31) Thunderstorms (Regional) | Mars | 10 km | A7 1000 km | E6 | 50 km | C8 100% D1 | 10 msec | E1 | 1 min | E8 | a | a | Passive RF | F12 | 50 m | G15 | 20% H2 | - | - | |
| | Venus | 10 km | A7 1000 km | E6 | 50 km | C8 100% D1 | 10 msec | E1 | 1 min | E8 | a | b | Passive RF | F12 | 50 m | G15 | 20% H2 | - | - | |
| | Jupiter | 10 km | A7 10000 km | E10 | 100 km | C9 100% D1 | 10 msec | E1 | 1 min | E8 | a, b | b | Passive RF | F12 | 50 m | G15 | 20% H2 | - | - | |
| 32) (Detailed) | Mars | 1 km | A6 100 km | E4 | 5 km | G5 20% D2 | 10 msec | E1 | 1 min | E8 | a | a | Passive RF | F12 | 50 m | G15 | 20% H2 | - | - | |
| | Venus | 1 km | A6 100 km | E4 | 5 km | G5 20% D2 | 10 msec | E1 | 1 min | E8 | a | a | Passive RF | F12 | 50 m | G15 | 20% H2 | - | - | |
| | Jupiter | 1 km | A6 500 km | E5 | 5 km | G5 20% D2 | 10 msec | E1 | 1 min | E8 | a, b | b | Passive RF | F12 | 50 m | G15 | 20% H2 | - | - | |
| 33) Cyclone Formations (Regional) | Mars | 10 km | A7 1000 km | E6 | 50 km | C8 100% D1 | 10 min | E6 | - | - | a, b, c, d | a | Visible | F25A | 6 μm | G2 | 20% H2 | Day 16 | - | |
| | Venus | 10 km | A7 1000 km | E6 | 50 km | C8 100% D1 | 10 min | E6 | - | - | a, b, c, d | b | IR | F7 | 10 μm | G5 | 20% H2 | Day 16 | - | |
| | Jupiter | 10 km | A7 10000 km | E10 | 100 km | C9 100% D1 | 1 min | E5 | - | - | a, b, c, d | c | IR | F7 | 10 μm | G5 | 20% H2 | Day 16 | - | |
| 34) (Detailed) | Mars | 1 km | A6 100 km | E4 | 10 km | G6 20% D2 | 10 min | E6 | 1 hr | E9 | a, b, c, d | a | Multi-band | F3, 6, 11 | 6 bands | G19 | 20% H2 | Day 18 | - | |
| | Venus | 1 km | A6 100 km | E4 | 10 km | G6 20% D2 | 10 min | E6 | 1 hr | E9 | a, b, c, d | a | Multi-band | F3, 6, 11 | 6 bands | G19 | 20% H2 | Day 18 | - | |
| | Jupiter | 1 km | A6 1000 km | E5 | 10 km | G6 20% D2 | 1 min | E5 | 10 min | E6 | a, b, c, d | a | Multi-band | F3, 6, 11 | 6 bands | G19 | 20% H2 | Day 18 | - | |
| 35) Surface to Atmosphere Transfer | Moon | 1 km | A6 500 km | E5 | 10 km | C6 100% D1 | 1 min | E5 | 1 day | E13 | a, c | a | Visible | F3 | 1000A | G2 | 20% H2 | 45° 12 | - | |
| | Mercury | 1 km | A6 500 km | E5 | 10 km | C6 100% D1 | 1 min | E5 | 1 day | E13 | b, d | b | Visible | F3 | 1000A | G2 | 20% H2 | 45° 12 | - | |
| | Mars | 1 km | A6 1000 km | E6 | 10 km | C6 100% D1 | 1 min | E5 | 1 day | E13 | a, b, d, e | a | Vis. Color | F3 | 1000A | G2 | 20% H2 | 45° 12 | - | |
| | Venus | 1 km | A6 1000 km | E6 | 10 km | C6 100% D1 | 1 min | E5 | 1 day | E13 | a, c, f | a | Vis. Color | F3 | 1000A | G2 | 20% H2 | 45° 12 | - | |
| | Jupiter | 10 km | A7 10000 km | E10 | 100 km | C9 100% D1 | 1 min | E5 | 1 day | E13 | a, e, f | a | IR Microwave | F11 | 10 cm | G8 | 20% H2 | 60° 13 | - | |
| 36) Radio Bursts | Jupiter | 100 km | A8 50000 km | E11 | 500 km | C11 200% D1 | 1 min | E2 | 1 min | E2 | a | a | Passive RF | F22 | 3 bands | G17 | 20% H2 | - | Local Time | |
| | Mars | 10 km | A7 1000 km | E6 | 50 km | C8 100% D1 | 1 min | E5 | 1 hr | E9 | a, b | a | Visible | F3 | 1000A | G2 | 20% H2 | Night 17 | - | |
| | Venus | 10 km | A7 1000 km | E6 | 50 km | C8 100% D1 | 1 min | E5 | 1 hr | E9 | a, b | b | Vis. Color | F3 | 1000A | G2 | 20% H2 | Night 17 | - | |
| 38) Animal Life | Mars | 20 cm | A2 400 m | B1 | 100 m | C3 | 1 sec | E4 | 10 sec | E5 | a, b, c, d | a | Visible | F25A | 6 μm | G2 | 60% H3 | 65° 12 | - | |
| | Venus | 20 cm | A2 400 m | B1 | 100 m | C3 | 1 sec | E4 | 10 sec | E5 | a, b, c, d | b | Vis. Stereo | F25A | 6 μm | G2 | 60% H3 | 60° 13 | - | |
| | Jupiter | 20 cm | A2 10000 km | B10 | 100 km | C3 | 1 sec | E4 | 10 sec | E5 | a, b, c, d | c | Multi-band | F8 | 10 bands | G20 | 60% H3 | 45° 12 | - | |
| 39) Plant Life | Mars | 100 m | A5 200 km | B4 | 1 km | C4 | 1 hr | E7 | - | - | a, b, c | a | Visible | F25A | 6 μm | G2 | 60% H3 | 65° 12 | - | |
| | Venus | 100 m | A5 200 km | B4 | 1 km | C4 | 1 hr | E7 | - | - | a, b, c | b | Vis. Color | F25A | 6 μm | G2 | 60% H3 | 60° 13 | - | |
| | Jupiter | 100 m | A5 200 km | B4 | 1 km | C4 | 1 hr | E7 | - | - | a, b, c | d | Multi-band | F8 | 15 bands | G20 | 60% H3 | 45° 12 | - | |
| 40) Biochemical Systems | Mars | 1 km | A6 200 km | E6 | 10 km | C7 | 1 hr | E7 | - | - | a | a | Multi-band | F8 | 10 bands | G20 | 20% H2 | 45° 12 | - | |
| | Venus | 1 km | A6 200 km | E6 | 10 km | C7 | 1 hr | E7 | - | - | a | b | Multi-band | F8 | 10 bands | G20 | 20% H2 | Day 16 | - | |
| | Jupiter | 1 km | A6 2000 km | E9 | 20 km | C8 | 1 hr | E7 | - | - | a, b | b | Multi-band | F8 | 10 bands | G20 | 20% H2 | Day 16 | - | |
| 41) Hydrocarbons | Moon | 1 km | A6 500 km | E5 | 10 km | C7 | - | - | - | - | a | a | Multi-band | F7 | 10 bands | G20 | - | Day 16 | - | |
| | Mercury | 1 km | A6 500 km | E5 | 10 km | C7 | - | - | - | - | a | b | Multi-band | F10 | 10 bands | G20 | - | Day 16 | - | |
| | Mars | 1 km | A6 500 km | E5 | 10 km | C7 | - | - | - | - | a | b | Multi-band | F10 | 10 bands | G20 | - | Day 16 | - | |

Measurements made on this observable may be applicable to engineering objectives.

A

FOLDDOUT FRAME 1

B

FOLDDOUT FRAME 2

This is because during the time period under study (1975-1995) it is expected that actual lunar missions will utilize orbits whose selection is dominated by constraints arising from operational, rather than purely scientific, considerations. Orbit selection based on such criteria are beyond the scope of this study. For unmanned planetary missions, orbits have been selected for each imaging experiment by considering the required values of minimum image ground size, minimum image overlap, extent and location of planetary coverage, solar illumination, coverage time and image repetition time. These selected orbits are defined in detail by orbit data sheets contained in Volume III.

The sensor system scaling laws presented in Volume IV have been used to estimate experiment support requirements. These scaling laws relate the image specifications and the orbital parameters to measurement achievement and sensor system design. Because of the flexibility in imaging system design, the experiment support requirements are not uniquely determined by the image specifications and the orbital parameters, even for a single type of imaging system. That is, it is usually possible to perform tradeoffs between the support requirements, such as trading power requirements for sensor system weight. For this reason, the experiment support requirements presented here are representative requirements, rather than definitive.

The support requirements for each conceptual experiment are described on a data sheet in this volume. In most cases, only those experiments deemed to be useful or very useful have been investigated. Each support requirement data sheet, in addition to providing specific values of the support requirements, provides summary information pertaining to the orbit selection, the image specifications, and the sensor system design. All those experiments which can be usefully performed from the same orbit have been grouped into a family, the family numbers appearing near the top of the data sheet. The

letters in the family number refer to the first, second, or possibly third orbit selected for that family. The imaging on-time given on the data sheets is an estimate of the maximum amount of time the sensor system is in operation on a single orbital pass. In many cases, the sensor system is operated only every tenth orbit, for example, and hence the reader is cautioned not to estimate the total amount of data acquired per orbit by multiplying the data rate times the imaging on-time.

The image specifications listed on the data sheets are values derived from the appropriate worth curves, and hence describe a minimal experiment. In some cases, the capability of the sensor system greatly exceeds the minimal requirements, and the ground resolution, for example, actually provided by the sensor system design exceeds that listed on the data sheet as an image specification. If the sensor system design provides imagery substantially different from that implied by the image specifications, comments to this effect are made on the support requirements data sheet.

The sensor system design is summarized on the data sheet by values for the important sensor system design variables. Sufficient information is provided that the sensor system design can be reconstructed in detail by using the sensor system scaling laws. In some cases, different sensor system designs have been provided for the same experiment. Similar experiments are identified by comparing the image specifications and orbital parameters and by comments on the support requirements data sheet.

Values for the experiment support requirements are enclosed by the box on each data sheet. The type of support requirements provided varies slightly from one type of sensor system to the next. In estimating the data acquisition rate, it has been assumed throughout the study that 64 shades of grey are required in the resultant imagery. That is, the data acquisition rate given is based on six binary bits per resolution

element. THE DATA RATE GIVEN ON EACH DATA SHEET IS THE MAXIMUM RATE AT WHICH DATA MUST BE REMOVED FROM THE IMAGING SYSTEM TO PREVENT ITS LOSS. NO DATA STORAGE CAPABILITY HAS BEEN ASCRIBED TO IMAGING SYSTEMS OTHER THAN TELEVISION AND PHOTOGRAPHIC FILM SYSTEMS. The reader is cautioned that the total data load during a hypothetical mission CANNOT be accurately ascertained by multiplying the given data rate by the length of the mission. An UPPER LIMIT on the DATA LOAD PER ORBIT is provided by multiplying the data rate by the imaging on-time given on each data sheet. Finally, comments pertaining to measurement achievement, alternate sensor system designs, and alternate orbit selections are provided on each data sheet, if appropriate. If no comment is provided to the contrary, the experiment may be presumed to satisfy the image specifications in every respect.

The following data sheets provide experiment support requirements. They are grouped according to type of sensor system in the order ultraviolet, visual, infrared, passive microwave, and radar. Within each spectral region, the data sheets are ordered by planets in the order Mars, Venus, Mercury, and Jupiter. Finally, within each spectral region-planet combination, the data sheets are ordered by the type of planetary observables in the same order as in Table I.

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ULTRAVIOLET SCANNING SYSTEMS

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PLANET: Mars

OBSERVABLE: Global Cloud Coverage

Family No. 1a

DETECTOR: Photomultiplier

ORBIT: Data Sheet Number..... 1
Periapse/Apoapse Alt. (km).....931/931
Inclination (deg)..... 71
Imaging Altitude Range (km).....931
Imaging On-Time (min)..... 71

IMAGE: Minimum Image Width (km).....1000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

SCANNER: Collector Diameter (cm).....0.07
Aperture Stop.....f/8
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm)..... 10

SUPPORT REQUIREMENTS:

Field of View (deg).....0.87 x 54
Pointing Accuracy (deg).....3.1
System Volume (cu. ft.).....0.04
Max. Roll/Yaw Rate (deg/sec).....32
Operating Power (watts).....1
Data Rate (bits/sec).....430
System Weight (lbs).....2.2

COMMENTS:

95% planetary coverage is achieved in 3 days, while 70%
in 1 day is desired.

PLANET: Mars

OBSERVABLE: Global Cloud Coverage

Family No. 16

DETECTOR: Photomultiplier

| | | |
|----------|----------------------------------|----------|
| ORBIT: | Data Sheet Number..... | 2 |
| | Periapse/Apoapse Alt. (km)..... | 440/5473 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 440-2749 |
| | Imaging On-Time (min)..... | 52 |
| IMAGE: | Minimum Image Width (km)..... | 1000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| SCANNER: | Collector Diameter (cm)..... | 1.7 |
| | Aperture Stop..... | f/8 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 1 |
| | Scanner Rotation Rate (rpm)..... | 68 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 0.41 x 92 |
| Pointing Accuracy (deg)..... | 1.1 |
| System Volume (cu. ft.)..... | 0.04 |
| Max. Roll/Yaw Rate (deg/sec)..... | 200 |
| Operating Power (watts)..... | 1 |
| Data Rate (bits/sec)..... | 6000 |
| System Weight (lbs)..... | 2.2 |

COMMENTS:

This orbit provides only 58% planet coverage at the proper illumination once every 6 days, while 70% coverage is desired in one day twenty times per year.

PLANET: Mars

OBSERVABLE: Cloud Formation
Family No. 9

DETECTOR: Photomultiplier

ORBIT: Data Sheet Number..... 15
Periapse/Apoapse Alt. (km).....969
Inclination (deg)..... 90
Imaging Altitude Range (km).....969
Imaging On-Time (min)..... 44

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

SCANNER: Collector Diameter (cm).....1.0
Aperture Stop.....f/8
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm)..... 59

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.15 x 34
Pointing Accuracy (deg)..... 1.2
System Volume (cu. ft.)..... 0.04
Max. Roll/Yaw Rate (deg/sec)..... 180
Operating Power (watts)..... 1
Data Rate (bits/sec)..... 2200
System Weight (lbs)..... 2.2

COMMENTS:

Nearly 5 min, rather than 1 min, is necessary to collect data for a 600 x 600 km image. The same area may be imaged again in 2.4 hours, rather than 15 min as desired.

PLANET: Venus

OBSERVABLE: Global Cloud Coverage

Family No. 3a

DETECTOR: Photomultiplier

ORBIT: Data Sheet Number..... 89
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg)..... 90
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km).....1500
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

SCANNER: Collector Diameter (cm).....0.01
Aperture Stop.....f/8
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm)..... 70

SUPPORT REQUIREMENTS:

Field of View (deg).....0.71 x 112
Pointing Accuracy (deg).....6.3
System Volume (cu. ft.).....0.04
Max. Roll/Yaw Rate (deg/sec).....210
Operating Power (watts).....1
Data Rate (bits/sec).....3.5 x 10³
System Weight (lbs).....2.2

COMMENTS:

Only 50% daylight planetary coverage can be achieved without an orbit plane change. Only two coverages per year are obtained, rather than ten; each coverage takes 120 days, rather than 1. A solid-state detector could be used, with no change in the support requirements.

PLANET: Venus

OBSERVABLE: Global Cloud Coverage

Family No. 36

DETECTOR: Photomultiplier

| | | |
|----------|----------------------------------|-------------|
| ORBIT: | Data Sheet Number..... | 90 |
| | Periapse/Apoapse Alt. (km)..... | 248/113,700 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 248-1297 |
| | Imaging On-Time (min)..... | 19 |
| IMAGE: | Minimum Image Width (km)..... | 1500 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| SCANNER: | Collector Diameter (cm)..... | 0.22 |
| | Aperture Stop..... | f/8 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 1 |
| | Scanner Rotation Rate (rpm)..... | 250 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.35 x 129 |
| Pointing Accuracy (deg)..... | 2.2 |
| System Volume (cu. ft.)..... | 0.04 |
| Max. Roll/Yaw Rate (deg/sec)..... | 770 |
| Operating Power (watts)..... | 1 |
| Data Rate (bits/sec)..... | 2.6×10^4 |
| System Weight (lbs)..... | 2.2 |

COMMENTS:

Since imaging is not performed at all altitudes along the orbit, only 38% planetary daylight coverage can be obtained, requiring 243 days. A detector response time of 0.1 msec is required, eliminating consideration of solid-state detectors(which would result in essentially the same support requirements anyway). Required angular resolution is controlled by effects of planetary curvature when imaging at periapse.

PLANET: .Venus

OBSERVABLE: Cloud Formation

Family No. 9a

DETECTOR: Photomultiplier

ORBIT: Data Sheet Number.....101
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg)..... 90
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

SCANNER: Collector Diameter (cm).....0.3
Aperture Stop.....f/70
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm).....200

SUPPORT REQUIREMENTS:

Field of View (deg).....0.24x67
Pointing Accuracy (deg).....1.3
System Volume (cu. ft.).....0.04
Max. Roll/Yaw Rate (deg/sec).....570
Operating Power (watts).....1
Data Rate (bits/sec).....:3.0x10⁴
System Weight (lbs).....2.2

COMMENTS:

50% planetary coverage can be achieved in daylight without a plane change, while only 10% is required. 1.5 min is required to obtain data from an image area of W x W, while one min is desired. Essentially the same area can be imaged every 96 min, while an image repetition time of 15 min is desired.

PLANET: Venus

OBSERVABLE: Cloud Formation

Family No. 9b

DETECTOR: Photomultiplier

ORBIT: Data Sheet Number.....102.
Periapse/Apoapse Alt. (km).....255/50,735
Inclination (deg)..... 90
Imaging Altitude Range (km).....255-2125
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

SCANNER: Collector Diameter (cm).....4.6
Aperture Stop.....f/1.2
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm).....1600

SUPPORT REQUIREMENTS:

Field of View (deg).....0.08 x 96
Pointing Accuracy (deg).....0.27
System Volume (cu. ft.).....0.06
Max. Roll/Yaw Rate (deg/sec).....4800
Operating Power (watts).....1
Data Rate (bits/sec).....7.6 x 10⁵
System Weight (lbs).....3

COMMENTS:

A detector time constant of about 4 μ sec is required. Only 31% daylight planetary coverage is achieved from the altitude range considered here. At some expense in optics weight, this could be increased to 50% by operating over a wider altitude range. The image repetition time is every 17 hours, rather than the desired 15 min; however, data from an area W by W is obtained in almost one minute, as desired.

PLANET: Mercury

OBSERVABLE: Contacts (Regional)

Family No. 1a

DETECTOR: Photomultiplier

ORBIT: Data Sheet Number.....119
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 13

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

SCANNER: Collector Diameter (cm).....0.24
Aperture Stop.....f/10
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm).....6.8

SUPPORT REQUIREMENTS:

Field of View (deg).....0.23 x 60
Pointing Accuracy (deg).....1.1
System Volume (cu. ft.).....0.06
Max. Roll/Yaw Rate (deg/sec).....200
Operating Power (watts).....1
Data Rate (bits/sec).....1.1 x 10⁴
System Weight (lbs).....2.2

COMMENTS:

Detector response time must be less than about 0.3m sec, probably eliminating solid-state detectors. Photomultiplier tube permits smaller optical system, anyway. Only 15% planetary coverage is obtained at solar zenith angles less than 20°, which is as much as can be seen from an inertial orbit, while 70% coverage is desired.

PLANET: Mercury

OBSERVABLE: Contacts (Regional)

Family No. 1b

DETECTOR: Photomultiplier

ORBIT: Data Sheet Number.....120
Periapse/Apoapse Alt. (km).....500/53,420
Inclination (deg)..... 90
Imaging Altitude Range (km).....500-1150
Imaging On-Time (min)..... 9

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

SCANNER: Collector Diameter (cm).....1.7
Aperture Stop.....f/2.6
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm).....620

SUPPORT REQUIREMENTS:

Field of View (deg).....0.13 x 60
Pointing Accuracy (deg).....0.5
System Volume (cu. ft.).....0.06
Max. Roll/Yaw Rate (deg/sec).....1900
Operating Power (watts).....1
Data Rate (bits/sec)..... 1.7×10^5
System Weight (lbs).....2.3

COMMENTS:

Only 7.4% planetary coverage is achieved at solar zenith angles $< 20^\circ$. This could be increased by operating images over wider altitude range at some expense in system weight. Required detector response time is about 180 sec, eliminating solid-state detectors.

PLANET: Mercury

OBSERVABLE: Contacts (Local)

Family No. 11

DETECTOR: Photomultiplier

ORBIT: Data Sheet Number.....135
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 13

IMAGE: Minimum Image Width (km).....100
Max. Ground Resolution (km).....0.2
Positional Accuracy (km)..... 2

SCANNER: Collector Diameter (cm)..... 26
Aperture Stop.....f/1
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm).....700

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.02 x 11
Pointing Accuracy (deg)..... 0.22
System Volume (cu. ft.)..... 2.7
Max. Roll/Yaw Rate (deg/sec)..... 2100
Operating Power (watts)..... 1
Data Rate (bits/sec)..... 1.3×10^6
System Weight (lbs)..... 51

COMMENTS:

Scanner and optics weight each about 24 lbs. Detector response time must be less than 2.6μ sec, eliminating solid-state detectors. However, solid-state detector would result in essentially the same sensor system weight.

PLANET: Mercury

OBSERVABLE: Contacts (Detailed)

Family No. 18

DETECTOR: Photomultiplier

ORBIT: Data Sheet Number.....142
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 13

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005
Positional Accuracy (km).....0.02

SCANNER: Collector Diameter (cm).....
Aperture Stop.....
No. of Detectors.....
No. of Scanner Faces.....
Scanner Rotation Rate (rpm).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
System Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
System Weight (lbs).....

COMMENTS:

Even with 10 detectors and a 20-faced mirror, the detector time constant must be less than 0.36μ sec. For a photomultiplier detector, the required optics diameter is nearly 30 meters. If a solid-state detector could be used (with D_p^* of 4×10^{11} cm-Hz $^{1/2}$ /watt), the optics diameter is still about 18 meters.

PLANET: Jupiter

OBSERVABLE: Global Cloud Coverage

Family No. 4a

DETECTOR: Photomultiplier

ORBIT: Data Sheet Number.....155
Periapse/Apoapse Alt. (km).....356,750/665,059
Inclination (deg)..... 90
Imaging Altitude Range (km).....395,000-665,000
Imaging On-Time..... 44 hrs

IMAGE: Minimum Image Width (km).....15,000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km).....200

SCANNER: Collector Diameter (cm).....~3000
Aperture Stop.....
No. of Detectors.....
No. of Scanner Faces.....
Scanner Rotation Rate (rpm).....

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.0017 x 2.4
Pointing Accuracy (deg).....
System Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
System Weight (lbs).....

COMMENTS:

Combination of angular resolution and low illumination requires 30 meter collecting optics, which is completely unreasonable! An imaging altitude on the order of 50,000 km is required for one meter optics.

PLANET: Jupiter

OBSERVABLE: Cloud Formation

Family No. 13a

DETECTOR:

ORBIT: Data Sheet Number.....175
Periapse/Apoapse Alt. (km).....178,375/480,812
Inclination (deg)..... 90
Imaging Altitude Range (km).....214,000/480,812
Imaging On-Time..... 28 hrs

IMAGE: Minimum Image Width (km).....5000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km).....100

SCANNER: Collector Diameter (cm).....320
Aperture Stop.....
No. of Detectors.....
No. of Scanner Faces.....
Scanner Rotation Rate (rpm).....

SUPPORT REQUIREMENTS:

Field of View (deg).....0.0024 x 3.2
Pointing Accuracy (deg).....
System Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
System Weight (lbs).....

COMMENTS:

Again, combination of angular resolution and illumination renders experiment unfeasible.

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VISUAL IMAGING SYSTEMS

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PLANET: Mars

OBSERVABLE: Surface Elevations

Family No. 8a

TV TYPE: 2-inch vidicon (shadowing)

| | | |
|---------|----------------------------------|--------------|
| ORBIT: | Data Sheet Number..... | 13 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 34 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 (1 vert.) |
| | Positional Accuracy (km)..... | 30 |
| CAMERA: | Focal Length (mm)..... | 37 |
| | Aperture Stop..... | f/8 |
| | Exposure Time (sec)..... | 0.1 |
| | Cycle Time (sec)..... | 200 |
| | Signal-to-Noise Ratio..... | 35 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 1.8 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.17/0.55 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 1.9×10^4 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Only 67% (rather than 70%) planetary coverage is achieved, at the proper illumination, with this orbit. A ground resolution of 1.7km is required (and achieved) in order to provide inference of 1km vertical height differences by measurement of shadow lengths. 40m ground resolution could be achieved by use of a 2" RBV, but the data rate would be increased to 3.8×10^5 .

PLANET: Mars

OBSERVABLE: Surface Elevations

Family No. 8b

TV TYPE: 2-inch vidicon (shadowing)

| | | |
|---------|----------------------------------|--------------|
| ORBIT: | Data Sheet Number..... | 14 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 94.8 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 45 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 (1 vert.) |
| | Positional Accuracy (km)..... | 30 |
| CAMERA: | Focal Length (mm)..... | 37 |
| | Aperture Stop..... | f/8 |
| | Exposure Time (sec)..... | 0.1 |
| | Cycle Time (sec)..... | 200 |
| | Signal-to-Noise Ratio..... | 35 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 1.8 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.17/0.55 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 1.9×10^4 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

74% planetary coverage is achieved, at the proper illumination, by this orbit. A ground resolution of 1.7 km is provided to permit inference of 1 km vertical height differences by measurement of shadow lengths. A 2" RBV would provide 40m ground resolution, but the data rate would be 3.8×10^5 .

PLANET: Mars

OBSERVABLE: Surface Elevations

Family No. 3a

CAMERA: 70mm with SO-243 film (side stereo)

ORBIT: Data Sheet Number.....5
Periapse/Apoapse Alt. (km).....994/994
Inclination (deg).....95
Imaging Altitude Range (km).....994
Imaging On-Time (min).....15
IMAGE: Minimum Image Size (km).....600
Max. Ground Resolution (km).....20(1 vert.)
Positional Accuracy (km).....30
CAMERA: Focal Length (mm).....34
Aperture Stop.....f/1.8
Exposure Time (sec).....0.02
Cycle Time (sec).....760
Length of Film (ft).....14
Shielding Weight (lbs).....2

| | |
|-----------------------------------|-------------------|
| SUPPORT REQUIREMENTS: | |
| Field of View (deg)..... | 87 x 87 |
| Pointing Accuracy (deg)..... | 1.7 |
| Camera Volume (cu. ft.)..... | 0.68 |
| Camera Shape (ft)..... | 1x0.54x1.1 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.44/0.38 |
| Operating Power (watts)..... | 36 |
| Data Rate (bits/sec)..... | 6.8×10^5 |
| Camera Weight (lbs)..... | 25 |

COMMENTS:

70% planetary coverage requires 418 days at the proper solar illumination. For 600x600 km image size, 4000 TV lines are required, hence film has been used. To take advantage of increased capability of film, image size actually used is 2300x2300 km. Ground resolution is 0.93 km to provide 1 km vertical resolution by stereo. Use of forward-overlap stereo would double data rate. Film length is based on 70% planetary coverage.

PLANET: Mars

OBSERVABLE: Surface Elevations

Family No. 3b

TV TYPE: 3-inch RBV (side stereo)

| | | |
|---------|----------------------------------|--------------|
| ORBIT: | Data Sheet Number..... | 6 |
| | Periapse/Apoapse Alt. (km)..... | 400/9175 |
| | Inclination (deg)..... | 113 |
| | Imaging Altitude Range (km)..... | 400-580 |
| | Imaging On-Time (min)..... | 8 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 (1 vert.) |
| | Positional Accuracy (km)..... | 30 |
| CAMERA: | Focal Length (mm)..... | 23 |
| | Aperture Stop..... | f/2.8 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 130 |
| | Signal-to-Noise Ratio..... | 27 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 72 x 72 |
| Pointing Accuracy (deg)..... | 3.0 |
| Camera Volume (cu. ft.)..... | 0.97 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.99/1.9 |
| Operating Power (watts)..... | 48 |
| Data Rate (bits/sec)..... | 4.9×10^5 |
| Camera Weight (lbs)..... | 48 |

COMMENTS:

70% planetary coverage at proper solar illumination requires 420 days. A ground resolution of 0.6 km is provided to meet the vertical resolution requirements. Use of forward-overlap stereo would increase the data rate to 7.6×10^5 .

PLANET: Mars

OBSERVABLE: Layering

Family No. 29

TV TYPE:

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 41 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-1115 |
| | Imaging On-Time (min)..... | 31 |
| IMAGE: | Minimum Image Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.0003 |
| | Positional Accuracy (km)..... | 0.02 |
| CAMERA: | Focal Length (mm)..... | |
| | Aperture Stop..... | |
| | Exposure Time (sec)..... | |
| | Cycle Time (sec)..... | |
| | Signal-to-Noise Ratio..... | |

SUPPORT REQUIREMENTS:

| |
|-----------------------------------|
| Field of View (deg)..... |
| Pointing Accuracy (deg)..... |
| Camera Volume (cu. ft.)..... |
| Max. Roll/Yaw Rate (deg/sec)..... |
| Operating Power (watts)..... |
| Data Rate (bits/sec)..... |
| Camera Weight (lbs)..... |

COMMENTS:

From 1115 km altitude, even classical diffraction limit implies that 2.7 meter optics is required for this experiment. In any real experiment, actual optical system diameter must be significantly larger. Therefore experiment is beyond state-of-art (from this orbit).

PLANET: Mars

OBSERVABLE: Contacts (regional)

Family No. 8a

TV TYPE: 1-inch vidicon

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 13 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 34 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 19 |
| | Aperture Stop..... | f/8 |
| | Exposure Time (sec)..... | 0.1 |
| | Cycle Time (sec)..... | 200 |
| | Signal-to-Noise Ratio..... | 28 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 0.59 |
| Camera Volume (cu. ft.)..... | 0.32 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.30/0.95 |
| Operating Power (watts)..... | 16 |
| Data Rate (bits/sec)..... | 7400 |
| Camera Weight (lbs)..... | 16 |

COMMENTS:

67% planetary coverage is achieved in 40 days.

PLANET: Mars

OBSERVABLE: Contacts (regional)

Family No. 8b

TV TYPE: 1-inch vidicon

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 14 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 95 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 45 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 19 |
| | Aperture Stop..... | f/8 |
| | Exposure Time (sec)..... | 0.1 |
| | Cycle Time (sec)..... | 200 |
| | Signal-to-Noise Ratio..... | 28 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 0.59 |
| Camera Volume (cu. ft.)..... | 0.32 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.30/0.95 |
| Operating Power (watts)..... | 16 |
| Data Rate (bits/sec)..... | 7400 |
| Camera Weight (lbs)..... | 16 |

COMMENTS:

This sun-synchronous orbit provides 74% planetary coverage in five days.

PLANET: Mars

OBSERVABLE: Contacts (local)

Family No. 21a

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 32 |
| | Periapse/Apoapse Alt. (km)..... | 340/33,809 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 340-976 |
| | Imaging On-Time (min)..... | 22 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 |
| | Positional Accuracy (km)..... | 2 |
| CAMERA: | Focal Length (mm)..... | 77 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 19 |
| | Signal-to-Noise Ratio..... | 10 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 17 x 17 |
| Pointing Accuracy (deg)..... | 0.12 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.20/3.8 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 2.0×10^6 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

The ground resolution obtained with the 2" RBV is 0.17 km.

PLANET: Mars

OBSERVABLE: Contacts (local)

Family No. 21b

CAMERA: 70mm with SO-243 film and IMC

ORBIT: Data Sheet Number..... 33
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-2117
Imaging On-Time (min)..... 39

IMAGE: Minimum Image Size (km)..... 100
Max. Ground Resolution (km)..... 0.2
Positional Accuracy (km)..... 2

CAMERA: Focal Length (mm)..... 74
Aperture Stop..... f/1.8
Exposure Time (sec)..... 0.05
Cycle Time (sec)..... 67
Length of Film (ft)..... 46
Shielding Weight (lbs)..... 2

SUPPORT REQUIREMENTS:

Field of View (deg)..... 47 x 47
Pointing Accuracy (deg)..... 0.054
Camera Volume (cu. ft.)..... 1.3
Camera Shape (ft)..... 1.4x0.6x1.4
Max. Roll/Yaw Rate (deg/sec)..... 0.018/0.22
Operating Power (watts)..... 67
Data Rate (bits/sec)..... 7.7×10^6
Camera Weight (lbs)..... 41

COMMENTS:

Film length based on 10% planetary coverage. A 2" RBV with a zoom lens could also be used. To take advantage of film resolution capability, the image size used is 335 x 335 km at periapse. Ground resolution is 0.2 km at 2117 km altitude, 45m at periapse.

PLANET: Mars

OBSERVABLE: Contacts (detailed)

Family No. 30

TV TYPE:

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 42 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-2117 |
| | Imaging On-Time (min)..... | 39 |
| IMAGE: | Minimum Image Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.005 |
| | Positional Accuracy (km)..... | 0.02 |
| CAMERA: | Focal Length (mm)..... | |
| | Aperture Stop..... | |
| | Exposure Time (sec)..... | |
| | Cycle Time (sec)..... | |
| | Signal-to-Noise Ratio..... | |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|--|
| Field of View (deg)..... | |
| Pointing Accuracy (deg)..... | |
| Camera Volume (cu. ft.)..... | |
| Max. Roll/Yaw Rate (deg/sec)..... | |
| Operating Power (watts)..... | |
| Data Rate (bits/sec)..... | |
| Camera Weight (lbs)..... | |

COMMENTS:

For TV systems large focal lengths (~5m) and large optical system diameters (>2m) are required. For film systems, the high resolution requirements require short exposure times to prevent image smear, and since scene luminance is low, no readily available film is fast enough.

PLANET: Mars (1988 opportunity)

OBSERVABLE: Contacts (detailed)

Family No. 30

TV TYPE: 2-inch RBV with IMC

| | |
|--------------------------------------|-----------|
| ORBIT: Data Sheet Number..... | 80 |
| Periapse/Apoapse Alt. (km)..... | 1027/1027 |
| Inclination (deg)..... | 95 |
| Imaging Altitude Range (km)..... | 1027 |
| Imaging On-Time (min)..... | 48 |
| IMAGE: Minimum Image Width (km)..... | 0.5 |
| Max. Ground Resolution (km)..... | 0.005 |
| Positional Accuracy (km)..... | 0.02 |
| CAMERA: Focal Length (mm)..... | 2650 |
| Aperture Stop..... | f/2.5 |
| Exposure Time (sec)..... | 0.006 |
| Cycle Time (sec)..... | 2.9 |
| Signal-to-Noise Ratio..... | 6 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.5x0.5 |
| Pointing Accuracy (deg)..... | 0.0012 |
| Camera Volume (cu. ft.)..... | 110 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.078/1.8 |
| Operating Power (watts)..... | 47 |
| Data Rate (bits/sec)..... | 1.4×10^7 |
| Camera Weight (lbs)..... | 480 |

COMMENTS:

System weight is dominated by optical subsystem weighing about 430 pounds. A 2-inch RBV provides 5 meter resolution over an imaged area of nearly 9 x 9 km.

PLANET: Mars

OBSERVABLE: Structure of Features (regional)

Family No. 8a

TV TYPE: 1-inch vidicon (shadowing)

| | | |
|---------|----------------------------------|-------------|
| ORBIT: | Data Sheet Number..... | 13 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 34 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (3 vert.) |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 19 |
| | Aperture Stop..... | f/8 |
| | Exposure Time (sec)..... | 0.1 |
| | Cycle Time (sec)..... | 200 |
| | Signal-to-Noise Ratio..... | 28 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 0.59 |
| Camera Volume (cu. ft.)..... | 0.32 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.30/0.96 |
| Operating Power (watts)..... | 16 |
| Data Rate (bits/sec)..... | 7400 |
| Camera Weight (lbs)..... | 16 |

COMMENTS:

67% planetary coverage is provided in 40 days.

PLANET: Mars

OBSERVABLE: Structure of Features (regional)

Family No. 8b

TV TYPE: 1-inch vidicon (shadowing)

| | | |
|---------|----------------------------------|-------------|
| ORBIT: | Data Sheet Number..... | 14 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 95 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 45 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (3 vert.) |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 19 |
| | Aperture Stop..... | f/8 |
| | Exposure Time (sec)..... | 0.1 |
| | Cycle Time (sec)..... | 200 |
| | Signal-to-Noise Ratio..... | 28 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 0.59 |
| Camera Volume (cu. ft.)..... | 0.32 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.30/0.96 |
| Operating Power (watts)..... | 16 |
| Data Rate (bits/sec)..... | 7400 |
| Camera Weight (lbs)..... | 16 |

COMMENTS:

This sun-synchronous orbit provides 74% coverage in five days.

PLANET: Mars

OBSERVABLE: Structure of Features (regional)

Family No. 3a

TV TYPE: 2-inch RBV (side stereo)

| | | |
|---------|----------------------------------|-------------|
| ORBIT: | Data Sheet Number..... | 5 |
| | Periapse/Apoapse Alt. (km)..... | 994/994 |
| | Inclination (deg)..... | 95 |
| | Imaging Altitude Range (km)..... | 994 |
| | Imaging On-Time (min)..... | 15 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (3 vert.) |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 16 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.001 |
| | Cycle Time (sec)..... | 530 |
| | Signal-to-Noise Ratio..... | 9 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 72 x 72 |
| Pointing Accuracy (deg)..... | 0.58 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 19/23 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

418 days is required to obtain 70% planetary coverage at proper solar illumination. To minimize focal length, image size of 1600 x 1600 km is used. Forward stereo would result in same support requirements.

