



CASSINI SOST SEGMENT

Rev 154 Handoff Package

Segment Boundary 2011-273T23:17:00 – 2011-276T23:02:00

21 March 2011

Nora Alonge

SMT report and SPASS

Science Highlights

Notes & Liens

Integration Checklist

SMT report

SOST 154 (E14)

https://cassini.jpl.nasa.gov/sp/icy/rev154/SOST_154_E14_110321.rpt
(no issues)

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 CPACTY (Mb)	MRGN (Mb)	OPNAV (Mb)	SCI (Mb)	ENGR (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGN (Mb)	NET_MARGN (Mb)	CAROVR (%)	CAROVR (Mb)	
SP_154EA_G70METNON275_PRIME	275 14:17	275 23:17	0	2770	182	2953	3322	369	0	214	53	3220	2754	-467	0	0%	466
SP_154EA_C70METNON275_PRIME	275 23:17	276 00:17	466	0	0	466	3322	2856	0	160	6	631	334	-298	0	0%	297
SP_154EA_G34HEFNON276_PRIME	276 14:02	276 23:02	297	518	58	873	3322	2449	0	214	53	1140	649	-492	0	0%	491

XD_154_155 agreed to 496 Mb carryover, but due to a late change to use ISS imaging instead of CIRS SI rider, we decreased the carryover a few bits.

.warning file message due to playing back SSR-A first on dual PB pass (OK):

"2011-275T14:17:00.000 SP_154EA_G70METNON275_PRIME Priority List conflicts with selected SSR. (SSR_B) Input:
"SSRAP4","SSRBP4","SSRNULL","SSRNULL","SSRNULL","SSRNULL",Expected:
"SSRBP5","SSRAP5","SSRBP4","SSRAP4","SSRNULL","SSRNULL","

SPASS

SOST 154 (E14)

https://cassini.jpl.nasa.gov/sp/icy/rev154/SPASS_SOST_154_E14_110316.pdf
https://cassini.jpl.nasa.gov/sp/icy/rev154/SPASS_SOST_154_E14_110316.xls
https://cassini.jpl.nasa.gov/sp/icy/rev154/SPASS_SOST_154_E14_110316.txt

