



15138 - The Atmosphere of an Extremely Low Density Super-Earth Mass Planet

Cycle: 25, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Dr. Daniel Jontof-Hutter (PI) (Contact)	University of the Pacific	djontofhutter@pacific.edu
Dr. Drake Deming (CoI)	University of Maryland	ddeming@astro.umd.edu
Dr. Hannah Ruth Wakeford (CoI)	Space Telescope Science Institute	hwakeford@stsci.edu
Dr. Eric B. Ford (CoI)	The Pennsylvania State University	eford@psu.edu
Dr. Nikku Madhusudhan (CoI) (ESA Member)	University of Cambridge	nmadhu@ast.cam.ac.uk
Dr. Heather A. Knutson (CoI)	California Institute of Technology	hknutson@caltech.edu
Dr. Zach K. Berta-Thompson (CoI)	University of Colorado at Boulder	zachory.bertathompson@colorado.edu

VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) KEPLER-79	WFC3/IR	13	16-Feb-2018 11:07:45.0	yes
02	(1) KEPLER-79	WFC3/IR	13	16-Feb-2018 11:08:09.0	yes

26 Total Orbits Used

ABSTRACT

Kepler-79 d provides a unique opportunity to study the atmosphere of a low-mass low density planet among compact multi-transiting systems. It has the largest estimated atmospheric scale-height for a planet in a known compact system of four or more transiting exoplanets and has the highest expected atmospheric annulus depth for any exoplanet unobserved by HST. Its extremely low density, and its low mass places it among a small number of exoplanets that challenge atmospheric mass loss models. Other planets of similarly low density are likely young in age and may still be

cooling and contracting. With an age of ~ 3.4 Gyr, however, Kepler-79 d is unlikely to be contracting and is the best candidate for atmospheric retrieval among low density planets in compact formation. Whether such compact multi-transiting systems formed in situ or beyond the snow-line before migrating to within 1AU is the subject of a high profile debate in planet formation theory, motivating the search for atmospheric water. Kepler-79 d occupies a unique space in temperature, surface gravity and stellar type which will provide an important constraint on the formation of clouds and hazes, although a cloud-free atmosphere is expected for a wide range of compositions.

OBSERVING DESCRIPTION

Spectroscopy of transiting exoplanet. Two visits. Observations occur at specific times of transit, according to known ephemerides.

Proposal 15138 - Kepler-79 (01) - The Atmosphere of an Extremely Low Density Super-Earth Mass Planet

Fri Feb 16 16:08:13 GMT 2018

Visit	<p>Proposal 15138, Kepler-79 (01), implementation</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/IR</p> <p>Special Requirements: SCHED 100%; ORIENT 232.56D TO 357.96 D; ORIENT 52.56D TO 177.96 D; AFTER 16-SEP-2017:00:00:00; Period 52.0908 D AND ZERO-PHASE HJD2458013.0123</p> <p><i>Comments: Long orbital period of 52.0908 days: The schedulability of these times is apparent on APT if we make each visit just 5 orbits, but APT restricts this and gives a schedulability error when we include the full 13 orbits per visit.</i></p> <p><i>SAA: We have 13 orbits allocated per visit. However, APT warns against more than 8 consecutive orbits because of the SAA. If the SAA requires a pause from observing of 3 orbits or less, we request to resume our observation trying to keep the in-transit baseline roughly equal to the out of transit baseline. However, if the SAA requires an interruption of 4 or more orbits, we will make do with a reduced number of orbits per visit. This will have a small but tolerable effect on our expected SNR and we are flexible about whether the orbits at the start or at the end of the ideal 17 hours are abandoned.</i></p> <p><i>Initial phase flexible: We have calculated the initial phase to begin at 0.99189 (one transit duration + one HST orbit) before mid-transit. Transiit_duration = 8.6388 hours, Orbit period = 1250.1792 hours. However, because of the long duration, we are flexible on this start time by ~3 hours and can observe out of transit baseline before ingress or after egress.</i></p> <p><i>TTVs: The TTVs will have no effect on schedulability since the ephemeris is known precisely.</i></p> <p><i>Orientation: The requirements below are calculated to avoid the spectrum of a field star KIC 8394725, 2.4 magnitudes fainter than Kepler-79 in J-band, at PA 160.26 degrees from Kepler-79, at a distance of 5.7 arcseconds. (This is using the Kepler Input Catalog, SIMBAD gives a closely consistent 158.2 degrees PA.)</i></p> <p><i>We calculated the scan tolerance assuming a minimum of 2 arcsec for the neighboring star. With NSAMP 14, and a scan length of 4.3 arcsec, a minimum of 2 arcsec for the nearby star gives a scan tolerance of $\text{acos}(2/4.37) = 62.7$ degrees.</i></p> <p><i>Orient and X,Y position: We calculated the orient to be 160.26 degrees for the position angle of the nearby star, plus 135 degrees for WFC3 from Table 7.4 in the manual = 295.26 degrees (293.6 degrees using the SIMBAD coordinates). We placed the (X, Y) of the target at (1,0) such that the scan would not reach the edge of the field. Our orient ranges include 295-180 degrees since it doesn't matter if the other star is above or below Kepler-79 on the detector.</i></p> <p><i>We have left 300s at the end of each sequence because of our use of spatial scanning, to allow a bias update on Gyro 2.</i></p>																								
	<p>(Kepler-79 (01)) Warning (Orbit Planner): LONG SU LIKELY TO INTERSECT THE SAA</p>																								
Fixed Targets	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Target Coordinates</th> <th>Targ. Coord. Corrections</th> <th>Fluxes</th> <th>Miscellaneous</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>KEPLER-79</td> <td>RA: 20 02 4.1060 (300.5171083d)</td> <td></td> <td>V=13.98</td> <td>Reference Frame: SIMBAD</td> </tr> <tr> <td></td> <td>Alt Name1: KOI-152</td> <td>Dec: +44 22 53.60 (44.38156d)</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Alt Name2: KIC8394721</td> <td>Equinox: J2000</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i></p> <p><i>Category=STAR</i></p> <p><i>Description=[EXTRA-SOLAR PLANETARY SYSTEM]</i></p>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous	(1)	KEPLER-79	RA: 20 02 4.1060 (300.5171083d)		V=13.98	Reference Frame: SIMBAD		Alt Name1: KOI-152	Dec: +44 22 53.60 (44.38156d)					Alt Name2: KIC8394721	Equinox: J2000			
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous																			
(1)	KEPLER-79	RA: 20 02 4.1060 (300.5171083d)		V=13.98	Reference Frame: SIMBAD																				
	Alt Name1: KOI-152	Dec: +44 22 53.60 (44.38156d)																							
	Alt Name2: KIC8394721	Equinox: J2000																							

Proposal 15138 - Kepler-79 (01) - The Atmosphere of an Extremely Low Density Super-Earth Mass Planet

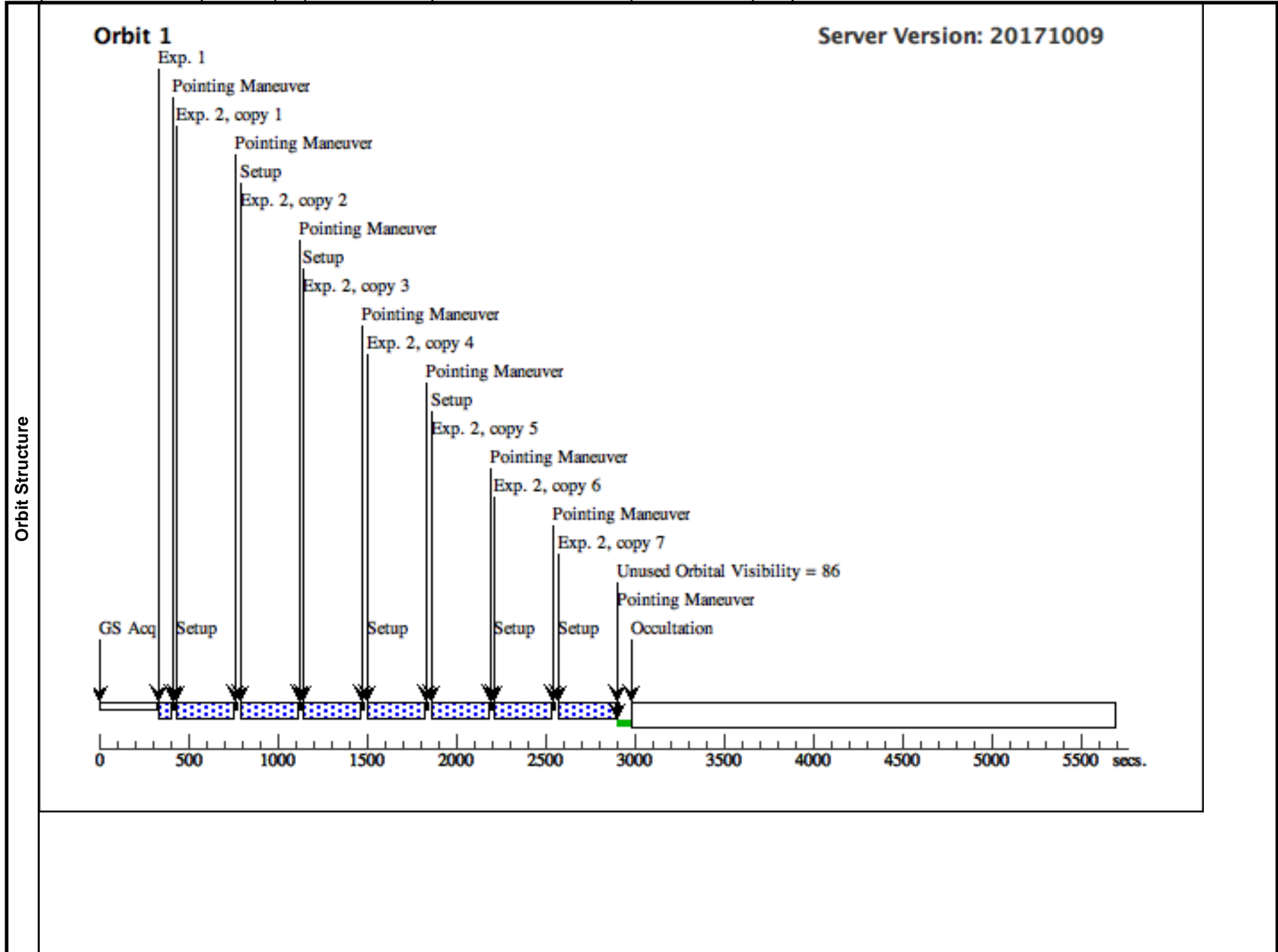
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	F139M	NSAMP=3; SAMP-SEQ=SPAR S25	POS TARG 0.0,0.0; PHASE 0.99189 TO 0.99429	Sequence 1-2 Non-Int in Kepler-79 (01)	44.969893 Secs (44.97 Secs) [==>]	[1]
	2	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 1-2 Non-Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Secs) [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	[1]
	3	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 3-3 Non-Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Secs) [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	[2]
	4	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 4-4 Non-Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Secs) [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	[3]
	5	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 5-5 Non-Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Secs) [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	[4]

Proposal 15138 - Kepler-79 (01) - The Atmosphere of an Extremely Low Density Super-Earth Mass Planet

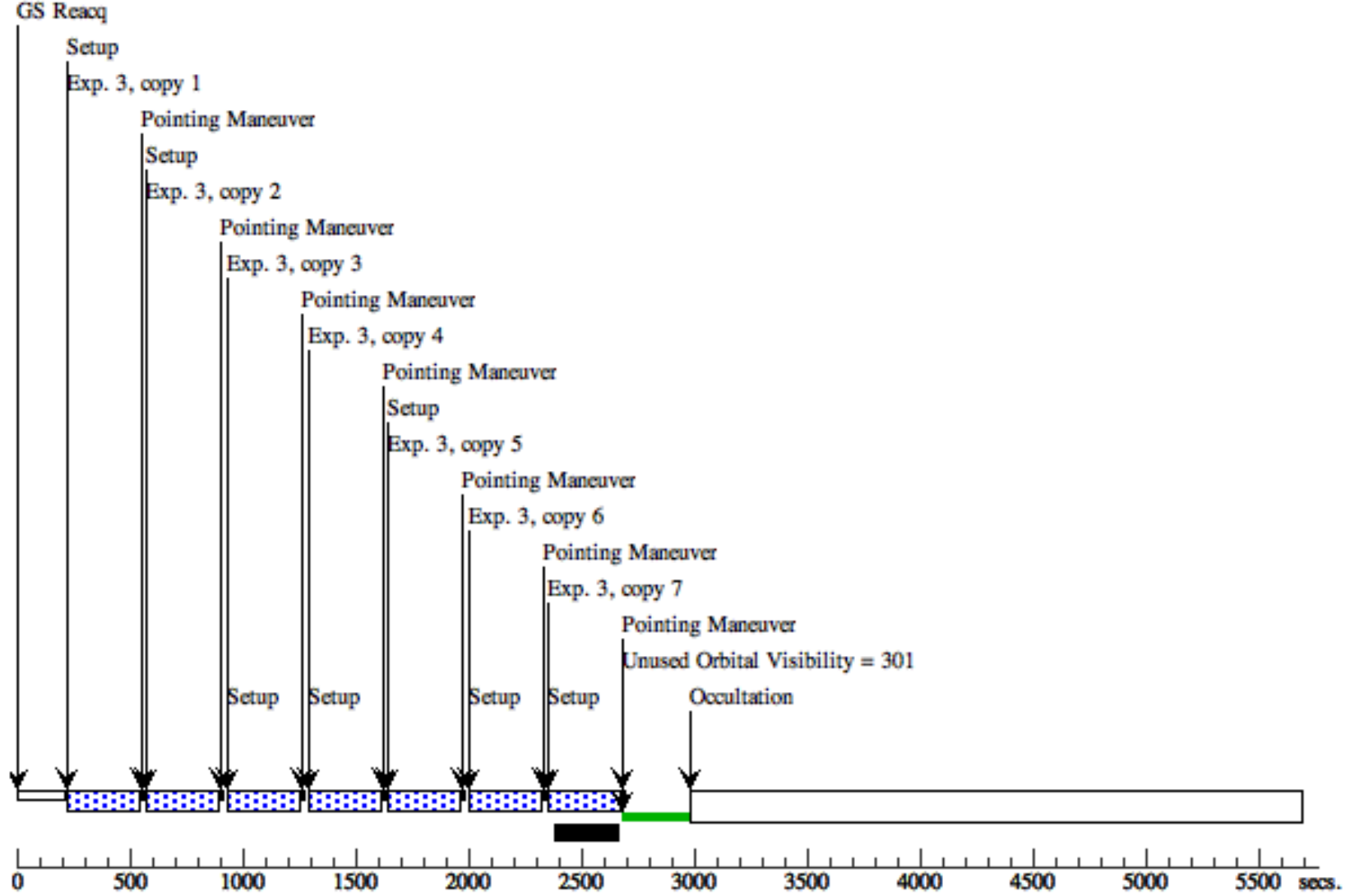
6	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 6-6 Non-Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Secs)	[5]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
7	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 7-7 Non-Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Secs)	[6]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
8	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 8-8 Non-Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Secs)	[7]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
9	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 9-9 Non-Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Secs)	[8]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
10	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 10-10 Non-Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Secs)	[9]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	

