16194 - Cooking a planet: The heating and cooling of an exoplanet atmosphere

Cycle: 28, 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) HAT-P-2	WFC3/IR	12	04-Nov-2020 09:01:09.0	yes
02	(1) HAT-P-2	WFC3/IR	11	04-Nov-2020 09:01:53.0	yes

23 Total Orbits Used

ABSTRACT

Exoplanets on highly eccentric orbits offer unique insights into how planetary atmospheres respond to extreme variations in stellar forcing. By tracking the reradiation of heat during the planet's closest approach to its host star (periapse passage), we can test how a planet's atmosphere responds to extreme radiative forcing, and directly measure the radiative timescales that remain ambiguous for planets on circular orbits. We propose to observe with HST/WFC3 a partial-orbit spectroscopic phase curve of the highly-eccentric transiting exoplanet, HAT-P-2b. The planet's dayside temperature changes from being a typical Hot-Jupiter (1300~K) at apoapse, with no thermal inversion expected, to that of an Ultra-Hot-Jupiter (2400~K) at periapse, at which temperature thermal inversions are expected. Therefore, this target offers an opportunity to explore the transition between Hot- and Ultra-Hot-Jupiters.

This WFC3 phase curve observation, will start before transit, continue through periapse passage, and end after secondary eclipse. The wavelength range offered by WFC3 will probe deep atmospheric pressure levels, where dynamical processes become relevant in shaping the observed spatial and temporal flux variations. The spectroscopic phase curve observation through periapse passage will be the key to constraining the timescales of atmospheric response, and to measure changes in the atmospheric vertical structure and opacities in this atmosphere. Our investigation will disentangle the contributions of radiative, dynamical, and chemical processes at work in strongly irradiated atmospheres, enabling it to become a model for the broader class of Hot and Ultra-Hot Jupiters.

OBSERVING DESCRIPTION

We will observe a partial phase curve of HAT-P-2b, starting 2-3 HST orbits before primary transit and ending 2-3 orbits after secondary eclipse. The observing start window is relatively lax (75 minutes) to enable as many observing opportunities as possible.

The first orbit of Visit 01 consists of a direct image, a non-scanned spectrum to measure the spectra of any potentially-overlapping background stars, and the standard spatially-scanned spectra. The orient constraints are such that they avoid overlapping spectra with a faint source seen in the 2MASS image. The remaining 22 orbits are identicle, consisting of a direct image and 14 spatially-scanned spectra (7 in each direction), and have been separated into 2 visits to keep the total number of non-destructive reads below 400 per visit. Visit 2 should immediately follow Visit 1. The scan rate has been set to accumulate a maximum fluence of 42,500 electrons/pixel. The total scan length (400 pixels) fits comfortably within the 512x512 subarray. There is unused time at the end of each HST orbit for gyro bias updates.

We will work with the STScI schedulers to plan the observation around SAA crossings. In order to make a precise measurement, we note that SAA crossings must only impact the latter half of an HST orbit and cannot coincide with in-transit or in-eclipse orbits.

Visit

Proposal 16194, Visit 01, implementation Wed Nov 04 14:01:57 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR

Special Requirements: SCHED 100%; Period 5.6334754 D AND ZERO-PHASE HJD2455288.84910

Diagnostics

(Visit 01) Warning (Orbit Planner): LONG SU LIKELY TO INTERSECT THE SAA

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HAT-P-2	RA: 16 20 36.3438 (245.1514325d) Dec: +41 02 52.66 (41.04796d) Equinox: J2000	Proper Motion RA: -9.115658833574942E-4 sec of time/yr Proper Motion Dec: -0.02919799994742789 arcsec/yr Epoch of Position: 2015.5	V=8.69	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0; PHASE 0.9555 TO 0.9641	Sequence 1-3 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	 ***[1]***
2		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=RAPID; NSAMP=2	POS TARG -25,0	Sequence 1-3 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	 ***[1]***
3		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 1-3 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	 ***[1]***
4		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 4-5 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	 ***[2]***
5		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 4-5 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	 ***[2]***
6		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 6-7 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	 ***[3]***

	7	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 6-7 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[3]***
	8	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 8-9 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	***[4]***
	9	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 8-9 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[4]***
	10	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 10-11 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	***[5]***

11	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 10-11 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[5]***
12	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 12-13 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	***[6]***
13	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 12-13 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[6]***
14	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 14-15 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	***[7]***

15	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 14-15 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[7]***
16	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 16-17 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	***[8]***
17	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 16-17 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[8]***
18	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 18-19 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	***[9]***

	19	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 18-19 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[9]***
	20	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 20-21 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	***[10]***
	21	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 20-21 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[10]***
	22	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 22-23 Non-Int in Visit 01	1.706054 Secs (1.706 Secs) *[==>]*	***[11]***

	23	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 22-23 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs)	
								[==>(Copy 1, Forward)] *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[11]***
	24	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 24-25 Non-Int in Visit 01	1.706054 Secs (1.706 Secs)	
								[==>]	***[12]***
	25	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 24-25 Non-Int in Visit 01	138.380533 Secs X 6 (1660.566 Secs)	
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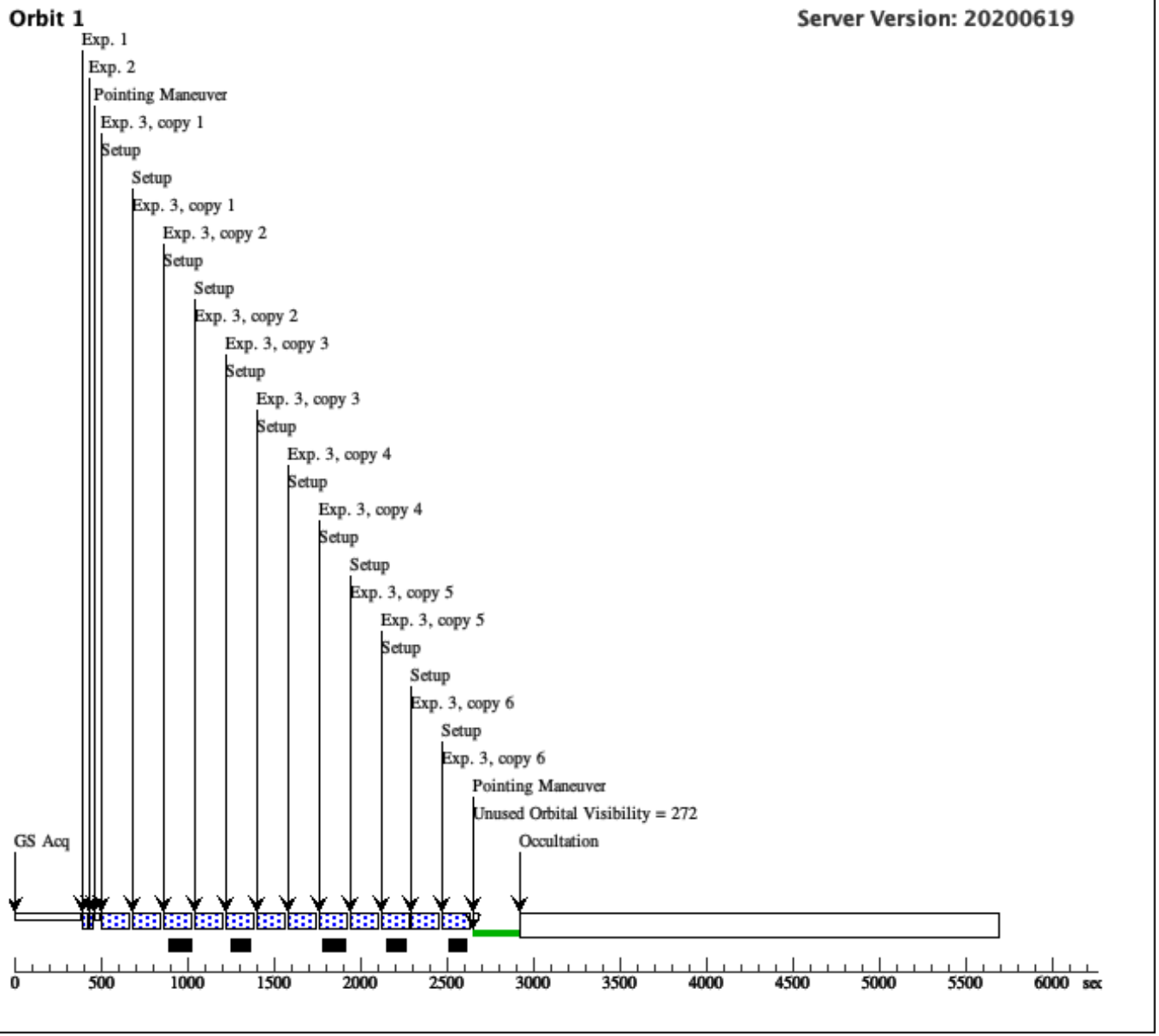
Orbit Structure

