Timeline for Cassini Rev 189: 2-Way RSS Ingress Saturn Atmospheric Occultation & Egress Ring Occultation

May 10-11, 2013 UTC (DOY-130/131)

Essam Marouf & Aseel Anabtawi 05/06/2013 (v3)

	ERT UTC OWLT = 1:13:32	SCET	PDT ERT-7hrs 7:00:00	Comments
Spacecraft is NOT Earth Pointed				
RSSG: Load 1-W, 2-W, and 3-W Frequency Predicts	TBD			
DSS-45: Begin Pre-Cal	16:40:00	15:26:28	09:40:00	
DSS-45: Begin of Track	17:40:00	16:26:28	10:40:00	Spacecraft is not Earth pointed
DSS-63: Begin Pre-Cal	17:40:00	16:26:28	10:40:00	
DSS-45 Transmitter ON, 18 kW, LCP, RAMP, SWEEP	17:53:28	16:39:56	10:53:28	
DSS-55: Begin Pre-Cal	18:20:00	17:06:28	11:20:00	
Ka-Band ON	18:20:42	17:07:10	11:20:42	
DSS-63: Begin of Track	18:40:00	17:26:28	11:40:00	Spacecraft is not Earth pointed
DSS-45: Transmitter OFF	18:53:15	17:39:43	11:53:15	
DSS-63: Transmitter ON, 18 kW, LCP, RAMP, SWEEP	19:02:00	17:48:28	12:02:00	
DSS-45: End of Track	19:10:00	17:56:28	12:10:00	
DSS-45: End of Post Cal	19:25:00	18:11:28	12:25:00	
DSS-55: Begin of Track	19:50:00	18:36:28	12:50:00	Spacecraft is not Earth pointed
Start of atmospheric occultation observation	20:20:32	19:07:00	13:20:32	X/Ka-band downlink detectable shortly before 20:20:32
DSS-63: Begin X-band 3-Way Acquisition (w/ DSS-45)	20:20:32	19:07:00	13:20:32	PC/N0 (X-70m, S-70m) = 54, 42 dB-Hz
DSS-55: Begin X- & Ka-band 3-Way Acquisition (w/ DSS-45)	20:20:32	19:07:00	13:20:32	PC/N0 (X-34m, Ka-34m) = 48, 48 dB-Hz
DSS-55: Enable Monopulse	TBD			Enable monopulse only when requested by RS Operations
RNG OFF/TLM OFF	20:20:41	19:07:09	13:20:41	X-band signal level increase
S-Band ON	20:20:44	19:07:12	13:20:44	S-band downlink is also detectable
DSS-63: Begin S-band 3-Way Acquisition (w/ DSS-45)	20:20:44	19:07:12	13:20:44	PC/N0 (S-70m) = 42 dB-Hz
Begin 3-Way Free-Space Baseline w/DSS-45	20:24:05	19:10:33	13:24:05	PC/N0 (X70, S70, X34, Ka34) = 54, 42, 48, and 48 dB-Hz
DSS-63: Begin X- & S-band 1-Way Acquisition (U/L Gap)	21:20:19	20:06:47	14:20:19	
DSS-55: Begin X- & Ka-band 1-Way Acquisition (U/L Gap)	21:20:19	20:06:47	14:20:19	
Begin 1-Way Short Free-Space Baseline (U/L Gap)	21:20:20	20:06:48	14:20:20	PC/N0 (X70, S70, X34, Ka34) = 54, 42, 48, and 48 dB-Hz
DSS-63: Begin X- & S-band 2-Way Acquisition	21:29:04	20:15:32	14:29:04	PC/N0 (X-70m, S-70m) = 54, 42 dB-Hz
DSS-55: Begin X- & Ka-band 3-Way Acquisition (w/ DSS-63)	21:29:04	20:15:32	14:29:04	PC/N0 (X-34m, Ka-34m) = 48, 48 dB-Hz
Begin 2-Way & 3-Way Free-Space Baseline	21:33:00	20:19:28	14:33:00	
Top of the ionosphere (68,000 km)	21:46:48	20:33:16	14:46:48	No visible real-time effects

