CASSINI SOST_155_E15 SEGMENT

Rev 155 Handoff Package

Segment Boundary 2011-291T14:46:00 – 2011-293T04:31:00

16 March 2011

Sarah Milkovich

SMT report and SPASS

Science Highlights

Notes & Liens

Integration Checklist

SMT report

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

			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_155EA_G70METNON292_PRIME	292 14:06	292 19:31	0	3218	99	3317	3322	5	0	182	32	3531	1764	-1767	0	0%	1767
SP_155EA_C70METNON292_PRIME	292 19:31	293 04:31	1767	0	0	1767	3322	1555	0	1078	53	2898	2878	-21	0	0%	20

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			
Enceladus Flyby E15 Segment		2011-291T14:46:00		001T13:45:00	2011-293T04:31:00			
SP_155EA_WAYPTTURN291_PRIME		2011-291T14:46:00		000T00:40:00	2011-291T15:26:00	XBAND to Earth	POS_X to 270.7/72.4	
NEW WAYPOINT		**2011-291T15:26:00**		**000T11:04:00**	**2011-292T02:30:00**	**XBAND to Earth**	**POS_X to 270.7/72.4**	
ISS_155TI_M60R2CLD291_PRIME	C, V	2011-291T15:26:00	E155_M60R2CLD291+000T00:00:00	000T01:30:00	2011-291T16:56:00	ISS_NAC to Titan	POS_X to 135.2/56.1	
ISS_155TI_CLOUD001_PRIME	C, V	2011-291T23:50:00		000T02:00:00	2011-292T01:50:00	ISS_NAC to Titan	POS_X to 220.7/-83.7	
SP_155EN_WAYPTTURN292_PRIME		2011-292T01:50:00		000T00:40:00	2011-292T02:30:00	ISS_NAC to Enceladus	NEG_X to 61.9/78.3	
NEW WAYPOINT		**2011-292T02:30:00**		**000T10:06:00**	**2011-292T12:36:00**	**ISS_NAC to Enceladus**	**NEG_X to 61.9/78.3**	
ISS_155EN_PLMHPHR001_PIE	C, U, V	2011-292T02:30:00		000T04:10:00	2011-292T06:40:00	ISS_NAC to Enceladus	NEG_X to NSP	SOST PIE
SP_155EN_DEADTIME292_PRIME	**M**	**2011-292T06:40:00**		**000T00:05:00**	**2011-292T06:45:00**	**NEG_Y to Enceladus**	**NEG_X to 61.9/78.3**	
Begin Custom		**2011-292T06:45:00**	**GMB_E155_ENCELADUS_E15-000T02:37:12**	**000T00:00:01**	**2011-292T06:45:01**	**ISS_NAC to Enceladus**	**NEG_X to 61.9/78.3**	
ISS_155EN_ENCEL002_PIE	C, M, U, V	2011-292T06:45:00	GMB_E155_ENCELADUS_E15-000T02:37:12	000T02:03:00	2011-292T08:48:00	ISS_NAC to Enceladus	NEG_X to 61.9/78.3	Pick up at ISS_NAC to Enceladus, NEG_X to 61.9/78.3; Hand off at ISS_NAC to Enceladus (0.0,60.0,0.0 deg. offset), POS_Z to NSP.
UVIS_155EN_ICYEXO001_PRIME	C, I, M	2011-292T08:48:00	GMB_E155_ENCELADUS_E15-000T00:34:12	000T00:42:00	2011-292T09:30:00	UVIS_FUV to 84.05/-1.202	NEG_Z to 174.9/-33.0	Pick up at ISS_NAC to Enceladus (0.0,60.0,0.0 deg. offset), POS_Z to NSP; Hand off at UVIS_FUV to 84.05/-1.202, NEG_Z to 174.9/-33.0. Duration requested includes possible turn time. Actual occ is from 09:23 to 09:25.
Begin Dual Playback Science...		2011-292T09:18:00	GMB_E155_ENCELADUS_E15-000T00:04:12	000T00:00:01	2011-292T09:18:01			
155EN (t) E15 ENCELADUS In...		2011-292T09:22:12		000T00:00:01	2011-292T09:22:13			
End Dual Playback Science f...		2011-292T09:30:00	GMB_E155_ENCELADUS_E15+000T00:07:48	000T00:00:01	2011-292T09:30:01			
CIRS_155EN_ENCELADUS001_PRIME	I, M, U, V	2011-292T09:30:00	GMB_E155_ENCELADUS_E15+000T00:07:48	000T02:20:00	2011-292T11:50:00	CIRS_FP1 to Enceladus	NEG_Z to 174.9/-33.0	Pick up at UVIS_FUV to 84.05/-1.202, NEG_Z to 174.9/-33.0; Hand off at ISS_NAC to Enceladus, NEG_X to 61.9/78.3.
End Custom		**2011-292T11:50:00**	**GMB_E155_ENCELADUS_E15+000T02:27:48**	**000T00:00:01**	**2011-292T11:50:01**	**ISS_NAC to Enceladus**	**NEG_X to 61.9/78.3**	
SP_155EN_DEADTIME492_PRIME		**2011-292T11:50:00**	**GMB_E155_ENCELADUS_E15+000T02:27:48**	**000T00:06:00**	**2011-292T11:56:00**	**NEG_Y to Enceladus**	**NEG_X to 61.9/78.3**	
SP_155EA_DLTURN292_PRIME		2011-292T11:56:00		000T00:20:00	2011-292T12:16:00	POS_X to 158.46/5.9	NEG_Z to 63.73/38.57	
SP_155EA_DLTURN492_PRIME		2011-292T12:16:00		000T00:20:00	2011-292T12:36:00	XBAND to Earth	POS_X to NEP	
NEW WAYPOINT		**2011-292T12:36:00**		**000T15:55:00**	**2011-293T04:31:00**	**XBAND to Earth**	**POS_X to NEP**	
Periapse R = 3.259 Rs, lat ...		2011-292T12:23:30		000T00:00:01	2011-292T12:23:31			
SP_155EA_YBIAS292_PRIME		2011-292T12:36:00		000T01:30:00	2011-292T14:06:00	XBAND to Earth	POS_X to NEP	
SP_155EA_G70METNON292_PRIME	C, E, R	2011-292T14:06:00		000T05:25:00	2011-292T19:31:00	XBAND to Earth	POS_X to NEP	POS_X to NEP or NSP, CAPS
Pointer Reset in preparatio...		2011-292T19:31:00		000T00:00:01	2011-292T19:31:01			
SP_155EA_C70METNON292_PRIME	C, E, M	2011-292T19:31:00		000T09:00:00	2011-293T04:31:00	XBAND to Earth	Rolling/SRU	POS_X to NEP or NSP, CAPS