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Exp. 5, copy 5
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Exp. 5, copy 6
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Exp. 5, copy 6
Unused Orbital Visibility = 308
Pointing Maneuver
Occultation
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Orbit 3
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Exp. 7, copy 1
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Exp. 7, copy 2
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Pointing Maneuver
Occultation
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Orbit 4
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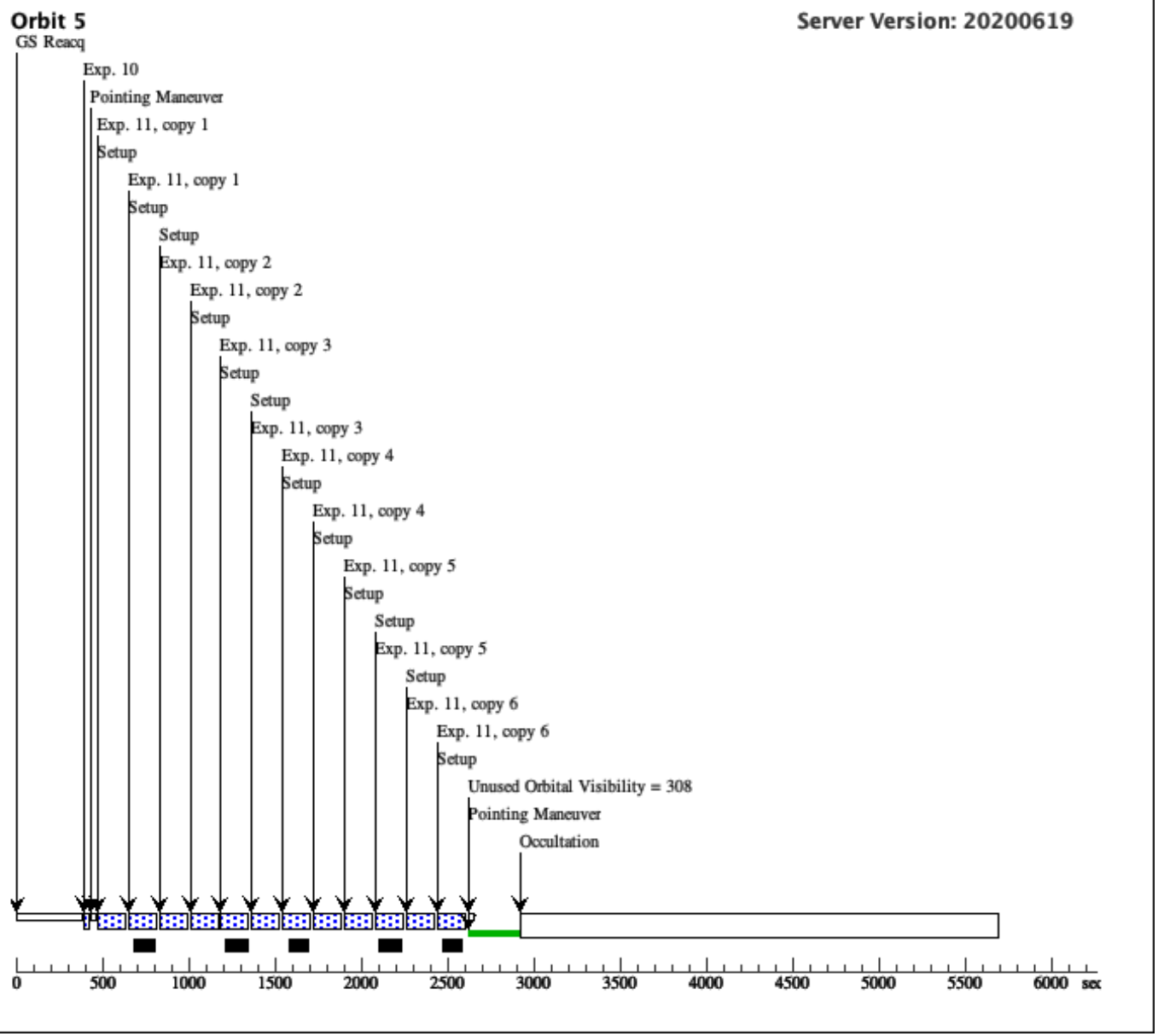
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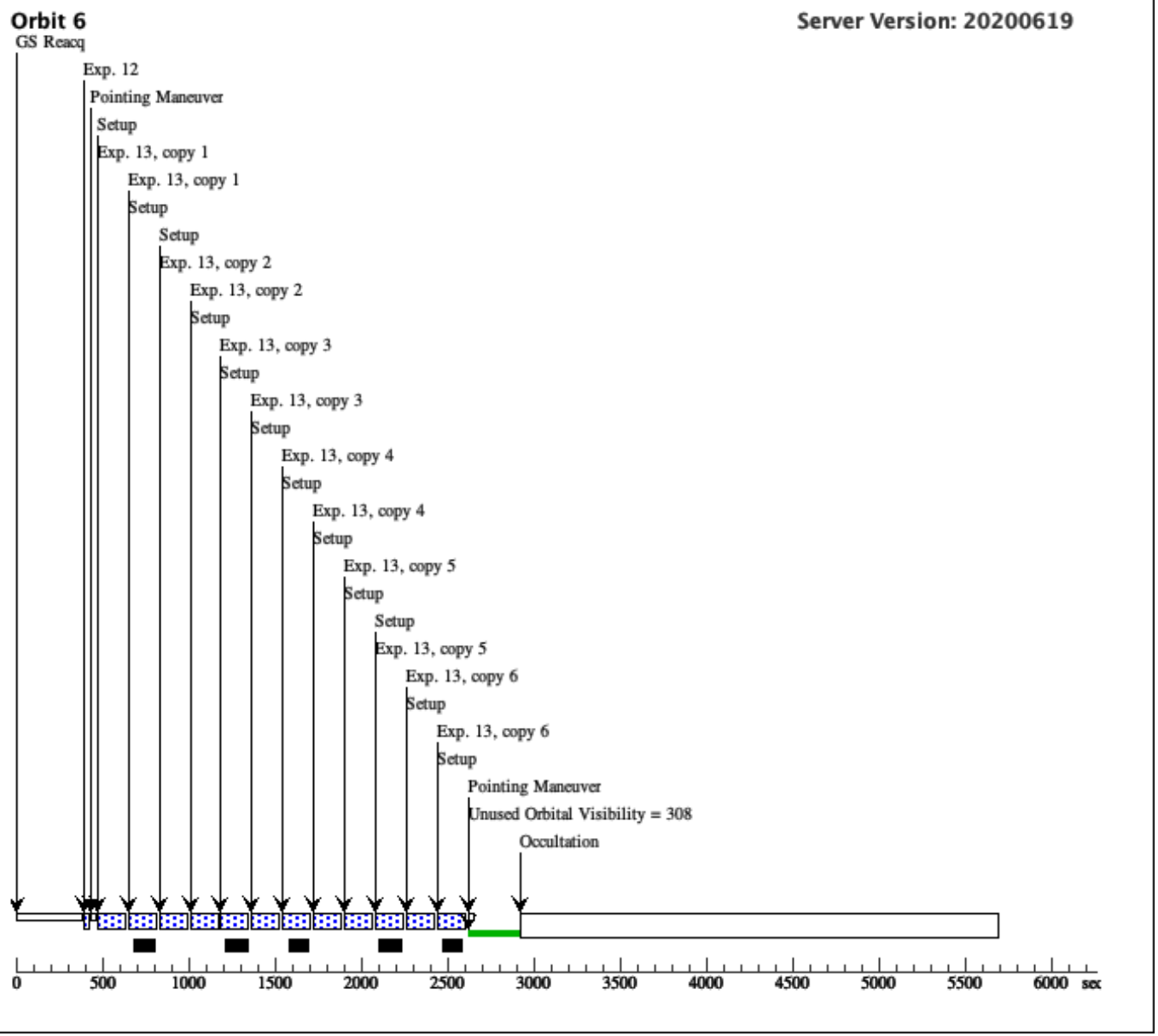
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Pointing Maneuver
Unused Orbital Visibility = 308
Occultation
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Orbit 7
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Pointing Maneuver
