CASSINI 142SOST SEGMENT

Rev 142 Handoff Package

Segment Boundary 2010-354T00:23:00– 2010-356T02:23:00

03 Jun 2010

Nancy V: initial WP & DL strategy

Sarah M: Science timeline, segment clean-up, package

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_142EA_G34HEFNON355_PRIME	355 09:35	355 16:23	0	3165	158	3323	3319	-3	0	109	40	3467	639	-2829	132	3%	2828
SP_142EA_C70METNON355_PRIME	355 16:23	356 01:23	2828	0	0	2828	3319	491	0	383	53	3264	3157	-108	132	4%	107
SP_142EA_M70METNON356_PRIME	356 01:23	356 02:23	107	0	0	107	3319	3211	0	25	6	138	270	131	132	49%	0

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
Sequence S65, length = 54 days		2010-328T19:35:00		053T13:07:00	2011-017T08:42:00			
Enceladus Flyby E13 Segment		2010-354T00:23:00		002T02:00:00	2010-356T02:23:00			
SP_142TI_WAYPTTURN354_PRIME		2010-354T00:23:00		000T00:40:00	2010-354T01:03:00	ISS_NAC to Titan	POS_X to 227.8/-83.9	
NEW WAYPOINT		**2010-354T01:03:00**		**000T03:12:00**	**2010-354T04:15:00**	**ISS_NAC to Titan**	**POS_X to 227.8/-83.9**	
ISS_142TI_M60R1CLD354_PRIME	C, V	2010-354T01:03:00	E142_M60R1CLD354+000T00:00:00	000T02:00:00	2010-354T03:03:00	ISS_NAC to Titan	POS_X to 227.8/-83.9	
SP_142DI_WAYPTTURN354_PRIME		2010-354T03:40:00		000T00:35:00	2010-354T04:15:00	ISS_NAC to Dione	POS_X to 223.7/-83.5	
NEW WAYPOINT		**2010-354T04:15:00**		**000T11:00:00**	**2010-354T15:15:00**	**ISS_NAC to Dione**	**POS_X to 223.7/-83.5**	
VIMS_142DI_DIONE001_PRIME	C, I, U	2010-354T04:15:00		000T03:57:00	2010-354T08:12:00	ISS_NAC to Dione	POS_X to 223.7/-83.5	any rbot friendly secondary
VIMS_142DI_DIONE002_PRIME	C, U	2010-354T08:12:00		000T02:18:00	2010-354T10:30:00	ISS_NAC to Dione	POS_X to 223.7/-83.5	any rbot friendly secondary
CIRS_142DI_FP3NITE001_PRIME	U, V	2010-354T10:30:00		000T03:55:00	2010-354T14:25:00	ISS_NAC to Dione	POS_X to 223.7/-83.5	
ISS_142DI_REGMAP001_PRIME	C, V	2010-354T14:25:00		000T00:30:00	2010-354T14:55:00	ISS_NAC to Dione	POS_X to 223.7/-83.5	
SP_142EN_WAYPTTURN354_PRIME		2010-354T14:55:00		000T00:20:00	2010-354T15:15:00	ISS_NAC to Enceladus	POS_X to 185.1/-47.1	
NEW WAYPOINT		**2010-354T15:15:00**		**000T12:05:00**	**2010-355T03:20:00**	**ISS_NAC to Enceladus**	**POS_X to 185.1/-47.1**	
ISS_142EN_PLMHPHR001_PIE	C, U, V	2010-354T15:15:00		000T04:40:00	2010-354T19:55:00	ISS_NAC to Enceladus	NEG_X to NSP	SOST PIE
CIRS_142EN_NITEMAP001_PRIME	I, M, U, V	2010-354T19:55:00		000T00:40:00	2010-354T20:35:00	ISS_NAC to Enceladus	POS_X to 185.1/-47.1	
SP_142EN_DEADTIME354_PRIME	**M**	**2010-354T20:35:00**		**000T00:07:00**	**2010-354T20:42:00**	**NEG_Y to Enceladus**	**POS_X to 185.1/-47.1**	
VIMS_142SA_ALPORIOCC001_PIE	C, M	2010-354T20:42:00	GMB_E142_ENCELADUS_E13-000T04:26:26	000T02:03:00	2010-354T22:45:00	CIRS_FPB to 88.793/7.407	PIC	POS_Z to NSP is an acceptable secondary for CIRS.
Begin Custom		**2010-354T22:45:00**	**GMB_E142_ENCELADUS_E13-000T02:23:26**	**000T00:00:01**	**2010-354T22:45:01**	**ISS_NAC to Enceladus**	**POS_X to 185.1/-47.1**	
