

STARDUST

MISSION PLAN

**POST LAUNCH
SUPPLEMENT A**

December 8, 1999

Jet Propulsion Laboratory
California Institute of Technology

SD-75000-100-Revision A - Supplement A

JPL D-300-1-Revision B - Supplement A

STARDUST
MISSION PLAN
POST LAUNCH
SUPPLEMENT A



Edward A. Hirst
Mission Design Engineer



Chen-wan L. Yen
Mission Design Manager

December 8, 1999

Jet Propulsion Laboratory
California Institute of Technology

SD-75000-100-Revision A - Supplement A
JPL D-300-1-Revision B - Supplement A

Table of Contents

| | |
|---|----|
| Table of Contents | i |
| Change Log | ii |
| 1.0 Introduction | 1 |
| 2.0 Post Launch Figure Updates | 2 |
| Figure 2.3-1 STARDUST (E-E-W2-E) Heliocentric Trajectory | 3 |
| Figure 2.3-2 STARDUST Mission Overview (1999-2006) | 4 |
| Figure 4.2-1 Profile of ISP Collection Experiment - Loop 1 | 5 |
| Figure 4.2-2 ISP Impact Velocity History ($\beta=1$ particle) | 5 |
| Figure 4.2-3.a Spacecraft +z-axis Off-sun and Off-Earth Angle History | 5 |
| Figure 4.2-3.b Spacecraft +y-axis Yaw Angle History | 6 |
| Figure 4.2-4.a Collector Deployment Angle and Grid Exposure History | 6 |
| Figure 4.2-4.b Beta Meteoroid Impact Angle | 6 |
| 3.0 Post Launch Table Updates | 7 |
| Table 2.3-1 STARDUST Mission Phases | 8 |
| Table 2.3-2 Baseline Mission Parameters vs. Launch Date | 8 |
| Table 4.1-1 Cruise Phase Subphase Definition | 9 |
| Table 4.2-1.a Interstellar Particle Collection Subphases | 9 |
| Table 4.2-2 Interstellar Particle Related CIDA Experiment Periods | 9 |
| Table 4.3-1.a Cruise Phase Mission Operations | 10 |
| Table 4.3-1.b Cruise Phase Mission Operations - DSN Profile | 10 |
| Table 4.3-1.c Cruise Phase Mission Operations - Spacecraft Attitude | 11 |
| Table 5.1-1 Earth Gravity Assist Phase Subphase Definition | 12 |
| Table 5.2-1 Earth Gravity Assist Phase Mission Operations | 12 |
| Table 6.1-1 Wild-2 Encounter Phase Subphase Definition | 13 |
| Table 6.3-1 Wild-2 Encounter Phase Mission Operations | 14 |
| Table 7.1-1 Earth Return Phase Subphase Definition | 15 |
| Table 7.3-1 Earth Return Phase Mission Operations | 15 |
| Table 10.1-3 Spacecraft Attitude Profile - Limit Cycle Model | 16 |
| Table 10.2-5 Spacecraft Attitude Profile - Slew ΔV Model | 17 |
| Table 10.2-6 Communications Schedule | 18 |
| Table 11-1 Event Listing | 21 |
| Table 11-2 Time Ordered Event Listing | 25 |
| Table 12-1 ISP#1 Collection Period Characteristics | 27 |
| Table 12-2 ISP#2 Collection Period Characteristics | 29 |
| Table 12-3 ISP#1 Spacecraft Attitude [EME'2000] | 31 |
| Table 12-4 ISP#2 Spacecraft Attitude [EME'2000] | 33 |
| Table 12-5 CIDA#1 Experiment Period Characteristics | 35 |
| Table 12-6 CIDA#2 Experiment Period Characteristics | 37 |

| | | |
|---------------|---|----|
| Table 12-7 | CIDA#3 Experiment Period Characteristics | 39 |
| Table 12-8 | CIDA#1 Spacecraft Attitude [EME'2000] | 40 |
| Table 12-9 | CIDA#2 Spacecraft Attitude [EME'2000] | 42 |
| Table 12-10 | CIDA#3 Spacecraft Attitude [EME'2000] | 44 |
| Table 12-11 | CIDA#3 Solar Conjunction Characteristics | 45 |
| Table 12-12 | CIDA#3 Solar Conjunction Spacecraft Attitude [EME'2000] | 46 |
| | | |
| 4.0 | Additional Mission Plan MCRs | 47 |
| MCR 579 Rev a | Mission Plan Post Launch Supplement A | 48 |
| MCR 612 | Addition of TCM-A to Mission Plan | 51 |

Change Log

| Change Letter | Date | Affected Sections |
|---------------|----------|--|
| - | 04/13/99 | Draft |
| - | 12/08/99 | Final, Release approved with MCR 579 rev a |

1.0 Introduction

The purpose of this document is to provide a post launch update to information that is key to the successful implementation of the Stardust Mission Plan. The update is required as a result of having launched on the second of Stardust's 20 day launch period, February 7, 1999. Mission plans described in the parent document of this supplement are applicable to launching on the first day of the launch period, February 6, 1999. This supplement is consistent with the Stardust operations ephemeris designated:

SDU_L_991117_990207_060401.bsp

Most changes reflected in this document are fairly minor, consisting in updating mission plan schedules, typically listed in number of days from launch. However, the schedule for two events has changed sufficiently to warrant further note:

1. Location of Deep Space Maneuver #1: In the February 7 baseline mission, the location of this maneuver is shifted earlier by 52 days, from 3/10/2000 to 1/18/2000. This location minimizes mission delta-V costs, allows for an increase in the Interstellar Dust Collection duration, and retains the possibility of an asteroid flyby in late 2002.
2. Schedule for Interstellar Dust Collection Period #1: Earlier execution of Deep Space Maneuver #1 allows for an earlier start to the first Interstellar Dust Collection period. The start of collection moves 16-28 days earlier, from 3/15/2000 to 2/16-28/2000. Geometrical data is provided in the document illustrating that collection could start as much as 49 days earlier than 3/15/2000. This option is not selected, however, given that it would place SRC operations only a few days prior to solar conjunction, an undesirable situation given the first time nature of the SRC operations.

No detailed information regarding the asteroid flyby opportunity mentioned in item 1 is included in this document. Just briefly, it is worth mentioning that the asteroid is named Annefrank, and the flyby opportunity falls on November 2, 2002, about 13 months prior to the Wild-2 flyby. They flyby opportunity overlaps the second interstellar dust collection period, but has no impact on the remainder of the mission. An additional supplement to the mission plan will be issued if the Stardust Project decides to include Annefrank activities in the mission baseline.

This supplement, together with the Mission Plan document, describes the intended implementation of the Stardust Project Plans. No attempt has been made to reflect historical deviations from this plan. Future major deviations, if known far enough in advance, will be documented in similar supplements to the Mission Plan document. For historical deviations from the Mission Plan, please refer to operations status reports.

Section 4.0 Additional Mission Plan MCRs (Mission Change Request) includes additional major changes to the mission plan (known at the time of publication) for which formal documentation in the Mission Plan was not deemed of any benefit (i.e. implementation planning occurred prior to documentation in the Mission Plan).

Finally, this document assumes the reader is familiar with the Stardust Mission language and the latest version of the Stardust Mission plan (SD-75000-100-Rev. A, or JPL D-300-1-Rev. B, dated February 1, 1999).

2.0 Post Launch Figure Updates

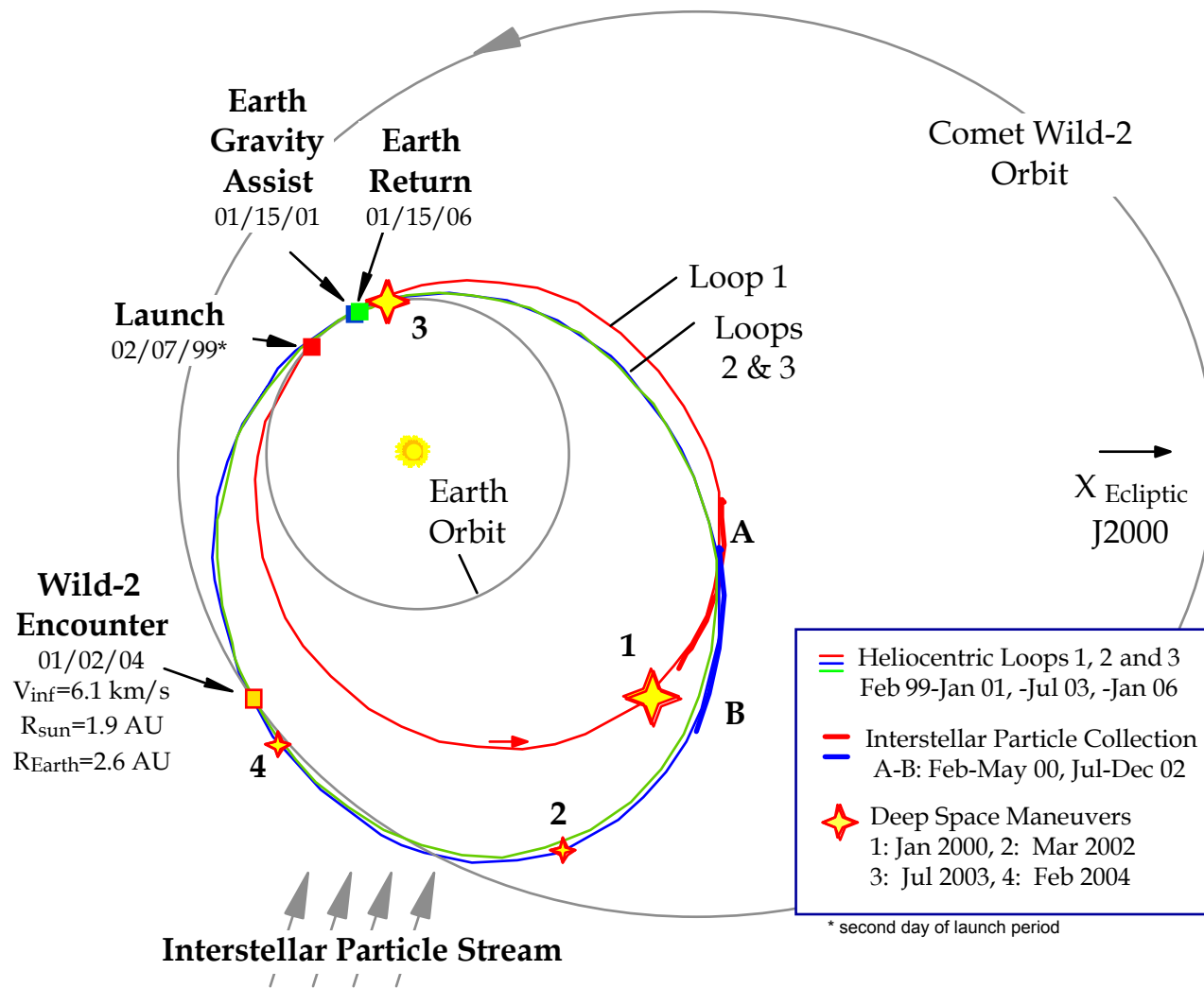


Figure 2.3-1 STARDUST (E-E-W2-E) Heliocentric Trajectory

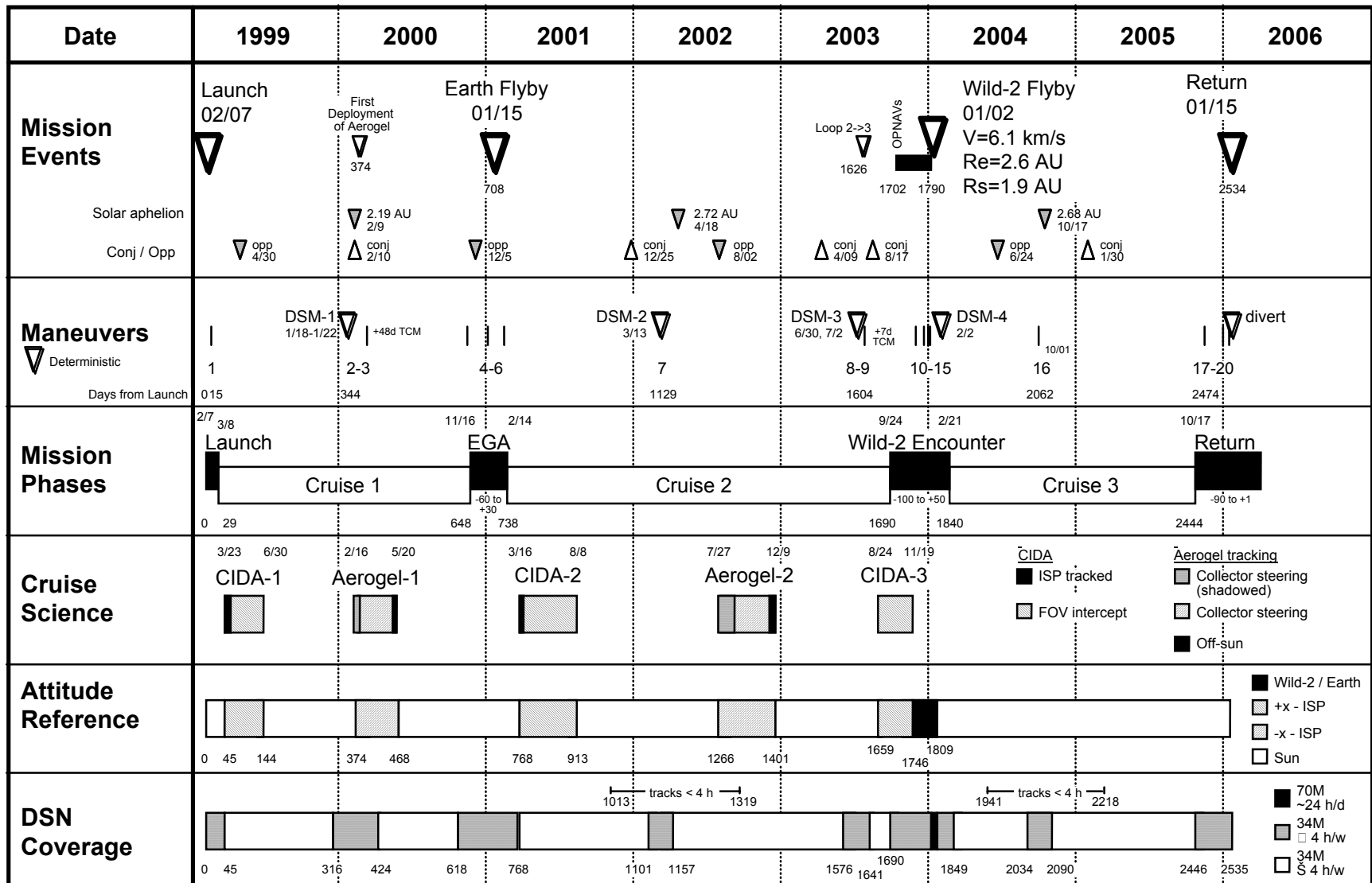


Figure 2.3-2 STARDUST Mission Overview (1999-2006)

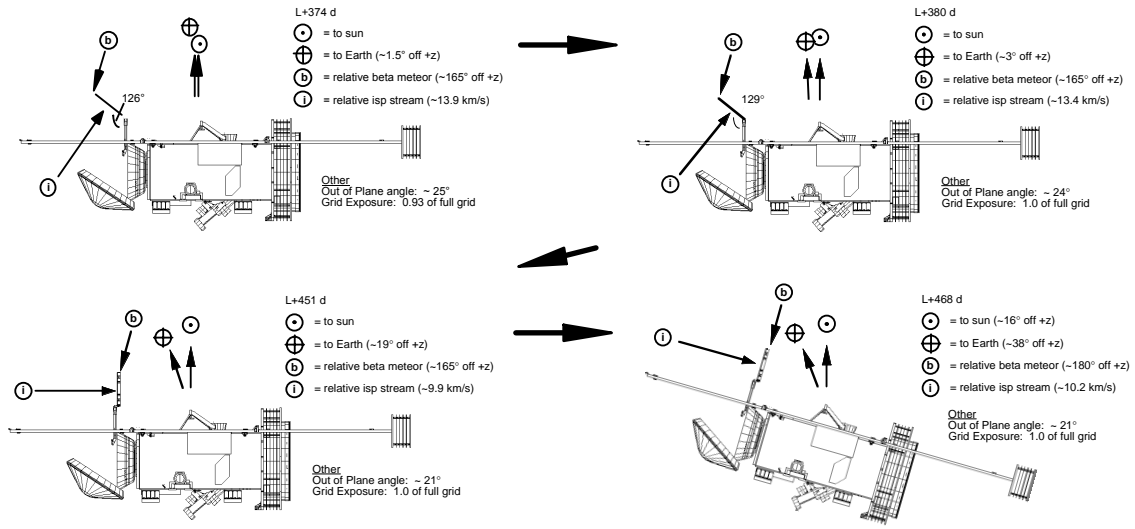


Figure 4.2-1 Profile of ISP Collection Experiment - Loop 1

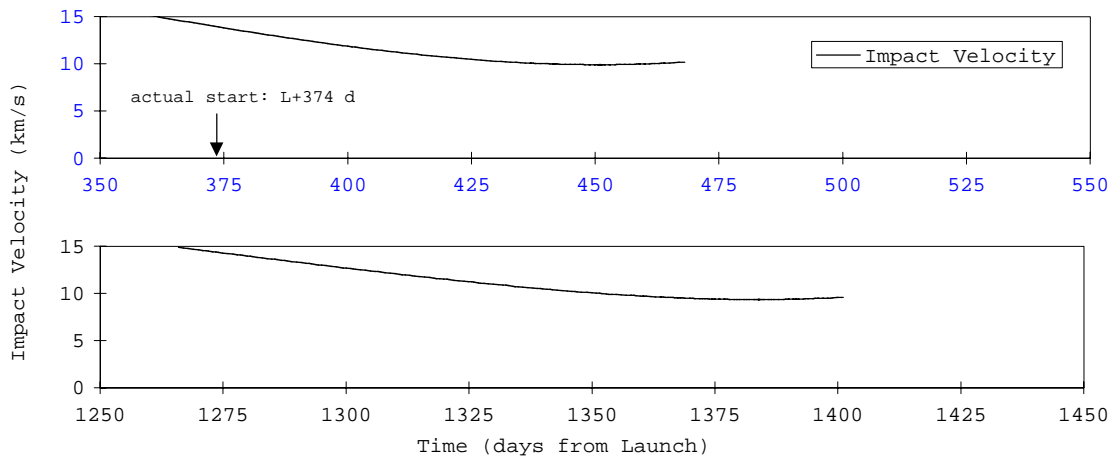


Figure 4.2-2 ISP Impact Velocity History ($\beta=1$ particle)

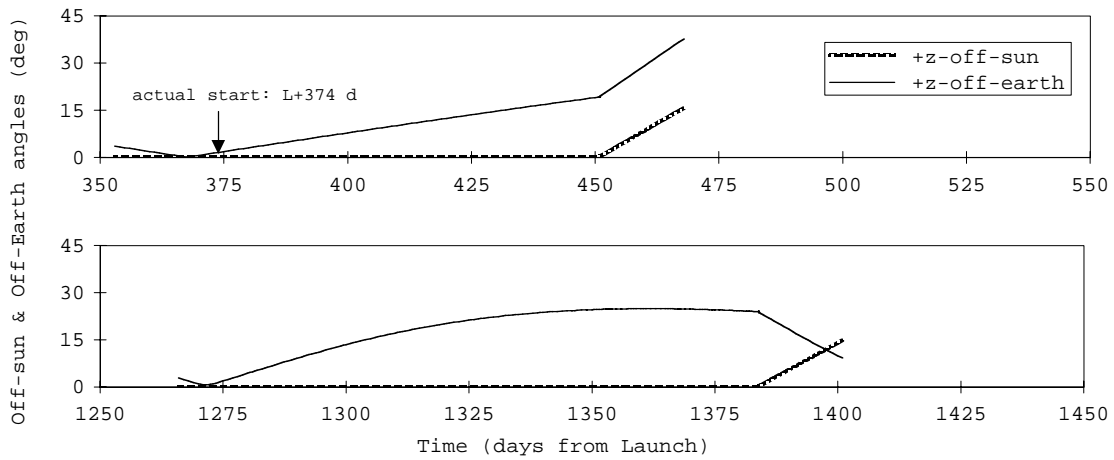


Figure 4.2-3.a. Spacecraft +z-axis Off-sun and Off-Earth Angle History

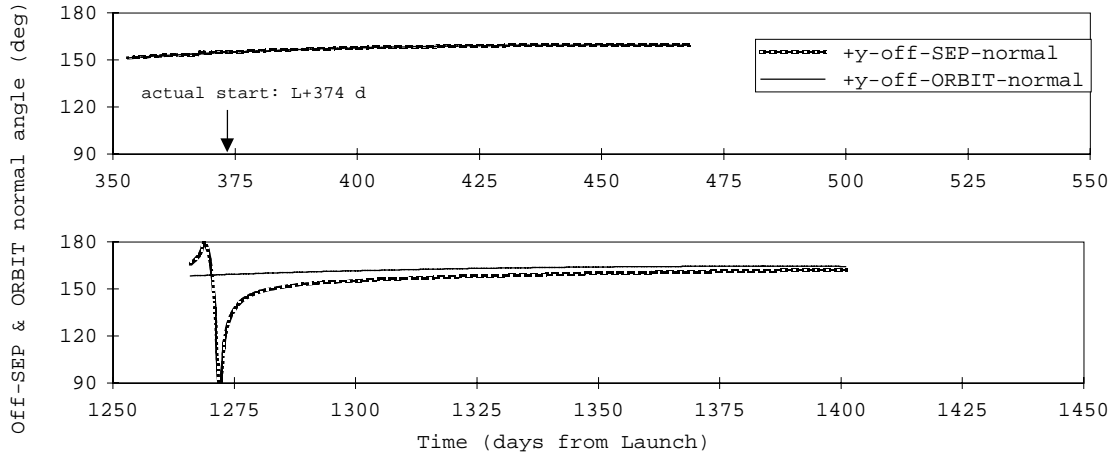


Figure 4.2-3.b. Spacecraft +y-axis Yaw Angle History

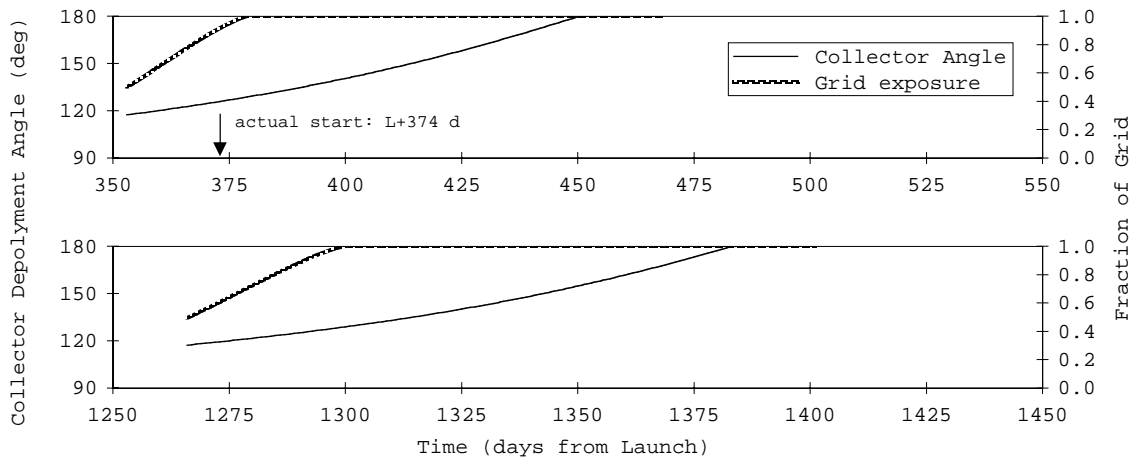


Figure 4.2-4.a. Collector Deployment Angle and Grid Exposure History

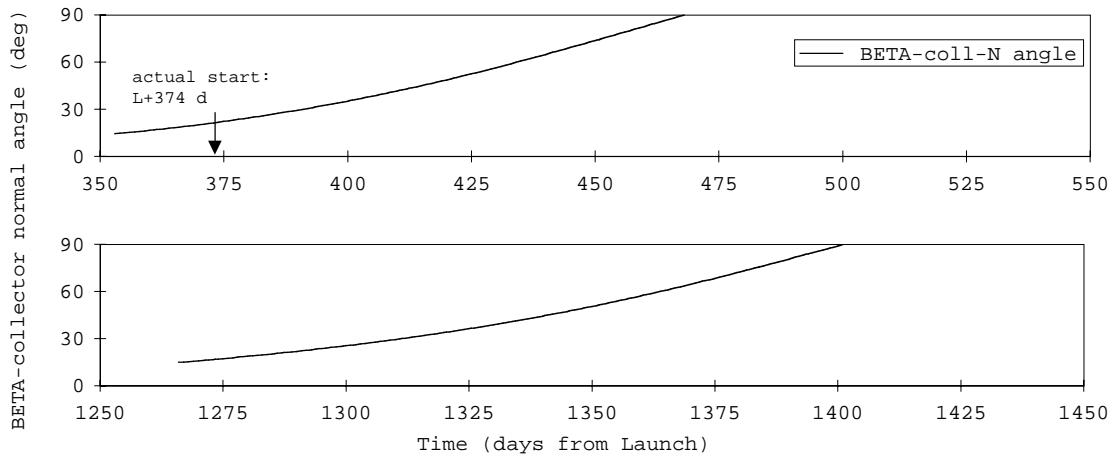


Figure 4.2-4.b. Beta Meteoroid Impact Angle

3.0 Post Launch Table Updates

Table 2.3-1 STARDUST Mission Phases

| Main Phase | Subphases | Time (L+days) | Duration (days) |
|--|---|---------------|-----------------|
| Launch | Initial Acquisition, Activation and Checkout, TCM 1 | 0 - 29 | 29 |
| Cruise 1 (Earth - Earth) | ISP Collection, DSM 1, TCM 3 | 29 - 648 | 619 |
| Earth Gravity Assist (EGA-60d to +30d) | TCM 4-6 | 648 - 738 | 90 |
| Cruise 2 (Earth-Wild-2) | ISP Collection, DSM 2, DSM 3, TCM 9 | 738 - 1690 | 952 |
| Wild-2 Encounter (E-100d to E+50d) | Far, Near, Close, Closest, Post TCM 10-14, DSM 4 | 1690 - 1840 | 150 |
| Cruise 3 (Wild-2 - Earth) | TCM 16 | 1840 - 2444 | 604 |
| Earth Return (ER-90d to ER+1d) | Approach, Entry, Descent, Recovery, Post Recovery, TCM 17-19, Divert (TCM 20) | 2444 - 2535 | 91 |

