10607 - Probing Circumstellar and Interstellar Dust with Scattered-Light Echoes

Cycle: 14, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) SN-1991T	ACS/HRC	5	26-May-2006 21:01:14.0	yes
02	(2) SN-1998BU	ACS/HRC	4	26-May-2006 21:01:37.0	yes

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(3) SN-1999BW	ACS/HRC	1	26-May-2006 21:01:43.0	yes
04	(4) SN-2002HH	ACS/HRC	4	26-May-2006 21:01:59.0	yes
14	(4) SN-2002HH	ACS/HRC	1	26-May-2006 21:02:06.0	yes
24	(6) SN-2002HH-COPY	ACS/HRC	1	26-May-2006 21:02:11.0	yes
05	(5) SN-2004DJ	ACS/HRC	4	26-May-2006 21:02:36.0	yes

20 Total Orbits Used

ABSTRACT

Scattered-light echoes are one of the most powerful and efficient probes of the structure and composition of dust in circumstellar and interstellar (ISM) environments. Observations of light echoes provide exact three-dimensional positions of dust while constraining its density, grain-size and chemical make-up. Furthermore, echoes can be used as distance indicators via polarization measurements.

We propose to take deep, high-resolution ACS/HRC images of five supernovae (SNe). Two of these, SNe 1991T and 1998bu, have known circumstellar echoes that have only recently become fully resolvable with HST, and therefore require new observations. Only four echo-producing SNe are currently known, and in an attempt to increase this sample, we will also observe SNe 1999bw, 2002hh, and 2004dj. All three SNe are strong candidates for producing echoes from circumstellar and ISM dust, but only at angular sizes that HST can resolve. With these observations, we will use light echoes to their full advantage, to study (1) the mass-loss histories of Type II and Ia SN progenitors, (2) the contributions of these SNe and their progenitors to the dust content of their galaxies, (3) the structure of gas and stars in the ISM of external galaxies, and (4) we will independently measure the distance to the host galaxies, including a member of the Virgo cluster, and M96, a Type Ia cosmological distance-scale calibrator.

OBSERVING DESCRIPTION

Our primary observational goals are to carefully map the positions, fluxes, and polarization of light echoes. With these data, we will determine the distances to the SNe, the morphology of the scattering materials and the properties of that dust, the mass-loss history of the SN progenitors, the structure and composition of dust in the host galaxys' ISM, and evaluate the impact of these results on models for the evolution of dust in these environments.

Guided by Sugerman (2003) and practical experience with SNe 1987A and 1993J, we can maximize the efficiency of, and information contained in, each observation by using ACS/HRC in three broad-band filters (F435W, F606W, F814W), thereby providing the necessary flux and colors to contrain the dust properties as well as its 3-D positions. When needed, one emission-line (F658N) image will rule out positional coincidence of echo-like nebular features. Based on the signal-to-noise achieved in these previous echo observations, and the echo observability calculations of Sugerman (2003), total exposure times of at least 1800 sec in F435W, 1200 sec in F606W and 1500 sec in F814W will be sufficient for our goals.

Since echoes can be faint and/or small features, we must take data so as to minimize the possible contamination from cosmic rays and warm pixels. We adopt a 4-step HRC box dither sequence, which is optimal at rejecting bad pixels while minimizing overhead and allowing a 25% increase in image resolution.

For SNe 1991T and 1998bu, we already know that echoes are present,

that the field is not confused with nebular emission, and that polarization data can be taken. We therefore need only observe in F606W, F814W and the three polarizers with F435W. Using the APT orbit planner, we find that they can be observed in 5 and 4 orbits, respectively.

The region around SN 1999bw does not appear to be confused with any nebular emission in the only image present in the HST archive, thus we will only take deep broad-band exposures (F435W, F606W, F814W) with the exposure times listed above, which just fit in two orbits.

SN 2002hh is located a few arcsec from a suspected H II region, and may itself be confused with another H2 region that was not resolved by Spitzer. We will add narrow H-alpha (F658N) imaging to the full-complement of broad-band observations (Polarized 435W; unpolarized 606W and 814W), to rule out nebular contamination/confusion and also to confirm the identification of the SN. This will require four orbits. Follow-up imaging will be taken 6 months later in F606W to search for faint echo structures using PSF-matched difference imaging.

SN 2004dj was observed in Nov 2004 in F330W with ACS/HRC, revealing little detail about the SN field. However, an 11000 sec F469N WFPC2 image 1arcmin away shows considerable structure, and since the SN is in a spiral arm, we extrapolate that nebular structures may be present in our field. We will therefore take the full series of broad-band and H-alpha images, requiring four orbits. The SN is fading at a rate of 1 V mag every 3-4 months, and should be at

V=17 when observations can be taken. Broad-band 606W and 814W observations are taken with short exposure times to avoid saturation. Due to scheduling constraints, no follow-up observations are possible in Cycle 14.

REAL TIME JUSTIFICATION

Observations of SNe 1991T, 1998bu, 1999bw, and 2004hh have no observing constraints. Observations of SN 2002hh must be taken at least 6 months apart, thus we have requested that the first visit occur before the end of observability in 2005 Nov, with the follow-up visit scheduled more than 180-days later.

Visit

Proposal 10607, Visit 01 Sat May 27 01:02:43 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: (none)

Comments: SN 1991T

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-HRC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.15 Line Spacing=0.098	Coordinate Frame=POS-TARG Pattern Orientation=19.9 Angle Between Sides=63.5 Center Pattern=false		(1), (2), (3), (4), (5)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SN-1991T	RA: 12 34 10.2000 (188.5425000d) Dec: +02 39 56.40 (2.66567d) Equinox: J2000		V=25.0	Coordinate Source: NED

Comments: This object was generated by the targetselector and retrieved from the NED database.

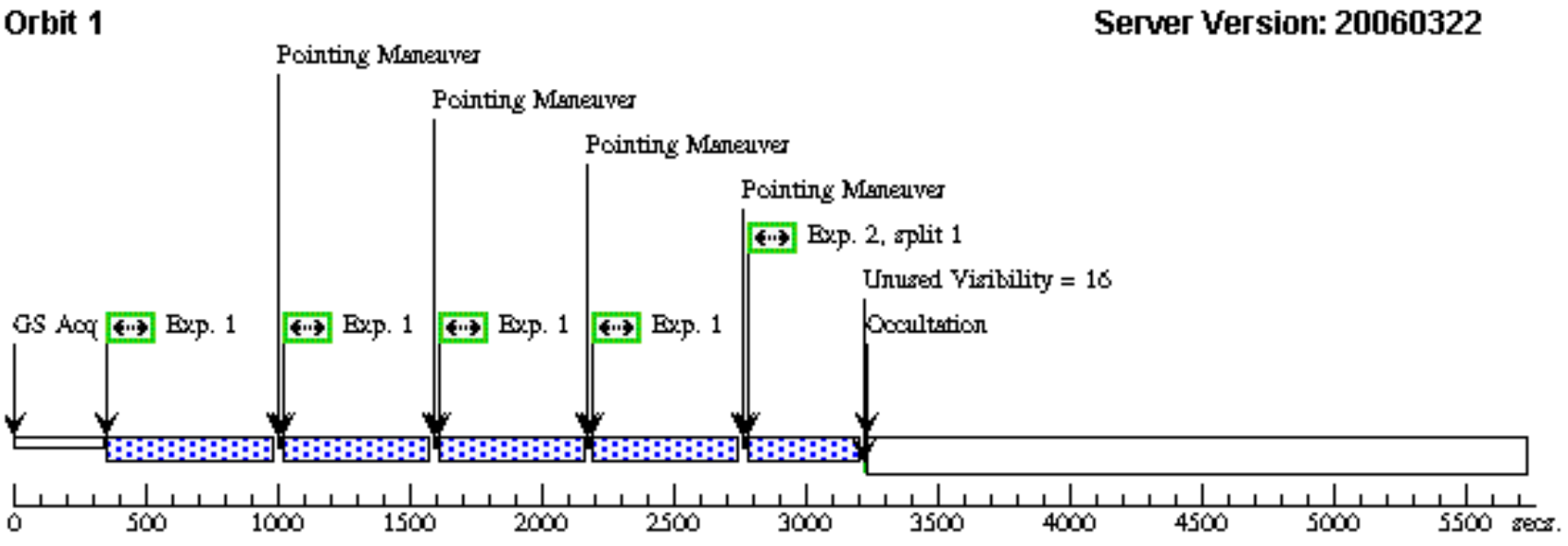
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) SN-1991T	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 1-1 (1)	520.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(1) SN-1991T	ACS/HRC, ACCUM, HRC	F435W POL0UV	CR-SPLIT=2; PAREXP=NONE	POS TARG 1.5,-1	Pattern 2-2 (1)	700.0 Secs	
								[==>(Pattern 1, Split 1)]	***[1]***
								[==>(Pattern 1, Split 2)] *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]* *[==>(Pattern 4, Split 2)]*	***[2]***

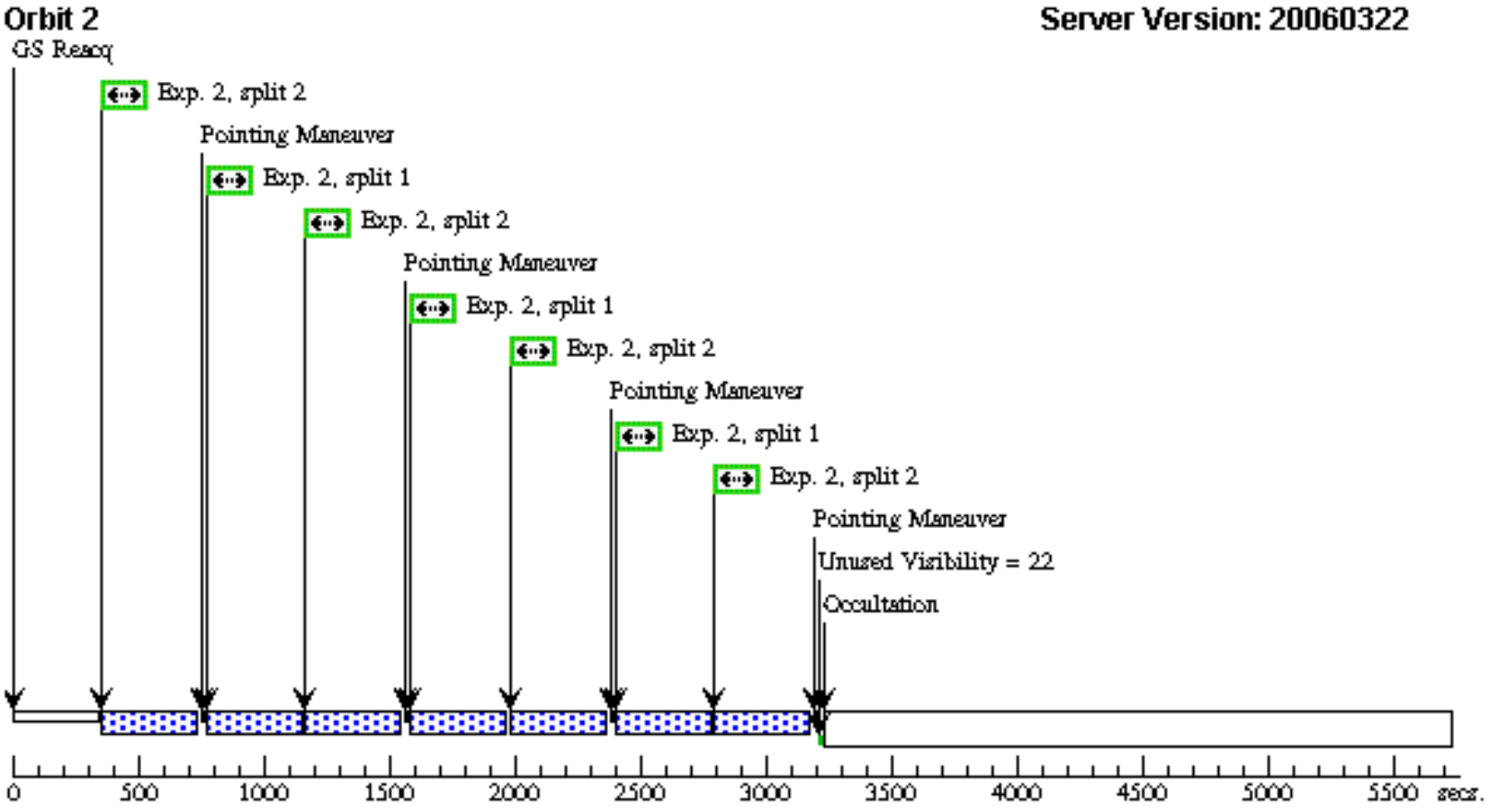
Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
3		(1) SN-1991T	ACS/HRC, ACCUM, HRC	F435W POL60UV	CR-SPLIT=2; PAREXP=NONE	POS TARG 1.5,-1	Pattern 3-3 (1)	700.0 Secs	
								[==>(Pattern 1, Split 1)] *[==>(Pattern 1, Split 2)]* *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]*	***[3]***
								[==>(Pattern 4, Split 2)]	***[4]***
4		(1) SN-1991T	ACS/HRC, ACCUM, HRC	F606W	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 4-4 (1)	425.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[4]***
5		(1) SN-1991T	ACS/HRC, ACCUM, HRC	F435W POL120UV	CR-SPLIT=2; PAREXP=NONE	POS TARG 1.5,-1	Pattern 5-5 (1)	700.0 Secs	
								[==>(Pattern 1, Split 1)]	***[4]***
								[==>(Pattern 1, Split 2)] *[==>(Pattern 2, Split 1)]* *[==>(Pattern 2, Split 2)]* *[==>(Pattern 3, Split 1)]* *[==>(Pattern 3, Split 2)]* *[==>(Pattern 4, Split 1)]* *[==>(Pattern 4, Split 2)]*	***[5]***

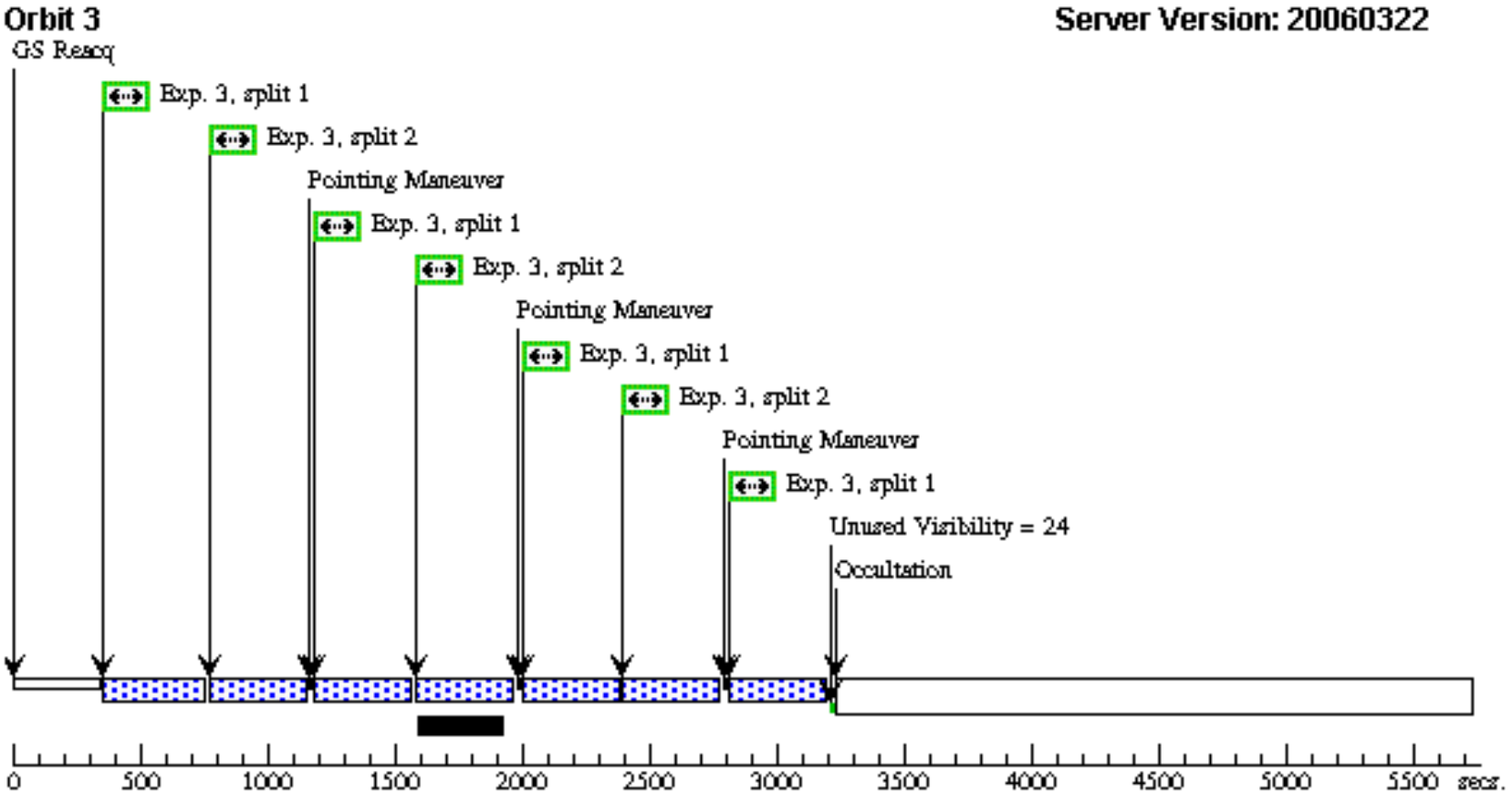
Orbit Structure



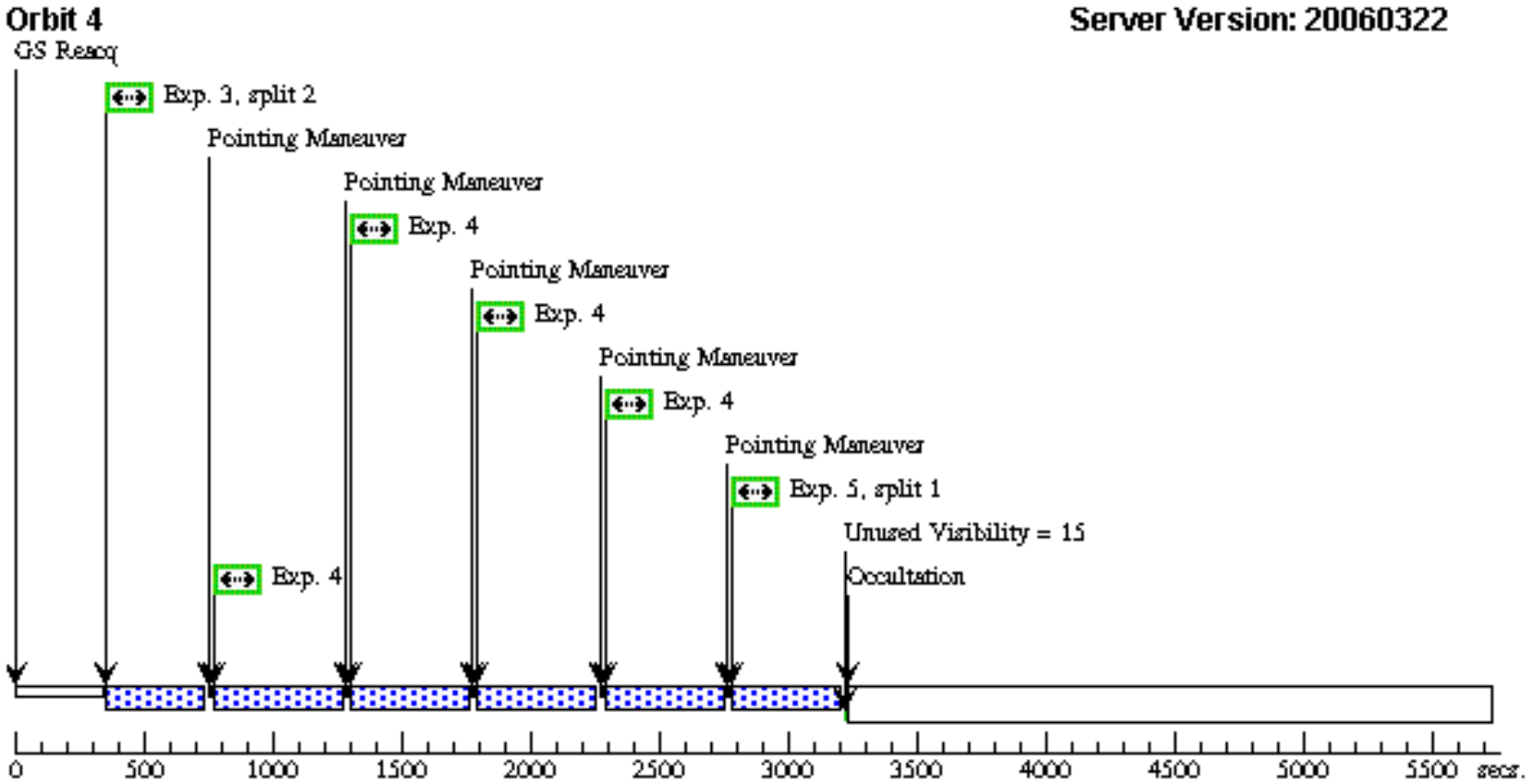
Orbit Structure (continued)

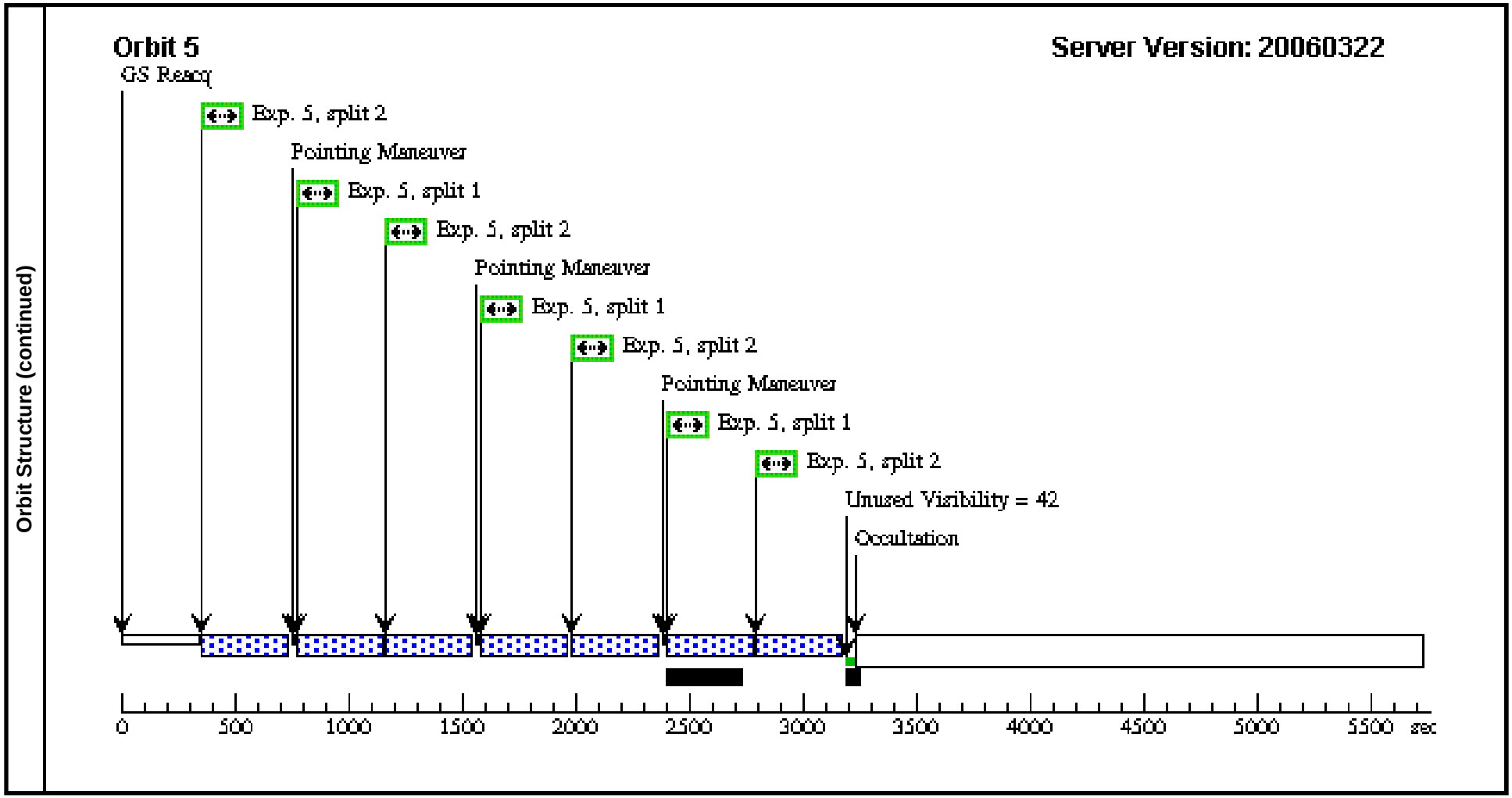


Orbit Structure (continued)



Orbit Structure (continued)




Orbit Structure (continued)
Orbit 5
Server Version: 20060322
GS Reacq
Exp. 5, split 2
Pointing Maneuver
Exp. 5, split 1
Exp. 5, split 2
Pointing Maneuver
Exp. 5, split 1
Exp. 5, split 2
Pointing Maneuver
Exp. 5, split 1
Exp. 5, split 2
Unused Visibility = 42
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10607, Visit 02 Sat May 27 01:02:46 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: (none)

Comments: SN 1998bu

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-HRC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.15 Line Spacing=0.098	Coordinate Frame=POS-TARG Pattern Orientation=19.9 Angle Between Sides=63.5 Center Pattern=false		(1), (2), (3), (4), (5)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	SN-1998BU	RA: 10 46 46.0900 (161.6920417d) Dec: +11 50 7.00 (11.83528d) Equinox: J2000		V=25.0	Coordinate Source: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

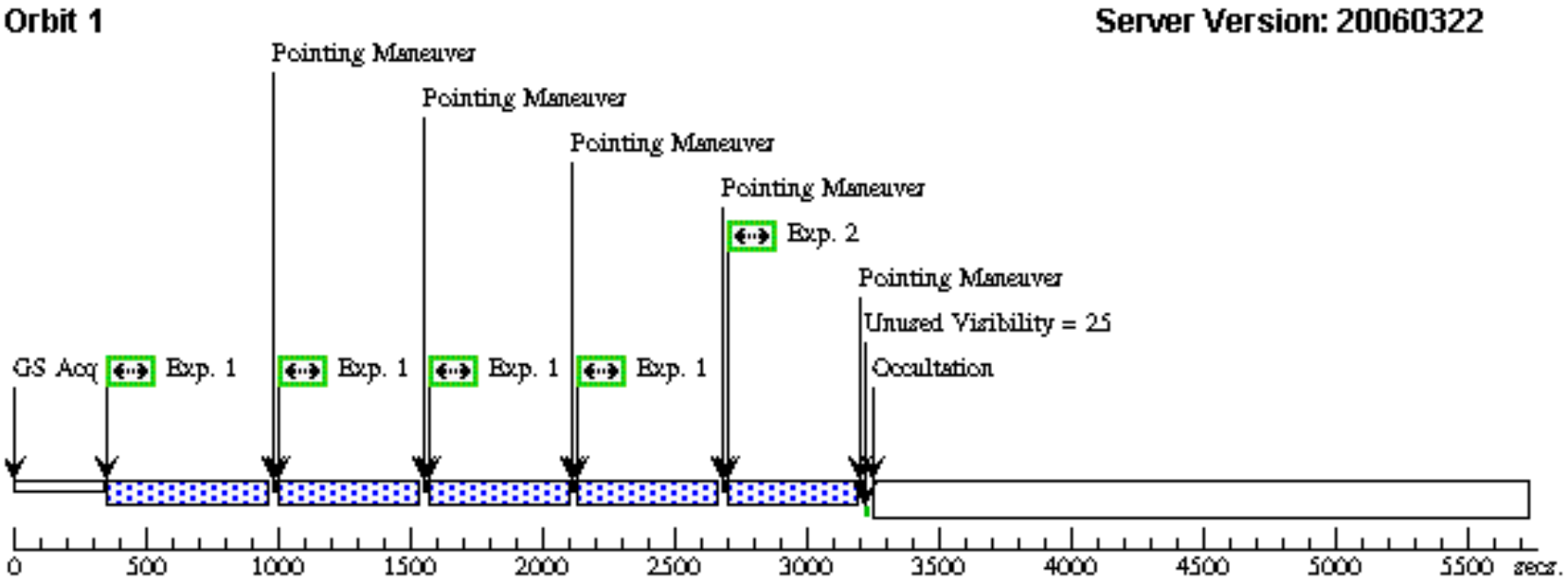
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(2) SN-1998BU	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 1-1 (1)	500.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(2) SN-1998BU	ACS/HRC, ACCUM, HRC	F606W	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 2-2 (1)	400.0 Secs	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)] *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***
3		(2) SN-1998BU	ACS/HRC, ACCUM, HRC	F435W POL0UV	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 3-3 (1)	500.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	***[2]***
								[==>(Pattern 3)] *[==>(Pattern 4)]*	***[3]***
4		(2) SN-1998BU	ACS/HRC, ACCUM, HRC	F435W POL60UV	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 4-4 (1)	500.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[3]***
								[==>(Pattern 4)]	***[4]***

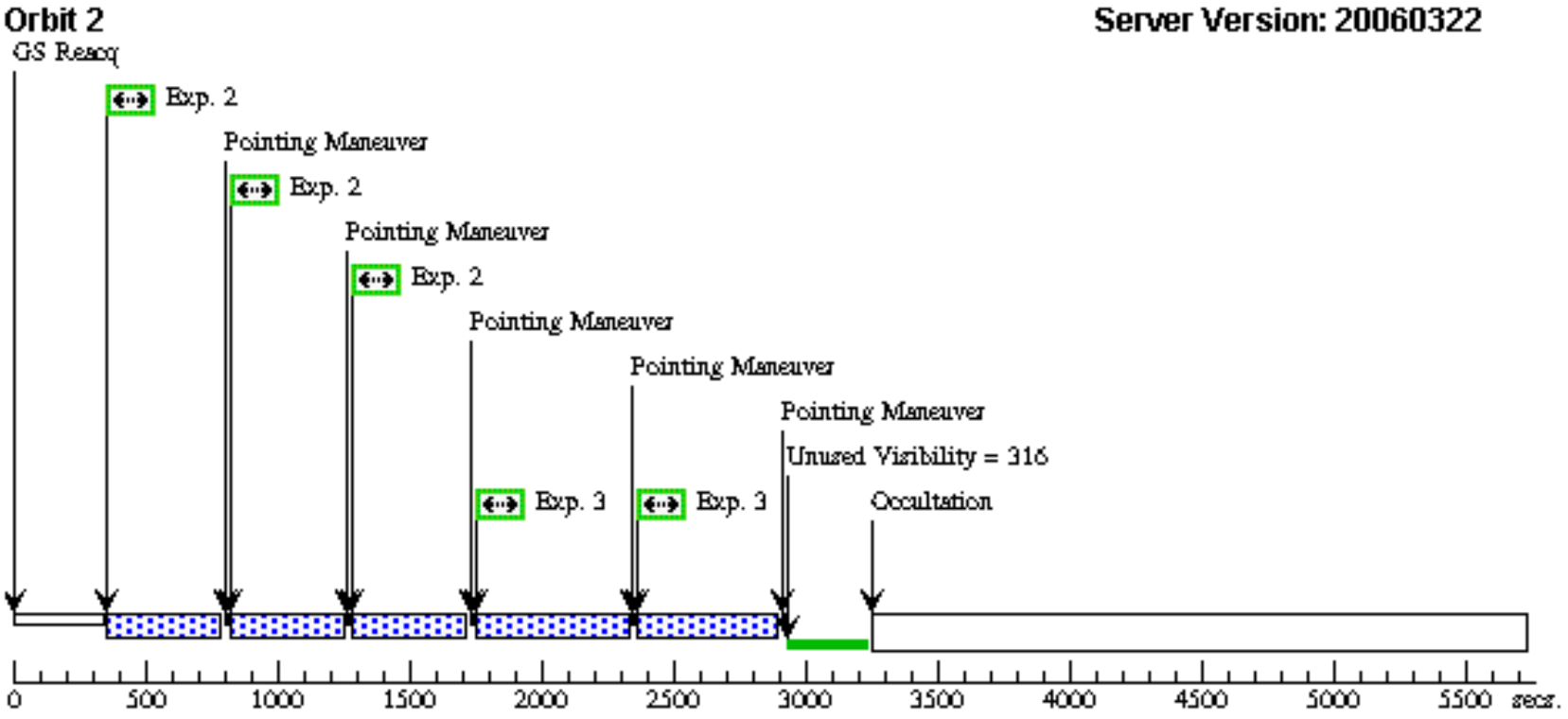
Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
5		(2) SN-1998BU	ACS/HRC, ACCUM, HRC	F435W POL120UV	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 5-5 (1)	500.0 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[4]***

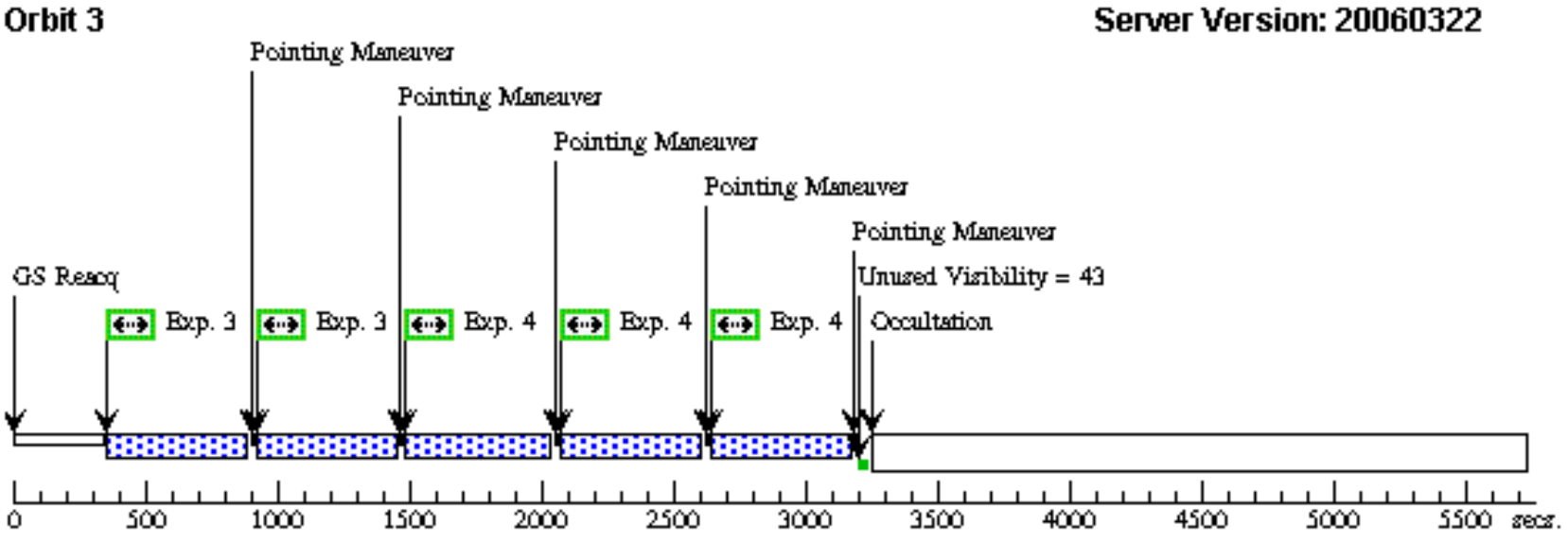
Orbit Structure

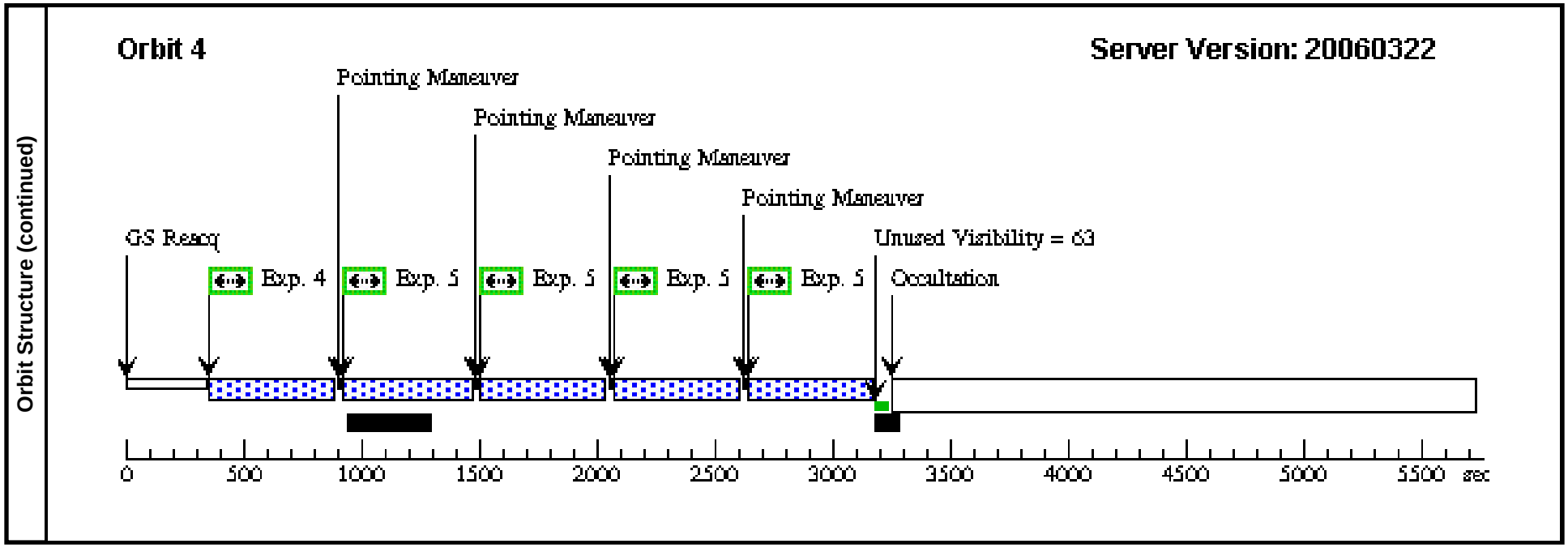


Orbit Structure (continued)



Orbit Structure (continued)




Orbit Structure (continued)
Orbit 4
Server Version: 20060322
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
GS Reacq
Exp. 4
Exp. 5
Exp. 5
Exp. 5
Exp. 5
Unused Visibility = 63
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10607, Visit 03 Sat May 27 01:02:47 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: PCS MODE FINE

Comments: SN 1999bw

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(3)	Pattern Type=ACS-HRC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.198 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=44.3 Angle Between Sides= Center Pattern=false		(1), (2)

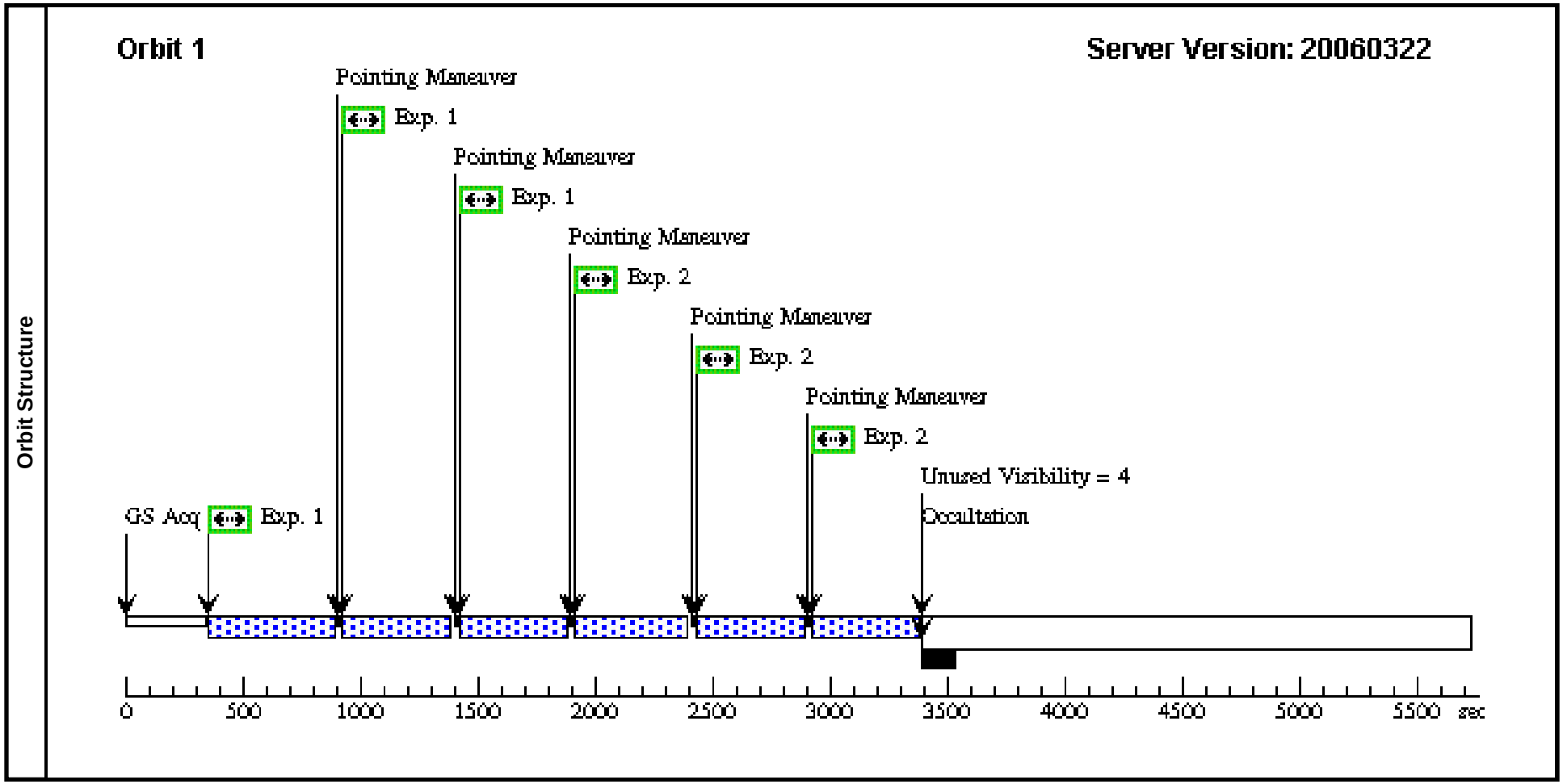
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	SN-1999BW	RA: 10 19 46.8100 (154.9450417d) Dec: +45 31 35.00 (45.52639d) Equinox: J2000		V=25.0	Coordinate Source: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(3) SN-1999BW	ACS/HRC, ACCUM, HRC	F606W	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 1-1 (3)	425.0 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	 ***[1]***
2		(3) SN-1999BW	ACS/HRC, ACCUM, HRC	F658N	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 2-2 (3)	425.0 Secs *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	 ***[1]***


Orbit Structure
Orbit 1
Server Version: 20060322
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 2
Pointing Maneuver
Exp. 2
Pointing Maneuver
Exp. 2
Unused Visibility = 4
Occultation
GS Acq
Exp. 1
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10607, Visit 04 Sat May 27 01:02:47 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: PCS MODE FINE; BETWEEN 29-APR-2005:21:46:41 AND 13-NOV-2005:23:59:59

Comments: 2002hh Visit 1

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-HRC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.15 Line Spacing=0.098	Coordinate Frame=POS-TARG Pattern Orientation=19.9 Angle Between Sides=63.5 Center Pattern=false		(1), (2), (3), (4), (5), (6)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	SN-2002HH	RA: 20 34 44.2900 (308.6845417d) Dec: +60 07 19.00 (60.12194d) Equinox: J2000		V=25.0	Coordinate Source: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

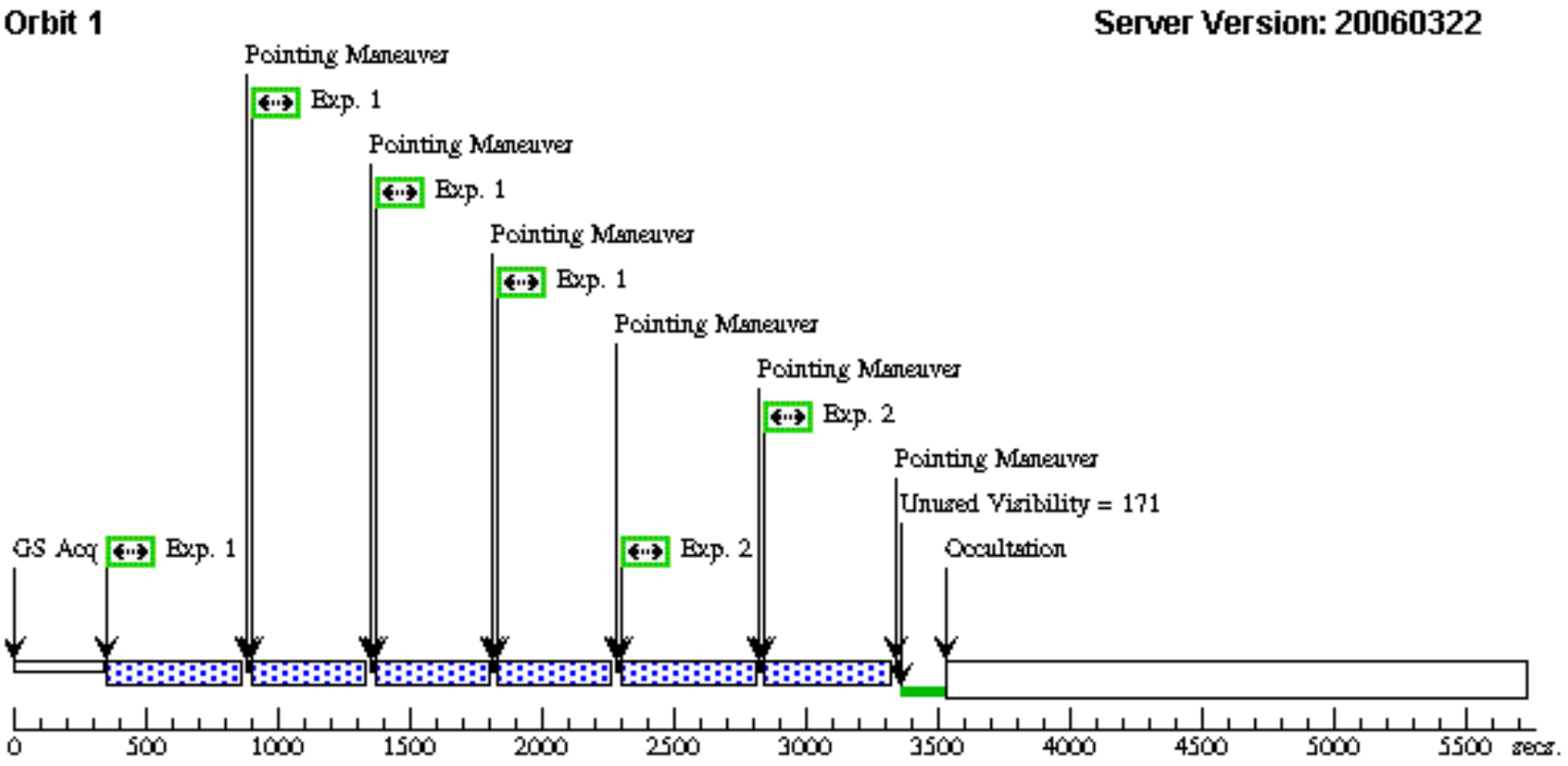
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(4) SN-2002HH	ACS/HRC, ACCUM, HRC	F606W	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 1-1 (1)	400.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(4) SN-2002HH	ACS/HRC, ACCUM, HRC	F658N	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 2-2 (1)	448.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	***[1]***
								[==>(Pattern 3)] *[==>(Pattern 4)]*	***[2]***
3		(4) SN-2002HH	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 3-3 (1)	450.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***
4		(4) SN-2002HH	ACS/HRC, ACCUM, HRC	F435W POL0UV	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 4-4 (1)	450.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[3]***

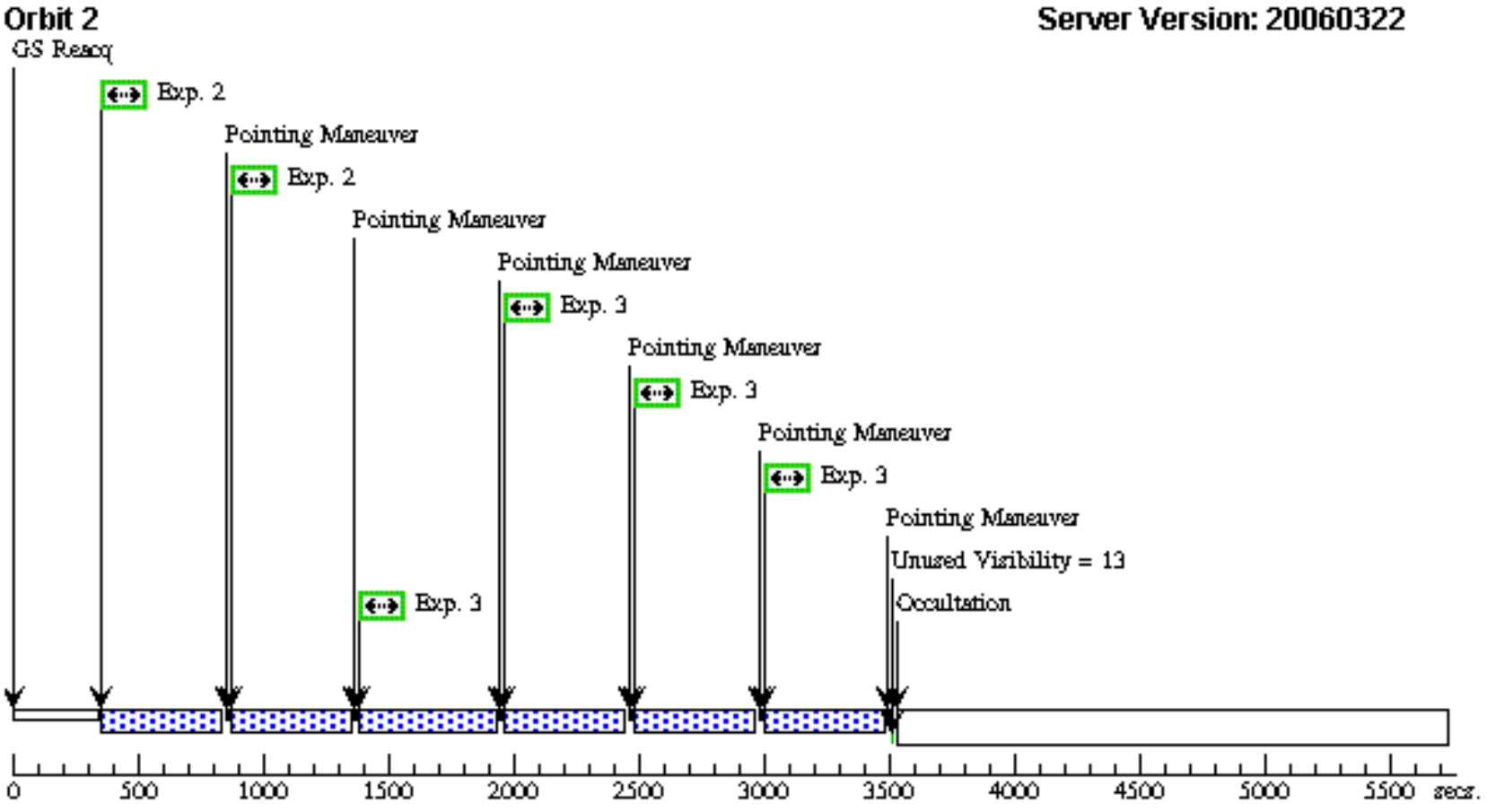
Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
5		(4) SN-2002HH	ACS/HRC, ACCUM, HRC	F435W POL60UV	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 5-5 (1)	450.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]*	*[3]*
								[==>(Pattern 3)] *[==>(Pattern 4)]*	*[4]*
6		(4) SN-2002HH	ACS/HRC, ACCUM, HRC	F435W POL120UV	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 6-6 (1)	450.0 Secs	
								[==>(Pattern 1)] *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[4]*

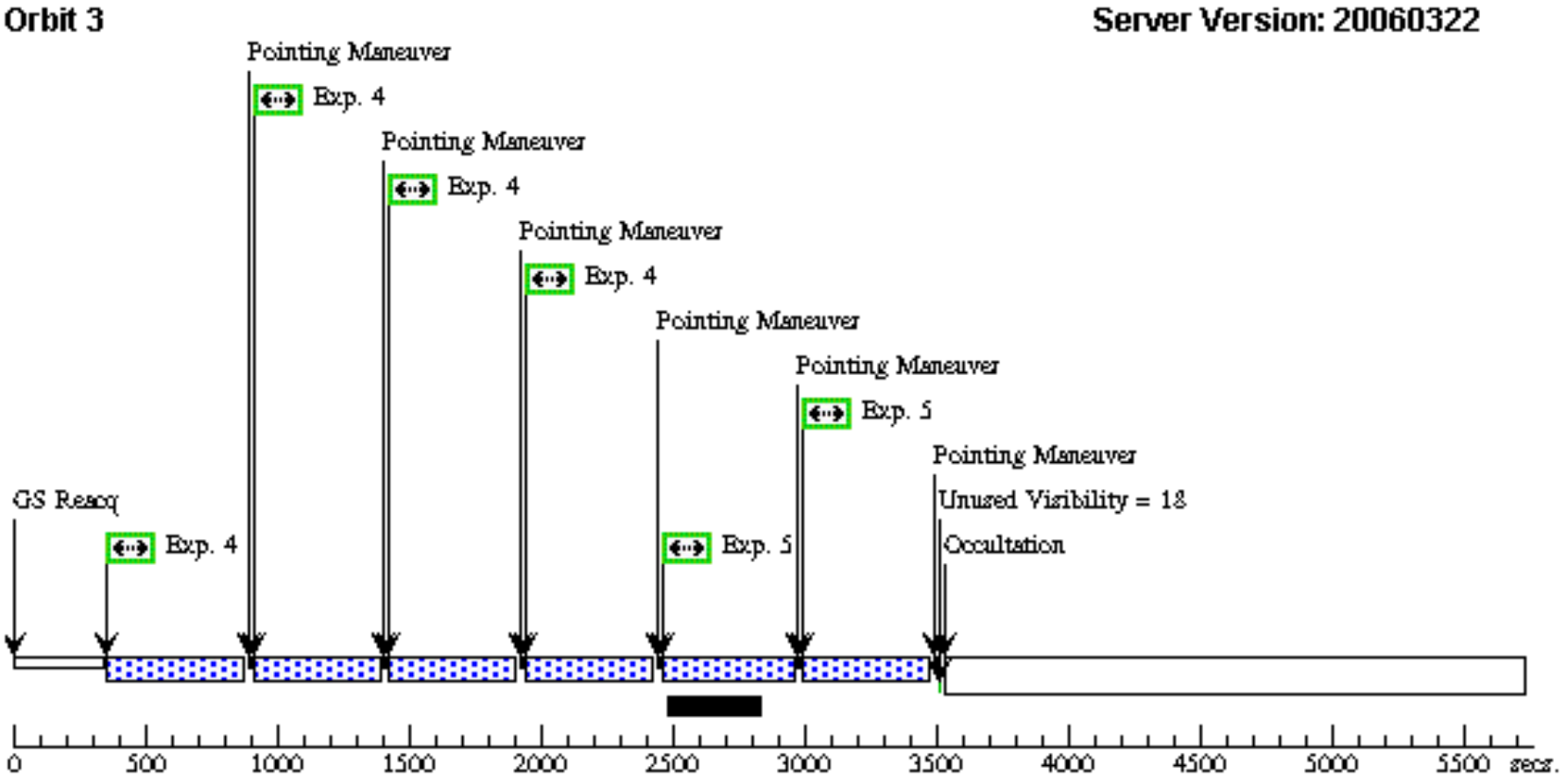
Orbit Structure

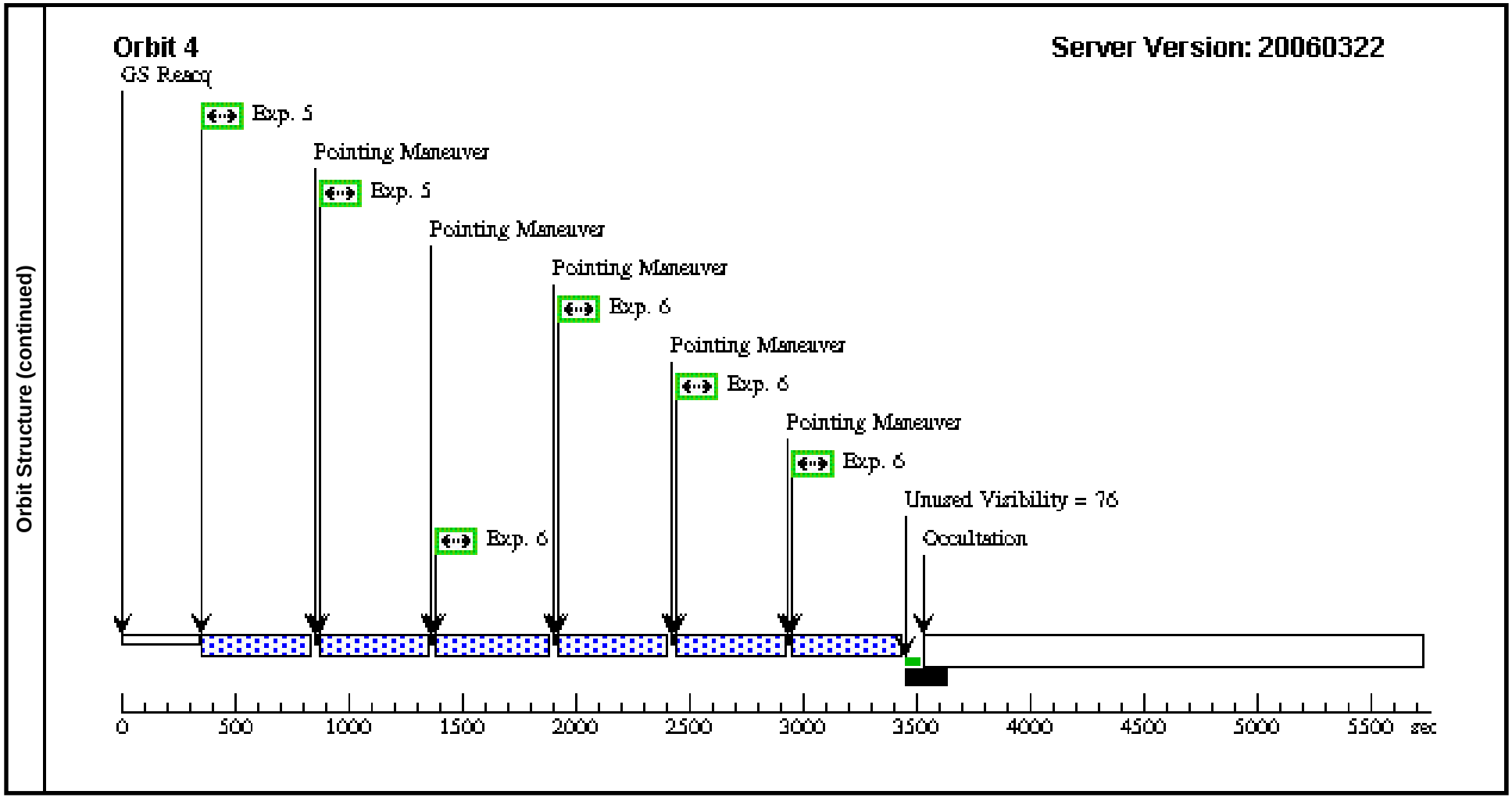


Orbit Structure (continued)



Orbit Structure (continued)




Orbit Structure (continued)
Orbit 4
Server Version: 20060322
GS Reacq
Exp. 5
Pointing Maneuver
Exp. 5
Pointing Maneuver
Exp. 6
Pointing Maneuver
Exp. 6
Pointing Maneuver
Exp. 6
Pointing Maneuver
Exp. 6
Unused Visibility = 76
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10607, Visit 14 Sat May 27 01:02:49 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: PCS MODE FINE; AFTER 04 BY 180 D TO 270 D

Comments: 2002hh Visit 2

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(2)	Pattern Type=ACS-HRC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.198 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=44.3 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-HRC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.15 Line Spacing=0.098	Coordinate Frame=POS-TARG Pattern Orientation=19.9 Angle Between Sides=63.5 Center Pattern=false	(1)

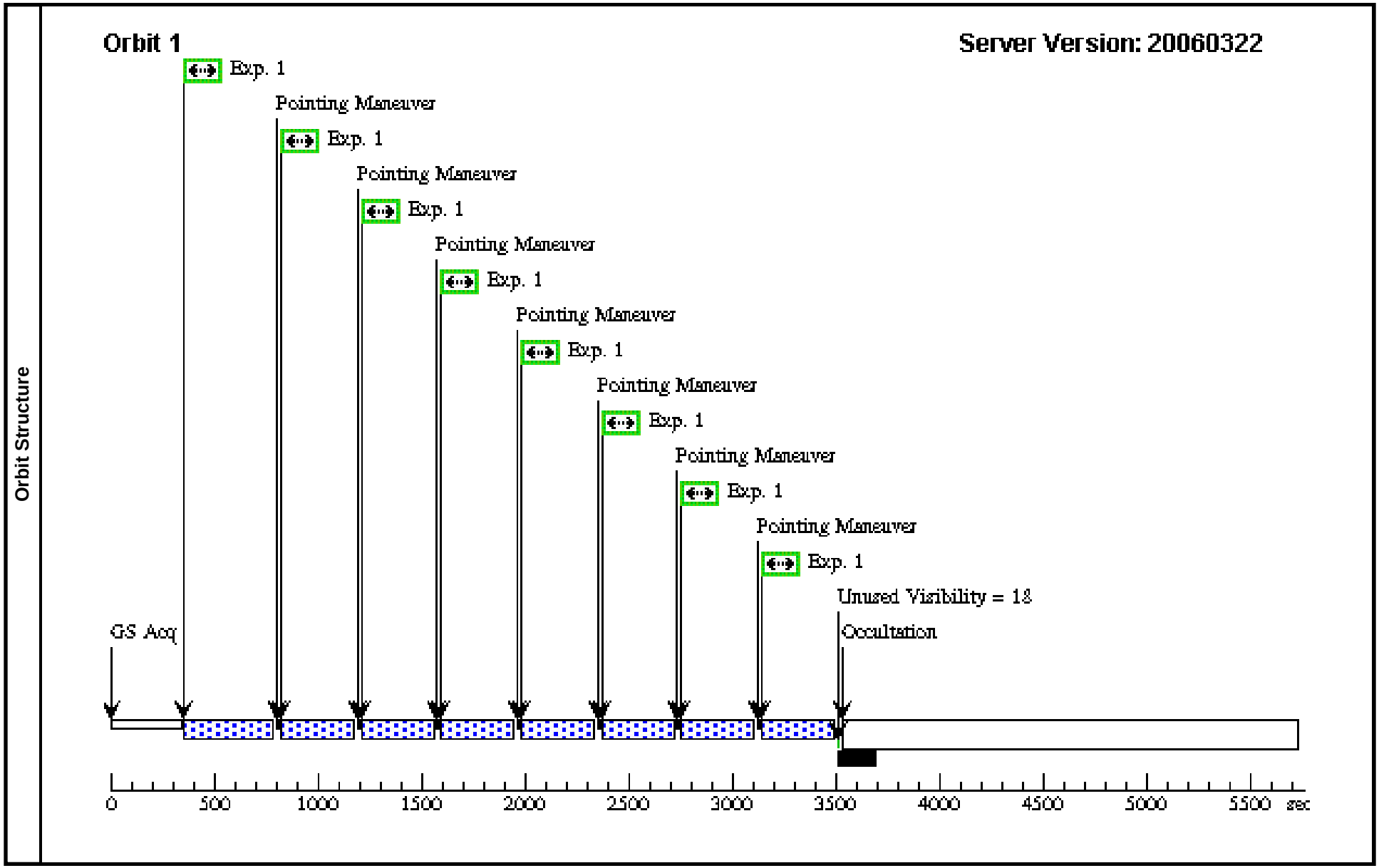
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	SN-2002HH	RA: 20 34 44.2900 (308.6845417d) Dec: +60 07 19.00 (60.12194d) Equinox: J2000		V=25.0	Coordinate Source: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(4) SN-2002HH	ACS/HRC, ACCUM, HRC	F606W	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 1-1 (2)	320.0 Secs *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 1,3)]* *[==>(Pattern 1,4)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]* *[==>(Pattern 2,3)]* *[==>(Pattern 2,4)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20060322
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Unused Visibility = 18
GS Acq
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10607, Visit 24 Sat May 27 01:02:49 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: PCS MODE FINE; BETWEEN 01-SEP-2006:00:00:00 AND 31-DEC-2006:00:00:00

Comments: 2002hh Visit 3

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(2)	Pattern Type=ACS-HRC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.198 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=44.3 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-HRC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.15 Line Spacing=0.098	Coordinate Frame=POS-TARG Pattern Orientation=19.9 Angle Between Sides=63.5 Center Pattern=false	(1)

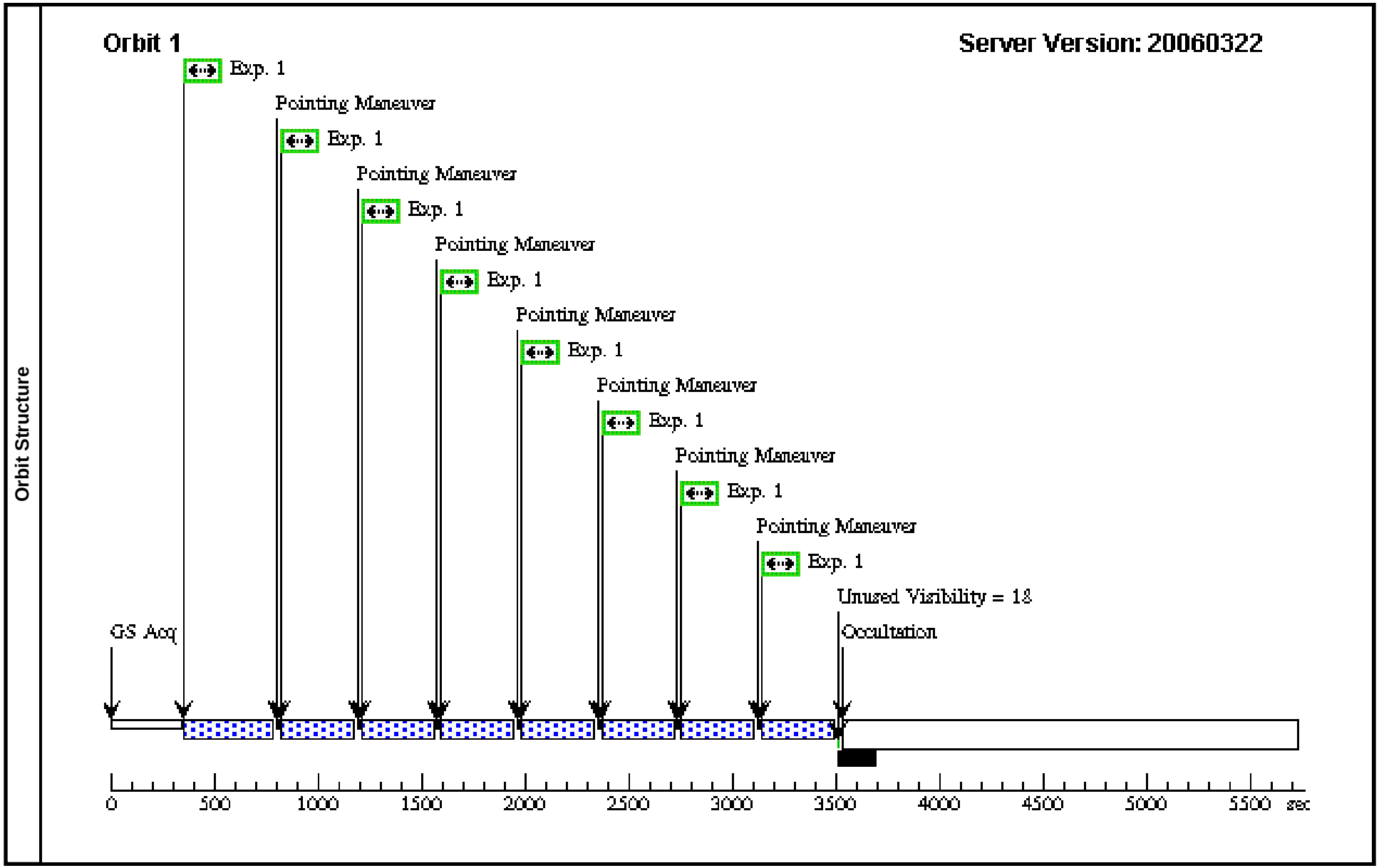
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	SN-2002HH-COPY	RA: 20 34 44.2900 (308.6845417d) Dec: +60 07 19.00 (60.12194d) Equinox: J2000		V=25.0	Coordinate Source: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(6) SN-2002HH-COPY	ACS/HRC, ACCUM, HRC	F606W	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 1-1 (2)	320.0 Secs *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 1,3)]* *[==>(Pattern 1,4)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]* *[==>(Pattern 2,3)]* *[==>(Pattern 2,4)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20060322
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Unused Visibility = 18
GS Acq
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10607, Visit 05 Sat May 27 01:02:49 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: PCS MODE FINE; BETWEEN 27-APR-2005:20:36:57 AND 13-NOV-2005:00:00:00

Comments: 2004dj

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-HRC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.15 Line Spacing=0.098	Coordinate Frame=POS-TARG Pattern Orientation=19.9 Angle Between Sides=63.5 Center Pattern=false			(2), (4), (5), (6)
(2)	Pattern Type=ACS-HRC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.198 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=44.3 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-HRC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.15 Line Spacing=0.098	Coordinate Frame=POS-TARG Pattern Orientation=19.9 Angle Between Sides=63.5 Center Pattern=false	(1), (3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	SN-2004DJ	RA: 07 37 17.0200 (114.3209167d) Dec: +65 35 57.80 (65.59939d) Equinox: J2000		V=17.0	Coordinate Source: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

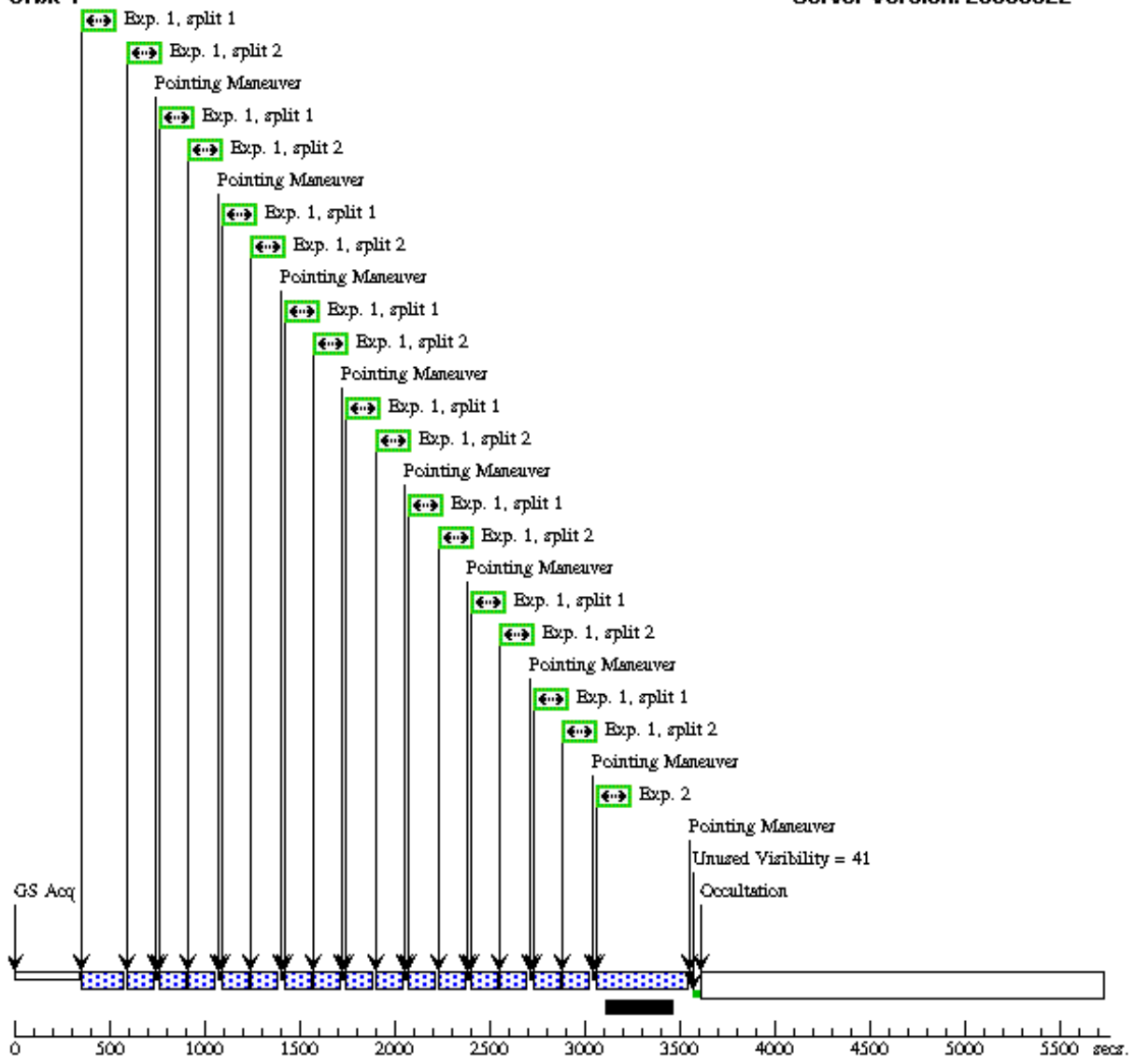
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(5) SN-2004DJ	ACS/HRC, ACCUM, HRC	F606W	CR-SPLIT=2; PAREXP=NONE	POS TARG 1.5,-1	Pattern 1-1 (2)	206.0 Secs	
								[==>(Pattern 1,1, Split 1)]	
								[==>(Pattern 1,1, Split 2)]	
								[==>(Pattern 1,2, Split 1)]	
								[==>(Pattern 1,2, Split 2)]	
								[==>(Pattern 1,3, Split 1)]	
								[==>(Pattern 1,3, Split 2)]	
								[==>(Pattern 1,4, Split 1)]	
								[==>(Pattern 1,4, Split 2)]	***[1]***
								[==>(Pattern 2,1, Split 1)]	
								[==>(Pattern 2,1, Split 2)]	
								[==>(Pattern 2,2, Split 1)]	
								[==>(Pattern 2,2, Split 2)]	
								[==>(Pattern 2,3, Split 1)]	
								[==>(Pattern 2,3, Split 2)]	
								[==>(Pattern 2,4, Split 1)]	
								[==>(Pattern 2,4, Split 2)]	
2		(5) SN-2004DJ	ACS/HRC, ACCUM, HRC	F435W POL0UV	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 2-2 (1)	400.0 Secs	
								[==>(Pattern 1)]	***[1]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	***[2]***
								[==>(Pattern 4)]	

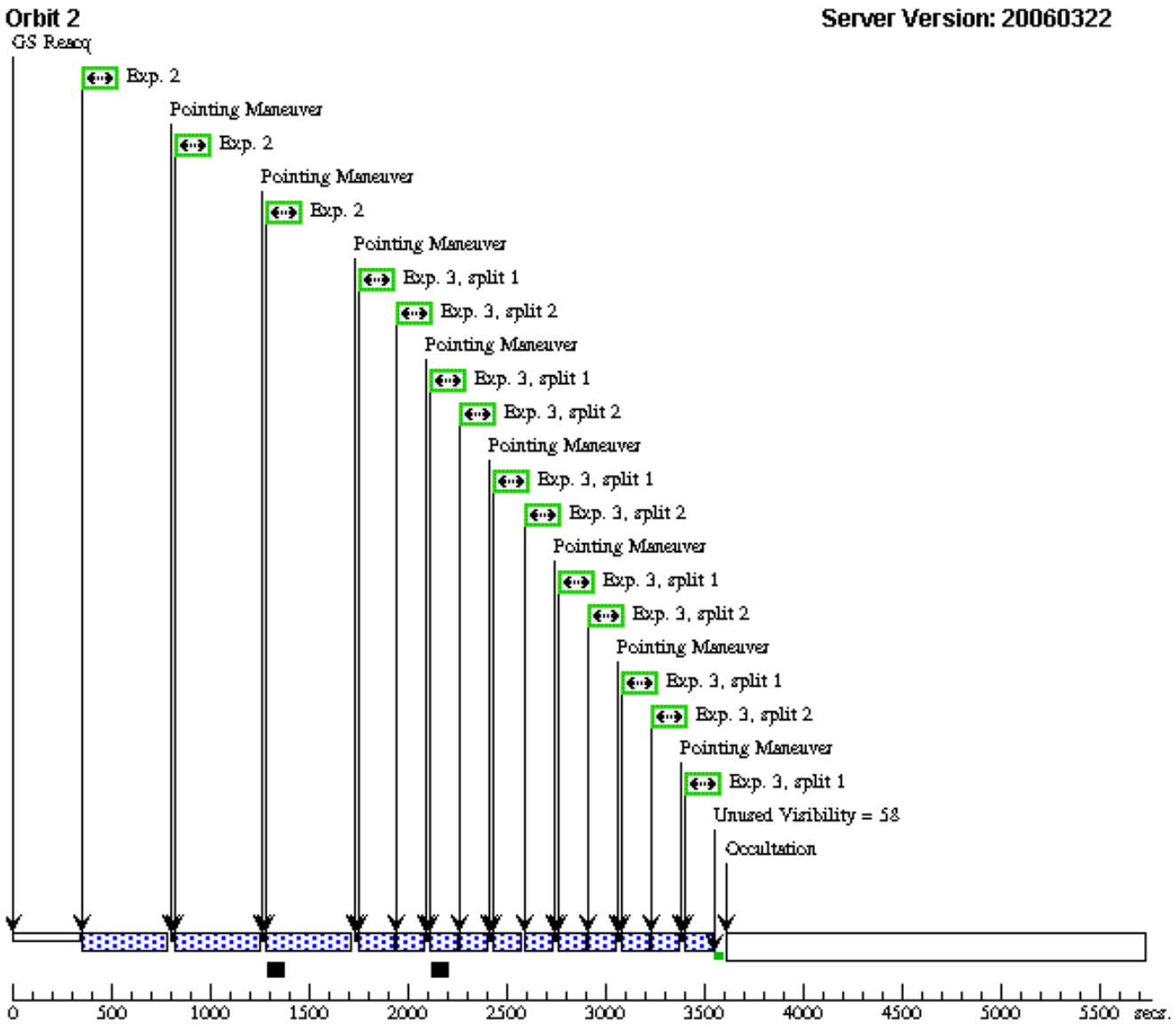
Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
3		(5) SN-2004DJ	ACS/HRC, ACCUM, HRC	F814W	CR-SPLIT=2; PAREXP=NONE	POS TARG 1.5,-1	Pattern 3-3 (2)	200.0 Secs	
								[==>(Pattern 1,1, Split 1)]	
								[==>(Pattern 1,1, Split 2)]	
								[==>(Pattern 1,2, Split 1)]	
								[==>(Pattern 1,2, Split 2)]	
								[==>(Pattern 1,3, Split 1)]	
								[==>(Pattern 1,3, Split 2)]	***[2]***
								[==>(Pattern 1,4, Split 1)]	
								[==>(Pattern 1,4, Split 2)]	
								[==>(Pattern 2,1, Split 1)]	
								[==>(Pattern 2,1, Split 2)]	
								[==>(Pattern 2,2, Split 1)]	
								[==>(Pattern 2,2, Split 2)]	
								[==>(Pattern 2,3, Split 1)]	
								[==>(Pattern 2,3, Split 2)]	***[3]***
								[==>(Pattern 2,4, Split 1)]	
								[==>(Pattern 2,4, Split 2)]	
4		(5) SN-2004DJ	ACS/HRC, ACCUM, HRC	F435W POL60UV	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 4-4 (1)	400.0 Secs	
								[==>(Pattern 1)]	
								[==>(Pattern 2)]	***[3]***
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	
5		(5) SN-2004DJ	ACS/HRC, ACCUM, HRC	F435W POL120UV	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 5-5 (1)	400.0 Secs	
								[==>(Pattern 1)]	***[3]***
								[==>(Pattern 2)]	
								[==>(Pattern 3)]	***[4]***
								[==>(Pattern 4)]	
6		(5) SN-2004DJ	ACS/HRC, ACCUM, HRC	F658N	CR-SPLIT=NO; PAREXP=NONE	POS TARG 1.5,-1	Pattern 6-6 (1)	385.0 Secs	
								[==>(Pattern 1)]	
								[==>(Pattern 2)]	***[4]***
								[==>(Pattern 3)]	
								[==>(Pattern 4)]	

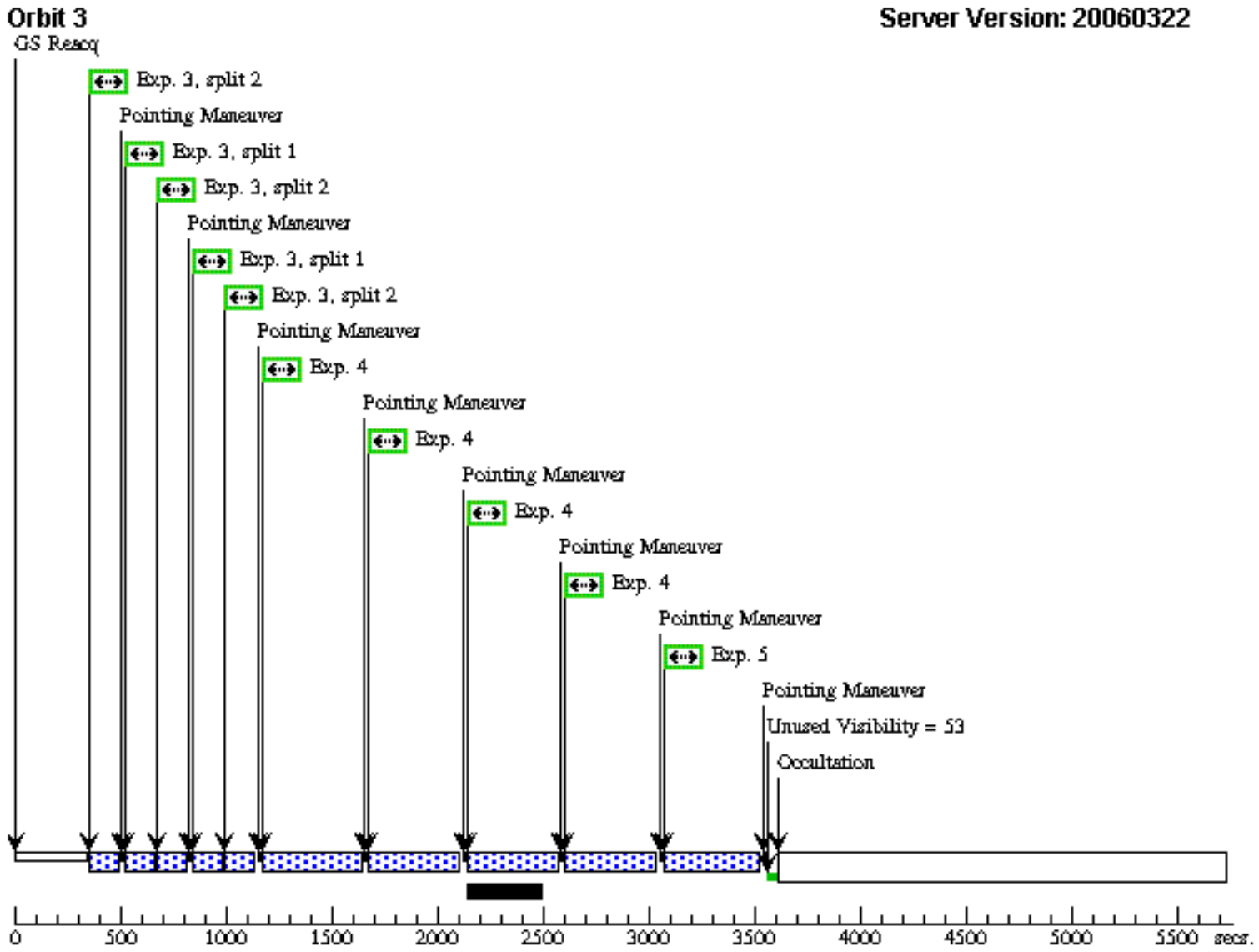
Orbit Structure

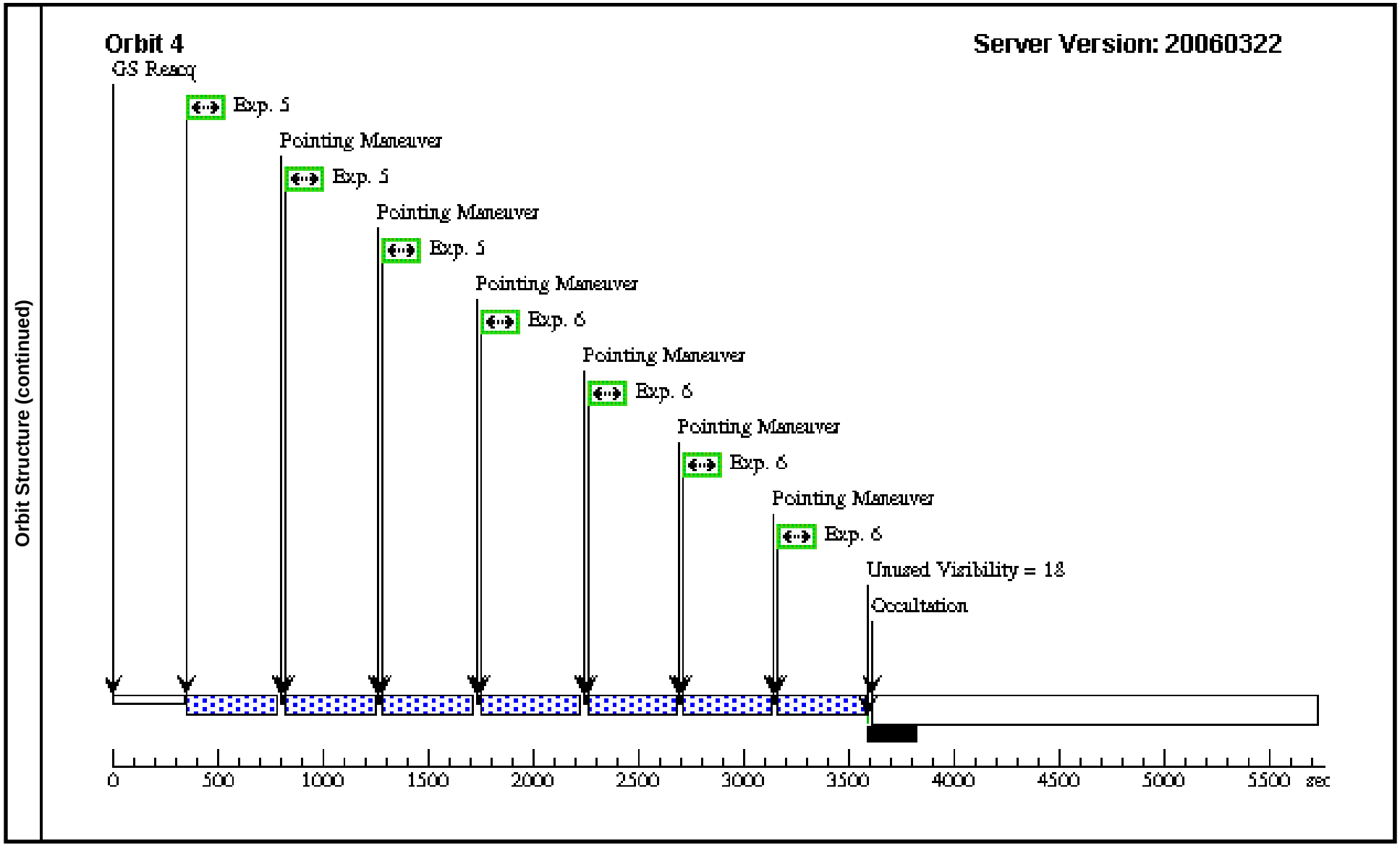


Orbit Structure (continued)



Orbit Structure (continued)




Orbit Structure (continued)
Orbit 4
Server Version: 20060322
GS Reacq
Exp. 5
Pointing Maneuver
Exp. 5
Pointing Maneuver
Exp. 5
Pointing Maneuver
Exp. 6
Pointing Maneuver
Exp. 6
Pointing Maneuver
Exp. 6
Pointing Maneuver
Exp. 6
Unused Visibility = 18
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec