CASSINI TOST SEGMENT

153_T78 Handoff Package

Segment Boundary 2011-254T06:47:00 – 2011-256T07:32:00

04 March 2011

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DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)
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| | | | | OBSERVATION_PERIOD | | | | | DOWNLINK_PASS | | | | | |
| | | | P4 | | | | | P5 | RECORDED | | PLAYBACK | | | | |
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)
SP_153EA_G70METNON255_PRIME	255 15:00	256 00:00	0	2619	136	2756	3322	567	0	209	53	3018	3012	−6	2 0%	6
SP_153EA_C34BWGNON255_PRIME	256 00:00	256 07:32	6	0	0	6	3322	3316	0	447	44	497	499	1	2 0%	0

Dual playback fits in the T78 segment.

153TI_T78	5821					

Start Time	End Time	Prime Activity	Obs. Detail	Op Mode	TLM Mode	Comments
2011-254T06:47:00	2011-254T07:27:00	SP Turn to WP	NEG_Y to Titan (0,0,5.0), NEG_X to 37.6/83.8	DFPW Normal	S_N_ER_3	
2011-254T07:27:00	C/A-19:08:06	OD Uncertainty Dead Time		DFPW Normal	S_N_ER_3	
C/A-19:08:06	-13:00	CIRS	M4 (TC1b)	DFPW Normal	S_N_ER_3	
-13:00	-09:00	CIRS	N1 (TC1b)	DFPW Normal	S_N_ER_3	
-09:00	-05:00	CIRS	R (TN1c)	DFPW Normal	S_N_ER_3	
-05:00	-02:15	CIRS	T (TN2c, TC1b)	DFPW Normal	S_N_ER_3	
begin custom period				DFPW Normal	S_N_ER_3	
-02:15	-00:43	**CIRS**	TN1c	DFPW Normal	S_N_ER_3	CUSTOM period for occs
-00:43	-00:27	VIMS occ	occ at -00:32 to -00:25 (TN1c)	DFPW Normal	S_N_ER_3	
-00:27	0	UVIS solar occ	occ at -00:03 to +00:24 (TC1a, TC1b, TN1c)	DFPW Normal	S_N_ER_3	
2011-255T02:50:06		**CLOSEST APPROACH**	**UVIS_SOL_OFF to Sun, -X to Pole North Pole Dir**	DFPW Normal	S_N_ER_3	CIRS -> VIMS stellar->UVIS solar->CAPS
0	+00:29	**UVIS solar occ**	**TC1a, TC1b, TN1c**	DFPW Normal	S_N_ER_3	
+00:29	+04:00	**CAPS**	TC2a	DFPW Normal	S_N_ER_3	CAPS will pick up at occ attitude
end custom period				DFPW Normal	S_N_ER_3	
+04:00	C/A + 10:09:54	UVIS	X modified ((TN1c, TC1b)	DFPW Normal	S_N_ER_3	
C/A + 10:09:54	2011-255T13:10:00	OD Uncertainty Dead Time		DFPW Normal	S_N_ER_3	
2011-255T13:10:00	2011-255T13:30:00	SP Turn to Earth for downlink		DFPW Normal	S_N_ER_3	
2011-255T13:30:00	2011-255T15:00:00	Y-Bias window		DFPW Normal	S_N_ER_3	
2011-255T15:00:00	2011-256T00:00:00	Goldstone 70M		DFPW Normal	RTE_N_SPB	
2011-256T00:00:00	2011-256T07:32:00	Canberra 34M		DFPW Normal	RTE_N_SPB	Dual playback for UVIS occ, -00:03 to +00:24

Deadband: N/A
Walking Deadband: N/A
Y-Bias Window precedes downlink
Dual Playback from -00:03 to +00:24