Unused Orbital Visibility = 308
Occultation
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Orbit 8
Server Version: 20200619
GS Reacq
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Exp. 17, copy 6
Setup
Unused Orbital Visibility = 308
Pointing Maneuver
Occultation
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Orbit 9
Server Version: 20200619
GS Reacq
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Exp. 19, copy 4
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Exp. 19, copy 5
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Exp. 19, copy 5
Exp. 19, copy 6
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Exp. 19, copy 6
Setup
Unused Orbital Visibility = 308
Pointing Maneuver
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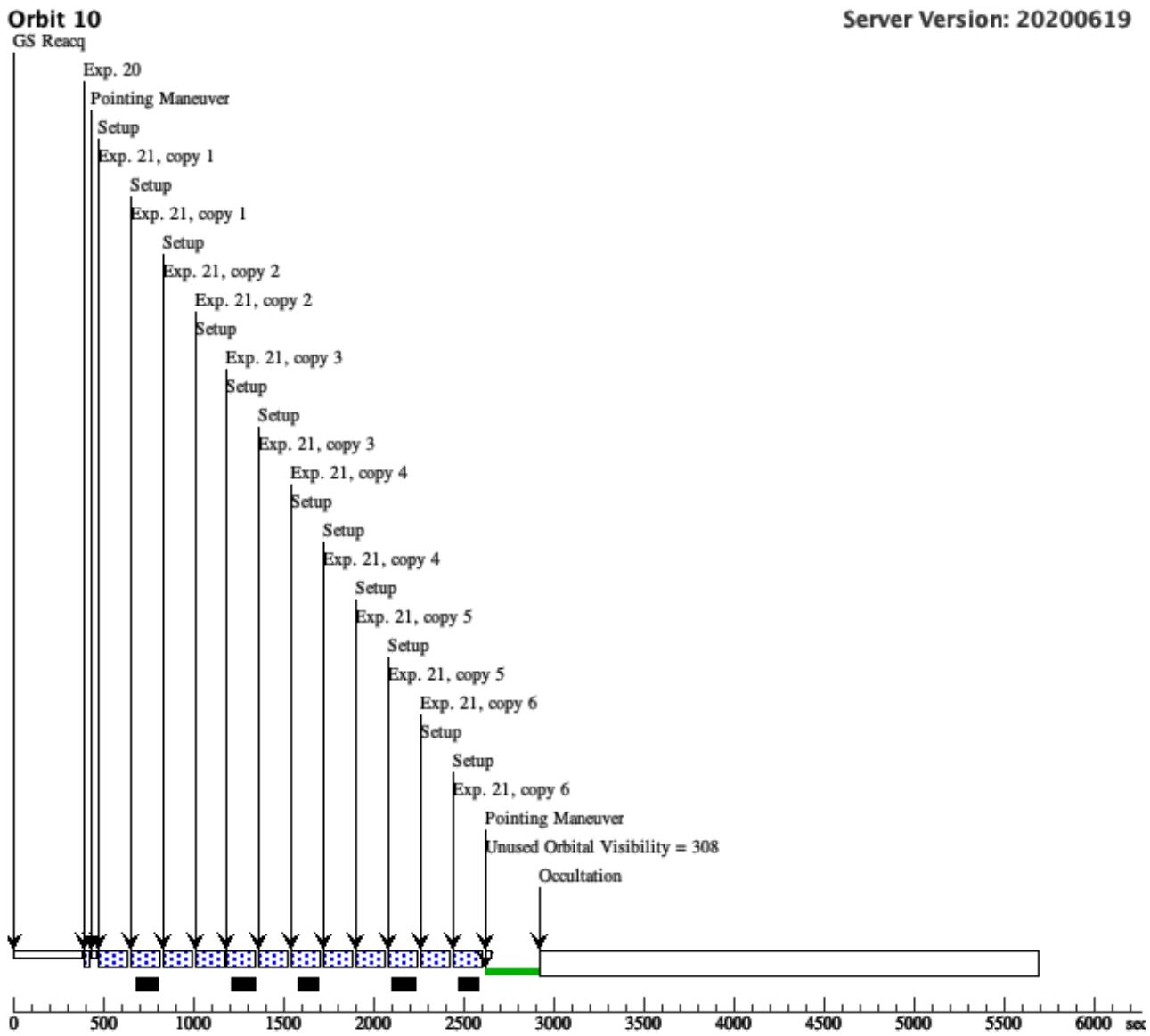
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Exp. 21, copy 5
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Exp. 21, copy 5
Exp. 21, copy 6
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Setup
Exp. 21, copy 6
Pointing Maneuver