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 E14 Segment		2011-273T23:17:00		002T23:45:00	2011-276T23:02:00			
SP 154DI WAYPTTURN273_PRIME		2011-273T23:17:00		000T00:45:00	2011-274T00:02:00	ISS_NAC to Dione	NEG_X to 12.4/66.9	
NEW WAYPOINT		2011-274T00:02:00		000T06:58:00	2011-274T07:00:00	ISS_NAC to Dione	NEG_X to 12.4/66.9	
ISS 154DI_WISPYMOV1001_PRIME	C, U, V	2011-274T00:02:00		000T06:18:00	2011-274T06:20:00	ISS_NAC to Dione	NEG_X to 12.4/66.9	
SP 154EN WAYPTTURN274_PRIME		2011-274T06:20:00		000T00:40:00	2011-274T07:00:00	ISS_NAC to Enceladus	NEG_X to 80.9/53.2	
NEW WAYPOINT		2011-274T07:00:00		000T13:55:00	2011-274T20:55:00	ISS_NAC to Enceladus	NEG_X to 80.9/53.2	
SP 154EN_DEADTIME274_PRIME		2011-274T07:00:00		000T00:15:00	2011-274T07:15:00	ISS_NAC to Enceladus	NEG_X to 80.9/53.2	
Begin Custom		2011-274T07:15:00	GMB_E154_ENCELADUS_E14-000T06:37:26	000T00:00:01	2011-274T07:15:01	ISS_NAC to Enceladus	NEG_X to 80.9/53.2	
ISS 154EN_PLMHPR001_PIE	C, M, U, V	2011-274T07:15:00	GMB_E154_ENCELADUS_E14-000T06:37:26	000T04:45:00	2011-274T12:00:00	ISS_NAC to Enceladus	NEG_X to NSP	Pick up at ISS_NAC to Enceladus, NEG_X to 80.9/53.2; Hand off at ISS_NAC to Enceladus, NEG_X to NSP, SOST PIE
INMS_154EN_ENCEL14001_PIE	C, M	2011-274T12:00:00	GMB_E154_ENCELADUS_E14-000T01:52:26	000T02:19:26	2011-274T14:19:26	NEG_X to SC_RAM	ISS_NAC to 39.3/83.38	Collaborative Rider(s): CIR5. Collaborative Rider(s): CIR5. Pick up at ISS_NAC to Enceladus, NEG_X to NSP; Hand off at NEG_X to SC_RAM, ISS_NAC to 39.3/83.38. Collaborative Rider(s): CIR5. The Handoff secondary for CIR5 should be NEG_X to NEP offset (0, -470 mrad, 0), but CIMS does...
Begin Dual Playback Science...		2011-274T13:37:26	GMB_E154_ENCELADUS_E14-000T00:15:00	000T00:00:01	2011-274T13:37:27			
154EN (t) E14_ENCELADUS in...		2011-274T13:52:26	GMB_E154_ENCELADUS_E14-000T00:15:00	000T00:00:01	2011-274T13:52:27			
End Dual Playback Science f...		2011-274T14:07:26	GMB_E154_ENCELADUS_E14-000T00:15:00	000T00:00:01	2011-274T14:07:27			
CIRS_154EN_FP1SECLX001_PIE	C, I, M, U, V	2011-274T14:19:26	GMB_E154_ENCELADUS_E14-000T00:27:00	000T03:40:34	2011-274T18:00:00	CIRS_FP1 to Enceladus (0.0,-26.929,0.0 deg. offset)	NEG_X to NEP	Pick up at NEG_X to SC_RAM, ISS_NAC to 39.3/83.38; Hand off at CIRS_FP1 to Enceladus (0.0,-26.929,0.0 deg. offset), NEG_X to NEP. Offset is (0,-470 mrad,0) converted to deg.
Periapse R = 3.250 Rs, lat ...		2011-274T16:52:54		000T00:00:01	2011-274T16:52:55			
ISS 154EN_ENCELADUS001_PRIME	C, U, V	2011-274T18:00:00	GMB_E154_ENCELADUS_E14-000T04:07:34	000T02:00:00	2011-274T20:00:00	ISS_NAC to Enceladus	NEG_X to 80.9/53.2	Pick up at CIRS_FP1 to Enceladus (0.0,-26.929,0.0 deg. offset), NEG_X to NEP; Hand off at ISS_NAC to Enceladus, NEG_X to 80.9/53.2.
End Custom		2011-274T20:00:00	GMB_E154_ENCELADUS_E14+000T06:07:34	000T00:00:01	2011-274T20:00:01	ISS_NAC to Enceladus	NEG_X to 80.9/53.2	
SP 154EN_DEADTIME474_PRIME		2011-274T20:00:00	GMB_E154_ENCELADUS_E14+000T06:07:34	000T00:15:00	2011-274T20:15:00	ISS_NAC to Enceladus	NEG_X to 80.9/53.2	
SP 154DI WAYPTTURN474_PRIME		2011-274T20:15:00		000T00:40:00	2011-274T20:55:00	ISS_NAC to Dione	POS_X to 223.4/-83.6	
NEW WAYPOINT		2011-274T20:55:00		000T15:52:00	2011-275T12:47:00	ISS_NAC to Dione	POS_X to 223.4/-83.6	
ISS 154DI_GLOCOL001_PRIME	C, M, U, V	2011-274T20:55:00		000T14:52:00	2011-275T11:47:00	ISS_NAC to Dione	POS_X to 223.4/-83.6	(1) Interrupt tracking every ~3 hrs for ~20 min. (2) Don't kill our data volume!!
SP 154EA_DLTURN275_PRIME		2011-275T11:47:00		000T01:00:00	2011-275T12:47:00	XBAND to Earth	POS_X to NSP	
NEW WAYPOINT		2011-275T12:47:00		000T23:45:00	2011-276T12:32:00	XBAND to Earth	POS_X to NSP	
SP 154EA_YBIAS275_PRIME	E	2011-275T12:47:00		000T01:30:00	2011-275T14:17:00	XBAND to Earth	POS_X to NSP	
SP 154EA_G70METNON275_PRIME	C, E, R	2011-275T14:17:00		000T09:00:00	2011-275T23:17:00	XBAND to Earth	Rolling	POS_X to NEP or NSP, CAPS
Pointer Reset in preparatio...		2011-275T23:17:00		000T00:00:01	2011-275T23:17:01			
SP 154EA_C70METNON275_PRIME	C, R	2011-275T23:17:00		000T01:00:00	2011-276T00:17:00	XBAND to Earth	Rolling	POS_X to NEP or NSP, CAPS
ISS 1540T_ENCEL4276_PRIME	C, V	2011-276T00:17:00		000T05:30:00	2011-276T05:47:00	ISS_NAC to Rocks (0.0,-10.0,0.0 deg. offset)	NEG_Z to Earth	No return to WP (ISS-internal hand-off)
ISS 1540T_TITANL4276_PRIME	V	2011-276T05:47:00		000T06:05:00	2011-276T11:52:00	ISS_NAC to Rocks (0.0,-10.0,0.0 deg. offset)	NEG_Z to Earth	Pick-up at Enceladus-L4 attitude (ISS-internal hand-off)
SP 154EA_DLTURN276_PRIME		2011-276T11:52:00		000T00:40:00	2011-276T12:32:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	MIMI pointing, rolling
NEW WAYPOINT		2011-276T12:32:00		000T10:30:00	2011-276T23:02:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
SP 154EA_YBIAS276_PRIME	E	2011-276T12:32:00		000T01:30:00	2011-276T14:02:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	NEG_Y to Saturn	
SP 154EA_G34HEFNON276_PRIME	C, E	2011-276T14:02:00		000T09:00:00	2011-276T23:02:00	XBAND to Earth (0.0,0.0,-9.5 deg. offset)	3 Hr Rolling	NEG_Y to Saturn (0.0,-9.5), MIMI