PLANET: Mars

OBSERVABLE: Structure of Features (regional)

Family No. 3b

TV TYPE: 2-inch RBV (side stereo)

| | | |
|---------|----------------------------------|-------------|
| ORBIT: | Data Sheet Number..... | 6 |
| | Periapse/Apoapse Alt. (km)..... | 400/9175 |
| | Inclination (deg)..... | 113 |
| | Imaging Altitude Range (km)..... | 400-580 |
| | Imaging On-Time (min)..... | 8 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (3 vert.) |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 9 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.001 |
| | Cycle Time (sec)..... | 250 |
| | Signal-to-Noise Ratio..... | 9 |

| | |
|-----------------------------------|-----------------------|
| SUPPORT REQUIREMENTS: | |
| Field of View (deg)..... | 106 x 106 |
| Pointing Accuracy (deg)..... | 0.99 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 49/48 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8 x 10 ⁵ |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

This sun-synchronous orbit maximizes coverage, which is only 27% in first 55 days. 420 days are required for 70% planetary coverage at proper solar illumination. Forward stereo would result in same support requirements.

PLANET: Mars

OBSERVABLE: Structure of Features (regional)

Family No. 6

TV TYPE: 2-inch RBV with color filters (forward stereo)

ORBIT: Data Sheet Number.....11
Periapse/Apoapse Alt. (km).....425/6955
Inclination (deg).....90
Imaging Altitude Range (km).....425-952
Imaging On-Time (min).....18

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km).....3 (3 vert.)
Positional Accuracy (km).....10

CAMERA: Focal Length (mm).....9
Aperture Stop.....f/2
Exposure Time (sec).....0.01
Cycle Time (sec).....140
Signal-to-Noise Ratio.....8

SUPPORT REQUIREMENTS:

Field of View (deg).....104 x 104
Pointing Accuracy (deg).....0.60
Camera Volume (cu. ft.).....0.65
Max. Roll/Yaw Rate (deg/sec).....3.0/4.6
Operating Power (watts).....32
Data Rate (bits/sec)..... 8.2×10^5
Camera Weight (lbs).....32

COMMENTS:

Only 58% (not 70%) planetary coverage is achieved.
For non-stereo coverage, data rate would be 4.1×10^5 .

PLANET: Mars

OBSERVABLE: Structure of Features (local)

Family No. 21a

TV TYPE: 2-inch RBV (shadowing)

| | | |
|---------|----------------------------------|-----------------|
| ORBIT: | Data Sheet Number..... | 32 |
| | Periapse/Apoapse Alt. (km)..... | 340/33,809 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 340-976 |
| | Imaging On-Time (min)..... | 22 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 (0.2 vert.) |
| | Positional Accuracy (km)..... | 2 |
| CAMERA: | Focal Length (mm)..... | 77 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 19 |
| | Signal-to-Noise Ratio..... | 10 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 17 x 17 |
| Pointing Accuracy (deg)..... | 0.012 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.20/3.8 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 2.0×10^6 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

PLANET: Mars

OBSERVABLE: Structure of Features (local)

Family No. 21b

CAMERA: 70mm with S0-243 and IMC (shadowing)

| | |
|-------------------------------------|-----------------|
| ORBIT: Data Sheet Number..... | 33 |
| Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| Inclination (deg)..... | 124 |
| Imaging Altitude Range (km)..... | 383-2117 |
| Imaging On-Time (min)..... | 39 |
| IMAGE: Minimum Image Size (km)..... | 100 |
| Max. Ground Resolution (km)..... | 0.2 (0.2 vert.) |
| Positional Accuracy (km)..... | 2 |
| CAMERA: Focal Length (mm)..... | 74 |
| Aperture Stop..... | f/1.8 |
| Exposure Time (sec)..... | 0.05 |
| Cycle Time (sec)..... | 67 |
| Length of Film (ft)..... | 46 |
| Shielding Weight (lbs)..... | 2 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 47 x 47 |
| Pointing Accuracy (deg)..... | 0.054 |
| Camera Volume (cu. ft.)..... | 1.3 |
| Camera Shape (ft)..... | 1.4x0.6x1.4 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.018/0.22 |
| Operating Power (watts)..... | 67 |
| Data Rate (bits/sec)..... | 7.7×10^6 |
| Camera Weight (lbs)..... | 41 |

COMMENTS:

Film length based on 10% planetary coverage. Image size at periapse is 335 x 335 km to take advantage of film resolution capability. Ground resolution is 45m at periapse, 0.2 km at 2117 km altitude. A 2"RBV with a zoom lens might be used, but would weigh more.

PLANET: Mars

OBSERVABLE: Structure of Features (local)

Family No. 16

CAMERA: 70mm with SO-243 film (side stereo)

ORBIT: Data Sheet Number..... 27
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-485
Imaging On-Time (min)..... 17

IMAGE: Minimum Image Size (km)..... 100
Max. Ground Resolution (km)..... 0.2(0.2 vert.)
Positional Accuracy (km)..... 2

CAMERA: Focal Length (mm)..... 42
Aperture Stop..... f/1.8
Exposure Time (sec)..... 0.007
Cycle Time (sec)..... 120
Length of Film (ft)..... 29
Shielding Weight (lbs)..... 2

SUPPORT REQUIREMENTS:

Field of View (deg)..... 74 x 74
Pointing Accuracy (deg)..... 0.24
Camera Volume (cu. ft.)..... 0.87
Camera Shape (ft)..... 1.2x0.6x1.3
Max. Roll/Yaw Rate (deg/sec)..... 0.35/0.57
Operating Power (watts)..... 36
Data Rate (bits/sec)..... 4.3×10^6
Camera Weight (lbs)..... 26

COMMENTS:

Film length based on 10% planetary coverage.. Ground resolution of 130m is provided to permit 200m vertical resolution by stereo.

PLANET: Mars

OBSERVABLE: Structure of Features (local)

Family No. 19

CAMERA: 5-inch with SO-243 and color filters (forward stereo)

ORBIT: Data Sheet Number..... 30
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-880
Imaging On-Time (min)..... 23

IMAGE: Minimum Image Size (km)..... 100
Max. Ground Resolution (km)..... 0.2(0.2 vert.)
Positional Accuracy (km)..... 2

CAMERA: Focal Length (mm)..... 48
Aperture Stop..... f/1.8
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 100
Length of Film (ft)..... 56
Shielding Weight (lbs)..... 5

| SUPPORT REQUIREMENTS: | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 100 x 100 |
| Pointing Accuracy (deg)..... | 0.13 |
| Camera Volume (cu. ft.)..... | 1.2 |
| Camera Shape (ft)..... | 1x0.8x1.5 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.22/0.38 |
| Operating Power (watts)..... | 51 |
| Data Rate (bits/sec)..... | 4.9×10^7 |
| Camera Weight (lbs)..... | 40 |

COMMENTS:

Image size of 1000 x 1000 km used to take advantage of film resolution capability. Film length based on 10% coverage. See next data sheet for same experiment without stereo.

PLANET: Mars

OBSERVABLE: Structure of Features (detailed)

Family No. 30

TV TYPE: Shadowing

| | | |
|---------|----------------------------------|--------------------|
| ORBIT: | Data Sheet Number..... | 42 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-2117 |
| | Imaging On-Time (min)..... | 39 |
| IMAGE: | Minimum Image Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.005 (0.05 vert.) |
| | Positional Accuracy (km)..... | 0.02 |
| CAMERA: | Focal Length (mm)..... | |
| | Aperture Stop..... | |
| | Exposure Time (sec)..... | |
| | Cycle Time (sec)..... | |
| | Signal-to-Noise Ratio..... | |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|--|
| Field of View (deg)..... | |
| Pointing Accuracy (deg)..... | |
| Camera Volume (cu. ft.)..... | |
| Max. Roll/Yaw Rate (deg/sec)..... | |
| Operating Power (watts)..... | |
| Data Rate (bits/sec)..... | |
| Camera Weight (lbs)..... | |

COMMENTS:

Large focal lengths (~5m) and large optical system diameters (>2m) are required for TV systems. Low sun elevation angles do not afford sufficient scene luminance for use of film.

PLANET: Mars

OBSERVABLE: Structure of Features (detailed)

Family No. 25

CAMERA: 9.5-inch with SQ-230 film and IMC (forward stereo)

ORBIT: Data Sheet Number..... 37
Periapse/Apoapse Alt. (km)....., 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-485
Imaging On-Time (min)..... 17

IMAGE: Minimum Image Size (km)..... 0.5
Max. Ground Resolution (km)..... 0.005 (0.05 vert.)
Positional Accuracy (km)..... 0.02

CAMERA: Focal Length (mm)..... 700
Aperture Stop..... f/1.9
Exposure Time (sec)..... 0.002
Cycle Time (sec)..... 12
Length of Film (ft)..... 230
Shielding Weight (lbs)..... 74

| SUPPORT REQUIREMENTS: | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 18 x 18 |
| Pointing Accuracy (deg)..... | 0.0024 |
| Camera Volume (cu. ft.)..... | 13 |
| Camera Shape (ft)..... | 3.3x1.3x2.9 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.49/0.38 |
| Operating Power (watts)..... | 280 |
| Data Rate (bits/sec)..... | 5.0×10^8 |
| Camera Weight (lbs)..... | 270 |

COMMENTS:

Film length based on 1% planetary coverage. Image size actually used is 125 x 125 km. Color filters can be used with a faster film. See next data sheet.

PLANET: Mars

OBSERVABLE: Structure of Features (detailed)

Family No. 25

CAMERA: 9.5-inch with SO-102 film, IMC and color filters (forward stereo)

ORBIT: Data Sheet Number..... 37
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-485
Imaging On-Time (min)..... 17

IMAGE: Minimum Image Size (km)..... 0.5
Max. Ground Resolution (km)..... 0.005 (0.05 vert.)
Positional Accuracy (km)..... 0.02

CAMERA: Focal Length (mm)..... 830
Aperture Stop..... f/3
Exposure Time (sec)..... 0.003
Cycle Time (sec)..... 10
Length of Film (ft)..... 770
Shielding Weight (lbs)..... 180

SUPPORT REQUIREMENTS:

Field of View (deg)..... 8 x 8
Pointing Accuracy (deg)..... 0.0024
Camera Volume (cu. ft.)..... 25
Camera Shape (ft)..... 5 x 1 x 4
Max. Roll/Yaw Rate (deg/sec)..... 0.29/0.27
Operating Power (watts)..... 280
Data Rate (bits/sec)..... 1.2×10^9
Camera Weight (lbs)..... 400

COMMENTS:

Film length based on 1% coverage. Image size is
105 x 105 km.

PLANET: Mars

OBSERVABLE: Surface Topography (regional)

Family No. 8a

TV TYPE: 2-inch RBV (shadowing)

| | | |
|---------|----------------------------------|-------------|
| ORBIT: | Data Sheet Number..... | 13 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 34 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (1 vert.) |
| | Positional Accuracy (km)..... | 3 |
| CAMERA: | Focal Length (mm)..... | 37 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 200 |
| | Signal-to-Noise Ratio..... | 10 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 0.18 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.39/1.2 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Using 600 x 600 km image size, a 2" RBV will provide a 0.4 km ground resolution. A 2" vidicon could also be used but would barely provide the 1.7 km ground resolution which is required to determine vertical height differences of 1 km by shadow measurements. Alternatively a 2" RBV could be used with a larger image size (see next data sheet). 67% coverage is achieved in 40 days.

PLANET: Mars

OBSERVABLE: Surface Topography (regional)

Family No. 8a

TV TYPE: 2-inch RBV (shadowing)

| | | |
|---------|----------------------------------|-------------|
| ORBIT: | Data Sheet Number..... | 13 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 34 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (1 vert.) |
| | Positional Accuracy (km)..... | 3 |
| CAMERA: | Focal Length (mm)..... | 16 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 490 |
| | Signal-to-Noise Ratio..... | 10 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 70 x 70 |
| Pointing Accuracy (deg)..... | 0.18 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 1.7/2.2 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Image size used in 1500 x 1500 km, with a ground resolution of 1.7 km. For the same size camera, use of a large image size will result, in general, in shorter focal lengths, smaller optics, and a lower data rate (unless, as in this case, the data rate is controlled by the tube storage time).

PLANET: Mars

OBSERVABLE: Surface Topography (regional)

Family No. 8b

TV TYPE: 2-inch RBV (shadowing)

ORBIT: Data Sheet Number..... 14
Periapse/Apoapse Alt. (km)..... 969/969
Inclination (deg)..... 95
Imaging Altitude Range (km)..... 969
Imaging On-Time (min)..... 45

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3 (1 vert.)
Positional Accuracy (km)..... 3

CAMERA: Focal Length (mm)..... 16
Aperture Stop..... f/2
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 490
Signal-to-Noise Ratio..... 10

SUPPORT REQUIREMENTS:

Field of View (deg)..... 70 x 70
Pointing Accuracy (deg)..... 0.18
Camera Volume (cu. ft.)..... 0.65
Max. Roll/Yaw Rate (deg/sec)..... 1.7/2.2
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 32

COMMENTS:

This sun-synchronous orbit provides 74% coverage in five days. Image size used is 1500 x 1500 km with ground resolution of 1.7 km permitting detection of vertical height differences of 1 km by shadow measurements.

PLANET: Mars

OBSERVABLE: Surface Topography (regional)

Family No. 3a

CAMERA: 70mm with SO-243 film (side stereo)

ORBIT: Data Sheet Number..... 5
Periapse/Apoapse Alt. (km)..... 994/994
Inclination (deg)..... 95
Imaging Altitude Range (km)..... 994
Imaging On-Time (min)..... 15
IMAGE: Minimum Image Size (km)..... 600
Max. Ground Resolution (km)..... 3 (1 vert.)
Positional Accuracy (km)..... 3
CAMERA: Focal Length (mm)..... 34
Aperture Stop..... f/1.8
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 750
Length of Film (ft)..... 7
Shielding Weight (lbs)..... 1

SUPPORT REQUIREMENTS:

Field of View (deg)..... 87 x 87
Pointing Accuracy (deg)..... 0.17
Camera Volume (cu. ft.)..... 0.58
Camera Shape (ft)..... 1x0.6x1
Max. Roll/Yaw Rate (deg/sec)..... 0.89/0.77
Operating Power (watts)..... 36
Data Rate (bits/sec)..... 6.9×10^5
Camera Weight (lbs)..... 24

COMMENTS:

Image size is 2300 x 2300 km with ground resolution of 0.93 km. Film length based on 36% coverage which is achieved in 55 days. 418 days are required for 70% coverage. Forward stereo would increase data rate to 1.4×10^6 .

PLANET: Mars

OBSERVABLE: Surface Topography (regional)

Family No. 3b

TV TYPE: 2-inch RBV (side stereo)

| | | |
|---------|----------------------------------|-------------|
| ORBIT: | Data Sheet Number..... | 6 |
| | Periapse/Apoapse Alt. (km)..... | 400/9175 |
| | Inclination (deg)..... | 113 |
| | Imaging Altitude Range (km)..... | 400-580 |
| | Imaging On-Time (min)..... | 8 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (1 vert.) |
| | Positional Accuracy (km)..... | 3 |
| CAMERA: | Focal Length (mm)..... | 16 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 125 |
| | Signal-to-Noise Ratio..... | 26 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 72 x 72 |
| Pointing Accuracy (deg)..... | 0.30 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.99/1.9 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 4.6×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Only 27% coverage is achieved with this sun-synchronous orbit in the first 55 days. 70% coverage requires 420 days. Ground resolution is 0.6 km to permit 1 km vertical height difference detection by stereo parallax. Forward stereo would increase data rate to 9.2×10^5 .

PLANET: Mars

OBSERVABLE: Surface Topography (local)

Family No. 21a

TV TYPE: 2-inch RBV (shadowing)

ORBIT: Data Sheet Number..... 32
Periapse/Apoapse Alt. (km)..... 340/33,809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340-976
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km)..... 100
Max. Ground Resolution (km)..... 0.2 (0.1 vert.)
Positional Accuracy (km)..... 0.2

CAMERA: Focal Length (mm)..... 77
Aperture Stop..... f/2
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 19
Signal-to-Noise Ratio..... 10

SUPPORT REQUIREMENTS:

Field of View (deg)..... 17 x 17
Pointing Accuracy (deg)..... 0.012
Camera Volume (cu. ft.)..... 0.65
Max. Roll/Yaw Rate (deg/sec)..... 0.20/3.8
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 2.0×10^6
Camera Weight (lbs)..... 32

COMMENTS:

Ground resolution of 0.17 km is used to permit shadow measurements leading to vertical height differences of 0.1 km.

PLANET: Mars

OBSERVABLE: Surface Topography (local)

Family No. 21b

CAMERA: 70mm with SO-243 film and IMC (shadowing)

ORBIT: Data Sheet Number..... 33
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-2117
Imaging On-Time (min)..... 39

IMAGE: Minimum Image Size (km)..... 100
Max. Ground Resolution (km)..... 0.2 (0.1 vert.)
Positional Accuracy (km)..... 0.2

CAMERA: Focal Length (mm)..... 99
Aperture Stop..... f/1.8
Exposure Time (sec)..... 0.05
Cycle Time (sec)..... 55
Length of Film (ft)..... 68
Shielding Weight (lbs)..... 3

SUPPORT REQUIREMENTS:

Field of View (deg)..... 36 x 36
Pointing Accuracy (deg)..... 0.0054
Camera Volume (cu. ft.)..... 1.6
Camera Shape (ft)..... 1.5x0.6x1.5
Max. Roll/Yaw Rate (deg/sec)..... 0.016/0.24
Operating Power (watts)..... 67
Data Rate (bits/sec)..... 9.4×10^6
Camera Weight (lbs)..... 45

COMMENTS:

Image size is 250 x 250 km. Film length based on 10% coverage.

PLANET: Mars

OBSERVABLE: Surface Topography (local)

Family No. 16

CAMERA: 5-inch with SO-243 film and IMC (side stereo)

ORBIT: Data Sheet Number..... 27
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-485
Imaging On-Time (min)..... 17

IMAGE: Minimum Image Size (km)..... 100
Max. Ground Resolution (km)..... 0.2 (0.1 vert.)
Positional Accuracy (km)..... 0.2

CAMERA: Focal Length (mm)..... 82
Aperture Stop..... f/1.8
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 110
Length of Film (ft)..... 62
Shielding Weight (lbs)..... 5

SUPPORT REQUIREMENTS:

Field of View (deg)..... 70 x 70
Pointing Accuracy (deg)..... 0.024
Camera Volume (cu. ft.)..... 2.3
Camera Shape (ft)..... 1.1x0.8x2.2
Max. Roll/Yaw Rate (deg/sec)..... 1.1/0.20
Operating Power (watts)..... 110
Data Rate (bits/sec)..... 1.6×10^7
Camera Weight (lbs)..... 63

COMMENTS:

Image size is actually 550 x 550 km, with ground resolution (at periapse) of 60m. Forward stereo would result in data rate of 3.1×10^7 .

PLANET: Mars

OBSERVABLE: Surface Topography (detailed)

Family No. 30

TV TYPE: Shadowing

| | | |
|---------|----------------------------------|--------------------|
| ORBIT: | Data Sheet Number..... | 42 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-2117 |
| | Imaging On-Time (min)..... | 39 |
| IMAGE: | Minimum Image Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.005 (0.05 vert.) |
| | Positional Accuracy (km)..... | 0.005 |
| CAMERA: | Focal Length (mm)..... | |
| | Aperture Stop..... | |
| | Exposure Time (sec)..... | |
| | Cycle Time (sec)..... | |
| | Signal-to-Noise Ratio..... | |

SUPPORT REQUIREMENTS:

| |
|-----------------------------------|
| Field of View (deg)..... |
| Pointing Accuracy (deg)..... |
| Camera Volume (cu. ft.)..... |
| Max. Roll/Yaw Rate (deg/sec)..... |
| Operating Power (watts)..... |
| Data Rate (bits/sec)..... |
| Camera Weight (lbs)..... |

COMMENTS:

Large focal lengths (~5m) and large optical system diameters (>2m) are required for TV systems. Low solar elevation required for shadows prevents use of a slow film which would otherwise provide adequate resolution.

PLANET: Mars

OBSERVABLE: Surface Topography (detailed)

Family No. 25

CAMERA: 9.5-inch with SO-230 film and IMC (forward stereo)

| | |
|-------------------------------------|--------------------|
| ORBIT: Data Sheet Number..... | 37 |
| Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| Inclination (deg)..... | 124 |
| Imaging Altitude Range (km)..... | 383-485 |
| Imaging On-Time (min)..... | 17 |
| IMAGE: Minimum Image Size (km)..... | 0.5 |
| Max. Ground Resolution (km)..... | 0.005 (0.05 vert.) |
| Positional Accuracy (km)..... | 0.005 |
| CAMERA: Focal Length (mm)..... | 700 |
| Aperture Stop..... | f/1.9 |
| Exposure Time (sec)..... | 0.002 |
| Cycle Time (sec)..... | 12 |
| Length of Film (ft)..... | 230 |
| Shielding Weight (lbs)..... | 74 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 18 x 18 |
| Pointing Accuracy (deg)..... | 0.0006 |
| Camera Volume (cu. ft.)..... | 13 |
| Camera Shape (ft)..... | 3.3x1.3x2.9 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.49/0.38 |
| Operating Power (watts)..... | 280 |
| Data Rate (bits/sec)..... | 5.0×10^8 |
| Camera Weight (lbs)..... | 270 |

COMMENTS:

Image size is actually 125 x 125 km. Film length based on 1% planetary coverage.

PLANET: Mars

OBSERVABLE: Surface Appearance (regional)

Family No. 8a

TV TYPE: 1-inch vidicon

ORBIT: Data Sheet Number..... 13
Periapse/Apoapse Alt. (km)..... 969/969
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 969
Imaging On-Time (min)..... 34

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 19
Aperture Stop..... f/8
Exposure Time (sec)..... 0.1
Cycle Time (sec)..... 200
Signal-to-Noise Ratio..... 28

SUPPORT REQUIREMENTS:

Field of View (deg)..... 34 x 34
Pointing Accuracy (deg)..... 0.59
Camera Volume (cu. ft.)..... 0.32
Max. Roll/Yaw Rate (deg/sec)..... 0.30/0.95
Operating Power (watts)..... 16
Data Rate (bits/sec)..... 7400
Camera Weight (lbs)..... 16

COMMENTS:

67% coverage is completed in 40 days.

PLANET: Mars

OBSERVABLE: Surface Appearance (regional)

Family No. 8b

TV TYPE: 1-inch vidicon

ORBIT: Data Sheet Number..... 14
Periapse/Apoapse Alt. (km)..... 969/969
Inclination (deg)..... 95
Imaging Altitude Range (km)..... 969
Imaging On-Time (min)..... 45

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 19
Aperture Stop..... f/8
Exposure Time (sec)..... 0.1
Cycle Time (sec)..... 200
Signal-to-Noise Ratio..... 28

SUPPORT REQUIREMENTS:

Field of View (deg)..... 34 x 34
Pointing Accuracy (deg)..... 0.59
Camera Volume (cu. ft.)..... 0.32
Max. Roll/Yaw Rate (deg/sec)..... 0.30/0.95
Operating Power (watts)..... 16
Data Rate (bits/sec)..... 7400
Camera Weight (lbs)..... 16

COMMENTS:

74% coverage achieved in 5 days by sun-synchronous orbit.

PLANET: Mars

OBSERVABLE: Surface Appearance (regional)

Family No. 6

TV TYPE: 2-inch RBV with color filters

| | | |
|---------|----------------------------------|----------|
| ORBIT: | Data Sheet Number..... | 11 |
| | Periapse/Apoapse Alt. (km)..... | 425/6955 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 425-952 |
| | Imaging On-Time (min)..... | 18 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 9 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 280 |
| | Signal-to-Noise Ratio..... | 8 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------------------|
| Field of View (deg)..... | 104 x 104 |
| Pointing Accuracy (deg)..... | 0.60 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 3.0/4.6 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 4.1 x 10 ⁵ |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Only 58% coverage is achieved. A 1½" vidicon with a zoom lens could have been used; the data rate would be decreased but the system weight increased.

PLANET: Mars

OBSERVABLE: Surface Appearance (local)

Family No. 21a

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number.....32
Periapse/Apoapse Alt. (km)..... 340/33,809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340-976
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km)..... 100
Max. Ground Resolution (km)..... 0.2
Positional Accuracy (km)..... 2

CAMERA: Focal Length (mm)..... 77
Aperture Stop..... f/2
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 19
Signal-to-Noise Ratio..... 10

| SUPPORT REQUIREMENTS: | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 17 x 17 |
| Pointing Accuracy (deg)..... | 0.12 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.20/3.8 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 2.0×10^6 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

PLANET: Mars

OBSERVABLE: Surface Appearance (local)

Family No. 21b

CAMERA: 70mm with SO-243 film and IMC

| | |
|-------------------------------------|------------|
| ORBIT: Data Sheet Number..... | 33 |
| Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| Inclination (deg)..... | 124 |
| Imaging Altitude Range (km)..... | 383-2117 |
| Imaging On-Time (min)..... | 39 |
| IMAGE: Minimum Image Size (km)..... | 100 |
| Max. Ground Resolution (km)..... | 0.2 |
| Positional Accuracy (km)..... | 2 |
| CAMERA: Focal Length (mm)..... | 74 |
| Aperture Stop..... | f/1.8 |
| Exposure Time (sec)..... | 0.05 |
| Cycle Time (sec)..... | 67 |
| Length of Film (ft)..... | 46 |
| Shielding Weight (lbs)..... | 2 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 47 x 47 |
| Pointing Accuracy (deg)..... | 0.054 |
| Camera Volume (cu. ft.)..... | 1.3 |
| Camera Shape (ft)..... | 1.4x0.6x1.4 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.018/0.22 |
| Operating Power (watts)..... | 67 |
| Data Rate (bits/sec)..... | 7.7×10^6 |
| Camera Weight (lbs)..... | 41 |

COMMENTS:

Image size is actually 335 x 335 km, providing ground resolution of 45m at periapse. Film length based on 10% coverage.

PLANET: Mars

OBSERVABLE: Surface Appearance (local)

Family No. 19

TV TYPE: 2-inch RBV with color filters

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 30 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-880 |
| | Imaging On-Time (min)..... | 23 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 |
| | Positional Accuracy (km)..... | 2 |
| CAMERA: | Focal Length (mm)..... | 87 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 20 |
| | Signal-to-Noise Ratio..... | 8 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 15 x 15 |
| Pointing Accuracy (deg)..... | 0.13 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.22/3.8 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 5.7×10^6 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Ground resolution is actually 0.13 km at 880 km altitude.

PLANET: Mars

OBSERVABLE: Surface Appearance (detailed)

Family No. 28

TV TYPE: 2-inch RBV with color filters and IMC

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 40 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-880 |
| | Imaging On-Time (min)..... | 23 |
| IMAGE: | Minimum Image Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.005 |
| | Positional Accuracy (km)..... | 0.02 |
| CAMERA: | Focal Length (mm)..... | 2300 |
| | Aperture Stop..... | f/2.5 |
| | Exposure Time (sec)..... | 0.003 |
| | Cycle Time (sec)..... | 0.8 |
| | Signal-to-Noise Ratio..... | 4 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.5 x 0.5 |
| Pointing Accuracy (deg)..... | 0.0013 |
| Camera Volume (cu. ft.)..... | 66 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.18/8.4 |
| Operating Power (watts)..... | 47 |
| Data Rate (bits/sec)..... | 2.4×10^8 |
| Camera Weight (lbs)..... | 360 |

COMMENTS:

Image size used is 3.8 x 3.8 km. Optical system is one meter in diameter.

PLANET: Mars

OBSERVABLE: Surface Appearance (detailed)

Family No. 30

TV TYPE:

ORBIT: Data Sheet Number.....42
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-2117
Imaging On-Time (min)..... 39

IMAGE: Minimum Image Width (km)..... 0.5
Max. Ground Resolution (km)..... 0.005
Positional Accuracy (km)..... 0.02

CAMERA: Focal Length (mm).....
Aperture Stop.....
Exposure Time (sec).....
Cycle Time (sec).....
Signal-to-Noise Ratio.....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
Camera Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
Camera Weight (lbs).....

COMMENTS:

TV systems require long focal lengths (~5m) and large optical system diameter (>2m). Low solar elevation angles do not permit use of film with adequate resolution capability.

PLANET: Mars

OBSERVABLE: Variable Surface Appearance (regional)

Family No. 8a

TV TYPE: 1-inch vidicon

ORBIT: Data Sheet Number..... 13
Periapse/Apoapse Alt. (km)..... 969/969
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 969
Imaging On-Time (min)..... 34

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 19
Aperture Stop..... f/8
Exposure Time (sec)..... 0.1
Cycle Time (sec)..... 200
Signal-to-Noise Ratio..... 28

SUPPORT REQUIREMENTS:

Field of View (deg)..... 34 x 34
Pointing Accuracy (deg)..... 0.59
Camera Volume (cu. ft.)..... 0.32
Max. Roll/Yaw Rate (deg/sec)..... 0.30/0.95
Operating Power (watts)..... 16
Data Rate (bits/sec)..... 7400
Camera Weight (lbs)..... 16

COMMENTS:

The same area can be imaged once every 5 days, not daily as desired.

PLANET: Mars

OBSERVABLE: Variable Surface Appearance (regional)

Family No. 8b

TV TYPE: 1-inch vidicon

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 14 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 95 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 45 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 19 |
| | Aperture Stop..... | f/8 |
| | Exposure Time (sec)..... | 0.1 |
| | Cycle Time (sec)..... | 200 |
| | Signal-to-Noise Ratio..... | 28 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 0.59 |
| Camera Volume (cu. ft.)..... | 0.32 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.30/0.95 |
| Operating Power (watts)..... | 16 |
| Data Rate (bits/sec)..... | 7400 |
| Camera Weight (lbs)..... | 16 |

COMMENTS:

The same area can be imaged every 5 days, not daily as desired. However, 74% coverage is available in each 5 day period, so at least four coverages of 10% can be obtained in a Martian year as desired.

PLANET: Mars

OBSERVABLE: Variable Surface Appearance (regional)

Family No. 6

TV TYPE: 2-inch RBV with color filters

ORBIT: Data Sheet Number..... 11
Periapse/Apoapse Alt. (km)..... 425/6955
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 425-952
Imaging On-Time (min)..... 18

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 9
Aperture Stop..... f/2
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 280
Signal-to-Noise Ratio..... 8

SUPPORT REQUIREMENTS:

Field of View (deg)..... 104 x 104
Pointing Accuracy (deg)..... 0.60
Camera Volume (cu. ft.)..... 0.65
Max. Roll/Yaw Rate (deg/sec)..... 3.0/4.6
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 4.1×10^5
Camera Weight (lbs)..... 32

COMMENTS:

The same area can be observed every 10 days, not daily as desired. However, nearly 60% of the planet can be observed in each ten day period, permitting seasonal coverage as desired.

PLANET: Mars

OBSERVABLE: Variable Surface Appearance (local)

Family No. 21a

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 32 |
| | Periapse/Apoapse Alt. (km)..... | 340/33,809 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 340-976 |
| | Imaging On-Time (min)..... | 22 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 |
| | Positional Accuracy (km)..... | 2 |
| CAMERA: | Focal Length (mm)..... | 77 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 19 |
| | Signal-to-Noise Ratio..... | 10 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 17 x 17 |
| Pointing Accuracy (deg)..... | 0.12 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.20/3.8 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 2.0×10^6 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

The same area can be imaged after a 1 day interval.
75% coverage can be obtained every 50 days.

PLANET: Mars

OBSERVABLE: Variable Surface Appearance (local)

Family No. 21b

CAMERA: 70mm with SO-243 film and IMC

| | |
|-------------------------------------|------------|
| ORBIT: Data Sheet Number..... | 33 |
| Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| Inclination (deg)..... | 124 |
| Imaging Altitude Range (km)..... | 383-2117 |
| Imaging On-Time (min)..... | 39 |
| IMAGE: Minimum Image Size (km)..... | 100 |
| Max. Ground Resolution (km)..... | 0.2 |
| Positional Accuracy (km)..... | 2 |
| CAMERA: Focal Length (mm)..... | 74 |
| Aperture Stop..... | f/1.8 |
| Exposure Time (sec)..... | 0.05 |
| Cycle Time (sec)..... | 67 |
| Length of Film (ft)..... | 46 |
| Shielding Weight (lbs)..... | 2 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 47 x 47 |
| Pointing Accuracy (deg)..... | 0.054 |
| Camera Volume (cu. ft.)..... | 1.3 |
| Camera Shape (ft)..... | 1.4x0.6x1.4 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.018/0.22 |
| Operating Power (watts)..... | 67 |
| Data Rate (bits/sec)..... | 7.7×10^6 |
| Camera Weight (lbs)..... | 41 |

COMMENTS:

Image size is actually 335 x 335 km, with ground resolution of 45m at periapse. Film length is based on 10% coverage, although only 1% is required. 74% coverage is available every 50 days.

PLANET: Mars

OBSERVABLE: Variable Surface Appearance (local)

Family No. 19

TV TYPE: 2-inch RBV with color filters

ORBIT: Data Sheet Number..... 30
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-880
Imaging On-Time (min)..... 23

IMAGE: Minimum Image Width (km)..... 100
Max. Ground Resolution (km)..... 0.2
Positional Accuracy (km)..... 2

CAMERA: Focal Length (mm)..... 87
Aperture Stop..... f/2
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 20
Signal-to-Noise Ratio..... 8

SUPPORT REQUIREMENTS:

Field of View (deg)..... 15 x 15
Pointing Accuracy (deg)..... 0.13
Camera Volume (cu. ft.)..... 0.65
Max. Roll/Yaw Rate (deg/sec)..... 0.22/3.8
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 5.7×10^6
Camera Weight (lbs)..... 32

COMMENTS:

Both a daily image interval and a seasonal coverage interval is provided as desired. Ground resolution is actually 0.13 km at 880 km altitude.

PLANET: Mars

OBSERVABLE: Variable Surface Appearance (detailed)

Family No. 28

TV TYPE: 2-inch RBV with color filters and IMC

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 40 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-880 |
| | Imaging On-Time (min)..... | 23 |
| IMAGE: | Minimum Image Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.005 |
| | Positional Accuracy (km)..... | 0.02 |
| CAMERA: | Focal Length (mm)..... | 2300 |
| | Aperture Stop..... | f/2.5 |
| | Exposure Time (sec)..... | 0.003 |
| | Cycle Time (sec)..... | 0.8 |
| | Signal-to-Noise Ratio..... | 4 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.5 x 0.5 |
| Pointing Accuracy (deg)..... | 0.0013 |
| Camera Volume (cu. ft.)..... | 66 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.18/8.4 |
| Operating Power (watts)..... | 47 |
| Data Rate (bits/sec)..... | 2.4×10^8 |
| Camera Weight (lbs)..... | 360 |

COMMENTS:

Same area can be imaged daily and seasonally, as desired. Image size is actually 3.8 x 3.8 km.

PLANET: Mars

OBSERVABLE: Variable Surface Appearance (detailed)

Family No. 30

TV TYPE:

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 42 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-2117 |
| | Imaging On-Time (min)..... | 39 |
| IMAGE: | Minimum Image Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.005 |
| | Positional Accuracy (km)..... | 0.02 |
| CAMERA: | Focal Length (mm)..... | |
| | Aperture Stop..... | |
| | Exposure Time (sec)..... | |
| | Cycle Time (sec)..... | |
| | Signal-to-Noise Ratio..... | |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|--|
| Field of View (deg)..... | |
| Pointing Accuracy (deg)..... | |
| Camera Volume (cu. ft.)..... | |
| Max. Roll/Yaw Rate (deg/sec)..... | |
| Operating Power (watts)..... | |
| Data Rate (bits/sec)..... | |
| Camera Weight (lbs)..... | |

COMMENTS:

TV systems require optical components beyond state-of-art, while film systems do not have adequate sensitivity at low solar elevation angles.

PLANET: Mars

OBSERVABLE: Surface Winds (regional)

Family No. 7

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number.....12
Periapse/Apoapse Alt. (km)..... 969/969
Inclination (deg)..... 95
Imaging Altitude Range (km)..... 969
Imaging On-Time (min)..... 32

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 30

CAMERA: Focal Length (mm)..... 6
Aperture Stop..... f/5.6
Exposure Time (sec)..... 0.05
Cycle Time (sec)..... 320
Signal-to-Noise Ratio..... 10

SUPPORT REQUIREMENTS:

Field of View (deg)..... 34 x 34
Pointing Accuracy (deg)..... 1.8
Camera Volume (cu. ft.)..... 0.16
Max. Roll/Yaw Rate (deg/sec)..... 2.0/3.8
Operating Power (watts)..... 8
Data Rate (bits/sec)..... 4600
Camera Weight (lbs)..... 8

COMMENTS:

The same area can be imaged again after 5 days, not 2 hrs as desired. 78% coverage is achieved in 5 days. Ground resolution provided is 7.3 km.

PLANET: Mars

OBSERVABLE: Surface Winds (local)

Family No. 20

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 31 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-1115 |
| | Imaging On-Time (min)..... | 31 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 |
| | Positional Accuracy (km)..... | 2 |
| CAMERA: | Focal Length (mm)..... | 87 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 20 |
| | Signal-to-Noise Ratio..... | 16 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 15 x 15 |
| Pointing Accuracy (deg)..... | 0.10 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.17/3.8 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 1.9×10^6 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

The ground resolution is 60m at periapse, 170m at 1115 km altitude. By using 60% image overlap and doubling the data rate, very nearly the same area could be imaged after a 10 sec interval. A one min interval is desired.

PLANET: Mars

OBSERVABLE: Topographic Changes

Family No. 30

TV TYPE: Shadowing

ORBIT: Data Sheet Number..... 42
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-2117
Imaging On-Time (min)..... 39

IMAGE: Minimum Image Width (km)..... 0.5
Max. Ground Resolution (km)..... 0.005 (0.05 vert)
Positional Accuracy (km)..... 0.005

CAMERA: Focal Length (mm).....
Aperture Stop.....
Exposure Time (sec).....
Cycle Time (sec).....
Signal-to-Noise Ratio.....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
Camera Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
Camera Weight (lbs).....

COMMENTS:

From 2117 km altitude, required TV systems have optics exceeding state-of-art, while film systems are not sufficiently sensitive at the required low solar elevation angles.