Science Highlights

DOY 291

The segment begins with ISS, CIRS, and VIMS observing Titan as part of the Titan cloud monitoring campaign. Cassini then turns to Enceladus to begin the fifteenth flyby of that moon. As Enceladus gets ever-closer, ISS observes the plumes and CIRS, UVIS and VIMS ride along.

DOY 292

The Enceladus flyby continues as Cassini's suite of optical instruments observe the surface of the moon. Half an hour before closest approach, UVIS takes control of the spacecraft to observe two stars in Orion's Belt, epsilon Ori and zeta Ori, as they pass behind the plume of Enceladus. This observation will give us vertical structure in the plume, and pin down collimation of gas in the jets.

Once the occultation is over, CIRS observes the surface of Enceladus as the moon recedes from Cassini. The observations begin when Enceladus is in eclipse, i.e., in Saturn's shadow, providing a particularly good opportunity for CIRS to investigate how different parts of Enceladus cool down during the eclipse and warm up again once sunlight returns. The flyby ends, and Cassini turns to Earth and downlinks data over Goldstone and Canberra DSN stations.

Dual playbacks

- A Dual Playback for High Value Science has been planned
- Based on DSN requests, SMT results indicate it will fit within this segment

Flyby	Driving Instrument	BEGHIVAL	ENDHIVAL	P4 Dual Playback	SSR-A empty after first playback?	Anything nonstandard?
E15	UVIS	E15 - 4 min 12 sec	E15 + 7 min 48 sec	79.3 Mb	Yes	First downlink empties SSR-A (playback SSR-A first), but not SSR-B

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:
  - No collaborative prime/rider coordination designs
  - Teams have validated custom handoffs and turn times
  - >3 hr observations near periapse: less than 6 degrees of motion
  - RBOT friendly waypoints used at all times
- Data Volume:
  - Dual playback. Strawman DSN timeline originally had the first pass as a 2 hour pass, so we expanded this pass to start earlier and allow us to playback all of SSR-A. SSR-A must be played back first.
  - Because of the extra pass, we have extra observations to take advantage of extra data volume. This segment can handle cuts to data volume during DSN negotiations.
  - After integration was completed, changes in DSN passes from MP created 20 Mb of carryover.
- DSN: No Level 3 requests; no stations requested during maintenance
- Opmodes: No unique opmodes
- Special Activities: dual playback
- Disposition of Resource Checker items:
  - Gap in Prime SPASS requests between ISS_155TI_M60R2CLD291_PRIME and ISS_155TI_CLOUD001_PRIME. Gap of 000T06:54:00 is greater than or equal to 60 seconds. OK
  - Request referencing GMB_E155_ENCELADUS_E15 occurs outside of corresponding Movable Block OK – we get this error when ending the custom period at the same time as starting dead time for the GMB.
  - Validate SSR parameters for Downlink Pass Requests – OK, Changed fields to playback SSR-A first (see dual playback page).

Sequence Liens:

- Dual playback! If data volume cuts are necessary in second playback, make sure RPWS cuts first since they got a lot of extra data volume at the end of integration.

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	WP goes bad for a few secs during custom period
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!	X
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.	X
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.	N/A
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	See notes page
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!!!!!**	None
30. Avoid requesting two overlapping stations (except for RSS science) whenever possible – use RSS station for downlink too	N/A
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)	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 your segment, ensure IVPGAP info correct, NO “start before” MAPS requests	N/A
39. 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
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