



## **CASSINI TOST SEGMENT**

**Rev 148 Handoff Package (T76)**

**Segment Boundary 2011-128T08:47:00– 2011-130T10:32:00**

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SMT report and SPASS

Science Highlights

Notes & Liens

Integration Checklist

# SMT report

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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)	(%)	CAROVR (Mb)
SP_148EA_G70METNON129_PRIME	129 23:32	130 08:32	0	3152	164	3316	3317	1	0	978	53	4346	3776	-571	19	0%	571
SP_148EA_C70METNON130_PRIME	130 08:32	130 10:32	571	0	0	571	3317	2746	0	268	12	851	870	19	19	2%	0

# SPASS

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Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
Sequence S68, length = 69 days		2011-115716:03:00		068T19:07:00	2011-184T11:10:00			
Titan Flyby T76 Segment		2011-128T08:47:00		002T01:45:00	2011-130T10:32:00			
SP_148TI_WAYPTTURN128_PRIME		2011-128T08:47:00		000T00:40:00	2011-128T09:27:00	NEG_Y to Titan	NEG_X to NTP	
<b>NEW WAYPOINT</b>		<b>2011-128T09:27:00</b>		<b>001T12:35:00</b>	<b>2011-129T22:02:00</b>	<b>NEG_Y to Titan</b>	<b>NEG_X to NTP</b>	
<b>SP_148NA_DEADTIME128_PRIME</b>		<b>2011-128T09:27:00</b>		<b>000T00:15:00</b>	<b>2011-128T09:42:00</b>	<b>NEG_Y to Titan</b>	<b>NEG_X to NTP</b>	
CIRS_148TI_FIRNADCMP001_PRIM I, V		2011-128T09:42:00	GMB_E148_TITAN_T76-000T13:11:45	000T04:11:45	2011-128T13:53:45	CIRS_FP1 to Titar PIC		
CIRS_148TI_MIRLMBMAP001_PRIM I, V		2011-128T13:53:45	GMB_E148_TITAN_T76-000T09:00:00	000T04:00:00	2011-128T17:53:45	CIRS_FP1 to Titar PIC		
CIRS_148TI_FIRNADMAP001_PRIM I, V		2011-128T17:53:45	GMB_E148_TITAN_T76-000T05:00:00	000T02:45:00	2011-128T20:38:45	CIRS_FP1 to Titar PIC		
<b>Begin Custom period</b>		<b>2011-128T20:38:4</b>	<b>GMB_E148_TITAN_T76-000T02:15:00</b>	<b>000T00:00:01</b>	<b>2011-128T20:38:46</b>			
CIRS_148TI_FIRLMBINT001_PRIME I, M, V		2011-128T20:38:45	GMB_E148_TITAN_T76-000T02:15:00	000T01:00:00	2011-128T21:38:45	CIRS_FP1 to Titar PIC		Pick up at NEG_Y to Titan, NEG_X to NTP; Hand off at CIRS_FP1 to Titan, PIC.
CIRS_148TI_FIRLMBAR001_PRIME I, M, V		2011-128T21:38:45	GMB_E148_TITAN_T76-000T01:15:00	000T00:30:00	2011-128T22:08:45	CIRS_FP1 to Titar PIC		Pick up at CIRS_FP1 to Titan, PIC; Hand off at CIRS_FP1 to Titan, PIC.
