

Science Planning & Sequence Team

## SATURN TARGET WORKING TEAM

**Rev 59 Segment Legacy Package** 

Segment Boundary: February 18, 2008 – February 22, 2008 2008-049T11:36:00 – 2008-053T03:51:00 (SCET)

Integration Began 08/04/2003 Segment Delivered to S38 Sequence 08/17/2004 Lead Integrator was Shawn Boll

Legacy Package Assembled by Shawn Boll

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# **Segment Overview and Final Products**

• This was an over 3.5 day long segment in the Prime Mission, mostly inbound to and including periapse, during an inclined orbit. The spacecraft approached Saturn with a view of the northern hemisphere on the lit-side. At periapse, the view was of the southern hemisphere on the dark side of the planet. By the time the segment had ended, the spacecraft again faced the lit-side, with an unobstructed view of the southern hemisphere.

• Inbound, Saturn science included ISS-led ORS polar movies, VIMS regional and polar mapping, and RADAR polar scans.

• Near periapse, VIMS observed solar occultations of both the rings and Saturn's atmosphere. They also looked at the rings at high phase while the sun was occulted by the planet. This geometry required managing the CMT solar viewing constraint limits.

• Outbound, Saturn science included VIMS polar mapping, a VIMS atmospheric stellar occultation, and UVIS limb studies. Observations of Janus and Titan were also performed.

• Because of the timing sensitivity of the VIMS solar occultations and hi-phase ring observation, the integration team made use of a Ground Movable Block. This allowed the flight team to update the timing during sequence development, utilizing the last trajectory update prior to uplink.

## **Final Sequenced SPASS**

Saturn 59 Legacy

	Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
	Sequence S038, length = 36		2008-047T11:51:00	E059_SEQUENCE_038+000T00:00:00	035T13:59:00	2008-083T01:50:00			
	SATURN rev 59 Segment		2008-049T11:36:00		003T16:15:00	2008-053T03:51:00			
	SP_059SA_WAYPTTURN049_PRIME		2008-049T11:36:00		000T00:30:00	2008-049T12:06:00	ISS_NAC to Saturn	NEG_Z to NSP	
	NEW WAYPOINT		2008-049T12:06:00		001T13:30:00	2008-051T01:36:00	ISS NAC to Saturn	NEG Z to NSP	
Gap 1	ISS 059SA POLRMOV03001 PRIME	C, M, U, V	2008-049T12:06:00		000T14:00:00	2008-050T02:06:00	ISS NAC to Saturn	NEG Z to NSP	
•	SP 059EA DLTURN050 PRIME	M	2008-050T02:06:00		000T00:30:00	2008-050T02:36:00	XBAND to Earth	POS_X to NEP	21 min. turn
	SP_059EA_G34BWGOTP050_PRIME	C, M, N	2008-050T02:36:00		000T09:00:00	2008-050T11:36:00	XBAND to Earth	POS_X to NEP	
	SP 059SA WAYPTTURN050 PRIME	M	2008-050T11:36:00		000T00:30:00	2008-050T12:06:00	ISS_NAC to Saturn	NEG Z to NSP	21 min. turn
Gap 2	ISS_059SA_POLRMOV04001_PRIME	C, M, R, U, V	/ 2008-050T12:06:00		000T08:30:00	2008-050T20:36:00	ISS_NAC to Saturn	NEG_Z to NSP	
	SP_059EA_DLTURN450_PRIME	M, R	2008-050T20:36:00		000T00:30:00	2008-050T21:06:00	XBAND to Earth	POS_X to NEP	19 min. turn
	SP_059EA_M70METNON050_PRIME	C, M, R	2008-050T21:06:00		000T03:59:57	2008-051T01:05:57	XBAND to Earth	POS_X to NEP	Shortened duration by 3 seconds for
								_	Telecom because of overlapping commands
	SP_059SA_WAYPTTURN051_PRIME	M, R	2008-051T01:05:57		000T00:30:03	2008-051T01:36:00	ISS_NAC to Saturn (0.0,-20.0,20.0 deg. offset)	POS_X to NSP	21 min. turn
	NEW WAYPOINT		2008-051T01:36:00		000T18:24:00	2008-051T20:00:00	ISS_NAC to Saturn (0.0,-20.0,20.0 deg. offset)	POS_X to NSP	
	VIMS_059SA_REGPOLMAP001_PRIME	M, R	2008-051T01:36:00		000T00:30:00	2008-051T02:06:00	ISS_NAC to Saturn	POS_X to NSP	
	RADAR_059SA_1POLAR001_PRIME	M	2008-051T02:06:00		000T14:20:00	2008-051T16:26:00	NEG_Z to Saturn	NEG_X to Sun	RADAR must control primary and
								-	secondary axes to obtain correct
									polarization. MAG will be accommodated as
									much as possible.
	SP_059NA_DEADTIME051_PRIME		2008-051T16:26:00		000T00:05:00	2008-051T16:31:00	ISS_NAC to Saturn (0.0,-20.0,20.0 deg. offset)	POS_X to NSP	
	VIMS 059RI SOLAROCC001 PRIME	U	2008-051T16:31:02	GMB E059 SATURN SOLAR OCC 1 ING-000T00:54:32	000T00:55:00	2008-051T17:26:02	ISS NAC to Sun (-20.0,0.0,-0.109 deg. offset)	POS X to NSP	UVIS to ride along. Secondary axis for
								_	MAG.
	VIMS 059RI HIPHASE001 PRIME	C, I, M	2008-051T17:26:02	GMB E059 SATURN SOLAR OCC 1 ING+000T00:00:28	000T00:35:00	2008-051T18:01:02	VIMS IR to L ANSA D	POS X to 53.3/50.8	Sun in occultation 1739 - 1838. Secondary
								-	axis for CDA & MAG.
	VIMS 059SA SOLOCC001 PRIME	C, M, U	2008-051T18:01:02	GMB E059 SATURN SOLAR OCC 1 ING+000T00:35:28	000T01:10:00	2008-051T19:11:02	ISS NAC to Sun (-20.0,0.0,-0.109 deg. offset)	POS X to NSP	Joint VIMS/UVIS observation. Secondary
								-	axis for MAG.
	SP_059NA_DEADTIME451_PRIME		2008-051T19:12:00		000T00:28:00	2008-051T19:40:00	ISS_NAC to Saturn (0.0,-20.0,20.0 deg. offset)	POS_X to NSP	
	Periapse R = 3.3 Rs, lat =		2008-051T19:22:48		000T00:00:01	2008-051T19:22:49			
	SP_059SA_WAYPTTURN451_PRIME		2008-051T19:40:00		000T00:20:00	2008-051T20:00:00	ISS_NAC to Saturn	POS_Z to NSP	18 min. turn
	NEW WAYPOINT		2008-051T20:00:00		001T08:21:00	2008-053T04:21:00	ISS_NAC to Saturn	POS_Z to NSP	
	VIMS 059SA REGPOLMAP003 PRIME		2008-051T20:00:00		000T00:45:00	2008-051T20:45:00	ISS NAC to Saturn	POS Z to North Pole Dir	
	ISS_059JA_GEOLOG001_PRIME	C, U, V	2008-051T20:45:00		000T02:15:00	2008-051T23:00:00	CIRS_FP1 to Janus	POS_Z to NSP	ISS will accommodate CIRS
	VIMS_059SA_ALPAUROCC001_PRIME	V	2008-051T23:00:00		000T01:00:00	2008-052T00:00:00	VIMS_IR to 79.172/45.998	POS_Z to NSP	
	UVIS_059SA_LIMBSKIM001_PRIME		2008-052T00:00:00		000T02:06:00	2008-052T02:06:00	UVIS_EUV to Saturn	PIC	
	SP 059EA DLTURN052 PRIME		2008-052T02:06:00		000T00:30:00	2008-052T02:36:00	XBAND to Earth	NEG X to NEP	17 min. turn
	SP_059EA_G34BWGOTB052_PRIME	C, E, M, N	2008-052T02:36:00		000T09:00:00	2008-052T11:36:00	XBAND to Earth	NEG_X to NEP	
	SP_059SA_WAYPTTURN052_PRIME	M	2008-052T11:36:00		000T00:30:00	2008-052T12:06:00	ISS_NAC to Saturn	POS_Z to NSP	
Gap 3	CIRS 059TI COMPMAP001 PRIME	M, V	2008-052T12:06:00		000T06:15:00	2008-052T18:21:00	CIRS_FPB to Titan	NEG Z to NSP	
p 0	SP_059EA_DLTURN452_PRIME		2008-052T18:21:00		000T00:30:00	2008-052T18:51:00	XBAND to Earth	NEG_X to NEP	18 min. turn
	SP 059EA M70METCLS052 PRIME	С	2008-052T18:51:00		000T09:00:00	2008-053T03:51:00	XBAND to Earth	NEG X to NEP	

#### DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)

					OBS	ERVATIO	ON_PERI	DD		   			DOWNLIN	K_PASS			   
		-   				P4			P5	   RECO 	RDED	   		PLAYB	ACK		   
DOWNLINK PASS NAME	Start doy hh:mm	End   doy hh:mm	START (Mb)	SCI (Mb)	HK+E (Mb)	TOTAL (Mb)	CPACTY (Mb)	MRGN (Mb)	OPNAV (Mb)	   SCI   (Mb)	ENGR (Mb)	   TOTAL   (Mb)	CPACTY (Mb)	MARGN (Mb)	NET_M (Mb)	ARGN (%)	CAROVR   (Mb)
SP_059EA_G34BWGOTP050_PRIME SP_059EA_M70METNON050_PRIME SP_059EA_G34BWGOTB052_PRIME SP_059EA_M70METCLS052_PRIME	050 02:36 050 21:06 052 02:36 052 18:51	050 11:36 051 01:05 052 11:36 053 03:51	0 1041 167 2902	1529 963 2258 243	63 40 109 31	1592 2044 2534 3176	3492 3492 3492 3492 3492	1900 1448 958 316	0 0 0 0	233 108 1296 1058	53 24 53 53	1878 2176 3883 4287	837 2009 981 4400	-1042 -167 -2903 112	30 30 30 30 30	08 08 08 08	1041   167   2902   0

#### DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED

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 SP_059EA_G34BWGOTP050_PRIME DAILY TOTAL SCIENCE	049 11:36 050 02:36 049 11:36	050 02:36 050 11:36 050 11:36	54.0 32.4 86.4	11.8 7.1 18.8	201.6 86.4 288.0	2.7 1.6 4.3	273.0 0.0 273.0	32.4 19.4 51.8	55.3 38.9 94.2	0.0 0.0 0.0	70.7 42.4 113.2	253.6 2.5 256.1	560.0 0.0 560.0	0.0 0.0 0.0	12.3 15 0.0 2	527.4 230.7
OBSERVATION_NOR SP_059EA_M70METNON050_PRIME DAILY TOTAL SCIENCE	050 11:36 050 21:06 050 11:36	050 21:06 051 01:05 051 01:05	34.2 14.4 48.6	7.5 4.1 11.6	122.4 43.2 165.6	1.7 0.7 2.4	168.0 0.0 168.0	20.5 8.6 29.2	41.0 17.3 58.3	0.0 0.0 0.0	44.8 18.9 63.7	154.0 0.0 154.0	360.0 0.0 360.0	0.0 0.0 0.0	7.8 0.0	961.9 107.2
OBSERVATION_NOR OBSERVATION_SI SP_059EA_G34BWGOTB052_PRIME DAILY TOTAL SCIENCE	051 01:05 051 01:05 052 02:36 051 01:05	052 02:36 052 02:36 052 11:36 052 11:36	91.8 0.0 32.4 124.2	64.3 0.0 9.6 73.9	40.8 0.0 86.4 127.2	12.4 0.0 1.6 14.0	209.3 0.0 0.0 209.3	107.0 0.0 19.4 126.5	98.7 0.0 38.4 137.0	275.9 0.0 0.0 275.9	674.6 0.0 1093.6 1768.2	299.9 0.0 2.5 302.3	362.5 0.5 0.0 363.0	0.0 0.0 0.0 0.0	20.8 22 0.0 0.0 12	258.0 0.5 283.9
OBSERVATION_NOR SP_059EA_M70METCLS052_PRIME DAILY TOTAL SCIENCE	052 11:36 052 18:51 052 11:36	052 18:51 053 03:51 053 03:51	26.1 320.8 346.9	7.8 17.0 24.8	90.0 86.4 176.4	1.3 1.6 2.9	0.0 0.0 0.0	15.7 64.0 79.7	30.0 58.3 88.3	0.0 0.0 0.0	34.2 497.6 531.8	0.0 2.5 2.5	36.0 0.0 36.0	0.0 0.0 0.0	5.9 2 0.0 10	247.0 048.2

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## Segment Geometry (1 of 2)

