11617 - HAT-P-1: A Direct Glimpse into the Atmosphere of a Hot Jupiter

Cycle: 17, Proposal Category: GO

(Availability Mode: AVAILABLE)

INVESTIGATORS

Name	*Institution*	*E-Mail*
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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	(2) ADS-16402A (3) MIDPOINT CCDFLAT NONE WAVE	STIS/CCD	5	01-Nov-2010 21:12:15.0	yes
02	(2) ADS-16402A (3) MIDPOINT CCDFLAT NONE WAVE	STIS/CCD	5	01-Nov-2010 21:13:21.0	yes

10 Total Orbits Used

ABSTRACT

The HATNet project has discovered a transiting planet that is an extremely valuable target for reflected light observations (Bakos et al. 2006). HAT-P-1b, with mass M_p=0.53 +/- 0.04 M_Jup, and radius R_p=1.20 +/- 0.05 R_Jup (Winn et al. 2007), has a density comparable to that of HD 209458b. However, HAT-P-1b's P=4.46536 day orbital period is longer than that of HD 209458b. It is expected that the cloud composition and particulate size distribution of HAT-P-1b will differ from that of HD 209458b, due to the larger semimajor axis and lower effective temperature of HAT-P-1b. The resulting geometric albedo for HAT-P-1b should be larger than that of HD~209458b. Furthermore, HAT-P-1 orbits one component of a wide binary (ADS 16402A and ADS 16402B are G0V stars with 11.2" at 1.39 pc), making this an ideal target for ultra-precise differential photometry. Therefore, we propose ACS/HRC slitless grism photometry near times of its secondary eclipse to make the first detection of reflected light from an extrasolar planet.

Note: this program was awarded DD time in Cycle 15 but the observations were not executed before the ACS failed.

Holman and Bakos are co-PIs on this proposal.

OBSERVING DESCRIPTION

10 orbits of STIS observations are used in two 5 orbit visits. High S/N observations with the G750L grism will be obtained in time series. The third and fourth orbits will be timed to coincide with secondary eclipse, while orbits two and five will be used to establish the out of eclipse intensity as the control. We conservatively assume that the first orbit will show the characteristic incorrigible systematic errors seen in other similar high S/N HST applications. To cover first order spectra and zeroth order image of both stars separated by 11.2 arcsec we can read out the central 380 columns, in slitless mode, detecting both spectra while leaving plenty of buffer on either side. The spectra obtained will be saturated in order to overcome the low duty cycle that for these bright objects would be associated with unsaturated spectra. Adopting times of 120s for G750L exposures, with 45s readout, allows 24 exposures per orbit. The brighter (10.0) star will be used as a photometric control for the target (10.4) star

resulting in a net differential (eclipse to control orbits, and target to
control star) precision per visit of 2e-5.

ADDITIONAL COMMENTS

We desire that the two visits be scheduled such that complementary phases are
obtained to maximize overall phase coverage of the secondary eclipse.
The initial submission uses a broad phase window. After possible scheduling windows
have been identified we will select the best two. We would also like to add exposures
to any orbits that are not full once the final scheduling windows have been identified.

Initial submission with phase = 0.454 - 0.4633. This is a one hour wide window.
At the center of this range, center of secondary eclipse would be half way between
HST orbits 3 and 4, and ingress and egress would be within occultations.
At the extrema of these ranges ingress would be up to 30 minutes before end of orbit
3, and egress could be up to 30 minutes into orbit 4.

Visit

Proposal 11617, Visit 01, implementation Tue Nov 02 01:13:41 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: ORIENT 72.7D TO 137.7 D; ORIENT 145.7D TO 159.7 D; ORIENT 252.7D TO 317.7 D; ORIENT 325.7D TO 339.7 D; Period 4.4652934 D AND ZERO-PHASE HJD2454363.94656

Comments: First of two visits. The five orbits need to be scheduled contiguously and free of SAA interupts during visibility windows.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	ADS-16402A	RA: 22 57 45.8820 (344.4411750d)	Proper Motion RA: 0.0022sec of time/yr	V=10.0+/-0.05	Reference Frame: ICRS
		Dec: +38 40 26.39 (38.67400d)	Proper Motion Dec: -0.052arcsec/yr		
		Equinox: J2000	Epoch of Position: 2000.0		

Comments: Photometric reference star.

Other member of the binary is exoplanetary host star ADS-16402B a.k.a. HAT-P-1, offset by 11.5 arcsec. It is a 10.4 V-magnitude G0V star. Exact coordinates: 22 57 46.8250, +38 40 29.83.

(3)	MIDPOINT	RA: 22 57 46.3535 (344.4431396d)	Proper Motion RA: 0.0022sec of time/yr	V=35+/-	Reference Frame: ICRS
		Dec: +38 40 28.11 (38.67448d)	Proper Motion Dec: -0.052arcsec/yr		
		Equinox: J2000	Epoch of Position: 2000.0		

Comments: Pseudo target at the midpoint of the binary. Pointing here allows subarray readout.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	ACQ	(2) ADS-16402A	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.4558 TO 0 .4629		0.2 Secs	
								[==>]	***[1]***
Comments: We first ACQ on one of the targets, then move the telescope in the midpoint of the two so that we can make subarray readouts.									
2	image	(3) MIDPOINT	STIS/CCD, ACCUM, F28X50LP	MIRROR	CR-SPLIT=NO; GAIN=4; WAVECAL=NO			0.2 Secs	
								[==>]	***[1]***
Comments: After ACQ, the telescope moves to the midpoint and we take this exposure to know the exact position of the stars along AXIS2, and have a good idea about the spectrum position too. Note that subarray readout width is still large enough to accomodate large pointing errors (e.g. if one of the binary stars stayed in the center), just in case (we gain 20 s as opposed to complete CCD readout, another 3 s would not be worth the risk).									
3	science	(3) MIDPOINT	STIS/CCD, ACCUM, 50CCD	G750L 7751 A	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=380			100 Secs X 19	
								[==>(Copy 1)]	
								[==>(Copy 2)]	
								[==>(Copy 3)]	
								[==>(Copy 4)]	
								[==>(Copy 5)]	
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								[==>(Copy 7)]	
								[==>(Copy 8)]	
								[==>(Copy 9)]	
								[==>(Copy 10)]	***[1]***
								[==>(Copy 11)]	
								[==>(Copy 12)]	
								[==>(Copy 13)]	
								[==>(Copy 14)]	
								[==>(Copy 15)]	
								[==>(Copy 16)]	
								[==>(Copy 17)]	
								[==>(Copy 18)]	
								[==>(Copy 19)]	
4	manual wavecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A				1 Secs	
								[==>]	***[1]***
5	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A				1 Secs X 2	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
6	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN			1 Secs	
								[==>]	***[1]***
7	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		AFTER BY 1500 S		1 Secs X 2	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
8	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN			1 Secs	
								[==>]	***[1]***

