Timeline for Cassini Rev 237: 2-Way RSS Saturn's Ring & Atmospheric Occultations

June 30, 2016 UTC (DOY-182)

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	ERT UTC OWLT = 01:15:54	SCET	PDT ERT-7hrs 07:00:00	Comments
DOY 2016-181				
RSSG: Load 1-W, 2-W, and 3-W Frequency Predicts				
DSS-54: Begin Pre-Cal	16:45:00	15:29:06	09:45:00	RSS DSN Monopulse Cal Support
S-Band ON	18:09:54	16:54:00	11:09:54	Per PEF
Ka-Band ON	18:14:50	16:58:56	11:14:50	Per PEF
Spacecraft is Earth Pointed & Rolling	18:14:54	16:59:00	11:14:54	Per Rev237 SPASS
DSS-54: Beginning Of Track	18:15:00	16:59:06	11:15:00	Support per DKF except no uplink transfer to DSS-63 at 234300
DSS-54: Begin X- and Ka-Band 1-Way Acquisition	18:15:00	16:59:06	11:15:00	PC/N0 (X-34m tlm ON, Ka-34m) = 39, 48 dB-Hz
DSS-54: Transmitter ON	18:45:00	17:29:06	11:45:00	Per DKF
DSS-54: Begin X- and Ka-Band 2-Way Acquisition	21:16:43	20:00:49	14:16:43	
DSS-63: Begin Pre-Cal	22:30:00	21:14:06	15:30:00	
RSSG: Begin DSS-63 Open-Loop Recordings	22:45:00	21:29:06	15:45:00	
DSS-63: Beginning of Track	23:30:00	22:14:06	16:30:00	Detectable X- and S-band signals
DSS-63: Begin X- & S-Band 3-Way Acquisition (w/ DSS-54)	23:30:00	22:14:06	16:30:00	PC/N0 (X-70m tlm ON, S-70m) = 45, 42 dB-Hz
DSS-54: Transmitter OFF	**23:43:11**	22:27:17	16:43:11	Start of 1-way baseline - RTLT
DSS-63 Transmitter ON, 18kW, LCP, RAMP, SWEEP	**23:54:00**	22:38:06	16:54:00	Start of 2- & 3-way baseline - RTLT
DOY 2016-182				
DSS-25: Begin Pre-Cal	00:10:00	22:54:06	17:10:00	
DSS-14: Begin Pre-Cal	00:30:00	23:14:06	17:30:00	
RSSG: Begin DSS-14 and DSS-25 Open-Loop Recordings	00:50:00	23:34:06	17:50:00	
DSS-14: Beginning Of Track	01:30:00	00:14:06	18:30:00	Detectable X- and S-band downlink
DSS-14: Begin X- and S-Band 3-Way Acquisition (w/ DSS-54)	01:30:00	00:14:06	18:30:00	PC/N0 (X-70m tlm ON, S-70m) = 45, 42 dB-Hz
DSS-25: Beginning Of Track	01:40:00	00:24:06	18:40:00	Detectable X- and Ka-band downlink
DSS-25: Begin X- and Ka-Band 3-Way Acquisition (w/ DSS-54)	01:40:00	00:24:06	18:40:00	PC/N0 (X-34m tlm ON, Ka-34m) = 39, 48 dB-Hz
DSS-25: Enable Monopulse	01:40:00	00:24:06	18:40:00	Enable monopulse only when requested by RS Operations
DSS-63 Transmitter OFF (Uplink Transfer to DSS-14)	**01:58:00**	00:42:06	18:58:00	Uplink Transfer from DSS-63 to DSS-14
DSS-14 Transmitter ON, 18 kW, LCP, RAMP	**01:58:00**	00:42:06	18:58:00	
DSS-63 End of Track	02:00:00	00:44:06	19:00:00	
DSS-25: Disable Monopulse Without Clearing the Offsets	02:14:00	00:58:06	19:14:00	Prior to switching to 3-way
Start 15m LMB Deadtime (Spacecraft is Earth Pointed)	02:14:54	00:59:00	19:14:54	Detectable X/S/Ka downlink signals
RNG OFF/TLM OFF	02:14:58	00:59:04	19:14:58	Jump in X-band signal level
DSS-14: Begin X- and S-Band 1-Way Acquisition	02:14:59	00:59:05	19:14:59	PC/N0 (X-70m tlm OFF, S-70m) = 54, 42 dB-Hz
DSS-25: Begin X- and Ka-Band 1-Way Acquisition	02:14:59	00:59:05	19:14:59	PC/N0 (X-34m tlm OFF, Ka-34m) = 48, 48 dB-Hz
RSSG: Enter 1-Way Open-Loop Frequency Offsets as Needed				

