



CASSINI TOST SEGMENT

Rev 211-T108 Handoff Package

Segment Boundary 2015-011T01:47:00 – 2015-014T01:32:00

26 June 2014

Jan Berkeley

SMT report and Master Timeline

Science Highlights

Notes & Liens

This document has been reviewed and determined not to contain export controlled technical data

SMT report

TOST T108

DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)

DOWNLINK PASS NAME	Start doy hh:mm	End doy hh:mm	OBSERVATION_PERIOD							DOWNLINK_PASS							
			P4				P5	RECORDED		PLAYBACK							
			START (Mb)	SCI (Mb)	HK+E (Mb)	TOTAL (Mb)	CPACTY (Mb)	MRGN (Mb)	OPNAV (Mb)	SCI (Mb)	ENGR (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGN (Mb)	NET_MARGN (Mb)	NET_MARGN (%)	CAROV (Mb)
SP_211EA_C70METNON012_PRIME	012 15:47	013 03:17	0	3143	176	3318	3322	4	0	231	68	3617	3548	-70	446	8%	69
SP_211EA_M70METNON013_PRIME	013 03:17	013 06:17	69	0	0	69	3322	3253	0	761	18	848	715	-134	446	20%	133
SP_211EA_C70METNON013_PRIME	013 16:32	013 19:32	133	601	43	778	3322	2544	0	59	18	855	1008	153	446	30%	0
SP_211EA_C34HEFNON013_PRIME	013 19:32	014 01:32	0	0	0	0	3322	3322	0	140	35	176	469	292	293	63%	0

SSR PARTITION SIZE SUMMARY - SELECTED SSR CONFIGURATION: DOUBLE

OBSERVATION PERIOD	SSR A/B		
	P4 Size (Frames)	P5 Size (Frames)	P6 Size (Frames)
SP_211NA_OBSERV011_NA	188954	10	38863
SP_211NA_OBSERV013_NA	188954	10	38863

DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED

Event	Start doy hh:mm	End doy hh:mm	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)	ENGR (Mb)	TOTAL (Mb)
OBSERVATION_NOR	011 01:47	012 15:47	0.0	71.7	315.7	23.7	325.0	81.8	125.6	1090.3	727.1	183.1	170.0	0.0	173.3	3287.4
SP_211EA_C70METNON012_PRIME	012 15:47	013 03:17	0.0	21.7	86.4	4.1	0.0	20.5	35.2	0.0	54.2	6.3	0.0	0.0	0.0	228.4
SP_211EA_M70METNON013_PRIME	013 03:17	013 06:17	0.0	5.7	28.8	1.1	0.0	5.3	9.2	0.0	14.1	1.6	0.0	0.0	688.3	754.2
DAILY TOTAL SCIENCE	011 01:47	013 06:17	0.0	99.0	430.9	29.0	325.0	107.6	170.0	1090.3	795.5	191.1	170.0	0.0	861.6	
OBSERVATION_NOR	013 06:17	013 16:32	0.0	19.3	0.0	3.7	450.0	18.2	31.4	0.0	48.3	0.0	25.0	0.0	42.8	638.8
SP_211EA_C70METNON013_PRIME	013 16:32	013 19:32	0.0	5.7	21.6	1.1	0.0	5.3	9.2	0.0	14.1	1.6	0.0	0.0	0.0	58.6
SP_211EA_C34HEFNON013_PRIME	013 19:32	014 01:32	0.0	11.3	64.8	2.2	0.0	10.7	18.4	0.0	28.3	3.3	0.0	0.0	0.0	138.9
DAILY TOTAL SCIENCE	013 06:17	014 01:32	0.0	36.3	86.4	6.9	450.0	34.2	58.9	0.0	90.8	4.9	25.0	0.0	42.8	