PLANET: Mars

OBSERVABLE: Topographic Changes

Family No. 25

CAMERA: 9.5-inch with SO-230 film and IMC (forward stereo)

ORBIT: Data Sheet Number..... 37
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-485
Imaging On-Time (min)..... 17

IMAGE: Minimum Image Size (km)..... 0.5
Max. Ground Resolution (km)..... 0.005 (0.05 vert.)
Positional Accuracy (km)..... 0.005

CAMERA: Focal Length (mm)..... 700
Aperture Stop..... f/1.9
Exposure Time (sec)..... 0.02
Cycle Time (sec)..... 12
Length of Film (ft)..... 230
Shielding Weight (lbs)..... 74

SUPPORT REQUIREMENTS:

Field of View (deg)..... 18 x 18
Pointing Accuracy (deg)..... 0.0006
Camera Volume (cu. ft.)..... 13
Camera Shape (ft)..... 3.3x1.3x2.9
Max. Roll/Yaw Rate (deg/sec)..... 0.49/0.38
Operating Power (watts)..... 280
Data Rate (bits/sec)..... 5.0×10^8
Camera Weight (lbs)..... 270

COMMENTS:

The same areas can be imaged after a one day interval which should be adequate to determine if topographic changes are occurring. Film length is based on 1% planetary coverage. Actual image size is 125 x 125 km.

PLANET: Mars

OBSERVABLE: Global Cloud Coverag

Family No. 1a

TV TYPE: 0.5-inch vidicon

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 1 |
| | Periapse/Apoapse Alt. (km)..... | 931/931 |
| | Inclination (deg)..... | 71 |
| | Imaging Altitude Range (km)..... | 931 |
| | Imaging On-Time (min)..... | 71 |
| IMAGE: | Minimum Image Width (km)..... | 1000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| CAMERA: | Focal Length (mm)..... | 5 |
| | Aperture Stop..... | f/5.6 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 400 |
| | Signal-to-Noise Ratio..... | 45 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | 62 x 62 |
| Pointing Accuracy (deg)..... | 3.1 |
| Camera Volume (cu. ft.)..... | 0.16 |
| Max. Roll/Yaw Rate (deg/sec)..... | 11/16 |
| Operating Power (watts)..... | 8 |
| Data Rate (bits/sec)..... | 4600 |
| Camera Weight (lbs)..... | 8 |

COMMENTS:

95% coverage is provided in 3 days, not 1 day as desired. Actual image size is 1200 x 1200 km with 10 km resolution.

PLANET: Mars

OBSERVABLE: Global Cloud Coverage

Family No. 1a

TV TYPE: 0.5-inch vidicon with color filters

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 1 |
| | Periapse/Apoapse Alt. (km)..... | 931/931 |
| | Inclination (deg)..... | 71 |
| | Imaging Altitude Range (km)..... | 931 |
| | Imaging On-Time (min)..... | 71 |
| IMAGE: | Minimum Image Width (km)..... | 1000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| CAMERA: | Focal Length (mm)..... | 5 |
| | Aperture Stop..... | f/5.6 |
| | Exposure Time (sec)..... | 0.05 |
| | Cycle Time (sec)..... | 400 |
| | Signal-to-Noise Ratio..... | 20 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | 62 x 62 |
| Pointing Accuracy (deg)..... | 3.1 |
| Camera Volume (cu. ft.)..... | 0.16 |
| Max. Roll/Yaw Rate (deg/sec)..... | 2.1/3.3 |
| Operating Power (watts)..... | 8 |
| Data Rate (bits/sec)..... | 4600 |
| Camera Weight (lbs)..... | 8 |

COMMENTS:

See previous data sheet.

PLANET: Mars

OBSERVABLE: Global Cloud Coverage

Family No. 1b

TV TYPE: 1.5-inch vidicon

ORBIT: Data Sheet Number.....2
Periapse/Apoapse Alt. (km).....440/5473
Inclination (deg).....90
Imaging Altitude Range (km).....440-2568
Imaging On-Time (min).....65

IMAGE: Minimum Image Width (km).....1000
Max. Ground Resolution (km).....20
Positional Accuracy (km).....50

CAMERA: Focal Length (mm).....8
Aperture Stop.....f/8
Exposure Time (sec).....0.01
Cycle Time (sec).....230
Signal-to-Noise Ratio.....57

SUPPORT REQUIREMENTS:

Field of View (deg).....92 x 92
Pointing Accuracy (deg).....1.1
Camera Volume (cu. ft.).....0.49
Max. Roll/Yaw Rate (deg/sec).....7.4/38
Operating Power (watts).....24
Data Rate (bits/sec)..... 1.2×10^4
Camera Weight (lbs).....24

COMMENTS:

58% coverage is provided in 6 days, not 70% in 1 day as desired. Coverage can be repeated every 6 days. Resolution is 8.6 km at periapse, 19 km at 2568 altitude. A $\frac{1}{2}$ " vidicon with a zoom lens could also be used.

PLANET: Mars

OBSERVABLE: Global Cloud Coverage

Family No. 16.

TV TYPE: 1.5-inch vidicon with color filters

ORBIT: Data Sheet Number.....2
Periapse/Apoapse Alt. (km).....440/5473
Inclination (deg).....90
Imaging Altitude Range (km).....440-2568
Imaging On-Time (min).....65

IMAGE: Minimum Image Width (km).....1000
Max. Ground Resolution (km).....20
Positional Accuracy (km).....50

CAMERA: Focal Length (mm).....8
Aperture Stop.....f/8
Exposure Time (sec).....0.1
Cycle Time (sec).....230
Signal-to-Noise Ratio.....35

SUPPORT REQUIREMENTS:

Field of View (deg).....92 x 92
Pointing Accuracy (deg).....1.1
Camera Volume (cu. ft.).....0.49
Max. Roll/Yaw Rate (deg/sec).....0.74/3.8
Operating Power (watts).....24
Data Rate (bits/sec).....1.2 x 10⁴
Camera Weight (lbs).....24

COMMENTS:

See previous data sheet.

PLANET: Mars

OBSERVABLE: Convective Cells and Turbulence (regional)

Family No. 9

TV TYPE: 0.5-inch vidicon

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 15 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 44 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| CAMERA: | Focal Length (mm)..... | 6 |
| | Aperture Stop..... | f/5.6 |
| | Exposure Time (sec)..... | 0.05 |
| | Cycle Time (sec)..... | 320 |
| | Signal-to-Noise Ratio..... | 10 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 3.0 |
| Camera Volume (cu. ft.)..... | 0.16 |
| Max. Roll/Yaw Rate (deg/sec)..... | 2.0/3.8 |
| Operating Power (watts)..... | 8 |
| Data Rate (bits/sec)..... | 4600 |
| Camera Weight (lbs)..... | 8 |

COMMENTS:

7.3 km ground resolution is provided.

PLANET: Mars

OBSERVABLE: Convective Cells and Turbulence (detailed)

Family No. 22

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number..... 34
Periapse/Apoapse Alt. (km)..... 340/33,809
Inclination (deg)..... 70
Imaging Altitude Range (km)..... 340-365
Imaging On-Time (min)..... 0.5

IMAGE: Minimum Image Width (km)..... 100
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 6

CAMERA: Focal Length (mm)..... 19
Aperture Stop..... f/5.6
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 20
Signal-to-Noise Ratio..... 45

SUPPORT REQUIREMENTS:

Field of View (deg)..... 17 x 17
Pointing Accuracy (deg)..... 0.94
Camera Volume (cu. ft.)..... 0.16
Max. Roll/Yaw Rate (deg/sec)..... 7.8/57
Operating Power (watts)..... 8
Data Rate (bits/sec)..... 2.3×10^4
Camera Weight (lbs)..... 8

COMMENTS:

Ground resolution is 0.6 km. The same area can be imaged on the next orbital pass (after 24.6 hrs) as desired.

PLANET: Mars

OBSERVABLE: Cloud Formation

Family No. 9

TV TYPE: 1-inch vidicon

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 15 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 44 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 19 |
| | Aperture Stop..... | f/8 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 200 |
| | Signal-to-Noise Ratio..... | 49 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 0.59 |
| Camera Volume (cu. ft.)..... | 0.32 |
| Max. Roll/Yaw Rate (deg/sec)..... | 3.0/9.5 |
| Operating Power (watts)..... | 16 |
| Data Rate (bits/sec)..... | 7400 |
| Camera Weight (lbs)..... | 16 |

COMMENTS:

Same area can be imaged after 5 days, not 15 min as desired. However, by using 60% image overlap nearly the same area could be imaged after 100 sec without increasing the data rate.

PLANET: Mars

OBSERVABLE: Cloud Formation

Family No. 9

TV TYPE: 1-inch vidicon with color filters

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 15 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 44 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 19 |
| | Aperture Stop..... | f/8 |
| | Exposure Time (sec)..... | 0.1 |
| | Cycle Time (sec)..... | 200 |
| | Signal-to-Noise Ratio..... | 30 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 34 x 34 |
| Pointing Accuracy (deg)..... | 0.59 |
| Camera Volume (cu. ft.)..... | 0.32 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.30/0.95 |
| Operating Power (watts)..... | 16 |
| Data Rate (bits/sec)..... | 1.1×10^4 |
| Camera Weight (lbs)..... | 16 |

COMMENTS:

Same area can be imaged after 5 days, not 15 min as desired.

PLANET: Mars

OBSERVABLE: Cyclone Formations (regional)

Family No. 9

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number.....15
Periapse/Apoapse Alt. (km).....969/969
Inclination (deg).....90
Imaging Altitude Range (km).....969
Imaging On-Time (min).....44

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km).....20
Positional Accuracy (km).....50

CAMERA: Focal Length (mm).....6
Aperture Stop.....f/5.6
Exposure Time (sec).....0.05
Cycle Time (sec).....320
Signal-to-Noise Ratio.....10

SUPPORT REQUIREMENTS:

Field of View (deg).....34 x 34
Pointing Accuracy (deg).....3.0
Camera Volume (cu. ft.).....0.16
Max. Roll/Yaw Rate (deg/sec).....2.0/3.8
Operating Power (watts).....8
Data Rate (bits/sec).....4600
Camera Weight (lbs).....8

COMMENTS:

A 1/2" vidicon provides 7.3 km ground resolution.

PLANET: Mars

OBSERVABLE: Cyclone Formations (detailed)

Family No. 22

TV TYPE: 0.5-inch vidicon

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 34 |
| | Periapse/Apoapse Alt. (km)..... | 340/33,809 |
| | Inclination (deg)..... | 70 |
| | Imaging Altitude Range (km)..... | 340-365 |
| | Imaging On-Time (min)..... | 0.5 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 19 |
| | Aperture Stop..... | f/5.6 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 20 |
| | Signal-to-Noise Ratio..... | 45 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 17 x 17 |
| Pointing Accuracy (deg)..... | 1.6 |
| Camera Volume (cu. ft.)..... | 0.16 |
| Max. Roll/Yaw Rate (deg/sec)..... | 7.8/57 |
| Operating Power (watts)..... | 8 |
| Data Rate (bits/sec)..... | 2.3×10^4 |
| Camera Weight (lbs)..... | 8 |

COMMENTS:

A $\frac{1}{2}$ " vidicon provides 0.6 km ground resolution. The same area can be imaged after 24.6 hrs, not 2 hrs as desired.

PLANET: Mars

OBSERVABLE: Surface to Atmosphere Transfer

Family No. 14

TV TYPE: 0.5-inch vidicon

| | | |
|---------|----------------------------------|-----------|
| ORBIT: | Data Sheet Number..... | 25 |
| | Periapse/Apoapse Alt. (km)..... | 1016/1016 |
| | Inclination (deg)..... | 96 |
| | Imaging Altitude Range (km)..... | 1016 |
| | Imaging On-Time (min)..... | 45 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 29 |
| | Aperture Stop..... | f/5.6 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 66 |
| | Signal-to-Noise Ratio..... | 24 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | 11 x 11 |
| Pointing Accuracy (deg)..... | 0.56 |
| Camera Volume (cu. ft.)..... | 0.16 |
| Max. Roll/Yaw Rate (deg/sec)..... | 2.8/28 |
| Operating Power (watts)..... | 8 |
| Data Rate (bits/sec)..... | 6900 |
| Camera Weight (lbs)..... | 8 |

COMMENTS:

A ½" vidicon actually provides 1 km resolution over an image size of 200 x 200 km. 75% coverage is obtained in 27 days, not 1 day as desired.

PLANET: Mars

OBSERVABLE: Surface to Atmosphere Transfer

Family No. 15

TV TYPE: 0.5-inch vidicon with color filters

ORBIT: Data Sheet Number.....24
Periapse/Apoapse Alt. (km).....1016/1016
Inclination (deg).....90
Imaging Altitude Range (km).....1016
Imaging On-Time (min).....74

IMAGE: Minimum Image Width (km).....100
Max. Ground Resolution (km).....3
Positional Accuracy (km).....10

CAMERA: Focal Length (mm).....29
Aperture Stop.....f/5.6
Exposure Time (sec).....0.1
Cycle Time (sec).....66
Signal-to-Noise Ratio.....5

SUPPORT REQUIREMENTS:

Field of View (deg).....11 x 11
Pointing Accuracy (deg).....0.56
Camera Volume (cu. ft.).....0.16
Max. Roll/Yaw Rate (deg/sec).....0.28/2.8
Operating Power (watts).....8
Data Rate (bits/sec)..... 2.1×10^4
Camera Weight (lbs).....8

COMMENTS:

See previous data sheet.

PLANET: Mars

OBSERVABLE: Auroras

Family No. 10a

TV TYPE: 0.5-inch vidicon

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 16 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 95 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 28 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| CAMERA: | Focal Length (mm)..... | 6 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.1 |
| | Cycle Time (sec)..... | 320 |
| | Signal-to-Noise Ratio..... | 20 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | 52 x 52 |
| Pointing Accuracy (deg)..... | 3.0 |
| Camera Volume (cu. ft.)..... | 0.16 |
| Max. Roll/Yaw Rate (deg/sec)..... | 2.0/3.8 |
| Operating Power (watts)..... | 8 |
| Data Rate (bits/sec)..... | 4600 |
| Camera Weight (lbs)..... | 8 |

COMMENTS:

A ½" vidicon gives image size of 1000 x 1000 km with 7.3 km resolution. Design based on 1 foot-lambert scene luminance. Image repetition time (same area) is 5 days, not 2 hrs. North pole is covered.

PLANET: Mars

OBSERVABLE: Auroras

Family No. 10a

TV TYPE: 0.5-inch vidicon with color filters

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 16. |
| | Periapse/Apoapse Alt.: (km)..... | 969/969 |
| | Inclination (deg)..... | 95 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 28 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| CAMERA: | Focal Length (mm)..... | 6 |
| | Aperture Stop..... | f/1.4 |
| | Exposure Time (sec)..... | 1 |
| | Cycle Time (sec)..... | 320 |
| | Signal-to-Noise Ratio..... | 17 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 52 x 52 |
| Pointing Accuracy (deg)..... | 3.0 |
| Camera Volume (cu. ft.)..... | 0.16 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.20/0.38 |
| Operating Power (watts)..... | 8 |
| Data Rate (bits/sec)..... | 4600 |
| Camera Weight (lbs)..... | 8 |

COMMENTS:

See previous data sheet.

PLANET: Mars

OBSERVABLE: Auroras

Family No. 10b

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|----------|
| ORBIT: | Data Sheet Number..... | 17 |
| | Periapse/Apoapse Alt. (km)..... | 425/6995 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 425-6481 |
| | Imaging On-Time (min)..... | 37 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| CAMERA: | Focal Length (mm)..... | 10 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.05 |
| | Cycle Time (sec)..... | 220 |
| | Signal-to-Noise Ratio..... | 6 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 94 x 94 |
| Pointing Accuracy (deg)..... | 0.44 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.6/7.6 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

2" RBV gives image size of 1000 x 1000 km with ground resolution of 1.6 km at periapse, 8.3 km at 6481 km altitude. Same area is seen after 10 days, not 2 hrs as desired. Design based on 1 foot-lambert scene luminance.

PLANET: Mars

OBSERVABLE: Auroras

Family No. 10b

TV TYPE: 2-inch RBV with color filters

| | | |
|---------|----------------------------------|----------|
| ORBIT: | Data Sheet Number..... | 17 |
| | Periapse/Apoapse Alt. (km)..... | 425/6995 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 425-6481 |
| | Imaging On-Time (min)..... | 37 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| CAMERA: | Focal Length (mm)..... | 10 |
| | Aperture Stop..... | f/1 |
| | Exposure Time (sec)..... | 0.12 |
| | Cycle Time (sec)..... | 220 |
| | Signal-to-Noise Ratio..... | 4 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 94 x 94 |
| Pointing Accuracy (deg)..... | 0.44 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.25/3.2 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 5.1×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

See previous data sheet.

PLANET: Mars

OBSERVABLE: Animal Life

Family No.

TV TYPE:

ORBIT: Data Sheet Number.....
Periapse/Apoapse Alt. (km).....
Inclination (deg).....
Imaging Altitude Range (km).....
Imaging On-Time (min).....

IMAGE: Minimum Image Width (km)..... 0.3
Max. Ground Resolution (km)..... 0.0002
Positional Accuracy (km)..... 0.2

CAMERA: Focal Length (mm).....
Aperture Stop.....
Exposure Time (sec).....
Cycle Time (sec).....
Signal-to-Noise Ratio.....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
Camera Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
Camera Weight (lbs).....

COMMENTS:

None of the selected orbits permit design of visual imaging systems with optical system less than two meters diameter.

PLANET: Mars

OBSERVABLE: Plant Life

Family No. 20

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 31 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-1115 |
| | Imaging On-Time (min)..... | 31 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 |
| | Positional Accuracy (km)..... | 2 |
| CAMERA: | Focal Length (mm)..... | 87 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 20 |
| | Signal-to-Noise Ratio..... | 16 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 15 x 15 |
| Pointing Accuracy (deg)..... | 0.10 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.17/3.8 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 1.9×10^6 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Ground resolution provided is 60 m at periapse,
170 m at 1115 km altitude.

PLANET: Mars

OBSERVABLE: Plant Life

Family No.19

TV TYPE: 2-inch RBV with color filters

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 30 |
| | Periapse/Apoapse Alt. (km)..... | 383/12,524 |
| | Inclination (deg)..... | 124 |
| | Imaging Altitude Range (km)..... | 383-880 |
| | Imaging On-Time (min)..... | 23 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 |
| | Positional Accuracy (km)..... | 2 |
| CAMERA: | Focal Length (mm)..... | 87 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 20 |
| | Signal-to-Noise Ratio..... | 8 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 15 x 15 |
| Pointing Accuracy (deg)..... | 0.13 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.22/3.8 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 5.7×10^6 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Ground resolution is actually 0.13 km at 880 km altitude.

PLANET: Venus

OBSERVABLE: Global Cloud Coverage

Family No. 3a

TV TYPE: 1.5-inch vidicon

ORBIT: Data Sheet Number..... 89
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg)..... 90
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48
IMAGE: Minimum Image Width (km).....1500
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50
CAMERA: Focal Length (mm)..... 6
Aperture Stop.....f/8
Exposure Time (sec).....0.01
Cycle Time (sec).....180
Signal-to-Noise Ratio.....240

SUPPORT REQUIREMENTS:

Field of View (deg).....112 x 112
Pointing Accuracy (deg).....6.3
Camera Volume (cu. ft.).....0.5
Max. Roll/Yaw Rate (deg/sec).....42/250
Operating Power (watts).....24
Data Rate (bits/sec)..... 1.3×10^4
Camera Weight (lbs).....24

COMMENTS:

Only 50% (rather than the desired 70%) of the planet can be observed in 122 days (rather than the desired 100 hrs.) Only two (rather than 10) coverages per year can be obtained.

PLANET: Venus

OBSERVABLE: Global Cloud Coverage

Family No. 3a

TV TYPE: 1.5-inch vidicon with 3 color filters

ORBIT: Data Sheet Number..... 89
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg)..... 90
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km).....1500
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

CAMERA: Focal Length (mm)..... 6
Aperture Stop.....f/8
Exposure Time (sec).....0.01
Cycle Time (sec).....180
Signal-to-Noise Ratio..... 46

SUPPORT REQUIREMENTS:

Field of View (deg).....112 x 112
Pointing Accuracy (deg).....6.3
Camera Volume (cu. ft.).....0.5
Max. Roll/Yaw Rate (deg/sec).....42/250
Operating Power (watts).....24
Data Rate (bits/sec).....2.2 x 10⁴
Camera Weight (lbs).....24

COMMENTS:

See previous data sheet.

PLANET: Venus

OBSERVABLE: Global Cloud Coverage

Family No. 3b

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number..... 90
Periapse/Apoapse Alt. (km).....248/113,700
Inclination (deg)..... 90
Imaging Altitude Range (km).....248-1297
Imaging On-Time (min)..... 19

IMAGE: Minimum Image Width (km).....1500
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

CAMERA: Focal Length (mm)..... 4
Aperture Stop.....f/2
Exposure Time (sec).....0.01
Cycle Time (sec).....180
Signal-to-Noise Ratio.....240

SUPPORT REQUIREMENTS:

Field of View (deg).....137 x 137
Pointing Accuracy (deg).....2.2
Camera Volume (cu. ft.).....0.65
Max. Roll/Yaw Rate (deg/sec).....15/26
Operating Power (watts).....32
Data Rate (bits/sec).....3.8 x 10⁵
Camera Weight (lbs).....32

COMMENTS:

Only 38% (rather than the desired 70%) planetary coverage is obtained. Each coverage requires 240 days (rather than the desired 100 hrs) and only one (rather than ten) coverages per year are possible from this inertial orbit. 70% planet coverage could be achieved with a 3.5 km/sec plane change.

PLANET: Venus

OBSERVABLE: Global Cloud Coverage

Family No. 3b

TV TYPE: 2-inch RBV with 3 color filters

ORBIT: Data Sheet Number..... 90
Periapse/Apoapse Alt. (km).....248/113,700
Inclination (deg)..... 90
Imaging Altitude Range (km).....248-1297
Imaging On-Time (min)..... 19

IMAGE: Minimum Image Width (km).....1500
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

CAMERA: Focal Length (mm)..... 4
Aperture Stop.....f/2
Exposure Time (sec).....0.01
Cycle Time (sec).....180
Signal-to-Noise Ratio..... 47

SUPPORT REQUIREMENTS:

Field of View (deg).....137 x 137
Pointing Accuracy (deg).....2.2
Camera Volume (cu. ft.).....0.65
Max. Roll/Yaw Rate (deg/sec).....15/26
Operating Power (watts).....32
Data Rate (bits/sec).....6.2 x 10⁵
Camera Weight (lbs).....32

COMMENTS:

See previous data sheet.

PLANET: Venus

OBSERVABLE: Convective Cells and Turbulence (regional)
Family No. 9a

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number.....101
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg)..... 90
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

CAMERA: Focal Length (mm)..... 4
Aperture Stop.....f/5.6
Exposure Time (sec).....0.01
Cycle Time (sec)..... 73
Signal-to-Noise Ratio.....200

SUPPORT REQUIREMENTS:

Field of View (deg)..... 66 x 66
Pointing Accuracy (deg).....6.3
Camera Volume (cu. ft.).....0.16
Max. Roll/Yaw Rate (deg/sec).....42/64
Operating Power (watts).....8
Data Rate (bits/sec).....6200
Camera Weight (lbs).....8

COMMENTS:

Without a plane change, only 50% of the planet can be covered in daylight. The 50% coverage (rather than the desired 70%) is achieved twice per year as desired.

PLANET: Venus

OBSERVABLE: Convective Cells and Turbulence (regional)
Family No. 9b

TV TYPE: 1-inch vidicon

ORBIT: Data Sheet Number.....102
Periapse/Apoapse Alt. (km).....255/50,735
Inclination (deg)..... 90
Imaging Altitude Range (km).....255-2125
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

CAMERA: Focal Length (mm)..... 5
Aperture Stop.....f/8
Exposure Time (sec).....0.01
Cycle Time (sec).....52
Signal-to-Noise Ratio.....210

SUPPORT REQUIREMENTS:

Field of View (deg).....98 x 98
Pointing Accuracy (deg).....1.4
Camera Volume (cu. ft.).....0.32
Max. Roll/Yaw Rate (deg/sec).....9.0/64
Operating Power (watts).....16
Data Rate (bits/sec)..... 1.5×10^4
Camera Weight (lbs).....16

COMMENTS:

This orbit provides only 31% daylight coverage once per year, as opposed to the desired 70% twice per year. A ground resolution of 6 km is provided at periapse.

PLANET: Venus

OBSERVABLE: Convective Cells and Turbulence (detailed)

Family No. 15

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number.....110
Periapse/Apoapse Alt. (km).....454/454.
Inclination (deg)..... 50
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km).....100
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 6

CAMERA: Focal Length (mm)..... 26
Aperture Stop.....f/5.6
Exposure Time (sec).....0.01
Cycle Time (sec)..... 12
Signal-to-Noise Ratio.....200

SUPPORT REQUIREMENTS:

Field of View (deg).....6.3 x 6.3
Pointing Accuracy (deg).....0.76
Camera Volume (cu. ft.).....0.16
Max. Roll/Yaw Rate (deg/sec).....6.3/57
Operating Power (watts).....8
Data Rate (bits/sec).....3.8 x 10⁴
Camera Weight (lbs).....8

COMMENTS:

The same area can be imaged 2 or 3 times at a 1.6 hr interval, an interval less than 100 hrs is required.

PLANET: Venus

OBSERVABLE: Cloud Formation

Family No. 9a

TV TYPE: 1.5-inch vidicon

ORBIT: Data Sheet Number.....101
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg)..... 90
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 13
Aperture Stop.....f/8
Exposure Time (sec).....0.01
Cycle Time (sec)..... 73
Signal-to-Noise Ratio.....250

SUPPORT REQUIREMENTS:

Field of View (deg).....66 x 66
Pointing Accuracy (deg).....1.3
Camera Volume (cu. ft.).....0.49
Max. Roll/Yaw Rate (deg/sec).....6.3/9.6
Operating Power (watts).....24
Data Rate (bits/sec)..... 1.7×10^4
Camera Weight (lbs).....24

COMMENTS:

It is desired that the same area be imaged at least twice in a 15 min interval. This is only possible on the same orbital pass, and then with 60% overlap yielding a cycle time of 35 sec and doubling the data rate given above. 50% of the planet can be observed (only 10% is required), but only twice a year, rather than four times.

PLANET: Venus

OBSERVABLE: Cloud Formation

Family No. 9a

TV TYPE: 1.5-inch vidicon with 3 color filters

ORBIT: Data Sheet Number.....101
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg)..... 90
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 13
Aperture Stop.....f/8
Exposure Time (sec).....0.01
Cycle Time (sec)..... 73
Signal-to-Noise Ratio..... 49

SUPPORT REQUIREMENTS:

Field of View (deg).....66 x, 66
Pointing Accuracy (deg).....1.3
Camera Volume (cu. ft.).....0.49
Max. Roll/Yaw Rate (deg/sec).....6.3/9.6
Operating Power (watts).....24
Data Rate (bits/sec).....5.0 x 10⁴
Camera Weight (lbs).....24

COMMENTS:

See previous data sheet.

PLANET: Venus

OBSERVABLE: Cloud Formation

Family No. 9b

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number.....102
Periapse/Apoapse Alt. (km).....255/50,735
Inclination (deg)..... 90
Imaging Altitude Range (km).....255-2125
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 10
Aperture Stop.....f/2
Exposure Time (sec).....0.01
Cycle Time (sec)..... 52
Signal-to-Noise Ratio.....240

SUPPORT REQUIREMENTS:

Field of View (deg).....98 x 98
Pointing Accuracy (deg).....0.27
Camera Volume (cu. ft.).....0.65
Max. Roll/Yaw Rate (deg/sec).....1.4/9.6
Operating Power (watts).....32
Data Rate (bits/sec).....7.2 x 10⁵
Camera Weight (lbs).....32

COMMENTS:

By reducing the cycle time to 26 sec, two images (with 60% overlap) could be taken. The data rate would then be 1.4 x 10⁶ bits/sec

PLANET: Venus

OBSERVABLE: Cyclone Formations (regional)

Family No. 9a

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number.....101
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg).....90
Imaging Altitude Range (km).....454
Imaging On-Time (min).....48

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km).....20
Positional Accuracy (km).....50

CAMERA: Focal Length (mm).....4
Aperture Stop.....f/5.6
Exposure Time (sec).....0.01
Cycle Time (sec).....73
Signal-to-Noise Ratio.....200

SUPPORT REQUIREMENTS:

Field of View (deg).....66 x 66
Pointing Accuracy (deg).....6.3
Camera Volume (cu. ft.).....0.16
Max. Roll/Yaw Rate (deg/sec).....42/64
Operating Power (watts).....8
Data Rate (bits/sec).....6200
Camera Weight (lbs).....8

COMMENTS:

Only 50% (rather than 70%) coverage is achieved twice (rather than four times) per planetary year.

PLANET: Venus

OBSERVABLE: Cyclone Formations (regional)
Family No. 9b

TV TYPE: 1-inch vidicon

ORBIT: Data Sheet Number.....102
Periapse/Apoapse Alt. (km).....255/50,735
Inclination (deg)..... 90
Imaging Altitude Range (km).....255-2125
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

CAMERA: Focal Length (mm)..... 5
Aperture Stop.....f/8
Exposure Time (sec).....0.01
Cycle Time (sec)..... 52
Signal-to-Noise Ratio.....210

SUPPORT REQUIREMENTS:

Field of View (deg).....98 x 98
Pointing Accuracy (deg).....1.4
Camera Volume (cu. ft.).....0.32
Max. Roll/Yaw Rate (deg/sec).....9.0/64
Operating Power (watts).....16
Data Rate (bits/sec).....1.5 x 10⁴
Camera Weight (lbs).....16

COMMENTS:

Only 31% (rather than 70%) coverage is achieved once
(rather than four times) per year.

PLANET: Venus

OBSERVABLE: Cyclone Formations (detailed)
Family No. 16

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number.....111
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg)..... 90
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km).....100
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 26
Aperture Stop..... f/5.6
Exposure Time (sec).....0.01
Cycle Time (sec)..... 12
Signal-to-Noise Ratio.....200

SUPPORT REQUIREMENTS:

Field of View (deg).....6.3 x 6.3
Pointing Accuracy (deg).....1.3
Camera Volume (cu. ft.).....0.16
Max. Roll/Yaw Rate (deg/sec).....6.3/57
Operating Power (watts).....8
Data Rate (bits/sec).....3.8 x 10⁴
Camera Weight (lbs).....8

COMMENTS:

Since the orbit period is 1.6 hrs, images of essentially the same area can be obtained two or three times at 1.6 hr intervals, which satisfies the desired 2 hr image interval specification. Only two coverages (of 50%) are possible per year, rather than four times. Only 10% coverage is required.

PLANET: Venus

OBSERVABLE: Auroras

Family No. 11a

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number.....105
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg)..... 90
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

CAMERA: Focal Length (mm)..... 4
Aperture Stop.....f/5.6
Exposure Time (sec).....0.1
Cycle Time (sec)..... 73
Signal-to-Noise Ratio..... 22

SUPPORT REQUIREMENTS:

Field of View (deg).....66 x 66
Pointing Accuracy (deg).....6.3
Camera Volume (cu. ft.).....0.16
Max. Roll/Yaw Rate (deg/sec).....4.2/6.4
Operating Power (watts).....8
Data Rate (bits/sec).....6200
Camera Weight (lbs).....8

COMMENTS:

Assumed scene luminance of 10 foot-lamberts. Only 50% (rather than 70%) of planet can be seen in darkness per year, unless plane change is made. Essentially same area can be imaged twice in 1.6 hrs. Only two (rather than four) planet coverages per year are possible (without a plane change).

PLANET: Venus

OBSERVABLE: Auroras

Family No. 11a

TV TYPE: 0.5-inch vidicon with color filters

ORBIT: Data Sheet Number.....105
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg)..... 90
Imaging Altitude Range (km).....454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

CAMERA: Focal Length (mm)..... 4
Aperture Stop.....f/2
Exposure Time (sec).....0.2
Cycle Time (sec)..... 73
Signal-to-Noise Ratio..... 17

SUPPORT REQUIREMENTS:

Field of View (deg).....66 x 66
Pointing Accuracy (deg).....6.3
Camera Volume (cu. ft.).....0.16
Max. Roll/Yaw Rate (deg/sec).....2.1/3.2
Operating Power (watts).....8
Data Rate (bits/sec).....1.9 x 10⁴
Camera Weight (lbs).....8

COMMENTS:

See previous data sheet.

PLANET: Venus

OBSERVABLE: Auroras

Family No. 11b

TV TYPE: 1-inch vidicon

ORBIT: Data Sheet Number..... 106
Periapse/Apoapse Alt. (km)..... 255/50,735
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 255-2125
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

CAMERA: Focal Length (mm)..... 5
Aperture Stop..... f/8
Exposure Time (sec)..... 0.1
Cycle Time (sec)..... 52
Signal-to-Noise Ratio..... 24

SUPPORT REQUIREMENTS:

Field of View (deg)..... 98 x 98
Pointing Accuracy (deg)..... 1.4
Camera Volume (cu. ft.)..... 0.32
Max. Roll/Yaw Rate (deg/sec)..... 0.9/6.4
Operating Power (watts)..... 16
Data Rate (bits/sec)..... 1.5×10^4
Camera Weight (lbs)..... 16

COMMENTS:

Essentially the same area can be viewed twice within 17 hrs (30 hrs is required), but only one (not four) coverages per year are possible from this orbit. Although 70% coverage night-time coverage is required, only 27% is achieved. Support requirements based on scene luminance of 10 foot-lamberts.

PLANET: Venus

OBSERVABLE: Auroras

Family No. 11b

TV TYPE: 1-inch vidicon with 3 color filters

ORBIT: Data Sheet Number.....106
Periapse/Apoapse Alt. (km).....255/50,735
Inclination (deg)..... 90
Imaging Altitude Range (km).....255-2125
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

CAMERA: Focal Length (mm)..... 5
Aperture Stop.....f/2
Exposure Time (sec).....0.4
Cycle Time (sec)..... 52
Signal-to-Noise Ratio..... 37

SUPPORT REQUIREMENTS:

Field of View (deg)..... 98 x 98
Pointing Accuracy (deg).....1.4
Camera Volume (cu. ft.).....0.32
Max. Roll/Yaw Rate (deg/sec).....0.23/1.6
Operating Power (watts).....16
Data Rate (bits/sec)..... 4.5×10^4
Camera Weight (lbs).....16

COMMENTS:

See previous data sheet.

PLANET: Mercury

OBSERVABLE: Surface Elevations

Family No. 4a

TV TYPE: 2-inch RBV (shadowing)

| | |
|--------------------------------------|-------------|
| ORBIT: Data Sheet Number..... | 125 |
| Periapse/Apoapse Alt. (km)..... | 500/500 |
| Inclination (deg)..... | 90 |
| Imaging Altitude Range (km)..... | 500 |
| Imaging On-Time (min)..... | 36 |
| IMAGE: Minimum Image Width (km)..... | 600 |
| Max. Ground Resolution (km)..... | 3 (1 vert.) |
| Positional Accuracy (km)..... | 30 |
| CAMERA: Focal Length (mm)..... | 20 |
| Aperture Stop..... | f/2 |
| Exposure Time (sec)..... | 0.01 |
| Cycle Time (sec)..... | 210 |
| Signal-to-Noise Ratio..... | 65 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 30 x 30 |
| Pointing Accuracy (deg)..... | 5.4 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 3.3/5.6 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Although a horizontal resolution of 1.7 km is required to infer vertical heights of 1 km by shadow measurements, use of a 2-inch RBV provides a ground resolution of only 2.5 km. Only 63% of the planet is covered by imagery from this orbit.

PLANET: Mercury

OBSERVABLE: Surface Elevations

Family No. 4b

TV TYPE: 2.5-inch RBV (shadowing)

| | | |
|---------|----------------------------------|-------------|
| ORBIT: | Data Sheet Number..... | 126 |
| | Periapse/Apoapse Alt. (km)..... | 500/53,420 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500-2910 |
| | Imaging On-Time (min)..... | 32 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (1 vert.) |
| | Positional Accuracy (km)..... | 30 |
| CAMERA: | Focal Length (mm)..... | 25 |
| | Aperture Stop..... | f/2.5 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 150 |
| | Signal-to-Noise Ratio..... | 53 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 30 x 30 |
| Pointing Accuracy (deg)..... | 0.59 |
| Camera Volume (cu. ft.)..... | 0.8 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.6/5.6 |
| Operating Power (watts)..... | 40 |
| Data Rate (bits/sec)..... | 4.9×10^5 |
| Camera Weight (lbs)..... | 40 |

COMMENTS:

Only 32% of the planet is covered by imagery from this orbit. However, the total orbit ΔV is 5.68 km/sec, rather than 6.44 km/sec as with the preceding experiment (orbit data sheet #125).

PLANET: Mercury

OBSERVABLE: Surface Elevations

Family No. 7

TV TYPE: 2-inch RBV (side-overlap stereo)

ORBIT: Data Sheet Number..... 131
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 13

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3 (1 vert.)
Positional Accuracy (km)..... 30

CAMERA: Focal Length (mm)..... 20
Aperture Stop..... f/2
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 210
Signal-to-Noise Ratio..... 160

SUPPORT REQUIREMENTS:

Field of View (deg)..... 30 x 30
Pointing Accuracy (deg)..... 5.4
Camera Volume (cu. ft.)..... 0.65
Max. Roll/Yaw Rate (deg/sec)..... 3.3/5.6
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 32

COMMENTS:

Only 15% of the planet is covered at the proper illumination from this orbit. Forward overlap of 60% can be achieved by changing the cycle time to 110 seconds with no change in the support requirements. A horizontal resolution of 0.48 km is provided to permit determination of vertical heights to within 1 km by stereo parallax.

PLANET: Mercury

OBSERVABLE: Layering

Family No. 20

CAMERA:

ORBIT: Data Sheet Number..... 144
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min).....
IMAGE: Minimum Image Size (km)..... 0.5
Max. Ground Resolution (km)..... 0.0003
Positional Accuracy (km).....
CAMERA: Focal Length (mm).....
Aperture Stop.....
Exposure Time (sec).....
Cycle Time (sec).....
Length of Film (ft).....
Shielding Weight (lbs).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
Camera Volume (cu. ft.).....
Camera Shape (ft).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
Camera Weight (lbs).....

COMMENTS:

From an altitude of 500 km, even the classical diffraction limit yields an optical system diameter of 1.8 meters. Thus this resolution is not feasible from orbital altitudes.

