11633 - A Precision White Dwarf Cooling Age for NGC 6397

Cycle: 17, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) N6397-C13 ANY	ACS/WFC WFC3/UVIS	3	18-May-2009 21:31:13.0	yes
02	(1) N6397-C13 ANY	ACS/WFC WFC3/UVIS	3	18-May-2009 21:31:30.0	yes
03	(1) N6397-C13 ANY	ACS/WFC WFC3/UVIS	3	18-May-2009 21:31:42.0	yes

9 Total Orbits Used

ABSTRACT

We propose to obtain second epoch imaging of the globular cluster NGC 6397, which has the deepest ACS/WFC dataset (126 orbits in Cycle 13) ever obtained in a globular cluster. These additional 14 orbits would enable the construction of a proper motion - cleaned white dwarf cooling sequence reaching fainter than the observed truncation point of the white dwarf luminosity function; a byproduct will be absolute proper motions (relative to the extragalactic reference frame) of the rich spheroid field population. Our data shows the long sought ``blue hook'', a feature in the WD cooling sequence predicted in theoretical white dwarf models; the improved photometry and statistics afforded by the second epoch observations are needed to confirm the blue hook and to test other aspects of white dwarf cooling models that contribute to a 0.5 Gyr or greater uncertainty in the age. The proposed observations will provide formal constraints on the age and formation timescale of NGC 6397 that will be smaller than 1 Gyr and place the cluster's formation epoch relative to the end of reionization. The final proper motion-purified white dwarf sequence will be a powerful constraint for white dwarf cooling models and atmospheres, the basis for white dwarf-based globular cluster age determinations, and also constrain the fraction of binary white dwarfs.

OBSERVING DESCRIPTION

second epoch observations to do proper motion cleaning of the cluster sample.

Visit

Proposal 11633, Visit 01, implementation Tue May 19 01:31:47 GMT 2009

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC, WFC3/UVIS

Special Requirements: ORIENT 270.35D TO 270.35 D

Diagnostics

(Visit 01) Warning (Orbit Planner): VISIBILITY OVERRUN

Fixed Targets

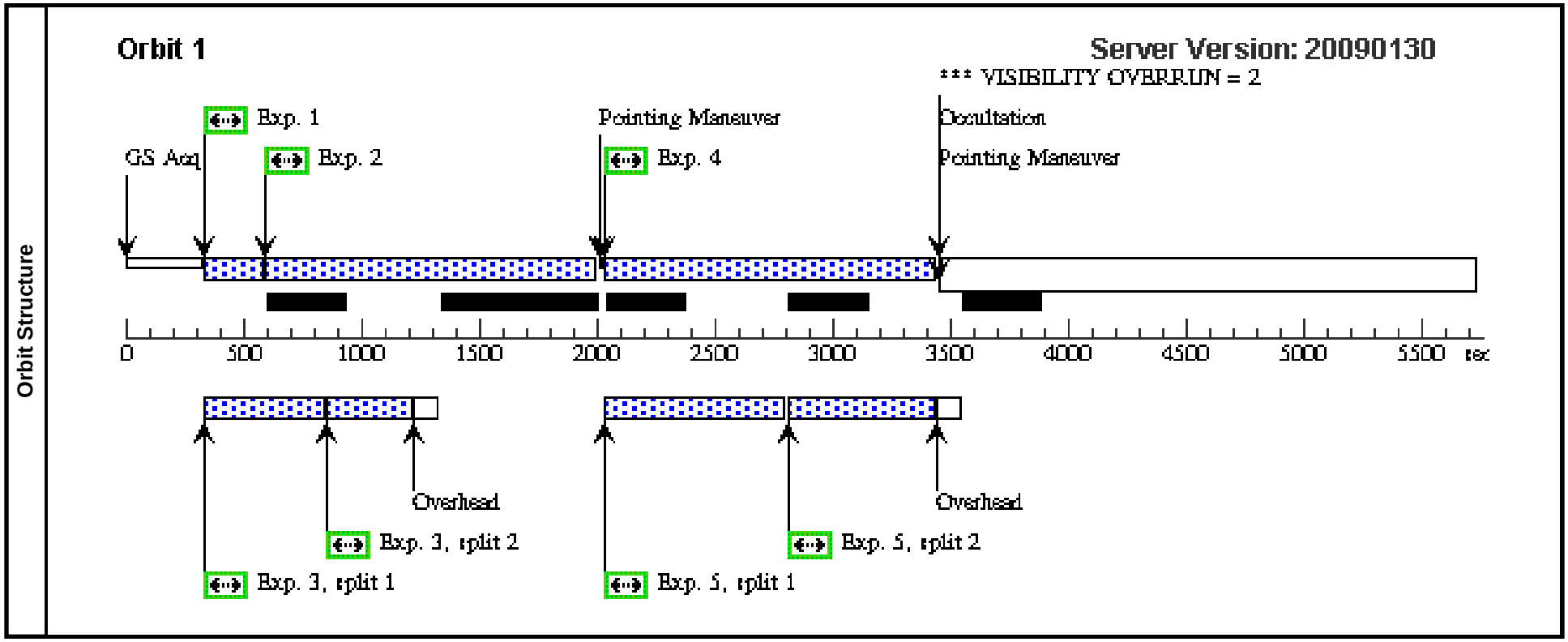
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	N6397-C13	RA: 17 41 2.6960 (265.2612333d) Dec: -53 44 20.79 (-53.73911d) Equinox: J2000		V=30.0+/-0.5 I=28.0 +/- 1	Reference Frame: HST_Target

