15134 - A global map of thermal inversions for an ultra-hot planet

Cycle: 25, 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) WASP-121	WFC3/IR	19	19-Dec-2018 09:02:20.0	yes
02	(1) WASP-121	WFC3/IR	7	19-Dec-2018 09:03:22.0	yes
03	(1) WASP-121	WFC3/IR	19	19-Dec-2018 09:05:25.0	yes
04	(1) WASP-121	WFC3/IR	7	19-Dec-2018 09:06:20.0	yes

52 Total Orbits Used

ABSTRACT

WASP-121b is one of the standout exoplanets available for atmospheric characterization, both in transmission and emission, due to its large radius (1.8 Rjup), high temperature (~2400K), and bright host star (H=9.4mag). Recent WFC3/G141 transit and eclipse observations of WASP-121b by our group show clear detections of water at 1.4 micron that are in absorption on the nightside and emission on the dayside, implying that the planet has a dayside thermal inversion. Combined, these factors make WASP-121b the best target available to observationally probe the variation of thermal inversions with longitude. Here we propose spectroscopic phase-curve measurements of WASP-121b over a full orbital period with WFC3/G141. Given the measurement precision demonstrated by our previous transit and eclipse observations with WFC3, we anticipate an unprecedented signal-to-noise for a near-infrared exoplanet phase curve. Combined with state-of-the-art atmospheric retrieval analysis and circulation models, our data will produce a longitudinally-resolved map of the atmospheric thermal structure, and will track the thermal inversion with longitude by measuring the 1.4 micron H2O feature as it transitions from absorption to emission. This information-rich dataset will provide valuable new insight into the long-standing mystery of thermal inversions in hot gas giants, which will provide critical constraints for the global circulation and the molecular sources that produce thermal inversions.

OBSERVING DESCRIPTION

We are observing two full-orbit phase curves of WASP-121b using WFC3 G141 in spatial scanning mode over two visits. We will adopt the same observing setup as was used successfully for our previous observations of WASP-121b as part of Programs 14468 and 14767. Each visit will include two consecutive secondary eclipses of the planet as well as the intervening primary transit. We have specified different phase constraints for each visit to maximize the phase coverage achieved for the transits and eclipses.

We request that two 26-orbit visits be performed. Due to problems encountered with APT when trying to specify 26-orbit visits, for the purpose of Phase 2 we have split each 26-rbit visit into a 19-orbit "visit A" and 7-orbit "visit B". We request that these visits be performed back-to-back, to achieve a single 26-orbit visit:
i.e. Full visit = "visit A" + "visit B"

We have correctly phase-constrained the Acquisition image for "visit A". We have also added a phase-constraint to the first exposure in "visit B", which is simply the phase-constraint for "visit A" *plus 20 HST orbits*. We did this with the aim of trying to ensure the orbits of "visit A" and "visit B" are contifuous. But hopefully there is a safer way to ensure this occurs as part of the scheduling (it was the best way we could come up with using APT).

The primary technical challenge of our observations is the long duration of each visit, both of which consists of 26 contiguous HST orbits. In particular, SAA crossings pose a challenge for these observations, but hopefully this can be mitigated somewhat by the short 30.6 hour period of our target which allows for a relatively large number of scheduling opportunities.

Following consultation with our STSCI support contact, the following points outline the steps we have taken in APT and the requests we have in allowing these observations to be scheduled succesfully:

1. We require a gyro bias update every HST orbit. To accommodate this, we have left 5 minutes of unused FGS visibility at the end of each orbit. In practice, we achieved this in APT by setting SCHED 100 orbits, as recommended by our STSCI support contact.
2. We will likely require a second full GS Acq at some point during each visit, probably about 14 orbits in. This is in addition to the first full GS Acq done automatically at the start of the first orbit.
3. Ideally, we would like the observations to be scheduled without being affected by SAA crossings (i.e. an "SAA hider"). However, given the length of our visits, this may not be achievable, in which case we request that orbits are scheduled such that any SAA crossings occur at close to the *end* of target visibility as possible. This will allow the GS Reacq (plus the full Acqs) to be performed at the start of the affected orbits before dropping to gyro part way through. If we are unlucky and it is unavoidable for SAA crossings to occur in the first half of orbits, we will presumably be forced to gyro guiding for the affected orbits.
4. For orbits affected by SAA crossings, we request that they do not coincide with the planetary primary transit and secondary eclipse. Specifically, we request that they occur *outside* the phase ranges -0.12 to +0.12 (primary transit) and +0.38 to +0.62 (secondary eclipse).

Visit

Proposal 15134, WASP-121 WFC3 (01), implementation Wed Dec 19 14:06:24 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR

Special Requirements: SCHED 80%; ORIENT 25D TO 50 D; ORIENT 125D TO 140 D; ORIENT 310D TO 325 D; ORIENT 200D TO 220 D; Period 1.2749255 D AND ZERO-PHASE HJD2457424.88650151

Comments: Please see Proposal Description for important notes on SAA crossing.

We have defined each HST orbit within a non-interruptible sequence, to ensure that all exposures defined within the sequence are taken during the same HST orbit. We will use forward spatial scanning mode to avoid saturation on relatively long exposures and increase observing efficiency.

Visit orientation requirements have been defined to avoid spectra from nearby stars overlapping the target spectrum.

Phase constraints have been specified to maximize phase coverage of the primary transits and secondary eclipses achieved by the two visits of our program.

Diagnostics

(WASP-121 WFC3 (01)) Warning (Orbit Planner): LONG SU LIKELY TO INTERSECT THE SAA

(WASP-121 WFC3 (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WASP-121	RA: 07 10 24.0580 (107.6002417d)	Proper Motion RA: -2.993 mas/yr	V=10.5	Reference Frame: SIMBAD
		Dec: -39 05 50.55 (-39.09737d)	Proper Motion Dec: 25.086 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

Comments:
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM, F3-F9]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition 1	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	F130N	NSAMP=3; SAMP-SEQ=RAPID	GSPAIR S63I000677F2S63I000202F1	Sequence 1-2 Non-Int in WASP-121 WFC3 (01)	0.833445 Secs (0.833 Secs)	
								[==>]	***[1]***
Comments: Phase-constrained									
2	Science 1	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 1-2 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 15 (1546.929 Secs)	
								[==>(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)]*	***[1]***
3	Science 2	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward; PHASE 0.3399 TO 0.3459; GSPAIR S63I000677F2S63I000202F1	Sequence 3-4 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs (103.129 Secs)	
								[==>]	***[2]***
4	Science 2	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 3-4 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 15 (1546.929 Secs)	
								[==>(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)]*	***[2]***

	5	Science 3	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 5-5 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[3]***
	6	Science 4	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 6-6 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[4]***

	7	Science 5	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 7-7 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)	
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	8	Science 6	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 8-8 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)	
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	9	Science 7	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 9-9 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(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)]*	***[7]***
	10	Science 8	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 10-10 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(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)]*	***[8]***

11	Science 9	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 11-11 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)		
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12	Science 10	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward; NEW OBSET FULL ACQ; GSPAIR S63I000677F2S63I000202F1	Sequence 12-12 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)		
								[==>(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)]*	***[10]***

13	Science 11	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 13-13 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)	
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14	Science 12	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 14-14 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)	
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15	Science 13	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 15-15 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)		
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16	Science 14	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 16-16 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)		
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	17	Science 15	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 17-17 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[15]***
	18	Science 16	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 18-18 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[16]***

19	Science 17	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.0 73,90.0 Degrees,Forward	Sequence 19-19 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)		
								[==>(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)]*	***[17]***
20	Science 18	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.0 73,90.0 Degrees,Forward	Sequence 20-20 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)		
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	21	Science 19	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 21-21 Non-Int in WASP-121 WFC3 (01)	103.128633 Secs X 16 (1650.058 Secs)	
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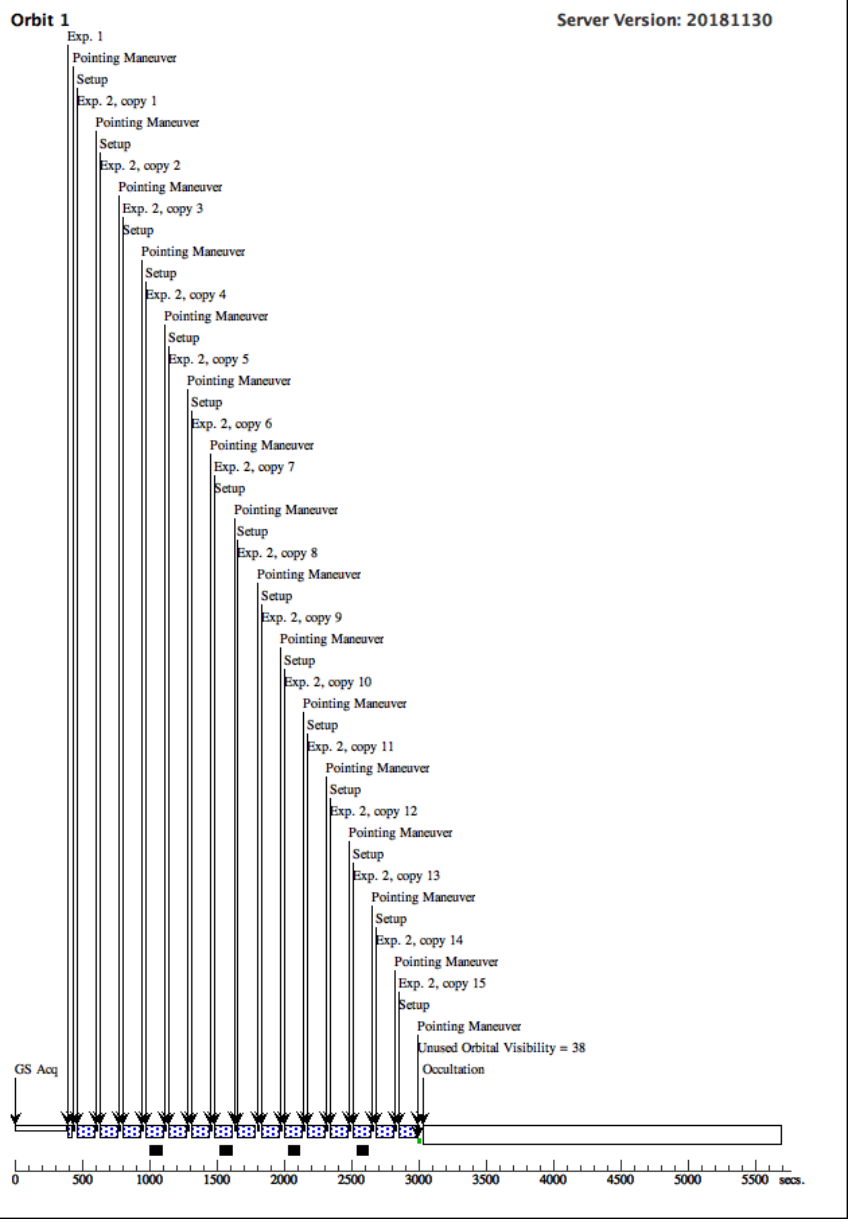
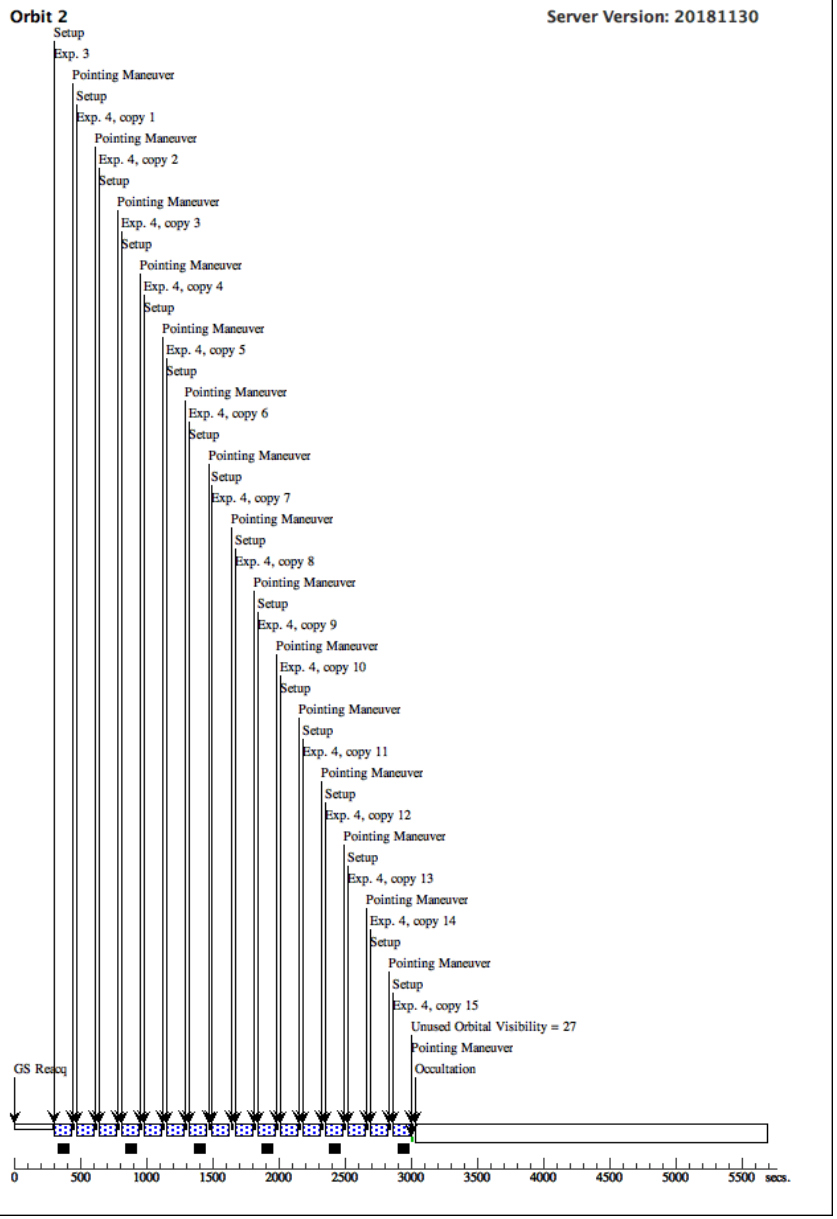
Orbit Structure

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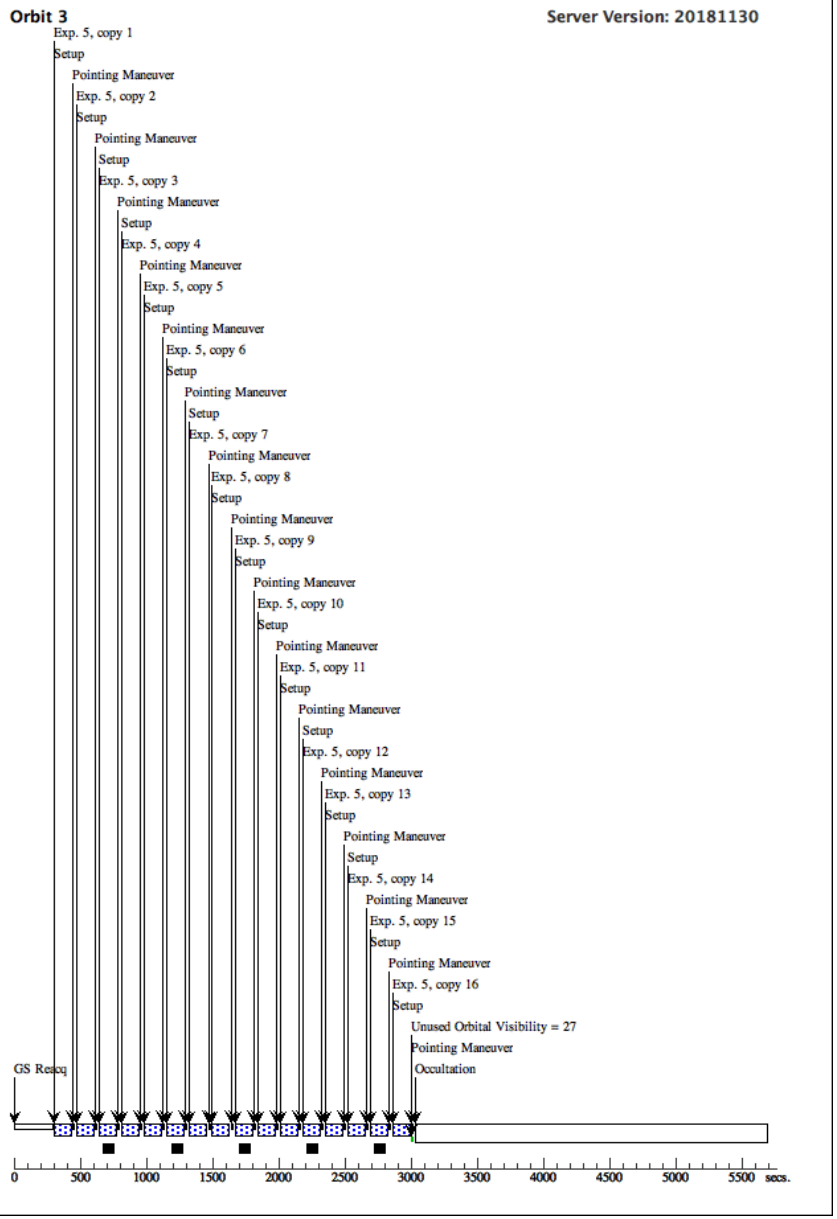
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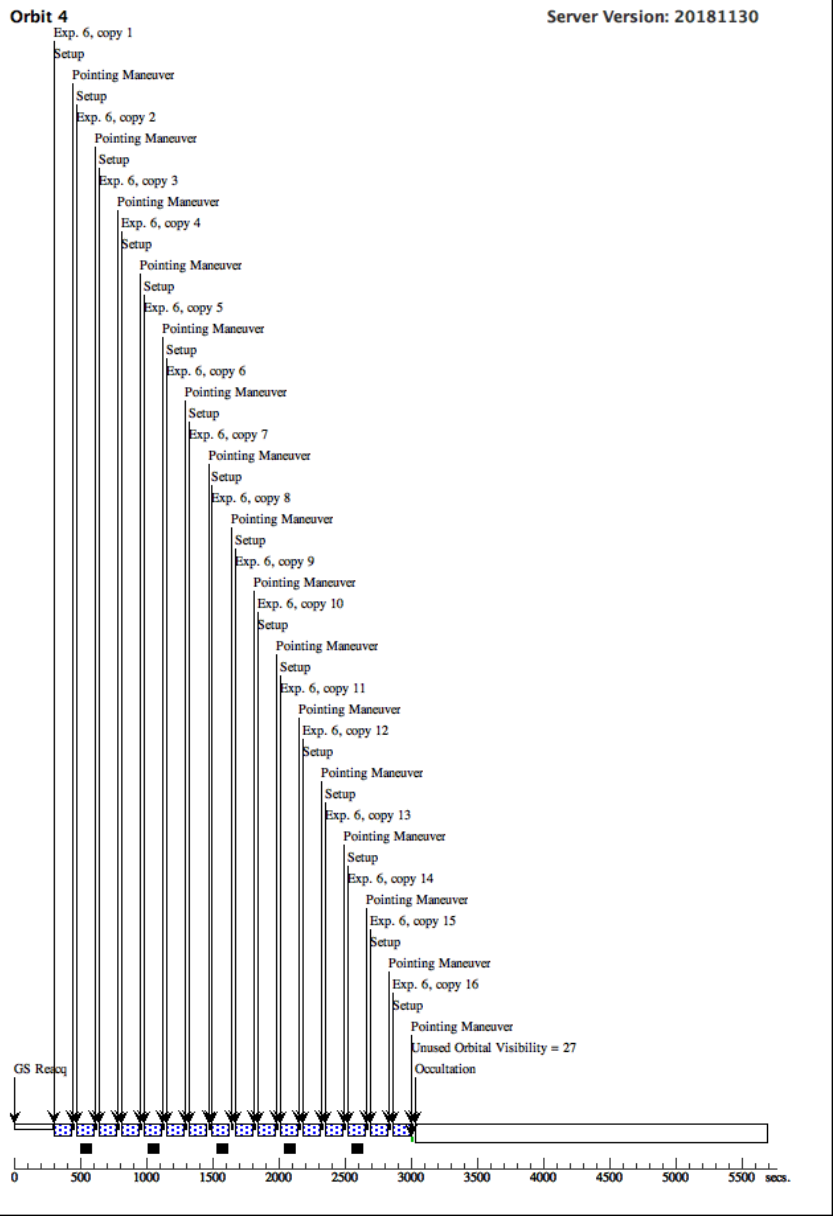
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Server Version: 20181130
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Pointing Maneuver
Setup
Exp. 6, copy 2
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Exp. 6, copy 3
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Exp. 6, copy 4
Setup
Pointing Maneuver
Setup
Exp. 6, copy 5
Pointing Maneuver
Setup
Exp. 6, copy 6
Pointing Maneuver
Setup
Exp. 6, copy 7
Pointing Maneuver
Setup
Exp. 6, copy 8
Pointing Maneuver
Setup
Exp. 6, copy 9
Pointing Maneuver
Exp. 6, copy 10
Setup
Pointing Maneuver
Setup
Exp. 6, copy 11
Pointing Maneuver
Exp. 6, copy 12
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Pointing Maneuver
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Exp. 6, copy 13
Pointing Maneuver
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Exp. 6, copy 14
Pointing Maneuver
Exp. 6, copy 15
Setup
Pointing Maneuver
Exp. 6, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Resoq
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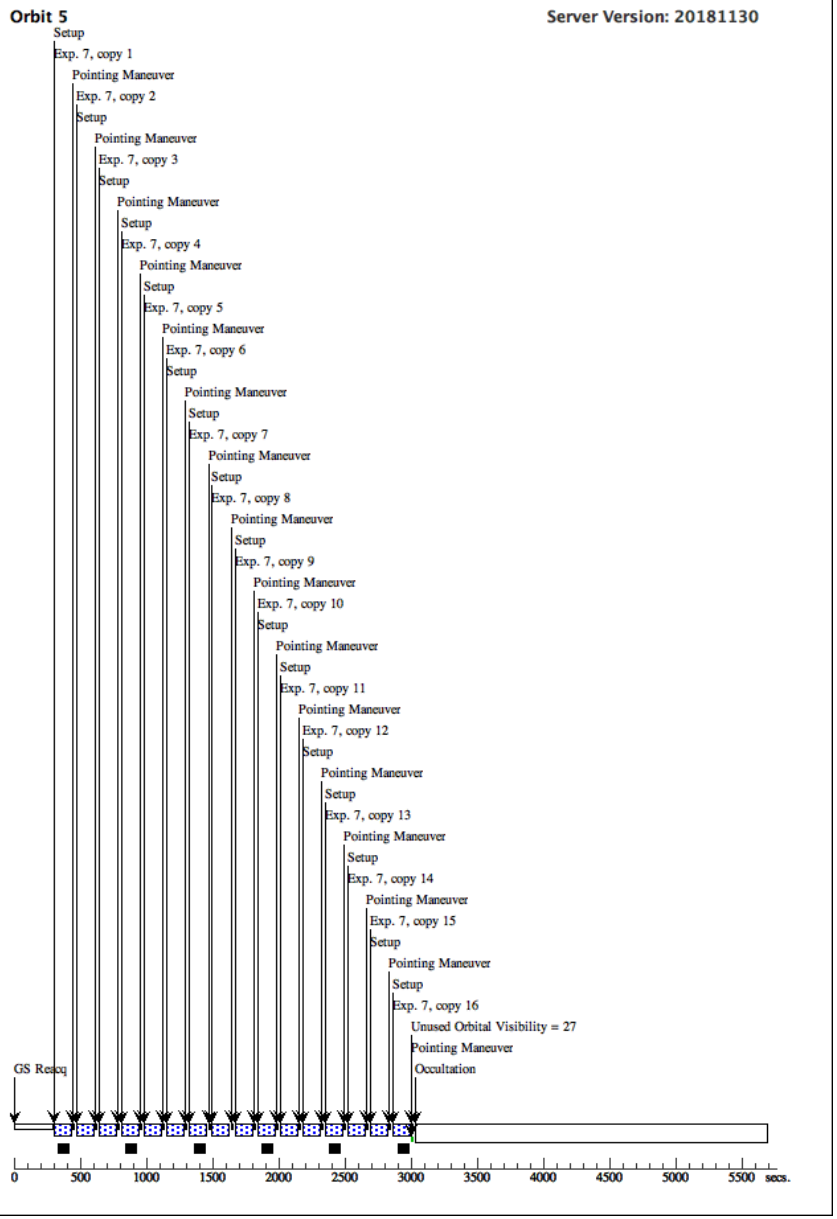
secs.


