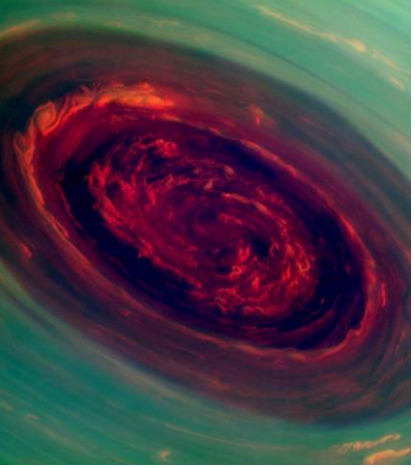
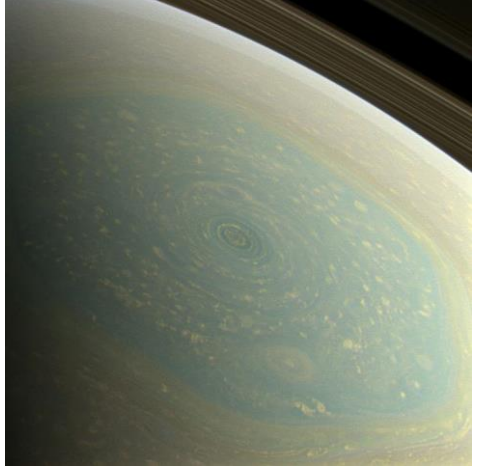
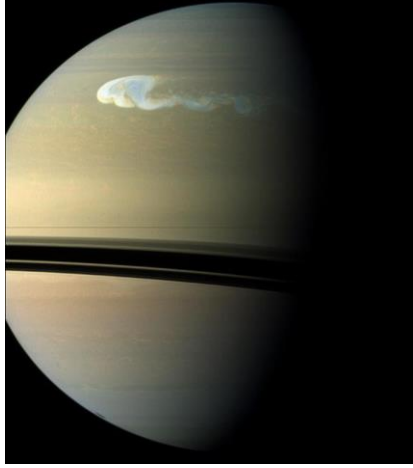


Science Planning & Sequence Team
CASSINI

SATURN TARGET WORKING TEAM

Rev 137 Segment Legacy Package

Segment Boundary: September 4, 2010 – September 6, 2010
2010-247T06:33 – 2010-249T06:33 (SCET)

Integration Began 01/04/2010
Segment Delivered to S62 Sequence 01/25/2010
Lead Integrator was Leo Cheng

Legacy Package Assembled by Kyle Cloutier

Table of Contents

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

Segment Overview and Final Products

Segment Summary

- Saturn 137 is the last segment in S62, a sequence in the Equinox extended mission. The spacecraft stays relatively equatorial during this three day long segment.
- Primary science includes a UVIS scan, VIMS hemispherical maps, and an ISS imaging observation of the transit of Telesto across Rhea (out-of-discipline).

Final Sequenced SPASS

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End	Primary	Secondary	Comments
SATURN REV_137 Segment		2010-247T06:33:00		002T00:00:00	2010-249T06:33:00			
SP_137SA_WAYPTTURN247_PRIME	M	2010-247T06:33:00		000T00:40:00	2010-247T07:13:00	ISS_NAC to Saturn	NEG_Z to 84.1/84.1	
NEW WAYPOINT		**2010-247T07:13:00**		**001T14:20:00**	**2010-248T21:33:00**	**ISS_NAC to Saturn**	**NEG_Z to 84.1/84.1**	
UVIS_137SA_EUVFUV001_PRIME	M	2010-247T07:13:00		000T16:00:00	2010-247T23:13:00	UVIS_FUV to Saturn	NEG_Z to 84.1/84.1	
VIMS_137SA_REGMAP001_PRIME	I, M	2010-247T23:13:00		000T03:39:00	2010-248T02:52:00	ISS_NAC to Saturn	NEG_Z to 84.1/84.1	
ISS_137TL_MUTUALEVE001_PRIME	M	2010-248T02:52:00		000T01:07:00	2010-248T03:59:00	ISS_NAC to Telesto	NEG_Z to 84.1/84.1	ISS_NAC to Telesto control of secondary axis not required
VIMS_137SA_REGMAP002_PRIME	I, M	2010-248T03:59:00		000T15:24:00	2010-248T19:23:00	ISS_NAC to Saturn	NEG_Z to 84.1/84.1	Secondary: Neg Z to 84.1/84.1
SP_137EA_DLTURN248_PRIME	M	2010-248T19:23:00		000T00:40:00	2010-248T20:03:00	XBAND to Earth	NEG_Y to 274.96/-3.3	NEG_Y to 274.96/-3.30, (NEG_Y to Saturn (0,0,-9.5)), MIMI
SP_137EA_YBIAS248_PRIME	M	2010-248T20:03:00		000T01:30:00	2010-248T21:33:00	XBAND to Earth	NEG_Y to 274.96/-3.3	
NEW WAYPOINT		**2010-248T21:33:00**		**000T09:00:00**	**2010-249T06:33:00**	**XBAND to Earth**	**NEG_Y to 274.96/-3.3**	
SP_137EA_C70METSEQ248_PRIME	C, M	2010-248T21:33:00		000T08:40:00	2010-249T06:13:00	XBAND to Earth	NEG_Y to 274.96/-3.3	NEG_Y to 274.96/-3.30, (NEG_Y to Saturn (0,0,-9.5)), MIMI

Gap 1

Final Sequenced SMT and Data Volume

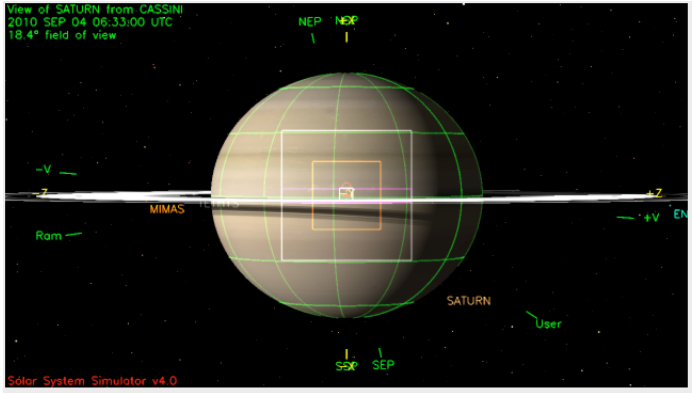
DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)

			OBSERVATION_PERIOD							DOWNLINK_PASS							
			P4						P5	RECORDED		PLAYBACK					
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_MARGN (%)	CAROVR (Mb)	
SP_137EA_C70METSEQ248_PRIME	248 21:33	249 06:13	0	2335	165	2500	3308	808	0	237	51	2788	2898	109	110	4%	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	247 06:33	248 21:33	140.4	73.6	0.0	24.1	324.0	84.2	168.5	0.0	183.9	245.2	1070.0	0.0	163.0	2476.9
SP_137EA_C70METSEQ248_PRIME	248 21:33	249 06:13	31.2	16.3	82.8	3.1	0.0	18.7	37.4	0.0	40.9	4.8	0.0	0.0	0.0	235.3
DAILY TOTAL SCIENCE	247 06:33	249 06:13	171.6	89.9	82.8	27.2	324.0	103.0	205.9	0.0	224.8	250.0	1070.0	0.0	163.0	

Segment Geometry



Rev 137 OUTBOUND
2010 - 247T06:33:00 SCET
2010 SEP 04 06:33:00 SCET
2010 SEP 04 08:00:03 ERT
Apoapse_137 + 011T05:08:50
Periapse_137 + 001T04:53:34
Light time: 87.0 min
Orbit period: 20.0 days

Radius	937020 km	15.55 Rs
Rad_cyl	936893 km	15.55 Rs
Z_ht_cyl	15427 km	0.26 Rs
Mag_L	15.55	
Semi_axs	1418929 km	23.54 Rs
Eccentricity	0.853	
Inclination	4.63 deg	
Sun_range	9.55 AU	
Earth_range	10.47 AU	

--- DSN ELEV -- D/L -- U/L --------

Goldstone	-50.4	-22.2
Canberra	18.2	48.1
Madrid	3.2	-28.8

------- LOOK DIRECTION INFO -------

FOV	18.4 deg	321.2 mrad
RA	-123.248 deg	
DEC	5.265 deg	
Crosses_RP_@	0.000 Rs	
EPS	2.360 deg	
SEP	22.936 deg	
ORS b/s angle	130.1 deg	
ORS rad angle	84.7 deg	*

Point NEG_Y at SATURN and align POS_X = Up with NSP

User vector - RA: +86.506 DEC: -20.791 Paste Current RA/DEC

Tilt L Up Tilt R | Left Reset Right | Image Down Hi Res

Zoom Out Fill Screen Zoom In | Labels Axes | Orbits Vectors | FOVs Lat/lons

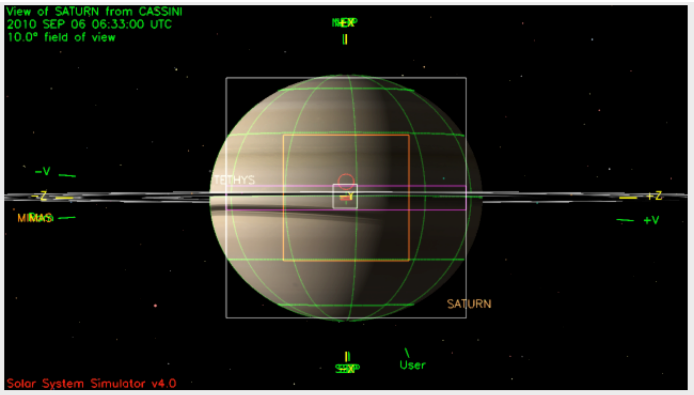
Year Month Day Hour Minute Second

Turn analyzer: SATURN to EARTH about Z on RWA = 12.5 min / 127.9 deg Event

BODY	S/C OCC?	SAT OCC?	RANGE [km]	RANGE [Rs]	ALTITUDE [km]	ALTITUDE [Rs]	PHASE [deg]	ANGLR_DIAMETER [deg]	ANGLR_DIAMETER mrad]	SUB_S/C LON	SUB_S/C LAT	ALON [deg]	VREL [km/s]	Z_HGHT [km]	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	937020	15.55	876754	14.55	49.9	7.38	128.73	55	1	0	7.4	0	0.0	127.9	159.4
MIMAS	--	--	1093171	18.14	1092966	18.14	55.3	0.02	0.38	28	-0	146	16.3	-4980	5.4	122.5	153.9
ENCELADUS	--	--	735117	12.20	734863	12.19	41.2	0.04	0.70	221	1	-28	14.0	32	8.7	136.6	167.9
TETHYS	--	--	647819	10.75	647279	10.74	54.0	0.10	1.67	167	0	9	8.3	5221	4.1	123.8	155.2
DIONE	--	--	920101	15.27	919540	15.26	26.7	0.07	1.23	279	1	-76	15.9	152	23.5	151.2	175.8
RHEA	--	--	1381214	22.92	1380447	22.91	35.7	0.06	1.11	337	0	-139	15.7	-108	14.4	142.2	173.4
TITAN	--	--	1603056	26.60	1600481	26.56	97.0	0.18	3.21	35	1	97	4.8	-6597	47.4	80.7	112.1
HYPERION	--	--	1711666	28.40	1711545	28.40	6.6	0.01	0.19	264	-41	-94	12.5	16078	52.7	174.9	147.7
IAPETUS	--	--	4386658	72.79	4385911	72.77	74.3	0.02	0.34	13	-2	148	8.0	-876590	27.5	103.2	132.4
PHOEBE	--	--	13346575	221.45	13346464	221.45	23.0	0.00	0.02	124	7	-109	6.0	2287753	67.5	159.0	133.1
SATURN	--	--	937020	15.55	876754	14.55	49.9	7.38	128.73	55	1	0	7.4	0	0.0	127.9	159.4

Segment Start: 2010-247T06:33

Segment End: 2010-249T06:33



Rev 137 OUTBOUND
2010 - 249T06:33:00 SCET
2010 SEP 06 06:33:00 SCET
2010 SEP 06 08:00:09 ERT
Apoapse_137 + 013T05:08:50
Periapse_137 + 003T04:53:34
Light time: 87.2 min
Orbit period: 20.0 days

Radius	1731726 km	28.73 Rs
Rad_cyl	1731544 km	28.73 Rs
Z_ht_cyl	-25122 km	-0.42 Rs
Mag_L	28.74	
Semi_axs	1418867 km	23.54 Rs
Eccentricity	0.853	
Inclination	4.63 deg	
Sun_range	9.55 AU	
Earth_range	10.48 AU	

--- DSN ELEV -- D/L -- U/L --------

Goldstone	-51.2	-23.6
Canberra	16.8	47.3
Madrid	4.5	-27.7

------- LOOK DIRECTION INFO -------

FOV	10.0 deg	173.9 mrad
RA	-101.049 deg	
DEC	5.909 deg	
Crosses_RP_@	0.000 Rs	
EPS	2.189 deg	
SEP	21.209 deg	
ORS b/s angle	108.0 deg	
ORS rad angle	83.8 deg	*

