Science Planning & Sequence Team CASSINI

CASSINI TOST SEGMENT

Rev 160 T81 Handoff Package

Segment Boundary 2012-029T22:41:00 – 2012-031T21:41:00

27 July 2011

Kim Steadman

SMT report and SPASS

Science Highlights

Notes & Liens

Integration Checklist

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DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)
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DOWNLINK PASS NAME	Start doy hh:mm	End doy hh:mm	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)
					OBSERVATION_PERIOD						DOWNLINK_PASS					
				P4				P5	RECORDED		PLAYBACK					
SP_160EA_G70METNON031_PRIME	031 06:41	031 16:41	0	3149	135	3284	3322	38	0	233	59	3576	3552	-25	0 0%	24
SP_160EA_C34HEFNON031_PRIME	031 16:41	031 21:41	24	0	0	24	3322	3298	0	498	29	552	511	-41	0 0%	41

160TI_T81	31131					

Start Time	End Time	Prime Activity	Obs. Detail	Op Mode	TLM Mode	Comments
2012-029T22:41:00	2012-029T23:21:00	SP Turn to WP	NEG_Y to Titan, POS_X to 276/-25	DFPW Normal	S_N_ER_3	
2012-029T23:21:00	C/A-14:03:47	OD Uncertainty Dead Time		DFPW Normal	S_N_ER_3	
C/A-14:03:47	-13:00	CIRS	part M4(TC1b)	DFPW Normal	S_N_ER_3	
-13:00	-09:00	CIRS	N1(TC1b)	DFPW Normal	S_N_ER_3	
-09:00	-02:15	UVIS	X (TN1c, TC1b)	DFPW Normal	S_N_ER_3	
-02:15	0	ISS		DFPW Normal	S_N_ER_3	
2012-030T13:39:47		CLOSEST APPROACH	NEG_Y to Titan	DFPW Normal	S_N_ER_3	Ontario near terminator at high emission angle; high-southern leading hemisphere; C/A >31,000 km (phase ≤ 95°)
0	+02:15	ISS		DFPW Normal	S_N_ER_3	
+02:15	+03:00	ISS		DFPW Normal	S_N_ER_3	
+03:00	+09:00	UVIS	modified X (TN1c, TC1b)	DFPW Normal	S_N_ER_3	
+09:00	+14:00	CIRS	C (TC1a, TC1b)	DFPW Normal	S_N_ER_3	VIMS rider
+14:00	C/A+14:36:13	CIRS	TC1b	DFPW Normal	S_N_ER_3	
C/A+14:36:13	2012-031T04:31:00	OD Uncertainty Dead Time		DFPW Normal	S_N_ER_3	
2012-031T04:31:00	2012-031T05:11:00	SP Turn to Earth for downlink		DFPW Normal	S_N_ER_3	
2012-031T05:11:00	2012-031T06:41:00	Y-Bias window		DFPW Normal	S_N_ER_3	
2012-031T06:41:00	2012-031T16:41:00	Goldstone 70M		DFPW Normal	RTE_N_SPB	
2012-031T16:41:00	2012-031T21:41:00	Canberra HEF 34M		DFPW Normal	RTE_N_SPB	Added pass for dual playback for ISS

Dual Playback: +00:30 to +02:00 (447 Mb)