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	40sec F814W	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.716287,-0.476637	Sequence 1-5 Non-Int Prime + Parallel Group 1-3	40.0 Secs *[==>]*	***[1]***
2	F814W B	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.716287,-0.476637	Sequence 1-5 Non-Int Prime + Parallel Group 1-3	1280.0 Secs *[==>]*	***[1]***
3	F606W Visit 1	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Sequence 1-5 Non-Int Prime + Parallel Group 1-3	720.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
4	F814w 40 sec orbit, second exposure	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.426044,-0.460661	Sequence 1-5 Non-Int Prime + Parallel Group 4-5	1280.0 Secs *[==>]*	***[1]***
5	F336W Visit 1	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W			Sequence 1-5 Non-Int Prime + Parallel Group 4-5	1240.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
6	10 sec F814W	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.135802,-0.444684	Sequence 6-10 Non-Int Prime + Parallel Group 6-8	10.0 Secs *[==>]*	***[2]***

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
7	F814W B	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.135802,-0.444684	Sequence 6-10 Non-Int Prime + Parallel Group 6-8	1405.0 Secs *[==>]*	***[2]***
8	F225W Visit 1 Exp 1	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 6-10 Non-Int Prime + Parallel Group 6-8	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
9	F814w 40 sec orbit, second exposure	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.154441,-0.468649	Sequence 6-10 Non-Int Prime + Parallel Group 9-10	1405.0 Secs *[==>]*	***[2]***
10	F225W Visit 1 Exp 2	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 6-10 Non-Int Prime + Parallel Group 9-10	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
11	5 sec F814W	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.444684,-0.452672	Sequence 11-15 Non-Int Prime + Parallel Group 11-13	5.0 Secs *[==>]*	***[3]***
12	F814W B	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.444684,-0.452672	Sequence 11-15 Non-Int Prime + Parallel Group 11-13	1405.0 Secs *[==>]*	***[3]***
13	F225W Visit 1 Exp 3	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 11-15 Non-Int Prime + Parallel Group 11-13	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***
14	F814w 40 sec orbit, second exposure	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.734927,-0.436696	Sequence 11-15 Non-Int Prime + Parallel Group 14-15	1405.0 Secs *[==>]*	***[3]***
15	F225W Visit 1 Exp 4	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 11-15 Non-Int Prime + Parallel Group 14-15	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***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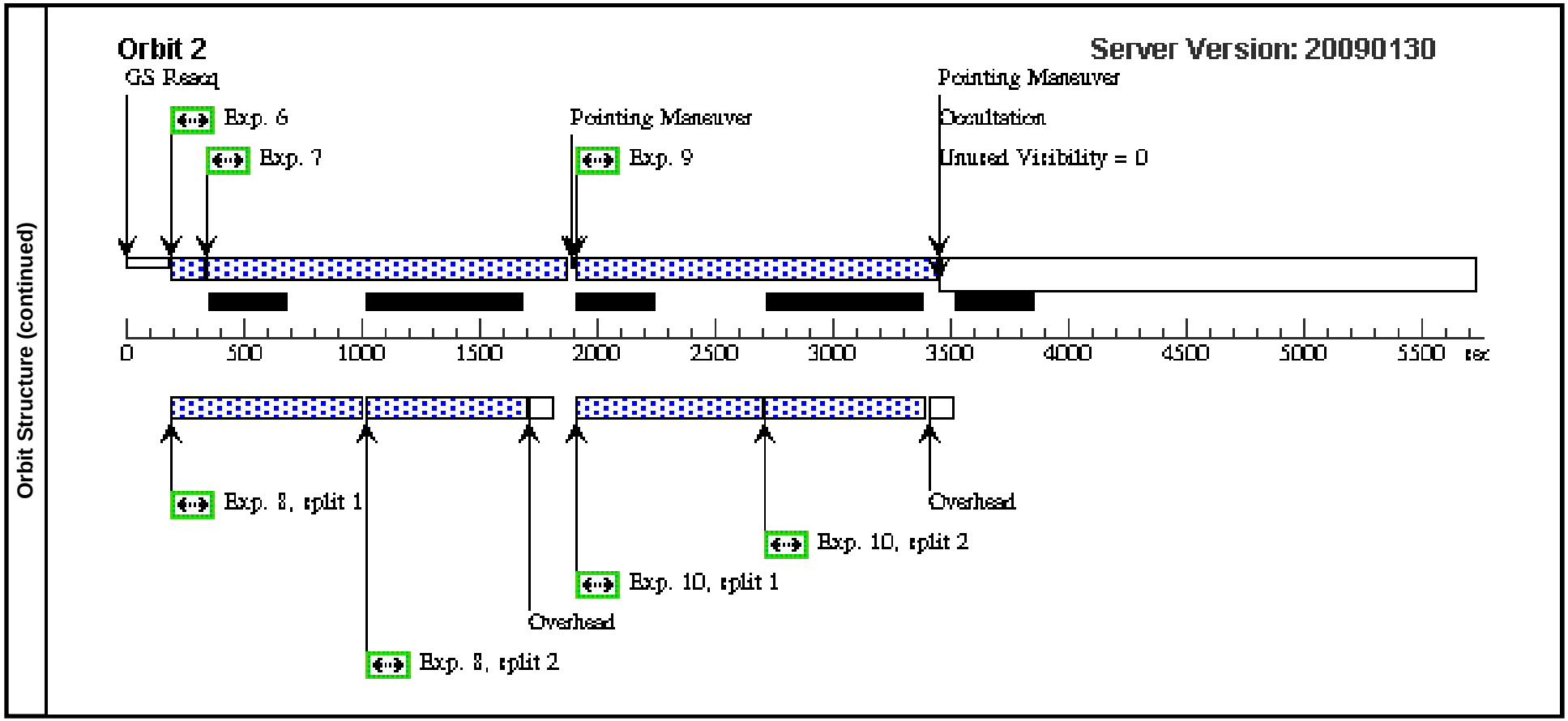
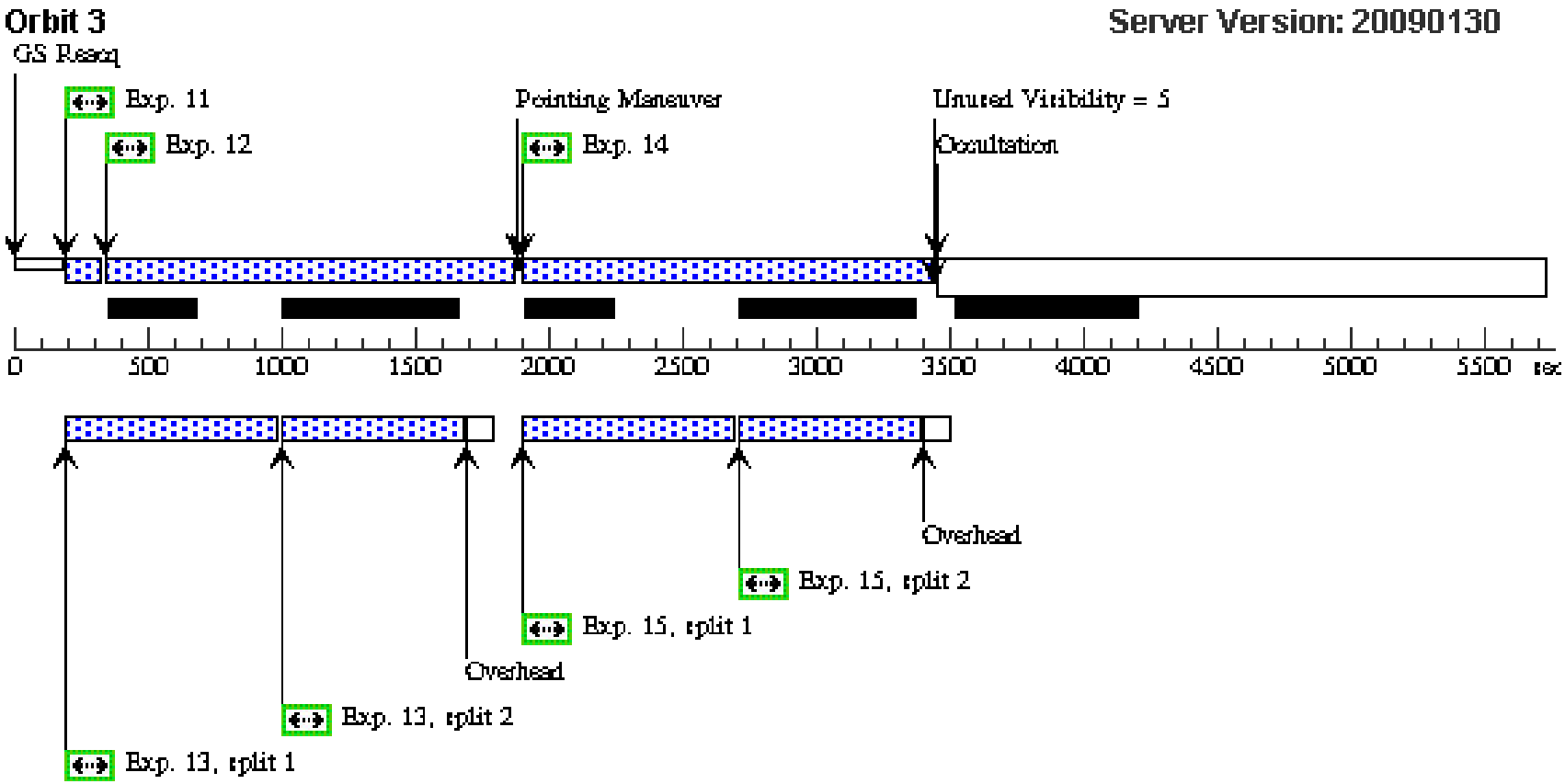
Orbit 1
Server Version: 20090130
*** VISIBILITY OVERRUN = 2
GS Acq
Exp. 1
Exp. 2
Pointing Maneuver
Exp. 4
Occultation
Pointing Maneuver
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Overhead
Exp. 3, split 2
Exp. 3, split 1
Overhead
Exp. 5, split 2
Exp. 5, split 1