CIRS_148TI_FIRLMBT001_PRIME I, M, V		2011-128T22:08:45	GMB_E148_TITAN_T76-000T00:45:00	000T00:35:00	2011-128T22:43:45	CIRS_FP1 to Titar PIC		Pick up at CIRS_FP1 to Titan, PIC; Hand off at NEG_Y to Titan, NEG_X to Sun.
VIMS_148TI_HIRES001_PRIME	C, I, M	2011-128T22:43:45	GMB_E148_TITAN_T76-000T00:10:00	000T02:25:00	2011-129T01:08:45	VIMS_IR to Titan	NEG_X to Sun	Pick up at NEG_Y to Titan, NEG_X to Sun; Hand off at NEG_Y to Titan, NEG_X to NTP.
Begin Dual Playback Science		2011-128T22:53:45	GMB_E148_TITAN_T76+000T00:00:00	000T00:00:01	2011-128T22:53:46			
148TI (t) T76 TITAN Inbound...		2011-128T22:53:45		000T00:00:01	2011-128T22:53:46			
End Dual Playback Science		2011-128T23:53:45	GMB_E148_TITAN_T76+000T01:00:00	000T00:00:01	2011-128T23:53:46			
<b>End Custom period</b>		<b>2011-129T01:08:4</b>	<b>GMB_E148_TITAN_T76+000T02:15:00</b>	<b>000T00:00:01</b>	<b>2011-129T01:08:46</b>			
VIMS_148TI_REGMAP001_PRIME	C, I	2011-129T01:08:45	GMB_E148_TITAN_T76+000T02:15:00	000T00:45:00	2011-129T01:53:45	VIMS_IR to Titan	NEG_X to NTP	
UVIS_148TI_EUVFUV001_PRIME	C, I, V	2011-129T01:53:45	GMB_E148_TITAN_T76+000T03:00:00	000T06:00:00	2011-129T07:53:45	UVIS_FUV to Titan	NEG_Z to NTP	
VIMS_148TI_GLOBMAP001_PRIME	C, I	2011-129T07:53:45	GMB_E148_TITAN_T76+000T09:00:00	000T05:00:00	2011-129T12:53:45	VIMS_IR to Titan	NEG_X to NTP	
CIRS_148TI_MIDIRMAP002_PRIME I, V		2011-129T12:53:45	GMB_E148_TITAN_T76+000T14:00:00	000T08:13:15	2011-129T21:07:00	CIRS_FP1 to Titar POS	X to North Pole_Dir	
<b>SP_148NA_DEADTIME129_PRIME</b>		<b>2011-129T21:07:0</b>	<b>GMB_E148_TITAN_T76+000T22:13:00</b>	<b>000T00:15:00</b>	<b>2011-129T21:22:00</b>	<b>NEG_Y to Titan</b>	<b>NEG_X to NTP</b>	
SP_148EA_DLTURN129_PRIME		2011-129T21:22:00		000T00:40:00	2011-129T22:02:00	XBAND to Earth	NEG_X to NEP	
<b>NEW WAYPOINT</b>		<b>2011-129T22:02:00</b>		<b>000T12:30:00</b>	<b>2011-130T10:32:00</b>	<b>XBAND to Earth</b>	<b>NEG_X to NEP</b>	
SP_148EA_YBIAS129_PRIME	E	2011-129T22:02:00		000T01:30:00	2011-129T23:32:00	XBAND to Earth	NEG_X to NEP	
SP_148EA_G70METNON129_PRIME	C	2011-129T23:32:00		000T09:00:00	2011-130T08:32:00	XBAND to Earth	Rolling	NEG_X to NEP or NSP, CAPS
SP_148EA_C70METNON130_PRIME	C	2011-130T08:32:00		000T02:00:00	2011-130T10:32:00	XBAND to Earth	NEG_X to NEP	NEG_X to NEP or NSP, CAPS

