11984 - Observing Saturn's high latitude polar auroras

Cycle: 16, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Jonathan D. Nichols (PI) (ESA Member)	**University of Leicester**	**jdn@ion.le.ac.uk**
Prof. John T. Clarke (CoI) (AdminUSPI)	Boston University	jclarke@bu.edu
Prof. Jean-Claude M. Gerard (CoI) (ESA Member)	Universite de Liege	jc.gerard@ulg.ac.be
Dr. Denis Grodent (CoI) (ESA Member)	Universite de Liege	d.grodent@ulg.ac.be
Prof. Stanley W.H. Cowley (CoI) (ESA Member)	University of Leicester	swhc1@ion.le.ac.uk
Dr. Emma J. Bunce (CoI) (ESA Member)	University of Leicester	ejb10@ion.le.ac.uk
Dr. Sarah V. Badman (CoI) (ESA Member)	University of Leicester	svb4@ion.le.ac.uk
Dr. Dean L. Talboys (CoI) (ESA Member)	University of Leicester	dean.talboys@star.le.ac.uk
Dr. Tom Stallard (CoI) (ESA Member)	University of Leicester	tss@ion.le.ac.uk
Prof. Michele Dougherty (CoI) (ESA Member)	Imperial College of Science Technology and Medicine	mdougherty@ic.ac.uk
Dr. Donald G. Mitchell (CoI)	The Johns Hopkins University Applied Physics Laboratory	donald.g.mitchell@jhuapl.edu
Dr. William S. Kurth (CoI)	University of Iowa	wsk@space.physics.uiowa.edu
Dr. Wayne R. Pryor (CoI)	Central Arizona College	Wayne_Pryor@centralaz.edu
Dr. Frank J. Crary (CoI)	Southwest Research Institute	fcrary@swri.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
C1	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:49:07.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
C2	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:49:13.0	yes
C3	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:49:19.0	yes
C4	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:49:24.0	yes
D1	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:49:32.0	yes
D2	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:49:37.0	yes
D3	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:49:42.0	yes
D4	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:49:47.0	yes
E1	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:49:51.0	yes
E2	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:49:56.0	yes
E3	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:50:01.0	yes
E4	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:50:08.0	yes
F1	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:50:13.0	yes
F2	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:50:17.0	yes
F3	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:50:22.0	yes
F4	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:50:26.0	yes
G1	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:50:30.0	yes
G2	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:50:37.0	yes
G3	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:50:41.0	yes
G4	(1) SATURN	ACS/SBC	1	17-Feb-2009 21:50:45.0	yes

20 Total Orbits Used

ABSTRACT

Planetary auroral emissions are critical indicators of how the magnetospheres of the planets work. Recently, a new component of Saturn's auroral emissions, i.e. high latitude auroras inside the main auroral oval, have been observed by the Cassini spacecraft during otherwise quiet auroral conditions. Such high latitude auroras are of immense interest since they occur on magnetic flux tubes connected to a region that is key to the overall dynamics of the system, the magnetotail, and where if conventional theories regarding Saturn's magnetosphere are correct there should not be any auroras. These faint auroral emissions have not been previously observed by the Hubble Space Telescope (HST). However, the unique oblique viewing geometry afforded during early 2009 due to Saturn's orbital longitude will result in the apparent brightening of these polar emissions due to the limb-brightening effect, with the result that they may be observable by HST for the first ever time. In addition, at this time the Cassini spacecraft will be in a high latitude orbit, with a trajectory that will take it through these magnetic flux tubes, providing essential simultaneous in situ data. This is the last time Cassini will be in such an orbit during its mission as currently scheduled and HST is the only instrument capable of obtaining sustained long-term observations of Saturn's auroras. These observations will address the following:

Does Saturn exhibit high latitude UV auroras observable by HST?
Where do these auroras occur, and at what altitude?
How do these auroras behave over time? How variable are they? Are they periodic?
How do they behave with respect to other auroral components?
What processes drive these auroras?
Are these auroras generated by processes internal to the magnetosphere or are they driven by the solar wind?
How do the infrared (IR) auroras relate to the ultraviolet (UV) auroras?

OBSERVING DESCRIPTION

These observations can be obtained with the Solar Blind Channel (SBC) of the ACS. The field of view of the ACS/SBC (35" x 31") is large enough to encompass the whole disc of the planet plus a significant portion of the rings. The sensitivity of the ACS/SBC using the F125LP filter is ~2.1 x 10-3 counts/pixel/s for 1 kiloRayleigh of H2 plus Lyman-alpha

emission, such that the typically measured count rates are ~25,000 counts/s, well below the limit of 200,000 counts/s. We will use the F115LP filter in order to obtain the maximum signal to noise for observing the faint polar emissions. In order to obtain images without Ly-alpha background contamination from the geocorona the observations are to be obtained whilst HST is in shadow. Higher count rates are desirable since planetary rotation introduces ~1°/100 s of blurring of features near the central meridian longitude. We will obtain 100 s exposures, a length experience shows is sufficient to obtain a good signal-to-noise ratio, while retaining good temporal resolution. We request 20 orbits in order to determine the long-term behavior of the polar auroras. Experience shows that the windows for observing Saturn during this interval are generally ~4 orbits in length, and the 20 orbits would ideally consist of ~5 groups of ~4 orbits. They would ideally be scheduled to occur when Cassini is at high dayside latitudes in the southern hemisphere and when groundbased observations are being obtained, but in practice these observations can be scheduled whenever possible.

Visit

Proposal 11984, Visit C1, scheduling Wed Feb 18 02:50:49 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 17-FEB-2009:00:00:00 AND 18-FEB-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations. It will particularly coincide with Cassini UVIS observations of Saturn.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP				100 Secs X 19	
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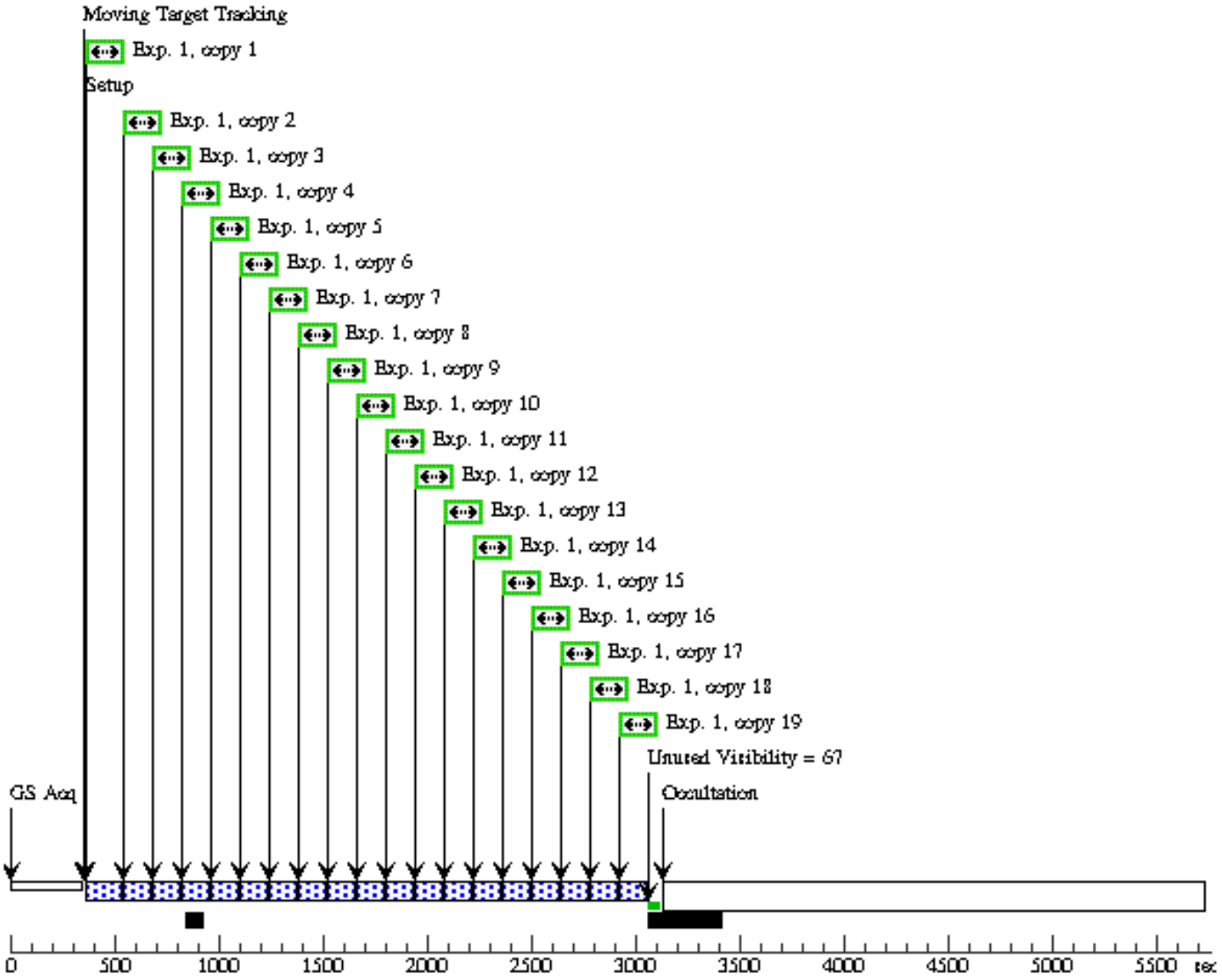
Orbit Structure