Saturn 59 Legacy

-       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -	2008 FEB 19.8° field	18 11 d of vie	:36:00	CASSINI UTC	N						+ <b>V</b>	EN	CELADUS	5	<pre>tev 059 IN 2008 - 049 2008 FEB 18 200</pre>	BOUND T11:36:0 11:36:0 12:44:5 9 + 0035 9 - 0025 69:0 d: 12:0 320401 3 067694 3 776845 3 33:5	00 SCET 00 SCET 07 ERT 16:12:2 07:46:5 0 min 0 days 0 days 0 min 0 days 0 min	0 9 21.91 Rs 17.72 Rs 12.89 Rs	+	S	eg S	Stai	rt (
Color System Simulator v4.0       Dec       10.9 of deg S.0 meta         Point NEG_Y O at SATURN O and align POS.X O = Up O with NSP O Conserse R.P. 0.000 RB       Dec       -10.4 31 deg         User vector - RA:       +62.168       TitL Up TitR       Zoom Out O Labels O Axes       Year I + Mout         DEC +11.204       Left Reset Right       FII Screen       Orbits O Vectors       Month I + Mout         Paste Current RA/DEC       Image Down O H H Res       Zoom I POVS O Lations       Day I + Mout       Secon         Soft R to 10.9 21.9 1 (262121)       20.44 55.4 5.23       91.32 164 36       0.4.5       0       0.01 127.0 43.9         MIXAB 1307168       21.49 1 (262221)       20.44 55.4 5.23       91.32 164 36       0       4.5       0       0.01 127.0 43.9         MIXAB 1307168       21.49 1 (26232 1 7.26 44.2 10.01 2.25 32 2.2 -79       7.4       -5121 11.5 126.7 5.3       0       0.01 127.0 43.9         MIXAB 1307168       21.49 1 (26232 1 7.26 44.2 0.01 0.15 2.2 5 3.5 0.4 -512 3 11.5 126.7 5.3       0       0.00 127.0 43.9       0.01 127.0 43.9         MIXAB 1307168       21.49 1 (26232 1 7.26 44.2 10.01 0.15 2.2 5 3.5 0.4 -512 3 11.5 126.7 5.3       0       0.00 127.0 43.9       0.00 127.0 43.9         MIXAB 1307168       23.772 45.5 1.4 5.23 91.3 2.2 125 1.5 1.5 0.6 0.4 7.7       0.1 12.8 97.7 1	-z _	-					Ê	Sr	TURN				- +	-Z 1	Semi_axs 1 Sccentricit Inclination Sun_range Earth_range DSN ELE Soldstone Canberra Madrid	010564 3 y 0.8 47.0 9.2 8.2 V D/1 27.5 35.6 -38.2	m 105 11 deg 17 AU 19 AU 19 AU 13 U/L 13 -3 13 -27.6	16.77 Rs		P	eria	pse	<b>) (</b>
Schor System Simulator v4 0       Sec       -30.430 Big Goodese RF = 0.000 Big Ess Big F = 0.0413 deg Goodese RF = 0.0780 deg SEP = 173.434 deg ORS rad angle 126.5 deg ORS rad angle 126.5 deg ORS rad angle 126.5 deg ORS rad angle 127.8 deg         User vector - RA: 42.168       Tit L       Up       Tit R       Zoom Out I       Labels I X vectors       Year       Image Down       Hour Muntue         Paste Current RA/DEC       Image Down I       H HRs       Zoom In III FOVS       Lat/Ions       Year       Image Down       Encertain III / Ions       Secon         Turn analyzer:       SATURN III to EARTH III and Mark III / Ions       Zoom IIII III / Ions       Zoom IIII / Ions       Jule III / Ions       Secon         BOOY       OCC7 OCC7 (Km) (Re)       MARK IIII / Ions       Audite DIAMETER SUB S/C ALON VEEL IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII				v /			•		-						100 100	19.8 167.0	deg 3	45.8 mrad	View of SATURN	from CASSINI			NER
Solor System Simulator v4.0       Crosses P.P. 6       0.000 Rs         Point NEG, Y et al. SATURN © and align POS, X © = Up © with NSP       Disk by angle 126.5 deg         Nors rad angle 127.8 deg         User vector - RA: +62.188       Tit L       Up Tit R         Dec +11.204       Left Reset Right       Fill Screen © Orbits © Vectors       Month ← Minute         Dec +11.204       Left Reset Right       Fill Screen © Orbits © Vectors       Month ← Minute         Day ← Sccore       Saturn 0       to EARTH © about Z © on RWA © 12.4 min/127.0 deg       Even         Turn analyzer:       SATURN © to EARTH © about Z © on RWA © 2 - 12.4 min/127.0 deg       Even       ANGLE PROM         Saturns       132001       21.91       1262121       20.44       53.4       5.23       92.132       12.4       10.0       122.6       43.9         Saturns       132001       21.91       1262231       2.42       64.9       0.03       123.3       12.5       12.6       13.0.5       51.6         Dicone       104084       17.27       10487223       12.2.5       13.0.5       12.6       13.0.5       51.6       0       0.0       122.6       43.1       10.0         Rinka       1040845       12.77       13.0.5       12															DEC	-30.4	13 deg		112.1° field of	view	-V		
Color System Simulator v& 0       Exp       177.143 dag         Point NEG,Y © at SATURN © and align POS,X © = Up © with NSP © ons rad angle 127.8 deg       Gos b's angle 127.8 deg         User vector - RA: +62.168       Tilt L Up Tilt R       Zoom Out © Labels © Axes       Year → Hour         DEC +111.204       Left Reset Right       Fill Screen © Orbits © Vectors       Month → → Secon         Zoom In © FOVs © Latrions       Zoom In © FOVs © Latrions       Secon         BODY       Occ 7 OCC7       (km)       (km)       ARGLE PROM         BODY       OCC 7 OCC7       (km)       (km)       Sature Rame       Rame         SATURN = 1320001       21.91       1262321       20.94       53.4       5.23       91.32       164 36       0       4.5       0       0.0       127.0       43.9         NTMAS       1020018       21.91       1262321       20.24       53.4       5.23       91.3       21.45       9.9       -2.784       21.15       156.0       46.7         DCOS       OCC 7 OCC7       (km)       (km)       10.94       53.4       5.23       91.32       164 36       0       4.5       0       0.0       127.0       43.9         DCOS       OCC 7 OCC7       (km)       10.05<							500		ŜΕΡ –						rosses_RP_	.0.0	00 Rs						
Point       NEG_Y       © at SATURN       © and align       POS.X       © UP       • with       NSP       ©       OBS       b/s       angle       127.5       deg         User       vector       - RA:       +62.168       Tilt L       UP       Tilt R       Zoom Out       C       Labels       Axes       Per < Por       Po	Solar Syst	tem Sir					554								IEP	173.3	143 deg						
Wolf       WEG.Y       a       SALURN       a       SALURN       a       SALURN       a       OBS       red angle 127.8 deg         User vector - RA:       H62.168       Tilt L       Up       Tilt R       Zoom Dut       Labels       Axes       Year       Hour       Hour         DEC       +11.204       Left       Reset       Right       Fill Screen       Orbits       Vectors       Month       Hour       Minute         Paste Current RA/DEC       Image       Down       Hilkes       Zoom In       FOVs       Lat/Inons       Day       Secon         Soft C       Sac       RAMME       AXETTUDE       PHAME       ANCLAPINEER       SUB_ofC       ALON       VARLE       Z HOM       ANCLE FROM         BODY       Occ       AXC       Max       Geg       Nack       Geg       Nack       Kann       SACTINE       SACTINE       RAM       Nack       Hour       ANCLE FROM         BODY       Occ       ACC Sac       RAME       ANCLAPINEER       SUB_ofC       ALON       VARLE       Z HOM       ANCLE FROM       RAM       Hour		0 X		. COATUR				X A	114			NOD			ORS b/s ang	le 126.9	deg						
User vector - RA: +62.168 DEC +11.204 Paste Current RA/DEC Turn analyzer: SATURN © to EARTH © about Z © on RWA © = 12.4 min / 127.0 deg Even DOV SATURN = 1320401 21.91 1262121 20.94 53.4 5.23 91.32 164 36 0 4.5 0 0.0 127.0 43.9 SATURN = 2310293 83.33 200724 38.29 58.6 0.13 0.25 53.6 0.15 0.15 275 -36 59.5 -59 3.8 -59090 122.8 63.7 110.2 SATURN = 2300293 63.33 200724 38.29 58.6 0.13 0.25 51 5 -5 5.3 -5 5.3 -59 3.8 -59090 122.8 63.7 110.2 SATURN = 1320401 21.91 1262121 20.94 53.4 5.23 91.32 164 36 0 4.5 0 0.0 127.0 43.9 EVEN = - 166555 12.27.1 1262122 12.9 4.53.4 5.23 91.32 164 36 0 4.5 0 0.0 127.0 43.9 EVEN = - 166555 12.27.1 1262223 17.26 64.4 0.06 1.00 171 48 6 5 9.0 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 55.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.3 -57 12.5 115.5 126.7 15.5 -55 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57 12.5 -57		0_1		. Onioi			gii (100		- (00			1101			ORS rad ang	1e 127.8	deg						