DOY 128: CIRS will perform both mid and far-infrared limb sounding near 50 degrees N, as part of a campaign to monitor changing chemical abundances and temperatures as the northern hemisphere moves through late spring. VIMS is prime at closest approach and will acquire high resolution images of Adiri and its limits with the surrounding dune fields. ISS will ride along with VIMS to acquire high-resolution images at low phase angle. The flyby will be an approach with the sun in the INCA FOV until 18 minutes before closest approach. After that, it will be a very nice opportunity for INCA to do ENA imaging of the ion interaction with the exosphere, and CHEMS and LEMMS will be making good ion and electron measurements of the energetic particle environment throughout the encounter. INCA should be able to detect any ion acceleration that may be taking place in Titan's wake with the viewing geometry of the approach, and possibly also after closest approach.

DOY 129: Later during the flyby, the VIMS will stare at Titan to continue its mapping of the cloud coverage in order to detect any seasonal change in the cloud distribution before and after the equinox. CIRS temperature mapping. ISS will ride along with VIMS to acquire regional- and global-scale observations of Titan's trailing/anti-Saturnian hemisphere, including western Belet and Senkyo. ISS will also monitor Titan's haze and clouds over a period of 19+ hours while riding along with UVIS, VIMS and CIRS. –UVIS will obtain an image cube of Titan's atmosphere at EUV and FUV wavelengths by sweeping its slit across the disk. These cubes provide spectral and spatial information on nitrogen emissions, H emission and absorption, absorption by simple hydrocarbons, and the scattering properties of haze aerosols. T76 is a post-dusk, upstream equatorial flyby at 1862 km altitude, similar to prime mission T34 flyby. During T76 MAG will investigate the structure of Titan's induced magnetosphere along the ram direction while being on the dayside, a geometry which is ideal for pressure balance studies. The high altitude of periapsis (above the exobase) however limitates the study of diffusion of magnetic field within the ionosphere.

# Notes and Liens

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- Pointing:
  - No prime/rider coordination designs
  - Custom handoffs as noted
  - No CIRS heating during waypoints
  - All observations use RBOT-friendly secondaries EXCEPT for CIRS limb observations. RBOT changes to CIRS requests containing the letters “LMB” should be made in conjunction with the CIRS team.
  - XD (preceding segment) informed that NEG\_X to NEP/NSP secondary for final downlink would cause problems for initial T76 waypoint turn.
- Data Volume:
  - No issues. Dual PB from C/A to +00:30:00.
- DSN:
  - No special requests
- Opmodes:
  - No special arrangements.
- Special Activities:
  - None

## Sequence Liens:

- None

# Segment Checklist p1

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Item	Disposition notes, or X if complete
1. Disposition all requests in CIMS - approve all pending requests, no outstanding revisions/new requests	X
2. Version the SPASS in CIMS, use label INTEG_FIN, in description put date and your name	x
3. Examine SPASS, ensure SP turns correctly designated PRIME or NEW WAYPOINT. Review Ybias presentation. Prime RSS observations require the Xband to Earth attitude be a waypoint, use DLTURN with spass type New Waypoint	x
4. Waypoints and downlinks are violation free (per CTV). NOTE ON ISSUES PAGE if periods of no valid waypoint	x
5. SP turns have been checked and are violation free. All turns use the slower XM slew rates and include 2 minutes turn margin. First turn of segment has been checked using correct final attitude of previous segment	x (no final attitude yet from XD)
6. YBIAS windows have been included as required, guidelines for integration met per MP forum package	x
7. There are no more than 3 waypoint changes in a 24 hour period (DLTURN waypoints for YBIAS do not count)	x
8. The minimum prime instrument request duration outside $\pm 5$ hours from a targeted satellite flyby is 30 minutes	x
9. Custom handoffs are limited to $\pm 3$ hours around a targeted Titan or Icy Satellite flyby	x
10. Custom periods 1) designated properly with SPASS notes 2) requests have "pick up at" and "hand off at" information filled in correctly 3) turn times and handoff attitudes have been verified – early PDT work recommended!	x
11. Prime/rider coordination: secondaries have all been reviewed and agreed to, co-designed observations are so designated, pre-designed in PDT	N/A
12. Use rolling_sru if required per CTV checks	N/A
13. The secondary axis for downlinks that contain prime and backup OTMs is the same, and inertially fixed	N/A
14. Downlinks that contain OTPs only roll for the first 4 hours of the downlink pass max. OTB: Full rolling OK, unless SRU issues, then 4_Hr_Rolling max (NO split rolls)	N/A
15. There is one downlink pass block per OTM prime or backup window (one wedding cake for a split pass). Exception - if first split downlink pass is $\leq 4$ hours can use 2 cakes, put playback_gap in 2nd pass, put OTP/OTB in name of BOTH passes (for CDA)	N/A
16. Downlinks (attitude/rolling) match XMDLWG plan. Negotiated changes should be reported back to the WG	x