ISS_142EN_PLMHPHR002_PIE	C, M, U, V	2010-354T22:45:00	GMB_E142_ENCELADUS_E13-000T02:23:26	000T01:30:00	2010-355T00:15:00	ISS_NAC to Enceladus	NEG_X to NSP	Pick up at ISS_NAC to Enceladus, POS_X to 185.1/-47.1; Hand off at ISS_NAC to Enceladus, POS_X to 185.1/-47.1. SOST PIE
Periapse R = 3.578 Rs, lat ...		2010-354T22:49:02		000T00:00:01	2010-354T22:49:03			
INMS_142EN_ENCEL13001_PRIME	M, U	2010-355T00:15:00	GMB_E142_ENCELADUS_E13-000T00:53:26	000T01:58:40	2010-355T02:13:40	NEG_X to SC_RAM	POS_Y to COROT	Pick up at ISS_NAC to Enceladus, POS_X to 185.1/-47.1; Hand off at ISS_NAC to Enceladus, NEG_Z to 88.0/-25.6.
Begin Dual Playback Science...		2010-355T00:53:26	GMB_E142_ENCELADUS_E13-000T00:15:00	000T00:00:01	2010-355T00:53:27			
142EN (t) E13 ENCELADUS Ou...		2010-355T01:08:26		000T00:00:01	2010-355T01:08:27			
End Dual Playback Science f...		2010-355T01:23:26	GMB_E142_ENCELADUS_E13+000T00:15:00	000T00:00:01	2010-355T01:23:27			
ISS_142EN_ORSCA001_PIE	C, U, V	2010-355T02:13:40	GMB_E142_ENCELADUS_E13+000T01:05:14	000T01:01:20	2010-355T03:15:00	ISS_NAC to Enceladus	NEG_Z to 88.0/-25.6	Pick up at ISS_NAC to Enceladus, NEG_Z to 88.0/-25.6; Hand off at ISS_NAC to Enceladus, NEG_Z to 88.0/-25.6.
SP_142EN_WAYPTTURN355_PRIME		2010-355T03:15:00	GMB_E142_ENCELADUS_E13+000T02:06:34	000T00:05:00	2010-355T03:20:00	ISS_NAC to Enceladus	NEG_Z to 88.0/-25.6	Pick up at ISS_NAC to Enceladus, NEG_Z to 88.0/-25.6; Hand off at ISS_NAC to Enceladus, NEG_Z to 88.0/-25.6.
NEW WAYPOINT		**2010-355T03:20:00**		**000T04:45:00**	**2010-355T08:05:00**	**ISS_NAC to Enceladus**	**NEG_Z to 88.0/-25.6**	
End Custom		**2010-355T03:20:00**	**GMB_E142_ENCELADUS_E13+000T02:11:34**	**000T00:00:01**	**2010-355T03:20:01**	**ISS_NAC to Enceladus**	**NEG_Z to 88.0/-25.6**	
SP_142EN_DEADTIME355_PRIME		**2010-355T03:20:00**	**GMB_E142_ENCELADUS_E13+000T02:11:34**	**000T00:05:00**	**2010-355T03:25:00**	**NEG_Y to Enceladus**	**NEG_Z to 88.0/-25.6**	
VIMS_142EN_ENCEL001_PIE	C, I, U	2010-355T03:25:00		000T03:35:00	2010-355T07:00:00	ISS_NAC to Enceladus	NEG_Z to 88.0/-25.6	secondary not critical
SP_142EA_DLTURN355_PRIME		2010-355T07:00:00		000T00:34:00	2010-355T07:34:00	NEG_Y to Enceladus	POS_X to NEP	
SP_142EA_DLTURN455_PRIME		2010-355T07:34:00		000T00:31:00	2010-355T08:05:00	XBAND to Earth	POS_X to NEP	
NEW WAYPOINT		**2010-355T08:05:00**		**000T18:18:00**	**2010-356T02:23:00**	**XBAND to Earth**	**POS_X to NEP**	
SP_142EA_YBIAS355_PRIME	E	2010-355T08:05:00		000T01:30:00	2010-355T09:35:00	XBAND to Earth	POS_X to NEP	
SP_142EA_G34HEFNON355_PRIME	E	2010-355T09:35:00		000T06:48:00	2010-355T16:23:00	XBAND to Earth	POS_X to NEP	
Pointer Reset in preparatio...		2010-355T16:23:00		000T00:00:01	2010-355T16:23:01			
SP_142EA_C70METNON355_PRIME	C	2010-355T16:23:00		000T09:00:00	2010-356T01:23:00	XBAND to Earth	POS_X to NEP	POS_X to NEP or NSP, CAPS
SP_142EA_M70METNON356_PRIME	C	2010-356T01:23:00		000T01:00:00	2010-356T02:23:00	XBAND to Earth	Rolling	POS_X to NEP or NSP, CAPS

Science Highlights

Dec 20-22, 2010 (DOY 354-356)
These 3 days encompass the rev 142 SOST segment, which includes the 13th targeted flyby of Enceladus, along with observations of Titan and Dione.