Unused Orbital Visibility = 308
Occultation
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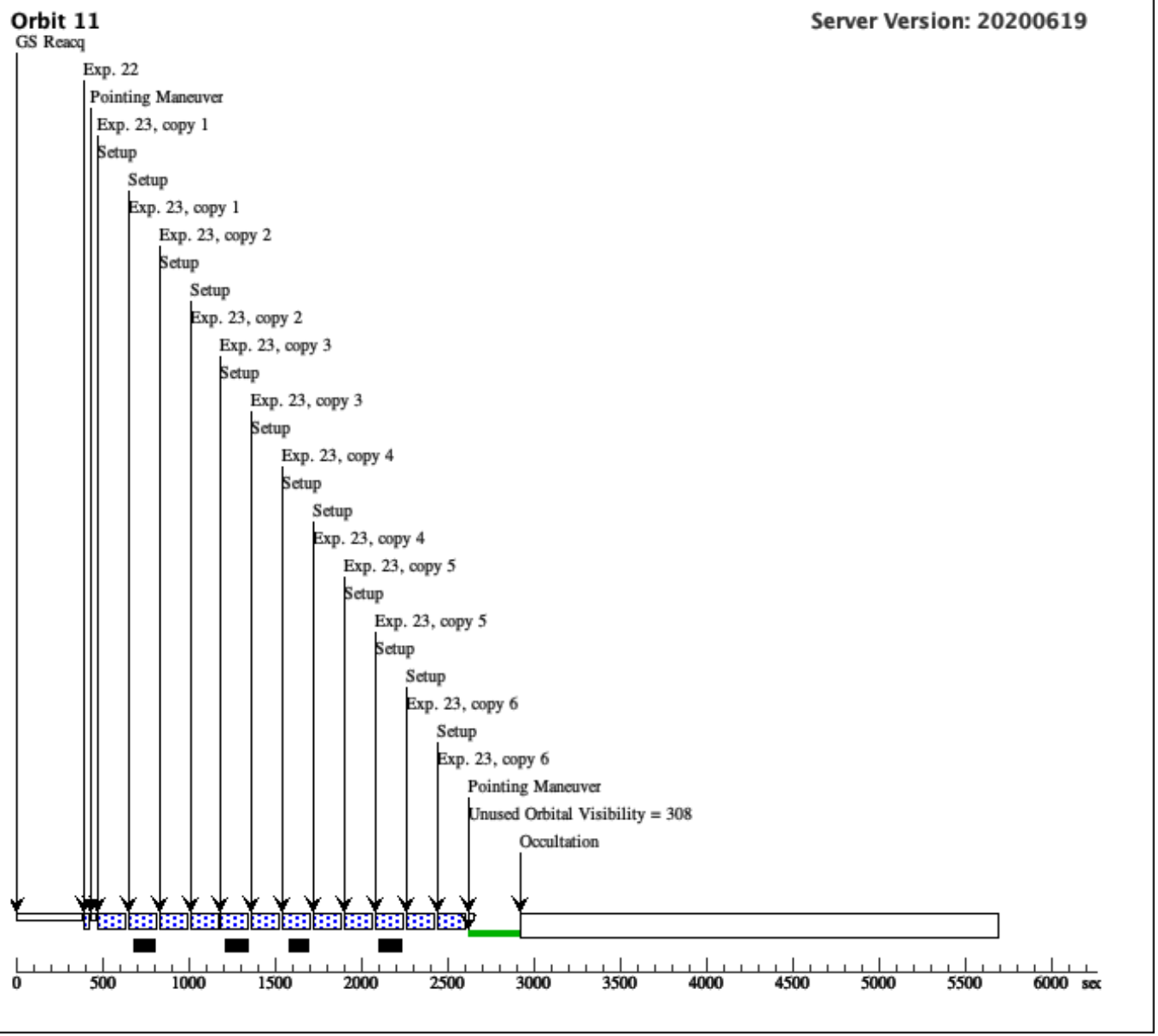
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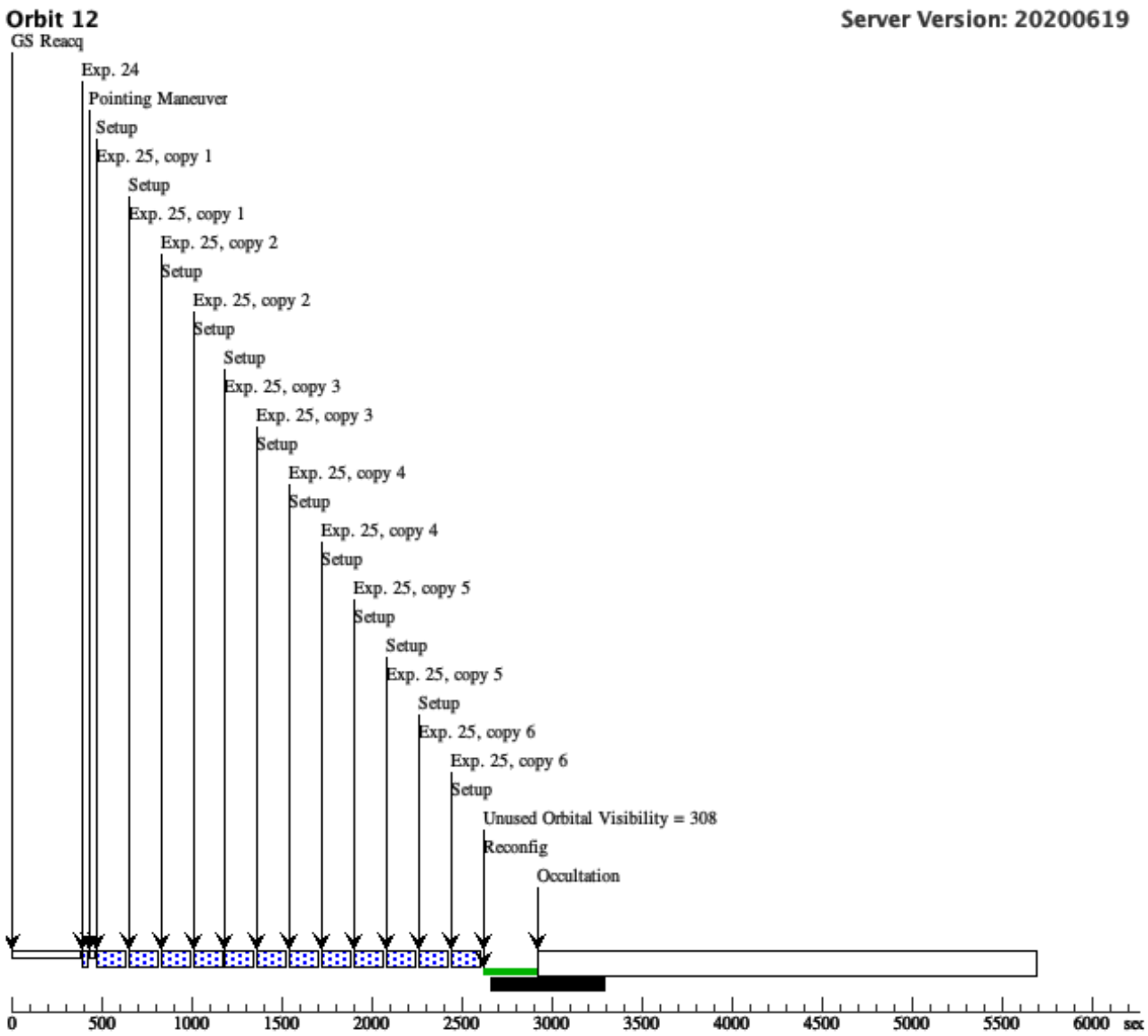
Exp. 22
Pointing Maneuver
Exp. 23, copy 1
Setup
Setup
Exp. 23, copy 1
Exp. 23, copy 2
Setup
Setup
Exp. 23, copy 2
Exp. 23, copy 3
Setup
Exp. 23, copy 3
Setup
Exp. 23, copy 4
Setup
Setup
Exp. 23, copy 4
Exp. 23, copy 5
Setup
Exp. 23, copy 5
Setup
Setup
Exp. 23, copy 6
Setup
Exp. 23, copy 6
Pointing Maneuver
Unused Orbital Visibility = 308
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 12
Server Version: 20200619
GS Reacq
Exp. 24
Pointing Maneuver
Setup
Exp. 25, copy 1
Setup
Exp. 25, copy 1
Exp. 25, copy 2
Setup
Exp. 25, copy 2
Setup
Setup
Exp. 25, copy 3
Exp. 25, copy 3
Setup
Exp. 25, copy 4
Setup
Exp. 25, copy 4
Setup
Exp. 25, copy 5
Setup
Setup
Exp. 25, copy 5
Setup
Exp. 25, copy 6
Exp. 25, copy 6
Setup
Unused Orbital Visibility = 308
Reconfig
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

