

Science Planning & Sequence Team

### SATURN TARGET WORKING TEAM

**Rev 59\_60 Segment Legacy Package** 

Segment Boundary: February 24, 2008 – February 28, 2008 2008-055T11:21 – 2008-059T10:51 (SCET)

Integration Began 09/29/2003 Segment Delivered to S38 Sequence 08/23/2004 Lead Integrator was Scott Edgington

Legacy Package Assembled by Kyle Cloutier

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\* N.A. = Slide present but content not available.

# **Segment Overview and Final Products**

• Saturn 59/60 is an apoapse segment during the Prime Mission, with increasing phase angles and sub-spacecraft latitudes.

• Saturn science was limited to ISS photopolarimetry mosaics of Saturn.

• The timeline was dominated by out-of-discipline science, including a VIMS/ISS/CIRS F-ring rotation movie, ISS photopolarimetry mosaics of Titan, ISS satellite orbit determination campaign observations, a CIRS radial scan of the rings, a VIMS 3 star calibration of their instrument, and a UVIS stellar-ring occultation.

• An RSS Operations Readiness Test (ORT) was performed in order to demonstrate DSN and RSS preparedness to support the upcoming Rings Occultation experiment on DOY 062.

## **Final Sequenced SPASS**

Saturn 59\_60 Legacy

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
SATURN revs 59/60 Segment		2008-055T11:21:00		003T23:30:00	2008-059T10:51:00			
SP_059RI_WAYPTTURN055_PRIME	С, М	2008-055T11:21:00		000T00:25:00	2008-055T11:46:00	ISS_NAC to L_ANSA_F	POS_X to NEP	
SP_059RI_WAYPTTURN455_PRIME	М	2008-055T11:46:00		000T00:09:00	2008-055T11:55:00	ISS_NAC to L_ANSA_F	POS_X to NSP	Use 140223.7 km as ring radius
NEW WAYPOINT		2008-055T11:55:00		000T23:41:00	2008-056T11:36:00	ISS_NAC to L_ANSA_F	POS_X to NSP	
VIMS_059RF_FMOVIE002_PRIME	C, I, M, R	2008-055T11:55:00		000T16:41:00	2008-056T04:36:00	VIMS_IR to L_ANSA_F	POS_X to NSP	
SP_059EA_DLTURN056_PRIME	M, R	2008-056T04:36:00		000T00:30:00	2008-056T05:06:00	XBAND to Earth	POS_X to NEP	16.1 min. Turn
SP_059EA_G34BWGNON056_PRIME	C, M, R	2008-056T05:06:00		000T06:00:00	2008-056T11:06:00	XBAND to Earth	Rolling	
SP_059SA_WAYPTTURN056_PRIME	С, М	2008-056T11:06:00		000T00:30:00	2008-056T11:36:00	ISS_NAC to Saturn	NEG_Z to NSP	22.3 min. Turn
NEW WAYPOINT		2008-056T11:36:00		002T23:53:00	2008-059T11:29:00	ISS_NAC to Saturn	NEG_Z to NSP	
ISS_059TI_1X1PT60001_PRIME	М	2008-056T11:36:00		000T01:00:00	2008-056T12:36:00	ISS_NAC to Titan	POS_X to North_Pole_Dir	
ISS_059OT_SATELLORB018_PRIME	С, М	2008-056T12:36:00		000T00:30:00	2008-056T13:06:00	ISS_NAC to Satellites	NEG_Z to NSP	
ISS_059SA_1X2WPH25001_PRIME	M, R, U	2008-056T13:06:00		000T12:30:00	2008-057T01:36:00	ISS_NAC to Saturn	NEG_X to Sun	
Apoapse Per = 10.6 d, inc		2008-056T22:07:25		000T00:00:01	2008-056T22:07:26			
SP_060EA_DLTURN057_PRIME	C, M, R	2008-057T01:36:00		000T00:30:00	2008-057T02:06:00	XBAND to Earth	POS_X to NEP	22.5 min. Turn
SP_060EA_G34BWGNON057_PRIME	C, M, R	2008-057T02:06:00		000T09:00:00	2008-057T11:06:00	XBAND to Earth	Rolling	
SP_060SA_WAYPTTURN057_PRIME	С, М	2008-057T11:06:00		000T00:30:00	2008-057T11:36:00	ISS_NAC to Saturn	NEG_Z to NSP	22.5 min. Turn
ISS_0600T_SATELLORB001_PRIME	С, М	2008-057T11:36:00		000T00:30:00	2008-057T12:06:00	ISS_NAC to Satellites	NEG_Z to NSP	
ISS_060SA_1X2WPH25001_PRIME	M, R, U	2008-057T12:06:00		000T13:00:00	2008-058T01:06:00	ISS_NAC to Saturn	NEG_X to Sun	
ISS_060OT_SATELLORB002_PRIME	C, M, R	2008-058T01:06:00		000T00:30:00	2008-058T01:36:00	ISS_NAC to Satellites	NEG_Z to NSP	
SP_060EA_DLTURN058_PRIME	C, M, R	2008-058T01:36:00		000T00:30:00	2008-058T02:06:00	XBAND to Earth	POS_X to NEP	22.6 min. Turn
SP_060EA_G34BWGNON058_PRIME	C, M, R	2008-058T02:06:00		000T09:00:00	2008-058T11:06:00	XBAND to Earth	Rolling	
SP_060SA_WAYPTTURN058_PRIME	С, М	2008-058T11:06:00		000T00:25:00	2008-058T11:31:00	ISS_NAC to Saturn	NEG_Z to NSP	
CIRS_060RI_SUBMU30LP001_PRIME	С, М	2008-058T11:31:00		000T08:35:00	2008-058T20:06:00	CIRS_FP1 to Rings	NEG_Z to NSP	
VIMS_060ST_3STARCAL001_PRIME	М	2008-058T20:06:00		000T01:30:00	2008-058T21:36:00	VIMS_IR to 143.061/-62.789	PIC	
UVIS_060ST_URBETHYA001_PRIME	M	2008-058T21:36:00		000T03:45:00	2008-059T01:21:00	UVIS_FUV to 178.227/-33.908	NEG_X to Sun	
SP_060EA_DLTURN059_PRIME	С, М	2008-059T01:21:00		000T00:30:00	2008-059T01:51:00	XBAND to Earth	POS_X to NEP	22.6 min. Turn
SP_060EA_G70METNON059_PRIME	C, M, R	2008-059T01:51:00		000T09:00:00	2008-059T10:51:00	XBAND to Earth	Rolling	

