Chapter 6 - Data Return

Contents

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Data Return

The SL9 data were recorded on tape during the SL9 Impact and partially played back over a number of months. Due to the low data rates, not all of the NIMS SL9 observations were returned. NIMS data return efforts were concentrated on SL9 fragments G and R. First, about 17 mf of data were returned from the Jupiter reference, G and R observations to locate Jupiter within the scans. The start time of the G impact data return was derived from ground-based observations of the G impact. The initial playback strategy was to return every other scan (8 mf) to locate the first indication in the NIMS data of the G impact, then fill in the missing scans to better locate the time of impact. Since it was not known what the NIMS impact data would look like, NIMS continued to return every other scan until the playback allocation for the G impact data return was used up. The data return strategy for the R impact was similar to that used for the G impact, but modified using knowledge gained from the G impact. NIMS returned every other scan of the initial fireball data until the DN values fell to dark values, then jumped 6 RIMs ahead on the tape recorder to the 'splash' data: the ejected material's fallback onto and heating up of Jupiter's atmosphere. NIMS then returned as much data as possible until all NIMS playback resources were used up. Unfortunately, not all of the useful NIMS data for the 'splash' parts of the G and R impacts were returned and some very interesting science opportunities were lost.

The NIMS data are stored in EDRs (Experiment Data Records) produced by JPL-MIPS (Multi-mission Image Processing System). The NIMS EDR is described in the NIMS Experiment Data Record SIS (Software Interface Specification) Number 232-08. This document is part of the Galileo Project document GLL-625-610. The NIMS EDR file name is determined by the start time (SCLK) of the data. It begins with the letter "N", which is followed by the partition number, RIM and MOD91 counts; the file extension is a number which represents the version number of duplicate files. For example, if the clock is in its second cycle and the first record's SCLK is equal to 12345678.90.7, and this is the first such EDR, then the file will be named: "N21234567890.1".

The MIPS-generated EDRs have a Vicar label, followed by a PDS/ISIS label, binary header records and the data records. For archiving on CD-ROM, the Vicar labels are detached (but kept separately on the CD) and the file is renamed so as to conform to the 8.3 DOS file-naming convention as follows: The initial "N" becomes an "E", the partition number is preserved, the RIM count is split between the name and the extension, and a final character (A,B,...) is added to the extension to distinguish any EDRs that start in the same RIM. For example, the MIPS EDR N21234567890.1 becomes E2123456.78A.

Along with this NIMS Guide, other files are distributed on the NIMS EDR CD to help describe the NIMS data. Among these files are the OBSCAT, OBSPLN and RIMCAT. The OBSCAT is very similar to the OBSTAB described below in this chapter and as well as in its PDS label on the

CD. The OBSPLN, the planned OBSTAB, is a table similar to the planned Obstab found in Chapter 4 of this NIMS Guide. It is also described in its PDS label on the CD. The RIMCAT is a table which describes the NIMS EDR data on a RIM by RIM basis. It contains one entry (row) for each RIM of each NIMS EDR. The RIMCAT may be used to track instument mode and state changes, etc. It too is described in its PDS label on the CD.

The table on the following page, the NIMS Playback Obstab (Observation Table), is a time-ordered listing of the NIMS observation parameters for use by downlink data processing for the data played back from the SL9 Impact. The NIMS Obstab found in Chapter 4 of this NIMS Guide is the Predict Obstab - the Observation Table for the NIMS data that was recorded to the spacecraft’s tape recorder.