Proposal 15138 - Kepler-79 (01) - The Atmosphere of an Extremely Low Density Super-Earth Mass Planet

11	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,For ward	Sequence 11-11 Non -Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Sec s)	[10]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
12	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,For ward	Sequence 12-12 Non -Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Sec s)	[11]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
13	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,For ward	Sequence 13-13 Non -Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Sec s)	[12]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
14	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,For ward	Sequence 14-14 Non -Int in Kepler-79 (01)	290.776322 Secs X 7 (2035.434 Sec s)	[13]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	

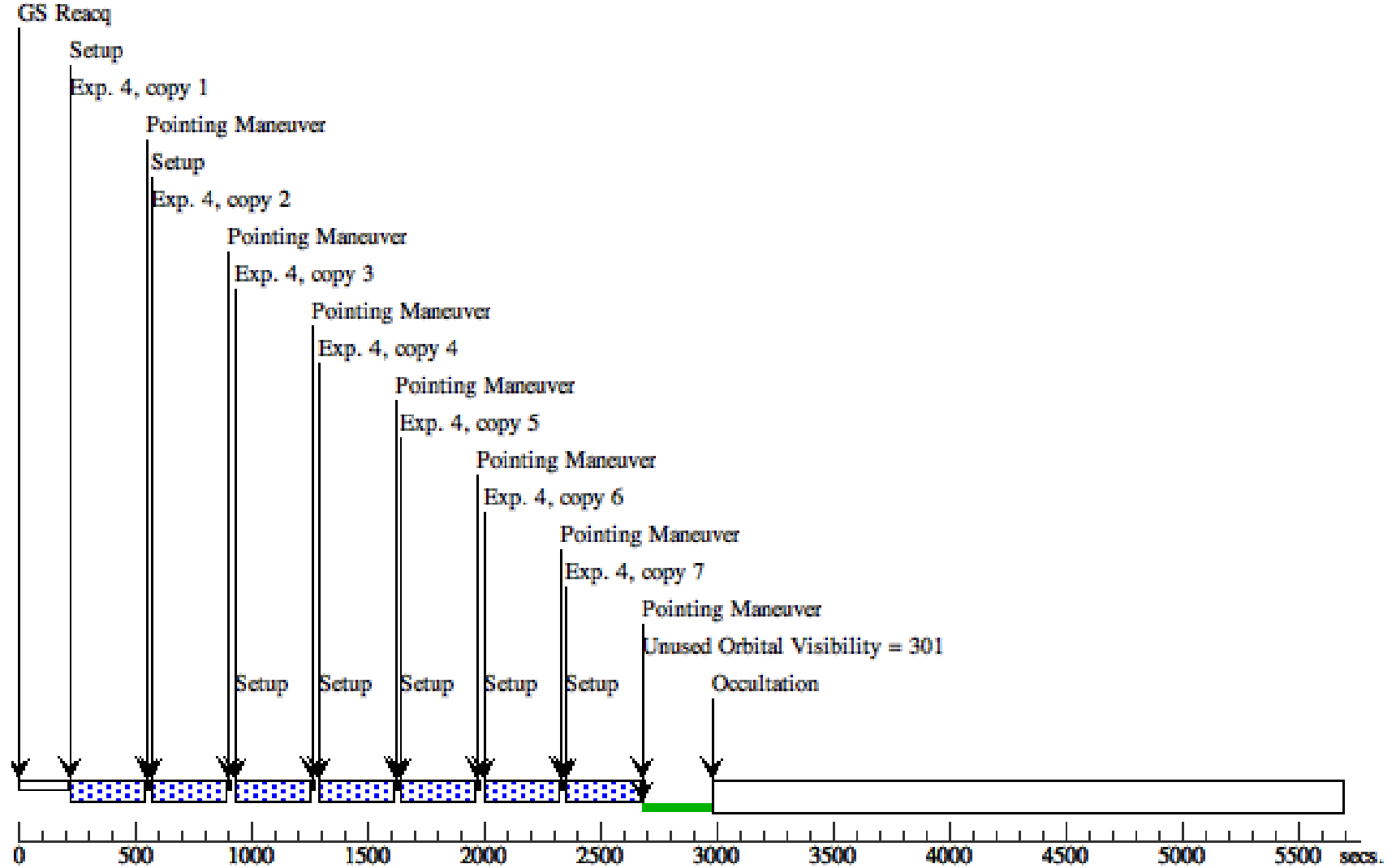


Orbit 2

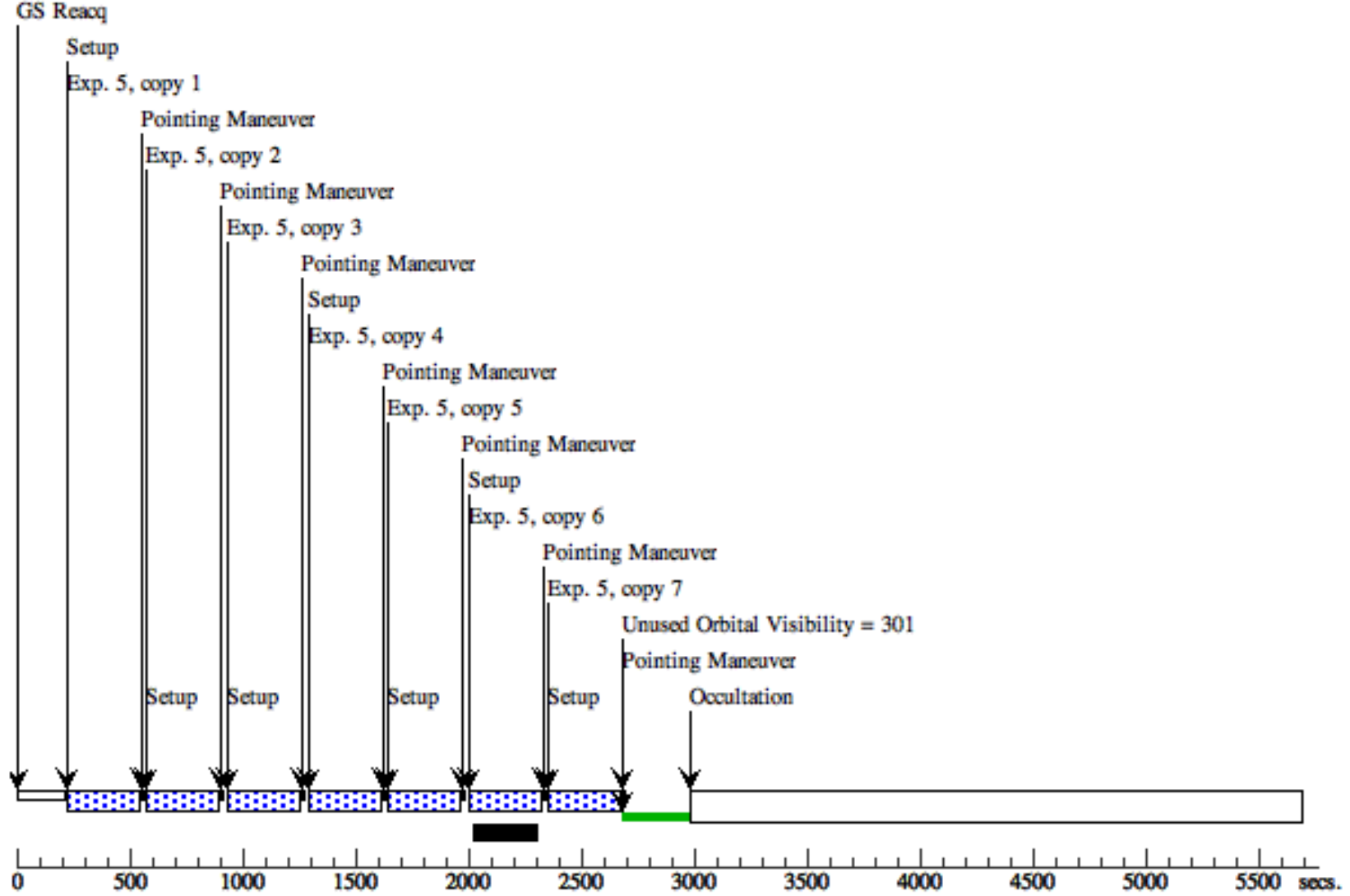


Orbit 3

Server Version: 20171009

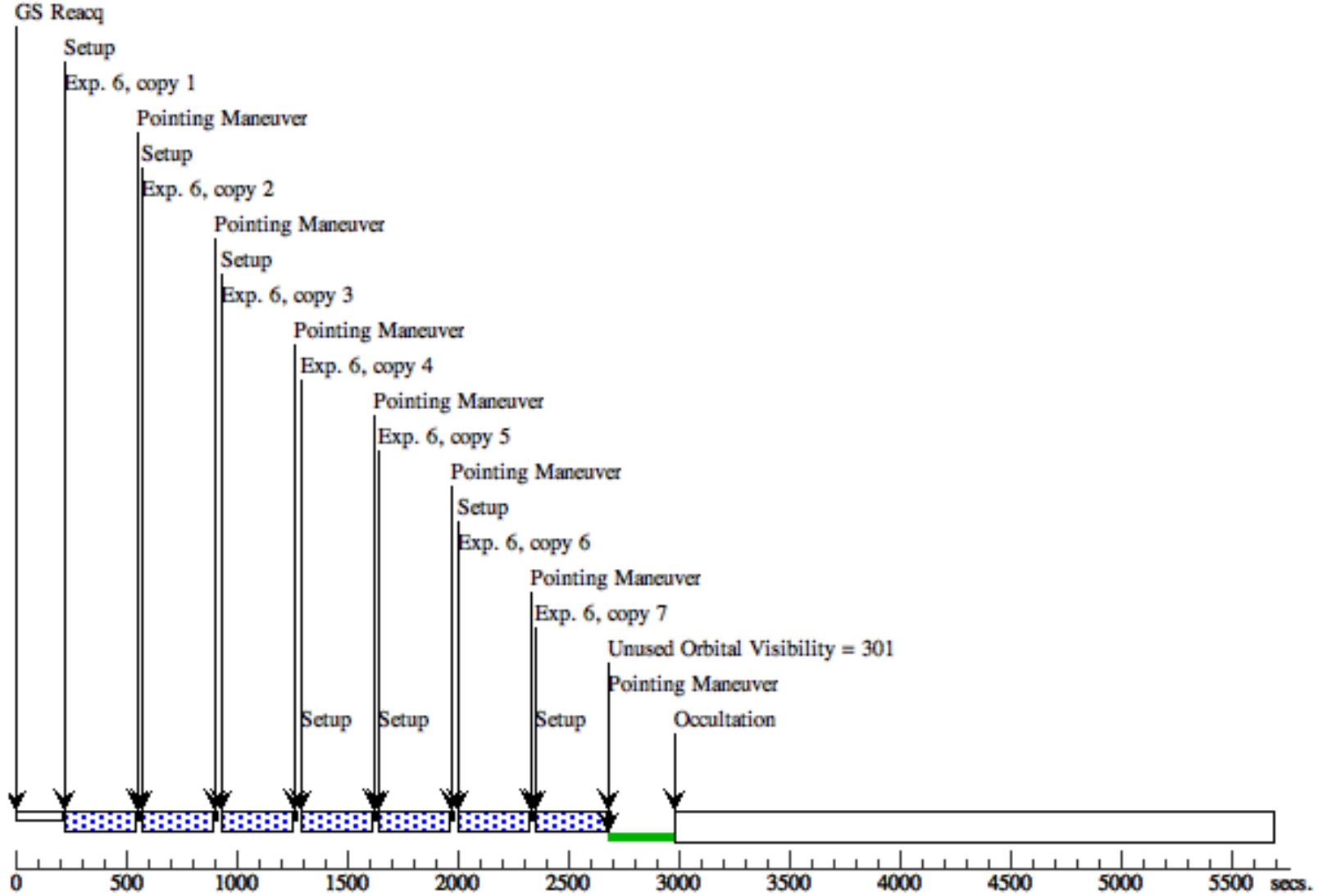


Orbit 4



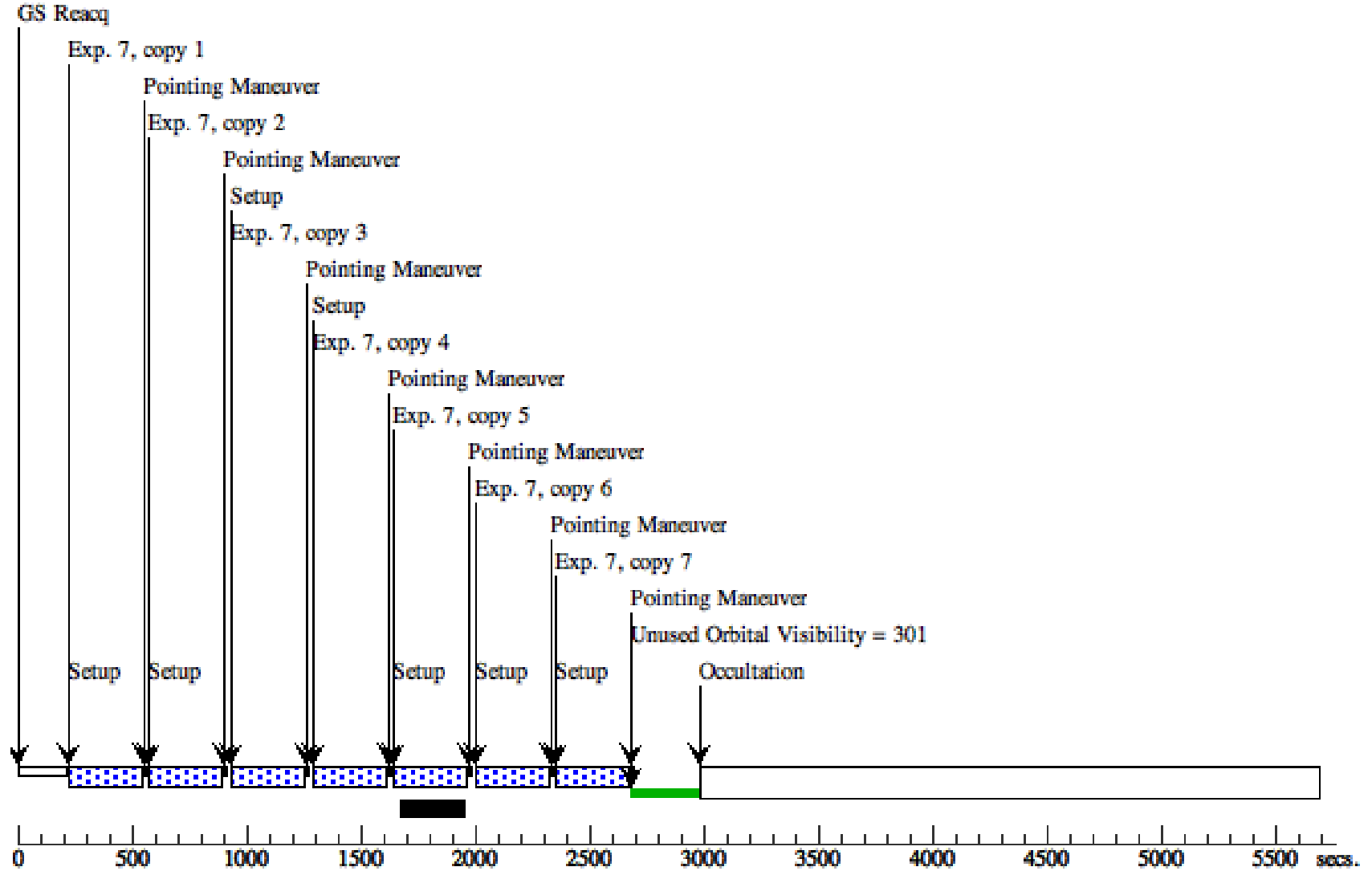
Orbit 5

Server Version: 20171009

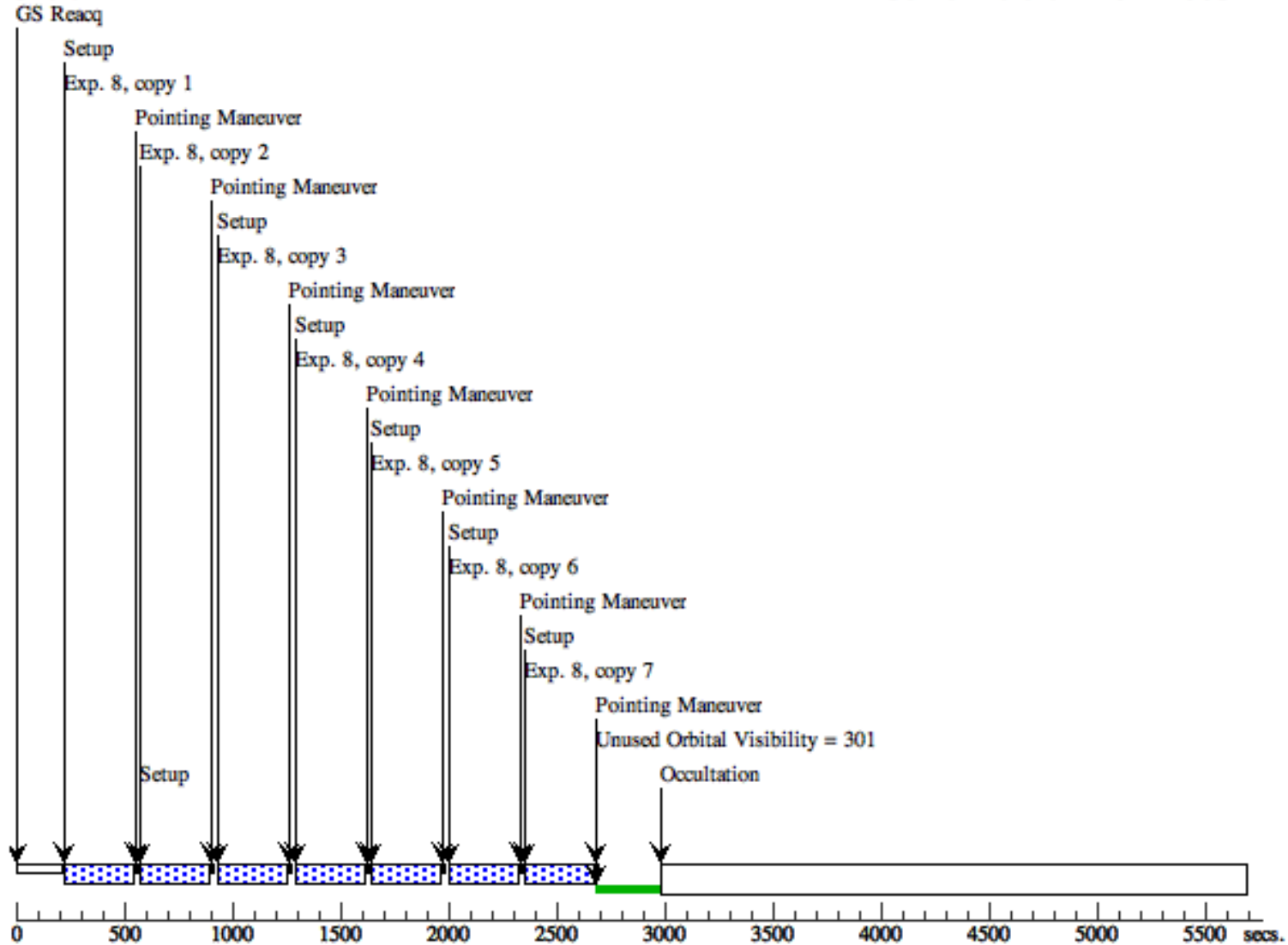


Orbit 6

Server Version: 20171009

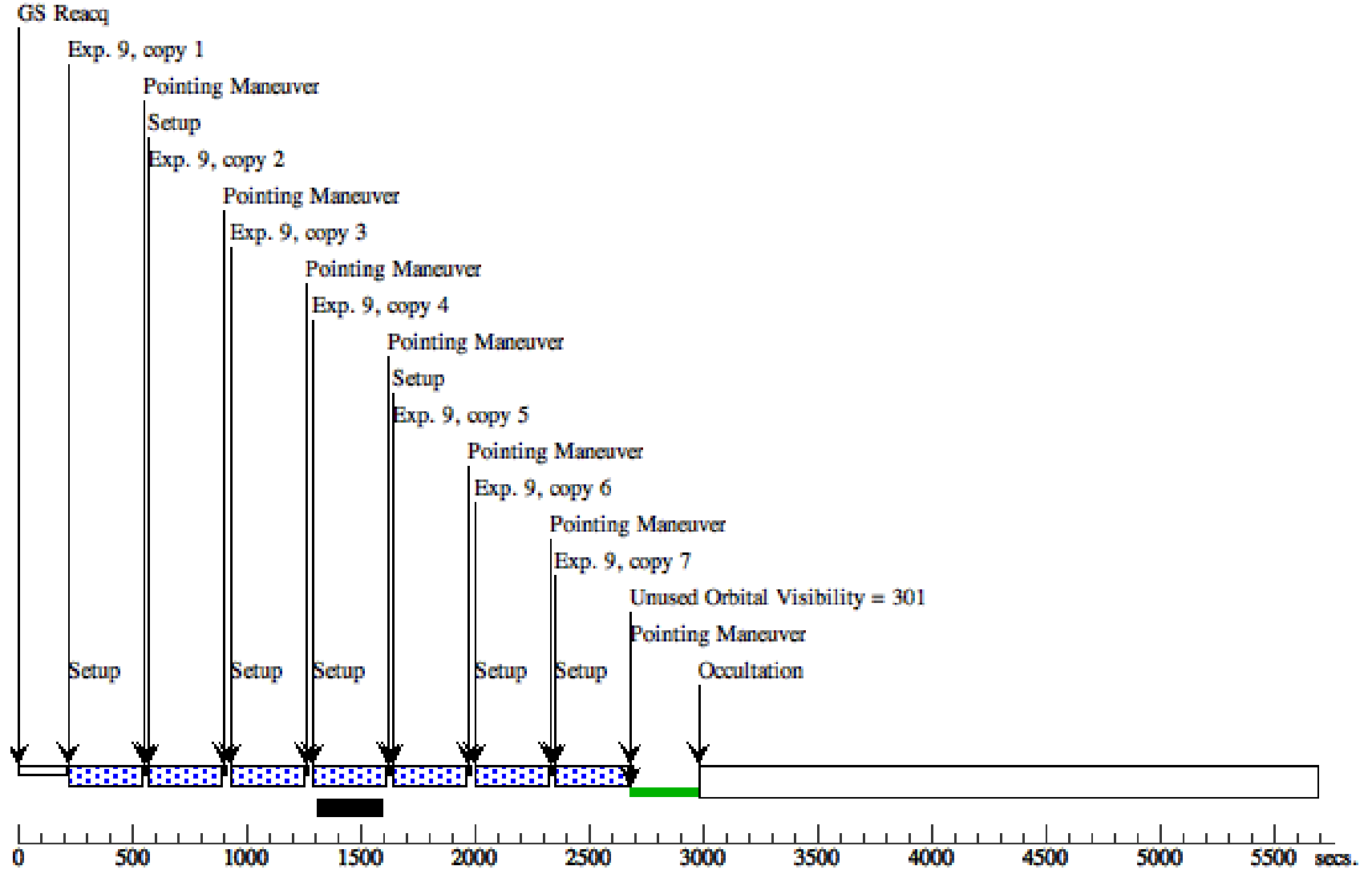


Orbit 7

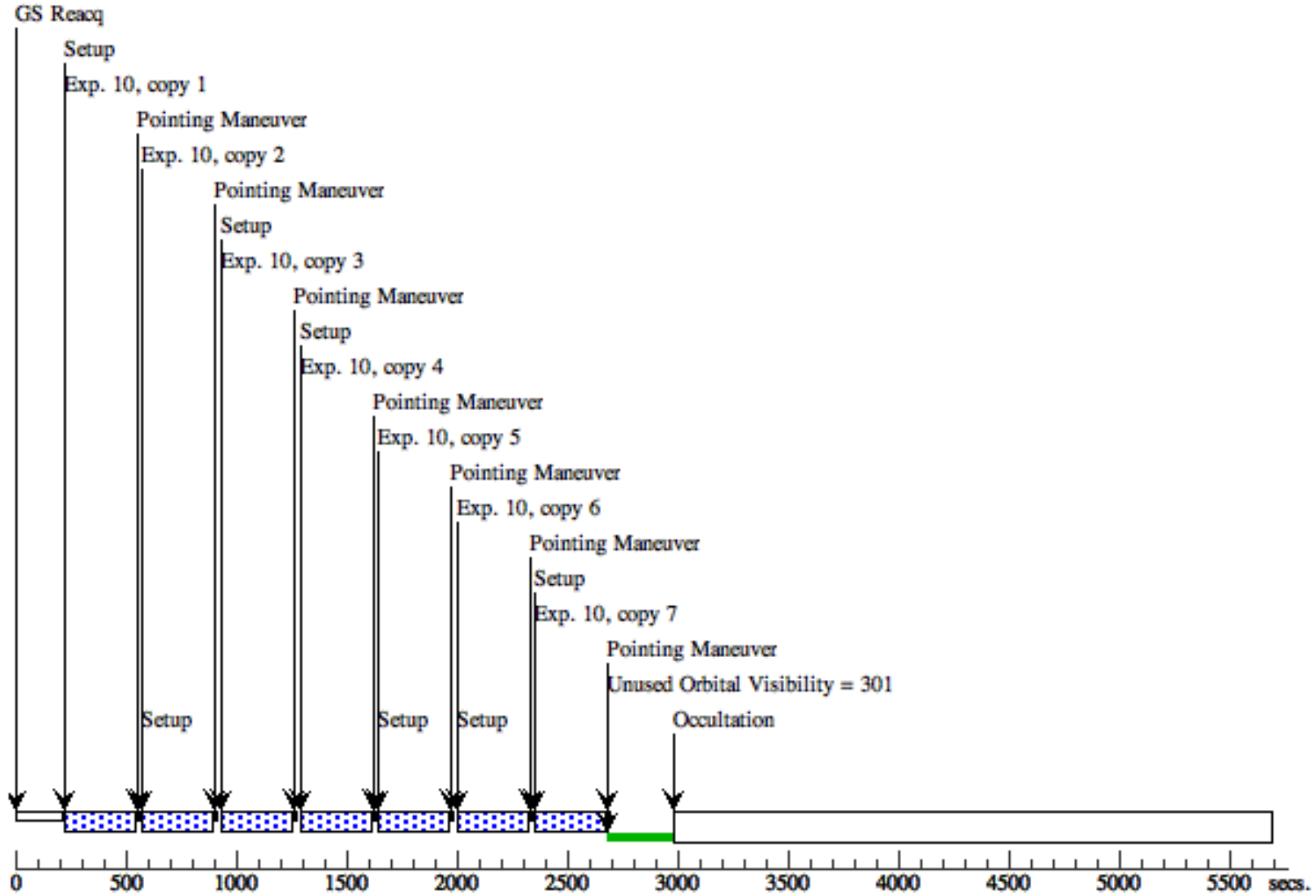


Orbit 8

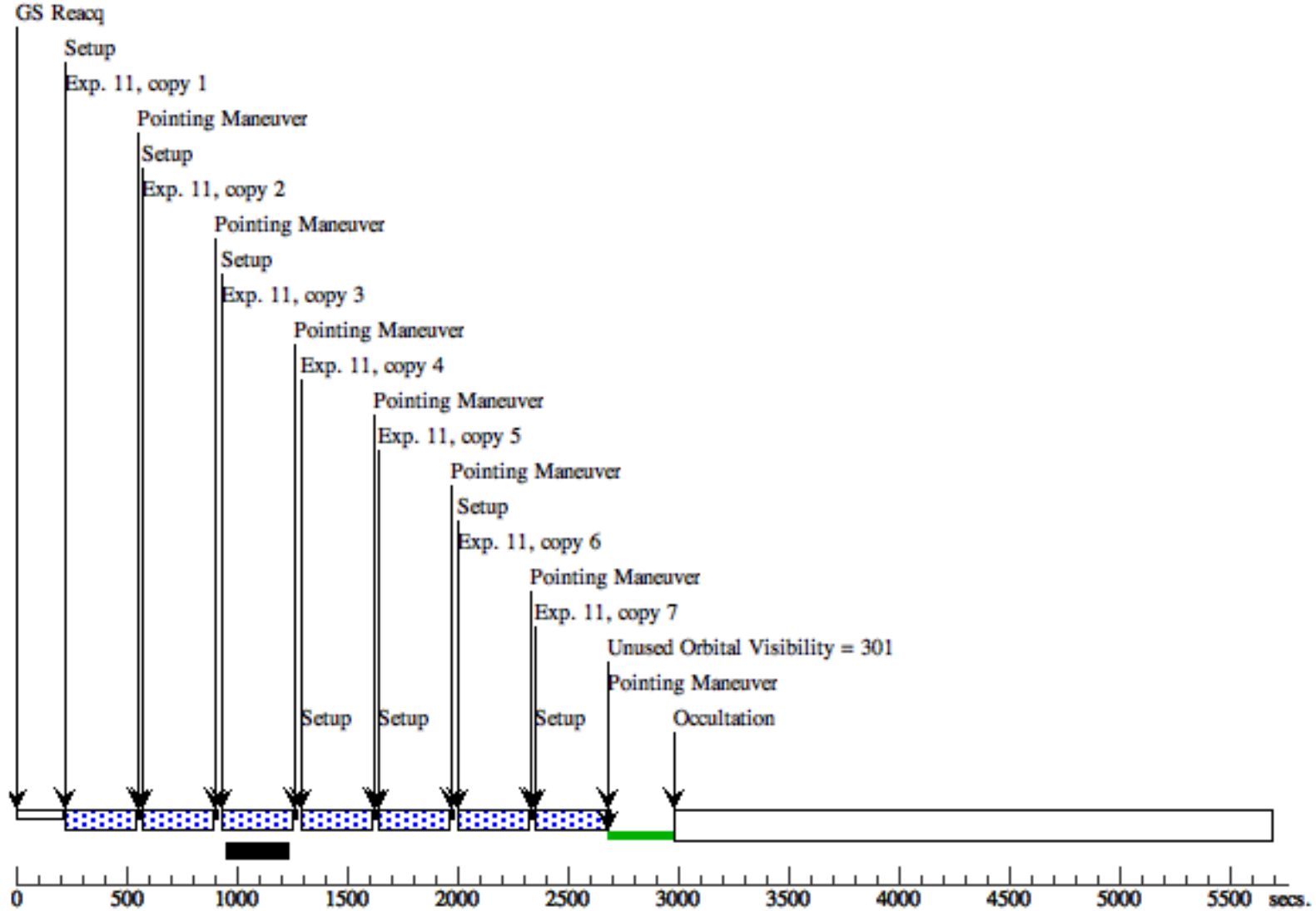
Server Version: 20171009