Visit

Proposal 16194, Visit 02, implementation Wed Nov 04 14:01:58 GMT 2020

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR

Special Requirements: SCHED 100%; SAME ORIENT AS 01; SEQ 01,02 WITHIN 12.2 Orbits

Diagnostics

(Visit 02) Warning (Orbit Planner): LONG SU LIKELY TO INTERSECT THE SAA

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HAT-P-2	RA: 16 20 36.3438 (245.1514325d) Dec: +41 02 52.66 (41.04796d) Equinox: J2000	Proper Motion RA: -9.115658833574942E-4 sec of time/yr Proper Motion Dec: -0.02919799994742789 arcsec/yr Epoch of Position: 2015.5	V=8.69	Reference Frame: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 1-2 Non-Int in Visit 02	1.706054 Secs (1.706 Secs)	
								[==>]	***[1]***
2		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 1-2 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs)	
								[==>(Copy 1, Forward)] *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[1]***
3		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 3-4 Non-Int in Visit 02	1.706054 Secs (1.706 Secs)	
								[==>]	***[2]***
4		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 3-4 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs)	
								[==>(Copy 1, Forward)] *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[2]***
5		(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 5-6 Non-Int in Visit 02	1.706054 Secs (1.706 Secs)	
								[==>]	***[3]***

	6	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 5-6 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[3]***
	7	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 7-8 Non-Int in Visit 02	1.706054 Secs (1.706 Secs) *[==>]*	***[4]***
	8	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 7-8 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[4]***
	9	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 9-10 Non-Int in Visit 02	1.706054 Secs (1.706 Secs) *[==>]*	***[5]***

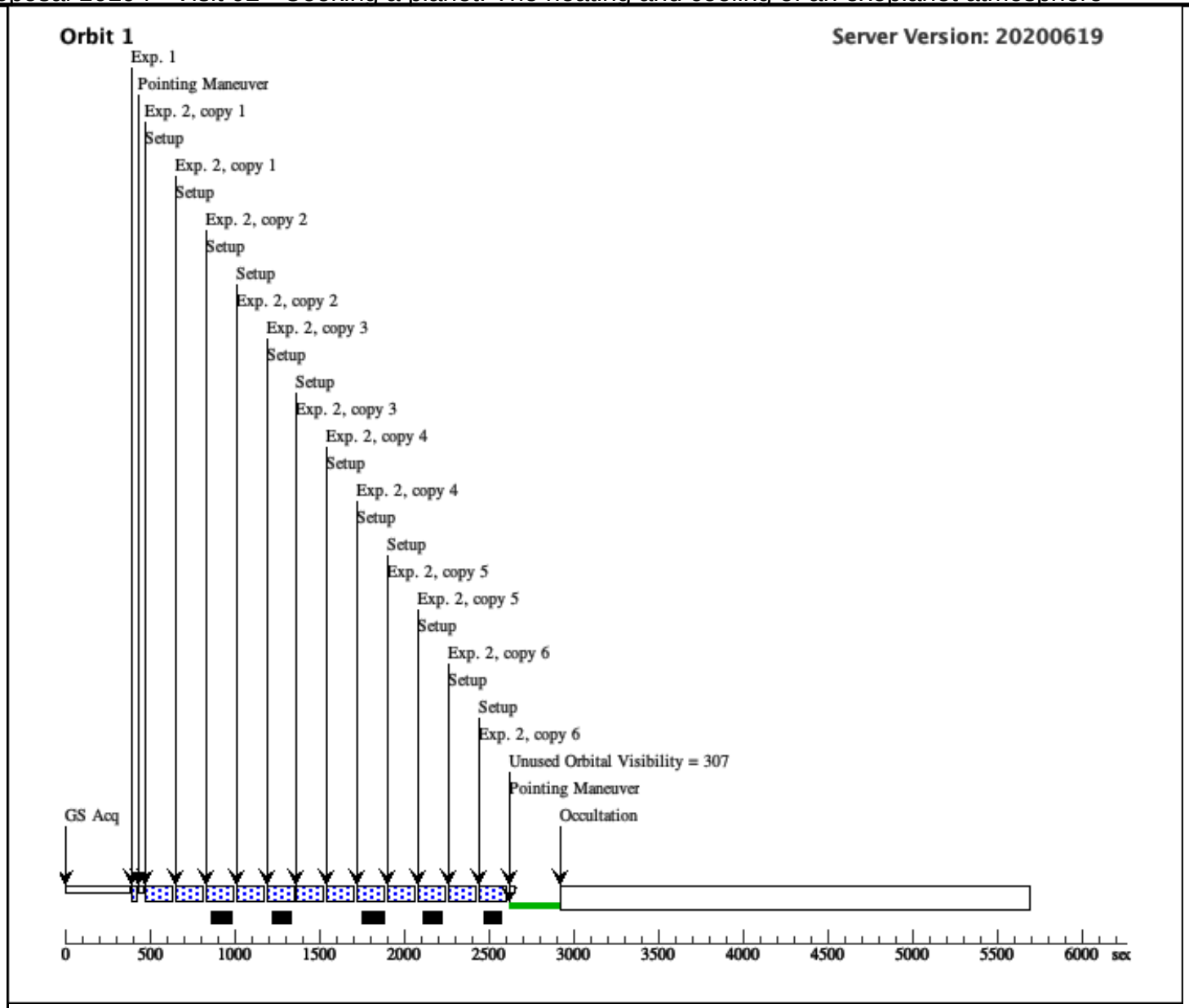
10	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 9-10 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[5]***
11	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 11-12 Non-Int in Visit 02	1.706054 Secs (1.706 Secs) *[==>]*	***[6]***
12	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 11-12 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[6]***
13	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 13-14 Non-Int in Visit 02	1.706054 Secs (1.706 Secs) *[==>]*	***[7]***