Visit

Proposal 11984, Visit C2, scheduling Wed Feb 18 02:50:51 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 17-FEB-2009:00:00:00 AND 18-FEB-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations. It will particularly coincide with Cassini UVIS observations of Saturn.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
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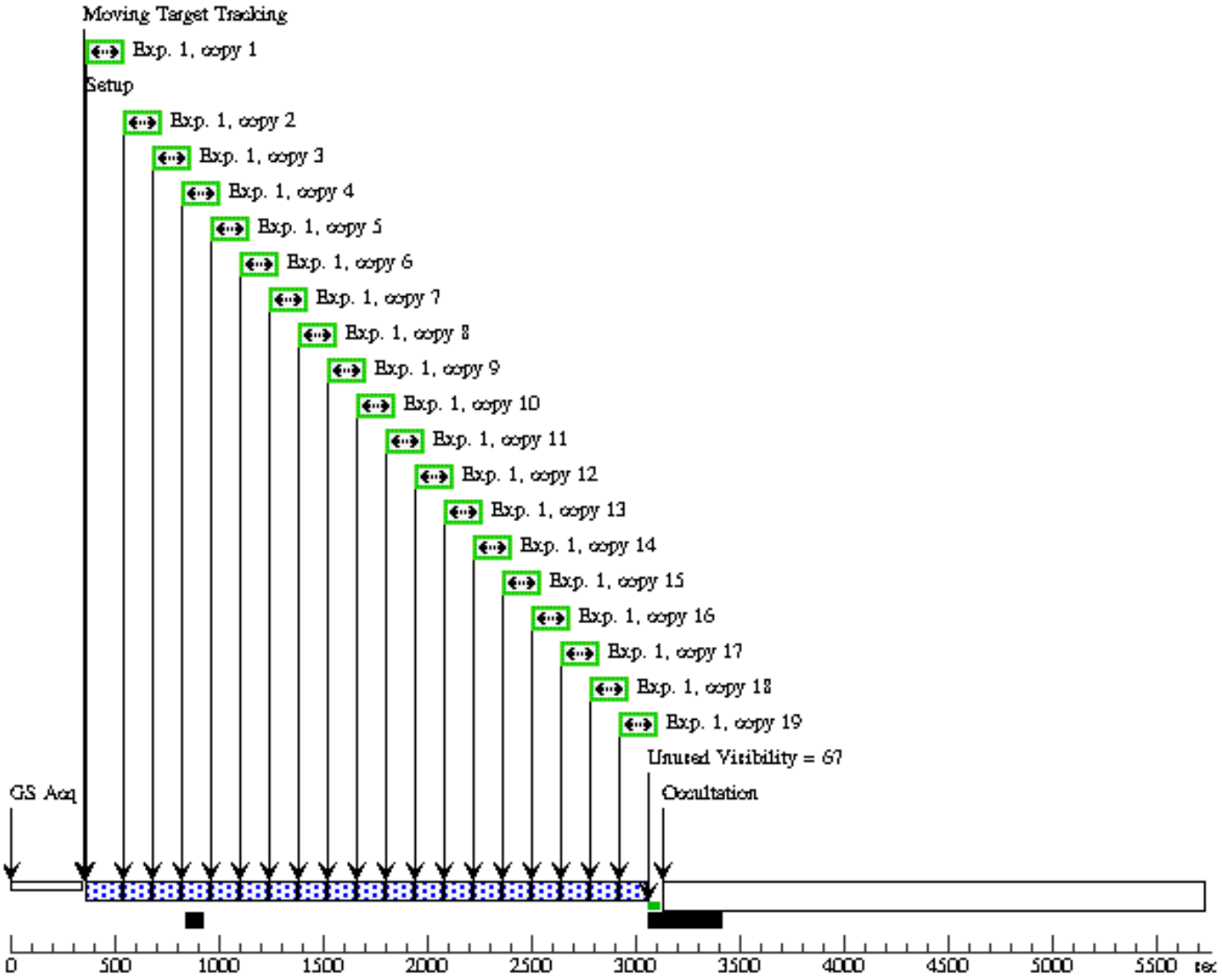
Orbit Structure



Visit

Proposal 11984, Visit C3, scheduling Wed Feb 18 02:50:51 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 17-FEB-2009:00:00:00 AND 18-FEB-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations. It will particularly coincide with Cassini UVIS observations of Saturn.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
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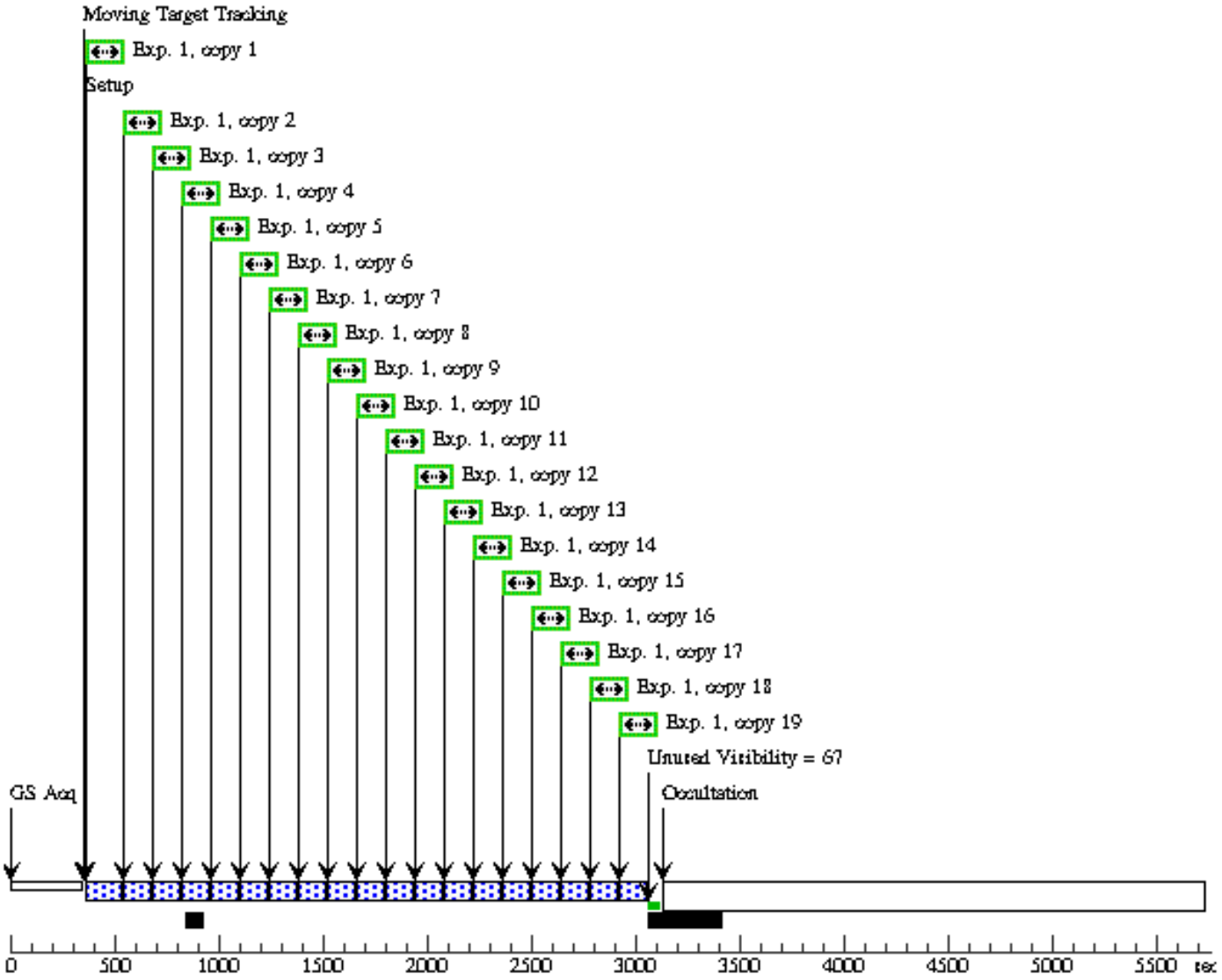
Orbit Structure



Visit

Proposal 11984, Visit C4, scheduling Wed Feb 18 02:50:52 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 17-FEB-2009:00:00:00 AND 18-FEB-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations. It will particularly coincide with Cassini UVIS observations of Saturn.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
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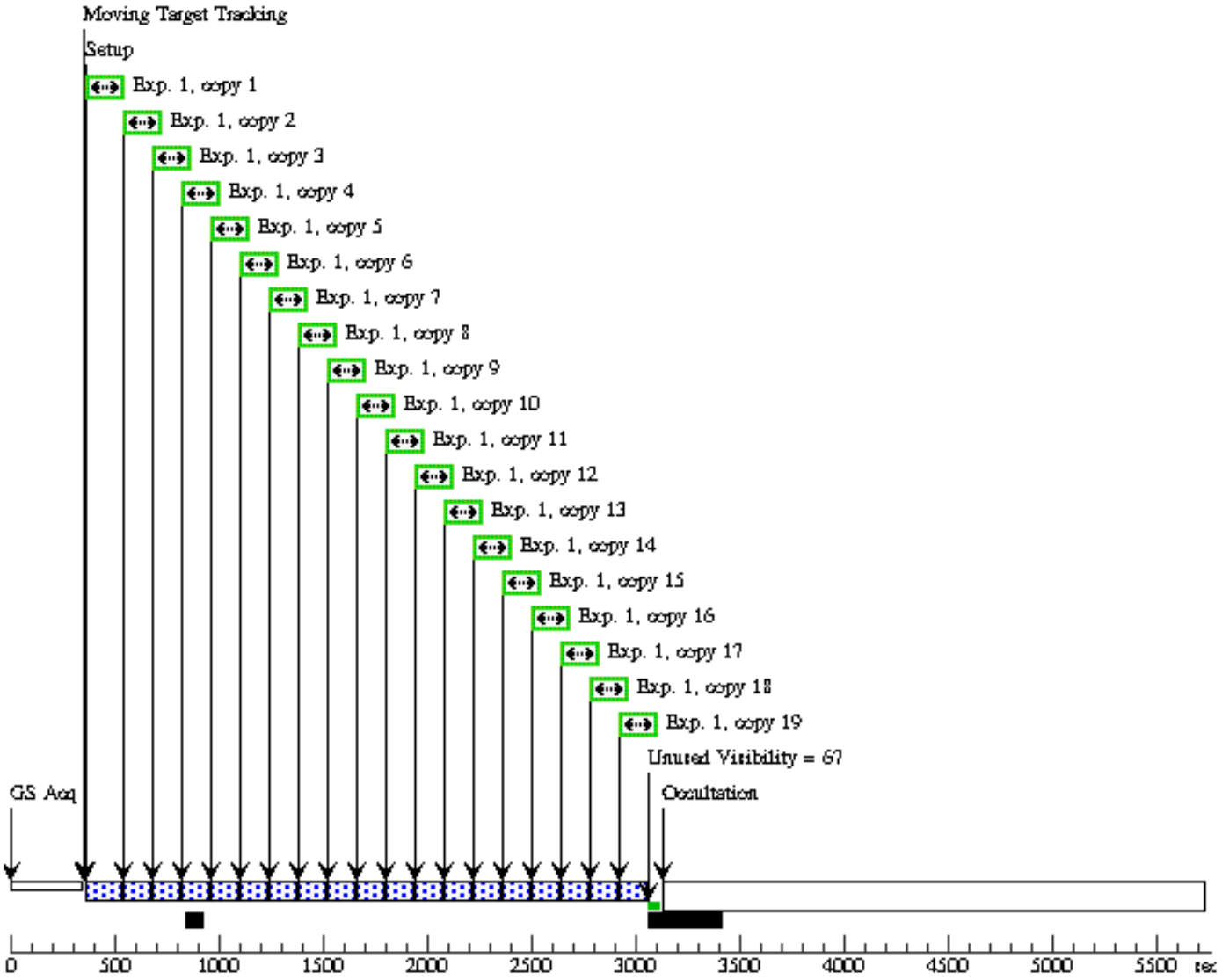
Orbit Structure



