```
S000131A.BSP LOG FILE
 Created 2000-02-22/13:56:21.00.
; BEGIN NIOSPK COMMANDS
LEAPSECONDS_FILE
                    = /usr/nav/traj/naif/mk98259a.tls
SPK_FILE
                   = S000131A.BSP
  SPK_LOG_FILE
                    = S000131A-GEM.log
  INCLUDE_TEXT_FILE = gem-comments.txt
  SOURCE_NIO_FILE = sateph/sateph-jup120.nio
                   = 505 514 515 516
    BODIES
                   = CAL-ET 1999 SEP 27 23:02:05.247
    BEGIN TIME
                    = CAL-ET 2000 FEB 01 20:01:04.184
    END_TIME
  SOURCE_NIO_FILE
                   = sateph/sateph-jup068.nio
    BODIES
                    = 506 507 508 509 510 511 512 513
                   = CAL-ET 1999 SEP 27 23:02:05.247
    BEGIN_TIME
                   = CAL-ET 2000 FEB 01 20:01:04.184
    END TIME
  SOURCE_NIO_FILE = orbiter/dpfil-980127-tour.nio
                   = -77
    BODIES
                   = CAL-ET 1997 DEC 01 00:01:03.183
    BEGIN TIME
    END_TIME
                    = CAL-ET 1998 JAN 26 00:01:03.184
  SOURCE_NIO_FILE
                   = sateph/sateph.OD201.nio
                    = 501 502 503 504 599
    BODTES
    BEGIN TIME
                   = CAL-ET 1997 DEC 01 00:01:03.183
    END_TIME
                    = CAL-ET 1998 JAN 26 00:01:03.184
  SOURCE_NIO_FILE
                   = plneph/eph.OD185.nio
    BODIES
                   = 3 5 10 301 399
                   = CAL-ET 1997 DEC 01 00:01:03.183
    BEGIN TIME
                   = CAL-ET 1998 MAY 03 20:01:03.185
    END_TIME
  SOURCE_NIO_FILE = orbiter/dpfil-980328-od208-e14-enc.nio
    BODIES
                   = -77
    BEGIN_TIME
                   = CAL-ET 1998 JAN 26 00:01:03.184
                   = CAL-ET 1998 MAR 14 00:01:03.186
    END TIME
  SOURCE_NIO_FILE = sateph/sateph.OD208.nio
    BODIES
                   = 501 502 503 504 599
    BEGIN TIME
                   = CAL-ET 1998 JAN 26 00:01:03.184
                   = CAL-ET 1998 MAR 14 00:01:03.186
    END TIME
  SOURCE_NIO_FILE
                   = orbiter/dpfil-980518-od212-tour.nio
    BODIES
                    = -77
    BEGIN TIME
                   = CAL-ET 1998 MAR 14 00:01:03.186
                    = CAL-ET 1998 MAY 03 20:01:03.185
    END_TIME
  SOURCE_NIO_FILE
                   = sateph/sateph.OD212.nio
    BODIES
                   = 501 502 503 504 599
                   = CAL-ET 1998 MAR 14 00:01:03.186
    BEGIN_TIME
    END_TIME
                   = CAL-ET 1998 MAY 03 20:01:03.185
  SOURCE_NIO_FILE = orbiter/dpfil-980720-od219-e16-enc.nio
                   = -77
    BODIES
                   = CAL-ET 1998 MAY 03 20:01:03.185
    BEGIN TIME
    END_TIME
                    = CAL-ET 1998 JUL 20 05:01:03.183
  SOURCE NIO FILE
                   = sateph/sateph.OD219.nio
    BODIES
                   = 501 502 503 504 599
    BEGIN_TIME
                   = CAL-ET 1998 MAY 03 20:01:03.185
    END_TIME
                    = CAL-ET 1998 JUL 20 05:01:03.183
                   = plneph/eph.OD214.nio
  SOURCE_NIO_FILE
                   = 3 5 10 301 399
    BODIES
    BEGIN TIME
                   = CAL-ET 1998 MAY 03 20:01:03.185
                   = CAL-ET 1998 JUL 20 05:01:03.183
    END TIME
  SOURCE_NIO_FILE = orbiter/dpfil-980925-od224-e17-enc.nio
    BODIES
                    = -77
    BEGIN TIME
                   = CAL-ET 1998 JUL 20 05:01:03.183
    END_TIME
                    = CAL-ET 1998 SEP 01 00:00:00.000
  SOURCE_NIO_FILE = sateph/sateph.OD224.nio
    BODIES
                    = 501 502 503 504 599
    BEGIN_TIME
                   = CAL-ET 1998 JUL 20 05:01:03.183
                   = CAL-ET 1998 SEP 01 00:00:00.000
    END TIME
  SOURCE_NIO_FILE
                   = plneph/eph.OD224.nio
    BODIES
                   = 3 5 10 301 399
                   = CAL-ET 1998 JUL 20 05:01:03.183
    BEGIN TIME
                    = CAL-ET 1998 SEP 01 00:00:00.000
    END_TIME
  SOURCE_NIO_FILE
                   = orbiter/dpfil-981116-od229-tour.nio
                   = -77
    BODIES
    BEGIN_TIME
                   = CAL-ET 1998 SEP 01 00:00:00.000
    END_TIME
                    = CAL-ET 1998 NOV 12 23:59:59.999
  SOURCE_NIO_FILE
                   = sateph/sateph.OD229.nio
    BODIES
                    = 501 502 503 504 599
                   = CAL-ET 1998 SEP 01 00:00:00.000
    BEGIN TIME
                    = CAL-ET 1998 NOV 12 23:59:59.999
    END_TIME
  SOURCE_NIO_FILE
                   = plneph/eph.OD229.nio
                    = 3 5 10 301 399
    BODIES
    BEGIN_TIME
                    = CAL-ET 1998 SEP 01 00:00:00.000
    END_TIME
                    = CAL-ET 1998 NOV 12 23:59:59.999
                   = orbiter/post-GEM-990114.nio
  SOURCE NIO FILE
```

```
BODTES
                  = -77
 BEGIN TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
  END TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
SOURCE_NIO_FILE = sateph/sateph.OD233.nio
 BODIES
                  = 501 502 503 504 599
 BEGIN_TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
                  = CAL-ET 1999 JAN 01 00:00:00.000
 END TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD232.nio
                  = 3 5 10 301 399
  BODIES
                  = CAL-ET 1998 NOV 12 23:59:59.999
 BEGIN_TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
 END_TIME
SOURCE_NIO_FILE
                 = orbiter/dpfil-990426-od241-tour.nio
 BODIES
                  = -77
                 = CAL-ET 1999 JAN 01 00:00:00.000
= CAL-ET 1999 APR 22 23:59:59.999
 BEGIN TIME
 END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD241.nio
 BODIES
                  = 501 502 503 504 599
                  = CAL-ET 1999 JAN 01 00:00:00.000
 BEGIN_TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
  END TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD238.nio
                  = 3 5 10 301 399
 BODTES
 BEGIN_TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
  END_TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
SOURCE NIO FILE
                 = orbiter/dpfil-990629-od248-c21-enc.nio
 BODIES
                  = -77
 BEGIN_TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
                  = CAL-ET 1999 JUN 08 23:59:59.999
 END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD248.nio
 BODIES
                  = 501 502 503 504 599
  BEGIN_TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
                  = CAL-ET 1999 JUN 08 23:59:59.999
 END TIME
                 = plneph/eph.OD248.nio
SOURCE_NIO_FILE
  BODIES
                  = 3 5 10 301 399
 BEGIN TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
                  = CAL-ET 1999 JUN 08 23:59:59.999
 END TIME
SOURCE_NIO_FILE
                 = orbiter/dpfil-990813-od252-c22-enc.nio
  BODIES
                  = -77
 BEGIN TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
                  = CAL-ET 1999 JUL 25 00:01:04.183
 END_TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD252.nio
 BODIES
                  = 501 502 503 504 599
                  = CAL-ET 1999 JUN 08 23:59:59.999
 BEGIN_TIME
                  = CAL-ET 1999 JUL 25 00:01:04.183
 END_TIME
SOURCE_NIO_FILE = plneph/eph.OD248.nio
                  = 3 5 10 301 399
 BODIES
 BEGIN_TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
  END_TIME
                  = CAL-ET 1999 JUL 25 00:01:04.183
SOURCE_NIO_FILE
                 = orbiter/dpfil-990915-od256-c23-enc.nio
 BODIES
                  = -77
 BEGIN_TIME
                  = CAL-ET 1999 JUL 25 00:01:04.183
 END_TIME
                  = CAL-ET 1999 AUG 29 11:59:59.999
SOURCE_NIO_FILE
                 = sateph/sateph.OD256.nio
                  = 501 502 503 504 599
 BODIES
 BEGIN TIME
                  = CAL-ET 1999 JUL 25 00:01:04.183
                  = CAL-ET 1999 AUG 29 11:59:59.999
 END_TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD248.nio
 BODIES
                  = 3 5 10 301 399
  BEGIN TIME
                  = CAL-ET 1999 JUL 25 00:01:04.183
                  = CAL-ET 1999 AUG 29 11:59:59.999
 END_TIME
SOURCE_NIO_FILE = orbiter/dpfil-991010-od263-i24-enc.nio
                  = -77
 BODIES
 BEGIN_TIME
                  = CAL-ET 1999 AUG 29 11:59:59.999
                  = CAL-ET 1999 SEP 27 01:00:00.000
 END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD263.nio
  BODIES
                  = 501 502 503 504 599
                  = CAL-ET 1999 AUG 29 11:59:59.999
 BEGIN TIME
                  = CAL-ET 1999 SEP 27 01:00:00.000
 END_TIME
SOURCE_NIO_FILE
                  = plneph/eph.OD261.nio
 BODIES
                  = 3 5 10 301 399
                  = CAL-ET 1999 AUG 29 11:59:59.999
= CAL-ET 1999 SEP 27 01:00:00.000
 BEGIN_TIME
 END_TIME
                  = orbiter/dpfil-991125-od271-i25-enc.nio
SOURCE_NIO_FILE
                  = -77
 BODIES
                  = CAL-ET 1999 SEP 27 01:00:00.000
 BEGIN TIME
  END_TIME
                  = CAL-ET 1999 NOV 12 00:59:59.999
SOURCE_NIO_FILE
                 = sateph/sateph.OD271.nio
 BODTES
                  = 501 502 503 504 599
 BEGIN_TIME
                  = CAL-ET 1999 SEP 27 01:00:00.000
                  = CAL-ET 1999 NOV 12 00:59:59.999
  END_TIME
SOURCE_NIO_FILE
                  = plneph/eph.OD261.nio
 BODIES
                  = 3 5 10 301 399
  BEGIN_TIME
                  = CAL-ET 1999 SEP 27 01:00:00.000
                  = CAL-ET 1999 NOV 12 00:59:59.999
 END TIME
SOURCE_NIO_FILE
                  = orbiter/dpfil-000102-od277-e26-enc.nio
  BODIES
                  = -77
```

```
BEGIN_TIME
                = CAL-ET 1999 NOV 12 00:59:59.999
END_TIME = CAL-ET 1999 DEC 24 12:01:04.183
SOURCE_NIO_FILE = sateph/sateph.OD277.nio
                 = 501 502 503 504 599
 BODTES
 BEGIN_TIME
                 = CAL-ET 1999 NOV 12 00:59:59.999
                 = CAL-ET 1999 DEC 24 12:01:04.183
 END_TIME
SOURCE_NIO_FILE = plneph/eph.OD261.nio
                 = 3 5 10 301 399
 BODTES
 BEGIN_TIME
                 = CAL-ET 1999 NOV 12 00:59:59.999
                 = CAL-ET 1999 DEC 24 12:01:04.183
 END_TIME
SOURCE_NIO_FILE = orbiter/dpfil-000221-od281-i27-enc.nio
 BODIES
                 = -77
 BEGIN_TIME
                 = CAL-ET 1999 DEC 24 12:01:04.183
                 = CAL-ET 2000 FEB 01 20:01:04.184
 END TIME
SOURCE NIO FILE = sateph/sateph.OD281.nio
  BODIES
                 = 501 502 503 504 599
 BEGIN_TIME
                 = CAL-ET 1999 DEC 24 12:01:04.183
                 = CAL-ET 2000 FEB 01 20:01:04.184
 END_TIME
SOURCE_NIO_FILE = plneph/eph.OD261.nio
 BODIES
                 = 3 5 10 301 399
 BEGIN TIME
                 = CAL-ET 1999 DEC 24 12:01:04.183
                 = CAL-ET 2000 FEB 01 20:01:04.184
 END_TIME
```

### ; END NIOSPK COMMANDS

Note: This is the final SPK file for the Galileo GEM mission.

The designation is S000131A.BSP, ...XSP, ...BSP\_LBL

GENERAL COMMENTS:

## KEY TO FILE SEGMENTS:

01-DEC-1997 to 26-JAN-1998 Reconstruction for Orbit 12, OD201 26-JAN-1998 to 14-MAR-1998 Reconstruction for Orbit 13, OD208 14-MAR-1998 to 03-MAY-1998 Reconstruction for Orbit 14, OD212 03-MAY-1998 to 20-JUL-1998 Reconstruction for Orbit 15, OD219 20-JUL-1998 to 01-SEP-1998 Reconstruction for Orbit 16, OD224 01-SEP-1998 to 13-NOV-1998 Reconstruction for Orbit 17, OD229 13-NOV-1998 to 01-JAN-1999 Reconstruction for Orbit 18, OD233 01-JAN-1999 to 23-APR-1999 Reconstruction for Orbit 19, OD241 23-APR-1999 to 09-JUN-1999 Reconstruction for Orbit 20, OD248 09-JUN-1999 to 25-JUL-1999 Reconstruction for Orbit 21, OD252 25-JUL-1999 to 29-AUG-1999 Reconstruction for Orbit 22, OD256 27-SEP-1999 to 12-NOV-1999 Reconstruction for Orbit 24, OD271 12-NOV-1999 to 24-DEC-1999 Reconstruction for Orbit 25, OD277 24-DEC-1999 to 31-JAN-2000 Reconstruction for Orbit 26, OD281

This file is a compilation of reconstructed trajectory segments. This file begins 1-DEC-1997 (DOY 97-335) and continues to the end of the GEM tour (DOY 00-031).

The file for the primary tour is S980326A.BSP. It is compiled of reconstructed data only and ends on 1-JAN-1998 (DOY 98-001).

A similar file covering reconstructed segments for the interplanetary trajectory can be found in a S970312A.BSP. The final reconstruction for the probe trajectory is provided separately in S960730A.BSP.

Amalthea is included for Orbit 22 of the GEM Mission. Bodies included in this file and radii for Jupiter and the Jovian satellites are:

| Name               | Body Number | Radius (km)               |
|--------------------|-------------|---------------------------|
| Orbiter            | -77         |                           |
| Earth              | 399         | 6378.14                   |
| Earth barycenter   | 3           |                           |
| Moon               | 301         | 1737.40                   |
| Sun barycenter     | 10          |                           |
| Jupiter            | 599         | 71492.0                   |
| Jupiter barycenter | 5           |                           |
| Io                 | 501         | 1821.3                    |
| Europa             | 502         | 1565.0                    |
| Ganymede           | 503         | 2634.0                    |
| Callisto           | 504         | 2403.0                    |
| Amalthea           | 505         | 86.2 (GEM orbit C22 only) |
| Himalia            | 506         | 85.0                      |
| Elara              | 507         | 40.0                      |
| Pasiphae           | 508         | 18.0                      |
| Sinope             | 509         | 14.0                      |
| Lysithea           | 510         | 12.0                      |
| Carme              | 511         | 15.0                      |
| Ananke             | 512         | 10.0                      |
| Leda               | 513         | 5.0                       |

```
11/1/23, 9:37 PM
```

Thebe 514 50.0 Adrastea 515 10.0 Metis 516 20.0

NOTE: The radii values were taken from the Report of the IAU/IAG/COSPAR Working Group on Cartographic Coordinates and Rotational Elements

of the Planets and Satellites: 1994.

Each segment listed has information under the following headings:

COMMENTS

TRAJECTORY BASIS/OD SOLUTION

TIME SPAN

SIGNIFICANT EVENTS

INPUT FILES

ET is used to denote ephemeris time; it differs from UTC (universal time coordinated) in which spacecraft events are usually given by the following:

ET minus UTC = 63.184 sec (as of Jul. 1, 1997) = 64.184 sec (as of Jan. 1, 1999)

SCLK is spacecraft clock string.

Questions should be directed to:

Joan Pojman (818 354-0264, Joan.Pojman@jpl.nasa.gov)

RECONSTRUCTION FOR ORBIT 12

COMMENTS: Reconstruction for Europa 12 encounter.

TRAJECTORY BASIS/OD SOLUTION: OD-201

TIME SPAN:

BEGIN: 01-DEC-1997 00:01:03.184 ET DOY: 97-335 01-DEC-1997 00:00:00.000 UTC DOY: 97-335 1/04240645:13:3:3 SCLK

END: 26-JAN-1998 00:00:00.000 ET DOY: 98-026 25-JAN-1998 23:58:56.815 UTC DOY: 98-026

25-JAN-1998 23:58:56.815 UTC DOY: 98-1/04320397:90:8:7 SCLK

1/04320397:90:8:7 SCL

### SIGNIFICANT EVENTS:

Europa 12 closest approach:

16-DEC-1997 12:04:23.06 ET (12:03:19.87 UTC, 1/04262723:16:3:3 SCLK)

Altitude: 201.0 km +/- 0.015 km Latitude: -8.66 deg +/- 0.003 deg

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

16-DEC-1997 06:35:56.58 ET (06:34:53.40 UTC, 1/04262398:31:6:1 SCLK)

Range to Jupiter from S/C: 629039.69 km (8.79874 Rj)

INPUT FILES:

Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio Satellite eph file: /usr/nav/od/deliveries/OD196/sateph.OD201.nio

Epoch file: /usr/nav/od/deliveries/OD201/epoch
GIN file /usr/nav/eph/gin-0894.nio

GIN file /usr/nav/eph/gin-0894.nio STOIC file /usr/nav/od/stoic/ld980430.p

STOIC file /usr/nav/od/stoic/ld980430.pt980711

P-file /usr/nav/traj/ref-traj/dpfil-980127-tour.nio

-----

RECONSTRUCTION FOR ORBIT 13

COMMENTS: Reconstruction for Phasing Orbit 13.

