



CASSINI TOST T95 SEGMENT

Rev 198 Handoff Package

Segment Boundary 2013-285T06:15:00 – 2013-290T00:00:00

11 Feb 2013

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SMT report and SPASS

Science Highlights

Notes & Liens

SMT report

TOST rev 198

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)	CAROVN (%)	CAROVN (Mb)
SP_198EA_C34HEFSEQ285_PRIME	285 21:15	286 06:15	0	620	63	683	3322	2639	0	232	53	968	660	-309	-60	0%	309
SP_198EA_C70METSEQ287_PRIME	287 19:45	288 07:25	309	2902	173	3383	3322	-60	0	262	69	3653	3395	-258	389	6%	258
SP_198EA_M70METNON288_PRIME	288 07:25	288 09:15	258	0	0	258	3322	3064	0	264	11	533	357	-176	389	13%	176
SP_198EA_G70METSEQ289_PRIME	289 15:00	290 00:00	176	1722	126	2024	3322	1298	0	106	53	2182	2572	389	389	15%	0

SPASS

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Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
Sequence S80, length = 70 days		2013-226T09:51:00		069T13:24:00	2013-295T23:15:00			
Titan Flyby T95 Segment		2013-285T06:15:00		004T09:45:00	2013-289T16:00:00			
SP_198SA_WAYPTTURN285_PRIME		2013-285T06:15:00		000T00:40:00	2013-285T06:55:00	NEG_Y to Titan	NEG_X to NTP	Pointing from OTP283: NEG_Y to Saturn (0,0,-9.5)
NEW WAYPOINT		2013-285T06:55:00		000T12:50:00	2013-285T19:45:00	NEG_Y to Titan	NEG_X to NTP	
ISS_198TI_CLOUD001_PRIME	C, V	2013-285T06:55:00		000T04:00:00	2013-285T10:55:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_198TI_CLOUD002_PRIME	C, V	2013-285T10:55:00		000T03:05:00	2013-285T14:00:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_198TI_CLOUD003_PRIME	C, V	2013-285T14:00:00		000T01:00:00	2013-285T15:00:00	ISS_NAC to Titan	NEG_X to Sun	
CIRS_198RI_NP20L30054_PIE		2013-285T15:00:00		000T04:05:00	2013-285T19:05:00	CIRS_FP1 to Rings	POS_X to 199.0/63.0	
SP_198EA_DLTURN285_PRIME		2013-285T19:05:00		000T00:40:00	2013-285T19:45:00	XBAND to Earth	NEG_Y to 123.0/-25.0	
NEW WAYPOINT		2013-285T19:45:00		000T11:10:00	2013-286T06:55:00	XBAND to Earth	NEG_Y to 123.0/-25.0	
SP_198NA_YGAP285_PRIME	E	2013-285T19:45:00		000T01:30:00	2013-285T21:15:00	XBAND to Earth	NEG_Y to 123.0/-25.0	
SP_198EA_C34HEFSEQ285_PRIME	C	2013-285T21:15:00		000T09:00:00	2013-286T06:15:00	XBAND to Earth	NEG_Y to 123.0/-25.0	MIMI. NEG_Y to Saturn (0,0,-9.5). pre-TOST flyby
SP_198TI_WAYPTTURN286_PRIME		2013-286T06:15:00		000T00:40:00	2013-286T06:55:00	NEG_Y to Titan	NEG_X to NTP	
NEW WAYPOINT		2013-286T06:55:00		001T12:50:00	2013-287T19:45:00	NEG_Y to Titan	NEG_X to NTP	
SP_198TI_DEADTIME286_PRIME		2013-286T06:55:00		000T00:14:50	2013-286T07:09:50	NEG_Y to Titan	NEG_X to NTP	
CIRS_198TI_MIDIRTMAP001_PRIME	I, V	2013-286T07:09:50	GMB_E198_TITAN_T95-000T21:46:28	000T07:46:28	2013-286T14:56:27	CIRS_FPB to Titan	NEG_X to NTP	Collaborative Rider(s): ISS. No Preference to secondary
