S77 Rev 181 Timeline for RSS Titan T79 Gravity Observation

and Gravity Science Enhancements

2013/046-049, Fri-Mon Feb 15-18, 2013 PST

Titan Closest Approach: 2013/048-03:16 ERT

OWLT = 01:19, RTLT = ~02:38

Closed-loop Doppler is prime for gravity. Open-loop is backup

RSR = Radio Science Receiver (open-loop receiver) RSSG = Radio Science Systems Group GSE = Gravity Science Enhancement

RSSG: Note telemetry bit rate. Playback periods.Set RSR fgain accordingly and do not change during observation

DOY	Time ERT	Date/Day PST	Time PST	Event	Comments
				X-TWTA ON	Has been on since DOY 017
046	23:15	Fri 2/15	3:15 PM	DSS-55 Pre-cal	Pass# 0047. Cassini specific 4th-order pointing model, TLC enabled
	23:45		3:45 PM	DSS-63 Pre-cal	Pass# 0047
047	00:45		4:45 PM	DSS-55 BOT	1-way
	00:45		4:45 PM	DSS-63 BOT	1-way
	00:45		4:45 PM	Begin Inbound GSE	
	00:45		4:45 PM	Ka-band ON (KEX & Ka-TWTA)	ON for GSE. Stays ON until end of outbound GSE
	00:45		4:45 PM	DSS-55 Enable Monopulse	At Ka-band 1-way acquisition
	00:55		4:55 PM	DSS-63 Transmitter ON	Ramped uplink predicts
	03:33		7:33 PM	DSS-55 Tracking mode change to 3-way w/ 63	DKF time 033240
	03:33		7:33 PM	DSS-63 Tracking mode change to 2-way	DKF time 033240
	08:02	Sat 2/16	12:02 AM	DSS-63 Transmitter OFF	DKF time 080211
	09:40		1:40 AM	End Inbound GSE	
	09:40		1:40 AM	DSS-55 EOT	
				DSS-55 Disable Monopulse	At loss of Ka-band signal
	09:45		1:45 AM	DSS-63 EOT	
047	10:30	Sat 2/16	2:30 AM	DSS-25 Pre-cal	Pass# 0047. Cassini specific 4th-order pointing model, TLC enabled, Enter Operator Directive: AP TMO 000001
	11:30		3:30 AM	DSS-34 Pre-cal	Pass# 0047. Cassini specific 4th-order pointing model, Enter Operator Directive: AP TMO 000001
	12:00		4:00 AM	DSS-25 BOT	No signal until ~131021 ERT
	12:10		4:10 AM	DSS-25 Transmitter ON	Ramped uplink predicts
	12:30		4:30 AM	*RSSG: Begin RSR recordings (X & Ka) at DSS-25 and -34*	
	13:00		5:00 AM	DSS-34 BOT	No signal until ~131021 ERT
	13:10		5:10 AM	Spacecraft Earth Pointed	DKF time 131021 ERT
				DSS-25 Acquire 1-way signal	DKF time 131021 ERT
				DSS-34 Acquire 1-way signal	DKF time 131021 ERT
				DSS-25 Enable Monopulse	When requested by RSSG
				DSS-34 Enable Monopulse	When requested by RSSG. Wait for ~10 degrees elevation
				DSS-25 Disable Monopulse, Clear offsets	Before mode switch to 2-way
				DSS-34 Disable Monopulse, Clear offsets	Before mode switch to 3-way
	13:15		5:15 AM	Uplink Transfer from 25 to 34	Ramped uplink predicts