TRAJECTORY BASIS/OD SOLUTION: OD-208

TIME SPAN:

BEGIN: 26-JAN-1998 00:00:00.000 ET DOY: 98-026 25-JAN-1998 23:58:56.815 UTC DOY: 98-026

1/04320397:90:8:7 SCLK

END: 14-MAR-1998 00:01:03.186 ET DOY: 98-073 14-MAR-1998 00:00:00.001 UTC DOY: 98-073

1/04387335:31:3:0 SCLK

## SIGNIFICANT EVENTS:

Europa 13A closest approach:

10-FEB-1998 17:58:35.67 ET (17:57:32.48 UTC, 1/04342827:35:6:1 SCLK)

Altitude: 3557.2 km +/- 0.052 kmLatitude: -8.93 deg +/- 0.0046 deg

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

10-FEB-1998 23:10:17.78 ET (23:09:14.60 UTC, 1/04343135:60:8:0 SCLK) Range to Jupiter from S/C: 633063.38 km (8.85502 Rj)

INPUT FILES:

Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio Satellite eph file: /usr/nav/od/deliveries/OD208/sateph.OD208.nio

```
11/1/23, 9:37 PM
  Epoch file:
                      /usr/nav/od/deliveries/OD208/epoch
  GIN file
                      /usr/nav/eph/gin-0198.nio
  STOIC file
                      /usr/nav/od/stoic/ld980326.pt980606
  P-file
                      /usr/nav/traj/pfiles/dpfil-980328-od208-e14-enc.nio
                      RECONSTRUCTION FOR ORBIT 14
 COMMENTS: Reconstruction for Orbit 14
            ET minus UTC is 63.184 seconds as of July 1, 1997.
 TRAJECTORY BASIS/OD SOLUTION: OD-212
 TTMF SPAN:
                 BEGIN: 14-MAR-1998 00:01:03.186 ET DOY: 98-073
                        14-MAR-1998 00:00:00.001 UTC DOY: 98-073
                        1/04387335:31:3:0
                                               SCLK
                   END: 03-MAY-1998 20:01:03.186 ET DOY: 98-123
                        03-MAY-1998 20:00:00.000 UTC DOY: 98-123
                        1/04459730:90:2:3
                                                SCLK
 SIGNIFICANT EVENTS:
   Europa 14 closest approach:
     29-MAR-1998 13:22:08.33 ET (13:21:05.14 UTC, 1/04409490:25:2:1 SCLK)
     Altitude:
                 1644.1 km +/- 0.015 km
                 12.21 deg +/- 0.001 deg
     Latitude:
                          (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     29-MAR-1998 08:00:16.60 ET (07:59:13.41 UTC, 1/04409171:86:6:0 SCLK)
     Range to Jupiter from S/C: 631692.54 km (8.83585 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio
  Satellite eph file: /usr/nav/od/deliveries/OD212/sateph.OD212.nio
                     /usr/nav/od/deliveries/OD212/epoch
  Epoch file:
  GIN file
                     /usr/nav/eph/gin-0198.nio
  STOIC file
                      /usr/nav/od/stoic/ld980430.pt980711
                      /usr/nav/traj/pfiles/dpfil-980518-od212-tour.nio
  P-file
                      RECONSTRUCTION FOR ORBIT 15
 COMMENTS: Reconstruction for Orbit 15
            ET minus UTC is 63.184 seconds as of July 1, 1997.
 TRAJECTORY BASIS/OD SOLUTION: OD-219
 TIME SPAN:
                 BEGIN: 03-MAY-1998 20:01:03.186 ET DOY: 98-123
                        03-MAY-1998 20:00:00.000 UTC DOY: 98-123
                        1/04459730:90:2:3
                                               SCLK
                   END: 20-JUL-1998 05:01:03.186 ET
                                                     DOY: 98-201
                        20-JUL-1998 05:00:00.000 UTC DOY: 98-201
                        1/04569926:59:8:6
                                                SCLK
 SIGNIFICANT EVENTS:
   Europa 15 closest approach:
     31-MAY-1998 21:13:59.77 ET (21:12:56.59 UTC, 1/04499680:07:2:7 SCLK)
     Altitude:
                 2514.5 km +/- 0.0134 km
                  15.00 deg +/- 0.001 deg
     Latitude:
                          (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     01-JUN-1998 02:35:44.77 ET (02:34:41.59 UTC, 1/04499998:26:8:0 SCLK)
     Range to Jupiter from S/C: 632696.58 km (8.84989 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD214/eph.OD214.nio
```

Satellite eph file: /usr/nav/od/deliveries/OD219/sateph.OD219.nio

Epoch file: /usr/nav/od/deliveries/OD219/epoch GIN file /usr/nav/eph/gin-0198.nio

STOIC file /usr/nav/od/stoic/ld980715.pt980925

/usr/nav/traj/pfiles/dpfil-980720-od219-e16-enc.nio P-file

RECONSTRUCTION FOR ORBIT 16

COMMENTS: Reconstruction for Orbit 16

ET minus UTC is 63.184 seconds as of July 1, 1997.

TRAJECTORY BASIS/OD SOLUTION: OD-224

TIME SPAN:

BEGIN: 20-JUL-1998 05:01:03.186 ET DOY: 98-201 20-JUL-1998 05:00:00.000 UTC DOY: 98-201

1/04569926:59:8:6 SCLK

```
END: 01-SEP-1998 00:00:00.000 ET
                                                    DOY: 98-244
                       31-AUG-1998 23:58:56.818 UTC DOY: 98-243
                      1/04630868:46:3:4
                                              SCLK
SIGNIFICANT EVENTS:
  Europa 16 closest approach:
```

21-JUL-1998 05:04:47.95 ET (05:03:44.77 UTC, 1/04571354:49:1:1 SCLK)

Altitude: 1834.2 km +/- 0.0123 km -25.65 deg +/- 0.00039 deg

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

21-JUL-1998 00:19:02.08 ET (00:17:58.89 UTC, 1/04571071:83:2:7 SCLK)

Range to Jupiter from S/C: 632799.65 km (8.85134 Rj)

TNPUT FTLES:

Planetary eph file: /usr/nav/od/deliveries/OD224/eph.OD224.nio Satellite eph file: /usr/nav/od/deliveries/OD224/sateph.OD224.nio

Epoch file: /usr/nav/od/deliveries/OD224/epoch

GIN file /usr/nav/eph/gin-0198.nio

STOIC file /usr/nav/od/stoic/ld980917.pt981128

P-file /usr/nav/traj/pfiles/dpfil-980925-od224-e17-enc.nio

\_\_\_\_\_\_

RECONSTRUCTION FOR ORBIT 17

COMMENTS: Reconstruction for Orbit 17

ET minus UTC is 63.184 seconds as of July 1, 1997.

TRAJECTORY BASIS/OD SOLUTION: OD-229

TIME SPAN:

BEGIN: 01-SEP-1998 00:00:00.000 ET DOY: 98-244 31-AUG-1998 23:58:56.818 UTC DOY: 98-243 1/04630868:46:3:4 SCLK

END: 13-NOV-1998 00:00:00.000 ET DOY: 98-317 12-NOV-1998 23:58:56.817 UTC DOY: 98-316

1/04734833:36:8:6 SCLK

SIGNIFICANT EVENTS:

Europa 17 closest approach:

26-SEP-1998 03:55:23.02 ET (03:54:19.84 UTC, 1/04666705:65:7:6 SCLK)

3582.4 km +/- 0.015 km Altitude: Latitude: -42.43 deg +/- 0.0002 deg

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

26-SEP-1998 08:27:30.34 ET (08:26:27.16 UTC, 1/04666974:77:7:7 SCLK)

Range to Jupiter from S/C: 637028.58 km (8.91049 Rj)

INPUT FILES:

Planetary eph file: /usr/nav/od/deliveries/OD229/eph.OD229.nio Satellite eph file: /usr/nav/od/deliveries/OD229/sateph.OD229.nio

/usr/nav/od/deliveries/OD229/epoch Epoch file: GIN file /usr/nav/eph/gin-0198.nio

STOIC file /usr/nav/od/stoic/ld981105.pt990116

/usr/nav/traj/pfiles/dpfil-981116-od229-tour.nio P-file

RECONSTRUCTION FOR ORBIT 18

COMMENTS: Reconstruction for Orbit 18

ET minus UTC is 63.184 seconds as of July 1, 1997.

TRAJECTORY BASIS/OD SOLUTION: OD-233

TIME SPAN:

BEGIN: 13-NOV-1998 00:00:00.000 ET DOY: 98-317 12-NOV-1998 23:58:56.817 UTC DOY: 98-316

1/04734833:36:8:6 SCLK

END: 01-JAN-1999 00:00:00.000 ET DOY: 99-001 31-DEC-1998 23:58:56.817 UTC DOY: 98-365

1/04804618:05:4:6 SCLK

SIGNIFICANT EVENTS:

Europa 18 closest approach:

22-NOV-1998 11:39:29.39 ET (11:38:26.21 UTC, 1/04748342:72:5:7 SCLK)

Altitude: 2270.8 km +/- 0.013 km 41.34 deg +/- 0.0 deg Latitude:

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

22-NOV-1998 07:31:54.95 ET (07:30:51.76 UTC, 1/04748097:85:9:0 SCLK)

Range to Jupiter from S/C: 639331.79 km (8.94270 Rj)

INPUT FILES:

Planetary eph file: /usr/nav/od/deliveries/OD232/eph.OD232.nio Satellite eph file: /usr/nav/od/deliveries/OD233/sateph.OD233.nio

```
11/1/23, 9:37 PM
  Epoch file:
                      /usr/nav/od/deliveries/OD233/epoch
  GIN file
                      /usr/nav/eph/gin-0198.nio
  STOIC file
                      /usr/nav/od/stoic/ld981229.pt990311
  P-file
                      /usr/traj1/post-GEM/990114/post-GEM-990114.nio
                      RECONSTRUCTION FOR ORBIT 19
 COMMENTS: Reconstruction for Europa 19
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-241
 TTMF SPAN:
                 BEGIN: 01-JAN-1999 00:00:00.000 ET DOY: 99-001
                        31-DEC-1998 23:58:56.817 UTC DOY: 98-365
                        1/04804618:05:4:6
                                               SCLK
                   END: 23-APR-1999 00:00:00.000 ET DOY: 99-113
                        22-APR-1999 23:58:55.814 UTC DOY: 99-112
                        1/04964125:76:8:4
                                               SCLK
 SIGNIFICANT EVENTS:
   Europa 19 closest approach:
     01-FEB-1999 02:20:54.13 ET (02:19:49.94 UTC, 1/04848906:80:9:5 SCLK)
     Altitude:
                 1439.4 km +/- 0.0139 km
                  30.52 deg +/- 0.000 deg
     Latitude:
                          (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     01-FEB-1999 05:03:14.45 ET (05:02:10.27 UTC, 1/04849067:40:4:4 SCLK)
     Range to Jupiter from S/C: 651211.84 km (9.10888 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD238/eph.OD238.nio
  Satellite eph file: /usr/nav/od/deliveries/OD241/sateph.OD241.nio
                     /usr/nav/od/deliveries/OD241/epoch
  Epoch file:
  GIN file
                     /usr/nav/eph/gin-0198.nio
  STOIC file
                      /usr/nav/od/stoic/ld990415.pt990708
  P-file
                      /usr/nav/traj/ref-traj/dpfil-990426-od241-tour.nio
                      RECONSTRUCTION FOR ORBIT 20
 COMMENTS: Reconstruction for Callisto 20
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-248
 TIME SPAN:
                 BEGIN: 23-APR-1999 00:00:00.000 ET DOY: 99-113
                        22-APR-1999 23:58:55.814 UTC DOY: 99-112
                        1/04964125:76:8:4
                                               SCLK
                   END: 09-JUN-1999 00:00:00.000 ET
                                                     DOY: 99-160
                        08-JUN-1999 23:58:55.815 UTC DOY: 99-159
                        1/05031062:13:3:6
                                                SCLK
 SIGNIFICANT EVENTS:
   Callisto 20 closest approach:
     05-MAY-1999 13:57:22.30 ET (13:56:18.11 UTC, 1/04982044:12:2:3 SCLK)
     Altitude: 1321.4 km +/- 0.0151 km
                   2.78 deg +/- 0.0015 deg
     Latitude:
                          (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     03-MAY-1999 17:01:15.21 ET (17:00:11.02 UTC, 1/04979377:58:4:5 SCLK)
     Range to Jupiter from S/C: 670009.42 km (9.37181 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD248/sateph.OD248.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD248/epoch
  GIN file
                      /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                      /usr/nav/od/stoic/ld990624.pt990910
                      /usr/nav/traj/pfiles/dpfil-990629-od248-c21-enc.nio
  P-file
                      RECONSTRUCTION FOR ORBIT 21
 COMMENTS: Reconstruction for Callisto 21
```

ET minus UTC is 64.184 seconds as of January 1, 1999.

TRAJECTORY BASIS/OD SOLUTION: OD-252

TIME SPAN:

BEGIN: 09-JUN-1999 00:00:00.000 ET DOY: 99-160 08-JUN-1999 23:58:55.815 UTC DOY: 99-159 SCLK

1/05031062:13:3:6

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11/1/23, 9:37 PM
                  END: 25-JUL-1999 00:01:04.184 ET
                                                    DOY: 99-206
                       25-JUL-1999 00:00:00.000 UTC DOY: 99-206
                       1/05096575:30:1:1
                                               SCLK
 SIGNIFICANT EVENTS:
   Callisto 21 closest approach:
     30-JUN-1999 07:47:53.87 ET (07:46:49.69 UTC, 1/05061432:55:7:7 SCLK)
     Altitude:
               1048.1 km +/- 0.011 km
                  -0.7 deg +/- 0.0003 deg
                         (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     02-JUL-1999 05:05:56.36 ET (05:04:52.18 UTC, 1/05064120:71:6:6 SCLK)
     Range to Jupiter from S/C: 519747.15 km (7.27000 Rj)
 TNPUT FTLES:
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD252/sateph.OD252.nio
                     /usr/nav/od/deliveries/OD252/epoch
  Epoch file:
  GIN file
                     /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                     /usr/nav/od/stoic/ld990729.pt991009
  P-file
                     /usr/nav/traj/pfiles/dpfil-990813-od252-c22-enc.nio
  ______
                     RECONSTRUCTION FOR ORBIT 22
 COMMENTS: Reconstruction for Callisto 22
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-256
 TIME SPAN:
                 BEGIN: 25-JUL-1999 00:01:04.184 ET DOY: 99-206
                       25-JUL-1999 00:00:00.000 UTC DOY: 99-206
                       1/05096575:30:1:1
                                              SCLK
                  END: 29-AUG-1999 12:00:00.000 ET DOY: 99-241
                       29-AUG-1999 11:58:55.817 UTC DOY: 99-241
                       1/05147132:49:5:1
                                               SCLK
 SIGNIFICANT EVENTS:
   Callisto 22 closest approach:
     14-AUG-1999 08:31:55.94 ET (08:30:51.76 UTC, 1/05125564:10:2:7 SCLK)
               2299.3 km +/- 0.015 km
     Altitude:
                  -2.3 +/- 0.001 deg
     Latitude:
                         (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     12-AUG-1999 10:59:35.66 ET (10:58:31.48 UTC, 1/05122861:72:7:2 SCLK)
     Range to Jupiter from S/C: 523080.41 km (7.31663 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD256/sateph.OD256.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD256/epoch
  GIN file
                     /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                     /usr/nav/od/stoic/ld990909.pt991202
                     /usr/nav/traj/pfiles/dpfil-990915-od256-c23-enc.nio
  P-file
                     RECONSTRUCTION FOR ORBIT 23
 COMMENTS: Reconstruction for Callisto 23
           ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-263
 TIME SPAN:
                 BEGIN: 29-AUG-1999 12:00:00.000 ET DOY: 99-241
                       29-AUG-1999 11:58:55.817 UTC DOY: 99-241
                       1/05147132:49:5:1
                                              SCLK
                   END: 27-SEP-1999 01:00:00.000 ET
                                                    DOY: 99-270
                       27-SEP-1999 00:58:55.818 UTC DOY: 99-270
                       1/05187780:83:6:4
                                               SCLK
 SIGNIFICANT EVENTS:
   Callisto 23 closest approach:
     16-SEP-1999 17:28:06.00 ET (17:27:01.813 UTC, 1/05173092:19:8:6 SCLK)
     Altitude:
                1052.4 km +/- 0.0118 km
                 0.0986 deg. +/- 0.001 deg
     Latitude:
                         (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     14-SEP-1999 19:58:41.02 ET (19:57:36.83 UTC, 1/05170392:72:2:5 SCLK)
```

Range to Jupiter from S/C: 467972.00 km (6.54580 Rj)

## INPUT FILES:

Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio Satellite eph file: /usr/nav/od/deliveries/OD263/sateph.OD263.nio

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11/1/23, 9:37 PM
  Epoch file:
                      /usr/nav/od/deliveries/OD263/epoch
  GIN file
                      /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                      /usr/nav/od/stoic/ld990930.pt991211
                      /usr/nav/traj/pfiles/dpfil-991010-od263-i24-enc.nio
  P-file
                     RECONSTRUCTION FOR ORBIT 24
 COMMENTS: Reconstruction for Io 24
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-271
 TTMF SPAN:
                 BEGIN: 27-SEP-1999 01:00:00.000 ET DOY: 99-270
                        27-SEP-1999 00:58:55.818 UTC DOY: 99-270
                        1/05187780:83:6:4
                                              SCLK
                   END: 12-NOV-1999 01:00:00.000 ET DOY: 99-316
                        12-NOV-1999 00:58:55.817 UTC DOY: 99-316
                        1/05253293:04:1:1
                                               SCLK
 SIGNIFICANT EVENTS:
   Io 24 closest approach:
     11-OCT-1999 04:34:06.72 ET (04:33:02.53 UTC, 1/05207931:13:8:0 SCLK)
     Altitude:
                611.3 km +/- 0.011 km
                 4.507 deg. +/- 0.003 deg
     Latitude:
                          (Io-centered, Io True Equator of Date)
   Jupiter Periapsis:
     11-OCT-1999 02:03:41.50 ET (02:02:37.31 UTC, 1/05207782:34:9:4 SCLK)
     Range to Jupiter from S/C: 396600.93 km (5.54749 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
  Satellite eph file: /usr/nav/od/deliveries/OD271/sateph.OD271.nio
                     /usr/nav/od/deliveries/OD271/epoch
  Epoch file:
  GIN file
                      /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                      /usr/nav/od/stoic/ld991121.pt000201
  P-file
                      /usr/nav/traj/pfiles/dpfil-991125-od271-i25-enc.nio
                     RECONSTRUCTION FOR ORBIT 25
 COMMENTS: Reconstruction for Io 25
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-277
 TIME SPAN:
                 BEGIN: 12-NOV-1999 01:00:00.000 ET DOY: 99-316
                        12-NOV-1999 00:58:55.817 UTC DOY: 99-316
                        1/05253293:04:1:1
                                            SCLK
                   END: 24-DEC-1999 12:01:04.184 ET
                                                     DOY: 99-358
                        24-DEC-1999 12:00:00.000 UTC DOY: 99-358
                        1/05313762:24:5:7
                                               SCLK
 SIGNIFICANT EVENTS:
   Io 25 closest approach:
     26-NOV-1999 04:06:25.06 ET (04:05:20.88 UTC, 1/05273415:80:7:5 SCLK)
                  300.484 km +/- 0.412 km
     Altitude:
     Latitude:
                  -76.383 deg. +/- 0.0025 deg.
                          (Io-centered, Io True Equator of Date)
   Jupiter Periapsis:
     26-NOV-1999 02:09:53.86 ET (02:08:49.68 UTC, 1/05273300:58:9:5 SCLK)
     Range to Jupiter from S/C: 405572.12 km (5.67297 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
  Satellite eph file: /usr/nav/od/deliveries/OD277/sateph.OD277.nio
                     /usr/nav/od/deliveries/OD277/epoch
  Epoch file:
  GIN file
                      /usr/nav/eph/gin-0198.v205.nio
  STOTC file
                      /usr/nav/od/stoic/ld991228.pt000309
  P-file
                      /usr/nav/traj/pfiles/dpfil-000102-od277-e26-enc.nio
                                               -----
                     RECONSTRUCTION FOR ORBIT 26
 COMMENTS: Reconstruction for Orbit 26
            ET minus UTC is 64.184 seconds as of January 1, 1999.
```

TRAJECTORY BASIS/OD SOLUTION: OD-281

TIME SPAN:

BEGIN: 24-DEC-1999 12:01:04.184 ET DOY: 99-358 24-DEC-1999 12:00:00.000 UTC DOY: 99-358 1/05313762:24:5:7 SCLK END: 01-FEB-2000 20:00:00.000 ET DOY: 00-032