Periapse R = 19.819 Rs, lat...		2013-286T13:40:23		000T00:00:01	2013-286T13:40:24			
ISS_198TI_MONITORNA001_PRIME	C, V	2013-286T14:56:27	GMB_E198_TITAN_T95-000T14:00:00	000T02:00:00	2013-286T16:56:27	ISS_NAC to Titan	NEG_X to Sun	
CIRS_198TI_FIRNADCMPO01_PRIME	I, U, V	2013-286T16:56:27	GMB_E198_TITAN_T95-000T12:00:00	000T03:00:00	2013-286T19:56:27	CIRS_FP1 to Titan	PIC	
CIRS_198TI_MIRLMBMAP001_PRIME	V	2013-286T19:56:27	GMB_E198_TITAN_T95-000T09:00:00	000T03:00:00	2013-286T22:56:27	CIRS_FPB to Titan	PIC	
RADAR_198TI_T95INRAD001_PRIME		2013-286T22:56:27	GMB_E198_TITAN_T95-000T06:00:00	000T03:45:00	2013-287T02:41:27	NEG_Z to Titan	POS_Y to NTP	Use +Y to NTP and -X to NTP secondaries for two
RADAR_198TI_T95INSCAT001_PRIME	M	2013-287T02:41:27	GMB_E198_TITAN_T95-000T02:15:00	000T01:03:00	2013-287T03:44:27	NEG_Z to Titan	NEG_Y to NTP	
RADAR_198TI_T95IHISAR001_PRIME	M	2013-287T03:44:27	GMB_E198_TITAN_T95-000T01:12:00	000T00:41:00	2013-287T04:25:27	NEG_Z to Titan (0.0,0.0,50.0 deg. offset)	NEG_X to NTP	
ENGR_198SC_RADRCS287_PRIME	M	2013-287T04:25:27	GMB_E198_TITAN_T95-000T00:31:00	000T00:01:00	2013-287T04:26:27	NEG_Z to Titan	PIC	Deadband = (0.5, 0.5, 2.0)
RADAR_198TI_T95INALT001_PRIME	M	2013-287T04:26:27	GMB_E198_TITAN_T95-000T00:30:00	000T00:15:00	2013-287T04:41:27	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
RADAR_198TI_T95RASAR001_PRIME	M, R	2013-287T04:41:27	GMB_E198_TITAN_T95-000T00:15:00	000T00:30:00	2013-287T05:11:27	NEG_X to Titan_SC_RAM	NEG_Z to Titan	Ride-along at c/a.
Begin Dual Playback Science		2013-287T04:50:27	GMB_E198_TITAN_T95-000T00:06:00	000T00:00:01	2013-287T04:50:28			
198TI (t) T95 TITAN Outbou...		2013-287T04:56:27		000T00:00:01	2013-287T04:56:28			
End Dual Playback Science		2013-287T05:02:27	GMB_E198_TITAN_T95+000T00:06:00	000T00:00:01	2013-287T05:02:28			
RADAR_198TI_T95OUTALT001_PRIME	M	2013-287T05:11:27	GMB_E198_TITAN_T95+000T00:15:00	000T00:15:00	2013-287T05:26:27	NEG_Z to Titan	NEG_X to NTP	
ENGR_198SC_RADRWBIAS287_PPS	M	2013-287T05:26:27	GMB_E198_TITAN_T95+000T00:30:00	000T00:22:00	2013-287T05:48:27	NEG_Z to Titan	PIC	Deadband=(2, 2, 20)
RADAR_198TI_T95OHISAR001_PRIME	M	2013-287T05:48:27	GMB_E198_TITAN_T95+000T00:52:00	000T00:20:00	2013-287T06:08:27	NEG_Z to Titan	NEG_X to NTP	
RADAR_198TI_T95OUTSCT001_PRIME	M	2013-287T06:08:27	GMB_E198_TITAN_T95+000T01:12:00	000T01:03:00	2013-287T07:11:27	NEG_Z to Titan	NEG_X to NTP	
RADAR_198TI_T95OUTRAD001_PRIME		2013-287T07:11:27	GMB_E198_TITAN_T95+000T02:15:00	000T03:45:00	2013-287T10:56:27	NEG_Z to Titan	NEG_X to NTP	Use -X to NTP and -Y to NTP for polarizations.
CIRS_198TI_MIRLMBINT001_PRIME	I, V	2013-287T10:56:27	GMB_E198_TITAN_T95+000T06:00:00	000T03:00:00	2013-287T13:56:27	CIRS_FPB to Titan	PIC	