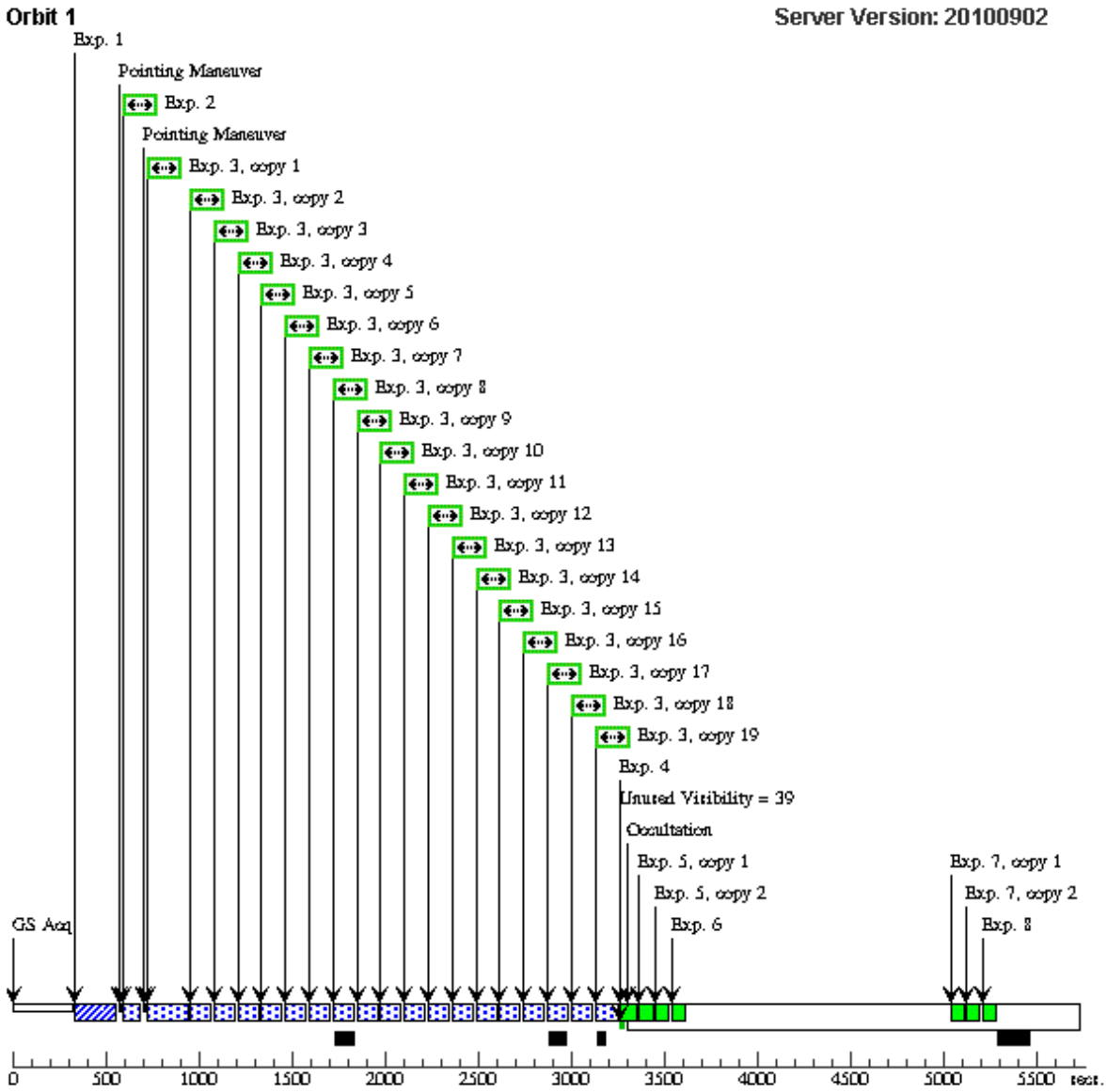
9	manual wavecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	 ***[2]***
10	science	(3) MIDPOINT	STIS/CCD, ACCUM, 50CCD	G750L 7751 A	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=380		100 Secs X 23 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]*	 ***[2]***
11	manual wavecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	 ***[2]***
12	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[2]***
13	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN		1 Secs *[==>]*	 ***[2]***
14	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		AFTER BY 1500 S	1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[2]***
15	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN		1 Secs *[==>]*	 ***[2]***
16	manual wavecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	 ***[2]***