# Segment Checklist p2

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Item	Disposition notes, or X if complete
17. Multi-revolution turns about the X-axis have an offset greater than or equal to 30 degrees about Z	N/A
18. Live moveable blocks (LMBs) include the appropriate time margin specified as a DEADTIME request in CIMS at the beginning and end of the moveable block. TLM modes in separate OBSMOV request (n/a for RSS)	n/a
19. Live moveable blocks use an LMB epoch and use the appropriate epoch naming conventions. Live Update Blocks use a LUB epoch (RSS only)	n/a
20. All stellar occultation observations include an additional +/-20 minutes of time (40 minutes total) when they occur within -1 day to +2 days of Saturn periapse	n/a
21. All Ground and Live Moveable blocks associated with non-targeted geometric events (e.g., solar and earth occultations) include an additional +/-20 minutes of time margin (40 minutes total) to account for reference trajectory changes.	n/a
22. Check your GMB, LMB, LUB, Occ times against current reference trajectory	X (technically, off by .6 seconds; not a problem)
23. Dual playback of high value science data is performed via multiple playbacks within this segment. CIMS entries are correct. Dual playback does not affect downstream segments	OK. Dual PB from C/A to +00:30:00
24. Run the resource checker in CIMS and fix errors found. Remaining notes disposition here	X errors with SSR due to change in policy. Use of PIC as secondary is OK (CIRS to CIRS handoff)
25. Run SMT, if SSR not empty at end of segment include in notes, and instances of <-90 SSR margin	X
26. Examine SMT warnings report, include dispositions here of any items (negative SSR margin should already be on notes page)	X
27. RSS boresight: one _SP pass, two _PRIME downlink passes, one hour observation block in SNER_3	n/a



# Segment Checklist p3

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Item	Disposition notes, or X if complete
28. Examine “ap_downlink report check” output, include dispositions here of any items (see next two items).	70M usage 100%, but hey, it's TOST.
29. List any DSN stations requested during maintenance periods, AND JUSTIFICATION. <b>AVOID!!!!</b>	n/a
30. Avoid requesting two overlapping stations (except for RSS science) whenever possible – use RSS station for downlink too – or have RSS move ORT	X
31. Compare RSS requests to DSN requests, make sure they jive (ORT, occ, etc), ORTs are integrated.	n/a
32. List your percent 70M stations requested - avoid >35%	100%
33. Examine “ap_downlink report nav” output, MP should ensure NAV OK with gaps in 2way	x
34. In CIMS check for “start before”, “end before”, “start after”, “end after” requests - fix if any problems found	x
35. Verify OPNAVs are in SNER5 and are support_image class, sanity check rest of tlm modes (RADAR 15 min in 5A/activity in 5A or 8, etc)	n/a
36. If sequence boundary at START of your segment, ensure IVPGAP info correct, NO “start before” MAPS requests	n/a
37. If sequence boundary at END of your segment (ie in the next segment), ensure 6 “SEQ” upload DSN passes - will probably ripple into preceding segment(s), make sure to notify them. Last pass has Ybias window in front, no bonus science. NO “end after” MAPS requests	n/a
38. Verify opmodes correct (RSS and RADAR especially), teams going to sleep have agreed? Use table at <a href="https://cassini.jpl.nasa.gov/wiki/bin/view/Cassini/XXMOpModes">https://cassini.jpl.nasa.gov/wiki/bin/view/Cassini/XXMOpModes</a>	n/a
39. If conjunction is in your segment, see Conjunction page on SP Wiki	n/a
40. RAMAVOID: new waypoint, NOT in custom period	n/a
41. If on thrusters, confirm deadbands	n/a
42. Segment products & this package linked to XXM deliveries page	Tautology, but x