CIRS_198TI_FIRNADCMPO02_PRIME	I, U, V	2013-287T13:56:27	GMB_E198_TITAN_T95+000T09:00:00	000T04:53:33	2013-287T18:50:00	CIRS_FP1 to Titan	PIC	
SP_198TI_DEADTIME287_PRIME		2013-287T18:50:00	GMB_E198_TITAN_T95+000T13:53:00	000T00:15:00	2013-287T19:05:00	NEG_Y to Titan	NEG_X to NTP	
SP_198EA_DLTURN287_PRIME		2013-287T19:05:00		000T00:40:00	2013-287T19:45:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
NEW WAYPOINT		2013-287T19:45:00		000T14:10:00	2013-288T09:55:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
SP_198EA_C70METSEQ287_PRIME	C	2013-287T19:45:00		000T11:40:00	2013-288T07:25:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	Rolling	MIMI. NEG_Y to Saturn (0,0,-9.5).
Pointer Reset in preparatio...		2013-288T07:25:00		000T00:00:01	2013-288T07:25:01			
SP_198EA_M70METNON288_PRIME	C	2013-288T07:25:00		000T01:50:00	2013-288T09:15:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	Rolling/SRU	MIMI. NEG_Y to Saturn (0,0,-9.5). SID suspend
SP_198SA_WAYPTTURN289_PRIME		2013-288T09:15:00		000T00:40:00	2013-288T09:55:00	NEG_Y to Titan	NEG_X to NTP	
NEW WAYPOINT		2013-288T09:55:00		001T03:35:00	2013-289T13:30:00	NEG_Y to Titan	NEG_X to NTP	
ISS_198TI_CLOUD004_PRIME	C, V	2013-288T09:55:00		000T02:30:00	2013-288T12:25:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_198TI_CLOUD005_PRIME	C, V	2013-288T12:25:00		000T04:00:00	2013-288T16:25:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_198TI_CLOUD006_PRIME	C, V	2013-288T16:25:00		000T04:00:00	2013-288T20:25:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_198TI_CLOUD007_PRIME	C, V	2013-288T20:25:00		000T04:40:00	2013-289T01:05:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_198TI_CLOUD008_PRIME	C, V	2013-289T01:05:00		000T01:00:00	2013-289T02:05:00	ISS_NAC to Titan	NEG_X to Sun	
RADAR_198TI_RADIOCAL128_PRIME		2013-289T02:05:00		000T02:00:00	2013-289T04:05:00	NEG_Z to Titan	NEG_X to NTP	No Preference to secondary pointing
ISS_198TI_CLOUD009_PRIME	C, V	2013-289T04:05:00		000T02:55:00	2013-289T07:00:00	ISS_NAC to Titan	NEG_X to Sun	
VIMS_198RI_RLYROCC001_PRIME	C, I	2013-289T07:00:00		000T05:05:00	2013-289T12:05:00	VIMS_IR to 283.833/43.946	NEG_X to NTP	No Preference to secondary pointing
SP_198EA_DLTURN289_PRIME	C	2013-289T12:50:00		000T00:40:00	2013-289T13:30:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
NEW WAYPOINT		2013-289T13:30:00		000T10:30:00	2013-290T00:00:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
SP_198EA_YGAP290_PRIME	C, E	2013-289T13:30:00		000T01:30:00	2013-289T15:00:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
SP_198EA_G70METSEQ289_PRIME	C	2013-289T15:00:00		000T09:00:00	2013-290T00:00:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	Rolling/SRU	MIMI. NEG_Y to Saturn (0,0,-9.5). SID suspend