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
Sequence S70, length = 70 days		2011-250T00:48:00		070T02:14:00	2011-320T03:02:00			
Titan Flyby T78 Segment		2011-254T06:47:00		002T00:45:00	2011-256T07:32:00			
SP_153TI_WAYPTTURN254_PRIME		2011-254T06:47:00		000T00:40:00	2011-254T07:27:00	NEG_Y to Titan (0.0,0.0,5.0 deg.	NEG_X to 37.6/83.8	
NEW WAYPOINT		2011-254T07:27:00		001T06:03:00	2011-255T13:30:00	NEG_Y to Titan (0.0,0.0,5.0 deg.	NEG_X to 37.6/83.8	
SP_153NA_DEADTIME254_PRIME		2011-254T07:27:00		000T00:15:00	2011-254T07:42:00	NEG_Y to Titan (0.0,0.0,5.0 deg.	NEG_X to 37.6/83.8	
CIRS_153TI_MIDIRTMAP001_PRIME	I, V	2011-254T07:42:00	GMB_E153_TITAN_T78-000T19:08:06	000T06:08:06	2011-254T13:50:06	CIRS_FPB to Titan	PIC	
CIRS_153TI_FIRNADCMP001_PRIME	I, V	2011-254T13:50:06	GMB_E153_TITAN_T78-000T13:00:00	000T04:00:00	2011-254T17:50:06	CIRS_FP1 to Titan	PIC	
CIRS_153TI_MIRLMBMAP001_PRIME	I, V	2011-254T17:50:06	GMB_E153_TITAN_T78-000T09:00:00	000T04:00:00	2011-254T21:50:06	CIRS_FPB to Titan	PIC	
CIRS_153TI_FIRNADMAP001_PRIME	I, V	2011-254T21:50:06	GMB_E153_TITAN_T78-000T05:00:00	000T02:45:00	2011-255T00:35:06	CIRS_FP1 to Titan	PIC	
Begin Custom period		2011-255T00:35:06	GMB_E153_TITAN_T78-000T02:15:00	000T00:00:01	2011-255T00:35:07			
CIRS_153TI_FIRLMBINT001_PRIME	I, M, V	2011-255T00:35:06	GMB_E153_TITAN_T78-000T02:15:00	000T01:00:00	2011-255T01:35:06	CIRS_FP1 to Titan	PIC	Pick up at NEG_Y to Titan (0.0,0.0,5.0 deg. offset), NEG_X to 37.6/83.8; Hand off at CIRS_FP1 to Titan, PIC.
CIRS_153TI_FIRLMBAER001_PRIME	I, M, V	2011-255T01:35:06	GMB_E153_TITAN_T78-000T01:15:00	000T00:32:00	2011-255T02:07:06	CIRS_FP1 to Titan	PIC	Collaborative Rider(s): CAPS. Pick up at CIRS_FP1 to Titan, PIC; Hand off at CIRS_FP1 to Titan (0.0,0.0,5.0 deg. offset), NEG_Z to North_Pole_Dir. Collaborative Rider(s): CAPS
VIMS_153TI_OCCRAQR001_PRIME	C, M	2011-255T02:07:06	GMB_E153_TITAN_T78-000T00:43:00	000T00:16:00	2011-255T02:23:06	VIMS_IR to 355.956/-15.284	NEG_X to Sun	Collaborative Rider(s): CAPS. Pick up at CIRS_FP1 to Titan (0.0,0.0,5.0 deg. offset), NEG_Z to North_Pole_Dir; Hand off at UVIS_SOL_OFF to Sun, NEG_Z to North_Pole_Dir. Collaborative Rider(s): CAPS
UVIS_153SU_USUNOCC001_PRIME	C, I, M, \	2011-255T02:23:06	GMB_E153_TITAN_T78-000T00:27:00	000T00:56:00	2011-255T03:19:06	UVIS_SOL_OFF to Sun	NEG_Z to North_Pole_Di	Collaborative Rider(s): CAPS, ISS. Pick up at UVIS_SOL_OFF to Sun, NEG_Z to North_Pole_Dir; Hand off at UVIS_SOL_OFF to Sun, NEG_Z to North_Pole_Dir. Collaborative Rider(s): CAPS, ISS
Begin Dual Playback Science		2011-255T02:47:06	GMB_E153_TITAN_T78-000T00:03:00	000T00:00:01	2011-255T02:47:07			
153TI (t) T78 TITAN Inboun...		2011-255T02:50:06		000T00:00:01	2011-255T02:50:07			
End Dual Playback Science		2011-255T03:14:06	GMB_E153_TITAN_T78+000T00:24:00	000T00:00:01	2011-255T03:14:07			
CAPS_153TI_T78PTG001_PRIME	C, M	2011-255T03:19:06	GMB_E153_TITAN_T78+000T00:29:00	000T03:31:00	2011-255T06:50:06	POS_Y to COROT	NEG_Z to NSP	Collaborative Rider(s): CAPS. Pick up at UVIS_SOL_OFF to Sun, NEG_Z to North_Pole_Dir; Hand off at NEG_Y to Titan (0.0,0.0,5.0 deg. offset), NEG_X to 37.6/83.8. Collaborative Rider(s): CAPS. Some offset about X may be needed to avoid ORS to Sun
End Custom period		2011-255T06:50:06	GMB_E153_TITAN_T78+000T04:00:00	000T00:00:01	2011-255T06:50:07			
UVIS_153TI_HDACSTARE001_PRIME	C, I, V	2011-255T06:50:06	GMB_E153_TITAN_T78+000T04:00:00	000T06:09:54	2011-255T13:00:00	UVIS_FUV to Titan	NEG_X to NTP	
SP_153NA_DEADTIME255_PRIME	C, I, V	2011-255T13:00:00	GMB_E153_TITAN_T78+000T10:09:54	000T00:10:00	2011-255T13:10:00	NEG_Y to Titan (0.0,0.0,5.0 deg.	NEG_X to 37.6/83.8	
SP_153NA_DLTURN255_PRIME	C, I, V	2011-255T13:10:00		000T00:20:00	2011-255T13:30:00	XBAND to Earth	NEG_X to NEP	
NEW WAYPOINT		2011-255T13:30:00		000T18:02:00	2011-256T07:32:00	XBAND to Earth	NEG_X to NEP	
SP_153EA_YBIAS255_PRIME	C, E, I, V	2011-255T13:30:00		000T01:30:00	2011-255T15:00:00	XBAND to Earth	NEG_X to NEP	
SP_153EA_G70METNON255_PRIME	C	2011-255T15:00:00		000T09:00:00	2011-256T00:00:00	XBAND to Earth	Rolling/SRU	NEG_X to NEP, CAPS
Pointer reset in preparatio...		2011-256T00:00:00		000T00:00:01	2011-256T00:00:01			
SP_153EA_C34BWGNON255_PRIME	C	2011-256T00:00:00		000T07:32:00	2011-256T07:32:00	XBAND to Earth	Rolling/SRU	NEG_X to NEP, CAPS