Point NEG_Y at SATURN and align POS_X = Up with NSP

User vector - RA: +86.506 DEC: -20.791 Paste Current RA/DEC

Tilt L Up Tilt R | Left Reset Right | Image Down Hi Res

Zoom Out Fill Screen Zoom In | Labels Axes | Orbits Vectors | FOVs Lat/lons

Year Month Day Hour Minute Second

Turn analyzer: SATURN to EARTH about Z on RWA = 10.9 min / 106.0 deg Event

BODY	S/C OCC?	SAT OCC?	RANGE [km]	RANGE [Rs]	ALTITUDE [km]	ALTITUDE [Rs]	PHASE [deg]	ANGLR_DIAMETER [deg]	ANGLR_DIAMETER mrad]	SUB_S/C LON	SUB_S/C LAT	ALON [deg]	VREL [km/s]	Z_HGHT [km]	ANGLE_FROM SATRN	ANGLE_FROM EARTH	ANGLE_FROM RAM
SATURN	--	--	1731726	28.73	1671459	27.73	71.9	3.99	69.62	214	-1	0	4.1	0	0.0	106.0	144.6
MIMAS	--	--	1839906	30.53	1839705	30.53	76.7	0.01	0.23	51	-2	123	13.2	-3846	4.9	101.2	139.8
ENCELADUS	--	--	1967500	32.65	1967243	32.64	71.0	0.01	0.26	357	-1	-172	15.6	-39	0.9	106.9	145.5
TETHYS	--	--	1442422	23.93	1441882	23.92	74.0	0.04	0.75	169	-2	10	9.1	5614	2.0	104.0	142.6
DIONE	--	--	1478224	24.53	1477662	24.52	81.9	0.04	0.76	127	-1	43	6.1	-151	10.0	96.0	134.6
RHEA	--	--	1748505	29.01	1747742	29.00	89.2	0.05	0.88	82	-1	83	5.1	-1060	17.4	88.7	127.2
TITAN	--	--	1761653	29.23	1759078	29.19	111.6	0.17	2.92	65	-1	71	2.0	-1549	39.8	66.3	104.8
HYPERION	--	--	2579344	42.80	2579223	42.80	42.6	0.01	0.13	339	-62	-112	9.5	324	29.5	135.4	173.7
IAPETUS	--	--	5187920	86.08	5187173	86.07	83.6	0.02	0.29	13	-4	161	5.7	-923973	16.8	94.0	130.2
PHOEBE	--	--	13069333	216.85	13069218	216.85	21.8	0.00	0.02	185	6	-86	3.1	2422296	86.2	159.9	128.9
SATURN	--	--	1731726	28.73	1671459	27.73	71.9	3.99	69.62	214	-1	0	4.1	0	0.0	106.0	144.6

	Saturn Range	Phase Angle	Sub-S/C Lat.
Segment Start	15.55 Rs	49.9 deg	1
Segment End	28.73 Rs	71.9 deg	-1

Solar Geometry – ORS Boresight Concerns

No ORS Boresight Solar Constraints on Science Pointing Noted.

Daily Science Highlights

September 4th, 2010 (DOY 247): UVIS began the day with a scan, in high resolution mode, across Saturn's visible hemisphere. This was followed by a VIMS hemispherical map of Saturn.

September 5th, 2010 (DOY 248): ISS took the opportunity to image a "mutual event", where Telesto, one of the small satellites of Saturn transited across another satellite, Rhea. We ended the day with another VIMS hemispherical map of Saturn.

Segment Integration Planning

Timeline Gaps and Suggested Observations

This segment contained only one observation period.

Suggested Observations:

- VIMS Regional Maps and an ISS observation of the transit of Telesto across Rhea
- OpNav observation

Initial SMT and Data Volume

Beginning of Integration:

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

			OBSERVATION_PERIOD							DOWNLINK_PASS							
			P4						P5	RECORDED		PLAYBACK					
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_MARGN (Mb)	(%)	CAROVR (Mb)
SP_137EA_C70METSEQ248_PRIME	248 21:33	249 06:33	0	2051	165	2216	3318	1102	0	247	53	2516	2983	466	467	16%	0

- **Downlink Limited - margin available: approx 460 Mb**
- **Gap fill must not exceed downlink margin**

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	247 06:33	248 21:33	140.4	90.1	0.0	24.1	248.0	84.2	168.5	0.0	183.9	289.8	760.0	0.0	163.0	2152.1
OBSERVATION_SI	247 06:33	248 21:33	0.0	0.0	0.0	0.0	43.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.5
SP_137EA_C70METSEQ248_PRIME	248 21:33	249 06:33	32.4	17.0	86.4	3.2	0.0	19.4	38.9	0.0	42.4	4.9	0.0	0.0	0.0	244.7
DAILY TOTAL SCIENCE	247 06:33	249 06:33	172.8	107.1	86.4	27.3	291.5	103.7	207.4	0.0	226.4	294.8	760.0	0.0	163.0	

	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)
TOTAL RECORDED (OPNAV data not included)	172.8	107.1	86.4	27.3	291.5	103.7	207.4	0.0	226.4	294.8	760.0	0.0

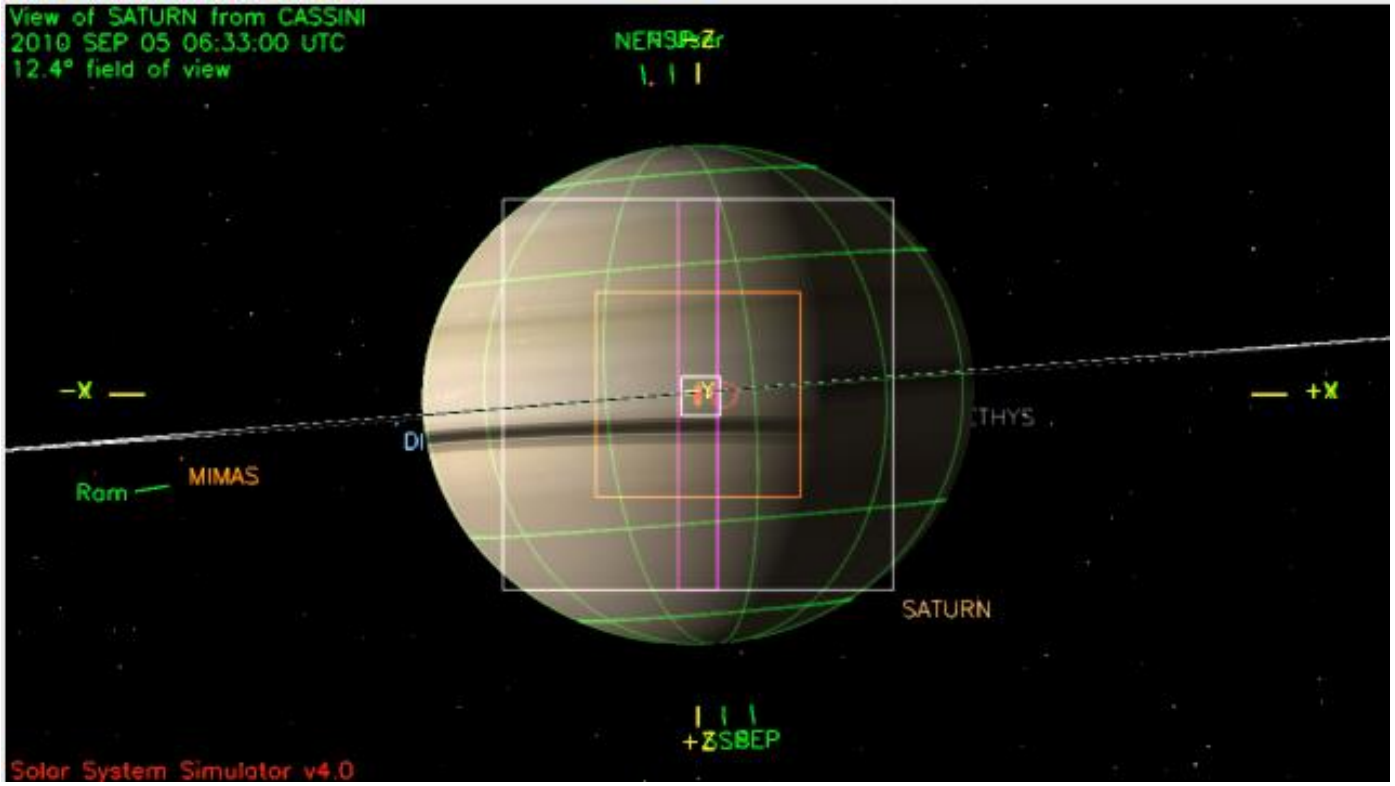
Waypoint Selection

Waypoint Options for Secondary Axis:

	Turn Time to NSP	Turn Time to NEP	Turn Time to Sun
NEG_X to 84.1/84.1	2.72 min	5.36 min	19.4 min
NEG_Z to 84.1/84.1	2.72 min	5.36 min	19.4 min

Waypoints Chosen

Waypoint 1 (2010-247T06:33 – 249T06:33): NAC to Saturn, NEG_Z to 84.1/84.1



Notes & Liens

- Pointing:
  - None
- Data Volume:
  - SSR emptied at the end of sequence
- DSN:
  - No issues
- Opmodes:
  - None
- Special Activities:
  - None

Sequence Liens:

- None