Paste Current RA/DEC       Ø Image       Down       Ø Hi Res       Zoom In       Ø FOVs       Ø Lat/Ions       Day       Ø Secon         Turn analyzer:       SATURN       © to       EARTH       © about       Z       o n       RWA       © 12.4 min / 12Z0 deg       Even       Image       Image       Image       Even       Image       Even       Image       Even       Image       Even       Image       Image       Image       Image	User vector	- RA: DEC	+62.	168 204	Tilt L	Up	Tilt	R	Zoom Fill Sc	Out		abels. Drbits	Axes	s tors I	Year 属 Month 属			Hour Minute	User		Con .		
Turn analyzer:       SATURN       O       DEARTH       O       about       Z       O       RWA       O       12.4 min / 127.0 deg       Even	Paste	Curren	t RA/D	FC		e Down	🛛 🔽 Hi	Res	Zoor	n In	FOV	s	Lat/	lons	Day 🔳			Secon					-
Turn analyzer:       SATURN       ©       to       EARTH       ©       about       Z       ©       m       ©       12.4 min / 127.0 deg       Even       Image: Control of the contrel of the control of the control of the control of th	1 4010	Garren	c ia qu		- mag								u cui		, C				-z				Ð
S/C         BAT         RANGE         ALTITUDE         PHASE         ANGLE_DIAMETER         SUB_S/C         ALON         VREL         Z.HOHT         ANGLE_FROM           BODY         OCC7         OCC7         (km)         (Rm)         (Rm) <td< th=""><th>Turn analyze</th><th>er: SA</th><th>TURN</th><th>&lt;</th><th>to EA</th><th>RTH</th><th>ᅌ abo</th><th>out Z</th><th>🗢 o</th><th>n RWA</th><th>&lt;</th><th>) = 1</th><th>12.4 min</th><th>/ 127.0 de</th><th>g</th><th>Even</th><th>4 Þ</th><th></th><th></th><th></th><th></th><th>X</th><th></th></td<>	Turn analyze	er: SA	TURN	<	to EA	RTH	ᅌ abo	out Z	🗢 o	n RWA	<	) = 1	12.4 min	/ 127.0 de	g	Even	4 Þ					X	
BODY       OCC7       OCC7       OCC7       ICR1       (R8)       (R8)       (deg)       (deg)       LON       LAT       (deg)       (km)       SATUR       EARCH       RAM         SATURE         1320401       21.91       1262121       20.44       53.4       5.23       91.32       164       36       0       4.5       0       0.0       10.70       43.9         SATURE        13106913       21.69       49.4       0.02       0.35       325       32       -132       12.2       -7       7.9       134.2       48.9         ENCELADUS         161085       39.77       160554       10.62       0.02       0.35       325       32       -132       12.2       -7       7.9       134.2       48.9         DIONE        1061084       17.7       160554       10.26       0.46       0.06       11.46       9.0       -57       12.5       16.6       0.46       7         REAR         102027       16.33       12.23       19       20       142       9.8       -2789       24.3       122.0       20.4		s/c	SAT	RAN	GE	ALTIT	UDE	PHASE	ANGLR D	IAMETER	SUB	s/c	ALON	VREL	Z HGHT	ANG	LE F	ROM			ENC	ELADL	
SATURN 1320401 21.91 1262121 20.94 53.4 5.23 91.32 164 36 0 4.5 0 0.0 127.0 43.9 MIMAS 1307168 21.69 1306973 21.99 49.4 0.02 0.33 325 32 -132 12.2 -7 7,7 9 134.2 48.9 MIMAS 1462121 42.64 1661978 24.24 64.62 0.02 0.33 325 32 -132 12.2 -7 7,7 9 134.2 48.9 TETHYS 1161085 19.27 1160554 19.26 54.6 0.05 0.93 23 42 -39 7.4 -5121 11.5 126.7 55.3 DIONE 1021057 16.94 102023 16.93 74.9 0.09 1.50 130 50 29 9.4 -2784 21.5 116.0 48.7 RIREA 2002346 33.22 200223 33.22 84.5 0.13 2.23 19 20 142 9.8 -3789 22.4 3 122.0 20.4 HYPERION 2002366 42.49 250012 42.48 135.7 0.03 0.58 5 19 -3 3.8 -5430 91.32 164 36 0 4.5 0 0.0 127.0 43.9 PHODEE 1444850 239.74 14449736 239.74 79.0 0.00 0.02 354 -21 -62 5.8 6697248 122.8 99.7 150.8 SATURN 1320401 21.91 1262121 20.94 53.4 5.23 91.32 164 36 0 4.5 0 0.0 127.0 43.9 MIME 1320401 21.91 1262121 20.94 53.4 5.23 91.32 164 36 0 4.5 0 0.0 127.0 43.9 MIME 2500240 21.91 1262121 20.94 53.4 5.23 91.32 164 36 0 4.5 0 0.0 127.0 43.9 MINDEE		0002	OCC?	(km)	(Rs)	(km)	(Rs)	(deg)	(deg	mrad)	LON	LAT	(deg)	(km/s)	(km)	SATRN	EARTH	RAM					
ARUKAN	BODY	00001			21.01	1262121	20.04	6.2 A	6 22	01 22	164	26		A 6			127.0	42.0					
ENCLUAUS	BODY			1320601	2			2214	0.00	0.32	268	36	-79	10.4	-4078	8.0	130.9	51.6					4.0
TETTYS 1161085 19.27 1160554 19.26 33.6 0.05 0.93 233 42 -39 7.4 -5121 11.5 126.7 55.3 DICOME 1040414 17.27 1040252 17.26 64.4 0.06 1.08 171 48 6 9.0 -57 12.5 116.0 48.7 RIERA 1021037 16.94 102023 16.93 74.9 0.09 1.50 130 50 29 9.4 -2784 21.5 105.5 42.0 RITYPERTON2200346 33.22 200223 33.22 84.5 0.01 0.16 27.36 96 9.6 -24873 43.4 96.1 16.3 LAPETUS 2200365 42.42 2050122 42.48 135.7 0.03 0.58 5 19 -9 3.8 6-597248 122.8 43.7 140.2 PHODERE 14448950 239.74 14448736 239.74 79.0 0.00 0.02 354 -21 -62 5.8 6697248 122.8 99.7 150.8 SATURN 1320401 21.91 1262121 20.94 53.4 5.23 91.32 164 36 0 4.5 0 0.0 127.0 43.9 TTIL UP Left Resel Paste Current RA/DEC	BODY SATURN MIMAS			1320401	21.91	1306973	21,69	49.4	0.02							7.9	134.2	49.0					and the second second
DODE        1040814       17.27       1040222       17.26       64.4       0.06       1.08       17.4       48       6       9.0       -57       12.5       115.0       48.7         RIEA	BODY SATURN MIMAS ENCELADUS			1320401 1307168 1462231	21.69 24.26	1306973 1461978	21.69 24.26	49.4 46.2	0.02	0.35	325	32	-132	12.2	-/			40.9					
RIREA         1021057       16.94       1020293       16.93       74.9       0.09       1.50       130       20       29       9.4      2784       21.5       105.5       42.0         TCTAN        -2210297       18.33       2007243       38.29       58.6       0.13       22.23       19       20       142       9.6      3789       24.3       122.0       20.4       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       125.0       105.5       42.0       105.0       16.0       105.5       42.0       125.0       125.0       16.0       125.0       125.0       16.0       105.5       42.0       16.0       125.0       125.8	BODY SATURN MIMAS ENCELADUS TETHYS			1320401 1307168 1462231 1161085	21.91 21.69 24.26 19.27	1306973 1461978 1160554	21.69 24.26 19.26	49.4 46.2 53.6	0.02	0.35	325 233	32 42	-132	12.2	-5121	11.5	126.7	55.3					
TITAN	BODY SATURN MIMAS ENCELADUS TETHYS DIONE			1320401 1307168 1462231 1161085 1040814	21.91 21.69 24.26 19.27 17.27	1306973 1461978 1160554 1040252	21.69 24.26 19.26 17.26	49.4 46.2 53.6 64.4	0.02 0.05 0.06	0.35 0.93 1.08	325 233 171	32 42 48	-132 -39 6	12.2 7.4 9.0	-5121 -57	11.5 12.5	126.7	55.3 48.7					
HYPERENS 2002346 33.22 2002223 33.22 84.5 0.01 0.16 275 -36 96 9.6 -24873 43.4 96.1 16.3 TAPETUS 256056 42.49 256012 42.48 135.7 0.03 0.58 5 19 -9 3.8 -59090 122.8 43.7 10.2 PHOEBE 1444850 239.74 1444736 239.74 79.0 0.00 0.02 354 -21 -62 5.8 6697248 122.8 43.7 150.8 SATURN 1320401 21.91 1262121 20.94 53.4 5.23 91.32 164 36 0 4.5 0 0.0 127.0 43.9 HOLD EC +11.204 DEC +11.204 DEC +11.204 DEC +11.204 DEC +11.204 DEC +11.204 DEC +11.204	BODY SATURN MIMAS ENCELADUS TETHYS DIONE RHEA			1320401 1307168 1462231 1161085 1040814 1021057	21.91 21.69 24.26 19.27 17.27 16.94	1306973 1461978 1160554 1040252 1020293	21.69 24.26 19.26 17.26 16.93	49.4 46.2 53.6 64.4 74.9	0.02 0.05 0.06 0.09	0.35 0.93 1.08 1.50	325 233 171 130	32 42 48 50	-132 -39 6 29	12.2 7.4 9.0 9.4	-5121 -57 -2784	11.5 12.5 21.5	126.7 116.0 105.5	48.9 55.3 48.7 42.0					1