Orbit 5
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Setup
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Exp. 7, copy 3
Setup
Pointing Maneuver
Setup
Exp. 7, copy 4
Pointing Maneuver
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Exp. 7, copy 5
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Exp. 7, copy 6
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Pointing Maneuver
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Exp. 7, copy 7
Pointing Maneuver
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Exp. 7, copy 8
Pointing Maneuver
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Exp. 7, copy 9
Pointing Maneuver
Exp. 7, copy 10
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Pointing Maneuver
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Exp. 7, copy 11
Pointing Maneuver
Exp. 7, copy 12
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Pointing Maneuver
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Exp. 7, copy 13
Pointing Maneuver
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Exp. 7, copy 14
Pointing Maneuver
Exp. 7, copy 15
Setup
Pointing Maneuver
Setup
Exp. 7, copy 16
Unused Orbital Visibility = 27
Pointing Maneuver
Occultation
GS Resoq
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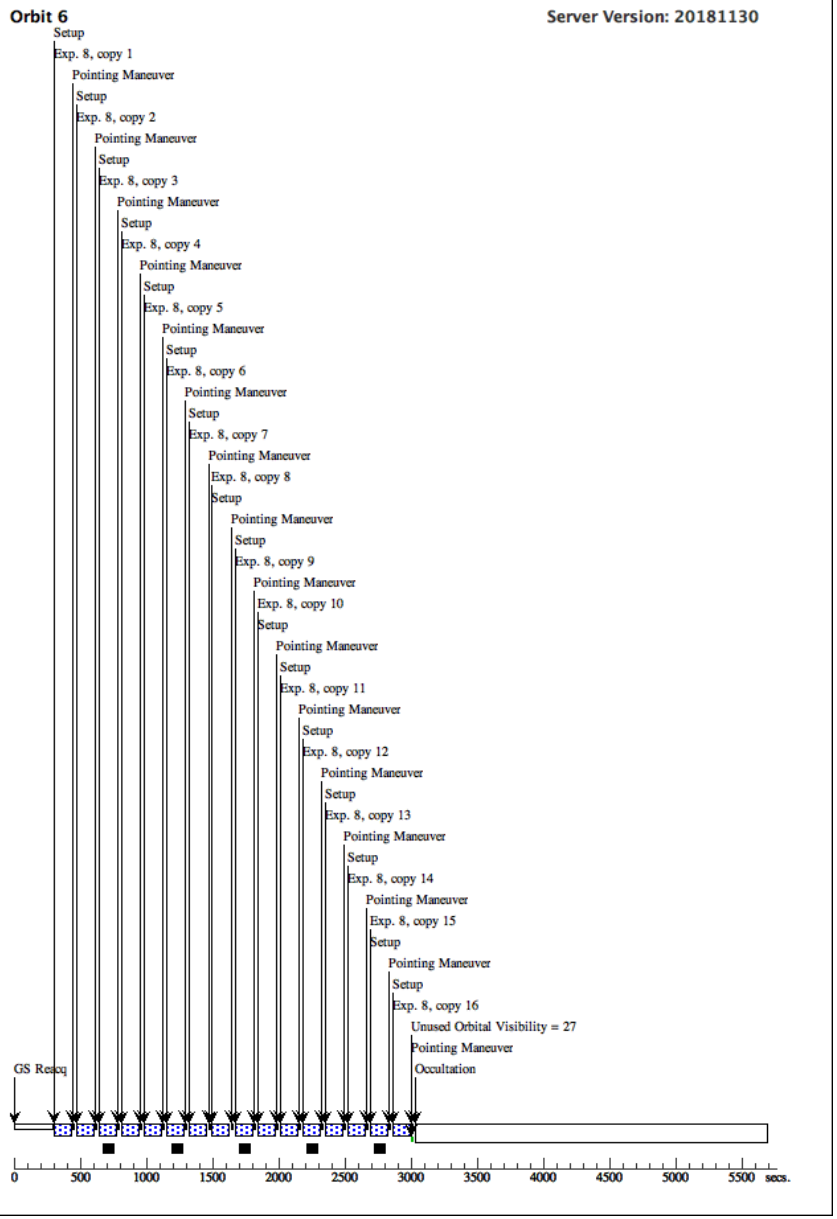
secs.


Orbit 6
Server Version: 20181130
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Exp. 8, copy 1
Pointing Maneuver
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Exp. 8, copy 2
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Exp. 8, copy 3
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Exp. 8, copy 4
Pointing Maneuver
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Exp. 8, copy 5
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Exp. 8, copy 6
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Exp. 8, copy 7
Pointing Maneuver
Exp. 8, copy 8
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Pointing Maneuver
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Exp. 8, copy 9
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Exp. 8, copy 10
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Exp. 8, copy 11
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Exp. 8, copy 12
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Exp. 8, copy 13
Pointing Maneuver
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Exp. 8, copy 14
Pointing Maneuver
Exp. 8, copy 15
Setup
Pointing Maneuver
Setup
Exp. 8, copy 16
Unused Orbital Visibility = 27
Pointing Maneuver
Occultation
GS Reacq
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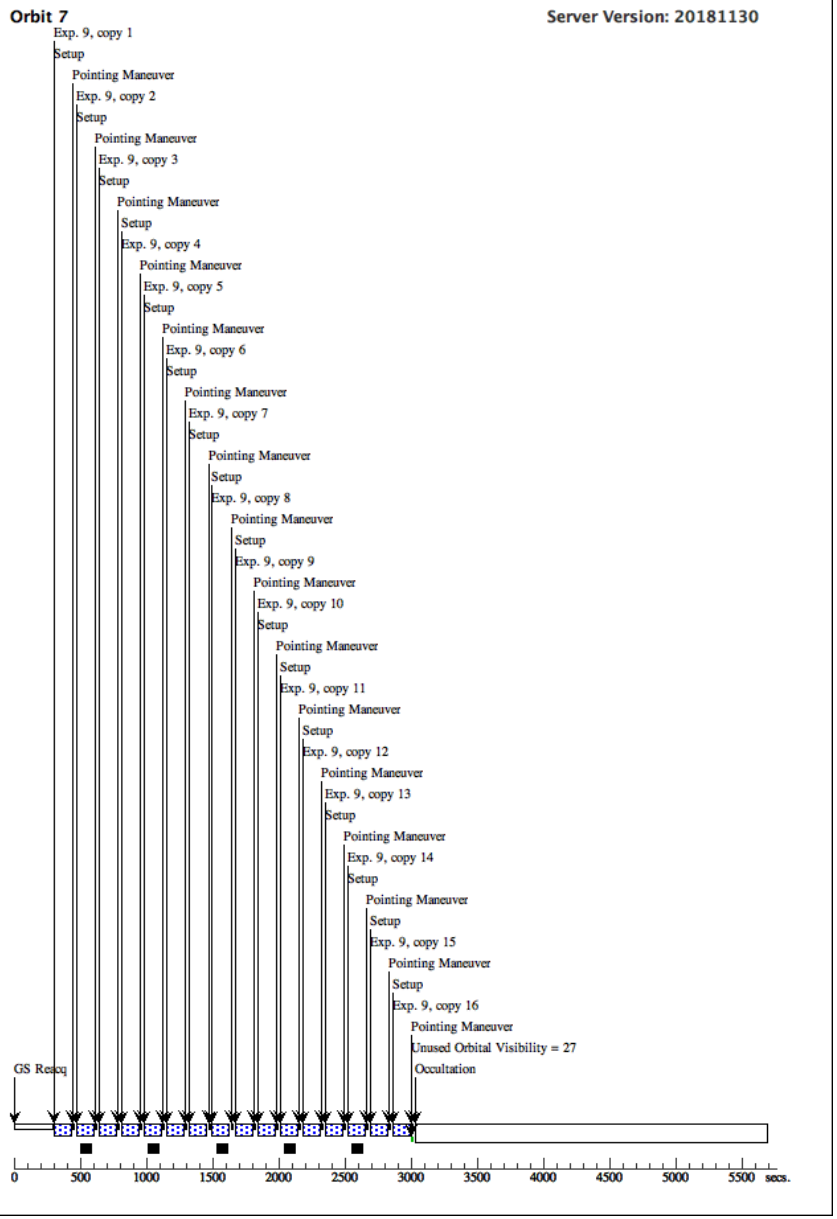
secs.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Setup
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Exp. 9, copy 4
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Exp. 9, copy 5
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Exp. 9, copy 6
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Exp. 9, copy 7
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Exp. 9, copy 8
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Exp. 9, copy 9
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Exp. 9, copy 10
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Exp. 9, copy 11
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Exp. 9, copy 12
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Exp. 9, copy 13
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Pointing Maneuver
Exp. 9, copy 14
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Pointing Maneuver
Setup
Exp. 9, copy 15
Pointing Maneuver
Setup
Exp. 9, copy 16
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
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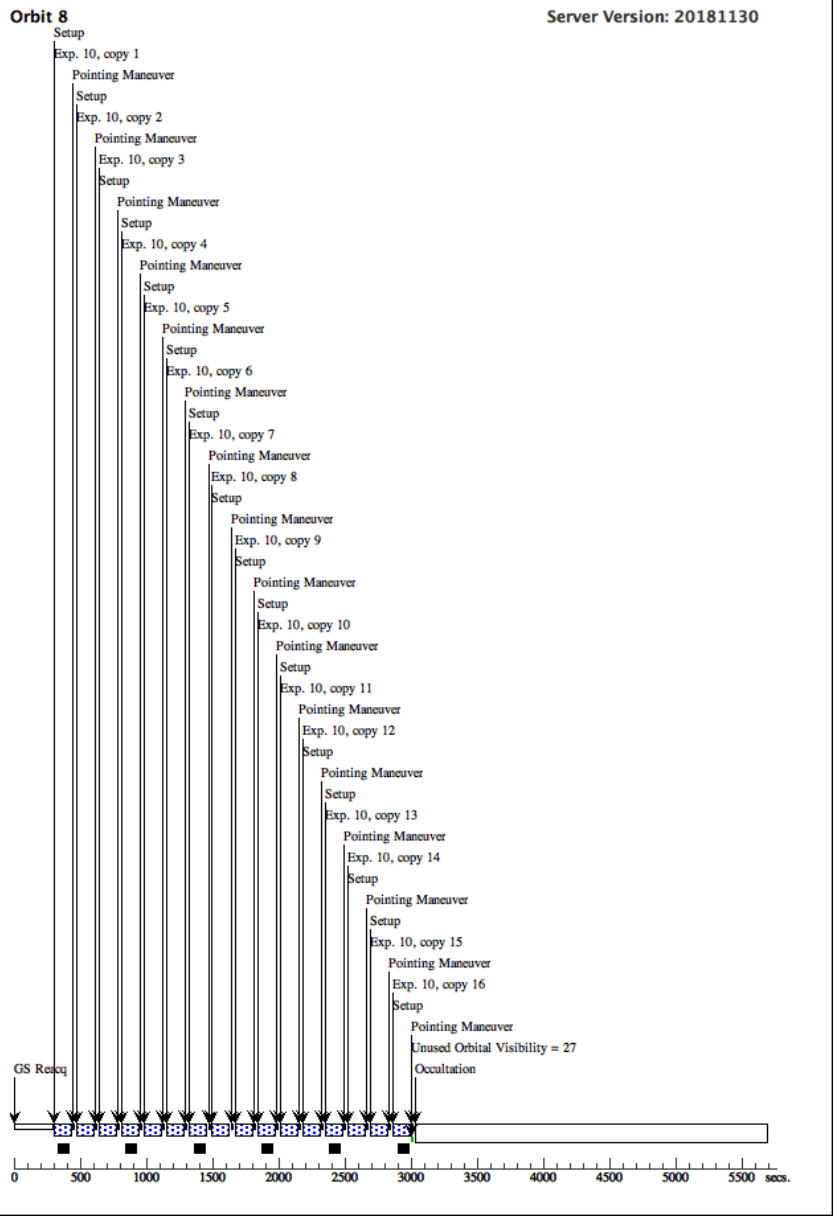
secs.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Exp. 10, copy 4
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Exp. 10, copy 5
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Exp. 10, copy 6
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Exp. 10, copy 7
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Exp. 10, copy 8
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Pointing Maneuver
Exp. 10, copy 9
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Exp. 10, copy 10
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Exp. 10, copy 15
Pointing Maneuver
Exp. 10, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
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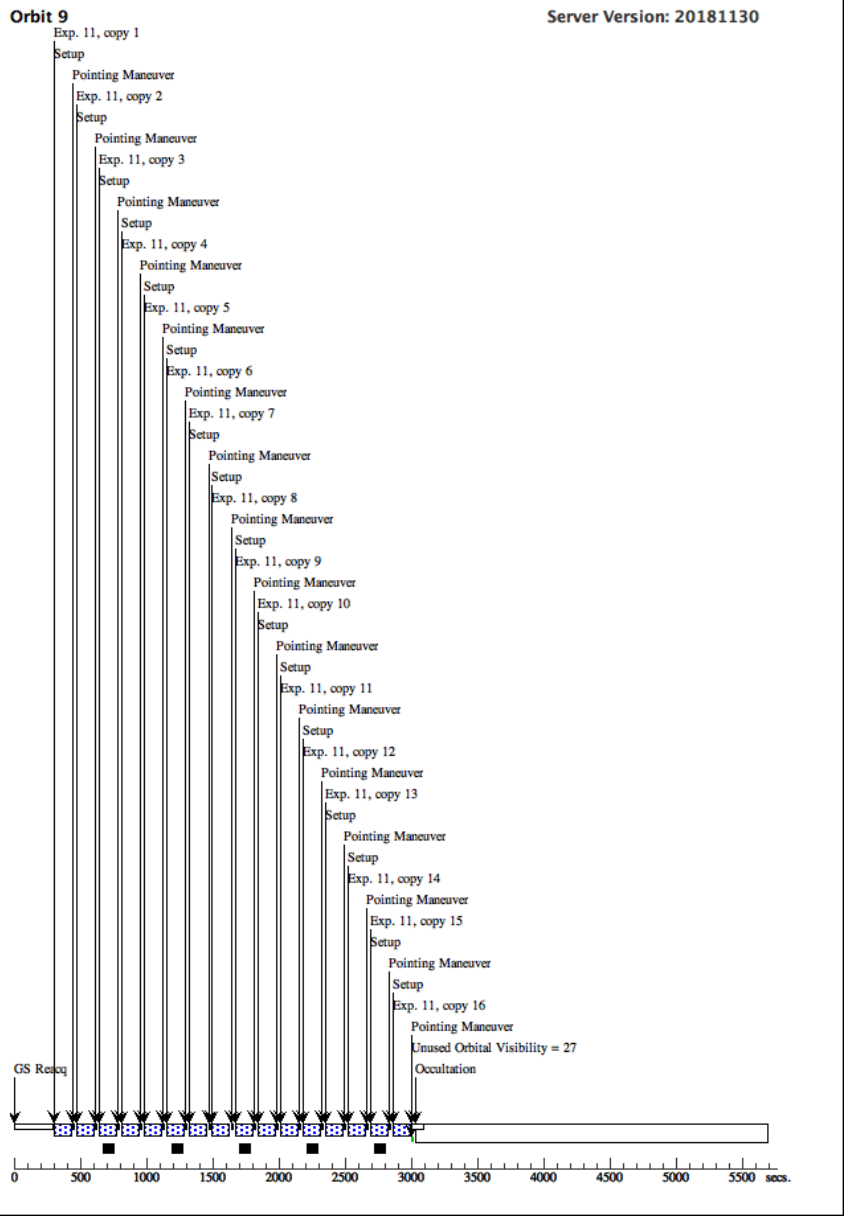
secs.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Exp. 11, copy 1
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Exp. 11, copy 2
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Exp. 11, copy 3
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Exp. 11, copy 4
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Exp. 11, copy 5
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Exp. 11, copy 6
Pointing Maneuver
Exp. 11, copy 7
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Pointing Maneuver
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Exp. 11, copy 8
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Exp. 11, copy 9
Pointing Maneuver
Exp. 11, copy 10
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Exp. 11, copy 11
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Exp. 11, copy 12
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Pointing Maneuver
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Exp. 11, copy 14
Pointing Maneuver
Exp. 11, copy 15
Setup
Pointing Maneuver
Setup
Exp. 11, copy 16
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Reacq
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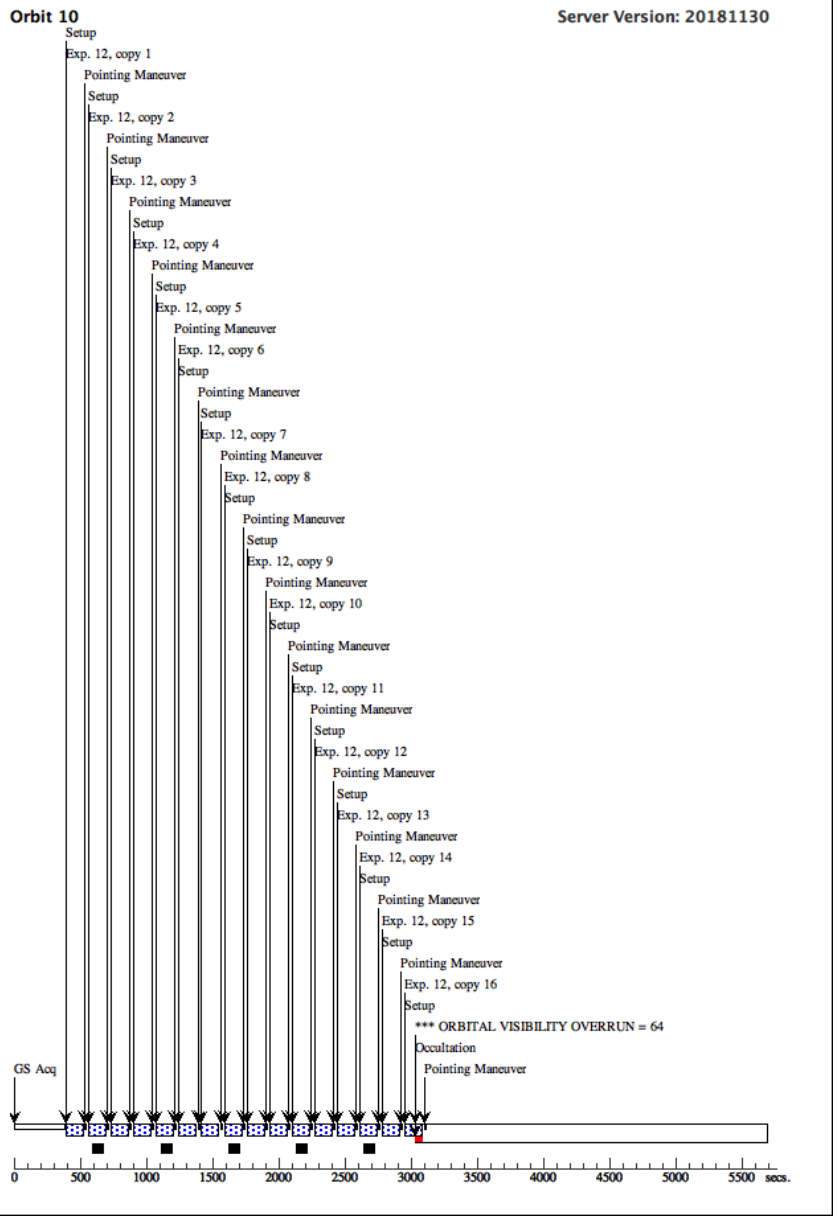
secs.


Orbit 10
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Exp. 12, copy 1
Pointing Maneuver
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Exp. 12, copy 2
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Exp. 12, copy 3
Pointing Maneuver
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Exp. 12, copy 4
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Exp. 12, copy 5
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Exp. 12, copy 6
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Exp. 12, copy 7
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Exp. 12, copy 8
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Pointing Maneuver
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Exp. 12, copy 9
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Exp. 12, copy 10
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Exp. 12, copy 11
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Exp. 12, copy 12
Pointing Maneuver
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Exp. 12, copy 13
Pointing Maneuver
Exp. 12, copy 14
Setup
Pointing Maneuver
Exp. 12, copy 15
Setup
Pointing Maneuver
Exp. 12, copy 16
Setup
*** ORBITAL VISIBILITY OVERRUN = 64
Occultation
Pointing Maneuver
GS Acq
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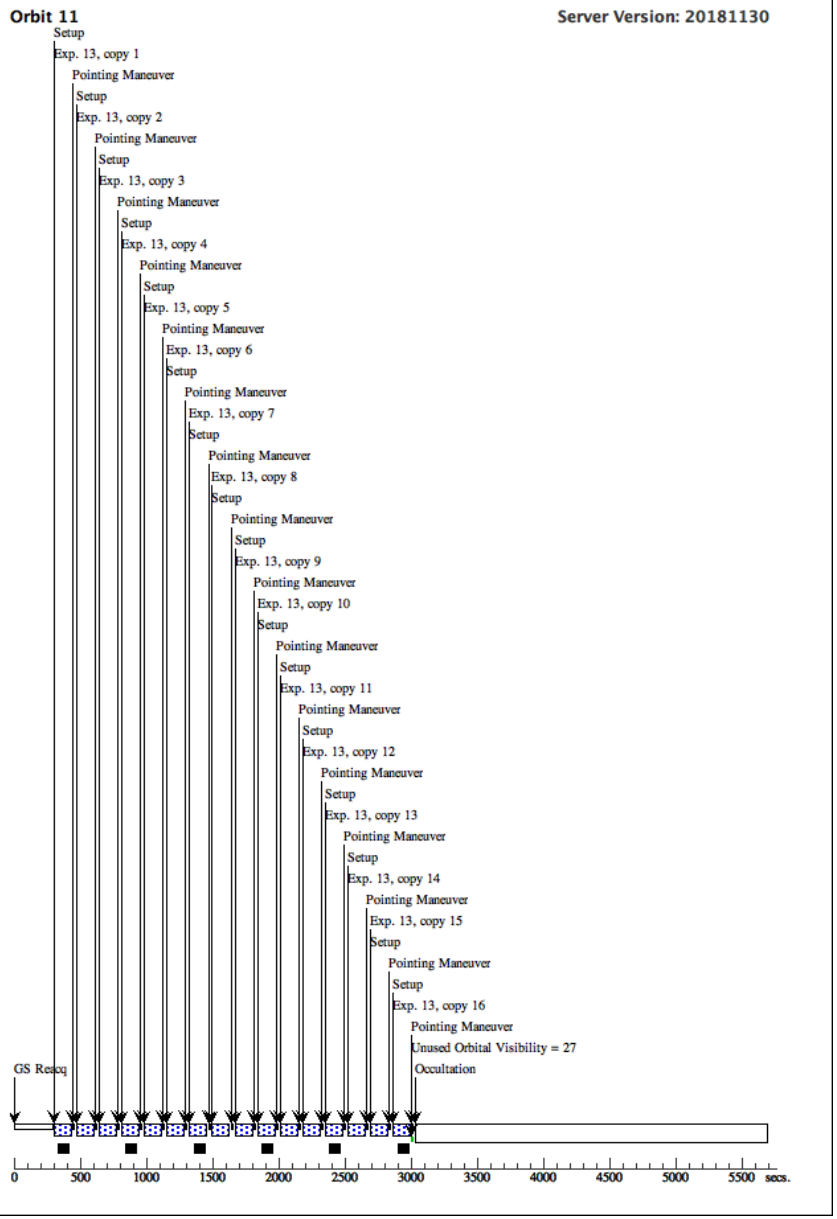
secs.


