TOST: 030TI (T19) Handoff Package

Segment: 2006-281T19:24 – 2006-283T19:00

Titan C/A: 2006-282T17:23:24, Altitude = 950 km

Epoch: GMB_E030_Titan19

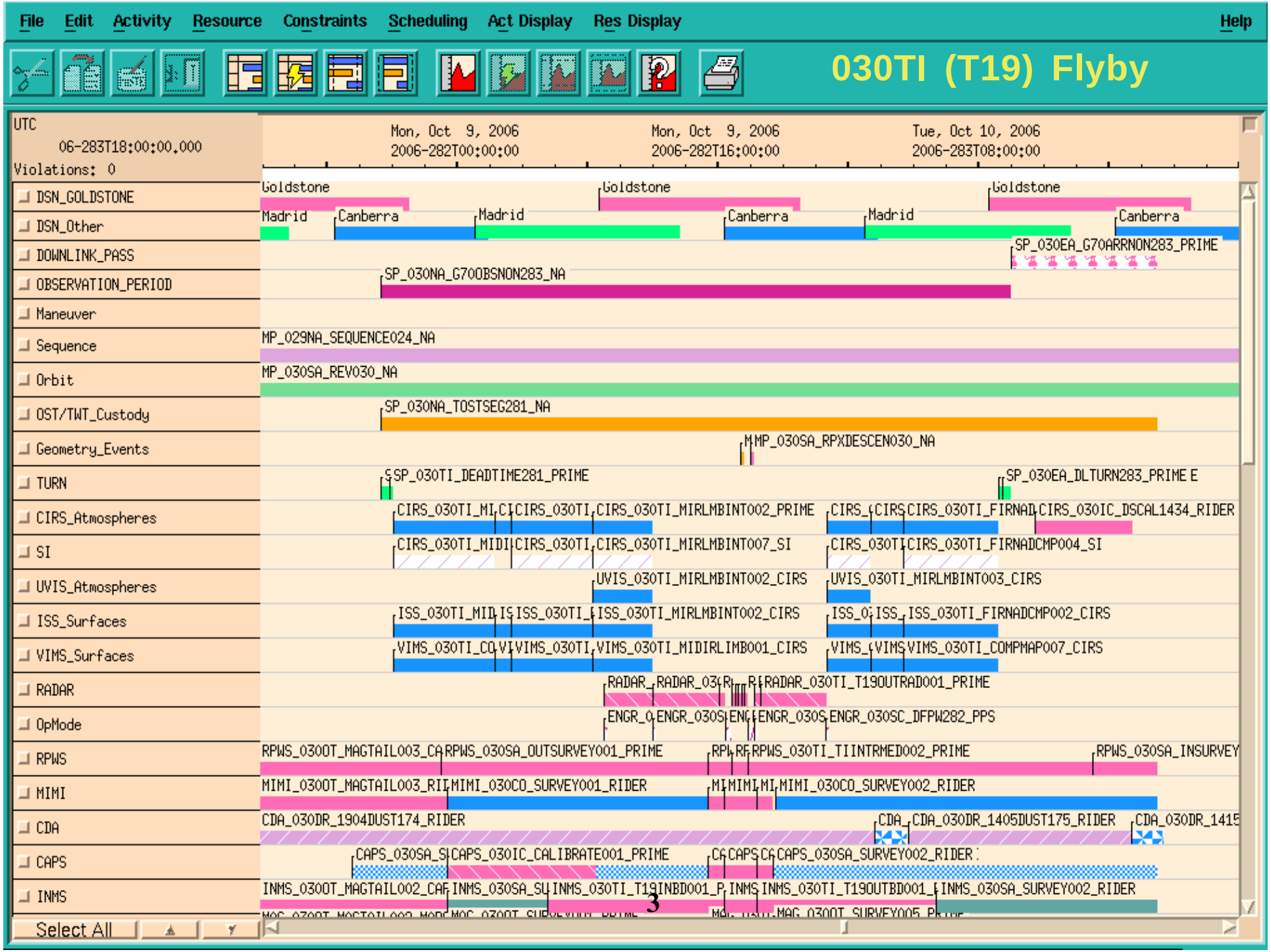
April 30, 2003

Scott Bolton, Candy Hansen, Dave Mohr, Trina Ray and Jerod Gross

030TI(T19) Timeline

C/A= 2006-282T17:23:24 @ 950 km

Start Time	End Time	Prime Activity	Obs. Detail	Op Mode	TLM Mode	Comments
281T19:24	281T19:54	SP Turn to waypoint		DFPW Normal	S_N_ER_3	
281T19:54	281T20:09	OD Uncertainty Dead Time		DFPW Normal	S_N_ER_3	
-21:14	-15:00	CIRS		DFPW Normal	S_N_ER_3	
-15:00	-14:00	ISS		DFPW Normal	S_N_ER_3	
-14:00	-09:00	CIRS	Long integration w/FP1	DFPW Normal	S_N_ER_3	
-09:00	-05:20	CIRS	Mid-IR limb integration	DFPW Normal / RAD_WU	S_N_ER_3	RADAR_WU and S_N_ER_5a at -08:20
-05:20	-01:15	RADAR Radiometry	Inbound	RADRWA	S_N_ER_8	Includes 20 min. for turn from waypoint
-01:15	-00:52	RADAR Scatterometry	Inbound	RADRWA	S_N_ER_8	