01-FEB-2000 19:58:55.816 UTC DOY: 00-032

https://naif.jpl.nasa.gov/pub/naif/GLL/kernels/spk/s000131a.bsp.lbl

```
SIGNIFICANT EVENTS:
```

```
Europa 26 closest approach:
   03-JAN-2000 18:00:46.77 ET (17:59:42.59 UTC, 1/05328359:72:2:3 SCLK)
   Altitude:
                 351.077 km +/- 0.015 km
                 -47.345 deg. +/- 0.001 deg.
   Latitude:
                         (Europa-centered, Europa True Equator of Date)
  Jupiter Periapsis:
   04-JAN-2000 03:33:54.78 ET (03:32:50.60 UTC, 1/05328926:57:2:6 SCLK)
   Range to Jupiter from S/C: 413330.37 km (5.78149 Rj)
INPUT FILES:
 Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
 Satellite eph file: /usr/nav/od/deliveries/OD281/sateph.OD281.nio
                     /usr/nav/od/deliveries/OD281/epoch
 Epoch file:
GIN file
                     /usr/nav/eph/gin-0198.v205.nio
STOIC file
                     /usr/nav/od/stoic/ld991228.pt0000309
P-file
                     /usr/nav/traj/pfiles/dpfil-000221-od281-i27-enc.nio
 S000131A.BSP LOG FILE
 Created 2000-02-22/13:56:21.00.
; BEGIN NIOSPK COMMANDS
LEAPSECONDS_FILE
                   = /usr/nav/traj/naif/mk98259a.tls
                   = S000131A.BSP
SPK FILE
  SPK_LOG_FILE
                   = S000131A-GEM.log
  INCLUDE_TEXT_FILE = gem-comments.txt
  SOURCE_NIO_FILE = sateph/sateph-jup120.nio
   BODIES
                   = 505 514 515 516
                   = CAL-ET 1999 SEP 27 23:02:05.247
   BEGIN TIME
   END_TIME
                   = CAL-ET 2000 FEB 01 20:01:04.184
  SOURCE_NIO_FILE
                   = sateph/sateph-jup068.nio
                   = 506 507 508 509 510 511 512 513
   BODIES
                   = CAL-ET 1999 SEP 27 23:02:05.247
   BEGIN TIME
   END_TIME
                   = CAL-ET 2000 FEB 01 20:01:04.184
  SOURCE NIO FILE = orbiter/dpfil-980127-tour.nio
                   = -77
   BODIES
                   = CAL-ET 1997 DEC 01 00:01:03.183
   BEGIN_TIME
                   = CAL-ET 1998 JAN 26 00:01:03.184
   END_TIME
  SOURCE_NIO_FILE
                   = sateph/sateph.OD201.nio
                   = 501 502 503 504 599
   BODIES
    BEGIN TIME
                   = CAL-ET 1997 DEC 01 00:01:03.183
   END_TIME
                   = CAL-ET 1998 JAN 26 00:01:03.184
  SOURCE_NIO_FILE = plneph/eph.OD185.nio
   BODIES
                   = 3 5 10 301 399
    BEGIN_TIME
                   = CAL-ET 1997 DEC 01 00:01:03.183
                   = CAL-ET 1998 MAY 03 20:01:03.185
   END TIME
  SOURCE_NIO_FILE
                   = orbiter/dpfil-980328-od208-e14-enc.nio
   BODIES
                   = -77
   BEGIN_TIME
                   = CAL-ET 1998 JAN 26 00:01:03.184
                   = CAL-ET 1998 MAR 14 00:01:03.186
   END_TIME
  SOURCE_NIO_FILE
                   = sateph/sateph.OD208.nio
                   = 501 502 503 504 599
   BODIES
                   = CAL-ET 1998 JAN 26 00:01:03.184
   BEGIN_TIME
                   = CAL-ET 1998 MAR 14 00:01:03.186
   END TIME
  SOURCE_NIO_FILE = orbiter/dpfil-980518-od212-tour.nio
   BODIES
                   = -77
                   = CAL-ET 1998 MAR 14 00:01:03.186
   BEGIN TIME
   END_TIME
                   = CAL-ET 1998 MAY 03 20:01:03.185
  SOURCE_NIO_FILE
                   = sateph/sateph.OD212.nio
                   = 501 502 503 504 599
   BODIES
                   = CAL-ET 1998 MAR 14 00:01:03.186
   BEGIN TIME
                   = CAL-ET 1998 MAY 03 20:01:03.185
    END_TIME
  SOURCE_NIO_FILE = orbiter/dpfil-980720-od219-e16-enc.nio
                   = -77
   BODIES
   BEGIN_TIME
                   = CAL-ET 1998 MAY 03 20:01:03.185
                   = CAL-ET 1998 JUL 20 05:01:03.183
   END_TIME
  SOURCE NIO FILE
                   = sateph/sateph.OD219.nio
   BODIES
                   = 501 502 503 504 599
    BEGIN_TIME
                   = CAL-ET 1998 MAY 03 20:01:03.185
    END_TIME
                   = CAL-ET 1998 JUL 20 05:01:03.183
  SOURCE_NIO_FILE = plneph/eph.OD214.nio
   BODIES
                   = 3 5 10 301 399
    BEGIN_TIME
                   = CAL-ET 1998 MAY 03 20:01:03.185
                   = CAL-ET 1998 JUL 20 05:01:03.183
   END TIME
  SOURCE_NIO_FILE
                   = orbiter/dpfil-980925-od224-e17-enc.nio
    BODIES
                   = -77
   BEGIN TIME
                   = CAL-ET 1998 JUL 20 05:01:03.183
                   = CAL-ET 1998 SEP 01 00:00:00.000
    END TIME
  SOURCE_NIO_FILE
                   = sateph/sateph.OD224.nio
```

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BODTES
                  = 501 502 503 504 599
 BEGIN TIME
                  = CAL-ET 1998 JUL 20 05:01:03.183
  END TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
SOURCE_NIO_FILE = plneph/eph.OD224.nio
 BODIES
                  = 3 5 10 301 399
 BEGIN_TIME
                  = CAL-ET 1998 JUL 20 05:01:03.183
                  = CAL-ET 1998 SEP 01 00:00:00.000
 END TIME
SOURCE_NIO_FILE
                 = orbiter/dpfil-981116-od229-tour.nio
                  = -77
  BODIES
 BEGIN_TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
                  = CAL-ET 1998 NOV 12 23:59:59.999
 END_TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD229.nio
 BODIES
                  = 501 502 503 504 599
                  = CAL-ET 1998 SEP 01 00:00:00.000
 BEGIN TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
 END TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD229.nio
 BODIES
                  = 3 5 10 301 399
 BEGIN_TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
                  = CAL-ET 1998 NOV 12 23:59:59.999
  END TIME
SOURCE_NIO_FILE
                  = orbiter/post-GEM-990114.nio
                  = -77
 BODTES
 BEGIN_TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
  END_TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
SOURCE_NIO_FILE
                 = sateph/sateph.OD233.nio
                  = 501 502 503 504 599
 BODIES
 BEGIN_TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
                  = CAL-ET 1999 JAN 01 00:00:00.000
 END TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD232.nio
 BODIES
                  = 3 5 10 301 399
  BEGIN_TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
                  = CAL-ET 1999 JAN 01 00:00:00.000
 END TIME
SOURCE_NIO_FILE = orbiter/dpfil-990426-od241-tour.nio
  BODIES
                  = -77
 BEGIN TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
                  = CAL-ET 1999 APR 22 23:59:59.999
 END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD241.nio
  BODIES
                  = 501 502 503 504 599
 BEGIN TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
                  = CAL-ET 1999 APR 22 23:59:59.999
 END_TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD238.nio
 BODIES
                  = 3 5 10 301 399
                 = CAL-ET 1999 JAN 01 00:00:00.000
= CAL-ET 1999 APR 22 23:59:59.999
 BEGIN_TIME
 END_TIME
SOURCE_NIO_FILE = orbiter/dpfil-990629-od248-c21-enc.nio
                  = -77
 BODIES
                  = CAL-ET 1999 APR 22 23:59:59.999
 BEGIN_TIME
  END_TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
SOURCE_NIO_FILE
                 = sateph/sateph.OD248.nio
 BODIES
                  = 501 502 503 504 599
 BEGIN_TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
 END_TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
SOURCE_NIO_FILE
                 = plneph/eph.OD248.nio
 BODIES
                  = 3 5 10 301 399
 BEGIN TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
                  = CAL-ET 1999 JUN 08 23:59:59.999
 END_TIME
SOURCE_NIO_FILE
                 = orbiter/dpfil-990813-od252-c22-enc.nio
                  = -77
 BODIES
  BEGIN TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
                  = CAL-ET 1999 JUL 25 00:01:04.183
 END_TIME
SOURCE_NIO_FILE = sateph/sateph.OD252.nio
 BODIES
                  = 501 502 503 504 599
 BEGIN_TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
                  = CAL-ET 1999 JUL 25 00:01:04.183
 END TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD248.nio
  BODIES
                  = 3 5 10 301 399
                  = CAL-ET 1999 JUN 08 23:59:59.999
 BEGIN TIME
                  = CAL-ET 1999 JUL 25 00:01:04.183
 END_TIME
SOURCE_NIO_FILE
                  = orbiter/dpfil-990915-od256-c23-enc.nio
 BODIES
                  = -77
                  = CAL-ET 1999 JUL 25 00:01:04.183
 BEGIN_TIME
 END_TIME
                  = CAL-ET 1999 AUG 29 11:59:59.999
SOURCE_NIO_FILE
                 = sateph/sateph.OD256.nio
                  = 501 502 503 504 599
= CAL-ET 1999 JUL 25 00:01:04.183
 BODIES
 BEGIN TIME
  END_TIME
                  = CAL-ET 1999 AUG 29 11:59:59.999
SOURCE_NIO_FILE
                 = plneph/eph.OD248.nio
 BODTES
                  = 3 5 10 301 399
 BEGIN_TIME
                  = CAL-ET 1999 JUL 25 00:01:04.183
                  = CAL-ET 1999 AUG 29 11:59:59.999
 END_TIME
SOURCE_NIO_FILE
                  = orbiter/dpfil-991010-od263-i24-enc.nio
 BODIES
                  = -77
  BEGIN_TIME
                  = CAL-ET 1999 AUG 29 11:59:59.999
                  = CAL-ET 1999 SEP 27 01:00:00.000
 END TIME
SOURCE_NIO_FILE
                  = sateph/sateph.OD263.nio
  BODIES
                  = 501 502 503 504 599
```

```
11/1/23, 9:37 PM
     BEGIN TIME
                    = CAL-ET 1999 AUG 29 11:59:59.999
     END TIME
                     = CAL-ET 1999 SEP 27 01:00:00.000
   SOURCE NIO FILE
                    = plneph/eph.OD261.nio
     BODTES
                     = 3 5 10 301 399
     BEGIN_TIME
                     = CAL-ET 1999 AUG 29 11:59:59.999
                     = CAL-ET 1999 SEP 27 01:00:00.000
     END_TIME
   SOURCE_NIO_FILE
                    = orbiter/dpfil-991125-od271-i25-enc.nio
     BODTES
                     = -77
                     = CAL-ET 1999 SEP 27 01:00:00.000
     BEGIN_TIME
                    = CAL-ET 1999 NOV 12 00:59:59.999
     END_TIME
   SOURCE_NIO_FILE = sateph/sateph.OD271.nio
     BODIES
                     = 501 502 503 504 599
     BEGIN_TIME
                     = CAL-ET 1999 SEP 27 01:00:00.000
                     = CAL-ET 1999 NOV 12 00:59:59.999
     END TIME
   SOURCE_NIO_FILE = plneph/eph.OD261.nio
                     = 3 5 10 301 399
     BODIES
     BEGIN_TIME
                     = CAL-ET 1999 SEP 27 01:00:00.000
                     = CAL-ET 1999 NOV 12 00:59:59.999
     END TIME
   SOURCE_NIO_FILE
                    = orbiter/dpfil-000102-od277-e26-enc.nio
     BODIES
                     = -77
     BEGIN TIME
                    = CAL-ET 1999 NOV 12 00:59:59.999
                     = CAL-ET 1999 DEC 24 12:01:04.183
     END_TIME
   SOURCE_NIO_FILE
                    = sateph/sateph.OD277.nio
                     = 501 502 503 504 599
     BODIES
                     = CAL-ET 1999 NOV 12 00:59:59.999
     BEGIN_TIME
     END_TIME
                    = CAL-ET 1999 DEC 24 12:01:04.183
   SOURCE NIO FILE = plneph/eph.OD261.nio
                    = 3 5 10 301 399
     BODIES
     BEGIN_TIME
                    = CAL-ET 1999 NOV 12 00:59:59.999
     END_TIME
                     = CAL-ET 1999 DEC 24 12:01:04.183
   SOURCE NIO FILE
                    = orbiter/dpfil-000221-od281-i27-enc.nio
                     = -77
     BODIES
     BEGIN_TIME
                    = CAL-ET 1999 DEC 24 12:01:04.183
     END TIME
                     = CAL-ET 2000 FEB 01 20:01:04.184
   SOURCE NIO FILE = sateph/sateph.OD281.nio
     BODIES
                    = 501 502 503 504 599
     BEGIN_TIME
                    = CAL-ET 1999 DEC 24 12:01:04.183
                    = CAL-ET 2000 FEB 01 20:01:04.184
     END TIME
                    = plneph/eph.OD261.nio
   SOURCE_NIO_FILE
     BODIES
                     = 3 5 10 301 399
     BEGIN TIME
                    = CAL-ET 1999 DEC 24 12:01:04.183
                     = CAL-ET 2000 FEB 01 20:01:04.184
     END_TIME
 ; END NIOSPK COMMANDS
 Note: This is the final SPK file for the Galileo GEM mission.
        The designation is S000131A.BSP, ...XSP, ...BSP_LBL
                          GENERAL COMMENTS:
 KEY TO FILE SEGMENTS:
 01-DEC-1997 to 26-JAN-1998 Reconstruction for Orbit 12, OD201
 26-JAN-1998 to 14-MAR-1998 Reconstruction for Orbit 13, OD208
 14-MAR-1998 to 03-MAY-1998 Reconstruction for Orbit 14, OD212
 03-MAY-1998 to 20-JUL-1998 Reconstruction for Orbit 15, OD219
 20-JUL-1998 to 01-SEP-1998 Reconstruction for Orbit 16, OD224
 01-SEP-1998 to 13-NOV-1998 Reconstruction for Orbit 17, OD229
 13-NOV-1998 to 01-JAN-1999 Reconstruction for Orbit 18, OD233
 01-JAN-1999 to 23-APR-1999 Reconstruction for Orbit 19, OD241
 23-APR-1999 to 09-JUN-1999 Reconstruction for Orbit 20, OD248
 09-JUN-1999 to 25-JUL-1999 Reconstruction for Orbit 21, OD252
 25-JUL-1999 to 29-AUG-1999 Reconstruction for Orbit 22, OD256
 29-AUG-1999 to 27-SEP-1999 Reconstruction for Orbit 23, OD263
```

27-SEP-1999 to 12-NOV-1999 Reconsturction for Orbit 24, OD271 12-NOV-1999 to 24-DEC-1999 Reconstruction for Orbit 25, OD277 24-DEC-1999 to 31-JAN-2000 Reconstruction for Orbit 26, OD281

This file is a compilation of reconstructed trajectory segments. This file begins 1-DEC-1997 (DOY 97-335) and continues to the end of the GEM tour (DOY 00-031).

The file for the primary tour is S980326B.BSP. It is compiled of reconstructed data only and ends on 1-JAN-1998 (DOY 98-001).

A similar file covering reconstructed segments for the interplanetary trajectory can be found in a S970312A.BSP. The final reconstruction for the probe trajectory is provided separately in S960730A.BSP.

Amalthea is included for Orbit 22 of the GEM Mission. Bodies included in this file and radii for Jupiter and the Jovian satellites are:

Name Body Number Radius (km)

```
Orbiter
                       -77
                       399
                                          6378.14
Earth
                         3
Earth barycenter
                                          1737.40
Moon
                       301
Sun barycenter
                        10
Jupiter
                       599
                                         71492.0
Jupiter barycenter
                         5
                       501
Ιo
                                          1821.3
Europa
                       502
                                          1565.0
Ganymede
                       503
                                          2634.0
                       504
                                          2403.0
Callisto
Amalthea
                       505
                                            86.2
                                                   (GEM orbit C22 only)
Himalia
                       506
                                            85.0
Flara
                       507
                                            40.0
Pasiphae
                       508
                                            18.0
                       509
Sinope
                                            14.0
                       510
Lysithea
                                            12.0
Carme
                       511
                                            15.0
Ananke
                       512
                                            10.0
Leda
                       513
                                             5.0
                                            50.0
Thehe
                       514
Adrastea
                       515
                                            10.0
Metis
                       516
                                             20.0
```

NOTE: The radii values were taken from the Report of the IAU/IAG/COSPAR Working Group on Cartographic Coordinates and Rotational Elements of the Planets and Satellites: 1994.

Each segment listed has information under the following headings:

COMMENTS

TRAJECTORY BASIS/OD SOLUTION

TIME SPAN

SIGNIFICANT EVENTS

INPUT FILES

ET is used to denote ephemeris time; it differs from UTC (universal time coordinated) in which spacecraft events are usually given by the following:

ET minus UTC = 63 184 sec (as of Jul. 1, 1997)

ET minus UTC = 63.184 sec (as of Jul. 1, 1997) = 64.184 sec (as of Jan. 1, 1999)

SCLK is spacecraft clock string.

Questions should be directed to:

Joan Pojman (818 354-0264, Joan.Pojman@jpl.nasa.gov)

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RECONSTRUCTION FOR ORBIT 12

COMMENTS: Reconstruction for Europa 12 encounter.

TRAJECTORY BASIS/OD SOLUTION: OD-201

TIME SPAN:

BEGIN: 01-DEC-1997 00:01:03.184 ET DOY: 97-335 01-DEC-1997 00:00:00.000 UTC DOY: 97-335 1/04240645:13:3:3 SCLK END: 26-JAN-1998 00:00:00.000 ET DOY: 98-026 25-JAN-1998 23:58:56.815 UTC DOY: 98-026

1/04320397:90:8:7 SCLK

SIGNIFICANT EVENTS:

Europa 12 closest approach:

16-DEC-1997 12:04:23.06 ET (12:03:19.87 UTC, 1/04262723:16:3:3 SCLK)

Altitude: 201.0 km +/- 0.015 km Latitude: -8.66 deg +/- 0.003 deg

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

16-DEC-1997 06:35:56.58 ET (06:34:53.40 UTC, 1/04262398:31:6:1 SCLK)

Range to Jupiter from S/C: 629039.69 km (8.79874 Rj)

INPUT FILES:

Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio Satellite eph file: /usr/nav/od/deliveries/OD196/sateph.OD201.nio

Epoch file: /usr/nav/od/deliveries/OD201/epoch

GIN file /usr/nav/eph/gin-0894.nio

STOIC file /usr/nav/od/stoic/ld980430.pt980711

P-file /usr/nav/traj/ref-traj/dpfil-980127-tour.nio

\_\_\_\_\_\_

RECONSTRUCTION FOR ORBIT 13

COMMENTS: Reconstruction for Phasing Orbit 13.

TRAJECTORY BASIS/OD SOLUTION: OD-208

TIME SPAN:

BEGIN: 26-JAN-1998 00:00:00.000 ET DOY: 98-026

```
25-JAN-1998 23:58:56.815 UTC DOY: 98-026
                      1/04320397:90:8:7
                                             SCLK
                                                   DOY: 98-073
                 END: 14-MAR-1998 00:01:03.186 ET
                      14-MAR-1998 00:00:00.001 UTC DOY: 98-073
                      1/04387335:31:3:0
                                             SCLK
SIGNIFICANT EVENTS:
  Europa 13A closest approach:
   10-FEB-1998 17:58:35.67 ET (17:57:32.48 UTC, 1/04342827:35:6:1 SCLK)
               3557.2 km +/- 0.052 km
   Altitude:
   Latitude:
                -8.93 deg +/- 0.0046 deg
                        (Europa-centered, Europa True Equator of Date)
  Juniter Periansis:
   10-FEB-1998 23:10:17.78 ET (23:09:14.60 UTC, 1/04343135:60:8:0 SCLK)
   Range to Jupiter from S/C: 633063.38 km (8.85502 Rj)
INPUT FILES:
Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio
 Satellite eph file: /usr/nav/od/deliveries/OD208/sateph.OD208.nio
                    /usr/nav/od/deliveries/OD208/epoch
Fnoch file:
GIN file
                    /usr/nav/eph/gin-0198.nio
STOIC file
                    /usr/nav/od/stoic/ld980326.pt980606
                    /usr/nav/traj/pfiles/dpfil-980328-od208-e14-enc.nio
P-file
                    RECONSTRUCTION FOR ORBIT 14
COMMENTS: Reconstruction for Orbit 14
          ET minus UTC is 63.184 seconds as of July 1, 1997.
TRAJECTORY BASIS/OD SOLUTION: OD-212
TIME SPAN:
               BEGIN: 14-MAR-1998 00:01:03.186 ET DOY: 98-073
                      14-MAR-1998 00:00:00.001 UTC DOY: 98-073
                      1/04387335:31:3:0
                                             SCLK
                 END: 03-MAY-1998 20:01:03.186 ET DOY: 98-123
                      03-MAY-1998 20:00:00.000 UTC DOY: 98-123
                      1/04459730:90:2:3
                                             SCLK
SIGNIFICANT EVENTS:
  Europa 14 closest approach:
   29-MAR-1998 13:22:08.33 ET (13:21:05.14 UTC, 1/04409490:25:2:1 SCLK)
              1644.1 km +/- 0.015 km
   Altitude:
                12.21 deg +/- 0.001 deg
   Latitude:
                        (Europa-centered, Europa True Equator of Date)
  Jupiter Periapsis:
   29-MAR-1998 08:00:16.60 ET (07:59:13.41 UTC, 1/04409171:86:6:0 SCLK)
   Range to Jupiter from S/C: 631692.54 km (8.83585 Rj)
INPUT FILES:
Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio
 Satellite eph file: /usr/nav/od/deliveries/OD212/sateph.OD212.nio
Epoch file:
                    /usr/nav/od/deliveries/OD212/epoch
GIN file
                    /usr/nav/eph/gin-0198.nio
STOIC file
                    /usr/nav/od/stoic/ld980430.pt980711
                    /usr/nav/traj/pfiles/dpfil-980518-od212-tour.nio
P-file
______
                    RECONSTRUCTION FOR ORBIT 15
COMMENTS: Reconstruction for Orbit 15
          ET minus UTC is 63.184 seconds as of July 1, 1997.
TRAJECTORY BASIS/OD SOLUTION: OD-219
TIME SPAN:
               BEGIN: 03-MAY-1998 20:01:03.186 ET DOY: 98-123
                      03-MAY-1998 20:00:00.000 UTC DOY: 98-123
                      1/04459730:90:2:3
                                             SCLK
                 END: 20-JUL-1998 05:01:03.186 ET
                                                   DOY: 98-201
                      20-JUL-1998 05:00:00.000 UTC DOY: 98-201
                      1/04569926:59:8:6
                                             SCI K
SIGNIFICANT EVENTS:
  Europa 15 closest approach:
    31-MAY-1998 21:13:59.77 ET (21:12:56.59 UTC, 1/04499680:07:2:7 SCLK)
               2514.5 km +/- 0.0134 km
   Altitude:
                15.00 deg +/- 0.001 deg
   Latitude:
                        (Europa-centered, Europa True Equator of Date)
  Jupiter Periapsis:
```

Range to Jupiter from S/C: 632696.58 km (8.84989 Rj)

01-JUN-1998 02:35:44.77 ET (02:34:41.59 UTC, 1/04499998:26:8:0 SCLK)