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary
Sequence S72, length = 73 days		2012-024T22:55:00		072T12:52:00	2012-097T11:47:00		
Titan Flyby T81 Segment		2012-029T22:41:00		001T18:00:00	2012-031T16:41:00		
SP_160TI_WAYPTTURN029_PRIME		2012-029T22:41:00		000T00:40:00	2012-029T23:21:00	NEG_Y to Titan	POS_X to 276.0/-25.0
NEW WAYPOINT		2012-029T23:21:00		001T05:50:00	2012-031T05:11:00	NEG_Y to Titan	POS_X to 276.0/-25.0
SP_160NA_DEADTIME029_PRIME		2012-029T23:21:00		000T00:15:00	2012-029T23:36:00	NEG_Y to Titan	POS_X to 276.0/-25.0
CIRS_160TI_FIRNADCMP001_PRIME	I, V	2012-029T23:36:00	GMB_E160_TITAN_T81-000T14:03:47	000T05:03:47	2012-030T04:39:47	CIRS_FP1 to Titan	PIC
UVIS_160TI_EUVFUV001_PRIME	C, V	2012-030T04:39:47	GMB_E160_TITAN_T81-000T09:00:00	000T06:45:00	2012-030T11:24:47	UVIS_FUV to Titan	POS_X to 276.0/-25.0
ISS_160TI_HIRES001_PRIME	C, M, V	2012-030T11:24:47	GMB_E160_TITAN_T81-000T02:15:00	000T05:15:00	2012-030T16:39:47	ISS_NAC to Titan	NEG_X to Sun
160TI (t) T81 TITAN Outbou...		2012-030T13:39:48		000T00:00:01	2012-030T13:39:49		
Begin Dual Playback Science		2012-030T14:09:47	GMB_E160_TITAN_T81+000T00:30:00	000T00:00:01	2012-030T14:09:48		
End Dual Playback Science		2012-030T15:39:47	GMB_E160_TITAN_T81+000T02:00:00	000T00:00:01	2012-030T15:39:48		
UVIS_160TI_EUVFUV002_PRIME	C, V	2012-030T16:39:47	GMB_E160_TITAN_T81+000T03:00:00	000T06:00:00	2012-030T22:39:47	UVIS_FUV to Titan	POS_X to 276.0/-25.0
CIRS_160TI_FIRNADCMP002_PRIME	I, V	2012-030T22:39:47	GMB_E160_TITAN_T81+000T09:00:00	000T05:36:13	2012-031T04:16:00	CIRS_FP1 to Titan	PIC
SP_160NA_DEADTIME031_PRIME	I	2012-031T04:16:00	GMB_E160_TITAN_T81+000T14:36:13	000T00:15:00	2012-031T04:31:00	NEG_Y to Titan	POS_X to 276.0/-25.0
SP_160NA_DLTURN031_PRIME		2012-031T04:31:00		000T00:40:00	2012-031T05:11:00	XBAND to Earth (0.0,0.0,-9.5 deg.	NEG_Y to Saturn
NEW WAYPOINT		2012-031T05:11:00		000T16:30:00	2012-031T21:41:00	XBAND to Earth (0.0,0.0,-9.5 deg.	NEG_Y to Saturn
SP_160EA_YBIAS031_PRIME	E	2012-031T05:11:00		000T01:30:00	2012-031T06:41:00	XBAND to Earth (0.0,0.0,-9.5 deg.	NEG_Y to Saturn
SP_160EA_G70METNON031_PRIME	C	2012-031T06:41:00		000T10:00:00	2012-031T16:41:00	XBAND to Earth	Rolling
Pointer reset in preparatio...		2012-031T16:41:00		000T00:00:01	2012-031T16:41:01		
SP_160EA_C34HEFNON031_PRIME	C	2012-031T16:41:00		000T05:00:00	2012-031T21:41:00	XBAND to Earth	Rolling

Jan 30 (DOY 030) - On this high-altitude encounter, ISS will perform high-resolution observations around closest-approach along Titan's leading hemisphere at high southern latitudes, including a late view of Ontario Lacus before the Sun sets for southern winter. ISS will also ride along with CIRS' inbound high-phase angle observations and CIRS' outbound observations over Titan's anti-Saturnian hemisphere at low phase angles. This encounter is one of the last views of Titan's high southern latitudes. VIMS will ride along with ISS to look for lakes in the South Pole area.

Inbound and outbound 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. This is one of many such cubes gathered over the coarse of the mission to provide latitude and seasonal coverage of Titan's middle atmosphere and stratosphere.

During the flyby, RPWS will measure thermal plasmas in Titan's ionosphere and surrounding environment; search for lightning in Titan's atmosphere; investigate the interaction of Titan with Saturn's magnetosphere. CAPS will Measure the ion and electron temperatures, densities and the ion composition and flow field in the vicinity of Titan, to characterize and understand its interaction with the magnetosphere of Saturn. Observe any seasonal or other long-term variability in the characteristics of this interaction, and study the processes by which Titan's atmosphere and ionosphere are lost to the magnetosphere.

Jan 31 (DOY 031) – Playback of Titan data will occur over Goldstone 70M.

Notes and Liens

- Pointing:
    - Collaborative prime/rider coordination designs
        - ISS_160TI_HIRES001_PRIME observation w/ VIMS (-02:15 to +03:00)
    - No custom period
    - RBOT-friendly secondaries used in all cases except for RADAR and CIRS limb observations.
    - Secondaries are flexible except in the following cases:
        - ISS_160TI_HIRES001_PRIME : Significant science impact if secondary changed

- Data Volume:
    - Handing over small amount to X-disc. They have approved this.
- DSN:
    - Dual Playback: +00:30 to +02:00.
- Opmodes:
    - No special op modes.
- Hydrazine:
    - No thrusters.
- Special Activities:
    - None.

Sequence Liens:

- None.

Segment Checklist p1

Item	Disposition notes, or X if complete
1. Disposition all requests in CIMS - approve all pending requests, no outstanding revisions/new requests	X
2. No rocking downlinks. No AZSCANS (IGAPIMAGE). No arrayed downlinks.	X
3. Examine SPASS, ensure SP turns correctly designated PRIME or NEW WAYPOINT. Prime RSS observations require the Xband to Earth attitude be a waypoint, use DLTURN with spass type New Waypoint (also for DLTURN before Ybiases)	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- use ctv_batch or PDT. Fix any issues found. First turn of segment has been checked using correct final attitude of previous segment. All turns use the slower XM slew rates and include 2 minutes turn margin. Allow extra turn time whenever possible to aid possible RBOT changes.	X
6. YBIAS windows have been included as required, guidelines met per https://cassini.jpl.nasa.gov/sp/xxmdev/ybias_mpforum.pdf	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 ± 5 hours from a targeted satellite flyby is 30 minutes	X
9. Custom handoffs are limited to ± 3 hours around a targeted Titan flyby or an asymmetric 10 hour window for Icy Satellite flybys. 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!	N/A
10. PIEs are properly identified via _PIE naming convention. All agreed to PIEs have been integrated.	N/A
11. Prime/rider coordination: secondaries have all been reviewed and agreed to, collaborative observations are so designated, pre-designed in PDT, prime instrument agrees to work with riders for collaborate designs	X
12. Use rolling_sru if required. Follow rolling guidelines per SCO, see the ScoRules wiki page (linked to integration procedure)	X
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 ≤4 hours can use 2 cakes, put playback_gap in 2nd pass, put OTP/OTB in name of BOTH passes (for CDA). MUST have a full length 9 hour station requested for NAV tracking data	X

Segment Checklist p2

Item	Disposition notes, or X if complete
16. Moving any downlink pass to a different view period requires coordination with Navigation. Changes to the DSN strawman plan require SPST manager approval.	N/A
17. Multi-revolution turns about the X-axis have an offset greater than or equal to 30 degrees	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). Waypoint same entering as leaving, and is valid throughout. Avoid skeet shoots in LMBs. If CMT management required, contain within LMB. 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
19. Pointing is not altered for science during any SCO/MP activity that has pointing requirements (e.g., dust hazards). [Note that science turns are allowed for all but the first minute of an inbound thruster transition during a Titan or icy satellite flyby. No science turns are allowed during any portion of the outbound transition]	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	X
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.	X
22. Check your GMB, LMB, LUB, Occ times against current reference trajectory (Tour Atlas)	X
23. Dual playback of high value data is performed within this segment and does not affect downstream segments. CIMS entries are correct and SPASS type Note. SSR-A is emptied after the first downlink. Open a SPLAT item (tied to the ENGR request that resets the pointers, ie the DUALPB_CDS request) which says, "During DSN negotiations ensure that SSR-A is emptied before the pointers are reset. This item cannot be closed until the DSN negotiations are complete for both downlink passes, or the dual playback is deleted."	X
24. Run the resource checker in CIMS and fix errors found. Remaining notes disposition here or on notes page	X
25. SMT: note if SSR not empty at end of segment, have approval from following segment. No carryover across sequence boundaries. Aim for empty SSR every 4 days. No negative SSR margin during integration. List discrepancies on notes page.	X
26. Examine SMT warnings report, include dispositions here or on notes page of any items	X
27. RSS boresight: one _SP pass, two _PRIME downlink passes, one hour observation block in SNER_3	N/A

Segment Checklist p3

Item	Disposition notes, or X if complete
28. Examine "ap_downlink report check" output, include dispositions here or on notes page of any items (see next two items).	70M usage is 100%; # of seq passes <5 (both ok for TOST)
29. List any DSN stations requested during maintenance periods, AND JUSTIFICATION. **AVOID!!!!!**	X
30. Avoid requesting two overlapping stations (except for RSS science) whenever possible – use RSS station for downlink too	X
31. Compare RSS requests to DSN requests, make sure they jive (ORT, occ, etc), ORTs are integrated.	N/A
32. Apoapse segments only: List your percent 70M stations requested - avoid >35%.	N/A
33. Apoapse segments only: Follow Integration Guideline & Constraint #15c regarding "two out of three" types of science per RBOT segment. ME OTM's split an RBOT segment.	N/A
34. Periapse segments: >3 hr observations with >60 degree target motion are broken up by a 20 min inertial period (lien if not explicit in SPASS)	X
35. Support images use _XXM or _XXM3 activity type	N/A
36. In CIMS check for "start before", "end before", "start after", "end after" requests - fix if any problems found	X
37. 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
38. If sequence boundary at START of segment, ensure IVPGAP info correct, NO "start before" MAPS requests, OpNav is not first thing in segment	N/A
39. If sequence boundary at END of segment (ie in the next segment), ensure 6 "SEQ" upload DSN passes - will probably ripple into preceding segment(s), notify them. Last pass has Ybias window in front, no bonus science. NO "end after" MAPS requests	N/A
40. Verify opmodes correct (RSS and RADAR especially), teams going to sleep have agreed? MIMI: not in sleep during RPX? Use table at https://cassini.jpl.nasa.gov/wiki/bin/view/Cassini/XXMOpModes	X
41. If conjunction is in your segment, see Conjunction page on SP Wiki	N/A

Segment Checklist p4

Item	Disposition notes, or X if complete
42. RAMAVOID: new waypoint, NOT in custom period	N/A
43. If on thrusters, confirm deadbands	N/A
44. Segment products linked to XXM deliveries page, & this package when you are done	X