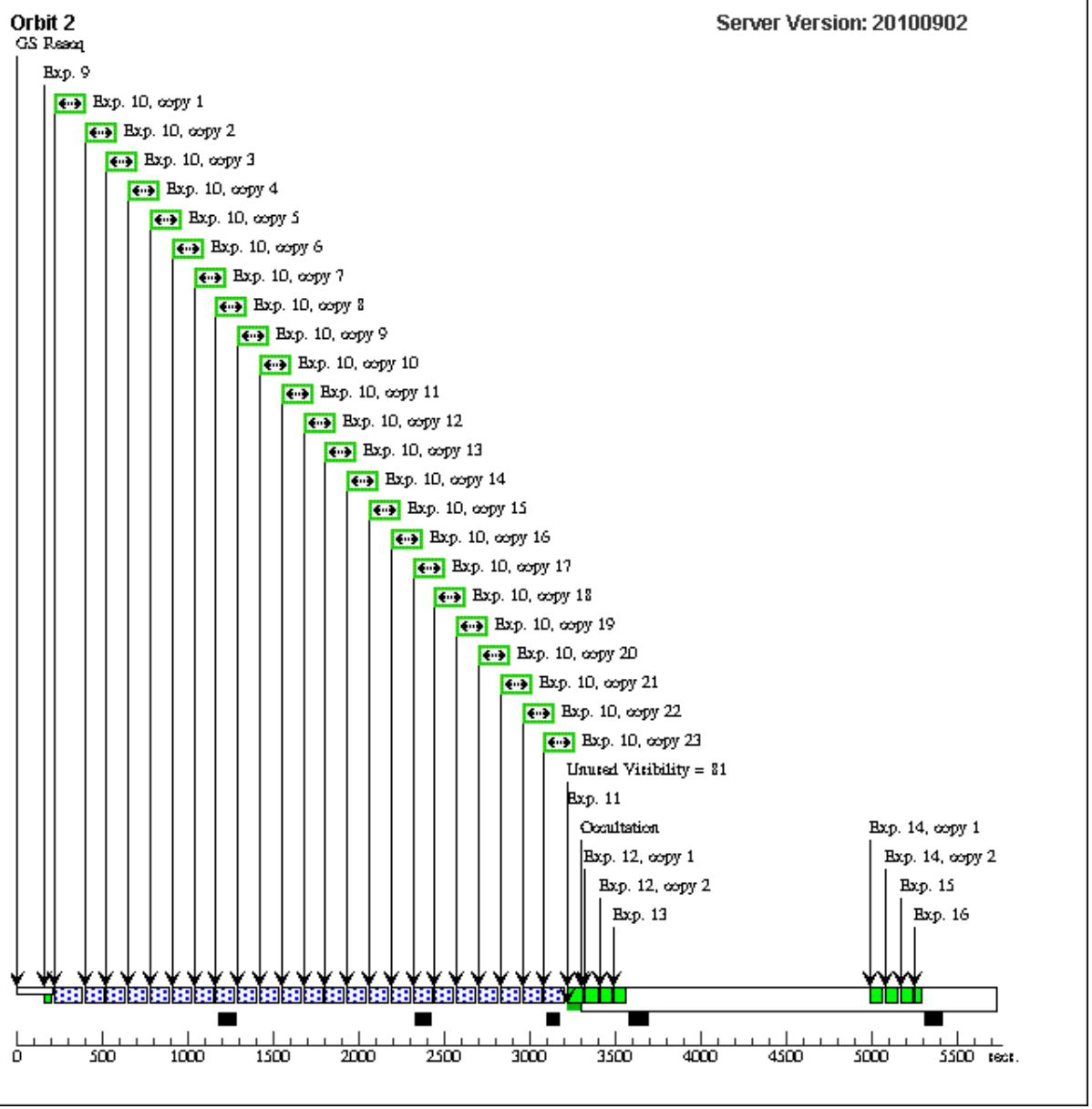
17	science	(3) MIDPOINT	STIS/CCD, ACCUM, 50CCD	G750L 7751 A	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=380		100 Secs X 23 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]*	***[3]***
18	manual wav ecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	***[3]***
19	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[3]***
20	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN		1 Secs *[==>]*	***[3]***
21	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		AFTER BY 1500 S	1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[3]***
22	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN		1 Secs *[==>]*	***[3]***
23	manual wav ecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	***[3]***

24	science	(3) MIDPOINT	STIS/CCD, ACCUM, 50CCD	G750L 7751 A	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=380		100 Secs X 23 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]*	***[4]***
25	manual wav ecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	***[4]***
26	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[4]***
27	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN		1 Secs *[==>]*	***[4]***
28	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		AFTER BY 1500 S	1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[4]***
29	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN		1 Secs *[==>]*	***[4]***
30	manual wav ecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	***[4]***

	31	science	(3) MIDPOINT	STIS/CCD, ACCUM, 50CCD	G750L 7751 A	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=380	100 Secs X 23 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]*	***[5]***
	32	manual wav ecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		1 Secs *[==>]*	***[5]***
	33	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[5]***
	34	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTE N	1 Secs *[==>]*	***[5]***

