

# **TOST: Handoff Package for 037TI (T23)**

**Segment: 2007-012T13:34 – 2007-014T13:34**  
**Titan C/A: 2007-013T08:34:00, Altitude = 950 km**  
**Epoch: GMB\_E037\_Titan23**

**May 14, 2003**

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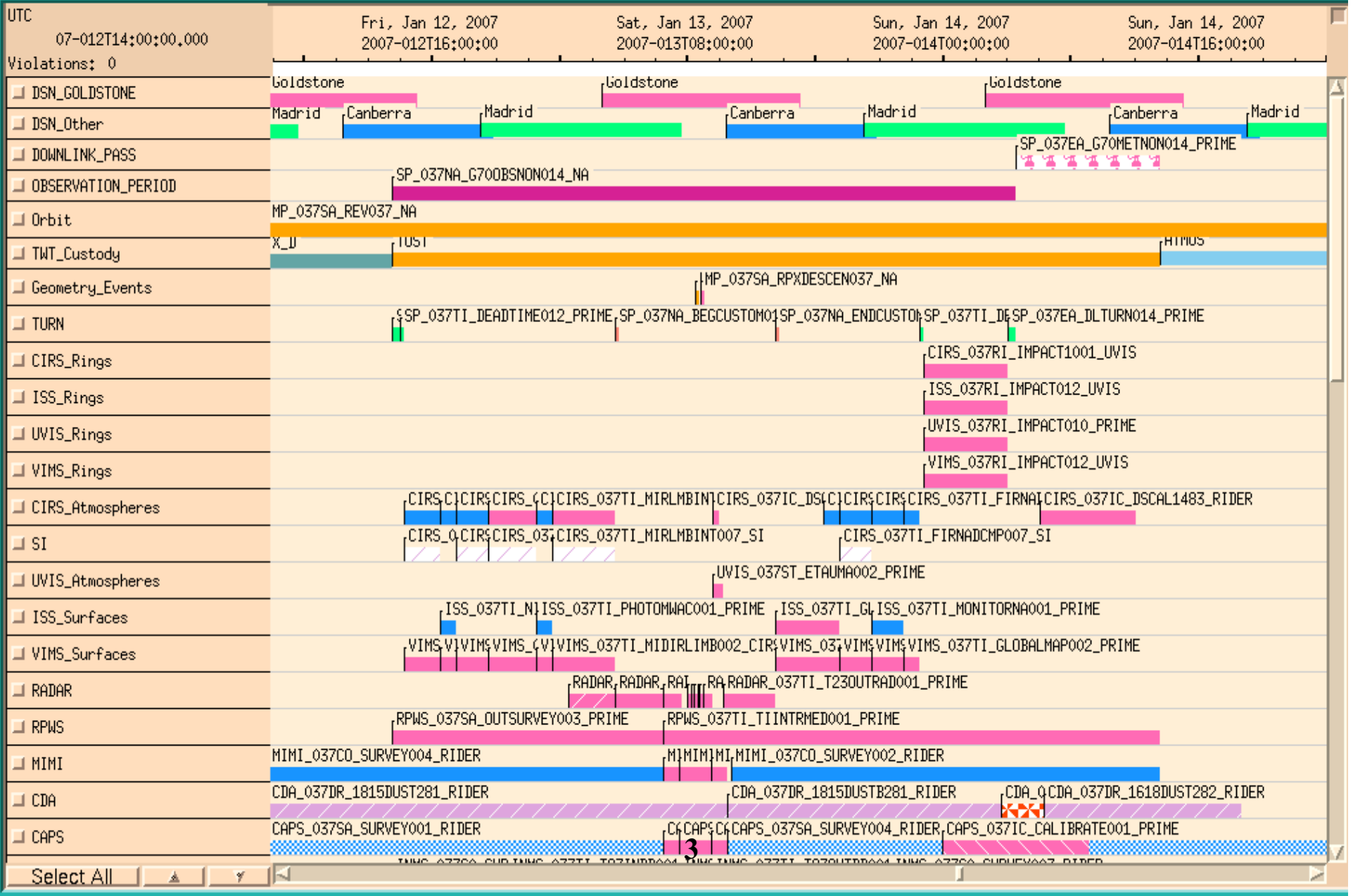
# 037TI(T23) Timeline