Orbit 9

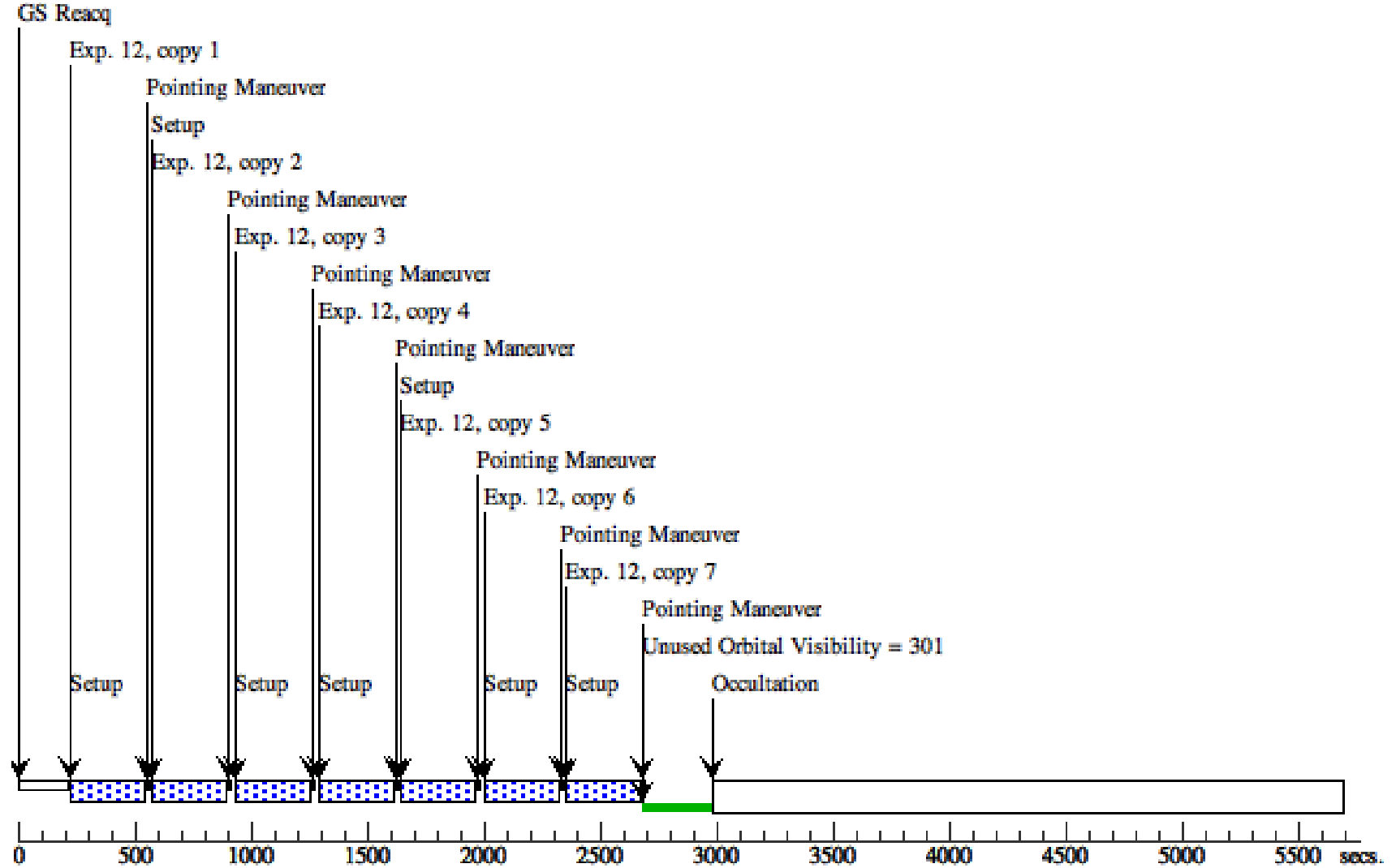


Orbit 10

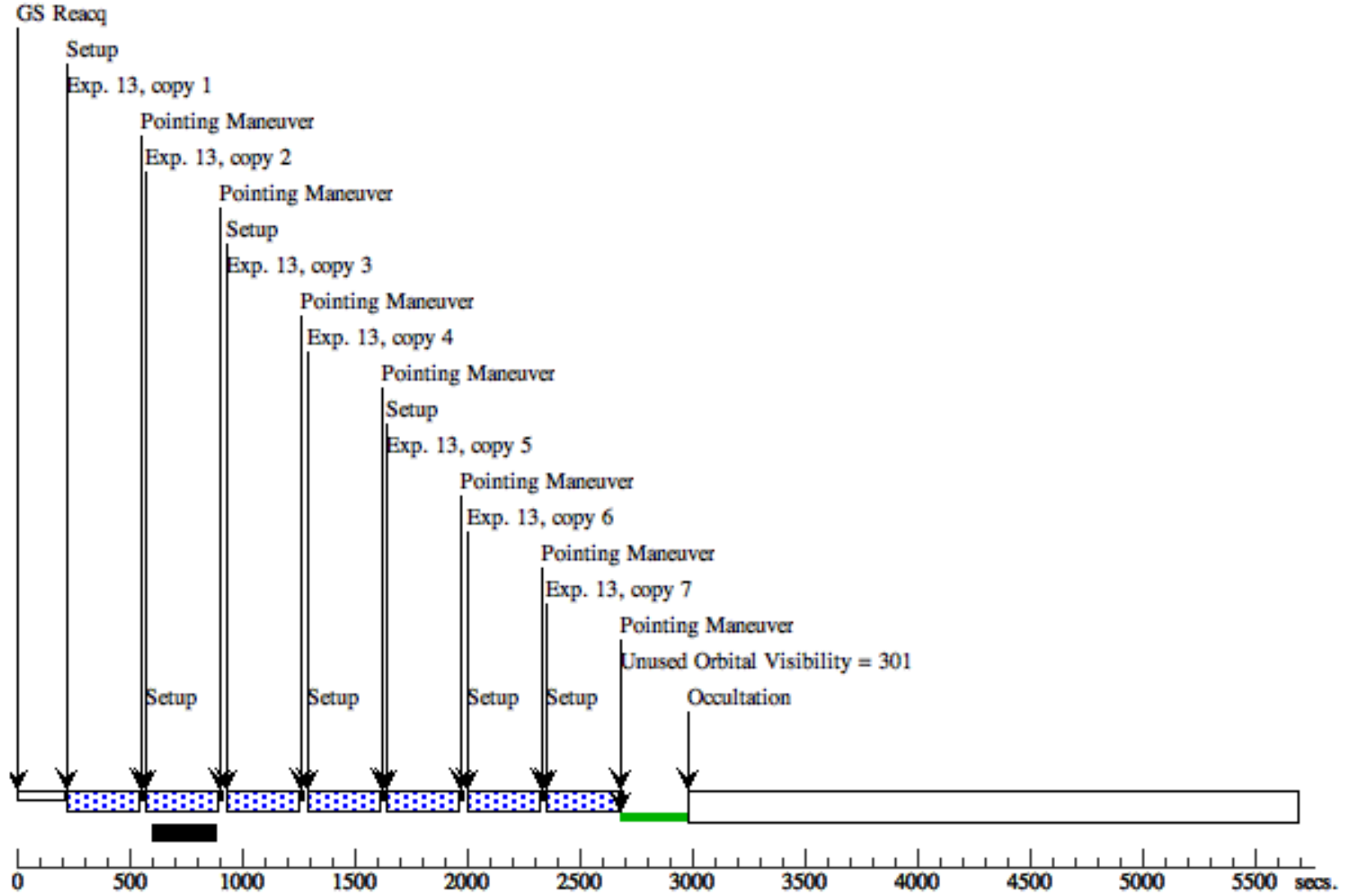


Orbit 11

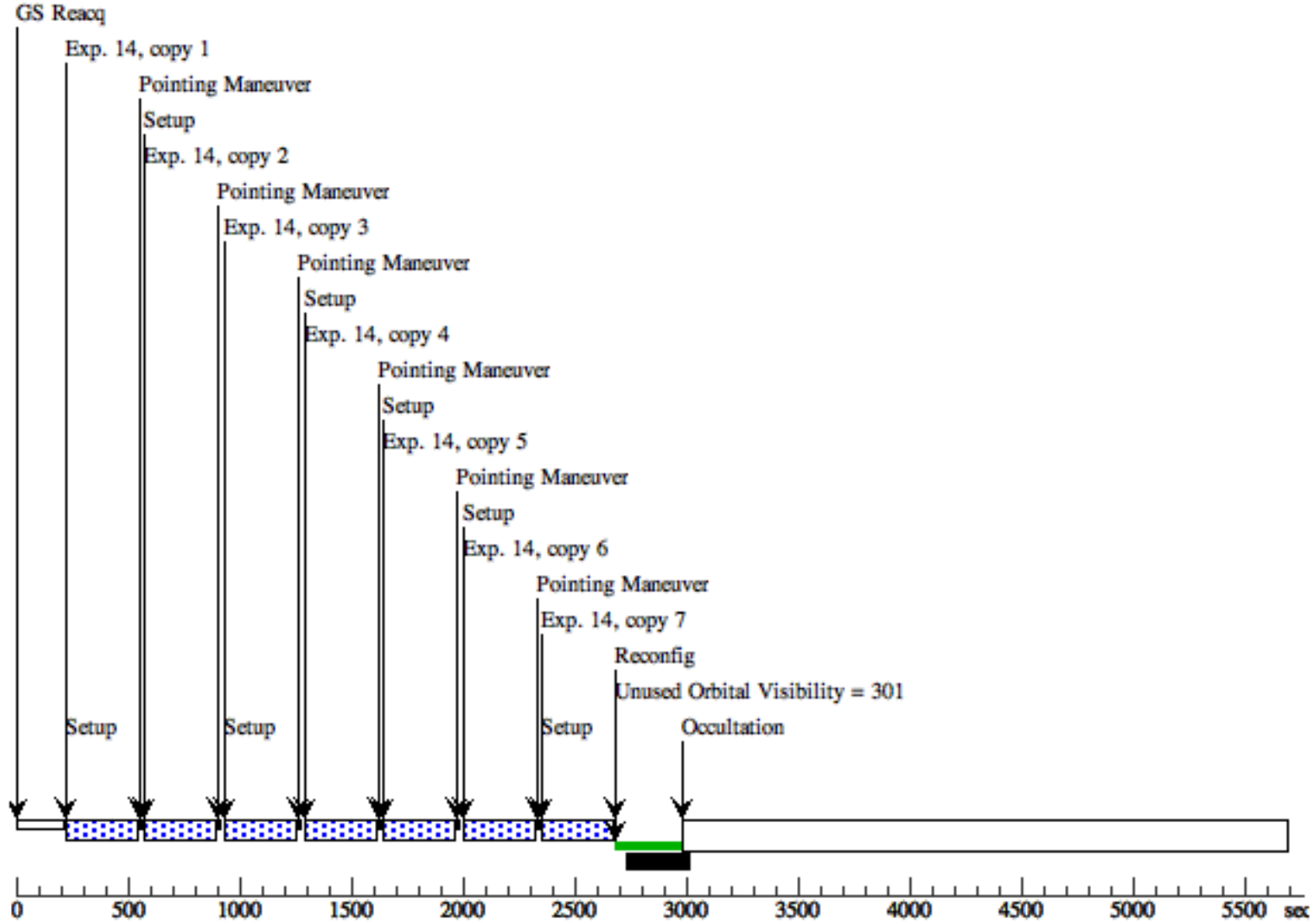
Server Version: 20171009



Orbit 12



Orbit 13



Proposal 15138 - Kepler-79 (02) - The Atmosphere of an Extremely Low Density Super-Earth Mass Planet

Fri Feb 16 16:08:14 GMT 2018

Visit	<p>Proposal 15138, Kepler-79 (02), implementation</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/IR</p> <p>Special Requirements: SCHED 100%; ORIENT 232.56D TO 357.96 D; ORIENT 52.56D TO 177.96 D; AFTER 07-NOV-2017:00:00:00; Period 52.0908 D AND ZERO-PHASE HJD2458013.0123</p> <p><i>Comments: Same as for Visit 01.</i></p>					
Diagnostics	(Kepler-79 (02)) Warning (Orbit Planner): LONG SU LIKELY TO INTERSECT THE SAA					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	KEPLER-79	RA: 20 02 4.1060 (300.5171083d)		V=13.98	Reference Frame: SIMBAD
		Alt Name1: KOI-152	Dec: +44 22 53.60 (44.38156d)			
		Alt Name2: KIC8394721	Equinox: J2000			
	<p><i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i></p> <p>Category=STAR</p> <p>Description=[EXTRA-SOLAR PLANETARY SYSTEM]</p>					

Proposal 15138 - Kepler-79 (02) - The Atmosphere of an Extremely Low Density Super-Earth Mass Planet

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	F139M	NSAMP=3; SAMP-SEQ=SPAR S25	PHASE 0.99189 TO 0.99429	Sequence 1-2 Non-Int in Kepler-79 (02)	44.969893 Secs (44.97 Secs) [==>]	[1]