PLANET: Mercury

OBSERVABLE: Contacts (regional)

Family No. 4a

TV TYPE: 1.5-Inch Vidicon

ORBIT: Data Sheet Number.....125
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg).....90
Imaging Altitude Range (km).....500
Imaging On-Time (min).....36
IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km).....3
Positional Accuracy (km).....10
CAMERA: Focal Length (mm).....15
Aperture Stop.....f/8
Exposure Time (sec).....0.01
Cycle Time (sec).....210
Signal-to-Noise Ratio.....64

SUPPORT REQUIREMENTS:

Field of View (deg).....30 x 30
Pointing Accuracy (deg).....1.2
Camera Volume (cu. ft.).....0.5
Max. Roll/Yaw Rate (deg/sec).....5.7/9.6
Operating Power (watts).....24
Data Rate (bits/sec)..... 1.2×10^4
Camera Weight (lbs).....24

COMMENTS:

Only 63% of the planet is seen at the desired illumination.

PLANET: Mercury

OBSERVABLE: Contacts (regional)

Family No. 4b

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 126 |
| | Periapse/Apoapse Alt. (km)..... | 500/53,420 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500-2910 |
| | Imaging On-Time (min)..... | 32 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| CAMERA: | Focal Length (mm)..... | 20 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 210 |
| | Signal-to-Noise Ratio..... | 65 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 30 x 30 |
| Pointing Accuracy (deg)..... | 0.20 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 1.1/9.9 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Only 32% of the planet is covered at the proper illumination, while 70% coverage is desired. A 2-inch RBV provides 2 km resolution. The total orbit ΔV is 5.68 km/sec, rather than 6.44 km/sec as with the preceding experiment (orbit data sheet #125).

PLANET: Mercury

OBSERVABLE: Contacts (local)

Family No. 14

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 138 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 36 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 |
| | Positional Accuracy (km)..... | 2 |
| CAMERA: | Focal Length (mm)..... | 113 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.001 |
| | Cycle Time (sec)..... | 35 |
| | Signal-to-Noise Ratio..... | 22 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 5.7 x 5.7 |
| Pointing Accuracy (deg)..... | 0.023 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 38/38 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 1.1×10^6 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

The ground resolution achieved is about 70 meters. Use of a larger field-of-view would increase the cycle time and reduce the data rate (see next data sheet).

PLANET: Mercury

OBSERVABLE: Contacts (local)

Family No. 14

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 138 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 36 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 |
| | Positional Accuracy (km)..... | 2 |
| CAMERA: | Focal Length (mm)..... | 38 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.001 |
| | Cycle Time (sec)..... | 110 |
| | Signal-to-Noise Ratio..... | 22 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 17 x 17 |
| Pointing Accuracy (deg)..... | 0.23 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 18/13 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

The image ground size actually achieved is 300 x 300 km, at a ground resolution of 0.2 km. A smaller image size would result in superior resolution, but a higher data rate (see previous data sheet).

PLANET: Mercury

OBSERVABLE: Contacts (detailed)

Family No. 21

TV TYPE: 4.5-inch RBV

ORBIT: Data Sheet Number..... 145
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km)..... 0.5
Max. Ground Resolution (km)..... 0.005
Positional Accuracy (km)..... 0.02

CAMERA: Focal Length (mm)..... 2140
Aperture Stop..... f/4
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec)..... 4.2
Signal-to-Noise Ratio..... 13

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.68x0.68
Pointing Accuracy (deg)..... 0.0023
Camera Volume (cu. ft.)..... 22
Max. Roll/Yaw Rate (deg/sec)..... 0.19/16
Operating Power (watts)..... 72
Data Rate (bits/sec)..... 1.9×10^7
Camera Weight (lbs)..... 170

COMMENTS:

Image ground size achieved is 12 x 12 km. A smaller image size would increase the focal length, camera weight, and data rate. Even this image size is too small to provide 20% image overlap on successive orbits. A 2-inch RBV could also be used here (see next data sheet).

PLANET: Mercury

OBSERVABLE: Contacts (detailed)

Family No. 21

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number..... 145
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km)..... 0.5
Max. Ground Resolution (km)..... 0.005
Positional Accuracy (km)..... 0.02

CAMERA: Focal Length (mm)..... 1300
Aperture Stop..... f/2
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec)..... 3
Signal-to-Noise Ratio..... 16

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.49×0.49
Pointing Accuracy (deg)..... 6×10^{-4}
Camera Volume (cu. ft.)..... 20
Max. Roll/Yaw Rate (deg/sec)..... 0.19/22
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 1.5×10^7
Camera Weight (lbs)..... 190

COMMENTS:

Actual imaged area is 8.5 x 8.5 km.

PLANET: Mercury

OBSERVABLE: Structure of Features (regional)

Family No. 4a

TV TYPE: 1.5-inch Vidicon (shadowing)

ORBIT: Data Sheet Number.....125
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg).....90
Imaging Altitude Range (km).....500
Imaging On-Time (min).....36

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km).....3 (3 vert.)
Positional Accuracy (km).....10

CAMERA: Focal Length (mm).....15
Aperture Stop.....f/8
Exposure Time (sec).....0.01
Cycle Time (sec).....210
Signal-to-Noise Ratio.....64

SUPPORT REQUIREMENTS:

Field of View (deg).....30 x 30
Pointing Accuracy (deg).....1.2
Camera Volume (cu. ft.).....0.5
Max. Roll/Yaw Rate (deg/sec).....5.7/9.6
Operating Power (watts).....24
Data Rate (bits/sec)..... 1.2×10^4
Camera Weight (lbs).....24

COMMENTS:

Only 63% planetary coverage is achieved at the desired illumination conditions, 70% is desired. This is essentially the same experiment as Contacts (regional), since a ground resolution of 3 km is more than adequate to achieve 3 km vertical resolution by measuring shadow lengths.

PLANET: Mercury

OBSERVABLE: Structure of Features (regional)

Family No. 4b

TV TYPE: 2-inch RBV (shadowing)

| | |
|--------------------------------------|-------------|
| ORBIT: Data Sheet Number..... | 126 |
| Periapse/Apoapse Alt. (km)..... | 500/53,420 |
| Inclination (deg)..... | 90 |
| Imaging Altitude Range (km)..... | 500-2910 |
| Imaging On-Time (min)..... | 32 |
| IMAGE: Minimum Image Width (km)..... | 600 |
| Max. Ground Resolution (km)..... | 3 (3 vert.) |
| Positional Accuracy (km)..... | 10 |
| CAMERA: Focal Length (mm)..... | 20 |
| Aperture Stop..... | f/2 |
| Exposure Time (sec)..... | 0.01 |
| Cycle Time (sec)..... | 210 |
| Signal-to-Noise Ratio..... | 65 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 30 x 30 |
| Pointing Accuracy (deg)..... | 0.20 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 1.1/9.9 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Only 32% planetary coverage is achieved at proper solar zenith angles, while 70% is desired. A 2 km ground resolution is provided, which is more than adequate to afford a 3 km vertical resolution by measurement of shadow lengths. Thus this experiment is identical to Contacts (regional).

PLANET: Mercury

OBSERVABLE: Structure of Features (regional)
Family No. 7

TV TYPE: 2-inch RBV (side-overlap stereo)

| | |
|--------------------------------------|-------------|
| ORBIT: Data Sheet Number..... | 131 |
| Periapse/Apoapse Alt. (km)..... | 500/500 |
| Inclination (deg)..... | 90 |
| Imaging Altitude Range (km)..... | 500 |
| Imaging On-Time (min)..... | 13 |
| IMAGE: Minimum Image Width (km)..... | 600 |
| Max. Ground Resolution (km)..... | 3 (3 vert.) |
| Positional Accuracy (km)..... | 10 |
| CAMERA: Focal Length (mm)..... | 20 |
| Aperture Stop..... | f/2 |
| Exposure Time (sec)..... | 0.01 |
| Cycle Time (sec)..... | 210 |
| Signal-to-Noise Ratio..... | 200 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 30 x 30 |
| Pointing Accuracy (deg)..... | 1.1 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 2.8/4.6 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

Only 15% planetary coverage is obtained at desired solar illumination, 70% is desired. However, only 15% coverage can be obtained with an inertial orbit. The ground resolution achieved (and required for stereo) is 1.4 km. Forward-overlap stereo would result in identical support requirements.

PLANET: Mercury

OBSERVABLE: Structure of Features (regional)

Family No. 2a

TV TYPE: 1.5-inch Vidicon w/color filters

ORBIT: Data Sheet Number.....121
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg).....90
Imaging Altitude Range (km).....500
Imaging On-Time (min).....25

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km).....3 (3 vert.)
Positional Accuracy (km).....10

CAMERA: Focal Length (mm).....15
Aperture Stop.....f/8
Exposure Time (sec).....0.05
Cycle Time (sec).....210
Signal-to-Noise Ratio.....70

SUPPORT REQUIREMENTS:

Field of View (deg).....30 x 30
Pointing Accuracy (deg).....1.1
Camera Volume (cu. ft.).....0.5
Max. Roll/Yaw Rate (deg/sec).....1.2/1.9
Operating Power (watts).....24
Data Rate (bits/sec)..... 1.6×10^4
Camera Weight (lbs).....24

COMMENTS:

Only 50% of the planet can be seen at the proper illumination conditions for color from an inertial orbit, while 70% coverage is desired. Poor vertical resolution (at best 3.6 km) is provided by shadow measurements in this experiment. An image is procured every 70 sec, but the full cycle time of 210 sec is used to acquire red, blue, and green images.

PLANET: Mercury

OBSERVABLE: Structure of Features (local)

Family No. 14

TV TYPE: 2-inch RBV (shadowing)

ORBIT: Data Sheet Number.....138
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km).....100
Max. Ground Resolution (km)..... 0.2 (0.2 vert.)
Positional Accuracy (km)..... 2

CAMERA: Focal Length (mm).....113
Aperture Stop.....f/2
Exposure Time (sec)..... 0.001
Cycle Time (sec)..... 35
Signal-to-Noise Ratio..... 22

SUPPORT REQUIREMENTS:

Field of View (deg).....5.7 x 5.7
Pointing Accuracy (deg).....0.023
Camera Volume (cu. ft.).....0.65
Max. Roll/Yaw Rate (deg/sec).....38/38
Operating Power (watts).....32
Data Rate (bits/sec).....1.1 x 10⁶
Camera Weight (lbs).....32

COMMENTS:

Use of a 2 inch RBV affords a ground resolution of about 60 meters. Shadow measurements can provide vertical resolutions of about 35 meters, only 200 meters is required. However, a 2 inch vidicon will not provide adequate resolution.

PLANET: Mercury

OBSERVABLE: Structure of Features (local)

Family No. 12

TV TYPE: 2-inch RBV with 3 color filters

| | | |
|---------|----------------------------------|-----------------|
| ORBIT: | Data Sheet Number..... | 136 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 25 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 (0.2 vert.) |
| | Positional Accuracy (km)..... | 2 |
| CAMERA: | Focal Length (mm)..... | 113 |
| | Aperture Stop..... | f/2 |
| | Exposure Time (sec)..... | 0.001 |
| | Cycle Time (sec)..... | 35 |
| | Signal-to-Noise Ratio..... | 11 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 5.7 x 5.7 |
| Pointing Accuracy (deg)..... | 0.023 |
| Camera Volume (cu. ft.)..... | 0.65 |
| Max. Roll/Yaw Rate (deg/sec)..... | 38/38 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.3×10^6 |
| Camera Weight (lbs)..... | 32 |

COMMENTS:

A 2 inch RBV provides a ground resolution of about 60 meters. Measurements of shadow lengths allows vertical height estimation to within 70-180 meters, depending on the illumination. Only 200 meter resolution is required. A 2 inch vidicon would not provide the desired ground horizontal resolution.

PLANET: Mercury

OBSERVABLE: Structure of Features (local)

Family No. 16

CAMERA: 70mm (side stereo) with SO-243 film

ORBIT: Data Sheet Number.....140
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 13

IMAGE: Minimum Image Size (km).....100
Max. Ground Resolution (km)..... 0.2 (0.2 vert.)
Positional Accuracy (km)..... 2

CAMERA: Focal Length (mm)..... 56
Aperture Stop.....f/1.8
Exposure Time (sec).....0.01
Cycle Time (sec).....210
Length of Film (ft)..... 23
Shielding Weight (lbs).....-19

SUPPORT REQUIREMENTS:

Field of View (deg).....30 x 30
Pointing Accuracy (deg).....0.23
Camera Volume (cu. ft.).....0.85
Camera Shape (ft).....1.2 x 0.6 x 1.3
Max. Roll/Yaw Rate (deg/sec).....0.18/0.31
Operating Power (watts).....36
Data Rate (bits/sec)..... 2.5×10^6
Camera Weight (lbs).....44

COMMENTS:

15% planetary coverage can be achieved, requiring 23 ft. of film. The image ground size actually used is 590 x 590 km to take advantage of the film resolution capability. Forward stereo would result in a 5×10^6 bits/sec data rate.

PLANET: Mercury

OBSERVABLE: Structure of Features (detailed)
Family No. 21

TV TYPE: 4.5-inch RBV (shadowing)

ORBIT: Data Sheet Number.....145
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg).....90
Imaging Altitude Range (km).....500
Imaging On-Time (min).....36

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005 (0.05 vert.)
Positional Accuracy (km).....0.02

CAMERA: Focal Length (mm).....2140
Aperture Stop.....f/4
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec).....4.2
Signal-to-Noise Ratio.....13

SUPPORT REQUIREMENTS:

Field of View (deg).....0.68 x 0.68
Pointing Accuracy (deg).....0.0023
Camera Volume (cu. ft.).....22
Max. Roll/Yaw Rate (deg/sec).....0.19/16
Operating Power (watts).....72
Data Rate (bits/sec)..... 1.9×10^7
Camera Weight (lbs).....170

COMMENTS:

Image ground size actually provided is 12 x 12 km. A smaller image size would increase the focal length, camera weight, and data rate. 20% image overlap can be achieved only along the heading line. Shadow measurements could be used to deduce vertical heights within 3 meters. A 2 inch RBV could also be used (see next data sheet).

PLANET: Mercury

OBSERVABLE: Structure of Features (detailed)
Family No. 21

TV TYPE: 2-inch RBV (shadowing)

ORBIT: Data Sheet Number.....145
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005 (0.05 vert.)
Positional Accuracy (km).....0.02

CAMERA: Focal Length (mm).....1300
Aperture Stop.....f/2
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec)..... 3
Signal-to-Noise Ratio..... 16

SUPPORT REQUIREMENTS:

Field of View (deg).....0.49 x 0.49
Pointing Accuracy (deg).....0.0023
Camera Volume (cu. ft.).....20
Max. Roll/Yaw Rate (deg/sec).....0.19/22
Operating Power (watts).....32
Data Rate (bits/sec)..... 1.5×10^7
Camera Weight (lbs).....190

COMMENTS:

Here an image size of 8.5 x 8.5 km is used.

PLANET: Mercury

OBSERVABLE: Structure of Features (detailed)

Family No. 19

TV TYPE: 4.5-inch RBV with IMC and 3 color filters

ORBIT: Data Sheet Number.....143
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg).....90
Imaging Altitude Range (km).....500
Imaging On-Time (min).....25

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005 (0.05 vert.)
Positional Accuracy (km).....0.02

CAMERA: Focal Length (mm).....2140
Aperture Stop.....f/4
Exposure Time (sec).....0.005
Cycle Time (sec).....4.2
Signal-to-Noise Ratio.....21

SUPPORT REQUIREMENTS:

Field of View (deg).....0.68 x 0.68
Pointing Accuracy (deg).....0.0023
Camera Volume (cu. ft.).....22
Max. Roll/Yaw Rate (deg/sec).....0.19/1.6
Operating Power (watts).....87
Data Rate (bits/sec)..... 5.4×10^7
Camera Weight (lbs).....190

COMMENTS:

Image ground size actually provided is 12 x 12 km. Use of a smaller image size would increase the focal length, camera weight, and data rate. Shadow measurements could be used to infer vertical heights within about 30 meters.

PLANET: Mercury

OBSERVABLE: Structure of Features (detailed)
Family No. 23

CAMERA: 9.5 inch (side stereo) with S0-243 film

ORBIT: Data Sheet Number.....147
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 13

IMAGE: Minimum Image Size (km).....0.5
Max. Ground Resolution (km).....0.005 (0.05 vert.)
Positional Accuracy (km).....0.02

CAMERA: Focal Length (mm).....250
Aperture Stop.....f/1.8
Exposure Time (sec).....0.001
Cycle Time (sec).....170
Length of Film (ft)..... 81
Shielding Weight (lbs).....110

SUPPORT REQUIREMENTS:

Field of View (deg).....50 x 50
Pointing Accuracy (deg).....0.0023
Camera Volume (cu. ft.).....4.6
Camera Shape (ft).....1.4 x 1.3 x 2.4
Max. Roll/Yaw Rate (deg/sec).....0.36/0.76
Operating Power (watts).....110
Data Rate (bits/sec)..... 3.9×10^7
Camera Weight (lbs).....210

COMMENTS:

Film length and shielding weight based on 10% planetary coverage available from this orbit. Image size used is 475 x 475 km. Forward stereo could be achieved with 7.8×10^7 bits/sec data rate.

PLANET: Mercury

OBSERVABLE: Surface Topography (regional)

Family No. 4a

TV TYPE: 2-inch RBV (shadowing)

ORBIT: Data Sheet Number..... 125
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3 (1 vert.)
Positional Accuracy (km)..... 3

CAMERA: Focal Length (mm)..... 20
Aperture Stop..... f/2
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 210
Signal-to-Noise Ratio..... 71

SUPPORT REQUIREMENTS:

Field of View (deg)..... 30 x 30
Pointing Accuracy (deg)..... 0.54
Camera Volume (cu. ft.)..... 0.65
Max. Roll/Yaw Rate (deg/sec)..... 6.5/5.5
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 32

COMMENTS:

Only 63% (rather than the desired 70%) planetary coverage can be obtained at proper solar illumination from an inertial orbit. A horizontal resolution of 1.7 km is provided to permit deduction of vertical heights to within 1 km by shadow measurements as required.

PLANET: Mercury

OBSERVABLE: Surface Topography (regional)
Family No. 4b

TV TYPE: 2.5-inch RBV (shadowing)

ORBIT: Data Sheet Number.....126
Periapse/Apoapse Alt. (km).....500/53,420
Inclination (deg)..... 90
Imaging Altitude Range (km).....500-2910
Imaging On-Time (min)..... 32

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3 (1 vert.)
Positional Accuracy (km)..... 3

CAMERA: Focal Length (mm)..... 25
Aperture Stop.....f/2.5
Exposure Time (sec).....0.01
Cycle Time (sec).....150
Signal-to-Noise Ratio..... 53

SUPPORT REQUIREMENTS:

Field of View (deg).....30 x 30
Pointing Accuracy (deg).....0.06
Camera Volume (cu. ft.).....0.8
Max. Roll/Yaw Rate (deg/sec).....0.6/5.6
Operating Power (watts).....40
Data Rate (bits/sec)..... 4.9×10^5
Camera Weight (lbs).....40

COMMENTS:

Only 32% of the planet is covered at the proper solar illumination. However, the total orbit ΔV is 5.68 km/sec, rather than 6.44 km/sec as with the proceeding experiment.

PLANET: Mercury

OBSERVABLE: Surface Topography (regional)

Family No. 7

TV TYPE: 2-inch RBV (side-overlap stereo)

ORBIT: Data Sheet Number.....131
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 13

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3 (1 vert.)
Positional Accuracy (km)..... 3

CAMERA: Focal Length (mm)..... 20
Aperture Stop.....f/2
Exposure Time (sec).....0.001
Cycle Time (sec).....210
Signal-to-Noise Ratio..... 64

SUPPORT REQUIREMENTS:

Field of View (deg).....30 x 30
Pointing Accuracy (deg).....0.54
Camera Volume (cu. ft.).....0.65
Max. Roll/Yaw Rate (deg/sec).....9.1/15
Operating Power (watts).....32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs).....32

COMMENTS:

Only 15% (rather than the desired 70%) planetary coverage at proper solar illumination can be obtained from an inertial orbit. A horizontal resolution of 0.5 km is provided to achieve 1 km vertical resolution. Forward-overlap stereo could be achieved with a cycle time of 110 sec and no change in the support requirements.

PLANET: Mercury

OBSERVABLE: Surface Topography (local)

Family No. 14

TV TYPE: 2-inch RBV (shadowing)

ORBIT: Data Sheet Number.....138
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg).....90
Imaging Altitude Range (km).....500
Imaging On-Time (min).....36

IMAGE: Minimum Image Width (km).....100
Max. Ground Resolution (km).....0.2 (0.1 vert.)
Positional Accuracy (km).....0.2

CAMERA: Focal Length (mm).....110
Aperture Stop.....f/2
Exposure Time (sec).....0.01
Cycle Time (sec).....35
Signal-to-Noise Ratio.....71

SUPPORT REQUIREMENTS:

Field of View (deg).....5.7 x 5.7
Pointing Accuracy (deg).....0.023
Camera Volume (cu. ft.).....0.65
Max. Roll/Yaw Rate (deg/sec).....0.33/3.3
Operating Power (watts).....32
Data Rate (bits/sec)..... 1.1×10^6
Camera Weight (lbs).....32

COMMENTS:

A horizontal resolution of 170 meters is required to obtain 100 meter vertical resolution by shadow measurements. A 2 inch vidicon will provide only 400 meter horizontal resolution, while the 2 inch RBV suggested here provides 60 meter resolution.

PLANET: Mercury

OBSERVABLE: Surface Topography (local)

Family No. 16

CAMERA: 5 inch SO-243 film (side stereo)

ORBIT: Data Sheet Number.....140
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 13

IMAGE: Minimum Image Size (km).....100
Max. Ground Resolution (km).....0.2 (0.1 vert.)
Positional Accuracy (km).....0.2

CAMERA: Focal Length (mm).....120
Aperture Stop.....f/1.8
Exposure Time (sec).....0.001
Cycle Time (sec).....170
Length of Film (ft)..... 62
Shielding Weight (lbs)..... 55

SUPPORT REQUIREMENTS:

Field of View (deg)..... 50 x 50
Pointing Accuracy (deg).....0.023
Camera Volume (cu. ft.).....2.3
Camera Shape (ft).....1.2 x 0.8 x 2.2
Max. Roll/Yaw Rate (deg/sec).....0.73/1.5
Operating Power (watts).....50
Data Rate (bits/sec)..... 9.6×10^6
Camera Weight (lbs)..... 96

COMMENTS:

Film length and shielding weight based on 15% planetary coverage available from this orbit. Image size used is 480 x 480 km. Forward stereo would increase data rate to 1.9×10^7 bits/sec.

PLANET: Mercury

OBSERVABLE: Surface Topography (detailed)

Family No. 21

TV TYPE: 2-inch RBV (shadowing)

ORBIT: Data Sheet Number.....145
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005 (0.05 vert.)
Positional Accuracy (km).....0.005

CAMERA: Focal Length (mm).....1300
Aperture Stop.....f/2
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec)..... 3
Signal-to-Noise Ratio..... 16

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.49×0.49
Pointing Accuracy (deg)..... 6×10^{-4}
Camera Volume (cu. ft.).....20
Max. Roll/Yaw Rate (deg/sec).....0.19/22
Operating Power (watts).....32
Data Rate (bits/sec)..... 1.5×10^7
Camera Weight (lbs).....190

COMMENTS:

A 1 inch vidicon will provide better than 5 meter resolution over an image size of 0.5 x 0.5 km, but with a focal length of 11 meters! The 2 inch RBV suggested here will provide 5 meter resolution over an image size of 8.5 x 8.5 km. A 4½ inch RBV could be used as well (see next data sheet).

PLANET: Mercury

OBSERVABLE: Surface Topography (detailed)

Family No. 21

TV TYPE: 4.5-inch RBV (shadowing)

ORBIT: Data Sheet Number.....145
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg).....90
Imaging Altitude Range (km).....500
Imaging On-Time (min).....36

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005 (0.05 vert.)
Positional Accuracy (km).....0.005

CAMERA: Focal Length (mm).....2140
Aperture Stop.....f/4
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec).....4.2
Signal-to-Noise Ratio.....13

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.68×0.68
Pointing Accuracy (deg)..... 6×10^{-4}
Camera Volume (cu. ft.).....22
Max. Roll/Yaw Rate (deg/sec).....0.19/16
Operating Power (watts).....72
Data Rate (bits/sec)..... 1.9×10^7
Camera Weight (lbs).....170

COMMENTS:

An image size of 12 x 12 km is actually used.

PLANET: Mercury

OBSERVABLE: Surface Topography (detailed)

Family No. 23

CAMERA: 9.5 inch SO-243 film (side stereo)

ORBIT: Data Sheet Number.....147
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 13

IMAGE: Minimum Image Size (km).....0.5
Max. Ground Resolution (km).....0.005 (0.05 vert.
Positional Accuracy (km).....0.005

CAMERA: Focal Length (mm).....710
Aperture Stop.....f/1.8
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec)..... 57
Length of Film (ft)..... 71
Shielding Weight (lbs).....100

SUPPORT REQUIREMENTS:

Field of View (deg)..... 18 x 18
Pointing Accuracy (deg)..... 5.7×10^{-4}
Camera Volume (cu. ft.).....9.2
Camera Shape (ft).....2.9 x 1.3 x 2.4
Max. Roll/Yaw Rate (deg/sec).....0.38/1.2
Operating Power (watts).....110
Data Rate (bits/sec)..... 1.2×10^8
Camera Weight (lbs).....300

COMMENTS:

Film and shielding weight based on 1% planetary coverage although 15% can be achieved from this orbit. Image size used is 160 x 160 km. Forward stereo would increase data rate to 2.4×10^8 bits/sec.

PLANET: Mercury

OBSERVABLE: Surface Appearance (regional)

Family No. 4a

TV TYPE: 1.5-inch Vidicon

ORBIT: Data Sheet Number.....125
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 15
Aperture Stop.....f/8
Exposure Time (sec).....0.01
Cycle Time (sec).....210
Signal-to-Noise Ratio..... 64

SUPPORT REQUIREMENTS:

Field of View (deg).....30 x 30
Pointing Accuracy (deg).....1.2
Camera Volume (cu. ft.).....0.5
Max. Roll/Yaw Rate (deg/sec).....5.7/9.6
Operating Power (watts).....24
Data Rate (bits/sec).....1.2 x 10⁴
Camera Weight (lbs).....24

COMMENTS:

Only 63% (rather than the desired 70%) planetary coverage at the proper solar illumination can be obtained from an inertial orbit.

PLANET: Mercury

OBSERVABLE: Surface Appearance (regional)

Family No. 4b

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number.....126
Periapse/Apoapse Alt. (km).....500/53,420
Inclination (deg)..... 90
Imaging Altitude Range (km).....500-2910
Imaging On-Time (min)..... 32

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 20
Aperture Stop.....f/2
Exposure Time (sec).....0.01
Cycle Time (sec).....210
Signal-to-Noise Ratio..... 65

SUPPORT REQUIREMENTS:

Field of View (deg).....30 x 30
Pointing Accuracy (deg).....0.20
Camera Volume (cu. ft.).....0.65
Max. Roll/Yaw Rate (deg/sec).....1.1/9.9
Operating Power (watts).....32
Data Rate (bits/sec).....3.8 x 10⁵
Camera Weight (lbs).....32

COMMENTS:

Only 32% (rather than the desired 70%) planetary coverage at the proper illumination is achieved from this orbit. However, the total orbit ΔV is 5.68 km/sec, rather than 6.44 km/sec as with the previous experiment.

PLANET: Mercury

OBSERVABLE: Surface Appearance (regional)

Family No. 2a

TV TYPE: 1.5-inch vidicon with 3 color filters

ORBIT: Data Sheet Number..... 121
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 25

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 15
Aperture Stop..... f/8
Exposure Time (sec)..... 0.05
Cycle Time (sec)..... 210
Signal-to-Noise Ratio..... 70

SUPPORT REQUIREMENTS:

Field of View (deg)..... 30 x 30
Pointing Accuracy (deg)..... 1.1
Camera Volume (cu. ft.)..... 0.5
Max. Roll/Yaw Rate (deg/sec)..... 1.2/1.9
Operating Power (watts)..... 24
Data Rate (bits/sec)..... 1.6×10^4
Camera Weight (lbs)..... 24

COMMENTS:

Only 50% (rather than 70%) of the planet can be seen at the proper illumination from an inertial orbit.

PLANET: Mercury

OBSERVABLE: Surface Appearance (local)

Family No. 14

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number.....138
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km).....100
Max. Ground Resolution (km).....0.2
Positional Accuracy (km)..... 2

CAMERA: Focal Length (mm).....113
Aperture Stop.....f/2
Exposure Time (sec).....0.001
Cycle Time (sec)..... 35
Signal-to-Noise Ratio..... 22

SUPPORT REQUIREMENTS:

Field of View (deg).....5.7 x 5.7
Pointing Accuracy (deg).....0.023
Camera Volume (cu. ft.).....0.65
Max. Roll/Yaw Rate (deg/sec).....38/38
Operating Power (watts).....32
Data Rate (bits/sec)..... 1.1×10^6
Camera Weight (lbs).....32

COMMENTS:

A 2 inch RBV provides 70 meter resolution over an image size of 100 x 100 km. A poorer resolution could be used over a larger imaged area (see next data sheet).

PLANET: Mercury

OBSERVABLE: Surface Appearance (local)

Family No. 14

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number..... 138
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 36
IMAGE: Minimum Image Width (km)..... 100
Max. Ground Resolution (km)..... 0.2
Positional Accuracy (km)..... 2
CAMERA: Focal Length (mm)..... 38
Aperture Stop..... f/2
Exposure Time (sec)..... 0.001
Cycle Time (sec)..... 110
Signal-to-Noise Ratio..... 22

SUPPORT REQUIREMENTS:

Field of View (deg)..... 17 x 17
Pointing Accuracy (deg)..... 0.023
Camera Volume (cu. ft.)..... 0.65
Max. Roll/Yaw Rate (deg/sec)..... 18/13
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 32

COMMENTS:

Imaged area is actually 300 x 300 km.

PLANET: Mercury

OBSERVABLE: Surface Appearance (detailed)
Family No. 21

TV TYPE: 4.5-inch RBV

ORBIT: Data Sheet Number.....145
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005
Positional Accuracy (km).....0.02

CAMERA: Focal Length (mm).....2140
Aperture Stop.....f/4
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec).....4.2
Signal-to-Noise Ratio.....13

SUPPORT REQUIREMENTS:

Field of View (deg).....0.68 x 0.68
Pointing Accuracy (deg).....0.0023
Camera Volume (cu. ft.).....22
Max. Roll/Yaw Rate (deg/sec).....0.19/16
Operating Power (watts).....72
Data Rate (bits/sec)..... 1.9×10^7
Camera Weight (lbs).....170

COMMENTS:

20% image overlap is achieved only along the heading line.
A 2 inch RBV could also be used for this experiment (see next data
sheet). The image size actually used here is 12 x 12 km.

PLANET: Mercury

OBSERVABLE: Surface Appearance (detailed)

Family No. 21

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number.....145
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg).....90
Imaging Altitude Range (km).....500
Imaging On-Time (min).....36

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005
Positional Accuracy (km).....0.02

CAMERA: Focal Length (mm).....1300
Aperture Stop.....f/2
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec).....3
Signal-to-Noise Ratio.....16

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.49×0.49
Pointing Accuracy (deg)..... 6×10^{-4}
Camera Volume (cu. ft.).....20
Max. Roll/Yaw Rate (deg/sec).....0.19/22
Operating Power (watts).....32
Data Rate (bits/sec)..... 1.5×10^7
Camera Weight (lbs).....190

COMMENTS:

Actual imaged area is 8.5 x 8.5 km.

PLANET: Mercury

OBSERVABLE: Surface Appearance (detailed)

Family No. 19

TV TYPE: 4.5-inch RBV with IMC and 3 color filters

ORBIT: Data Sheet Number.....143
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 25

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005
Positional Accuracy (km).....0.02

CAMERA: Focal Length (mm).....2140
Aperture Stop.....f/4
Exposure Time (sec).....0.005
Cycle Time (sec).....4.2
Signal-to-Noise Ratio.....21

SUPPORT REQUIREMENTS:

Field of View (deg).....0.68 x 0.68
Pointing Accuracy (deg).....0.0023
Camera Volume (cu. ft.).....22
Max. Roll/Yaw Rate (deg/sec).....0.19/1.6
Operating Power (watts).....87
Data Rate (bits/sec)..... 5.4×10^7
Camera Weight (lbs).....190

COMMENTS:

Imaged area actually used here is 12 x 12 km.

PLANET: Mercury

OBSERVABLE: Surface Winds (regional)

Family No. 3a

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number.....123
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 35

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 30

CAMERA: Focal Length (mm)..... 5
Aperture Stop.....f/5.6
Exposure Time (sec).....0.01
Cycle Time (sec).....210
Signal-to-Noise Ratio..... 86

SUPPORT REQUIREMENTS:

Field of View (deg).....30 x 30
Pointing Accuracy (deg).....3.4
Camera Volume (cu. ft.).....0.3
Max. Roll/Yaw Rate (deg/sec).....38/64
Operating Power (watts).....8
Data Rate (bits/sec).....3900
Camera Weight (lbs).....8

COMMENTS:

Since 70% planetary coverage requires 171 days, two coverages per year cannot be achieved. A 1/2 inch vidicon affords a surface resolution of about 5 km.

PLANET: Mercury

OBSERVABLE: Surface Winds (regional)

Family No. 3b

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number.....124
Periapse/Apoapse Alt. (km).....500/53,420
Inclination (deg)..... 90
Imaging Altitude Range (km).....500-2120
Imaging On-Time (min)..... 29

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 30

CAMERA: Focal Length (mm)..... 20
Aperture Stop.....f/5.6
Exposure Time (sec).....0.01
Cycle Time (sec).....150
Signal-to-Noise Ratio..... 86

SUPPORT REQUIREMENTS:

Field of View (deg).....30 x 30
Pointing Accuracy (deg).....0.81
Camera Volume (cu. ft.).....0.3
Max. Roll/Yaw Rate (deg/sec).....9.0/64
Operating Power (watts)..... 8
Data Rate (bits/sec).....3900
Camera Weight (lbs)..... 8

COMMENTS:

This orbit does not provide images of the same area in 2 hours as required, and as provided by orbit data sheet #123 (see previous page). A resolution of about 15 km is obtained from an altitude of 2120 km. 70% planetary coverage requires 180 days.

PLANET: Mercury

OBSERVABLE: Surface Winds (local)

Family No. 13

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number.....137
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 35

IMAGE: Minimum Image Width (km).....100
Max. Ground Resolution (km).....0.2
Positional Accuracy (km)..... 2

CAMERA: Focal Length (mm)..... 38
Aperture Stop.....f/2
Exposure Time (sec).....0.01
Cycle Time (sec)..... 53
Signal-to-Noise Ratio..... 97

SUPPORT REQUIREMENTS:

Field of View (deg).....17 x 17
Pointing Accuracy (deg).....0.23
Camera Volume (cu. ft.).....0.65
Max. Roll/Yaw Rate (deg/sec).....0.38/1.3
Operating Power (watts).....32
Data Rate (bits/sec).....7.6 x 10⁵
Camera Weight (lbs).....32

COMMENTS:

Since a 2 inch vidicon will not provide adequate resolution, the actual imaged area is increased to 300 x 300 km to take advantage of the resolution capability of a 2 inch RBV. A 60% image overlap is used to acquire images of the same area after a 53 sec interval satisfying the desired 2 min image repetition rate.

PLANET: Mercury

OBSERVABLE: Topographic Changes

Family No. 21

TV TYPE: 2-inch RBV (shadowing)

ORBIT: Data Sheet Number.....145
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005 (0.05 vert.)
Positional Accuracy (km).....0.005

CAMERA: Focal Length (mm).....1300
Aperture Stop.....f/2
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec)..... 3
Signal-to-Noise Ratio..... 16

SUPPORT REQUIREMENTS:

Field of View (deg).....0.49 x 0.49
Pointing Accuracy (deg)..... 6×10^{-4}
Camera Volume (cu. ft.).....20
Max. Roll/Yaw Rate (deg/sec).....0.19/22
Operating Power (watts).....32
Data Rate (bits/sec)..... 1.5×10^7
Camera Weight (lbs).....190

COMMENTS:

Although it is desired to view the same area after a time interval of 300 hours, it is necessary to wait 180 days because of Mercury's slow rotation. The imaged area used here is actually 8.5 x 8.5 km. A 4½ inch RBV could be used as well (see next data sheet).

PLANET: Mercury

OBSERVABLE: Topographic Changes

Family No. 21

TV TYPE: 4.5-inch RBV (shadowing)

ORBIT: Data Sheet Number.....145
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005 (0.05 vert.)
Positional Accuracy (km).....0.005

CAMERA: Focal Length (mm).....2140
Aperture Stop.....f/4
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec).....4.2
Signal-to-Noise Ratio..... 13

SUPPORT REQUIREMENTS:

Field of View (deg).....0.68 x 0.68
Pointing Accuracy (deg)..... 6×10^{-4}
Camera Volume (cu. ft.).....22
Max. Roll/Yaw Rate (deg/sec).....0.19/16
Operating Power (watts).....72
Data Rate (bits/sec)..... 1.9×10^7
Camera Weight (lbs).....170

COMMENTS:

Imaged area is 12 x 12 km.

PLANET: Mercury

OBSERVABLE: Topographic Changes

Family No. 23

CAMERA: 9.5 inch S0-243 film (side stereo)

ORBIT: Data Sheet Number.....147
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 13

IMAGE: Minimum Image Size (km).....0.5
Max. Ground Resolution (km).....0.005 (0.05 vert.)
Positional Accuracy (km).....0.005

CAMERA: Focal Length (mm).....710
Aperture Stop.....f/1.8
Exposure Time (sec)..... 5×10^{-4}
Cycle Time (sec)..... 57
Length of Film (ft).....140
Shielding Weight (lbs).....200

| SUPPORT REQUIREMENTS: | |
|-----------------------------------|----------------------|
| Field of View (deg)..... | 18 x 18 |
| Pointing Accuracy (deg)..... | 5.7×10^{-4} |
| Camera Volume (cu. ft.)..... | 9.2 |
| Camera Shape (ft)..... | 2.9 x 1.3 x 2.4 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.38/1.2 |
| Operating Power (watts)..... | 110 |
| Data Rate (bits/sec)..... | 1.2×10^8 |
| Camera Weight (lbs)..... | 400 |

COMMENTS:

Film and shielding weight based on double coverage of 1% of the planet, although 15% can be achieved from this orbit. Each 160 x 160 km is imaged twice at an interval of 1.9 hrs.