-00:52	-00:30	RWA to RCS transition		RADRCS		
-00:30	-00:15	RADAR Altimetry	Inbound	RADRCS	S_N_ER_8	
-00:15	-00:07	RADAR Low-Res SAR	Inbound	RADRCS	S_N_ER_8	
-00:07	+00:07	RADAR High-Res SAR	C/A	RADRCS	S_N_ER_8	
+00:07	+00:15	RADAR Low-Res SAR	Outbound	RADRCS	S_N_ER_8	
+00:15	+00:30	RADAR Altimetry	Outbound	RADRCS	S_N_ER_8	
+00:30	+00:54	RCS to RWA transition		RADRWA		
+00:54	+01:15	RADAR Scatterometry	Outbound	RADRWA	S_N_ER_8	
+01:15	+05:20	RADAR Radiometry		RADRWA	S_N_ER_8	Includes 20 min. for turn to waypoint
+05:20	+08:00	CIRS		DFPW Normal	S_N_ER_3	
+08:00	+10:00	ISS	Global Map	DFPW Normal	S_N_ER_3	
+10:00	+15:51	CIRS	Long integration w/FP1	DFPW Normal	S_N_ER_3	
283T09:15	283T09:30	OD Uncertainty Dead Time		DFPW Normal	S_N_ER_3	
283T09:30	283T10:00	SP Turn to Earth for downlink		DFPW Normal	S_N_ER_3	
283T10:00	283T19:00	Downlink over Goldstone		DFPW Normal	RTE_N_SPB	