DOY	Time ERT	Date/Day PST	Time PST	Event	Comments
	14:47		6:47 AM	Begin Titan Gravity - Begin Coherent Data	DKF time 144732
				DSS-25 Tracking mode change to 2-way	DKF time 144732
				DSS-34 Tracking mode change to 3-way w/ 25	DKF time 144732
				DSS-25 Enable Monopulse	When requested by RSSG
				DSS-34 Enable Monopulse	When requested by RSSG
	15:53		7:53 AM	DSS-25 Tracking mode change to 3-way w/ 34	DKF time 155231
	15:53		7:53 AM	DSS-34 Tracking mode change to 2-way	
	17:30		9:30 AM	DSS-25 EOT	
				DSS-25 Disable Monopulse	At loss of Ka-band signal
	23:00		3:00 PM	DSS-55 Pre-cal	Pass# 0048. Cassini specidic 4th-order pointing model, TLC enabled
048	00:00		4:00 PM	*RSSG: Begin RSR recordings (X & Ka) at DSS-55*	
	00:30		4:30 PM	DSS-55 BOT	
				DSS-55 Acquire 3-way signal w/ 34	
				DSS-55 Enable Monopulse	When requested by RSSG. Wait for ~10 degrees elevation
	00:40		4:40 PM	DSS-34 Transmitter OFF	
	00:55		4:55 PM	DSS-55 Transmitter ON	Ramped uplink predicts
	01:00			DSS-34 EOT	
				DSS-34 Disable Monopulse	At loss of Ka-band signal
	03:16		7:16 PM	T89 Titan Closest Approach	Altitude 1978 km
	03:17		7:17 PM	DSS-55 Tracking mode change to 1-way	DKF time 031723
				DSS-55 Re-enable Monopulse	When requested by RSSG
	03:32		7:32 PM	DSS-55 Tracking mode change to 2-way	DKF time 033223
				DSS-55 Re-enable Monopulse	When requested by RSSG
	06:20		10:20 PM	DSS-25 Pre-cal	Pass# 0048. Cassini specific 4th-order pointing model, TLC enabled Enter Operator Directive: AP TMO 000001
	07:20		11:20 PM	*RSSG: Begin RSR recordings (X & Ka) at DSS-25*	
	07:50		11:50 PM	DSS-25 BOT	
				DSS-25 Acquire 3-way signal w/ 55	
				DSS-25 Enable Monopulse	When requested by RSSG. Wait for ~10 degrees elevation
	09:10	Sun, 2/17	1:10 AM	Uplink Transfer from 55 to 25	Ramped uplink predicts
	09:35		1:35 AM	DSS-55 EOT	
				DSS-55 Disable Monopulse	At loss of Ka-band signal
	11:47			DSS-25 Tracking mode change to 2-way	DKF time 114717
	12:43		4:43 AM	DSS-25 Transmitter OFF	5 minutes after DKF time 123757
	15:15		7:15 AM	End Titan Gravity - End Coherent Data	DKF time 151512
				Begin turn from Earth	
				DSS-25 Disable Monopulse	At loss of Ka-band signal
	15:45		7:45 AM	DSS-25 EOT	
048	23:00	Sun, 2/17	3:00 PM	DSS-55 Pre-cal	Pass# 0049. Cassini specidic 4th-order pointing model, TLC enabled
	23:30		3:30 PM	DSS-63 Pre-cal	Pass# 0049
049	00:30		4:30 PM	DSS-55 BOT	1-way
	00:30		4:30 PM	DSS-63 BOT	1-way
	00:30		4:30 PM	Begin Outbound GSE	
				DSS-55 Enable Monopulse	At Ka-band 1-way acquisition
	00:50		4:50 PM	DSS-55 Transmitter ON	Ramped uplink predicts

DOY	Time ERT	Date/Day PST	Time PST	Event	Comments
	03:27		7:27 PM	DSS-55 Tracking mode change to 2-way	DKF time 032707
	03:27		7:27 PM	DSS-63 Tracking mode change to 3-way w/ 55	DKF time 032707
	08:15		12:15 AM	DSS-63 EOT	
	08:27	Mon, 2/18	12:27 AM	DSS-55 Transmitter OFF	DKF time 082729
	09:29		1:29 AM	Ka-band OFF	DKF time 092915
				DSS-55 Disable Monopulse	At loss of Ka-band signal
	09:30		1:30 AM	End Outbound GSE	
	09:30		1:30 AM	DSS-55 EOT	

T89 Gravity passes:

13 047 1030 1200 1730 1745 DSS-25 CAS RS181-T89 GRAV 5618 N748 1A1
13 047 1130 1300 0100 0115 DSS-34 CAS RS181-T89 GRAV 5619 N750 1A1
13 047 2300 0030 0935 0950 DSS-55 CAS RS181-T89 GRAV 5619 N750 1A1
13 048 0620 0750 1545 1600 DSS-25 CAS RS181-T89 GRAV 5619 N748 1A1

Gravity Science Enhancement (GSE) passes around T89:

Inbound
13 046 2315 0045 0940 0955 DSS-55 CAS TP RS181-TI GSE 5618 N750 1A1
13 046 2345 0045 0945 1000 DSS-63 CAS TKG PASS 5618 N003 1A1

Outbound:
13 048 2300 0030 0930 0945 DSS-55 CAS RS181-TI GSE 5620 N750 1A1
13 048 2330 0030 0815 0830 DSS-63 CAS T/P T89PB 5620 N003 1A1