Science Planning & Sequence Team
CASSINI

CASSINI TOST SEGMENT

T92 Handoff Package

Segment Boundary 2013-190T22:26:00 – 2013-194T05:41:00

13 December 2012

Kim Steadman

SMT report and SPASS

Science Highlights

Notes & Liens

T92 Master Timeline

194TI_T92	964					

Start Time	End Time	Prime Activity	Obs. Detail	Op Mode	TLM Mode	Comments
2013-190T22:26:00	2013-190T23:06:00	SP Turn to WP	NEG_Y to Titan, NEG_X to NEP	DFPW Normal	S_N_ER_3	Waypoint goes bad near c/a but ok due to custom period.
2013-190T23:06:00	C/A-14:00:47	OD Uncertainty Dead Time		DFPW Normal	S_N_ER_3	
C/A-14:00:47	-12:00	ISS	D2 extended (TC1a, TC1b, TN1a, TN2c)	DFPW Normal	S_N_ER_3	
-12:00	-09:00	CIRS	Reverse D2 (TN1c)	DFPW Normal	S_N_ER_3	VIMS rider
-09:00	-06:00	CIRS	R1 (TN1c or Tc1b, decided in implementation)	RADWU	S_N_ER_5a @-09:00 for 15 min then S_N_ER_3	RADAR Warm-up @ -09:00
begin custom period						
-06:00	-02:15	RADAR	L+R1 (TN2c)	RADRWA	S_N_ER_8	ISS, VIMS sleep
-02:15	-01:12	RADAR scatterometry/radiometry	TN2c, TN1a	RADRWA	S_N_ER_8	ISS, VIMS sleep
-01:12	-00:31	RADAR HiSAR	TC1a, TN1a, TN1b, TN2b	RADRCS	S_N_ER_8	
-00:31	-00:30	RWA to RCS Transition	TC1a, TN1a, TN1b, TN2b	RADRCS	S_N_ER_8	
-00:30	-00:18	RADAR Altimetry	TN2b	RADRCS	S_N_ER_8	
-00:18	0	RADAR SAR	TC1a, TN1a, TN1b, TN2b	RADRCS	S_N_ER_8	
2013-191T13:21:47		CLOSEST APPROACH	NEG_Z to Titan, NEG_X to RAM, INMS riding along at C/A (Tc2a)			T92L/T93L Priority pair for stereo/change on small lakes
0	+00:18	RADAR SAR	INMS ride along, TC1a, TN1a, TN1b, TN2b	RADRCS	S_N_ER_8	minor CIRS heating possible
+00:18	+00:30	RADAR Altimetry	TN2b	RADRCS	S_N_ER_8	may need to change secondary to avoid additional heating to CIRS
+00:30	+00:50	RADAR HiSAR	TC1a, TN1a, TN1b, TN2b	RADRCS	S_N_ER_8	
+00:50	+01:00	RADAR	TN2c, TN1a	RADRCS	S_N_ER_8	RADAR turn to ORS attitude
+01:00	+01:22	RCS to RWA Transition	On VIMS point at +01:00	DFPW Normal	S_N_ER_3	
+01:22	+02:15	VIMS	TC1a, TN2c	DFPW Normal	S_N_ER_3	
+02:15	+05:00	VIMS	Y, TN1c	DFPW Normal	S_N_ER_3	
+05:00	+09:00	VIMS	I, TC1a, TN2c	DFPW Normal	S_N_ER_3	ISS rider
end custom period						
+09:00	C/A+13:54:13	ISS	TC1a, TN1a, TN2c	DFPW Normal	S_N_ER_3	
C/A+13:54:13	2013-192T03:31:00	OD Uncertainty Dead Time		DFPW Normal		
2013-192T03:31:00	2013-192T04:11:00	SP Turn to Earth for downlink		DFPW Normal	S_N_ER_3	
2013-192T04:11:00	2013-192T13:11:00	Canberra 70M*		DFPW Normal	RTE_N_SPB	
2013-192T13:11:00	2013-192T15:11:00	Madrid 70M		DFPW Normal	RTE_N_SPB	Dual playback for RADAR, -00:18 to +00:18

Deadband: (0.5, 0.5, 2.0)
Walking Deadband: no
Dual Playback: -00:18 to +00:18

CIRS/VIMS consumable likely.

SMT report

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OPNAV TELEMETRY MODE REPORT
--------------------------------------------------------------------------
OPNAV REQUEST              START TIME      TELEMETRY MODE    OBSERVATION PERIOD
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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_194EA_C70METNON192_PRIME	192 04:11	192 13:11	0	3158	138	3295	3322	27	0	201	53	3549	3607	57	116 2%	0
SP_194EA_M70METNON192_PRIME	192 13:11	192 15:11	0	0	0	0	3322	3322	0	669	12	681	514	-168	58 2%	167
SP_194EA_G70METNON193_PRIME	193 20:41	194 00:41	167	1216	125	1508	3322	1815	0	87	24	1618	1464	-154	58 3%	154
SP_194EA_G34BWGNON193_PRIME	194 00:41	194 05:41	154	0	0	154	3322	3168	0	122	29	305	363	58	58 16%	0

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
Sequence S79, length = 68 days		2013-158T00:45:00		068T09:06:00	2013-226T09:51:00			
Titan Flyby T92 Segment		2013-190T22:26:00		003T07:15:00	2013-194T05:41:00			
SP_194TI_WAYPTTURN190_PRIME		2013-190T22:26:00		000T00:40:00	2013-190T23:06:00	NEG_Y to Titan	NEG_X to NEP	
NEW WAYPOINT		2013-190T23:06:00		001T05:05:00	2013-192T04:11:00	NEG_Y to Titan	NEG_X to NEP	
SP_194NA_DEADTIME190_PRIME		2013-190T23:06:00		000T00:14:59	2013-190T23:20:59	NEG_Y to Titan	NEG_X to NEP	
ISS_194TI_MONITORNA001_PRIME	C, V	2013-190T23:20:59	GMB_E194_TITAN_T92-000T	000T02:00:48	2013-191T01:21:47	ISS_NAC to Titan	NEG_X to Sun	
CIRS_194TI_FIRNADCMP001_PRIME	I, U, V	2013-191T01:21:47	GMB_E194_TITAN_T92-000T	000T03:00:00	2013-191T04:21:47	CIRS_FP1 to Titan	PIC	
CIRS_194TI_MIRLMBINT001_PRIME	I, V	2013-191T04:21:47	GMB_E194_TITAN_T92-000T	000T03:00:00	2013-191T07:21:47	CIRS_FPB to Titan	PIC	
Begin custom period		2013-191T07:21:47	GMB_E194_TITAN_T92-000T	000T00:00:01	2013-191T07:21:48			
RADAR_194TI_T92INRAD001_PRIME		2013-191T07:21:47	GMB_E194_TITAN_T92-000T	000T03:45:00	2013-191T11:06:47	NEG_Z to Titan	NEG_X to NTP	Pick up at NEG_Y to Titan, NEG_X to NEP; Hand off at NEG_Z to Titan, POS_Y to NTP. Use -X to NTP and +Y to NTP secondaries for two polarizations.
RADAR_194TI_T92INSCAT001_PRIME	M	2013-191T11:06:47	GMB_E194_TITAN_T92-000T	000T01:03:00	2013-191T12:09:47	NEG_Z to Titan	POS_Y to NTP	Pick up at NEG_Z to Titan, POS_Y to NTP; Hand off at NEG_Z to Titan, NEG_X to NTP.
RADAR_194TI_T92IHISAR001_PRIME	M	2013-191T12:09:47	GMB_E194_TITAN_T92-000T	000T00:41:00	2013-191T12:50:47	NEG_Z to Titan	NEG_X to NTP	Pick up at NEG_Z to Titan, NEG_X to NTP; Hand off at NEG_Z to Titan, NEG_X to NTP.
ENGR_194SC_RADRCS191_PRIME	M	2013-191T12:50:47	GMB_E194_TITAN_T92-000T	000T00:01:00	2013-191T12:51:47	NEG_Z to Titan	NEG_X to NTP	Pick up at NEG_Z to Titan, NEG_X to NTP; Hand off at NEG_Z to Titan, NEG_X to NTP. Deadband = (0.5,0.5,2) For RADAR
RADAR_194TI_T92INALT001_PRIME	M	2013-191T12:51:47	GMB_E194_TITAN_T92-000T	000T00:12:00	2013-191T13:03:47	NEG_Z to Titan	NEG_X to Titan_SC_R	Pick up at NEG_Z to Titan, NEG_X to NTP; Hand off at NEG_Z to Titan, NEG_X to Titan_SC_RAM.
Begin Dual Playback Science		2013-191T13:03:47	GMB_E194_TITAN_T92-000T	000T00:00:01	2013-191T13:03:48			
RADAR_194TI_T92INOSAR001_PRIME	M	2013-191T13:03:47	GMB_E194_TITAN_T92-000T	000T00:36:00	2013-191T13:39:47	NEG_Z to Titan	NEG_X to Titan_SC_R	Pick up at NEG_Z to Titan, NEG_X to Titan_SC_RAM; Hand off at NEG_Z to Titan, NEG_X to Titan_SC_RAM.
194TI (t) T92 TITAN Outbou...		2013-191T13:21:47		000T00:00:01	2013-191T13:21:48			
End Dual Playback Science		2013-191T13:39:47	GMB_E194_TITAN_T92+000T	000T00:00:01	2013-191T13:39:48			
RADAR_194TI_T92OUTALT001_PRIME	M	2013-191T13:39:47	GMB_E194_TITAN_T92+000T	000T00:12:00	2013-191T13:51:47	NEG_Z to Titan	NEG_X to NEP	Pick up at NEG_Z to Titan, NEG_X to Titan_SC_RAM; Hand off at NEG_Z to Titan, NEG_X to NEP.
RADAR_194TI_T92OHISAR001_PRIME	M	2013-191T13:51:47	GMB_E194_TITAN_T92+000T	000T00:30:00	2013-191T14:21:47	NEG_Z to Titan	NEG_X to NEP	Pick up at NEG_Z to Titan, NEG_X to NEP; Hand off at VIMS_IR to Titan, NEG_X to NEP.
ENGR_194SC_DFPWBIAS191_PPS	C, M, V	2013-191T14:21:47	GMB_E194_TITAN_T92+000T	000T00:21:09	2013-191T14:42:56	VIMS_IR to Titan	NEG_X to NEP	Pick up at VIMS_IR to Titan, NEG_X to NEP; Hand off at VIMS_IR to Titan, NEG_X to NEP. Deadband=(2,2,20)

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
VIMS_194TI_HIRES001_PRIME	C, I, M	2013-191T14:43:47	GMB_E194_TITAN_T92+000T	000T00:53:00	2013-191T15:36:47	VIMS_IR to Titan	NEG_X to NEP	Pick up at VIMS_IR to Titan, NEG_X to NEP; Hand off at VIMS_IR to Titan, NEG_X to NEP.
VIMS_194TI_REGMAP001_PRIME	C, I	2013-191T15:36:47	GMB_E194_TITAN_T92+000T	000T02:45:00	2013-191T18:21:47	VIMS_IR to Titan	NEG_X to NEP	Pick up at VIMS_IR to Titan, NEG_X to NEP; Hand off at VIMS_IR to Titan, NEG_X to NEP.
VIMS_194TI_MEDRES001_PRIME	C, I	2013-191T18:21:47	GMB_E194_TITAN_T92+000T	000T04:00:00	2013-191T22:21:47	VIMS_IR to Titan	NEG_X to NEP	Pick up at VIMS_IR to Titan, NEG_X to NEP; Hand off at NEG_Y to Titan, NEG_X to NEP.
End custom period		2013-191T22:21:47	GMB_E194_TITAN_T92+0001	000T00:00:01	2013-191T22:21:48			
ISS_194TI_MONITORNA002_PRIME	C, V	2013-191T22:21:47	GMB_E194_TITAN_T92+000T	000T04:54:12	2013-192T03:15:59	ISS_NAC to Titan	NEG_X to Sun	
SP_194NA_DEADTIME192_PRIME		2013-192T03:15:59	GMB_E194_TITAN_T92+0001	000T00:15:00	2013-192T03:30:59	NEG_Y to Titan	NEG_X to NEP	
SP_194EA_DLTURN192_PRIME		2013-192T03:31:00		000T00:40:00	2013-192T04:11:00	XBAND to Earth	NEG_Y to 114.0/-48.0	
NEW WAYPOINT		2013-192T04:11:00		000T11:40:00	2013-192T15:51:00	XBAND to Earth	NEG_Y to 114.0/-48.0	
SP_194EA_C70METNON192_PRIME	C	2013-192T04:11:00		000T09:00:00	2013-192T13:11:00	XBAND to Earth	Rolling	MIMI. NEG_Y to Saturn (0,0,-45). CIRS heating
Pointer Reset in preparatio...		2013-192T13:11:00		000T00:00:01	2013-192T13:11:01			
SP_194EA_M70METNON192_PRIME		2013-192T13:11:00		000T02:00:00	2013-192T15:11:00	XBAND to Earth	Rolling	-Y to Saturn (0,0,45) for MIMI
SP_194TI_WAYPTTURN192_PRIME		2013-192T15:11:00		000T00:40:00	2013-192T15:51:00	NEG_Y to Titan	NEG_X to 354.0/28.0	
NEW WAYPOINT		2013-192T15:51:00		001T03:20:00	2013-193T19:11:00	NEG_Y to Titan	NEG_X to 354.0/28.0	
ISS_194TI_CLOUD001_PRIME	V	2013-192T15:51:00		000T04:00:00	2013-192T19:51:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_194TI_CLOUD002_PRIME	V	2013-192T19:51:00		000T04:00:00	2013-192T23:51:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_194TI_CLOUD003_PRIME	V	2013-192T23:51:00		000T04:00:00	2013-193T03:51:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_194TI_CLOUD004_PRIME	V	2013-193T03:51:00		000T04:00:00	2013-193T07:51:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_194TI_CLOUD005_PRIME	V	2013-193T07:51:00		000T04:00:00	2013-193T11:51:00	ISS_NAC to Titan	NEG_X to Sun	
ISS_194TI_CLOUD006_PRIME	V	2013-193T11:51:00		000T03:40:00	2013-193T15:31:00	ISS_NAC to Titan	NEG_X to Sun	
RADAR_194TI_RADIOMCAL127_PRIME		2013-193T15:31:00		000T02:00:00	2013-193T17:31:00	NEG_Z to Titan	NEG_X to 354.0/28.0	
ISS_194TI_CLOUD007_PRIME	V	2013-193T17:31:00		000T01:00:00	2013-193T18:31:00	ISS_NAC to Titan	NEG_X to Sun	
SP_194EA_DLTURN193_PRIME		2013-193T18:31:00		000T00:40:00	2013-193T19:11:00	XBAND to Earth	NEG_Y to 114.0/-48.0	
NEW WAYPOINT		2013-193T19:11:00		000T10:30:00	2013-194T05:41:00	XBAND to Earth	NEG_Y to 114.0/-48.0	
SP_194EA_YGAP193_PRIME	E	2013-193T19:11:00		000T01:30:00	2013-193T20:41:00	XBAND to Earth	NEG_Y to 114.0/-48.0	
SP_194EA_G70METNON193_PRIME	C	2013-193T20:41:00		000T04:00:00	2013-194T00:41:00	XBAND to Earth	Rolling	MIMI. NEG_Y to Saturn (0,0,-45). CIRS heating
SP_194EA_G34BWGNON193_PRIME	C	2013-194T00:41:00		000T05:00:00	2013-194T05:41:00	XBAND to Earth	3_Hr_Rolling	MIMI. NEG_Y to Saturn (0,0,-45). SID suspend. CIRS heating