Orbit Structure (continued)
Orbit 2
Server Version: 20090130
GS Reacq
Exp. 6
Exp. 7
Pointing Maneuver
Exp. 9
Pointing Maneuver
Occultation
Unused Visibility = 0
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Exp. 8, split 1
Exp. 8, split 2
Overhead
Exp. 10, split 1
Exp. 10, split 2
Overhead

Orbit Structure (continued)



Visit

Proposal 11633, Visit 02, implementation Tue May 19 01:31:49 GMT 2009

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC, WFC3/UVIS

Special Requirements: ORIENT 270.35D TO 270.35 D

Diagnostics

(Visit 02) Warning (Orbit Planner): VISIBILITY OVERRUN

Fixed Targets

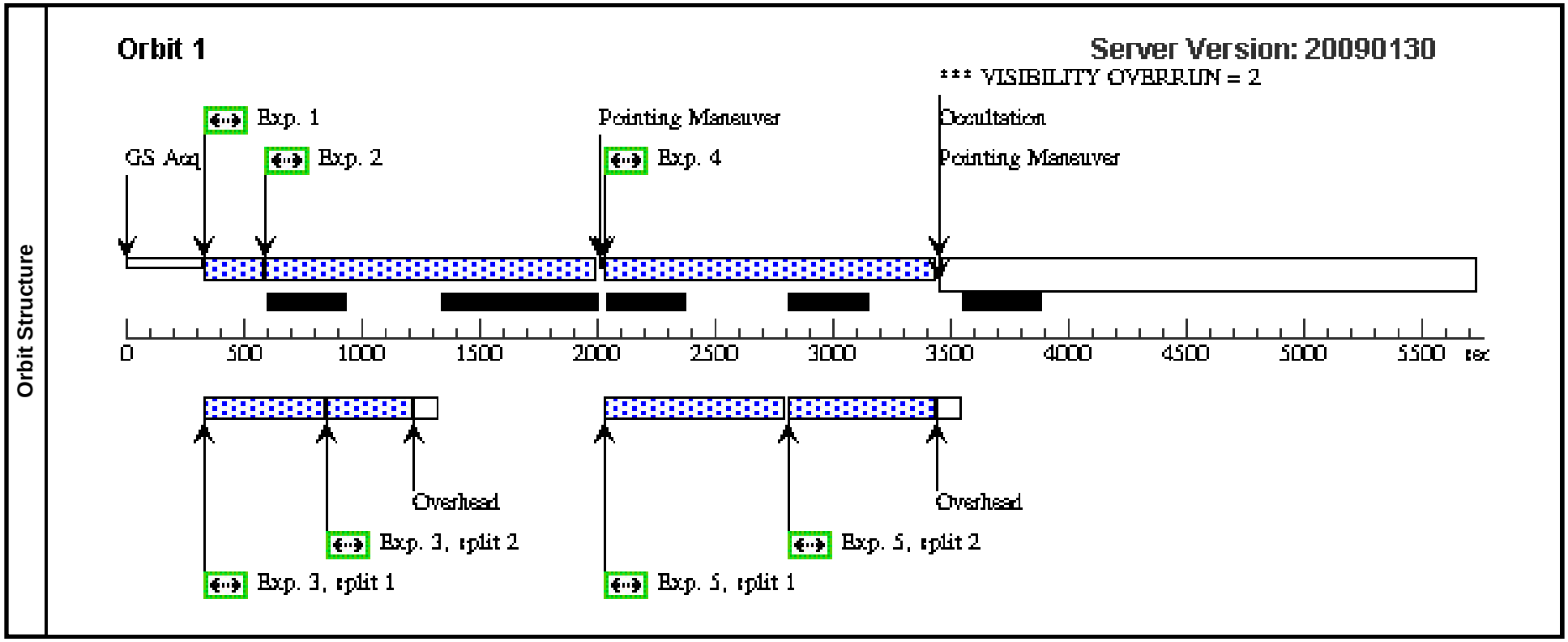
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	N6397-C13	RA: 17 41 2.6960 (265.2612333d) Dec: -53 44 20.79 (-53.73911d) Equinox: J2000		V=30.0+/-0.5 I=28.0 +/- 1	Reference Frame: HST_Target