DSS-54: End of Track	02:15:00	00:59:06	19:15:00	
DSS-63: End of Post-Cal	02:15:00	00:59:06	19:15:00	
Start Short (~10 m) 1-Way Baseline	02:15:00	00:59:06	19:15:00	
DSS-25: Enable Monopulse	02:20:00	01:04:06	19:20:00	Enable monopulse only when requested by RS Operations
DSS-25: Disable Monopulse without Clearing the Offsets	02:25:00	01:09:06	19:25:00	Prior to switching to 1-way
RSSG: End DSS-63 Open-Loop Recordings	02:25:00	01:09:06	19:25:00	
DSS-14: Begin X- & S-Band 3-Way Acquisition (w/ DSS-63)	02:25:48	01:09:54	19:25:48	PC/N0 (X-70m tlm OFF, S-70m) = 54, 42 dB-Hz
DSS-25: Begin X- & Ka-Band 3-Way Acquisition(w/ DSS-63)	02:25:48	01:09:54	19:25:48	PC/N0 (X-34m tlm OFF, Ka-34m) = 48, 48 dB-Hz
DSS-25: Enable Monopulse	02:25:48	01:09:54	19:25:48	Enable monopulse only when requested by RS Operations
Begin 3-Way Free-Space Baseline	02:27:48	01:11:54	19:27:48	
DSS-54: End of Post-Cal	02:30:00	01:14:06	19:30:00	
Ring F	03:00:30	01:44:36	20:00:30	Approx. time; Ring F is usually not detectable in real-time
Ring A In	03:05:29	01:49:35	20:05:29	Approximate time
Middle of Encke Gap	03:10:08	01:54:14	20:10:08	Increase in signal levels for a short period
Top of the Ionosphere (~68,000 km)	03:23:46	02:07:52	20:23:46	
DSS-25: Disable Monopulse Without Clearing the Offsets	03:24:00	02:08:06	20:24:00	Disable monopulse only when requested by RS Operations
Ring A Out	03:26:56	02:11:02	20:26:56	Approximate time
Ring B In	03:33:33	02:17:39	20:33:33	Signals will likely be blocked over parts of Ring B
Top of the Troposhere (~0.01° Bending Angle)	03:47:44	02:31:50	20:47:44	
Severe Rings & Tropspheric Interference	03:47:44	02:31:50	20:47:44	Unpredictable signal bevior until all signals are extinguished
DSS-35: Begin Pre-Cal	04:25:00	03:09:06	21:25:00	
Uplink Transfer from DSS-63 to DSS-14 Observed	04:29:48	03:13:54	21:29:48	
Cassini is Behind Saturn as Seen From Earth	04:40:54	03:25:00	21:40:54	No downlink signals detectable until about 07:00:04
RSSG: Begin DSS-35 Open-Loop Recordings (3-Way w/ DSS-63)	05:15:00	03:59:06	22:15:00	
DSS-35: Beginning Of Track	05:55:00	04:39:06	22:55:00	No dowlink detectable
Begin Limb Track	06:44:16	05:28:22	23:44:16	
DSS-14: Begin X- & S-Band 2-Way Acquisition	06:44:54	05:29:00	23:44:54	~15m earlier than detectable downlink signals (margin)
DSS-25: Begin X- & Ka-Band 3-Way Acquisition (w /DSS-14)	06:44:54	05:29:00	23:44:54	~15m earlier than detectable downlink signals (margin)
DSS-35: Begin X- & Ka-Band 3-Way Acquisition (w/ DSS-14)	06:44:54	05:29:00	23:44:54	~15m earlier than detectable downlink signals (margin)
Cassini is Behind Saturn as Seen From Earth				
Weak S-band signal (~1.55° BA) at DSS-14	07:00:04	05:44:10	00:00:04	Approx. time; 1-Way until X-band uplink lock, then 2-Way
Weak X-band signal (~1.35° BA) at DSS- 14	07:06:49	05:50:55	00:06:49	Approx. time; 1-Way until X-band uplink lock, then 2-Way
Weak X-band signal (~1.35° BA) at DSS-25 & 35	07:06:49	05:50:55	00:06:49	Approx. time; 1-Way until X-band uplink lock, then 3-Way/14
Weak Ka-band signal (~1.15° BA) at DSS-25 & 35	07:13:29	05:57:35	00:13:29	Approx. time; 1-Way until X-band uplink lock, then 3-Way/14
Top of the Troposphere (~0.01° BA)	07:51:04	06:35:10	00:51:04	
End Tracking Egress Atmospheric Occultation	07:52:54	06:37:00	00:52:54	Pc/N0 (dB/Hz) ~ 54 14X, 48 25/34/X, 48 25/34K, 42 14S
DSS-25: Enable Monopulse	07:54:00	06:38:06	00:54:00	Enable monopulse only when requested by RS Operations
DSS-35: Enable Monopulse	07:54:00	06:38:06	00:54:00	Enable monopulse only when requested by RS Operations
DSS-14: Transmitter OFF	07:56:00	06:40:06	00:56:00	Start of the egress 1-way baseline minus the RTLT
Ring C In	07:56:57	06:41:03	00:56:57	Approximate time
DSS-43: Begin Pre-Cal	08:00:00	06:44:06	01:00:00	