File Edit Activity Resource Constraints Scheduling Act Display Res Display Help
030TI (T19) Flyby
UTC
06-283T18:00:00.000
Violations: 0
Mon, Oct 9, 2006
2006-282T00:00:00
Mon, Oct 9, 2006
2006-282T16:00:00
Tue, Oct 10, 2006
2006-283T08:00:00
DSN_GOLDSTONE
DSN_Other
DOWNLINK_PASS
OBSERVATION_PERIOD
Maneuver
Sequence
Orbit
OST/TWT_Custody
Geometry_Events
TURN
CIRS_Atmospheres
SI
UVIS_Atmospheres
ISS_Surfaces
VIMS_Surfaces
RADAR
OpMode
RPWS
MIMI
CDA
CAPS
INMS
Goldstone
Madrid
Canberra
SP_030EA_G70ARRNON283_PRIME
SP_030NA_G700BSNON283_NA
MP_029NA_SEQUENCE024_NA
MP_030SA_REV030_NA
SP_030NA_TOSTSEG281_NA
MP_030SA_RPXDESCEN030_NA
SP_030TI_DEADTIME281_PRIME
SP_030EA_DLTURN283_PRIME
CIRS_030TI_MIRLMBINT002_PRIME
CIRS_030TI_FIRNADCMP004_SI
CIRS_030IC_DSCAL1434_RIDER
CIRS_030TI_MIRLMBINT007_SI
UVIS_030TI_MIRLMBINT002_CIRS
UVIS_030TI_MIRLMBINT003_CIRS
ISS_030TI_MIRLMBINT002_CIRS
ISS_030TI_FIRNADCMP002_CIRS
VIMS_030TI_MIDIRLIMB001_CIRS
VIMS_030TI_COMPMAP007_CIRS
RADAR_030TI_T19OUTRAD001_PRIME
ENGR_030SC_DFPW282_PPS
RPWS_030OT_MAGTAIL003_CA
RPWS_030SA_OUTSURVEY001_PRIME
RPWS_030TI_TIINTRMED002_PRIME
RPWS_030SA_INSURVEY
MIMI_030OT_MAGTAIL003_RI
MIMI_030CO_SURVEY001_RIDER
MIMI_030CO_SURVEY002_RIDER
CDA_030DR_1904DUST174_RIDER
CDA_030DR_1405DUST175_RIDER
CDA_030DR_1415
CAPS_030IC_CALIBRATE001_PRIME
CAPS_030SA_SURVEY002_RIDER
INMS_030OT_MAGTAIL002_CA
INMS_030SA_SU
INMS_030TI_T19INBD001_P
INMS_030TI_T19OUTBD001_
INMS_030SA_SURVEY002_RIDER
Select All
3