Visit

Proposal 11984, Visit D1, scheduling Wed Feb 18 02:50:52 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 18-FEB-2009:00:00:00 AND 19-FEB-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations. It will particularly coincide with Cassini UVIS observations of Saturn.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
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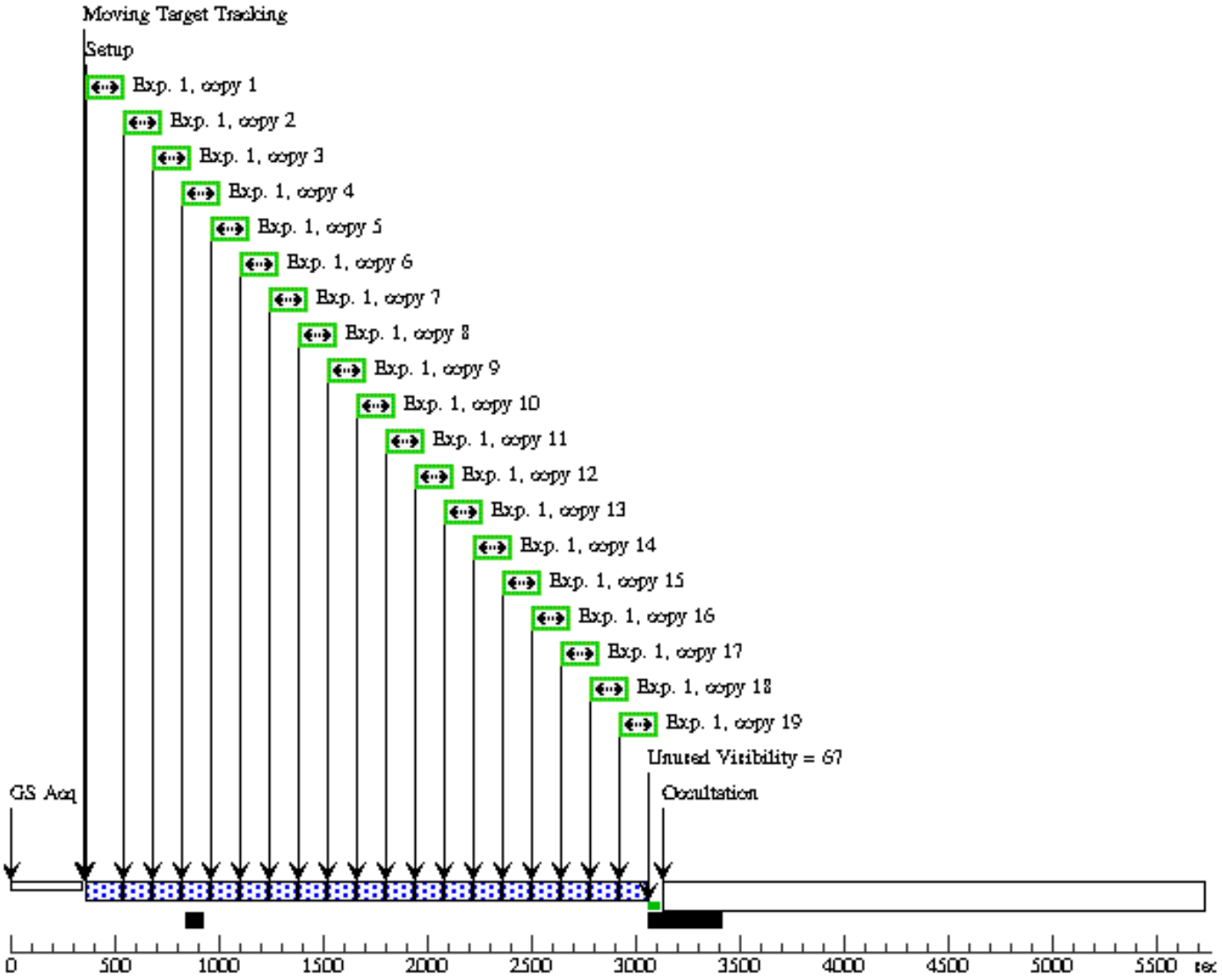
Orbit Structure



Visit

Proposal 11984, Visit D2, scheduling Wed Feb 18 02:50:53 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 18-FEB-2009:00:00:00 AND 19-FEB-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations. It will particularly coincide with Cassini UVIS observations of Saturn.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
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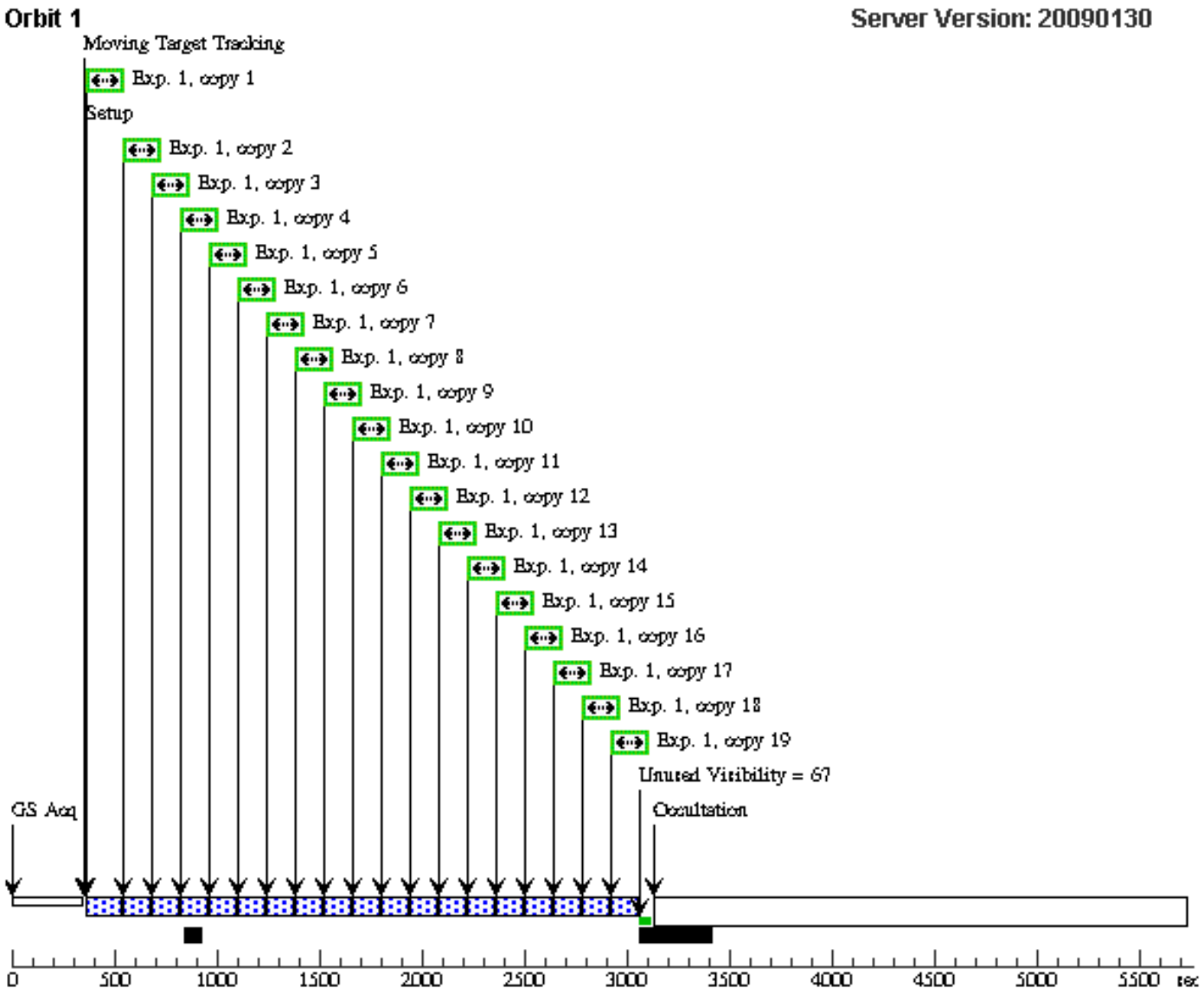
Orbit Structure