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

				OBSERVATION_PERIOD									DOWNLIN	K_PASS			
				P4   P5   							RDED	   		PLAYE	ACK		
DOWNLINK PASS NAME	Start doy <u>hh:mm</u>	End   doy <u>hh:mm</u>	START (Mb)	SCI (Mb)	HK+E (Mb)	TOTAL (Mb)	CPACTY (Mb)	MRGN (Mb)	0PNAV (Mb)	   SCI   (Mb)	ENGR (Mb)	   TOTAL   (Mb)	CPACTY (Mb)	MARGN (Mb)	NET_M (Mb)	IARGN (%)	CAROVR (Mb)
SP_059EA_G34BWGNON056_PRIME SP_060EA_G34BWGNON057_PRIME SP_060EA_G34BWGNON058_PRIME SP_060EA_G70METNON059_PRIME	056 05:06 057 02:06 058 02:06 059 01:51	056 11:06 057 11:06 058 11:06 059 10:51	0 1366 2102 2765	1093 1390 1319 504	751 63 63 62	1845 2819 3485 3331	3492 3492 3492 3492 3492	1648 673 8 162	0 0 0 0	172 236 236 1042	35 53 53 53 53	2052 3108 3773 4425	686 1006 1008 4535	-1366 -2103 -2765 109	8 8 162 186	0% 0% 1% 1%	1366 2102 2765 0

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

Event	Start doy <u>hh:mm</u>	End doy <u>hh:mm</u>	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 TOT (Mb) (M	TAL Mb)
OBSERVATION_NOR SP_059EA_G34BWGNON056_PRIME DAILY TOTAL SCIENCE	055 11:21 056 05:06 055 11:21	056 05:06 056 11:06 056 11:06	63.9 21.6 85.5	19.2 6.5 25.6	246.2 72.0 318.2	3.2 1.1 4.3	372.0 0.0 372.0	38.3 13.0 51.3	76.7 25.9 102.6	0.0 0.0 0.0	83.7 28.3 112.0	0.0 1.6 1.6	180.0 0.0 180.0	0.0 0.0 0.0	691.0 1774 0.0 170	4.2 0.0
OBSERVATION_NOR SP_060EA_G34BWGNON057_PRIME DAILY TOTAL SCIENCE	056 11:06 057 02:06 056 11:06	057 02:06 057 11:06 057 11:06	54.0 32.4 86.4	15.6 9.7 25.4	21.6 86.4 108.0	2.7 1.6 4.3	1070.5 0.0 1070.5	32.4 19.4 51.8	64.8 38.9 103.7	0.0 0.0 0.0	70.7 42.4 113.2	45.1 2.5 47.5	0.0 0.0 0.0	0.0 0.0 0.0	12.3 1389 0.0 233	9.7 3.4
OBSERVATION_NOR SP_060EA_G34BWGNON058_PRIME DAILY TOTAL SCIENCE	057 11:06 058 02:06 057 11:06	058 02:06 058 11:06 058 11:06	54.0 32.4 86.4	16.2 9.7 25.9	28.8 86.4 115.2	2.7 1.6 4.3	990.3 0.0 990.3	32.4 19.4 51.8	64.8 38.9 103.7	0.0 0.0 0.0	70.7 42.4 113.2	46.9 2.5 49.3	0.0 0.0 0.0	0.0 0.0 0.0	12.3 1319 0.0 233	9.0 3.4
OBSERVATION_NOR OBSERVATION_SI SP_060EA_G70METNON059_PRIME DAILY TOTAL SCIENCE	058 11:06 058 11:06 059 01:51 058 11:06	059 01:51 059 01:51 059 10:51 059 10:51	53.1 0.0 320.8 373.9	15.9 0.0 17.0 32.9	136.8 17.0 86.4 240.2	2.7 0.0 1.6 4.3	0.0 0.0 0.0 0.0	31.9 0.0 64.0 95.9	63.7 0.0 38.9 102.6	0.0 0.0 0.0 0.0	69.6 0.0 501.2 570.8	88.4 0.0 2.5 90.9	20.0 0.0 0.0 20.0	0.0 0.0 0.0 0.0	12.1 494 0.0 17 0.0 1032	4.1 7.0 2.4