```
11/1/23, 9:37 PM
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD214/eph.OD214.nio
  Satellite eph file: /usr/nav/od/deliveries/OD219/sateph.OD219.nio
                     /usr/nav/od/deliveries/OD219/epoch
  Epoch file:
  GIN file
                     /usr/nav/eph/gin-0198.nio
  STOIC file
                     /usr/nav/od/stoic/ld980715.pt980925
                     /usr/nav/traj/pfiles/dpfil-980720-od219-e16-enc.nio
  P-file
                     RECONSTRUCTION FOR ORBIT 16
 COMMENTS: Reconstruction for Orbit 16
            ET minus UTC is 63.184 seconds as of July 1, 1997.
 TRAJECTORY BASTS/OD SOLUTION: OD-224
 TIME SPAN:
                BEGIN: 20-JUL-1998 05:01:03.186 ET DOY: 98-201
                       20-JUL-1998 05:00:00.000 UTC DOY: 98-201
                       1/04569926:59:8:6
                                              SCLK
                  END: 01-SEP-1998 00:00:00.000 ET DOY: 98-244
                       31-AUG-1998 23:58:56.818 UTC DOY: 98-243
                       1/04630868:46:3:4
 SIGNIFICANT EVENTS:
   Europa 16 closest approach:
     21-JUL-1998 05:04:47.95 ET (05:03:44.77 UTC, 1/04571354:49:1:1 SCLK)
                1834.2 km +/- 0.0123 km
     Altitude:
     Latitude:
                -25.65 deg +/- 0.00039 deg
                         (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     21-JUL-1998 00:19:02.08 ET (00:17:58.89 UTC, 1/04571071:83:2:7 SCLK)
     Range to Jupiter from S/C: 632799.65 km (8.85134 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD224/eph.OD224.nio
  Satellite eph file: /usr/nav/od/deliveries/OD224/sateph.OD224.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD224/epoch
  GIN file
                     /usr/nav/eph/gin-0198.nio
  STOIC file
                     /usr/nav/od/stoic/ld980917.pt981128
  P-file
                     /usr/nav/traj/pfiles/dpfil-980925-od224-e17-enc.nio
                     RECONSTRUCTION FOR ORBIT 17
 COMMENTS: Reconstruction for Orbit 17
            ET minus UTC is 63.184 seconds as of July 1, 1997.
 TRAJECTORY BASIS/OD SOLUTION: OD-229
 TIME SPAN:
                 BEGIN: 01-SEP-1998 00:00:00.000 ET DOY: 98-244
                       31-AUG-1998 23:58:56.818 UTC DOY: 98-243
                       1/04630868:46:3:4
                                              SCLK
                   END: 13-NOV-1998 00:00:00.000 ET
                                                    DOY: 98-317
                       12-NOV-1998 23:58:56.817 UTC DOY: 98-316
                       1/04734833:36:8:6
                                              SCLK
 SIGNIFICANT EVENTS:
   Europa 17 closest approach:
     26-SEP-1998 03:55:23.02 ET (03:54:19.84 UTC, 1/04666705:65:7:6 SCLK)
     Altitude:
                3582.4 km +/- 0.015 km
                -42.43 deg +/- 0.0002 deg
     Latitude:
                         (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     26-SEP-1998 08:27:30.34 ET (08:26:27.16 UTC, 1/04666974:77:7:7 SCLK)
     Range to Jupiter from S/C: 637028.58 km (8.91049 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD229/eph.OD229.nio
  Satellite eph file: /usr/nav/od/deliveries/OD229/sateph.OD229.nio
                     /usr/nav/od/deliveries/OD229/epoch
  Epoch file:
  GIN file
                     /usr/nav/eph/gin-0198.nio
  STOIC file
                     /usr/nav/od/stoic/ld981105.pt990116
  P-file
                     /usr/nav/traj/pfiles/dpfil-981116-od229-tour.nio
 _____
                     RECONSTRUCTION FOR ORBIT 18
 COMMENTS: Reconstruction for Orbit 18
            ET minus UTC is 63.184 seconds as of July 1, 1997.
 TRAJECTORY BASIS/OD SOLUTION: OD-233
```

TIME SPAN:

```
BEGIN: 13-NOV-1998 00:00:00.000 ET
                                                    DOY: 98-317
                      12-NOV-1998 23:58:56.817 UTC DOY: 98-316
                      1/04734833:36:8:6
                                              SCLK
                  END: 01-JAN-1999 00:00:00.000 ET DOY: 99-001
                      31-DEC-1998 23:58:56.817 UTC DOY: 98-365
                      1/04804618:05:4:6
                                              SCLK
SIGNIFICANT EVENTS:
  Europa 18 closest approach:
    22-NOV-1998 11:39:29.39 ET (11:38:26.21 UTC, 1/04748342:72:5:7 SCLK)
               2270.8 km +/- 0.013 km
    Altitude:
    Latitude:
                41.34 deg +/- 0.0 deg
                        (Europa-centered, Europa True Equator of Date)
  Juniter Periansis:
    22-NOV-1998 07:31:54.95 ET (07:30:51.76 UTC, 1/04748097:85:9:0 SCLK)
    Range to Jupiter from S/C: 639331.79 km (8.94270 Rj)
INPUT FILES:
 Planetary eph file: /usr/nav/od/deliveries/OD232/eph.OD232.nio
 Satellite eph file: /usr/nav/od/deliveries/OD233/sateph.OD233.nio
                    /usr/nav/od/deliveries/OD233/epoch
 Fnoch file:
 GIN file
                    /usr/nav/eph/gin-0198.nio
 STOIC file
                    /usr/nav/od/stoic/ld981229.pt990311
                    /usr/traj1/post-GEM/990114/post-GEM-990114.nio
 P-file
                    RECONSTRUCTION FOR ORBIT 19
COMMENTS: Reconstruction for Europa 19
           ET minus UTC is 64.184 seconds as of January 1, 1999.
TRAJECTORY BASIS/OD SOLUTION: OD-241
TIME SPAN:
               BEGIN: 01-JAN-1999 00:00:00.000 ET DOY: 99-001
                      31-DEC-1998 23:58:56.817 UTC DOY: 98-365
                       1/04804618:05:4:6
                                              SCLK
                  END: 23-APR-1999 00:00:00.000 ET DOY: 99-113
                       22-APR-1999 23:58:55.814 UTC DOY: 99-112
                      1/04964125:76:8:4
                                              SCLK
SIGNIFICANT EVENTS:
  Europa 19 closest approach:
    01-FEB-1999 02:20:54.13 ET (02:19:49.94 UTC, 1/04848906:80:9:5 SCLK)
               1439.4 km +/- 0.0139 km
    Altitude:
                30.52 deg +/- 0.000 deg
    Latitude:
                        (Europa-centered, Europa True Equator of Date)
  Jupiter Periapsis:
    01-FEB-1999 05:03:14.45 ET (05:02:10.27 UTC, 1/04849067:40:4:4 SCLK)
    Range to Jupiter from S/C: 651211.84 km (9.10888 Rj)
INPUT FILES:
 Planetary eph file: /usr/nav/od/deliveries/OD238/eph.OD238.nio
 Satellite eph file: /usr/nav/od/deliveries/OD241/sateph.OD241.nio
 Epoch file:
                    /usr/nav/od/deliveries/OD241/epoch
 GIN file
                    /usr/nav/eph/gin-0198.nio
STOIC file
                     /usr/nav/od/stoic/ld990415.pt990708
                    /usr/nav/traj/ref-traj/dpfil-990426-od241-tour.nio
 P-file
                    RECONSTRUCTION FOR ORBIT 20
COMMENTS: Reconstruction for Callisto 20
           ET minus UTC is 64.184 seconds as of January 1, 1999.
TRAJECTORY BASIS/OD SOLUTION: OD-248
TIME SPAN:
                BEGIN: 23-APR-1999 00:00:00.000 ET DOY: 99-113
                      22-APR-1999 23:58:55.814 UTC DOY: 99-112
                      1/04964125:76:8:4
                                              SCLK
                  END: 09-JUN-1999 00:00:00.000 ET
                                                    DOY: 99-160
                      08-JUN-1999 23:58:55.815 UTC DOY: 99-159
                      1/05031062:13:3:6
                                              SCI K
SIGNIFICANT EVENTS:
  Callisto 20 closest approach:
    05-MAY-1999 13:57:22.30 ET (13:56:18.11 UTC, 1/04982044:12:2:3 SCLK)
              1321.4 km +/- 0.0151 km
    Altitude:
                 2.78 deg +/- 0.0015 deg
    Latitude:
                         (Callisto-centered, Callisto True Equator of Date)
  Jupiter Periapsis:
    03-MAY-1999 17:01:15.21 ET (17:00:11.02 UTC, 1/04979377:58:4:5 SCLK)
    Range to Jupiter from S/C: 670009.42 km (9.37181 Rj)
```

```
11/1/23, 9:37 PM
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD248/sateph.OD248.nio
                     /usr/nav/od/deliveries/OD248/epoch
  Epoch file:
  GIN file
                     /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                     /usr/nav/od/stoic/ld990624.pt990910
                     /usr/nav/traj/pfiles/dpfil-990629-od248-c21-enc.nio
  P-file
                     RECONSTRUCTION FOR ORBIT 21
 COMMENTS: Reconstruction for Callisto 21
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASTS/OD SOLUTION: OD-252
 TIME SPAN:
                BEGIN: 09-JUN-1999 00:00:00.000 ET DOY: 99-160
                       08-JUN-1999 23:58:55.815 UTC DOY: 99-159
                       1/05031062:13:3:6
                                              SCLK
                  END: 25-JUL-1999 00:01:04.184 ET DOY: 99-206
                       25-JUL-1999 00:00:00.000 UTC DOY: 99-206
                       1/05096575:30:1:1
 SIGNIFICANT EVENTS:
   Callisto 21 closest approach:
     30-JUN-1999 07:47:53.87 ET (07:46:49.69 UTC, 1/05061432:55:7:7 SCLK)
               1048.1 km +/- 0.011 km
     Altitude:
     Latitude:
                  -0.7 \text{ deg } +/- 0.0003 \text{ deg}
                         (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     02-JUL-1999 05:05:56.36 ET (05:04:52.18 UTC, 1/05064120:71:6:6 SCLK)
     Range to Jupiter from S/C: 519747.15 km (7.27000 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD252/sateph.OD252.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD252/epoch
  GIN file
                     /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                     /usr/nav/od/stoic/ld990729.pt991009
  P-file
                     /usr/nav/traj/pfiles/dpfil-990813-od252-c22-enc.nio
 -----
                     RECONSTRUCTION FOR ORBIT 22
 COMMENTS: Reconstruction for Callisto 22
           ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-256
 TIME SPAN:
                BEGIN: 25-JUL-1999 00:01:04.184 ET DOY: 99-206
                       25-JUL-1999 00:00:00.000 UTC DOY: 99-206
                       1/05096575:30:1:1
                                             SCLK
                  END: 29-AUG-1999 12:00:00.000 ET
                                                   DOY: 99-241
                       29-AUG-1999 11:58:55.817 UTC DOY: 99-241
                       1/05147132:49:5:1
                                             SCLK
 SIGNIFICANT EVENTS:
   Callisto 22 closest approach:
     14-AUG-1999 08:31:55.94 ET (08:30:51.76 UTC, 1/05125564:10:2:7 SCLK)
     Altitude: 2299.3 km +/- 0.015 km
                  -2.3 +/- 0.001 deg
     Latitude:
                         (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     12-AUG-1999 10:59:35.66 ET (10:58:31.48 UTC, 1/05122861:72:7:2 SCLK)
     Range to Jupiter from S/C: 523080.41 km (7.31663 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD256/sateph.OD256.nio
                    /usr/nav/od/deliveries/OD256/epoch
  Epoch file:
  GIN file
                     /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                     /usr/nav/od/stoic/ld990909.pt991202
  P-file
                    /usr/nav/traj/pfiles/dpfil-990915-od256-c23-enc.nio
 _____
                     RECONSTRUCTION FOR ORBIT 23
 COMMENTS: Reconstruction for Callisto 23
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-263
```

TIME SPAN:

```
BEGIN: 29-AUG-1999 12:00:00.000 ET
                                                    DOY: 99-241
                      29-AUG-1999 11:58:55.817 UTC DOY: 99-241
                      1/05147132:49:5:1
                                              SCLK
                  END: 27-SEP-1999 01:00:00.000 ET
                                                    DOY: 99-270
                      27-SEP-1999 00:58:55.818 UTC DOY: 99-270
                      1/05187780:83:6:4
                                              SCLK
SIGNIFICANT EVENTS:
  Callisto 23 closest approach:
    16-SEP-1999 17:28:06.00 ET (17:27:01.813 UTC, 1/05173092:19:8:6 SCLK)
              1052.4 km +/- 0.0118 km
    Altitude:
    Latitude:
                0.0986 deg. +/- 0.001 deg
                        (Callisto-centered, Callisto True Equator of Date)
  Jupiter Periapsis:
    14-SEP-1999 19:58:41.02 ET (19:57:36.83 UTC, 1/05170392:72:2:5 SCLK)
    Range to Jupiter from S/C: 467972.00 km (6.54580 Rj)
TNPUT FTLES:
 Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
 Satellite eph file: /usr/nav/od/deliveries/OD263/sateph.OD263.nio
                    /usr/nav/od/deliveries/OD263/epoch
 Fnoch file:
 GIN file
                    /usr/nav/eph/gin-0198.v205.nio
 STOIC file
                    /usr/nav/od/stoic/ld990930.pt991211
                    /usr/nav/traj/pfiles/dpfil-991010-od263-i24-enc.nio
 P-file
                    RECONSTRUCTION FOR ORBIT 24
COMMENTS: Reconstruction for Io 24
           ET minus UTC is 64.184 seconds as of January 1, 1999.
TRAJECTORY BASIS/OD SOLUTION: OD-271
TIME SPAN:
                BEGIN: 27-SEP-1999 01:00:00.000 ET DOY: 99-270
                      27-SEP-1999 00:58:55.818 UTC DOY: 99-270
                      1/05187780:83:6:4
                                              SCLK
                  END: 12-NOV-1999 01:00:00.000 ET DOY: 99-316
                      12-NOV-1999 00:58:55.817 UTC DOY: 99-316
                      1/05253293:04:1:1
                                              SCLK
SIGNIFICANT EVENTS:
  Io 24 closest approach:
    11-OCT-1999 04:34:06.72 ET (04:33:02.53 UTC, 1/05207931:13:8:0 SCLK)
              611.3 km +/- 0.011 km
    Altitude:
                4.507 deg. +/- 0.003 deg
    Latitude:
                        (Io-centered, Io True Equator of Date)
  Jupiter Periapsis:
    11-OCT-1999 02:03:41.50 ET (02:02:37.31 UTC, 1/05207782:34:9:4 SCLK)
    Range to Jupiter from S/C: 396600.93 km (5.54749 Rj)
INPUT FILES:
 Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
 Satellite eph file: /usr/nav/od/deliveries/OD271/sateph.OD271.nio
 Epoch file:
                    /usr/nav/od/deliveries/OD271/epoch
 GIN file
                    /usr/nav/eph/gin-0198.v205.nio
 STOIC file
                     /usr/nav/od/stoic/ld991121.pt000201
                    /usr/nav/traj/pfiles/dpfil-991125-od271-i25-enc.nio
 P-file
                    RECONSTRUCTION FOR ORBIT 25
COMMENTS: Reconstruction for Io 25
           ET minus UTC is 64.184 seconds as of January 1, 1999.
TRAJECTORY BASIS/OD SOLUTION: OD-277
TIME SPAN:
                BEGIN: 12-NOV-1999 01:00:00.000 ET DOY: 99-316
                      12-NOV-1999 00:58:55.817 UTC DOY: 99-316
                      1/05253293:04:1:1
                                              SCLK
                  END: 24-DEC-1999 12:01:04.184 ET
                                                    DOY: 99-358
                      24-DEC-1999 12:00:00.000 UTC DOY: 99-358
                      1/05313762:24:5:7
                                              SCLK
SIGNIFICANT EVENTS:
  Io 25 closest approach:
    26-NOV-1999 04:06:25.06 ET (04:05:20.88 UTC, 1/05273415:80:7:5 SCLK)
    Altitude:
                 300.484 km +/- 0.412 km
                 -76.383 deg. +/- 0.0025 deg.
    Latitude:
                         (Io-centered, Io True Equator of Date)
  Jupiter Periapsis:
    26-NOV-1999 02:09:53.86 ET (02:08:49.68 UTC, 1/05273300:58:9:5 SCLK)
    Range to Jupiter from S/C: 405572.12 km (5.67297 Rj)
```

INPUT FILES:

```
Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
 Satellite eph file: /usr/nav/od/deliveries/OD277/sateph.OD277.nio
 Epoch file:
                    /usr/nav/od/deliveries/OD277/epoch
                    /usr/nav/eph/gin-0198.v205.nio
GIN file
 STOIC file
                    /usr/nav/od/stoic/ld991228.pt000309
 P-file
                    /usr/nav/traj/pfiles/dpfil-000102-od277-e26-enc.nio
______
                    RECONSTRUCTION FOR ORBIT 26
COMMENTS: Reconstruction for Orbit 26
           ET minus UTC is 64.184 seconds as of January 1, 1999.
TRAJECTORY BASIS/OD SOLUTION: OD-281
TTMF SPAN:
               BEGIN: 24-DEC-1999 12:01:04.184 ET
                                                   DOY: 99-358
                      24-DEC-1999 12:00:00.000 UTC DOY: 99-358
                      1/05313762:24:5:7
                                             SCLK
                 END: 01-FEB-2000 20:00:00.000 ET
                                                   DOY: 00-032
                      01-FEB-2000 19:58:55.816 UTC DOY: 00-032
                      1/05369778:75:2:5
                                              SCI K
SIGNIFICANT EVENTS:
  Europa 26 closest approach:
    03-JAN-2000 18:00:46.77 ET (17:59:42.59 UTC, 1/05328359:72:2:3 SCLK)
                351.077 km +/- 0.015 km
    Altitude:
    Latitude:
                -47.345 deg. +/- 0.001 deg.
                        (Europa-centered, Europa True Equator of Date)
  Jupiter Periapsis:
    04-JAN-2000 03:33:54.78 ET (03:32:50.60 UTC, 1/05328926:57:2:6 SCLK)
    Range to Jupiter from S/C: 413330.37 km (5.78149 Rj)
INPUT FILES:
 Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
 Satellite eph file: /usr/nav/od/deliveries/OD281/sateph.OD281.nio
 Epoch file:
                    /usr/nav/od/deliveries/OD281/epoch
 GIN file
                    /usr/nav/eph/gin-0198.v205.nio
STOIC file
                    /usr/nav/od/stoic/ld991228.pt0000309
 P-file
                    /usr/nav/traj/pfiles/dpfil-000221-od281-i27-enc.nio
; S000131A.BSP LOG FILE
 Created 2000-02-22/13:56:21.00.
; BEGIN NIOSPK COMMANDS
LEAPSECONDS_FILE
                   = /usr/nav/traj/naif/mk98259a.tls
SPK_FILE
                   = S000131A.BSP
  SPK_LOG_FILE
                   = S000131A-GEM.log
  INCLUDE_TEXT_FILE = gem-comments.txt
  SOURCE_NIO_FILE = sateph/sateph-jup120.nio
    BODIES
                   = 505 514 515 516
    BEGIN_TIME
                   = CAL-ET 1999 SEP 27 23:02:05.247
                   = CAL-ET 2000 FEB 01 20:01:04.184
    END_TIME
  SOURCE_NIO_FILE
                  = sateph/sateph-jup068.nio
                   = 506 507 508 509 510 511 512 513
    BODIES
                   = CAL-ET 1999 SEP 27 23:02:05.247
    BEGIN TIME
                   = CAL-ET 2000 FEB 01 20:01:04.184
    END TIME
  SOURCE_NIO_FILE = orbiter/dpfil-980127-tour.nio
    BODIES
                   = -77
                   = CAL-ET 1997 DEC 01 00:01:03.183
    BEGIN TIME
    END_TIME
                   = CAL-ET 1998 JAN 26 00:01:03.184
  SOURCE_NIO_FILE
                  = sateph/sateph.OD201.nio
                   = 501 502 503 504 599
    BODIES
    BEGIN_TIME
                   = CAL-ET 1997 DEC 01 00:01:03.183
                   = CAL-ET 1998 JAN 26 00:01:03.184
    END_TIME
  SOURCE_NIO_FILE = plneph/eph.OD185.nio
    BODTES
                   = 3 5 10 301 399
    BEGIN_TIME
                   = CAL-ET 1997 DEC 01 00:01:03.183
                   = CAL-ET 1998 MAY 03 20:01:03.185
    END_TIME
  SOURCE NIO FILE
                  = orbiter/dpfil-980328-od208-e14-enc.nio
    BODIES
                   = -77
    BEGIN_TIME
                   = CAL-ET 1998 JAN 26 00:01:03.184
    END_TIME
                   = CAL-ET 1998 MAR 14 00:01:03.186
  SOURCE_NIO_FILE = sateph/sateph.OD208.nio
    BODIES
                   = 501 502 503 504 599
                   = CAL-ET 1998 JAN 26 00:01:03.184
    BEGIN_TIME
                   = CAL-ET 1998 MAR 14 00:01:03.186
    END TIME
  SOURCE_NIO_FILE
                  = orbiter/dpfil-980518-od212-tour.nio
    BODIES
                   = -77
    BEGIN TIME
                   = CAL-ET 1998 MAR 14 00:01:03.186
                   = CAL-ET 1998 MAY 03 20:01:03.185
    END TIME
  SOURCE_NIO_FILE
                   = sateph/sateph.OD212.nio
```

```
BODTES
                 = 501 502 503 504 599
 BEGIN TIME
                  = CAL-ET 1998 MAR 14 00:01:03.186
  END TIME
                  = CAL-ET 1998 MAY 03 20:01:03.185
SOURCE NIO FILE
                 = orbiter/dpfil-980720-od219-e16-enc.nio
                  = -77
 BODIES
 BEGIN_TIME
                 = CAL-ET 1998 MAY 03 20:01:03.185
                  = CAL-ET 1998 JUL 20 05:01:03.183
 END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD219.nio
                  = 501 502 503 504 599
  BODIES
 BEGIN_TIME
                  = CAL-ET 1998 MAY 03 20:01:03.185
                  = CAL-ET 1998 JUL 20 05:01:03.183
 END_TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD214.nio
 BODIES
                  = 3 5 10 301 399
 BEGIN TIME
                  = CAL-ET 1998 MAY 03 20:01:03.185
                  = CAL-ET 1998 JUL 20 05:01:03.183
 END TIME
                 = orbiter/dpfil-980925-od224-e17-enc.nio
SOURCE_NIO_FILE
 BODIES
                  = -77
                  = CAL-ET 1998 JUL 20 05:01:03.183
 BEGIN_TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
  END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD224.nio
                  = 501 502 503 504 599
 BODTES
 BEGIN_TIME
                  = CAL-ET 1998 JUL 20 05:01:03.183
  END_TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
SOURCE NIO FILE
                 = plneph/eph.OD224.nio
                  = 3 5 10 301 399
 BODIES
 BEGIN_TIME
                 = CAL-ET 1998 JUL 20 05:01:03.183
                  = CAL-ET 1998 SEP 01 00:00:00.000
 END TIME
SOURCE NIO FILE
                 = orbiter/dpfil-981116-od229-tour.nio
 BODIES
                  = -77
  BEGIN_TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
                  = CAL-ET 1998 NOV 12 23:59:59.999
 END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD229.nio
  BODIES
                  = 501 502 503 504 599
 BEGIN TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
                  = CAL-ET 1998 NOV 12 23:59:59.999
 END TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD229.nio
  BODIES
                  = 3 5 10 301 399
                  = CAL-ET 1998 SEP 01 00:00:00.000
 BEGIN TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
 END_TIME
SOURCE_NIO_FILE
                 = orbiter/post-GEM-990114.nio
 BODIES
                  = -77
                  = CAL-ET 1998 NOV 12 23:59:59.999
 BEGIN_TIME
 END_TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
SOURCE_NIO_FILE
                 = sateph/sateph.OD233.nio
                  = 501 502 503 504 599
 BODIES
 BEGIN_TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
  END_TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
SOURCE_NIO_FILE
                 = plneph/eph.OD232.nio
                  = 3 5 10 301 399
 BODIES
 BEGIN_TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
 END_TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
                 = orbiter/dpfil-990426-od241-tour.nio
SOURCE_NIO_FILE
 BODIES
                  = -77
 BEGIN TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
 END_TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
SOURCE_NIO_FILE
                 = sateph/sateph.OD241.nio
 BODIES
                  = 501 502 503 504 599
  BEGIN TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
                  = CAL-ET 1999 APR 22 23:59:59.999
 END_TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD238.nio
 BODIES
                  = 3 5 10 301 399
 BEGIN_TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
                  = CAL-ET 1999 APR 22 23:59:59.999
 END TIME
SOURCE_NIO_FILE
                  = orbiter/dpfil-990629-od248-c21-enc.nio
  BODIES
                  = -77
 BEGIN TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
                  = CAL-ET 1999 JUN 08 23:59:59.999
 END_TIME
                 = sateph/sateph.OD248.nio
SOURCE_NIO_FILE
 BODIES
                  = 501 502 503 504 599
                  = CAL-ET 1999 APR 22 23:59:59.999
 BEGIN_TIME
 END_TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
SOURCE_NIO_FILE
                 = plneph/eph.OD248.nio
                  = 3 5 10 301 399
 BODIES
                  = CAL-ET 1999 APR 22 23:59:59.999
 BEGIN TIME
  END_TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
SOURCE_NIO_FILE
                 = orbiter/dpfil-990813-od252-c22-enc.nio
 BODTES
                  = -77
 BEGIN_TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
                  = CAL-ET 1999 JUL 25 00:01:04.183
  END_TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD252.nio
                  = 501 502 503 504 599
 BODIES
  BEGIN_TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
 END TIME
                  = CAL-ET 1999 JUL 25 00:01:04.183
SOURCE_NIO_FILE
                 = plneph/eph.OD248.nio
  BODIES
                  = 3 5 10 301 399
```

```
BEGIN TIME
                   = CAL-ET 1999 JUN 08 23:59:59.999
    END TIME
                   = CAL-ET 1999 JUL 25 00:01:04.183
  SOURCE NIO FILE
                   = orbiter/dpfil-990915-od256-c23-enc.nio
    BODTES
                   = -77
    BEGIN_TIME
                   = CAL-ET 1999 JUL 25 00:01:04.183
                    = CAL-ET 1999 AUG 29 11:59:59.999
    END_TIME
  SOURCE_NIO_FILE
                   = sateph/sateph.OD256.nio
                   = 501 502 503 504 599
    BODTES
    BEGIN_TIME
                   = CAL-ET 1999 JUL 25 00:01:04.183
                   = CAL-ET 1999 AUG 29 11:59:59.999
    END_TIME
  SOURCE_NIO_FILE = plneph/eph.OD248.nio
    BODIES
                    = 3 5 10 301 399
    BEGIN_TIME
                    = CAL-ET 1999 JUL 25 00:01:04.183
                    = CAL-ET 1999 AUG 29 11:59:59.999
    END TIME
  SOURCE_NIO_FILE = orbiter/dpfil-991010-od263-i24-enc.nio
    BODIES
                    = -77
    BEGIN_TIME
                   = CAL-ET 1999 AUG 29 11:59:59.999
                   = CAL-ET 1999 SEP 27 01:00:00.000
    END TIME
  SOURCE_NIO_FILE
                   = sateph/sateph.OD263.nio
                    = 501 502 503 504 599
    BODIES
                   = CAL-ET 1999 AUG 29 11:59:59.999
    BEGIN TIME
                   = CAL-ET 1999 SEP 27 01:00:00.000
    END_TIME
  SOURCE_NIO_FILE
                   = plneph/eph.OD261.nio
                   = 3 5 10 301 399
   BODIES
                   = CAL-ET 1999 AUG 29 11:59:59.999
    BEGIN_TIME
                   = CAL-ET 1999 SEP 27 01:00:00.000
    END_TIME
  SOURCE NIO FILE = orbiter/dpfil-991125-od271-i25-enc.nio
                   = -77
    BODIES
                   = CAL-ET 1999 SEP 27 01:00:00.000
    BEGIN_TIME
    END_TIME
                   = CAL-ET 1999 NOV 12 00:59:59.999
  SOURCE NIO FILE
                   = sateph/sateph.OD271.nio
                   = 501 502 503 504 599
    BODIES
                   = CAL-ET 1999 SEP 27 01:00:00.000
    BEGIN_TIME
    END TIME
                   = CAL-ET 1999 NOV 12 00:59:59.999
  SOURCE NIO FILE = plneph/eph.OD261.nio
    BODIES
                   = 3 5 10 301 399
    BEGIN_TIME
                   = CAL-ET 1999 SEP 27 01:00:00.000
                   = CAL-ET 1999 NOV 12 00:59:59.999
    END TIME
  SOURCE_NIO_FILE = orbiter/dpfil-000102-od277-e26-enc.nio
    BODIES
                   = -77
    BEGIN TIME
                   = CAL-ET 1999 NOV 12 00:59:59.999
                   = CAL-ET 1999 DEC 24 12:01:04.183
    END_TIME
  SOURCE_NIO_FILE = sateph/sateph.OD277.nio
    BODIES
                    = 501 502 503 504 599
                   = CAL-ET 1999 NOV 12 00:59:59.999
= CAL-ET 1999 DEC 24 12:01:04.183
    BEGIN TIME
    END TIME
  SOURCE_NIO_FILE = plneph/eph.OD261.nio
                   = 3 5 10 301 399
    BODIES
    BEGIN_TIME
                   = CAL-ET 1999 NOV 12 00:59:59.999
    END_TIME
                    = CAL-ET 1999 DEC 24 12:01:04.183
  SOURCE_NIO_FILE
                   = orbiter/dpfil-000221-od281-i27-enc.nio
                   = -77
    BODIES
                   = CAL-ET 1999 DEC 24 12:01:04.183
    BEGIN_TIME
    END TIME
                   = CAL-ET 2000 FEB 01 20:01:04.184
  SOURCE_NIO_FILE = sateph/sateph.OD281.nio
                   = 501 502 503 504 599
    BODIES
                   = CAL-ET 1999 DEC 24 12:01:04.183
    BEGIN_TIME
                    = CAL-ET 2000 FEB 01 20:01:04.184
    END_TIME
  SOURCE NIO FILE
                   = plneph/eph.OD261.nio
                   = 3 5 10 301 399
    BODTES
    BEGIN_TIME
                    = CAL-ET 1999 DEC 24 12:01:04.183
                    = CAL-ET 2000 FEB 01 20:01:04.184
    END TIME
; END NIOSPK COMMANDS
      This is the final SPK file for the Galileo GEM mission.
       The designation is S000131A.BSP, ...XSP, ...BSP_LBL
                         GENERAL COMMENTS:
KEY TO FILE SEGMENTS:
01-DEC-1997 to 26-JAN-1998 Reconstruction for Orbit 12, OD201
26-JAN-1998 to 14-MAR-1998 Reconstruction for Orbit 13, OD208
14-MAR-1998 to 03-MAY-1998 Reconstruction for Orbit 14, OD212
03-MAY-1998 to 20-JUL-1998 Reconstruction for Orbit 15, OD219
20-JUL-1998 to 01-SEP-1998 Reconstruction for Orbit 16, OD224
01-SEP-1998 to 13-NOV-1998 Reconstruction for Orbit 17, OD229
13-NOV-1998 to 01-JAN-1999 Reconstruction for Orbit 18, OD233
01-JAN-1999 to 23-APR-1999 Reconstruction for Orbit 19, OD241
23-APR-1999 to 09-JUN-1999 Reconstruction for Orbit 20, OD248
09-JUN-1999 to 25-JUL-1999 Reconstruction for Orbit 21, OD252
25-JUL-1999 to 29-AUG-1999 Reconstruction for Orbit 22, OD256
```

29-AUG-1999 to 27-SEP-1999 Reconstruction for Orbit 23, OD263 27-SEP-1999 to 12-NOV-1999 Reconstruction for Orbit 24, OD271 12-NOV-1999 to 24-DEC-1999 Reconstruction for Orbit 25, OD277

24-DEC-1999 to 31-JAN-2000 Reconstruction for Orbit 26, OD281

This file is a compilation of reconstructed trajectory segments. This file begins 1-DEC-1997 (DOY 97-335) and continues to the end of the GEM tour (DOY 00-031).

The file for the primary tour is S980326A.BSP. It is compiled of reconstructed data only and ends on 1-JAN-1998 (DOY 98-001).

A similar file covering reconstructed segments for the interplanetary trajectory can be found in a S970311A.BSP. The final reconstruction for the probe trajectory is provided separately in S960730A.BSP.

Amalthea is included for Orbit 22 of the GEM Mission. Bodies included in this file and radii for Jupiter and the Jovian satellites are:

| Name               | Body Number | Radius (km)               |
|--------------------|-------------|---------------------------|
| Orbiter            | -77         |                           |
| Earth              | 399         | 6378.14                   |
| Earth barycenter   | 3           |                           |
| Moon               | 301         | 1737.40                   |
| Sun barycenter     | 10          |                           |
| Jupiter            | 599         | 71492.0                   |
| Jupiter barycenter | 5           |                           |
| Io                 | 501         | 1821.3                    |
| Europa             | 502         | 1565.0                    |
| Ganymede           | 503         | 2634.0                    |
| Callisto           | 504         | 2403.0                    |
| Amalthea           | 505         | 86.2 (GEM orbit C22 only) |
| Himalia            | 506         | 85.0                      |
| Elara              | 507         | 40.0                      |
| Pasiphae           | 508         | 18.0                      |
| Sinope             | 509         | 14.0                      |
| Lysithea           | 510         | 12.0                      |
| Carme              | 511         | 15.0                      |
| Ananke             | 512         | 10.0                      |
| Leda               | 513         | 5.0                       |
| Thebe              | 514         | 50.0                      |
| Adrastea           | 515         | 10.0                      |
| Metis              | 516         | 20.0                      |

NOTE: The radii values were taken from the Report of the IAU/IAG/COSPAR Working Group on Cartographic Coordinates and Rotational Elements of the Planets and Satellites: 1994.

Each segment listed has information under the following headings:

COMMENTS

TRAJECTORY BASIS/OD SOLUTION

TIME SPAN

SIGNIFICANT EVENTS

INPUT FILES

ET is used to denote ephemeris time; it differs from UTC (universal time coordinated) in which spacecraft events are usually given by the following:

ET minus UTC = 63 184 sec (as of Jul 1 1997)

ET minus UTC = 63.184 sec (as of Jul. 1, 1997) = 64.184 sec (as of Jan. 1, 1999)

SCLK is spacecraft clock string.

Questions should be directed to:

Joan Pojman (818 354-0264, Joan.Pojman@jpl.nasa.gov)

RECONSTRUCTION FOR ORBIT 12

COMMENTS: Reconstruction for Europa 12 encounter.

TRAJECTORY BASIS/OD SOLUTION: OD-201

TTME SPAN:

BEGIN: 01-DEC-1997 00:01:03.184 ET DOY: 97-335 01-DEC-1997 00:00:00.000 UTC DOY: 97-335 1/04240645:13:3:3 SCLK END: 26-JAN-1998 00:00:00.000 ET DOY: 98-026 25-JAN-1998 23:58:56.815 UTC DOY: 98-026

1/04320397:90:8:7 SCLK

SIGNIFICANT EVENTS:

Europa 12 closest approach:

16-DEC-1997 12:04:23.06 ET (12:03:19.87 UTC, 1/04262723:16:3:3 SCLK)

Altitude: 201.0 km +/- 0.015 km Latitude: -8.66 deg +/- 0.003 deg

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

```
11/1/23, 9:37 PM
     16-DEC-1997 06:35:56.58 ET (06:34:53.40 UTC, 1/04262398:31:6:1 SCLK)
     Range to Jupiter from S/C: 629039.69 km (8.79874 Rj)
 TNPUT FTLES:
  Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio
  Satellite eph file: /usr/nav/od/deliveries/OD196/sateph.OD201.nio
                      /usr/nav/od/deliveries/OD201/epoch
  Epoch file:
                      /usr/nav/eph/gin-0894.nio
  GIN file
  STOIC file
                      /usr/nav/od/stoic/ld980430.pt980711
  P-file
                      /usr/nav/traj/ref-traj/dpfil-980127-tour.nio
                      RECONSTRUCTION FOR ORBIT 13
 COMMENTS: Reconstruction for Phasing Orbit 13.
 TRAJECTORY BASIS/OD SOLUTION: OD-208
 TIME SPAN:
                 BEGIN: 26-JAN-1998 00:00:00.000 ET DOY: 98-026 25-JAN-1998 23:58:56.815 UTC DOY: 98-026
                        1/04320397:90:8:7
                                                SCLK
                   END: 14-MAR-1998 00:01:03.186 ET
                                                      DOY: 98-073
                        14-MAR-1998 00:00:00.001 UTC DOY: 98-073
                        1/04387335:31:3:0
                                                SCLK
 SIGNIFICANT EVENTS:
   Europa 13A closest approach:
     10-FEB-1998 17:58:35.67 ET (17:57:32.48 UTC, 1/04342827:35:6:1 SCLK)
                3557.2 km +/- 0.052 km
     Altitude:
                  -8.93 deg +/- 0.0046 deg
     Latitude:
                          (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     10-FEB-1998 23:10:17.78 ET (23:09:14.60 UTC, 1/04343135:60:8:0 SCLK)
     Range to Jupiter from S/C: 633063.38 km (8.85502 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio
  Satellite eph file: /usr/nav/od/deliveries/OD208/sateph.OD208.nio
  Epoch file:
                   /usr/nav/od/deliveries/OD208/epoch
  GIN file
                      /usr/nav/eph/gin-0198.nio
  STOIC file
                      /usr/nav/od/stoic/ld980326.pt980606
                      /usr/nav/traj/pfiles/dpfil-980328-od208-e14-enc.nio
  P-file
                      RECONSTRUCTION FOR ORBIT 14
 COMMENTS: Reconstruction for Orbit 14
            ET minus UTC is 63.184 seconds as of July 1, 1997.
 TRAJECTORY BASIS/OD SOLUTION: OD-212
 TIME SPAN:
                 BEGIN: 14-MAR-1998 00:01:03.186 ET DOY: 98-073
                        14-MAR-1998 00:00:00.001 UTC DOY: 98-073
                        1/04387335:31:3:0
                                             SCLK
                   END: 03-MAY-1998 20:01:03.186 ET DOY: 98-123
                        03-MAY-1998 20:00:00.000 UTC DOY: 98-123
                        1/04459730:90:2:3
                                                SCI K
 SIGNIFICANT EVENTS:
   Europa 14 closest approach:
     29-MAR-1998 13:22:08.33 ET (13:21:05.14 UTC, 1/04409490:25:2:1 SCLK)
                1644.1 km +/- 0.015 km
     Altitude:
                  12.21 deg +/- 0.001 deg
     Latitude:
                          (Europa-centered, Europa True Equator of Date)
     29-MAR-1998 08:00:16.60 ET (07:59:13.41 UTC, 1/04409171:86:6:0 SCLK)
     Range to Jupiter from S/C: 631692.54 km (8.83585 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio
  Satellite eph file: /usr/nav/od/deliveries/OD212/sateph.OD212.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD212/epoch
  GIN file
                      /usr/nav/eph/gin-0198.nio
  STOTC file
                      /usr/nav/od/stoic/ld980430.pt980711
  P-file
                      /usr/nav/traj/pfiles/dpfil-980518-od212-tour.nio
                      RECONSTRUCTION FOR ORBIT 15
```

COMMENTS: Reconstruction for Orbit 15

ET minus UTC is 63.184 seconds as of July 1, 1997.