T108 TOST Master timeline

TOST T108

Start Time	End Time	Prime Activity	Obs. Detail	Op Mode	TLM Mode	Comments
211TI_T108	970					
2015-011T01:47:00	2015-011T02:27:00	SP Turn to WP	NEG_Y to Titan; POS_X to 308/6	DFPW Normal	S_N_ER_3	
2015-011T02:27:00	C/A-17:06:34	OD Uncertainty Dead Time			S_N_ER_3	
C/A-17:06:34	-16:18	ISS		DFPW Normal	S_N_ER_3	
-16:18	-12:33	UVIS_URDELGET	RINGS PIE (2015-011T03:30:00 - 2015-01T07:15:00)	DFPW Normal	S_N_ER_3	
-12:33	-09:00	CIRS	C modified (TN1c)	DFPW Normal	S_N_ER_3	VIMS rider
-09:00	-05:00	CIRS	F (TC1b OR TN1c)	DFPW Normal	S_N_ER_3	
-05:00	-02:15	VIMS	Y ; RADAR Warm UP @ 5:15 (TC1a, TN1a (depending on pointing) and TN2c)	RADWU	S_N_ER_3, S_N_ER_5a	S_N_ER_5a for 00:15 @ C/A -05:15; RWA SLOW @ -02:15
-02:15	-01:12	RADAR scatterometry/radiometry		RADRWA	S_N_ER_8	
-01:12	-00:31	RADAR HiSAR		RADRCS	S_N_ER_8	
-00:31	-00:30	RWA to RCS Transition				
-00:30	-00:18	RADAR Altimetry		RADRCS	S_N_ER_8	
-00:18	0	RADAR SAR	INMS riding (TC1a, TN1a, TN1b, TN2b, TN2c (little))	RADRCS	S_N_ER_8	
2015-011T19:48:34		CLOSEST APPROACH	NEG_Z to Titan (Tc2a)		S_N_ER_8	Change detection and stereo on dark lakes (NB R-SAR fills Kraken gap)
0	+00:18	RADAR SAR	INMS riding (TC1a, TN1a, TN1b, TN2b, TN2c (little))	RADRCS	S_N_ER_8	
+00:18	+00:30	RADAR Altimetry		RADRCS	S_N_ER_8	
+00:30	+00:50	RADAR HiSAR		RADRCS	S_N_ER_8	
+00:50	+01:12	RCS to RWA Transition			S_N_ER_8	
+01:12	+02:15	RADAR scatterometry/radiometry		RADRWA	S_N_ER_8	
+02:15	+05:00	RADAR	L +R1 (TN2c, TN2c)	RADRWA	S_N_ER_8	give one hour to CIRS
+05:00	+09:00	CIRS	R1 (TN1c or Tc1b, decided in implementation)	DFPW Normal	S_N_ER_3	Turn on all instruments
+09:00	+13:00	CIRS	N1 (Tc1b, TN1c aerosol)	DFPW Normal	S_N_ER_3	
+13:00	C/A+19:03:26	CIRS	M4 (Tc1b (TN1c on outbound))	DFPW Normal	S_N_ER_3	

T108 TOST Master timeline, cont.