### Segment Geometry (1 of 2)

Saturn 59\_60 Legacy

View of SA 2008 FEB 11.1° field	TURN 24 11 of viv	Rec	CASSINI NO UTC					+V	RN					Rev 059 OT 2008 FED 2 2008 FED 2 2008 FED 2 Apoapse Light time Orbit peri Radius Rad cyl Z_ht_cyl Mag_L Semi axs Recentric Inclinatio Sour range Earth rang DSN RI Goldstone Canberra Madrid LC FOV RA	TEDOUND 55111:21: 4 11:21: 4 11:21: 4 11:21: 55 + 009 55 + 009 56 + 009 57 + 0	00 SCRT 00 SCRT 52 ERT 115:55:1 115:55:1 9 min 6 days km km km 30 km 13 deg 27 AU 28 AU 28 AU 28 AU 28 AU 28 AU 28 AU 28 AU 29 1	20 25.69 R 24.92 R 6.25 R 15.43 R 1 3 70 194.6 mr
						- SEXP		SEP U	ser					DEC Crosses_RI EPS	-11. 2_0 0. 0.	171 deg 000 Rs 200 deg	
Solor Syste Point NEG	em Si LY	o alla t	at SATU	RN	≎ and al	ign POS	_x ¢	= Up	٥	with	NSP		0	SEP ORS b/s ar ORS rad ar	178. Igle 157. Igle 112.	130 deg 6 deg 3 deg	
User vector -	RA:	+89	.300	Tilt L	Up	) (Til	t R	Zoom	Out		Labels	🗹 Axe	s	Year		4 >	Hour
	DEC:	-54	.820	Left	Reset	t Rig	pht	Fill Sc	reen		Orbits	Vec	tors	Month		• •	Minute
Paste	Currer	nt RA/	DEC	🔽 Ima	ge Down	_ ⊻н	i Res	Zoor	n In	FO	/s	✓ Lat/	lons	Day		4 1	Secon
Turn analyze	r: S/	ATURI	N ;	to E	ARTH	0 ab	out Z	۵ د	RWA	A.	≎ =	14.7 min	/ 157.4	deg	Event	4 Þ	]
BODY	s/c occ7	SAT OCC7	RAM	GE[R8]	ALTI1 [km]	UDE	PHASE [deg]	ANGLR_D	IAMETER mrad]	SUB_ LON	_S/C LAT	ALON (deg)	VREL (km/s)	Z_HGHT (km)	AN SATRN	GLEI EARTH	ROM
SATURN	112		1548103	25.69	1488171	24.69	22.4	4.46	77.88	14	14	0	2.9	0	0.0	157.4	108.8
NIMAS			1654666	27.46	1654466	27.45	21.7	0.01	0.25	54	12	123	14.3	439	5.6	158.1	103.6
ENCELADUS			1448864	24.04	1448612	24.04	24.2	0.02	0.35	115	15	60	11.5	-8	8.3	155.7	102.3
TETHYS			1762521	29.24	1761985	29.24	22.5	0.04	0.61	322	12	-134	13.2	-4326	7.0	157.3	113.9
DIONE	100		1872370	20.99	1871605	20.98	25.4	0.04	0.69	209	12	-122	10.2	-11/	14.0	153.2	119.4
TITAN	1		878097	14.57	875522	14.53	62.3	0.34	5.86	260	26	- 32	5.6	-1559	50.0	117.5	157.5
HYPERION			1069554	17.75	1069439	17.74	81.2	0.02	0.31	97	57	-38	4.8	106	71.7	98.6	167.7
IAPETUS			3259423	54.08	3258677	54.07	86.4	0.03	0.46	338	12	-70	4.2	362115	84.7	93.3	146.5
PHOEBE			15150494	251.39	15150381	251.38	80.1	0.00	0.02	175	-21	-9.2	3.0	6553319	88.2	99.3	122.9
SATURN			1548103	25.69	1488171	24.69	22.4	4.46	77.88	14	14	0	2.9	0	0.0	157.4	108.8

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	25.69 Rs	22.4 deg	14
Apoapse	27.10 Rs	31.4 deg	23
Segment End	22.62 Rs	50.3 deg	38

#### Segment Start: 2008-055T11:21

### Apoapse: 2008-056T22:07:25

View of Sk 2008 FEB 10.6° field Solar Syst Point NEC	em Si 3_Y	Ror mulat	cr v4.0		CP	NE?		+V 	IRN User	with	NSP		2	Rev 060 II 2008 - 057 2008 FEB 2: 2008 FEB 2: 2008 FEB 2: 2008 FEB 2: 2008 FEB 2: 2008 FEB 2: Apapage_00 Light time orbit peri. Rad.cyl : 2 ht.cyl Mag L Semi axs Eccentrici: Inclination Sun range Earth range 	NEOUND 6722107:2 5 22:07:2 5 23:16:1 60 - 00:5 : 68:5 od: 10:6 1633374 b 31:5 929777 b 1505547 b 633434 b 31:5 929777 b 1505547 b 633434 b 31:5 929777 b 150:5 0 22 - 23:6 -25	15 SCET 15 SCET 15 SCET 15 SCET 16	27.10 Rs 24.98 Rs 10.51 Rs 15.43 Rs 
User vector	- RA:	+89	.300	Tilt L	Up	) ( Ti	t R	Zoon	n Out	<b>v</b> .	Labels	✓ Axe	s	Year 🖪		4 Þ	Hour
	DEC:	-54	.820	Left	Reset	Ri	ght	Fill S	creen		Orbits	Vec	tors	Month		4 Þ	Minute
Paste	Currer	nt RA/	DEC	✓ Imag	ge Down		li Res	Zoo	m In	FO\	/s	✓ Lat/	lons	Day 🗖		• •	Second
Turn analyze	er: S	ATURI	N :	to E	ARTH	0 at	out Z	0	on RWA		0 =	14.0 min	/ 148.3	deg	Event	<b>4</b> •	)
	#/C		DAS		AT # 11	NITOR	DUARY	ANGLD	DIAMPERD	RITD	8/2	ALC N	WDPT	7 NORT	aNG	TP D	POM
BODY	OCC?	OCC?	[ km ]	[R8]	[km]	[R8]	[deg]	[deg	mrad]	LON	LAT	[deg]	(km/s)	(km)	SATRN	EARTH	RAM
SATURN			1633374	27.10	1573961	26.12	31.4	4.23	73.81	102	2.3	0	2.4	n	0.0	148.3	90.0
MIMAS			1575149	26.14	1574953	26.13	32.0	0.02	0.26	253	22	-66	13.5	-1848	6.2	147.7	95.8
ENCELADUS			1492976	24.77	1492723	24.77	35.3	0.02	0.34	130	25	46	12.4	-0	7.0	144.4	85.4
TETHYS			1456756	24.17	1456223	24.16	34.4	0.04	0.74	234	25	-44	10.0	-40 35	8.8	145.3	98.7
DIONE			1620147	26.88	1619586	26.87	36.4	0.04	0.70	85	23	81	10.8	112	13.3	143.3	78.8
RHEA			1989848	33.02	1989083	33.00	31.7	0.04	0.77	41	19	130	10.1	253	12.4	148.0	77.8
TITAN			1498623	24.87	1496048	24.82	54.6	0.20	3.44	283	25	-59	4.7	2963	45.0	125.2	132.7
HYPERION			1502622	24.93	1502484	24.93	69.3	0.01	0.22	188	45	-52	3.6	10625	61.2	110.6	148.7
THORDE			1/863588	246.62	14863479	246.62	80.8	0.03	0.45	338	-21	-70	2.5	403415	92.9	93.8	128.3
SATURN			1633374	27.10	1573961	26.12	31.4	4.23	73.81	10.2	2.3	0	2.4		0.0	148.3	90.0
Control Char			101111/4		4013501	20122	2414	4163		202	A 3	0	214	0	0.0		

K. Cloutier



## Segment Geometry (2 of 2)

Saturn 59\_60 Legacy

View of SA	TURN 28.10	from	CASSINI			NER				÷				Rev 060	IN1 0591	BOUND	OD SCRT	
2008 FEB 12.7° field	28 10 of vie	0.51:00						SATURN	+ V ·				z	2008 - 2008 FE 2008 FE	0599 B 28 B 28 C 26 C 20 C 20 C 20 C 20 C 20 C 20 C 20 C 20	<pre>r10:51: 10:51: 11:59: 11:59: 0 + 002 0 - 002 68. 1: 10. 362979 068525 846148 36. 929735 y 0. 56. 9. 929735 y 0. 56. 9. 928. 34. -37. -37. -73. -9. 0.</pre>	000 SCRT 000 SCRT 56 ERT T12:47: T18:12:9 min 6 days km 6 km 80 km 80 km 20 AU 29 AU 29 AU 29 AU 20 AU 29 AU 20 AU 20 AU 29 AU 20 AU 2	44 33 17.73 Ra 14.04 Ra 15.43 Ra L6 6 0 0 0 220.9 mrad
Solar Syste	em Si	mulato	er v4.0	_				-		311114		-		SEP ORS b/s	ang	175. le 129.	182 deg 7 deg	
Solar Syste	em Si		at SATUF	RN Tilt I	and all	gn POS	x ¢	= Up	0	with	NSP		0	SEP ORS b/s ORS rad	ang: ang:	175. 175. 1e 129. 1e 133.	182 deg 7 deg 4 deg	]
Solor Syste Point NEG Jser vector -	em Si LY - RA:	+89.	at SATUF	RN Tilt L	and all	gn POS	X ¢	= Up Zoom C	Out	with (	NSP Labels	✓ Axe:	\$	SEP ORS b/s ORS rad Year	angi angi	175. le 129. le 133.	182 deg 7 deg 4 deg	Hour
Solor Syste Point NEG Jser vector	- RA: DEC:	+89. -54.	at SATUF 300 820	RN Tilt L Left	O and all Up Reset	gn POS Tilt Rig	X ¢	= Up Zoom C Fill Scre	Out G	with (	NSP Labels Orbits	<ul> <li>✓ Axes</li> <li>✓ Vect</li> </ul>	s tors	ORS b/s ORS rad Year Month	angi angi	175. le 129. le 133.	182 deg 7 deg 4 deg • •	Hour Minute
Solar Syste Point NEG Jser vector - Paste (	em Sit I_Y - RA: DEC: Currer	+89. -54.	at SATUF 300 820 DEC	RN Tilt L Left ☑ Imag	<ul> <li>and all</li> <li>Up</li> <li>Reset</li> <li>ge</li> </ul>	gn POS. Tilt Rig V Hi	X O R ht Res	= Up Zoom C Fill Scre Zoom	Out Gen I	with	NSP Labels Orbits /s	<ul> <li>✓ Axes</li> <li>✓ Vect</li> <li>✓ Lat/</li> </ul>	¢ s tors lons	SEP ORS b/s ORS rad Year Month Day	angi angi angi	175. 175. 1e 129. 1e 133.	182 deg 7 deg 4 deg 4 b	Hour Minute Second
Solor Syste Point NEG User vector Paste ( Furn analyze	em Si E_Y - RA: DEC: Currer r: S/	+89. -54. nt RA/D	at SATUF 300 820 DEC	RN Tilt L Left ✓ Imag to E/	<ul> <li>and all</li> <li>Up</li> <li>Reset</li> <li>Down</li> <li>ARTH</li> </ul>	gn POS Tilt Rig V Hi O ab	X R ht Res out Z	= Up Zoom C Fill Scre Zoom ♦ on	Out Seen IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	with ( FOV	NSP Labels Orbits /s	<ul> <li>✓ Axes</li> <li>✓ Vect</li> <li>✓ Lat/</li> <li>12.6 min</li> </ul>	s tors lons / 129.2	SEP ORS b/s ORS rad Year Month Day deg		175. 175. 1e 129. le 133. () () () () () () () () () ()	182 deg 7 deg 4 deg 4 b 4 b	Hour Minute Second
Solor Syste Point NEG Jser vector - Paste ( Furn analyze BODY	- RA: DEC: Currer r: S/ occ?	+89. -54. nt RA/D ATURN	or v4.0 at SATUF 300 820 DEC	RN Tilt L ✓ Imag C to E/ GB [Ra]	♦ and all Up Reset Bown ARTH ALTII [km]	gn POS Tilt Rig ♥ Hi ♥ ab	X 0 R ht Res out Z PHASE [deg]	Up Zoom C Fill Scre Zoom O on ANGLR_DL. [deg	Out Gen Charlen Charle	with	NSP Labels Orbits /s ○ = 	✓ Axes ✓ Vect ✓ Lat/ 12.6 min <sup>ALON</sup> (deg)	C C C C C C C C C C C C C C C C C C C	SEP ORS b/s ORS rad Year Month Day deg z_H (k	GHT m)	175. 1e 129. le 133. Event ( Event (	A dag 182 dag 4 dag 4 dag 4 b 4 b 5LE B EARTE	Hour Minute Second
Solar Syste Point NEG Jser vector - Paste I Paste I furn analyze BODY SATURN	em Sit F_Y - RA: DEC: Curren r: S/ occ? 	+89. -54. nt RA/D ATURN SAT 	rr v4.0 at SATUR 300 B20 DEC ( RAN [km] 1362979	Tilt L Left I left to E/ GB [Ra] 22.62	C and all Up Reset Down ARTH ALTII [km] 1304928	gn POS Tilt Rig V Hi O ab UDR [R8] 21.65	X R ht Res out Z PHASE [deg] 50.3	<ul> <li>Up</li> <li>Zoom C</li> <li>Fill Scree</li> <li>Zoom</li> <li>on</li> <li>ANGLR_DL.</li> <li>[deg</li> <li>5.07</li> </ul>	Out Seen IIII RWA	with	NSP Labels Orbits /s = 	✓ Axes ✓ Vect ✓ Lat/ 12.6 min (deg) 0	\$ tors lons / 129.2 VREL (km/a) 3.9	SEP ORS b/s ORS rad Year Month Day deg z_H (k	angi angi angi GHT m)	175. le 129. le 133. Event ( Event ( ANI SATEN 0.0	182 deg 7 deg 4 deg 4 b 4 b 5LE b 5LE 129.2	Hour Minute Second
Solor Systemetric Systemetrie Systemetric Systemetrie Systemetrie Systemetrie Systemetrie	em Sit F_Y - RA: DEC: Curren r: S/ occ?	+89. -54. nt RA/D ATURN SAT 	or v4.0 at SATUF 300 820 DEC 	RN Tilt L Left ✓ Imag to E/ GB [R#] 22.62 21.80		gn POS. Tilt Rig ✓ Hi O ab UDE [Re] 21.65 21.80	X R ht Res out Z PHASE [deg] 50.3 55.5	Up Zoom C Fill Scre Zoom O on ANGLR_DI. [deg 5.07 0.02	Out Gen Charles American Ameri	with () 7   1 7   1 1 7   1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	NSP Labels Orbits /s = 	<ul> <li>✓ Axes</li> <li>✓ Vect</li> <li>✓ Lat/</li> <li>12.6 min</li> <li>ΔLON (deg)</li> <li>67</li> </ul>	↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	SEP ORS b/s ORS rad Year Month Day deg z_H (k	s ang l ang l ang l sht m) 0 049	175 le 129. le 133. Event ( SATRN 0.0 7.7	182 deg 7 deg 4 deg 4 b 4 b 5LE 1 EARTE 129.2 124.0	Hour Minute Second 7KOM RAM 55.8 50.6