	2	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 1-2 Non-Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Secs) [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	[1]
	3	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 3-3 Non-Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Secs) [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	[2]
	4	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 4-4 Non-Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Secs) [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	[3]
	5	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 5-5 Non-Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Secs) [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	[4]

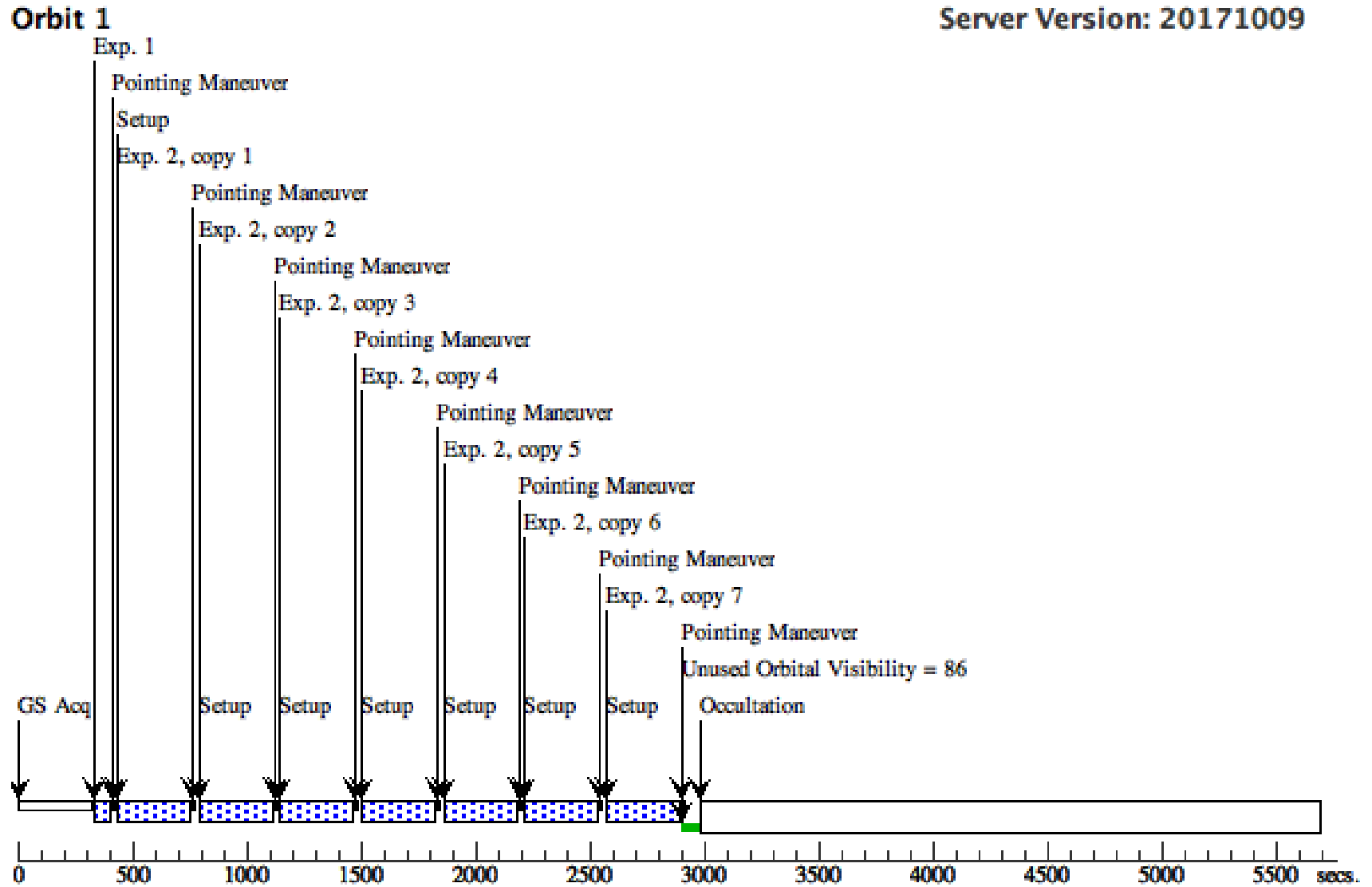
Proposal 15138 - Kepler-79 (02) - The Atmosphere of an Extremely Low Density Super-Earth Mass Planet

6	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 6-6 Non-Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Secs)	[5]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
7	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 7-7 Non-Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Secs)	[6]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
8	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 8-8 Non-Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Secs)	[7]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