TOST T108

C/A+19:03:26	2015-012T15:07:00	OD Uncertainty Dead Time			S_N_ER_3	
2015-012T15:07:00	2015-012T15:47:00	SP Turn to Earth for downlink	XBAND to EARTH, NEG_Y to Saturn	DFPW Normal	S_N_ER_3	
2015-012T15:47:00	2015-013T03:17:00	Canberra 70M		DFPW Normal	RTE_N_SPB	
2015-013T03:17:00	2015-013T06:17:00	Madrid 70M		DFPW Normal	RTE_N_SPB	Dual playback for RADAR, -00:18 to +00:18
2015-013T06:17:00	2015-013T06:57:00	SP Turn to WP	NEG_Z to Titan, NEG_X to NEP			
2015-013T06:57:00	2015-013T09:57:00	ISS	<i>ISS mosaic at first, then sit and stare for CIRS and VIMS (TN2c, TNd2)</i>	DFPW Normal	S_N_ER_3	
2015-013T09:57:00	2015-013T13:22:00	ISS	<i>ISS mosaic at first, then sit and stare for CIRS and VIMS (TN2c, TNd2)</i>	DFPW Normal	S_N_ER_3	
2015-013T13:22:00	2015-013T14:22:00	ISS	<i>ISS mosaic at first, then sit and stare for CIRS and VIMS (TN2c, TNd2)</i>	DFPW Normal	S_N_ER_3	
2015-013T14:22:00	2015-013T15:02:00	SP Turn to Earth for downlink	XBAND to EARTH, NEG_Y to Saturn	DFPW Normal	S_N_ER_3	
2015-013T15:02:00	2015-013T16:32:00	Ybias window		DFPW Normal	S_N_ER_3	
2015-013T16:32:00	2015-013T19:32:00	Canberra 70M		DFPW Normal	RTE_N_SPB	
2015-013T19:32:00	2015-014T01:32:00	Canberra 34M		DFPW Normal	RTE_N_SPB	

DOY 011: This Titan segment begins with an ISS observation to monitor surface and atmosphere, followed by a RINGS PIE for UVIS with VIMS riding. CIRS follows with a 7-hour observation to obtain information on CO, HCN and CH₄, and vertical profiles of temperatures in Titan's stratosphere. VIMS performs its first regional map of Titan to monitor the evolution of the South Polar vortex (TC1b) and will look for the presence of clouds at Northern latitudes (TC1a). It will also obtain a mosaic of the sub-Saturn hemisphere with long integration time of the equatorial area to look for spectral signatures in the 5- μ m band (TN1a).

As RADAR scatterometry and radiometry begin, RPWS also rides along to take thermal plasma density and temperature measurements, search for lightning and other radio emissions, characterize the plasma wave spectrum, and search for evidence of pickup ions. SAR imaging by RADAR of Ligeia and Kraken shorelines begins approximately an hour before closest approach. Closest approach SAR is of the Kraken-Ligeia channel labyrinth area covered by T104 altimetry to permit co-analysis and is the highest priority RADAR science of this flyby, with INMS riding. Post-closest approach RADAR SAR and altimetry will examine other high-latitude areas. RADAR repeats scatterometry and radiometry observations outbound.

DOY 012: On the outbound, VIMS, ISS and UVIS will ride along with CIRS and may obtain low resolution images of the Northern Pole. CIRS prime observations again observe temperatures and aerosols, and finishes its observations with a mid infrared thermal map to Obtain information on the thermal structure of Titan's stratosphere.

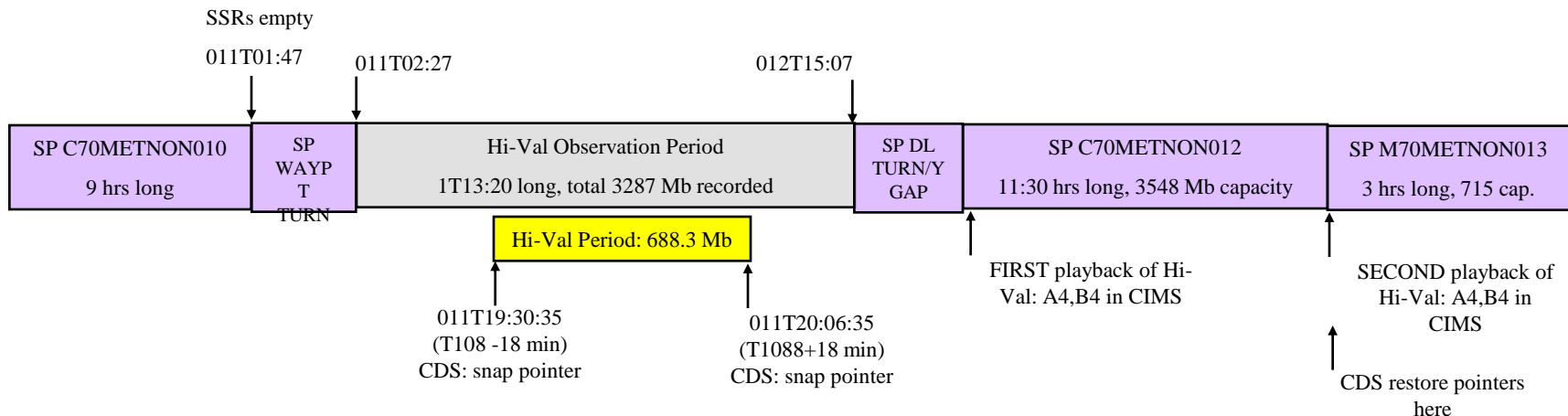
DOY 013: For an extra day after the Titan encounter, ISS will monitor Titan's atmosphere to track clouds and the evolution thereof as summer approaches (TC1a, TC1b, TN1a, TN2c, TN2d), with VIMS riding. And scene.