Solar System Point NEG Jser vector - Paste I Paste I furn analyze BODY SATURN HIMAS BKCELADUS	em Sit - RA: DEC: Currer r: S/ s/c occz  	ATURN	rr v4.0 at SATUF 300 820 DEC (RAN [km] 1362791 1313781 1465463	RN Tilt L Left ✓ Image to E/ GB (RB) 22.62 21.80 24.32		gn POS. Tilt Rig ♥ Hi ♥ Hi ♥ Bi (R8) 21.65 21.80 24.31	X R ht Res out Z PHASE [deg] 50.3 55.5 52.1	<ul> <li>Up</li> <li>Zoom C</li> <li>Fill Scree</li> <li>Zoom</li> <li>on</li> <li>ANGLR_DI.</li> <li>Ideg</li> <li>5.07</li> <li>0.02</li> <li>0.02</li> <li>0.02</li> </ul>	Cut	with	NSP Labels Orbits /s = 	<ul> <li>✓ Axe:</li> <li>✓ Vec:</li> <li>✓ Lat/</li> <li>12.6 min</li> <li>ΔLON (deg)</li> <li>67</li> <li>117</li> </ul>	↓ 129.2       VREL       (km/s)       3.9       16.3       16.5	SEP ORS b/s ORS rad Year Month Day deg z_H (k 5	ang: ang: ang: ang: ang: ang: ang: ang:	175 le 129. le 133. Event ( ANI SATRN 0.0 7.7 8.7	182 deg 7 deg 4 deg 4 b 1	Hour Minute Second 7K0M RAM 55.8 50.6 47.4
Solar Syste Point NEG Jser vector - Paste I Paste I furn analyze BODY SATURN MIMAS BROELADUS TETHYS DOWN	em Sit - RA: DEC: Currer r: S/ occ:   	ATURN	rr v4.0 at SATUF 300 820 bEC 1362979 1313781 1465463 1579980	RN Tilt L Left ✓ Imag to E/ GB [R8] 22.62 21.80 24.32 26.22 25.05		gn POS. Tilt Rig ✓ HI C ab UDR [Re] 21.65 21.80 24.31 26.21 25.21	X R ht Res put Z PHASE [deg] 50.3 55.5 52.1 42.8	Up     Zoom C     Fill Scree     Zoom     On     ANGLR_DI.     [deg     5.07     0.02     0.04	C	with	NSP Labels Orbits /s = 	<ul> <li>✓ Axes</li> <li>✓ Vect</li> <li>✓ Lat/</li> <li>12.6 min</li> <li>ΔLON (deg)</li> <li>67</li> <li>117</li> <li>-151</li> <li>114</li> </ul>	♦ 16.3 ♦ 16.3	SEP ORS b/s ORS rad Year Month Day deg z_H (k 5 5	s ang: l ang: 	175 le 129. le 133. Event ( ANI SATRN 0.0 7.7 8.7 7.8 12.5	182 deg           7 deg           4 deg           4 b           5LE           129.2           124.0           127.3           136.7	Hour Minute Second 780M RAM 55.8 50.6 47.4 57.5
Solor Syste Point NEG Jser vector - Paste I furn analyze BODY SATURN MIHAS NICELADUS ENTRYS DIONE DUVA	em Sit	ATURN	r v4.0 at SATUF 300 820 0EC ( RAM 1362979 1313781 1465463 1579980 1557980 1557980	Tilt L           Left           ✓ Imag           to           E/           22.62           21.80           24.32           26.22           25.95           20.42	and all Up Reset pe Down ARTH         ALT11	gn POS Tilt Rig ✔ Hi ↓ ab UDR [Re] 21.65 21.80 24.31 26.21 25.94 20.95	x ≎ R ht Res out Z PHASE [deg] 50.3 55.5 52.1 42.8 52.3 55.5	■ Up Zoom ( Fill Scree Zoom	C	with	NSP Labels Orbits /s = 	<ul> <li>✓ Axes</li> <li>✓ Vect</li> <li>✓ Lat/</li> <li>12.6 min</li> <li>ΔLON (deg)</li> <li>67</li> <li>117</li> <li>-151</li> <li>124</li> <li>-56</li> </ul>	♦ 1000 € 10000 € 10000 € 1000 € 1000 € 1000 € 1000 € 1000 € 1000 € 1000 € 1	SEP ORS b/s ORS rad Year Month Day deg z_H (k 5 -1	(ang) (ang)	0.0 175. le 129. le 133. Event ( Event ( AN) SATRN 0.0 7.7 8.7 7.8 12.5	11         dag           11         182         dag           7         dag         dag           4         dag         dag           4         dag         dag           4         dag         dag           4         dag         dag           5         dag         dag           129         dag         dag           136         dag         dag	Hour Minute Second 780M RAM 55.8 50.6 47.4 57.5 43.4 78.7
Point NEG Point NEG Diser vector - Paste ( Paste ( furn analyze BODY SATURS MINAS NECELADUS TETHYS DIONE RIERA	em Sit	ATURN	r v4.0 at SATUF 300 820 EC (km) 1113781 11465463 1553865 1222248 105379	RN Tilt L Left ✓ Image to E/ GB [Ra] 22.62 21.80 24.32 25.95 20.40 32.64	♦ and all Up Reset re Down ARTH 1304928 1311596 1465212 1593044 12563104 12563104	gn POS Tilt Rig ♥ Hi ♥ DB [R8] 21.65 21.80 24.31 26.21 25.94 20.38 32.63	x ≎ R ht Res out Z PHASE [deg] 50.3 55.5 52.1 42.8 52.3 52.2 42.3	■ Up Zoom C Fill Scre Zoom C on ANGLR DL [deg 5.07 0.02 0.04 0.04 0.07 0.15	C	with	NSP Labels Orbits /s 	<ul> <li>✓ Axes</li> <li>✓ Vect</li> <li>✓ Lat/</li> <li>12.6 min</li> <li>ΔLON (deg)</li> <li>67</li> <li>117</li> <li>-151</li> <li>124</li> <li>-56</li> </ul>	C S tors lons √ 129.2 √ REL (km/a) 3.9 16.8 16.5 12.1 13.9 4.6 4.6 4.6 5.6 5.6 5.7 7.8 7.	SEP ORS b/s ORS rad Year Month Day deg z_H (k 5 -1	(ang) (ang)	175 le 129. le 133. () Event () Event () 0.0 7.7 8.7 7.8 12.5 22.7 39.	182         deg           7         deg           4         deg           4         deg           4         b           4         b           5         b           5         b           5         b           5         b           129.2         124.0           127.3         136.7           127.2         127.2           127.4         129.2	Hour Minute Second RAM 55.8 50.6 47.4 47.4 43.4 78.2 98 1