```
TRAJECTORY BASIS/OD SOLUTION: OD-219
```

TIME SPAN:

BEGIN: 03-MAY-1998 20:01:03.186 ET DOY: 98-123 03-MAY-1998 20:00:00.000 UTC DOY: 98-123

SCLK 1/04459730:90:2:3

END: 20-JUL-1998 05:01:03.186 ET DOY: 98-201 20-JUL-1998 05:00:00.000 UTC DOY: 98-201 1/04569926:59:8:6 SCLK

SIGNIFICANT EVENTS:

Europa 15 closest approach:

31-MAY-1998 21:13:59.77 ET (21:12:56.59 UTC, 1/04499680:07:2:7 SCLK)

Altitude: 2514.5 km +/- 0.0134 km 15.00 deg +/- 0.001 deg Latitude:

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

01-JUN-1998 02:35:44.77 ET (02:34:41.59 UTC, 1/04499998:26:8:0 SCLK)

Range to Jupiter from S/C: 632696.58 km (8.84989 Rj)

TNPUT FILES:

Planetary eph file: /usr/nav/od/deliveries/OD214/eph.OD214.nio Satellite eph file: /usr/nav/od/deliveries/OD219/sateph.OD219.nio

/usr/nav/od/deliveries/OD219/epoch Epoch file:

GIN file /usr/nav/eph/gin-0198.nio

STOIC file /usr/nav/od/stoic/ld980715.pt980925

P-file /usr/nav/traj/pfiles/dpfil-980720-od219-e16-enc.nio

RECONSTRUCTION FOR ORBIT 16

COMMENTS: Reconstruction for Orbit 16

ET minus UTC is 63.184 seconds as of July 1, 1997.

TRAJECTORY BASIS/OD SOLUTION: OD-224

TIME SPAN:

BEGIN: 20-JUL-1998 05:01:03.186 ET DOY: 98-201 20-JUL-1998 05:00:00.000 UTC DOY: 98-201 1/04569926:59:8:6 SCLK

END: 01-SEP-1998 00:00:00.000 ET DOY: 98-244

31-AUG-1998 23:58:56.818 UTC DOY: 98-243

1/04630868:46:3:4 SCLK

SIGNIFICANT EVENTS:

Europa 16 closest approach:

21-JUL-1998 05:04:47.95 ET (05:03:44.77 UTC, 1/04571354:49:1:1 SCLK)

Altitude: 1834.2 km +/- 0.0123 km -25.65 deg +/- 0.00039 deg Latitude:

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

21-JUL-1998 00:19:02.08 ET (00:17:58.89 UTC, 1/04571071:83:2:7 SCLK)

Range to Jupiter from S/C: 632799.65 km (8.85134 Rj)

Planetary eph file: /usr/nav/od/deliveries/OD224/eph.OD224.nio Satellite eph file: /usr/nav/od/deliveries/OD224/sateph.OD224.nio

/usr/nav/od/deliveries/OD224/epoch Epoch file:

GIN file /usr/nav/eph/gin-0198.nio

STOTC file /usr/nav/od/stoic/ld980917.pt981128

P-file /usr/nav/traj/pfiles/dpfil-980925-od224-e17-enc.nio

-----

RECONSTRUCTION FOR ORBIT 17

COMMENTS: Reconstruction for Orbit 17

ET minus UTC is 63.184 seconds as of July 1, 1997.

TRAJECTORY BASIS/OD SOLUTION: OD-229

TIME SPAN:

BEGIN: 01-SEP-1998 00:00:00.000 ET DOY: 98-244 31-AUG-1998 23:58:56.818 UTC DOY: 98-243

1/04630868:46:3:4 SCLK

END: 13-NOV-1998 00:00:00.000 ET DOY: 98-317 12-NOV-1998 23:58:56.817 UTC DOY: 98-316

1/04734833:36:8:6 SCLK

SIGNIFICANT EVENTS:

Europa 17 closest approach:

26-SEP-1998 03:55:23.02 ET (03:54:19.84 UTC, 1/04666705:65:7:6 SCLK)

Altitude: 3582.4 km +/- 0.015 km -42.43 deg +/- 0.0002 deg Latitude:

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

```
11/1/23, 9:37 PM
     26-SEP-1998 08:27:30.34 ET (08:26:27.16 UTC, 1/04666974:77:7:7 SCLK)
     Range to Jupiter from S/C: 637028.58 km (8.91049 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD229/eph.OD229.nio
  Satellite eph file: /usr/nav/od/deliveries/OD229/sateph.OD229.nio
                      /usr/nav/od/deliveries/OD229/epoch
  Enoch file:
                      /usr/nav/eph/gin-0198.nio
  GTN file
  STOIC file
                      /usr/nav/od/stoic/ld981105.pt990116
  P-file
                      /usr/nav/traj/pfiles/dpfil-981116-od229-tour.nio
                      RECONSTRUCTION FOR ORBIT 18
 COMMENTS: Reconstruction for Orbit 18
            ET minus UTC is 63.184 seconds as of July 1, 1997.
 TRAJECTORY BASIS/OD SOLUTION: OD-233
 TIME SPAN:
                 BEGIN: 13-NOV-1998 00:00:00.000 ET DOY: 98-317
                        12-NOV-1998 23:58:56.817 UTC DOY: 98-316
                        1/04734833:36:8:6
                                              SCLK
                   END: 01-JAN-1999 00:00:00.000 ET DOY: 99-001
                        31-DEC-1998 23:58:56.817 UTC DOY: 98-365
                        1/04804618:05:4:6
                                                SCLK
 SIGNIFICANT EVENTS:
   Europa 18 closest approach:
     22-NOV-1998 11:39:29.39 ET (11:38:26.21 UTC, 1/04748342:72:5:7 SCLK)
                2270.8 km +/- 0.013 km
     Altitude:
                  41.34 deg +/- 0.0 deg
     Latitude:
                          (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     22-NOV-1998 07:31:54.95 ET (07:30:51.76 UTC, 1/04748097:85:9:0 SCLK)
     Range to Jupiter from S/C: 639331.79 km (8.94270 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD232/eph.OD232.nio
  Satellite eph file: /usr/nav/od/deliveries/OD233/sateph.OD233.nio
  Epoch file:
                   /usr/nav/od/deliveries/OD233/epoch
  GIN file
                      /usr/nav/eph/gin-0198.nio
  STOIC file
                      /usr/nav/od/stoic/ld981229.pt990311
                      /usr/traj1/post-GEM/990114/post-GEM-990114.nio
  P-file
                     RECONSTRUCTION FOR ORBIT 19
 COMMENTS: Reconstruction for Europa 19
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-241
 TIME SPAN:
                 BEGIN: 01-JAN-1999 00:00:00.000 ET DOY: 99-001
                        31-DEC-1998 23:58:56.817 UTC DOY: 98-365
                        1/04804618:05:4:6
                                            SCLK
                   END: 23-APR-1999 00:00:00.000 ET DOY: 99-113
                        22-APR-1999 23:58:55.814 UTC DOY: 99-112
                        1/04964125:76:8:4
                                                SCI K
 SIGNIFICANT EVENTS:
   Europa 19 closest approach:
     01-FEB-1999 02:20:54.13 ET (02:19:49.94 UTC, 1/04848906:80:9:5 SCLK)
                1439.4 km +/- 0.0139 km
     Altitude:
                 30.52 deg +/- 0.000 deg
     Latitude:
                          (Europa-centered, Europa True Equator of Date)
     01-FEB-1999 05:03:14.45 ET (05:02:10.27 UTC, 1/04849067:40:4:4 SCLK)
     Range to Jupiter from S/C: 651211.84 km (9.10888 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD238/eph.OD238.nio
  Satellite eph file: /usr/nav/od/deliveries/OD241/sateph.OD241.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD241/epoch
  GIN file
                      /usr/nav/eph/gin-0198.nio
  STOIC file
                      /usr/nav/od/stoic/ld990415.pt990708
  P-file
                      /usr/nav/traj/ref-traj/dpfil-990426-od241-tour.nio
                     RECONSTRUCTION FOR ORBIT 20
 COMMENTS: Reconstruction for Callisto 20
```

ET minus UTC is 64.184 seconds as of January 1, 1999.

```
11/1/23, 9:37 PM
 TRAJECTORY BASIS/OD SOLUTION: OD-248
 TIME SPAN:
                 BEGIN: 23-APR-1999 00:00:00.000 ET DOY: 99-113
                        22-APR-1999 23:58:55.814 UTC DOY: 99-112
                        1/04964125:76:8:4 SCLK
                   END: 09-JUN-1999 00:00:00.000 ET DOY: 99-160
                        08-JUN-1999 23:58:55.815 UTC DOY: 99-159
                        1/05031062:13:3:6
                                               SCLK
 SIGNIFICANT EVENTS:
   Callisto 20 closest approach:
     05-MAY-1999 13:57:22.30 ET (13:56:18.11 UTC, 1/04982044:12:2:3 SCLK)
     Altitude:
                1321.4 km +/- 0.0151 km
                   2.78 deg +/- 0.0015 deg
     Latitude:
                         (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     03-MAY-1999 17:01:15.21 ET (17:00:11.02 UTC, 1/04979377:58:4:5 SCLK)
     Range to Jupiter from S/C: 670009.42 km (9.37181 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD248/sateph.OD248.nio
                     /usr/nav/od/deliveries/OD248/epoch
  Epoch file:
  GIN file
                      /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                     /usr/nav/od/stoic/ld990624.pt990910
  P-file
                     /usr/nav/traj/pfiles/dpfil-990629-od248-c21-enc.nio
                     RECONSTRUCTION FOR ORBIT 21
 COMMENTS: Reconstruction for Callisto 21
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-252
 TIME SPAN:
                 BEGIN: 09-JUN-1999 00:00:00.000 ET DOY: 99-160
                        08-JUN-1999 23:58:55.815 UTC DOY: 99-159
                        1/05031062:13:3:6
                                              SCLK
                   END: 25-JUL-1999 00:01:04.184 ET DOY: 99-206
                        25-JUL-1999 00:00:00.000 UTC DOY: 99-206
                        1/05096575:30:1:1
                                               SCLK
 SIGNIFICANT EVENTS:
   Callisto 21 closest approach:
     30-JUN-1999 07:47:53.87 ET (07:46:49.69 UTC, 1/05061432:55:7:7 SCLK)
     Altitude: 1048.1 km +/- 0.011 km
                  -0.7 deg +/- 0.0003 deg
     Latitude:
                         (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     02-JUL-1999 05:05:56.36 ET (05:04:52.18 UTC, 1/05064120:71:6:6 SCLK)
     Range to Jupiter from S/C: 519747.15 km (7.27000 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD252/sateph.OD252.nio
                 /usr/nav/od/deliveries/OD252/epoch
  Epoch file:
                     /usr/nav/eph/gin-0198.v205.nio
  GIN file
  STOTC file
                     /usr/nav/od/stoic/ld990729.pt991009
  P-file
                      /usr/nav/traj/pfiles/dpfil-990813-od252-c22-enc.nio
                     RECONSTRUCTION FOR ORBIT 22
 COMMENTS: Reconstruction for Callisto 22
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-256
 TIME SPAN:
                 BEGIN: 25-JUL-1999 00:01:04.184 ET DOY: 99-206
```

25-JUL-1999 00:00:00.000 UTC DOY: 99-206 1/05096575:30:1:1 SCLK END: 29-AUG-1999 12:00:00.000 ET DOY: 99-241 29-AUG-1999 11:58:55.817 UTC DOY: 99-241

1/05147132:49:5:1 SCLK

SIGNIFICANT EVENTS:

Callisto 22 closest approach:

14-AUG-1999 08:31:55.94 ET (08:30:51.76 UTC, 1/05125564:10:2:7 SCLK)

Altitude: 2299.3 km +/- 0.015 km -2.3 +/- 0.001 deg Latitude:

(Callisto-centered, Callisto True Equator of Date)

Jupiter Periapsis:

```
11/1/23, 9:37 PM
     12-AUG-1999 10:59:35.66 ET (10:58:31.48 UTC, 1/05122861:72:7:2 SCLK)
     Range to Jupiter from S/C: 523080.41 km (7.31663 Rj)
 TNPUT FTLES:
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD256/sateph.OD256.nio
                      /usr/nav/od/deliveries/OD256/epoch
  Epoch file:
                      /usr/nav/eph/gin-0198.v205.nio
  GIN file
  STOIC file
                      /usr/nav/od/stoic/ld990909.pt991202
  P-file
                      /usr/nav/traj/pfiles/dpfil-990915-od256-c23-enc.nio
                      RECONSTRUCTION FOR ORBIT 23
 COMMENTS: Reconstruction for Callisto 23
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-263
 TIME SPAN:
                 BEGIN: 29-AUG-1999 12:00:00.000 ET DOY: 99-241
                        29-AUG-1999 11:58:55.817 UTC DOY: 99-241
                        1/05147132:49:5:1
                                              SCLK
                   END: 27-SEP-1999 01:00:00.000 ET DOY: 99-270
                        27-SEP-1999 00:58:55.818 UTC DOY: 99-270
                        1/05187780:83:6:4
                                                SCLK
 SIGNIFICANT EVENTS:
   Callisto 23 closest approach:
     16-SEP-1999 17:28:06.00 ET (17:27:01.813 UTC, 1/05173092:19:8:6 SCLK)
                1052.4 km +/- 0.0118 km
     Altitude:
                  0.0986 deg. +/- 0.001 deg
     Latitude:
                         (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     14-SEP-1999 19:58:41.02 ET (19:57:36.83 UTC, 1/05170392:72:2:5 SCLK)
     Range to Jupiter from S/C: 467972.00 km (6.54580 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
  Satellite eph file: /usr/nav/od/deliveries/OD263/sateph.OD263.nio
  Epoch file:
                   /usr/nav/od/deliveries/OD263/epoch
  GIN file
                      /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                      /usr/nav/od/stoic/ld990930.pt991211
                      /usr/nav/traj/pfiles/dpfil-991010-od263-i24-enc.nio
  P-file
                     RECONSTRUCTION FOR ORBIT 24
 COMMENTS: Reconstruction for Io 24
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-271
 TIME SPAN:
                 BEGIN: 27-SEP-1999 01:00:00.000 ET DOY: 99-270
                        27-SEP-1999 00:58:55.818 UTC DOY: 99-270
                        1/05187780:83:6:4
                                              SCLK
                   END: 12-NOV-1999 01:00:00.000 ET DOY: 99-316
                        12-NOV-1999 00:58:55.817 UTC DOY: 99-316
                        1/05253293:04:1:1
                                                SCI K
 SIGNIFICANT EVENTS:
   Io 24 closest approach:
     11-OCT-1999 04:34:06.72 ET (04:33:02.53 UTC, 1/05207931:13:8:0 SCLK)
                611.3 km +/- 0.011 km
     Altitude:
                 4.507 deg. +/- 0.003 deg
     Latitude:
                          (Io-centered, Io True Equator of Date)
     11-OCT-1999 02:03:41.50 ET (02:02:37.31 UTC, 1/05207782:34:9:4 SCLK)
     Range to Jupiter from S/C: 396600.93 km (5.54749 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
  Satellite eph file: /usr/nav/od/deliveries/OD271/sateph.OD271.nio
  Epoch file:
                    /usr/nav/od/deliveries/OD271/epoch
  GIN file
                      /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                     /usr/nav/od/stoic/ld991121.pt000201
  P-file
                      /usr/nav/traj/pfiles/dpfil-991125-od271-i25-enc.nio
                      RECONSTRUCTION FOR ORBIT 25
 COMMENTS: Reconstruction for Io 25
            ET minus UTC is 64.184 seconds as of January 1, 1999.
```

TRAJECTORY BASIS/OD SOLUTION: OD-277

```
TIME SPAN:
               BEGIN: 12-NOV-1999 01:00:00.000 ET
                                                   DOY: 99-316
                      12-NOV-1999 00:58:55.817 UTC DOY: 99-316
                      1/05253293:04:1:1
                                             SCLK
                 END: 24-DEC-1999 12:01:04.184 ET
                                                   DOY:
                                                        99-358
                      24-DEC-1999 12:00:00.000 UTC DOY: 99-358
                      1/05313762:24:5:7
                                             SCI K
SIGNIFICANT EVENTS:
  Io 25 closest approach:
   26-NOV-1999 04:06:25.06 ET (04:05:20.88 UTC, 1/05273415:80:7:5 SCLK)
                300.484 km +/- 0.412 km
   Altitude:
   Latitude:
                -76.383 deg. +/- 0.0025 deg.
                        (Io-centered, Io True Equator of Date)
  Jupiter Periapsis:
    26-NOV-1999 02:09:53.86 ET (02:08:49.68 UTC, 1/05273300:58:9:5 SCLK)
   Range to Jupiter from S/C: 405572.12 km (5.67297 Rj)
INPUT FILES:
Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
 Satellite eph file: /usr/nav/od/deliveries/OD277/sateph.OD277.nio
                    /usr/nav/od/deliveries/OD277/epoch
GIN file
                    /usr/nav/eph/gin-0198.v205.nio
STOIC file
                    /usr/nav/od/stoic/ld991228.pt000309
P-file
                    /usr/nav/traj/pfiles/dpfil-000102-od277-e26-enc.nio
                                             RECONSTRUCTION FOR ORBIT 26
COMMENTS: Reconstruction for Orbit 26
          ET minus UTC is 64.184 seconds as of January 1, 1999.
TRAJECTORY BASIS/OD SOLUTION: OD-281
TIME SPAN:
               BEGIN: 24-DEC-1999 12:01:04.184 ET DOY: 99-358
                      24-DEC-1999 12:00:00.000 UTC DOY:
                                                        99-358
                      1/05313762:24:5:7
                                            SCLK
                 END: 01-FEB-2000 20:00:00.000 ET
                                                   DOY: 00-032
                      01-FEB-2000 19:58:55.816 UTC DOY: 00-032
                      1/05369778:75:2:5
                                             SCLK
SIGNIFICANT EVENTS:
  Europa 26 closest approach:
   03-JAN-2000 18:00:46.77 ET (17:59:42.59 UTC, 1/05328359:72:2:3 SCLK)
                351.077 km +/- 0.015 km
   Altitude:
   Latitude:
                -47.345 deg. +/- 0.001 deg.
                        (Europa-centered, Europa True Equator of Date)
  Jupiter Periapsis:
    04-JAN-2000 03:33:54.78 ET (03:32:50.60 UTC, 1/05328926:57:2:6 SCLK)
    Range to Jupiter from S/C: 413330.37 km (5.78149 Rj)
INPUT FILES:
 Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
 Satellite eph file: /usr/nav/od/deliveries/OD281/sateph.OD281.nio
                    /usr/nav/od/deliveries/OD281/epoch
 Epoch file:
GIN file
                    /usr/nav/eph/gin-0198.v205.nio
STOIC file
                    /usr/nav/od/stoic/ld991228.pt0000309
                    /usr/nav/traj/pfiles/dpfil-000221-od281-i27-enc.nio
P-file
______
 S000131A.BSP LOG FILE
 Created 2000-02-22/13:56:21.00.
; BEGIN NIOSPK COMMANDS
LEAPSECONDS_FILE
                   = /usr/nav/traj/naif/mk98259a.tls
                   = S000131A.BSP
SPK FILE
  SPK_LOG_FILE
                  = S000131A-GEM.log
  INCLUDE_TEXT_FILE = gem-comments.txt
  SOURCE_NIO_FILE = sateph/sateph-jup120.nio
   BODIES
                   = 505 514 515 516
    BEGIN_TIME
                   = CAL-ET 1999 SEP 27 23:02:05.247
    END_TIME
                   = CAL-ET 2000 FEB 01 20:01:04.184
  SOURCE_NIO_FILE = sateph/sateph-jup068.nio
   BODIES
                   = 506 507 508 509 510 511 512 513
                   = CAL-ET 1999 SEP 27 23:02:05.247
    BEGIN_TIME
                   = CAL-ET 2000 FEB 01 20:01:04.184
   END TIME
  SOURCE_NIO_FILE
                  = orbiter/dpfil-980127-tour.nio
    BODIES
                   = -77
   BEGIN TIME
                   = CAL-ET 1997 DEC 01 00:01:03.183
                   = CAL-ET 1998 JAN 26 00:01:03.184
   END TIME
```

= sateph/sateph.OD201.nio

SOURCE\_NIO\_FILE