Dual Playback

TOST T108

Flyby	BEGHIVAL	ENDHIVAL	P4 Dual Playback Data Volume	SSR empty before hi-val observation period? (if not verify any carryover on A fits with Hi-Val data)	SSR-A empty after first playback?	PPL set to A4,B4 for first AND second playbacks?	SSRs empty after second playback? (if not does any Hi-Val data carry over?)
T108	T108-18 min	T108+18 min	688.3Mb	Yes	Yes	Yes	No; caboose period empties SSRS

Playbacks contiguous:



Reminder - ALL instruments' data is played back twice during P4 dual playback periods

In addition to the P4 dual playback, SCO/AACS has asked for P6 playback for T108

- Pointing:
 - CMT violations. POS_X to SUN angle dips down to a minimum angle of 83.1 deg at approximately 2015-011T19:42:01.200. It then goes back up to a safe angle and then dips back down to a minimum angle of 28.03 deg at approximately 2015-011T19:58:00.200. (POS_X to SUN angle threshold is 83 deg + pad).
 - There is a CIRS temperature violation. CIRS temperature rises from 74.6 deg K to 80.9 deg K ($dT = 6.3$ deg K) up until approximately 2015-011T20:02:05.200. This is known and accepted by CIRS.
 - There are two FR07B128 violations. The first at approximately 2015-011T19:43:45 and lasting for 00:04:42.999. The interference to the SRU is caused by Titan. The second violation is at approximately 2015-011T19:48:56 and lasting for 00:09:21.974. The interference to the SRU is caused by Saturn and/or Rings. A quiescent period before the flyby and another after the flyby will allow 7SID_SUSPEND to engage and disengage, and these two violations will go away.
 - YGAP on DOY 013 included per master timeline although flyby is on thrusters.
- Data Volume:
 - SMT warning: Radar data not collected during warmup – OK
 - Caboose period empties SSRs

- DSN:
 - DSS-43 pass on DOY 013 overlaps weekly maintenance.
- Resource checker:
 - UVIS RINGS PIE needs to be epoch-relative + adjust start time.
 - Telemetry mode change during ISS_211TI_REGMAP001_VIMS—needed for RADAR warmup --OK
- Opmodes:
 - No issues.
 - Hydrazine:
 - KPT Estimate: 310.15 g (per L. Andrade analysis)
 - FSDS Estimate: 359.79 g
 - Deadband (per RSS): (0.5, 0.5, 2.0)
 - Steps for walking deadband = 3
- Special Activities:
 - None

Sequence Liens (should all be SPLAT items):

- Description of UVIS Rings PIE needed
- UVIS RINGS PIE needs to be epoch-relative
- Track Dual Playback status during DSN allocation process
- YGAP included although flyby on thrusters