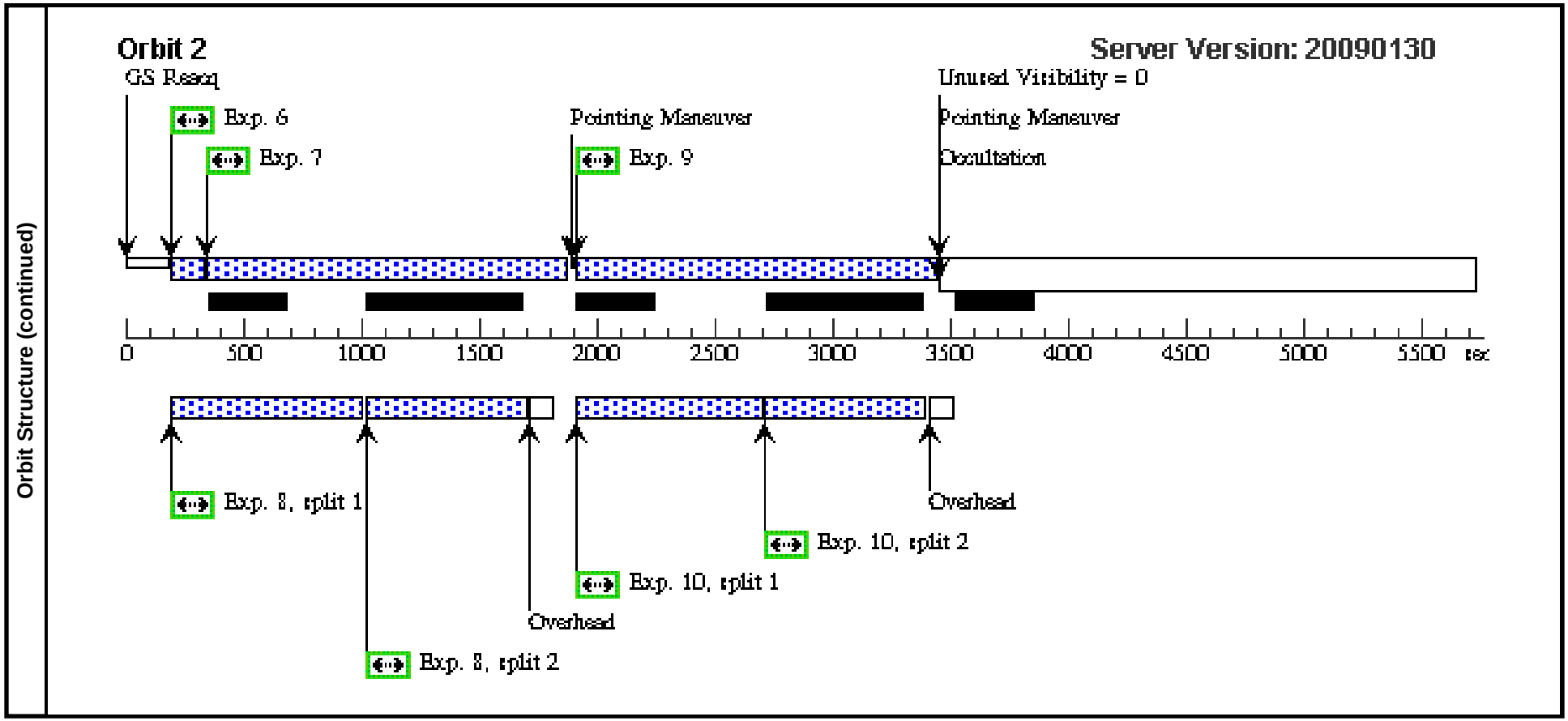
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	40sec F814W	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.652381,0.005326	Sequence 1-5 Non-Int Prime + Parallel Group 1-3	40.0 Secs *[==>]*	***[1]***
2	F814W B	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.652381,0.005326	Sequence 1-5 Non-Int Prime + Parallel Group 1-3	1280.0 Secs *[==>]*	***[1]***
3	F606W Visit 2	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Sequence 1-5 Non-Int Prime + Parallel Group 1-3	720.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
4	F814w 40 sec orbit, second exposure	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.362138,0.021302	Sequence 1-5 Non-Int Prime + Parallel Group 4-5	1280.0 Secs *[==>]*	***[1]***
5	F336W Visit 2	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W			Sequence 1-5 Non-Int Prime + Parallel Group 4-5	1240.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
6	10 sec F814W	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.071895,0.037279	Sequence 6-10 Non-Int Prime + Parallel Group 6-8	10.0 Secs *[==>]*	***[2]***