Solon Systemeter Solon Systemeter Solon Systemeter Solon Systemeter Solon Solon Statemeter Solon	em Sil )_Y - RA: [ DEC: ] Curren Curren 	ATURN	r v4.0 at SATUF 300 820 DEC (RAN 1362979 1313781 1465463 1579980 1563665 15229248 1963309	RN Tilt L Left ✓ Imag to E/ GR [Ra] 22.62 21.80 24.32 25.95 20.40 32.58 30.40		gn POS Tilit Rig ✔ Hi ↓ ab UDE [Rs] 21.65 21.80 24.31 26.21 25.94 20.38 32.53 30.3 <sup>3</sup>	x ≎ Res ht ht Z PHASE [deg] 55.5 52.1 42.8 52.2 40.2 40.2 50.3 55.5 52.1 42.8 52.2 40.2 50.2 52.2 40.2 55.5	<ul> <li>Up</li> <li>Zoom C</li> <li>Fill Screet</li> <li>Zoom</li> <li>Com</li> <li>Com</li> <li>Com</li> <li>ANGLR_DI.</li> <li>Ideg</li> <li>5.07</li> <li>0.02</li> <li>0.04</li> <li>0.04</li> <li>0.04</li> <li>0.07</li> <li>0.15</li> <li>0.01</li> </ul>	C	with	NSP Labels Orbits /s = 	<ul> <li>✓ Axes</li> <li>✓ Vect</li> <li>✓ Lat/</li> <li>12.6 min</li> <li>12.6 min</li> <li>(deg)</li> <li>67</li> <li>117</li> <li>-151</li> <li>124</li> <li>-56</li> <li>-100</li> <li>-23</li> </ul>	Constant       S       tors       lons       / 129.2       VREL       (km/a)       3.9       16.3       16.5       12.1       13.9       4.6       3.6	SEP ORS b/s ORS rad Year Month Day deg Z_H (k 5 5 -1	(ang) (ang)	0.0 175. le 129. le 133. Event ( SATRN 0.0 7.7 8.7 7.8 12.5 22.7 38.7 57.4	182 deg           7 deg           4 deg           4 deg           4 b           512 c           127.3           136.7           127.2           127.4           139.6           127.2	Hour Minute Second Second 50.6 47.4 57.5 73.2 88.1 110.2
Colon Syste Point NEG Diser vector - Paste I Paste I Nurn analyze BODY SATURN HIMAS BROEZADUS TETHYS DIONE RRIEA RRIEA RRIEA TITAN HYPERION TADEFILO	am Sit j_Y - RA: [ DEC: ] Currer r: S/c occ2       	+89. -54. nt RA/D ATURN SAT 	x v4.0 at SATUR 300 820 DEC (RAN [km] 136376 1563665 1252248 13635665 1256350 1263248 1363760	RN Tilt L Left Imag to E/ GB [RB] 22.62 21.80 24.32 26.22 25.95 20.40 32.59 30.32 52.59	and all Up Reset res reset reset reset reset reset reset reset reset reset reset reset	gn POS Tilt Rig ✓ Hi (Ra) 21.65 21.80 24.31 25.94 20.38 32.59 30.31 52.57	X ≎ Res ht Res Dut Z PHASE [deg] 50.3 55.5 52.1 42.8 52.3 52.2 40.2 58.6 4	■ Up Zoom C Fill Scre Zoom C on ANGLR DI. [deg 5.07 0.02 0.04 0.04 0.04 0.07 0.01 0.01 0.01	C	with with	NSP Labels Orbits (\$ = 	<ul> <li>✓ Axes</li> <li>✓ Vect</li> <li>✓ Lat/</li> <li>12.6 min</li> <li>ΔL08 (deg)</li> <li>0</li> <li>67</li> <li>117</li> <li>151</li> <li>124</li> <li>-56</li> <li>-100</li> <li>-73</li> </ul>	↓ 129.2       VREL       (km/a)       3.9       16.3       16.5       12.1       13.9       4.6       3.6       1.5	SEP ORS b/s ORS rad Year Month Day deg z_H (k 5 5 -1 7 24	(ang) (ang)	0.0 175.2 le 129. le 133. Event ( Event ( AN) SATRN 0.0 7.7 8.7 7.8 12.5 22.7 33.7 57.4 92.5	182 deg           7 deg           4 deg           4 deg           1 +	Hour Minute Second Second 740M RAM 50.6 47.4 57.5 43.4 43.4 78.2 81.1 110.2
Solor Systemeter Syste	em Sit §_Y - RA: [ DEC: Currer r: S/ s/c occ?       	ATURN	x v4.0 at SATUR 300 B20 DEC RAN [km] 1362979 1313781 1465463 1553655 12229248 1563365 1263309 1827165 1363309 1827165	RN Tilt L Left Imag to E/ Carterian Ca	and all Up Reset Reset Pe Down ARTH ALTIT [km] 1304928 1313586 13579444 1563104 1528458 1960734 13827015 3168006 134882151	gn POS Tilt Rig ✓ Hi ○ ab UDR [Re] 21.65 21.80 24.31 26.21 25.94 20.38 30.31 52.57 240.30	X C R ht Res put Z PHASE [deg] 50.3 55.5 52.1 42.8 52.3 52.2 42.3 52.2 52.2 52.2 52.2 52.2 53.0 76.4 84.0	■ Up Zoom C Fill Scre Zoom C on ANGLR DI. [deg 5.07 0.02 0.04 0.04 0.07 0.15 0.01 0.01 0.00	C	with	NSP Labels Orbits (%) = S/C LAT 38 39 35 32 33 34 44 25 33 34 44 25 33 17 -21	✓ Axes ✓ Vect ✓ Lat/ 12.6 min ALON (deg) 0 67 117 -151 124 -56 -100 -73 -66	♦ 1000000000000000000000000000000000000	SEP ORS b/s ORS rad Year Month Day deg z_H (k 5 -1 7 24 623 6447	s ang: i ang i ang i a a an a a a a a ang i a a an	0.0 175. le 129. le 133. Event ( Event ( AN) SATRN 0.0 7.7 8.7 7.8 12.5 22.7 33.7 57.4 92.3 117.6	182 deg           7 deg           4 deg           4 deg           1 +	Hour Minute Second Second S5.8 50.6 47.4 57.5 43.4 73.2 88.1 10.2 140.7