C/A= 2007-013T08:34:00 @ 950 km

Start Time	End Time	Prime Activity	Obs. Detail	Op Mode	TLM Mode	Comments
012T13:34	012T14:04	SP Turn to waypoint	-Y to Titan, -X to Sun	DFPW Normal	S_N_ER_3	
012T14:04	012T14:19	OD Uncertainty Dead Time		DFPW Normal	S_N_ER_3	
-18:15	-16:00	CIRS	Mid-IR Temp Map	DFPW Normal	S_N_ER_3	Template M (truncated)
-16:00	-15:00	ISS		DFPW Normal	S_N_ER_3	Template M
-15:00	-13:00	CIRS		DFPW Normal	S_N_ER_3	Template M
-13:00	-10:00	CIRS	FP1	DFPW Normal	S_N_ER_3	Template N
-10:00	-09:00	ISS	Photometry	DFPW Normal	S_N_ER_3	Template N
-09:00	-05:00	CIRS	Mid-IR Limb	DFPW Normal / RADWU	S_N_ER_3, S_N_ER_5a	Template R; RADWU & S_N_ER_5a at -08:00
-05:00		Begin Custom Period				
-05:00	-01:15	RADAR Radiometry	Inbound	RADROWA	S_N_ER_8	Template S
-01:15	-00:52	RADAR Scatterometry	Inbound	RADROWA	S_N_ER_8	
-00:52	-00:30	RWA to RCS transition	Inbound	RADRCS		(Deadband = 2,2,20)
-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	RADAR Scatterometry	Outbound	RADRCS	S_N_ER_8	
+00:54	+01:04	RADAR turn to UVIS occ		RADRCS	S_N_ER_8	-Y to 206.8850/49.313, -Z to NTP
+01:04	+01:28	RCS to RWA transition		RADROWA		Transition at start of occ
+01:04	+01:41	UVIS Occ of Eta Uma		RADRCS	S_N_ER_3	RCS to RWA transition during observation
+01:41	+02:00	RADAR turn to radiometry		RADRCS	S_N_ER_8	
+02:00	+05:00	RADAR Radiometry	Outbound	RADROWA	S_N_ER_8	End at ORS waypoint; Template L
+05:00		End Custom Period				
+05:00	+08:00	ISS	Regional Map	DFPW Normal	S_N_ER_3	Template H
+08:00	+09:00	ISS	Wide Angle	DFPW Normal	S_N_ER_3	Template H
+09:00	+11:00	CIRS	FP1	DFPW Normal	S_N_ER_3	Template D (Updated)
+11:00	+13:00	ISS	Mosaic	DFPW Normal	S_N_ER_3	Template D (Updated)
+13:00	+14:00	VIMS	Stare	DFPW Normal	S_N_ER_3	Template D (Updated)
013T22:34	013T22:49	OD Uncertainty Dead Time		DFPW Normal	S_N_ER_3	
013T22:49	014T04:04	UVIS	Ring Impact	DFPW Normal	S_N_ER_3	
014T04:04	014T04:34	SP Turn to Earth for downlink		DFPW Normal	S_N_ER_3	
014T04:34	014T13:34	Downlink over Goldstone		DFPW Normal	RTE_N_SPB	