Upper Troposphere (~0.02° BA)	22:09:50		20:56:18	15:09:50	S/X/Ka signal intensities quickly drop and scintillate
Loss of 3-Way Ka-band signal (~1.15° BA)	22:26:34		21:13:02	15:26:34	Approximate time; Ka-band downlink signal absorbed
Loss of 2-Way & 3-Way X-band signal (~1.35° BA)	22:29:39		21:16:07	15:29:39	Approximate time; X-band downlink signal absorbed
Loss of 2-Way S-band signal	22:31:12		21:17:40	15:31:12	Approximate time
DSS-63: S-band 1-Way Signal Acquisition	22:31:12		21:17:40	15:31:12	Approximate time; S/C Aux-Osc kicks in
Loss of 1-Way S-band signal (~1.55° BA)	22:32:47		21:19:15	15:32:47	Approximate time; likely loss of all downlink signals
End of Noise Baseline	23:03:32		21:50:00	16:03:32	No downlink signals detectable
DSS-63: Transmitter OFF	23:11:28		21:57:56	16:11:28	End of DSS-63 uplink period
Cassini is behind Saturn as seen from Earth					
Start mixed atmosphere/rings egress occ'n (DOY-131)	00:13:10		22:59:38	17:13:10	Internittent weak 1-way signals
DSS-63: Begin X- & S-band 2-Way Acquisition	00:13:10		22:59:38	17:13:10	Likely internittent lock; strong atmospheric attenuation
DSS-55: Begin X- & Ka-band 3-Way Acquisition (w/ DSS-63)	00:13:10		22:59:38	17:13:10	Likely internittent lock; strong atmospheric attenuation
Ring B1 In	00:27:11		23:13:39	17:27:11	Likely lock over most of B1; moderate atmospheric atten'tn
Ring B2 In	00:30:35		23:17:03	17:30:35	Likely intermittent lock over B2; small atmospheric atten'tn
Top of the troposphere mixed with Ring B2	00:33:04		23:19:32	17:33:04	Likely intermittent lock over B2; rings clear of atmosphere
Ring B3 In	00:33:30		23:19:58	17:33:30	Likely loss of lock over most of the optically thick B3 (core)
Ring B4 In	00:35:37		23:22:05	17:35:37	Likely lock over most of B4 and the rest of the rings
Ring B4 Out	00:40:54		23:27:22	17:40:54	Relatively strong signals in the Cassini Division
Ring A In	00:43:24		23:29:52	17:43:24	Detectable signals over most of Ring A
Top of the ionosphere (~68,000 km)	00:48:46		23:35:14	17:48:46	Ionosphere primarily affects signals frequency/phase
In Mid Encke Gap	00:49:43		23:36:11	17:49:43	Signals are briefly back to full strength
Ring A out	00:51:28		23:37:56	17:51:28	PC/N0 (X70, S70, X34, Ka34) = 54, 42, 48, and 48 dB-Hz
Ring F	00:53:28		23:39:56	17:53:28	Ring F is usually not detectable in real-time
End of 2-way baseline	01:32:59		0:19:27	17:00:00	
DSS-55: Enable Monopulse	01:33:00		0:19:28	18:33:00	Enable monopulse only when requested by RS Operations
Ka-Band and S-Band OFF	01:37:53		00:24:21	18:37:53	End of RSS3 Op-Mode
TLM ON/RNG ON	01:38:30		00:24:58	18:38:30	End of Rev 189 RSS Experiment
End of Rev 189 RSS S/C Activities	01:38:32		00:25:00	18:38:32	
DSS-63 and DSS-55: End of Track	02:10:00		00:56:28	19:25:00	
DSS-63 and DSS-55: End of Post Cal	02:25:00		01:11:28	19:25:00	

Madrid DSS-55 & DSS-63 related activities

Canberra DSS-45 related activities

Predicted atmospheric event times are approximate and are based on Live-Update (LUD) OD on 01 May 2013