9	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 9-9 Non-Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Secs)	[8]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
10	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,Forward	Sequence 10-10 Non-Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Secs)	[9]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	

Proposal 15138 - Kepler-79 (02) - The Atmosphere of an Extremely Low Density Super-Earth Mass Planet

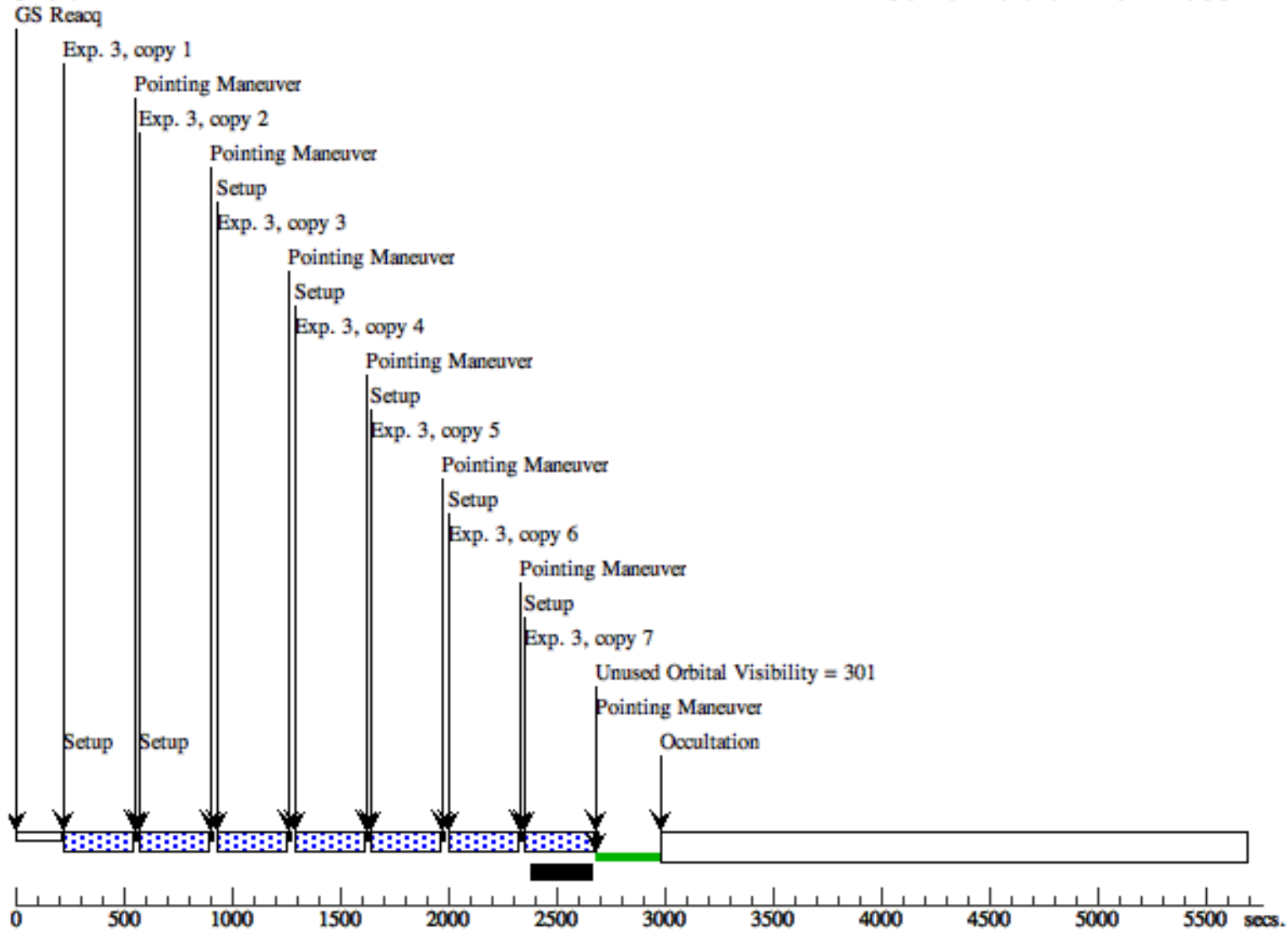
11	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,For ward	Sequence 11-11 Non -Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Sec s)	[10]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
12	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,For ward	Sequence 12-12 Non -Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Sec s)	[11]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
13	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,For ward	Sequence 13-13 Non -Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Sec s)	[12]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	
14	(1) KEPLER-79	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=14; SAMP-SEQ=SPAR S25	POS TARG 1.0,0.0; SPATIAL SCAN 0.0 15,90.0 Degrees,For ward	Sequence 14-14 Non -Int in Kepler-79 (02)	290.776322 Secs X 7 (2035.434 Sec s)	[13]
							[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)]	