```
BODTES
                 = 501 502 503 504 599
 BEGIN TIME
                  = CAL-ET 1997 DEC 01 00:01:03.183
  END TIME
                  = CAL-ET 1998 JAN 26 00:01:03.184
                = plneph/eph.OD185.nio
SOURCE NIO FILE
 BODIES
                  = 3 5 10 301 399
 BEGIN_TIME
                  = CAL-ET 1997 DEC 01 00:01:03.183
                  = CAL-ET 1998 MAY 03 20:01:03.185
 END TIME
SOURCE_NIO_FILE
                 = orbiter/dpfil-980328-od208-e14-enc.nio
  BODIES
 BEGIN_TIME
                 = CAL-ET 1998 JAN 26 00:01:03.184
                  = CAL-ET 1998 MAR 14 00:01:03.186
 END_TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD208.nio
 BODIES
                  = 501 502 503 504 599
                  = CAL-ET 1998 JAN 26 00:01:03.184
 BEGIN TIME
 END TIME
                  = CAL-ET 1998 MAR 14 00:01:03.186
SOURCE_NIO_FILE
                 = orbiter/dpfil-980518-od212-tour.nio
 BODIES
                  = -77
                  = CAL-ET 1998 MAR 14 00:01:03.186
 BEGIN_TIME
                  = CAL-ET 1998 MAY 03 20:01:03.185
  END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD212.nio
                  = 501 502 503 504 599
 BODTES
 BEGIN_TIME
                  = CAL-ET 1998 MAR 14 00:01:03.186
  END_TIME
                  = CAL-ET 1998 MAY 03 20:01:03.185
SOURCE NIO FILE
                 = orbiter/dpfil-980720-od219-e16-enc.nio
 BODIES
                  = -77
 BEGIN_TIME
                 = CAL-ET 1998 MAY 03 20:01:03.185
                  = CAL-ET 1998 JUL 20 05:01:03.183
 END TIME
                 = sateph/sateph.OD219.nio
SOURCE NIO FILE
 BODIES
                  = 501 502 503 504 599
  BEGIN_TIME
                  = CAL-ET 1998 MAY 03 20:01:03.185
                  = CAL-ET 1998 JUL 20 05:01:03.183
 END TIME
SOURCE_NIO_FILE
                = plneph/eph.OD214.nio
  BODIES
                  = 3 5 10 301 399
 BEGIN TIME
                  = CAL-ET 1998 MAY 03 20:01:03.185
                  = CAL-ET 1998 JUL 20 05:01:03.183
 END TIME
SOURCE_NIO_FILE
                 = orbiter/dpfil-980925-od224-e17-enc.nio
  BODIES
                  = -77
 BEGIN TIME
                  = CAL-ET 1998 JUL 20 05:01:03.183
                  = CAL-ET 1998 SEP 01 00:00:00.000
 END_TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD224.nio
 BODIES
                  = 501 502 503 504 599
                  = CAL-ET 1998 JUL 20 05:01:03.183
 BEGIN_TIME
 END_TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
SOURCE_NIO_FILE
                 = plneph/eph.OD224.nio
                  = 3 5 10 301 399
 BODIES
 BEGIN_TIME
                  = CAL-ET 1998 JUL 20 05:01:03.183
  END_TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
SOURCE_NIO_FILE
                 = orbiter/dpfil-981116-od229-tour.nio
 BODIES
                 = -77
 BEGIN_TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
 END_TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
SOURCE_NIO_FILE
                 = sateph/sateph.OD229.nio
                  = 501 502 503 504 599
 BODIES
 BEGIN TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
                  = CAL-ET 1998 NOV 12 23:59:59.999
 END_TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD229.nio
 BODIES
                  = 3 5 10 301 399
  BEGIN TIME
                  = CAL-ET 1998 SEP 01 00:00:00.000
                  = CAL-ET 1998 NOV 12 23:59:59.999
  END_TIME
SOURCE_NIO_FILE = orbiter/post-GEM-990114.nio
 BODIES
                  = -77
 BEGIN_TIME
                 = CAL-ET 1998 NOV 12 23:59:59.999
                  = CAL-ET 1999 JAN 01 00:00:00.000
 END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD233.nio
  BODIES
                  = 501 502 503 504 599
 BEGIN TIME
                  = CAL-ET 1998 NOV 12 23:59:59.999
                  = CAL-ET 1999 JAN 01 00:00:00.000
 END_TIME
                 = plneph/eph.OD232.nio
SOURCE_NIO_FILE
 BODIES
                  = 3 5 10 301 399
                  = CAL-ET 1998 NOV 12 23:59:59.999
 BEGIN_TIME
 END_TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
                  = orbiter/dpfil-990426-od241-tour.nio
SOURCE_NIO_FILE
                  = -77
 BODIES
                  = CAL-ET 1999 JAN 01 00:00:00.000
 BEGIN TIME
  END_TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
SOURCE_NIO_FILE
                 = sateph/sateph.OD241.nio
 BODTES
                  = 501 502 503 504 599
 BEGIN_TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
                  = CAL-ET 1999 APR 22 23:59:59.999
  END_TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD238.nio
 BODIES
                  = 3 5 10 301 399
  BEGIN_TIME
                  = CAL-ET 1999 JAN 01 00:00:00.000
                  = CAL-ET 1999 APR 22 23:59:59.999
 END TIME
                  = orbiter/dpfil-990629-od248-c21-enc.nio
SOURCE_NIO_FILE
  BODIES
                  = -77
```

```
BEGIN TIME
                 = CAL-ET 1999 APR 22 23:59:59.999
                 = CAL-ET 1999 JUN 08 23:59:59.999
  END_TIME
SOURCE NIO FILE
                 = sateph/sateph.OD248.nio
                 = 501 502 503 504 599
 BODIES
 BEGIN_TIME
                  = CAL-ET 1999 APR 22 23:59:59.999
 END_TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
SOURCE_NIO_FILE
                 = plneph/eph.OD248.nio
 BODIES
                  = 3 5 10 301 399
                  = CAL-ET 1999 APR 22 23:59:59.999
  BEGIN_TIME
                 = CAL-ET 1999 JUN 08 23:59:59.999
 END_TIME
SOURCE_NIO_FILE
                 = orbiter/dpfil-990813-od252-c22-enc.nio
 BODIES
                  = -77
                 = CAL-ET 1999 JUN 08 23:59:59.999
  BEGIN_TIME
 END_TIME
                  = CAL-ET 1999 JUL 25 00:01:04.183
SOURCE_NIO_FILE = sateph/sateph.OD252.nio
                  = 501 502 503 504 599
  BODIES
 BEGIN_TIME
                  = CAL-ET 1999 JUN 08 23:59:59.999
                  = CAL-ET 1999 JUL 25 00:01:04.183
 END TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD248.nio
 BODIES
                  = 3 5 10 301 399
 BEGIN TIME
                 = CAL-ET 1999 JUN 08 23:59:59.999
  END_TIME
                  = CAL-ET 1999 JUL 25 00:01:04.183
SOURCE_NIO_FILE
                 = orbiter/dpfil-990915-od256-c23-enc.nio
                  = -77
 BODIES
                 = CAL-ET 1999 JUL 25 00:01:04.183
 BEGIN_TIME
 END_TIME
                 = CAL-ET 1999 AUG 29 11:59:59.999
SOURCE NIO FILE = sateph/sateph.OD256.nio
                 = 501 502 503 504 599
 BODIES
                 = CAL-ET 1999 JUL 25 00:01:04.183
 BEGIN_TIME
                  = CAL-ET 1999 AUG 29 11:59:59.999
  END_TIME
SOURCE_NIO_FILE
                 = plneph/eph.OD248.nio
 BODIES
                 = 3 5 10 301 399
  BEGIN_TIME
                 = CAL-ET 1999 JUL 25 00:01:04.183
 END TIME
                  = CAL-ET 1999 AUG 29 11:59:59.999
SOURCE NIO FILE
                 = orbiter/dpfil-991010-od263-i24-enc.nio
 BODIES
                 = -77
 BEGIN_TIME
                 = CAL-ET 1999 AUG 29 11:59:59.999
                 = CAL-ET 1999 SEP 27 01:00:00.000
 END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD263.nio
 BODIES
                  = 501 502 503 504 599
                 = CAL-ET 1999 AUG 29 11:59:59.999
 BEGIN TIME
                  = CAL-ET 1999 SEP 27 01:00:00.000
 END TIME
SOURCE_NIO_FILE = plneph/eph.OD261.nio
                  = 3 5 10 301 399
 BODIES
                 = CAL-ET 1999 AUG 29 11:59:59.999
 BEGIN TIME
                  = CAL-ET 1999 SEP 27 01:00:00.000
 END TIME
SOURCE_NIO_FILE
                 = orbiter/dpfil-991125-od271-i25-enc.nio
 BODIES
                 = CAL-ET 1999 SEP 27 01:00:00.000
 BEGIN TIME
 END_TIME
                  = CAL-ET 1999 NOV 12 00:59:59.999
SOURCE_NIO_FILE
                 = sateph/sateph.OD271.nio
                 = 501 502 503 504 599
 BODIES
                 = CAL-ET 1999 SEP 27 01:00:00.000
  BEGIN_TIME
 END TIME
                 = CAL-ET 1999 NOV 12 00:59:59.999
SOURCE_NIO_FILE = plneph/eph.OD261.nio
                 = 3 5 10 301 399
 BODIES
 BEGIN_TIME
                 = CAL-ET 1999 SEP 27 01:00:00.000
                  = CAL-ET 1999 NOV 12 00:59:59.999
 END_TIME
SOURCE_NIO_FILE
                 = orbiter/dpfil-000102-od277-e26-enc.nio
 BODTES
                 = -77
 BEGIN_TIME
                  = CAL-ET 1999 NOV 12 00:59:59.999
                  = CAL-ET 1999 DEC 24 12:01:04.183
 END_TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD277.nio
 BODIES
                  = 501 502 503 504 599
                 = CAL-ET 1999 NOV 12 00:59:59.999
  BEGIN_TIME
                 = CAL-ET 1999 DEC 24 12:01:04.183
 END TIME
SOURCE NIO FILE
                 = plneph/eph.OD261.nio
                  = 3 5 10 301 399
  BODIES
 BEGIN_TIME
                 = CAL-ET 1999 NOV 12 00:59:59.999
 END_TIME
                  = CAL-ET 1999 DEC 24 12:01:04.183
SOURCE_NIO_FILE = orbiter/dpfil-000221-od281-i27-enc.nio
 BODIES
                  = -77
                 = CAL-ET 1999 DEC 24 12:01:04.183
= CAL-ET 2000 FEB 01 20:01:04.184
 BEGIN TIME
 END TIME
SOURCE_NIO_FILE
                 = sateph/sateph.OD281.nio
 BODIES
                 = 501 502 503 504 599
                 = CAL-ET 1999 DEC 24 12:01:04.183
 BEGIN_TIME
  END_TIME
                  = CAL-ET 2000 FEB 01 20:01:04.184
SOURCE_NIO_FILE
                 = plneph/eph.OD261.nio
                  = 3 5 10 301 399
 BODIES
 BEGIN_TIME
                  = CAL-ET 1999 DEC 24 12:01:04.183
  END_TIME
                  = CAL-ET 2000 FEB 01 20:01:04.184
```

# ; END NIOSPK COMMANDS

Note: This is the final SPK file for the Galileo GEM mission.
The designation is S000131A.BSP, ...XSP, ...BSP\_LBL
GENERAL COMMENTS:

#### KEY TO FILE SEGMENTS:

01-DEC-1997 to 26-JAN-1998 Reconstruction for Orbit 12, 0D201 26-JAN-1998 to 14-MAR-1998 Reconstruction for Orbit 13, 0D208 14-MAR-1998 to 03-MAY-1998 Reconstruction for Orbit 14, 0D212 03-MAY-1998 to 20-JUL-1998 Reconstruction for Orbit 15, 0D219 20-JUL-1998 to 01-SEP-1998 Reconstruction for Orbit 16, 0D224 01-SEP-1998 to 13-NOV-1998 Reconstruction for Orbit 17, 0D229 13-NOV-1998 to 01-JAN-1999 Reconstruction for Orbit 18, 0D233 01-JAN-1999 to 23-APR-1999 Reconstruction for Orbit 19, 0D241 23-APR-1999 to 09-JUN-1999 Reconstruction for Orbit 20, 0D248 09-JUN-1999 to 25-JUL-1999 Reconstruction for Orbit 21, 0D252 25-JUL-1999 to 29-AUG-1999 Reconstruction for Orbit 22, 0D256 27-SEP-1999 to 12-NOV-1999 Reconstruction for Orbit 23, 0D263 27-SEP-1999 to 24-DEC-1999 Reconstruction for Orbit 24, 0D271 12-NOV-1999 to 24-DEC-1999 Reconstruction for Orbit 25, 0D277 24-DEC-1999 to 31-JAN-2000 Reconstruction for Orbit 26, 0D281

This file is a compilation of reconstructed trajectory segments. This file begins 1-DEC-1997 (DOY 97-335) and continues to the end of the GEM tour (DOY 00-031).

The file for the primary tour is S980326B.BSP. It is compiled of reconstructed data only and ends on 1-JAN-1998 (DOY 98-001).

A similar file covering reconstructed segments for the interplanetary trajectory can be found in a S970312A.BSP. The final reconstruction for the probe trajectory is provided separately in S960730A.BSP.

Amalthea is included for Orbit 22 of the GEM Mission. Bodies included in this file and radii for Jupiter and the Jovian satellites are:

| Name               | Body Number | Radius (km)               |
|--------------------|-------------|---------------------------|
| Orbiter            | -77         |                           |
| Earth              | 399         | 6378.14                   |
| Earth barycenter   | 3           |                           |
| Moon               | 301         | 1737.40                   |
| Sun barycenter     | 10          |                           |
| Jupiter            | 599         | 71492.0                   |
| Jupiter barycenter | 5           |                           |
| Io                 | 501         | 1821.3                    |
| Europa             | 502         | 1565.0                    |
| Ganymede           | 503         | 2634.0                    |
| Callisto           | 504         | 2403.0                    |
| Amalthea           | 505         | 86.2 (GEM orbit C22 only) |
| Himalia            | 506         | 85.0                      |
| Elara              | 507         | 40.0                      |
| Pasiphae           | 508         | 18.0                      |
| Sinope             | 509         | 14.0                      |
| Lysithea           | 510         | 12.0                      |
| Carme              | 511         | 15.0                      |
| Ananke             | 512         | 10.0                      |
| Leda               | 513         | 5.0                       |
| Thebe              | 514         | 50.0                      |
| Adrastea           | 515         | 10.0                      |
| Metis              | 516         | 20.0                      |

NOTE: The radii values were taken from the Report of the IAU/IAG/COSPAR Working Group on Cartographic Coordinates and Rotational Elements of the Planets and Satellites: 1994.

Each segment listed has information under the following headings:

COMMENTS

TRAJECTORY BASIS/OD SOLUTION

TIME SPAN

SIGNIFICANT EVENTS

INPUT FILES

 ${\sf ET}$  is used to denote ephemeris time; it differs from UTC (universal time coordinated) in which spacecraft events are usually given by the following:

ET minus UTC = 63.184 sec (as of Jul. 1, 1997) = 64.184 sec (as of Jan. 1, 1999)

SCLK is spacecraft clock string.

Questions should be directed to:

Joan Pojman (818 354-0264, Joan.Pojman@jpl.nasa.gov)

.....

RECONSTRUCTION FOR ORBIT 12

```
11/1/23, 9:37 PM
 COMMENTS: Reconstruction for Europa 12 encounter.
 TRAJECTORY BASIS/OD SOLUTION: OD-201
 TIME SPAN:
                 BEGIN: 01-DEC-1997 00:01:03.184 ET
                                                      DOY: 97-335
                        01-DEC-1997 00:00:00.000 UTC DOY: 97-335
                        1/04240645:13:3:3
                                               SCLK
                   END: 26-JAN-1998 00:00:00.000 ET
                                                      DOY: 98-026
                        25-JAN-1998 23:58:56.815 UTC DOY: 98-026
                        1/04320397:90:8:7
                                                SCLK
 SIGNIFICANT EVENTS:
   Europa 12 closest approach:
     16-DEC-1997 12:04:23.06 ET (12:03:19.87 UTC, 1/04262723:16:3:3 SCLK)
                 201.0 km +/- 0.015 km
-8.66 deg +/- 0.003 deg
     Altitude:
     Latitude:
                          (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     16-DEC-1997 06:35:56.58 ET (06:34:53.40 UTC, 1/04262398:31:6:1 SCLK)
     Range to Jupiter from S/C: 629039.69 km (8.79874 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio
  Satellite eph file: /usr/nav/od/deliveries/OD196/sateph.OD201.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD201/epoch
  GIN file
                      /usr/nav/eph/gin-0894.nio
  STOIC file
                      /usr/nav/od/stoic/ld980430.pt980711
  P-file
                      /usr/nav/traj/ref-traj/dpfil-980127-tour.nio
                      RECONSTRUCTION FOR ORBIT 13
 COMMENTS: Reconstruction for Phasing Orbit 13.
 TRAJECTORY BASIS/OD SOLUTION: OD-208
 TIME SPAN:
                 BEGIN: 26-JAN-1998 00:00:00.000 ET DOY: 98-026
                        25-JAN-1998 23:58:56.815 UTC DOY: 98-026
                        1/04320397:90:8:7
                                                SCLK
                   END: 14-MAR-1998 00:01:03.186 ET DOY: 98-073
                        14-MAR-1998 00:00:00.001 UTC DOY: 98-073
                        1/04387335:31:3:0
                                                SCLK
 SIGNIFICANT EVENTS:
   Europa 13A closest approach:
     10-FEB-1998 17:58:35.67 ET (17:57:32.48 UTC, 1/04342827:35:6:1 SCLK)
     Altitude:
                 3557.2 km +/- 0.052 km
                 -8.93 deg +/- 0.0046 deg
     Latitude:
                          (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     10-FEB-1998 23:10:17.78 ET (23:09:14.60 UTC, 1/04343135:60:8:0 SCLK)
     Range to Jupiter from S/C: 633063.38 km (8.85502 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio
  Satellite eph file: /usr/nav/od/deliveries/OD208/sateph.OD208.nio
  Epoch file:
                  /usr/nav/od/deliveries/OD208/epoch
  GIN file
                      /usr/nav/eph/gin-0198.nio
  STOIC file
                      /usr/nav/od/stoic/ld980326.pt980606
  P-file
                      /usr/nav/traj/pfiles/dpfil-980328-od208-e14-enc.nio
                      RECONSTRUCTION FOR ORBIT 14
 COMMENTS: Reconstruction for Orbit 14
            ET minus UTC is 63.184 seconds as of July 1, 1997.
 TRAJECTORY BASIS/OD SOLUTION: OD-212
 TIME SPAN:
                 BEGIN: 14-MAR-1998 00:01:03.186 ET DOY: 98-073
                        14-MAR-1998 00:00:00.001 UTC DOY: 98-073
                        1/04387335:31:3:0
                                               SCLK
                   END: 03-MAY-1998 20:01:03.186 ET
                                                      DOY: 98-123
                        03-MAY-1998 20:00:00.000 UTC DOY: 98-123
                        1/04459730:90:2:3
                                               SCLK
 SIGNIFICANT EVENTS:
   Europa 14 closest approach:
     29-MAR-1998 13:22:08.33 ET (13:21:05.14 UTC, 1/04409490:25:2:1 SCLK)
```

1644.1 km +/- 0.015 km

Altitude:

```
Latitude:
                12.21 deg +/- 0.001 deg
                        (Europa-centered, Europa True Equator of Date)
  Jupiter Periapsis:
   29-MAR-1998 08:00:16.60 ET (07:59:13.41 UTC, 1/04409171:86:6:0 SCLK)
   Range to Jupiter from S/C: 631692.54 km (8.83585 Rj)
Planetary eph file: /usr/nav/od/deliveries/OD185/eph.OD185.nio
 Satellite eph file: /usr/nav/od/deliveries/OD212/sateph.OD212.nio
Epoch file:
                    /usr/nav/od/deliveries/OD212/epoch
GIN file
                    /usr/nav/eph/gin-0198.nio
STOIC file
                    /usr/nav/od/stoic/ld980430.pt980711
                    /usr/nav/traj/pfiles/dpfil-980518-od212-tour.nio
P-file
                    RECONSTRUCTION FOR ORBIT 15
COMMENTS: Reconstruction for Orbit 15
          ET minus UTC is 63.184 seconds as of July 1, 1997.
TRAJECTORY BASIS/OD SOLUTION: OD-219
TIME SPAN:
               BEGIN: 03-MAY-1998 20:01:03.186 ET DOY: 98-123
                      03-MAY-1998 20:00:00.000 UTC DOY: 98-123
                      1/04459730:90:2:3
                                             SCLK
                 END: 20-JUL-1998 05:01:03.186 ET
                                                   DOY: 98-201
                      20-JUL-1998 05:00:00.000 UTC DOY: 98-201
                      1/04569926:59:8:6
                                             SCLK
SIGNIFICANT EVENTS:
  Europa 15 closest approach:
    31-MAY-1998 21:13:59.77 ET (21:12:56.59 UTC, 1/04499680:07:2:7 SCLK)
   Altitude:
               2514.5 km +/- 0.0134 km
                15.00 deg +/- 0.001 deg
   Latitude:
                        (Europa-centered, Europa True Equator of Date)
  Jupiter Periapsis:
   01-JUN-1998 02:35:44.77 ET (02:34:41.59 UTC, 1/04499998:26:8:0 SCLK)
   Range to Jupiter from S/C: 632696.58 km (8.84989 Rj)
Planetary eph file: /usr/nav/od/deliveries/OD214/eph.OD214.nio
 Satellite eph file: /usr/nav/od/deliveries/OD219/sateph.OD219.nio
                  /usr/nav/od/deliveries/OD219/epoch
Epoch file:
GIN file
                    /usr/nav/eph/gin-0198.nio
STOIC file
                    /usr/nav/od/stoic/ld980715.pt980925
P-file
                    /usr/nav/traj/pfiles/dpfil-980720-od219-e16-enc.nio
______
                    RECONSTRUCTION FOR ORBIT 16
COMMENTS: Reconstruction for Orbit 16
          ET minus UTC is 63.184 seconds as of July 1, 1997.
TRAJECTORY BASIS/OD SOLUTION: OD-224
TIME SPAN:
               BEGIN: 20-JUL-1998 05:01:03.186 ET DOY: 98-201
                      20-JUL-1998 05:00:00.000 UTC DOY: 98-201
                      1/04569926:59:8:6
                                             SCLK
                 END: 01-SEP-1998 00:00:00.000 ET
                                                   DOY: 98-244
                      31-AUG-1998 23:58:56.818 UTC DOY: 98-243
                      1/04630868:46:3:4
                                             SCLK
SIGNIFICANT EVENTS:
  Europa 16 closest approach:
   21-JUL-1998 05:04:47.95 ET (05:03:44.77 UTC, 1/04571354:49:1:1 SCLK)
              1834.2 km +/- 0.0123 km
   Altitude:
   Latitude:
               -25.65 deg +/- 0.00039 deg
                        (Europa-centered, Europa True Equator of Date)
  Jupiter Periapsis:
   21-JUL-1998 00:19:02.08 ET (00:17:58.89 UTC, 1/04571071:83:2:7 SCLK)
   Range to Jupiter from S/C: 632799.65 km (8.85134 Rj)
Planetary eph file: /usr/nav/od/deliveries/OD224/eph.OD224.nio
Satellite eph file: /usr/nav/od/deliveries/OD224/sateph.OD224.nio
 Epoch file:
                   /usr/nav/od/deliveries/OD224/epoch
GIN file
                    /usr/nav/eph/gin-0198.nio
STOIC file
                    /usr/nav/od/stoic/ld980917.pt981128
                    /usr/nav/traj/pfiles/dpfil-980925-od224-e17-enc.nio
P-file
```

RECONSTRUCTION FOR ORBIT 17

```
11/1/23, 9:37 PM
```

COMMENTS: Reconstruction for Orbit 17

ET minus UTC is 63.184 seconds as of July 1, 1997.

TRAJECTORY BASIS/OD SOLUTION: OD-229

TIME SPAN:

BEGIN: 01-SEP-1998 00:00:00.000 ET DOY: 98-244 31-AUG-1998 23:58:56.818 UTC DOY: 98-243 1/04630868:46:3:4 SCLK

END: 13-NOV-1998 00:00:00.000 ET DOY: 98-317 12-NOV-1998 23:58:56.817 UTC DOY: 98-316

1/04734833:36:8:6 SCLK

SIGNIFICANT EVENTS:

Europa 17 closest approach:

26-SEP-1998 03:55:23.02 ET (03:54:19.84 UTC, 1/04666705:65:7:6 SCLK)

Altitude: 3582.4 km +/- 0.015 km -42.43 deg +/- 0.0002 deg Latitude:

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

26-SEP-1998 08:27:30.34 ET (08:26:27.16 UTC, 1/04666974:77:7:7 SCLK)

Range to Jupiter from S/C: 637028.58 km (8.91049 Rj)

Planetary eph file: /usr/nav/od/deliveries/OD229/eph.OD229.nio Satellite eph file: /usr/nav/od/deliveries/OD229/sateph.OD229.nio

Epoch file: /usr/nav/od/deliveries/OD229/epoch

GIN file /usr/nav/eph/gin-0198.nio

STOIC file /usr/nav/od/stoic/ld981105.pt990116

P-file /usr/nav/traj/pfiles/dpfil-981116-od229-tour.nio

RECONSTRUCTION FOR ORBIT 18

COMMENTS: Reconstruction for Orbit 18

ET minus UTC is 63.184 seconds as of July 1, 1997.

TRAJECTORY BASIS/OD SOLUTION: OD-233

TIME SPAN:

BEGIN: 13-NOV-1998 00:00:00.000 ET DOY: 98-317 12-NOV-1998 23:58:56.817 UTC DOY: 98-316 1/04734833:36:8:6 SCLK END: 01-JAN-1999 00:00:00.000 ET DOY: 99-001 31-DEC-1998 23:58:56.817 UTC DOY: 98-365

1/04804618:05:4:6 SCLK

SIGNIFICANT EVENTS:

Europa 18 closest approach:

22-NOV-1998 11:39:29.39 ET (11:38:26.21 UTC, 1/04748342:72:5:7 SCLK)

Altitude: 2270.8 km +/- 0.013 km 41.34 deg +/- 0.0 deg Latitude:

(Europa-centered, Europa True Equator of Date)

Jupiter Periapsis:

22-NOV-1998 07:31:54.95 ET (07:30:51.76 UTC, 1/04748097:85:9:0 SCLK)

Range to Jupiter from S/C: 639331.79 km (8.94270 Rj)

Planetary eph file: /usr/nav/od/deliveries/OD232/eph.OD232.nio Satellite eph file: /usr/nav/od/deliveries/OD233/sateph.OD233.nio

Epoch file: /usr/nav/od/deliveries/OD233/epoch GIN file /usr/nav/eph/gin-0198.nio

STOIC file /usr/nav/od/stoic/ld981229.pt990311

P-file /usr/traj1/post-GEM/990114/post-GEM-990114.nio

RECONSTRUCTION FOR ORBIT 19

COMMENTS: Reconstruction for Europa 19

ET minus UTC is 64.184 seconds as of January 1, 1999.

TRAJECTORY BASIS/OD SOLUTION: OD-241

TIME SPAN:

BEGIN: 01-JAN-1999 00:00:00.000 ET DOY: 99-001 31-DEC-1998 23:58:56.817 UTC DOY: 98-365 1/04804618:05:4:6 SCLK

END: 23-APR-1999 00:00:00.000 ET DOY: 99-113 22-APR-1999 23:58:55.814 UTC DOY: 99-112 1/04964125:76:8:4 SCLK

SIGNIFICANT EVENTS:

Europa 19 closest approach:

01-FEB-1999 02:20:54.13 ET (02:19:49.94 UTC, 1/04848906:80:9:5 SCLK)

Altitude: 1439.4 km +/- 0.0139 km

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11/1/23, 9:37 PM
     Latitude:
                  30.52 deg +/- 0.000 deg
                          (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     01-FEB-1999 05:03:14.45 ET (05:02:10.27 UTC, 1/04849067:40:4:4 SCLK)
     Range to Jupiter from S/C: 651211.84 km (9.10888 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD238/eph.OD238.nio
  Satellite eph file: /usr/nav/od/deliveries/OD241/sateph.OD241.nio
  Epoch file:
                      /usr/nav/od/deliveries/OD241/epoch
  GIN file
                      /usr/nav/eph/gin-0198.nio
  STOIC file
                      /usr/nav/od/stoic/ld990415.pt990708
  P-file
                      /usr/nav/traj/ref-traj/dpfil-990426-od241-tour.nio
                      RECONSTRUCTION FOR ORBIT 20
 COMMENTS: Reconstruction for Callisto 20
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-248
 TIME SPAN:
                 BEGIN: 23-APR-1999 00:00:00.000 ET DOY: 99-113
                        22-APR-1999 23:58:55.814 UTC DOY: 99-112
                        1/04964125:76:8:4
                                                SCLK
                   END: 09-JUN-1999 00:00:00.000 ET
                                                      DOY: 99-160
                        08-JUN-1999 23:58:55.815 UTC DOY: 99-159
                        1/05031062:13:3:6
                                                SCLK
 SIGNIFICANT EVENTS:
   Callisto 20 closest approach:
     05-MAY-1999 13:57:22.30 ET (13:56:18.11 UTC, 1/04982044:12:2:3 SCLK)
     Altitude:
                1321.4 km +/- 0.0151 km
                   2.78 deg +/- 0.0015 deg
     Latitude:
                          (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     03-MAY-1999 17:01:15.21 ET (17:00:11.02 UTC, 1/04979377:58:4:5 SCLK)
     Range to Jupiter from S/C: 670009.42 km (9.37181 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD248/sateph.OD248.nio
                    /usr/nav/od/deliveries/OD248/epoch
  Epoch file:
  GIN file
                      /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                      /usr/nav/od/stoic/ld990624.pt990910
  P-file
                      /usr/nav/traj/pfiles/dpfil-990629-od248-c21-enc.nio
                      RECONSTRUCTION FOR ORBIT 21
 COMMENTS: Reconstruction for Callisto 21
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-252
 TIME SPAN:
                 BEGIN: 09-JUN-1999 00:00:00.000 ET DOY: 99-160
                        08-JUN-1999 23:58:55.815 UTC DOY: 99-159
                        1/05031062:13:3:6
                                                SCLK
                   END: 25-JUL-1999 00:01:04.184 ET
                                                      DOY: 99-206
                        25-JUL-1999 00:00:00.000 UTC DOY: 99-206
                        1/05096575:30:1:1
                                                SCLK
 SIGNIFICANT EVENTS:
   Callisto 21 closest approach:
     30-JUN-1999 07:47:53.87 ET (07:46:49.69 UTC, 1/05061432:55:7:7 SCLK)
               1048.1 km +/- 0.011 km
     Altitude:
     Latitude:
                   -0.7 deg +/- 0.0003 deg
                          (Callisto-centered, Callisto True Equator of Date)
   Jupiter Periapsis:
     02-JUL-1999 05:05:56.36 ET (05:04:52.18 UTC, 1/05064120:71:6:6 SCLK)
     Range to Jupiter from S/C: 519747.15 \text{ km} (7.27000 \text{ Rj})
  Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio
  Satellite eph file: /usr/nav/od/deliveries/OD252/sateph.OD252.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD252/epoch
  GIN file
                      /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                      /usr/nav/od/stoic/ld990729.pt991009
                      /usr/nav/traj/pfiles/dpfil-990813-od252-c22-enc.nio
  P-file
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RECONSTRUCTION FOR ORBIT 22

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11/1/23, 9:37 PM
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COMMENTS: Reconstruction for Callisto 22

ET minus UTC is 64.184 seconds as of January 1, 1999.

TRAJECTORY BASIS/OD SOLUTION: OD-256

TIME SPAN:

BEGIN: 25-JUL-1999 00:01:04.184 ET DOY: 99-206 25-JUL-1999 00:00:00.000 UTC DOY: 99-206

1/05096575:30:1:1 SCLK

END: 29-AUG-1999 12:00:00.000 ET DOY: 99-241 29-AUG-1999 11:58:55.817 UTC DOY: 99-241

1/05147132:49:5:1 SCLK

SIGNIFICANT EVENTS:

Callisto 22 closest approach:

14-AUG-1999 08:31:55.94 ET (08:30:51.76 UTC, 1/05125564:10:2:7 SCLK)

Altitude: 2299.3 km +/- 0.015 km Latitude: -2.3 +/- 0.001 deg

(Callisto-centered, Callisto True Equator of Date)

Jupiter Periapsis:

12-AUG-1999 10:59:35.66 ET (10:58:31.48 UTC, 1/05122861:72:7:2 SCLK)

Range to Jupiter from S/C: 523080.41 km (7.31663 Rj)

INPUT FILES:

Planetary eph file: /usr/nav/od/deliveries/OD248/eph.OD248.nio Satellite eph file: /usr/nav/od/deliveries/OD256/sateph.OD256.nio

Epoch file: /usr/nav/od/deliveries/OD256/epoch
GIN file /usr/nav/eph/gin-0198.v205.nio
STOIC file /usr/nav/od/stoic/ld990909.pt991202

P-file /usr/nav/traj/pfiles/dpfil-990915-od256-c23-enc.nio

RECONSTRUCTION FOR ORBIT 23

COMMENTS: Reconstruction for Callisto 23

ET minus UTC is 64.184 seconds as of January 1, 1999.

TRAJECTORY BASIS/OD SOLUTION: OD-263

TIME SPAN:

BEGIN: 29-AUG-1999 12:00:00.000 ET DOY: 99-241 29-AUG-1999 11:58:55.817 UTC DOY: 99-241 1/05147132:49:5:1 SCLK END: 27-SEP-1999 01:00:00.000 ET DOY: 99-270

27-SEP-1999 00:58:55.818 UTC DOY: 99-270

1/05187780:83:6:4 SCLK

SIGNIFICANT EVENTS:

Callisto 23 closest approach:

16-SEP-1999 17:28:06.00 ET (17:27:01.813 UTC, 1/05173092:19:8:6 SCLK)

Altitude: 1052.4 km +/- 0.0118 km Latitude: 0.0986 deg. +/- 0.001 deg

(Callisto-centered, Callisto True Equator of Date)

Jupiter Periapsis:

14-SEP-1999 19:58:41.02 ET (19:57:36.83 UTC, 1/05170392:72:2:5 SCLK)

Range to Jupiter from S/C: 467972.00 km (6.54580 Rj)

INPUT FILES:

Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio Satellite eph file: /usr/nav/od/deliveries/OD263/sateph.OD263.nio

Epoch file: /usr/nav/od/deliveries/OD263/epoch
GIN file /usr/nav/eph/gin-0198.v205.nio
STOIC file /usr/nav/od/stoic/ld990930.pt991211

P-file /usr/nav/traj/pfiles/dpfil-991010-od263-i24-enc.nio

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RECONSTRUCTION FOR ORBIT 24

COMMENTS: Reconstruction for Io 24

ET minus UTC is 64.184 seconds as of January 1, 1999.

TRAJECTORY BASIS/OD SOLUTION: OD-271

TIME SPAN:

BEGIN: 27-SEP-1999 01:00:00.000 ET DOY: 99-270 27-SEP-1999 00:58:55.818 UTC DOY: 99-270

1/05187780:83:6:4 SCLK

END: 12-NOV-1999 01:00:00.000 ET DOY: 99-316 12-NOV-1999 00:58:55.817 UTC DOY: 99-316

1/05253293:04:1:1 SCLK

SIGNIFICANT EVENTS:

Io 24 closest approach:

11-OCT-1999 04:34:06.72 ET (04:33:02.53 UTC, 1/05207931:13:8:0 SCLK)

Altitude: 611.3 km +/- 0.011 km

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11/1/23, 9:37 PM
     Latitude:
                 4.507 deg. +/- 0.003 deg
                         (Io-centered, Io True Equator of Date)
   Jupiter Periapsis:
     11-OCT-1999 02:03:41.50 ET (02:02:37.31 UTC, 1/05207782:34:9:4 SCLK)
     Range to Jupiter from S/C: 396600.93 km (5.54749 Rj)
  Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
  Satellite eph file: /usr/nav/od/deliveries/OD271/sateph.OD271.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD271/epoch
  GTN file
                     /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                     /usr/nav/od/stoic/ld991121.pt000201
                     /usr/nav/traj/pfiles/dpfil-991125-od271-i25-enc.nio
  P-file
 ______
                     RECONSTRUCTION FOR ORBIT 25
 COMMENTS: Reconstruction for Io 25
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-277
 TIME SPAN:
                 BEGIN: 12-NOV-1999 01:00:00.000 ET DOY: 99-316
                       12-NOV-1999 00:58:55.817 UTC DOY: 99-316
                       1/05253293:04:1:1
                                              SCLK
                  END: 24-DEC-1999 12:01:04.184 ET
                                                    DOY: 99-358
                       24-DEC-1999 12:00:00.000 UTC DOY: 99-358
                       1/05313762:24:5:7
                                              SCLK
 SIGNIFICANT EVENTS:
   Io 25 closest approach:
     26-NOV-1999 04:06:25.06 ET (04:05:20.88 UTC, 1/05273415:80:7:5 SCLK)
     Altitude:
                 300.484 km +/- 0.412 km
     Latitude:
                 -76.383 deg. +/- 0.0025 deg.
                         (Io-centered, Io True Equator of Date)
   Jupiter Periapsis:
     26-NOV-1999 02:09:53.86 ET (02:08:49.68 UTC, 1/05273300:58:9:5 SCLK)
     Range to Jupiter from S/C: 405572.12 km (5.67297 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
  Satellite eph file: /usr/nav/od/deliveries/OD277/sateph.OD277.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD277/epoch
  GIN file
                     /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                     /usr/nav/od/stoic/ld991228.pt000309
                     /usr/nav/traj/pfiles/dpfil-000102-od277-e26-enc.nio
  P-file
                     RECONSTRUCTION FOR ORBIT 26
 COMMENTS: Reconstruction for Orbit 26
            ET minus UTC is 64.184 seconds as of January 1, 1999.
 TRAJECTORY BASIS/OD SOLUTION: OD-281
 TIME SPAN:
                 BEGIN: 24-DEC-1999 12:01:04.184 ET
                                                    DOY: 99-358
                       24-DEC-1999 12:00:00.000 UTC DOY: 99-358
                       1/05313762:24:5:7
                                              SCLK
                   END: 01-FEB-2000 20:00:00.000 ET
                                                    DOY: 00-032
                       01-FEB-2000 19:58:55.816 UTC DOY: 00-032
                       1/05369778:75:2:5
                                              SCLK
 SIGNIFICANT EVENTS:
   Europa 26 closest approach:
     03-JAN-2000 18:00:46.77 ET (17:59:42.59 UTC, 1/05328359:72:2:3 SCLK)
                 351.077 km +/- 0.015 km
     Altitude:
                 -47.345 deg. +/- 0.001 deg.
     Latitude:
                         (Europa-centered, Europa True Equator of Date)
   Jupiter Periapsis:
     04-JAN-2000 03:33:54.78 ET (03:32:50.60 UTC, 1/05328926:57:2:6 SCLK) Range to Jupiter from S/C: 413330.37 km (5.78149 Rj)
 INPUT FILES:
  Planetary eph file: /usr/nav/od/deliveries/OD261/eph.OD261.nio
  Satellite eph file: /usr/nav/od/deliveries/OD281/sateph.OD281.nio
  Epoch file:
                     /usr/nav/od/deliveries/OD281/epoch
  GTN file
                     /usr/nav/eph/gin-0198.v205.nio
  STOIC file
                     /usr/nav/od/stoic/ld991228.pt0000309
                     /usr/nav/traj/pfiles/dpfil-000221-od281-i27-enc.nio
  P-file
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https://naif.jpl.nasa.gov/pub/naif/GLL/kernels/spk/s000131a.bsp.lbl