# 037TI (T23) Segment



# 037TI (T23) Attitude Strategy

Request	Riders	Start(SCET)	Start(Epoch)	Duration	End(SCET)	Primary Pointing	Secondary Pointing	Comments
<b>Start Sequence S027</b>		<b>2007-005T13:50:00</b>		<b>042T21:02:00</b>	<b>2007-048T10:52:00</b>			
<b>TOST rev 37 Segment</b>		<b>2007-012T13:34:00</b>		<b>002T00:00:00</b>	<b>2007-014T13:34:00</b>			
SP_037TI_WAYPTTURN012_PRIME		2007-012T13:34:00		000T00:30:00	2007-012T14:04:00	ISS_NAC to Titan	NEG_X to Sun	SP Turn to Waypoint
<b>NEW WAYPOINT</b>		<b>2007-012T14:04:00</b>		<b>001T23:30:00</b>	<b>2007-014T13:34:00</b>	<b>ISS_NAC to Titan</b>	<b>NEG_X to Sun</b>	
<b>SP_037TI_DEADTIME012_PRIME</b>		<b>2007-012T14:04:00</b>		<b>000T00:15:00</b>	<b>2007-012T14:19:00</b>	<b>ISS_NAC to Titan</b>	<b>NEG_X to Sun</b>	
CIRS_037TI_MIDIRMAP001_PRIME	C, V	2007-012T14:19:00	GMB_E037_Titan23-000T18:15:00	000T02:15:00	2007-012T16:34:00	CIRS_FPB to Titan	POS_X to North_Pole_Dir	
ISS_037TI_NIGHTNAC001_PRIME	C, V	2007-012T16:34:00	GMB_E037_Titan23-000T16:00:00	000T01:00:00	2007-012T17:34:00	ISS_NAC to Titan	NEG_X to Sun	
CIRS_037TI_MIDIRMAP002_PRIME	C, V	2007-012T17:34:00	GMB_E037_Titan23-000T15:00:00	000T02:00:00	2007-012T19:34:00	CIRS_FPB to Titan	POS_X to North_Pole_Dir	
CIRS_037TI_FIRNADCMF001_PRIME	C, V	2007-012T19:34:00	GMB_E037_Titan23-000T13:00:00	000T03:00:00	2007-012T22:34:00	CIRS_FP1 to Titan	PC	
ISS_037TI_PHOTOMWAC001_PRIME	C, V	2007-012T22:34:00	GMB_E037_Titan23-000T10:00:00	000T01:00:00	2007-012T23:34:00	ISS_NAC to Titan	NEG_X to Sun	
CIRS_037TI_MIRLMBINT001_PRIME	C, R, V	2007-012T23:34:00	GMB_E037_Titan23-000T09:00:00	000T04:00:00	2007-013T03:34:00	CIRS_FPB to Titan	PC	
<b>Begin Custom Period</b>		<b>2007-013T03:34:00</b>	<b>GMB_E037_Titan23-000T05:00:00</b>	<b>000T00:01:00</b>	<b>2007-013T03:35:00</b>	<b>NEG_Z to Titan</b>	<b>POS_X to North_Pole_Dir</b>	
RADAR_037TI_T23INRAD001_PRIME		2007-013T03:34:00	GMB_E037_Titan23-000T05:00:00	000T03:00:00	2007-013T06:34:00	NEG_Z to Titan	POS_X to North_Pole_Dir	
RADAR_037TI_T23INSCAT001_PRIME	M	2007-013T06:34:00	GMB_E037_Titan23-000T02:00:00	000T01:08:00	2007-013T07:42:00	NEG_Z to Titan	NEG_Y to North_Pole_Dir	
ENGR_037SC_RADRCS013_PPS	M	2007-013T07:42:00	GMB_E037_Titan23-000T00:52:00	000T00:21:13	2007-013T08:03:13	NEG_Z to Titan	PC	Deadband = (2,2,20)
RADAR_037TI_T23INALT001_PRIME	M	2007-013T08:04:00	GMB_E037_Titan23-000T00:30:00	000T00:15:00	2007-013T08:19:00	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
RADAR_037TI_T23INLSAR001_PRIME	M	2007-013T08:19:00	GMB_E037_Titan23-000T00:15:00	000T00:08:00	2007-013T08:27:00	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
RADAR_037TI_T23HISAR001_PRIME	M	2007-013T08:27:00	GMB_E037_Titan23-000T00:07:00	000T00:14:00	2007-013T08:41:00	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
RADAR_037TI_T23OTLSAR001_PRIME	M	2007-013T08:41:00	GMB_E037_Titan23+000T00:07:00	000T00:08:00	2007-013T08:49:00	NEG_Z to Titan	NEG_X to Titan_SC_RAM	
RADAR_037TI_T23OUTALT001_PRIME	M	2007-013T08:49:00	GMB_E037_Titan23+000T00:15:00	000T00:15:00	2007-013T09:04:00	NEG_Z to Titan (0.0,0.0,-5.0 deg. offset)	POS_X to North_Pole_Dir	
RADAR_037TI_T23OTSCAT001_PRIME	M	2007-013T09:04:00	GMB_E037_Titan23+000T00:30:00	000T00:34:00	2007-013T09:38:00	NEG_Z to Titan (0.0,0.0,-5.0 deg. offset)	POS_X to North_Pole_Dir	Leave at UVIS_FUV to 206.885/49.3313, -Z to NTP
RADRCS to RADRWVA Transition		2007-013T09:38:00	GMB_E037_Titan23+000T01:04:00	000T00:23:18	2007-013T10:01:18			
UVIS_037ST_ETAU002_PRIME	C, M	2007-013T09:38:00	GMB_E037_Titan23+000T01:04:00	000T00:37:00	2007-013T10:15:00	UVIS_FUV to 206.885/49.331	NEG_Z to North_Pole_Dir	
RADAR_037TI_T23OUTRAD001_PRIME	M	2007-013T10:15:00	GMB_E037_Titan23+000T01:41:00	000T03:19:00	2007-013T13:34:00	NEG_Z to Titan	POS_Y to North_Pole_Dir	PickUp@UVIS_FUV to 206.885/49.331, -Z to NTP,leave@ISS_NAC to Ti, -X to Sun
<b>End Custom Period</b>		<b>2007-013T13:34:00</b>	<b>GMB_E037_Titan23+000T05:00:00</b>	<b>000T00:01:00</b>	<b>2007-013T13:35:00</b>	<b>ISS_NAC to Titan</b>	<b>NEG_X to Sun</b>	
ISS_037TI_GLOBMAP001_PRIME	C, V	2007-013T13:34:00	GMB_E037_Titan23+000T05:00:00	000T04:00:00	2007-013T17:34:00	ISS_NAC to Titan	NEG_X to Sun	
CIRS_037TI_FIRNADCMF002_PRIME	C, V	2007-013T17:34:00	GMB_E037_Titan23+000T09:00:00	000T02:00:00	2007-013T19:34:00	CIRS_FP1 to Titan	PC	
ISS_037TI_MONITORNA001_PRIME	C, V	2007-013T19:34:00	GMB_E037_Titan23+000T11:00:00	000T02:00:00	2007-013T21:34:00	ISS_NAC to Titan	NEG_X to Sun	
VIMS_037TI_GLOBALMAP002_PRIME	C	2007-013T21:34:00	GMB_E037_Titan23+000T13:00:00	000T01:00:00	2007-013T22:34:00	VIMS_IR to Titan	NEG_X to Sun	
<b>SP_037TI_DEADTIME014_PRIME</b>		<b>2007-013T22:34:00</b>		<b>000T00:15:00</b>	<b>2007-013T22:49:00</b>	<b>ISS_NAC to Titan</b>	<b>NEG_X to Sun</b>	
UVIS_037RI_IMPACT010_PRIME	C, I, M, V	2007-013T22:49:00		000T05:15:00	2007-014T04:04:00	UVIS_HSP to L_ANSA_B	POS_X to NSP	
SP_037EA_DLTURN014_PRIME	M	2007-014T04:04:00		000T00:30:00	2007-014T04:34:00	XBAND to Earth	NEG_X to NEP	SP Turn to Earth
SP_037EA_G70METNON014_PRIME	C, M	2007-014T04:34:00		000T09:00:00	2007-014T13:34:00	XBAND to Earth	Rolling	