Orbit 11
Server Version: 20181130
Setup
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Pointing Maneuver
Setup
Exp. 13, copy 2
Pointing Maneuver
Setup
Exp. 13, copy 3
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Exp. 13, copy 4
Pointing Maneuver
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Exp. 13, copy 5
Pointing Maneuver
Exp. 13, copy 6
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Pointing Maneuver
Exp. 13, copy 7
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Pointing Maneuver
Exp. 13, copy 8
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Pointing Maneuver
Setup
Exp. 13, copy 9
Pointing Maneuver
Exp. 13, copy 10
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Exp. 13, copy 11
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Exp. 13, copy 13
Pointing Maneuver
Setup
Exp. 13, copy 14
Pointing Maneuver
Exp. 13, copy 15
Setup
Pointing Maneuver
Setup
Exp. 13, copy 16
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Resoq
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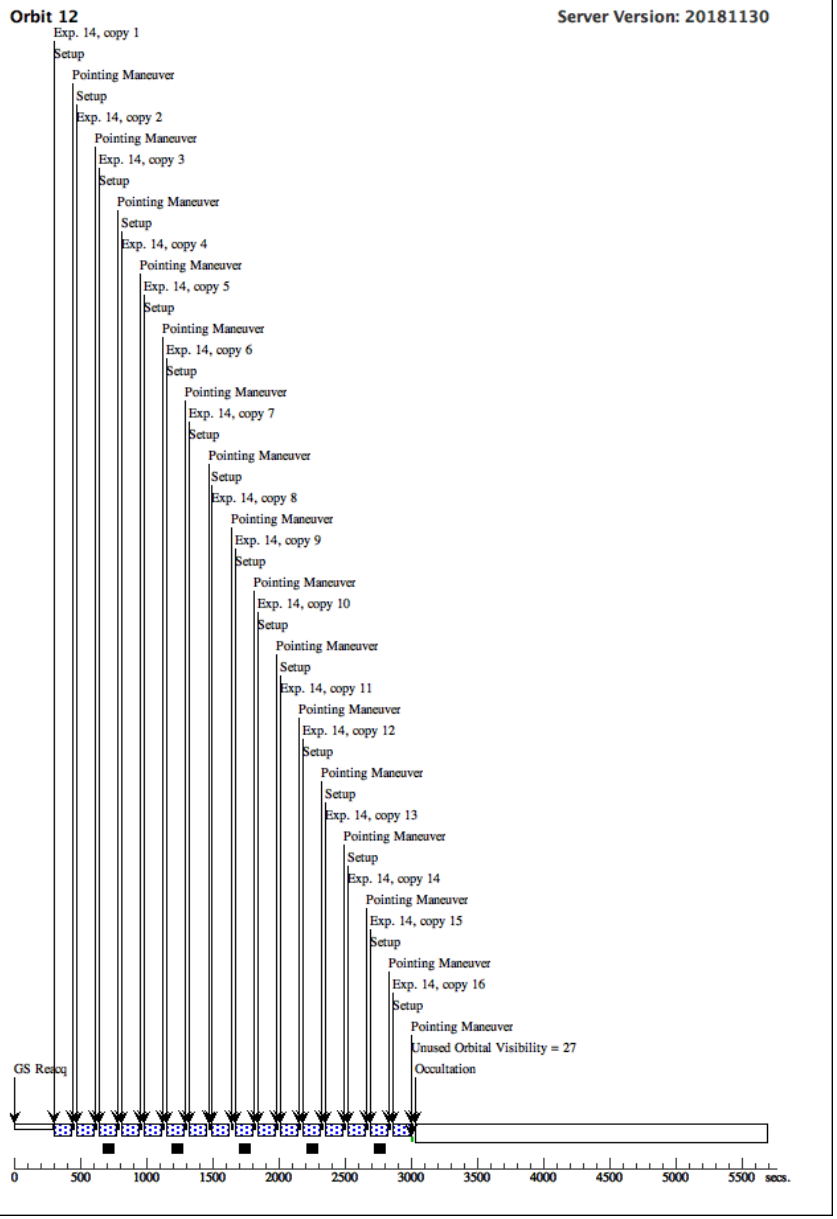
secs.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Setup
Exp. 14, copy 4
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Pointing Maneuver
Exp. 14, copy 6
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Exp. 14, copy 8
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Pointing Maneuver
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Exp. 14, copy 13
Pointing Maneuver
Setup
Exp. 14, copy 14
Pointing Maneuver
Exp. 14, copy 15
Setup
Pointing Maneuver
Exp. 14, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Reseq
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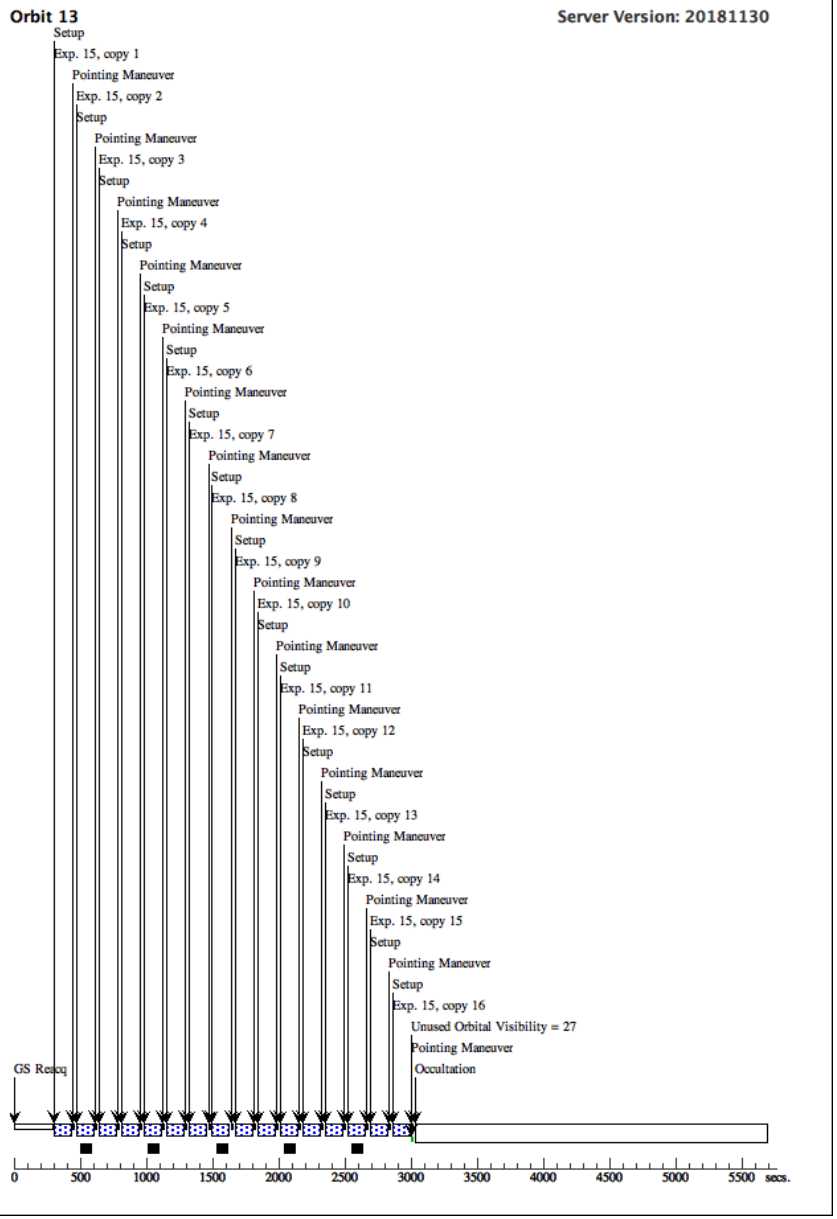
secs.


Orbit 13
Server Version: 20181130
Setup
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Exp. 15, copy 2
Setup
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Exp. 15, copy 3
Setup
Pointing Maneuver
Exp. 15, copy 4
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Pointing Maneuver
Setup
Exp. 15, copy 5
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Exp. 15, copy 6
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Exp. 15, copy 7
Pointing Maneuver
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Exp. 15, copy 8
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Exp. 15, copy 9
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Exp. 15, copy 10
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Exp. 15, copy 11
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Exp. 15, copy 12
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Setup
Exp. 15, copy 13
Pointing Maneuver
Setup
Exp. 15, copy 14
Pointing Maneuver
Exp. 15, copy 15
Setup
Pointing Maneuver
Setup
Exp. 15, copy 16
Unused Orbital Visibility = 27
Pointing Maneuver
Occultation
GS Resoq
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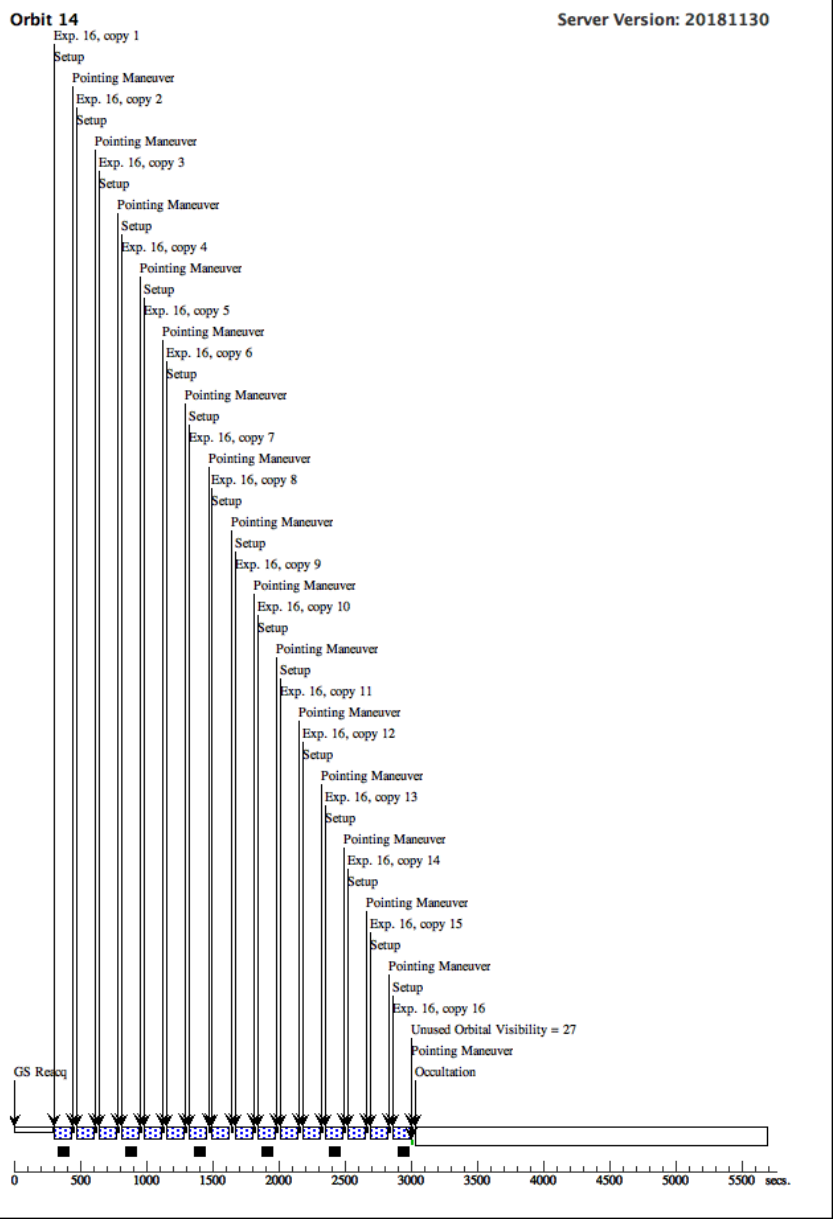
secs.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Exp. 16, copy 3
Setup
Pointing Maneuver
Setup
Exp. 16, copy 4
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Exp. 16, copy 5
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Exp. 16, copy 6
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Pointing Maneuver
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Exp. 16, copy 7
Pointing Maneuver
Exp. 16, copy 8
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Pointing Maneuver
Setup
Exp. 16, copy 9
Pointing Maneuver
Exp. 16, copy 10
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Exp. 16, copy 11
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Exp. 16, copy 12
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Pointing Maneuver
Exp. 16, copy 13
Setup
Pointing Maneuver
Exp. 16, copy 14
Setup
Pointing Maneuver
Exp. 16, copy 15
Setup
Pointing Maneuver
Setup
Exp. 16, copy 16
Unused Orbital Visibility = 27
Pointing Maneuver
Occultation
GS Reacq
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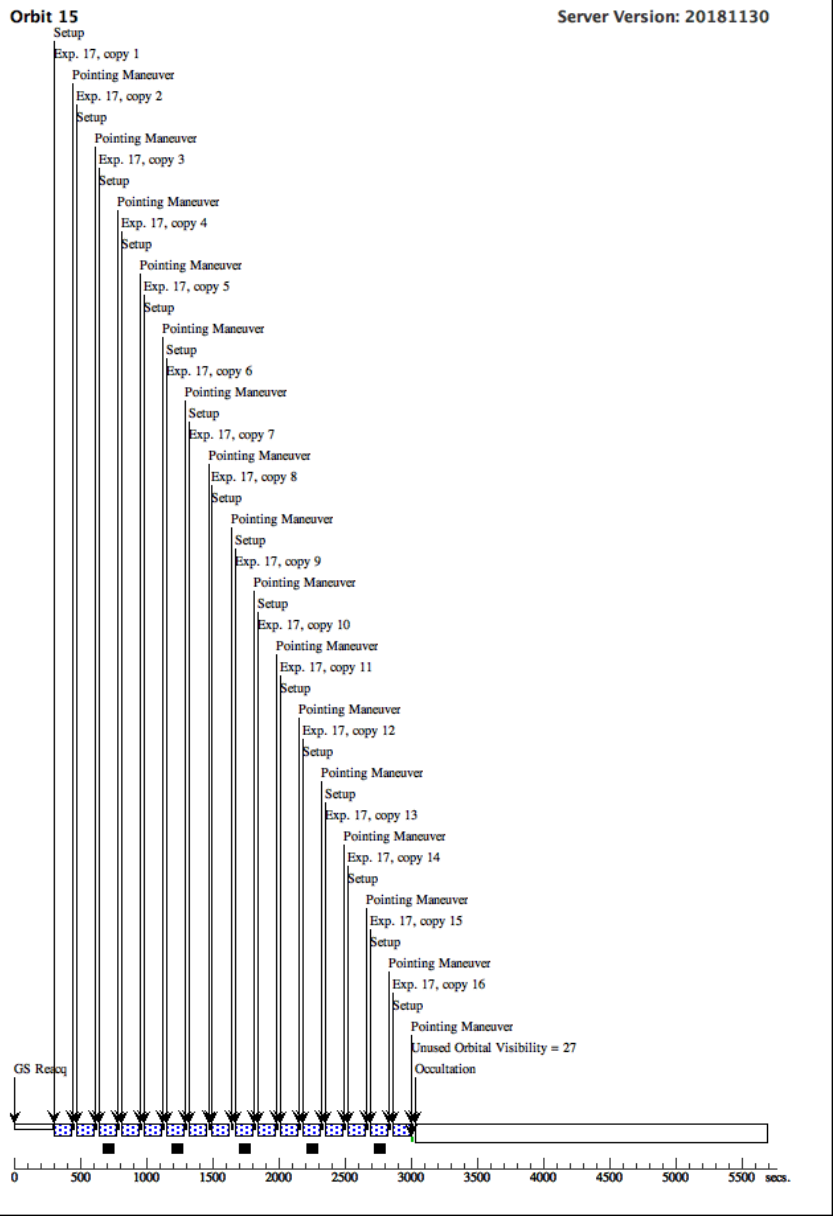
secs.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Server Version: 20181130
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Exp. 17, copy 4
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Exp. 17, copy 7
Pointing Maneuver
Exp. 17, copy 8
Setup
Pointing Maneuver
Setup
Exp. 17, copy 9
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Exp. 17, copy 10
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Exp. 17, copy 11
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Pointing Maneuver
Exp. 17, copy 12
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Pointing Maneuver
Setup
Exp. 17, copy 13
Pointing Maneuver
Exp. 17, copy 14
Setup
Pointing Maneuver
Exp. 17, copy 15
Setup
Pointing Maneuver
Exp. 17, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Reacq
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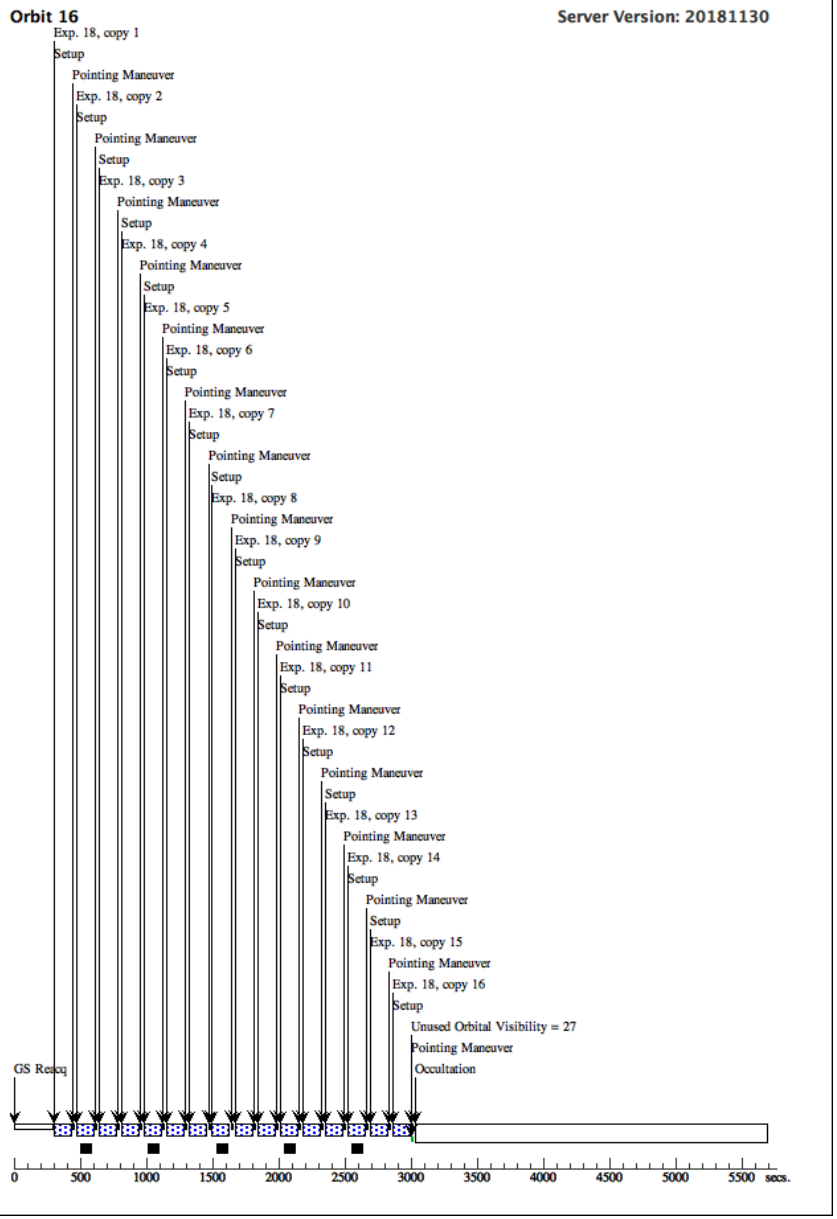
secs.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Exp. 18, copy 3
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Exp. 18, copy 4
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Exp. 18, copy 5
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Exp. 18, copy 6
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Pointing Maneuver
Exp. 18, copy 7
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Pointing Maneuver
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Exp. 18, copy 8
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Exp. 18, copy 9
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Exp. 18, copy 13
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Exp. 18, copy 14
Setup
Pointing Maneuver
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Exp. 18, copy 15
Pointing Maneuver
Exp. 18, copy 16
Setup
Unused Orbital Visibility = 27
Pointing Maneuver
Occultation
GS Resoq
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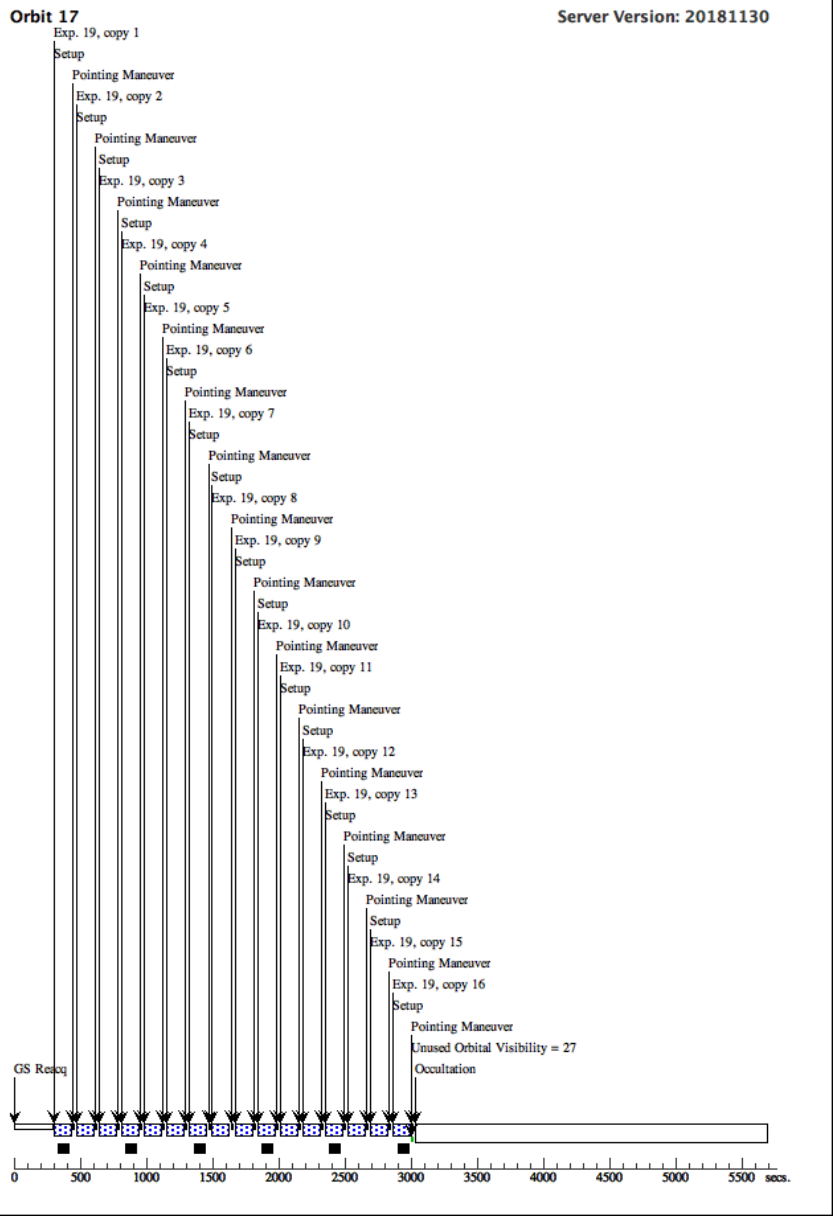
secs.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Exp. 19, copy 3
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Exp. 19, copy 4
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Exp. 19, copy 8
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Exp. 19, copy 9
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Exp. 19, copy 14
Pointing Maneuver
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Exp. 19, copy 15
Pointing Maneuver
Exp. 19, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Resoq
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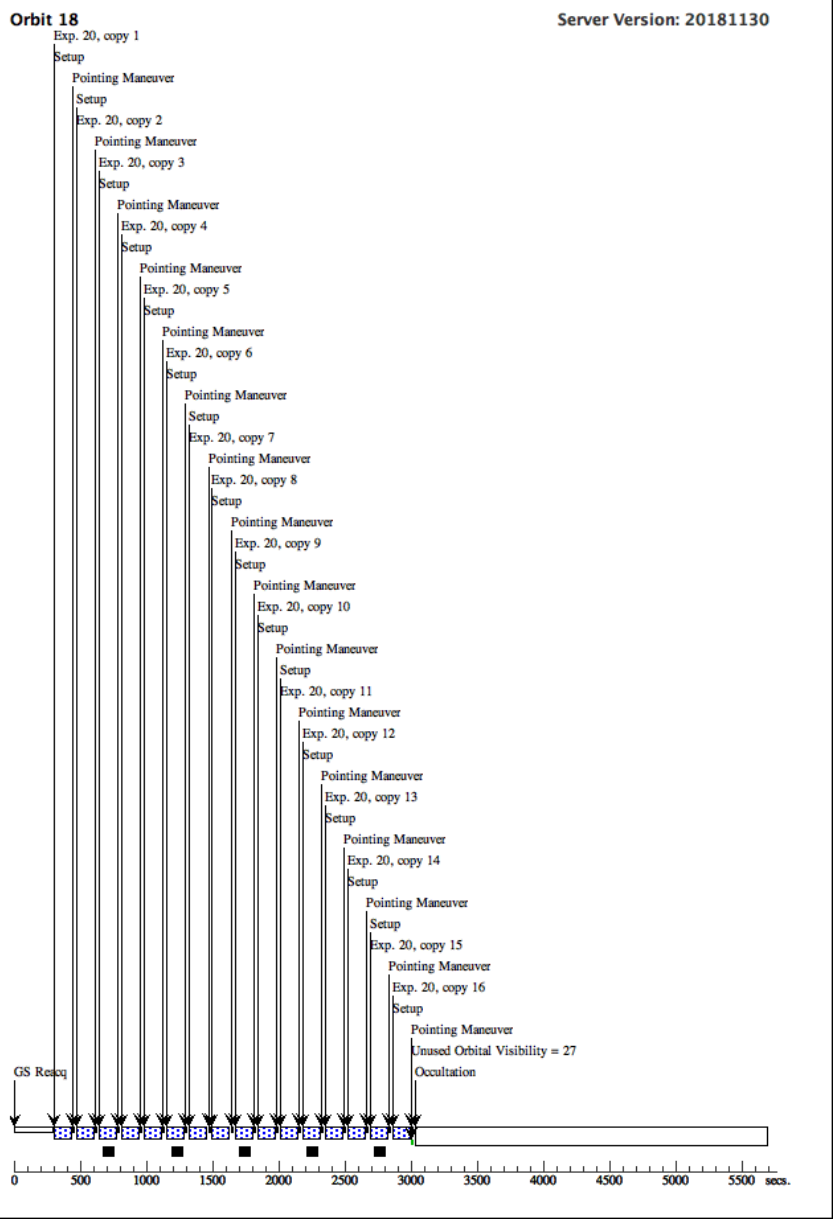
secs.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Exp. 20, copy 4
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Exp. 20, copy 7
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Exp. 20, copy 8
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Pointing Maneuver
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Pointing Maneuver
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Exp. 20, copy 13
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Exp. 20, copy 14
Setup
Pointing Maneuver
Setup
Exp. 20, copy 15
Pointing Maneuver
Exp. 20, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Reacq
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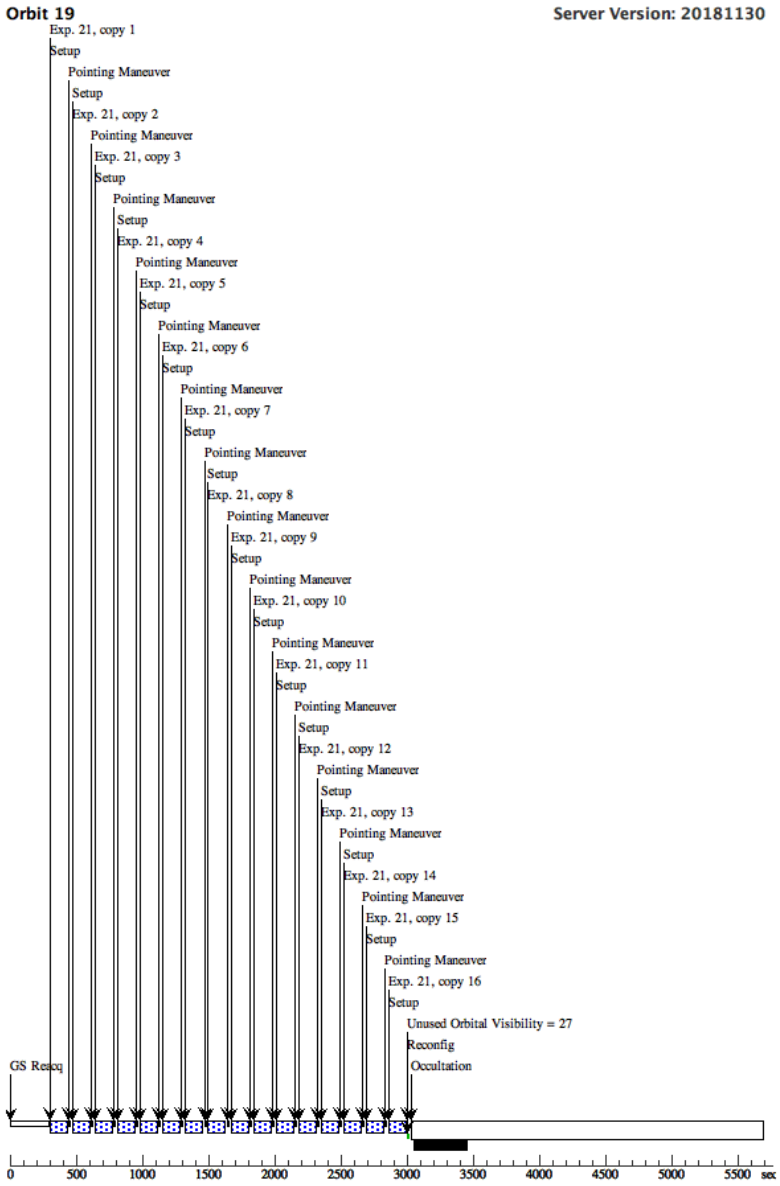
secs.