Overview: MAPS flyby with ORS drag at C/A (a lot of coordination here), also with SRU violations, so coordinated quiescent time. Otherwise, ISS inbound, CIRS and ISS outbound. ISS Dione on wings, with ISS Lagrangian search in caboose.

DOY 274 (of 2011):

We begin this busy flyby day with a long observation of Dione by ISS as all other ORS instruments ride along.

ISS then will observe Enceladus on the inbound approach in a coordinated effort to image both its surface and plume regions. CIRS, UVIS, and VIMS continue to ride-along. At closest-approach to Enceladus (99 km), INMS will have prime spacecraft control with a secondary axis orientation such that Enceladus' surface should drift through ORS instruments' fields of view.

Travelling outbound from this icy moon, CIRS takes control to observe Enceladus then hands off back to ISS.

To end this day, ISS then images Dione once again for nearly 15 hours with ORS riders also taking data.

DOY 275:

The ISS observation of Dione from DOY 274 continues before we finally turn Cassini to downlink the abundance of data through the Goldstone, California 70-meter Deep Space Network antenna. A redundant playback of the high-value data from +/- 15 minutes around Enceladus closest-approach will also occur over the Canberra, Australia DSN 70-meter.

DOY 276:

ISS will search for satellites around Enceladus' and Titan's L4 Lagrange points for several hours before Cassini turns back to Earth to downlink to Goldstone's High-Efficiency 34-meter DSN antenna.

* Note from Frank: Geometry of the plume crossings for E14, E17 and E18, is such that these three have nearly parallel ground tracks, running along Baghdad and about 10 km apart. Given the sampling rate for INMS, CAPS and CDA and the speed of the encounter, the three passes should give us a 10-20 km resolution "map" of the gas and dust above Baghdad. (Ok, measurements on a 3x10 point grid might not be exactly what you can call a map, but you get the idea.)