	14	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 13-14 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[7]***
	15	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 15-16 Non-Int in Visit 02	1.706054 Secs (1.706 Secs) *[==>]*	***[8]***
	16	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 15-16 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[8]***
	17	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 17-18 Non-Int in Visit 02	1.706054 Secs (1.706 Secs) *[==>]*	***[9]***

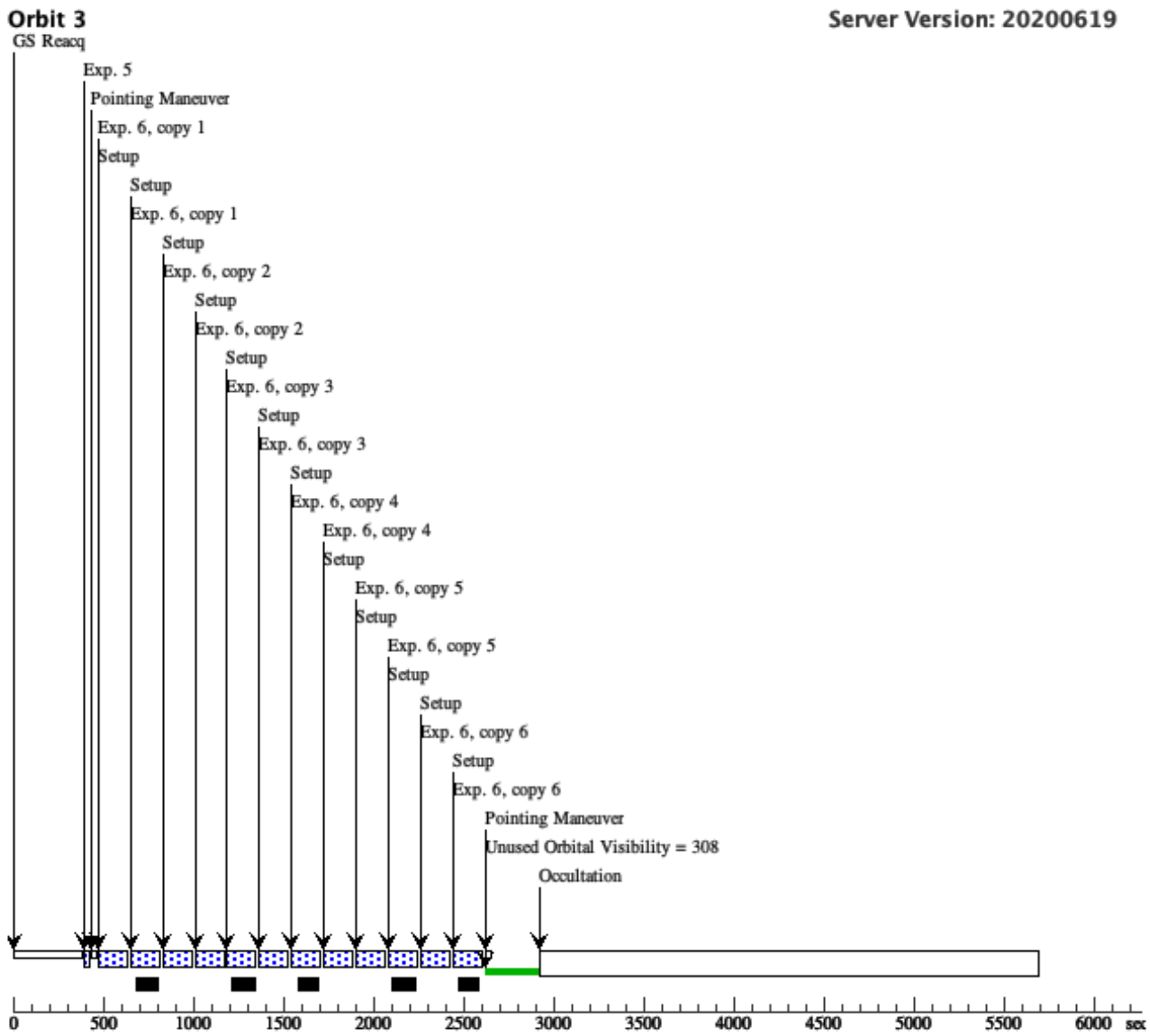
18	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 17-18 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs)	
							[==>(Copy 1, Forward)] *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[9]***
19	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 19-20 Non-Int in Visit 02	1.706054 Secs (1.706 Secs)	
							[==>]	***[10]***
20	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 19-20 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs)	
							[==>(Copy 1, Forward)] *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[10]***
21	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	F126N	NSAMP=2; SAMP-SEQ=RAPID	POS TARG -25,0	Sequence 21-22 Non-Int in Visit 02	1.706054 Secs (1.706 Secs)	
							[==>]	***[11]***

	22	(1) HAT-P-2	WFC3/IR, MULTIACCUM, GRISM512	G141	SAMP-SEQ=SPARS 25; NSAMP=7	POS TARG -25,-28; SPATIAL SCAN 0.35115,90.0 Degrees,Round trip	Sequence 21-22 Non-Int in Visit 02	138.380533 Secs X 6 (1660.566 Secs) *[==>(Copy 1, Forward)]* *[==>(Copy 1, Reverse)]* *[==>(Copy 2, Forward)]* *[==>(Copy 2, Reverse)]* *[==>(Copy 3, Forward)]* *[==>(Copy 3, Reverse)]* *[==>(Copy 4, Forward)]* *[==>(Copy 4, Reverse)]* *[==>(Copy 5, Forward)]* *[==>(Copy 5, Reverse)]* *[==>(Copy 6, Forward)]* *[==>(Copy 6, Reverse)]*	***[11]***