## 037TI (T23) Telemetry Modes

### TELEMETRY MODE REPORT

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SCET	TELEMETRY MODE	REQUEST
2007-012T13:21:00	S_N_ER_3	SP_037NA_G70OBSNON014_NA
2007-013T00:34:00	S_N_ER_5A	SP_037NA_G70OBSNON014_NA
2007-013T03:34:00	S_N_ER_8	SP_037NA_G70OBSNON014_NA
2007-013T09:38:00	S_N_ER_3	SP_037NA_G70OBSNON014_NA
2007-013T10:15:00	S_N_ER_8	SP_037NA_G70OBSNON014_NA
2007-013T13:34:00	S_N_ER_3	SP_037NA_G70OBSNON014_NA
2007-014T04:34:00	RTE_N_SPB_142200	SP_037EA_G70METNON014_PRIME
2007-014T05:21:00	RTE_N_SPB_165900	SP_037EA_G70METNON014_PRIME
2007-014T12:06:00	RTE_N_SPB_142200	SP_037EA_G70METNON014_PRIME
2007-014T13:21:00	RTE_N_SPB_124425	SP_037EA_G70METNON014_PRIME

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# 037TI (T23) SMT Results

## DATA VOLUME SUMMARY

DOWNLINK PASS NAME	Start doy hh:mm	End doy hh:mm	OBSERVATION_PERIOD								DOWNLINK_PASS						
			START (Mb)	SCI (Mb)	HK+E (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGIN (Mb)	(%)	OPNAV (Mb)	SCI (Mb)	ENGR (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGIN (Mb)	(%)	CAROVR (Mb)
SP_037EA_G70METNON014_PRIME	014 04:34	014 13:34	0	3360	135	3495	3565	70	2%	0	403	53	3951	4379	428	10%	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	012 13:34	014 04:34	270.0	21.2	247.0	21.3	566.0	123.9	145.4	836.2	363.9	195.0	553.0	0.0	0.0	3343.0
OBSERVATION_SI	012 13:34	014 04:34	0.0	0.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.0
SP_037EA_G70METNON014_PRIME	014 04:34	014 13:34	217.1	6.5	86.4	1.6	0.0	19.4	29.2	0.0	42.4	0.0	0.0	0.0	0.0	402.6
DAILY TOTAL SCIENCE	012 13:34	014 13:34	487.1	27.6	350.4	23.0	566.0	143.3	174.6	836.2	406.4	195.0	553.0	0.0		