DOY 354:
The segment begins with a Titan cloud monitoring campaign by ISS, CIRS, and VIMS. Cassini then turns to Dione for 6 hours of VIMS observations of the moon's surface composition, with CIRS, ISS and UVIS riding along. CIRS then takes over for nearly 4 hours of scans of the night side of Dione with additional observations by UVIS and VIMS. Finally, ISS observes the lit crescent of Dione.

The Enceladus flyby (E13) starts with ORS observations of the plumes at the south pole. VIMS follows this with an observation of the star alpha Ori as it is occulted by the Saturn atmosphere. ISS then continues to observe the plume with the other ORS instruments riding along.

DOY 355:
INMS takes over as Cassini passes over the moon's north pole with an altitude of 51 km at closest approach. The other MAPS instruments ride along to observe the particles and fields environments around Enceladus. ISS observes the Enceladus surface morphology after closest approach, followed by VIMS observations of Enceladus' surface composition, with the other ORS instruments riding along on both. Once the flyby is completed, Cassini turns to the Earth to downlink data over the DSN antennas at Goldstone, California, and Canberra, Australia.

DOY 356:
Cassini finishes downlinking over the 70-meter DSN antenna in Madrid, Spain.

Notes and Liens (1)

- Pointing:
  - The WP goes bad during the custom period. There is also a WP turn during a custom period.
    - WP1 is good going into custom period. It goes bad during the custom period. However, the final instrument team in the custom period hands off at the pointing for WP2, which is good at the end of the custom period.
  - Collaborative prime/rider coordination designs:
    - VIMS_142SA_ALPORIOCC001_PIE
    - INMS_142EN_ENCEL13001_PRIME
    - ISS_142EN_ORSCA001_PIE
  - Teams validated custom handoffs and turn times. The SOST checklist is here:
    - https://cassini.jpl.nasa.gov/sp/icy/rev142/SOST_142_E13_checklist_100601.xls
  - WP with RBOT friendly secondaries were used throughout, and all observation secondaries are the same as the WP, with the following exceptions:
    - VIMS OCC PIE (secondary is science-driven)
    - INMS at closest approach (secondary is science-driven plus no RBOT friendly secondary available)
    - 2 ISS Plume PIEs (using science-driven secondary but the design is flexible)
- Data Volume:
  - -3 Mb on SSR at end of observation period, but no carryover plus 131 Mb downlink margin at end of segment
  - Dual playback ± 15 minutes around closest approach
    - From 2010-355T00:53:26 (GMB_E142_ENCELADUS_E13-000T00:15:00)
    - To 2010-355T01:23:26 (GMB_E142_ENCELADUS_E13+000T00:15:00)

Notes and Liens (2)

- DSN:
  - No stations requested during maintenance, split pass OTMs, or Level 3 requests
- Opmodes:
  - No unique opmodes
- Special Activities:
  - WP turn during custom period

Sequence Liens:

- Disposition of resource checker notes:
  - SP_142NA_OBSERV354_NA does not match SP naming convention – new convention.
  - Gap in Prime SPASS requests btwn ISS_142TI_M60R1CLD534_PRIME and SP_142DI_WAYPTTURN354_PRIME – gap is correct
  - End of custom period references the GMB; this is OK
  - Waypoint change during a custom period is OK; discussed with SP manager. (This allows us to go into the custom period with an RBOT-friendly WP and come out of the custom period with an RBOT-friendly WP. No RBOT-friendly WP was good both before and after the custom period, let alone during.

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!	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 per CTV checks	X
13. The secondary axis for downlinks that contain prime and backup OTMs is the same, and inertially fixed	X
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)	X
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.	X
17. Multi-revolution turns about the X-axis have an offset greater than or equal to 30 degrees	X
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).	X
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]	X
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.	Used 7 and 5 min
22. Check your GMB, LMB, LUB, Occ times against current reference trajectory (Tour Atlas)	X
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	X
24. Run the resource checker in CIMS and fix errors found. Remaining notes disposition here or on notes page	X for dispositions 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!!!!!**	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.	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. Support images use _XXM or _XXM3 activity type	N/A
35. In CIMS check for “start before”, “end before”, “start after”, “end after” requests - fix if any problems found	X
36. 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
37. If sequence boundary at START of your segment, ensure IVPGAP info correct, NO “start before” MAPS requests	N/A
38. 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
39. 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
40. If conjunction is in your segment, see Conjunction page on SP Wiki	N/A
41. RAMAVOID: new waypoint, NOT in custom period	N/A
42. If on thrusters, confirm deadbands	N/A
43. Segment products linked to XXM deliveries page, & this package when you are done	X