Orbit 19
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Exp. 21, copy 3
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Pointing Maneuver
Setup
Exp. 21, copy 4
Pointing Maneuver
Exp. 21, copy 5
Setup
Pointing Maneuver
Exp. 21, copy 6
Setup
Pointing Maneuver
Exp. 21, copy 7
Setup
Pointing Maneuver
Setup
Exp. 21, copy 8
Pointing Maneuver
Exp. 21, copy 9
Setup
Pointing Maneuver
Exp. 21, copy 10
Setup
Pointing Maneuver
Exp. 21, copy 11
Setup
Pointing Maneuver
Setup
Exp. 21, copy 12
Pointing Maneuver
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Exp. 21, copy 13
Pointing Maneuver
Setup
Exp. 21, copy 14
Pointing Maneuver
Exp. 21, copy 15
Setup
Pointing Maneuver
Exp. 21, copy 16
Setup
Unused Orbital Visibility = 27
Reconfig
Occultation
GS Resoq
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sec

Visit

Proposal 15134, WASP-121 WFC3 (02), implementation Wed Dec 19 14:06:25 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR

Special Requirements: SCHED 80%; SAME ORIENT AS 01; AFTER 01 BY 18.9 Orbits TO 19.1 Orbits

Comments: Please see Proposal Description for important notes on SAA crossing.

We have defined each HST orbit within a non-interruptible sequence, to ensure that all exposures defined within the sequence are taken during the same HST orbit. We will use forward spatial scanning mode to avoid saturation on relatively long exposures and increase observing efficiency.

Visit orientation requirements have been defined to avoid spectra from nearby stars overlapping the target spectrum.

Phase constraints have been specified to maximize phase coverage of the primary transits and secondary eclipses achieved by the two visits of our program.

Diagnostics

(WASP-121 WFC3 (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WASP-121	RA: 07 10 24.0580 (107.6002417d)	Proper Motion RA: -2.993 mas/yr	V=10.5	Reference Frame: SIMBAD
		Dec: -39 05 50.55 (-39.09737d)	Proper Motion Dec: 25.086 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

Comments:
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM, F3-F9]

Exposures

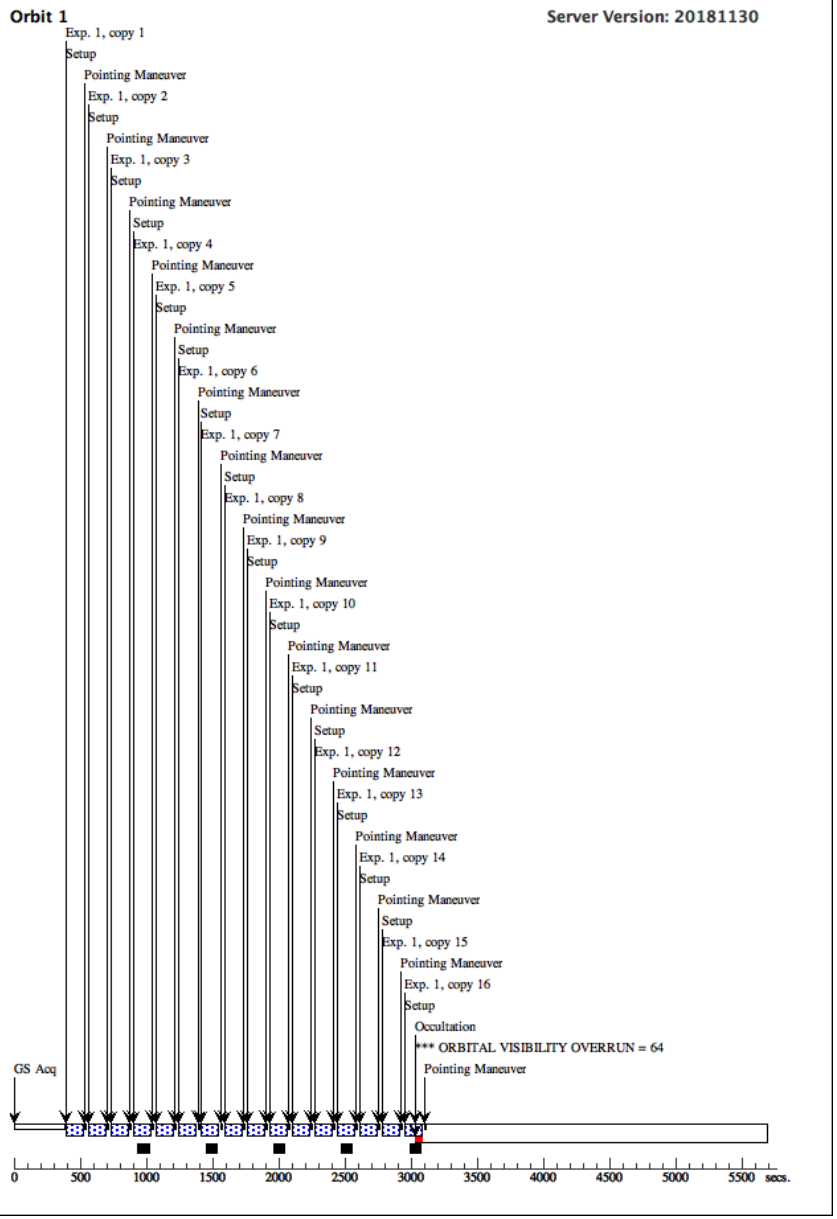
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Science 19	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward; GSPAIR S63I000677F2S63I000202F1	Sequence 1-1 Non-Int in WASP-121 WFC3 (02)	103.128633 Secs X 16 (1650.058 Secs)	
								[==>(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)]*	***[1]***
Comments: Visit 02 should follow directly from Visit 01 in a contiguous sequence of 26 HST orbits in total.									
2	Science 20	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 2-2 Non-Int in WASP-121 WFC3 (02)	103.128633 Secs X 16 (1650.058 Secs)	
								[==>(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)]*	***[2]***

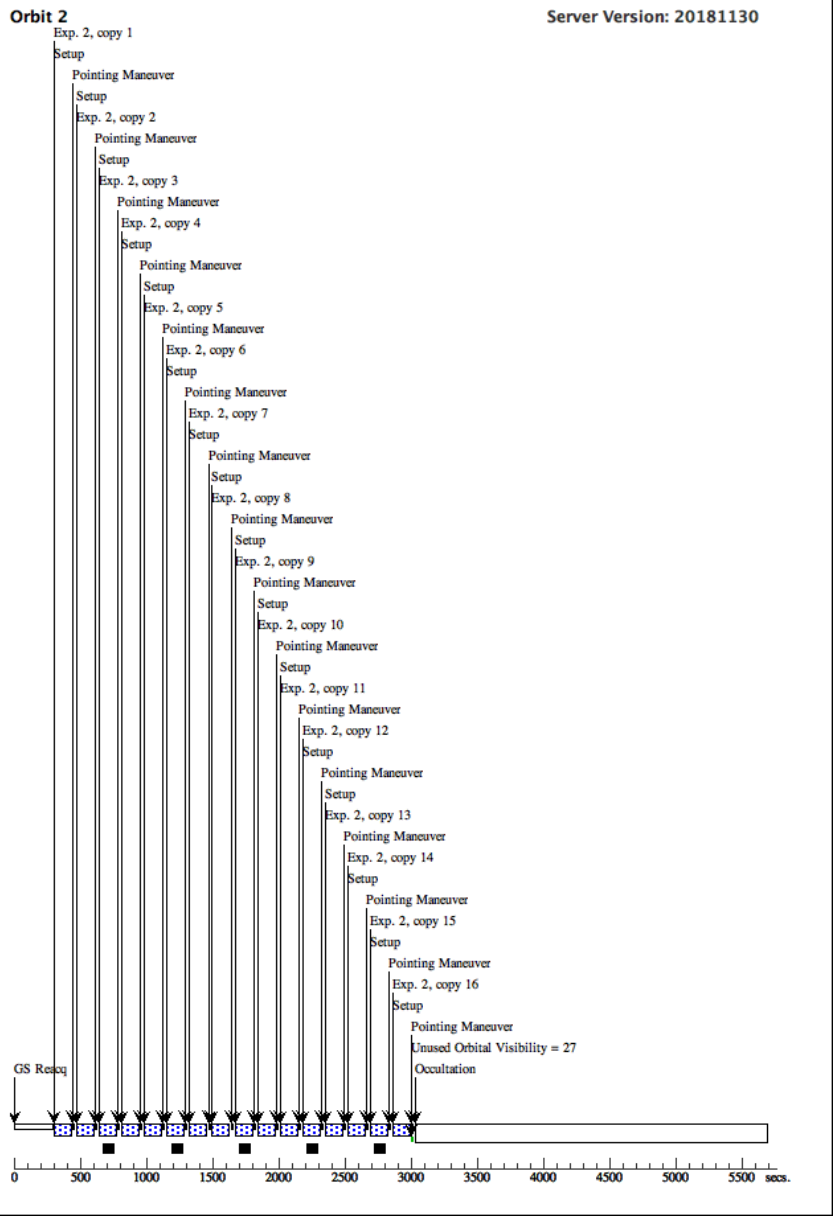
	3	Science 21	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 3-3 Non-Int in WASP-121 WFC3 (02)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]*	***[3]***
	4	Science 22	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 4-4 Non-Int in WASP-121 WFC3 (02)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(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)]*	***[4]***

	5	Science 23	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 5-5 Non-Int in WASP-121 WFC3 (02)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(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)]*	***[5]***
	6	Science 24	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 6-6 Non-Int in WASP-121 WFC3 (02)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(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)]*	***[6]***

	7	Science 25	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 7-7 Non-Int in WASP-121 WFC3 (02)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(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)]*	***[7]***

Orbit Structure

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Unused Orbital Visibility = 27
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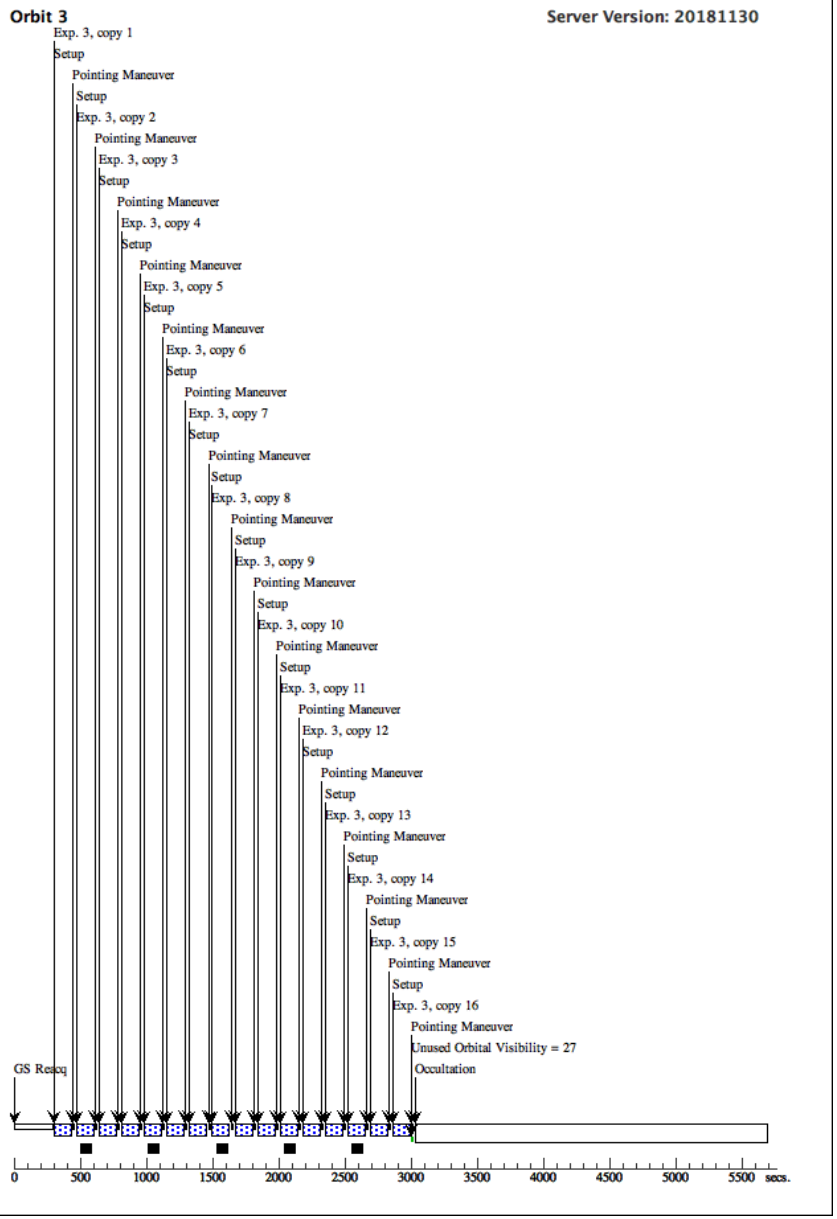
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Unused Orbital Visibility = 27
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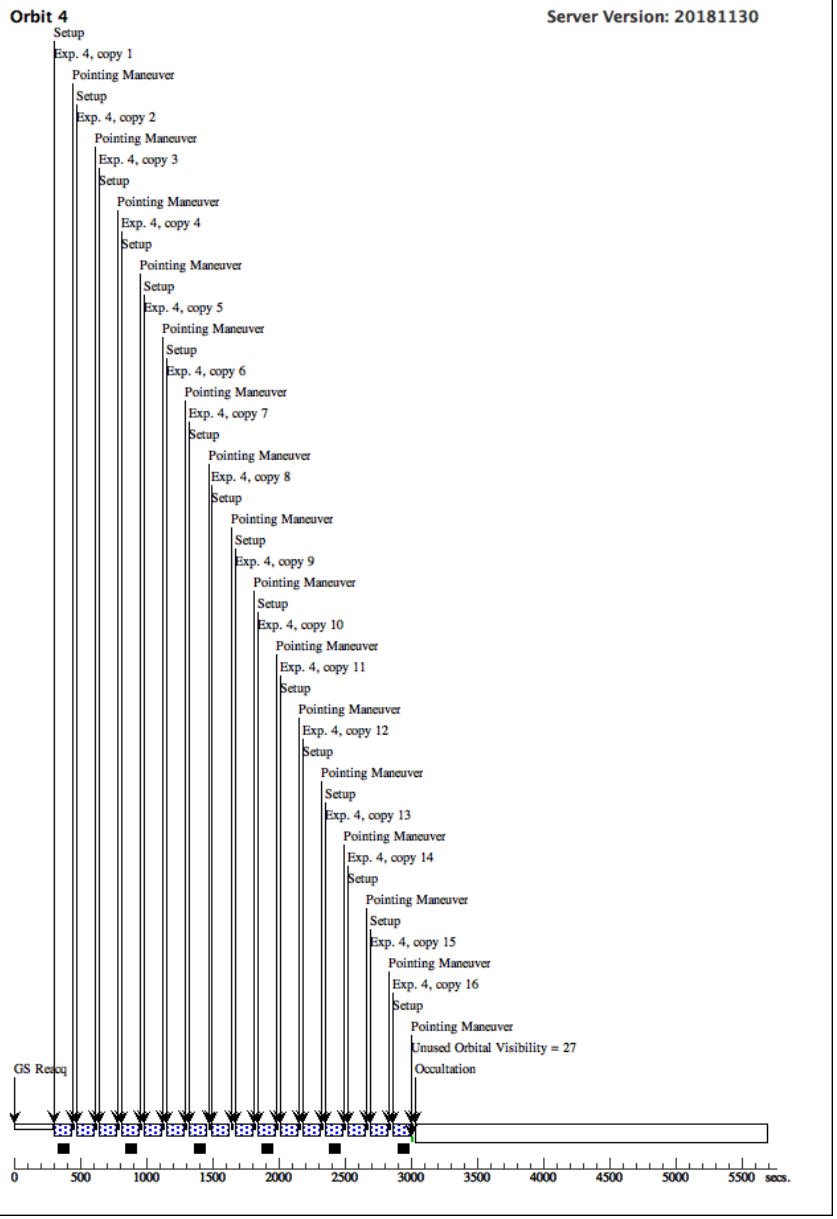
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Unused Orbital Visibility = 27
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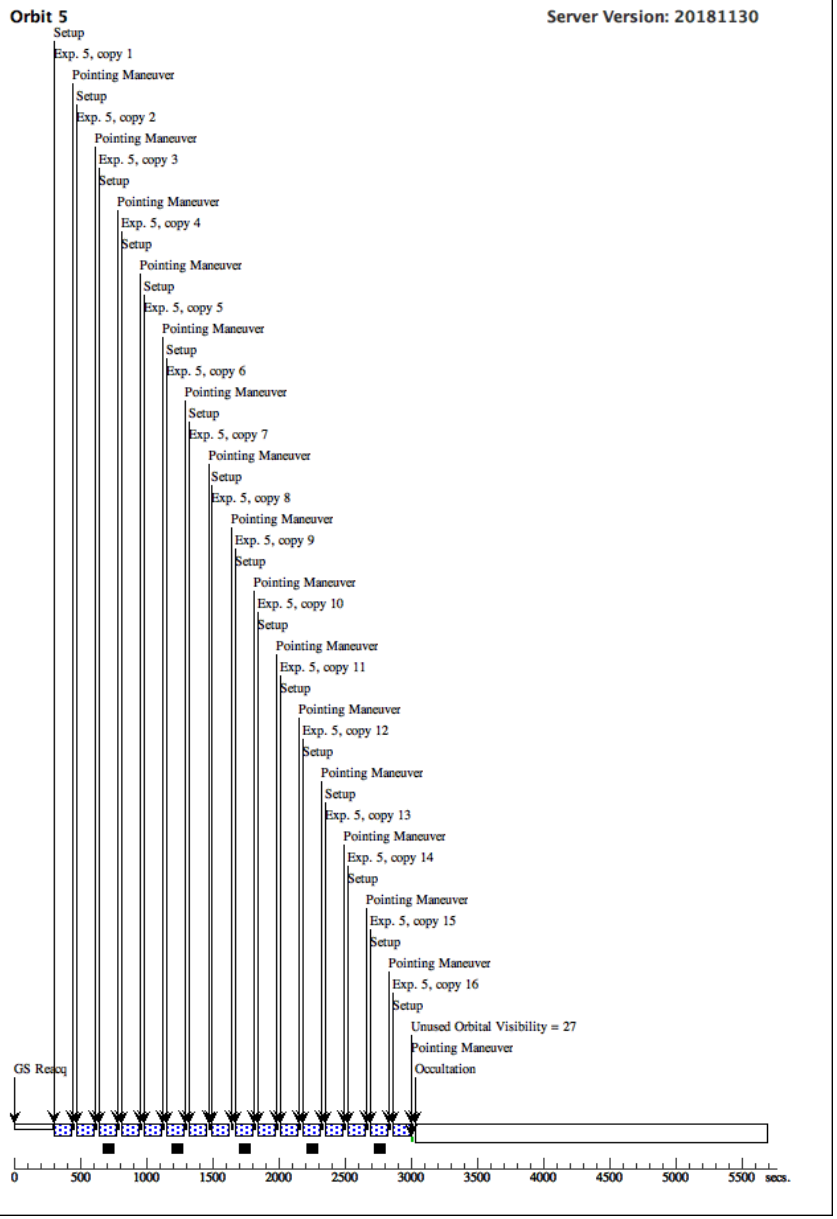
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Unused Orbital Visibility = 27
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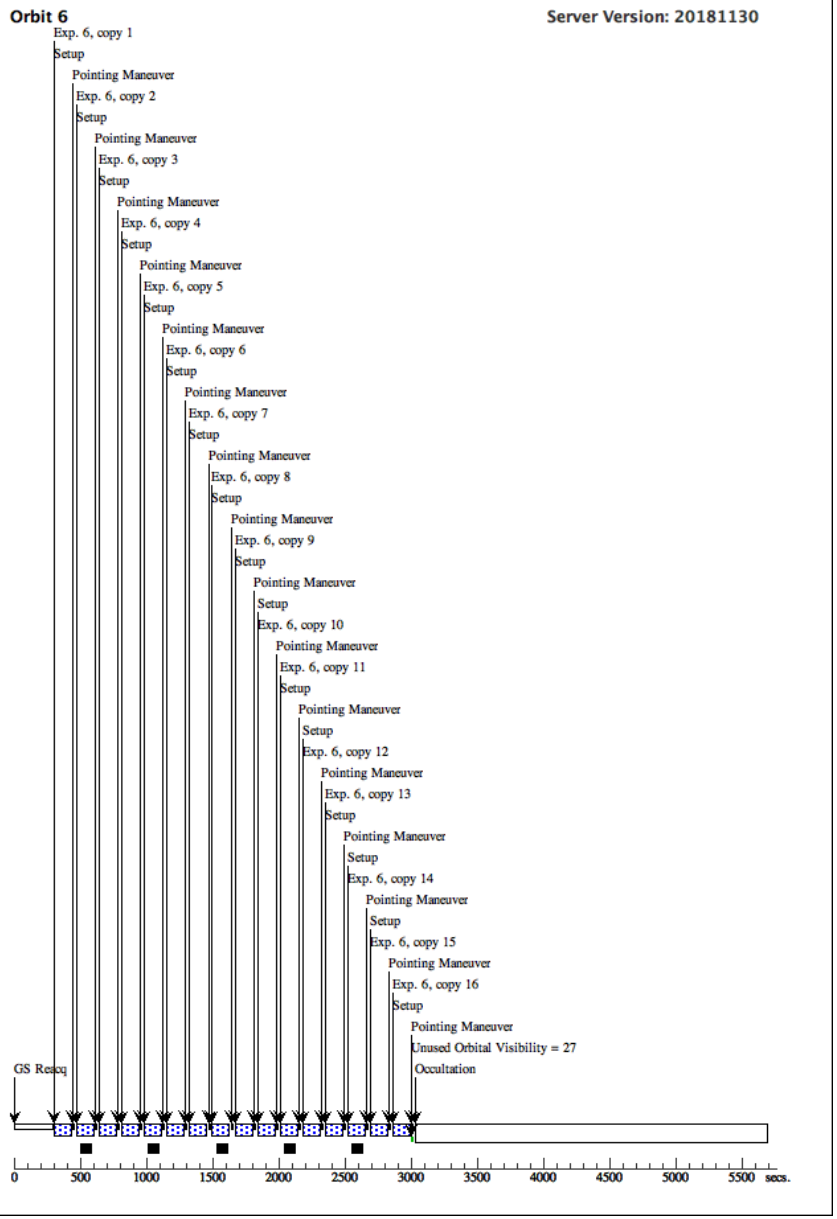
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Unused Orbital Visibility = 27
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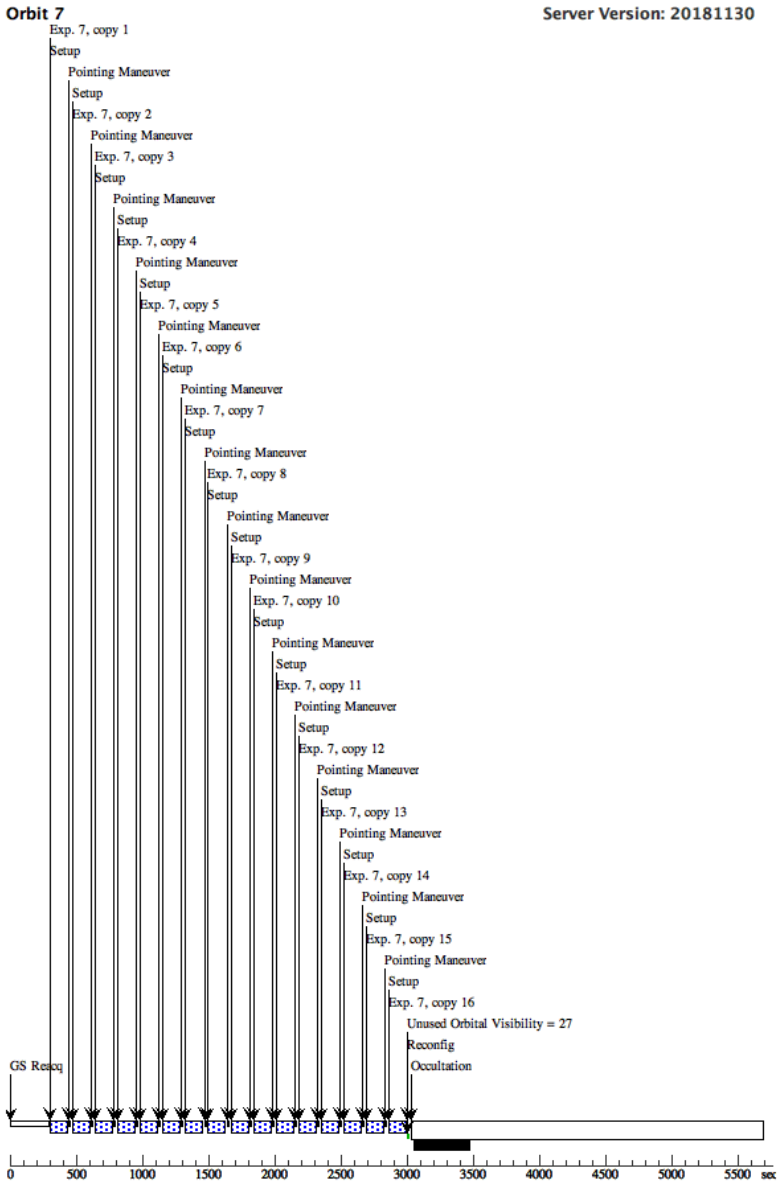
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Exp. 7, copy 16
Unused Orbital Visibility = 27
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Visit