Visit

Proposal 11984, Visit D3, scheduling Wed Feb 18 02:50:53 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 18-FEB-2009:00:00:00 AND 19-FEB-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations. It will particularly coincide with Cassini UVIS observations of Saturn.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
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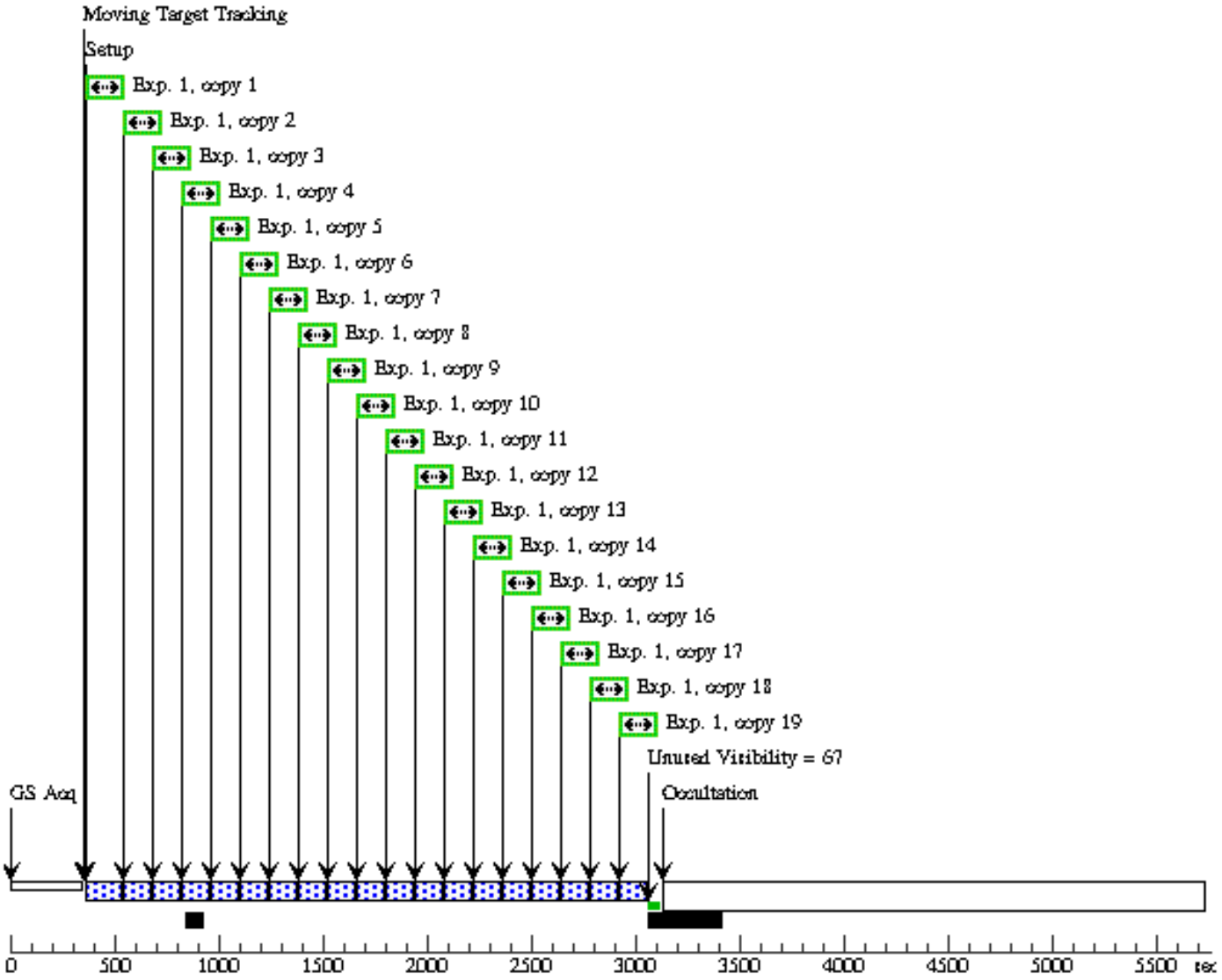
Orbit Structure



Visit

Proposal 11984, Visit D4, scheduling Wed Feb 18 02:50:53 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 18-FEB-2009:00:00:00 AND 19-FEB-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations. It will particularly coincide with Cassini UVIS observations of Saturn.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
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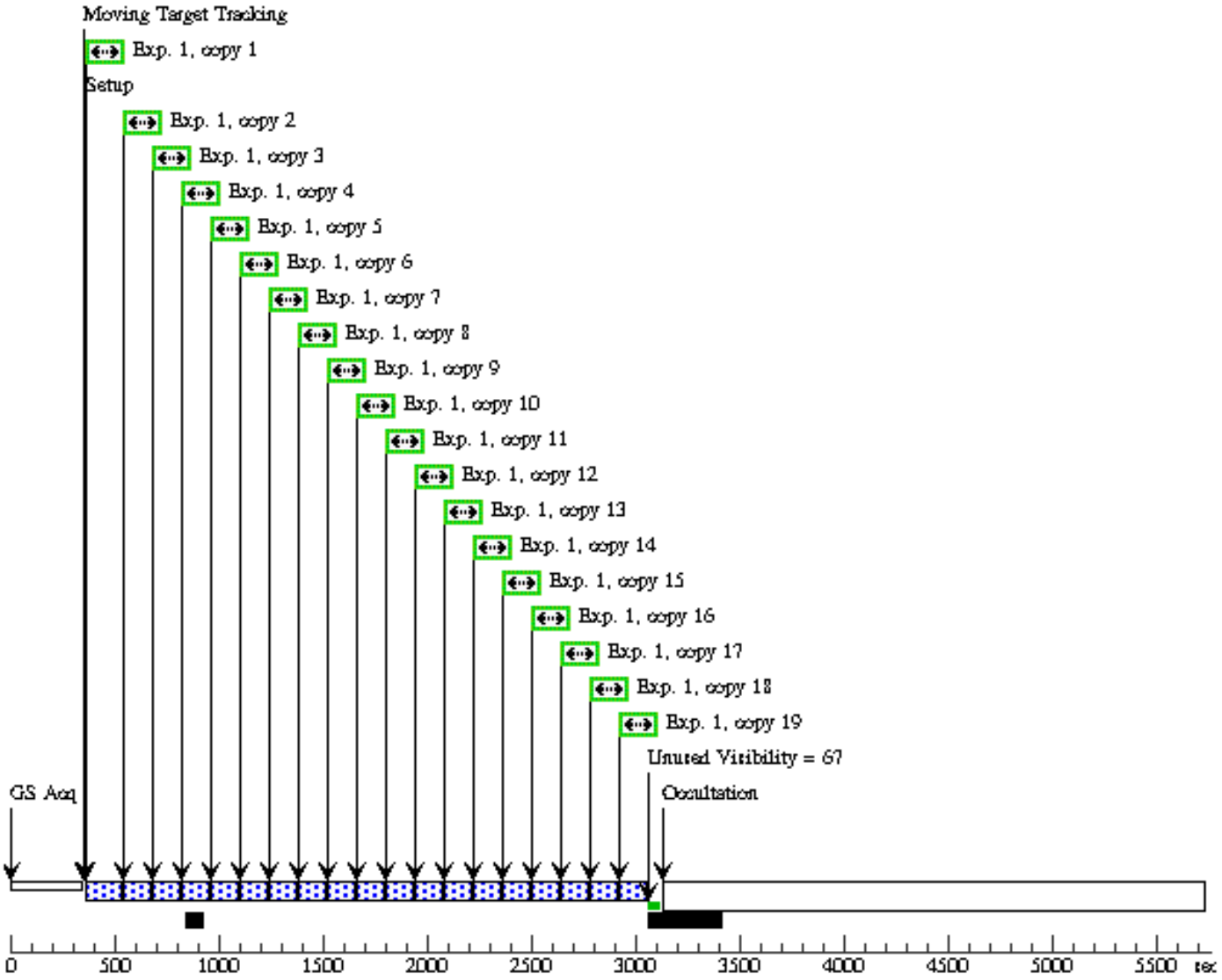
Orbit Structure



Visit

Proposal 11984, Visit E1, scheduling Wed Feb 18 02:50:54 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 28-FEB-2009:00:00:00 AND 01-MAR-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
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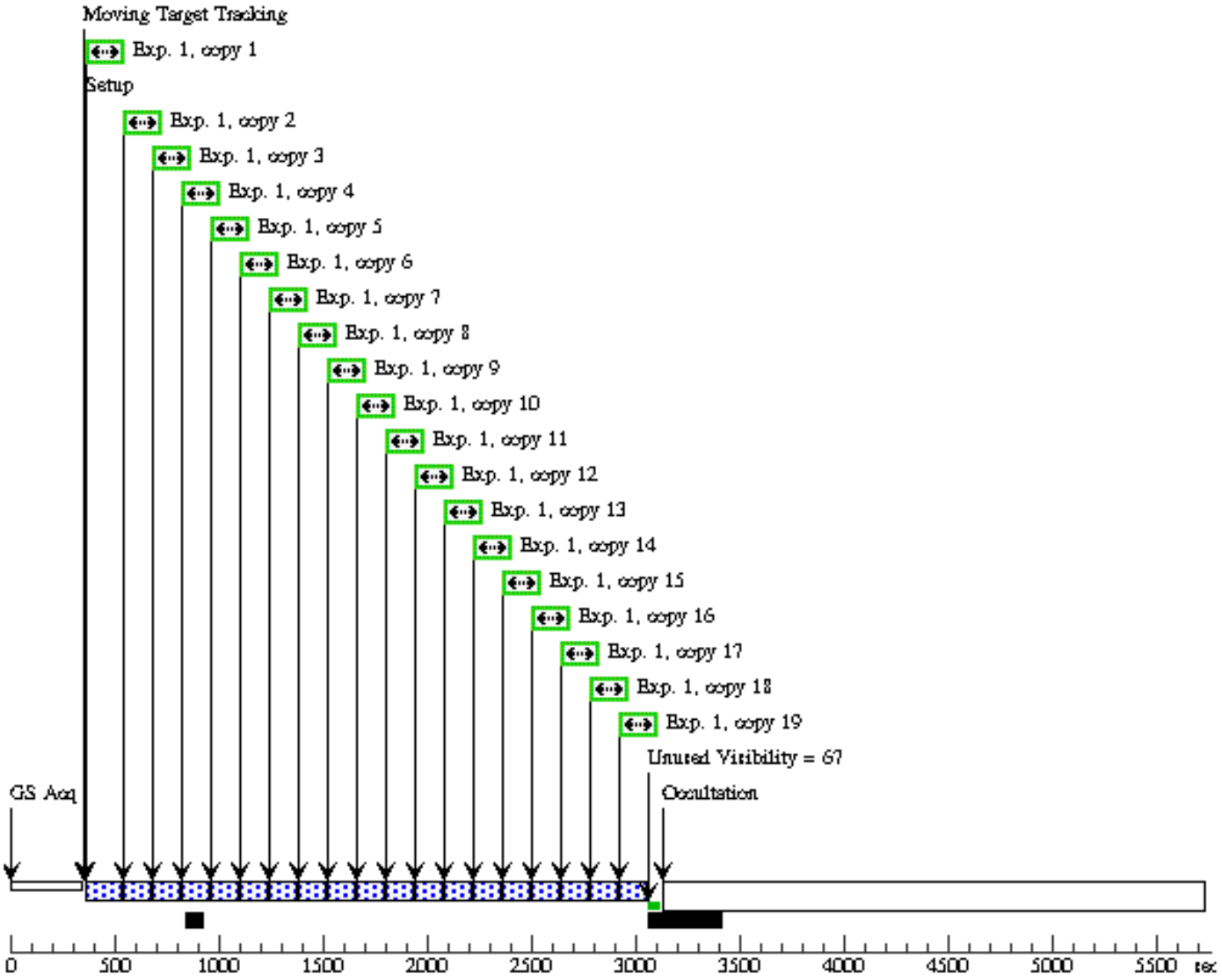
Orbit Structure