PLANET: Mercury

OBSERVABLE: Surface to Atmosphere Transfer

Family No. 10

TV TYPE: 0.5-inch vidicon

ORBIT: Data Sheet Number.....134
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg)..... 90
Imaging Altitude Range (km).....500
Imaging On-Time (min)..... 35

IMAGE: Minimum Image Width (km).....300
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 9
Aperture Stop.....f/5.6
Exposure Time (sec).....0.1
Cycle Time (sec).....110
Signal-to-Noise Ratio.....270

SUPPORT REQUIREMENTS:

Field of View (deg).....17 x 17
Pointing Accuracy (deg).....1.1
Camera Volume (cu. ft.).....0.3
Max. Roll/Yaw Rate (deg/sec).....0.57/1.9
Operating Power (watts).....8
Data Rate (bits/sec)..... 3.9×10^3
Camera Weight (lbs).....8

COMMENTS:

70% planetary coverage can be achieved in 170 days, not in the desired one day, because of Mercury's slow rotation. The coverage can be repeated every 180 days, not every 9 days as desired.

PLANET: Mercury

OBSERVABLE: Surface-to-Atmosphere Transfer

Family No. 9

TV TYPE: 0.5-inch vidicon with 3 color filters

ORBIT: Data Sheet Number.....133
Periapse/Apoapse Alt. (km).....500/500
Inclination (deg).....90
Imaging Altitude Range (km).....500
Imaging On-Time (min).....25

IMAGE: Minimum Image Width (km).....300
Max. Ground Resolution (km).....3
Positional Accuracy (km).....10

CAMERA: Focal Length (mm).....9.4
Aperture Stop.....f/5.6
Exposure Time (sec).....0.05
Cycle Time (sec).....110
Signal-to-Noise Ratio.....60

SUPPORT REQUIREMENTS:

Field of View (deg).....17 x 17
Pointing Accuracy (deg).....1.1°
Camera Volume (cu. ft.).....0.3
Max. Roll/Yaw Rate (deg/sec).....1.1/3.8
Operating Power (watts).....8
Data Rate (bits/sec)..... 1.1×10^4
Camera Weight (lbs).....8

COMMENTS:

Only 49% (rather than the desired 70%) of the planet can be seen at proper illumination from an inertial orbit. The 49% coverage is achieved in 167 days, not in the desired one day, because of Mercury's slow rotation. Coverage can be repeated every 180 days, not every 9 days as desired. A color image is acquired every 35 sec.

PLANET: Jupiter

OBSERVABLE: Global Cloud Coverage

Family No. 4a

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|-----------------|
| ORBIT: | Data Sheet Number..... | 155 |
| | Periapse/Apoapse Alt. (km)..... | 356,750/665,059 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 394,600-665,000 |
| | Imaging On-Time | 44 hrs |
| IMAGE: | Minimum Image Width (km)..... | 15000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 200 |
| CAMERA: | Focal Length (mm)..... | 600 |
| | Aperture Stop..... | f/2.4 |
| | Exposure Time (sec)..... | 0.001 |
| | Cycle Time (sec)..... | 920 |
| | Signal-to-Noise Ratio..... | 7 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 2 x 2 |
| Pointing Accuracy (deg)..... | 0.017 |
| Camera Volume (cu. ft.)..... | 2.0 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.29/26 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 55 |

COMMENTS:

70% coverage can be achieved only in much greater than one day. Actually 100% coverage is achieved, but in something on the order of 50 days.

PLANET: Jupiter

OBSERVABLE: Global Cloud Coverage

Family No. 4a

TV TYPE: 2-inch RBV with color filters

| | | |
|---------|----------------------------------|-----------------|
| ORBIT: | Data Sheet Number..... | 155 |
| | Periapse/Apoapse Alt. (km)..... | 356,760/665,059 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 394,600-665,000 |
| | Imaging On-Time..... | 44 hrs |
| IMAGE: | Minimum Image Width (km)..... | 15000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 200 |
| CAMERA: | Focal Length (mm)..... | 600 |
| | Aperture Stop..... | f/2.4 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 920 |
| | Signal-to-Noise Ratio..... | 4 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 2 x 2 |
| Pointing Accuracy (deg)..... | 0.017 |
| Camera Volume (cu. ft.)..... | 2.0 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.03/2.6 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 55 |

COMMENTS:

See previous data sheet.

PLANET: Jupiter

OBSERVABLE: Global Cloud Coverage

Family No. 4b

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|-------------------|
| ORBIT: | Data Sheet Number..... | 156 |
| | Periapse/Apoapse Alt. (km)..... | 178,375/1,156,043 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 178,375-356,750 |
| | Imaging On-Time | 5.7 hrs |
| IMAGE: | Minimum Image Width (km)..... | 15000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 200 |
| CAMERA: | Focal Length (mm)..... | 270 |
| | Aperture Stop..... | f/2.4 |
| | Exposure Time (sec)..... | 0.001 |
| | Cycle Time (sec)..... | 790 |
| | Signal-to-Noise Ratio..... | 7 |

| | |
|-----------------------------------|-------------------|
| SUPPORT REQUIREMENTS: | |
| Field of View (deg)..... | 4.8x4.8 |
| Pointing Accuracy (deg)..... | 0.032 |
| Camera Volume (cu. ft.)..... | 0.77 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.53/25 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 37 |

COMMENTS:

This orbit and imaging altitudes provides 50% coverage in about 100 days. 70% is desired in one day.

PLANET: Jupiter

OBSERVABLE: Global Cloud Coverage

Family No. 4b

TV TYPE: 2-inch RBV with color filters

| | | |
|---------|----------------------------------|-------------------|
| ORBIT: | Data Sheet Number..... | 156 |
| | Periapse/Apoapse Alt. (km)..... | 178,375/1.156,043 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 178,375-356,750 |
| | Imaging On-Time | 5.7 hrs |
| IMAGE: | Minimum Image Width (km)..... | 15000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 200 |
| CAMERA: | Focal Length (mm)..... | 270 |
| | Aperture Stop..... | f/2.4 |
| | Exposure Time (sec)..... | 0.01 |
| | Cycle Time (sec)..... | 790 |
| | Signal-to-Noise Ratio..... | 4 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 4.8x4.8 |
| Pointing Accuracy (deg)..... | 0.032 |
| Camera Volume (cu. ft.)..... | 0.77 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.05/2.5 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 37 |

COMMENTS:

See previous data sheet.

PLANET: Jupiter

OBSERVABLE: Global Cloud Coverage

Family No. 4c

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|-------------------|
| ORBIT: | Data Sheet Number..... | 157 |
| | Periapse/Apoapse Alt. (km)..... | 178,375/1,346,922 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 178,375-378,155 |
| | Imaging On-Time..... | 11 hrs |
| IMAGE: | Minimum Image Width (km)..... | 15000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 200 |
| CAMERA: | Focal Length (mm)..... | 270 |
| | Aperture Stop..... | f/2.4 |
| | Exposure Time (sec)..... | 0.001 |
| | Cycle Time (sec)..... | 790 |
| | Signal-to-Noise Ratio..... | 7 |

| | |
|-----------------------------------|-------------------|
| SUPPORT REQUIREMENTS: | |
| Field of View (deg)..... | 4.8x4.8 |
| Pointing Accuracy (deg)..... | 0.03 |
| Camera Volume (cu. ft.)..... | 0.77 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.50/25 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 37 |

COMMENTS:

99% coverage is obtained in roughly 100 days, not 70% in one day as desired.

PLANET: Jupiter

OBSERVABLE: Global Cloud Coverage

Family No. 4c

TV TYPE: 2-inch RBV with color filters

ORBIT: Data Sheet Number..... 157
Periapse/Apoapse Alt. (km)..... 178,375/1,346,922
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 178,375-378,155
Imaging On-Time 11 hrs

IMAGE: Minimum Image Width (km)..... 15000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 200

CAMERA: Focal Length (mm)..... 270
Aperture Stop..... f/2.4
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 790
Signal-to-Noise Ratio..... 4

SUPPORT REQUIREMENTS:

Field of View (deg)..... 4.8x4.8
Pointing Accuracy (deg)..... 0.03
Camera Volume (cu. ft.)..... 0.77
Max. Roll/Yaw Rate (deg/sec)..... 0.05/2.5
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 37

COMMENTS:

See previous data sheet.

PLANET: Jupiter

OBSERVABLE: Convective Cells and Turbulence (regional)

Family No. 12a

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|-----------------|
| ORBIT: | Data Sheet Number..... | 172 |
| | Periapse/Apoapse Alt. (km)..... | 356,750/665,059 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 394,566-664,982 |
| | Imaging On-Time..... | 44 hrs |
| IMAGE: | Minimum Image Width (km)..... | 5000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 100 |
| CAMERA: | Focal Length (mm)..... | 450 |
| | Aperture Stop..... | f/2.4 |
| | Exposure Time (sec)..... | 0.001 |
| | Cycle Time (sec)..... | 1200 |
| | Signal-to-Noise Ratio..... | 7 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 2.8x2.8 |
| Pointing Accuracy (deg)..... | 0.009 |
| Camera Volume (cu. ft.)..... | 1.2 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.29/19 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 45 |

COMMENTS:

Imaged area is actually 20,000 x 20,000 km to reduce focal length.

PLANET: Jupiter

OBSERVABLE: Convective Cells and Turbulence (regional)

Family No. 12b

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number..... 173
Periapse/Apoapse Alt. (km)..... 249,725/538,083
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 285,400-538,083
Imaging On-Time 33 hrs

IMAGE: Minimum Image Width (km)..... 5000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 100

CAMERA: Focal Length (mm)..... 360
Aperture Stop..... f/2.4
Exposure Time (sec)..... 0.001
Cycle Time (sec)..... 1100
Signal-to-Noise Ratio..... 7

SUPPORT REQUIREMENTS:

Field of View (deg)..... 3.6x3.6
Pointing Accuracy (deg)..... 0.011
Camera Volume (cu. ft.)..... 0.94
Max. Roll/Yaw Rate (deg/sec)..... 0.35/21
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 40

COMMENTS:

Imaged area is actually 18,000 x 18,000 km.

PLANET: Jupiter

OBSERVABLE: Convective Cells and Turbulence (regional)

Family No. 12c

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number..... 174
Periapse/Apoapse Alt. (km)..... 178,375/1,346,922
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 178,375-378,155
Imaging On-Time 11 hrs

IMAGE: Minimum Image Width (km)..... 5000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 100

CAMERA: Focal Length (mm)..... 250
Aperture Stop..... f/2.4
Exposure Time (sec)..... 0.001
Cycle Time (sec)..... 840
Signal-to-Noise Ratio..... 7

SUPPORT REQUIREMENTS:

Field of View (deg)..... 3.1x3.1
Pointing Accuracy (deg)..... 0.015
Camera Volume (cu. ft.)..... 0.75
Max. Roll/Yaw Rate (deg/sec)..... 0.50/24
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 36

COMMENTS:

Imaged area is actually 16,000 x 16,000 km.

PLANET: Jupiter

OBSERVABLE: Convective Cells and Turbulence (detailed)

Family No. 22

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number..... 191
Periapse/Apoapse Alt. (km)..... 178,375/480,812
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 214,050-480,812
Imaging On-Time 28 hrs

IMAGE: Minimum Image Width (km)..... 1000
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 2100
Aperture Stop..... f/2.4
Exposure Time (sec)..... 0.001
Cycle Time (sec)..... 125
Signal-to-Noise Ratio..... 7

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.6x0.6
Pointing Accuracy (deg)..... 0.0012
Camera Volume (cu. ft.)..... 57
Max. Roll/Yaw Rate (deg/sec)..... 0.06/25
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 280

COMMENTS:

Optics diameter is 88 cm. An image size of 2300x2300 km. is used to reduce focal length. The same area can be imaged after 1.6 days (on one orbital period) while image interval desired is one day.

PLANET: Jupiter

OBSERVABLE: Cloud Formation

Family No. 13a

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number..... 175
Periapse/Apoapse Alt. (km)..... 178,375/480,812
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 214,050-480,812
Imaging On-Time 28 hrs

IMAGE: Minimum Image Width (km)..... 5000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 100

CAMERA: Focal Length (mm)..... 320
Aperture Stop..... f/2.4
Exposure Time (sec)..... 0.001
Cycle Time (sec)..... 820
Signal-to-Noise Ratio..... 7

SUPPORT REQUIREMENTS:

Field of View (deg)..... 4x4
Pointing Accuracy (deg)..... 0.012
Camera Volume (cu. ft.)..... 0.86
Max. Roll/Yaw Rate (deg/sec)..... 0.40/25
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 39

COMMENTS:

Imaged area is 15000 x 15000 km. By reducing cycle time and increasing image overlap, the same area can be imaged after 2 min. as desired.

PLANET: Jupiter

OBSERVABLE: Cloud Formation

Family No. 13a

TV TYPE: 2-inch RBV with color filters

ORBIT: Data Sheet Number..... 175
Periapse/Apoapse Alt. (km)..... 178,375/480,812
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 214,050-480,812
Imaging On-Time 28 hrs

IMAGE: Minimum Image Width (km)..... 5000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 100

CAMERA: Focal Length (mm)..... 320
Aperture Stop..... f/2.4
Exposure Time (sec)..... 0.01
Cycle Time (sec)..... 820
Signal-to-Noise Ratio..... 4

| SUPPORT REQUIREMENTS: | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 4x4 |
| Pointing Accuracy (deg)..... | 0.012 |
| Camera Volume (cu. ft.)..... | 0.86 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.04/2.5 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 39 |

COMMENTS:

See previous data sheet.

PLANET: Jupiter

OBSERVABLE: Cloud Formation

Family No. 13b

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number..... 176
Periapse/Apoapse Alt. (km)..... 249,725/538,083
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 285,400-538,083
Imaging On-Time 33 hrs

IMAGE: Minimum Image Width (km)..... 5000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 100

CAMERA: Focal Length (mm)..... 360
Aperture Stop..... f/2.4
Exposure Time (sec)..... 0.001
Cycle Time (sec)..... 1100
Signal-to-Noise Ratio..... 7

SUPPORT REQUIREMENTS:

Field of View (deg)..... 3.6x3.6
Pointing Accuracy (deg)..... 0.011
Camera Volume (cu. ft.)..... 0.94
Max. Roll/Yaw Rate (deg/sec)..... 0.35/21
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 40

COMMENTS:

See previous data sheet.

PLANET: Jupiter

OBSERVABLE: Cloud Formation

Family No. 13b

TV TYPE: 2-inch RBV with color filters

ORBIT: Data Sheet Number.....176
Periapse/Apoapse Alt. (km).....249,725/538,083
Inclination (deg).....90
Imaging Altitude Range (km).....285,400-538,083
Imaging On-Time.....33 hrs

IMAGE: Minimum Image Width (km).....5000
Max. Ground Resolution (km).....20
Positional Accuracy (km).....100

CAMERA: Focal Length (mm).....360
Aperture Stop.....f/2.4
Exposure Time (sec).....0.01
Cycle Time (sec).....1100
Signal-to-Noise Ratio.....4

SUPPORT REQUIREMENTS:

Field of View (deg).....3.6x3.6
Pointing Accuracy (deg).....0.011
Camera Volume (cu. ft.).....0.94
Max. Roll/Yaw Rate (deg/sec).....0.03/2.1
Operating Power (watts).....32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs).....40

COMMENTS:

See previous data sheet.

PLANET: Jupiter

OBSERVABLE: Cyclone Formations (regional)

Family No. 12a

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number.....172
Periapse/Apoapse Alt. (km).....356,750/665,059
Inclination (deg).....90
Imaging Altitude Range (km).....394,566-664,982
Imaging On-Time44 hrs.

IMAGE: Minimum Image Width (km).....5000
Max. Ground Resolution (km).....20
Positional Accuracy (km).....100

CAMERA: Focal Length (mm).....450
Aperture Stop.....f/2.4
Exposure Time (sec).....0.001
Cycle Time (sec).....1200
Signal-to-Noise Ratio.....7

SUPPORT REQUIREMENTS:

Field of View (deg).....2.8 x 2.8
Pointing Accuracy (deg).....0.009
Camera Volume (cu. ft.).....1.2
Max. Roll/Yaw Rate (deg/sec).....0.29/19
Operating Power (watts).....32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs).....32

COMMENTS:

Imaged area used is actually 20,000 x 20,000 km
to decrease focal length.

PLANET: Jupiter

OBSERVABLE: Cyclone Formations (regional)

Family No. 12b

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number..... 173
Periapse/Apoapse Alt. (km)..... 249,725/538,083
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 285,400-538,083
Imaging On-Time 33 hrs

IMAGE: Minimum Image Width (km)..... 5000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 100

CAMERA: Focal Length (mm)..... 360
Aperture Stop..... f/2.4
Exposure Time (sec)..... 0.001
Cycle Time (sec)..... 1100
Signal-to-Noise Ratio..... 7

SUPPORT REQUIREMENTS:

Field of View (deg)..... 3.6 x 3.6
Pointing Accuracy (deg)..... 0.011
Camera Volume (cu. ft.)..... 0.94
Max. Roll/Yaw Rate (deg/sec)..... 0.35/21
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 40

COMMENTS:

Area actually imaged is 18,000 x 18,000 km per frame.

PLANET: Jupiter

OBSERVABLE: Cyclone Formations (regional)

Family No. 12c

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|-------------------|
| ORBIT: | Data Sheet Number..... | 174 |
| | Periapse/Apoapse Alt. (km)..... | 178,375/1,346,922 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 178,375-378,155 |
| | Imaging On-Time | 11 hrs |
| IMAGE: | Minimum Image Width (km)..... | 5000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 100 |
| CAMERA: | Focal Length (mm)..... | 250 |
| | Aperture Stop..... | f/2.4 |
| | Exposure Time (sec)..... | 0.001 |
| | Cycle Time (sec)..... | 840 |
| | Signal-to-Noise Ratio..... | 7 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 3.1 x 3.1 |
| Pointing Accuracy (deg)..... | 0.015 |
| Camera Volume (cu. ft.)..... | 0.75 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.50/24 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 36 |

COMMENTS:

Image ground size used is actually 16,000 x 16,000 km.

PLANET: Jupiter

OBSERVABLE: Cyclone Formations (detailed)

Family No. 22

TV TYPE: 2-inch RBV

ORBIT: Data Sheet Number..... 191
Periapse/Apoapse Alt. (km)..... 178,375/480,812
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 214,050-480,812
Imaging On-Time 28 hrs

IMAGE: Minimum Image Width (km)..... 1000
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

CAMERA: Focal Length (mm)..... 2100
Aperture Stop..... f/2.4
Exposure Time (sec)..... 0.001
Cycle Time (sec)..... 125
Signal-to-Noise Ratio..... 7

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.6 x 0.6
Pointing Accuracy (deg)..... 0.0012
Camera Volume (cu. ft.)..... 57
Max. Roll/Yaw Rate (deg/sec)..... 0.06/25
Operating Power (watts)..... 32
Data Rate (bits/sec)..... 3.8×10^5
Camera Weight (lbs)..... 280

COMMENTS:

The same area can be observed after a 1.6 day interval. The desired interval is one day or less. Image ground size used is 2300 x 2300 km. The optical system is 88 cm in diameter.

PLANET: Jupiter

OBSERVABLE: Auroras

Family No. 16a

TV TYPE: 2-inch RBV

| | | |
|---------|----------------------------------|-----------------|
| ORBIT: | Data Sheet Number..... | 181 |
| | Periapse/Apoapse Alt. (km)..... | 356,750/665,059 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 356,750-575,081 |
| | Imaging On-Time | 25 hrs |
| IMAGE: | Minimum Image Width (km)..... | 5000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 100 |
| CAMERA: | Focal Length (mm)..... | 390 |
| | Aperture Stop..... | f/2.4 |
| | Exposure Time (sec)..... | 0.03 |
| | Cycle Time (sec)..... | 1300 |
| | Signal-to-Noise Ratio..... | 4 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.8 x 0.8 |
| Pointing Accuracy (deg)..... | 0.010 |
| Camera Volume (cu. ft.)..... | 1.0 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.011/0.61 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 42 |

COMMENTS:

Experiment based on assumed scene luminance of 1 foot-lambert. Same area can be imaged after a 2.9 day interval, not a 2 hr. interval as desired. Orbit data sheet # 182 (Family 16b) will lead to essentially the same support requirements. However, image interval is reduced to 2 days.

PLANET: Jupiter

OBSERVABLE: Auroras

Family No. 16a

TV TYPE: 2-inch RBV with color filters

| | | |
|---------|----------------------------------|-----------------|
| ORBIT: | Data Sheet Number..... | 181 |
| | Periapse/Apoapse Alt. (km)..... | 356,750/665,059 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 356,750/575,081 |
| | Imaging On-Time | 25 hrs |
| IMAGE: | Minimum Image Width (km)..... | 5000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 100 |
| CAMERA: | Focal Length (mm)..... | 390 |
| | Aperture Stop..... | f/2.4 |
| | Exposure Time (sec)..... | 0.7 |
| | Cycle Time (sec)..... | 1300 |
| | Signal-to-Noise Ratio..... | 4 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.8 x 0.8 |
| Pointing Accuracy (deg)..... | 0.010 |
| Camera Volume (cu. ft.)..... | 1.0 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.0006/0.03 |
| Operating Power (watts)..... | 32 |
| Data Rate (bits/sec)..... | 3.8×10^5 |
| Camera Weight (lbs)..... | 42 |

COMMENTS:

See previous data sheet.

INFRARED SCANNING SYSTEMS

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PLANET: Mars

OBSERVABLE: Contacts (regional)

Family No. 8a

DETECTOR: PbS at 295 deg K

ORBIT: Data Sheet Number..... 13
Periapse/Apoapse Alt. (km)..... 969/969
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 969
Imaging On-Time (min)..... 34

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

SCANNER: Collector Diameter (cm)..... 1
Aperture Stop..... f/4
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm)..... 56

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.16 x 34
Pointing Accuracy (deg)..... 0.59
System Volume (cu. ft.)..... 0.04
Max. Roll/Yaw Rate (deg/sec)..... 170
Operating Power (watts)..... 4
Data Rate (bits/sec)..... 13,000
System Weight (lbs)..... 2.2

COMMENTS:

67% coverage (not 70%) is provided in 40 days. Use of a thermistor (with a single-faced scanning mirror) requires a collector diameter of 14 cm.

PLANET: Mars

OBSERVABLE: Contacts (regional)

Family No. 8b

DETECTOR: PbS at 295 deg K

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | ..14 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 95 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 45 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| SCANNER: | Collector Diameter (cm)..... | 1 |
| | Aperture Stop..... | f/4 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 1 |
| | Scanner Rotation Rate (rpm)..... | 56 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 0.16 × 34 |
| Pointing Accuracy (deg)..... | 0.59 |
| System Volume (cu. ft.)..... | 0.04 |
| Max. Roll/Yaw Rate (deg/sec)..... | 170 |
| Operating Power (watts)..... | 4 |
| Data Rate (bits/sec)..... | 13,000 |
| System Weight (lbs)..... | 2.2 |

COMMENTS:

This sun-synchronous orbit provides 74% coverage
in 5 days.

PLANET: Mars

OBSERVABLE: Contacts (local)

Family No. 21

DETECTOR: PbS at 295 deg K

ORBIT: Data Sheet Number..... 32
Periapse/Apoapse Alt. (km)..... 340/33,809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340-976
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km)..... 100
Max. Ground Resolution (km)..... 0.2
Positional Accuracy (km)..... 2

SCANNER: Collector Diameter (cm)..... 31
Aperture Stop..... f/1.6
No. of Detectors..... 50
No. of Scanner Faces..... 4
Scanner Rotation Rate (rpm)..... 18

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.012 x 17
Pointing Accuracy (deg)..... 0.12
System Volume (cu. ft.)..... 130
Max. Roll/Yaw Rate (deg/sec)..... 54
Operating Power (watts)..... 28
Data Rate (bits/sec)..... 2.8×10^6
System Weight (lbs)..... 410

COMMENTS:

PLANET: Mars

OBSERVABLE: Contacts (detailed)

Family No. 30

DETECTOR:

ORBIT: Data Sheet Number.....42
Periapse/Apoapse Alt. (km)..... 383/12,524
Inclination (deg)..... 124
Imaging Altitude Range (km)..... 383-2117
Imaging On-Time (min)..... 39

IMAGE: Minimum Image Width (km)..... 0.5
Max. Ground Resolution (km)..... 0.005
Positional Accuracy (km)..... 0.02

SCANNER: Collector Diameter (cm)..... 1.3
Aperture Stop.....
No. of Detectors.....
No. of Scanner Faces.....
Scanner Rotation Rate (rpm).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
System Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
System Weight (lbs).....

COMMENTS:

At 2117 km altitude, the optics is diffraction-limited to 1.3 meters or larger diameter.

PLANET: Mars

OBSERVABLE: Surface Thermal Anomalies (regional)

Family No. 11a

DETECTOR: Thermistor (2-50 μ)

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 18 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 72 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| SCANNER: | Collector Diameter (cm)..... | 6.3 |
| | Aperture Stop..... | f/1.8 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 4 |
| | Scanner Rotation Rate (rpm)..... | 14 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 0.16 x 34 |
| Pointing Accuracy (deg)..... | 0.59 |
| System Volume (cu. ft.)..... | 0.2 |
| Max. Roll/Yaw Rate (deg/sec)..... | 42 |
| Operating Power (watts)..... | 1.5 |
| Data Rate (bits/sec)..... | 3250 |
| System Weight (lbs)..... | 5.8 |

COMMENTS:

The same area can be imaged every 5 days, not after 30 hrs as desired. Orbit data sheet # 19 (Family No. 11b) would not increase measurement achievement, but would increase the support requirements.

PLANET: Mars

OBSERVABLE: Surface Thermal Anomalies (regional)

Family No. 11c

DETECTOR: Thermistor (2-50 μ)

| | | |
|----------|----------------------------------|----------|
| ORBIT: | Data Sheet Number..... | 20 |
| | Periapse/Apoapse Alt. (km)..... | 425/6995 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 425 |
| | Imaging On-Time (min)..... | 0.25 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| SCANNER: | Collector Diameter (cm)..... | 8.1 |
| | Aperture Stop..... | f/2.8 |
| | No. of Detectors..... | 2 |
| | No. of Scanner Faces..... | 2 |
| | Scanner Rotation Rate (rpm)..... | 29 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 0.25 x 69 |
| Pointing Accuracy (deg)..... | 1.3 |
| System Volume (cu. ft.)..... | 0.17 |
| Max. Roll/Yaw Rate (deg/sec)..... | 88 |
| Operating Power (watts)..... | 2.1 |
| Data Rate (bits/sec)..... | 8400 |
| System Weight (lbs)..... | 6.5 |

COMMENTS:

This experiment suffers from effects of planetary curvature on resolution and fast orbital velocity. However, images of the same area can be viewed after a 25 hr interval.

PLANET: Mars

OBSERVABLE: Surface Thermal Anomalies (local)

Family No. 23

DETECTOR: Si: Al at 23 deg K (2-18 μ)

ORBIT: Data Sheet Number..... 35
Periapse/Apoapse Alt. (km)..... 340/33,809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340-370
Imaging On-Time (min)..... 10

IMAGE: Minimum Image Width (km)..... 100
Max. Ground Resolution (km)..... 0.2
Positional Accuracy (km)..... 2

SCANNER: Collector Diameter (cm)..... 7.5
Aperture Stop..... f/2.5
No. of Detectors..... 1
No. of Scanner Faces..... 4
Scanner Rotation Rate (rpm)..... 350

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.03 x 17
Pointing Accuracy (deg)..... 0.31
System Volume (cu. ft.)..... 0.6
Max. Roll/Yaw Rate (deg/sec)..... 1000
Operating Power (watts)..... 4
Data Rate (bits/sec)..... 4.1 x 10⁵
System Weight (lbs)..... 60

COMMENTS:

Solid neon cooling system weighs 35 lbs based on
0.02 watts dissipated for 400 days.

PLANET: Mars

OBSERVABLE: Surface Thermal Anomalies (detailed)

Family No. 31

DETECTOR:

ORBIT: Data Sheet Number.....43
Periapse/Apoapse Alt. (km).....340/33,809
Inclination (deg).....90
Imaging Altitude Range (km).....340-370
Imaging On-Time (min).....
IMAGE: Minimum Image Width (km).....0.5
Max. Ground Resolution (km).....0.005
Positional Accuracy (km).....0.02
SCANNER: Collector Diameter (cm).....
Aperture Stop.....
No. of Detectors.....
No. of Scanner Faces.....
Scanner Rotation Rate (rpm).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
System Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
System Weight (lbs).....

COMMENTS:

Even from this low altitude, the optical size must exceed 4.5 meters diffraction limit (at 50 μ). Also the focal length is on the order of 7 meters.

PLANET: Mars

OBSERVABLE: Convective Cells and Turbulence (regional)

Family No. 27a

DETECTOR: Thermistor (6-14 μ)

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 21 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 72 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| SCANNER: | Collector Diameter (cm)..... | 0.8 |
| | Aperture Stop..... | f/14 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 1 |
| | Scanner Rotation Rate (rpm)..... | 8 |

SUPPORT REQUIREMENTS:

| | | |
|-----------------------------------|------|------|
| Field of View (deg)..... | 1.0 | x 34 |
| Pointing Accuracy (deg)..... | 3.0 | |
| System Volume (cu. ft.)..... | 0.04 | |
| Max. Roll/Yaw Rate (deg/sec)..... | 25 | |
| Operating Power (watts)..... | 1.5 | |
| Data Rate (bits/sec)..... | 300 | |
| System Weight (lbs)..... | 2.2 | |

COMMENTS:

Orbit data sheet # 22 (Family No. 27b) could also be used to satisfy image specifications at minor increase in support requirements. Orbit data sheet # 23 (Family No. 27c) would also increase support requirements and does not provide four coverages per year.

PLANET: Mars

OBSERVABLE: Convective Cells and Turbulence (regional)

Family No. 27a

DETECTOR: Thermistor (20-40 μ)

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 21 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 72 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| SCANNER: | Collector Diameter (cm)..... | 1.0 |
| | Aperture Stop..... | f/11 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 1 |
| | Scanner Rotation Rate (rpm)..... | 8 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 1.0° x 34 |
| Pointing Accuracy (deg)..... | 3.0 |
| System Volume (cu. ft.)..... | 0.04 |
| Max. Roll/Yaw Rate (deg/sec)..... | 25 |
| Operating Power (watts)..... | 1.5 |
| Data Rate (bits/sec)..... | 300 |
| System Weight (lbs)..... | 2.2 |

COMMENTS:

See previous data sheet.

PLANET: Mars

OBSERVABLE: Convective Cells and Turbulence (detailed)

Family No. 24

DETECTOR: Thermistor (6-14 μ)

ORBIT: Data Sheet Number..... 36
Periapse/Apoapse Alt. (km)..... 340/33,809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340-370
Imaging On-Time (min)..... 10

IMAGE: Minimum Image Width (km)..... 100
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 6

SCANNER: Collector Diameter (cm)..... 6.5
Aperture Stop..... f/1.9
No. of Detectors..... 1
No. of Scanner Faces..... 2
Scanner Rotation Rate (rpm)..... 46

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.45x17
Pointing Accuracy (deg)..... 0.93
System Volume (cu. ft.)..... 0.06
Max. Roll/Yaw Rate (deg/sec)..... 140
Operating Power (watts)..... 1.5
Data Rate (bits/sec)..... 3700
System Weight (lbs)..... 5.7

COMMENTS:

PLANET: Mars

OBSERVABLE: Convective Cells and Turbulence (detailed)

Family No. 24

DETECTOR: Thermistor (20-40 μ)

| | | |
|----------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 36 |
| | Periapse/Apoapse Alt. (km)..... | 340/33,809 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 340-370 |
| | Imaging On-Time (min)..... | 10 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 6 |
| SCANNER: | Collector Diameter (cm)..... | 8.1 |
| | Aperture Stop..... | f/1.6 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 2 |
| | Scanner Rotation Rate (rpm)..... | 46 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 0.45 x 17 |
| Pointing Accuracy (deg)..... | 0.93 |
| System Volume (cu. ft.)..... | 0.12 |
| Max. Roll/Yaw Rate (deg/sec)..... | 140 |
| Operating Power (watts)..... | 1.5 |
| Data Rate (bits/sec)..... | 3700 |
| System Weight (lbs)..... | 8.6 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Atmospheric Thermal Anomalies (regional)

Family No. 1a

DETECTOR: Thermistor (3-40 μ)

ORBIT: Data Sheet Number..... 85
Periapse/Apoapse Alt. (km)..... 454-454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Image Width (km)..... 1500
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

SCANNER: Collector Diameter (cm)..... 2.6
Aperture Stop..... f/4
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm)..... 86

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.57 x 112
Pointing Accuracy (deg)..... 6.3
System Volume (cu. ft.)..... 0.04
Max. Roll/Yaw Rate (deg/sec)..... 260
Operating Power (watts)..... 1.5
Data Rate (bits/sec)..... 5400
System Weight (lbs)..... 2.5

COMMENTS:

PLANET: Venus

OBSERVABLE: Atmospheric Thermal Anomalies (regional)

Family No. 1b

DETECTOR: Thermistor (3-40 μ)

| | | |
|----------|----------------------------------|-------------|
| ORBIT: | Data Sheet Number..... | 86 |
| | Periapse/Apoapse Alt. (km)..... | 248/113,700 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 248-1297 |
| | Imaging On-Time (min)..... | 19 |
| IMAGE: | Minimum Image Width (km)..... | 1500 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| SCANNER: | Collector Diameter (cm)..... | 3.9 |
| | Aperture Stop..... | f/4 |
| | No. of Detectors..... | 4 |
| | No. of Scanner Faces..... | 2 |
| | Scanner Rotation Rate (rpm)..... | 46 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------------------|
| Field of View (deg)..... | 0.35 x 137 |
| Pointing Accuracy (deg)..... | 2.2 |
| System Volume (cu. ft.)..... | 0.07 |
| Max. Roll/Yaw Rate (deg/sec)..... | 140 |
| Operating Power (watts)..... | 3 |
| Data Rate (bits/sec)..... | 1.9 x 10 ⁴ |
| System Weight (lbs)..... | 8 |

COMMENTS:

The angular resolution is controlled by planetary curvature effects. Only one coverage (of 71%) per year is afforded by this orbit.

PLANET: Venus

OBSERVABLE: Atmospheric Thermal Anomalies (detailed)

Family No. 12

DETECTOR: Thermistor (3-40 μ)

ORBIT: Data Sheet Number.....107
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg).....90
Imaging Altitude Range (km).....454
Imaging On-Time (min).....96

IMAGE: Minimum Image Width (km).....100
Max. Ground Resolution (km).....3
Positional Accuracy (km).....10

SCANNER: Collector Diameter (cm)..... 3.5
Aperture Stop..... f/4
No. of Detectors.....1
No. of Scanner Faces.....3
Scanner Rotation Rate (rpm).....44

SUPPORT REQUIREMENTS:

Field of View (deg).....0.37 x 13
Pointing Accuracy (deg).....1.3
System Volume (cu. ft.).....0.04
Max. Roll/Yaw Rate (deg/sec).....130
Operating Power (watts).....1.5
Data Rate (bits/sec).....4300
System Weight (lbs).....3

COMMENTS:

100% planetary coverage is available per planetary day.

PLANET: Venus

OBSERVABLE: Global Cloud Coverage

Family No. 2a

DETECTOR: PbS at 295°K

ORBIT: Data Sheet Number.....87
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg).....90
Imaging Altitude Range (km).....454
Imaging On-Time (min).....96

IMAGE: Minimum Image Width (km).....1500
Max. Ground Resolution (km).....20
Positional Accuracy (km).....50

SCANNER: Collector Diameter (cm).....1
Aperture Stop.....f/10
No. of Detectors.....1
No. of Scanner Faces.....1
Scanner Rotation Rate (rpm).....86

SUPPORT REQUIREMENTS:

Field of View (deg).....0.57 x 112
Pointing Accuracy (deg).....6.3
System Volume (cu. ft.).....0.04
Max. Roll/Yaw Rate (deg/sec).....260
Operating Power (watts).....4
Data Rate (bits/sec).....5400
System Weight (lbs).....2

COMMENTS:

No imagery will be obtained at night. This will reduce amount of coverage to 50%. No currently available detector will image satisfactorily at night in the near IR.

PLANET: Venus

OBSERVABLE: Global Cloud Coverage

Family No. 2a

DETECTOR: Thermistor (10-30 μ)

ORBIT: Data Sheet Number.....87
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg).....90
Imaging Altitude Range (km).....454
Imaging On-Time (min).....96

IMAGE: Minimum Image Width (km).....1500
Max. Ground Resolution (km).....20
Positional Accuracy (km).....50

SCANNER: Collector Diameter (cm).....3
Aperture Stop.....f/3.4
No. of Detectors.....1
No. of Scanner Faces.....1
Scanner Rotation Rate (rpm).....86

SUPPORT REQUIREMENTS:

Field of View (deg).....0.57 x 112
Pointing Accuracy (deg).....6.3
System Volume (cu. ft.).....0.04
Max. Roll/Yaw Rate (deg/sec).....260
Operating Power (watts).....1.5
Data Rate (bits/sec).....5400
System Weight (lbs).....2.5

COMMENTS:

Total planetary coverage is achieved, but in 122 days and only twice per year. It is desired to image 70% coverage in 100 hr, four times per year. Orbit data sheet # 88 (Family 2b) does not improve matters.

PLANET: Venus

OBSERVABLE: Convective Cells and Turbulence (regional)

Family No. 7a

DETECTOR: Thermistor (6-14 μ)

ORBIT: Data Sheet Number..... 97
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

SCANNER: Collector Diameter (cm)..... 1
Aperture Stop..... f/3.4
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm)..... 29

SUPPORT REQUIREMENTS:

Field of View (deg)..... 1.7 x 66
Pointing Accuracy (deg)..... 6.3
System Volume (cu. ft.)..... 0.04
Max. Roll/Yaw Rate (deg/sec)..... 88
Operating Power (watts)..... 1.5
Data Rate (bits/sec)..... 630
System Weight (lbs)..... 2

COMMENTS:

Orbit data sheet# 98 (Family No. 7b) does not provide 2 complete coverages per year as provided here and as is desired.