IAPETUS         2560856       42.49       2560112       42.48       135.7       0.03       0.58       5       19       -9       3.8       -54090       122.8       43.7       140.2         PHOEBE         14448950       239.74       14448736       239.74       79.0       0.00       0.02       354       -21       -62       5.8       6697248       122.8       99.7       150.8         SATURN         1320401       21.91       1262121       20.94       53.4       5.23       91.32       164       36       0       4.5       0       0.0       127.0       43.9         User vector - RA:       +62.168       User vector - RA:       +62.168       Tilt L       Up         DEC       +11.204       User vector - RA:       +62.168       Vector - RA:       +62.168       Vector - RA:       +62.168       Vector - RA:       West vector - RA:       +62.168       Vector - RA:       +62.168       Vector - RA:       West vector - RA:       West vector - RA:       +62.168       Vector - RA:       West vector	BODY SATURN MIMAS ENCELADUS TETHYS DIONE RHEA TITAN		    	1320401 1307168 1462231 1161085 1040814 1021057 2310299	21.91 21.69 24.26 19.27 17.27 16.94 38.33	1306973 1461978 1160554 1040252 1020293 2307724	21.69 24.26 19.26 17.26 16.93 38.29	49.4 46.2 53.6 64.4 74.9 58.6	0.02 0.05 0.06 0.09 0.13	0.35 0.93 1.08 1.50 2.23	325 233 171 130 19	32 42 48 50 20	-132 -39 6 29 142	12.2 7.4 9.0 9.4 9.8	-5121 -57 -2784 -3789	11.5 12.5 21.5 24.3	126.7 116.0 105.5 122.0	40.9 55.3 48.7 42.0 20.4			SEP		II RGEOR
PHODERE         14448950       239.74       14448736       239.74       79.0       0.00       0.02       354       -21       -62       5.8       6697248       122.8       99.7       150.8       Point       POS_X       © at       SATURN       © and at         SATURN         1320401       21.91       1262121       20.94       53.4       5.23       91.32       164       36       0       4.5       0       0.0       127.0       43.9       User vector - RA:       +62.168       Tilt L       Up         Left       Reset       Paste Current RA/DEC       @ Image       Dowr	BODY SATURN MIMAS ENCELADUS TETHYS DIONE RHEA TITAN HYPERION		    	1320401 1307168 1462231 1161085 1040814 1021057 2310299 2002346	21.91 21.69 24.26 19.27 17.27 16.94 38.33 33.22	1306973 1461978 1160554 1040252 1020293 2307724 2002223	21.69 24.26 19.26 17.26 16.93 38.29 33.22	49.4 46.2 53.6 64.4 74.9 58.6 84.5	0.02 0.05 0.06 0.09 0.13 0.01	0.35 0.93 1.08 1.50 2.23 0.16	325 233 171 130 19 275	32 42 48 50 20 -36	-132 -39 6 29 142 96	12.2 7.4 9.0 9.4 9.8 9.6	-5121 -57 -2784 -3789 -24873	11.5 12.5 21.5 24.3 43.4	126.7 116.0 105.5 122.0 96.1	55.3 48.7 42.0 20.4 16.3	Solar System Si		SEP		II RSEOR
SATURN 1320401 21.91 1262121 20.94 53.4 5.23 91.32 164 36 0 4.5 0 0.0 127.0 43.9 User vector - RA: +62.168 Tilt L Up DEC +11.204 Left Reset Paste Current RA/DEC @ Image Dowr	BODY SATURN MIMAS ENCELADUS TETHYS DIONE RHEA TITAN HYPERION IAPETUS		     	1320401 1307168 1462231 1161085 1040814 1021057 2310299 2002346 2560856	21.91 21.69 24.26 19.27 17.27 16.94 38.33 33.22 42.49	1306973 1461978 1160554 1040252 1020293 2307724 2002223 2560112	21.69 24.26 19.26 17.26 16.93 38.29 33.22 42.48	49.4 46.2 53.6 64.4 74.9 58.6 84.5 135.7	0.02 0.05 0.06 0.09 0.13 0.01 0.03	0.35 0.93 1.08 1.50 2.23 0.16 0.58	325 233 171 130 19 275 5	32 42 48 50 20 -36 19	-132 -39 6 29 142 96 -9	12.2 7.4 9.0 9.4 9.8 9.6 3.8	-7 -5121 -57 -2784 -3789 -24873 -94090	11.5 12.5 21.5 24.3 43.4 122.8	126.7 116.0 105.5 122.0 96.1 43.7	40.9 55.3 48.7 42.0 20.4 16.3 140.2	Solar System Si	mulator, v4.0	SEP		II Reext
DEC +11.204 Left Reset Paste Current RA/DEC Vinage Down	BODY SATURN MIMAS ENCELADUS TETHYS DIONE RHEA TITAN HYPERION IAPETUS PHOEBE			1320401 1307168 1462231 1161085 1040814 1021057 2310299 2002346 2560856 14448850	21.91 21.69 24.26 19.27 17.27 16.94 38.33 33.22 42.49 239.74	1306973 1461978 1160554 1040252 1020293 2307724 2002223 2560112 14448736	21.69 24.26 19.26 17.26 16.93 38.29 33.22 42.48 239.74	49.4 46.2 53.6 64.4 74.9 58.6 84.5 135.7 79.0	0.02 0.05 0.06 0.09 0.13 0.01 0.03 0.00	0.35 0.93 1.08 1.50 2.23 0.16 0.58 0.02	325 233 171 130 19 275 5 354	32 42 48 50 20 -36 19 -21	-132 -39 6 29 142 96 -9 -62	12.2 7.4 9.0 9.4 9.8 9.6 3.8 5.8	-7 -5121 -57 -2784 -3789 -24873 -94090 6697248	11.5 12.5 21.5 24.3 43.4 122.8 122.8	126.7 116.0 105.5 122.0 96.1 43.7 99.7	55.3 48.7 42.0 20.4 16.3 140.2 150.8	Solor System Si Point POS_X	mulalor v4 0	SEP	ᅌ and alig	n PO
Paste Current RA/DEC SI mage Down	BODY SATURN MIMAS ENCELADUS TETHYS DIONE RHEA TITAN HYPERION IAPETUS PHOEBE SATURN			1320401 1307168 1462231 1161085 1040814 1021057 2310299 2002346 2560856 14448850 1320401	21.91 21.69 24.26 19.27 17.27 16.94 38.33 33.22 42.49 239.74 21.91	1306973 1461978 1160554 1040252 1020293 2307724 2002223 256012 14448736	21.69 24.26 19.26 17.26 16.93 38.29 33.22 42.48 239.74 20.94	49.4 46.2 53.6 64.4 74.9 58.6 84.5 135.7 79.0 53.4	0.02 0.05 0.06 0.09 0.13 0.01 0.03 0.00 5.23	0.35 0.93 1.08 1.50 2.23 0.16 0.58 0.02 91.32	325 233 171 130 19 275 5 354 164	32 42 48 50 20 -36 19 -21 36	-132 -39 6 29 142 96 -9 -62 0	12.2 7.4 9.0 9.4 9.8 9.6 3.8 5.8 4.5		11.5 12.5 21.5 24.3 43.4 122.8 122.8 122.8	126.7 116.0 105.5 122.0 96.1 43.7 99.7 127.0	48.9 55.3 48.7 42.0 20.4 16.3 140.2 150.8 43.9	Solor System Si Point POS_X User vector - RA:	at SAT	URN Tilt L	<ul> <li>and alig</li> <li>Up</li> </ul>	in PO
Paste Current RA/DEC 🗹 Image Down	BODY SATURN MIMAS ENCELADUS TETHYS DIONE RHEA TITAN HYPERION IAPETUS PHOEBE SATURN		       	1320401 1307168 1462231 1161085 1040814 1021057 2310299 2002346 2560856 14448850 1320401	21.91 21.69 24.26 19.27 17.27 16.94 38.33 33.22 42.49 239.74 21.91	1306973 1461978 1160554 1040252 1020293 2307724 2002223 2560112 14448736 1262121	21.69 24.26 19.26 17.26 16.93 38.29 33.22 42.48 239.74 20.94	49.4 46.2 53.6 64.4 74.9 58.6 84.5 135.7 79.0 53.4	0.02 0.05 0.06 0.09 0.13 0.01 0.03 0.00 5.23	0.35 0.93 1.08 1.50 2.23 0.16 0.58 0.02 91.32	325 233 171 130 19 275 5 354 164	32 42 48 50 20 -36 19 -21 36	-132 -39 6 29 142 96 -9 -62 0	12.2 7.4 9.0 9.4 9.8 9.6 3.8 5.8 4.5	-/ -5121 -57 -2784 -3789 -24873 -94090 6697248 0	11.5 12.5 21.5 24.3 43.4 122.8 122.8 0.0	126.7 116.0 105.5 122.0 96.1 43.7 99.7	48.7 42.0 20.4 16.3 140.2 150.8 43.9	Solar System Si Point POS_X User vector - RA:	mulotor v4 0 ♀ at SAT +62.168 +11.204	URN Tilt L	<ul> <li>and alig</li> <li>Up</li> <li>Resot</li> </ul>	in PO
	BODY SATURN MIMAS ENCELADUS TETHYS DIONE RHEA TITAN HYPERION IAPETUS PHOEBE SATURN		     	1320401 1307168 1462231 1161085 1040814 1021057 2310299 2002346 2560856 14448850 1320401	21.69 24.26 19.27 17.27 16.94 38.33 33.22 42.49 239.74 21.91	1306973 1461978 1160554 1040252 1020293 2307724 2002223 2560112 14448736 1262121	21.69 24.26 19.26 16.93 38.29 33.22 42.48 239.74 20.94	49.4 46.2 53.6 64.4 74.9 58.6 84.5 135.7 79.0 53.4	0.02 0.05 0.06 0.09 0.13 0.01 0.03 0.00 5.23	0.35 0.93 1.08 1.50 2.23 0.16 0.58 0.02 91.32	325 233 171 130 19 275 5 354 164	32 42 48 50 20 -36 19 -21 36	-132 -39 6 29 142 96 -9 -62	12.2 7.4 9.0 9.4 9.6 3.8 5.8 4.5	/ -5121 -57 -2784 -3789 -24873 -94090 6697248	11.5 12.5 21.5 24.3 43.4 122.8 122.8 0.0	126.7 116.0 105.5 122.0 96.1 43.7 99.7	48.7 42.0 20.4 16.3 140.2 150.8 43.9	Solor System Si Point POS_X User vector - RA: DEC	at SAT +62.168 +11.204	URN Tilt L Left	<ul> <li>and alig</li> <li>Up</li> <li>Reset</li> </ul>	in PO