Table 2.3-2 Baseline Mission Parameters vs.Launch Date

| Event | Quantity | Value |
|-------------------------------|--|------------------------|
| Launch | Date, Time (UTC) | 02/07/99, 21:04:57 |
| | Injection (ET) | 21:32:10.7 |
| | C3(km ² /s ²), DLA (deg), RLA (deg) | 26.0, -19.695, 235.173 |
| | Mass (kg) | 394.000 |
| DSM11 | Date, Time (ET) | 01/18/99, 18:01:04 |
| | DV (m/s), Prop (kg) | 60.00, 11.57 |
| | *Burn DEC (deg), RA (deg) | -7.98, 211.49 |
| DSM12 | Date, Time (ET) | 01/20/99, 18:01:04 |
| | DV (m/s), Prop (kg) | 60.00, 11.22 |
| | *Burn DEC (deg), RA (deg) | -8.09, 212.13 |
| DSM13 | Date, Time (ET) | 01/22/99, 18:01:04 |
| | DV (m/s), Prop (kg) | 51.98, 9.44 |
| | *Burn DEC (deg), RA (deg) | -8.21, 212.77 |
| EGA | *Date, Time (ET) | 01/15/01, 10:51:17 |
| | *Altitude (km), *B-plane Angle (deg) | 6049.6, 144.241 |
| | *V infinity (km/s), *Mass (kg) | 6.480, 361.587 |
| DSM2 | Date, Time (ET) | 03/13/02, 18:01:04 |
| | DV (m/s), Prop (kg) | 0.00, 0.00 |
| | *Burn DEC (deg), RA (deg) | n/a, n/a |
| DSM3 Note 3 | Date, Time (ET) | 07/01/03, 18:01:04 |
| | DV (m/s), Prop (kg) | 70.09, 12.30 |
| | *Burn DEC (deg), RA (deg) | 10.97, 3.21 |
| Wild-2 Encounter Note 4 | Date, Time (ET) | 01/02/04, 19:20:00.0 |
| | *V infinity (km/s), *Mass (kg) | 6.120, 337.612 |
| | z-Earth, z-Sun angles (deg) | 0.125, 16.630 |
| DSM4 | Date, Time (ET) | 02/02/04, 18:01:04 |
| | DV (m/s), Prop (kg) | 1.38, 0.24 |
| | *Burn DEC (deg), RA (deg) | 77.15, 159.50 |
| Earth Return | Date, Time (ET) | 01/15/06, 09:58:08 |
| | *V infinity (km/s), *B plane angle (deg) | 6.418, -41.069 |
| | *DEC (deg), RA (deg) | 10.984, 207.602 |
| | *Mass (kg) | 336.715 |
| Total DV (m/s) | | 241.723 |

Notes:

- 5.0 ET-UTC = 64.185 sec at Launch
6. RA, DEC values provided in EME J2000
7. Reflects current modeling in Navigation trajectory development. This maneuver is likely to be implemented in two portions, on 6/30 and 7/2.
8. $i = V_{rel}$, $j = toEarth$ X i , $z = i$ X j

Table 4.1-1 Cruise Phase Subphase Definition

| Cruise Phase | Sub-Phases | Time (L+days) | Duration (days) |
|-------------------------|-----------------------|---------------|-----------------|
| Cruise 1 (Earth-Earth) | | 29 - 648 | 619 |
| | DSM-1 (TCM 2) | 344 - 348 | 5 |
| | ISP Collection | 374 - 468 | 94 |
| | TCM 3 (DSM-1 + 48 d) | 396 | - |
| Cruise 2 (Earth-Wild-2) | | 738 - 1690 | 952 |
| | ISP Collection | 1266 - 1401 | 135 |
| | DSM-2 (TCM 7) | 1129 | 1 |
| | DSM-3 (TCM 8) | 1604 - 1606 | 3 |
| Cruise 3 (Wild-2-Earth) | | 1840 - 2444 | 604 |
| | TCM 16 (3rd aphelion) | 2062 | - |

Table 4.2-1.a Interstellar Particle Collection Subphases

| Period | Start (L+days) | End (L+days) | Duration (days) | Equivalent Full Grid Duration (days) |
|--------|----------------|--------------|-----------------|--------------------------------------|
| 1 | 374-386 | 468 | 82-94 | 82-94 |
| 2 | 1266 | 1401 | 135 | 127 |
| Total | - | - | 217-229 | 209-221 |

Table 4.2-2 Interstellar Particle Related CIDA Experiment Periods

| Period | Start (L+days) | End (L+days) | Duration (days) | Equivalent Full Target Duration (days) |
|--------|----------------|--------------|-----------------|--|
| 1 | 45 | 144 | 99 | 52 |
| 2 | 768 | 913 | 145 | 74 |
| 3 | 1702 | 1746 | 44 | 28 |
| Total | - | - | 288 | 154 |

Table 4.3-1.a Cruise Phase Mission Operations

| Mission Operation | Description | |
|-------------------|---|---|
| Communications | 4 ⁽¹⁾ hrs / week, antenna: MGA 4 ⁽¹⁾ hrs / month, antenna: HGA, can replace navigation tracking TCM/DSMs (overlay changes for DSM 1,2 / TCM 3,16 below)- Two - 4 hr pass/week - MGA Comm, -14 to -28, +14 to +28d 4 hrs /day - MGA Comm, ± 14 d of first/last segments 1 hr / between seg. - HGA Comm, DSMs only - if possible DSM 1 / TCM 3 (overlap with ISP-1) - overlay changes: 4 hrs /day - HGA Comm, 0 to +7 d, DSM-1 Two - 4 hr pass/week - HGA Comm, +7 d DSM-1 to -7 d TCM 3 4 hrs /day - HGA Comm, -7 to 0 d, TCM 3 Two - 4 hr passes/week - MGA Comm, +7 to +28 d, TCM 3 DSM 2 / TCM 16 (aphelion maneuvers) - overlay changes: 4 ⁽¹⁾ hrs / every other day - MGA Comm, ± 14 d | |
| Navigation | L+344-348 d: DSM-1 (TCM 2) L+396 d: TCM 3 L+1129 d: DSM-2 (TCM 7) | L+1604-1606 d: DSM-3 (TCM 8) L+1613 d: TCM 9 L+2062 d: TCM 16 |

1. Or maximum allowable at solar ranges greater than 2.5 AU Minimum of 2 hours for radiometric tracking.

Table 4.3-1.b Cruise Phase Mission Operations - DSN Profile

| Antennas: | All 34-m ⁽²⁾ | |
|--------------------------------------|--|--|
| L+29 to +43d: 2*4 h/w ⁽³⁾ | L+752 to +766d: 2*4 h/w | L+1690 to +1840d: Encounter |
| L+43 to +316d: 4 h/w | L+766 to L+1013: 4 h/w | L+1840 to +1849d: 2*4h/w |
| L+316 to +337d: 2*4 h/w | L+1013 to +1101d: 4 ⁽¹⁾ h/w | L+1849 to +1941d: 4 h/w |
| L+337 to +355d: 4 h/d | L+1101 to +1117d: 2*4 ⁽¹⁾ h/w | L+1941 to +2034d: 4 ⁽¹⁾ h/w |
| L+355 to +389d: 2*4 h/w | L+1115 to +1143d: 4 ⁽¹⁾ h/ 2d | L+2034 to +2048d: 2*4 ⁽¹⁾ h/w |
| L+389 to +403d: 4 h/d | L+1143 to +1157d: 2*4 ⁽¹⁾ h/w | L+2048 to +2076d: 4 ⁽¹⁾ h/ 2d |
| L+403 to +424d: 2*4 h/w | L+1157 to +1319d: 4 ⁽¹⁾ h/w | L+2076 to +2090d: 2*4 ⁽¹⁾ h/w |
| L+424 to +620d: 4 h/w | L+1319 to +1580d: 4 h/w | L+2090 to +2218d: 4 ⁽¹⁾ h/w |
| L+620 to +634d: 2*4 h/w | L+1580 to +1594d: 2*4 h/w | L+2218 to +2444d: 4 h/w |
| L+634 to +648d: 4 h/d | L+1594 to +1631d: 4 h/d | L+2444 to +2535d: Return |
| L+648 to +738d: EGA | L+1631 to +1645d: 2*4 h/w | |
| L+738 to +752d: 4 h/d | L+1645 to +1690d: 4 h/w | |

1. Or maximum allowable at solar ranges greater than 2.5 AU Minimum of 2 hours for radiometric tracking.

2. DSN Coverage should alternate between Northern Hemisphere and Southern Hemisphere DSN sites.

3. A*B = A number of tracks at B frequency

Table 4.3-1.c Cruise Phase Mission Operations - Spacecraft Attitude ⁽¹⁾

| Time (days) | Description | angz (°) | angy (°) | db (°) |
|---|------------------------|----------|----------|--------|
| L+0 to 20 | Launch Phase | | | |
| L+29 to 45 | constant off-sun | 22 | 180 | 15 |
| L+45 to 54 | CIDA tracking | - | - | 15 |
| L+54 to 144 | CIDA constant off-sun | -20 | - | 15 |
| L+144 to 374 | constant off-sun | 0 | 180 | 15 |
| L+374 to 452 | ISP collector steering | - | - | 15 |
| L+452 to 468 | ISP tracking | - | - | 15 |
| L+468 to 648 | constant off-sun | 0 | 0 | 15 |
| L+648 to 738 | EGA Phase | | | |
| L+738 to 743 | constant off-sun | 20 | 0 | 15 |
| L+743 to 768 | constant off-sun | 0 | 0 | 15 |
| L+768 to 779 | CIDA tracking | - | - | 15 |
| L+779 to 913 | CIDA constant off-sun | -20 | - | 15 |
| L+913 to 1052 | constant off-sun | 0 | 180 | 15 |
| L+1052 to 1266 | constant off-sun | 0 | 0 | 15 |
| L+1266 to 1384 | ISP collector steering | - | - | 15 |
| L+1384 to 1401 | ISP tracking | - | - | 15 |
| L+1401 to 1522 | constant off-sun | 0 | 180 | 15 |
| L+1522 to 1657 | constant off-sun | 0 | 0 | 15 |
| L+1657 to 1690 | constant off-sun | 0 | 180 | 15 |
| L+1690 to 1840 | Encounter Phase | | | |
| L+1840 to 1964 | constant off-sun | 0 | 0 | 15 |
| L+1964 to 2184 | constant off-sun | 0 | 180 | 15 |
| L+2184 to 2444 | constant off-sun | 0 | 0 | 15 |
| L+2444 to 2535 | Return Phase | | | |
| MGA communications: 7° off +z-axis to Earth | | | | 6 |
| HGA communications: +z-axis to Earth | | | | 2 |

1. See section 10 for attitude mode definitions.

Table 5.1-1 Earth Gravity Assist Phase Subphase Definition

| Mission Phase | Subphases | Time (L+days) | Duration (days) |
|--|------------------|---------------|-----------------|
| Earth Gravity Assist (EGA-60d to +30d) | TCM 4 (EGA-60 d) | 648 - 738 | 90 |
| | TCM 5 (EGA-10 d) | 648 | - |
| | TCM 6 (EGA+30 d) | 698 | - |
| | | 738 | - |

Table 5.2-1 Earth Gravity Assist Phase Mission Operations

| Mission Operation | Description | | | | |
|---|--|------------------|--|----------|--------|
| Communications All MGA, except LGA: L+707-727 | EGA - 8 hrs /day, within ±14 days TCMs - Two - 4 hr passes week, -14 to -28, +14 to +28d 4 hrs / day, within ± 14 days | | | | |
| Navigation | L+648 (EGA-60 d): TCM 4 L+698 (EGA-10 d): TCM 5 | | L+738 (EGA+30 d): TCM 6 | | |
| Spacecraft Attitude (see section 10 for attitude mode definitions) | Time | Description | angz (°) | angy (°) | db (°) |
| | L+648 to 667 d | constant off-sun | 0 | 0 | 15 |
| | L+667 to 703 d | constant off-sun | 0 | 180 | 15 |
| | L+703 to 707 d | constant off-sun | -17 | 180 | 15 |
| | L+707 to 708 d | constant off-sun | -45 | 0 | 15 |
| | L+708 to 727 d | constant off-sun | -45 | 180 | 15 |
| | L+727 to 738 d | constant off-sun | 20 | 0 | 15 |
| | MGA communications: 7° off +z-axis to Earth | | | | 6 |
| DSN Profile All 34-m ⁽¹⁾ | L+648 to +662d: 4 h/d L+662 to +684d: 2*4 h/w ⁽²⁾ L+684 to +694d: 4 h/d | | L+694 to +722d: 8 h/d L+722 to +738d: 4 h/d | | |

1. DSN Coverage should alternate between Northern Hemisphere and Southern Hemisphere DSN sites.
2. A*B = A number of tracks at B frequency

Table 6.1-1 Wild-2 Encounter Phase Subphase Definition

| Mission Phase | Sub-Phases | Time | Duration |
|--------------------------------------|-------------------|----------------|----------|
| Wild-2 Encounter (E-100d to +50d) | | L+1690 - 1840d | 150 d |
| | Far Encounter | E-100 to -1d | 99 d |
| | Near Encounter | E-1d to -5h | 19 h |
| | Close Encounter | E-5 to +5h | 10 h |
| | Closest Encounter | E-5 to +5 m | 10 min |
| | Post Encounter | E+5h to +50d | 50 d |
| | TCM 10 (E-30 d) | L+1760 d | - |
| | TCM 11 (E-10 d) | L+1780 d | - |
| | TCM 12 (E-2 d) | L+1788 d | - |
| | TCM 13 (E-18 h) | L+1789 d | - |
| | TCM 14 (E-6 h) | L+1790 d | - |
| DSM 4 (TCM 15) (E+31 d) | L+1821 d | - | |

Table 6.3-1 Wild-2 Encounter Phase Mission Operations

| | | | | | |
|--|--|-------------------|--|----------|--------|
| Mission Operation | Description | | | | |
| Communications | 8 hrs / wk - HGA Comm - E-100 to -7d, no s/c flip (small SEP) 8 hrs / day - HGA Comm - E-7 to E-1d 24 hrs / day - HGA Comm - E-2 to +3d, +5 to +8d, +10 to +13d 8 hrs / wk - HGA Comm - E+13 to E+50d TCMs - Two - 4 hr passes week - MGA Comm -14 to -28, +14 to +28d 4 hrs / day - MGA Comm within ± 14 days Encounter - 4 hrs / day - MGA Comm within ± 30 days | | | | |
| Navigation | L+1760 d (E-30 d): TCM 10 | | L+1789 d (E-18 h): TCM 13 | | |
| | L+1780 d (E-10 d): TCM 11 | | L+1790 d (E-6 h): TCM 14 | | |
| | L+1788 d (E-2 d): TCM 12 | | L+1821 d (E+31 d): DSM 4 (# 15) | | |
| Spacecraft Attitude (see section 10 for attitude mode definitions) | Time (days) | Description | angz (°) | angy (°) | db (°) |
| | L+1690 to 1702 | constant off-sun | 0 | 180 | 15 |
| | L+1702 to 1746 | CIDA cst. off-sun | -20 | 0 | 15 |
| | L+1746 to 1779 | MGA track Earth | - | - | 15 |
| | L+1779 to 1788 | HGA track Earth | - | - | 15 |
| | L+1788 to 1791 | Encounter | - | - | 2 |
| | L+1791 to 1804 | HGA track Earth | - | - | 2 |
| | L+1804 to 1810 | HGA track Earth | - | - | 15 |
| | L+1810 to 1840 | constant off-sun | 0 | 0 | 15 |
| | MGA communications: 7° off +z-axis to Earth | | | | 6 |
| | HGA communications: +z-axis to Earth | | | | 2 |
| Encounter mode | | | | 0.3 | |
| Imaging mode | | | | 0.5 | |
| DSN Profile ⁽¹⁾ All 34-m HEF except selective 70-m from L+1788 to +1803d | L+1690 to +1732d: 8 h/w L+1732 to +1740d: 2*4 h/w ⁽²⁾ L+1740 to +1746d: 2*8 h/w L+1746 to +1783d: 4 h/d L+1783 to +1788d: 8 h/d L+1788 to +1793d: 24 h/d | | L+1793 to +1795d: 4 h/d L+1795 to +1798d: 24 h/d L+1798 to +1800d: 4 h/d L+1800 to +1803d: 24 h/d L+1803 to +1834d: 4 h/d L+1834 to +1840d: 2*4 h/w | | |

1. DSN Coverage should alternate between Northern Hemisphere and Southern Hemisphere DSN sites.
2. A*B = A number of tracks at B frequency

Table 7.1-1 Earth Return Phase Subphase Definition

| Mission Phase | Sub-Phases | Time | Duration |
|----------------------------------|---|----------------|----------|
| Earth Return (ER-90 to ER+1d) | Approach TCM 17 (ER-60 d) TCM 18 (ER-13 d) TCM 19 (ER-1 d) SRC release S/C divert (TCM 20) | L+2444 - 2535d | 91d |
| | | L+2520 - 2534d | 14d |
| | | L+2474d | - |
| | | L+2521d | - |
| | | L+2533d | - |
| | | ER-4h | - |
| | | ER-3h | - |
| | SRC Entry / Descent Atmospheric Entry Parachute Descent SRC Recovery S/C Post Divert | ER+0 - +8m | ~8 m |
| | | ER+8 - +15m | ~7 m |
| | | ER+15 - +75m | ~60 m |
| | ER-3h - +1d | ~1 d | |

Table 7.3-1 Earth Return Phase Mission Operations

| Mission Operation | Description | | | | |
|---|--|------------------|--|----------|--------|
| Communications All MGA, exc. LGA: > L+2507 | Return - 16 hrs /day, within ER-14 days TCMs - Two - 4 hr passes week, -14 to -28, +14 to +28d 4 hrs / day, within ± 14 days | | | | |
| Navigation | L+2474 (ER-60 d): TCM 17 L+2521 (ER-13 d): TCM 18 | | L+2532 (ER-1 d): TCM 19 L+2533 (divert): TCM 20 | | |
| Spacecraft Attitude (see section 10 for attitude mode definitions) | Time (days) | Description | angz (°) | angy (°) | db (°) |
| | L+2444 to 2458 | constant off-sun | 0 | 0 | 15 |
| | L+2458 to 2488 | constant off-sun | 0 | 180 | 15 |
| | L+2487 to 2508 | constant off-sun | -21 | 180 | 15 |
| | L+2508 to 2532 | constant off-sun | 45 | 0 | 15 |
| | L+2532 to 2534 | constant off-sun | 26 | 0 | 15 |
| | L+2534 to 2536 | constant off-sun | 45 | 0 | 15 |
| | MGA communications: 7° off +z-axis to Earth | | | | 6 |
| DSN Profile All 34M ⁽¹⁾ | L+2444 to +2460 d: 2*4 h/w ⁽²⁾ L+2460 to +2488 d: 4 h/d L+2488 to +2507 d: 2*4 h/w | | L+2507 to 2520 d: 2*4 h/w L+2520 to 2535 d: 2*8 h/d | | |

1. DSN Coverage should alternate between Northern Hemisphere and Southern Hemisphere DSN sites.
2. A*B = A number of tracks at B frequency

Table 10.1-3 Spacecraft Attitude Profile - Limit Cycle Model

| Time From Launch | Attitude Option | Off-sun Angle (deg) | Deadband Option | Time From Launch | Attitude Option | Off-sun Angle (deg) | Deadband Option |
|------------------|-----------------|---------------------|-----------------|------------------|-----------------|---------------------|-----------------|
| 0 | 21 | 45 | 1 | 1384 | 33 | - | 1 |
| 29 | 22 | 22 | 1 | 1401 | 11 | - | 1 |
| 45 | 41 | - | 1 | 1522 | 12 | - | 1 |
| 54 | 42 | 20 | 1 | 1657 | 11 | - | 1 |
| 144 | 11 | - | 1 | 1702 | 42 | 20 | 1 |
| 374 | 31 | - | 1 | 1746 | 22 | 3 | 1 |
| 451 | 33 | - | 1 | 1759 | 22 | 5 | 1 |
| 468 | 12 | - | 1 | 1769 | 22 | 7 | 1 |
| 667 | 11 | - | 1 | 1779 | 22 | 16 | 1 |
| 703 | 21 | 17 | 1 | 1789 | 22 | 18 | 2 |
| 707 | 22 | 45 | 1 | 1804 | 22 | 20 | 1 |
| 708 | 21 | 45 | 1 | 1810 | 12 | - | 1 |
| 727 | 22 | 20 | 1 | 1964 | 11 | - | 1 |
| 743 | 12 | - | 1 | 2184 | 12 | - | 1 |
| 768 | 41 | - | 1 | 2458 | 11 | - | 1 |
| 779 | 42 | 20 | 1 | 2488 | 21 | 21 | 1 |
| 913 | 11 | - | 1 | 2508 | 22 | 45 | 1 |
| 1052 | 12 | - | 1 | 2532 | 22 | 26 | 1 |
| 1266 | 31 | - | 1 | | | | |