## 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_037NA_G70OBSNON014_NA	012 13:34	014 04:34	1923.1	150.9	152.0	882.3	1035.9	2592.0	1388.9
SP_037EA_G70METNON014_PRIME	014 04:34	014 13:34	6700.0	199.3	50.0	600.0	900.0	1310.0	0.0



# 037TI(T23) DSN Requests

CASSINI DSN COVERAGE SUMMARY for 037TI\_T23\_030514.apf generated on 2003-May-14 13:11:18  
(+ = pass overlaps with previous pass; \* = in conflict with DSN weekly maintenance)

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C ANT	ID	BOT_TO_EOT	DUR	XMT_AT	2WAY_PERIOD	DUR	DL_PERIOD	DL_PERIOD	DUR	NOT CALS	RADIO_CFG	DATA_RATES
		ERT	hh:mm	ERT	ERT	hh:mm	ERT	SCET	hh:mm	min	UD D UD MAR	kbps
G 70MET 14		014T05:40-14:45	09:05		014T05:50	08:08-14:43	06:35		014T05:43-14:43	014T04:34-13:34	09:00	--- 15/15 XX - -- --0 142,165,142,124

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## 037TI (T23) OpMode Strategy

Start	End	Request
2007-013T00:34:00e	2007-013T00:34:09	ENGR_037SC_RADWU013_PPS
2007-013T03:34:00e	2007-013T03:34:44	ENGR_037SC_RADRWA013_PPS
2007-013T07:42:00e	2007-013T08:03:13	ENGR_037SC_RADRCS013_PPS
2007-013T09:38:00e	2007-013T10:01:18	ENGR_037SC_RADRWBIAS013_PPS
2007-013T13:34:00e	2007-013T13:39:35	ENGR_037SC_DFPW013_PPS



## 037TI (T23) Notes

- **Timeline**
  - UVIS\_037RI\_IMPACT010\_PRIME is SCET-timed, not epoch-relative. It is intentionally placed after the outbound “Dead Time”
  - In consultation with SCO (L. Sakamoto), the RCS-to-RWA transition is simultaneous with the start of the UVIS occ. Since the occ is just point-and-stare, there is no conflict.
    - **The alternative was to change the deadband from (2,2,20) for RADAR to (2,20,2) for UVIS, but it was too costly in terms of time. The change would’ve required a 10-minute “settling time” prior to the start of the occ, and RADAR was unwilling to give up the time. They preferred a longer post-occ turn on RWA instead.**
    - **Using (2,2,2) the entire time was deemed too expensive in terms of hydrazine**
- **Pointing**
  - Waypoint of ISS\_NAC to Titan, NEG\_X to Sun is safe for entire segment.
  - SP turns are FR-safe and have enough time allocated to them.
  - RADAR modeled all of the custom handoffs; no issues.
- **Data Volume**
  - No issues. P4 has 2% margin, and there is 10% margin on the DSN capability at the end of the segment.
- **CIMS Issues**
  - None. All expected requests are in the database. All requests in the Moveable Block are tied to the GMB\_037TI\_Titan23 epoch.
- **Power Issues**
  - None.

## 037TI (T23) Notes (cont.)

- **MP Guidelines & Constraint Issues**
  - None. Nav & MP approve of DSN plan, and requested pass does not conflict with maintenance.
  - Flyby altitude = 950 km
    - Transition to RCS complete at -00:30 (alt ~ 8286 km)
    - Transition to RWA begins at +01:04 (alt ~ 9901 km)
- **Hydrazine Usage**
  - Has not be calculated, or even estimated, for this flyby.



## 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. B. All initial downlink attitudes have been checked as waypoints.	C		
2. All turns to and from waypoints checked for violations and margins. <input type="checkbox"/> CAPS <input type="checkbox"/> CDA <input type="checkbox"/> CIRS <input type="checkbox"/> INMS <input type="checkbox"/> ISS <input type="checkbox"/> MIMI <input type="checkbox"/> MAG <input type="checkbox"/> NAV <input checked="" type="checkbox"/> RADAR <input type="checkbox"/> RPWS <input type="checkbox"/> RSS <input type="checkbox"/> UVIS <input type="checkbox"/> 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. O pNavs preceding/following a downlink	C	RADAR checked custom turns; no issues	
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 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 90° RWA turns and/or 10 min. for RCS turns?	Yes	

(DOUBLE-CLICK TO MAKE CHANGES)