Science Highlights

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DOY 285: The highlight of the day is a CIRS “PIE” observation of the rings, part of the CIRS campaign to complete thermal phase curves of the lit rings at phase angles up to 90 degrees. The campaign includes observations at solar elevations between 15 and 22deg; emission at these solar elevations was not observed during the main mission, because they occurred when the spacecraft was in equatorial orbit. Today’s observation fills in one of the less common geometries. ISS will monitor Titan to track clouds and the evolution thereof at high northern latitudes, where it will be important to document cloud activity as summer approaches. The day concludes with downlinking data to Earth.

DOY 286: After completing the downlinking of yesterday’s data, CIRS makes nadir and limb maps in the mid-infrared to retrieve vertical and meridional distributions of temperature and minor gas abundances. ISS will ride along to track clouds at high northern latitude; VIMS also rides along, acquiring low spatial resolution images of the Northern Polar area where long integration times will be used to map the lake areas. ISS will acquire a mosaic of high northern latitudes on Titan's leading hemisphere, approaching northern summer. This area of Titan's surface has not yet been well observed (multiple observations of high northern latitudes may be needed in case of cloud cover obscuring the surface). ISS will ride along with CIRS on approach to track clouds at high northern latitudes, as well as outbound over Titan's southern hemisphere. RADAR begins inbound radiometry observations.

Science Highlights

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DOY 287: RADAR continues inbound radiometry observations, beginning a block of RADAR observations highlighted by ridealong SAR of Adiri and north to edge of lake region, reaching the T92 coverage area. Other RADAR observations include inbound HiSAR and altimetry, outbound scatterometry/radiometry, HiSAR and altimetry. INMS is prime at closest approach; T95 is highly inclined pass, with closest approach near the equator, providing coverage of equatorial region out to both mid Northern and Southern latitudes. This is the best pass in the Solstice Tour to study the effects of solar input on Titan's atmosphere. Coupled with the fact that it's in the outer flank of the Titan's magnetospheric interaction region, this makes T95 an excellent pass for studying the effects of solar activity on the magnetospheric boundary as well as seasonal change. From the perspective of MAG, T95 is almost identical to T94; a high inclination, low altitude (961 km) flyby in the noon sector of Saturn's magnetosphere. With closest approach in the dayside, Cassini will be able to study the diffusion of the external magnetic field at low altitudes and low solar zenith angles. A comparison with flybys at similar local times (T83-T94) will be very useful. At the end of the day, CIRS makes nadir and limb maps in the mid-infrared to retrieve vertical and meridional distributions of temperature and minor gas abundances, ISS rides along to track clouds over Titan's southern hemisphere, and VIMS rides along looking for the presence of clouds in the southern hemisphere and will monitor the evolution of the southern polar vortex. Finally, the spacecraft turns to Earth to begin downlink.

DOY 288: After finishing downlinking the flyby data, ISS will monitor Titan to track clouds and the evolution thereof for an extra day after (high southern latitudes, approaching winter) the Titan encounter, looking at high southern latitudes. VIMS rides along to look for the presence of clouds in the southern hemisphere and will monitor the evolution of the southern polar vortex.