Table 10.2-5 Spacecraft Attitude Profile - Slew ΔV Model

| Start Time (dFL) | End Time (dFL) | Attitude index | Angz (deg) | Angy ¹ (deg) | Flip-y? (opt) | Deadband | Slew Group |
|---------------------|-------------------|-------------------|---------------|----------------------------|------------------|----------|---------------|
| 0 | 29 | 1 | -45 | 180 | (0) | 1 | 0 |
| 29 | 45 | 1 | 22 | 0 | (0) | 1 | 3 |
| 45 | 54 | 2 | (0) | (180) | (0) | 1 | 3 |
| 54 | 144 | 3 | -20 | (180) | (0) | 1 | 0 |
| 144 | 374 | 1 | 0 | 180 | (0) | 1 | 4 |
| 374 | 451 | 5 | (0) | (180) | (0) | 1 | 5 |
| 451 | 468 | 6 | (0) | (180) | (0) | 1 | 0 |
| 468 | 667 | 1 | 0 | 0 | (0) | 1 | 6 |
| 667 | 703 | 1 | 0 | 180 | (0) | 1 | 5 |
| 703 | 707 | 1 | -17 | 180 | (0) | 1 | 2 |
| 707 | 708 | 1 | -45 | 0 | (0) | 1 | 3 |
| 708 | 727 | 1 | -45 | 180 | (0) | 1 | 3 |
| 727 | 743 | 1 | 20 | 0 | (0) | 1 | 3 |
| 743 | 768 | 1 | 0 | 0 | (0) | 1 | 2 |
| 768 | 779 | 2 | (0) | (180) | (0) | 1 | 7 |
| 779 | 913 | 3 | -20 | (180) | (0) | 1 | 0 |
| 913 | 1052 | 1 | 0 | 180 | (0) | 1 | 4 |
| 1052 | 1066 | 1 | 0 | 0 | (0) | 1 | 5 |
| 1266 | 1384 | 5 | (0) | (180) | (0) | 1 | 5 |
| 1384 | 1401 | 6 | (0) | (180) | (0) | 1 | 0 |
| 1401 | 1522 | 1 | 0 | 180 | (0) | 1 | 4 |
| 1522 | 1657 | 1 | 0 | 0 | (0) | 1 | 5 |
| 1657 | 1702 | 1 | 0 | 180 | (0) | 1 | 5 |
| 1702 | 1746 | 3 | -20 | (180) | (0) | 1 | 7 |
| 1746 | 1779 | 11 | (0) | (0) | (0) | 1 | 3 |
| 1779 | 1788 | 12 | (0) | (0) | 0 | 1 | 2 |
| 1788 | 1791 | 10 | (0) | (0) | (0) | 3 | 4 |
| 1791 | 1804 | 12 | (0) | (0) | 0 | 3 | 4 |
| 1804 | 1810 | 12 | (0) | (0) | 0 | 1 | 0 |
| 1810 | 1965 | 1 | 0 | 0 | (0) | 1 | 2 |
| 1964 | 2184 | 1 | 0 | 180 | (0) | 1 | 5 |
| 2184 | 2458 | 1 | 0 | 0 | (0) | 1 | 5 |
| 2458 | 2488 | 1 | 0 | 180 | (0) | 1 | 5 |
| 2488 | 2508 | 1 | -21 | 180 | (0) | 1 | 2 |
| 2508 | 2532 | 1 | 45 | 0 | (0) | 1 | 3 |
| 2532 | 2534 | 1 | 26 | 0 | (0) | 1 | 2 |
| 2534 | 2536 | 1 | 45 | 0 | (0) | 1 | 2 |

1. Values in parentheses do not influence actual attitude

Table 10.2-6 Communications Schedule

| Time (dFL) | Dur (hrs) | Antenna | Flip-y? (opt) | Slew option |
|---|--------------|---------|------------------|----------------|
| 31,34,37,40,43 | 4 | MGA | 0 | 2 |
| 50,4,57,64,71,78 | 4 | MGA | 0 | 3 |
| 85,4,92,99,106,113,120,127,134,141 | 4 | MGA | 0 | 4 |
| 148,155,162,169,173,183,190,197,204,211,218, 225,232,239,246,253 | 4 | MGA | 0 | 2 |
| 260 | 4 | HGA | 0 | 2 |
| 267,274,281 | 4 | MGA | 0 | 2 |
| 291 | 4 | HGA | 0 | 2 |
| 302,308,318,321,323,326, | 4 | MGA | 0 | 2 |
| 330 | 4 | HGA | 0 | 2 |
| 331-350 | 4 | MGA | 0 | 2 |
| 351 | 4 | HGA | 0 | 2 |
| 352-356,359,361,363,365 | 4 | MGA | 0 | 2 |
| 370,373 | 4 | HGA | 1 | 2 |
| 375,379,382,386,390-404,408,411,414,416,418, 421,425 | 4 | HGA | 1 | 4 |
| 432,438,444,450 | 4 | MGA | 0 | 7 |
| 456 | 4 | MGA | 0 | 3 |
| 463 | 4 | HGA | 0 | 3 |
| 470,477,484,491 | 4 | MGA | 0 | 2 |
| 498 | 4 | HGA | 0 | 2 |
| 505,512,519,526,533,540,547,554,561,568,575, 582,589,596,603,610,617,622,625,628,631,634- 662,665,668,671,673,675,678,681,684-693 | 4 | MGA | 0 | 2 |
| 694-706 | 8 | MGA | 0 | 2 |
| 727-752,755,758,761,764 | 4 | MGA | 0 | 2 |
| 771,778,785,792,799 | 4 | MGA | 0 | 3 |
| 806,813,820,827,834,841,848,855,862,869,876, 883,890,897,904,911 | 4 | MGA | 0 | 4 |
| 918,925,932 | 4 | MGA | 0 | 2 |
| 939 | 4 | HGA | 0 | 2 |
| 946,953,960,967 | 4 | MGA | 0 | 2 |
| 974 | 4 | HGA | 0 | 2 |
| 981,988,995,1002 | 4 | MGA | 0 | 2 |
| 1009 | 4 | HGA | 0 | 2 |
| 1016,1023,1030 | 3 | MGA | 0 | 2 |
| 1037 | 3 | HGA | 0 | 2 |
| 1045,1047,1056,1065,1072 | 3 | MGA | 0 | 2 |
| 1079 | 3 | HGA | 0 | 2 |
| 1086,1093,1100,1103,1106,1109,1112,1115,1117,1 119 | 3 | MGA | 0 | 2 |
| 1121 | 3 | HGA | 0 | 2 |
| 1123,1125,1127,1129,1131,1133,1135,1137,1139,1 141,1143,1146 | 3 | MGA | 0 | 2 |
| 1149 | 3 | HGA | 0 | 2 |
| 1152,1156,1163,1170,1177 | 3 | MGA | 0 | 2 |
| 1184 | 3 | HGA | 0 | 2 |
| 1191,1198,1205,1212 | 3 | MGA | 0 | 2 |
| 1219 | 3 | HGA | 0 | 2 |

Table 10.2-6 Communications Schedule (cont)

| Time (dFL) | Dur (hrs) | Antenna | Flip-y? (opt) | Slew option |
|---|--------------|---------|------------------|----------------|
| 1226,1233,1240,1247,1254,1261 | 3 | MGA | 0 | 2 |
| 1268,1275,1282 | 3 | MGA | 0 | 7 |
| 1289,1296,1303,1310,1317 | 3 | MGA | 0 | 4 |
| 1324,1331 | 4 | MGA | 0 | 4 |
| 1338 | 4 | HGA | 0 | 4 |
| 1345,1352,1359,1366 | 4 | MGA | 0 | 4 |
| 1373 | 4 | HGA | 0 | 4 |
| 1380,1387,1394 | 4 | MGA | 0 | 4 |
| 1401 | 4 | MGA | 0 | 2 |
| 1408 | 4 | HGA | 0 | 2 |
| 1415,1422,1429,1436 | 4 | MGA | 0 | 2 |
| 1443 | 4 | HGA | 0 | 2 |
| 1450,1457,1464,1471 | 4 | MGA | 0 | 2 |
| 1478 | 4 | HGA | 0 | 2 |
| 1485,1492,1499,1506 | 4 | MGA | 0 | 2 |
| 1513 | 4 | HGA | 0 | 2 |
| 1520,1527,1534,1541 | 4 | MGA | 0 | 2 |
| 1548 | 4 | HGA | 0 | 2 |
| 1555,1562,1569,1576,1578,1581 | 4 | MGA | 0 | 2 |
| 1584 | 4 | HGA | 0 | 2 |
| 1587,1590,1593-1614 | 4 | MGA | 0 | 2 |
| 1615 | 4 | HGA | 0 | 2 |
| 1616-1629,1632,1635,1638,1641,1644,1646,1653, 1660 | 4 | MGA | 0 | 2 |
| 1667 | 4 | HGA | 0 | 2 |
| 1674,1681 | 4 | MGA | 0 | 2 |
| 1690 | 6 | HGA | 0 | 2 |
| 1697 | 8 | HGA | 0 | 2 |
| 1704,1711 | 8 | HGA | 1 | 3 |
| 1718,1725,1732,1738,1741,1745 | 8 | HGA | 1 | 4 |
| 1746,1747 | 4 | MGA | 0 | 1 |
| 1748 | 8 | HGA | 0 | 2 |
| 1749-1751 | 4 | MGA | 0 | 1 |
| 1752 | 8 | HGA | 0 | 2 |
| 1753,1754 | 4 | MGA | 0 | 1 |
| 1755 | 8 | HGA | 0 | 2 |
| 1756-1758 | 4 | MGA | 0 | 1 |
| 1759 | 8 | HGA | 0 | 2 |
| 1760,1761 | 4 | MGA | 0 | 1 |
| 1762 | 8 | HGA | 0 | 2 |
| 1763-1765 | 4 | MGA | 0 | 1 |
| 1766 | 8 | HGA | 0 | 2 |
| 1767,1768 | 4 | MGA | 0 | 1 |
| 1769 | 8 | HGA | 0 | 2 |
| 1770-1772 | 4 | MGA | 0 | 1 |
| 1773 | 8 | HGA | 0 | 2 |
| 1774,1775 | 4 | MGA | 0 | 1 |
| 1776 | 8 | HGA | 0 | 2 |

Table 10.2-6 Communications Schedule (cont)

| Time (dFL) | Dur (hrs) | Antenna | Flip-y? (opt) | Slew option |
|---|--------------|---------|------------------|----------------|
| 1777,1778 | 4 | MGA | 0 | 1 |
| 1779 | 8 | HGA | 0 | 1 |
| 1780 | 4 | HGA | 0 | 1 |
| 1781 | 8 | HGA | 0 | 1 |
| 1782 | 4 | HGA | 0 | 1 |
| 1783-1787 | 8 | HGA | 0 | 1 |
| 1804-1809 | 4 | HGA | 0 | 1 |
| 1810-1833,1836,1839 | 4 | MGA | 0 | 2 |
| 1842 | 4 | HGA | 0 | 2 |
| 1845,1849,1856,1863,1870 | 4 | MGA | 0 | 2 |
| 1877 | 4 | HGA | 0 | 2 |
| 1884,1891,1898,1905,1912,1919,1926,1933,1940 | 4 | MGA | 0 | 2 |
| 1947,1954,1961,1968,1975,1982,1989,1996,2003,2010,2017,2024,2031,2036,2039,2042,2045,2048,2050,2052,2054,2056,2058,2060,2062 | 3 | MGA | 0 | 2 |
| 2064 | 3 | HGA | 0 | 2 |
| 2066,2068,2070,2072,2074,2076,2079,2082 | 3 | MGA | 0 | 2 |
| 2094 | 3 | HGA | 0 | 2 |
| 2101,2108,2115,2122 | 3 | MGA | 0 | 2 |
| 2129 | 3 | HGA | 0 | 2 |
| 2136,2143,2150,2157 | 3 | MGA | 0 | 2 |
| 2164 | 3 | HGA | 0 | 2 |
| 2171,2178,2189,2192 | 3 | MGA | 0 | 2 |
| 2199 | 3 | HGA | 0 | 2 |
| 2206,2213 | 3 | MGA | 0 | 2 |
| 2220,2227 | 4 | MGA | 0 | 2 |
| 2234 | 4 | HGA | 0 | 2 |
| 2241,2248,2255,2262 | 4 | MGA | 0 | 2 |
| 2269 | 4 | HGA | 0 | 2 |
| 2276,2283,2290,2297 | 4 | MGA | 0 | 2 |
| 2304 | 4 | HGA | 0 | 2 |
| 2311,2318,2325,2332 | 4 | MGA | 0 | 2 |
| 2339 | 4 | HGA | 0 | 2 |
| 2346,2353,2360,2367,2374,2381,2388,2395,2402,2409,2416,2423,2430,2437,2444,2448,2451,2454,2457,2460-2488,2491,2494,2496,2499,2501,2504,2507 | 4 | MGA | 0 | 2 |

- The communications schedule only shows those communication events that require a spacecraft turn to get to the communications attitude. This results in no slews scheduled just after launch (LGA comm: L+0-30 days), at and just after EGA (LGA comm: L+707-726 days), at and just after encounter (encounter attitude is HGA to Earth: L+1788-1803 days), and just prior to Return (LGA comm: L+2508-2534 days).

Table 11-1 Event Listing

STARDUST EVENT LISTING OUTPUT
 Generated on = 990330. 133135.

SCID = -29
 SPK FILE = /usr/people/eah/opseph/SDU_L_990302_990207_060401_prelim.bsp
 LAU DATE = 2451217.39734610 990207. 213211.
 RET DATE = 2453750.91536550 60115. 95808.

Planetary ephemeris = /usr/yyy/masl/ephem/de405s.bsp
 Comet ephemeris = /usr/yyy/masl/ephem/wild2v4.bsp

FILE NOTES:

1. Trajectory events established from CATO summary.
2. Mission phases and TCMs established from pre-set schedule.
3. Geometry events identified from values calculated every 1.0 hours.
4. ISP and CIDA events determined by geometric constraints only. Conflicts with mission events are NOT reflected in listings. Geometric constraints examined in terms of I-ANG and BETA angles. I-ANG is the angle between the To Sun vector and the To ISP vector. BETA is the angle between the To ISP vector and the To BETA vector.
5. Time listed in ephemeris time (ET).

TRAJECTORY EVENTS

| EVENT, JD, CALDATE(yymmdd hhmmss), TFL(day) | | | | |
|---|------------------|---------|---------|---------|
| LAUNCH | 2451217.39734610 | 990207. | 213211. | 0.00 |
| DSM 1-1 | 2451562.25074290 | 118. | 180104. | 344.85 |
| DSM 1-2 | 2451564.25074290 | 120. | 180104. | 346.85 |
| DSM 1-3 | 2451566.25074290 | 122. | 180104. | 348.85 |
| EGA | 2451924.95227940 | 10115. | 105117. | 707.55 |
| DSM 2 | 2452347.25074280 | 20313. | 180104. | 1129.85 |
| DSM 3-1 | 2452821.25074280 | 30630. | 180104. | 1603.85 |
| DSM 3-2 | 2452823.25074280 | 30702. | 180104. | 1605.85 |
| WILD-2 | 2453007.30555560 | 40102. | 192000. | 1789.91 |
| DSM 4 | 2453038.25074280 | 40202. | 180104. | 1820.85 |
| RETURN | 2453750.91536550 | 60115. | 95808. | 2533.52 |

MISSION PHASES

| EVENT, JD, CALDATE(yymmdd hhmmss), TFL(days) | | | | |
|--|------------------|---------|---------|---------|
| START LAUNCH | 2451217.39734610 | 990207. | 213211. | 0.00 |
| END LAUNCH | 2451246.39734610 | 990308. | 213211. | 29.00 |
| START EGA | 2451864.95227940 | 1116. | 105117. | 647.55 |
| END EGA | 2451954.95227940 | 10214. | 105117. | 737.55 |
| START ENCOUN | 2452907.30555560 | 30924. | 192000. | 1689.91 |
| END ENCOUN | 2453057.30555560 | 40221. | 192000. | 1839.91 |
| START RETURN | 2453660.91536550 | 51017. | 95808. | 2443.52 |
| END RETURN | 2453751.91536550 | 60116. | 95808. | 2534.52 |

Table 11-1 Event Listing (cont)

TRAJECTORY CORRECTION MANEUVERS

| EVENT, JD, CALDATE(yymmdd hhmmss), TFL(days) | | | | |
|--|------------------|---------|---------|--------|
| TCM 1 | 2451232.39734610 | 990222. | 213211. | 15.00 |
| TCM 2a | 2451562.25074290 | 118. | 180104. | 344.85 |
| TCM 2b | 2451564.25074290 | 120. | 180104. | 346.85 |
| TCM 2c | 2451566.25074290 | 122. | 180104. | 348.85 |

| | | | | |
|--------|------------------|--------|---------|---------|
| TCM 3 | 2451614.25074290 | 310. | 180104. | 396.85 |
| TCM 4 | 2451864.95227940 | 1116. | 105117. | 647.55 |
| TCM 5 | 2451914.95227940 | 10105. | 105117. | 697.55 |
| TCM 6 | 2451954.95227940 | 10214. | 105117. | 737.55 |
| TCM 7 | 2452347.25074280 | 20313. | 180104. | 1129.85 |
| TCM 8a | 2452821.25074280 | 30630. | 180104. | 1603.85 |
| TCM 8b | 2452823.25074280 | 30702. | 180104. | 1605.85 |
| TCM 9 | 2452830.25074280 | 30709. | 180104. | 1612.85 |
| TCM 10 | 2452977.30555560 | 31203. | 192000. | 1759.91 |
| TCM 11 | 2452997.30555560 | 31223. | 192000. | 1779.91 |
| TCM 12 | 2453005.30555560 | 31231. | 192000. | 1787.91 |
| TCM 13 | 2453006.55555560 | 40102. | 12000. | 1789.16 |
| TCM 14 | 2453007.05555560 | 40102. | 132000. | 1789.66 |
| TCM 15 | 2453038.25074280 | 40202. | 180104. | 1820.85 |
| TCM 16 | 2453279.50000004 | 41001. | 0. | 2062.10 |
| TCM 17 | 2453690.91536550 | 51116. | 95808. | 2473.52 |
| TCM 18 | 2453737.91536550 | 60102. | 95808. | 2520.52 |
| TCM 19 | 2453749.91536550 | 60114. | 95808. | 2532.52 |
| TCM 20 | 2453750.74869883 | 60115. | 55808. | 2533.35 |

SOLAR RANGE

| JD, CALDATE, TFL, RANGE (AU), MIN/MAX | | | | | |
|---------------------------------------|---------|---------|---------|------|-----|
| 2451219.73067943 | 990210. | 53211. | 2.33 | 0.99 | MIN |
| 2451584.56401277 | 210. | 13211. | 367.17 | 2.20 | MAX |
| 2451924.98067943 | 10115. | 113211. | 707.58 | 0.98 | MIN |
| 2452382.73067943 | 20418. | 53211. | 1165.33 | 2.72 | MAX |
| 2452843.06401277 | 30722. | 133211. | 1625.67 | 0.98 | MIN |
| 2453295.98067943 | 41017. | 113211. | 2078.58 | 2.68 | MAX |
| 2453748.98067943 | 60113. | 113211. | 2531.58 | 0.98 | MIN |
| 2453750.89734610 | 60115. | 93211. | 2533.50 | 0.98 | MAX |

EARTH RANGE

| JD, CALDATE, TFL, RANGE (AU), MIN/MAX | | | | | |
|---------------------------------------|--------|---------|---------|------|-----|
| 2451586.06401277 | 211. | 133211. | 368.67 | 3.18 | MAX |
| 2451924.93901277 | 10115. | 103211. | 707.54 | 0.00 | MIN |
| 2452281.48067943 | 20106. | 233211. | 1064.08 | 3.59 | MAX |
| 2452495.31401277 | 20808. | 193211. | 1277.92 | 1.59 | MIN |
| 2452669.85567943 | 30130. | 83211. | 1452.46 | 2.74 | MAX |
| 2452841.52234610 | 30721. | 3211. | 1624.12 | 2.00 | MIN |
| 2453001.06401277 | 31227. | 133211. | 1783.67 | 2.61 | MAX |
| 2453173.52234610 | 40617. | 3211. | 1956.12 | 1.53 | MIN |
| 2453389.48067943 | 50118. | 233211. | 2172.08 | 3.57 | MAX |
| 2453750.89734610 | 60115. | 93211. | 2533.50 | 0.00 | MIN |

Table 11-1 Event Listing (cont)

SEP ANGLE

| JD, CALDATE, TFL, SEP (deg), MIN/MAX | | | | | |
|--------------------------------------|---------|---------|---------|--------|-----|
| 2451218.52234610 | 990209. | 3211. | 1.12 | 83.61 | MIN |
| 2451299.18901277 | 990430. | 163211. | 81.79 | 179.79 | MAX |
| 2451584.93901277 | 210. | 103211. | 367.54 | 0.01 | MIN |
| 2451883.81401277 | 1205. | 73211. | 666.42 | 179.98 | MAX |
| 2451924.98067943 | 10115. | 113211. | 707.58 | 53.07 | MIN |
| 2451997.56401277 | 10329. | 13211. | 780.17 | 164.97 | MAX |
| 2452269.02234610 | 11225. | 123211. | 1051.62 | 0.96 | MIN |
| 2452488.93901277 | 20802. | 103211. | 1271.54 | 178.51 | MAX |
| 2452739.10567943 | 30409. | 143211. | 1521.71 | 2.13 | MIN |
| 2452793.35567943 | 30602. | 203211. | 1575.96 | 7.63 | MAX |
| 2452868.77234610 | 30817. | 63211. | 1651.38 | 0.93 | MIN |
| 2453180.98067943 | 40624. | 113211. | 1963.58 | 177.76 | MAX |
| 2453400.73067943 | 50130. | 53211. | 2183.33 | 0.69 | MIN |

| | | | | | |
|------------------|--------|--------|---------|--------|-----|
| 2453672.68901277 | 51029. | 43211. | 2455.29 | 164.95 | MAX |
| 2453749.81401277 | 60114. | 73211. | 2532.42 | 88.76 | MIN |
| 2453750.89734610 | 60115. | 93211. | 2533.50 | 121.52 | MAX |

SPE ANGLE

JD, CALDATE, TFL, SPE (deg), MIN/MAX

| | | | | | |
|------------------|---------|---------|---------|--------|-----|
| 2451218.43901277 | 990208. | 223211. | 1.04 | 96.19 | MAX |
| 2451299.18901277 | 990430. | 163211. | 81.79 | 0.17 | MIN |
| 2451391.39734610 | 990731. | 213211. | 174.00 | 34.05 | MAX |
| 2451584.93901277 | 210. | 103211. | 367.54 | 0.01 | MIN |
| 2451788.10567943 | 831. | 143211. | 570.71 | 35.18 | MAX |
| 2451883.81401277 | 1205. | 73211. | 666.42 | 0.02 | MIN |
| 2451924.98067943 | 10115. | 113211. | 707.58 | 126.92 | MAX |
| 2451998.35567943 | 10329. | 203211. | 780.96 | 11.54 | MIN |
| 2452083.98067943 | 10623. | 113211. | 866.58 | 31.74 | MAX |
| 2452269.02234610 | 11225. | 123211. | 1051.62 | 0.36 | MIN |
| 2452404.77234610 | 20510. | 63211. | 1187.38 | 21.83 | MAX |
| 2452488.93901277 | 20802. | 103211. | 1271.54 | 0.58 | MIN |
| 2452579.06401277 | 21031. | 133211. | 1361.67 | 24.84 | MAX |
| 2452738.81401277 | 30409. | 73211. | 1521.42 | 1.44 | MIN |
| 2452800.93901277 | 30610. | 103211. | 1583.54 | 6.93 | MAX |
| 2452869.14734610 | 30817. | 153211. | 1651.75 | 0.92 | MIN |
| 2453088.85567943 | 40324. | 83211. | 1871.46 | 25.94 | MAX |
| 2453180.98067943 | 40624. | 113211. | 1963.58 | 0.89 | MIN |
| 2453264.52234610 | 40916. | 3211. | 2047.12 | 22.08 | MAX |
| 2453400.68901277 | 50130. | 43211. | 2183.29 | 0.26 | MIN |
| 2453587.06401277 | 50804. | 133211. | 2369.67 | 31.91 | MAX |
| 2453671.93901277 | 51028. | 103211. | 2454.54 | 11.44 | MIN |
| 2453749.93901277 | 60114. | 103211. | 2532.54 | 91.00 | MAX |
| 2453750.89734610 | 60115. | 93211. | 2533.50 | 58.48 | MIN |

Table 11-1 Event Listing (cont)

SEP ANGLE = 3

JD, CALDATE, TFL, SEP (deg), INB/OUTB

| | | | | | |
|------------------|--------|---------|---------|------|------|
| 2451579.35567943 | 204. | 203211. | 361.96 | 3.01 | INB |
| 2451590.56401277 | 216. | 13211. | 373.17 | 3.00 | OUTB |
| 2452264.35567943 | 11220. | 203211. | 1046.96 | 3.01 | INB |
| 2452273.68901277 | 11230. | 43211. | 1056.29 | 3.01 | OUTB |
| 2452731.56401277 | 30402. | 13211. | 1514.17 | 3.00 | INB |
| 2452747.73067943 | 30418. | 53211. | 1530.33 | 3.00 | OUTB |
| 2452844.81401277 | 30724. | 73211. | 1627.42 | 3.00 | INB |
| 2452919.27234610 | 31006. | 183211. | 1701.88 | 3.00 | OUTB |
| 2453395.89734610 | 50125. | 93211. | 2178.50 | 3.00 | INB |
| 2453405.56401277 | 50204. | 13211. | 2188.17 | 3.01 | OUTB |