Orbit Structure

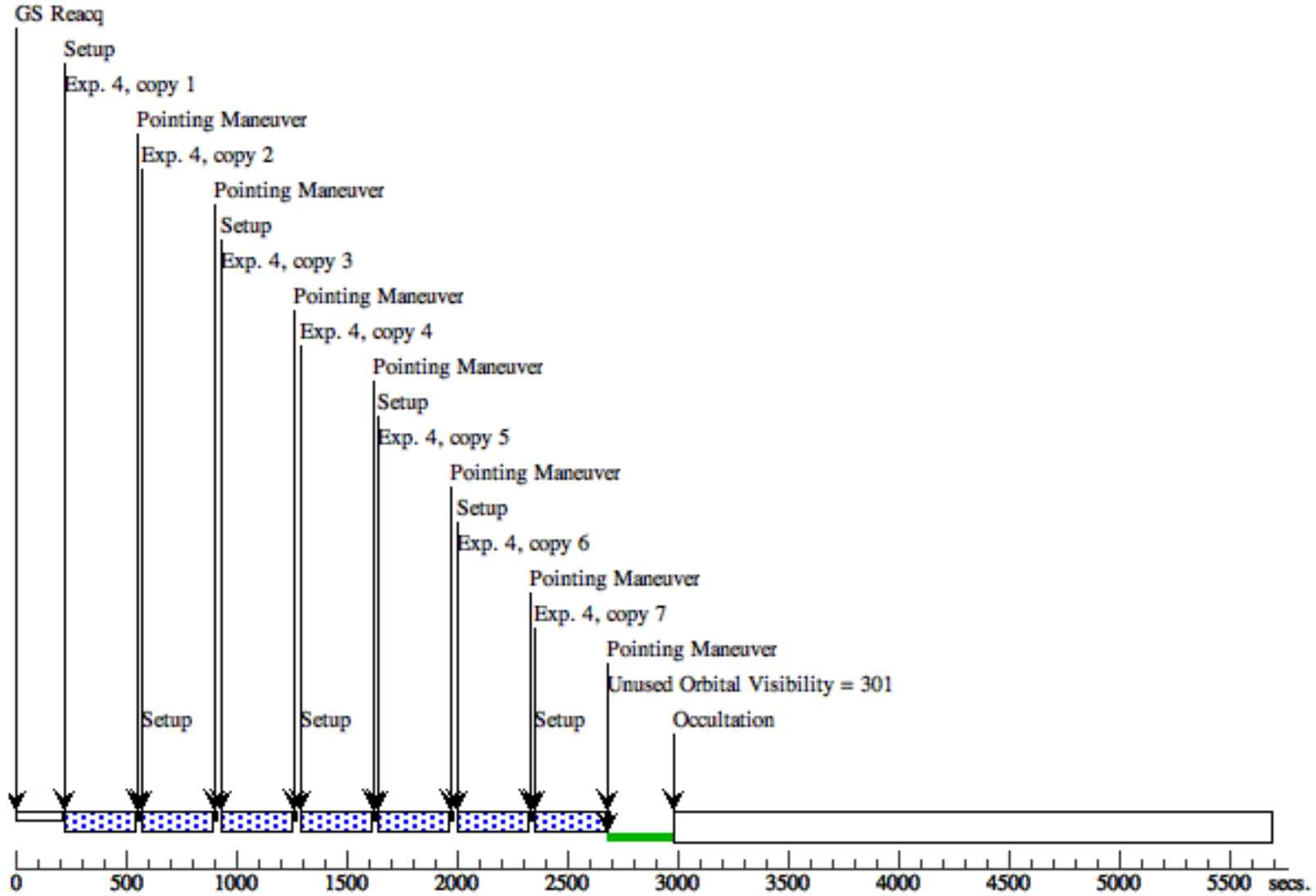


Orbit 2

Server Version: 20171009

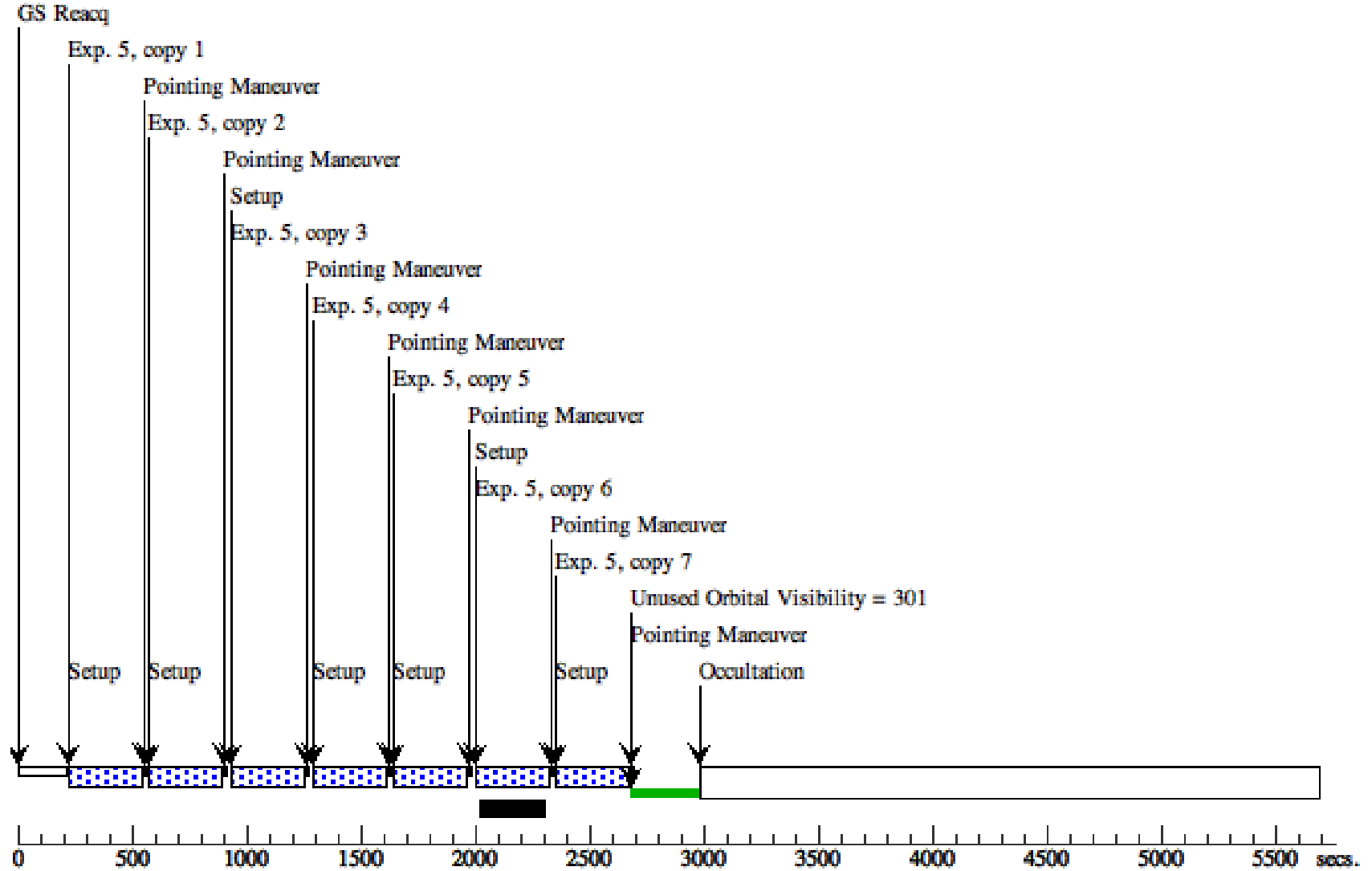


Orbit 3

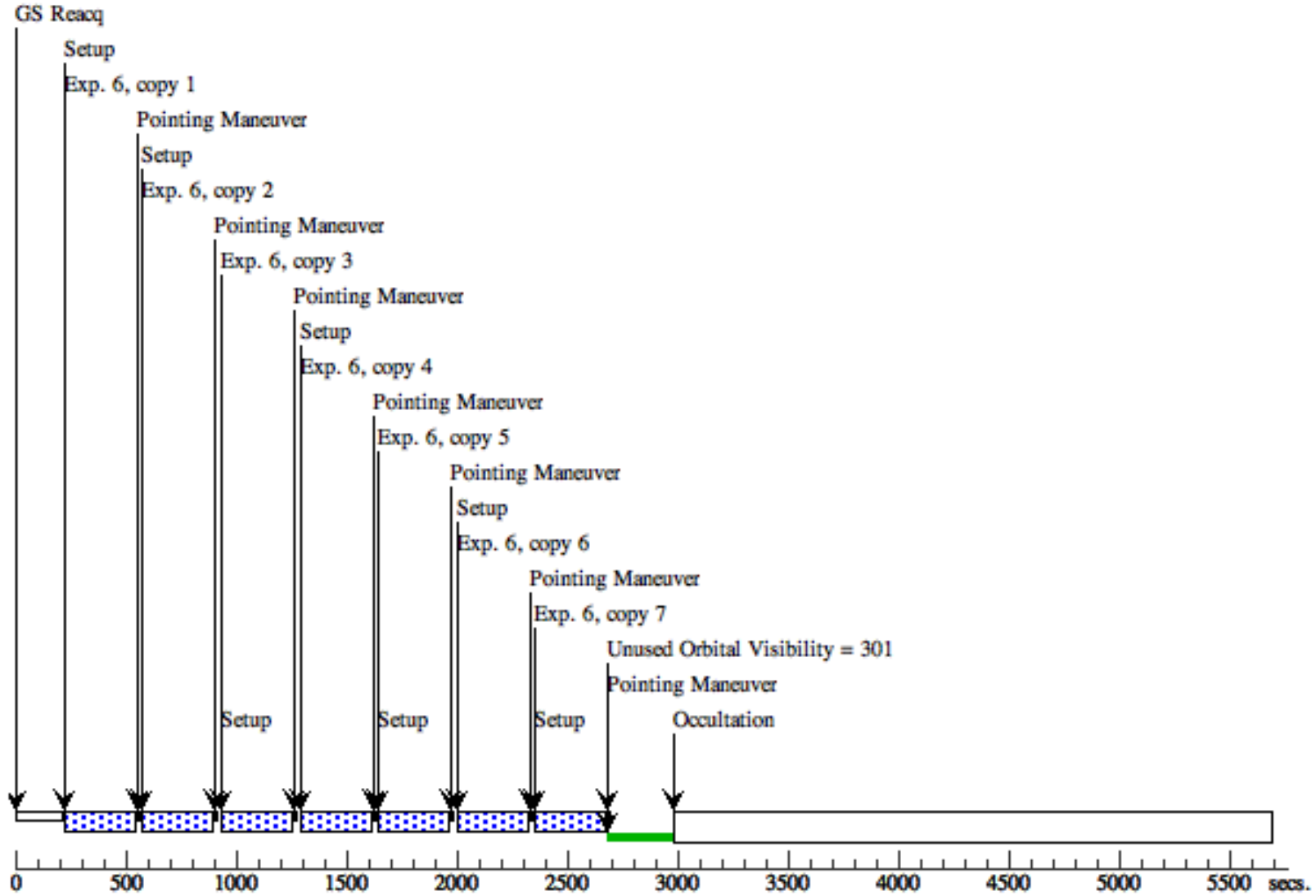


Orbit 4

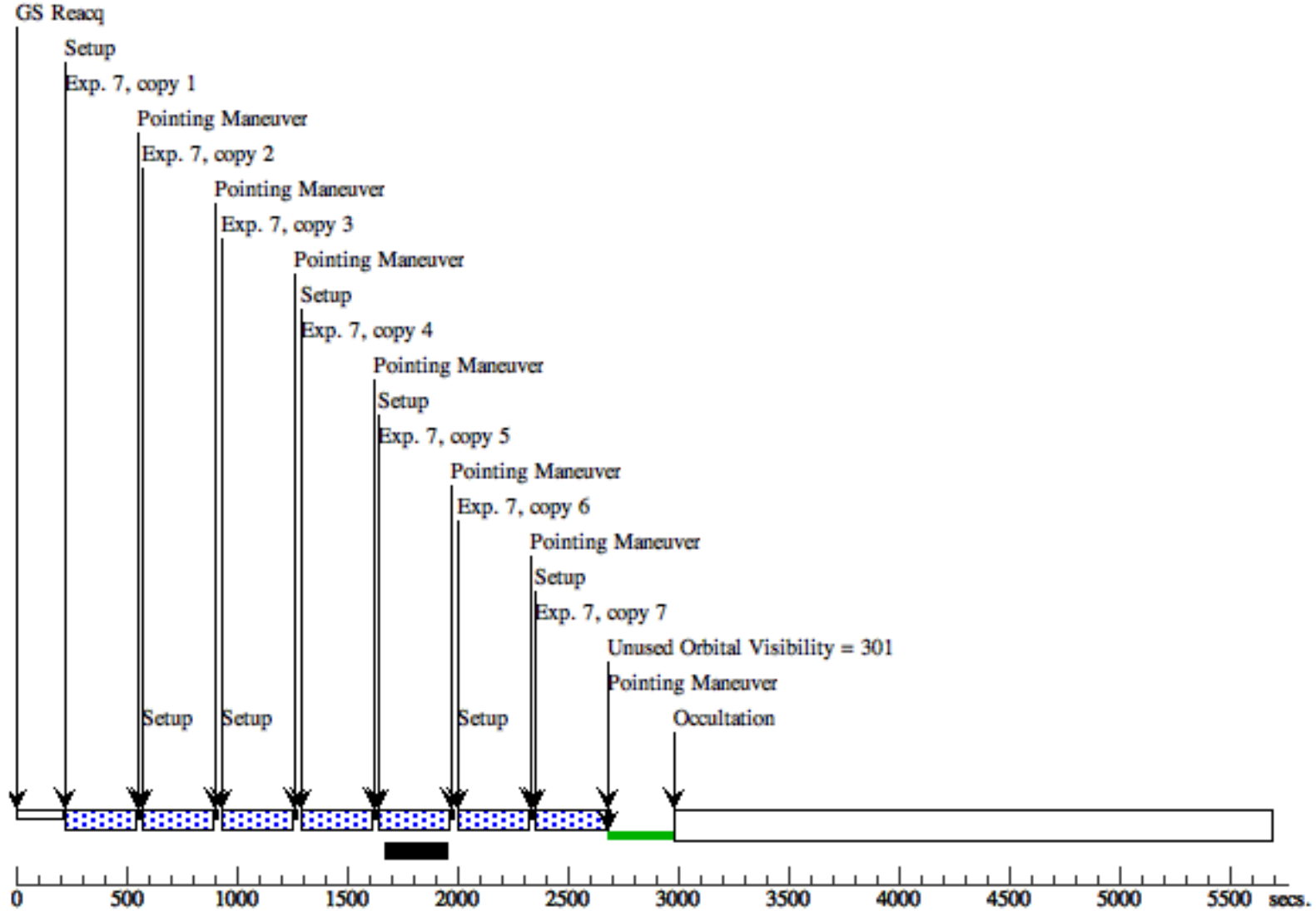