Visit

Proposal 11984, Visit E2, scheduling Wed Feb 18 02:50:54 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 28-FEB-2009:00:00:00 AND 01-MAR-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
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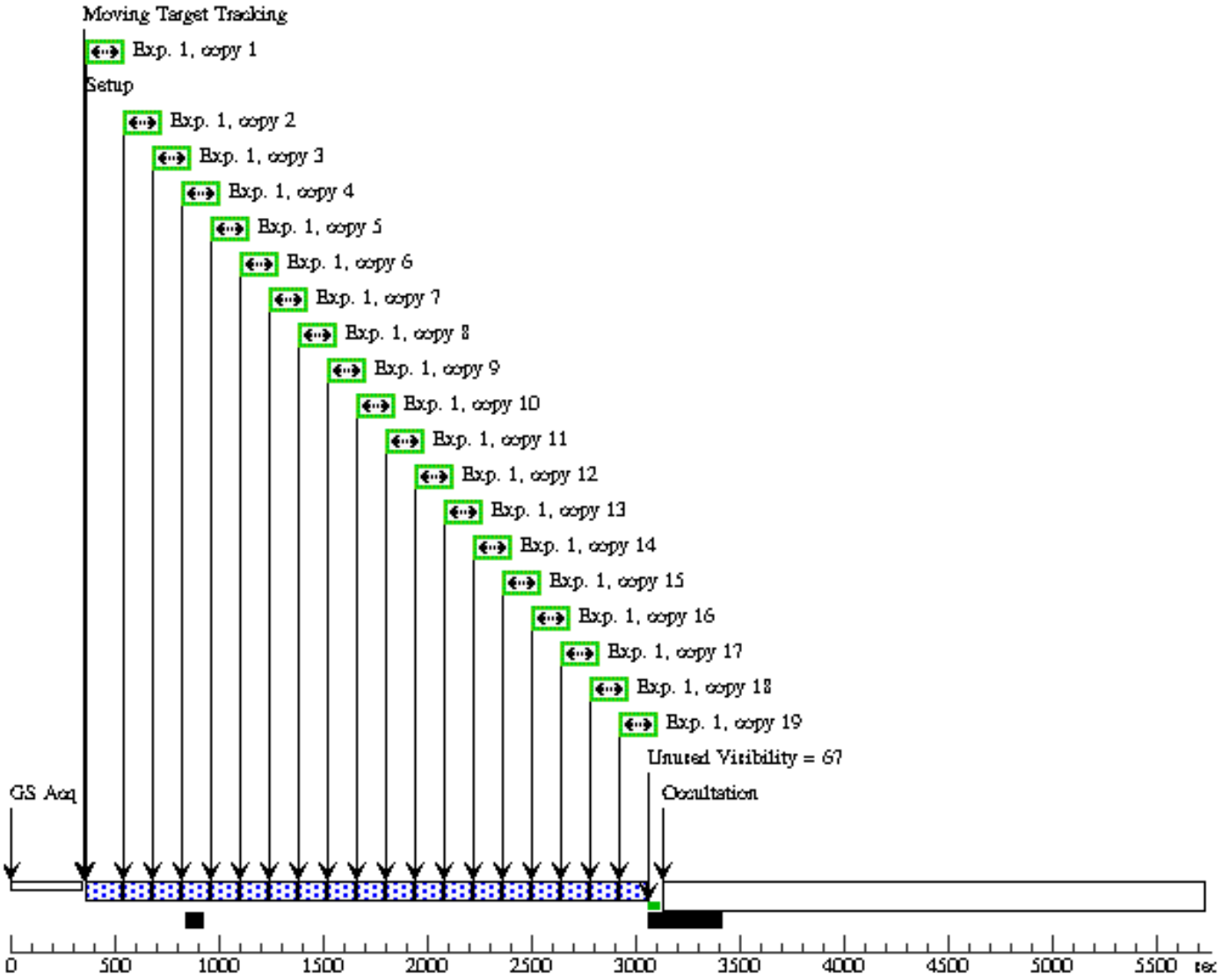
Orbit Structure



Visit

Proposal 11984, Visit E3, scheduling Wed Feb 18 02:50:54 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 28-FEB-2009:00:00:00 AND 01-MAR-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP		GS ACQ SCENARIO BASE1T3		100 Secs X 19	
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								[==>(Copy 7)]	
								[==>(Copy 8)]	
								[==>(Copy 9)]	
								[==>(Copy 10)]	***[1]***
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								[==>(Copy 12)]	
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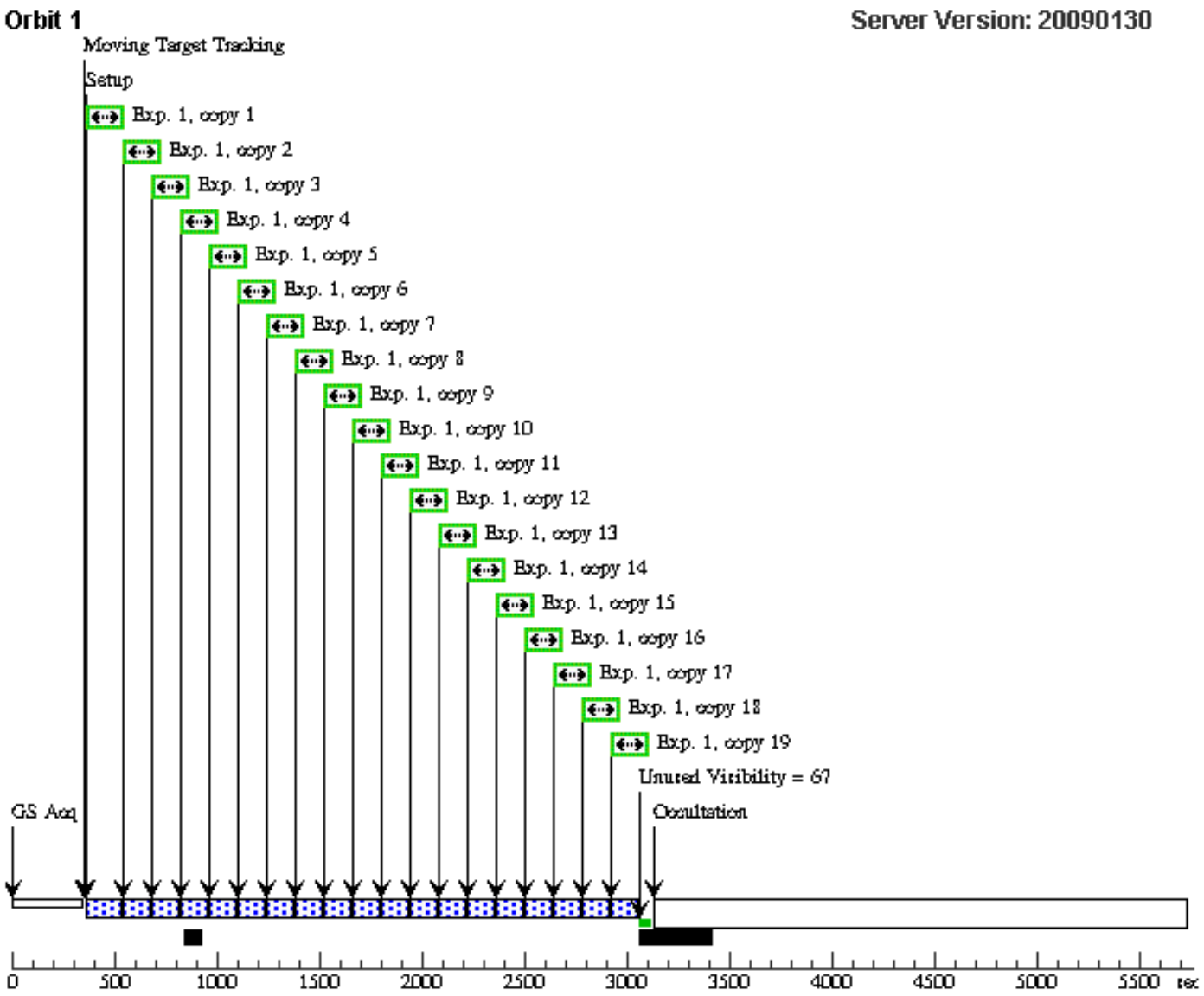
Orbit Structure



Visit

Proposal 11984, Visit E4, scheduling Wed Feb 18 02:50:55 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 28-FEB-2009:00:00:00 AND 01-MAR-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP		GS ACQ SCENARIO BASE1T3		100 Secs X 19	
								[==>(Copy 1)]	
								[==>(Copy 2)]	
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								[==>(Copy 10)]	***[1]***
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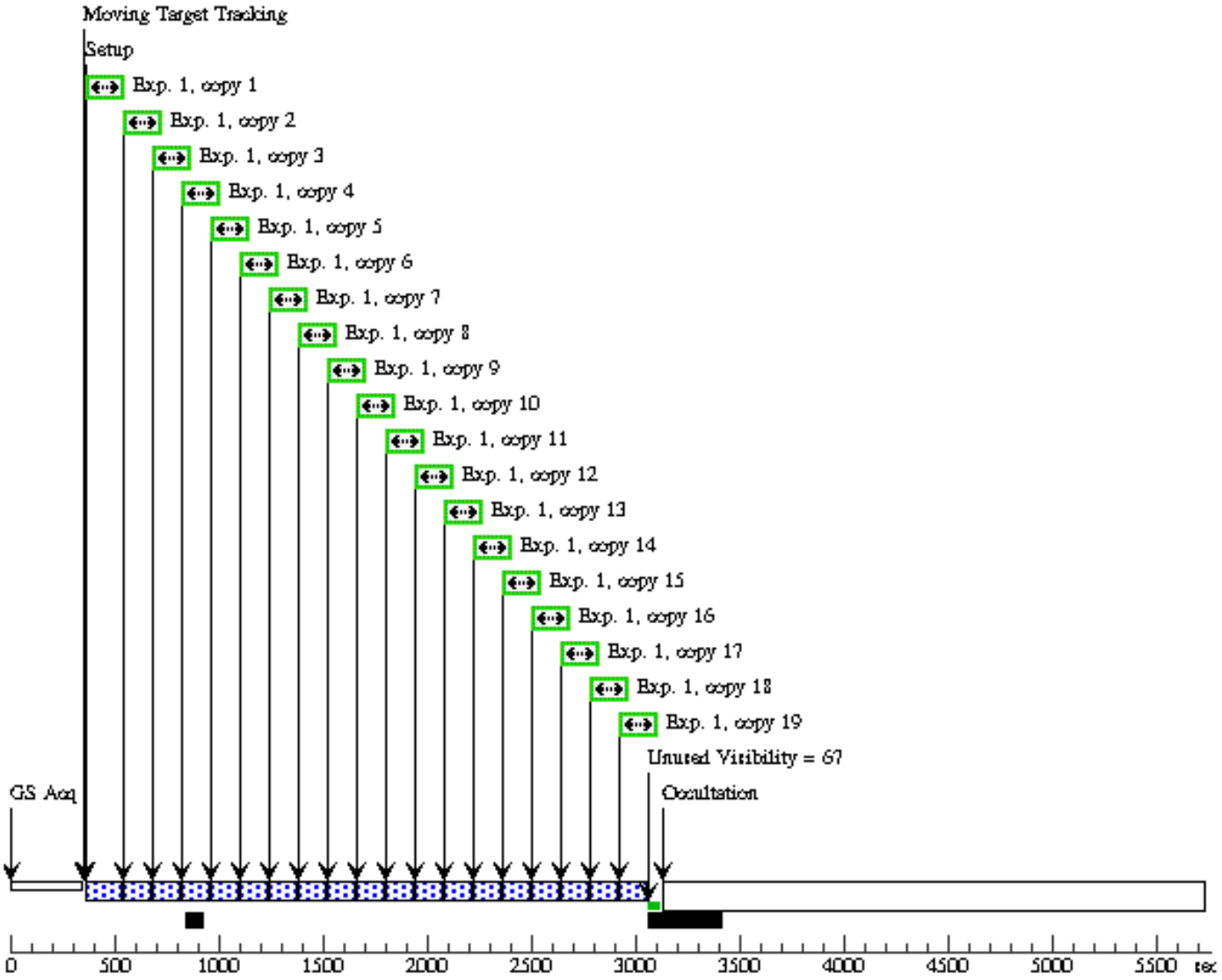
Orbit Structure