030TI (T19) Attitude Strategy

Request	Riders	Start(SCET)	Start(Epoch)	Duration	End(SCET)	Primary Pointing	Secondary Pointing	Comments
Sequence S024, length = 26 ...		2006-263T20:22:00		031T22:04:00	2006-295T18:26:00			
TOST rev 30 Segment		**2006-281T19:24:00**		**001T23:36:00**	**2006-283T19:00:00**			
SP_030TI_WAYPTTURN281_PRIME	M	2006-281T19:24:00		000T00:30:00	2006-281T19:54:00	ISS_NAC to Titan	NEG_X to Sun	SP Turn to Waypoint
NEW WAYPOINT		**2006-281T19:54:00**		**001T23:06:00**	**2006-283T19:00:00**	**ISS_NAC to Titan**	**NEG_X to Sun**	
SP_030TI_DEADTIME281_PRIME	**M**	**2006-281T19:54:00**		**000T00:15:00**	**2006-281T20:09:00**	**ISS_NAC to Titan**	**NEG_X to Sun**	
CIRS_030TI_MIDIRTMAP006_PRIME	C, I, M, V	2006-281T20:09:24	GMB_E030_Titan19-000T21:14:00	000T06:14:00	2006-282T02:23:24	CIRS_FPB to Titan	POS_X to North_Pole_Dir	
ISS_030TI_NIGHTNAC001_PRIME	C, M, V	2006-282T02:23:24	GMB_E030_Titan19-000T15:00:00	000T01:00:00	2006-282T03:23:24	ISS_NAC to Titan	NEG_X to Sun	
CIRS_030TI_FIRNADCMP003_PRIME	C, I, M, V	2006-282T03:23:24	GMB_E030_Titan19-000T14:00:00	000T05:00:00	2006-282T08:23:24	CIRS_FP1 to Titan	PIC	
CIRS_030TI_MIRLMBINT002_PRIME	C, I, M, R, U, V	2006-282T08:23:24	GMB_E030_Titan19-000T09:00:00	000T03:40:00	2006-282T12:03:24	CIRS_FPB to Titan	PIC	
RADAR_030TI_T19INRAD001_PRIME	M	2006-282T12:03:24	GMB_E030_Titan19-000T05:20:00	000T04:05:00	2006-282T16:08:24	NEG_Z to Titan	POS_X to North_Pole_Dir	
RADAR_030TI_T19INSCAT001_PRIME	M	2006-282T16:08:24	GMB_E030_Titan19-000T01:15:00	000T00:23:00	2006-282T16:31:24	NEG_Z to Titan	NEG_Y to North_Pole_Dir	
ENGR_030SC_RADRCS282_PPS	M	2006-282T16:31:24	GMB_E030_Titan19-000T00:52:00	000T00:21:13	2006-282T16:52:37	NEG_Z to Titan	NEG_Y to North_Pole_Dir	Deadband = (2,2,20)
RADAR_030TI_T19INALT001_PRIME	M	2006-282T16:53:24	GMB_E030_Titan19-000T00:30:00	000T00:15:00	2006-282T17:08:24	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
RADAR_030TI_T19INLRES001_PRIME	M	2006-282T17:08:24	GMB_E030_Titan19-000T00:15:00	000T00:08:00	2006-282T17:16:24	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
RADAR_030TI_T19HISAR001_PRIME	M	2006-282T17:16:24	GMB_E030_Titan19-000T00:07:00	000T00:14:00	2006-282T17:30:24	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
RADAR_030TI_T19OTLRES001_PRIME	M	2006-282T17:30:24	GMB_E030_Titan19+000T00:07:00	000T00:08:00	2006-282T17:38:24	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
RADAR_030TI_T19OTALT001_PRIME	M	2006-282T17:38:24	GMB_E030_Titan19+000T00:15:00	000T00:15:00	2006-282T17:53:24	NEG_Z to Titan	POS_X to North_Pole_Dir	
ENGR_030SC_RADWUBIAS282_PPS	M	2006-282T17:53:24	GMB_E030_Titan19+000T00:30:00	000T00:22:38	2006-282T18:16:02	NEG_Z to Titan	POS_X to North_Pole_Dir	
RADAR_030TI_T19OTSCAT001_PRIME	M	2006-282T18:17:24	GMB_E030_Titan19+000T00:54:00	000T00:21:00	2006-282T18:38:24	NEG_Z to Titan	POS_X to North_Pole_Dir	
RADAR_030TI_T19OUTRAD001_PRIME	M	2006-282T18:38:24	GMB_E030_Titan19+000T01:15:00	000T04:05:00	2006-282T22:43:24	NEG_Z to Titan	POS_X to North_Pole_Dir	
CIRS_030TI_MIRLMBINT003_PRIME	C, I, U, V	2006-282T22:43:24	GMB_E030_Titan19+000T05:20:00	000T02:40:00	2006-283T01:23:24	CIRS_FPB to Titan	PIC	
ISS_030TI_MONITORNA001_PRIME	C, V	2006-283T01:23:24	GMB_E030_Titan19+000T08:00:00	000T02:00:00	2006-283T03:23:24	ISS_NAC to Titan	NEG_X to Sun	
CIRS_030TI_FIRNADCMP002_PRIME	C, I, V	2006-283T03:23:24	GMB_E030_Titan19+000T10:00:00	000T05:51:00	2006-283T09:14:24	CIRS_FP1 to Titan	PIC	
SP_030TI_DEADTIME283_PRIME		**2006-283T09:15:00**		**000T00:15:00**	**2006-283T09:30:00**	**ISS_NAC to Titan**	**NEG_X to Sun**	
SP_030EA_DLTURN283_PRIME		2006-283T09:30:00		000T00:30:00	2006-283T10:00:00	XBAND to Earth	NEG_X to NEP	SP Turn to Earth
SP_030EA_G70ARRNON283_PRIME	C	2006-283T10:00:00		000T09:00:00	2006-283T19:00:00	XBAND to Earth	Rolling	

030TI(T19) Telem Modes

TELEMETRY MODE REPORT

SCET	TELEMETRY MODE	REQUEST
2006-281T11:54:00	S_N_ER_3	SP_030NA_G70OBSNON283_NA
2006-282T09:03:24	S_N_ER_5A	SP_030NA_G70OBSNON283_NA
2006-282T12:03:24	S_N_ER_8	SP_030NA_G70OBSNON283_NA
2006-282T22:43:24	S_N_ER_3	SP_030NA_G70OBSNON283_NA
2006-283T10:00:00	RTE_N_SPB_124425	SP_030EA_G70ARRNON283_PRIME
2006-283T10:39:00	RTE_N_SPB_142200	SP_030EA_G70ARRNON283_PRIME
2006-283T18:54:00	RTE_N_SPB_124425	SP_030EA_G70ARRNON283_PRIME

030TI(T19) SMT Results

DATA VOLUME SUMMARY

			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)	MARGIN (Mb)	MARGIN (%)	OPNAV (Mb)	SCI (Mb)	ENGR (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGIN (Mb)	CAROVR (%)	CAROVR (Mb)	
SP_030EA_G70ARRNON283_PRIME	283 10:00	283 19:00	0	3133	130	3263	3569	305	9%	0	218	53	3534	3862	328	8%	0	

DATA VOLUME REPORT

Event	Start doy hh:mm	End doy hh:mm	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)	ENGR (Mb)	TOTAL (Mb)
OBSERVATION_NOR	281 19:24	283 10:00	456.7	24.6	335.5	22.0	440.0	123.1	153.9	781.7	475.0	91.8	199.0	0.0	0.0	3103.3
OBSERVATION_SI	281 19:24	283 10:00	0.0	0.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0
SP_030EA_G70ARRNON283_PRIME	283 10:00	283 19:00	32.4	6.5	86.4	1.6	0.0	19.4	29.2	0.0	42.4	0.0	0.0	0.0	0.0	217.9

AVERAGE DATA RATE REPORT (calculated over observation periods and downlink passes)

Event	Start doy hh:mm	End doy hh:mm	CAPS (bps)	CDA (bps)	INMS (bps)	MAG (bps)	MIMI (bps)	RPWS (bps)	UVIS (bps)
SP_030NA_G70OBSNON283_NA	281 19:24	283 10:00	3286.3	177.3	158.5	885.8	1107.7	3418.0	660.5
SP_030EA_G70ARRNON283_PRIME	283 10:00	283 19:00	1000.0	199.3	50.0	600.0	900.0	1310.0	0.0

030TI (T19) DSN Requests

CASSINI DSN COVERAGE SUMMARY for 030TI_T19_030430.apf generated on 2003-Apr-30 12:04:19

(+ = pass overlaps with previous pass; * = in conflict with DSN weekly maintenance)

C	ANT	ID	BOT_TO_EOT ERT	DUR hh:mm	XMT_AT ERT	2WAY_PERIOD ERT	DUR hh:mm	DL_PERIOD ERT	DL_PERIOD SCET	DUR hh:mm	NOT	CALS min	RADIO_CONFG UD	D	UD	MAR	DATA_RATES kbps
G	70ARR	25	283T11:20-20:25	09:05	283T11:30	14:12-20:21	06:09	283T11:21-20:21	283T10:00-19:00	09:00	---	15/15	XX	-	--	--0	124,142,124
+G	70ARR	14	283T11:20-20:25	09:05	283T11:30	14:12-20:21	06:09	283T11:21-20:21	283T10:00-19:00	09:00	---	15/15	XX	-	--	--0	124,142,124

030TI (T19) OpMode Strategy

Start Time	End Time	Request
2006-282T09:03:24e	2006-282T09:03:33	ENGR_030SC_RADWU282_PPS
2006-282T12:03:24e	2006-282T12:04:08	ENGR_030SC_RADRWA282_PPS
2006-282T16:31:24e	2006-282T16:52:37	ENGR_030SC_RADRCS282_PPS
2006-282T17:53:24e	2006-282T18:16:02	ENGR_030SC_RADWUBIAS282_PPS
2006-282T18:16:24e	2006-282T18:17:08	ENGR_030SC_RADRWA283_PPS
2006-282T22:37:49e	2006-282T22:43:24	ENGR_030SC_DFPW282_PPS

030TI (T19) Comments & Issues

- **Pointing**
  - Waypoint attitude is FR-safe throughout segment
  - Turns between Earth and waypoint are FR-safe and have enough time allocated to them
  - Initial downlink attitude is FR-safe
- **Data Volume**
  - No issues. P4 has 9% margin. DSN pass has 8% margin.
- **CIMS Issues**
  - None. All expected requests are in delivery.
- **Power Issues**
  - None. All OpMode transitions are in CIMS.
- **Flight Rule / MP Guidelines & Constraints**
  - T19 is 950 km flyby. Transition to RCS is complete at inbound altitude of 8286 km. Transition to RWA begins at outbound altitude of 8286 km.

030TI (T19) Comments & Issues (cont.)

- **Segment End Time**
  - The original segment end time was 283T18:00. However, to improve DSN performance, the end time was slipped to 283T19:00. This required a re-delivery of the Saturn Rev 30 segment, which follows TOST. The first request in the Saturn Rev 30 segment is CIRS_030TI_COMPMAP007_PRIME. This made the decision to move the segment boundary simply a Titan science decision, and CIRS willingly agreed to cut the COMPMAP short to accommodate the change. J. Gross was the SPE responsible for both T19 and Saturn Rev 30 segments and coordinated the change.
- **Hydrazine Usage**
  - Still an open issue at the time the segment was delivered.
  - We've tried to minimize the amount of time on RCS (only c/a +/- 30 min.), but the amount of hydrazine used for RADAR altimetry & SAR designs is still TBD.

TWT/OST Integration Constraint and Guideline Checklist

Below are Target Working Team (TWT) and Orbiter Science Team (OST) constraints that must be followed during segment implementation. Any exceptions to constraint numbers 3, 4, 6, or 7 must be approved by the Science Planning Manager.

Constraint	C=Comply V=Violate N/A=Not Applicable	Comments	Disposition
1. A. SP has checked all waypoints turns to and from waypoints.	C		
B. All initial downlink attitudes have been checked as waypoints.	C		
2. All turns to and from waypoints checked for violations and margins. ☐CAPS ☐CDA ☐CIRS ☐INMS ☐ISS ☐MIMI ☐MAG ☐NAV ☒RADAR ☐RPWS ☐RSS ☐UVIS ☐VIMS Each Prime Instrument agrees to accept a reduction in observation time during implementation if problems arise.	C	SP also checked SP turns; no problems found	
3. Custom handoffs limited to:			
A. ±3 hours from targeted Icy Satellite flyby			
B. ± 3 hours from targeted Titan Flyby	C		
C. O pNavs preceding/following a downlink			
4. Minimum 30. min SPASS Prime request duration outside ±5 min. from targeted satellite flyby (5 min. integer duration if >30 min.)	C		
5. Live and Ground Movable Blocks include appropriate time margins.	C	K. Klaasen's margin for flyby is min. according to memo dated .	
6. Waypoints changes are ≤3 per day	C		
A. All turns that accomplish the waypoint strategy are requested by SP or OpNav.	C		
7. Live Movable Blocks limited to the following orbits: 7, 8, 9, 10, 12, 28, 51, 56, 57, 60, 63, 64	N/A		

Guideline	Yes / No	Comments
1. Were repeatable/reusable templates used where possible?	Yes	
2. During Pre-Integration: Was 30 min. used for 90º RWA turns and/or 10 min. for RCS turns?	Yes	

(DOUBLE-CLICK TO MAKE CHANGES)