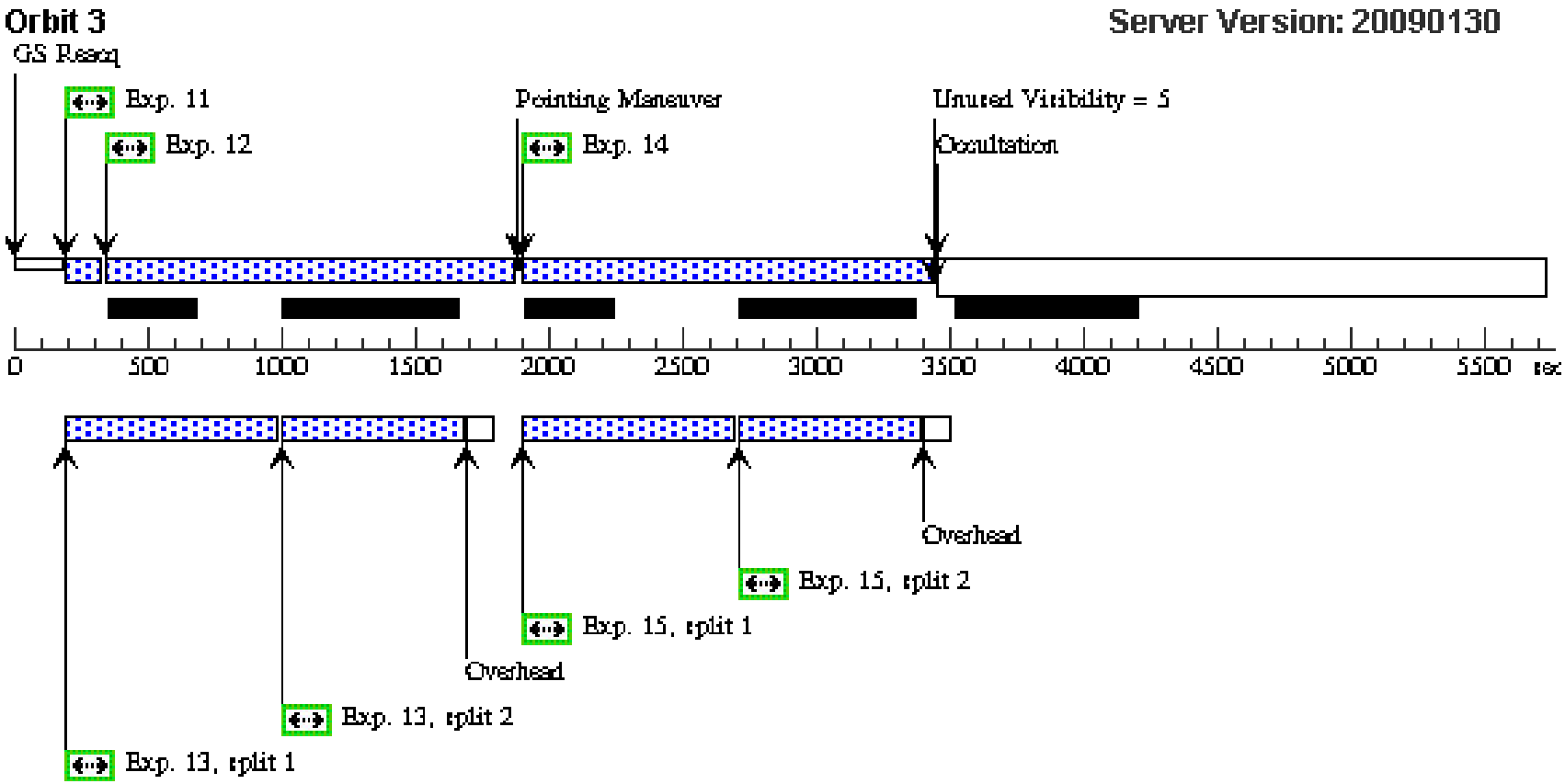
Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
7	F814W B	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.071895,0.037279	Sequence 6-10 Non-Int Prime + Parallel Group 6-8	1405.0 Secs *[==>]*	***[2]***
8	F225W Visit 2 Exp 1	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 6-10 Non-Int Prime + Parallel Group 6-8	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
9	F814w 40 sec orbit, second exposure	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.218348,0.013314	Sequence 6-10 Non-Int Prime + Parallel Group 9-10	1405.0 Secs *[==>]*	***[2]***
10	F225W Visit 2 Exp 2	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 6-10 Non-Int Prime + Parallel Group 9-10	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
11	5 sec F814W	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.508591,0.029291	Sequence 11-15 Non-Int Prime + Parallel Group 11-13	5.0 Secs *[==>]*	***[3]***
12	F814W B	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.508591,0.029291	Sequence 11-15 Non-Int Prime + Parallel Group 11-13	1405.0 Secs *[==>]*	***[3]***
13	F225W Visit 2 Exp 3	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 11-15 Non-Int Prime + Parallel Group 11-13	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***
14	F814w 40 sec orbit, second exposure	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.798833,0.045267	Sequence 11-15 Non-Int Prime + Parallel Group 14-15	1405.0 Secs *[==>]*	***[3]***
15	F225W Visit 2 Exp 4	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 11-15 Non-Int Prime + Parallel Group 14-15	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***


Orbit Structure
Orbit 1
Server Version: 20090130
*** VISIBILITY OVERRUN = 2
Exp. 1
GS Acq
Exp. 2
Pointing Maneuver
Exp. 4
Occultation
Pointing Maneuver
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Overhead
Exp. 3, split 2
Exp. 3, split 1
Overhead
Exp. 5, split 2
Exp. 5, split 1


Orbit Structure (continued)
Orbit 2
Server Version: 20090130
GS Reacq
Exp. 6
Exp. 7
Pointing Maneuver
Exp. 9
Unused Visibility = 0
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Exp. 8, split 1
Exp. 8, split 2
Overhead
Exp. 10, split 1
Exp. 10, split 2
Overhead

Orbit Structure (continued)