Dual playbacks

SOST 154 (E14)

- 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?
E14	INMS/ MAPS	E14-15 min	E14+15 min	133.9 Mb	Yes	Playback SSRAP4 before SSRBP4 on main post-flyby DL at 2011-275T14:17:00

A “standard” dual playback **except priority playback is set for SSRAP4 first to abide by XXM G&C, so will see this in SMT warnings and CIMS resource checker.**

No carryover coming in, single observation period, first downlink empties **SSR-A.**

Notes and Liens

SOST 154 (E14)

- Pointing:
 - All turns and WPs are good except for a flash warning (duration of seconds) at E14 C/A of VIMS and CIRS FR violation. However, this is a custom period with MAPS pointing control so won't be at WP at that time, so ok.
 - Collaborative prime/rider coordination designs – MAPS flyby with ORS drag at C/A (INMS_154EN_ENCEL14001_PIE) (much coordination here! INMS doing C/A design, including SID suspend quiescent time then 2-part turn to C/A attitude.)
 - Custom handoffs and turn times have been validated
 - RBOT friendly WPs used along with Earth-pointed WP for caboose period.
 - Potential SRU violation identified at 2011-274T12:26:00. INMS has agreed to include 10 min. SID suspend quiescent period at 2011-274, 12:00:00 - 12:10:00. CIRS has agreed to include a 20 min. un-suspend quiescent time starting 2011-274, 17:10:00 or earlier. (John Pearl had agreed to 15:40-16:00, if needed, but prefers to delay this later, as far as possible from C/A.) [Also, ISS found quiescent time at between 274, 10:25-10:38 to do the original suspend commands if INMS time doesn't work.]
- Data Volume:
 - Dual PB within segment. Playback SSR-A before SSR-B on main 9-hr post-flyby DL (see dual PB page). Carryover of 491 Mb to following XD_154_155 segment; approved by XD leads.
- DSN:
 - No DSN issues
- Opmodes:
 - Nothing unusual
- Hydrazine: N/A
- Special Activities:
 - None: No CMT management, no conjunction, no FSW loads, etc.

Sequence Liens:

- Keep an eye on implementation of E14 dual PB (play SSRA back first) (SPLAT added to CIMS)

Segment Checklist p1

SOST 154 (E14)

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 (note E14 C/A)
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 (min. is 5.5 hrs)
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 – except custom is 12.75 hrs but only involves 3 teams (was the simplest strategy)
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

SOST 154 (E14)

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	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 (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 – see notes page and dual PB page
24. Run the resource checker in CIMS and fix errors found. Remaining notes disposition here or on notes page: (1) at 275T14:17 = OK due to dual PB strategy, (2) INMS Survey items noted = OK, they like to use epochs for continuity, (1) at 274T20:00 = OK since ENDCUSTOM and END GMB occur at same time.	X - all OK
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 – XD accepts carryover
26. Examine SMT warnings report, include dispositions here or on notes page of any items	X – 1 warning (OK), SSRA first for dual PB
27. RSS boresight: one _SP pass, two _PRIME downlink passes, one hour observation block in SNER_3	n/a

Segment Checklist p3

SOST 154 (E14)

28. Examine “ap_downlink report check” output, include dispositions here or on notes page of any items (see next two items).	X (dual PB strategy noted)
29. List any DSN stations requested during maintenance periods, AND JUSTIFICATION. AVOID!!!!	n/a
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 -- Periapse
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 -- Periapse
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) ISS Dione at 274, 00:02: noted in SOST posted timeline. ISS Dione at 274, 20:55 noted in SPASS. Lagrange moon searches at 276, 00:17 and 05:47 are fairly quiescent. [Tilmann and T. Roatsch reminded about both on 3/21/11 by e-mail.]	1 noted in SPASS, 1 noted in official timeline
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 -- Almost, but not quite.
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