Proposal 15134, WASP-121 WFC3 (03), completed Wed Dec 19 14:06:26 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR

Special Requirements: SCHED 80%; ORIENT 25D TO 50 D; ORIENT 125D TO 140 D; ORIENT 310D TO 325 D; ORIENT 200D TO 220 D; Period 1.2749255 D AND ZERO-PHASE HJD2457424.88650151

Comments: Please see Proposal Description for important notes on SAA crossing.

We have defined each HST orbit within a non-interruptible sequence, to ensure that all exposures defined within the sequence are taken during the same HST orbit. We will use forward spatial scanning mode to avoid saturation on relatively long exposures and increase observing efficiency.

Visit orientation requirements have been defined to avoid spectra from nearby stars overlapping the target spectrum.

Phase constraints have been specified to maximize phase coverage of the primary transits and secondary eclipses achieved by the two visits of our program.

Diagnostics

(WASP-121 WFC3 (03)) Warning (Orbit Planner): LONG SU LIKELY TO INTERSECT THE SAA

(WASP-121 WFC3 (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WASP-121	RA: 07 10 24.0580 (107.6002417d)	Proper Motion RA: -2.993 mas/yr	V=10.5	Reference Frame: SIMBAD
		Dec: -39 05 50.55 (-39.09737d)	Proper Motion Dec: 25.086 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

Comments:
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM, F3-F9]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition 1	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	F130N	NSAMP=3; SAMP-SEQ=RAPID	GSPAIR S63I00067 7F2S63I000202F1	Sequence 1-2 Non-Int in WASP-121 WFC 3 (03)	0.833445 Secs (0.833 Secs) *[==>]*	 ***[1]***
Comments: Phase-constrained									
2	Science 1	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 1-2 Non-Int in WASP-121 WFC 3 (03)	103.128633 Secs X 15 (1546.929 Secs) *[==>(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)]*	 ***[1]***
3	Science 2	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward; PHASE 0.3629 TO 0.3689	Sequence 3-4 Non-Int in WASP-121 WFC 3 (03)	103.128633 Secs (103.129 Secs) *[==>]*	 ***[2]***
4	Science 2	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 3-4 Non-Int in WASP-121 WFC 3 (03)	103.128633 Secs X 15 (1546.929 Secs) *[==>(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)]*	 ***[2]***

	5	Science 3	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 5-5 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[3]***
	6	Science 4	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 6-6 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[4]***

	7	Science 5	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 7-7 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(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)]*	***[5]***
	8	Science 6	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 8-8 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(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)]*	***[6]***

	9	Science 7	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.0 73,90.0 Degrees,Forward	Sequence 9-9 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[7]***
	10	Science 8	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.0 73,90.0 Degrees,Forward	Sequence 10-10 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[8]***

11	Science 9	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 11-11 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)		
								[==>(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)]*	***[9]***
12	Science 10	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward; NEW OBSET FULL ACQ	Sequence 12-12 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)		
								[==>(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)]*	***[10]***

	13	Science 11	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 13-13 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)	
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	14	Science 12	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 14-14 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)	
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15	Science 13	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 15-15 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)		
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16	Science 14	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 16-16 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)		
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	17	Science 15	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.0 73,90.0 Degrees,Forward	Sequence 17-17 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)	
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	18	Science 16	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.0 73,90.0 Degrees,Forward	Sequence 18-18 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)	
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	19	Science 17	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.0 73,90.0 Degrees,Forward	Sequence 19-19 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[17]***
	20	Science 18	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.0 73,90.0 Degrees,Forward	Sequence 20-20 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[18]***

	21	Science 18	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 21-21 Non-Int in WASP-121 WFC3 (03)	103.128633 Secs X 16 (1650.058 Secs)	
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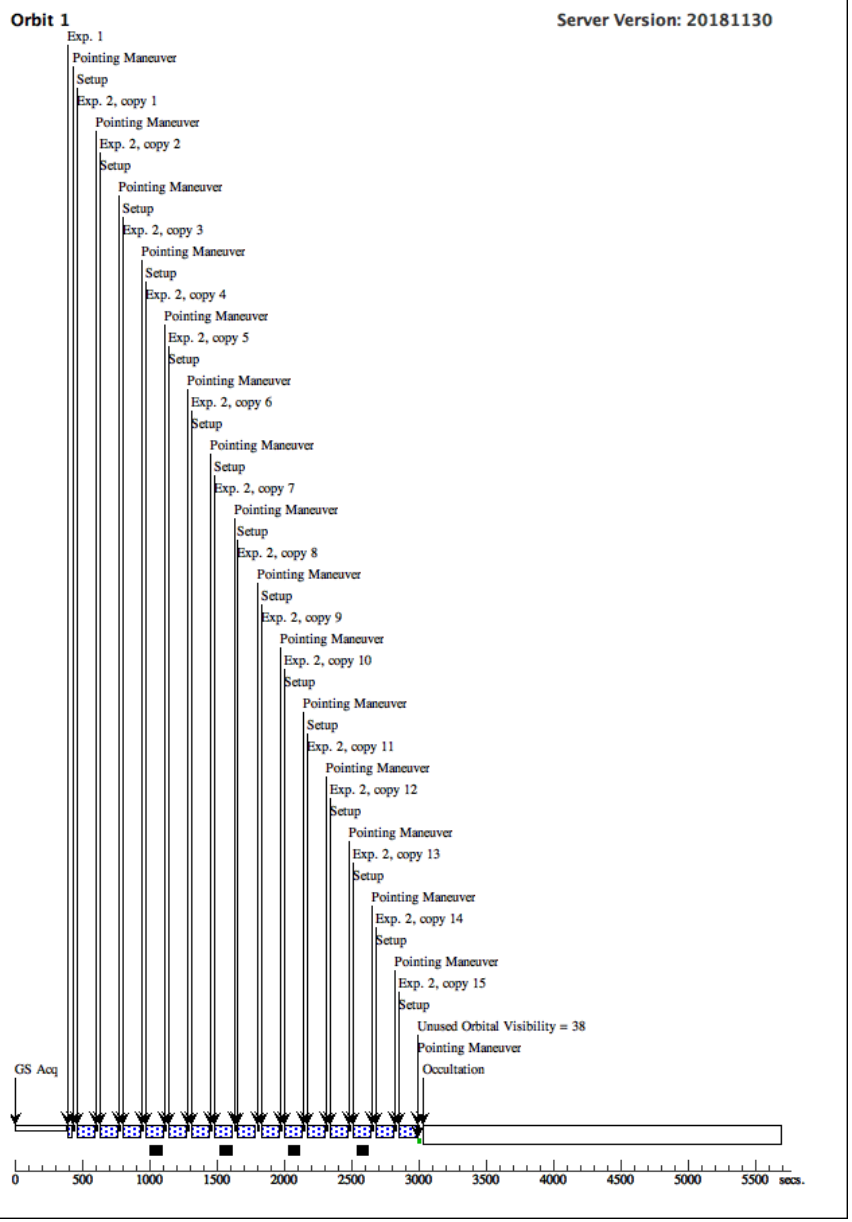