Visit

Proposal 11633, Visit 03, implementation Tue May 19 01:31:51 GMT 2009

Diagnostic Status: Warning

Scientific Instruments: ACS/WFC, WFC3/UVIS

Special Requirements: ORIENT 270.35D TO 270.35 D

Diagnostics

(Visit 03) Warning (Orbit Planner): VISIBILITY OVERRUN

Fixed Targets

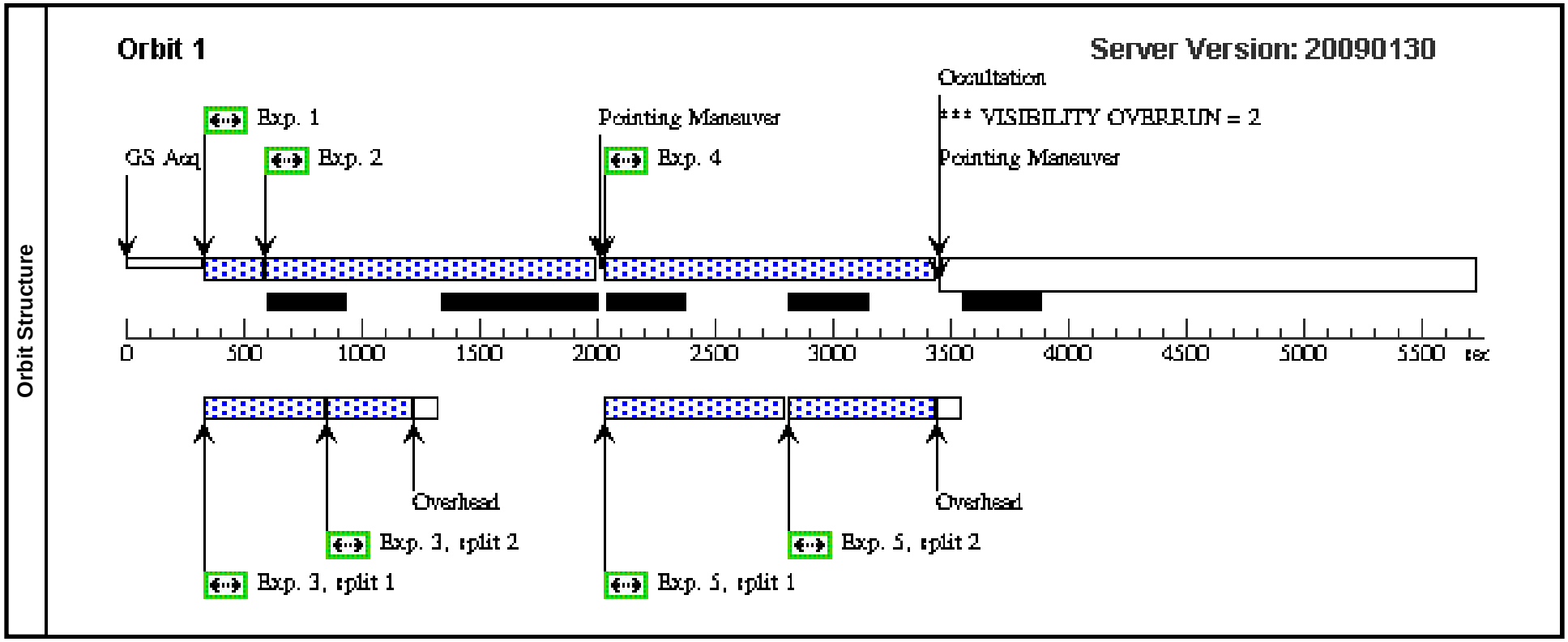
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	N6397-C13	RA: 17 41 2.6960 (265.2612333d) Dec: -53 44 20.79 (-53.73911d) Equinox: J2000		V=30.0+/-0.5 I=28.0 +/- 1	Reference Frame: HST_Target