Server Version: 20171009



Orbit 5

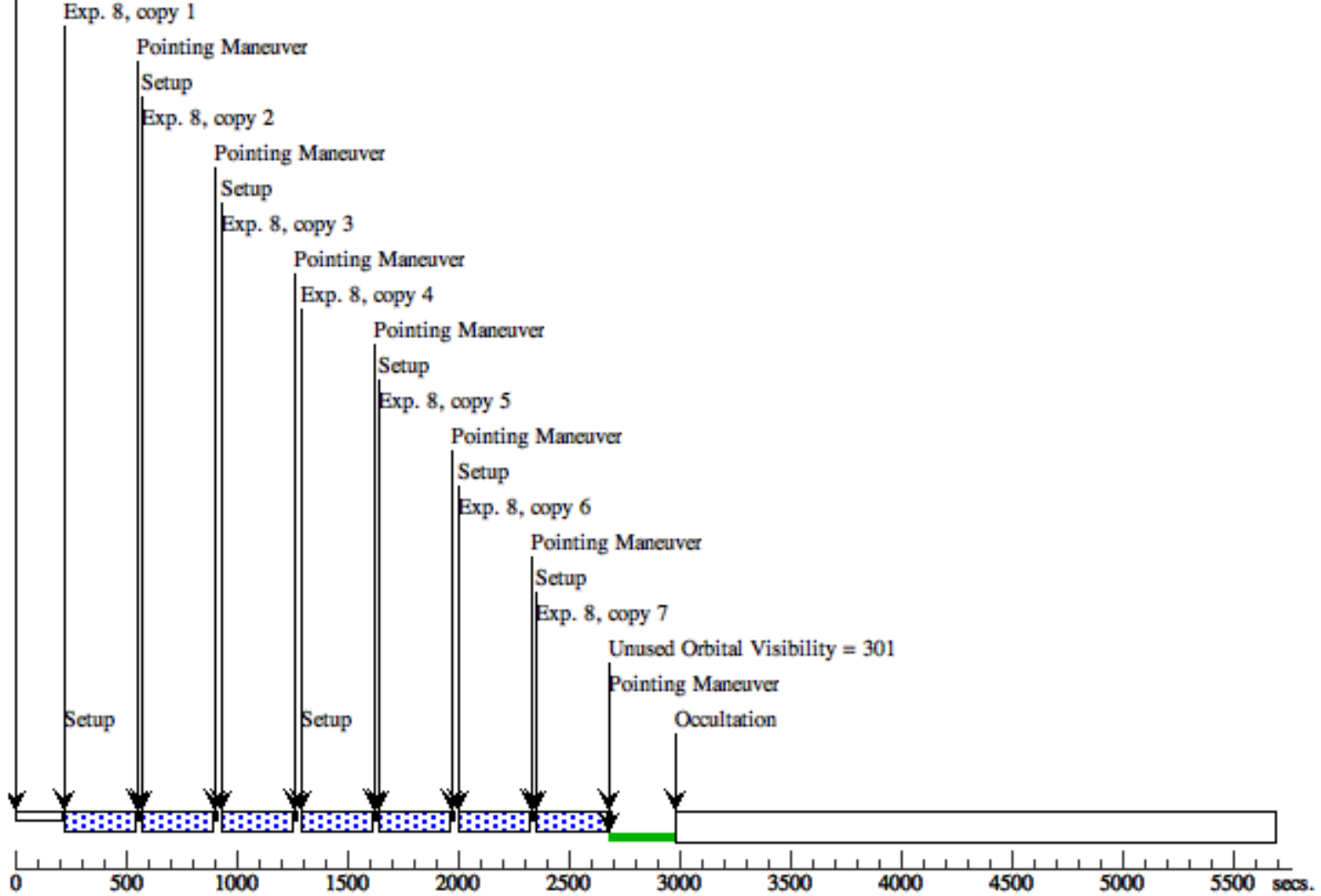


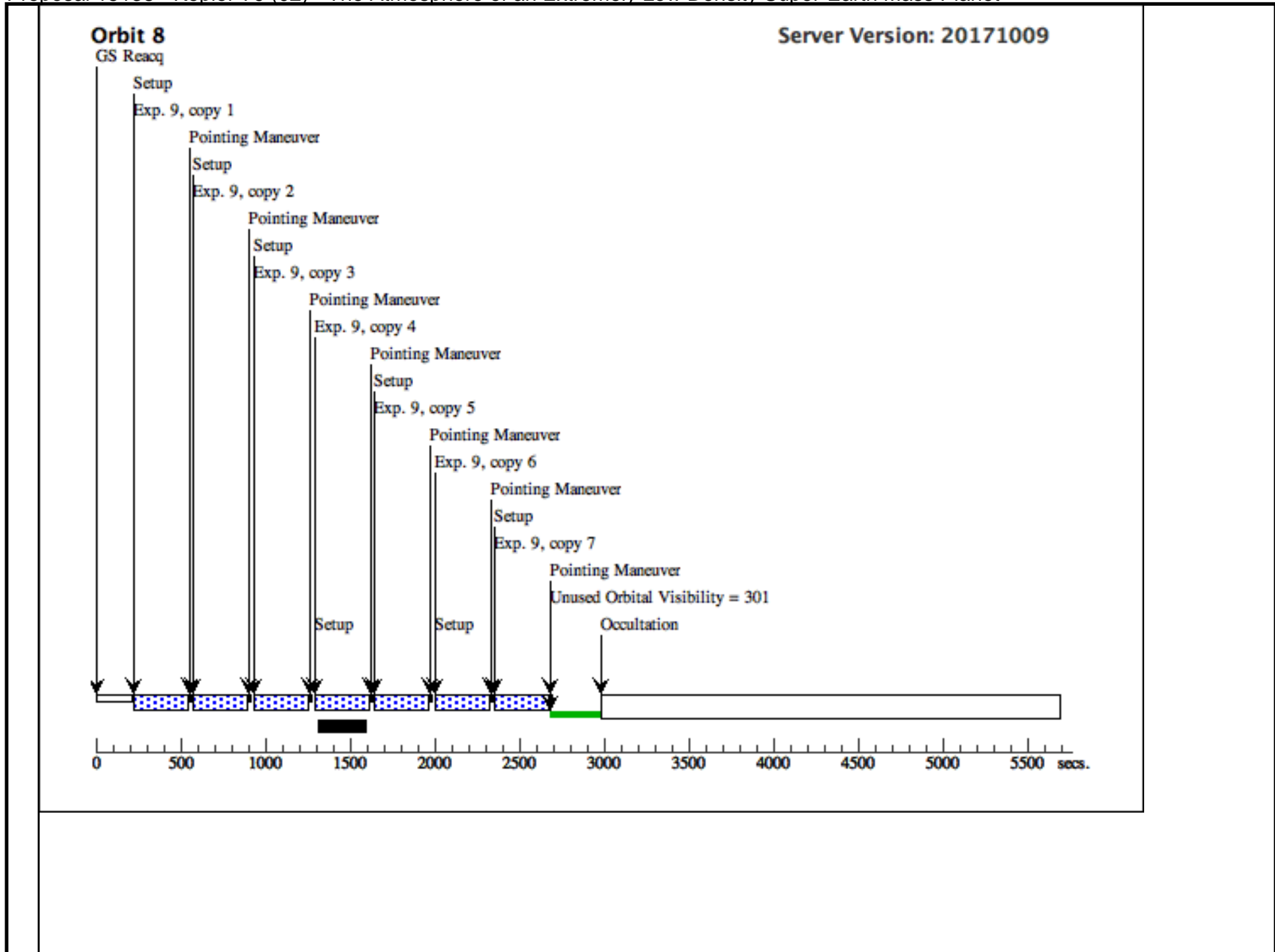
Orbit 6



Orbit 7

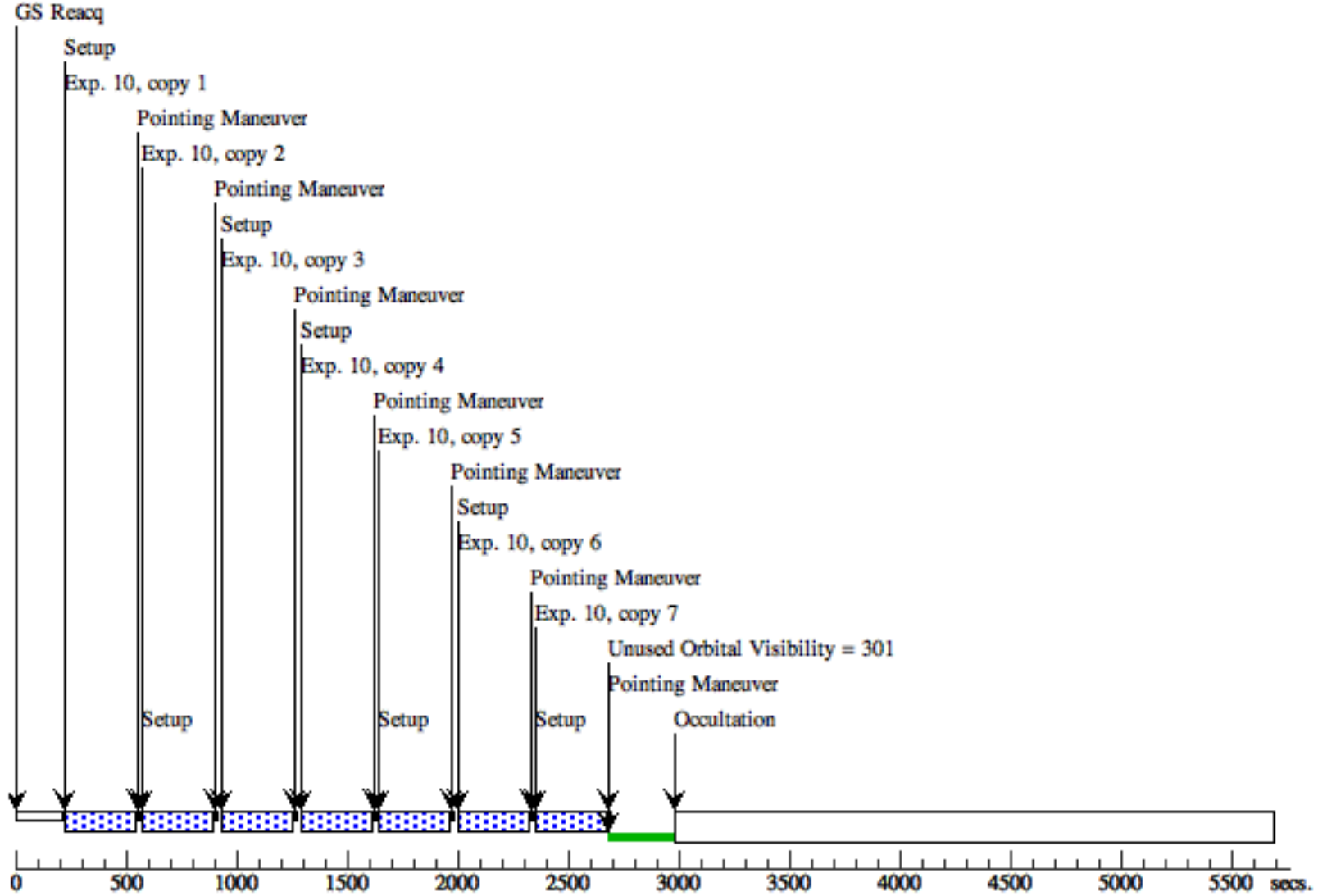
GS Reacq





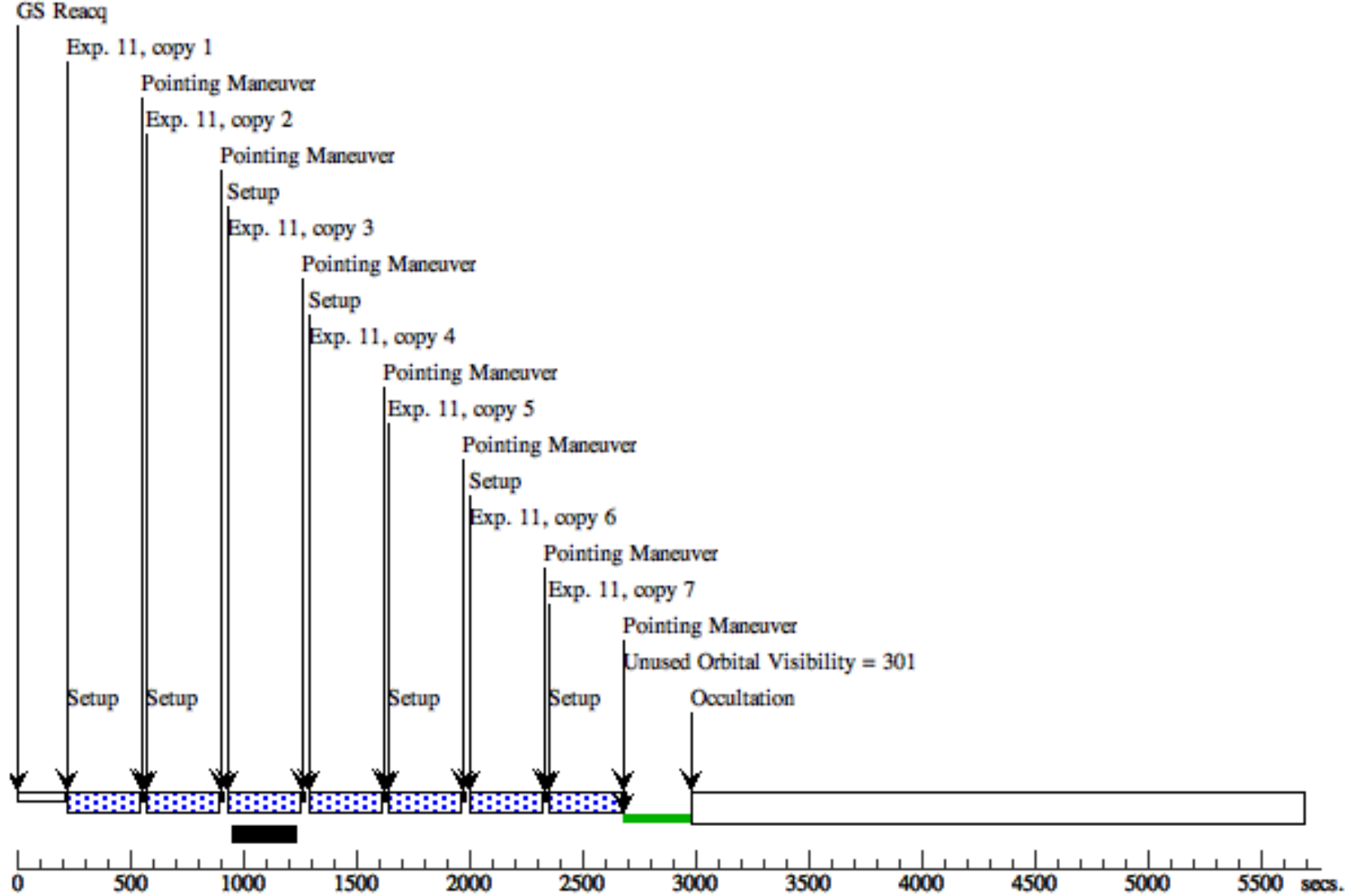