Orbit Structure

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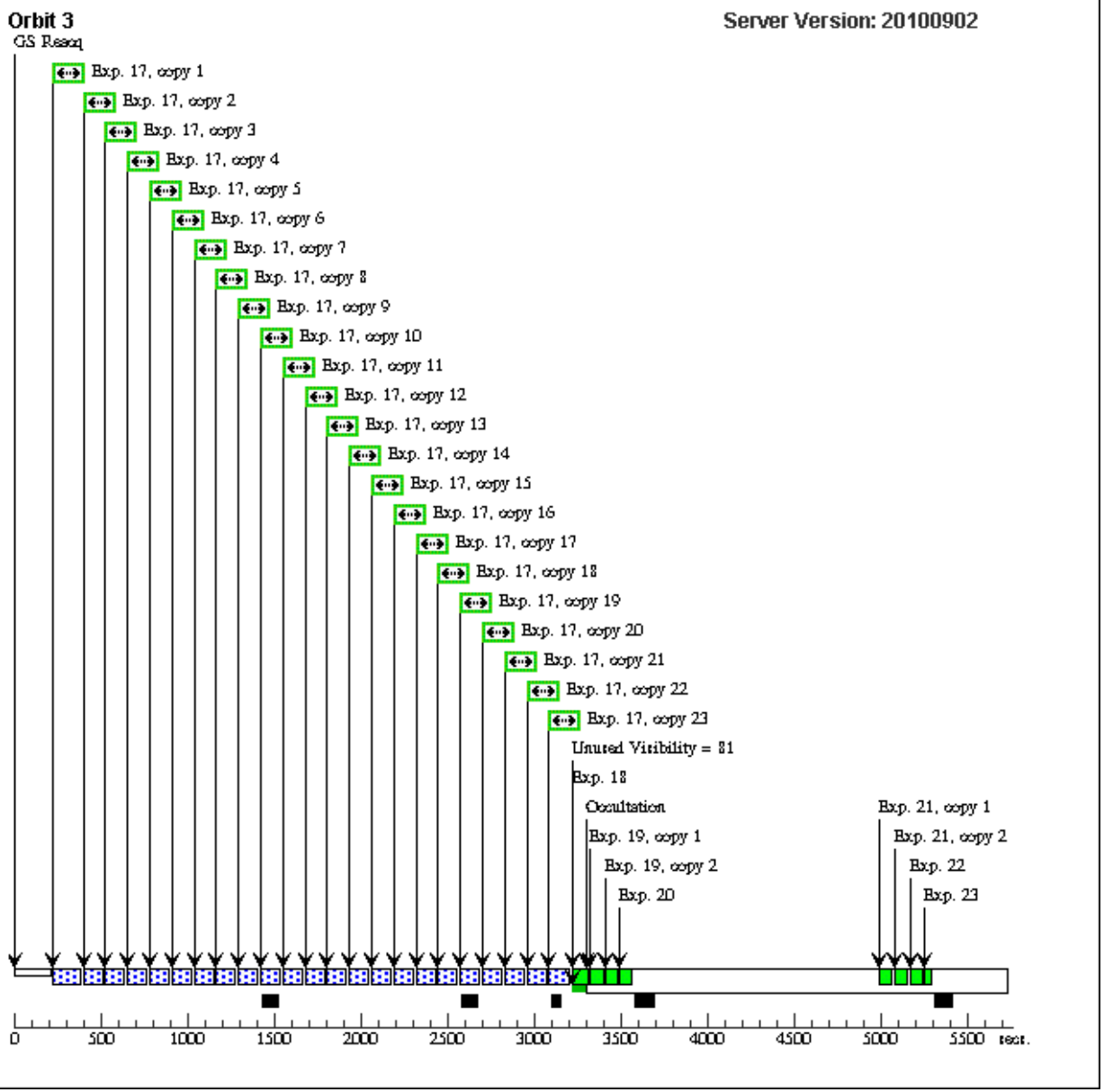
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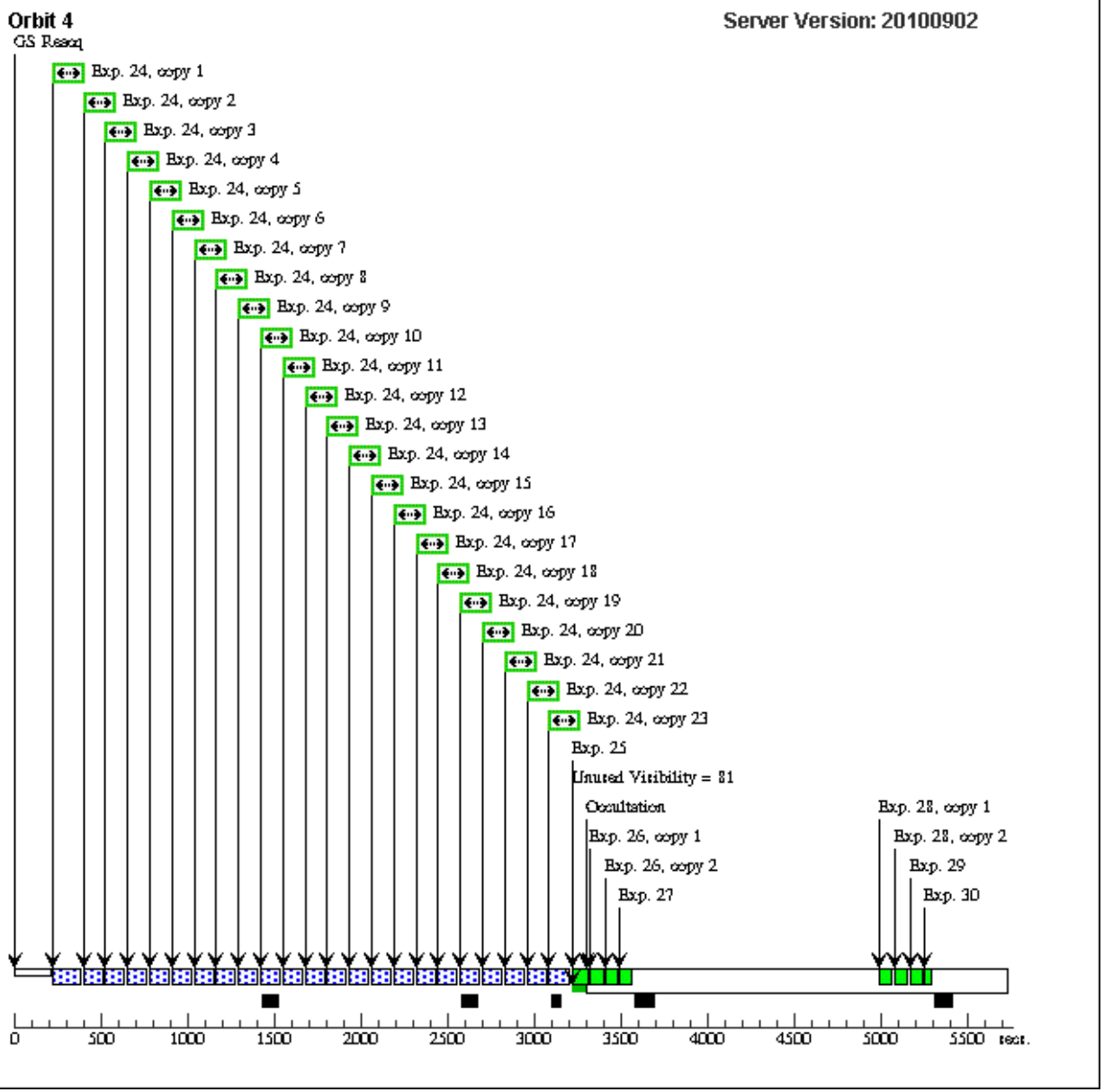
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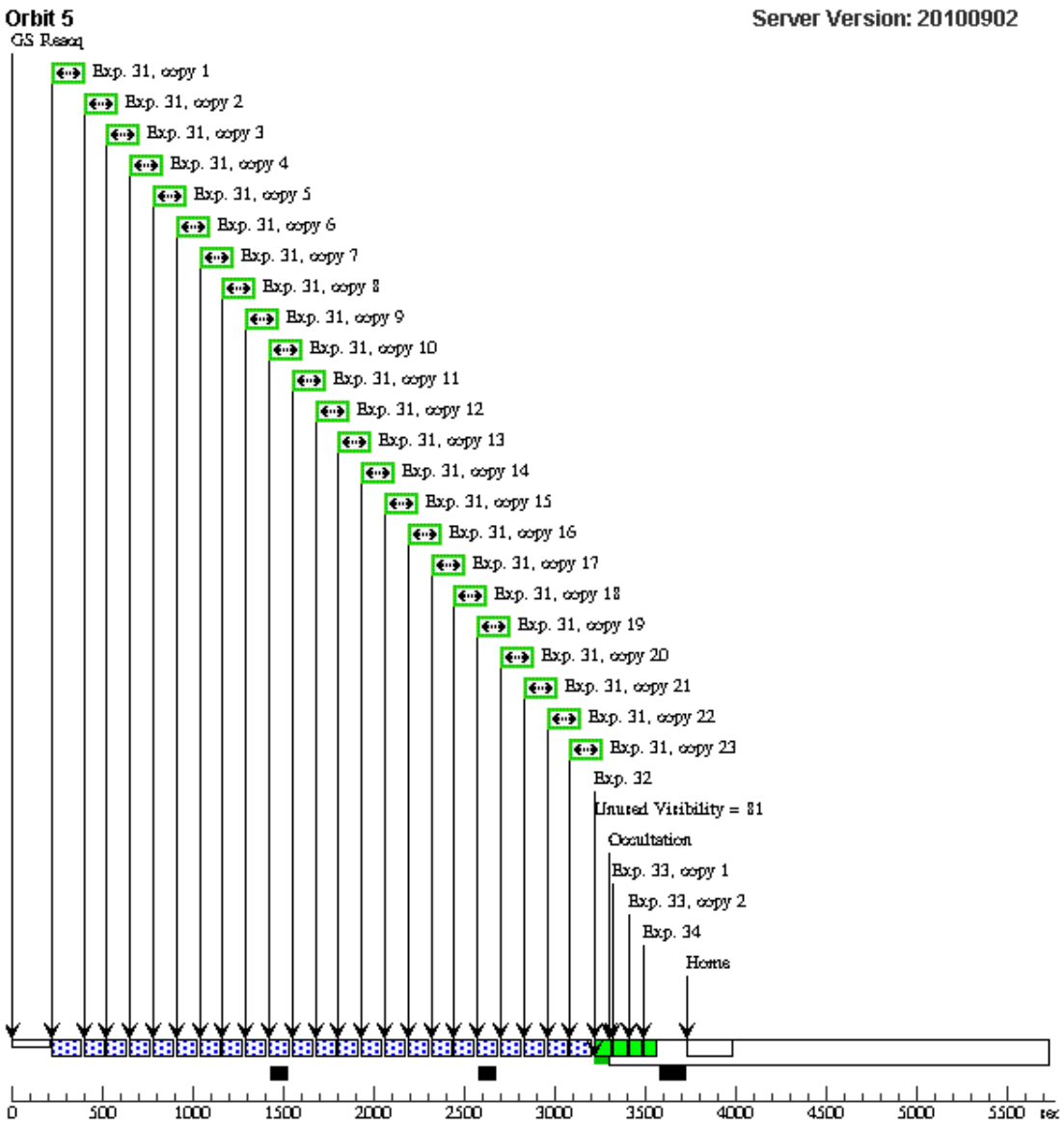
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Exp. 31, copy 21
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Exp. 31, copy 23
Exp. 32
Unused Visibility = 81
Occultation
Exp. 33, copy 1
Exp. 33, copy 2
Exp. 34
Home
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3500
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5000
5500
sec

Visit

Proposal 11617, Visit 02 Tue Nov 02 01:13:47 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/CCD

Special Requirements: ORIENT 72.7D TO 137.7 D; ORIENT 145.7D TO 159.7 D; ORIENT 252.7D TO 317.7 D; ORIENT 325.7D TO 339.7 D; Period 4.4652934 D AND ZERO-PHASE HJD2454363.94656

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Comments: Photometric reference star.

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(3)	MIDPOINT	RA: 22 57 46.3535 (344.4431396d)	Proper Motion RA: 0.0022sec of time/yr	V=35+/-	Reference Frame: ICRS
		Dec: +38 40 28.11 (38.67448d)	Proper Motion Dec: -0.052arcsec/yr		
		Equinox: J2000	Epoch of Position: 2000.0		

Comments: Pseudo target at the midpoint of the binary. Pointing here allows subarray readout.

Exposures

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								[==>]	***[1]***
Comments: We first ACQ on one of the targets, then move the telescope in the midpoint of the two so that we can make subarray readouts.									
2	image	(3) MIDPOINT	STIS/CCD, ACCUM, F28X50LP	MIRROR	CR-SPLIT=NO; GAIN=4; WAVECAL=NO			0.2 Secs	
								[==>]	***[1]***
Comments: After ACQ, the telescope moves to the midpoint and we take this exposure to know the exact position of the stars along AXIS2, and have a good idea about the spectrum position too. Note that subarray readout width is still large enough to accomodate large pointing errors (e.g. if one of the binary stars stayed in the center), just in case (we gain 20 s as opposed to complete CCD readout, another 3 s would not be worth the risk).									
3	science	(3) MIDPOINT	STIS/CCD, ACCUM, 50CCD	G750L 7751 A	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=380			100 Secs X 19	
								[==>(Copy 1)]	
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4	manual wavecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A				1 Secs	
								[==>]	***[1]***
5	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A				1 Secs X 2	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
6	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN			1 Secs	
								[==>]	***[1]***
7	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		AFTER BY 1500 S		1 Secs X 2	
								[==>(Copy 1)]	***[1]***
								[==>(Copy 2)]	
8	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN			1 Secs	
								[==>]	***[1]***

9	manual wavecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	 ***[2]***
10	science	(3) MIDPOINT	STIS/CCD, ACCUM, 50CCD	G750L 7751 A	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=380		100 Secs X 23 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]*	 ***[2]***
11	manual wavecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	 ***[2]***
12	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[2]***
13	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN		1 Secs *[==>]*	 ***[2]***
14	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		AFTER BY 1500 S	1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	 ***[2]***
15	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN		1 Secs *[==>]*	 ***[2]***
16	manual wavecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	 ***[2]***

	17	science	(3) MIDPOINT	STIS/CCD, ACCUM, 50CCD	G750L 7751 A	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=380	100 Secs X 23 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]*	***[3]***
	18	manual wav ecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		1 Secs *[==>]*	***[3]***
	19	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[3]***
	20	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN	1 Secs *[==>]*	***[3]***
	21	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	AFTER BY 1500 S	1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[3]***
	22	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN	1 Secs *[==>]*	***[3]***
	23	manual wav ecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		1 Secs *[==>]*	***[3]***

24	science	(3) MIDPOINT	STIS/CCD, ACCUM, 50CCD	G750L 7751 A	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=380		100 Secs X 23 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]*	***[4]***
25	manual wav ecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	***[4]***
26	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[4]***
27	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN		1 Secs *[==>]*	***[4]***
28	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		AFTER BY 1500 S	1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[4]***
29	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN		1 Secs *[==>]*	***[4]***
30	manual wav ecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A			1 Secs *[==>]*	***[4]***

	31	science	(3) MIDPOINT	STIS/CCD, ACCUM, 50CCD	G750L 7751 A	CR-SPLIT=NO; GAIN=4; SIZEAXIS2=380	100 Secs X 23 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]*	***[5]***
	32	manual wav ecal	WAVE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		1 Secs *[==>]*	***[5]***
	33	fringe flat	CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A		1 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	***[5]***
	34	tungsten	NONE	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A	CR-SPLIT=NO; GAIN=4; LAMP=TUNGSTEN	1 Secs *[==>]*	***[5]***