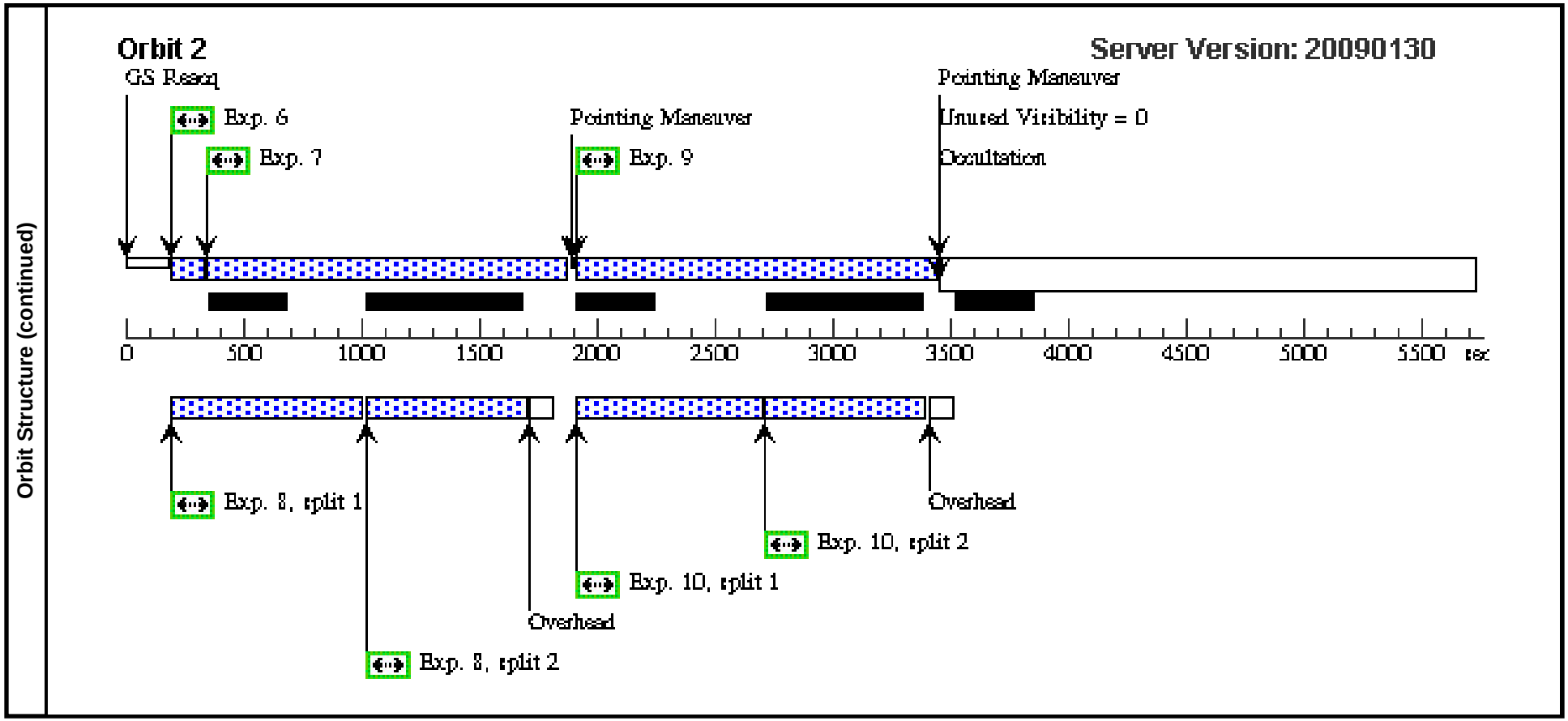
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	40sec F814W	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.732264,0.487288	Sequence 1-5 Non-Int Prime + Parallel Group 1-3	40.0 Secs *[==>]*	***[1]***
2	F814W B	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.732264,0.487288	Sequence 1-5 Non-Int Prime + Parallel Group 1-3	1280.0 Secs *[==>]*	***[1]***
3	F606W Visit 3	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W			Sequence 1-5 Non-Int Prime + Parallel Group 1-3	720.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
4	F814w 40 sec orbit, second exposure	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.442021,0.503265	Sequence 1-5 Non-Int Prime + Parallel Group 4-5	1280.0 Secs *[==>]*	***[1]***
5	F336W Visit 3	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W			Sequence 1-5 Non-Int Prime + Parallel Group 4-5	1240.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
6	10 sec F814W	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.151778,0.519242	Sequence 6-10 Non-Int Prime + Parallel Group 6-8	10.0 Secs *[==>]*	***[2]***

Exposures (continued)

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
7	F814W B	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG -0.151778,0.519242	Sequence 6-10 Non-Int Prime + Parallel Group 6-8	1405.0 Secs *[==>]*	***[2]***
8	F225W Visit 3 Exp 1	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 6-10 Non-Int Prime + Parallel Group 6-8	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
9	F814w 40 sec orbit, second exposure	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.138464,0.495277	Sequence 6-10 Non-Int Prime + Parallel Group 9-10	1405.0 Secs *[==>]*	***[2]***
10	F225W Visit 3 Exp 2	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 6-10 Non-Int Prime + Parallel Group 9-10	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
11	5 sec F814W	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.428707,0.527230	Sequence 11-15 Non-Int Prime + Parallel Group 11-13	5.0 Secs *[==>]*	***[3]***
12	F814W B	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.428707,0.527230	Sequence 11-15 Non-Int Prime + Parallel Group 11-13	1405.0 Secs *[==>]*	***[3]***
13	F225W Visit 3 Exp 3	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 11-15 Non-Int Prime + Parallel Group 11-13	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***
14	F814w 40 sec orbit, second exposure	(1) N6397-C13	ACS/WFC, ACCUM, WFC	F814W	CR-SPLIT=NO; GAIN=2.0	POS TARG 0.718950,0.511253	Sequence 11-15 Non-Int Prime + Parallel Group 14-15	1405.0 Secs *[==>]*	***[3]***
15	F225W Visit 3 Exp 4	ANY	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W			Sequence 11-15 Non-Int Prime + Parallel Group 14-15	1360.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***


Orbit Structure
Orbit 1
Server Version: 20090130
Occultation
*** VISIBILITY OVERRUN = 2
Exp. 1
Pointing Maneuver
GS Acq
Exp. 2
Exp. 4
Pointing Maneuver
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Overhead
Exp. 3, split 2
Exp. 3, split 1
Overhead
Exp. 5, split 2
Exp. 5, split 1


Orbit Structure (continued)
Orbit 2
Server Version: 20090130
GS Reacq
Exp. 6
Exp. 7
Pointing Maneuver
Exp. 9
Pointing Maneuver
Unused Visibility = 0
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Exp. 8, split 1
Exp. 8, split 2
Overhead
Exp. 10, split 1
Exp. 10, split 2
Overhead

Orbit Structure (continued)