Sept 11 (DOY 254) - On this flyby, CIRS is performing limb sounding in the far-infrared at 72S – the more southerly latitude until 2015 to measure changing aerosol and gas concentrations as the south pole moves towards winter.

Sept 12 (DOY 255) – VIMS Stellar occultation which will allow us to constrain the composition and the spectral properties of Titan's atmosphere followed by a solar occultation. Solar occultations by Titan are the most valuable Titan observations for UVIS because they provide detailed vertical profiles of nitrogen (in the EUV channel during solar occultation) and hydrocarbons, HCN, and aerosols (in the FUV channel during stellar occultations). The experiment is self-calibrating (the information comes from a ratio of signal during occultation to signal of the unocculted sun or star just before or after occultation). These profiles probe altitudes between 300 km and 2400 km which fill the gap between CIRS and INMS measurements. Much of the chemistry and aerosol formation occurs in this vertical region. Observations taken over the course of the mission will collectively provide coverage at many latitudes and local times and these will be used to study meridional and local time gradients in the upper atmosphere. Knowledge of these gradients is important for understanding the meridional circulation and other dynamical and chemical processes. (

RPWS will also 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.

T78 Dual playback

- A Dual Playback for High Value Science has been planned

- Based on DSN requests, SMT results indicate it will fit within this segment

- A SPLAT item has been opened until the DSN negotiations for this time period are complete

Flyby	Driving Instrument	BEGHIVAL	ENDHIVAL	P4 Dual Playback	SSR-A empty after first playback?	Anything nonstandard?
T78	UVIS	T78-03 min	T78+24 min	210 Mb	Yes	no

A "standard" dual playback: no carryover coming in, single observation period, first downlink empties SSR, no caboose observation period, second downlink empties SSR

Notes and Liens

- Pointing:
    - Waypoint is RBOT friendly and good throughout the
    - CAPS is a Collaborative rider on the following:
        - CIRS_153TI_FIRLMBAER001_PRIME, VIMS_153TI_OCCRAQR001_PRIME
    - CAPS and ISS are collaborative rides on UVIS_153SU_USUNOCC001_PRIME.
    - All teams have agreed to custom handoff attitudes and times.

- Data Volume:
    - No issues

- DSN:
    - G70 requested during weekly maintenance.

- Opmodes:
    - None

- Hydrazine:
    - None

- Special Activities:
    - None

Sequence Liens:

- Dual Playback from T78 – 3 min to T78 + 24 min

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!	Custom extends to +04hr due to length of CIRS obs.
10. PIEs are properly identified via _PIE naming convention. All agreed to PIEs have been integrated.	X
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	n/a

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	Occ has as much pad as possible
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).	X
29. List any DSN stations requested during maintenance periods, AND JUSTIFICATION. **AVOID!!!!!**	DSS14, Titan flyby
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.	X
32. Apoapse segments only: List your percent 70M stations requested - avoid >35%.	n/a
33. Apoapse segments only: Follow Integration Guideline & Constaint #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)	n/a
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
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