Visit

Proposal 11984, Visit F1, scheduling Wed Feb 18 02:50:55 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 01-MAR-2009:00:00:00 AND 02-MAR-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP				100 Secs X 19	
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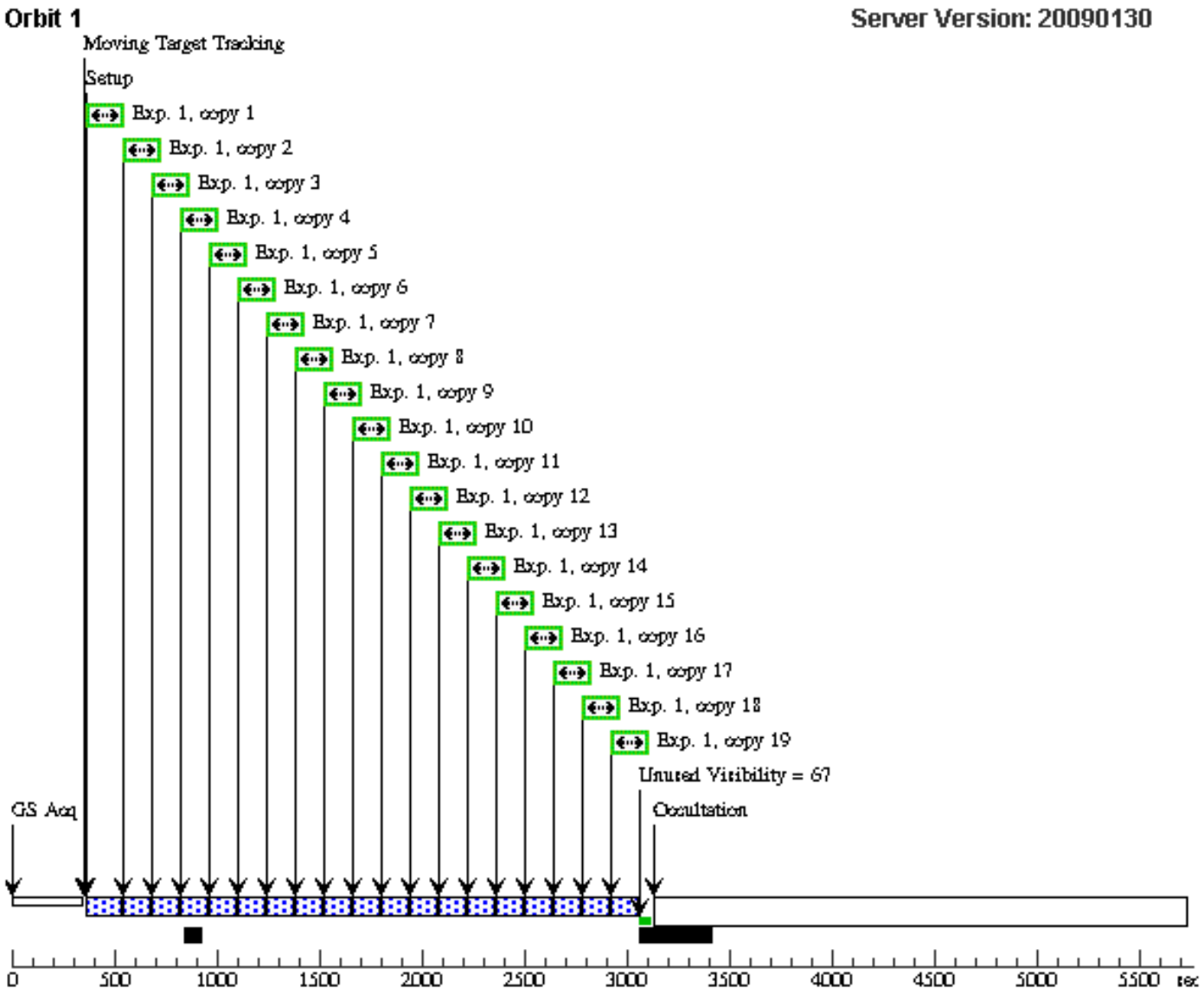
Orbit Structure



Visit

Proposal 11984, Visit F2, scheduling Wed Feb 18 02:50:56 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 01-MAR-2009:00:00:00 AND 02-MAR-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP				100 Secs X 19	
								[==>(Copy 1)]	
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								[==>(Copy 3)]	
								[==>(Copy 4)]	
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								[==>(Copy 9)]	
								[==>(Copy 10)]	***[1]***
								[==>(Copy 11)]	
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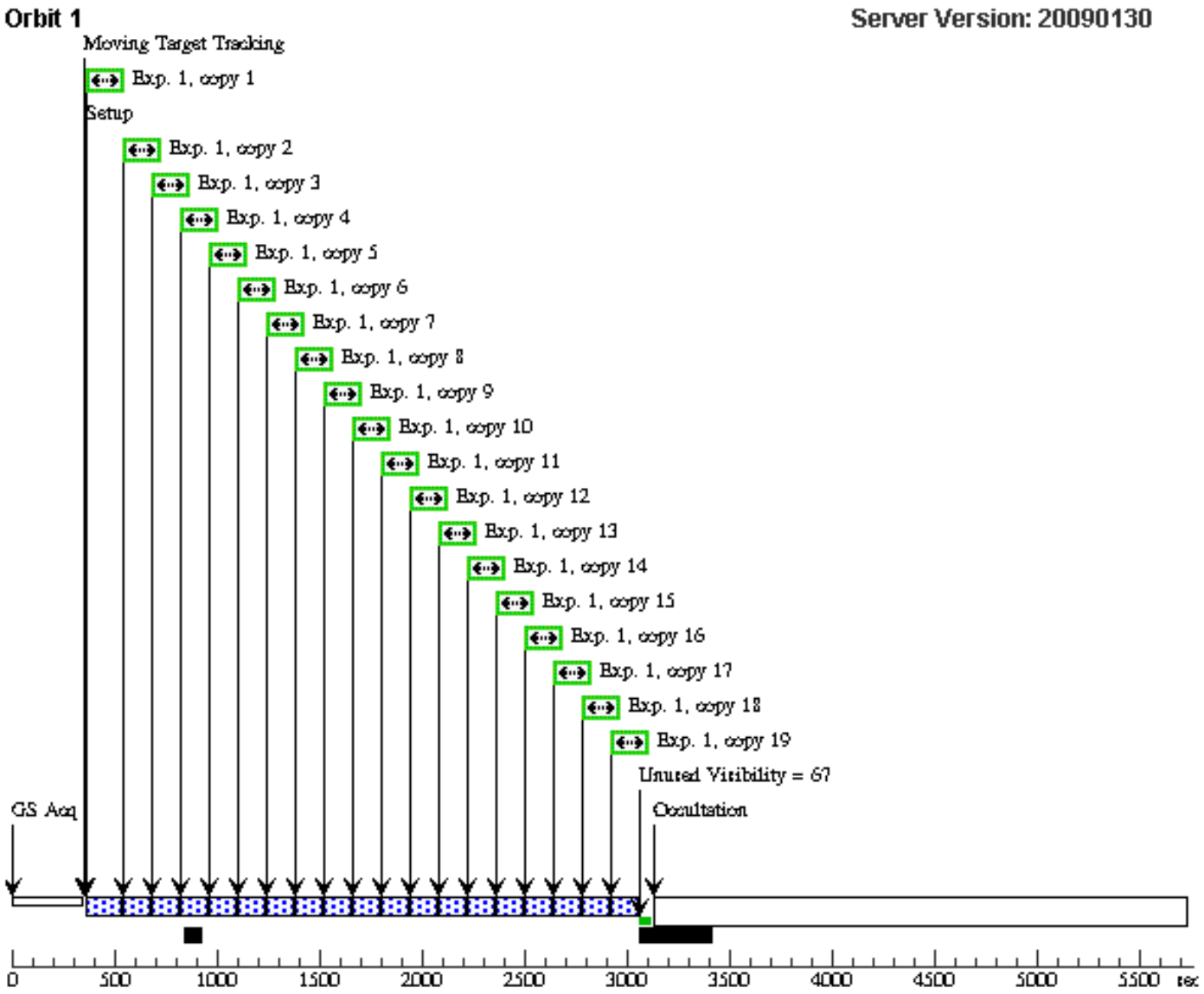
Orbit Structure