The table on the following four pages gives a brief summary of the NIMS data returned for the SL9 Impacts G and R. Each row in this table represents a scan across Jupiter with entries for the start and end times for each data segment, duration (mf.rti) and times when Jupiter is seen by NIMS (mf.rti). Jupiter is seen by NIMS at most four times in each scan, generally in mirror positions 9 and 10. Approximate start times for the fireball and splash phases of both the G and R impacts are indicated in this table.

```
                    NIMS Obstab (Data Returned)

 Heading                Columns     Comments
------------------------------------------------------------------------------
  OAPEL                   1 -  12     .Oapel Name from SEF
  EXT                    14 -  14     .Extension (allow for split OAPELs)
  PSID                   16 -  17     .2 Letter ID for the OAPEL
  SCLK1                  19 -  29     .Start time of OBS in SCLK
  SCLK2                  31 -  41     .STOP time of OBS in SCLK
  MODE                   43 -  44     .NIMS Instrument MODE
  GAIN                   46 -  47     .Gain State (true value)
  CHOP                   49 -  50     .Chopper State (1=Ref,2=63Hz,3=FreeRun,4=Off)
  GRAT_OFF               52 -  53     .Grating Offset
  PTAB_A(6)              55 -  71     .First PTAB  (repeat count,mirror op,autobias...
  PTAB_B(6)              73 -  89     .Second PTAB (...grating start, grating delta...
                                      .             (...number of grating postions)
  ECAL                   92 -  92     .Electronics Calibration Active (1=yes)
  OPCAL                  94 -  94     .Optics Calibration active (1=yes)
  UTC1                   96 - 112     .Start time of OBS in UTC (from SEF - ISO STANDARD)
  REAL_TIME             115 - 115     .NIMS in Real-Time Telemetry (1=yes)
  RECORD                117 - 117     .NIMS in Record Telemetry(1=yes)
  TARGET                120 - 127     .Primary Target of OBS
                                       JUPITER     - J - Jupiter
  (the single letter abbreviation appears as the third character in the OBSNAME (OAPEL Name) ).
 INPUT SEF FILE: EJ7HIA.SEF
----------------------------------------------------------------------------------------------------------------------------
OAPEL, EXT, PSID, SCLK1, SCLK2, MODE, GAIN, CHOP, GRAT_OFF, PTAB_A(6), PTAB_B(6), ECAL, OPCAL, UTC1, REAL_TIME, RECORD, TARGET

OAPEL      EXT PSID SCLK1       SCLK2      M  G  C  O  |    PTAB A    |  |    PTAB B    |  E O      UTC1          R T  TARGET
----------------------------------------------------------------------------------------------------------------------------
SLJNREFJUP01 A JA 02480846:33 02480846:49  7  2  1  4  1  1  0  2  0 12  1  1  0  2  0 12  0 0 1994-195T08:09:03  0 1  JUPITER

SLJNFRAGMG01 A JD 02486477:17 02486487:74  7  2  1  4  1  1  0  2  0 12  1  1  0  2  0 12  0 0 1994-199T07:02:26  0 1  JUPITER

SLJNFRAGMR01 A JE 02490632:26 02490635:78  7  2  1  4  1  1  0  2  0 12  1  1  0  2  0 12  0 0 1994-202T05:03:42  0 1  JUPITER
SLJNFRAGMR01 B JE 02490639:16 02490643:24  7  2  1  4  1  1  0  2  0 12  1  1  0  2  0 12  0 0 1994-202T05:10:40  0 1  JUPITER
----------------------------------------------------------------------------------------------------------------------------
```

NIMS SL9 G Impact Observations

N	SCLK1 Start	SCLK2 Stop	Dur (mf)	When Jupiter Seen by NIMS 1	2	3	4	Comment
1	2486477.17.9	2486477.33.7	15.9	22.3	22.8	23.3		
2				29.3	29.8	30.3		
3	2486477.35.7	2486477.41.7	6.1	38.3	***	39.3		
4	2486477.55.3	2486477.57.6	2.4	*	*	55.3		
5	2486477.67.7	2486477.73.6	6.0	70.3	70.8	***		
6	2486477.83.7	2486477.89.5	5.9	85.8	86.3	86.8	87.3	
7	2486478.09.7	2486478.15.6	6.0	10.8	11.3	11.8	12.3	
8	2486478.25.7	2486478.31.4	5.8	26.8	27.3	27.8	*	
9	2486478.42.0	2486478.47.6	5.7	43.3	43.8	44.3		
10	2486478.57.7	2486478.63.5	5.9	59.3	59.8	60.3		
11	2486478.73.7	2486478.79.7	6.1	74.8	75.3	75.8	76.3	
12	2486478.90.0	2486479.04.6	5.7	00.3	00.8	01.3		---Fireball---
13	2486479.06.0	2486479.11.8	5.9	07.8	08.3	08.8		Start
14	2486479.14.6	2486479.20.6	6.1	15.8	16.3	16.8		
15	2486479.22.0	2486479.27.9	6.0	23.8	24.3			
16	2486479.30.9	2486479.36.5	5.7	31.8	***	32.3	32.8	
17	2486479.38.0	2486479.43.9	6.0	39.3	39.8	40.3		
18	2486479.47.4	2486479.51.3	4.0	48.3	48.8	49.3		
19	2486479.54.0	2486479.59.9	6.0	55.8	56.3	56.8		
20	2486479.63.4	2486479.67.3	4.0	63.8	64.3	***	65.3	
21	2486479.70.0	2486479.75.0	5.1	***	71.8	72.3		
22	2486479.79.4	2486479.83.3	4.0	*	80.3	80.8		
23	2486479.86.0	2486480.01.0	6.1	87.3	87.8	88.3		
24	2486480.04.4	2486480.08.3	4.0	05.3	05.8	***		
25	2486480.11.0	2486480.17.0	6.1	***	13.3			
26	2486480.20.4	2486480.24.3	4.0	20.8	21.3	21.8		
27	2486480.27.0	2486480.32.9	6.0	*	28.8	29.3		
28	2486480.36.4	2486480.40.2	3.9	36.8	37.3	37.8		
29	2486480.43.0	2486480.48.8	5.9	44.8	45.3	45.8		
30	2486480.55.1	2486480.56.0	1.0	*	*	*		
31	2486480.59.0	2486480.65.0	6.1	60.3	60.8	61.3		
32	2486480.68.3	2486480.72.2	4.0	68.8	69.3	69.8		
33	2486480.75.3	2486480.80.9	5.7	76.8	77.3	***		
34	2486480.84.3	2486480.88.2	4.0	85.3	85.8	86.3		
35	2486481.00.0	2486481.05.9	6.0	01.3	01.8	02.3		
36	2486481.09.3	2486481.13.2	4.0	09.8	10.3	10.8	11.3	
37	2486481.16.0	2486481.21.8	5.9	17.8	18.3			
38	2486481.25.3	2486481.29.2	4.0	***	26.3	26.8		
39	2486481.41.3	2486481.45.2	4.0	41.8	42.3	42.8		
40	2486481.57.3	2486481.61.2	4.0	***	58.8			
41	2486481.73.3	2486481.77.2	4.0	73.8	74.3	***		
42	2486481.89.3	2486482.02.3	4.1	89.8	90.3	***		
43	2486482.14.7	2486482.18.2	3.6	14.8	15.3	15.8		
44	2486482.30.3	2486482.32.5	2.3	30.8	31.3	31.8		
45	2486482.47.4	2486482.50.2	2.9	*	47.8	48.3		

NIMS SL9 G Impact Observations

N	SCLK1 Start	SCLK2 Stop	Dur (mf)	When Jupiter Seen by NIMS 1	2	3	4	Comment
46	2486482.62.3	2486482.66.2	4.0	62.8,	63.3,	63.8		
47	2486482.78.3	2486482.82.0	3.8	79.3,	79.8,	80.3		
48	2486483.03.3	2486483.07.1	3.9	04.3,	04.8,	05.3		
49	2486483.19.3	2486483.23.2	4.0	20.3,	20.8,	21.3		
50	2486483.35.3	2486483.39.2	4.0	35.8,	36.3,	36.8,	37.3	
51	2486483.51.3	2486483.55.1	3.9	52.3,	* ,	53.3		
52	2486483.67.2	2486483.71.1	4.0	* ,	* ,	69.3		
53	2486483.83.2	2486483.87.1	4.0	***,	84.8,	85.3		
54	2486484.08.2	2486484.12.1	4.0	08.8,	09.3,	09.8,	10.3	
55	2486484.24.2	2486484.28.1	4.0	24.8,	25.3,	***		
56	2486484.40.2	2486484.44.0	3.9	41.3,	41.8,	42.3		---Splash---
57	2486484.56.9	2486484.60.1	3.3	57.3,	57.8,	***		Start
58	2486484.72.2	2486484.76.1	4.0	73.8,	74.3,	74.8		
59	2486484.88.2	2486485.01.1	4.0	88.8,	89.3,	89.8,	90.3	
60	2486485.13.2	2486485.17.1	4.0	13.8,	14.3,	14.8,	15.3	
61	2486485.29.2	2486485.33.0	3.9	29.8,	30.3,	30.8,	31.3	
62	2486485.45.2	2486485.49.1	4.0	45.8,	46.3,	46.8,	47.3	
63	2486485.61.2	2486485.65.0	3.9	* ,	* ,	*		
64	2486485.77.2	2486485.81.2	4.1	***,	78.3,	78.8,	79.3	
65	2486486.02.2	2486486.06.1	4.0	02.8,	03.3,	03.8		
66	2486486.18.2	2486486.22.1	4.0	***,	19.8,	20.3		
67	2486486.34.2	2486486.38.1	4.0	34.8,	35.3,	35.8,	36.3	
68	2486486.50.2	2486486.54.1	4.0	50.8,	52.3,	***,	52.3	
69	2486486.66.2	2486486.70.0	3.9	67.3,	67.8,	68.3		
70	2486486.82.1	2486486.86.0	4.0	83.3,	83.8,	***		
71	2486487.07.1	2486487.10.0	4.0	07.8,	08.3,	08.8		
72	2486487.23.1	2486487.27.0	4.0	23.8,	24.3,	24.8,	25.3	
73	2486487.39.1	2486487.43.0	4.0	40.3,	40.8,	41.3		
74	2486487.55.1	2486487.59.0	4.0	56.3,	56.8,	57.3		
75	2486487.71.1	2486487.74.9	3.9	72.3,	72.8,	73.3		
	**							

*   data missing
**   end of data
*** mirror wait

NIMS SL9 R Impact Observations

N	SCLK1 Start	SCLK2 Stop	Dur (mf)	When Jupiter Seen by NIMS 1	2	3	4	Comment
1	2490632.26.3	2490632.41.9	15.7	30.8	31.3,	31.8,	***	
2				***,	39.3,	39.8		
3	2490632.45.1	2490632.48.6	3.7	46.3	46.8,	47.3,	47.8	
4	2490632.61.8	2490632.65.0	3.1	62.3,	62.8	63.3,	63.8	
5	2490632.77.1	2490632.81.6	4.6	78.3,	78.8,	79.3,	79.8	
6	2490633.02.1	2490633.06.0	4.0	03.3,	03.8,	04.3,		
7	2490633.18.1	2490633.22.6	4.6	*** ,	19.8,	20.3,	20.8	
8	2490633.34.1	2490633.38.6	4.6	35.3,	35.8,	36.3,	36.8	
9	2490633.50.7	2490633.54.6	4.0	51.3,	*** ,	52.3,	52.8	
10	2490633.66.7	2490633.68.4	1.8	67.3,	67.8,	68.3,		
11	2490633.82.7	2490633.86.6	4.0	83.3,	83.8,	84.3,	84.8	
12	2490634.07.7	2490634.11.6	4.0	08.3,	08.8,	09.3,		---Fireball---
13	2490634.23.7	2490634.27.6	4.0	24.3,	24.8,	25.3,	25.8	Start
14	2490634.39.7	2490634.43.6	4.0	40.3,	* ,	41.3,	41.8	
15	2490634.55.7	2490634.59.6	4.0		56.8,	57.3,	57.8	
16	2490634.71.7	2490634.75.6	4.0	72.3,	72.8,	73.3,	73.8	
17	2490634.87.7	2490635.00.6	4.0		88.8,	89.3,	89.8	
18	2490635.12.7	2490635.16.6	4.0	13.3,	13.8	14.3,	14.8	
19	2490635.28.7	2490635.32.6	4.0	29.3,	29.8,	30.3,	30.8	
10	2490635.44.7	2490635.46.3	1.6	*** ,	45.8,	* ,	*	
21	2490635.60.7	2490635.64.6	4.0	61.3,	61.8,	62.3,	62.8	
22	2490635.76.7	2490635.78.9	2.3	77.3,	*** ,	78.3,		
Push Ahead to Splash								
23	2490639.16.7	2490639.18.9	2.3	17.3,	17.8,	18.3		
24	2490639.34.4	2490639.36.6	2.3					
25	2490639.48.7	2490639.51.9	3.3	49.3,	49.8,	50.3		
26	2490639.67.6	2490639.68.6	1.1					
27	2490639.80.7	2490639.84.6	4.0	,	81.8,	82.3		---Splash---
28	2490640.05.7	2490640.09.5	3.9		06.8,	07.3,	07.8	Start
29	2490640.21.7	2490640.25.6	4.0	22.3,	22.8,	23.3		
30	2490640.37.7	2490640.41.6	4.0	38.3,	*** ,	39.3		
31	2490640.53.7	2490640.57.6	4.0		54.8,	55.3		
32	2490640.69.7	2490640.73.6	4.0	70.3,	70.8,	*** ,	71.8	
33	2490640.85.7	2490640.86.2	0.6	*	*	*		
34	2490641.10.7	2490641.14.5	3.9		11.8,	12.3,	***	
35	2490641.26.7	2490641.30.6	4.0	27.3,	27.8,	28.3,	28.8	
36	2490641.42.7	2490641.46.5	3.9	43.3,	43.8,	44.3		
37	2490641.60.4	2490641.62.7	2.4	*	*	*		
38	2490641.74.7	2490641.78.6	4.0	75.3,	75.8,	76.3		
39	2490641.90.7	2490642.01.7	4.0	00.3,	00.8,	01.3		
40	2490641.90.7	2490642.03.6	4.0	00.3,	00.8,	01.3,	01.8	
41	2490642.15.7	2490642.19.5	3.9	16.3,	16.8,	17.3		
42	2490642.31.7	2490642.35.7	3.9	*** ,	32.8,	33.3		

NIMS SL9 R Impact Observations

N	SCLK1 Start	SCLK2 Stop	Dur (mf)	When Jupiter Seen by NIMS 1	2	3	4	Comment
43	2490642.47.7	2490642.51.6	4.0	48.3,	48.8,	49.3		
44	2490642.63.7	2490642.67.6	4.0		*** ,	65.3,	65.8	
45	2490642.79.7	2490642.83.6	4.0	80.3,	80.8,	81.3,	81.8	
46	2490643.04.7	2490643.08.0	3.4	05.3,	05.8,	***		
47	2490643.22.5 **	2490643.24.5	2.1	* ,	* ,	* ,	22.8	

* data missing
** end of data
*** mirror wait