

Timeline for Cassini Rev 190: 2-Way RSS Ingress Saturn Atmospheric Occultation & Egress Ring Occultation

May 20, 2013 UTC (DOY-140)

Essam Marouf & Aseel Anabtawi 05/16/2013 (v5)

	ERT UTC OWLT = 1:13:57	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-14: Begin Pre-Cal	05:30:00	04:16:03	22:30:00	
DSS-14: Begin of Track	06:30:00	05:16:03	23:30:00	Spacecraft is not Earth pointed
DSS-34: Begin Pre-Cal	07:20:00	06:06:03	00:20:00	
DSS-14 Transmitter ON, 18 kW, LCP, RAMP, SWEEP	07:28:46	06:14:49	00:28:46	Start transmitter time = start of 3-way baseline - RTLTL
DSS-45: Begin Pre-Cal	07:50:00	06:36:03	00:50:00	
Ka-Band ON	08:19:03	07:05:06	01:19:03	Spacecraft is not Earth pointed
DSS-34 & DSS-45: Begin of Track	08:50:00	07:36:03	01:50:00	Spacecraft is not Earth pointed
RSSG: Begin All Open-Loop Ingress Recordings	08:50:00	07:36:03	01:50:00	
Start Live Moveable Block (LMB) deadtime	09:18:57	08:05:00	02:18:57	X- and Ka-band signals detectable shortly before 09:19:06
DSS-14: Begin X-band 1-Way Acquisition	09:18:57	08:05:00	02:18:57	PC/N0 (X-70m) = 54 dB-Hz
DSS-45: Begin X-band 1-Way Acquisition	09:18:57	08:05:00	02:18:57	PC/N0 (X-34m) = 48 dB-Hz
DSS-34: Begin X- & Ka-band 1-Way Acquisition	09:18:57	08:05:00	02:18:57	PC/N0 (X-34m, Ka-34m) = 48, 48 dB-Hz
RNG OFF/TLM OFF	09:19:06	08:05:09	02:19:06	X-band signal level increase
S-Band ON	09:19:09	08:05:12	02:19:09	S-band downlink is also detectable
DSS-14: Begin S-band 1-Way Acquisition	09:19:09	08:05:12	02:19:09	PC/N0 (S-70m) = 42 dB-Hz
DSS-45: Begin S-band 1-Way Acquisition	09:19:09	08:05:12	02:19:09	PC/N0 (S-34m) = 36 dB-Hz
Start 1-way baseline	09:19:10	08:05:13	02:19:10	
DSS-34: Enable Monopulse	TBD			Enable monopulse only when requested by RS Operations
Start of S/C roll to occultation attitude	09:39:05	08:25:08	02:39:05	
End of S/C roll to occultation attitude	09:56:39	08:42:42	02:56:39	
DSS-14: Begin X- & S-band 2-Way Acquisition	09:56:40	08:42:43	02:56:40	PC/N0 (X-70m, S-70m) = 54, 42 dB-Hz
DSS-45: Begin X- & S-band 3-Way Acquisition (w/ DSS-14)	09:56:40	08:42:43	02:56:40	PC/N0 (X-34m, S-34m) = 48, 36 dB-Hz
DSS-34: Begin X- & Ka-band 3-Way Acquisition (w/ DSS-14)	09:56:40	08:42:43	02:56:40	PC/N0 (X-34m, Ka-34m) = 48, 48 dB-Hz
Begin 3-Way Free-Space Baseline w/ DSS-14	09:56:40	08:42:43	02:56:40	
DSS-14: Uplink transfer to DSS-34	10:49:00	09:35:03	03:49:00	Uplink transfer from DSS-14 to DSS-34