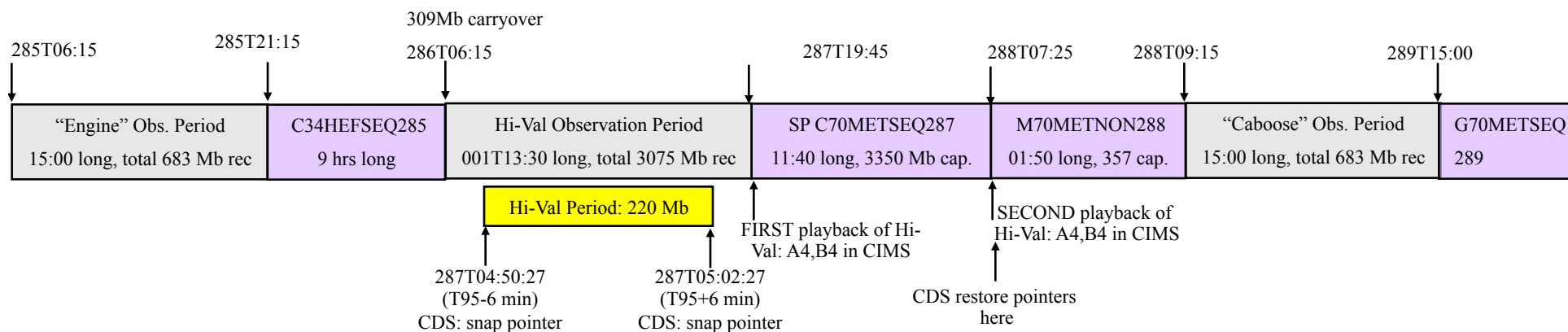
DOY 289: ISS continues to monitor Titan to track clouds and the evolution thereof for an extra day after (high southern latitudes, approaching winter) the Titan encounter, looking at high southern latitudes. . . At the end of the caboose, VIMS conducts an ingress occultation from the F Ring to the D Ring. ISS rides along on the VIMS ring occultation, primarily to observe the F ring.

Dual Playback

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Flyby	BEGHIVAL	ENDHIVAL	P4 Dual Playback Data Volume	SSR-A empty after first playback?	PPL set to A4,B4 for 1 st AND 2 nd playbacks?	Any HiVal data carryover after second playback?
T95	T95-06 min	T95+06 min	220 Mb	Yes	Yes	No

Playbacks contiguous:



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

Notes

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- Pointing:
 - Waypoint goes bad during short interval around C/A, but this is effectively a custom period.
 - CIRS consumable-level heating to 6.6 degrees is expected during the C/A interval.
 - RADAR has been given go-ahead by CIRS TOST rep
 - No YBIAS window during downlink immediately after flyby (since it's on thrusters)
 - RBOT: Difficult to find RBOT-friendly waypoints.
 - Gap between VIMS RLYROCC001 and DOY 289 downlink turn. SIP leads may choose to move turn earlier if that helps with implementation issues.
- Data Volume:
 - Carryover exists within segment itself. P4 overflow disappears if CAPS remains off.
 - All other SMT warnings are non-issues.
- DSN:
 - Maintenance conflict for post-flyby downlink C70METSEQ287; known since segmentation by MP, will ask for waiver.
 - Other ap_downlink report check warnings are OK (unusual PPL due to dual PB, other issues are rubbish)
- Resource checker:
 - All resource checker items ok (intentional gap, telemetry changes during ISS observations)
- Opmodes:
 - ISS and VIMS sleep during RADRWA periods as per power envelope
- Hydrazine:
 - AACS estimates **495g** of hydrazine based on early pointing design submission.
 - Deadband of (0.5, 0.5, 2) to accommodate RADAR
- Special Activities:
 - Known CMT management periods: +X to Sun CMT flight rule waiver will be needed for the RADAR ride-along SAR with INMS at C/A on DOY 287

Liens

TOST rev 198

Sequence Liens (should all be SPLAT items):

- Existing Liens:
 - Dual playback
 - CIRS consumable-level heating
 - POS_X to Sun CMT
 - Maintenance conflict with post-flyby downlink on C70