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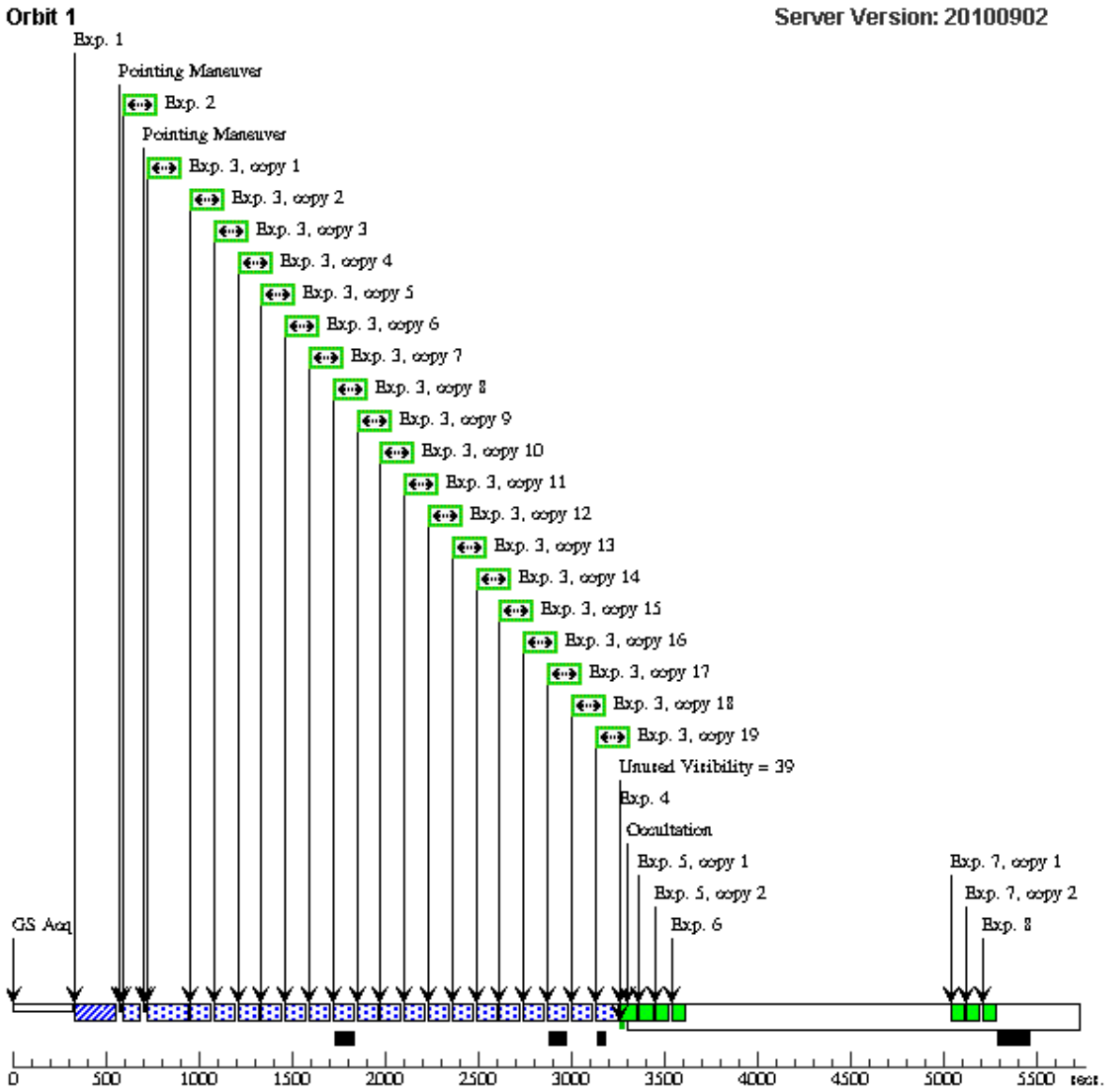

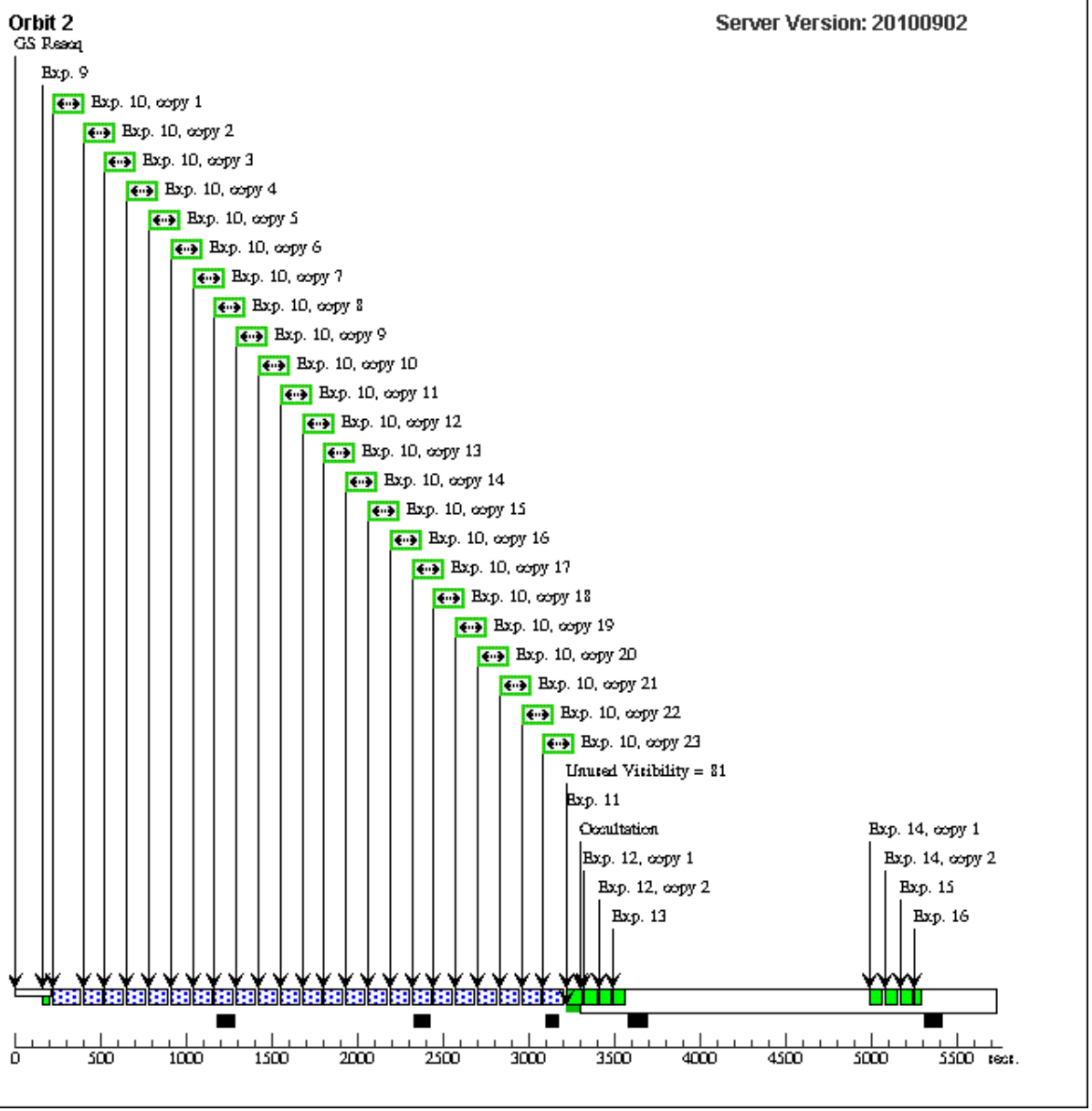
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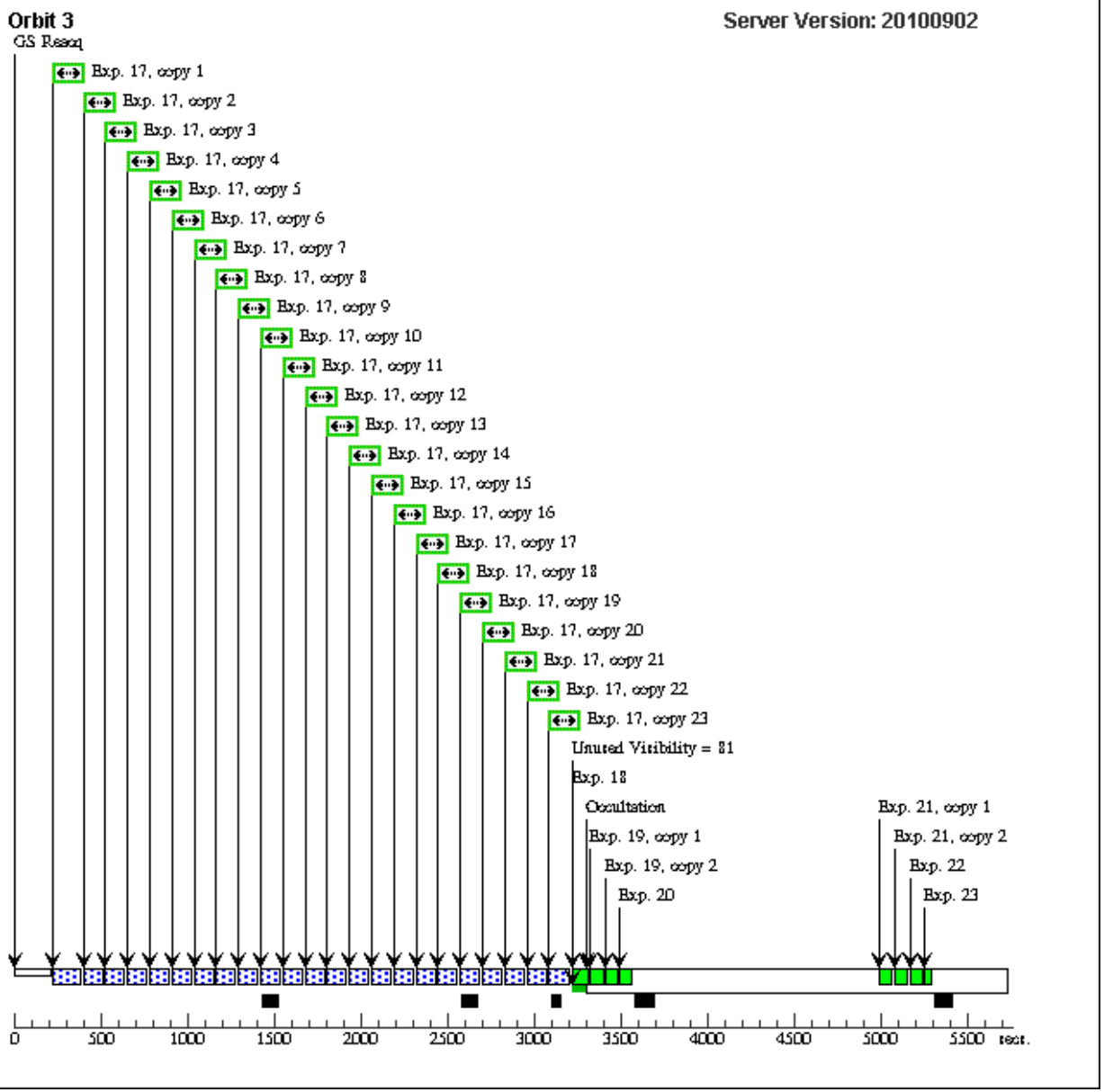
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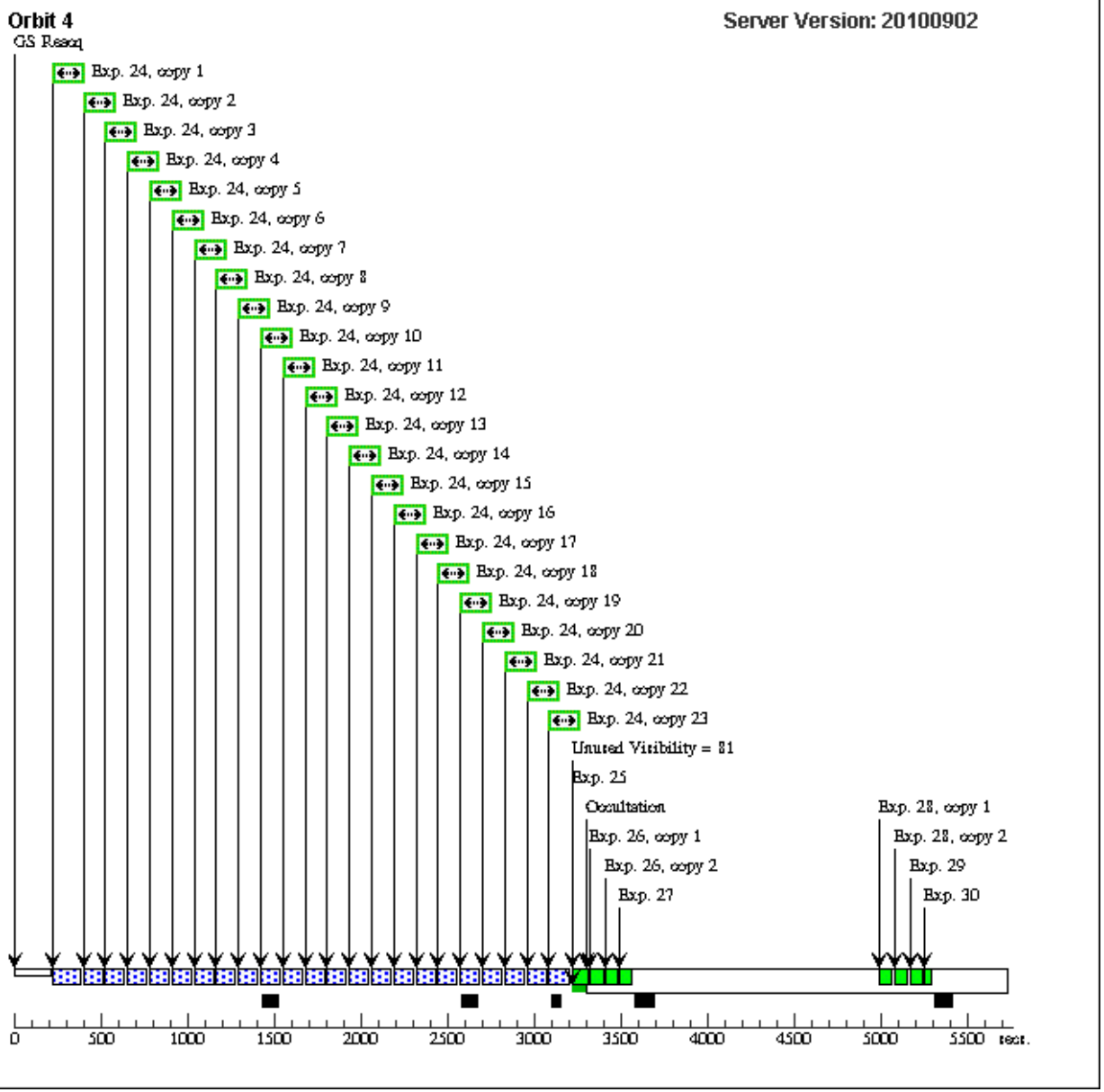
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Exp. 25
Occultation
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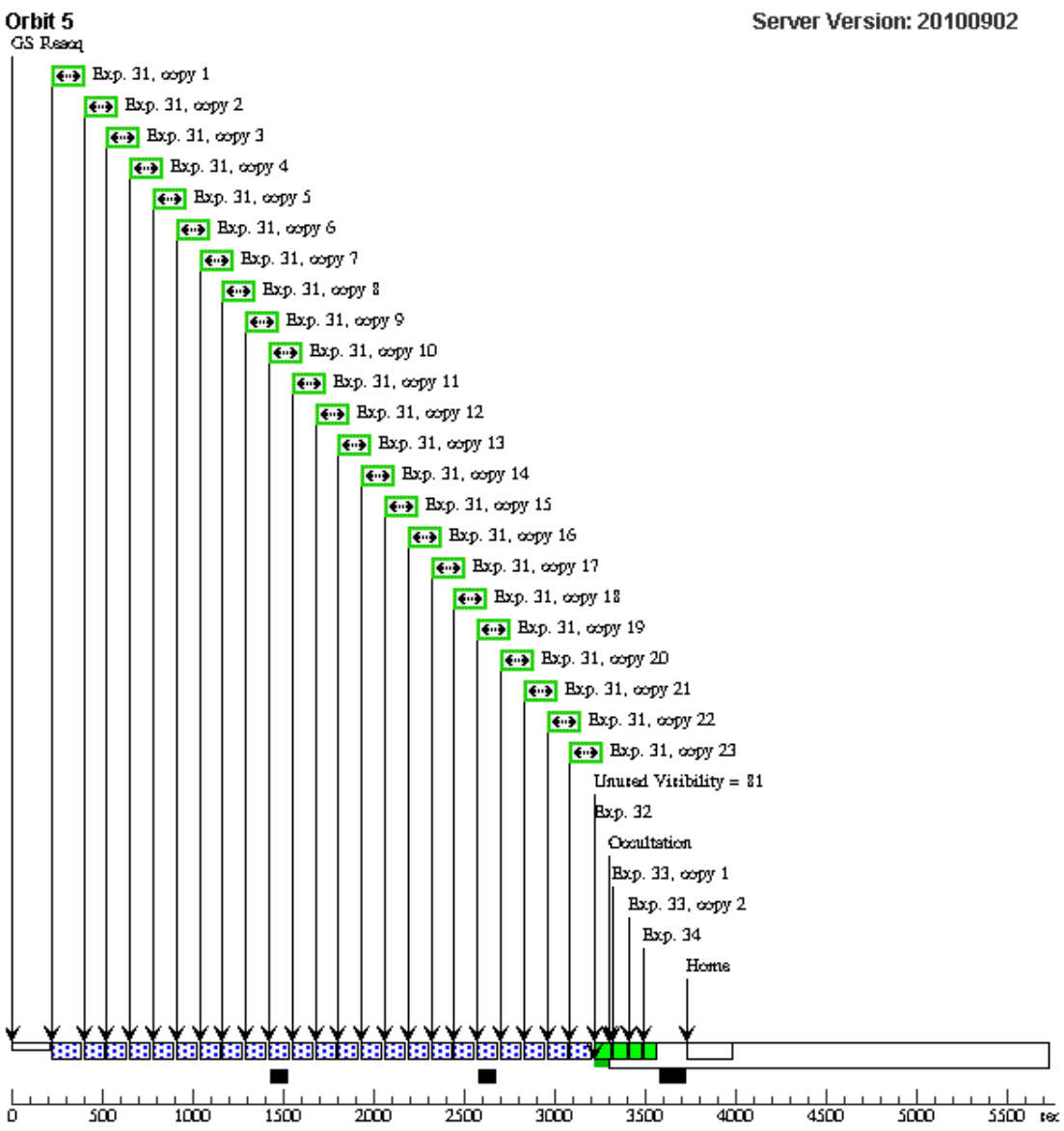
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Exp. 31, copy 20
Exp. 31, copy 21
Exp. 31, copy 22
Exp. 31, copy 23
Unused Visibility = 81
Exp. 32
Occultation
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Exp. 33, copy 2
Exp. 34
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