DOY 191:

Inbound, ISS will acquire a mosaic of high northern latitudes on Titan's leading hemisphere, approaching northern summer. This area of Titan's surface has not yet been well observed (multiple observations of high northern latitudes may be needed in case of cloud cover obscuring the surface). CIRS performs limb and nadir sounding to map stratospheric temperatures. While riding along with ISS and CIRS, VIMS will observe the North Pole area and willcontinue to monitor the evolution of the cloud system. The specular reflection geometry happens at (55.28,133.9N)-(55.45, 137.2W) during the period -9 to -6 hours before C/A.

RADAR will be prime around closest approach and will be doing SAR coverage of Small lakes seen in T18/19. SAR stereo with T91. Inbound and outbound scatterometry/radiometry, HiSAR and altimetry.

Outbound, ISS will acquire a mosaic of high southern latitudes, approaching southern winter. ISS will also ride along with CIRS' and VIMS' observations, inbound and outbound, to image Titan's surface and atmosphere. ISS will monitor Titan's high southern latitudes, approaching winter, to track clouds and the evolution thereof for an extra day after the Titan encounter.

DOY 191 continued:

T92 is another high inclination (990 km) low altitude flyby in the noon sector of Saturn's magnetosphere. With closest approach in the dayside, Cassini will be able to study the diffusion of the external magnetic field at low altitudes and low solar zenith angles. A comparison with flybys T83-T91 will be very useful. MIMI will measure energetic ion and electron energy input to atmosphere while 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.

DOY 192:

ISS outbound imaging with VIMS riding along. Playback of T92 data on the Canberra 70M followed by the second playback of the dual playback on the Madrid 70M.