Visit

Proposal 11984, Visit F3, scheduling Wed Feb 18 02:50:56 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 01-MAR-2009:00:00:00 AND 02-MAR-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP				100 Secs X 19	
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								[==>(Copy 9)]	
								[==>(Copy 10)]	***[1]***
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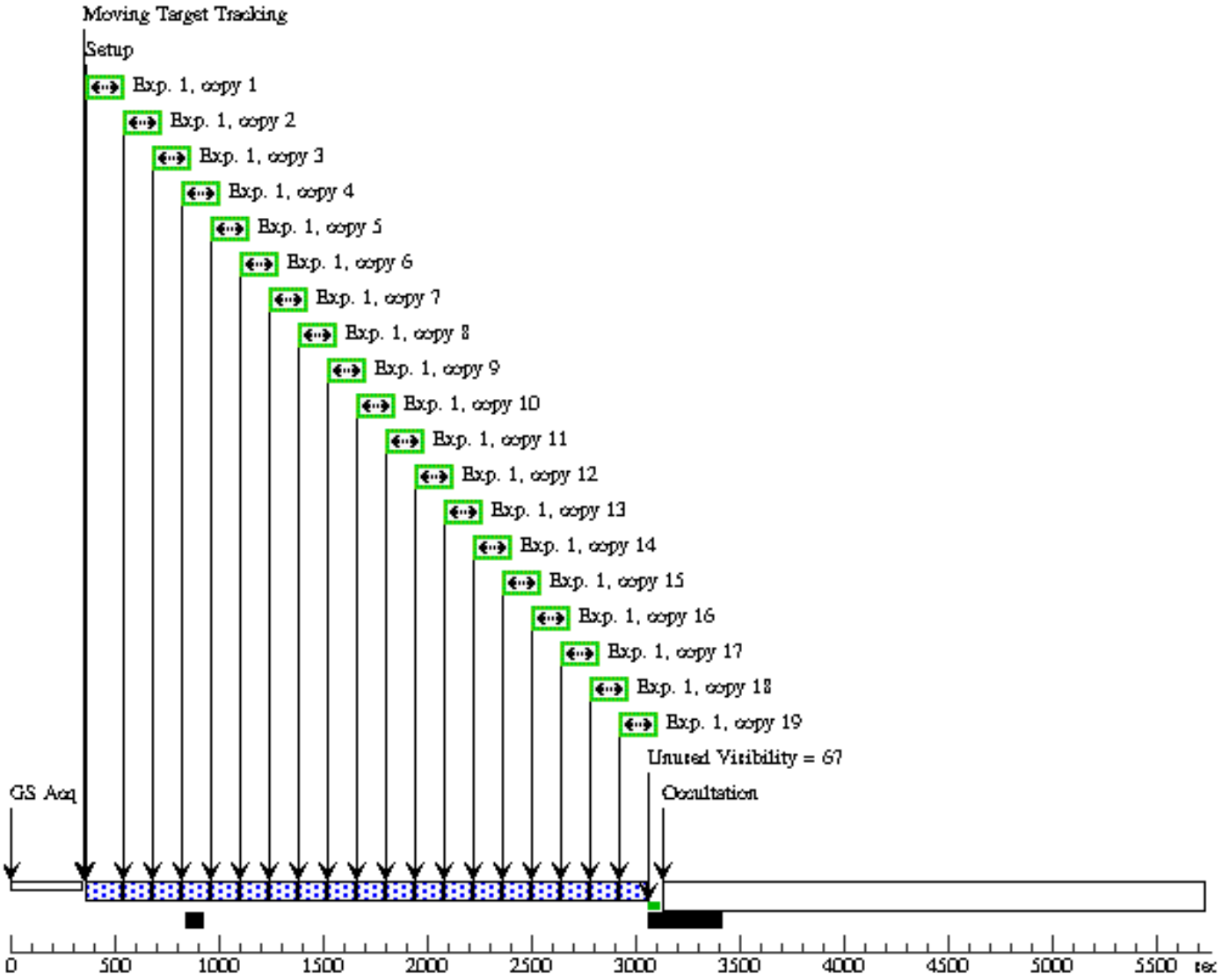
Orbit Structure



Visit

Proposal 11984, Visit F4, scheduling Wed Feb 18 02:50:57 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 01-MAR-2009:00:00:00 AND 02-MAR-2009:00:00:00

Comments: This visit is scheduled to occur when Cassini is in optimum location (high latitude, dayside) to provide supporting in situ observations.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP				100 Secs X 19	
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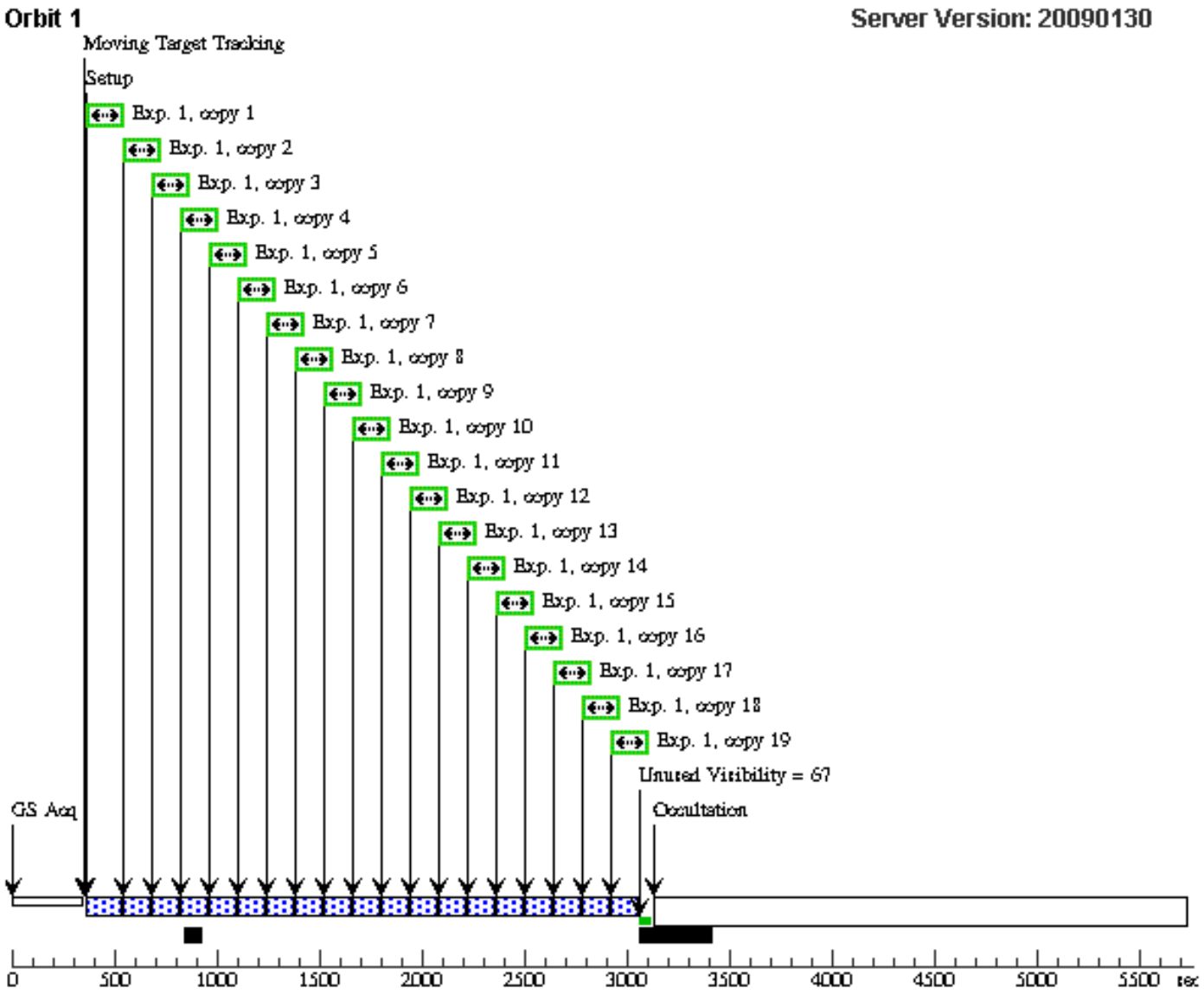
Orbit Structure



Visit

Proposal 11984, Visit G1, implementation Wed Feb 18 02:50:57 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 06-MAR-2009:22:30:00 AND 07-MAR-2009:16:00:00

Comments: This visit is scheduled to coincide with simultaneous groundbased observations of Saturn's infrared (IR) auroras using Keck

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP				100 Secs X 19	
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								[==>(Copy 9)]	
								[==>(Copy 10)]	***[1]***
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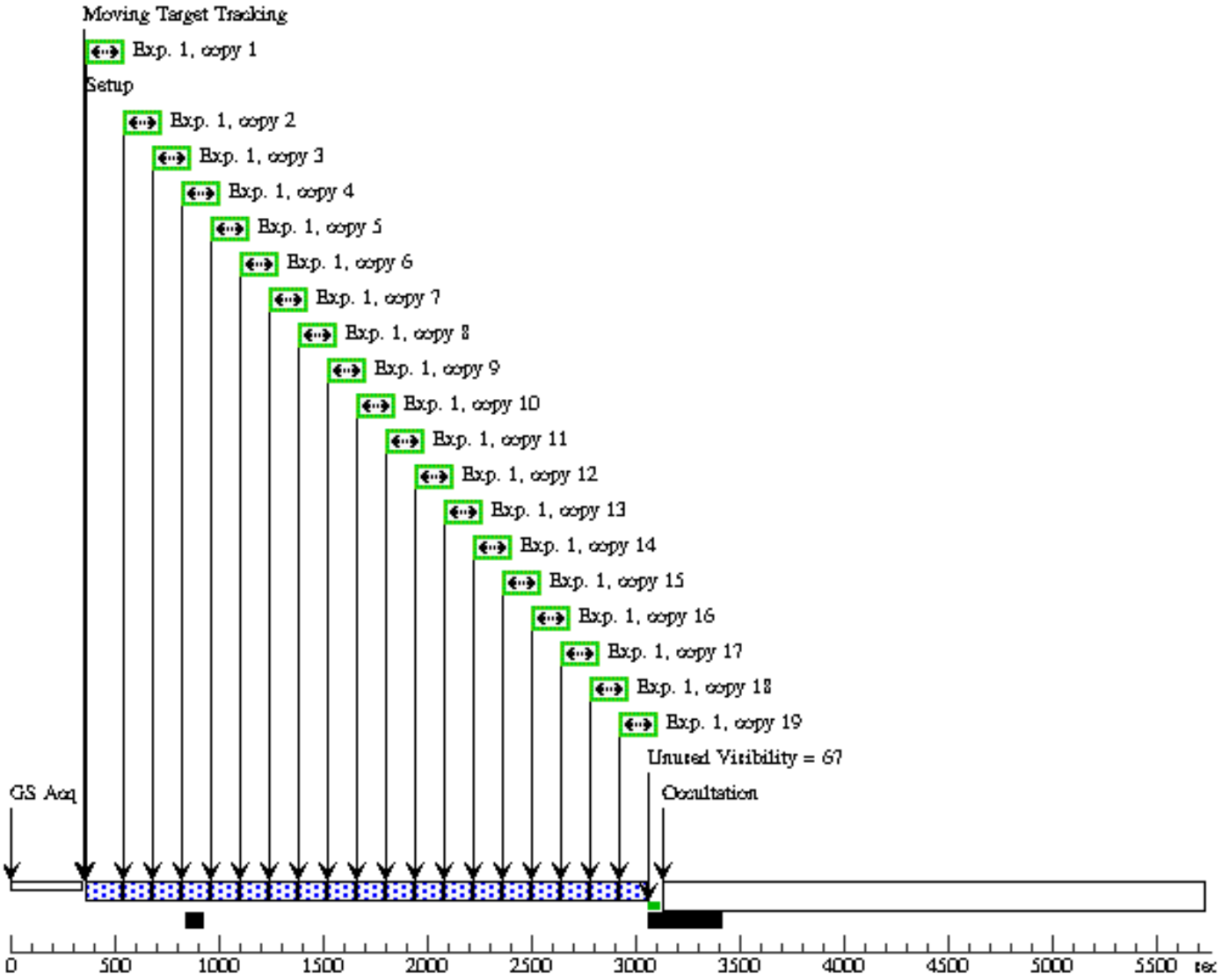
Orbit Structure