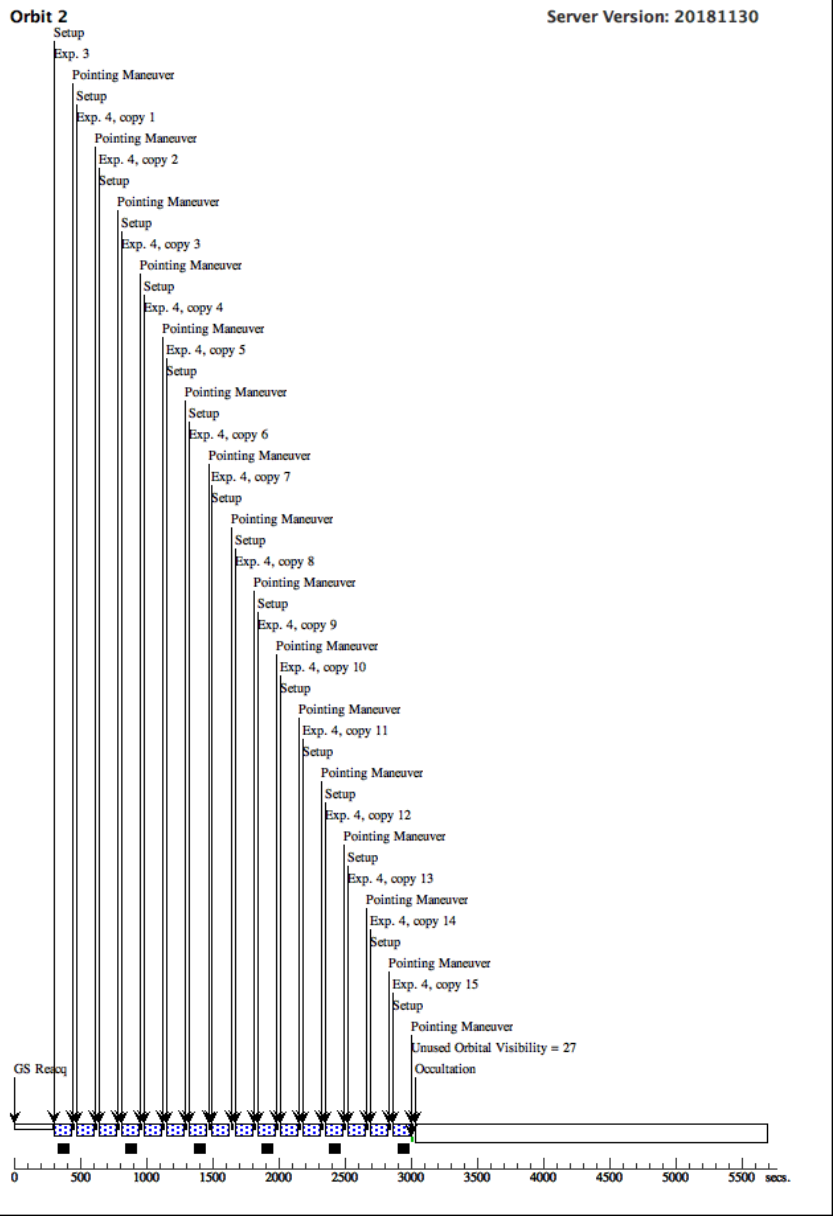
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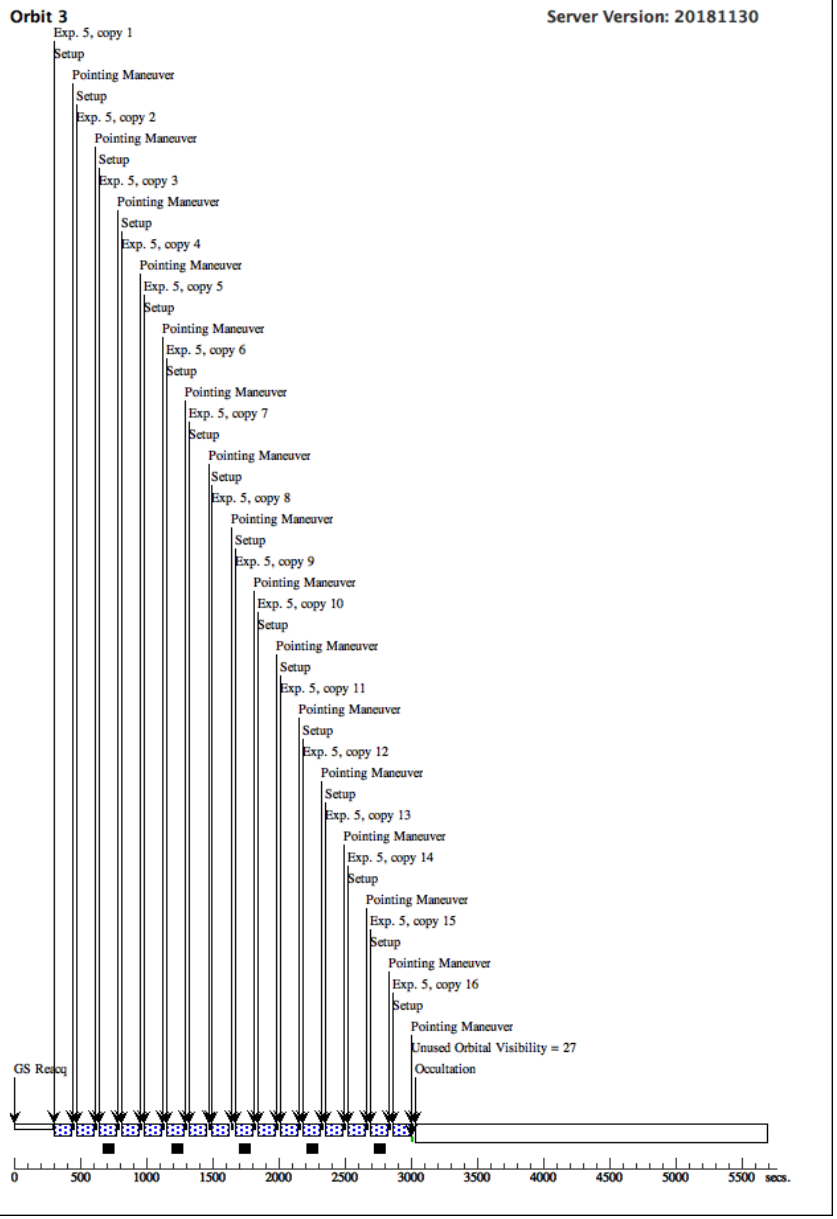
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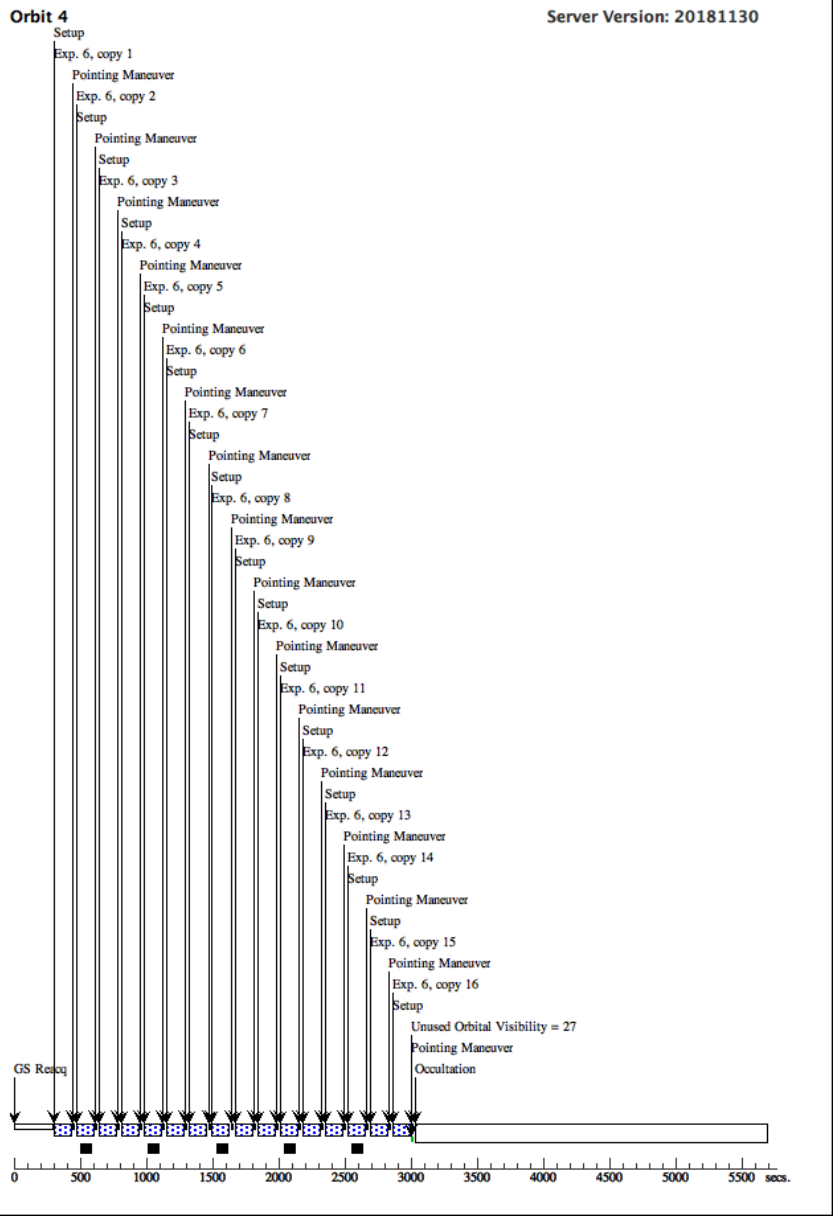
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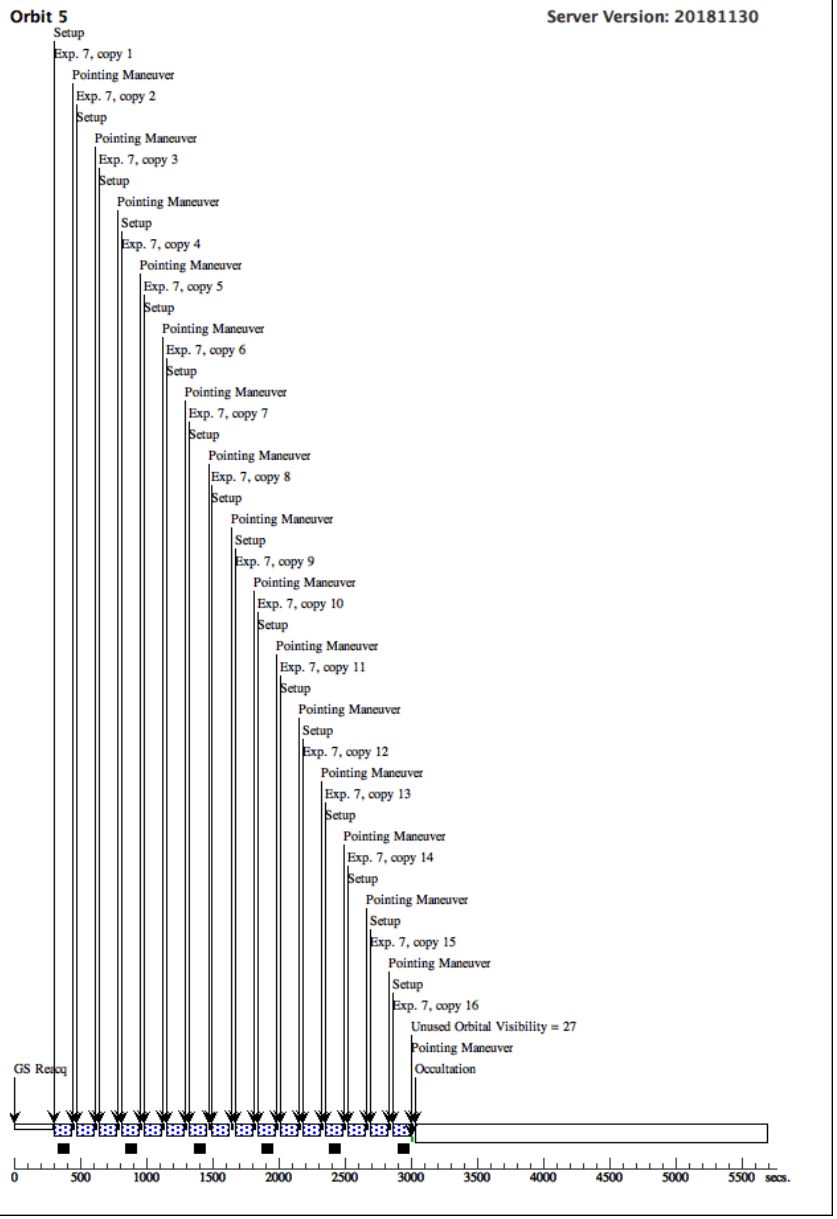
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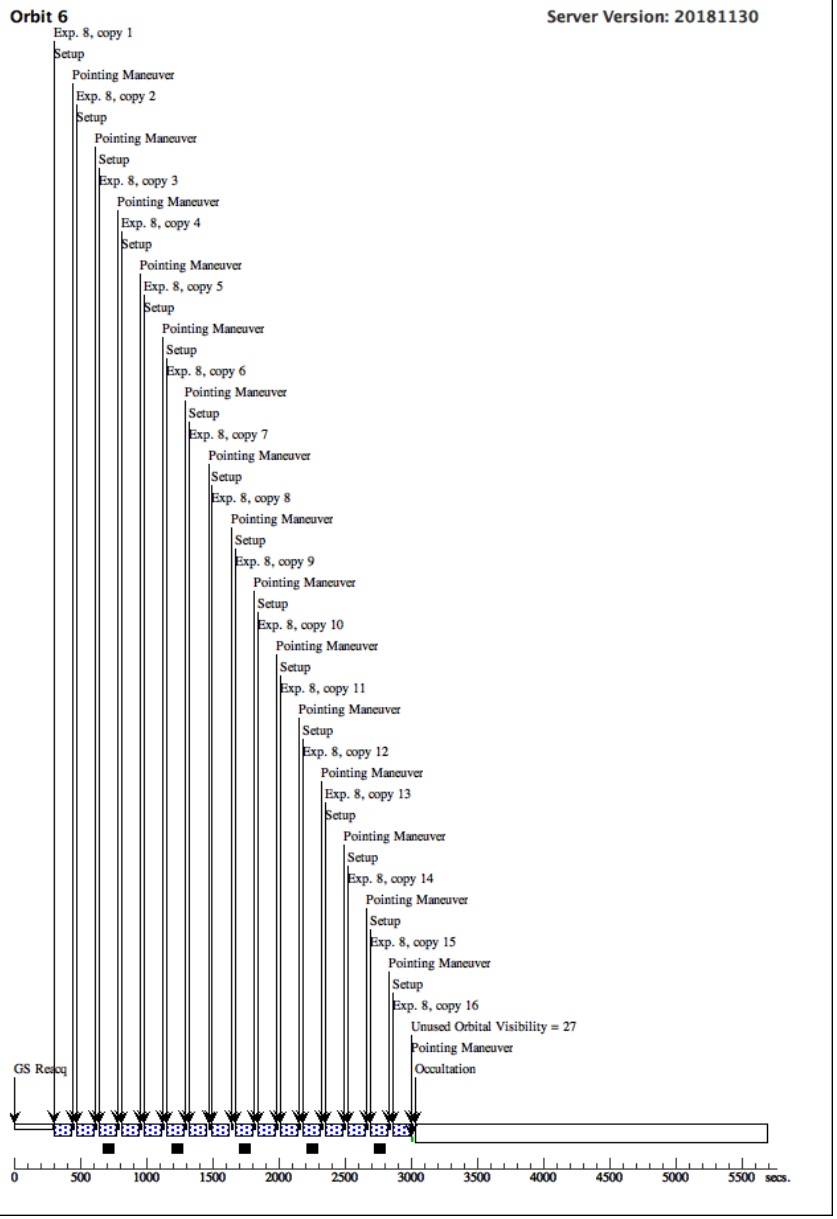
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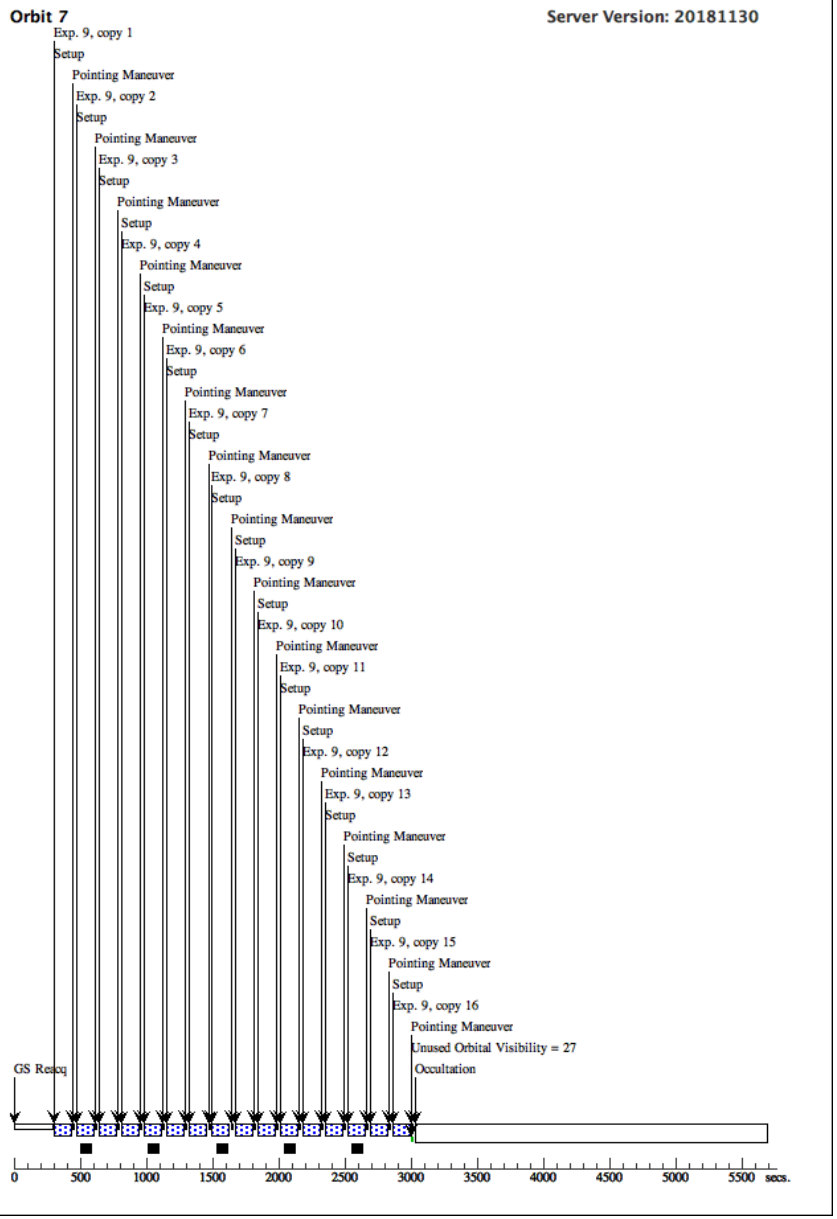
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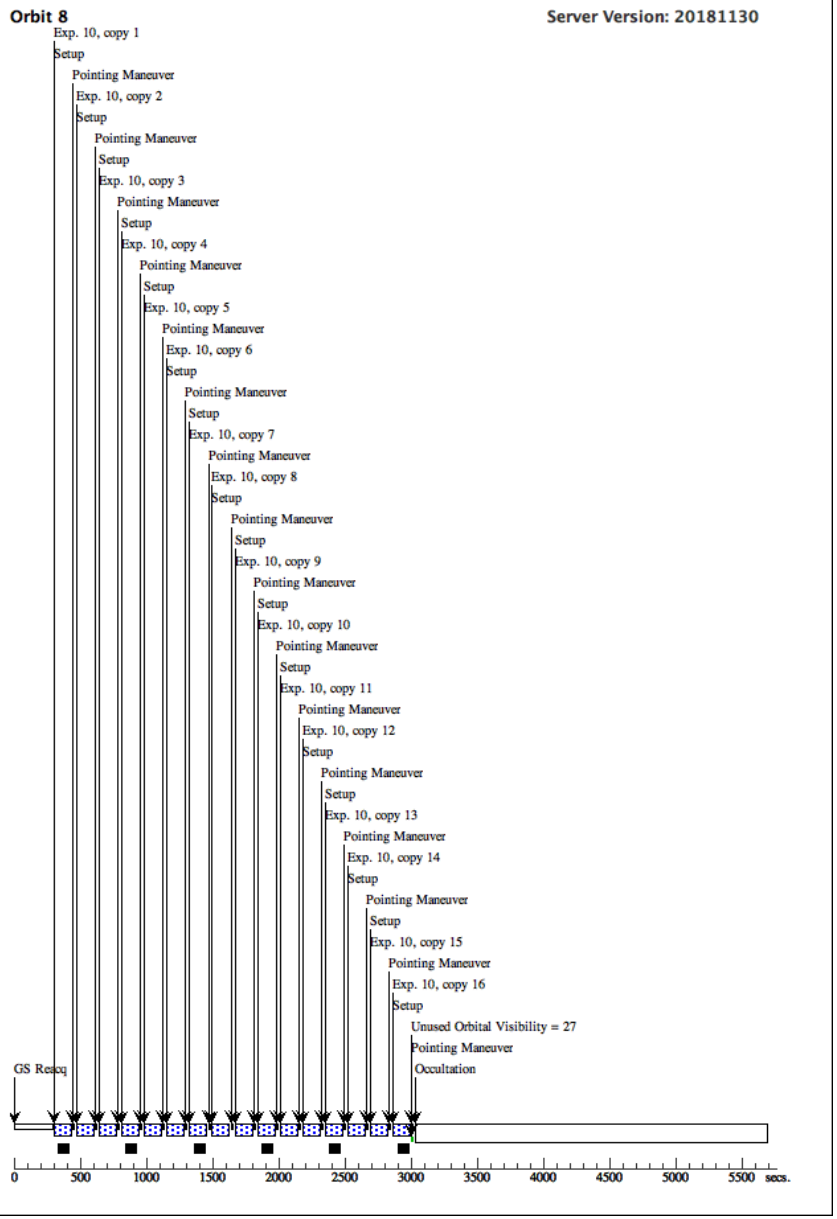
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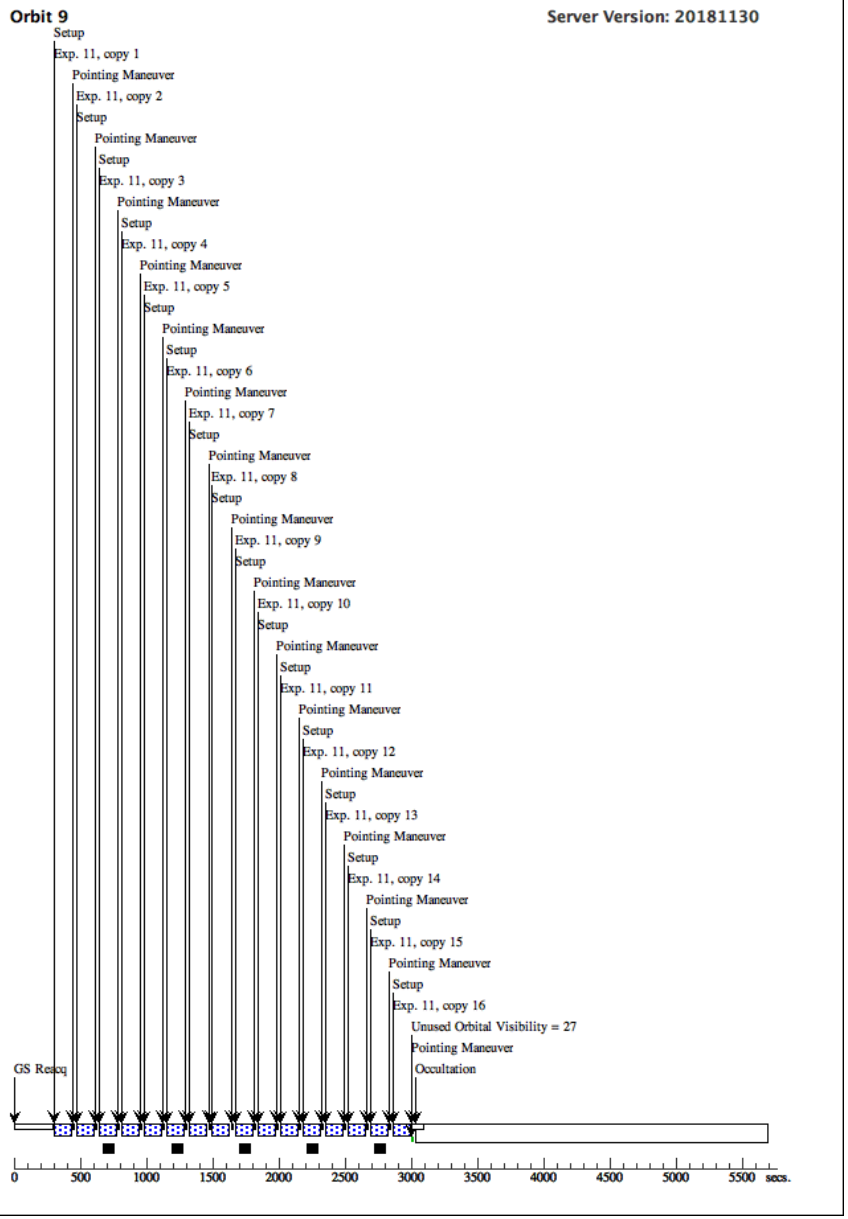
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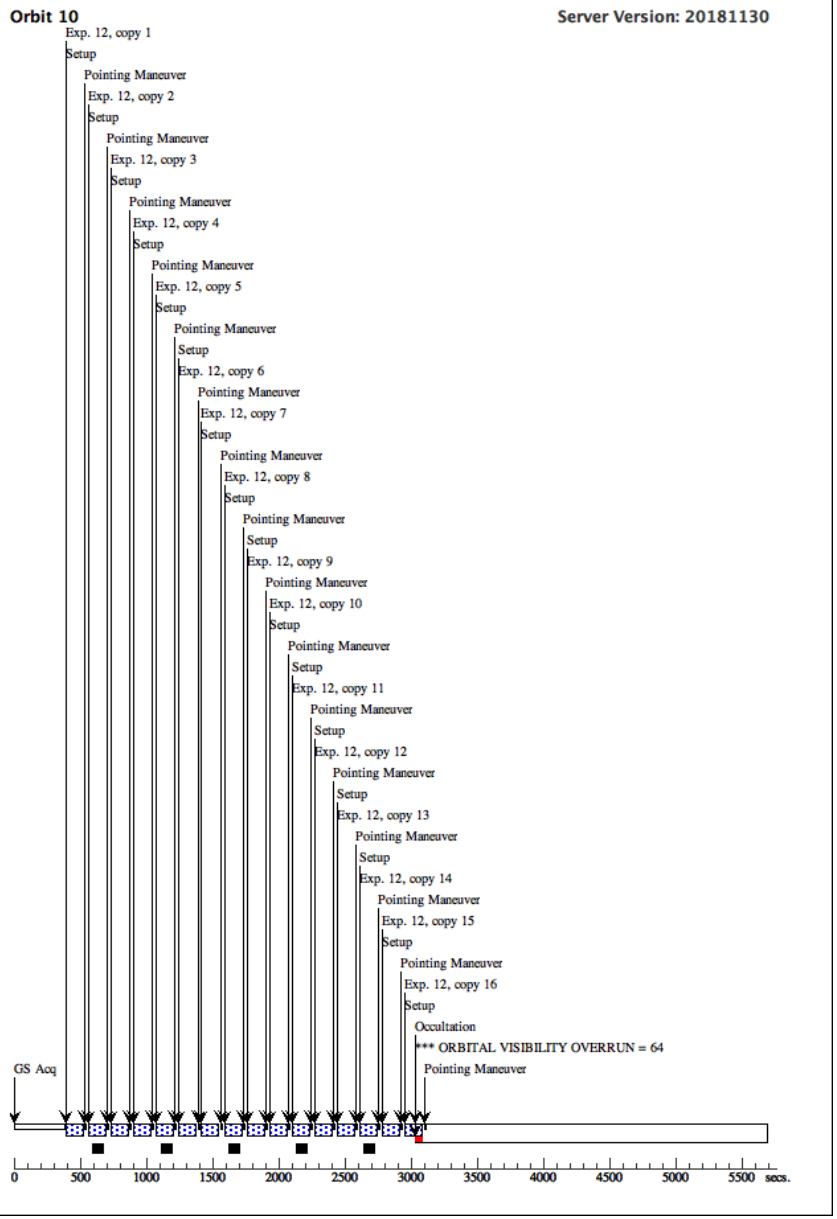
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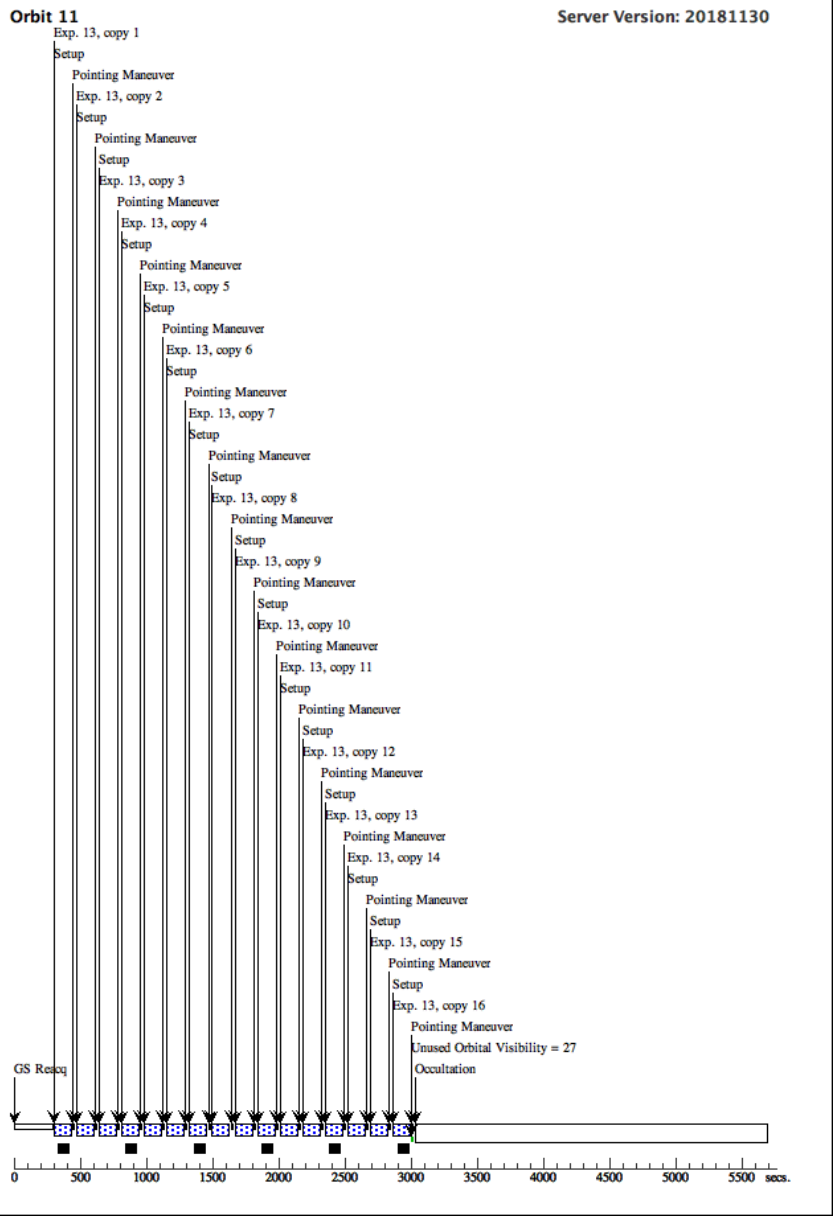
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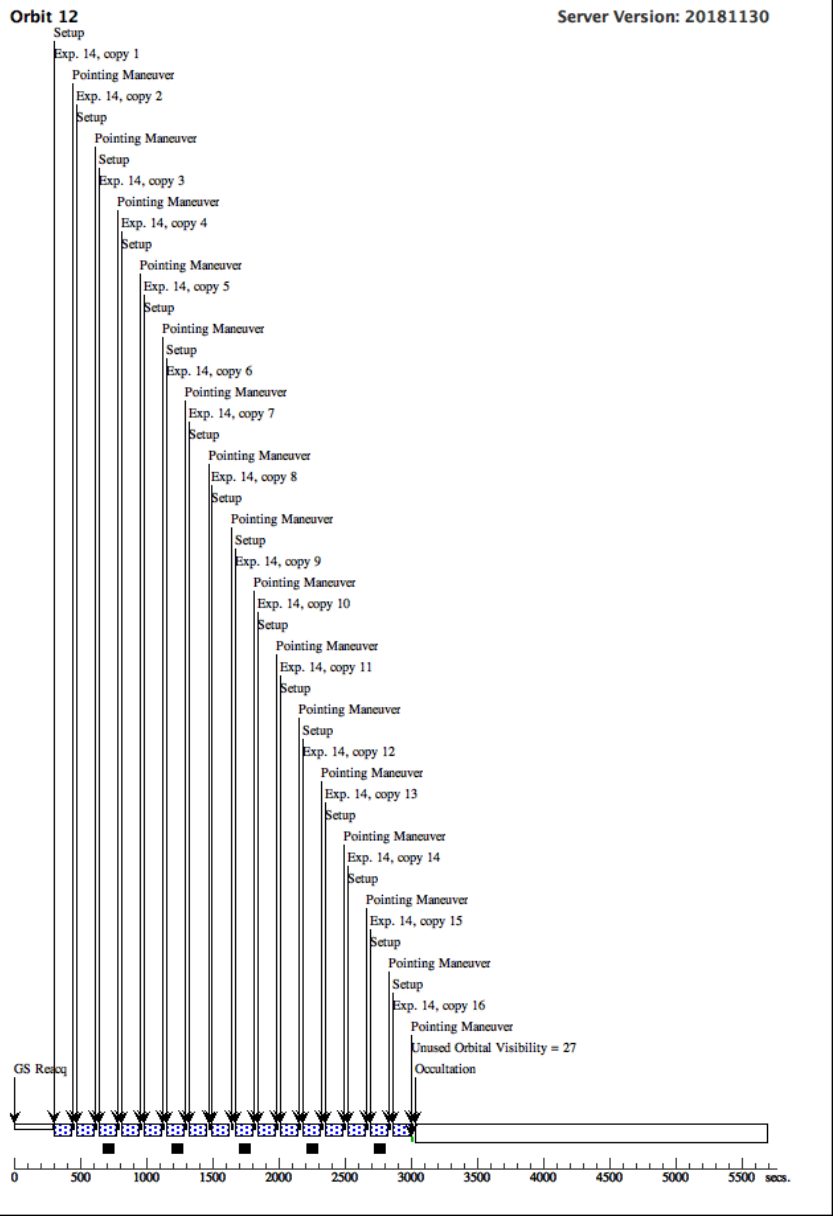
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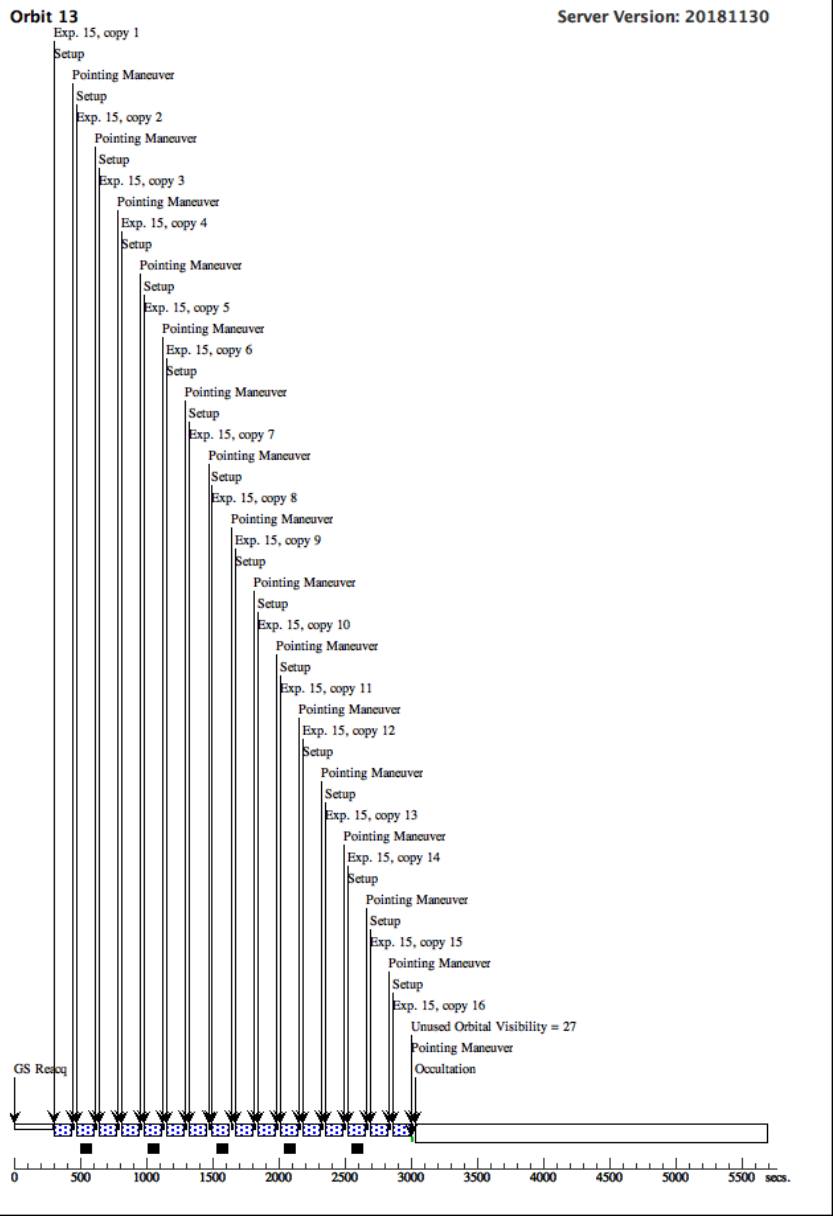
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Pointing Maneuver
Setup
Exp. 15, copy 3
Pointing Maneuver
Exp. 15, copy 4
Setup
Pointing Maneuver
Setup
Exp. 15, copy 5
Pointing Maneuver
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Pointing Maneuver
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Exp. 15, copy 7
Pointing Maneuver
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Exp. 15, copy 8
Pointing Maneuver
Exp. 15, copy 9
Setup
Pointing Maneuver
Setup
Exp. 15, copy 10
Pointing Maneuver
Setup
Exp. 15, copy 11
Pointing Maneuver
Exp. 15, copy 12
Setup
Pointing Maneuver
Setup
Exp. 15, copy 13
Pointing Maneuver
Exp. 15, copy 14
Setup
Pointing Maneuver
Setup
Exp. 15, copy 15
Pointing Maneuver
Setup
Exp. 15, copy 16
Unused Orbital Visibility = 27
Pointing Maneuver
Occultation
GS Resoq
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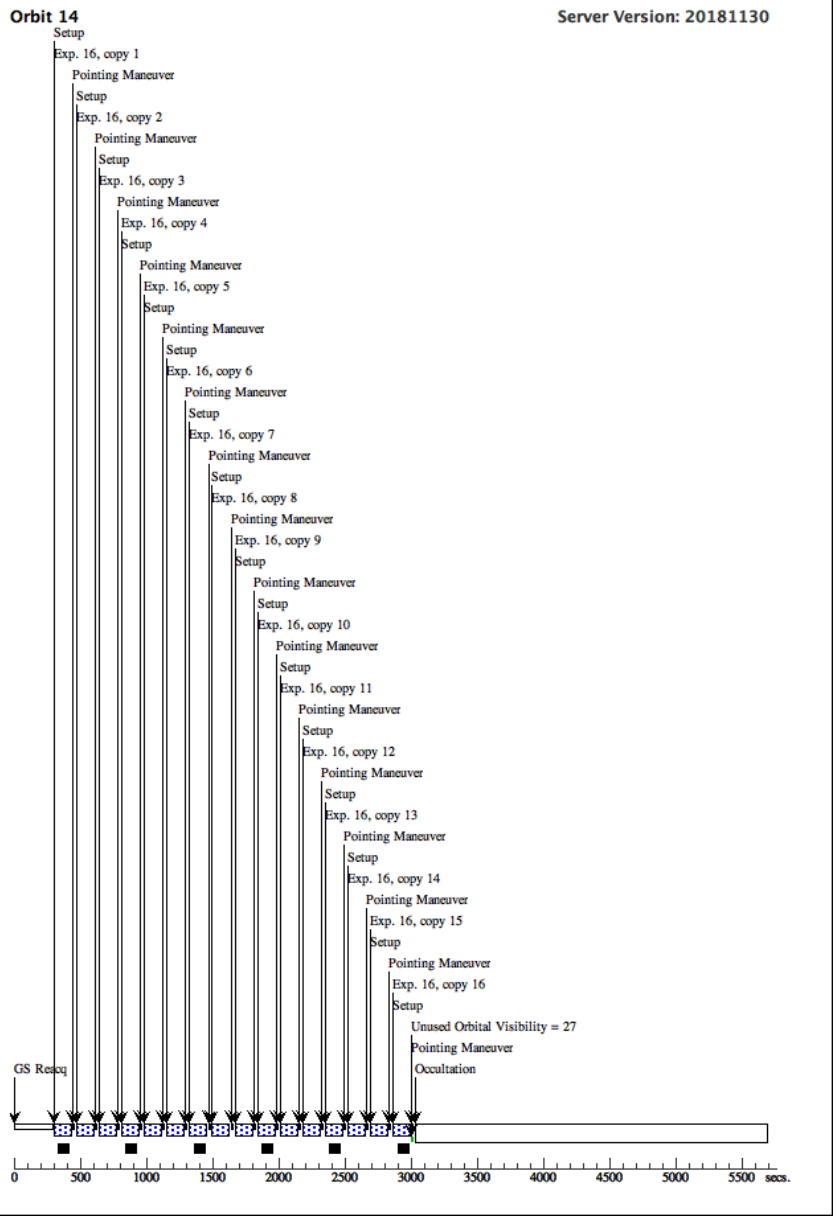
secs.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Exp. 16, copy 6
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Exp. 16, copy 7
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Exp. 16, copy 8
Pointing Maneuver
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Setup
Pointing Maneuver
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Exp. 16, copy 12
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Pointing Maneuver
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Exp. 16, copy 14
Pointing Maneuver
Exp. 16, copy 15
Setup
Pointing Maneuver
Exp. 16, copy 16
Setup
Unused Orbital Visibility = 27
Pointing Maneuver
Occultation
GS Resoq
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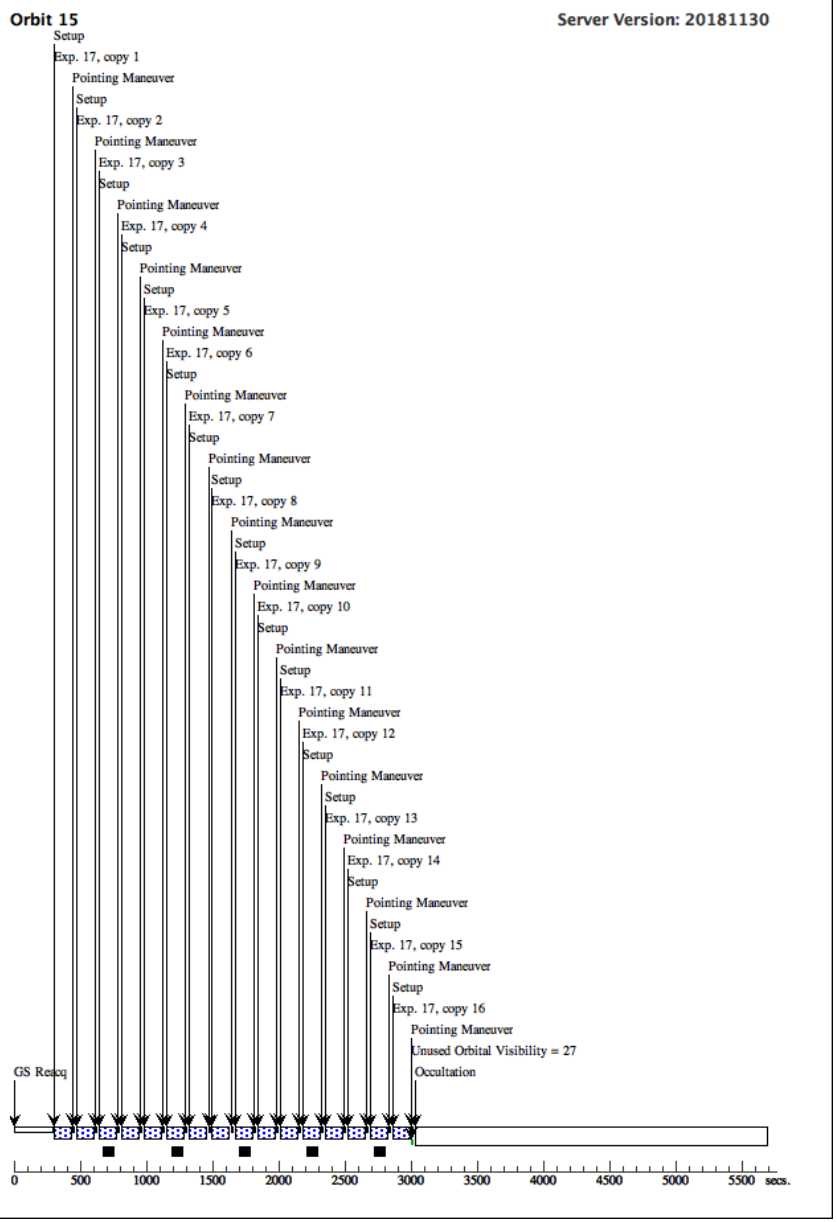
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Pointing Maneuver
Exp. 17, copy 7
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Setup
Exp. 17, copy 8
Pointing Maneuver
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Exp. 17, copy 9
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Exp. 17, copy 10
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Pointing Maneuver
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Exp. 17, copy 11
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Pointing Maneuver
Setup
Exp. 17, copy 13
Pointing Maneuver
Exp. 17, copy 14
Setup
Pointing Maneuver
Setup
Exp. 17, copy 15
Pointing Maneuver
Setup
Exp. 17, copy 16
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Reacq
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3500
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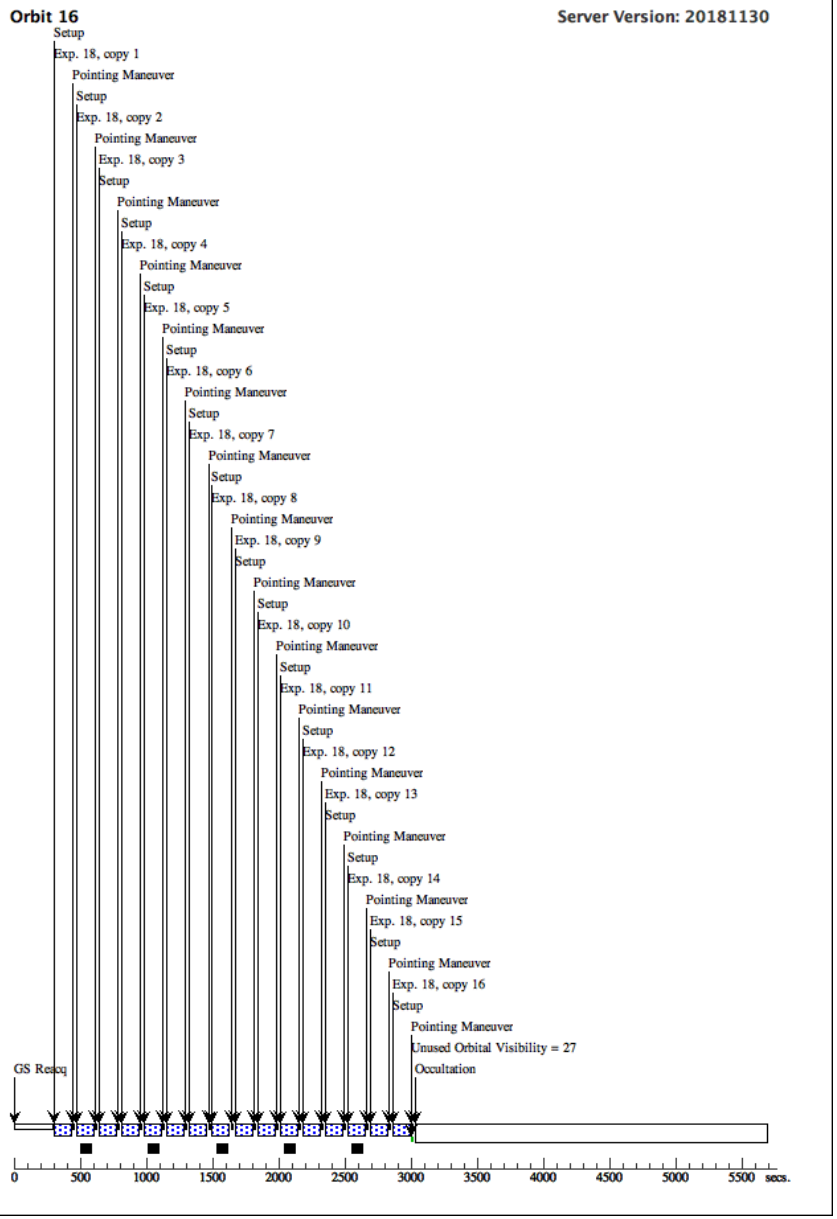
secs.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Server Version: 20181130
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Exp. 18, copy 15
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Pointing Maneuver
Exp. 18, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
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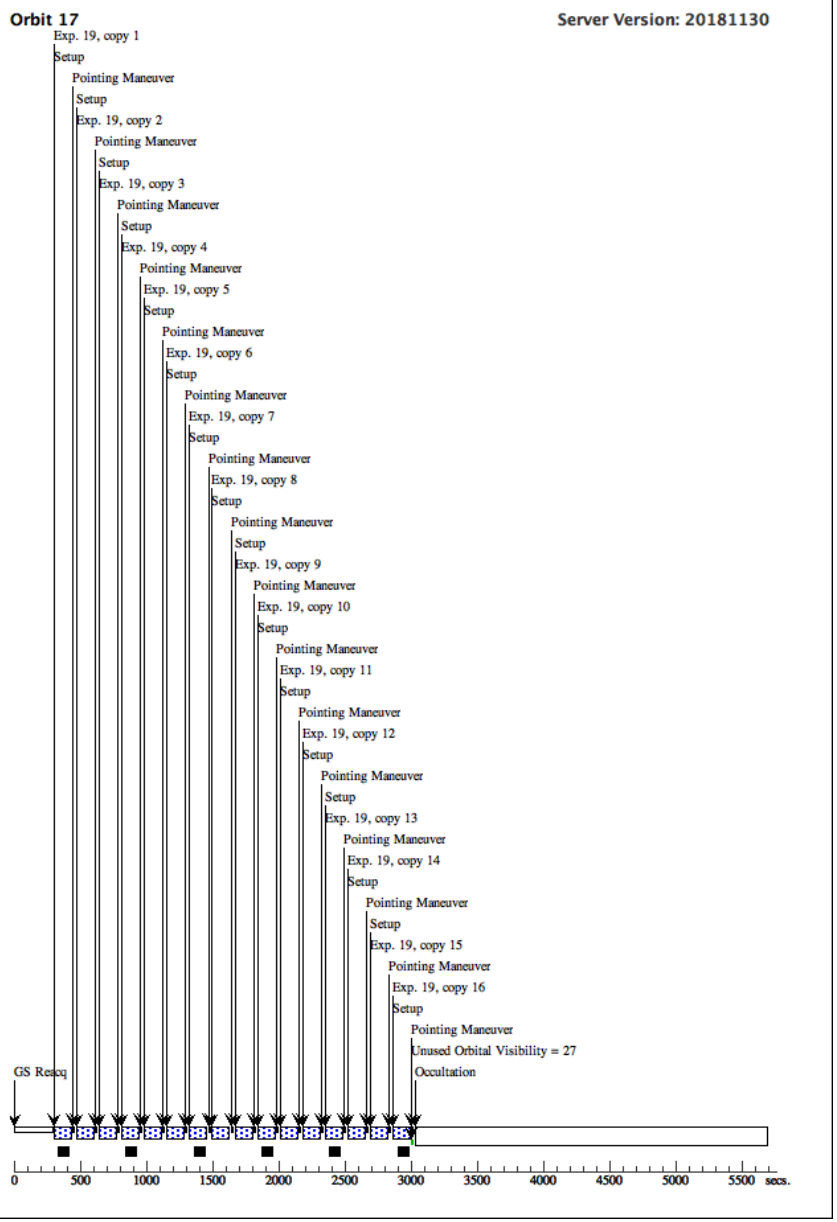
secs.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Exp. 19, copy 14
Setup
Pointing Maneuver
Setup
Exp. 19, copy 15
Pointing Maneuver
Exp. 19, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Reacq
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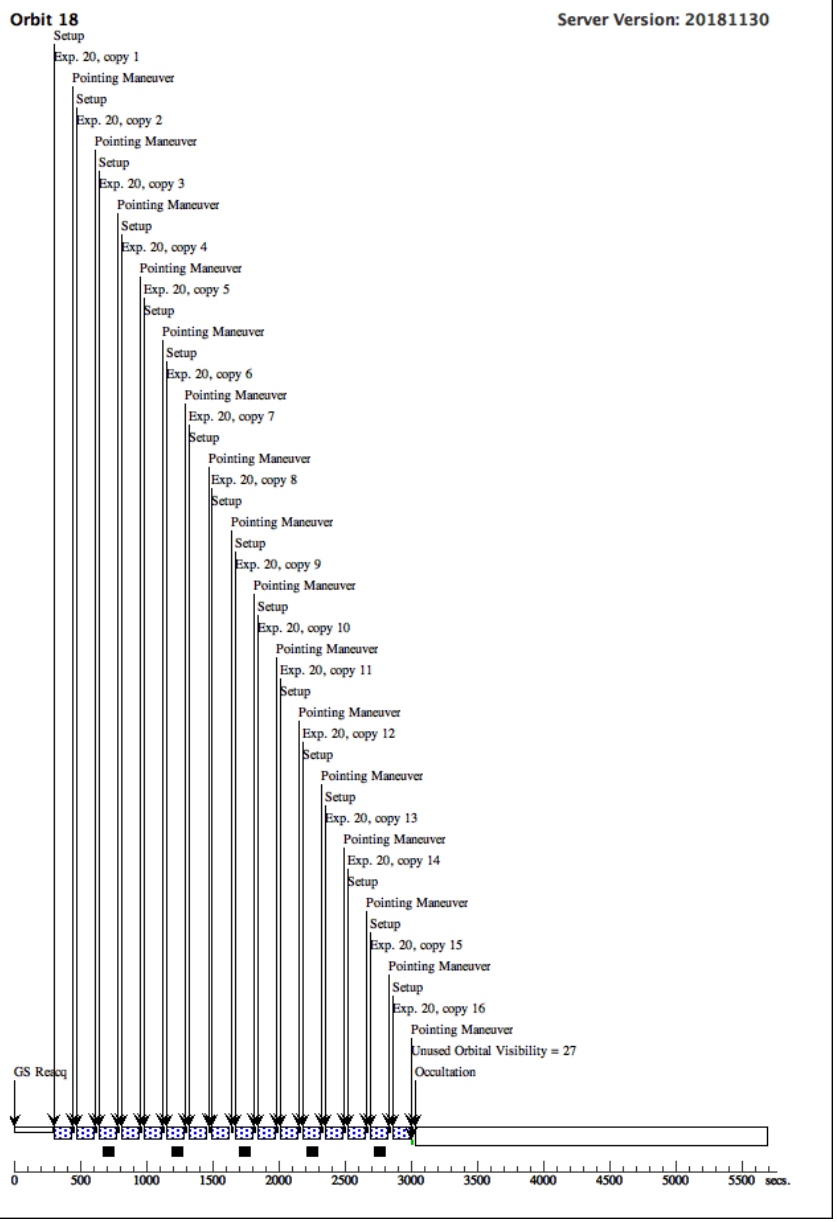
secs.