Orbit Structure




Orbit 2
Server Version: 20200619
GS Reacq
Exp. 3
Pointing Maneuver
Exp. 4, copy 1
Setup
Setup
Exp. 4, copy 1
Setup
Exp. 4, copy 2
Setup
Exp. 4, copy 2
Setup
Exp. 4, copy 3
Setup
Exp. 4, copy 3
Exp. 4, copy 4
Setup
Setup
Exp. 4, copy 4
Exp. 4, copy 5
Setup
Setup
Exp. 4, copy 5
Exp. 4, copy 6
Setup
Setup
Exp. 4, copy 6
Unused Orbital Visibility = 308
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 3
Server Version: 20200619
GS Reacq
Exp. 5
Pointing Maneuver
Exp. 6, copy 1
Setup
Setup
Exp. 6, copy 1
Setup
Exp. 6, copy 2
Setup
Exp. 6, copy 2
Setup
Exp. 6, copy 3
Setup
Exp. 6, copy 3
Setup
Exp. 6, copy 4
Exp. 6, copy 4
Setup
Exp. 6, copy 5
Setup
Exp. 6, copy 5
Setup
Setup
Exp. 6, copy 6
Setup
Exp. 6, copy 6
Pointing Maneuver
Unused Orbital Visibility = 308
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 4
Server Version: 20200619
GS Reacq
Exp. 7
Pointing Maneuver
Setup
Exp. 8, copy 1
Exp. 8, copy 1
Setup
Exp. 8, copy 2
Setup
Exp. 8, copy 2
Setup
Setup
Exp. 8, copy 3
Exp. 8, copy 3
Setup
Setup
Exp. 8, copy 4
Exp. 8, copy 4
Setup
Exp. 8, copy 5
Setup
Setup
Exp. 8, copy 5
Exp. 8, copy 6
Setup
Exp. 8, copy 6
Setup
Unused Orbital Visibility = 308
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

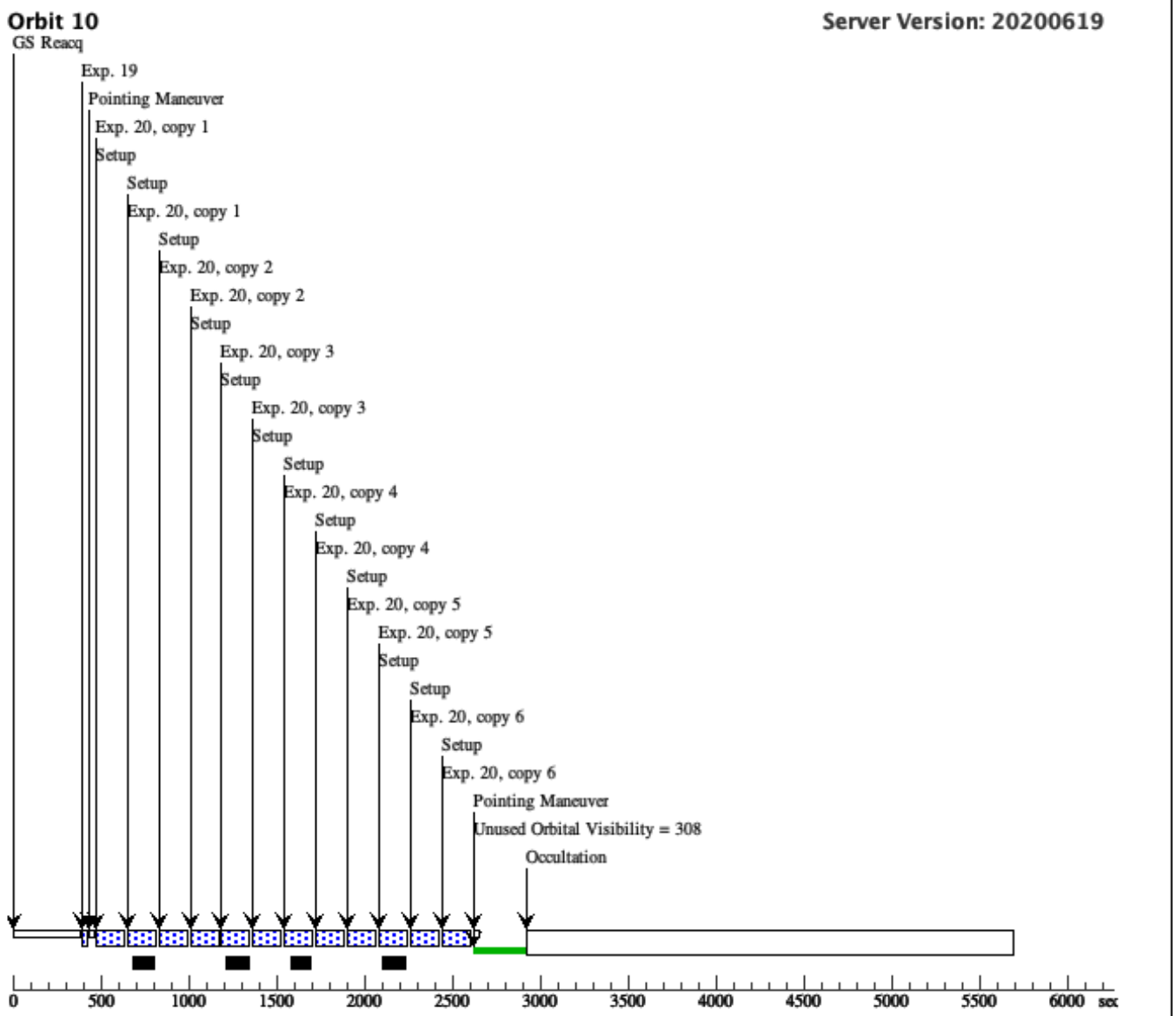

Orbit 5
Server Version: 20200619
GS Reacq
Exp. 9
Pointing Maneuver
Exp. 10, copy 1
Setup
Exp. 10, copy 1
Setup
Exp. 10, copy 2
Setup
Exp. 10, copy 2
Setup
Exp. 10, copy 3
Setup
Setup
Exp. 10, copy 3
Exp. 10, copy 4
Setup
Setup
Exp. 10, copy 4
Setup
Exp. 10, copy 5
Exp. 10, copy 5
Setup
Exp. 10, copy 6
Setup
Exp. 10, copy 6
Setup
Unused Orbital Visibility = 308
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec

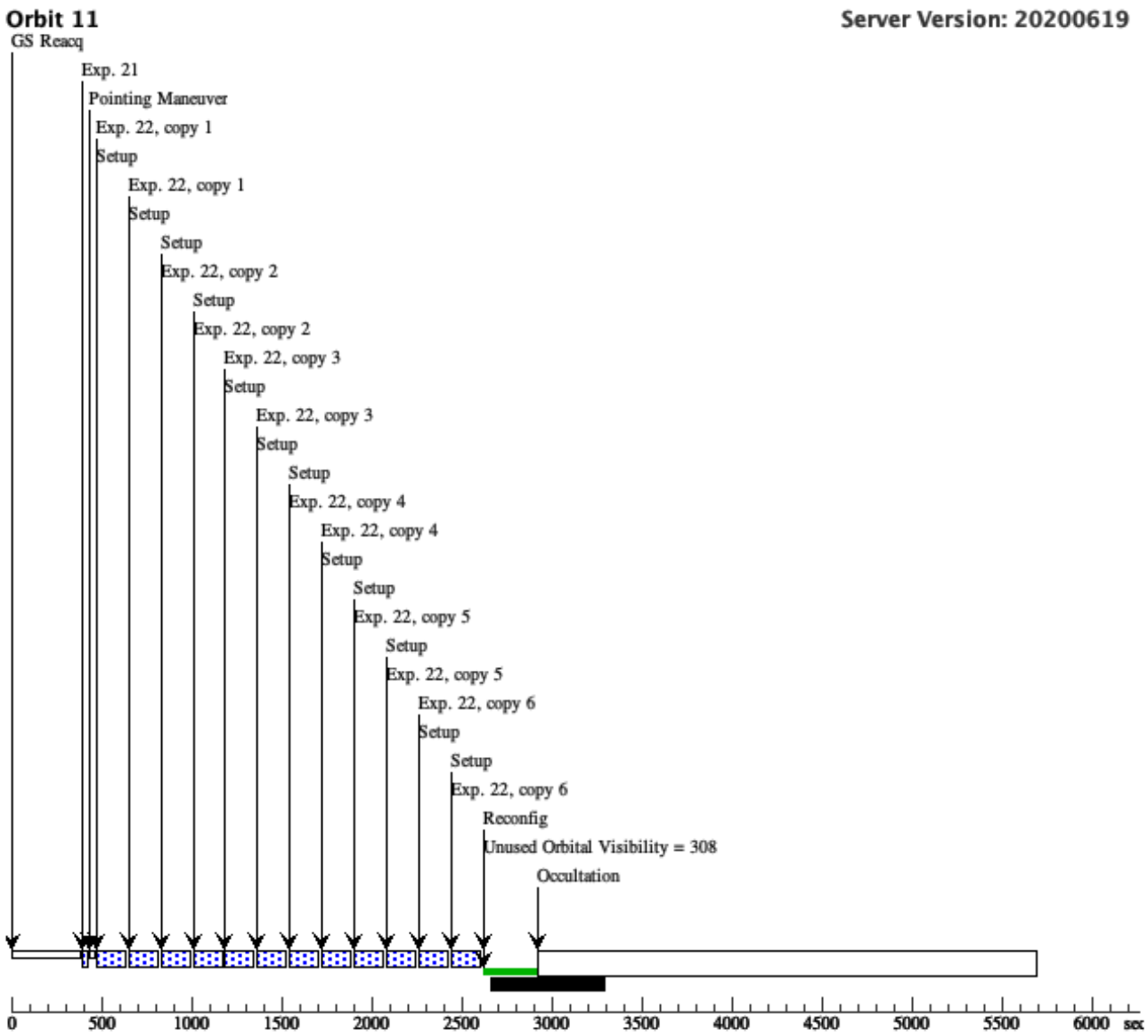

Orbit 6
Server Version: 20200619
GS Reacq
Exp. 11
Pointing Maneuver
Exp. 12, copy 1
Setup
Exp. 12, copy 1
Setup
Setup
Exp. 12, copy 2
Setup
Exp. 12, copy 2
Setup
Exp. 12, copy 3
Exp. 12, copy 3
Setup
Setup
Exp. 12, copy 4
Setup
Exp. 12, copy 4
Exp. 12, copy 5
Setup
Setup
Exp. 12, copy 5
Setup
Exp. 12, copy 6
Exp. 12, copy 6
Setup
Pointing Maneuver
Unused Orbital Visibility = 308
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 7
Server Version: 20200619
GS Reacq
Exp. 13
Pointing Maneuver
Setup
Exp. 14, copy 1
Setup
Exp. 14, copy 1
Setup
Exp. 14, copy 2
Exp. 14, copy 2
Setup
Exp. 14, copy 3
Setup
Exp. 14, copy 3
Setup
Exp. 14, copy 4
Setup
Exp. 14, copy 4
Setup
Setup
Exp. 14, copy 5
Setup
Exp. 14, copy 5
Setup
Exp. 14, copy 6
Exp. 14, copy 6
Setup
Unused Orbital Visibility = 308
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 8
Server Version: 20200619
GS Reacq
Exp. 15
Pointing Maneuver
Setup
Exp. 16, copy 1
Setup
Exp. 16, copy 1
Exp. 16, copy 2
Setup
Exp. 16, copy 2
Setup
Exp. 16, copy 3
Setup
Setup
Exp. 16, copy 3
Exp. 16, copy 4
Setup
Setup
Exp. 16, copy 4
Exp. 16, copy 5
Setup
Setup
Exp. 16, copy 5
Setup
Exp. 16, copy 6
Exp. 16, copy 6
Setup
Pointing Maneuver
Unused Orbital Visibility = 308
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 9
Server Version: 20200619
GS Reacq
Exp. 17
Pointing Maneuver
Setup
Exp. 18, copy 1
Setup
Exp. 18, copy 1
Setup
Exp. 18, copy 2
Setup
Exp. 18, copy 2
Exp. 18, copy 3
Setup
Exp. 18, copy 3
Setup
Setup
Exp. 18, copy 4
Exp. 18, copy 4
Setup
Setup
Exp. 18, copy 5
Setup
Exp. 18, copy 5
Exp. 18, copy 6
Setup
Setup
Exp. 18, copy 6
Unused Orbital Visibility = 308
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 10
Server Version: 20200619
GS Reacq
Exp. 19
Pointing Maneuver
Exp. 20, copy 1
Setup
Setup
Exp. 20, copy 1
Setup
Exp. 20, copy 2
Exp. 20, copy 2
Setup
Exp. 20, copy 3
Setup
Exp. 20, copy 3
Setup
Setup
Exp. 20, copy 4
Setup
Exp. 20, copy 4
Setup
Exp. 20, copy 5
Exp. 20, copy 5
Setup
Setup
Exp. 20, copy 6
Setup
Exp. 20, copy 6
Pointing Maneuver
Unused Orbital Visibility = 308
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec


Orbit 11
Server Version: 20200619
GS Reacq
Exp. 21
Pointing Maneuver
Exp. 22, copy 1
Setup
Exp. 22, copy 1
Setup
Setup
Exp. 22, copy 2
Setup
Exp. 22, copy 2
Exp. 22, copy 3
Setup
Exp. 22, copy 3
Setup
Setup
Exp. 22, copy 4
Exp. 22, copy 4
Setup
Setup
Exp. 22, copy 5
Setup
Exp. 22, copy 5
Exp. 22, copy 6
Setup
Setup
Exp. 22, copy 6
Reconfig
Unused Orbital Visibility = 308
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
sec