Visit

Proposal 11984, Visit G2, implementation Wed Feb 18 02:50:57 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 06-MAR-2009:22:30:00 AND 07-MAR-2009:16:00:00

Comments: This visit is scheduled to coincide with simultaneous groundbased observations of Saturn's infrared (IR) auroras using Keck

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP				100 Secs X 19	
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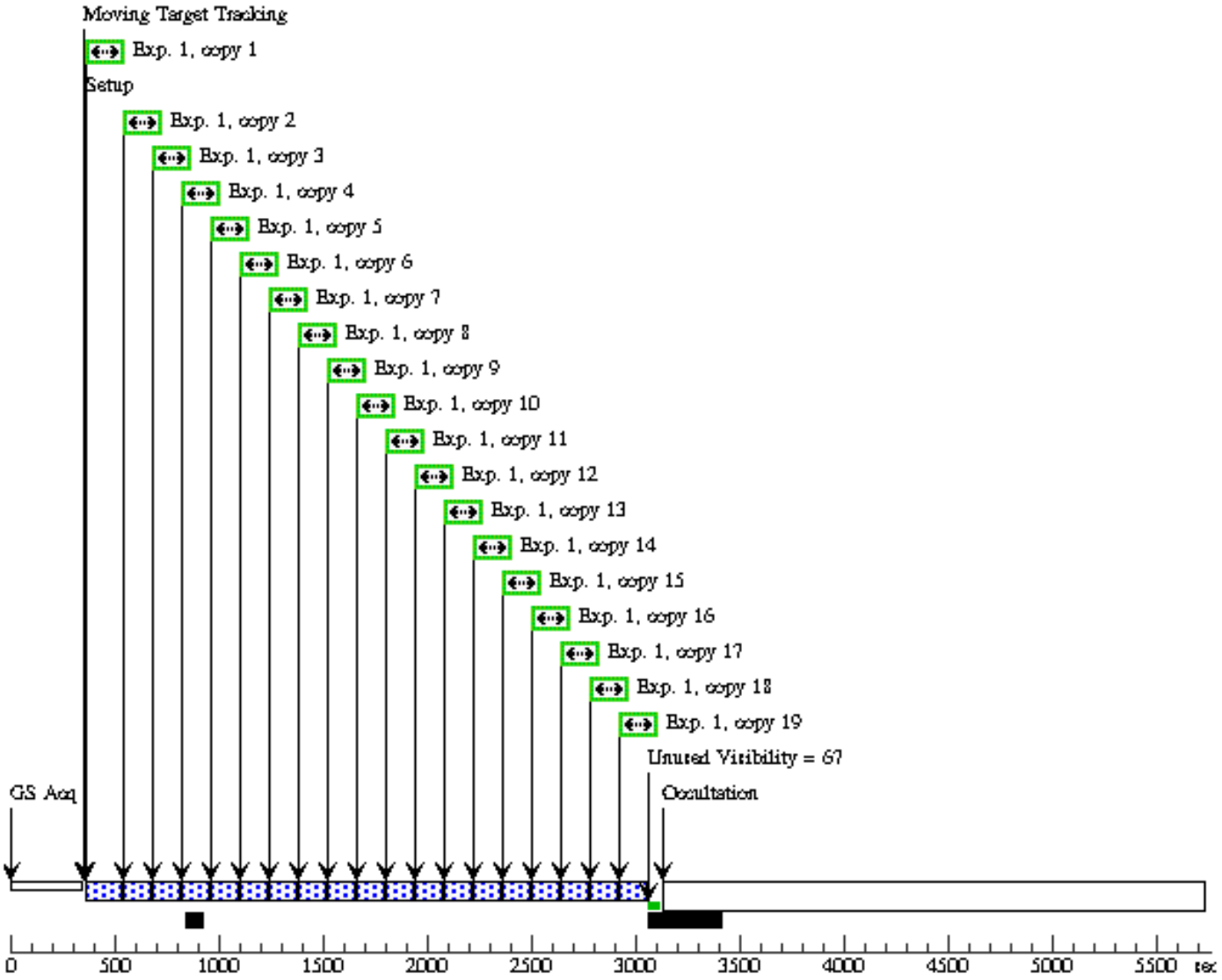
Orbit Structure



Visit

Proposal 11984, Visit G3, implementation Wed Feb 18 02:50:58 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 06-MAR-2009:22:30:00 AND 07-MAR-2009:16:00:00

Comments: This visit is scheduled to coincide with simultaneous groundbased observations of Saturn's infrared (IR) auroras using Keck

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP				100 Secs X 19	
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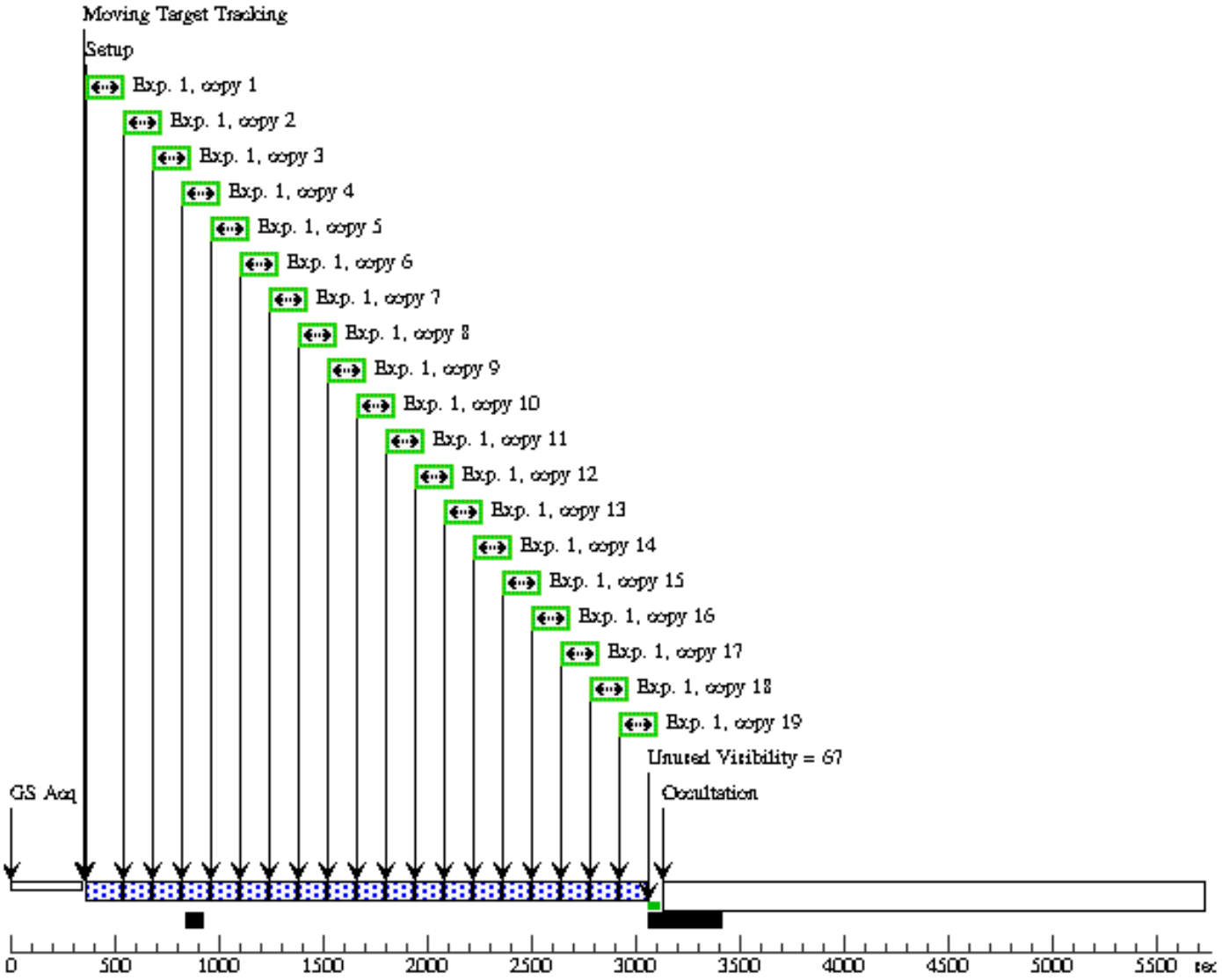
Orbit Structure



Visit

Proposal 11984, Visit G4, implementation Wed Feb 18 02:50:59 GMT 2009

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: BETWEEN 06-MAR-2009:22:30:00 AND 07-MAR-2009:16:00:00

Comments: This visit is scheduled to coincide with simultaneous groundbased observations of Saturn's infrared (IR) auroras using Keck

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	SATURN	STD=SATURN				EARTH

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SATURN	ACS/SBC, ACCUM, SBC-FIX	F115LP				100 Secs X 19	
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Orbit Structure