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	21.91	53.4	36
Periapse	3.27	149.7	-21
Segment End	15.98	17.7	-7



## below)

User _ -2	of	9:22:48 New	в отс -У		NCELADL	HPR 1	Ð	NEP			MI	MAS	+Z	2008 - 053 2008 FEB 22 2008 FEB 20 2008 FE	NBOUND 2 1719:22:4 0 29:31: 59 + 0055 59 - 00: : 69.0 0: 197194 3 197194 3 197194 3 197194 3 1015522 3 y 0.6 n 47.0 9.2 8.2 EV - D/1	8 SCET 18 SCET 17 ERT 123:59:0 00:11 0 min 14 days 18 10 10 10 10 10 10 10 10 10 10	8 3.27 Rs 3.06 Rs -1.15 Rs 16.85 Rs
							C.	DI	ONE					Goldstone	-43.3	-34.7	
							34	CI URINE .	HYPERIO	N				Canberra	-5.1	20.6	
						1.								LOC	OK DIRECT	ION INF	° 0
						OB CONTRACT	ARS							FOV	112.1	deg 19	55.9 mrad
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Solor System	n Sir													SEP	175.0	i83 deg	
										_	-						
		the second second			1000								100	ORS b/s and	gle 30.3	deg	
Point POS_X	<	۵ ا	at SATUR	RN	ond ali	gn POS	6_X 🜔	= Up	0	with	NSP		0	ORS b/s and ORS rad and	gle 30.3 gle 118.6	deg deg	
Point POS_X	K RA:	+62	at SATUF	RN Tilt L	and ali	gn POS	S_X ᅌ	= Up Zoor	n Out	with	NSP Label	s 💟 Axe	is	ORS b/s and ORS rad and Year	gle 30.3 gle 118.6	deg deg	Hour
Point POS_X User vector - R DI	RA:	+62 +11.	at SATUF .168 .204	Tilt L Left	and all	ign POS Til	S_X ᅌ	= Up Zoor Fill S	n Out creen	with	NSP Label Orbits	s 💟 Axe	es ctors	ORS b/s and ORS rad and Year Month	gle 30.3 gle 118.0	deg deg	Hour Minute
Point POS_X User vector - R Di Paste Cu	K RA: EC	+62 +11. ht RA/D	at SATUF .168 .204 DEC	Tilt L Left	<ul> <li>and all</li> <li>Up</li> <li>Reset</li> <li>ge</li> <li>Down</li> </ul>	ign POS	S_X 📀 It R ght Ii Res	= Up Zoor Fill S Zoo	n Out creen m In	with	NSP Label Orbits Vs	s 🗹 Axe s 💟 Vec 💟 Lat,	es etors /lons	Vear Month Day	gle 30.3 gle 118.0	deg deg	Hour Minute Secon
Point POS_X User vector - R Di Paste Cu Turn analyzer:	KA:	+62 +11. ht RA/D	at SATUF .168 .204 DEC	Tilt L Left	and ali Up Reset ge Down	ign POS	S_X O	= Up Zoor Fill S Zoo	n Out creen m In	with	NSP Label Orbits /s	s 🗹 Axe s 💟 Vec v Lat	Stors /lons	Vear Month Day	gle 30.3 gle 118.6	deg deg	Hour Minute Secon
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Point POS User vector - R Di Paste Cu Turn analyzer: BODY C SATURN MIMAS ENCELADUS	CRA: EC Urren SA S/C OCC?	+62     +11.     ATURN     SAT     occ?	at SATUF .168 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .2	Tilt L Left Image to E/ (Rs) 3.27 4.33 6.60	and all     Up     Reset     Down     ARTH <u>ALTI17     (km)     137663     260884     397472     1000 </u>	gn POS Til : Ris : Ris : 2 H : 2 H	S_X ○ It R ght li Res bout Z PHASE (deg) 149.7 134.6 140.5	= Up Zoor Fill S Zoo € ANGLR_ (deg 35.59 0.09 0.07	on Out creen m In on RWA DIAMETER mrad) 621.20 1.59 1.29	with	NSP Label: Orbits /s = 	s 🗹 Ахе s 🗸 Vec v Lat, 5.2 min / (deg) 0 -85 135	Control Con	ORS b/s and ORS rad and Year Month Day z_HGHT (km) 0 3272 221	Jle 30.: Jle 118.6 Even SATRN 0.0 45.6 26.9	i deg i deg	Hour Minute Secon RAM 90.0 92.9 80.8
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Point POS.) User vector - R Di Paste Cu Turn analyzer: BODY 6 SATURN MIMAS ENCELADUS ENCELADUS TETHYS DIONE BHEA	RA: C EC SA SA SA SA C C C C C C C C C	+62 +11.      tr RA/D      ATURN      SAT     occ?	at SATUF 168 204 DEC RAN (Xm) 197194 26106 397727 192345 539810 350582	Tilt L Left Image to E/ (Rs) 3.27 4.33 6.60 3.19 8.96 5.82	and all     Up     Reset     pe     Down     ARTH <u></u>	ign POS Till Rig ✓ H ♥ H ♥ at VUDE (Rs) 2.28 4.33 6.60 3.18 8.895 5.80	S_X C t R ght fi Res pHASE (deg) 149.7 134.6 140.5 61.8 157.6 7.7	= Up Zoor Fill S Zoo ANGLR (deg 35.59 0.07 0.32 0.12 0.22	on Out creen m In 000 RWA 01AMETER mrad) 621.20 1.29 5.62 2.09 4.38	with	NSP Label: Orbits /s = 	s 🗸 Axe s 🗸 Vec s Lat, 5.2 min / (deg) 0 -85 135 36 -142 2	C S S S S S S S S S S S S S	ORS b/s ang ORS rad ang Year Month Day 2_HGHT ) (km) 0 3272 21 -2822 500 2612	gle 30.: gle 118.0 Even SATRN 0.0 45.6 26.9 98.3 28.0	<pre>d deg deg deg deg deg deg deg deg deg deg</pre>	Hour Minute Secon ROM
Point POS.X User vector - R Di Paste Cu Turn analyzer: SATURN MIMAS EENCELADUS TETHYS DIONE RHEA TITAN	KRA: EC UITTEN	+62     +11.     tt RA/E     ATURN     SAT     occ?	at SATUF .168 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .205 .204 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .2	Tilt L Left Index to E (Rs) 3.27 4.33 6.60 3.19 8.96 5.82 21.38	© and all Up Reset pe Down ARTH 	ign POS Til Rig ₹ Rig ₹ H ₹ at 700E (Rs) 2.28 4.33 6.60 3.18 8.95 5.80 21.33	SX C t R ght fi Res bout Z PHASE (deg) 149.7 134.6 140.7 134.6 140.7 134.6 140.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 134.6 149.7 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2 129.2	= Up Zoor Fill S Zoo 35.59 0.09 0.07 0.32 0.12 0.25 0.23	C n Out creen m In DIAMETER mrad) 621.20 1.59 1.29 5.62 2.09 4.38 4.00	with	NSP Label: Orbits /s = 	s 🗸 Axe s 🗸 Vec s 🗸 Vec s Lat, 5.2 min / ALON (deg) 0 -85 135 366 -142 2 -113	Control Contro	ORS b/s ang Year Month Day <u>z_HGHT</u> (Xm) 0 0 272 21 -2822 50 2612 -7679	gle 30.: gle 118.4 Even SATRN 0.0 45.6 26.9 98.3 28.0 147.4 60.2	deg deg begin deg begin deg deg deg deg deg deg deg deg deg deg	Hour Minute Secon RAM 79.0 92.9 80.8 113.8 79.3 122.4 83.3
Point POS.X User vector - R DI Paste Cu Turn analyzer: SATURN MIMAS ENCELADUS ENCELADUS ENCELADUS ENCELADUS TETHYS DIONE RHERA TITAN HYPERION	KRA: EC SA SA S/C CCC?	+62 +11. at RA/E ATURN SAT occ?	at SATUF .168 .204 DEC 	Tilt L Left Imag to E/ GE (Rs) 3.27 4.33 6.60 3.19 8.96 5.82 21.38 26.97	© and all Up Reset Down ARTH <u>ALTI7</u> (3m) 137653 260884 397472 191810 539246 349915 1285676 1625108	ign POS Till Rig (Rs) 2.28 4.33 6.60 3.18 8.95 5.80 21.33 26.96	S_X 3 It R ght li Res bout Z PHASE (deg) 149.7 134.6 140.5 61.8 157.6 7.7 129.2 159.0	= Up Zoor Fill S Zoo 35.59 0.09 0.07 0.32 0.12 0.25 0.23 0.01	C n Out creen m In 0 n RWA 0 DIAMETER mrad) 0 21.20 1.59 1.29 5.62 2.09 4.38 4.00 0.20	with	NSP Label Orbits /s =	s S Axes s Vec S Lat, 5.2 min / (deg) 0 -85 135 366 -142 2 -113 -149	Control Con	ORS D/s and ORS rad and Year           Month           Day           2g           2_HGHT           0           3272           211           -2822           50           2612	gle 30.: gle 118.0 P Even SATRN 0.0 45.6 26.9 98.3 28.0 147.4 60.2 33.2	deg deg deg deg deg deg deg deg deg deg	Hour Minute Secon ROM RAM 90.0 92.9 80.8 113.8 79.3 122.4 83.3 74.1
Point POS.2 User vector - R DI Paste Cu Turn analyzer: BODY SAUCE SATURN MITMAS EXCELADUS TETHINS DIONE RIEA DIONE RIEA TITAN HYPERION	KRA: [ EC ] JITTEN SA/C DCC?         	+62     +11.     tr RA/E     ATURN     SAT     OCC?	at SATUF .168 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .205 .204 .205 .204 .204 .204 .204 .205 .204 .205 .204 .205 .204 .205 .204 .205 .204 .205 .204 .205 .204 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .2	N Tilt L Left ✓ Imag to E/ (Rs) to E/ (Rs) 3.27 4.33 6.60 3.19 8.96 5.82 21.38 26.97 59.84	© and all Up Reset ge Down ARTH <u>ALT17</u> (km) 137663 260884 397472 191810 539246 349815 1285676 1625108 3605412	yune (Rs) 2.28 4.33 6.03 3.18 8.95 5.80 21.33 26.96 59.82	S_X         It R           ght         ght           di Res         ght           di Res         ght           di Res         ght           di Res         ght           149.7         134.6           140.5         61.8           157.6         7.7           7.129.2         159.0           129.8         129.8	= Up Zoor Fill S Zoo O ANGLR_ (deg 0.07 0.32 0.12 0.25 0.23 0.01 0.02	C n Out creen m In DIAMETER mrad) 621.20 1.59 5.62 2.09 4.38 4.00 0.20 0.41	with	NSP Label Orbits /s =S/C LAT -21 -15 -10 -21 -7 -12 -3 3 -1	s 🗸 Axe s 🗸 Vec s Lat, 5.2 min / (deg) 0 -85 36 -142 2 -113 -149 138	Construction of the second	ORS D/G ang           Vear           Month           Day           2           Month           0           3272           21           -2622           50           2512           -7679           -22624           86413	gle 30.: gle 118.0 Even Contemport SATRN 0.0 45.6 26.9 98.3 28.0 147.4 60.2 33.2 42.7	deg deg deg LE F EARTH 30.2 45.8 39.0 117.7 22.7 172.7 51.2 21.4 49.7	Hour Minute Secon 90.0 92.9 80.8 79.3 113.8 79.3 122.4 83.3 74.1 75.8
Point POS.> User vector - R DI Paste Cu Turn analyzer: SATURN MIMAS BODY S SATURN MIMAS BODY S SATURN MIMAS TETHYS RECELADUS TETHYS RECELADUS TITAN HYPERION IAPETUS PHODEBE	KRA: [ EC ] JITTEN SA/C DCC?         	+62     +11.     tr RA/C     ATURN     SAT     OCC?	at SATUF .168 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .204 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .205 .20	Tilt L Left Image to E (Rs) 3.27 4.33 6.60 3.19 8.96 26.97 59.84 253.02	© and all Up Reset pe Down ARTH <u></u>	gn POS Til Rig ♥ H ♥ H ♥ H ♥ H ♥ H ♥ H ♥ H ♥ H ♥ H ♥ H	S_X it R ght ii Res ii Res pHASE (deg) 149.7 134.6 140.7 149.7 134.6 140.7 129.2 159.0 129.8 84.4	= Up Zoor Fill S Zoo 2 ANGLR (deg 35.59 0.09 0.07 0.32 0.12 0.23 0.01 0.022 0.00	C n Out creen m In DIAMETER mrad) 621.20 1.59 1.29 5.62 2.09 4.38 4.00 0.02 0.41 0.02	with	NSP Label Orbits /s =	S Vec Lat, 5.2 min / (deg) 0 -85 135 36 -142 2 -113 -149 138 97	Control Con	ORS D/S and ORS J/S and NoRS rad and Day	gle 30.: gle 118.4 Even Contemport SATRN 0.0 45.6 26.9 98.3 28.0 147.4 47.4 233.2 42.7 74.3	deg deg LLE F EARTH 30.2 45.8 39.0 117.7 22.7 172.7 51.2 21.4 94.6	Hour Minute Secon 90.0 92.9 80.8 113.8 79.3 122.4 83.3 74.1 75.8 110.4