ISP COLLECTION

JD, CALDATE, TFL, I-ANG/BETA (deg), COMMENT

| | | | | | |
|------------------|--------|---------|---------|--------|-----------------|
| 2451569.85567943 | 126. | 83211. | 352.46 | 152.99 | START shadowed |
| 2451597.23067943 | 222. | 173211. | 379.83 | 140.99 | CONT end shadow |
| 2451668.14734610 | 503. | 153211. | 450.75 | 89.99 | CONT end steer |
| 2451685.73067943 | 521. | 53211. | 468.33 | 89.98 | END beta meteor |
| 2452482.98067943 | 20727. | 113211. | 1265.58 | 152.99 | START shadowed |
| 2452518.27234610 | 20831. | 183211. | 1300.88 | 140.99 | CONT end shadow |
| 2452601.10567943 | 21122. | 143211. | 1383.71 | 89.98 | CONT end steer |
| 2452618.89734610 | 21210. | 93211. | 1401.50 | 89.97 | END beta meteor |
| 2453394.52234610 | 50124. | 3211. | 2177.12 | 152.99 | START shadowed |
| 2453428.73067943 | 50227. | 53211. | 2211.33 | 141.00 | CONT end shadow |

| | | | | | |
|------------------|--------|---------|---------|-------|-----------------|
| 2453509.10567943 | 50518. | 143211. | 2291.71 | 89.98 | CONT end steer |
| 2453526.52234610 | 50605. | 3211. | 2309.12 | 90.00 | END beta meteor |

CIDA EXPERIMENT

| JD, CALDATE, TFL, | I-ANG (deg), | COMMENT |
|-------------------|-----------------|------------------------------|
| 2451236.89734610 | 990227. 93211. | 19.50 90.00 START tracking |
| 2451270.18901277 | 990401. 163211. | 52.79 110.01 CONT FOV |
| 2451361.02234610 | 990701. 123211. | 143.62 145.50 END 1/4 FOV |
| 2451417.68901277 | 990827. 43211. | 200.29 160.01 MAX 0 FOV |
| 2451956.60567943 | 10216. 23211. | 739.21 90.01 START tracking |
| 2451995.77234610 | 10327. 63211. | 778.38 110.01 CONT FOV |
| 2452132.35567943 | 10810. 203211. | 914.96 145.51 END 1/4 FOV |
| 2452228.39734610 | 11114. 213211. | 1011.00 160.00 MAX 0 FOV |
| 2452877.06401277 | 30825. 133211. | 1659.67 90.02 START tracking |
| 2452916.18901277 | 31003. 163211. | 1698.79 110.00 CONT FOV |
| 2453051.77234610 | 40216. 63211. | 1834.38 145.50 END 1/4 FOV |
| 2453146.35567943 | 40520. 203211. | 1928.96 160.00 MAX 0 FOV |

Table 11-2 Time Ordered Event Listing

| CALDATE | TFL | DESCRIPTION | VALUE | JD |
|-----------------|--------|----------------------|--------|------------------|
| 990207. 213211. | 0.00 | START LAUNCH | | 2451217.39734610 |
| 990207. 213211. | 0.00 | LAUNCH | | 2451217.39734610 |
| 990208. 223211. | 1.04 | max SPE angle (deg) | 96.19 | 2451218.43901277 |
| 990209. 3211. | 1.12 | min SEP angle (deg) | 83.61 | 2451218.52234610 |
| 990210. 53211. | 2.33 | min Solar range (AU) | 0.99 | 2451219.73067943 |
| 990222. 213211. | 15.00 | tcm 1 | | 2451232.39734610 |
| 990227. 93211. | 19.50 | START CIDA: TRACKIN | | 2451236.89734610 |
| 990308. 213211. | 29.00 | END LAUNCH | | 2451246.39734610 |
| 990401. 163211. | 52.79 | cont CIDA: FOV | | 2451270.18901277 |
| 990430. 163211. | 81.79 | max SEP angle (deg) | 179.79 | 2451299.18901277 |
| 990430. 163211. | 81.79 | min SPE angle (deg) | 0.17 | 2451299.18901277 |
| 990701. 123211. | 143.62 | END CIDA: 1/4 FOV | | 2451361.02234610 |
| 990731. 213211. | 174.00 | max SPE angle (deg) | 34.05 | 2451391.39734610 |
| 990827. 43211. | 200.29 | MAX CIDA: 0 FOV | | 2451417.68901277 |
| 118. 180104. | 344.85 | tcm 2a | | 2451562.25074290 |
| 118. 180104. | 344.85 | DSM 1-1 | | 2451562.25074290 |
| 120. 180104. | 346.85 | tcm 2b | | 2451564.25074290 |
| 120. 180104. | 346.85 | DSM 1-2 | | 2451564.25074290 |
| 122. 180104. | 348.85 | tcm 2c | | 2451566.25074290 |
| 122. 180104. | 348.85 | DSM 1-3 | | 2451566.25074290 |
| 126. 83211. | 352.46 | START ISP: SHADOWED | | 2451569.85567943 |
| 204. 203211. | 361.96 | inb SEP = 3 deg | 3.01 | 2451579.35567943 |
| 210. 13211. | 367.17 | max Solar range (AU) | 2.20 | 2451584.56401277 |
| 210. 103211. | 367.54 | min SEP angle (deg) | 0.01 | 2451584.93901277 |
| 210. 103211. | 367.54 | min SPE angle (deg) | 0.01 | 2451584.93901277 |
| 211. 133211. | 368.67 | max Earth range (AU) | 3.18 | 2451586.06401277 |
| 216. 13211. | 373.17 | outb SEP = 3 deg | 3.00 | 2451590.56401277 |
| 222. 173211. | 379.83 | cont ISP: end shadow | | 2451597.23067943 |
| 310. 180104. | 396.85 | tcm 3 | | 2451614.25074290 |
| 503. 153211. | 450.75 | cont ISP: end steer | | 2451668.14734610 |
| 521. 53211. | 468.33 | END ISP: BETA METEOR | | 2451685.73067943 |
| 831. 143211. | 570.71 | max SPE angle (deg) | 35.18 | 2451788.10567943 |
| 1116. 105117. | 647.55 | START EGA | | 2451864.95227940 |
| 1116. 105117. | 647.55 | tcm 4 | | 2451864.95227940 |
| 1205. 73211. | 666.42 | max SEP angle (deg) | 179.98 | 2451883.81401277 |
| 1205. 73211. | 666.42 | min SPE angle (deg) | 0.02 | 2451883.81401277 |
| 10105. 105117. | 697.55 | tcm 5 | | 2451914.95227940 |
| 10115. 103211. | 707.54 | min Earth range (AU) | 0.00 | 2451924.93901277 |

| | | | | | |
|--------|---------|---------|----------------------|--------|------------------|
| 10115. | 105117. | 707.55 | EGA | | 2451924.95227940 |
| 10115. | 113211. | 707.58 | min SEP angle (deg) | 53.07 | 2451924.98067943 |
| 10115. | 113211. | 707.58 | max SPE angle (deg) | 126.92 | 2451924.98067943 |
| 10115. | 113211. | 707.58 | min Solar range (AU) | 0.98 | 2451924.98067943 |
| 10214. | 105117. | 737.55 | END EGA | | 2451954.95227940 |
| 10214. | 105117. | 737.55 | tcm 6 | | 2451954.95227940 |
| 10216. | 23211. | 739.21 | START CIDA: TRACKIN | | 2451956.60567943 |
| 10327. | 63211. | 778.38 | cont CIDA: FOV | | 2451995.77234610 |
| 10329. | 13211. | 780.17 | max SEP angle (deg) | 164.97 | 2451997.56401277 |
| 10329. | 203211. | 780.96 | min SPE angle (deg) | 11.54 | 2451998.35567943 |
| 10623. | 113211. | 866.58 | max SPE angle (deg) | 31.74 | 2452083.98067943 |
| 10810. | 203211. | 914.96 | END CIDA: 1/4 FOV | | 2452132.35567943 |
| 11114. | 213211. | 1011.00 | MAX CIDA: 0 FOV | | 2452228.39734610 |
| 11220. | 203211. | 1046.96 | inb SEP = 3 deg | 3.01 | 2452264.35567943 |
| 11225. | 123211. | 1051.62 | min SPE angle (deg) | 0.36 | 2452269.02234610 |
| 11225. | 123211. | 1051.62 | min SEP angle (deg) | 0.96 | 2452269.02234610 |
| 11230. | 43211. | 1056.29 | outb SEP = 3 deg | 3.01 | 2452273.68901277 |
| 20106. | 233211. | 1064.08 | max Earth range (AU) | 3.59 | 2452281.48067943 |
| 20313. | 180104. | 1129.85 | DSM 2 | | 2452347.25074280 |
| 20313. | 180104. | 1129.85 | tcm 7 | | 2452347.25074280 |
| 20418. | 53211. | 1165.33 | max Solar range (AU) | 2.72 | 2452382.73067943 |
| 20510. | 63211. | 1187.38 | max SPE angle (deg) | 21.83 | 2452404.77234610 |
| 20727. | 113211. | 1265.58 | START ISP: SHADOWED | | 2452482.98067943 |
| 20802. | 103211. | 1271.54 | min SPE angle (deg) | 0.58 | 2452488.93901277 |
| 20802. | 103211. | 1271.54 | max SEP angle (deg) | 178.51 | 2452488.93901277 |
| 20808. | 193211. | 1277.92 | min Earth range (AU) | 1.59 | 2452495.31401277 |
| 20831. | 183211. | 1300.88 | cont ISP: end shadow | | 2452518.27234610 |
| 21031. | 133211. | 1361.67 | max SPE angle (deg) | 24.84 | 2452579.06401277 |
| 21122. | 143211. | 1383.71 | cont ISP: end steer | | 2452601.10567943 |
| 21210. | 93211. | 1401.50 | END ISP: BETA METEOR | | 2452618.89734610 |
| 30130. | 83211. | 1452.46 | max Earth range (AU) | 2.74 | 2452669.85567943 |
| 30402. | 13211. | 1514.17 | inb SEP = 3 deg | 3.00 | 2452731.56401277 |
| 30409. | 73211. | 1521.42 | min SPE angle (deg) | 1.44 | 2452738.81401277 |
| 30409. | 143211. | 1521.71 | min SEP angle (deg) | 2.13 | 2452739.10567943 |
| 30418. | 53211. | 1530.33 | outb SEP = 3 deg | 3.00 | 2452747.73067943 |
| 30602. | 203211. | 1575.96 | max SEP angle (deg) | 7.63 | 2452793.35567943 |
| 30610. | 103211. | 1583.54 | max SPE angle (deg) | 6.93 | 2452800.93901277 |
| 30630. | 180104. | 1603.85 | tcm 8a | | 2452821.25074280 |
| 30630. | 180104. | 1603.85 | DSM 3-1 | | 2452821.25074280 |

Table 11-2 Time Ordered Event Listing (cont)

| CALDATE | TFL | DESCRIPTION | VALUE | JD | |
|---------|---------|-------------|----------------------|------------------|------------------|
| 30702. | 180104. | 1605.85 | tcm 8b | 2452823.25074280 | |
| 30702. | 180104. | 1605.85 | DSM 3-2 | 2452823.25074280 | |
| 30709. | 180104. | 1612.85 | tcm 9 | 2452830.25074280 | |
| 30721. | 3211. | 1624.12 | min Earth range (AU) | 2.00 | 2452841.52234610 |
| 30722. | 133211. | 1625.67 | min Solar range (AU) | 0.98 | 2452843.06401277 |
| 30724. | 73211. | 1627.42 | inb SEP = 3 deg | 3.00 | 2452844.81401277 |
| 30817. | 63211. | 1651.38 | min SEP angle (deg) | 0.93 | 2452868.77234610 |
| 30817. | 153211. | 1651.75 | min SPE angle (deg) | 0.92 | 2452869.14734610 |
| 30825. | 133211. | 1659.67 | START CIDA: TRACKIN | | 2452877.06401277 |
| 30924. | 192000. | 1689.91 | START ENCOUN | | 2452907.30555560 |
| 31003. | 163211. | 1698.79 | cont CIDA: FOV | | 2452916.18901277 |
| 31006. | 183211. | 1701.88 | outb SEP = 3 deg | 3.00 | 2452919.27234610 |
| 31203. | 192000. | 1759.91 | tcm 10 | | 2452977.30555560 |
| 31223. | 192000. | 1779.91 | tcm 11 | | 2452997.30555560 |
| 31227. | 133211. | 1783.67 | max Earth range (AU) | 2.61 | 2453001.06401277 |
| 31231. | 192000. | 1787.91 | tcm 12 | | 2453005.30555560 |
| 40102. | 12000. | 1789.16 | tcm 13 | | 2453006.55555560 |
| 40102. | 132000. | 1789.66 | tcm 14 | | 2453007.05555560 |
| 40102. | 192000. | 1789.91 | WILD-2 | | 2453007.30555560 |
| 40202. | 180104. | 1820.85 | DSM 4 | | 2453038.25074280 |
| 40202. | 180104. | 1820.85 | tcm 15 | | 2453038.25074280 |
| 40216. | 63211. | 1834.38 | END CIDA: 1/4 FOV | | 2453051.77234610 |
| 40221. | 192000. | 1839.91 | END ENCOUN | | 2453057.30555560 |
| 40324. | 83211. | 1871.46 | max SPE angle (deg) | 25.94 | 2453088.85567943 |
| 40520. | 203211. | 1928.96 | MAX CIDA: 0 FOV | | 2453146.35567943 |
| 40617. | 3211. | 1956.12 | min Earth range (AU) | 1.53 | 2453173.52234610 |
| 40624. | 113211. | 1963.58 | max SEP angle (deg) | 177.76 | 2453180.98067943 |
| 40624. | 113211. | 1963.58 | min SPE angle (deg) | 0.89 | 2453180.98067943 |
| 40916. | 3211. | 2047.12 | max SPE angle (deg) | 22.08 | 2453264.52234610 |
| 41001. | 0. | 2062.10 | tcm 16 | | 2453279.50000004 |
| 41017. | 113211. | 2078.58 | max Solar range (AU) | 2.68 | 2453295.98067943 |
| 50118. | 233211. | 2172.08 | max Earth range (AU) | 3.57 | 2453389.48067943 |
| 50124. | 3211. | 2177.12 | START ISP: SHADOWED | | 2453394.52234610 |
| 50125. | 93211. | 2178.50 | inb SEP = 3 deg | 3.00 | 2453395.89734610 |
| 50130. | 43211. | 2183.29 | min SPE angle (deg) | 0.26 | 2453400.68901277 |
| 50130. | 53211. | 2183.33 | min SEP angle (deg) | 0.69 | 2453400.73067943 |
| 50204. | 13211. | 2188.17 | outb SEP = 3 deg | 3.01 | 2453405.56401277 |
| 50227. | 53211. | 2211.33 | cont ISP: end shadow | | 2453428.73067943 |

| | | | | | |
|--------|---------|---------|----------------------|--------|------------------|
| 50518. | 143211. | 2291.71 | cont ISP: end steer | | 2453509.10567943 |
| 50605. | 3211. | 2309.12 | END ISP: BETA METEOR | | 2453526.52234610 |
| 50804. | 133211. | 2369.67 | max SPE angle (deg) | 31.91 | 2453587.06401277 |
| 51017. | 95808. | 2443.52 | START RETURN | | 2453660.91536550 |
| 51028. | 103211. | 2454.54 | min SPE angle (deg) | 11.44 | 2453671.93901277 |
| 51029. | 43211. | 2455.29 | max SEP angle (deg) | 164.95 | 2453672.68901277 |
| 51116. | 95808. | 2473.52 | tcm 17 | | 2453690.91536550 |
| 60102. | 95808. | 2520.52 | tcm 18 | | 2453737.91536550 |
| 60113. | 113211. | 2531.58 | min Solar range (AU) | 0.98 | 2453748.98067943 |
| 60114. | 73211. | 2532.42 | min SEP angle (deg) | 88.76 | 2453749.81401277 |
| 60114. | 95808. | 2532.52 | tcm 19 | | 2453749.91536550 |
| 60114. | 103211. | 2532.54 | max SPE angle (deg) | 91.00 | 2453749.93901277 |
| 60115. | 55808. | 2533.35 | tcm 20 | | 2453750.74869883 |
| 60115. | 93211. | 2533.50 | max Solar range (AU) | 0.98 | 2453750.89734610 |
| 60115. | 93211. | 2533.50 | min SPE angle (deg) | 58.48 | 2453750.89734610 |
| 60115. | 93211. | 2533.50 | max SEP angle (deg) | 121.52 | 2453750.89734610 |
| 60115. | 93211. | 2533.50 | min Earth range (AU) | 0.00 | 2453750.89734610 |
| 60115. | 95808. | 2533.52 | RETURN | | 2453750.91536550 |
| 60116. | 95808. | 2534.52 | END RETURN | | 2453751.91536550 |

3. Actual start at L+374 days

Table 12-1 ISP #1 Collection Period Characteristics (cont)

| TFL (days) (1) | impact velocity (km/s) | +z-off sun (deg) | +z-off earth (deg) | +y-off SEP-N (deg) | +y-off orbit-N (deg) | collector angle (deg) (2) | grid exposure | beta angle (deg) |
|-------------------|------------------------------|------------------------|--------------------------|--------------------------|----------------------------|---------------------------------|------------------|------------------------|
| 424. | 10.478 | 0.000 | 13.263 | 158.856 | 158.842 | 157.137 | 1.000 | 51.547 |
| 425. | 10.436 | 0.000 | 13.489 | 158.892 | 158.878 | 157.923 | 1.000 | 52.324 |
| 426. | 10.395 | 0.000 | 13.713 | 158.927 | 158.913 | 158.716 | 1.000 | 53.108 |
| 427. | 10.355 | 0.000 | 13.937 | 158.960 | 158.947 | 159.515 | 1.000 | 53.898 |
| 428. | 10.317 | 0.000 | 14.161 | 158.992 | 158.979 | 160.320 | 1.000 | 54.695 |
| 429. | 10.281 | 0.000 | 14.384 | 159.023 | 159.010 | 161.132 | 1.000 | 55.497 |
| 430. | 10.246 | 0.000 | 14.607 | 159.052 | 159.040 | 161.950 | 1.000 | 56.306 |
| 431. | 10.212 | 0.000 | 14.828 | 159.080 | 159.068 | 162.773 | 1.000 | 57.122 |
| 432. | 10.180 | 0.000 | 15.050 | 159.106 | 159.094 | 163.603 | 1.000 | 57.943 |
| 433. | 10.149 | 0.000 | 15.271 | 159.131 | 159.119 | 164.438 | 1.000 | 58.769 |
| 434. | 10.120 | 0.000 | 15.491 | 159.155 | 159.143 | 165.278 | 1.000 | 59.602 |
| 435. | 10.092 | 0.000 | 15.711 | 159.177 | 159.166 | 166.124 | 1.000 | 60.440 |
| 436. | 10.066 | 0.000 | 15.930 | 159.198 | 159.187 | 166.976 | 1.000 | 61.283 |
| 437. | 10.042 | 0.000 | 16.149 | 159.217 | 159.207 | 167.832 | 1.000 | 62.131 |
| 438. | 10.019 | 0.000 | 16.367 | 159.236 | 159.225 | 168.693 | 1.000 | 62.984 |
| 439. | 9.998 | 0.000 | 16.584 | 159.252 | 159.242 | 169.559 | 1.000 | 63.843 |
| 440. | 9.978 | 0.000 | 16.801 | 159.268 | 159.258 | 170.430 | 1.000 | 64.705 |
| 441. | 9.960 | 0.000 | 17.017 | 159.282 | 159.272 | 171.304 | 1.000 | 65.572 |
| 442. | 9.944 | 0.000 | 17.233 | 159.295 | 159.285 | 172.183 | 1.000 | 66.443 |
| 443. | 9.929 | 0.000 | 17.448 | 159.306 | 159.296 | 173.066 | 1.000 | 67.318 |
| 444. | 9.917 | 0.000 | 17.663 | 159.316 | 159.306 | 173.952 | 1.000 | 68.197 |
| 445. | 9.906 | 0.000 | 17.877 | 159.325 | 159.315 | 174.842 | 1.000 | 69.079 |
| 446. | 9.896 | 0.000 | 18.090 | 159.332 | 159.323 | 175.735 | 1.000 | 69.964 |
| 447. | 9.889 | 0.000 | 18.303 | 159.338 | 159.328 | 176.631 | 1.000 | 70.852 |
| 448. | 9.883 | 0.000 | 18.515 | 159.342 | 159.333 | 177.530 | 1.000 | 71.743 |
| 449. | 9.879 | 0.000 | 18.726 | 159.345 | 159.336 | 178.431 | 1.000 | 72.637 |
| 450. | 9.876 | 0.000 | 18.937 | 159.347 | 159.338 | 179.334 | 1.000 | 73.532 |
| 451. | (3) 9.876 | 0.239 | 19.371 | 159.347 | 159.338 | 180.000 | 1.000 | 74.430 |
| 452. | 9.877 | 1.146 | 20.432 | 159.345 | 159.337 | 180.000 | 1.000 | 75.329 |
| 453. | 9.881 | 2.054 | 21.499 | 159.343 | 159.335 | 180.000 | 1.000 | 76.230 |
| 454. | 9.886 | 2.964 | 22.569 | 159.339 | 159.331 | 180.000 | 1.000 | 77.132 |
| 455. | 9.893 | 3.874 | 23.642 | 159.333 | 159.325 | 180.000 | 1.000 | 78.034 |
| 456. | 9.901 | 4.785 | 24.718 | 159.326 | 159.318 | 180.000 | 1.000 | 78.937 |
| 457. | 9.912 | 5.696 | 25.795 | 159.317 | 159.310 | 180.000 | 1.000 | 79.841 |
| 458. | 9.924 | 6.608 | 26.874 | 159.307 | 159.300 | 180.000 | 1.000 | 80.744 |
| 459. | 9.939 | 7.519 | 27.954 | 159.296 | 159.289 | 180.000 | 1.000 | 81.647 |
| 460. | 9.955 | 8.429 | 29.033 | 159.282 | 159.276 | 180.000 | 1.000 | 82.550 |
| 461. | 9.973 | 9.339 | 30.113 | 159.268 | 159.261 | 180.000 | 1.000 | 83.452 |
| 462. | 9.993 | 10.247 | 31.191 | 159.252 | 159.245 | 180.000 | 1.000 | 84.353 |
| 463. | 10.015 | 11.155 | 32.269 | 159.234 | 159.228 | 180.000 | 1.000 | 85.252 |
| 464. | 10.039 | 12.061 | 33.345 | 159.215 | 159.209 | 180.000 | 1.000 | 86.150 |
| 465. | 10.064 | 12.965 | 34.419 | 159.194 | 159.188 | 180.000 | 1.000 | 87.046 |
| 466. | 10.092 | 13.866 | 35.491 | 159.171 | 159.166 | 180.000 | 1.000 | 87.939 |
| 467. | 10.121 | 14.766 | 36.560 | 159.147 | 159.142 | 180.000 | 1.000 | 88.831 |
| 468. | 10.152 | 15.663 | 37.627 | 159.122 | 159.116 | 180.000 | 1.000 | 89.720 |

1. TFL epoch = 02/07/99 21:31:07 UTC
2. Collector fully stowed at 0 deg, fully deployed at 180 deg.
3. Attitude mode change

Table 12-3 ISP #1 Spacecraft Attitude [EME'2000]

| TFL (days) (1) | i-LAT (deg) | i-LNG (deg) | j-LAT (deg) | j-LNG (deg) | k-LAT (deg) | k-LNG (deg) |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 353. | -10.730 | 53.047 | -70.943 | 176.317 | 15.558 | 140.023 |
| 354. | -10.463 | 53.189 | -71.161 | 175.958 | 15.486 | 140.257 |
| 355. | -10.200 | 53.334 | -71.375 | 175.601 | 15.414 | 140.490 |
| 356. | -9.942 | 53.480 | -71.584 | 175.245 | 15.341 | 140.723 |
| 357. | -9.689 | 53.628 | -71.789 | 174.890 | 15.268 | 140.956 |
| 358. | -9.441 | 53.778 | -71.989 | 174.537 | 15.195 | 141.189 |
| 359. | -9.197 | 53.929 | -72.185 | 174.186 | 15.122 | 141.422 |
| 360. | -8.958 | 54.083 | -72.378 | 173.836 | 15.048 | 141.654 |
| 361. | -8.723 | 54.238 | -72.566 | 173.487 | 14.974 | 141.886 |
| 362. | -8.493 | 54.395 | -72.751 | 173.140 | 14.900 | 142.118 |
| 363. | -8.266 | 54.554 | -72.932 | 172.795 | 14.826 | 142.350 |
| 364. | -8.044 | 54.714 | -73.110 | 172.451 | 14.752 | 142.581 |
| 365. | -7.825 | 54.876 | -73.284 | 172.108 | 14.677 | 142.813 |
| 366. | -7.610 | 55.039 | -73.455 | 171.767 | 14.602 | 143.044 |
| 367. | -7.399 | 55.204 | -73.623 | 171.428 | 14.527 | 143.275 |
| 368. | -7.192 | 55.370 | -73.787 | 171.091 | 14.451 | 143.506 |
| 369. | -6.988 | 55.537 | -73.949 | 170.755 | 14.376 | 143.737 |
| 370. | -6.788 | 55.706 | -74.108 | 170.420 | 14.300 | 143.968 |
| 371. | -6.591 | 55.876 | -74.264 | 170.088 | 14.224 | 144.198 |
| 372. | -6.398 | 56.048 | -74.417 | 169.757 | 14.148 | 144.428 |
| 373. | -6.208 | 56.221 | -74.568 | 169.427 | 14.071 | 144.659 |
| 374. | (2) -6.021 | 56.395 | -74.716 | 169.100 | 13.995 | 144.889 |
| 375. | -5.837 | 56.570 | -74.862 | 168.774 | 13.918 | 145.119 |
| 376. | -5.657 | 56.747 | -75.005 | 168.449 | 13.840 | 145.348 |
| 377. | -5.479 | 56.924 | -75.146 | 168.127 | 13.763 | 145.578 |
| 378. | -5.304 | 57.103 | -75.285 | 167.806 | 13.685 | 145.808 |
| 379. | -5.133 | 57.283 | -75.422 | 167.487 | 13.607 | 146.037 |
| 380. | -4.964 | 57.464 | -75.556 | 167.170 | 13.529 | 146.267 |
| 381. | -4.798 | 57.646 | -75.689 | 166.854 | 13.451 | 146.496 |
| 382. | -4.634 | 57.830 | -75.819 | 166.540 | 13.372 | 146.726 |
| 383. | -4.474 | 58.014 | -75.947 | 166.228 | 13.294 | 146.955 |
| 384. | -4.316 | 58.199 | -76.074 | 165.918 | 13.215 | 147.184 |
| 385. | -4.160 | 58.386 | -76.199 | 165.610 | 13.135 | 147.413 |
| 386. | -4.007 | 58.573 | -76.322 | 165.303 | 13.056 | 147.642 |
| 387. | -3.857 | 58.761 | -76.443 | 164.998 | 12.976 | 147.871 |
| 388. | -3.709 | 58.950 | -76.563 | 164.695 | 12.896 | 148.100 |
| 389. | -3.564 | 59.141 | -76.681 | 164.394 | 12.816 | 148.329 |
| 390. | -3.421 | 59.332 | -76.798 | 164.095 | 12.736 | 148.558 |
| 391. | -3.280 | 59.524 | -76.913 | 163.797 | 12.655 | 148.787 |
| 392. | -3.142 | 59.717 | -77.027 | 163.502 | 12.574 | 149.015 |
| 393. | -3.006 | 59.911 | -77.139 | 163.208 | 12.493 | 149.244 |
| 394. | -2.872 | 60.106 | -77.250 | 162.916 | 12.411 | 149.473 |
| 395. | -2.741 | 60.301 | -77.360 | 162.626 | 12.330 | 149.702 |
| 396. | -2.611 | 60.498 | -77.468 | 162.338 | 12.248 | 149.930 |
| 397. | -2.484 | 60.695 | -77.576 | 162.052 | 12.166 | 150.159 |
| 398. | -2.359 | 60.893 | -77.682 | 161.768 | 12.083 | 150.388 |
| 399. | -2.236 | 61.092 | -77.786 | 161.486 | 12.001 | 150.617 |
| 400. | -2.115 | 61.292 | -77.890 | 161.205 | 11.918 | 150.846 |
| 401. | -1.997 | 61.493 | -77.993 | 160.927 | 11.835 | 151.074 |
| 402. | -1.880 | 61.694 | -78.095 | 160.651 | 11.752 | 151.303 |
| 403. | -1.765 | 61.897 | -78.195 | 160.376 | 11.668 | 151.532 |
| 404. | -1.652 | 62.100 | -78.295 | 160.104 | 11.584 | 151.761 |
| 405. | -1.542 | 62.304 | -78.394 | 159.833 | 11.500 | 151.990 |
| 406. | -1.433 | 62.508 | -78.492 | 159.565 | 11.416 | 152.219 |
| 407. | -1.326 | 62.714 | -78.589 | 159.299 | 11.331 | 152.448 |
| 408. | -1.221 | 62.920 | -78.686 | 159.034 | 11.246 | 152.677 |
| 409. | -1.118 | 63.127 | -78.781 | 158.772 | 11.161 | 152.907 |
| 410. | -1.016 | 63.335 | -78.876 | 158.512 | 11.076 | 153.136 |
| 411. | -0.917 | 63.544 | -78.970 | 158.253 | 10.990 | 153.365 |
| 412. | -0.819 | 63.753 | -79.064 | 157.997 | 10.905 | 153.595 |
| 413. | -0.724 | 63.963 | -79.157 | 157.743 | 10.818 | 153.825 |
| 414. | -0.630 | 64.174 | -79.249 | 157.491 | 10.732 | 154.054 |
| 415. | -0.537 | 64.385 | -79.341 | 157.242 | 10.645 | 154.284 |
| 416. | -0.447 | 64.597 | -79.432 | 156.994 | 10.559 | 154.514 |
| 417. | -0.358 | 64.810 | -79.522 | 156.748 | 10.471 | 154.744 |
| 418. | -0.271 | 65.024 | -79.612 | 156.505 | 10.384 | 154.974 |
| 419. | -0.186 | 65.238 | -79.702 | 156.264 | 10.296 | 155.205 |
| 420. | -0.103 | 65.454 | -79.791 | 156.025 | 10.208 | 155.435 |
| 421. | -0.021 | 65.669 | -79.880 | 155.789 | 10.120 | 155.666 |
| 422. | 0.059 | 65.886 | -79.968 | 155.554 | 10.032 | 155.896 |
| 423. | 0.137 | 66.103 | -80.056 | 155.322 | 9.943 | 156.127 |

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Actual start at L+374 days

Table 12-3 ISP #1 Spacecraft Attitude [EME'2000] (cont)

| TFL (days) (1) | i-LAT (deg) | i-LNG (deg) | j-LAT (deg) | j-LNG (deg) | k-LAT (deg) | k-LNG (deg) |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 424. | 0.213 | 66.321 | -80.144 | 155.093 | 9.854 | 156.358 |
| 425. | 0.288 | 66.540 | -80.231 | 154.865 | 9.765 | 156.590 |
| 426. | 0.361 | 66.759 | -80.318 | 154.640 | 9.675 | 156.821 |
| 427. | 0.433 | 66.979 | -80.405 | 154.418 | 9.585 | 157.053 |
| 428. | 0.503 | 67.200 | -80.491 | 154.198 | 9.495 | 157.284 |
| 429. | 0.571 | 67.422 | -80.577 | 153.980 | 9.405 | 157.516 |
| 430. | 0.637 | 67.644 | -80.663 | 153.765 | 9.314 | 157.749 |
| 431. | 0.702 | 67.867 | -80.749 | 153.552 | 9.223 | 157.981 |
| 432. | 0.765 | 68.090 | -80.835 | 153.342 | 9.132 | 158.214 |
| 433. | 0.827 | 68.315 | -80.921 | 153.134 | 9.041 | 158.446 |
| 434. | 0.886 | 68.540 | -81.007 | 152.929 | 8.949 | 158.679 |
| 435. | 0.945 | 68.765 | -81.092 | 152.727 | 8.857 | 158.913 |
| 436. | 1.001 | 68.992 | -81.178 | 152.528 | 8.765 | 159.146 |
| 437. | 1.056 | 69.219 | -81.263 | 152.331 | 8.672 | 159.380 |
| 438. | 1.109 | 69.447 | -81.349 | 152.138 | 8.579 | 159.614 |
| 439. | 1.160 | 69.675 | -81.434 | 151.947 | 8.486 | 159.848 |
| 440. | 1.210 | 69.904 | -81.520 | 151.759 | 8.392 | 160.083 |
| 441. | 1.258 | 70.134 | -81.605 | 151.574 | 8.298 | 160.318 |
| 442. | 1.305 | 70.365 | -81.691 | 151.392 | 8.204 | 160.553 |
| 443. | 1.350 | 70.596 | -81.777 | 151.214 | 8.110 | 160.788 |
| 444. | 1.393 | 70.828 | -81.863 | 151.038 | 8.015 | 161.024 |
| 445. | 1.434 | 71.060 | -81.949 | 150.866 | 7.920 | 161.260 |
| 446. | 1.474 | 71.294 | -82.036 | 150.698 | 7.825 | 161.496 |
| 447. | 1.512 | 71.528 | -82.122 | 150.533 | 7.729 | 161.733 |
| 448. | 1.548 | 71.762 | -82.209 | 150.371 | 7.634 | 161.970 |
| 449. | 1.582 | 71.998 | -82.296 | 150.214 | 7.537 | 162.207 |
| 450. | 1.615 | 72.234 | -82.384 | 150.060 | 7.441 | 162.445 |
| 451. (2) | 1.616 | 72.233 | -82.472 | 149.910 | 7.351 | 162.442 |
| 452. | 1.531 | 71.571 | -82.560 | 149.764 | 7.279 | 161.766 |
| 453. | 1.446 | 70.907 | -82.648 | 149.622 | 7.206 | 161.090 |
| 454. | 1.363 | 70.243 | -82.737 | 149.485 | 7.132 | 160.413 |
| 455. | 1.280 | 69.578 | -82.827 | 149.352 | 7.057 | 159.737 |
| 456. | 1.198 | 68.913 | -82.917 | 149.224 | 6.980 | 159.060 |
| 457. | 1.117 | 68.248 | -83.007 | 149.101 | 6.902 | 158.383 |
| 458. | 1.037 | 67.584 | -83.098 | 148.983 | 6.823 | 157.708 |
| 459. | 0.958 | 66.920 | -83.189 | 148.871 | 6.742 | 157.033 |
| 460. | 0.880 | 66.257 | -83.281 | 148.763 | 6.660 | 156.359 |
| 461. | 0.803 | 65.595 | -83.374 | 148.662 | 6.577 | 155.688 |
| 462. | 0.728 | 64.935 | -83.467 | 148.567 | 6.492 | 155.017 |
| 463. | 0.653 | 64.276 | -83.561 | 148.478 | 6.406 | 154.349 |
| 464. | 0.580 | 63.619 | -83.655 | 148.395 | 6.318 | 153.683 |
| 465. | 0.508 | 62.965 | -83.750 | 148.320 | 6.229 | 153.020 |
| 466. | 0.437 | 62.313 | -83.846 | 148.252 | 6.138 | 152.360 |
| 467. | 0.368 | 61.663 | -83.943 | 148.192 | 6.046 | 151.702 |
| 468. | 0.300 | 61.017 | -84.041 | 148.140 | 5.952 | 151.048 |

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

Table 12-4 ISP #2 Spacecraft Attitude [EME'2000]

| TFL (days) (1) | i-LAT (deg) | i-LNG (deg) | j-LAT (deg) | j-LNG (deg) | k-LAT (deg) | k-LNG (deg) |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1266. | -9.490 | 44.919 | -68.747 | 160.373 | 18.833 | 131.651 |
| 1267. | -9.320 | 45.031 | -68.860 | 160.147 | 18.798 | 131.829 |
| 1268. | -9.153 | 45.144 | -68.972 | 159.923 | 18.762 | 132.007 |
| 1269. | -8.987 | 45.258 | -69.082 | 159.700 | 18.726 | 132.185 |
| 1270. | -8.823 | 45.374 | -69.190 | 159.478 | 18.690 | 132.364 |
| 1271. | -8.661 | 45.490 | -69.297 | 159.258 | 18.654 | 132.542 |
| 1272. | -8.500 | 45.607 | -69.402 | 159.040 | 18.618 | 132.721 |
| 1273. | -8.342 | 45.726 | -69.506 | 158.823 | 18.581 | 132.900 |
| 1274. | -8.184 | 45.845 | -69.608 | 158.607 | 18.544 | 133.080 |
| 1275. | -8.029 | 45.966 | -69.709 | 158.393 | 18.507 | 133.259 |
| 1276. | -7.875 | 46.087 | -69.809 | 158.181 | 18.469 | 133.439 |
| 1277. | -7.723 | 46.209 | -69.907 | 157.970 | 18.432 | 133.619 |
| 1278. | -7.572 | 46.333 | -70.004 | 157.760 | 18.394 | 133.799 |
| 1279. | -7.423 | 46.457 | -70.100 | 157.552 | 18.355 | 133.980 |
| 1280. | -7.275 | 46.583 | -70.194 | 157.345 | 18.317 | 134.160 |
| 1281. | -7.129 | 46.709 | -70.288 | 157.140 | 18.279 | 134.341 |
| 1282. | -6.985 | 46.836 | -70.380 | 156.937 | 18.240 | 134.522 |
| 1283. | -6.841 | 46.964 | -70.471 | 156.734 | 18.201 | 134.703 |
| 1284. | -6.700 | 47.093 | -70.561 | 156.534 | 18.161 | 134.885 |
| 1285. | -6.559 | 47.223 | -70.649 | 156.334 | 18.122 | 135.067 |
| 1286. | -6.420 | 47.354 | -70.737 | 156.137 | 18.082 | 135.249 |
| 1287. | -6.282 | 47.486 | -70.824 | 155.940 | 18.042 | 135.431 |
| 1288. | -6.146 | 47.619 | -70.909 | 155.745 | 18.002 | 135.613 |
| 1289. | -6.011 | 47.752 | -70.994 | 155.552 | 17.961 | 135.796 |
| 1290. | -5.877 | 47.887 | -71.078 | 155.359 | 17.920 | 135.979 |
| 1291. | -5.744 | 48.022 | -71.161 | 155.169 | 17.879 | 136.162 |
| 1292. | -5.613 | 48.158 | -71.243 | 154.979 | 17.838 | 136.346 |
| 1293. | -5.483 | 48.295 | -71.323 | 154.791 | 17.797 | 136.530 |
| 1294. | -5.354 | 48.433 | -71.404 | 154.605 | 17.755 | 136.714 |
| 1295. | -5.226 | 48.572 | -71.483 | 154.420 | 17.713 | 136.898 |
| 1296. | -5.099 | 48.712 | -71.561 | 154.236 | 17.671 | 137.082 |
| 1297. | -4.974 | 48.852 | -71.639 | 154.054 | 17.628 | 137.267 |
| 1298. | -4.850 | 48.993 | -71.716 | 153.873 | 17.585 | 137.452 |
| 1299. | -4.726 | 49.135 | -71.792 | 153.693 | 17.542 | 137.638 |
| 1300. | -4.604 | 49.278 | -71.867 | 153.515 | 17.499 | 137.823 |
| 1301. | -4.483 | 49.422 | -71.942 | 153.338 | 17.455 | 138.009 |
| 1302. | -4.364 | 49.567 | -72.016 | 153.162 | 17.412 | 138.196 |
| 1303. | -4.245 | 49.712 | -72.089 | 152.988 | 17.368 | 138.382 |
| 1304. | -4.127 | 49.859 | -72.162 | 152.815 | 17.323 | 138.569 |
| 1305. | -4.010 | 50.006 | -72.233 | 152.644 | 17.279 | 138.756 |
| 1306. | -3.894 | 50.154 | -72.305 | 152.474 | 17.234 | 138.944 |
| 1307. | -3.780 | 50.302 | -72.375 | 152.305 | 17.189 | 139.131 |
| 1308. | -3.666 | 50.452 | -72.445 | 152.137 | 17.143 | 139.319 |
| 1309. | -3.553 | 50.602 | -72.515 | 151.971 | 17.097 | 139.508 |
| 1310. | -3.442 | 50.753 | -72.584 | 151.806 | 17.052 | 139.696 |
| 1311. | -3.331 | 50.905 | -72.652 | 151.643 | 17.005 | 139.885 |
| 1312. | -3.221 | 51.058 | -72.720 | 151.481 | 16.959 | 140.075 |
| 1313. | -3.112 | 51.212 | -72.787 | 151.320 | 16.912 | 140.264 |
| 1314. | -3.004 | 51.366 | -72.854 | 151.160 | 16.865 | 140.454 |
| 1315. | -2.897 | 51.521 | -72.920 | 151.002 | 16.818 | 140.645 |
| 1316. | -2.791 | 51.677 | -72.986 | 150.845 | 16.770 | 140.835 |
| 1317. | -2.686 | 51.834 | -73.051 | 150.690 | 16.722 | 141.026 |
| 1318. | -2.582 | 51.992 | -73.116 | 150.536 | 16.674 | 141.218 |
| 1319. | -2.479 | 52.150 | -73.180 | 150.383 | 16.625 | 141.409 |
| 1320. | -2.376 | 52.309 | -73.244 | 150.231 | 16.576 | 141.601 |
| 1321. | -2.275 | 52.469 | -73.308 | 150.081 | 16.527 | 141.794 |
| 1322. | -2.174 | 52.630 | -73.371 | 149.932 | 16.478 | 141.987 |
| 1323. | -2.074 | 52.792 | -73.434 | 149.784 | 16.428 | 142.180 |
| 1324. | -1.975 | 52.954 | -73.496 | 149.638 | 16.378 | 142.373 |
| 1325. | -1.877 | 53.117 | -73.558 | 149.493 | 16.328 | 142.567 |
| 1326. | -1.780 | 53.281 | -73.620 | 149.349 | 16.277 | 142.761 |
| 1327. | -1.683 | 53.446 | -73.682 | 149.206 | 16.227 | 142.956 |
| 1328. | -1.587 | 53.612 | -73.743 | 149.065 | 16.175 | 143.151 |
| 1329. | -1.493 | 53.778 | -73.803 | 148.925 | 16.124 | 143.347 |
| 1330. | -1.399 | 53.946 | -73.864 | 148.787 | 16.072 | 143.543 |
| 1331. | -1.306 | 54.114 | -73.924 | 148.650 | 16.020 | 143.739 |
| 1332. | -1.213 | 54.283 | -73.984 | 148.514 | 15.968 | 143.935 |
| 1333. | -1.122 | 54.452 | -74.044 | 148.379 | 15.915 | 144.133 |
| 1334. | -1.031 | 54.623 | -74.103 | 148.246 | 15.862 | 144.330 |
| 1335. | -0.941 | 54.794 | -74.162 | 148.114 | 15.808 | 144.528 |
| 1336. | -0.852 | 54.967 | -74.221 | 147.983 | 15.755 | 144.726 |

1337. -0.764 55.140 -74.280 147.854 15.701 144.925

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-4 ISP #2 Spacecraft Attitude [EME'2000] (cont)

| TFL (days) (1) | i-LAT (deg) | i-LNG (deg) | j-LAT (deg) | j-LNG (deg) | k-LAT (deg) | k-LNG (deg) |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1338. | -0.676 | 55.314 | -74.338 | 147.726 | 15.646 | 145.124 |
| 1339. | -0.589 | 55.488 | -74.397 | 147.599 | 15.591 | 145.324 |
| 1340. | -0.503 | 55.664 | -74.455 | 147.474 | 15.536 | 145.524 |
| 1341. | -0.418 | 55.840 | -74.513 | 147.350 | 15.481 | 145.724 |
| 1342. | -0.334 | 56.018 | -74.571 | 147.227 | 15.425 | 145.925 |
| 1343. | -0.250 | 56.196 | -74.628 | 147.106 | 15.369 | 146.127 |
| 1344. | -0.167 | 56.375 | -74.686 | 146.986 | 15.313 | 146.329 |
| 1345. | -0.085 | 56.554 | -74.743 | 146.867 | 15.256 | 146.531 |
| 1346. | -0.004 | 56.735 | -74.801 | 146.750 | 15.199 | 146.734 |
| 1347. | 0.076 | 56.917 | -74.858 | 146.634 | 15.142 | 146.937 |
| 1348. | 0.156 | 57.099 | -74.915 | 146.519 | 15.084 | 147.141 |
| 1349. | 0.235 | 57.282 | -74.972 | 146.406 | 15.026 | 147.345 |
| 1350. | 0.313 | 57.466 | -75.029 | 146.295 | 14.967 | 147.550 |
| 1351. | 0.391 | 57.651 | -75.086 | 146.184 | 14.909 | 147.755 |
| 1352. | 0.467 | 57.837 | -75.143 | 146.076 | 14.849 | 147.961 |
| 1353. | 0.543 | 58.024 | -75.200 | 145.968 | 14.790 | 148.168 |
| 1354. | 0.618 | 58.212 | -75.256 | 145.862 | 14.730 | 148.374 |
| 1355. | 0.692 | 58.400 | -75.313 | 145.758 | 14.670 | 148.582 |
| 1356. | 0.766 | 58.590 | -75.370 | 145.654 | 14.609 | 148.790 |
| 1357. | 0.839 | 58.780 | -75.427 | 145.553 | 14.548 | 148.998 |
| 1358. | 0.911 | 58.972 | -75.484 | 145.453 | 14.487 | 149.207 |
| 1359. | 0.982 | 59.164 | -75.540 | 145.354 | 14.425 | 149.416 |
| 1360. | 1.052 | 59.357 | -75.597 | 145.257 | 14.363 | 149.627 |
| 1361. | 1.121 | 59.551 | -75.654 | 145.161 | 14.300 | 149.837 |
| 1362. | 1.190 | 59.746 | -75.711 | 145.067 | 14.237 | 150.048 |
| 1363. | 1.258 | 59.942 | -75.768 | 144.975 | 14.174 | 150.260 |
| 1364. | 1.325 | 60.139 | -75.825 | 144.884 | 14.110 | 150.472 |
| 1365. | 1.391 | 60.337 | -75.883 | 144.795 | 14.046 | 150.685 |
| 1366. | 1.457 | 60.536 | -75.940 | 144.707 | 13.981 | 150.899 |
| 1367. | 1.522 | 60.736 | -75.997 | 144.621 | 13.916 | 151.113 |
| 1368. | 1.585 | 60.936 | -76.055 | 144.537 | 13.851 | 151.327 |
| 1369. | 1.648 | 61.138 | -76.113 | 144.454 | 13.785 | 151.543 |
| 1370. | 1.711 | 61.341 | -76.170 | 144.373 | 13.719 | 151.759 |
| 1371. | 1.772 | 61.545 | -76.229 | 144.294 | 13.653 | 151.975 |
| 1372. | 1.832 | 61.749 | -76.287 | 144.216 | 13.586 | 152.192 |
| 1373. | 1.892 | 61.955 | -76.345 | 144.141 | 13.518 | 152.410 |
| 1374. | 1.951 | 62.162 | -76.404 | 144.067 | 13.450 | 152.629 |
| 1375. | 2.008 | 62.370 | -76.463 | 143.995 | 13.382 | 152.848 |
| 1376. | 2.065 | 62.578 | -76.522 | 143.925 | 13.313 | 153.067 |
| 1377. | 2.121 | 62.788 | -76.581 | 143.856 | 13.244 | 153.288 |
| 1378. | 2.177 | 62.999 | -76.640 | 143.790 | 13.175 | 153.509 |
| 1379. | 2.231 | 63.211 | -76.700 | 143.726 | 13.105 | 153.731 |
| 1380. | 2.284 | 63.424 | -76.760 | 143.664 | 13.034 | 153.953 |
| 1381. | 2.336 | 63.638 | -76.821 | 143.603 | 12.963 | 154.176 |
| 1382. | 2.388 | 63.853 | -76.881 | 143.545 | 12.892 | 154.400 |
| 1383. | 2.438 | 64.069 | -76.943 | 143.490 | 12.820 | 154.624 |
| 1384. | (2) 2.430 | 64.030 | -77.004 | 143.436 | 12.759 | 154.580 |
| 1385. | 2.293 | 63.427 | -77.066 | 143.384 | 12.722 | 153.945 |
| 1386. | 2.157 | 62.823 | -77.128 | 143.335 | 12.684 | 153.309 |
| 1387. | 2.021 | 62.217 | -77.190 | 143.288 | 12.644 | 152.671 |
| 1388. | 1.885 | 61.609 | -77.253 | 143.244 | 12.602 | 152.031 |
| 1389. | 1.749 | 61.000 | -77.316 | 143.202 | 12.558 | 151.390 |
| 1390. | 1.613 | 60.389 | -77.380 | 143.163 | 12.513 | 150.748 |
| 1391. | 1.478 | 59.778 | -77.444 | 143.126 | 12.466 | 150.105 |
| 1392. | 1.343 | 59.166 | -77.509 | 143.092 | 12.416 | 149.462 |
| 1393. | 1.208 | 58.553 | -77.574 | 143.060 | 12.365 | 148.818 |
| 1394. | 1.074 | 57.940 | -77.640 | 143.032 | 12.312 | 148.174 |
| 1395. | 0.941 | 57.327 | -77.706 | 143.006 | 12.257 | 147.531 |
| 1396. | 0.808 | 56.713 | -77.773 | 142.983 | 12.200 | 146.888 |
| 1397. | 0.676 | 56.101 | -77.840 | 142.964 | 12.141 | 146.246 |
| 1398. | 0.544 | 55.488 | -77.908 | 142.947 | 12.080 | 145.605 |
| 1399. | 0.414 | 54.877 | -77.976 | 142.934 | 12.017 | 144.965 |
| 1400. | 0.284 | 54.266 | -78.045 | 142.924 | 11.951 | 144.326 |
| 1401. | 0.156 | 53.657 | -78.115 | 142.918 | 11.884 | 143.690 |

1. TFL epoch = 02/07/99 21:31:07 UTC
2. Attitude mode change

Table 12-5 CIDA #1 Collection Period Characteristics

| TFL (days) (1) | impact velocity (km/s) | +z-off sun (deg) | +z-off earth (deg) | +y-off SEP-N (deg) | +y-off orbit-N (deg) | +x-off ISP (deg) | fov exposure |
|-------------------|------------------------------|------------------------|--------------------------|--------------------------|----------------------------|------------------------|-----------------|
| 45. | 58.645 | 15.710 | 59.851 | 176.800 | 176.480 | 0.000 | 0.766 |
| 46. | 58.525 | 16.276 | 59.134 | 176.791 | 176.463 | 0.000 | 0.766 |
| 47. | 58.402 | 16.838 | 58.412 | 176.781 | 176.445 | 0.000 | 0.766 |
| 48. | 58.275 | 17.396 | 57.685 | 176.772 | 176.427 | 0.000 | 0.766 |
| 49. | 58.146 | 17.950 | 56.953 | 176.762 | 176.408 | 0.000 | 0.766 |
| 50. | 58.014 | 18.500 | 56.218 | 176.752 | 176.388 | 0.000 | 0.766 |
| 51. | 57.879 | 19.046 | 55.478 | 176.742 | 176.368 | 0.000 | 0.766 |
| 52. | 57.742 | 19.588 | 54.735 | 176.733 | 176.347 | 0.000 | 0.766 |
| 53. | 57.602 | 20.126 | 53.989 | 176.723 | 176.326 | 0.000 | 0.766 |
| 54. (2) | 57.459 | 20.000 | 52.581 | 176.713 | 176.304 | 0.660 | 0.759 |
| 55. | 57.314 | 20.000 | 51.301 | 176.704 | 176.282 | 1.189 | 0.753 |
| 56. | 57.167 | 20.000 | 50.024 | 176.695 | 176.258 | 1.715 | 0.746 |
| 57. | 57.018 | 20.000 | 48.749 | 176.687 | 176.235 | 2.237 | 0.740 |
| 58. | 56.867 | 20.000 | 47.479 | 176.679 | 176.211 | 2.754 | 0.734 |
| 59. | 56.714 | 20.000 | 46.212 | 176.672 | 176.186 | 3.268 | 0.728 |
| 60. | 56.559 | 20.000 | 44.950 | 176.666 | 176.161 | 3.778 | 0.722 |
| 61. | 56.402 | 20.000 | 43.693 | 176.661 | 176.135 | 4.283 | 0.716 |
| 62. | 56.243 | 20.000 | 42.443 | 176.657 | 176.108 | 4.785 | 0.710 |
| 63. | 56.083 | 20.000 | 41.199 | 176.656 | 176.081 | 5.283 | 0.704 |
| 64. | 55.921 | 20.000 | 39.963 | 176.657 | 176.054 | 5.777 | 0.697 |
| 65. | 55.758 | 20.000 | 38.735 | 176.660 | 176.025 | 6.267 | 0.691 |
| 66. | 55.593 | 20.000 | 37.517 | 176.668 | 175.997 | 6.753 | 0.685 |
| 67. | 55.427 | 20.000 | 36.308 | 176.679 | 175.967 | 7.236 | 0.679 |
| 68. | 55.260 | 20.000 | 35.109 | 176.697 | 175.937 | 7.714 | 0.673 |
| 69. | 55.091 | 20.000 | 33.922 | 176.721 | 175.907 | 8.189 | 0.667 |
| 70. | 54.921 | 20.000 | 32.748 | 176.754 | 175.876 | 8.661 | 0.661 |
| 71. | 54.751 | 20.000 | 31.586 | 176.798 | 175.844 | 9.128 | 0.654 |
| 72. | 54.579 | 20.000 | 30.437 | 176.858 | 175.812 | 9.592 | 0.648 |
| 73. | 54.406 | 20.000 | 29.304 | 176.938 | 175.780 | 10.052 | 0.642 |
| 74. | 54.233 | 20.000 | 28.184 | 177.046 | 175.746 | 10.509 | 0.636 |
| 75. | 54.059 | 20.000 | 27.080 | 177.196 | 175.712 | 10.962 | 0.630 |
| 76. | 53.883 | 20.000 | 25.992 | 177.408 | 175.678 | 11.412 | 0.624 |
| 77. | 53.708 | 20.000 | 24.920 | 177.722 | 175.643 | 11.858 | 0.618 |
| 78. | 53.531 | 20.000 | 23.864 | 178.219 | 175.607 | 12.300 | 0.612 |
| 79. | 53.354 | 20.000 | 22.825 | 179.095 | 175.571 | 12.739 | 0.605 |
| 80. | 53.177 | 20.000 | 21.803 | 179.019 | 175.534 | 13.175 | 0.599 |
| 81. | 52.998 | 20.000 | 20.798 | 172.405 | 175.497 | 13.608 | 0.593 |
| 82. | 52.820 | 20.000 | 19.810 | 136.432 | 175.459 | 14.037 | 0.587 |
| 83. | 52.641 | 20.000 | 18.840 | 167.530 | 175.420 | 14.463 | 0.581 |
| 84. | 52.461 | 20.000 | 17.887 | 171.076 | 175.381 | 14.885 | 0.575 |
| 85. | 52.282 | 20.000 | 16.952 | 172.398 | 175.341 | 15.305 | 0.569 |
| 86. | 52.102 | 20.000 | 16.036 | 173.073 | 175.300 | 15.721 | 0.563 |
| 87. | 51.921 | 20.000 | 15.137 | 173.474 | 175.259 | 16.134 | 0.557 |
| 88. | 51.741 | 20.000 | 14.257 | 173.732 | 175.217 | 16.544 | 0.551 |
| 89. | 51.560 | 20.000 | 13.395 | 173.907 | 175.175 | 16.951 | 0.545 |
| 90. | 51.379 | 20.000 | 12.552 | 174.028 | 175.132 | 17.355 | 0.539 |
| 91. | 51.198 | 20.000 | 11.727 | 174.113 | 175.088 | 17.756 | 0.534 |
| 92. | 51.017 | 20.000 | 10.922 | 174.172 | 175.044 | 18.154 | 0.528 |
| 93. | 50.836 | 20.000 | 10.135 | 174.211 | 174.999 | 18.549 | 0.522 |
| 94. | 50.655 | 20.000 | 9.369 | 174.237 | 174.953 | 18.942 | 0.516 |
| 95. | 50.474 | 20.000 | 8.622 | 174.250 | 174.907 | 19.331 | 0.510 |
| 96. | 50.293 | 20.000 | 7.896 | 174.255 | 174.860 | 19.718 | 0.504 |
| 97. | 50.111 | 20.000 | 7.191 | 174.252 | 174.812 | 20.102 | 0.498 |
| 98. | 49.930 | 20.000 | 6.509 | 174.242 | 174.764 | 20.483 | 0.493 |
| 99. | 49.749 | 20.000 | 5.851 | 174.228 | 174.715 | 20.861 | 0.487 |
| 100. | 49.569 | 20.000 | 5.219 | 174.208 | 174.665 | 21.237 | 0.481 |
| 101. | 49.388 | 20.000 | 4.616 | 174.185 | 174.615 | 21.610 | 0.475 |
| 102. | 49.207 | 20.000 | 4.046 | 174.159 | 174.563 | 21.981 | 0.470 |
| 103. | 49.027 | 20.000 | 3.518 | 174.129 | 174.511 | 22.349 | 0.464 |
| 104. | 48.847 | 20.000 | 3.041 | 174.097 | 174.459 | 22.714 | 0.458 |
| 105. | 48.667 | 20.000 | 2.632 | 174.062 | 174.405 | 23.077 | 0.453 |
| 106. | 48.487 | 20.000 | 2.316 | 174.025 | 174.351 | 23.438 | 0.447 |
| 107. | 48.308 | 20.000 | 2.120 | 173.986 | 174.296 | 23.796 | 0.442 |
| 108. | 48.128 | 20.000 | 2.068 | 173.944 | 174.240 | 24.151 | 0.436 |
| 109. | 47.949 | 20.000 | 2.157 | 173.902 | 174.183 | 24.505 | 0.430 |
| 110. | 47.771 | 20.000 | 2.363 | 173.857 | 174.126 | 24.856 | 0.425 |
| 111. | 47.592 | 20.000 | 2.649 | 173.811 | 174.068 | 25.204 | 0.419 |
| 112. | 47.414 | 20.000 | 2.986 | 173.763 | 174.009 | 25.551 | 0.414 |
| 113. | 47.237 | 20.000 | 3.353 | 173.713 | 173.949 | 25.895 | 0.408 |
| 114. | 47.059 | 20.000 | 3.736 | 173.663 | 173.888 | 26.237 | 0.403 |

1. TFL epoch = 02/07/99 21:31:07 UTC
2. Attitude mode change

Table 12-5 CIDA #1 Collection Period Characteristics (cont)

| TFL (days) (1) | impact velocity (km/s) | +z-off sun (deg) | +z-off earth (deg) | +y-off SEP-N (deg) | +y-off orbit-N (deg) | +x-off ISP (deg) | fov exposure |
|-------------------|------------------------------|------------------------|--------------------------|--------------------------|----------------------------|------------------------|-----------------|
| 115. | 46.882 | 20.000 | 4.125 | 173.610 | 173.826 | 26.577 | 0.398 |
| 116. | 46.705 | 20.000 | 4.517 | 173.557 | 173.764 | 26.915 | 0.392 |
| 117. | 46.529 | 20.000 | 4.906 | 173.502 | 173.700 | 27.250 | 0.387 |
| 118. | 46.353 | 20.000 | 5.291 | 173.445 | 173.636 | 27.584 | 0.381 |
| 119. | 46.178 | 20.000 | 5.670 | 173.387 | 173.571 | 27.915 | 0.376 |
| 120. | 46.002 | 20.000 | 6.042 | 173.328 | 173.504 | 28.245 | 0.371 |
| 121. | 45.828 | 20.000 | 6.406 | 173.268 | 173.437 | 28.572 | 0.365 |
| 122. | 45.653 | 20.000 | 6.762 | 173.206 | 173.369 | 28.898 | 0.360 |
| 123. | 45.479 | 20.000 | 7.109 | 173.143 | 173.300 | 29.221 | 0.355 |
| 124. | 45.306 | 20.000 | 7.447 | 173.078 | 173.230 | 29.543 | 0.350 |
| 125. | 45.133 | 20.000 | 7.775 | 173.013 | 173.159 | 29.862 | 0.344 |
| 126. | 44.960 | 20.000 | 8.095 | 172.946 | 173.086 | 30.180 | 0.339 |
| 127. | 44.788 | 20.000 | 8.405 | 172.877 | 173.013 | 30.496 | 0.334 |
| 128. | 44.616 | 20.000 | 8.707 | 172.808 | 172.939 | 30.810 | 0.329 |
| 129. | 44.445 | 20.000 | 8.999 | 172.737 | 172.863 | 31.123 | 0.324 |
| 130. | 44.274 | 20.000 | 9.282 | 172.665 | 172.787 | 31.434 | 0.318 |
| 131. | 44.104 | 20.000 | 9.556 | 172.591 | 172.709 | 31.742 | 0.313 |
| 132. | 43.934 | 20.000 | 9.821 | 172.516 | 172.630 | 32.050 | 0.308 |
| 133. | 43.764 | 20.000 | 10.078 | 172.440 | 172.550 | 32.355 | 0.303 |
| 134. | 43.595 | 20.000 | 10.327 | 172.363 | 172.469 | 32.659 | 0.298 |
| 135. | 43.427 | 20.000 | 10.567 | 172.284 | 172.386 | 32.961 | 0.293 |
| 136. | 43.259 | 20.000 | 10.799 | 172.204 | 172.303 | 33.262 | 0.288 |
| 137. | 43.091 | 20.000 | 11.023 | 172.122 | 172.218 | 33.561 | 0.283 |
| 138. | 42.924 | 20.000 | 11.239 | 172.039 | 172.132 | 33.858 | 0.278 |
| 139. | 42.758 | 20.000 | 11.448 | 171.955 | 172.044 | 34.154 | 0.273 |
| 140. | 42.591 | 20.000 | 11.649 | 171.869 | 171.955 | 34.449 | 0.268 |
| 141. | 42.426 | 20.000 | 11.843 | 171.782 | 171.865 | 34.741 | 0.263 |
| 142. | 42.261 | 20.000 | 12.030 | 171.693 | 171.773 | 35.033 | 0.258 |
| 143. | 42.096 | 20.000 | 12.210 | 171.603 | 171.680 | 35.323 | 0.253 |
| 144. | 41.932 | 20.000 | 12.383 | 171.511 | 171.585 | 35.611 | 0.249 |

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-7 CIDA #3 Collection Period Characteristics

| TFL (days) (1) | impact velocity (km/s) | +z-off sun (deg) | +z-off earth (deg) | +y-off SEP-N (deg) | +y-off orbit-N (deg) | +x-off ISP (deg) | fov exposure |
|-------------------|------------------------------|------------------------|--------------------------|--------------------------|----------------------------|------------------------|-----------------|
| 1702. | 55.650 | 20.000 | 21.719 | 135.685 | 177.213 | 1.338 | 0.751 |
| 1703. | 55.538 | 20.000 | 21.839 | 137.545 | 177.200 | 1.745 | 0.746 |
| 1704. | 55.426 | 20.000 | 21.961 | 139.310 | 177.186 | 2.149 | 0.741 |
| 1705. | 55.313 | 20.000 | 22.086 | 140.981 | 177.172 | 2.549 | 0.737 |
| 1706. | 55.200 | 20.000 | 22.213 | 142.564 | 177.158 | 2.945 | 0.732 |
| 1707. | 55.085 | 20.000 | 22.342 | 144.061 | 177.144 | 3.338 | 0.727 |
| 1708. | 54.970 | 20.000 | 22.474 | 145.476 | 177.130 | 3.727 | 0.723 |
| 1709. | 54.855 | 20.000 | 22.608 | 146.815 | 177.115 | 4.112 | 0.718 |
| 1710. | 54.738 | 20.000 | 22.743 | 148.081 | 177.100 | 4.494 | 0.713 |
| 1711. | 54.621 | 20.000 | 22.882 | 149.278 | 177.085 | 4.873 | 0.709 |
| 1712. | 54.504 | 20.000 | 23.022 | 150.411 | 177.070 | 5.248 | 0.704 |
| 1713. | 54.386 | 20.000 | 23.164 | 151.483 | 177.054 | 5.619 | 0.699 |
| 1714. | 54.268 | 20.000 | 23.308 | 152.497 | 177.039 | 5.988 | 0.695 |
| 1715. | 54.149 | 20.000 | 23.454 | 153.458 | 177.023 | 6.353 | 0.690 |
| 1716. | 54.030 | 20.000 | 23.601 | 154.369 | 177.007 | 6.714 | 0.686 |
| 1717. | 53.910 | 20.000 | 23.751 | 155.233 | 176.991 | 7.073 | 0.681 |
| 1718. | 53.790 | 20.000 | 23.902 | 156.052 | 176.974 | 7.428 | 0.677 |
| 1719. | 53.670 | 20.000 | 24.055 | 156.830 | 176.958 | 7.781 | 0.672 |
| 1720. | 53.550 | 20.000 | 24.209 | 157.569 | 176.941 | 8.130 | 0.667 |
| 1721. | 53.429 | 20.000 | 24.366 | 158.272 | 176.924 | 8.476 | 0.663 |
| 1722. | 53.309 | 20.000 | 24.523 | 158.940 | 176.907 | 8.819 | 0.658 |
| 1723. | 53.188 | 20.000 | 24.682 | 159.577 | 176.890 | 9.159 | 0.654 |
| 1724. | 53.066 | 20.000 | 24.842 | 160.183 | 176.872 | 9.496 | 0.649 |
| 1725. | 52.945 | 20.000 | 25.004 | 160.760 | 176.855 | 9.831 | 0.645 |
| 1726. | 52.824 | 20.000 | 25.167 | 161.311 | 176.837 | 10.163 | 0.641 |
| 1727. | 52.702 | 20.000 | 25.331 | 161.837 | 176.819 | 10.491 | 0.636 |
| 1728. | 52.581 | 20.000 | 25.497 | 162.340 | 176.801 | 10.817 | 0.632 |
| 1729. | 52.459 | 20.000 | 25.663 | 162.820 | 176.782 | 11.141 | 0.627 |
| 1730. | 52.337 | 20.000 | 25.831 | 163.280 | 176.764 | 11.461 | 0.623 |
| 1731. | 52.216 | 20.000 | 26.000 | 163.719 | 176.745 | 11.779 | 0.619 |
| 1732. | 52.094 | 20.000 | 26.170 | 164.141 | 176.726 | 12.095 | 0.614 |
| 1733. | 51.972 | 20.000 | 26.341 | 164.544 | 176.707 | 12.408 | 0.610 |
| 1734. | 51.850 | 20.000 | 26.513 | 164.932 | 176.688 | 12.718 | 0.606 |
| 1735. | 51.729 | 20.000 | 26.685 | 165.303 | 176.669 | 13.026 | 0.601 |
| 1736. | 51.607 | 20.000 | 26.859 | 165.660 | 176.649 | 13.331 | 0.597 |
| 1737. | 51.486 | 20.000 | 27.034 | 166.002 | 176.630 | 13.635 | 0.593 |
| 1738. | 51.364 | 20.000 | 27.209 | 166.332 | 176.610 | 13.935 | 0.589 |
| 1739. | 51.243 | 20.000 | 27.385 | 166.649 | 176.590 | 14.233 | 0.584 |
| 1740. | 51.122 | 20.000 | 27.562 | 166.953 | 176.570 | 14.529 | 0.580 |
| 1741. | 51.001 | 20.000 | 27.740 | 167.247 | 176.549 | 14.823 | 0.576 |
| 1742. | 50.880 | 20.000 | 27.919 | 167.529 | 176.529 | 15.114 | 0.572 |
| 1743. | 50.759 | 20.000 | 28.098 | 167.802 | 176.508 | 15.404 | 0.568 |
| 1744. | 50.639 | 20.000 | 28.278 | 168.064 | 176.487 | 15.691 | 0.564 |
| 1745. | 50.518 | 20.000 | 28.459 | 168.317 | 176.466 | 15.976 | 0.560 |
| 1746. | 50.398 | 20.000 | 28.640 | 168.562 | 176.445 | 16.258 | 0.555 |

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-8 CIDA #1 Spacecraft Attitude [EME'2000]

| TFL (days) (1) | i-LAT (deg) | i-LNG (deg) | j-LAT (deg) | j-LNG (deg) | k-LAT (deg) | k-LNG (deg) |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 45. | -19.836 | 262.634 | -70.068 | 88.497 | -1.877 | 353.311 |
| 46. | -19.849 | 263.069 | -70.074 | 88.314 | -1.679 | 353.675 |
| 47. | -19.861 | 263.500 | -70.079 | 88.131 | -1.482 | 354.036 |
| 48. | -19.871 | 263.928 | -70.083 | 87.947 | -1.287 | 354.393 |
| 49. | -19.880 | 264.353 | -70.087 | 87.764 | -1.092 | 354.748 |
| 50. | -19.887 | 264.773 | -70.090 | 87.580 | -0.899 | 355.098 |
| 51. | -19.893 | 265.190 | -70.093 | 87.396 | -0.706 | 355.446 |
| 52. | -19.898 | 265.603 | -70.095 | 87.212 | -0.515 | 355.790 |
| 53. | -19.901 | 266.013 | -70.096 | 87.027 | -0.325 | 356.130 |
| 54. (2) | -19.903 | 267.120 | -70.097 | 86.843 | 0.089 | 357.088 |
| 55. | -19.897 | 268.085 | -70.097 | 86.658 | 0.457 | 357.920 |
| 56. | -19.885 | 269.043 | -70.097 | 86.473 | 0.822 | 358.745 |
| 57. | -19.866 | 269.991 | -70.096 | 86.287 | 1.185 | 359.563 |
| 58. | -19.841 | 270.932 | -70.094 | 86.101 | 1.545 | 0.374 |
| 59. | -19.809 | 271.864 | -70.092 | 85.915 | 1.903 | 1.179 |
| 60. | -19.772 | 272.788 | -70.089 | 85.729 | 2.257 | 1.976 |
| 61. | -19.729 | 273.704 | -70.085 | 85.543 | 2.609 | 2.767 |
| 62. | -19.679 | 274.611 | -70.081 | 85.356 | 2.957 | 3.552 |
| 63. | -19.625 | 275.509 | -70.077 | 85.169 | 3.303 | 4.330 |
| 64. | -19.564 | 276.399 | -70.071 | 84.982 | 3.645 | 5.102 |
| 65. | -19.499 | 277.281 | -70.066 | 84.794 | 3.985 | 5.867 |
| 66. | -19.428 | 278.154 | -70.059 | 84.606 | 4.321 | 6.627 |
| 67. | -19.352 | 279.018 | -70.052 | 84.418 | 4.654 | 7.380 |
| 68. | -19.272 | 279.874 | -70.044 | 84.230 | 4.984 | 8.127 |
| 69. | -19.186 | 280.721 | -70.036 | 84.041 | 5.311 | 8.868 |
| 70. | -19.096 | 281.560 | -70.027 | 83.852 | 5.634 | 9.603 |
| 71. | -19.002 | 282.391 | -70.018 | 83.663 | 5.955 | 10.333 |
| 72. | -18.903 | 283.213 | -70.008 | 83.473 | 6.272 | 11.056 |
| 73. | -18.800 | 284.027 | -69.997 | 83.283 | 6.586 | 11.774 |
| 74. | -18.693 | 284.832 | -69.986 | 83.093 | 6.896 | 12.487 |
| 75. | -18.582 | 285.629 | -69.974 | 82.902 | 7.204 | 13.194 |
| 76. | -18.467 | 286.418 | -69.962 | 82.711 | 7.508 | 13.895 |
| 77. | -18.348 | 287.199 | -69.949 | 82.520 | 7.809 | 14.592 |
| 78. | -18.226 | 287.971 | -69.935 | 82.329 | 8.107 | 15.283 |
| 79. | -18.100 | 288.735 | -69.921 | 82.137 | 8.402 | 15.968 |
| 80. | -17.971 | 289.492 | -69.906 | 81.944 | 8.693 | 16.649 |
| 81. | -17.838 | 290.240 | -69.891 | 81.751 | 8.981 | 17.325 |
| 82. | -17.703 | 290.980 | -69.874 | 81.558 | 9.266 | 17.995 |
| 83. | -17.564 | 291.713 | -69.858 | 81.365 | 9.548 | 18.661 |
| 84. | -17.422 | 292.438 | -69.840 | 81.171 | 9.827 | 19.322 |
| 85. | -17.278 | 293.155 | -69.822 | 80.977 | 10.102 | 19.978 |
| 86. | -17.130 | 293.864 | -69.804 | 80.782 | 10.375 | 20.629 |
| 87. | -16.980 | 294.566 | -69.784 | 80.587 | 10.644 | 21.276 |
| 88. | -16.828 | 295.260 | -69.765 | 80.392 | 10.910 | 21.918 |
| 89. | -16.673 | 295.947 | -69.744 | 80.196 | 11.173 | 22.556 |
| 90. | -16.515 | 296.627 | -69.723 | 79.999 | 11.434 | 23.189 |
| 91. | -16.355 | 297.299 | -69.701 | 79.802 | 11.691 | 23.817 |
| 92. | -16.193 | 297.964 | -69.678 | 79.605 | 11.945 | 24.442 |
| 93. | -16.029 | 298.622 | -69.655 | 79.408 | 12.196 | 25.062 |
| 94. | -15.862 | 299.273 | -69.631 | 79.209 | 12.444 | 25.678 |
| 95. | -15.694 | 299.917 | -69.607 | 79.011 | 12.690 | 26.289 |
| 96. | -15.523 | 300.554 | -69.582 | 78.812 | 12.932 | 26.897 |
| 97. | -15.351 | 301.184 | -69.556 | 78.612 | 13.172 | 27.500 |
| 98. | -15.177 | 301.807 | -69.529 | 78.412 | 13.409 | 28.100 |
| 99. | -15.000 | 302.424 | -69.502 | 78.211 | 13.643 | 28.695 |
| 100. | -14.823 | 303.035 | -69.474 | 78.010 | 13.874 | 29.287 |
| 101. | -14.643 | 303.638 | -69.445 | 77.809 | 14.103 | 29.875 |
| 102. | -14.462 | 304.236 | -69.416 | 77.606 | 14.328 | 30.459 |
| 103. | -14.279 | 304.827 | -69.385 | 77.404 | 14.552 | 31.039 |
| 104. | -14.095 | 305.412 | -69.354 | 77.201 | 14.772 | 31.615 |
| 105. | -13.909 | 305.990 | -69.323 | 76.997 | 14.990 | 32.188 |
| 106. | -13.722 | 306.563 | -69.290 | 76.792 | 15.206 | 32.758 |
| 107. | -13.533 | 307.129 | -69.257 | 76.588 | 15.418 | 33.323 |
| 108. | -13.343 | 307.690 | -69.223 | 76.382 | 15.629 | 33.886 |
| 109. | -13.152 | 308.245 | -69.188 | 76.176 | 15.837 | 34.444 |
| 110. | -12.959 | 308.793 | -69.152 | 75.969 | 16.042 | 35.000 |
| 111. | -12.765 | 309.337 | -69.116 | 75.762 | 16.245 | 35.552 |
| 112. | -12.570 | 309.874 | -69.079 | 75.554 | 16.446 | 36.100 |
| 113. | -12.374 | 310.406 | -69.040 | 75.346 | 16.644 | 36.646 |
| 114. | -12.176 | 310.932 | -69.001 | 75.136 | 16.840 | 37.188 |
| 115. | -11.977 | 311.453 | -68.962 | 74.927 | 17.034 | 37.727 |
| 116. | -11.778 | 311.969 | -68.921 | 74.716 | 17.225 | 38.262 |
| 117. | -11.577 | 312.479 | -68.879 | 74.505 | 17.414 | 38.795 |

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

Table 12-8 CIDA #1 Spacecraft Attitude [EME'2000] (cont)

| TFL (days) (1) | i-LAT (deg) | i-LNG (deg) | j-LAT (deg) | j-LNG (deg) | k-LAT (deg) | k-LNG (deg) |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 118. | -11.375 | 312.984 | -68.837 | 74.294 | 17.601 | 39.325 |
| 119. | -11.172 | 313.484 | -68.793 | 74.081 | 17.786 | 39.851 |
| 120. | -10.968 | 313.979 | -68.749 | 73.868 | 17.969 | 40.375 |
| 121. | -10.763 | 314.468 | -68.704 | 73.654 | 18.150 | 40.895 |
| 122. | -10.557 | 314.953 | -68.657 | 73.440 | 18.329 | 41.413 |
| 123. | -10.350 | 315.432 | -68.610 | 73.225 | 18.505 | 41.928 |
| 124. | -10.142 | 315.907 | -68.562 | 73.009 | 18.680 | 42.440 |
| 125. | -9.933 | 316.377 | -68.513 | 72.792 | 18.853 | 42.949 |
| 126. | -9.723 | 316.842 | -68.462 | 72.575 | 19.023 | 43.455 |
| 127. | -9.513 | 317.303 | -68.411 | 72.357 | 19.192 | 43.959 |
| 128. | -9.301 | 317.759 | -68.359 | 72.138 | 19.360 | 44.460 |
| 129. | -9.088 | 318.210 | -68.305 | 71.918 | 19.525 | 44.958 |
| 130. | -8.875 | 318.657 | -68.251 | 71.698 | 19.688 | 45.454 |
| 131. | -8.660 | 319.099 | -68.195 | 71.477 | 19.850 | 45.947 |
| 132. | -8.445 | 319.537 | -68.138 | 71.255 | 20.010 | 46.438 |
| 133. | -8.228 | 319.970 | -68.080 | 71.032 | 20.168 | 46.926 |
| 134. | -8.011 | 320.399 | -68.021 | 70.808 | 20.325 | 47.411 |
| 135. | -7.793 | 320.824 | -67.961 | 70.584 | 20.480 | 47.894 |
| 136. | -7.574 | 321.245 | -67.899 | 70.359 | 20.634 | 48.375 |
| 137. | -7.354 | 321.661 | -67.836 | 70.133 | 20.786 | 48.853 |
| 138. | -7.133 | 322.073 | -67.772 | 69.906 | 20.936 | 49.329 |
| 139. | -6.911 | 322.481 | -67.707 | 69.678 | 21.085 | 49.802 |
| 140. | -6.689 | 322.885 | -67.640 | 69.450 | 21.232 | 50.274 |
| 141. | -6.465 | 323.285 | -67.572 | 69.220 | 21.378 | 50.742 |
| 142. | -6.240 | 323.681 | -67.503 | 68.990 | 21.523 | 51.209 |
| 143. | -6.015 | 324.073 | -67.432 | 68.759 | 21.666 | 51.674 |
| 144. | -5.788 | 324.461 | -67.360 | 68.527 | 21.808 | 52.136 |

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-9 CIDA #2 Spacecraft Attitude [EME'2000]

| TFL (days) (1) | i-LAT (deg) | i-LNG (deg) | j-LAT (deg) | j-LNG (deg) | k-LAT (deg) | k-LNG (deg) |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 768. | -17.522 | 252.715 | -70.458 | 99.908 | -8.382 | 345.382 |
| 769. | -17.572 | 253.062 | -70.474 | 99.805 | -8.243 | 345.692 |
| 770. | -17.622 | 253.405 | -70.491 | 99.702 | -8.106 | 345.998 |
| 771. | -17.670 | 253.745 | -70.506 | 99.599 | -7.970 | 346.301 |
| 772. | -17.716 | 254.081 | -70.522 | 99.497 | -7.835 | 346.600 |
| 773. | -17.762 | 254.414 | -70.537 | 99.394 | -7.701 | 346.896 |
| 774. | -17.806 | 254.743 | -70.552 | 99.291 | -7.568 | 347.189 |
| 775. | -17.849 | 255.069 | -70.567 | 99.188 | -7.435 | 347.478 |
| 776. | -17.891 | 255.392 | -70.581 | 99.084 | -7.304 | 347.763 |
| 777. | -17.931 | 255.711 | -70.595 | 98.981 | -7.174 | 348.046 |
| 778. | -17.971 | 256.027 | -70.609 | 98.878 | -7.045 | 348.325 |
| 779. | (2) -18.043 | 256.621 | -70.622 | 98.775 | -6.832 | 348.858 |
| 780. | -18.130 | 257.366 | -70.636 | 98.672 | -6.574 | 349.529 |
| 781. | -18.213 | 258.105 | -70.648 | 98.568 | -6.318 | 350.192 |
| 782. | -18.292 | 258.836 | -70.661 | 98.465 | -6.063 | 350.848 |
| 783. | -18.366 | 259.561 | -70.674 | 98.361 | -5.809 | 351.497 |
| 784. | -18.437 | 260.280 | -70.686 | 98.258 | -5.557 | 352.139 |
| 785. | -18.503 | 260.992 | -70.698 | 98.154 | -5.307 | 352.774 |
| 786. | -18.565 | 261.698 | -70.709 | 98.050 | -5.058 | 353.401 |
| 787. | -18.623 | 262.397 | -70.721 | 97.946 | -4.811 | 354.022 |
| 788. | -18.678 | 263.090 | -70.732 | 97.843 | -4.566 | 354.637 |
| 789. | -18.729 | 263.777 | -70.743 | 97.739 | -4.322 | 355.245 |
| 790. | -18.776 | 264.457 | -70.753 | 97.634 | -4.080 | 355.846 |
| 791. | -18.819 | 265.131 | -70.764 | 97.530 | -3.840 | 356.441 |
| 792. | -18.860 | 265.799 | -70.774 | 97.426 | -3.601 | 357.030 |
| 793. | -18.896 | 266.460 | -70.784 | 97.322 | -3.364 | 357.613 |
| 794. | -18.930 | 267.116 | -70.794 | 97.217 | -3.129 | 358.190 |
| 795. | -18.960 | 267.766 | -70.803 | 97.113 | -2.895 | 358.761 |
| 796. | -18.987 | 268.409 | -70.813 | 97.008 | -2.663 | 359.326 |
| 797. | -19.011 | 269.047 | -70.822 | 96.903 | -2.433 | 359.886 |
| 798. | -19.032 | 269.679 | -70.831 | 96.799 | -2.205 | 0.440 |
| 799. | -19.050 | 270.305 | -70.839 | 96.694 | -1.978 | 0.988 |
| 800. | -19.066 | 270.925 | -70.848 | 96.588 | -1.754 | 1.531 |
| 801. | -19.078 | 271.540 | -70.856 | 96.483 | -1.530 | 2.069 |
| 802. | -19.088 | 272.149 | -70.864 | 96.378 | -1.309 | 2.602 |
| 803. | -19.095 | 272.752 | -70.872 | 96.272 | -1.090 | 3.129 |
| 804. | -19.099 | 273.350 | -70.879 | 96.167 | -0.872 | 3.652 |
| 805. | -19.101 | 273.942 | -70.887 | 96.061 | -0.656 | 4.169 |
| 806. | -19.100 | 274.529 | -70.894 | 95.955 | -0.441 | 4.682 |
| 807. | -19.097 | 275.110 | -70.901 | 95.849 | -0.229 | 5.189 |
| 808. | -19.092 | 275.686 | -70.908 | 95.743 | -0.018 | 5.692 |
| 809. | -19.084 | 276.257 | -70.915 | 95.637 | 0.192 | 6.191 |
| 810. | -19.074 | 276.823 | -70.921 | 95.530 | 0.399 | 6.685 |
| 811. | -19.062 | 277.383 | -70.927 | 95.424 | 0.605 | 7.174 |
| 812. | -19.048 | 277.939 | -70.933 | 95.317 | 0.809 | 7.659 |
| 813. | -19.032 | 278.489 | -70.939 | 95.210 | 1.012 | 8.140 |
| 814. | -19.013 | 279.035 | -70.945 | 95.103 | 1.213 | 8.617 |
| 815. | -18.993 | 279.575 | -70.950 | 94.996 | 1.412 | 9.089 |
| 816. | -18.971 | 280.111 | -70.956 | 94.889 | 1.609 | 9.557 |
| 817. | -18.947 | 280.641 | -70.961 | 94.781 | 1.805 | 10.022 |
| 818. | -18.921 | 281.167 | -70.966 | 94.673 | 2.000 | 10.482 |
| 819. | -18.893 | 281.689 | -70.971 | 94.565 | 2.192 | 10.938 |
| 820. | -18.863 | 282.205 | -70.975 | 94.457 | 2.384 | 11.390 |
| 821. | -18.832 | 282.717 | -70.980 | 94.349 | 2.573 | 11.839 |
| 822. | -18.799 | 283.225 | -70.984 | 94.240 | 2.761 | 12.284 |
| 823. | -18.765 | 283.728 | -70.988 | 94.131 | 2.947 | 12.725 |
| 824. | -18.729 | 284.226 | -70.992 | 94.023 | 3.132 | 13.163 |
| 825. | -18.691 | 284.720 | -70.996 | 93.913 | 3.316 | 13.597 |
| 826. | -18.652 | 285.210 | -70.999 | 93.804 | 3.498 | 14.028 |
| 827. | -18.611 | 285.696 | -71.002 | 93.694 | 3.678 | 14.455 |
| 828. | -18.569 | 286.177 | -71.006 | 93.585 | 3.857 | 14.879 |
| 829. | -18.526 | 286.654 | -71.009 | 93.475 | 4.034 | 15.300 |
| 830. | -18.481 | 287.127 | -71.012 | 93.364 | 4.210 | 15.717 |
| 831. | -18.435 | 287.595 | -71.014 | 93.254 | 4.385 | 16.131 |
| 832. | -18.387 | 288.060 | -71.017 | 93.143 | 4.558 | 16.542 |
| 833. | -18.339 | 288.521 | -71.019 | 93.032 | 4.729 | 16.950 |
| 834. | -18.289 | 288.978 | -71.021 | 92.921 | 4.899 | 17.354 |
| 835. | -18.237 | 289.431 | -71.023 | 92.810 | 5.068 | 17.756 |
| 836. | -18.185 | 289.880 | -71.025 | 92.698 | 5.236 | 18.155 |
| 837. | -18.132 | 290.325 | -71.027 | 92.586 | 5.402 | 18.550 |
| 838. | -18.077 | 290.766 | -71.028 | 92.474 | 5.567 | 18.943 |
| 839. | -18.021 | 291.204 | -71.029 | 92.361 | 5.730 | 19.333 |
| 840. | -17.965 | 291.638 | -71.031 | 92.249 | 5.892 | 19.720 |

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

Table 12-9 CIDA #2 Spacecraft Attitude [EME'2000] (cont)

| TFL (days) (1) | i-LAT (deg) | i-LNG (deg) | j-LAT (deg) | j-LNG (deg) | k-LAT (deg) | k-LNG (deg) |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 841. | -17.907 | 292.068 | -71.031 | 92.136 | 6.053 | 20.105 |
| 842. | -17.848 | 292.495 | -71.032 | 92.022 | 6.212 | 20.487 |
| 843. | -17.788 | 292.918 | -71.033 | 91.909 | 6.371 | 20.866 |
| 844. | -17.727 | 293.338 | -71.033 | 91.795 | 6.528 | 21.242 |
| 845. | -17.666 | 293.755 | -71.034 | 91.681 | 6.683 | 21.616 |
| 846. | -17.603 | 294.167 | -71.034 | 91.566 | 6.838 | 21.987 |
| 847. | -17.539 | 294.577 | -71.034 | 91.452 | 6.991 | 22.356 |
| 848. | -17.475 | 294.983 | -71.033 | 91.337 | 7.143 | 22.722 |
| 849. | -17.410 | 295.386 | -71.033 | 91.221 | 7.294 | 23.086 |
| 850. | -17.343 | 295.786 | -71.033 | 91.106 | 7.443 | 23.447 |
| 851. | -17.276 | 296.182 | -71.032 | 90.990 | 7.592 | 23.806 |
| 852. | -17.209 | 296.575 | -71.031 | 90.873 | 7.739 | 24.163 |
| 853. | -17.140 | 296.965 | -71.030 | 90.757 | 7.885 | 24.517 |
| 854. | -17.071 | 297.352 | -71.029 | 90.640 | 8.030 | 24.869 |
| 855. | -17.001 | 297.736 | -71.027 | 90.522 | 8.174 | 25.219 |
| 856. | -16.930 | 298.117 | -71.026 | 90.405 | 8.317 | 25.567 |
| 857. | -16.858 | 298.495 | -71.024 | 90.287 | 8.459 | 25.912 |
| 858. | -16.786 | 298.870 | -71.022 | 90.168 | 8.600 | 26.256 |
| 859. | -16.713 | 299.242 | -71.020 | 90.050 | 8.739 | 26.597 |
| 860. | -16.639 | 299.611 | -71.017 | 89.931 | 8.878 | 26.936 |
| 861. | -16.565 | 299.978 | -71.015 | 89.811 | 9.015 | 27.273 |
| 862. | -16.490 | 300.341 | -71.012 | 89.692 | 9.152 | 27.608 |
| 863. | -16.414 | 300.702 | -71.009 | 89.571 | 9.287 | 27.941 |
| 864. | -16.338 | 301.060 | -71.006 | 89.451 | 9.421 | 28.272 |
| 865. | -16.261 | 301.415 | -71.003 | 89.330 | 9.555 | 28.601 |
| 866. | -16.184 | 301.768 | -71.000 | 89.209 | 9.687 | 28.928 |
| 867. | -16.105 | 302.118 | -70.996 | 89.087 | 9.819 | 29.253 |
| 868. | -16.027 | 302.465 | -70.993 | 88.965 | 9.949 | 29.577 |
| 869. | -15.948 | 302.810 | -70.989 | 88.843 | 10.079 | 29.898 |
| 870. | -15.868 | 303.152 | -70.985 | 88.720 | 10.207 | 30.218 |
| 871. | -15.787 | 303.491 | -70.980 | 88.596 | 10.335 | 30.536 |
| 872. | -15.707 | 303.828 | -70.976 | 88.473 | 10.462 | 30.852 |
| 873. | -15.625 | 304.163 | -70.971 | 88.349 | 10.588 | 31.166 |
| 874. | -15.543 | 304.495 | -70.966 | 88.224 | 10.713 | 31.479 |
| 875. | -15.461 | 304.825 | -70.961 | 88.099 | 10.837 | 31.790 |
| 876. | -15.378 | 305.152 | -70.956 | 87.974 | 10.960 | 32.099 |
| 877. | -15.295 | 305.477 | -70.950 | 87.848 | 11.082 | 32.407 |
| 878. | -15.211 | 305.800 | -70.945 | 87.722 | 11.204 | 32.713 |
| 879. | -15.126 | 306.120 | -70.939 | 87.595 | 11.324 | 33.017 |
| 880. | -15.041 | 306.438 | -70.933 | 87.468 | 11.444 | 33.320 |
| 881. | -14.956 | 306.754 | -70.927 | 87.340 | 11.563 | 33.621 |
| 882. | -14.870 | 307.068 | -70.920 | 87.212 | 11.681 | 33.921 |
| 883. | -14.784 | 307.379 | -70.914 | 87.083 | 11.799 | 34.219 |
| 884. | -14.697 | 307.688 | -70.907 | 86.954 | 11.915 | 34.515 |
| 885. | -14.610 | 307.995 | -70.900 | 86.825 | 12.031 | 34.810 |
| 886. | -14.522 | 308.300 | -70.893 | 86.695 | 12.146 | 35.104 |
| 887. | -14.434 | 308.603 | -70.885 | 86.564 | 12.261 | 35.396 |
| 888. | -14.346 | 308.903 | -70.877 | 86.433 | 12.374 | 35.687 |
| 889. | -14.257 | 309.202 | -70.870 | 86.302 | 12.487 | 35.976 |
| 890. | -14.168 | 309.499 | -70.861 | 86.170 | 12.599 | 36.264 |
| 891. | -14.078 | 309.793 | -70.853 | 86.037 | 12.710 | 36.551 |
| 892. | -13.988 | 310.086 | -70.845 | 85.904 | 12.821 | 36.836 |
| 893. | -13.898 | 310.376 | -70.836 | 85.771 | 12.931 | 37.120 |
| 894. | -13.807 | 310.665 | -70.827 | 85.637 | 13.040 | 37.402 |
| 895. | -13.715 | 310.952 | -70.818 | 85.502 | 13.149 | 37.683 |
| 896. | -13.624 | 311.236 | -70.808 | 85.367 | 13.257 | 37.963 |
| 897. | -13.532 | 311.519 | -70.798 | 85.231 | 13.364 | 38.242 |
| 898. | -13.439 | 311.800 | -70.789 | 85.095 | 13.470 | 38.519 |
| 899. | -13.346 | 312.079 | -70.778 | 84.958 | 13.576 | 38.795 |
| 900. | -13.253 | 312.356 | -70.768 | 84.821 | 13.681 | 39.070 |
| 901. | -13.160 | 312.632 | -70.757 | 84.683 | 13.786 | 39.343 |
| 902. | -13.066 | 312.906 | -70.747 | 84.544 | 13.890 | 39.616 |
| 903. | -12.971 | 313.177 | -70.735 | 84.405 | 13.993 | 39.887 |
| 904. | -12.877 | 313.448 | -70.724 | 84.265 | 14.096 | 40.157 |
| 905. | -12.781 | 313.716 | -70.712 | 84.125 | 14.198 | 40.426 |
| 906. | -12.686 | 313.983 | -70.701 | 83.984 | 14.300 | 40.693 |
| 907. | -12.590 | 314.247 | -70.688 | 83.843 | 14.401 | 40.960 |
| 908. | -12.494 | 314.511 | -70.676 | 83.700 | 14.501 | 41.225 |
| 909. | -12.397 | 314.772 | -70.663 | 83.558 | 14.601 | 41.490 |
| 910. | -12.300 | 315.032 | -70.650 | 83.414 | 14.700 | 41.753 |
| 911. | -12.203 | 315.290 | -70.637 | 83.270 | 14.799 | 42.015 |
| 912. | -12.105 | 315.547 | -70.624 | 83.126 | 14.897 | 42.276 |
| 913. | -12.007 | 315.802 | -70.610 | 82.981 | 14.995 | 42.536 |

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-10 CIDA #3 Spacecraft Attitude [EME'2000]

| TFL (days) (1) | i-LAT (deg) | i-LNG (deg) | j-LAT (deg) | j-LNG (deg) | k-LAT (deg) | k-LNG (deg) |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1702. | -18.287 | 258.777 | -70.650 | 98.547 | -6.109 | 350.804 |
| 1703. | -18.363 | 259.507 | -70.662 | 98.443 | -5.853 | 351.458 |
| 1704. | -18.434 | 260.232 | -70.675 | 98.339 | -5.600 | 352.104 |
| 1705. | -18.502 | 260.950 | -70.687 | 98.235 | -5.347 | 352.744 |
| 1706. | -18.565 | 261.661 | -70.698 | 98.131 | -5.097 | 353.377 |
| 1707. | -18.624 | 262.366 | -70.710 | 98.026 | -4.848 | 354.004 |
| 1708. | -18.680 | 263.064 | -70.721 | 97.922 | -4.600 | 354.623 |
| 1709. | -18.732 | 263.756 | -70.732 | 97.818 | -4.355 | 355.236 |
| 1710. | -18.780 | 264.442 | -70.743 | 97.713 | -4.110 | 355.842 |
| 1711. | -18.824 | 265.122 | -70.753 | 97.608 | -3.868 | 356.443 |
| 1712. | -18.865 | 265.795 | -70.763 | 97.504 | -3.627 | 357.037 |
| 1713. | -18.903 | 266.463 | -70.773 | 97.399 | -3.389 | 357.624 |
| 1714. | -18.937 | 267.124 | -70.783 | 97.294 | -3.151 | 358.206 |
| 1715. | -18.968 | 267.779 | -70.792 | 97.189 | -2.916 | 358.782 |
| 1716. | -18.995 | 268.428 | -70.802 | 97.084 | -2.682 | 359.352 |
| 1717. | -19.020 | 269.071 | -70.811 | 96.979 | -2.450 | 359.916 |
| 1718. | -19.041 | 269.709 | -70.820 | 96.873 | -2.220 | 0.475 |
| 1719. | -19.060 | 270.340 | -70.828 | 96.768 | -1.991 | 1.028 |
| 1720. | -19.075 | 270.966 | -70.837 | 96.662 | -1.765 | 1.576 |
| 1721. | -19.088 | 271.586 | -70.845 | 96.556 | -1.540 | 2.119 |
| 1722. | -19.098 | 272.200 | -70.853 | 96.450 | -1.316 | 2.656 |
| 1723. | -19.105 | 272.809 | -70.861 | 96.344 | -1.095 | 3.188 |
| 1724. | -19.110 | 273.412 | -70.869 | 96.238 | -0.875 | 3.715 |
| 1725. | -19.112 | 274.010 | -70.876 | 96.132 | -0.657 | 4.237 |
| 1726. | -19.111 | 274.602 | -70.883 | 96.026 | -0.441 | 4.754 |
| 1727. | -19.108 | 275.188 | -70.890 | 95.919 | -0.226 | 5.267 |
| 1728. | -19.103 | 275.770 | -70.897 | 95.812 | -0.013 | 5.774 |
| 1729. | -19.095 | 276.346 | -70.904 | 95.705 | 0.198 | 6.277 |
| 1730. | -19.085 | 276.917 | -70.910 | 95.598 | 0.407 | 6.776 |
| 1731. | -19.073 | 277.482 | -70.916 | 95.491 | 0.615 | 7.270 |
| 1732. | -19.059 | 278.043 | -70.922 | 95.384 | 0.821 | 7.759 |
| 1733. | -19.042 | 278.598 | -70.928 | 95.276 | 1.026 | 8.244 |
| 1734. | -19.024 | 279.149 | -70.934 | 95.168 | 1.228 | 8.725 |
| 1735. | -19.003 | 279.694 | -70.939 | 95.061 | 1.429 | 9.202 |
| 1736. | -18.980 | 280.235 | -70.944 | 94.953 | 1.629 | 9.674 |
| 1737. | -18.956 | 280.770 | -70.949 | 94.844 | 1.826 | 10.143 |
| 1738. | -18.930 | 281.301 | -70.954 | 94.736 | 2.023 | 10.607 |
| 1739. | -18.901 | 281.828 | -70.959 | 94.627 | 2.217 | 11.068 |
| 1740. | -18.871 | 282.349 | -70.964 | 94.518 | 2.410 | 11.525 |
| 1741. | -18.840 | 282.866 | -70.968 | 94.409 | 2.601 | 11.978 |
| 1742. | -18.806 | 283.378 | -70.972 | 94.300 | 2.791 | 12.427 |
| 1743. | -18.771 | 283.886 | -70.976 | 94.191 | 2.979 | 12.872 |
| 1744. | -18.735 | 284.389 | -70.980 | 94.081 | 3.166 | 13.314 |
| 1745. | -18.696 | 284.888 | -70.984 | 93.971 | 3.351 | 13.752 |
| 1746. | -18.657 | 285.382 | -70.987 | 93.861 | 3.535 | 14.187 |

1. TFL epoch = 02/07/99 21:31:07 UTC

Table 12-11 CIDA #3 Solar Conjunction Characteristics

| TFL (days) (1) | impact velocity (km/s) | +z-off sun (deg) | +z-off earth (deg) | +y-off SEP-N (deg) | +y-off orbit-N (deg) | +x-off ISP (deg) | fov exposure |
|-------------------|------------------------------|------------------------|--------------------------|--------------------------|----------------------------|------------------------|-----------------|
| 1657. | 58.572 | 1.608 | 1.988 | 96.536 | 177.533 | 0.000 | 0.766 |
| 1658. | 58.583 | 0.993 | 1.540 | 99.367 | 177.534 | 0.000 | 0.766 |
| 1659. | 58.588 | 0.381 | 1.194 | 101.808 | 177.535 | 0.000 | 0.766 |
| 1660. | 58.589 | 0.225 | 1.054 | 103.886 | 177.535 | 0.000 | 0.766 |
| 1661. | 58.585 | 0.826 | 1.195 | 105.631 | 177.534 | 0.000 | 0.766 |
| 1662. | 58.576 | 1.423 | 1.541 | 107.072 | 177.533 | 0.000 | 0.766 |
| 1663. | 58.562 | 2.015 | 1.988 | 108.233 | 177.532 | 0.000 | 0.766 |
| 1664. | 58.545 | 2.601 | 2.481 | 109.138 | 177.530 | 0.000 | 0.766 |
| 1665. | 58.522 | 3.183 | 2.998 | 109.808 | 177.528 | 0.000 | 0.766 |
| 1666. | 58.496 | 3.760 | 3.528 | 110.259 | 177.526 | 0.000 | 0.766 |
| 1667. | 58.466 | 4.332 | 4.065 | 110.507 | 177.522 | 0.000 | 0.766 |
| 1668. | 58.431 | 4.899 | 4.607 | 110.563 | 177.519 | 0.000 | 0.766 |
| 1669. | 58.393 | 5.460 | 5.152 | 110.437 | 177.515 | 0.000 | 0.766 |
| 1670. | 58.351 | 6.017 | 5.699 | 110.137 | 177.511 | 0.000 | 0.766 |
| 1671. | 58.306 | 6.569 | 6.248 | 109.668 | 177.506 | 0.000 | 0.766 |
| 1672. | 58.257 | 7.116 | 6.797 | 109.037 | 177.501 | 0.000 | 0.766 |
| 1673. | 58.204 | 7.658 | 7.347 | 108.245 | 177.496 | 0.000 | 0.766 |
| 1674. | 58.149 | 8.195 | 7.897 | 107.296 | 177.490 | 0.000 | 0.766 |
| 1675. | 58.090 | 8.727 | 8.447 | 106.191 | 177.484 | 0.000 | 0.766 |
| 1676. | 58.028 | 9.254 | 8.997 | 104.932 | 177.478 | 0.000 | 0.766 |
| 1677. | 57.963 | 9.776 | 9.547 | 103.520 | 177.471 | 0.000 | 0.766 |
| 1678. | 57.895 | 10.294 | 10.097 | 101.958 | 177.464 | 0.000 | 0.766 |
| 1679. | 57.825 | 10.806 | 10.646 | 100.247 | 177.457 | 0.000 | 0.766 |
| 1680. | 57.752 | 11.314 | 11.194 | 98.390 | 177.449 | 0.000 | 0.766 |
| 1681. | 57.676 | 11.817 | 11.743 | 96.391 | 177.441 | 0.000 | 0.766 |
| 1682. | 57.598 | 12.315 | 12.290 | 85.742 | 177.433 | 0.000 | 0.766 |
| 1683. | 57.517 | 12.808 | 12.837 | 88.004 | 177.425 | 0.000 | 0.766 |
| 1684. | 57.435 | 13.297 | 13.383 | 90.384 | 177.416 | 0.000 | 0.766 |
| 1685. | 57.350 | 13.781 | 13.929 | 92.870 | 177.407 | 0.000 | 0.766 |
| 1686. | 57.263 | 14.260 | 14.473 | 95.449 | 177.397 | 0.000 | 0.766 |
| 1687. | 57.174 | 14.735 | 15.017 | 98.104 | 177.388 | 0.000 | 0.766 |
| 1688. | 57.083 | 15.206 | 15.560 | 100.819 | 177.378 | 0.000 | 0.766 |
| 1689. | 56.990 | 15.671 | 16.103 | 103.575 | 177.368 | 0.000 | 0.766 |
| 1690. | 56.895 | 16.133 | 16.644 | 106.352 | 177.357 | 0.000 | 0.766 |
| 1691. | 56.799 | 16.590 | 17.184 | 109.131 | 177.347 | 0.000 | 0.766 |
| 1692. | 56.701 | 17.042 | 17.723 | 111.893 | 177.336 | 0.000 | 0.766 |
| 1693. | 56.602 | 17.490 | 18.261 | 114.619 | 177.324 | 0.000 | 0.766 |
| 1694. | 56.501 | 17.934 | 18.799 | 117.295 | 177.313 | 0.000 | 0.766 |
| 1695. | 56.399 | 18.374 | 19.335 | 119.906 | 177.301 | 0.000 | 0.766 |
| 1696. | 56.295 | 18.810 | 19.870 | 122.441 | 177.289 | 0.000 | 0.766 |
| 1697. | 56.191 | 19.241 | 20.403 | 124.890 | 177.277 | 0.000 | 0.766 |
| 1698. | (2) 56.085 | 20.000 | 21.266 | 127.247 | 177.265 | 0.332 | 0.762 |
| 1699. | 55.977 | 20.000 | 21.376 | 129.507 | 177.252 | 0.092 | 0.765 |
| 1700. | 55.869 | 20.000 | 21.488 | 131.667 | 177.240 | 0.511 | 0.760 |
| 1701. | 55.760 | 20.000 | 21.602 | 133.726 | 177.227 | 0.926 | 0.756 |
| 1702. | 55.650 | 20.000 | 21.719 | 135.685 | 177.213 | 1.338 | 0.751 |

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

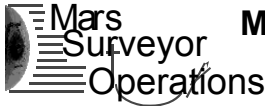
Table 12-12 CIDA #3 Solar Conjunction Spacecraft Attitude [EME'2000]

| TFL (days) (1) | i-LAT (deg) | i-LNG (deg) | j-LAT (deg) | j-LNG (deg) | k-LAT (deg) | k-LNG (deg) |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 1657. | -15.117 | 240.188 | -69.736 | 103.158 | -13.174 | 333.813 |
| 1658. | -15.224 | 240.645 | -69.766 | 103.057 | -13.007 | 334.249 |
| 1659. | -15.328 | 241.099 | -69.796 | 102.957 | -12.842 | 334.681 |
| 1660. | -15.431 | 241.550 | -69.825 | 102.856 | -12.677 | 335.110 |
| 1661. | -15.531 | 241.998 | -69.853 | 102.755 | -12.512 | 335.534 |
| 1662. | -15.629 | 242.443 | -69.881 | 102.653 | -12.348 | 335.954 |
| 1663. | -15.725 | 242.884 | -69.908 | 102.552 | -12.185 | 336.370 |
| 1664. | -15.819 | 243.323 | -69.935 | 102.451 | -12.023 | 336.782 |
| 1665. | -15.912 | 243.758 | -69.962 | 102.349 | -11.861 | 337.190 |
| 1666. | -16.002 | 244.189 | -69.988 | 102.248 | -11.700 | 337.594 |
| 1667. | -16.090 | 244.617 | -70.013 | 102.146 | -11.540 | 337.994 |
| 1668. | -16.176 | 245.042 | -70.038 | 102.044 | -11.381 | 338.389 |
| 1669. | -16.261 | 245.463 | -70.062 | 101.942 | -11.223 | 338.781 |
| 1670. | -16.343 | 245.881 | -70.086 | 101.840 | -11.065 | 339.169 |
| 1671. | -16.424 | 246.295 | -70.109 | 101.738 | -10.909 | 339.552 |
| 1672. | -16.502 | 246.706 | -70.133 | 101.636 | -10.753 | 339.931 |
| 1673. | -16.579 | 247.113 | -70.155 | 101.534 | -10.598 | 340.307 |
| 1674. | -16.654 | 247.517 | -70.177 | 101.432 | -10.444 | 340.678 |
| 1675. | -16.727 | 247.917 | -70.199 | 101.330 | -10.291 | 341.045 |
| 1676. | -16.799 | 248.313 | -70.220 | 101.227 | -10.139 | 341.408 |
| 1677. | -16.869 | 248.706 | -70.241 | 101.125 | -9.988 | 341.767 |
| 1678. | -16.937 | 249.095 | -70.262 | 101.022 | -9.838 | 342.122 |
| 1679. | -17.003 | 249.481 | -70.282 | 100.920 | -9.689 | 342.473 |
| 1680. | -17.068 | 249.862 | -70.301 | 100.817 | -9.540 | 342.820 |
| 1681. | -17.131 | 250.241 | -70.321 | 100.715 | -9.393 | 343.164 |
| 1682. | -17.193 | 250.615 | -70.340 | 100.612 | -9.247 | 343.503 |
| 1683. | -17.253 | 250.987 | -70.358 | 100.509 | -9.102 | 343.838 |
| 1684. | -17.311 | 251.354 | -70.377 | 100.407 | -8.957 | 344.170 |
| 1685. | -17.368 | 251.718 | -70.395 | 100.304 | -8.814 | 344.498 |
| 1686. | -17.424 | 252.078 | -70.412 | 100.201 | -8.672 | 344.822 |
| 1687. | -17.478 | 252.435 | -70.429 | 100.098 | -8.530 | 345.142 |
| 1688. | -17.530 | 252.789 | -70.446 | 99.995 | -8.390 | 345.459 |
| 1689. | -17.582 | 253.138 | -70.463 | 99.892 | -8.251 | 345.772 |
| 1690. | -17.631 | 253.485 | -70.479 | 99.789 | -8.113 | 346.081 |
| 1691. | -17.680 | 253.828 | -70.495 | 99.686 | -7.975 | 346.387 |
| 1692. | -17.727 | 254.167 | -70.510 | 99.582 | -7.839 | 346.690 |
| 1693. | -17.773 | 254.503 | -70.526 | 99.479 | -7.704 | 346.988 |
| 1694. | -17.818 | 254.836 | -70.541 | 99.376 | -7.569 | 347.284 |
| 1695. | -17.861 | 255.165 | -70.555 | 99.272 | -7.436 | 347.575 |
| 1696. | -17.903 | 255.491 | -70.570 | 99.169 | -7.304 | 347.864 |
| 1697. | -17.944 | 255.814 | -70.584 | 99.065 | -7.172 | 348.149 |
| 1698. (2) | -17.941 | 255.787 | -70.598 | 98.962 | -7.145 | 348.113 |
| 1699. | -18.034 | 256.545 | -70.611 | 98.858 | -6.884 | 348.797 |
| 1700. | -18.123 | 257.295 | -70.624 | 98.755 | -6.624 | 349.473 |
| 1701. | -18.208 | 258.039 | -70.637 | 98.651 | -6.365 | 350.142 |
| 1702. | -18.287 | 258.777 | -70.650 | 98.547 | -6.109 | 350.804 |

1. TFL epoch = 02/07/99 21:31:07 UTC

2. Attitude mode change

4.0 Additional Mission Plan MCRs



MSOP CHANGE REQUEST

Mission Change Request # 579 rev a
 Sequence Change Request # _____
 Command Change Request # _____

Title Mission Plan Post Launch Supplement A (Keywords)

S/C Affected:
 MGS SD
 MSÖ98O MSÖ98L

| | | |
|--|--|---------------------------------|
| Initiator: E. Hirst Phone: 818 354 4947 Date: 01 Dec 1999 Type of Change: (n/a for CMD) <input type="checkbox"/> Hardware - NASA ID: _____ H/W Location: _____ <input type="checkbox"/> Software <input checked="" type="checkbox"/> Documentation <input type="checkbox"/> Sequence # _____ Priority: <input type="checkbox"/> 1. No workaround exists <input checked="" type="checkbox"/> 2. Arduous workaround exists <input type="checkbox"/> 3. Acceptable workaround exists <input type="checkbox"/> 4. Desirable | Teams Affected by this Request: <input type="checkbox"/> GDS <input checked="" type="checkbox"/> MP&S <input checked="" type="checkbox"/> Science <input checked="" type="checkbox"/> SCT <input type="checkbox"/> TMOD <input checked="" type="checkbox"/> NAV <input type="checkbox"/> Facilities | Subsystems/Components Affected: |
| | Implementation Required by: ASAP | Related: (n/a for CMD) |
| | Documents Affected: (n/a for CMD) Mission Plan Design Reference Mission Navigation Plan | |

Change Requested:

This supplement (attachment 1) documents post-launch updates to information that is key in the implementation of the Stardust Mission Plan. The update is required as a result of having launched on the second day of the Stardust launch period, 02/07/99. Mission Plans described in the Mission Plan document... (continued next page)

Reason for Change/Command:

Bring documentation up to date given the actual launch date and operations trajectory.

Impact if not implemented:

Approximately 20 m/s to not move DSM-1. Missed opportunity for increasing ISP collection by 16-28 days. Mission Plan schedules off by 1 day and/or inconsistent with operations trajectory.

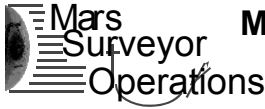
Implementation Approach:

Publish Mission Plan Supplement document. Allow flow down of new plans to subsystems.

Approved **MCCB**
 Rejected
 Authorized by: Tom Duxbury Date: 12/16/99

| | |
|---|--|
| Approximate Cost Estimate: W/F _____ \$ _____ Mission Phase No.: _____ ICA: _____ Date Implemented: Closed Date: | Comments: Modification of the Mission Plan to reflect the change in DSM#1 is also approved. |
|---|--|

10/29/96
JAB



MSOP CHANGE REQUEST

Mission Change Request # ???
Sequence Change Request #
Command Change Request #

Title Mission Plan Post Launch Supplement A

(Keywords)

S/C Affected:

MGS SD
 MSÖ98O MSÖ98L

Change Requested (cont):

(SD-75000-100-Rev. A, 02/01/99) are applicable to launching on the first day of the launch period, 02/06/99. The supplement also provides updates to detailed ISP collection and CIDA experiment spacecraft attitude data, making them consistent with the latest operations ephemeris: SDU_L_991117_990207_060401.

Two major changes to the Stardust Mission Plan are reflected in this supplement:

1. Location of Deep Space Maneuver #1: The location of this maneuver is shifted earlier by 52 days, from 03/10/2000 to 01/18/2000. This location minimizes the delta-V cost of the mission.
2. Earlier start to Interstellar Dust Collection Period #1: Earlier execution of DSM1 allows for an earlier start to the first ISP collection period. The start of collection moves 16-28 days earlier, from 03/15/2000 to 02/16-28/2000. The total duration of dust collection is increased by the same amount, corresponding to a Öfull gridÓ increase of the same amount.

The detailed changes included in this supplement are described below:

2.0 Post Launch Figure Updates

Figure

Figure 2.3-1 STARDUST (E-E-W2-E) Heliocentric Trajectory
Figure 2.3-2 STARDUST Mission Overview (1999-2006)

Change

launch date, date of DSM-1, start of ISP-1
launch date, date of DSM-1, start of ISP-1, TFL* reference
TCM-3 placed post solar conjunction
DSM-3 moved 4 days earlier to avoid July 4 holidays
DSM-4 moved 1 day later to avoid Sunday
modified DSN schedule to reflect modified DSM schedules
depicts characteristics of earlier start of ISP-1
depicts characteristics of earlier start of ISP-1
depicts characteristics of earlier start of ISP-1
depicts characteristics of earlier start of ISP-1
depicts characteristics of earlier start of ISP-1
depicts characteristics of earlier start of ISP-1

Figure 4.2-1 Profile of ISP Collection Experiment - Loop 1
Figure 4.2-2 ISP Impact Velocity History (b=1 particle)
Figure 4.2-3.a. Spacecraft +z-axis Off-sun and Off-Earth Angle History
Figure 4.2-3.b. Spacecraft +y-axis Yaw Angle History
Figure 4.2-4.a. Collector Deployment Angle and Grid Exposure History
Figure 4.2-4.b. Beta Meteoroid Impact Angle

3.0 Post Launch Table Updates

Table

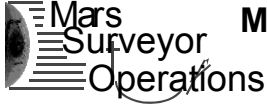
Table 2.3-1 STARDUST Mission Phases
Table 2.3-2 Baseline Mission Parameters vs. Launch Date
Table 4.1-1 Cruise Phase Subphase Definition
Table 4.2-1.a Interstellar Particle Collection Subphases
Table 4.2-2 Interstellar Particle Related CIDA Experiment Periods
Table 4.3-1.a Cruise Phase Mission Operations
Table 4.3-1.b Cruise Phase Mission Operations - DSN Profile
Table 4.3-1.c Cruise Phase Mission Operations - Spacecraft Attitude
Table 5.1-1 Earth Gravity Assist Phase Subphase Definition
Table 5.2-1 Earth Gravity Assist Phase Mission Operations
Table 6.1-1 Wild-2 Encounter Phase Subphase Definition
Table 6.3-1 Wild-2 Encounter Phase Mission Operations
Table 7.1-1 Earth Return Phase Subphase Definition
Table 7.3-1 Earth Return Phase Mission Operations
Table 10.1-3 Spacecraft Attitude Profile - Limit Cycle Model
Table 10.2-5 Spacecraft Attitude Profile - Slew dV Model
Table 10.2-6 Communications Schedules
Table 11-1 Event Listing
Table 11-2 Time Ordered Event Listing

Change

TFL references
reflects characteristics of current operations trajectory
TFL references, DSM/TCM schedule, ISP schedule
Earlier start to ISP-1, TFL references
TFL references, except CIDA-1
DSM/TCM schedule, TFL references
DSM/TCM schedules, TFL references
ISP schedule, TFL references
TFL references
TFL references
TFL references
TFL references
TFL references
TFL references
TFL references
ISP schedule, TFL references, remove duplicate entries
ISP schedule, TFL references, remove duplicate entries
DSM/TCM schedule, ISP schedule, TFL references
update mission profile as per all above
update mission profile as per all above

(continued next page)

TFL = time from launch



MSOP CHANGE REQUEST

Mission Change Request # ???
 Sequence Change Request #
 Command Change Request #

Title Mission Plan Post Launch Supplement A

(Keywords)

S/C Affected:

MGS SD
 MSÖ98O MSÖ98L

Change Requested (cont):

3.0 Post Launch Table Updates (cont)

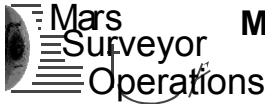
Table

- Table 12-1 ISP#1 Collection Period Characteristics
- Table 12-2 ISP#2 Collection Period Characteristics
- Table 12-3 ISP #1 Spacecraft Attitude [EMEÖ2000]
- Table 12-4 ISP#2 Spacecraft Attitude [EMEÖ2000]
- Table 12-5 CIDA#1 Collection Period Characteristics
- Table 12-6 CIDA#2 Collection Period Characteristics
- Table 12-7 CIDA#3 Collection Period Characteristics
- Table 12-8 CIDA#1 Spacecraft Attitude [EMEÖ2000]
- Table 12-9 CIDA#2 Spacecraft Attitude [EMEÖ2000]
- Table 12-10 CIDA#3 Spacecraft Attitude [EMEÖ2000]
- Table 12-11 CIDA#3 Solar Conjunction Characteristics
- Table 12-12 CIDA#3 Solar Conjunction Spacecraft Attitude [EMEÖ2000]

Change

- earlier start to ISP#1, TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory
- earlier start to ISP#1, TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory
- TFL references, reflect current operations trajectory

TFL = time from launch



MSOP CHANGE REQUEST

Mission Change Request # 612
 Sequence Change Request # _____
 Command Change Request # _____

Title Addition of TCM-A to Mission Plan (Keywords)

S/C Affected:
 MGS SD
 MSÖ98O MSÖ98L

| | | |
|--|--|---|
| Initiator: E. Hirst Phone: 818 354 4947 Date: 01 Dec 1999 Type of Change: (n/a for CMD) <input type="checkbox"/> Hardware - NASA ID: _____ H/W Location: _____ <input type="checkbox"/> Software <input checked="" type="checkbox"/> Documentation <input checked="" type="checkbox"/> Sequence # <u>TCM-A Mini-sequence</u> Priority: <input type="checkbox"/> 1. No workaround exists <input type="checkbox"/> 2. Arduous workaround exists <input checked="" type="checkbox"/> 3. Acceptable workaround exists <input type="checkbox"/> 4. Desirable | Teams Affected by this Request: <input type="checkbox"/> GDS <input checked="" type="checkbox"/> MP&S <input type="checkbox"/> Science <input checked="" type="checkbox"/> SCT <input checked="" type="checkbox"/> TMOD <input checked="" type="checkbox"/> NAV <input type="checkbox"/> Facilities | Subsystems/Components Affected: Related: (n/a for CMD) |
| | Implementation Required by: ASAP | |
| | Documents Affected: (n/a for CMD) none | |

Change Requested:

Addition of TCM-A to Mission Plan, to be executed on 28 December 1999. No change to Mission Plan documentation as planning is already in place.

Reason for Change/Command:

DSM-1, the largest maneuver of the mission at ~170 m/s, would have been the first trajectory correction maneuver given the cancellation of TCM-1. TCM-A provides the flight team with the opportunity to perform a first time event with significantly less impact to the mission should an anomaly occur.

Impact if not implemented:

Increased risk due to DSM-1 being the first trajectory correction maneuver of the mission.

Implementation Approach:

Document addition of TCM-A with this change request only. Implement 11 m/s burn on 28 December 1999.

Approved

Rejected

MCCB

Authorized by: Tom Duxbury

Date: 12/06/99

Approximate Cost Estimate:
 W/F _____ \$ _____
 Mission Phase No.: _____
 ICA: _____
 Date Implemented:
 Closed Date:

Comments:

Modification of the Mission and Navigation Plans to reflect the Addition of TCM-A is also approved.