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	25.69 Rs	22.4 deg	14
Apoapse	27.10 Rs	31.4 deg	23
Segment End	22.62 Rs	50.3 deg	38

#### Segment End: 2008-059T10:51

Saturn 59\_60 Legacy

No ORS Boresight Solar Constraints on Science Pointing.

**DOY 055** – MAPS instruments continued their low-rate magnetospheric study. VIMS stared at 1 ansa of the F ring and observed continuously for 1 orbital period to build up a 360 deg azimuthal map of the ring.

**DOY 056** – UVIS continued their Interplanetary Hydrogen Survey. ISS targeted Titan for a NAC photopol at 60 deg phase then ISS targets several satellites in their ongoing satellite orbit determination campaign.

**DOY 057** - RSS Operations Readiness Test (ORT), to demonstrate DSN and RSSG preparedness to support the Rings Occultation experiment on DOY 062. ISS targeted several satellites in their ongoing satellite orbit determination campaign then ISS targeted Saturn for WAC photopolarimetry at 25 degree phase.

**DOY 058** – ISS targeted several satellites in their ongoing satellite orbit determination campaign. VIMS performed a 3 star calibration of their instrument. UVIS observed an occultation of star Bet Hya by the rings.

**DOY 059** – UVIS started the day by finishing their observations of the occultation of star Bet Hya by Saturn's rings. MAPS continued their continuous low-rate magnetospheric survey.

# **Segment Integration Planning**

## **Timeline Gaps and Suggested Observations**

Saturn 59\_60 Legacy

Activity	Start	Duration	Pointing	Notes	TLM
Segment Start	2008-055T11:21:00	)			
OPNAV and Turn to New Waypoint	2008-055T11:21:00	01:00:00			
New Waypoint	2008-055T12:21:00	)			
VIMS F-Movie	2008-055T12:21:00	15:15:00			
ISS Titan	2008-056T03:36:00	01:00:00			
SP Turn to Downlink	2008-056T04:36:00	00:30:00			
Downlink	2008-056T05:06:00	06:00:00	XBAND to Earth;	Goldstone 34 BWG	
SP Turn to Waypoint	2008-056T11:06:00	00:30:00			
OPEN	2008-056T11:36:00	14:00:00			
Rev 60 Apoapsis	2008-056T22:23:37	,			
SP Turn to Downlink	2008-057T01:36:00	00:30:00	XBAND to Earth;		
Downlink	2008-057T02:06:00	09:00:00	XBAND to Earth;	Goldstone 34 BWG	
SP Turn to Waypoint	2008-057T11:06:00	00:30:00			
OPEN	2008-057T11:36:00	06:00:00			
UVIS Ring Impact	2008-057T17:36:00	08:00:00			
SP Turn to Downlink	2008-058T01:36:00	00:30:00	XBAND to Earth;		
Downlink	2008-058T02:06:00	09:00:00	XBAND to Earth;	Goldstone 34 BWG	
OPNAV and Turn to Waypoint	2008-058T11:06:00	01:00:00			
CIRS Rings	2008-058T12:06:00	08:00:00			
UVIS Ring Impact	2008-058T20:06:00	05:15:00			
SP Turn to Downlink	2008-059T01:21:00	00:30:00			
Downlink	2008-059T01:51:00	09:00:00	XBAND to Earth;	Goldstone 34 BWG	

Time (2008)	Rs	Phase (deg.)	Sub S/C Lat
	Rev	59/60	
055T00:00:00	24.58	19.6	11
056T00:00:00	26.55	25.7	17
057T00:00:00	27.13	32	23
058T00:00:00	26.37	38.6	29
059T00:00:00	24.2	46.2	35

K. Cloutier

10/03/2017

#### **Beginning of Integration:**

#### DATA VOLUME SUMMARY

		OBSERV	ATION_PER	IOD										DOWN	NLINK_PAS	s	l
					P	4					P5	RECO	RDED		PLAYBA	ск	
DOWNLINK PASS NAME		Start doy hh:mm	End doy hh:mm	STAR (Mb)	r sci (Mb)	HK+E (Mb)	TOTAL (Mb)	CPACTY (Mb)	MAR (Mb)	GIN (%)	OPNAV (Mb)	SCI (Mb)	ENGR (Mb)	TOTAL   (Mb)	CPACTY (Mb)	MARGIN CA (Mb) (%)	ROVR   (Mb)
SP_059EA_G34BWGNON056_ SP_060EA_G34BWGNON057_I SP_060EA_G34BWGNON058_I SP_060EA_G34BWGNON059_I	PRIME PRIME PRIME PRIME	056 05:06 057 02:06 058 02:06 059 01:51	056 11:06 057 11:06 058 11:06 059 10:51	0 119 764 1337	525 1325 1252 629	62 52 52 51	586 1496 2068 2017	3534 3568 3568 3534	2947 2073 1500 1517	83% 58% 42% 43%	17 0 0 17	170 229 229 229	35 53 53 53	809 1777 2350 2316	690 1013 1013 1010	-119 -17% -764 -75% -1337 -132% -1306 -129%	119   764   1337   1306

#### 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 I (Mb)	PROBE (Mb)	ENGR (Mb)	TOTAL (Mb)
OBSERVATION_NOR OBSERVATION_OPN SP_059EA_G34BWGNON056_PRIME DAILY TOTAL SCIENCE	055 11:21 055 11:21 056 05:06 055 11:21	056 05:06 056 05:06 056 11:06 056 11:06	63.9 0.0 21.6 85.5	9.6 0.0 3.2 12.8	248.4 0.0 75.6 324.0	3.2 0.0 1.1 4.3	0.0 17.4 0.0 0.0	38.3 0.0 13.0 51.3	76.7 0.0 25.9 102.6	0.0 0.0 0.0 0.0	83.7 0.0 28.3 112.0	0.8 0.0 1.6 2.5	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0	524.6 17.4 170.3
OBSERVATION_NOR SP_060EA_G34BWGNON057_PRIME DAILY TOTAL SCIENCE	056 11:06 057 02:06 056 11:06	057 02:06 057 11:06 057 11:06	54.0 32.4 86.4	7.8 4.9 12.7	21.6 86.4 108.0	2.7 1.6 4.3	1070.5 0.0 1070.5	32.4 19.4 51.8	64.8 38.9 103.7	0.0 0.0 0.0	70.7 42.4 113.2	0.0 2.5 2.5	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0	1324.6 228.5
OBSERVATION_NOR SP_060EA_G34BWGNON058_PRIME DAILY TOTAL SCIENCE	057 11:06 058 02:06 057 11:06	058 02:06 058 11:06 058 11:06	54.0 32.4 86.4	8.1 4.9 12.9	28.8 86.4 115.2	2.7 1.6 4.3	990.3 0.0 990.3	32.4 19.4 51.8	64.8 38.9 103.7	0.0 0.0 0.0	70.7 42.4 113.2	0.0 2.5 2.5	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0	1251.8 228.5
OBSERVATION_NOR OBSERVATION_OPN OBSERVATION_SI SP_060EA_G34BWGNON059_PRIME DAILY TOTAL SCIENCE	058 11:06 058 11:06 058 11:06 059 01:51 058 11:06	059 01:51 059 01:51 059 01:51 059 10:51 059 10:51	53.1 0.0 0.0 32.4 85.5	8.0 0.0 0.0 4.9 12.8	212.4 0.0 16.0 86.4 314.8	2.7 0.0 0.0 1.6 4.3	48.0 17.4 0.0 0.0 48.0	31.9 0.0 0.0 19.4 51.3	63.7 0.0 0.0 38.9 102.6	0.0 0.0 0.0 0.0 0.0	69.6 0.0 42.4 112.0	123.7 0.0 0.0 2.5 126.2	0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	613.0 17.4 16.0 228.5
			CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADA (Mb)	R RPWS (Mb)	3 UVIS (Mb)	VIM (Mb	IS PRO p) (Mb	BE ))	
TOTAL RECORDED (OPNAV data not included)			343.8	51.3	862.0	17.2	2108.8	206.3	3 412.6	3 0.0	450.4	133.6	0.0	0.0		

**K. Cloutier** 

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No Waypoint Selection Info Available.

## **Waypoints Chosen**

Saturn 59\_60 Legacy

Waypoint 1 (2005-055T11:55 – 056T11:36): NAC to L\_ANSA\_F, POS\_X to NSP



Waypoint 2 (2005-056T11:36 – 059T11:29): NAC to Saturn, NEG\_Z to NSP



### Pointing Issues

None

### Data Volume Issues

 The version of SMT used does not apply the latest margin policy. We'll deal when implemented. The retrofitted segment uses the latest SMT version (MSS 10.2)

### Telemetry Mode Issues

- None

### CIMS Issues

- None

### Power/OPMODE Issues

- None

### Flight Rule/Mission Planning Guideline and Constraint Issues

- Not checked
- Other Issues
  - None