Orbit 18
Server Version: 20181130
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Exp. 20, copy 2
Pointing Maneuver
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Exp. 20, copy 3
Pointing Maneuver
Setup
Exp. 20, copy 4
Pointing Maneuver
Exp. 20, copy 5
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Pointing Maneuver
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Exp. 20, copy 6
Pointing Maneuver
Exp. 20, copy 7
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Pointing Maneuver
Exp. 20, copy 8
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Pointing Maneuver
Setup
Exp. 20, copy 9
Pointing Maneuver
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Exp. 20, copy 10
Pointing Maneuver
Exp. 20, copy 11
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Pointing Maneuver
Exp. 20, copy 12
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Pointing Maneuver
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Exp. 20, copy 13
Pointing Maneuver
Exp. 20, copy 14
Setup
Pointing Maneuver
Setup
Exp. 20, copy 15
Pointing Maneuver
Setup
Exp. 20, copy 16
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Resoq
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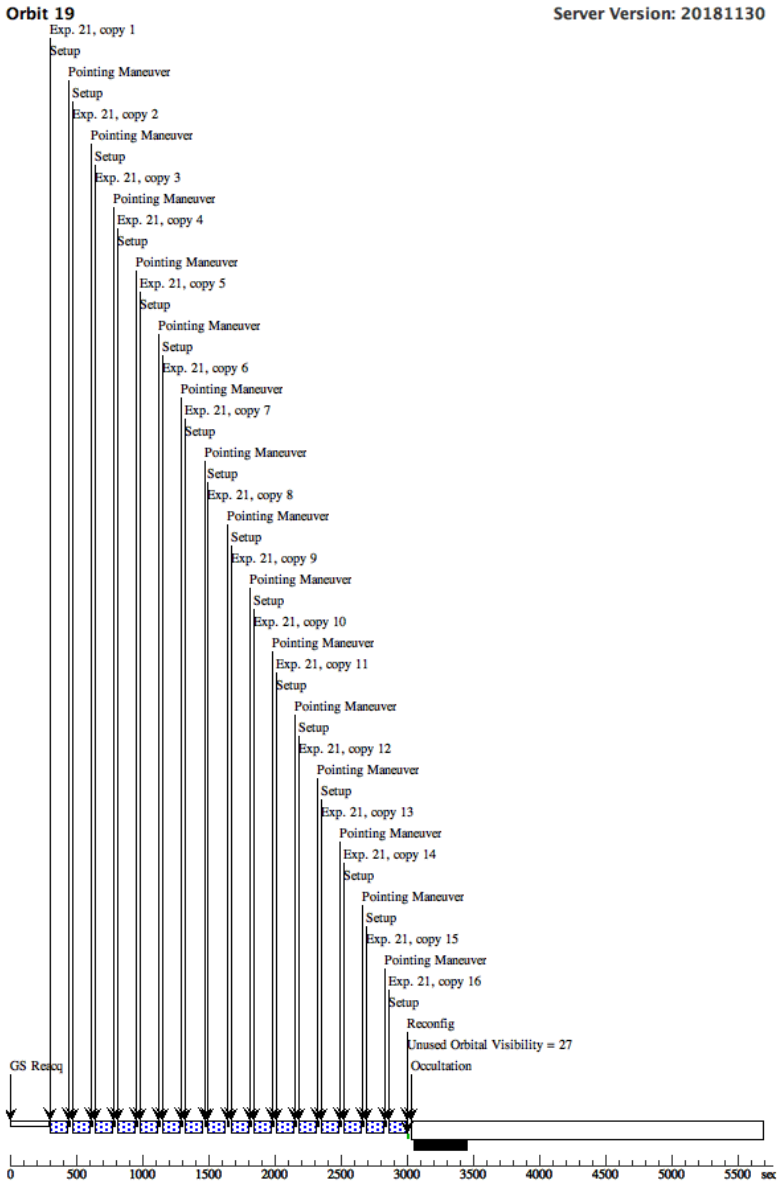
secs.


Orbit 19
Server Version: 20181130
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Pointing Maneuver
Exp. 21, copy 4
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Pointing Maneuver
Exp. 21, copy 5
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Exp. 21, copy 6
Pointing Maneuver
Exp. 21, copy 7
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Exp. 21, copy 8
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Exp. 21, copy 9
Pointing Maneuver
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Exp. 21, copy 10
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Exp. 21, copy 12
Pointing Maneuver
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Exp. 21, copy 13
Pointing Maneuver
Exp. 21, copy 14
Setup
Pointing Maneuver
Setup
Exp. 21, copy 15
Pointing Maneuver
Exp. 21, copy 16
Setup
Reconfig
Unused Orbital Visibility = 27
Occultation
GS Reacq
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sec

Visit

Proposal 15134, WASP-121 WFC3 (04), completed Wed Dec 19 14:06:27 GMT 2018

Diagnostic Status: Warning

Scientific Instruments: WFC3/IR

Special Requirements: SCHED 80%; ORIENT 25D TO 50 D; ORIENT 125D TO 140 D; ORIENT 310D TO 325 D; ORIENT 200D TO 220 D; AFTER 03 BY 18.9 Orbits TO 19.1 Orbits

Comments: Please see Proposal Description for important notes on SAA crossing.

We have defined each HST orbit within a non-interruptible sequence, to ensure that all exposures defined within the sequence are taken during the same HST orbit. We will use forward spatial scanning mode to avoid saturation on relatively long exposures and increase observing efficiency.

Visit orientation requirements have been defined to avoid spectra from nearby stars overlapping the target spectrum.

Phase constraints have been specified to maximize phase coverage of the primary transits and secondary eclipses achieved by the two visits of our program.