DSS-34: Uplink transfer, 18 kW, LCP, RAMP, NO SWEEP	10:49:00	09:35:03	03:49:00	Uplink transfer from DSS-14 to DSS-34
DSS-14: End of Track	11:10:00	09:56:03	04:10:00	
DSS-14: End of Post Cal	11:25:00	10:11:03	04:25:00	
RSSG: End DSS-14 Open-Loop Ingress Recordings	11:30:00	10:16:03	04:30:00	
Top of the ionosphere (68,000 km)	11:35:12	10:21:15	04:35:12	No visible real-time effects
Upper Troposphere (~0.02° BA)	11:59:26	10:45:29	04:59:26	S/X/Ka signal intensities quickly drop and scintillate
Loss of 3-Way Ka-band signal (~1.15° BA)	12:17:33	11:03:36	05:17:33	Approximate time; Ka-band downlink signal absorbed
Loss of 2-Way & 3-Way X-band signal (~1.35° BA)	12:20:59	11:07:02	05:20:59	Approximate time; X-band downlink signal absorbed
DSS-45: S-band 1-Way Signal Acquisition	12:22:57	11:09:00	05:22:57	Approximate time; S/C Aux-Osc kicks in
Loss of 1-Way S-band signal (~1.55° BA)	12:24:31	11:10:34	05:24:31	Approximate time; likely loss of all downlink signals
Cassini is behind Saturn as seen from Earth				No downlink signals expected till about 13:52
End of Ingress Noise Baseline	12:53:57	11:40:00	05:53:57	
RSSG: End Canberra Open-Loop Ingress Recordings	12:55:55	11:41:58	05:55:55	
RSSG: Switch Predicts	13:00:00	11:46:03	06:00:00	DSS-34 to 2-Way, DSS-45 to 3-Way w/ DSS-34
RSSG: Start Canberra Open-Loop Egress Recordings	13:20:00	12:06:03	06:20:00	
Start downlink referenced to uplink from DSS-34	13:16:54	12:02:57	06:16:54	RTLTL after U/L transfer to DSS-34; no downlink detectable
Start of Egress Noise Baseline	13:21:57	12:08:00	06:21:57	
Cassini is still behind Saturn as seen from Earth				No downlink signals expected till about 13:52
Start mixed atmosphere/rings egress occultation	13:51:51	12:37:54	06:51:51	Intermittent weak 1-way signals
DSS-45: Begin X- & S-band 3-Way Acquisition (w/ DSS-34)	13:51:51	12:37:54	06:51:51	Likely intermittent DST lock over Ring B
DSS-34: Begin X- & Ka-band 2-Way Acquisition	13:51:51	12:37:54	06:51:51	Likely intermittent DST lock over Ring B
DSS-34: Transmitter OFF	14:02:03	12:48:06	07:02:03	End of DSS-34 uplink period
Top of the troposphere mixed with Ring B	14:13:38	12:59:41	07:13:38	Ring B clear of the troposphere; intermittent DST lock
Ring B Out	14:27:28	13:13:31	07:27:28	Relatively strong signals in the Cassini Division
Top of the ionosphere (~68,000 km)	14:29:27	13:15:30	07:29:27	Ionosphere primarily affects signals' frequency/phase
Ring A In	14:29:58	13:16:01	07:29:58	Detectable signals over most of Ring A
In Mid Encke Gap	14:36:19	13:22:22	07:36:19	Signals are briefly back to full strength
Ring A out	14:38:03	13:24:06	07:38:03	PC/N0 (X34, S34, Ka34) = 48, 36, and 48 dB-Hz
Ring F	14:40:03	13:26:06	07:40:03	Ring F is usually not detectable in real-time
End of 2/3-Way free-space baseline	15:51:04	14:37:07	08:51:04	
Start spacecraft roll to waypoint	15:51:05	14:37:08	08:51:05	
End spacecraft roll to waypoint	16:08:39	14:54:42	09:08:39	
Start egress deadtime	16:09:57	14:56:00	09:09:57	Ingress & egress deadtime located wrongly in the timeline
DSS-34: Enable Monopulse	16:23:00	15:09:03	09:23:00	Enable monopulse only when requested by RS Operations

S-Band and Ka-band OFF	16:28:20	15:14:23	09:28:20	End of RSS3 Op-Mode
TLM ON/RNG ON	16:29:51	15:15:54	09:29:51	End of Rev190 RSS Experiment
End of Rev190 RSS S/C Activities	16:29:57	15:16:00	09:29:57	Spacecraft turn off Earth point
DSS-45 and DSS-34: End of Track	16:45:00	15:31:03	09:45:00	
RSSG: End Canberra Open-Loop Egress Recordings	16:50:00	15:36:03	09:50:00	
DSS-45 and DSS-34: End of Post Cal	17:00:00	15:46:03	10:00:00	

Canberra DSS-34 & DSS-45 related activities

Goldstone DSS-14 related activities

Predicted atmospheric event times are approximate and are based on **Live Update (LUD) OD on Monday May 13, 2013**