PLANET: Venus

OBSERVABLE: Convective Cells and Turbulence (regional)
Family No. 7a

DETECTOR: Thermistor (18-30 μ)

ORBIT: Data Sheet Number..... 97
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

SCANNER: Collector Diameter (cm)..... 1
Aperture Stop..... f/3.4
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm)..... 29

SUPPORT REQUIREMENTS:

Field of View (deg)..... 1.7 x 66
Pointing Accuracy (deg)..... 6.3
System Volume (cu. ft.)..... 0.04
Max. Roll/Yaw Rate (deg/sec)..... 88
Operating Power (watts)..... 1.5
Data Rate (bits/sec)..... 630
System Weight (lbs)..... 2

COMMENTS:

See previous data sheet.

PLANET: Venus

OBSERVABLE: Convective Cells and Turbulence (detailed)

Family No. 13

DETECTOR: Thermistor (6-14u)

ORBIT: Data Sheet Number.....108
Periapse/Apoapse Alt. (km).....454/454
Inclination (deg).....90
Imaging Altitude Range (km).....454
Imaging On-Time (min).....96

IMAGE: Minimum Image Width (km).....100
Max. Ground Resolution (km).....3
Positional Accuracy (km).....6

SCANNER: Collector Diameter (cm).....5.4
Aperture Stop.....f/2.9
No. of Detectors.....1
No. of Scanner Faces.....3
Scanner Rotation Rate (rpm).....44

SUPPORT REQUIREMENTS:

Field of View (deg).....0.37 x 13
Pointing Accuracy (deg).....0.76
System Volume (cu. ft.).....0.05
Max. Roll/Yaw Rate (deg/sec).....130
Operating Power (watts).....1.5
Data Rate (bits/sec).....4300
System Weight (lbs).....3.5

COMMENTS:

Approximately 5 images of the same area may be taken at intervals of 1.6 hrs. All that is required is an image repetition rate of less than 100 hrs.

PLANET: Venus

OBSERVABLE: Convective Cells and Turbulence (detailed)

Family No. 13

DETECTOR: Thermistor (18-30 μ)

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 108 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 96 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 6 |
| SCANNER: | Collector Diameter (cm)..... | 6.5 |
| | Aperture Stop..... | f/2.3 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 3 |
| | Scanner Rotation Rate (rpm)..... | 44 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 0.37 x 13 |
| Pointing Accuracy (deg)..... | 0.76 |
| System Volume (cu. ft.)..... | 0.09 |
| Max. Roll/Yaw Rate (deg/sec)..... | 130 |
| Operating Power (watts)..... | 1.5 |
| Data Rate (bits/sec)..... | 4300 |
| System Weight (lbs)..... | 4.3 |

COMMENTS:

See previous data sheet.

PLANET: Venus

OBSERVABLE: Cloud Formation

Family No. 9a

DETECTOR: PbS at 295 deg K

ORBIT: Data Sheet Number..... 101
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

SCANNER: Collector Diameter (cm)..... 1
Aperture Stop..... f/22
No. of Detectors..... 1
No. of Scanner Faces..... 4
Scanner Rotation Rate (rpm)..... 49

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.25 x 66
Pointing Accuracy (deg)..... 1.3
System Volume (cu. ft.)..... 0.04
Max. Roll/Yaw Rate (deg/sec)..... 150
Operating Power (watts)..... 4
Data Rate (bits/sec)..... 7000
System Weight (lbs)..... 2.2

COMMENTS:

1.5 min are required to scan a 600 x 600 km area, while 1 min is desired. The same area cannot be imaged again for 1.6 hrs (10-15 min is desired). Two coverages, of 50% in daylight, are provided each year; 4 coverages of 10% are desired. Orbit data sheet #102 (Family No. 9b) provides an image in one min, but yields an image interval of only 17 hrs and 2 coverages per year.

PLANET: Venus

OBSERVABLE: Cloud Formation

Family No. 7a

DETECTOR: Thermistor (10-30 μ)

ORBIT: Data Sheet Number..... 97
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

SCANNER: Collector Diameter (cm)..... 5.3
Aperture Stop..... f/4.3
No. of Detectors..... 2
No. of Scanner Faces..... 4
Scanner Rotation Rate (rpm)..... 24

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.25 x 66
Pointing Accuracy (deg)..... 1.3
System Volume (cu. ft.)..... 1.0
Max. Roll/Yaw Rate (deg/sec)..... 73
Operating Power (watts)..... 2
Data Rate (bits/sec)..... 7000
System Weight (lbs)..... 16

COMMENTS:

1.5 min are required to scan a 600 x 600 km area, while 1 min is desired. The same area can be imaged again in 1.6 hrs, not 10-15 min as desired. 2 coverages of 100% are provided annually, 4 of 10% are desired. Orbit data sheet #98 (Family No. 7b) provides the 1 min image time, but image interval is 17 hrs and only one coverage of 60% is provided per year. See next data sheet for effect of design change on support requirements.

PLANET: Venus

OBSERVABLE: Cloud Formation

Family No. 7a

DETECTOR: Thermistor (10-30 μ)

ORBIT: Data Sheet Number..... 97
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

SCANNER: Collector Diameter (cm)..... 5.3
Aperture Stop..... f/4.3
No. of Detectors..... 4
No. of Scanner Faces..... 2
Scanner Rotation Rate (rpm)..... 24

| | |
|-----------------------------------|-------------------|
| SUPPORT REQUIREMENTS: | |
| Field of View (deg)..... | 0.25 x 66 |
| Pointing Accuracy (deg)..... | 1.3 |
| System Volume (cu. ft.)..... | 0.06 |
| Max. Roll/Yaw Rate (deg/sec)..... | 73 |
| Operating Power (watts)..... | 3 |
| Data Rate (bits/sec)..... | 1.4×10^4 |
| System Weight (lbs)..... | 7 |

COMMENTS:

See previous data sheet. By doubling no. of detectors and halving no. of mirror faces, system weight and size are reduced at expense of data rate and power requirement.

PLANET: Venus

OBSERVABLE: Cyclone Formations (regional)

Family No. 9a

DETECTOR: Thermistor (0.8-2.5 μ)

ORBIT: Data Sheet Number..... 101
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

SCANNER: Collector Diameter (cm)..... 1
Aperture Stop..... f/3.4
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm)..... 29

| SUPPORT REQUIREMENTS: | |
|-----------------------------------|----------|
| Field of View (deg)..... | 1.7 x 66 |
| Pointing Accuracy (deg)..... | 6.3 |
| System Volume (cu. ft.)..... | 0.04 |
| Max. Roll/Yaw Rate (deg/sec)..... | 88 |
| Operating Power (watts)..... | 1.5 |
| Data Rate (bits/sec)..... | 630 |
| System Weight (lbs)..... | 2.2 |

COMMENTS:

Two coverages (of 50%) are provided each year. Four coverages (of 70%) are desired in one year.

PLANET: Venus

OBSERVABLE: Cyclone Formations (regional)

Family No. 9b

DETECTOR: PbS at 295 deg K

ORBIT: Data Sheet Number..... 102
Periapse/Apoapse Alt. (km)..... 255/50,735
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 255-2125
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

SCANNER: Collector Diameter (cm)..... 1
Aperture Stop..... f/11
No. of Detectors..... 1
No. of Scanner Faces..... 2
Scanner Rotation Rate (rpm)..... 120

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.52 x 98
Pointing Accuracy (deg)..... 1.3
System Volume (cu. ft.)..... 0.04
Max. Roll/Yaw Rate (deg/sec)..... 360
Operating Power (watts)..... 4
Data Rate (bits/sec)..... 8200
System Weight (lbs)..... 2.2

COMMENTS:

Only one daylight coverage (of 50%) is provided in one planetary year (240 days). Four coverages (of 70%) are desired. However, capture ΔV is only 2.0 km/sec, rather than 3.8 km/sec as for previous data sheet.

PLANET: Venus

OBSERVABLE: Cyclone Formations (regional)

Family No. 7a

DETECTOR: Thermistor (10-30 μ)

ORBIT: Data Sheet Number..... 97
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

SCANNER: Collector Diameter (cm)..... 1
Aperture Stop..... f/3.4
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm)..... 29

SUPPORT REQUIREMENTS:

Field of View (deg)..... 1.7 x 66
Pointing Accuracy (deg)..... 6.3
System Volume (cu. ft.)..... 0.04
Max. Roll/Yaw Rate (deg/sec)..... 88
Operating Power (watts)..... 1.5
Data Rate (bits/sec)..... 630
System Weight (lbs)..... 2.2

COMMENTS:

100% coverage is achieved in 122 days, hence two coverages per year are provided, not four as desired.

PLANET: Venus

OBSERVABLE: Cyclone Formations (regional)

Family No. 7b

DETECTOR: Thermistor (10-30 μ)

ORBIT: Data Sheet Number..... 98
Periapse/Apoapse Alt, (km)..... 255/50,735
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 255-2125
Imaging On-Time (min)..... 22

IMAGE: Minimum Image Width (km)..... 600
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 50

SCANNER: Collector Diameter (cm)..... 2.8
Aperture Stop..... f/4
No. of Detectors..... 2
No. of Scanner Faces..... 2
Scanner Rotation Rate (rpm)..... 59

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.52 x 98
Pointing Accuracy (deg)..... 1.3
System Volume (cu. ft.)..... 0.04
Max. Roll/Yaw Rate (deg/sec)..... 180
Operating Power (watts)..... 2.1
Data Rate (bits/sec)..... 8200
System Weight (lbs)..... 3.7

COMMENTS:

100% coverage is achieved in 243 days, providing only one coverage per year, rather than four as desired. However, orbit capture ΔV is only 2.0 km/sec, rather than 3.8 km/sec as for previous experiment.

PLANET: Venus

OBSERVABLE: Cyclone Formations (detailed)

Family No. 16

DETECTOR: Thermistor (0.8-2.5 μ)

ORBIT: Data Sheet Number..... 111
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 48

IMAGE: Minimum Image Width (km)..... 100
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

SCANNER: Collector Diameter (cm)..... 3.6
Aperture Stop..... f/4.2
No. of Detectors..... 1
No. of Scanner Faces..... 3
Scanner Rotation Rate (rpm)..... 44

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.37 x 13
Pointing Accuracy (deg)..... 1.3
System Volume (cu. ft.)..... 0.04
Max. Roll/Yaw Rate (deg/sec)..... 130
Operating Power (watts)..... 1.5
Data Rate (bits/sec)..... 4300
System Weight (lbs)..... 3.5

COMMENTS:

Two coverages of 50% are provided in one year, not four coverages of 10% as desired.

PLANET: Venus

OBSERVABLE: Cyclone Formations (detailed)

Family No. 13

DETECTOR: Thermistor (10-30 μ)

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 108 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 96 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| SCANNER: | Collector Diameter (cm)..... | 4 |
| | Aperture Stop..... | f/3.9 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 3 |
| | Scanner Rotation Rate (rpm)..... | 44 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 0.37 x 13 |
| Pointing Accuracy (deg)..... | 1.3 |
| System Volume (cu. ft.)..... | 0.04 |
| Max. Roll/Yaw Rate (deg/sec)..... | 130 |
| Operating Power (watts)..... | 1.5 |
| Data Rate (bits/sec)..... | 4300 |
| System Weight (lbs)..... | 3.8 |

COMMENTS:

Two complete coverages (100%) are provided in one year. 10% coverage four times per year is desired.

PLANET: Venus

OBSERVABLE: Surface to Atmosphere Transfer

Family No. 7a

DETECTOR: Thermistor (10-30 μ)

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 97 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 96 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| SCANNER: | Collector Diameter (cm)..... | 1 |
| | Aperture Stop..... | f/3.4 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 1 |
| | Scanner Rotation Rate (rpm)..... | 29 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|----------|
| Field of View (deg)..... | 1.7 x 66 |
| Pointing Accuracy (deg)..... | 6.3 |
| System Volume (cu. ft.)..... | 0.04 |
| Max. Roll/Yaw Rate (deg/sec)..... | 88 |
| Operating Power (watts)..... | 1.5 |
| Data Rate (bits/sec)..... | 630 |
| System Weight (lbs)..... | 2.2 |

COMMENTS:

From this orbit, 1.5 min is required to scan area of 600 x 600 km, 1 min is desired. 70% coverage is achieved in 122 days, not 100 hrs as desired. Only two coverages per year are provided, not ten.

PLANET: Venus

OBSERVABLE: Surface to Atmosphere Transfer

Family No. 7b

DETECTOR: Thermistor (10-30 μ)

| | | |
|----------|----------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 98 |
| | Periapse/Apoapse Alt. (km)..... | 255/50,735 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 255-2125 |
| | Imaging On-Time (min)..... | 22 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 50 |
| SCANNER: | Collector Diameter (cm)..... | 2.8 |
| | Aperture Stop..... | f/4 |
| | No. of Detectors..... | 2 |
| | No. of Scanner Faces..... | 2 |
| | Scanner Rotation Rate (rpm)..... | 29 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 0.52 x 98 |
| Pointing Accuracy (deg)..... | 1.3 |
| System Volume (cu. ft.)..... | 0.04 |
| Max. Roll/Yaw Rate (deg/sec)..... | 180 |
| Operating Power (watts)..... | 2.1 |
| Data Rate (bits/sec)..... | 8200 |
| System Weight (lbs)..... | 3.7 |

COMMENTS:

Orbital speed permits observation of 600 x 600 km area in one min as desired. 60% coverage is provided in 243 days, not 100 hrs as desired. Only one coverage in one year is achieved, not ten coverages.

PLANET: Mercury

OBSERVABLE: Contacts (regional)

Family No. 4a

DETECTOR: Pbs at 295 deg K

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 125 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 36 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| SCANNER: | Collector Diameter (cm)..... | 1 |
| | Aperture Stop..... | f/26 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 1 |
| | Scanner Rotation Rate (rpm)..... | 68 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.23 x 60 |
| Pointing Accuracy (deg)..... | 1.1 |
| System Volume (cu. ft.)..... | 0.04 |
| Max. Roll/Yaw Rate (deg/sec)..... | 200 |
| Operating Power (watts)..... | 4 |
| Data Rate (bits/sec)..... | 1.1×10^4 |
| System Weight (lbs)..... | 2 |

COMMENTS:

Only 63% of the planet can be seen, at the proper solar illumination, from an inertial orbit. This very nearly satisfies the image specification of 70% planetary coverage. Orbit on orbit data sheet #126 provides only 32% planetary coverage.

PLANET: Mercury

OBSERVABLE: Contacts (local)

Family No. 14

DETECTOR: PbS at 295 deg K

ORBIT: Data Sheet Number..... 138
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 36

IMAGE: Minimum Image Width (km)..... 100
Max. Ground Resolution (km)..... 0.2
Positional Accuracy (km)..... 2

SCANNER: Collector Diameter (cm)..... 30
Aperture Stop..... f/8.3
No. of Detectors..... 1
No. of Scanner Faces..... 1
Scanner Rotation Rate (rpm)..... 710

| SUPPORT REQUIREMENTS: | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.023 x 11 |
| Pointing Accuracy (deg)..... | 0.23 |
| System Volume (cu. ft.)..... | 9.8 |
| Max. Roll/Yaw Rate (deg/sec)..... | 2000 |
| Operating Power (watts)..... | 4 |
| Data Rate (bits/sec)..... | 1.1×10^6 |
| System Weight (lbs)..... | 77 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Contacts (detailed)

Family No. 21

DETECTOR: PbS at 295 deg K

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 145 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 36 |
| IMAGE: | Minimum Image Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.005 |
| | Positional Accuracy (km)..... | 0.02 |
| SCANNER: | Collector Diameter (cm)..... | 770 |
| | Aperture Stop..... | f/1.3 |
| | No. of Detectors..... | 25 |
| | No. of Scanner Faces..... | 4 |
| | Scanner Rotation Rate (rpm)..... | 280 |

SUPPORT REQUIREMENTS:

| |
|-----------------------------------|
| Field of View (deg)..... |
| Pointing Accuracy (deg)..... |
| System Volume (cu. ft.)..... |
| Max. Roll/Yaw Rate (deg/sec)..... |
| Operating Power (watts)..... |
| Data Rate (bits/sec)..... |
| System Weight (lbs)..... |

COMMENTS:

To reduce required collector size to one meter requires increasing the product p_m by a factor of 1000 or increasing D_p^* by factor of 100. Thus this experiment is well beyond the current state-of-art.

PLANET: Mercury

OBSERVABLE: Surface Thermal Anomalies (regional)

Family No. 6a

DETECTOR: Thermistor (3-50 μ)

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 129 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Image Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| SCANNER: | Collector Diameter (cm)..... | 2.0 |
| | Aperture Stop..... | f/12 |
| | No. of Detectors..... | 20 |
| | No. of Scanner Faces..... | 2 |
| | Scanner Rotation Rate (rpm)..... | 1.8 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-----------|
| Field of View (deg)..... | 0.23 x 60 |
| Pointing Accuracy (deg)..... | 1.1 |
| System Volume (cu. ft.)..... | 0.04 |
| Max. Roll/Yaw Rate (deg/sec)..... | 5.1 |
| Operating Power (watts)..... | 7 |
| Data Rate (bits/sec)..... | 5300 |
| System Weight (lbs)..... | 11 |

COMMENTS:

Diffraction-limited collector is 1.5 cm in diameter.

PLANET: Mercury

OBSERVABLE: Surface Thermal Anomalies (regional)

Family No. 6b

DETECTOR: Thermistor (3-50 μ)

ORBIT: Data Sheet Number.....130
Periapse/Apoapse Alt. (km).....500/53,420
Inclination (deg).....90
Imaging Altitude Range (km).....500-1540
Imaging On-Time (min).....100

IMAGE: Minimum Image Width (km).....600
Max. Ground Resolution (km).....3
Positional Accuracy (km).....10

SCANNER: Collector Diameter (cm).....4
Aperture Stop.....f/14
No. of Detectors.....20
No. of Scanner Faces.....2
Scanner Rotation Rate (rpm).....1.7

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.10 x 60
Pointing Accuracy (deg)..... 0.37
System Volume (cu. ft.)..... 0.05
Max. Roll/Yaw Rate (deg/sec)..... 5.0
Operating Power (watts)..... 7
Data Rate (bits/sec)..... 1.2 x 10⁴
System Weight (lbs)..... 11

COMMENTS:

Ground resolution is 1.4 km at periapse. 70% coverage is achieved between + 45 deg latitude. This coverage could be increased by operating sensor at higher altitudes on this orbit, but data rate (and other support requirements) would become more demanding. Collector diffraction limit is 3.4 cm at 1540 km altitude.

PLANET: Mercury

OBSERVABLE: Surface Thermal Anomalies (local)

Family No. 15

DETECTOR: Si:B at 23 deg K

| | | |
|----------|----------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 139 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Image Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 6.2 |
| | Positional Accuracy (km)..... | 2 |
| SCANNER: | Collector Diameter (cm)..... | 15 |
| | Aperture Stop..... | f/1.64 |
| | No. of Detectors..... | 1 |
| | No. of Scanner Faces..... | 1 |
| | Scanner Rotation Rate (rpm)..... | 710 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.023 x 11 |
| Pointing Accuracy (deg)..... | 0.23 |
| System Volume (cu. ft.)..... | 0.5 |
| Max. Roll/Yaw Rate (deg/sec)..... | 2000 |
| Operating Power (watts)..... | 4 |
| Data Rate (bits/sec)..... | 1.1×10^6 |
| System Weight (lbs)..... | 25 |

COMMENTS:

A solid neon cooling system (weighing about 5 lbs) is based on dissipating 0.02 watts for 60 days. The 15 cm collector diameter is diffraction-limited.

PLANET: Mercury

OBSERVABLE: Surface Thermal Anomalies (detailed)

Family No. 22

DETECTOR:

ORBIT: Data Sheet Number..... 146
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min).....

IMAGE: Minimum Image Width (km)..... 0.5
Max. Ground Resolution (km)..... 0.005
Positional Accuracy (km)..... 0.02

SCANNER: Collector Diameter (cm).....
Aperture Stop.....
No. of Detectors.....
No. of Scanner Faces.....
Scanner Rotation Rate (rpm).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
System Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
System Weight (lbs).....

COMMENTS:

Even with a large no. of detectors and scanning mirror faces, the detector response time must be on the order of 10^{-7} sec. This implies that detectors must operate at 10 microns or past. At 10 microns, the diffraction-limit requires a collector diameter larger than one meter. Thus this experiment is beyond current state-of-art.

PLANET: Jupiter

OBSERVABLE: Atmospheric Thermal Anomalies (regional)
Family No. 2a

DETECTOR: Si:B at 23 deg K

ORBIT: Data Sheet Number..... 151
Periapse/Apoapse Alt. (km)..... 356,750/665,059
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 356,750-575,081
Imaging On-Time (min).....

IMAGE: Minimum Image Width (km)..... 15,000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 200

SCANNER: Collector Diameter (cm).....
Aperture Stop.....
No. of Detectors.....
No. of Scanner Faces.....
Scanner Rotation Rate (rpm).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
System Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
System Weight (lbs).....

COMMENTS:

At 30 microns (near the peak of the thermal spectral emission curve), the diffraction-limit on the optics is one meter. Furthermore, the aperture required to collect sufficient energy is roughly 3 meters (for 2 deg K temperature resolution).

PLANET: Jupiter

OBSERVABLE: Atmospheric Thermal Anomalies (regional)

Family No. 2b

DETECTOR: Si:B at 23 deg K

| | | |
|----------|----------------------------------|-------------------|
| ORBIT: | Data Sheet Number..... | 152 |
| | Periapse/Apoapse Alt. (km)..... | 178,375/1,156,020 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 178,375-356,750 |
| | Imaging On-Time (min)..... | |
| IMAGE: | Minimum Image Width (km)..... | 15,000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 200 |
| SCANNER: | Collector Diameter (cm)..... | |
| | Aperture Stop..... | |
| | No. of Detectors..... | |
| | No. of Scanner Faces..... | |
| | Scanner Rotation Rate (rpm)..... | |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|--|
| Field of View (deg)..... | |
| Pointing Accuracy (deg)..... | |
| System Volume (cu. ft.)..... | |
| Max. Roll/Yaw Rate (deg/sec)..... | |
| Operating Power (watts)..... | |
| Data Rate (bits/sec)..... | |
| System Weight (lbs)..... | |

COMMENTS:

Although the diffraction limit is 66 cm, a 2 meter aperture is required to collect sufficient energy for 2 deg K temperature resolution.

PLANET: Jupiter

OBSERVABLE: Atmospheric Thermal Anomalies (detailed)

Family No. 17a

DETECTOR:

ORBIT: Data Sheet Number.....183
Periapse/Apoapse Alt. (km).....356,750/665,059
Inclination (deg).....90
Imaging Altitude Range (km).....356,750-575,081
Imaging On-Time (min).....

IMAGE: Minimum Image Width (km).....1500
Max. Ground Resolution (km).....3
Positional Accuracy (km).....50

SCANNER: Collector Diameter (cm).....
Aperture Stop.....
No. of Detectors.....
No. of Scanner Faces.....
Scanner Rotation Rate (rpm).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
System Volume (cu. ft.).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
System Weight (lbs).....

COMMENTS:

At 30 microns, optics is diffraction-limited at
7 meters.

PLANET: Jupiter

OBSERVABLE: Global Cloud Coverage

Family No. 3b

DETECTOR: PbS at 195 deg K

| | | |
|----------|----------------------------------|-------------------|
| ORBIT: | Data Sheet Number..... | 154 |
| | Periapse/Apoapse Alt. (km)..... | 178,375/1,156,020 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 178,375-356,750 |
| | Imaging On-Time | 8.7 hrs |
| IMAGE: | Minimum Image Width (km)..... | 15,000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 200 |
| SCANNER: | Collector Diameter (cm)..... | 76 |
| | Aperture Stop..... | f/2.4 |
| | No. of Detectors..... | 50 |
| | No. of Scanner Faces..... | 1 |
| | Scanner Rotation Rate (rpm)..... | 1.8 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.003 x 5 |
| Pointing Accuracy (deg)..... | 0.032 |
| System Volume (cu. ft.)..... | 63 |
| Max. Roll/Yaw Rate (deg/sec)..... | 5.5 |
| Operating Power (watts)..... | 28 |
| Data Rate (bits/sec)..... | 1.1×10^6 |
| System Weight (lbs)..... | 1400 |

COMMENTS:

The one meter size scanning mechanism weighs 1100 lbs. 16 min (not the desired 2 min) is required to scan a 15,000 x 15,000 km area.

PLANET: Jupiter

OBSERVABLE: Cyclone Formations (regional)

Family No. 12c

DETECTOR: PbS at 195 deg K

| | | |
|----------|----------------------------------|-------------------|
| ORBIT: | Data Sheet Number..... | 174 |
| | Periapse/Apoapse Alt. (km)..... | 178,375/1,346,922 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 178,375-378,155 |
| | Imaging On-Time | 11 hrs |
| IMAGE: | Minimum Image Width (km)..... | 5000 |
| | Max. Ground Resolution (km)..... | 20 |
| | Positional Accuracy (km)..... | 100 |
| SCANNER: | Collector Diameter (cm)..... | 82 |
| | Aperture Stop..... | f/2.3 |
| | No. of Detectors..... | 50 |
| | No. of Scanner Faces..... | 1 |
| | Scanner Rotation Rate (rpm)..... | 1.9 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.003 x 1.6 |
| Pointing Accuracy (deg)..... | 0.015 |
| System Volume (cu. ft.)..... | 76 |
| Max. Roll/Yaw Rate (deg/sec)..... | 5.8 |
| Operating Power (watts)..... | 28 |
| Data Rate (bits/sec)..... | 1.2×10^6 |
| System Weight (lbs)..... | 1600 |

COMMENTS:

Scanning mechanism weighs 1400 lbs. Requires 5 min to image 5000 x 5000 km area, not one min as desired.

PASSIVE MICROWAVE IMAGING SYSTEMS

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PLANET: Mars

OBSERVABLE: Surface Thermal Anomalies (regional)

Family No. 11a

ANTENNA TYPE: Electrical scan

ORBIT: Data Sheet Number..... 18
Periapse/Apoapse Alt. (km)..... 969/969
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 969
Imaging On-Time (min)..... 72

IMAGE: Minimum Scan Length (km)..... 600
Max. Ground Resolution (km)..... 3
Temperature Resolution (deg K)..... 2
Positional Accuracy (km)..... 10

SENSOR: Operating Frequency (GHz)..... 13
Integration Time (sec)..... 0.0046
Fly-Back Time (sec)..... 0.0002

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.15 x 34
Pointing Accuracy (deg)..... 0.59
Max. Rotation Rate (deg/sec)..... 16
Antenna Size (ft)..... 33
Receiver Volume (cu in)..... 200
Operating Power (watts)..... 110
Data Rate (bits/sec)..... 1400
Antenna Weight (lbs)..... 1200
Receiver Weight (lbs)..... 5

COMMENTS:

Complete planetary coverage can be achieved in 5 days, hence same area can be imaged every 5 days, not 30 hrs as desired. Frequency chosen to optimize temperature resolution at expense of antenna size. Even so, only 4.6 deg K resolution is achieved; 2 deg K resolution cannot be achieved even with noiseless receiver.

PLANET: Mars

OBSERVABLE: Surface Thermal Anomalies (regional)

Family No. 11c

ANTENNA TYPE: Electrical scan

ORBIT: Data Sheet Number..... 20
Periapse/Apoapse Alt. (km)..... 425/6995
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 425
Imaging On-Time (min)..... 0.25

IMAGE: Minimum Scan Length (km)..... 600
Max. Ground Resolution (km)..... 3
Temperature Resolution (deg K)..... 2
Positional Accuracy (km)..... 10

SENSOR: Operating Frequency (GHz)..... 13
Integration Time (sec)..... 0.0018
Fly-Back Time (sec)..... 0.0002

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.25 x 69
Pointing Accuracy (deg)..... 1.4
Max. Rotation Rate (deg/sec)..... 67
Antenna Size (ft)..... 24
Receiver Volume (cu in)..... 200
Operating Power (watts)..... 98
Data Rate (bits/sec)..... 3200
Antenna Weight (lbs)..... 590
Receiver Weight (lbs)..... 5

COMMENTS:

Image repetition time (of same area) is 5 hrs (less than 30 is desired). Frequency chosen to optimize temperature resolution (only 7.4 deg K can be achieved) at expense of antenna size.

PLANET: Mars

OBSERVABLE: Surface Thermal Anomalies (local)

Family No. 23

ANTENNA TYPE:

ORBIT: Data Sheet Number..... 35
Periapse/Apoapse Alt. (km)..... 340/33,809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340-370
Imaging On-Time (min)..... 10

IMAGE: Minimum Scan Length (km)..... 100
Max. Ground Resolution (km)..... 0.2
Temperature Resolution (deg K)..... 2
Positional Accuracy (km)..... 2

SENSOR: Operating Frequency (GHz).....
Integration Time (sec).....
Fly-Back Time (sec).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
Max. Rotation Rate (deg/sec).....
Antenna Size (ft).....
Receiver Volume (cu in).....
Operating Power (watts).....
Data Rate (bits/sec).....
Antenna Weight (lbs).....
Receiver Weight (lbs).....

COMMENTS:

A complete scan cycle must be completed in a little less than 50 m sec. Since each scan line contains 500 resolution elements, the antenna dwell time per resolution element is somewhat less than 0.1 m sec. If the beam switching time is 0.1 m sec, no time is left to observe the planet.

PLANET: Mars

OBSERVABLE: Surface Thermal Anomalies (detailed)

Family No. 31

ANTENNA TYPE:

ORBIT: Data Sheet Number..... 43
Periapse/Apoapse Alt. (km)..... 340/33,809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340-370
Imaging On-Time (min)..... 10

IMAGE: Minimum Scan Length (km)..... 0.5
Max. Ground Resolution (km)..... 0.005
Temperature Resolution (deg K)..... 2
Positional Accuracy (km)..... 0.02

SENSOR: Operating Frequency (GHz).....
Integration Time (sec).....
Fly-Back Time (sec).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
Max. Rotation Rate (deg/sec).....
Antenna Size (ft).....
Receiver Volume (cu in).....
Operating Power (watts).....
Data Rate (bits/sec).....
Antenna Weight (lbs).....
Receiver Weight (lbs).....

COMMENTS:

A complete scan cycle must be completed in about one msec. Since each scan line contains 100 resolution elements, the antenna dwell time is about ten microsec. The antenna beam cannot be switched this rapidly at the current state-of-art.

PLANET: Venus

OBSERVABLE: Surface Thermal Anomalies (regional)

Family No. 5a

ANTENNA TYPE: Electrical scan

ORBIT: Data Sheet Number..... 93
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Scan Length (km)..... 1000
Max. Ground Resolution (km)..... 3
Temperature Resolution (deg K)..... 5
Positional Accuracy (km)..... 10

SENSOR: Operating Frequency (GHz)..... 7
Integration Time (sec).....
Fly-Back Time (sec).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
Max. Rotation Rate (deg/sec).....
Antenna Size (ft)..... 88
Receiver Volume (cu in).....
Operating Power (watts).....
Data Rate (bits/sec).....
Antenna Weight (lbs).....
Receiver Weight (lbs).....

COMMENTS:

At 7 GHz, which provides the best temperature resolution, the maximum available integration time is 0.2 msec providing a surface temperature resolution of 12 deg K. At this frequency, a 3 km ground resolution implies an 88 ft antenna, which is beyond the current state-of-art.

PLANET: Venus

OBSERVABLE: Atmospheric Thermal Anomalies (regional)

Family No. 1a

ANTENNA TYPE: Electrical scan

ORBIT: Data Sheet Number..... 85
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Scan Length (km)..... 1500
Max. Ground Resolution (km)..... 20
Temperature Resolution (deg K)..... 5
Positional Accuracy (km)..... 50

SENSOR: Operating Frequency (GHz)..... 30
Integration Time (sec)..... 0.0034
Fly-Back Time (sec)..... 0.0002

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.57 x 112
Pointing Accuracy (deg)..... 6.3
Max. Rotation Rate (deg/sec)..... 81
Antenna Size (ft)..... 6.7
Receiver Volume (cu in)..... 250
Operating Power (watts)..... 82
Data Rate (bits/sec)..... 1700
Antenna Weight (lbs)..... 87
Receiver Weight (lbs)..... 15

COMMENTS:

The minimum integration time required to achieve a temperature resolution of 5 deg K is 5.2 m sec. Therefore, only a 6.2 deg K resolution is achieved. The entire planet may be mapped twice a year as desired. Orbit described on data sheet #86 affords only one coverage per year at poorer temperature resolution.

PLANET: Venus

OBSERVABLE: Atmospheric Thermal Anomalies (detailed)

Family No. 12

ANTENNA TYPE: Electrical scan

ORBIT: Data Sheet Number..... 107
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Scan Length (km)..... 100
Max. Ground Resolution (km)..... 3
Temperature Resolution (deg K)..... 5
Positional Accuracy (km)..... 10

SENSOR: Operating Frequency (GHz)..... 65
Integration Time (sec)..... 0.014
Fly-Back Time (sec)..... 0.0002

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.38 x 6.3
Pointing Accuracy (deg)..... 1.3
Max. Rotation Rate (deg/sec)..... 14
Antenna Size (ft)..... 2.0
Receiver Volume (cu in)..... 300
Operating Power (watts)..... 72
Data Rate (bits/sec)..... 440
Antenna Weight (lbs)..... 18
Receiver Weight (lbs)..... 19

COMMENTS:

The entire planet can be mapped once each planetary day and daily repetition of selected areas is desired.

PLANET: Venus

OBSERVABLE: Convective Cells and Turbulence (regional)

Family No. 7a

ANTENNA TYPE: Mechanical Scan

ORBIT: Data Sheet Number..... 97
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Scan Length (km)..... 600
Max. Ground Resolution (km)..... 20
Temperature Resolution (deg K)..... 5
Positional Accuracy (km)..... 50

SENSOR: Operating Frequency (GHz)..... 30
Integration Time (sec)..... 0.0052
Fly-Back Time (sec)..... 1

SUPPORT REQUIREMENTS:

Field of View (deg)..... 1.7 x 66
Pointing Accuracy (deg)..... 2.6
Max. Rotation Rate (deg/sec)..... 32
Antenna Size (ft)..... 1.3
Receiver Volume (cu in)..... 250
Operating Power (watts)..... 12
Data Rate (bits/sec)..... 230
Antenna Weight (lbs)..... 2
Receiver Weight (lbs)..... 15

COMMENTS:

Two complete planetary coverages per year are possible as desired.

PLANET: Venus

OBSERVABLE: Convective Cells and Turbulence (detailed)

Family No. 13

ANTENNA TYPE: Electrical scan

ORBIT: Data Sheet Number..... 108
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Scan Length (km)..... 100
Max. Ground Resolution (km)..... 3
Temperature Resolution (deg K)..... 5
Positional Accuracy (km)..... 6

SENSOR: Operating Frequency (GHz)..... 65
Integration Time (sec)..... 0.014
Fly-Back Time (sec)..... 0.0002

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.38 x 6.3
Pointing Accuracy (deg)..... 0.76
Max. Rotation Rate (deg/sec)..... .14
Antenna Size (ft)..... 2.0
Receiver Volume (cu in)..... 300
Operating Power (watts)..... .72
Data Rate (bits/sec)..... 440
Antenna Weight (lbs)..... .18
Receiver Weight (lbs)..... .19

COMMENTS:

The desired image repetition rate is at least once every 100 hrs. Essentially the same area can be viewed 10-20 times at image intervals of one orbital period (1.6 hrs).

PLANET: Venus

OBSERVABLE: Surface to Atmosphere Transfer

Family No. 7a

ANTENNA TYPE: Mechanical scan

ORBIT: Data Sheet Number..... 97
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Scan Length (km)..... 600
Max. Ground Resolution (km)..... 20
Temperature Resolution (deg K)..... 5
Positional Accuracy (km)..... 50

SENSOR: Operating Frequency (GHz)..... 7
Integration Time (sec)..... 0.011
Fly-Back Time (sec)..... 1

SUPPORT REQUIREMENTS:

Field of View (deg)..... 1.7 x 67
Pointing Accuracy (deg)..... 6.3
Max. Rotation Rate (deg/sec)..... 32
Antenna Size (ft)..... 5.8
Receiver Volume (cu in)..... 200
Operating Power (watts)..... 700
Data Rate (bits/sec)..... 230
Antenna Weight (lbs)..... 39
Receiver Weight (lbs)..... 4

COMMENTS:

Complete planetary coverage requires 120 days, not 100 hrs as desired. Only two (not ten) coverages per year are possible. An electrically-scanned antenna affords a longer integration time, and hence better temperature resolution as shown on next data sheet. Orbit described by data sheet #98 permits only 60% planetary coverage once per year, but at reduced ΔV .

PLANET: Venus

OBSERVABLE: Surface to Atmosphere Transfer

Family No. 7a

ANTENNA TYPE: Electrical scan

ORBIT: Data Sheet Number..... 97
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 96

IMAGE: Minimum Scan Length (km)..... 600
Max. Ground Resolution (km)..... 20
Temperature Resolution (deg K)..... 5
Positional Accuracy (km)..... 50

SENSOR: Operating Frequency (GHz)..... 10
Integration Time (sec)..... 0.05
Fly-Back Time (sec)..... 0.0002

SUPPORT REQUIREMENTS:

Field of View (deg)..... 1.7 x 67
Pointing Accuracy (deg)..... 6.3
Max. Rotation Rate (deg/sec)..... 16
Antenna Size (ft)..... 4.6
Receiver Volume (cu in)..... 200
Operating Power (watts)..... 16
Data Rate (bits/sec)..... 120
Antenna Weight (lbs)..... 27
Receiver Weight (lbs)..... 5

COMMENTS:

See previous data sheet. A temperature resolution of 2.5 deg K is achieved.

PLANET: Mercury

OBSERVABLE: Surface Thermal Anomalies (regional)

Family No. 6a

ANTENNA TYPE: Electrical scan

ORBIT: Data Sheet Number..... 129
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 110

IMAGE: Minimum Scan Length (km)..... 600
Max. Ground Resolution (km)..... 3
Temperature Resolution (deg K)..... 5
Positional Accuracy (km)..... 10

SENSOR: Operating Frequency (GHz)..... 15
Integration Time (sec)..... 0.0033
Fly-Back Time (sec)..... 0.0002

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.23 x 60
Pointing Accuracy (deg)..... 1.1
Max. Rotation Rate (deg/sec)..... 35
Antenna Size (ft)..... 21
Receiver Volume (cu in)..... 200
Operating Power (watts)..... 100
Data Rate (bits/sec)..... 2100
Antenna Weight (lbs)..... 470
Receiver Weight (lbs)..... 9

COMMENTS:

At the required spatial resolution, the maximum available integration time is 3.3 msec while 5.8 msec is required to achieve a temperature resolution of 5 deg K. Thus the temperature resolution achieved is only 6.7 deg K. Images of the same area can be achieved once per orbital period (1.9 hrs), which is consistent with the requirements. 100% planetary coverage can be achieved in 30 days. Orbit data sheet #130 will provide a poorer temperature resolution.

PLANET: Mercury

OBSERVABLE: Surface Thermal Anomalies (local)

Family No. 15

ANTENNA TYPE: Electrical scan

ORBIT: Data Sheet Number..... 139
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 110

IMAGE: Minimum Scan Length (km)..... 100
Max, Ground Resolution (km)..... 0.2
Temperature Resolution (deg K)..... 5
Positional Accuracy (km)..... 2

SENSOR: Operating Frequency (GHz).....
Integration Time (sec).....
Fly-Back Time (sec).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
Max. Rotation Rate (deg/sec).....
Antenna Size (ft).....
Receiver Volume (cu in).....
Operating Power (watts).....
Data Rate (bits/sec).....
Antenna Weight (lbs).....
Receiver Weight (lbs).....

COMMENTS:

At 15 GHz, which provides the best temperature resolution, the required antenna size is 210 ft. The antenna size can be brought within reach of the current state-of-art only by operating at 300 GHz, but here the amplifier noise prevents a temperature resolution even approaching the required 5 deg K.

PLANET: Jupiter

OBSERVABLE: Surface Thermal Anomalies

Family No. 7a

ANTENNA TYPE: Electrical scan

ORBIT: Data Sheet Number..... 162
Periapse/Apoapse Alt. (km)..... 356,750/665,059
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 356,750-575,081
Imaging On-Time (min)..... 25 hrs

IMAGE: Minimum Scan Length (km)..... 5000
Max. Ground Resolution (km)..... 20
Temperature Resolution (deg K)..... 2
Positional Accuracy (km)..... 100

SENSOR: Operating Frequency (GHz).....
Integration Time (sec).....
Fly-Back Time (sec).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
Max. Rotation Rate (deg/sec).....
Antenna Size (ft).....
Receiver Volume (cu in).....
Operating Power (watts).....
Data Rate (bits/sec).....
Antenna Weight (lbs).....
Receiver Weight (lbs).....

COMMENTS:

At required spatial resolution, maximum available integration time is 6 msec while at least 18 msec is required. Even at 1cm wavelength, which will not penetrate atmosphere, a 200 meter antenna is required to achieve spatial resolution required.

PLANET: Jupiter

OBSERVABLE: Atmospheric Thermal Anomalies (regional)

Family No. 2a

ANTENNA TYPE:

ORBIT: Data Sheet Number..... 151
Periapse/Apoapse Alt. (km)..... 356,750/665,059
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 356,750-575,081
Imaging On-Time (min)..... 25 hrs.

IMAGE: Minimum Scan Length (km)..... 15,000
Max. Ground Resolution (km)..... 20
Temperature Resolution (deg K)..... 2
Positional Accuracy (km)..... 200

SENSOR: Operating Frequency (GHz).....
Integration Time (sec).....
Fly-Back Time (sec).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Pointing Accuracy (deg).....
Max. Rotation Rate (deg/sec).....
Antenna Size (ft).....
Receiver Volume (cu in).....
Operating Power (watts).....
Data Rate (bits/sec).....
Antenna Weight (lbs).....
Receiver Weight (lbs).....

COMMENTS:

At 13-GHz, maximum available integration time (for 20 km ground resolution) limits temperature resolution to greater than 6 deg K. Required antenna size is 470 meters! If ground resolution is relaxed to 200 km, a longer integration time is available permitting 2 deg K resolution at 100 GHz and 6 meter antenna.

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RADAR IMAGING SYSTEMS

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PLANET: Mars

OBSERVABLE: Surface Elevations

Family No. 11a

RADAR TYPE: Noncoherent (shadowing)

| | | |
|--------|------------------------------------|----------------|
| ORBIT: | Data Sheet Number..... | 18 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 72 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 (0.9 range) |
| | Positional Accuracy (km)..... | 20 |
| RADAR: | Operating Wavelength (cm)..... | 1 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (usec)..... | 2.1 |
| | Pulse Repetition Freq. (/sec)..... | 250 |
| | No. of Integrated Pulses..... | 6 |
| | Beamwidth Travel Time (sec)..... | 5.1 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|------------|
| Field of View (deg)..... | 0.6 x 14 |
| Antenna Shape (ft)..... | 3.9 x 0.16 |
| Pointing Accuracy (deg)..... | 0.81 |
| Max. Roll/Yaw Rate (deg/sec)..... | 600/25 |
| Operating Power (watts)..... | 5300 |
| Data Rate (bits/sec)..... | 1800 |
| Radar Volume (cu. ft.)..... | 12 |
| Antenna Weight (lbs)..... | 4 |
| Radar Weight (lbs)..... | 190 |

COMMENTS:

6 pulses must be used to keep the peak transmitted power less than 4 megawatts per pulse. See next data sheet for same experiment with 7 cm wavelength. Orbit data sheets #19 (Family No. 11b) or orbit data sheet #20 (Family No. 11c) would increase support requirements without increasing measurement achievement.

PLANET: Mars

OBSERVABLE: Surface Elevations

Family No. 11a

RADAR TYPE: Noncoherent (shadowing)

| | | |
|--------|------------------------------------|----------------|
| ORBIT: | Data Sheet Number..... | 18 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 72 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 (0.9 range) |
| | Positional Accuracy (km)..... | 20 |
| RADAR: | Operating Wavelength (cm)..... | 7 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μsec)..... | 3.8 |
| | Pulse Repetition Freq. (/sec)..... | 0.20 |
| | No. of Integrated Pulses..... | 1 |
| | Beamwidth Travel Time (sec)..... | 5.1 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|----------|
| Field of View (deg)..... | 0.6/14 |
| Antenna Shape (ft)..... | 28 x 1.1 |
| Pointing Accuracy (deg)..... | 0.81 |
| Max. Roll/Yaw Rate (deg/sec)..... | 1200/50 |
| Operating Power (watts)..... | 110 |
| Data Rate (bits/sec)..... | 970 |
| Radar Volume (cu. ft.)..... | 8.5 |
| Antenna Weight (lbs)..... | 32 |
| Radar Weight (lbs)..... | 140 |

COMMENTS:

See previous data sheet.

PLANET: Mars

OBSERVABLE: Surface Elevations

Family No. 4a

RADAR TYPE: Noncoherent (one-sided stereo)

ORBIT: Data Sheet Number..... 7
Periapse/Apoapse Alt. (km)..... 994/994
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 994
Imaging On-Time (min)..... 73.2

IMAGE: Minimum Swath Width (km)..... 600
Max. Ground Resolution (km)..... 20 (0.2 range)
Positional Accuracy (km)..... 20

RADAR: Operating Wavelength (cm)..... 1
Depression Angle (deg)..... 45
Compressed Pulse Width (µsec)..... 1.1
Pulse Repetition Freq. (/sec)..... 250
No. of Integrated Pulses..... 1000
Beamwidth Travel Time (sec)..... 5.2

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.58 x 14
Antenna Shape (ft)..... 4.1 x 0.17
Pointing Accuracy (deg)..... 0.77
Max. Roll/Yaw Rate (deg/sec)..... 34./1.4
Operating Power (watts)..... 120,000
Data Rate (bits/sec)..... 3400
Radar Volume (cu. ft.)..... 10
Antenna Weight (lbs)..... 4
Radar Weight (lbs)..... 170

COMMENTS:

Although a large no. of integrated pulse keeps the peak transmitted power below 4 megawatts (in fact, 1 megawatt here) per pulse, it also increases the average power and hence the power requirement. See next data sheet for same experiment a 7 cm wavelength.

PLANET: Mars

OBSERVABLE: Surface Elevations

Family No. 4a

RADAR TYPE: Noncoherent (one-sided stereo)

ORBIT: Data Sheet Number..... 7
Periapse/Apoapse Alt. (km)..... 994/994
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 994
Imaging On-Time (min)..... 73.2

IMAGE: Minimum Swath Width (km)..... 600
Max. Ground Resolution (km)..... 20 (0.2 range)
Positional Accuracy (km)..... 20

RADAR: Operating Wavelength (cm)..... 7
Depression Angle (deg)..... 45
Compressed Pulse Width (usec)..... 1.1
Pulse Repetition Freq. (/sec)..... 0.19
No. of Integrated Pulses..... 1
Beamwidth Travel Time (sec)..... 5.2

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.58 x 14
Antenna Shape (ft)..... 29 x 1.2
Pointing Accuracy (deg)..... 0.77
Max. Roll/Yaw Rate (deg/sec)..... 1100/49
Operating Power (watts)..... 140
Data Rate (bits/sec)..... 3400
Radar Volume (cu. ft.)..... 11
Antenna Weight (lbs)..... 35
Radar Weight (lbs)..... 180

COMMENTS:

Orbit data sheet # 8 (Family No. 4b) or orbit data sheet # 9 (Family No. 4c) would lead to increased support requirements without increasing measurement achievement. See next data sheet.

PLANET: Mars

OBSERVABLE: Surface Elevations

Family No. 11c

RADAR TYPE: Noncoherent (one-sided stereo)

ORBIT: Data Sheet Number..... 20
Periapse/Apoapse Alt. (km)..... 425/6995
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 425
Imaging On-Time (min)..... 0.25

IMAGE: Minimum Swath Width (km)..... 600
Max. Ground Resolution (km)..... 20 (0.6 range)
Positional Accuracy (km)..... 20

RADAR: Operating Wavelength (cm)..... 7
Depression Angle (deg)..... 35
Compressed Pulse Width (μ sec)..... 1.2
Pulse Repetition Freq. (/sec)..... 0.41
No. of Integrated Pulses..... 1
Beamwidth Travel Time (sec)..... 2.5

SUPPORT REQUIREMENTS:

Field of View (deg)..... 1.1 x 39
Antenna Shape (ft)..... 14 x 0.43
Pointing Accuracy (deg)..... 1.7
Max. Roll/Yaw Rate (deg/sec)..... 6400/190
Operating Power (watts)..... 270
Data Rate (bits/sec)..... 5200
Radar Volume (cu. ft.)..... 12
Antenna Weight (lbs)..... 6
Radar Weight (lbs)..... 200

COMMENTS:

This experiment acquires imagery only at periapse, thus 120 days are required to complete 70% planetary coverage.

PLANET: Mars

OBSERVABLE: Layering

Family No. 31

RADAR TYPE: Synthetic Aperture

| | | |
|--------|------------------------------------|------------|
| ORBIT: | Data Sheet Number..... | 43 |
| | Periapse/Apoapse Alt. (km)..... | 340/33,809 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 340/370 |
| | Imaging On-Time (min)..... | 9.6 |
| IMAGE: | Minimum Swath Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.0003 |
| | Positional Accuracy (km)..... | 0.02 |
| RADAR: | Operating Wavelength (cm)..... | 1 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (usec)..... | 0.0017 |
| | Pulse Repetition Freq. (/sec)..... | 100,000 |
| | No. of Integrated Pulses..... | 300,000 |
| | Beamwidth Travel Time (sec)..... | 3 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------|
| Field of View (deg)..... | 1.2/.026 |
| Antenna Shape (ft)..... | 2/92 |
| Pointing Accuracy (deg)..... | 0.002 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.009/0.4 |
| Operating Power (watts)..... | 74000 |
| Data Rate (bits/sec)..... | 990,000,000 |
| Radar Volume (cu. ft.)..... | 10 |
| Antenna Weight (lbs)..... | 180 |
| Radar Weight (lbs)..... | 160 |

COMMENTS:

The power requirement cannot be reduced much by increasing the wavelength because the antenna size would be constrained by the state-of-art.

PLANET: Mars

OBSERVABLE: Contacts (regional)

Family No. 11a

RADAR TYPE: Noncoherent

| | | |
|--------|------------------------------------|---------|
| ORBIT: | Data Sheet Number..... | 18 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 72 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| RADAR: | Operating Wavelength (cm)..... | 1 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μsec)..... | 2.1 |
| | Pulse Repetition Freq. (/sec)..... | 250 |
| | No. of Integrated Pulses..... | 150 |
| | Beamwidth Travel Time (sec)..... | .77 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|----------|
| Field of View (deg)..... | 0.089/14 |
| Antenna Shape (ft)..... | 18/0.1 |
| Pointing Accuracy (deg)..... | 0.4 |
| Max. Roll/Yaw Rate (deg/sec)..... | 24/0.15 |
| Operating Power (watts)..... | 26,000 |
| Data Rate (bits/sec)..... | 12,000 |
| Radar Volume (cu. ft.)..... | 7.7 |
| Antenna Weight (lbs)..... | 4.4 |
| Radar Weight (lbs)..... | 120 |

COMMENTS:

By increasing the wavelength, the power requirement may be reduced at expense of antenna size. m can also be decreased. See next data sheet.

PLANET: Mars

OBSERVABLE: Contacts (regional)

Family No. 11a

RADAR TYPE: Noncoherent

ORBIT: Data Sheet Number..... 18
Periapse/Apoapse Alt. (km)..... 969/969
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 969
Imaging On-Time (min)..... 72

IMAGE: Minimum Swath Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

RADAR: Operating Wavelength (cm)..... 7
Depression Angle (deg)..... 45
Compressed Pulse Width (usec)..... 13
Pulse Repetition Freq. (/sec)..... 1.3
No. of Integrated Pulses..... 1
Beamwidth Travel Time (sec)..... .77

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.089/14
Antenna Shape (ft)..... 180/1.1
Pointing Accuracy (deg)..... 0.4
Max. Roll/Yaw Rate (deg/sec)..... 1700/11
Operating Power (watts)..... 100
Data Rate (bits/sec)..... 1900
Radar Volume (cu. ft.)..... 3.0
Antenna Weight (lbs)..... 210
Radar Weight (lbs)..... 48

COMMENTS:

PLANET: Mars

OBSERVABLE: Contacts (local)

Family No. 23

RADAR TYPE: Synthetic Aperture

ORBIT: Data Sheet Number..... 35
Periapse/Apoapse Alt. (km)..... 340/33809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340/370
Imaging On-Time (min)..... 9.6

IMAGE: Minimum Swath Width (km)..... 100
Max. Ground Resolution (km)..... 0.2
Positional Accuracy (km)..... 2

RADAR: Operating Wavelength (cm)..... 7
Depression Angle (deg)..... 40
Compressed Pulse Width (μ sec)..... 1
Pulse Repetition Freq. (/sec)..... 1000
No. of Integrated Pulses..... 30
Beamwidth Travel Time (sec)..... 0.55

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.25/6.7
Antenna Shape (ft)..... 66/2.5
Pointing Accuracy (deg)..... .15
Max. Roll/Yaw Rate (deg/sec)..... 220/8.4
Operating Power (watts)..... 130
Data Rate (bits/sec)..... 170,000
Radar Volume (cu. ft.)..... 4.2
Antenna Weight (lbs)..... 160
Radar Weight (lbs)..... 67

COMMENTS:

PLANET: Mars

OBSERVABLE: Contacts (detailed)

Family No. 31

RADAR TYPE: Synthetic Aperture

| | | |
|--------|------------------------------------|-----------|
| ORBIT: | Data Sheet Number..... | 43 |
| | Periapse/Apoapse Alt. (km)..... | 340/33809 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km):..... | 340-370 |
| | Imaging On-Time (min)..... | 9.6 |
| IMAGE: | Minimum Swath Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.005 |
| | Positional Accuracy (km)..... | 0.02 |
| RADAR: | Operating Wavelength (cm)..... | 7 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μsec)..... | 0.028 |
| | Pulse Repetition Freq. (/sec)..... | 100,000 |
| | No. of Integrated Pulses..... | 200,000 |
| | Beamwidth Travel Time (sec)..... | 2.1 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|------------|
| Field of View (deg)..... | 0.83/.5 |
| Antenna Shape (ft)..... | 20/33 |
| Pointing Accuracy (deg)..... | 0.002 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.25/0.42 |
| Operating Power (watts)..... | 1300 |
| Data Rate (bits/sec)..... | 57,000,000 |
| Radar Volume (cu. ft.)..... | 3.9 |
| Antenna Weight (lbs)..... | 650 |
| Radar Weight (lbs)..... | 63 |

COMMENTS:

PLANET: Mars

OBSERVABLE: Structure of Features (regional)

Family No. 4a

RADAR TYPE: Noncoherent (one-sided stereo)

ORBIT: Data Sheet Number..... 7
Periapse/Apoapse Alt. (km)..... 994/994
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 994
Imaging On-Time (min)..... 73.2

IMAGE: Minimum Swath Width (km)..... 600
Max. Ground Resolution (km)..... 3 (0.7 range)
Positional Accuracy (km)..... 10

RADAR: Operating Wavelength (cm)..... 1
Depression Angle (deg)..... 45
Compressed Pulse Width (μsec)..... 2.1
Pulse Repetition Freq. (/sec)..... 250
No. of Integrated Pulses..... 150
Beamwidth Travel Time (sec)..... .78

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.086/14
Antenna Shape (ft)..... 27/.17
Pointing Accuracy (deg)..... 0.4
Max. Roll/Yaw Rate (deg/sec)..... 23/0.14
Operating Power (watts)..... 24000
Data Rate (bits/sec)..... 12000
Radar Volume (cu. ft.)..... 7.6
Antenna Weight (lbs)..... 5
Radar Weight (lbs)..... 120

COMMENTS:

By increasing wavelength, power requirement may be reduced at expense of antenna weight and size.

PLANET: Mars

OBSERVABLE: Structure of Features (regional)

Family No. 4a

RADAR TYPE: Noncoherent (one-sided stereo)

ORBIT: Data Sheet Number..... 7
Periapse/Apoapse Alt. (km)..... 994/994
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 994
Imaging On-Time (min)..... 73.2

IMAGE: Minimum Swath Width (km)..... 600
Max. Ground Resolution (km)..... 3 (0.7 range)
Positional Accuracy (km)..... 10

RADAR: Operating Wavelength (cm)..... 7
Depression Angle (deg)..... 45
Compressed Pulse Width (μsec)..... 3.3
Pulse Repetition Freq. (/sec)..... 1.3
No. of Integrated Pulses..... 1
Beamwidth Travel Time (sec)..... 0.78

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.086/14
Antenna Shape (ft)..... 190/1.2
Pointing Accuracy (deg)..... 0.4
Max. Roll/Yaw Rate (deg/sec)..... 1100/7
Operating Power (watts)..... 110
Data Rate (bits/sec)..... 7500
Radar Volume (cu. ft.)..... 6.4
Antenna Weight (lbs)..... 230
Radar Weight (lbs)..... 100

COMMENTS:

PLANET: Mars

OBSERVABLE: Structure of Features (local)

Family No. 17

RADAR TYPE: Synthetic Aperture (one-sided stereo)

ORBIT: Data Sheet Number..... 28
Periapse/Apoapse Alt. (km)..... 340/33809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340-370
Imaging On-Time (min)..... 9.6

IMAGE: Minimum Swath Width (km)..... 100
Max. Ground Resolution (km)..... 0.2 (0.02 range)
Positional Accuracy (km)..... 2

RADAR: Operating Wavelength (cm)..... 7
Depression Angle (deg)..... 45
Compressed Pulse Width (μ sec)..... 0.12
Pulse Repetition Freq. (/sec)..... 1000
No. of Integrated Pulses..... 30
Beamwidth Travel Time (sec)..... 0.55

SUPPORT REQUIREMENTS:

Field of View (deg)..... 25/6.7
Antenna Shape (ft)..... 66/2.5
Pointing Accuracy (deg)..... 0.2
Max. Roll/Yaw Rate (deg/sec)..... 220/8.4
Operating Power (watts)..... 370
Data Rate (bits/sec)..... 1,500,000
Radar Volume (cu. ft.)..... 9.6
Antenna Weight (lbs)..... 160
Radar Weight (lbs)..... 150

COMMENTS:

PLANET: Mars

OBSERVABLE: Structure of Features (detailed)

Family No. 26

RADAR TYPE: Synthetic Aperture (one-sided stereo)

| | | |
|--------|------------------------------------|-----------------------|
| ORBIT: | Data Sheet Number..... | 38 |
| | Periapse/Apoapse Alt. (km)..... | 340/33809 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 340/370 |
| | Imaging On-Time (min)..... | 9.6 |
| IMAGE: | Minimum Swath Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.005 (0.00003 range) |
| | Positional Accuracy (km)..... | .02 |
| RADAR: | Operating Wavelength (cm)..... | 0.4 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μsec)..... | 0.00016 |
| | Pulse Repetition Freq. (/sec)..... | 100,000 |
| | No. of Integrated Pulses..... | 6000 |
| | Beamwidth Travel Time (sec)..... | 0.07 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 0.029/0.014 |
| Antenna Shape (ft)..... | 33/16 |
| Pointing Accuracy (deg)..... | 0.0013 |
| Max. Roll/Yaw Rate (deg/sec)..... | 0.24/.48 |
| Operating Power (watts)..... | 2600 |
| Data Rate (bits/sec)..... | 8.8×10^9 |
| Radar Volume (cu. ft.)..... | 7.9 |
| Antenna Weight (lbs)..... | 540 |
| Radar Weight (lbs)..... | 130 |

COMMENTS:

A short wavelength is required to maintain a pulse width-bandwidth product of unity.

PLANET: Mars

OBSERVABLE: Surface Topography (regional)

Family No. 4a

RADAR TYPE: Noncoherent (one-sided stereo)

| | | |
|--------|------------------------------------|---------------|
| ORBIT: | Data Sheet Number..... | 7 |
| | Periapse/Apoapse Alt. (km)..... | 994/994 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 994 |
| | Imaging On-Time (min)..... | 73.2 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (0.2 range) |
| | Positional Accuracy (km)..... | 3 |
| RADAR: | Operating Wavelength (cm)..... | 1 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (usec)..... | 1.1 |
| | Pulse Repetition Freq. (/sec)..... | 275 |
| | No. of Integrated Pulses..... | 200 |
| | Beamwidth Travel Time (sec)..... | 0.78 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|----------|
| Field of View (deg)..... | 0.086/14 |
| Antenna Shape (ft)..... | 27/.17 |
| Pointing Accuracy (deg)..... | .11 |
| Max. Roll/Yaw Rate (deg/sec)..... | 19/.12 |
| Operating Power (watts)..... | 53,000 |
| Data Rate (bits/sec)..... | 22,000 |
| Radar Volume (cu. ft.)..... | 9.1 |
| Antenna Weight (lbs)..... | 4.7 |
| Radar Weight (lbs)..... | 150 |

COMMENTS:

PLANET: Mars

OBSERVABLE: Surface Topography (regional)

Family No. 4a

RADAR TYPE: Noncoherent (one-sided stereo)

ORBIT: Data Sheet Number..... 7
Periapse/Apoapse Alt. (km)..... 9.94/9.94
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 9.94
Imaging On-Time (min)..... 73.2

IMAGE: Minimum Swath Width (km)..... 600
Max. Ground Resolution (km)..... 3 (0.2 range)
Positional Accuracy (km)..... 3

RADAR: Operating Wavelength (cm)..... 7
Depression Angle (deg)..... 45
Compressed Pulse Width (usec)..... 1.1
Pulse Repetition Freq. (/sec)..... 1.3
No. of Integrated Pulses..... 1
Beamwidth Travel Time (sec)..... 0.78

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.086/14
Antenna Shape (ft)..... 190/1.2
Pointing Accuracy (deg)..... .11
Max. Roll/Yaw Rate (deg/sec)..... 17/.11
Operating Power (watts)..... 140
Data Rate (bits/sec)..... 22,000
Radar Volume (cu. ft.)..... 9.1
Antenna Weight (lbs)..... 230
Radar Weight (lbs)..... 150

COMMENTS:

PLANET: Mars

OBSERVABLE: Surface Topography (local)

Family No. 17

RADAR TYPE: Synthetic Aperture (one-sided stereo)

ORBIT: Data Sheet Number..... 28
Periapse/Apoapse Alt. (km)..... 340/33809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340-370
Imaging On-Time (min)..... 9.6

IMAGE: Minimum Swath Width (km)..... 100
Max. Ground Resolution (km)..... 0.2 (0.01 range)
Positional Accuracy (km)..... .2

RADAR: Operating Wavelength (cm)..... 7
Depression Angle (deg)..... 40
Compressed Pulse Width (μsec)..... 0.058
Pulse Repetition Freq. (/sec)..... 1000
No. of Integrated Pulses..... 30
Beamwidth Travel Time (sec)..... .55

SUPPORT REQUIREMENTS:

Field of View (deg)..... .25/6.7
Antenna Shape (ft)..... 66/2.5
Pointing Accuracy (deg)..... 0.015
Max. Roll/Yaw Rate (deg/sec)..... 220/8.4
Operating Power (watts)..... 640
Data Rate (bits/sec)..... 3.1×10^6
Radar Volume (cu. ft.)..... 11
Antenna Weight (lbs)..... 160
Radar Weight (lbs)..... 180

COMMENTS:

PLANET: Mars

OBSERVABLE: Surface Topography (detailed)

Family No. 26

RADAR TYPE: Synthetic Aperture (one-sided stereo)

ORBIT: Data Sheet Number..... 38
Periapse/Apoapse Alt. (km)..... 340/33809
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 340/370
Imaging On-Time (min)..... 9.6

IMAGE: Minimum Swath Width (km)..... .5
Max. Ground Resolution (km)..... .05 (0.00003 range)
Positional Accuracy (km)..... 0.005

RADAR: Operating Wavelength (cm)..... .4
Depression Angle (deg)..... 40
Compressed Pulse Width (μsec)..... 0.00016
Pulse Repetition Freq. (/sec)..... 100,000
No. of Integrated Pulses..... 6000
Beamwidth Travel Time (sec)..... 0.073

SUPPORT REQUIREMENTS:

Field of View (deg)..... .029/.014
Antenna Shape (ft)..... 33/16
Pointing Accuracy (deg)..... 3.3×10^{-5}
Max. Roll/Yaw Rate (deg/sec)..... .24/.48
Operating Power (watts)..... 2600
Data Rate (bits/sec)..... 8.8×10^9
Radar Volume (cu. ft.)..... 7.9
Antenna Weight (lbs)..... 540
Radar Weight (lbs)..... 130

COMMENTS:

PLANET: Mars

OBSERVABLE: Surface Appearance (regional)

Family No. 11a

RADAR TYPE: Noncoherent

| | | |
|--------|--|---------|
| ORBIT: | Data Sheet Number..... | 18 |
| | Periapse/Apoapse Alt. (km)..... | 969/969 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 969 |
| | Imaging On-Time (min)..... | 72 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| RADAR: | Operating Wavelength (cm)..... | 1 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μ sec)..... | 2.1 |
| | Pulse Repetition Freq. (/sec)..... | 250 |
| | No. of Integrated Pulses..... | 150 |
| | Beamwidth Travel Time (sec)..... | .77 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|----------|
| Field of View (deg)..... | 0.089/14 |
| Antenna Shape (ft)..... | 18/.11 |
| Pointing Accuracy (deg)..... | .37 |
| Max. Roll/Yaw Rate (deg/sec)..... | 24/.15 |
| Operating Power (watts)..... | 26,000 |
| Data Rate (bits/sec)..... | 12,000 |
| Radar Volume (cu. ft.)..... | 7.7 |
| Antenna Weight (lbs)..... | 4.4 |
| Radar Weight (lbs)..... | 120 |

COMMENTS:

PLANET: Mars

OBSERVABLE: Surface Appearance (regional)

Family No. 11 a

RADAR TYPE: Noncoherent

ORBIT: Data Sheet Number..... 18
Periapse/Apoapse Alt. (km)..... 969/969
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 969
Imaging On-Time (min)..... 72

IMAGE: Minimum Swath Width (km)..... 600
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

RADAR: Operating Wavelength (cm)..... 7
Depression Angle (deg)..... 45
Compressed Pulse Width (μsec)..... 13
Pulse Repetition Freq. (/sec)..... 1.3
No. of Integrated Pulses..... 1
Beamwidth Travel Time (sec)..... 0.77

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.089/14
Antenna Shape (ft)..... 180/1.1
Pointing Accuracy (deg)..... .37
Max. Roll/Yaw Rate (deg/sec)..... 19/.12
Operating Power (watts)..... 100
Data Rate (bits/sec)..... 1900
Radar Volume (cu. ft.)..... 3
Antenna Weight (lbs)..... 210
Radar Weight (lbs)..... 48

COMMENTS:

PLANET: Venus

OBSERVABLE: Surface Elevations

Family No. 6 a

RADAR TYPE: Noncoherent (one-sided stereo)

ORBIT: Data Sheet Number..... 95
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... 1000
Max. Ground Resolution (km)..... 20
Positional Accuracy (km)..... 20

RADAR: Operating Wavelength (cm)..... 3
Depression Angle (deg)..... 25
Compressed Pulse Width (μsec)..... 3.1
Pulse Repetition Freq. (/sec)..... 100
No. of Integrated Pulses..... 100
Beamwidth Travel Time (sec)..... 1

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.72/35
Antenna Shape (ft)..... 9.8/19.9
Pointing Accuracy (deg)..... 1.2
Max. Roll/Yaw Rate (deg/sec)..... 35/.72
Operating Power (watts)..... 1.3×10^6
Data Rate (bits/sec)..... 9500
Radar Volume (cu. ft.)..... 14
Antenna Weight (lbs)..... 5
Radar Weight (lbs)..... 230

COMMENTS:

PLANET: Venus

OBSERVABLE: Surface Elevations

Family No. 6a

RADAR TYPE: Noncoherent (one-sided stereo)

ORBIT: Data Sheet Number..... 95
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... 1000
Max. Ground Resolution (km)..... 20 (0.9 range)
Positional Accuracy (km)..... 20.

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 25
Compressed Pulse Width (μ sec)..... 3.1
Pulse Repetition Freq. (/sec)..... 1
No. of Integrated Pulses..... 1
Beamwidth Travel Time (sec)..... 1.0

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.72/35
Antenna Shape (ft)..... 33/.66
Pointing Accuracy (deg)..... 1.2
Max. Roll/Yaw Rate (deg/sec)..... 3000/80
Operating Power (watts)..... 540
Data Rate (bits/sec)..... 9500
Radar Volume (cu. ft.)..... 12
Antenna Weight (lbs)..... 22
Radar Weight (lbs)..... 190

COMMENTS:

PLANET: Venus

OBSERVABLE: Layering

Family No. 19

RADAR TYPE: Synthetic Aperture

| | | |
|--------|------------------------------------|-----------|
| ORBIT: | Data Sheet Number..... | 114 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.0003 |
| | Positional Accuracy (km)..... | .02 |
| RADAR: | Operating Wavelength (cm)..... | 3 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μsec)..... | 0.0019 |
| | Pulse Repetition Freq. (/sec)..... | 100,000 |
| | No. of Integrated Pulses..... | 2,000,000 |
| | Beamwidth Travel Time (sec)..... | 23 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|-------------------|
| Field of View (deg)..... | 6.1/.072 |
| Antenna Shape (ft)..... | 1.2/99 |
| Pointing Accuracy (deg)..... | 0.00045 |
| Max. Roll/Yaw Rate (deg/sec)..... | .0036/.31 |
| Operating Power (watts)..... | 3.6×10^8 |
| Data Rate (bits/sec)..... | 8.7×10^8 |
| Radar Volume (cu. ft.)..... | 22 |
| Antenna Weight (lbs)..... | 110 |
| Radar Weight (lbs)..... | 350 |

COMMENTS: The operating power can be reduced at the expense of antenna weight. See next data sheet.

PLANET: Venus

OBSERVABLE: Layering

Family No. 19

RADAR TYPE: Synthetic Aperture

ORBIT: Data Sheet Number..... 114
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... .5
Max. Ground Resolution (km)..... 0.0003
Positional Accuracy (km)..... .02

RADAR: Operating Wavelength (cm)..... 3
Depression Angle (deg)..... 25
Compressed Pulse Width (μ sec).... 0.0019
Pulse Repetition Freq. (/sec).... 35,000
No. of Integrated Pulses..... 600,000
Beamwidth Travel Time (sec)..... 17

SUPPORT REQUIREMENTS:

Field of View (deg)..... 9.5/.072
Antenna Shape (ft)..... 2.5/330
Pointing Accuracy (deg)..... 0.00045
Max. Roll/Yaw Rate (deg/sec)..... .00042/.56
Operating Power (watts)..... 9.4×10^4
Data Rate (bits/sec)..... 3.5×10^8
Radar Volume (cu.ft.)..... 15
Antenna Weight (lbs)..... 810
Radar Weight (lbs)..... 240

COMMENTS:

PLANET: Venus

OBSERVABLE: Contacts (regional)

Family No. 5a

RADAR TYPE: Noncoherent

| | | |
|--------|--|---------|
| ORBIT: | Data Sheet Number..... | 93 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 1000 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| RADAR: | Operating Wavelength (cm)..... | 3 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec)..... | 9.4 |
| | Pulse Repetition Freq. (/sec)..... | 100 |
| | No. of Integrated Pulses..... | 10 |
| | Beamwidth Travel Time (sec)..... | .15 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | .12/35 |
| Antenna Shape (ft)..... | 65/.20 |
| Pointing Accuracy (deg)..... | .58 |
| Max. Roll/Yaw Rate (deg/sec)..... | 350/1.2 |
| Operating Power (watts)..... | 140,000 |
| Data Rate (bits/sec)..... | 21,000 |
| Radar Volume (cu. ft.)..... | 1.2 |
| Antenna Weight (lbs)..... | 13 |
| Radar Weight (lbs)..... | 170 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Contacts (regional)

Family No. 5a

RADAR TYPE: Noncoherent

ORBIT: Data Sheet Number..... 93
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... 1000
Max. Ground Resolution (km)..... 3
Positional Accuracy (km)..... 10

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 25
Compressed Pulse Width (μsec)..... 11
Pulse Repetition Freq. (/sec)..... 6.6
No. of Integrated Pulses..... 1
Beamwidth Travel Time (sec)..... 0.15

SUPPORT REQUIREMENTS:

Field of View (deg)..... 0.12/35
Antenna Shape (ft)..... 220/0.66
Pointing Accuracy (deg)..... 0.58
Max. Roll/Yaw Rate (deg/sec)..... 3200/110
Operating Power (watts)..... 230
Data Rate (bits/sec)..... 19,000
Radar Volume (cu. ft.)..... 6.2
Antenna Weight (lbs)..... 140
Radar Weight (lbs)..... 99

COMMENTS:

PLANET: Venus

OBSERVABLE: Contacts (local)

Family No. 12

RADAR TYPE: Synthetic Aperture

ORBIT: Data Sheet Number..... 107
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... 100
Max. Ground Resolution (km)..... 0.2
Positional Accuracy (km)..... 2

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 25
Compressed Pulse Width (µsec)..... 1.3
Pulse Repetition Freq. (/sec)..... 10^3
No. of Integrated Pulses..... 60
Beamwidth Travel Time (sec)..... .83

SUPPORT REQUIREMENTS:

Field of View (deg)..... 24/3.6
Antenna Shape (ft)..... 98/6.6
Pointing Accuracy (deg)..... 0.047
Max. Roll/Yaw Rate (deg/sec)..... 60/4
Operating Power (watts)..... 270
Data Rate (bits/sec)..... 220,000
Radar Volume (cu. ft.)..... 6.2
Antenna Weight (lbs)..... 590
Radar Weight (lbs)..... 90

COMMENTS:

PLANET: Venus

OBSERVABLE: Contacts (detailed)

Family No. 19

RADAR TYPE: Synthetic Aperture

ORBIT: Data Sheet Number..... 114
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... .5
Max. Ground Resolution (km)..... 0.005
Positional Accuracy (km)..... 0.02

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 25
Compressed Pulse Width (μsec)..... 0.032
Pulse Repetition Freq. (/sec)..... 10,000
No. of Integrated Pulses..... 30,000
Beamwidth Travel Time (sec)..... 3.4

SUPPORT REQUIREMENTS:

Field of View (deg)..... .89/1.8
Antenna Shape (ft)..... 26/13
Pointing Accuracy (deg)..... 0.00045
Max. Roll/Yaw Rate (deg/sec)..... .60/.30
Operating Power (watts)..... 300,000
Data Rate (bits/sec)..... 5.3×10^6
Radar Volume (cu. ft.)..... 14
Antenna Weight (lbs)..... 350
Radar Weight (lbs)..... 230

COMMENTS:

PLANET: . Venus

OBSERVABLE: Contacts (detailed)

Family No. 19

RADAR TYPE: Synthetic Aperture

ORBIT: Data Sheet Number..... 114
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... .5
Max. Ground Resolution (km)..... 0.005
Positional Accuracy (km)..... 0.02

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 25
Compressed Pulse Width (µsec)..... 0.032
Pulse Repetition Freq. (/sec)..... 10,000
No. of Integrated Pulses..... 30,000
Beamwidth Travel Time (sec)..... 3.4

SUPPORT REQUIREMENTS:

Field of View (deg)..... .89/.18
Antenna Shape (ft)..... 26/130
Pointing Accuracy (deg)..... 4.5×10^{-4}
Max. Roll/Yaw Rate (deg/sec)..... 0.06/.30
Operating Power (watts)..... 3100
Data Rate (bits/sec)..... 5.3×10^6
Radar Volume (cu. ft.)..... 8.3
Antenna Weight (lbs)..... 3500
Radar Weight (lbs)..... 130

COMMENTS:

PLANET: Venus

OBSERVABLE: Structure of Features (regional)

Family No. 6a

RADAR TYPE: Noncoherent (one-sided stereo)

| | | |
|--------|------------------------------------|---------------|
| ORBIT: | Data Sheet Number..... | 95 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 1000 |
| | Max. Ground Resolution (km)..... | 3 (2.6 range) |
| | Positional Accuracy (km)..... | 10 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μsec)..... | 9.4 |
| | Pulse Repetition Freq. (/sec)..... | 6.6 |
| | No. of Integrated Pulses..... | 1 |
| | Beamwidth Travel Time (sec)..... | 0.15 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|----------|
| Field of View (deg)..... | 0.12/35 |
| Antenna Shape (ft)..... | 220/0.66 |
| Pointing Accuracy (deg)..... | 0.50 |
| Max. Roll/Yaw Rate (deg/sec)..... | 3200/110 |
| Operating Power (watts)..... | 250 |
| Data Rate (bits/sec)..... | 21,000 |
| Radar Volume (cu. ft.)..... | 6.5 |
| Antenna Weight (lbs)..... | 140 |
| Radar Weight (lbs)..... | 100 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Structure of Features (local)

Family No. 18

RADAR TYPE: Synthetic Aperture (one-sided stereo)

| | | |
|--------|---|----------------------|
| ORBIT: | Data Sheet Number..... | 113 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km),..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | .2 (0.02 range) |
| | Positional Accuracy (km)..... | 2 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec).... | 1.1×10^{-1} |
| | Pulse Repetition Freq. (/sec).... | 10^3 |
| | No. of Integrated Pulses..... | 60 |
| | Beamwidth Travel Time (sec)..... | .62 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|-------------------|
| Field of View (deg)..... | 0.18/7.2 |
| Antenna Shape (ft)..... | 130/3.3 |
| Pointing Accuracy (deg)..... | 0.047 |
| Max. Roll/Yaw Rate (deg/sec).... | 120/3 |
| Operating Power (watts)..... | 5900 |
| Data Rate (bits/sec)..... | 3.3×10^6 |
| Radar Volume (cu.ft.)..... | 13 |
| Antenna Weight (lbs)..... | 430 |
| Radar Weight (lbs)..... | 210 |

COMMENTS:

PLANET: Venus
 OBSERVABLE: Structure of Features (detailed)
 Family No. 21
 RADAR TYPE: Synthetic Aperture (one-sided)

| | | |
|--------|---|---------|
| ORBIT: | Data Sheet Number..... | 116 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | .5 |
| | Max. Ground Resolution (km)..... | 0.005 |
| | Positional Accuracy (km)..... | 0.02 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | |
| | Compressed Pulse Width (μ sec).... | |
| | Pulse Repetition Freq. (/sec).... | |
| | No. of Integrated Pulses..... | |
| | Beamwidth Travel Time (sec)..... | |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|--|
| Field of View (deg)..... | |
| Antenna Shape (ft)..... | |
| Pointing Accuracy (deg)..... | |
| Max. Roll/Yaw Rate (deg/sec).... | |
| Operating Power (watts)..... | |
| Data Rate (bits/sec)..... | |
| Radar Volume (cu.ft.)..... | |
| Antenna Weight (lbs)..... | |
| Radar Weight (lbs)..... | |

COMMENTS:

Experiment rejected because of impossibility of satisfying constraints of compressed pulse width at suitable wavelengths. Required range resolution is 2.2 mm with 60% overlap at this image size!

PLANET: Venus

OBSERVABLE: Surface Topography (regional)

Family No. 6a

RADAR TYPE: Noncoherent (one-sided)

| | | |
|--------|---|---------------|
| ORBIT: | Data Sheet Number..... | 95 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 1000 |
| | Max. Ground Resolution (km)..... | 3 (0.9 range) |
| | Positional Accuracy (km)..... | 3 |
| RADAR: | Operating Wavelength (cm)..... | 3 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec).... | 3.1 |
| | Pulse Repetition Freq. (/sec).... | 100 |
| | No. of Integrated Pulses..... | 10 |
| | Beamwidth Travel Time (sec)..... | .15 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | .12/35 |
| Antenna Shape (ft)..... | 65/.20 |
| Pointing Accuracy (deg)..... | .17 |
| Max. Roll/Yaw Rate (deg/sec)..... | 350/1.1 |
| Operating Power (watts)..... | 420,000 |
| Data Rate (bits/sec)..... | 63,000 |
| Radar Volume (cu.ft.)..... | 13 |
| Antenna Weight (lbs)..... | 13 |
| Radar Weight (lbs)..... | 210 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Surface Topography (regional)

Family No. 6a

RADAR TYPE: Noncoherent (one-sided)

| | | |
|--------|---|---------------|
| ORBIT: | Data Sheet Number..... | 95 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 1000 |
| | Max. Ground Resolution (km)..... | 3 (0.9 range) |
| | Positional Accuracy (km)..... | 3 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec).... | 3.1 |
| | Pulse Repetition Freq. (/sec).... | 6.6 |
| | No. of Integrated Pulses..... | 1 |
| | Beamwidth Travel Time (sec)..... | 0.15 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|----------|
| Field of View (deg)..... | 0.12/35 |
| Antenna Shape (ft)..... | 220/0.66 |
| Pointing Accuracy (deg)..... | 0.17 |
| Max. Roll/Yaw Rate (deg/sec).... | 4000/140 |
| Operating Power (watts)..... | 540 |
| Data Rate (bits/sec)..... | 63,000 |
| Radar Volume (cu.ft.)..... | 9.2 |
| Antenna Weight (lbs)..... | 150 |
| Radar Weight (lbs)..... | 150 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Surface Topography (local)

Family No. 18

RADAR TYPE: Synthetic Aperture (one-sided)

| | | |
|--------|---|------------------|
| ORBIT: | Data Sheet Number..... | 113 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | .2 (0.009 range) |
| | Positional Accuracy (km)..... | .2 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec).... | 0.057 |
| | Pulse Repetition Freq. (/sec).... | 1000 |
| | No. of Integrated Pulses..... | 60 |
| | Beamwidth Travel Time (sec)..... | .62 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|-------------------|
| Field of View (deg)..... | 0.18/7.2 |
| Antenna Shape (ft)..... | 130/3.3 |
| Pointing Accuracy (deg)..... | 0.0047 |
| Max. Roll/Yaw Rate (deg/sec).... | 120/3.0 |
| Operating Power (watts)..... | 12,000 |
| Data Rate (bits/sec)..... | 6.6×10^6 |
| Radar Volume (cu.ft.)..... | 15 |
| Antenna Weight (lbs)..... | 430 |
| Radar Weight (lbs)..... | 240 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Surface Topography (detailed)

Family No. 21

RADAR TYPE: Synthetic Aperture (one-sided stereo)

ORBIT: Data Sheet Number..... 116
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... .5
Max. Ground Resolution (km)..... 0.005
Positional Accuracy (km)..... 0.005

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg).....
Compressed Pulse Width (μ sec)....
Pulse Repetition Freq. (/sec)....
No. of Integrated Pulses.....
Beamwidth Travel Time (sec).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Antenna Shape (ft).....
Pointing Accuracy (deg).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
Radar Volume (cu.ft.).....
Antenna Weight (lbs).....
Radar Weight (lbs).....

COMMENTS:

Experiment rejected because of impossibility of satisfying constraints on compressed pulse width at suitable wavelength. Requires 2.2 mm range resolution at this overlap and image size.

PLANET: Venus

OBSERVABLE: Surface Appearance (regional)

Family No. 5a

RADAR TYPE: Noncoherent

| | | |
|--------|---|-----------------|
| ORBIT: | Data Sheet Number..... | 93 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 10 ³ |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| RADAR: | Operating Wavelength (cm)..... | 3 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec).... | 9.4 |
| | Pulse Repetition Freq. (/sec).... | 100 |
| | No. of Integrated Pulses..... | 10 |
| | Beamwidth Travel Time (sec)..... | .15 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|---------|
| Field of View (deg)..... | .12/35 |
| Antenna Shape (ft)..... | 65/.20 |
| Pointing Accuracy (deg)..... | .58 |
| Max. Roll/Yaw Rate (deg/sec).... | 350/1.2 |
| Operating Power (watts)..... | 140,000 |
| Data Rate (bits/sec)..... | 21,000 |
| Radar Volume (cu.ft.)..... | 1.2 |
| Antenna Weight (lbs)..... | 13 |
| Radar Weight (lbs)..... | 170 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Surface Appearance (local)

Family No. 12

RADAR TYPE:

| | | |
|--------|---|---------|
| ORBIT: | Data Sheet Number..... | 107 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | .2 |
| | Positional Accuracy (km)..... | .2 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec).... | 1.3 |
| | Pulse Repetition Freq. (/sec).... | 1000 |
| | No. of Integrated Pulses..... | 60 |
| | Beamwidth Travel Time (sec)..... | .83 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|----------|
| Field of View (deg)..... | 0.24/1.2 |
| Antenna Shape (ft)..... | 99/20 |
| Pointing Accuracy (deg)..... | 0.047 |
| Max. Roll/Yaw Rate (deg/sec)..... | 20/40 |
| Operating Power (watts)..... | 120 |
| Data Rate (bits/sec)..... | 220,000 |
| Radar Volume (cu.ft.)..... | 3.4 |
| Antenna Weight (lbs)..... | 1900 |
| Radar Weight (lbs)..... | 54 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Surface Appearance (detailed)

Family No. 19

RADAR TYPE: Synthetic Aperture

| | | |
|--------|---|---------|
| ORBIT: | Data Sheet Number..... | 114 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 0.5 |
| | Max. Ground Resolution (km)..... | 0.005 |
| | Positional Accuracy (km)..... | 0.02 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec).... | 0.032 |
| | Pulse Repetition Freq. (/sec).... | 10,000 |
| | No. of Integrated Pulses..... | 30,000 |
| | Beamwidth Travel Time (sec)..... | 5.4 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|-------------------|
| Field of View (deg)..... | 1.4/.72 |
| Antenna Shape (ft)..... | 16/33 |
| Pointing Accuracy (deg)..... | 0.00045 |
| Max. Roll/Yaw Rate (deg/sec).... | 24/.48 |
| Operating Power (watts)..... | 75,000 |
| Data Rate (bits/sec)..... | 3.3×10^6 |
| Radar Volume (cu.ft.)..... | 13 |
| Antenna Weight (lbs)..... | 540 |
| Radar Weight (lbs)..... | 210 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Surface Appearance (detailed)

Family No. 19

RADAR TYPE: Synthetic Aperture

ORBIT: Data Sheet Number..... 114
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... 0.5
Max. Ground Resolution (km)..... 0.005
Positional Accuracy (km)..... 0.02

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 25
Compressed Pulse Width (μ sec).... 0.032
Pulse Repetition Freq. (/sec).... 10,000
No. of Integrated Pulses..... 30,000
Beamwidth Travel Time (sec)..... 5.4

SUPPORT REQUIREMENTS:

Field of View (deg)..... 1.4/.24
Antenna Shape (ft)..... 16/98
Pointing Accuracy (deg)..... 0.00045
Max. Roll/Yaw Rate (deg/sec)..... 0.08/.48
Operating Power (watts)..... 8500
Data Rate (bits/sec)..... 3.3×10^6
Radar Volume (cu.ft.)..... 10
Antenna Weight (lbs)..... 1600
Radar Weight (lbs)..... 160

COMMENTS:

PLANET: Venus

OBSERVABLE: Topographic Changes

Family No. 21

RADAR TYPE: Synthetic Aperture (one-sided stereo)

ORBIT: Data Sheet Number..... 116
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... .5
Max. Ground Resolution (km)..... 0.005 (0.0004 range)
Positional Accuracy (km)..... 0.005

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 25
Compressed Pulse Width (μ sec).... 0.0029
Pulse Repetition Freq. (/sec).... 100,000
No. of Integrated Pulses..... 300,000
Beamwidth Travel Time (sec)..... 5.4

SUPPORT REQUIREMENTS:

Field of View (deg)..... 1.4/.36
Antenna Shape (ft)..... 16/66
Pointing Accuracy (deg)..... 1.1×10^{-4}
Max. Roll/Yaw Rate (deg/sec)..... .12/.48
Operating Power (watts)..... 2.1×10^5
Data Rate (bits/sec)..... 3.8×10^8
Radar Volume (cu.ft.)..... 14
Antenna Weight (lbs)..... 1100
Radar Weight (lbs)..... 230

COMMENTS:

PLANET: Venus

OBSERVABLE: Topographic Changes

Family No. 21

RADAR TYPE: Synthetic Aperture (one-sided)

| | | |
|--------|---|----------------------|
| ORBIT: | Data Sheet Number..... | 116 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | .5 |
| | Max. Ground Resolution (km)..... | 0.005 (0.0004 range) |
| | Positional Accuracy (km)..... | 0.005 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec).... | 0.0029 |
| | Pulse Repetition Freq. (/sec).... | 100,000 |
| | No. of Integrated Pulses..... | 300,000 |
| | Beamwidth Travel Time (sec)..... | 5.4 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|-------------------|
| Field of View (deg)..... | 1.4/.18 |
| Antenna Shape (ft)..... | 16/130 |
| Pointing Accuracy (deg)..... | 0.00011 |
| Max. Roll/Yaw Rate (deg/sec).... | 0.06/.48 |
| Operating Power (watts)..... | 53,000 |
| Data Rate (bits/sec)..... | 3.8×10^8 |
| Radar Volume (cu.ft.)..... | 13 |
| Antenna Weight (lbs)..... | 2200 |
| Radar Weight (lbs)..... | 200 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Animal Life

Family No. 22

RADAR TYPE: Synthetic Aperture

| | | |
|--------|---|-----------|
| ORBIT: | Data Sheet Number..... | 118 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | .3 |
| | Max. Ground Resolution (km)..... | 0.0002 |
| | Positional Accuracy (km)..... | .2 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec).... | 0.0013 |
| | Pulse Repetition Freq. (/sec).... | 100,000 |
| | No. of Integrated Pulses..... | 6,000,000 |
| | Beamwidth Travel Time (sec)..... | 77 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|-------------------|
| Field of View (deg)..... | 21/.072 |
| Antenna Shape (ft)..... | 1.1/330 |
| Pointing Accuracy (deg)..... | 0.0045 |
| Max. Roll/Yaw Rate (deg/sec).... | 0.0012/.24 |
| Operating Power (watts)..... | 5.4×10^6 |
| Data Rate (bits/sec)..... | 7.1×10^8 |
| Radar Volume (cu.ft.)..... | 19 |
| Antenna Weight (lbs)..... | 380 |
| Radar Weight (lbs)..... | 300 |

COMMENTS:

PLANET: Venus

OBSERVABLE: Animal Life

Family No. 22

RADAR TYPE: Synthetic Aperture

ORBIT: Data Sheet Number..... 118
Periapse/Apoapse Alt. (km)..... 454/454
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 454
Imaging On-Time (min)..... 97

IMAGE: Minimum Swath Width (km)..... .3
Max. Ground Resolution (km)..... 0.0002
Positional Accuracy (km)..... .2

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 25
Compressed Pulse Width (μ sec).... 0.0013
Pulse Repetition Freq. (/sec)....
No. of Integrated Pulses.....
Beamwidth Travel Time (sec).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Antenna Shape (ft).....
Pointing Accuracy (deg).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
Radar Volume (cu.ft.).....
Antenna Weight (lbs).....
Radar Weight (lbs).....

COMMENTS:

Required pulse width cannot be achieved if bandwidth limited to ten percent of operating frequency.

PLANET: Venus

OBSERVABLE: Plant Life

Family No. 13

RADAR TYPE: Synthetic Aperture

| | | |
|--------|---|---------|
| ORBIT: | Data Sheet Number..... | 107 |
| | Periapse/Apoapse Alt. (km)..... | 454/454 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 454 |
| | Imaging On-Time (min)..... | 97 |
| IMAGE: | Minimum Swath Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | .2 |
| | Positional Accuracy (km)..... | .2 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 25 |
| | Compressed Pulse Width (μ sec).... | 1.3 |
| | Pulse Repetition Freq. (/sec).... | 1000 |
| | No. of Integrated Pulses..... | 60 |
| | Beamwidth Travel Time (sec)..... | .83 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|---------|
| Field of View (deg)..... | .24/1.2 |
| Antenna Shape (ft)..... | 99/20 |
| Pointing Accuracy (deg)..... | 0.047 |
| Max. Roll/Yaw Rate (deg/sec).... | 20/4 |
| Operating Power (watts)..... | 120 |
| Data Rate (bits/sec)..... | 220,000 |
| Radar Volume (cu.ft.)..... | 3.4 |
| Antenna Weight (lbs)..... | 1900 |
| Radar Weight (lbs)..... | 54 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Surface Elevations

Family No. 6a

RADAR TYPE: Noncoherent (shadowing)

| | | |
|--------|---|----------------|
| ORBIT: | Data Sheet Number..... | 129 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 (0.3 range, |
| | Positional Accuracy (km)..... | 20 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μ sec).... | .75 |
| | Pulse Repetition Freq. (/sec).... | 300 |
| | No. of Integrated Pulses..... | 1000 |
| | Beamwidth Travel Time (sec)..... | 4.2 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|--------|
| Field of View (deg)..... | 1/34 |
| Antenna Shape (ft)..... | 22/.69 |
| Pointing Accuracy (deg)..... | 1.6 |
| Max. Roll/Yaw Rate (deg/sec).... | 1/.31 |
| Operating Power (watts)..... | 3900 |
| Data Rate (bits/sec)..... | 4700 |
| Radar Volume (cu.ft.)..... | 9.2 |
| Antenna Weight (lbs)..... | 15 |
| Radar Weight (lbs)..... | 150 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Surface Elevations

Family No. 6a

RADAR TYPE: Noncoherent (shadowing)

| | | |
|--------|---|----------------|
| ORBIT: | Data Sheet Number..... | 129 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 (0.3 range) |
| | Positional Accuracy (km)..... | 20 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μ sec).... | .75 |
| | Pulse Repetition Freq. (/sec).... | .24 |
| | No. of Integrated Pulses..... | 1 |
| | Beamwidth Travel Time (sec)..... | 4.2 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | 1/34 |
| Antenna Shape (ft)..... | 22/.69 |
| Pointing Accuracy (deg)..... | 1.6 |
| Max. Roll/Yaw Rate (deg/sec)..... | .81/.25 |
| Operating Power (watts)..... | 220 |
| Data Rate (bits/sec)..... | 4700 |
| Radar Volume (cu.ft.)..... | 14 |
| Antenna Weight (lbs)..... | 15 |
| Radar Weight (lbs)..... | 220 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Surface Elevations

Family No. 8

RADAR TYPE: Noncoherent (one-sided stereo)

| | | |
|--------|---|----------------|
| ORBIT: | Data Sheet Number..... | 129 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 (0.5 range) |
| | Positional Accuracy (km)..... | 20 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μ sec).... | 1 |
| | Pulse Repetition Freq. (/sec).... | .24 |
| | No. of Integrated Pulses..... | 1 |
| | Beamwidth Travel Time (sec)..... | 4.2 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | 1/34 |
| Antenna Shape (ft)..... | 22/.69 |
| Pointing Accuracy (deg)..... | 1.6 |
| Max. Roll/Yaw Rate (deg/sec)..... | 8.1/.25 |
| Operating Power (watts)..... | 190 |
| Data Rate (bits/sec)..... | 3400 |
| Radar Volume (cu.ft.)..... | 13 |
| Antenna Weight (lbs)..... | 15 |
| Radar Weight (lbs)..... | 200 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Surface Elevations

Family No. 6a

RADAR TYPE: Noncoherent (two-sided stereo)

| | | |
|--------|---|--------------|
| ORBIT: | Data Sheet Number..... | 129 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 20 (2 range) |
| | Positional Accuracy (km)..... | 20 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μ sec).... | 4.6 |
| | Pulse Repetition Freq. (/sec).... | .24 |
| | No. of Integrated Pulses..... | 1 |
| | Beamwidth Travel Time (sec)..... | 4.2 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|----------|
| Field of View (deg)..... | 1/34 |
| Antenna Shape (ft)..... | 22.5/.69 |
| Pointing Accuracy (deg)..... | 2 |
| Max. Roll/Yaw Rate (deg/sec)..... | 8.1/.25 |
| Operating Power (watts)..... | 120 |
| Data Rate (bits/sec)..... | 760 |
| Radar Volume (cu.ft.)..... | 9 |
| Antenna Weight (lbs)..... | 15 |
| Radar Weight (lbs)..... | 140 |

COMMENTS:

PLANET: Mercury
OBSERVABLE: Layering
Family No. 22

RADAR TYPE: Synthetic Aperture

| | | |
|--------|---|-----------------|
| ORBIT: | Data Sheet Number..... | 146 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | .5 |
| | Max. Ground Resolution (km)..... | 0.0003 |
| | Positional Accuracy (km)..... | .02 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μ sec).... | 0.0017 |
| | Pulse Repetition Freq. (/sec).... | 100,000 |
| | No. of Integrated Pulses..... | 6×10^6 |
| | Beamwidth Travel Time (sec)..... | 65 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|-------------------|
| Field of View (deg)..... | 10/.56 |
| Antenna Shape (ft)..... | 2.3/42 |
| Pointing Accuracy (deg)..... | 0.0011 |
| Max. Roll/Yaw Rate (deg/sec).... | 0.0093/.17 |
| Operating Power (watts)..... | 2.6×10^6 |
| Data Rate (bits/sec)..... | 9.2×10^8 |
| Radar Volume (cu.ft.)..... | 18 |
| Antenna Weight (lbs)..... | 97 |
| Radar Weight (lbs)..... | 280 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Contacts (regional)

Family No. 6a

RADAR TYPE: Noncoherent

| | | |
|--------|---|---------|
| ORBIT: | Data Sheet Number..... | 129 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μ sec).... | 6.5 |
| | Pulse Repetition Freq. (/sec).... | .636 |
| | No. of Integrated Pulses..... | 1 |
| | Beamwidth Travel Time (sec)..... | .636 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|---------|
| Field of View (deg)..... | :16/34 |
| Antenna Shape (ft)..... | 150/.69 |
| Pointing Accuracy (deg)..... | .81 |
| Max. Roll/Yaw Rate (deg/sec).... | 22/.10 |
| Operating Power (watts)..... | 110 |
| Data Rate (bits/sec)..... | 3600 |
| Radar Volume (cu.ft.)..... | 5.8 |
| Antenna Weight (lbs)..... | 100 |
| Radar Weight (lbs)..... | 92 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Contacts (local)

Family No. 15

RADAR TYPE: Synthetic Aperture

| | | |
|--------|---|---------|
| ORBIT: | Data Sheet Number..... | 139 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | .2 |
| | Positional Accuracy (km)..... | 2 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μ sec).... | 1 |
| | Pulse Repetition Freq. (/sec).... | 1000 |
| | No. of Integrated Pulses..... | 100 |
| | Beamwidth Travel Time (sec)..... | 2 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|----------|
| Field of View (deg)..... | 0.14/4.3 |
| Antenna Shape (ft)..... | 160/5.5 |
| Pointing Accuracy (deg)..... | 0.12 |
| Max. Roll/Yaw Rate (deg/sec).... | 43/3.6 |
| Operating Power (watts)..... | 120 |
| Data Rate (bits/sec)..... | 150,000 |
| Radar Volume (cu.ft.)..... | 4 |
| Antenna Weight (lbs)..... | 900 |
| Radar Weight (lbs)..... | 65 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Contacts (local)

Family No. 15

RADAR TYPE: Synthetic Aperture

| | | |
|--------|---|---------|
| ORBIT: | Data Sheet Number..... | 139 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | .2 |
| | Positional Accuracy (km)..... | 2 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μ sec).... | 1 |
| | Pulse Repetition Freq. (/sec).... | 1000 |
| | No. of Integrated Pulses..... | 100 |
| | Beamwidth Travel Time (sec)..... | 2 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | .36/4.3 |
| Antenna Shape (ft)..... | 66/5.5 |
| Pointing Accuracy (deg)..... | .12 |
| Max. Roll/Yaw Rate (deg/sec)..... | 43/3.6 |
| Operating Power (watts)..... | 120 |
| Data Rate (bits/sec)..... | 150,000 |
| Radar Volume (cu.ft.)..... | 4 |
| Antenna Weight (lbs)..... | 360 |
| Radar Weight (lbs)..... | 65 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Contacts (detailed)

Family No. 22

RADAR TYPE: Synthetic Aperture

| | | |
|--------|---|---------|
| ORBIT: | Data Sheet Number..... | 146 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | .5 |
| | Max. Ground Resolution (km)..... | 0.005 |
| | Positional Accuracy (km)..... | .02 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μ sec).... | 0.028 |
| | Pulse Repetition Freq. (/sec).... | 100,000 |
| | No. of Integrated Pulses..... | 500,000 |
| | Beamwidth Travel Time (sec)..... | 9.1 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|-------------------|
| Field of View (deg)..... | 1.4/.72 |
| Antenna Shape (ft)..... | 16/33 |
| Pointing Accuracy (deg)..... | 0.0011 |
| Max. Roll/Yaw Rate (deg/sec).... | .14/.29 |
| Operating Power (watts)..... | 33,000 |
| Data Rate (bits/sec)..... | 3.3×10^7 |
| Radar Volume (cu.ft.)..... | 6.3 |
| Antenna Weight (lbs)..... | 540 |
| Radar Weight (lbs)..... | 100 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Structure of Features (regional)

Family No. 8

RADAR TYPE: Noncoherent (one-sided stereo)

| | | |
|--------|---|---------------|
| ORBIT: | Data Sheet Number..... | 132 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (1.4 range) |
| | Positional Accuracy (km)..... | 10 |
| RADAR: | Operating Wavelength (cm)..... | 1 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μ sec).... | 3.1 |
| | Pulse Repetition Freq. (/sec).... | 100 |
| | No. of Integrated Pulses..... | 50 |
| | Beamwidth Travel Time (sec)..... | .64 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | .16/34 |
| Antenna Shape (ft)..... | 150/.69 |
| Pointing Accuracy (deg)..... | .81 |
| Max. Roll/Yaw Rate (deg/sec)..... | 69/.31 |
| Operating Power (watts)..... | 45,000 |
| Data Rate (bits/sec)..... | 7500 |
| Radar Volume (cu.ft.)..... | 9 |
| Antenna Weight (lbs)..... | 5 |
| Radar Weight (lbs)..... | 140 |

COMMENTS:

Increasing the wavelength will decrease power requirement at expense of antenna weight. See next data sheet.

PLANET: Mercury

OBSERVABLE: Structure of Features (regional)

Family No. 8

RADAR TYPE: Noncoherent (one-sided stereo)

| | | |
|--------|---|--------------|
| ORBIT: | Data Sheet Number..... | 132 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3(1.4 range) |
| | Positional Accuracy (km)..... | 10 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μ sec).... | 3.1 |
| | Pulse Repetition Freq. (/sec).... | .64 |
| | No. of Integrated Pulses..... | 1 |
| | Beamwidth Travel Time (sec)..... | 0.64 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|---------|
| Field of View (deg)..... | .16/34 |
| Antenna Shape (ft)..... | 150/.69 |
| Pointing Accuracy (deg)..... | .81 |
| Max. Roll/Yaw Rate (deg/sec).... | 22/.10 |
| Operating Power (watts)..... | 130 |
| Data Rate (bits/sec)..... | 7500 |
| Radar Volume (cu.ft.)..... | 7.6 |
| Antenna Weight (lbs)..... | 100 |
| Radar Weight (lbs)..... | 120 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Structure of Features (local)

Family No. 17

RADAR TYPE: Synthetic Aperture (one-sided stereo)

| | | |
|--------|---|-----------------|
| ORBIT: | Data Sheet Number..... | 141 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | .2 (0.02 range) |
| | Positional Accuracy (km)..... | 2 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μ sec).... | 0.084 |
| | Pulse Repetition Freq. (/sec).... | 1000 |
| | No. of Integrated Pulses..... | 100 |
| | Beamwidth Travel Time (sec)..... | 4.1 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|---------|
| Field of View (deg)..... | .72/7.2 |
| Antenna Shape (ft)..... | 33/3.3 |
| Pointing Accuracy (deg)..... | 0.12 |
| Max. Roll/Yaw Rate (deg/sec).... | 72/7.2 |
| Operating Power (watts)..... | 1300 |
| Data Rate (bits/sec)..... | 960,000 |
| Radar Volume (cu.ft.)..... | 13 |
| Antenna Weight (lbs)..... | 110 |
| Radar Weight (lbs)..... | 210 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Structure of Features (detailed)

Family No. 27

RADAR TYPE: Synthetic Aperture (one-sided stereo)

ORBIT: Data Sheet Number..... 148
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 113

IMAGE: Minimum Swath Width (km)..... 0.5
Max. Ground Resolution (km)..... 0.005
Positional Accuracy (km)..... 0.02

RADAR Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 45
Compressed Pulse Width (μ sec).... 1.1×10^{-5}
Pulse Repetition Freq. (/sec)....
No. of Integrated Pulses.....
Beamwidth Travel Time (sec).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Antenna Shape (ft).....
Pointing Accuracy (deg).....
Max. Roll/Yaw Rate (deg/sec)....
Operating Power (watts).....
Data Rate (bits/sec).....
Radar Volume (cu.ft.).....
Antenna Weight (lbs).....
Radar Weight (lbs).....

COMMENTS:

Required pulse width cannot be achieved if bandwidth limited to ten percent of operating frequency.

PLANET: Mercury

OBSERVABLE: Surface Topography (regional)

Family no. 8

RADAR TYPE: Noncoherent (one-sided stereo)

| | | |
|--------|---|---------------|
| ORBIT: | Data Sheet Number..... | 132 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 (0.5 range) |
| | Positional Accuracy (km)..... | 3 |
| RADAR: | Operating Wavelength (cm)..... | 1 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μ sec).... | 1 |
| | Pulse Repetition Freq. (/sec).... | 300 |
| | No. of Integrated Pulses..... | 150 |
| | Beamwidth Travel Time (sec)..... | .64 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|---------|
| Field of View (deg)..... | .16/34 |
| Antenna Shape (ft)..... | .069 |
| Pointing Accuracy (deg)..... | 0.24 |
| Max. Roll/Yaw Rate (deg/sec).... | 69/.31 |
| Operating Power (watts)..... | 230,000 |
| Data Rate (bits/sec)..... | 23,000 |
| Radar Volume (cu.ft.)..... | 11 |
| Antenna Weight (lbs)..... | 5 |
| Radar Weight (lbs)..... | 180 |

COMMENTS:

Power can be reduced at expense of antenna size by increasing the wavelength. See next data sheet.

PLANET: Mercury

OBSERVABLE: Surface Topography (regional)

Family No. 8

RADAR TYPE: Noncoherent (one-sided stereo)

| | | |
|--------|---|--------------|
| ORBIT: | Data Sheet Number..... | 132 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km),..... | 3 (.5 range) |
| | Positional Accuracy (km)..... | 3 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg),..... | 40 |
| | Compressed Pulse Width (μ sec).... | 1 |
| | Pulse Repetition Freq. (/sec).... | 300 |
| | No. of Integrated Pulses..... | 25 |
| | Beamwidth Travel Time (sec)..... | .64 |

SUPPORT REQUIREMENTS:

| | |
|-----------------------------------|---------|
| Field of View (deg)..... | .16/34 |
| Antenna Shape (ft)..... | 150/.69 |
| Pointing Accuracy (deg)..... | .24 |
| Max. Roll/Yaw Rate (deg/sec)..... | 408/1.9 |
| Operating Power (watts)..... | 530 |
| Data Rate (bits/sec)..... | 23,000 |
| Radar Volume (cu.ft.)..... | 8.3 |
| Antenna Weight (lbs)..... | 100 |
| Radar Weight (lbs)..... | 120 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Surface Topography (local)

Family No. 17

RADAR TYPE: Synthetic Aperture (one-sided stereo)

| | | |
|--------|---|------------------|
| ORBIT: | Data Sheet Number..... | 141 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 100 |
| | Max. Ground Resolution (km)..... | 0.2 (.008 range) |
| | Positional Accuracy (km)..... | .2 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μ sec).... | .042 |
| | Pulse Repetition Freq. (/sec).... | 1000 |
| | No. of Integrated Pulses..... | 100 |
| | Beamwidth Travel Time (sec)..... | .2 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|-------------------|
| Field of View (deg)..... | .36/4.8 |
| Antenna Shape (ft)..... | 66/4.9 |
| Pointing Accuracy (deg)..... | .012 |
| Max. Roll/Yaw Rate (deg/sec).... | 48/3.6 |
| Operating Power (watts)..... | 640 |
| Data Rate (bits/sec)..... | 3.8×10^6 |
| Radar Volume (cu.ft.)..... | 12 |
| Antenna Weight (lbs)..... | 320 |
| Radar Weight (lbs)..... | 200 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Surface Topography (detailed)

Family No. 24

RADAR TYPE: Synthetic Aperture (one-sided stereo)

ORBIT: Data Sheet Number..... 148
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 113

IMAGE: Minimum Swath Width (km)..... 0.5
Max. Ground Resolution (km)..... .05 (2×10^{-5} range)
Positional Accuracy (km)..... .005

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 45
Compressed Pulse Width (μ sec).... 1.1×10^{-4}
Pulse Repetition Freq. (/sec)....
No. of Integrated Pulses.....
Beamwidth Travel Time (sec).....

SUPPORT REQUIREMENTS:

Field of View (deg).....
Antenna Shape (ft).....
Pointing Accuracy (deg).....
Max. Roll/Yaw Rate (deg/sec).....
Operating Power (watts).....
Data Rate (bits/sec).....
Radar Volume (cu.ft.).....
Antenna Weight (lbs).....
Radar Weight (lbs).....

COMMENTS:

Required pulse width cannot be achieved without increasing frequency to permit adequate bandwidth.

PLANET: Mercury

OBSERVABLE: Surface Appearance (regional)

Family No. 6a

RADAR TYPE: Noncoherent (one-sided stereo)

| | | |
|--------|---|---------|
| ORBIT: | Data Sheet Number..... | 129 |
| | Periapse/Apöapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | 600 |
| | Max. Ground Resolution (km)..... | 3 |
| | Positional Accuracy (km)..... | 10 |
| RADAR: | Operating Wavelength (cm)..... | 1 |
| | Depression Angle (deg)..... | 40 |
| | Compressed Pulse Width (μ sec).... | 6.5 |
| | Pulse Repetition Freq. (/sec).... | .636 |
| | No. of Integrated Pulses..... | 1 |
| | Beamwidth Travel Time (sec)..... | .636 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|---------|
| Field of View (deg)..... | .16/34 |
| Antenna Shape (ft)..... | 150/.69 |
| Pointing Accuracy (deg)..... | .81 |
| Max. Roll/Yaw Rate (deg/sec).... | 22/.10 |
| Operating Power (watts)..... | 110 |
| Data Rate (bits/sec)..... | 3600 |
| Radar Volume (cu.ft.)..... | 5.8 |
| Antenna Weight (lbs)..... | 100 |
| Radar Weight (lbs)..... | 92 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Surface Appearance (local)

Family No. 15

RADAR TYPE: Synthetic Aperture

ORBIT: Data Sheet Number..... 139
Periapse/Apoapse Alt. (km)..... 500/500
Inclination (deg)..... 90
Imaging Altitude Range (km)..... 500
Imaging On-Time (min)..... 113

IMAGE: Minimum Swath Width (km)..... 100
Max. Ground Resolution (km)..... .2
Positional Accuracy (km),..... 2

RADAR: Operating Wavelength (cm)..... 10
Depression Angle (deg)..... 45
Compressed Pulse Width (μ sec).... 1
Pulse Repetition Freq. (/sec).... 1000
No. of Integrated Pulses..... 100
Beamwidth Travel Time (sec)..... 4.1

SUPPORT REQUIREMENTS:

Field of View (deg)..... .72/4.8
Antenna Shape (ft)..... 33/4.9
Pointing Accuracy (deg)..... .12
Max. Roll/Yaw Rate (deg/sec)..... 48/7.2
Operating Power (watts)..... 140
Data Rate (bits/sec)..... 77,000
Radar Volume (cu.ft.)..... 6.1
Antenna Weight (lbs)..... 160
Radar Weight (lbs)..... 97

COMMENTS:

PLANET: Mercury

OBSERVABLE: Surface Appearance (detailed)

Family No. 22

RADAR TYPE: Synthetic Aperture

| | | |
|--------|---|---------|
| ORBIT: | Data Sheet Number..... | 146 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | .5 |
| | Max. Ground Resolution (km)..... | .005 |
| | Positional Accuracy (km),..... | .02 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μ sec).... | .028 |
| | Pulse Repetition Freq. (/sec).... | 100,000 |
| | No. of Integrated Pulses..... | 500,000 |
| | Beamwidth Travel Time (sec)..... | 9.1 |

SUPPORT REQUIREMENTS:

| | |
|----------------------------------|-------------------|
| Field of View (deg)..... | 1.4/.72 |
| Antenna Shape (ft)..... | 16/33 |
| Pointing Accuracy (deg)..... | .0011 |
| Max. Roll/Yaw Rate (deg/sec).... | .14/.29 |
| Operating Power (watts)..... | 3300 |
| Data Rate (bits/sec)..... | 3.3×10^7 |
| Radar Volume (cu.ft.)..... | 6.3 |
| Antenna Weight (lbs)..... | 540 |
| Radar Weight (lbs)..... | 100 |

COMMENTS:

PLANET: Mercury

OBSERVABLE: Topographic Changes

Family No. 24

RADAR TYPE: Synthetic Aperture (one-sided stereo)

| | | |
|--------|---|--------------------|
| ORBIT: | Data Sheet Number..... | 148 |
| | Periapse/Apoapse Alt. (km)..... | 500/500 |
| | Inclination (deg)..... | 90 |
| | Imaging Altitude Range (km)..... | 500 |
| | Imaging On-Time (min)..... | 113 |
| IMAGE: | Minimum Swath Width (km)..... | .5 |
| | Max. Ground Resolution (km)..... | .05 (.00005 range) |
| | Positional Accuracy (km)..... | .005 |
| RADAR: | Operating Wavelength (cm)..... | 10 |
| | Depression Angle (deg)..... | 45 |
| | Compressed Pulse Width (μ sec).... | .00011 |
| | Pulse Repetition Freq. (/sec).... | |
| | No. of Integrated Pulses..... | |
| | Beamwidth Travel Time (sec)..... | |

SUPPORT REQUIREMENTS:

| |
|-----------------------------------|
| Field of View (deg)..... |
| Antenna Shape (ft)..... |
| Pointing Accuracy (deg)..... |
| Max. Roll/Yaw Rate (deg/sec)..... |
| Operating Power (watts)..... |
| Data Rate (bits/sec)..... |
| Radar Volume (cu.ft.)..... |
| Antenna Weight (lbs)..... |
| Radar Weight (lbs)..... |

COMMENTS:

Required pulse width cannot be achieved without increasing frequency to permit adequate bandwidth.