RSSG: Begin DSS-43 Open-Loop Recordings (3-Way w/ DSS-14)	08:00:00	06:44:06	01:00:00	
Top of the ionosphere (~68,000 km)	08:09:24	06:53:30	01:09:24	Ionosphere primarily affects signals frequency/phase
DSS-25: Disable Monopulse	08:22:00	07:06:06	01:22:00	Enable monopulse only when requested by RS Operations
DSS-35: Disable Monopulse	08:22:00	07:06:06	01:22:00	Disable monopulse only when requested by RS Operations
Ring B In	08:23:11	07:07:17	01:23:11	Signals will likely be blocked over parts of Ring B
DSS-43: Beginning Of Track	08:30:00	07:14:06	01:30:00	
DSS-43: Begin X- & S-Band 3-Way Acquisition (w/ DSS-14)	08:30:00	07:14:06	01:30:00	in Ring B
Ring B Out	09:00:36	07:44:42	02:00:36	Approximate time; Strong signals in the Cassini Division
Ring A In	09:07:12	07:51:18	02:07:12	Detectable signals over most of Ring A
DSS-25: Enable Monopulse	09:10:00	07:54:06	02:10:00	Enable monopulse only when requested by RS Operations
DSS-35: Enable Monopulse	09:10:00	07:54:06	02:10:00	Enable monopulse only when requested by RS Operations
Middle of the Encke Gap	09:24:00	08:08:06	02:24:00	Strong signals over brief time period
Ring A Out	09:28:38	08:12:44	02:28:38	All signals back to full strength (free-space) levels
Ring F	09:33:37	08:17:43	02:33:37	Approximate time; Ring F is usually not detectable in real-time
DSS-14 & DSS-25: End Of Track	10:15:00	08:59:06	03:15:00	
DSS-35: Disable Monopulse Without Clearing the Offsets	10:27:00	09:11:06	03:27:00	Prior to switching to 1-way
DSS-43: Begin X- & S-band 1-Way Acquisition	10:27:48	09:11:54	03:27:48	PC/N0 (X-70m tlm OFF, S-70m) = 54, 42 dB-Hz
DSS-35: Begin X- & Ka-band 1-Way Acquisition	10:27:48	09:11:54	03:27:48	PC/N0 (X-34m tlm OFF, Ka-34m) = 48, 48 dB-Hz
DSS-35: Enable Monopulse	10:27:48	09:11:54	03:27:48	Enable monopulse only when requested by RS Operations
RSSG: Adjust 1-Way Open-Loop Frequency Offsets as Needed				
Begin Short (~15 m) 1-Way Baseline	10:29:00	09:13:06	03:29:00	
DSS-14 & DSS-25: End of Post-Cal	10:30:00	09:14:06	03:30:00	
TLM ON/RNG ON	10:44:09	09:28:15	03:44:09	
S-Band OFF	10:44:15	09:28:21	03:44:15	
Ka-Band OFF	10:44:17	09:28:23	03:44:17	
Spacecraft Turns Off Earth Point	10:44:54	09:29:00	03:44:54	
End of Rev 237 Observations (End of egress deadtime)	10:44:54	09:29:00	03:44:54	
RSSG: End DSS-14 and DSS-25 Open-Loop Recordings	10:45:00	09:29:06	03:45:00	
DSS-35 & DSS-43: End Of Track	11:10:00	09:54:06	04:10:00	
RSSG: End DSS-35 and DSS-43 Open-Loop Recordings	11:15:00	09:59:06	04:15:00	
DSS-35 & DSS-43: End of Post-Cal	11:25:00	10:09:06	04:25:00	

Madrid DSS-63 (and DSS-54) related activities

Goldstone DSS-14 & DSS-25 related activities

Canberra DSS-43 & DSS-35 related activities

Predicted ring event times are approximate and are based on reference trajectory 150901