## Segment Geometry (2 of 2)

Saturn 59 Legacy





There were solar viewing conflicts on DOY 051 and constraint management was required during the occultation for the VIMS Hi-Phase Rings observation.

Please see final slide for more details.

DOY 049 – This day was spent looking at Saturn's North Pole. ISS led the joint ORS campaign. Meanwhile the MAPS teams conducted a campaign of their own to study the dynamics of Saturn's inner magnetosphere.

DOY 050 – The day saw a continuation of the previous day's activities with ISS again leading observations of Saturn's northern hemisphere while MAPS looked at the magnetosphere. Toward the end of the day RSS performed an Operations Readiness Test (ORT) to demonstrate DSN and RSSG preparedness to support the Rings Occultation experiment on DOY 062.

DOY 051 – As the spacecraft neared periapse, VIMS took a quick map of the north polar region, followed by RADAR imaging of the northern polar region and the rings at high inclination. At periapse, VIMS led ORS observations of the solar eclipses of Saturn and the rings. Meanwhile, MAG took measurements yielding unique observations of Saturn's internal magnetic field over a unique orbit track in latitude and longitude space. Outbound from periapse, VIMS continued polar viewing and also observed a Alp Aur Stellar Occultation by Saturn. ISS led a joint observation of the tiny moon Janus.

DOY 052 - The day began with a UVIS observation of Saturn's limb to measure airglow spectrum and brightness vs. altitude. Half-way through the day the spacecraft turned its attention to Titan as CIRS obtained equatorial measurements of nitriles, hydrocarbons, an oxygen compound and  $CO_2$ , as a function of latitude and emission angle. Meanwhile the MAPS teams continued their campaign to study the dynamics of Saturn's inner magnetosphere.

# **Segment Integration Planning**

# **Timeline Gaps and Suggested Observations**

Saturn 59 Legacy

	Kev	<u> 59 -</u>	IUL		
Activity	Start	Duration	Pointing	Notes	TLM
Segment Start	2008-049T11:36:00				
OPNAV and NAV Turn to New Waypoint	2008-049T11:36:00	01:00:00			
New Waypoint	2008-049T12:36:00	0			
OPEN Gap 1	2008-049T12:36:00	13:30:00			
SP Turn to Downlink	2008-050T02:06:00	00:30:00			
Downlink	2008-050T02:36:00	09:00:00	XBAND to Earth;	Goldstone 34 BWG	
SP Turn to Waypoint	2008-050T11:36:00	00:30:00			
OPEN Gap 2	2008-050T12:06:00	08:30:00			
SP Turn to Downlink	2008-050T20:36:00	00:30:00			
Downlink (OTM Prime)	2008-050T21:06:00	06:00:00	XBAND to Earth;	Madrid 34 HEF	
SP Turn to Waypoint	2008-051T03:06:00	00:30:00			
RADAR/Warm-up ?	2008-051T03:36:00	12:54:00			
SP Deadtime	2008-051T16:30:00	00:15:00			
VIMS Ring Occ.	2008-051T16:45:00	00:55:00			
VIMS High Phase or Janus?	2008-051T17:40:00	00:35:00			
VIMS Saturn Occ.	2008-051T18:15:00	01:10:00			
SP Deadtime	2008-051T19:25:00	00:15:00			
RADAR/Warm-up ?	2008-051T19:40:00	05:26:00			
SOST Janus /More RADAR time?	2008-052T01:06:00	01:00:00			
SP Turn to Downlink	2008-052T02:06:00	00:30:00	XBAND to Earth;		
Downlink (OTM Back-up)	2008-052T02:36:00	09:00:00	XBAND to Earth;	Goldstone 34 HEF	
OPNAV and NAV Turn to Waypoint	2008-052T11:36:00	01:00:00			
OPEN Gap 3	2008-052T12:36:00	05:45:00			
SP Turn to Downlink	2008-052T18:21:00	00:30:00			
Downlink	2008-052T18:51:00	09:00:00	XBAND to Earth:	Madrid 34 HEF	

S. Boll

## **First Look During Integration:**

#### DATA VOLUME SUMMARY

!	OBSERV	ATION_PE	RIOD										DO	WNLINK_P	ASS		
     				P	4					  -    P5   	   REC 	ORDED	l I	PLAYB	ACK		
DOWNLINK PASS NAME	Start doy hh:mm	End doy hh:mm	STAR   (Mb)	T SCI (Mb)	HK+E (Mb)	TOTAL (Mb)	CPACTY (Mb)	MAR (Mb)	GIN   (%)	OPNAV   3 (Mb)	SCI (Mb)	ENGR   (Mb)	TOTAL   (Mb)	CPACTY (Mb)	MARGIN (Mb) (%	CAR )	OVR (Mb)
SP_059EA_G34HEFOTP050_PR SP_059EA_M34HEFNON050_PR SP_059EA_G34HEFOTB052_PR SP_059EA_G34HEFOTB052_PR SP_059EA_M34HEFCLS052_PR	IME         050         02:36           IME         050         21:06           IME         052         02:36           IME         052         18:51	050 11:36 051 01:06 052 11:36 053 03:51	0 433 1249 2489	1388 957 2175 195	52 33 89 25	1440 1423 3513 2709	3534 3568 3568 3534	2094 2146 55 824	59% 60% 2% 23%	17 0 0 17	142 111 147 220	53 24 53 53	1652 1557 3713 3000	1220 308 1224 1106	-433 -3 -1249 -4 -2489 -2 -1894 -1	5% 06% 03% 171%	433 1249 2489 1894

#### 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	049 11:36	050 02:36	54.0	8.1	194.4	2.7	54.6	32.4	55.3	0.0	70.7	255.5	660.0	0.0	0.0	1387.6
OBSERVATION_OPN	049 11:36	050 02:36	0.0	0.0	0.0	0.0	17.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4
SP_059EA_G34HEFOTP050_PRIME	050 02:36	050 11:36	32.4	4.9	0.0	1.6	0.0	19.4	38.9	0.0	42.4	2.5	0.0	0.0	0.0	142.1
DAILY TOTAL SCIENCE	049 11:36	050 11:36	86.4	12.9	194.4	4.3	54.6	51.8	94.2	0.0	113.2	257.9	660.0	0.0		
OBSERVATION_NOR	050 11:36	050 21:06	34.2	5.1	122.4	1.7	22.6	20.5	41.0	0.0	44.8	154.5	510.0	0.0	0.0	956.9
SP_059EA_M34HEFNON050_PRIME	050 21:06	051 01:06	14.4	2.7	46.8	0.7	0.0	8.6	17.3	0.0	18.9	1.1	0.0	0.0	0.0	110.5
DAILY TOTAL SCIENCE	050 11:36	051 01:06	48.6	7.9	169.2	2.4	22.6	29.2	58.3	0.0	63.7	155.6	510.0	0.0		
OBSERVATION_NOR	051 01:06	052 02:36	91.8	19.7	8.4	12.4	201.3	107.4	98.7	277.1	674.6	260.0	423.9	0.0	0.0	2175.3
SP_059EA_G34HEFOTB052_PRIME	052 02:36	052 11:36	32.4	6.1	0.0	1.6	0.0	19.4	38.4	0.0	46.8	2.5	0.0	0.0	0.0	147.2
DAILY TOTAL SCIENCE	051 01:06	052 11:36	124.2	25.8	8.4	14.0	201.3	126.9	137.0	277.1	721.4	262.4	423.9	0.0		
OBSERVATION_NOR	052 11:36	052 18:51	26.1	5.2	82.8	1.3	0.0	15.7	30.0	0.0	34.2	0.0	0.0	0.0	0.0	195.3
OBSERVATION_OPN	052 11:36	052 18:51	0.0	0.0	0.0	0.0	17.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4
SP_059EA_M34HEFCLS052_PRIME	052 18:51	053 03:51	32.4	5.8	86.4	1.6	0.0	19.4	29.2	0.0	42.4	2.5	0.0	0.0	0.0	219.7
DAILY TOTAL SCIENCE	052 11:36	053 03:51	58.5	11.0	169.2	2.9	0.0	35.1	59.2	0.0	76.6	2.5	0.0	0.0		
			CAPS	CDA	CIRS	INMS	ISS	MAG	MIMI	RADAR	RPWS	UVIS	VIMS	PROBE		
			(Mb)	(Mb)	(Mb)	(Mb)	(Mb)	(Mb)	(Mb)	(Mb)	(Mb)	(Mb)	(Mb)	(Mb)		
TOTAL RECORDED (OPNAV data not inclu	ded)		317.7	57.6	541.2	23.7	278.4	243.0	348.7	277.1	974.9	678.4	1594.0	0.0		

- Waypoint / Secondary Axis Pointing during Occultation Period
  - CDA suggested Occ\_Port to Sun; -X to 233.3/-50.8 was NOT safe during the period with CIRS heating of 2.07 degrees (must be under 5 for waypoint), however there are SRU violations, so this cannot be used as a waypoint.
  - RADAR observation
  - Other suggestions?

Waypoint 1 (2008-049T12:06:00 - 2008-051T01:36:00): ISS\_NAC to Saturn; NEG\_Z to NSP



Waypoint 2 (2008-051T01:36:00 – 2008-051T20:00:00): ISS\_NAC to Saturn (0.0,-20.0,20.0 deg. offset); POS\_X to NSP



Waypoint 3 (2008-051T20:00:00 - 2008-053T03:51:00): ISS\_NAC to Saturn; POS\_Z to NSP



### Pointing Issues

– None

### Data Volume Issues

None

### Telemetry Mode Issues

- None

### CIMS Issues

None

### Power/OPMODE Issues

None

## Flight Rule/Mission Planning Guideline and Constraint Issues

 The second downlink was shortened to 4 hrs. to accommodate a difficult time period of integration. The DSN station is requested early enough to get 2-way for the entire 4 hrs. This plan was approved by NAV during TWT meetings.

### Other Issues

- The DSN Station request may be 5-10 minutes earlier than necessary.

## **Details from waiver – usual diagram unavailable:**

VIMS requests to waive FR84B2 and FR89B21-2.0 and request CMT management during the Saturn Solar Occultation for observation VIMS\_059RI\_HIPHASE001\_PRIME to cover the period between 2008-051T17:34:59.810 and 2008-051T17:52:36.510.

The Neg Y to Sun KPT Data from PSIV1 data indicates:

Violation of the 15 deg from Sun (CIRS Rule) starts between 2008-051T17:34:59.810 and 2008-051T17:35:05:810.

Violation of the 12 deg from Sun (UVIS Rule) starts between 2008-051T17:35:59.810 and 2008-051T17:36:05.810.

Violation of 12 degrees from Sun (UVIS Rule) ends between 2008-051T17:50:42.510 and 2008-051T17:50:48.510.

Violation of 15 degrees from Sun (CIRS Rule) ends between 2008-051T17:52:30.510 and 2008-051T17:52:36.510.

During this period, the NEG\_Y to Sun angle reaches a minimum of 8.0957448 degrees at 2008-051T17:38:53.810.

Mission Planning indicates the occultation occurs between 2008-051T17:26:00 and 2008-051T18:22:00 with the main uncertainty due to the maneuver delivery uncertainty. Taking this into account the commanding of CMT to detect 16 minutes prior to and after the occultation is at a minimum of 3 times Ken Klaasen's uncertainty. The pointing design for this observation is within these guidelines.

\* The absolute times given for CMT management are base on the current epoch GMB\_E059\_SATURN\_OCC\_1\_ING of 2008-051T17:25:34. All CMT management times must be in epoch relative NOT absolute time.