ISS will monitor Titan's high southern latitudes, approaching winter, to track clouds and the evolution thereof for an extra day after the Titan encounter.
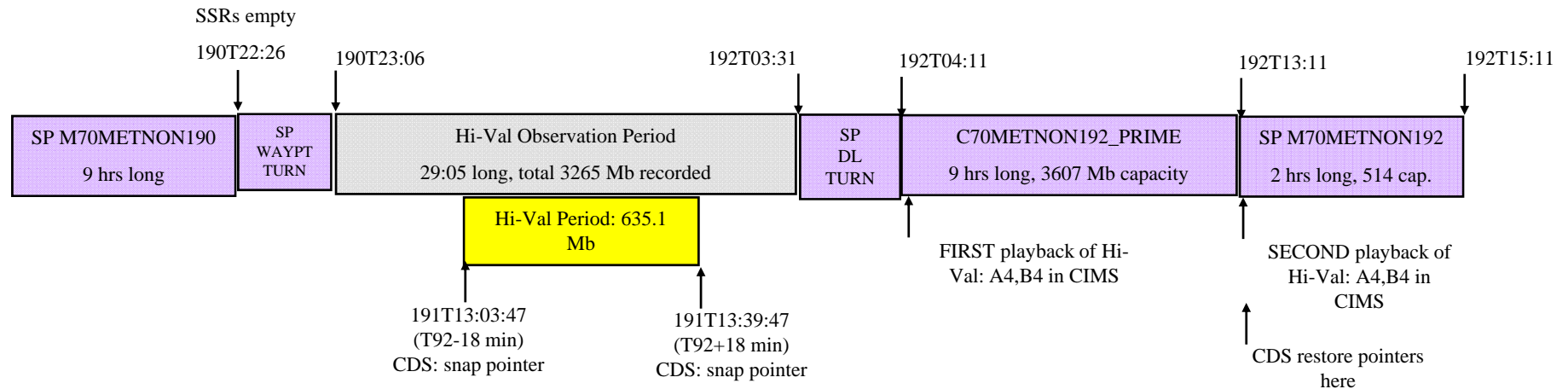
DOY 193:

ISS continues to monitor Titan's high southern latitudes, approaching winter, to track clouds and the evolution thereof for an extra day after the Titan encounter. RADAR radiometric calibration. Playback occurs over a Goldstone 70M handing over to a 34M

T92 Dual Playback

Flyby	BEGHIVAL	ENDHIVAL	P4 Dual Playback Data Volume	SSR empty before hi-val observation period? (if not verify any carryover on A fits with Hi-Val data)	SSR-A empty after first playback?	PPL set to A4,B4 for first AND second playbacks?	SSRs empty after second playback? (if not does any Hi-Val data carry over?)
T92	T92-18 min	T92+18 min	635.1 Mb	Yes	Yes	Yes	No, Yes 167 mb

Playbacks contiguous:

SSRs empty

190T22:26   190T23:06   192T03:31   192T04:11   192T13:11   192T15:11

| SP M70METNON190 9 hrs long | SP WAYPT TURN | Hi-Val Observation Period 29:05 long, total 3265 Mb recorded | SP DL TURN | C70METNON192_PRIME 9 hrs long, 3607 Mb capacity | SP M70METNON192 2 hrs long, 514 cap. |

Hi-Val Period: 635.1 Mb

FIRST playback of Hi-Val: A4,B4 in CIMS

SECOND playback of Hi-Val: A4,B4 in CIMS

191T13:03:47 (T92-18 min) CDS: snap pointer

191T13:39:47 (T92+18 min) CDS: snap pointer

CDS restore pointers here

Reminder - ALL instruments' data is played back twice during P4 dual playback periods

In addition to the P4 dual playback, SCO/AACS has asked for P6 playback for T92

Notes

- Pointing:
    - Waypoint no good between 191T12:45 to 13:29
- Data Volume:
    - SMT warnings both ok.
        - Found an activity whose data are NOT recorded in this telemetry mode "S_N_ER_3" commanded at 2013-191T04:36:47.000. Volume of 4.694976 Mb not given data policing space.
        - Found an activity whose data are NOT recorded in this telemetry mode "S_N_ER_3" commanded at 2013-193T11:51:00.000. Volume of 6.356275 Mb not given data policing space.
- DSN:
    - M70 on DOY 192 is used for dual playback and overlaps weekly maintenance.
- Resource checker:
    - Two Telemetry Mode changes during an ISS observation for RADAR. Both are ok with ISS.
    - First_Part value of SSRAP4 does not match default of SSRBP4. It's set this way on three passes for the dual playback so it's as intended.
- Opmodes:
    - None
- Hydrazine:
    - AACS ran T92 through KPT and their estimate is 496g plus transitions. The TOST estimate is 441g.
    - The deadband is 0.5, 0.5, 2 for RADAR

- Special Activities:
    - None

Notes/Liens

- M70 overlaps maintenance.

- There is a dual playback so DSN negotiations will need to be watched to make sure the dual playback still works.

- CIRS and VIMS heating at the consumable level.