Orbit 9

Server Version: 20171009

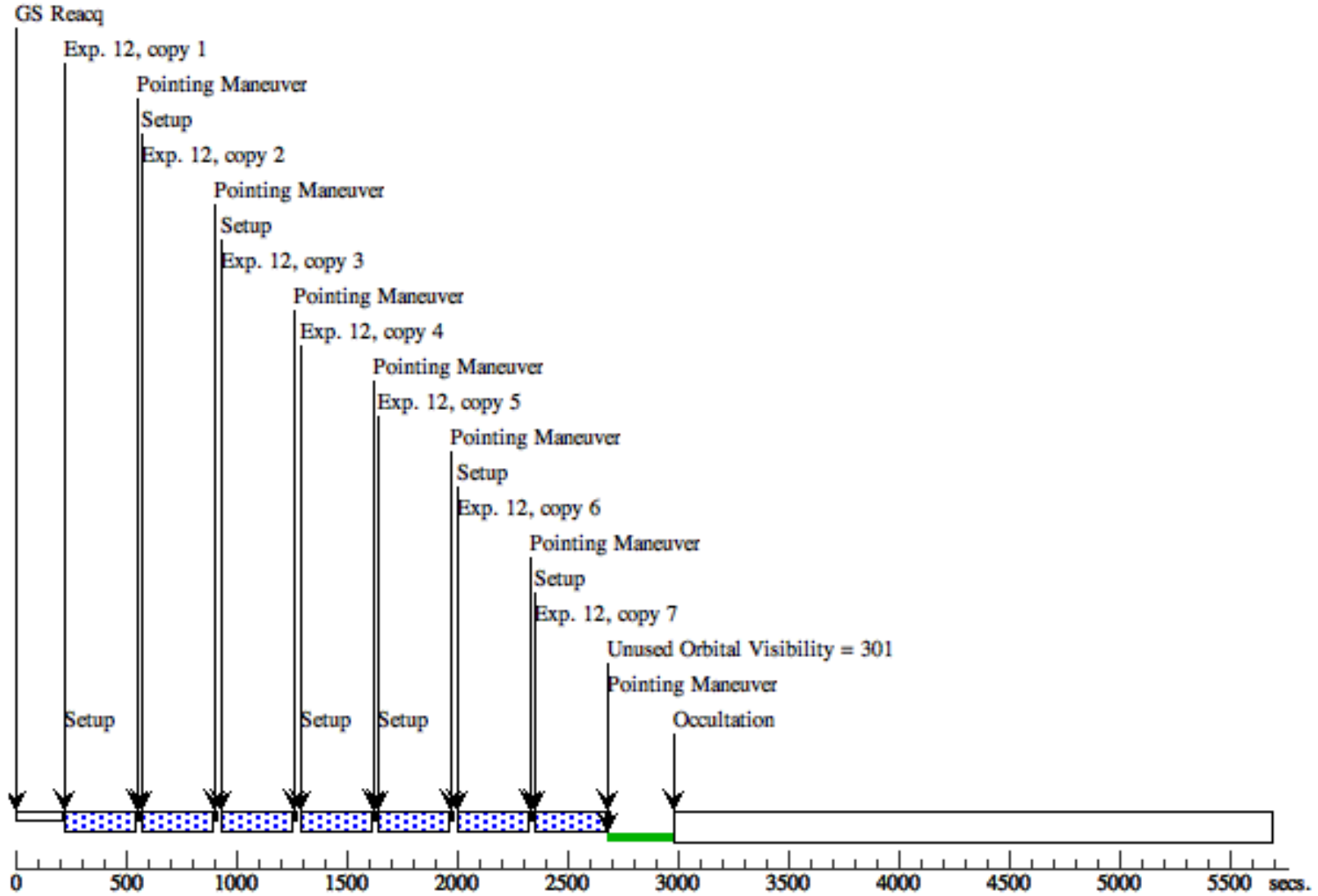


Orbit 10

Server Version: 20171009

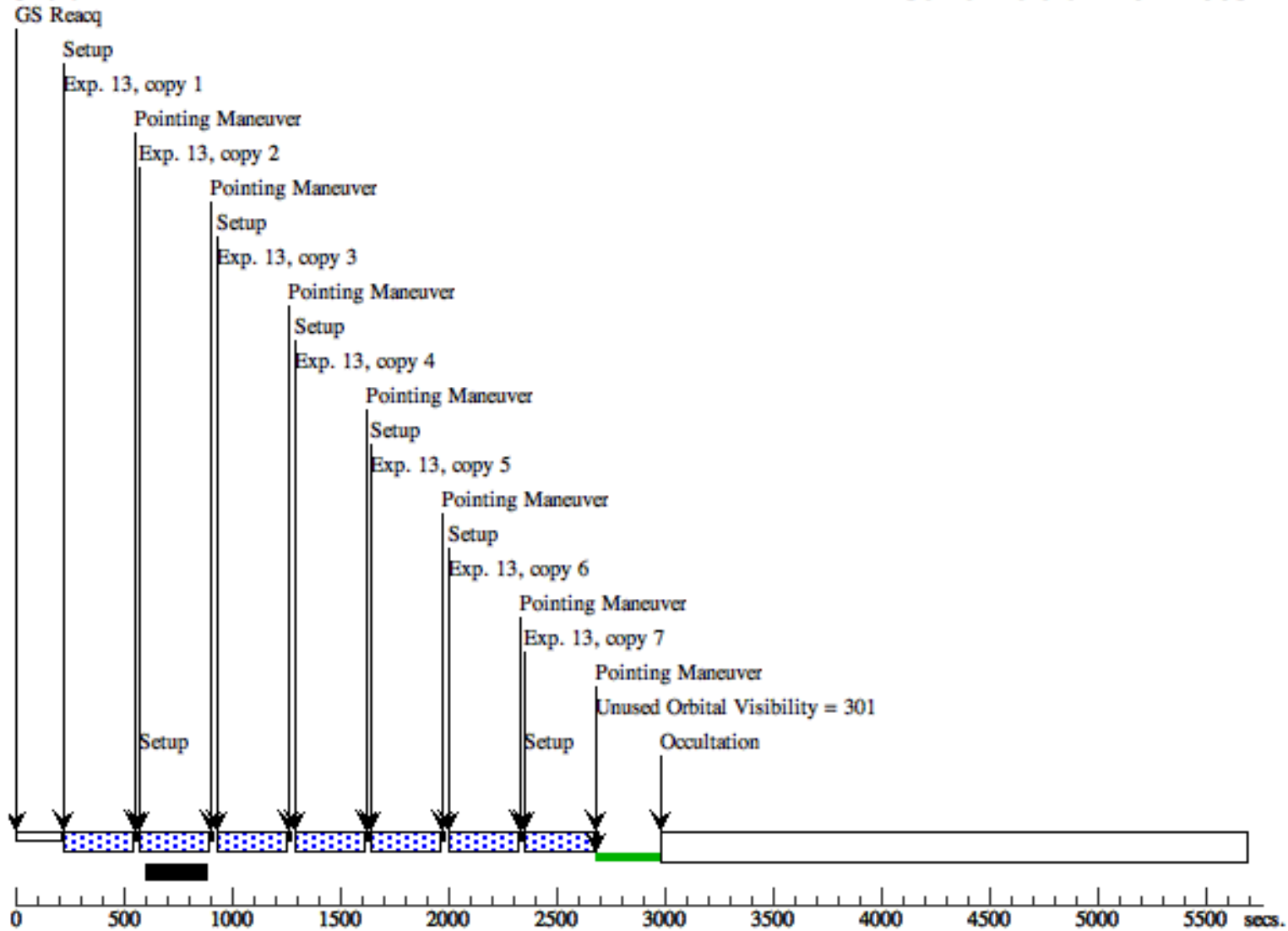


Orbit 11



Orbit 12

Server Version: 20171009



Orbit 13