Diagnostics

(WASP-121 WFC3 (04)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	WASP-121	RA: 07 10 24.0580 (107.6002417d)	Proper Motion RA: -2.993 mas/yr	V=10.5	Reference Frame: SIMBAD
		Dec: -39 05 50.55 (-39.09737d)	Proper Motion Dec: 25.086 mas/yr		
		Equinox: J2000	Epoch of Position: 2000		

Comments:
Category=EXT-STAR
Description=[EXTRA-SOLAR PLANETARY SYSTEM, F3-F9]

Exposures

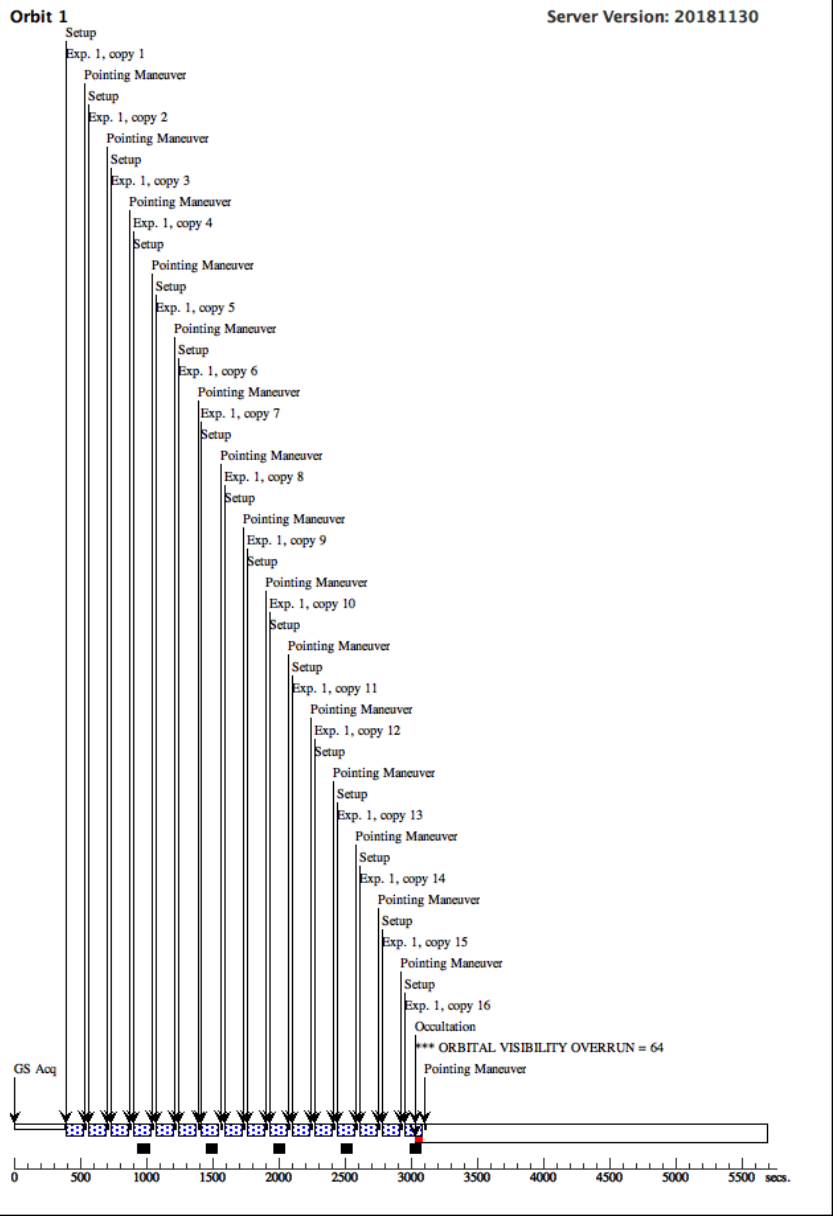
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Science 19	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward; GSPAIR S63I000677F2S63I000202F1	Sequence 1-1 Non-Int in WASP-121 WFC3 (04)	103.128633 Secs X 16 (1650.058 Secs)	
								[==>(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)]*	***[1]***
Comments: Visit 04 should follow directly from Visit 03 in a contiguous sequence of 26 HST orbits in total.									
2	Science 20	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 2-2 Non-Int in WASP-121 WFC3 (04)	103.128633 Secs X 16 (1650.058 Secs)	
								[==>(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)]*	***[2]***

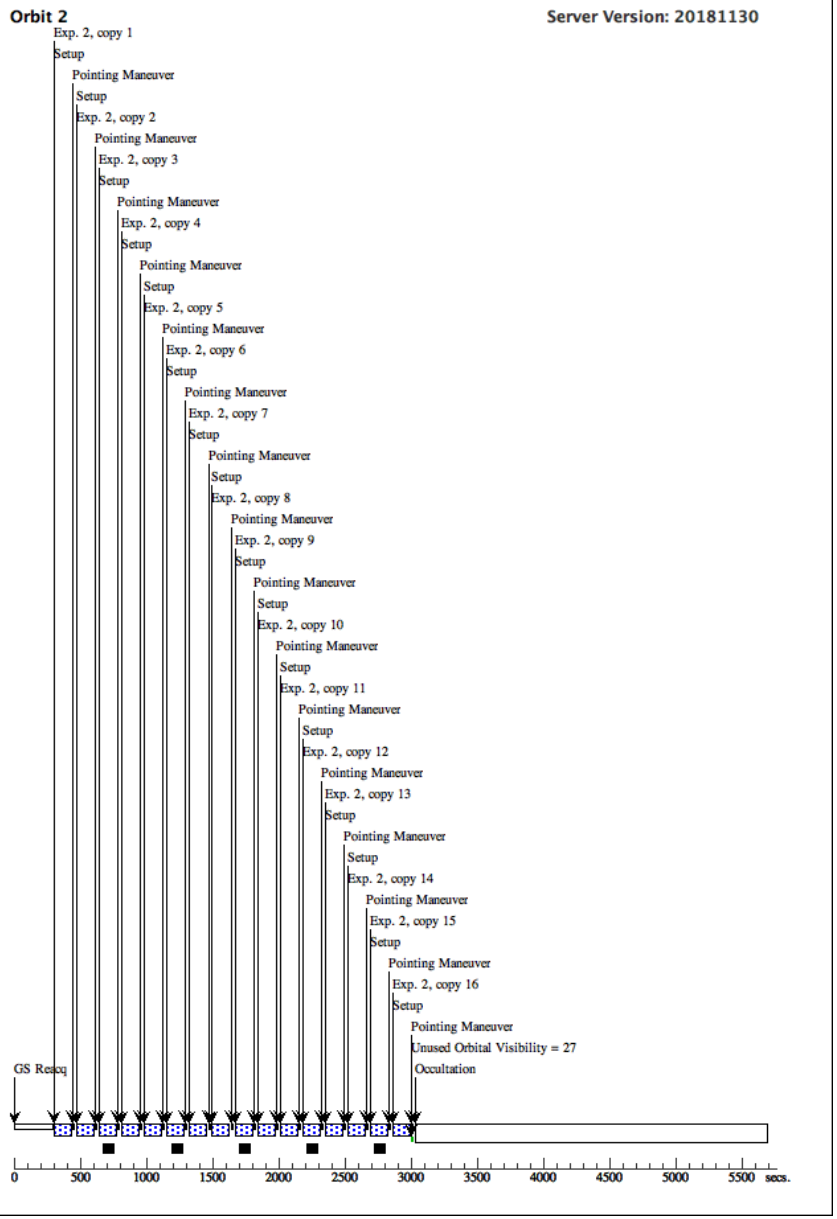
	3	Science 21	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.0 73,90.0 Degrees,Forward	Sequence 3-3 Non-Int in WASP-121 WFC3 (04)	103.128633 Secs X 16 (1650.058 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]*	***[3]***
	4	Science 22	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.0 73,90.0 Degrees,Forward	Sequence 4-4 Non-Int in WASP-121 WFC3 (04)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	***[4]***

	5	Science 23	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 5-5 Non-Int in WASP-121 WFC3 (04)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(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)]*	***[5]***
	6	Science 24	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 6-6 Non-Int in WASP-121 WFC3 (04)	103.128633 Secs X 16 (1650.058 Secs)	
									[==>(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)]*	***[6]***

	7	Science 25	(1) WASP-121	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=15; SAMP-SEQ=SPARS10	POS TARG null,-8; SPATIAL SCAN 0.073,90.0 Degrees,Forward	Sequence 7-7 Non-Int in WASP-121 WFC3 (04)	103.128633 Secs X 16 (1650.058 Secs) *[==>(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)]*	*[7]*

Orbit Structure

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Exp. 2, copy 5
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Setup
Exp. 2, copy 14
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Exp. 2, copy 15
Setup
Pointing Maneuver
Exp. 2, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Reacq
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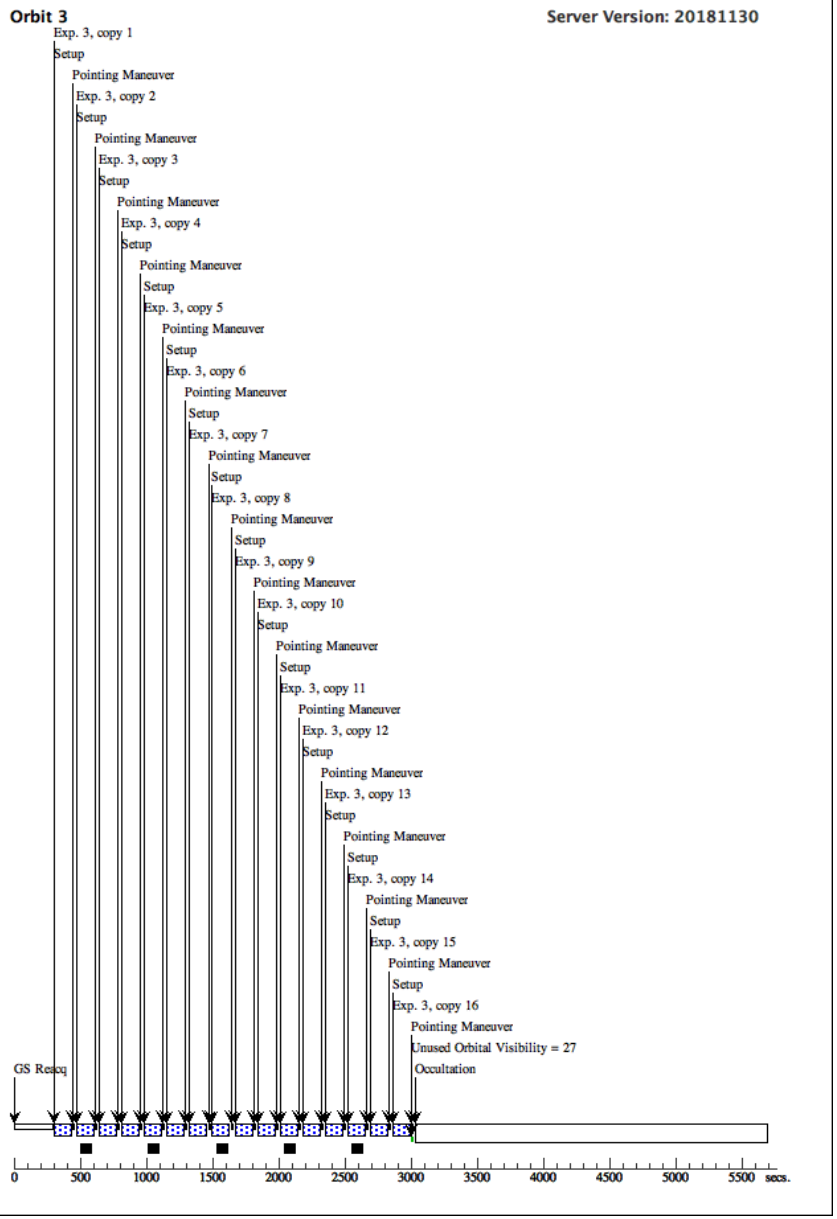
secs.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Exp. 3, copy 5
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Pointing Maneuver
Unused Orbital Visibility = 27
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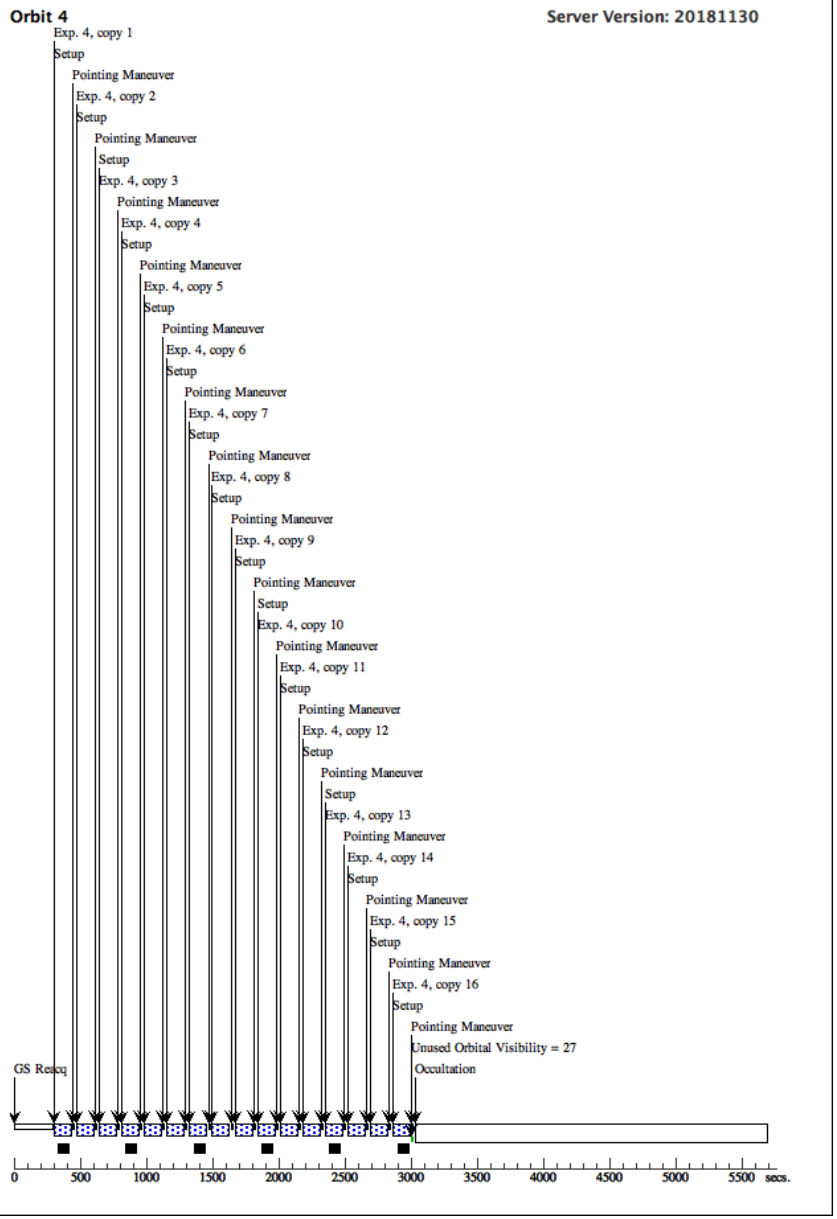
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Exp. 4, copy 16
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Unused Orbital Visibility = 27
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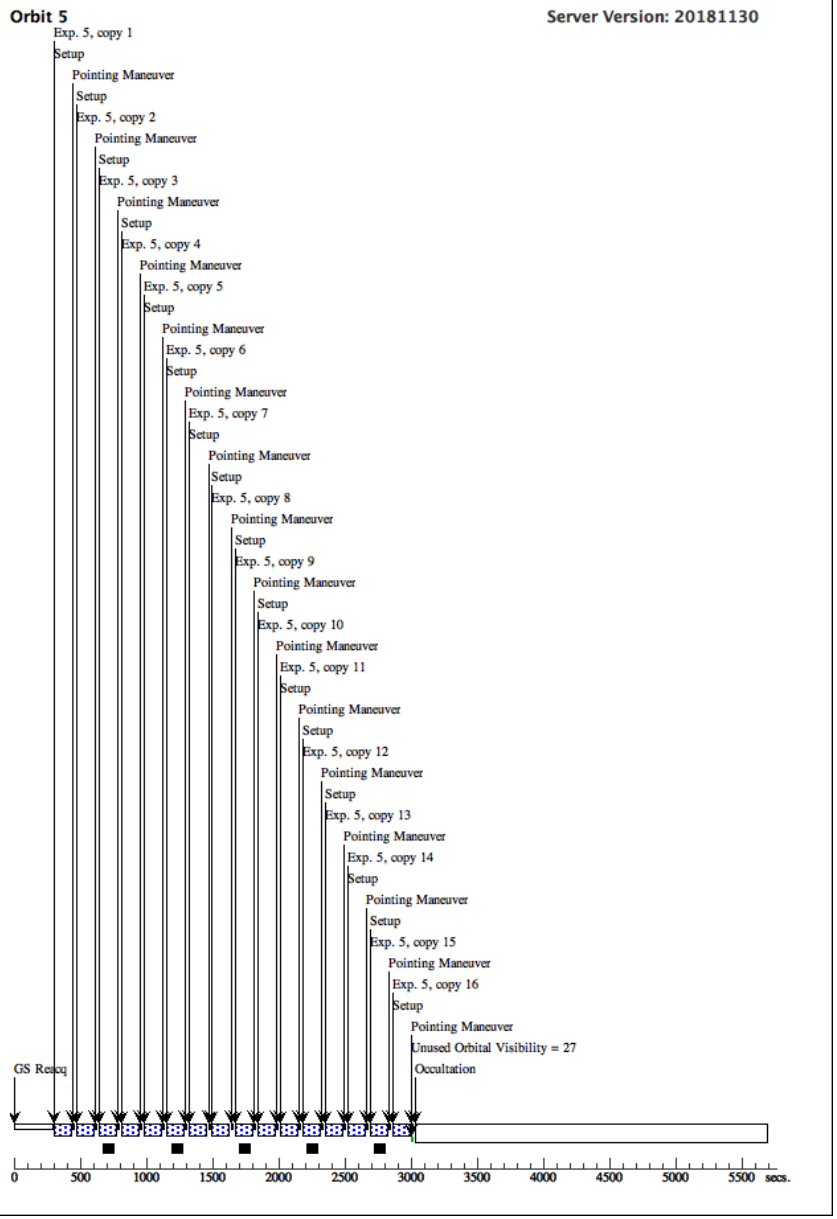
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Pointing Maneuver
Exp. 5, copy 11
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Exp. 5, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
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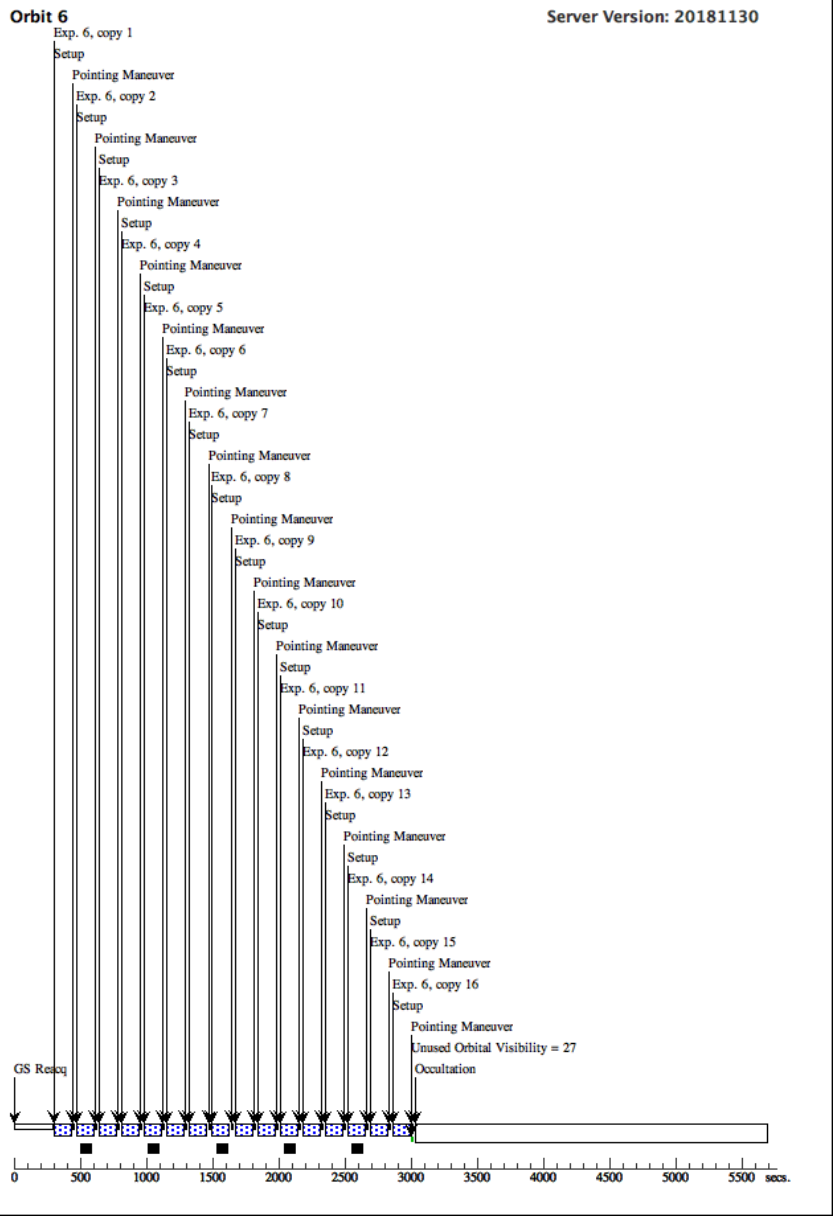
secs.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Pointing Maneuver
Exp. 6, copy 16
Setup
Pointing Maneuver
Unused Orbital Visibility = 27
Occultation
GS Resoq
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3500
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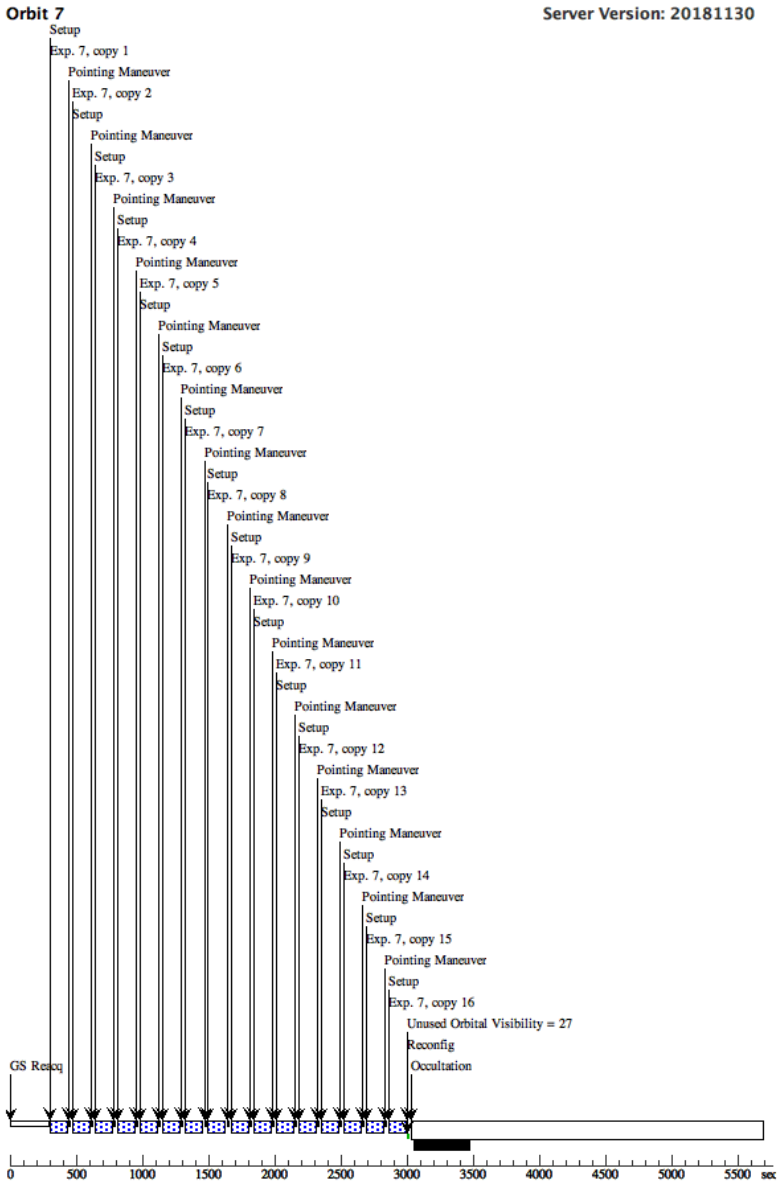
5500
secs.


Orbit 7
Server Version: 20181130
Setup
Exp. 7, copy 1
Pointing Maneuver
Exp. 7, copy 2
Setup
Pointing Maneuver
Setup
Exp. 7, copy 3
Pointing Maneuver
Setup
Exp. 7, copy 4
Pointing Maneuver
Exp. 7, copy 5
Setup
Pointing Maneuver
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Exp. 7, copy 6
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Exp. 7, copy 7
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Exp. 7, copy 8
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Exp. 7, copy 9
Pointing Maneuver
Exp. 7, copy 10
Setup
Pointing Maneuver
Exp. 7, copy 11
Setup
Pointing Maneuver
Setup
Exp. 7, copy 12
Pointing Maneuver
Exp. 7, copy 13
Setup
Pointing Maneuver
Setup
Exp. 7, copy 14
Pointing Maneuver
Setup
Exp. 7, copy 15
Pointing Maneuver
Setup
Exp. 7, copy 16
Unused Orbital Visibility = 27
Reconfig
Occultation
GS Reacq
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec