13794 - Seasonal Dependence of the Escape of Water from the Martian Atmosphere

Cycle: 22, 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) MARS-ACS-OFFSET-1 (4) SKY-NEAR-MARS (5) MARS-STIS	ACS/SBC STIS/FUV-MAMA	3	26-Sep-2015 21:04:05.0	yes
02	(2) MARS-ACS-OFFSET-2 (4) SKY-NEAR-MARS (5) MARS-STIS	ACS/SBC STIS/FUV-MAMA	3	26-Sep-2015 21:04:12.0	yes
03	(3) MARS-ACS-OFFSET-3 (4) SKY-NEAR-MARS (5) MARS-STIS	ACS/SBC STIS/FUV-MAMA	3	26-Sep-2015 21:04:19.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
04	(3) MARS-ACS-OFFSET-3 (4) SKY-NEAR-MARS (5) MARS-STIS	ACS/SBC STIS/FUV-MAMA	3	26-Sep-2015 21:04:26.0	yes
13	(6) SKY-NEAR-MARS-OCT-20-2014	ACS/SBC	1	26-Sep-2015 21:04:30.0	yes
23	(4) SKY-NEAR-MARS (5) MARS-STIS (7) MARS-ACS-OFFSET-4	ACS/SBC STIS/FUV-MAMA	3	26-Sep-2015 21:04:35.0	yes

16 Total Orbits Used

ABSTRACT

This proposal is to obtain ACS/SBC images and STIS spectra of the extended H Ly alpha and O 1304 emissions from H and O atoms in the atmosphere of Mars to study seasonal changes in the escape rate of H and O atoms, and thereby water. Prior HST observations have revealed a surprising rapid change in the H escape rate in late martian summer following a global dust storm, and have shown that STIS spectra can easily detect superthermal O atoms. The relative degree of influence of seasons and dust storms on the H density and escape flux are not known, and little is known about variations in the hot O density and escape rate. The timing of these observations is key to these scientific goals. Mars is now approaching the Sun, HST can observe Mars over a wide range of seasons from April - Nov 2014, and HST will not be able to observe Mars again until after the prime mission of MAVEN. The observations will also bracket in time the close approach of Comet Siding Spring on 19 Oct. 2014 and see any effects of the energy deposition in the martian upper atmosphere. These observations will provide strong support for the NASA MAVEN mission, scheduled to arrive at Mars in Sept. 2014, and STScI has granted 3 orbits to establish the baseline conditions in the martin atmosphere in late spring 2014, when Mars is far from the Sun.

OBSERVING DESCRIPTION

We propose to obtain ACS SBC UV images and STIS G140L spectra of Mars to measure the distribution of exospheric hydrogen and oxygen via the extended H Ly alpha and OI 1304 A emissions. The ACS images will be obtained in a series of clear and filtered images, with the F140LP filter used to record the disc emissions with Ly alpha blocked. The scaled difference of the clear and F140LP frames provides the Ly alpha emission. In practice, more than 250 km above the planet limb the only emission is from Ly alpha, while the difference method is needed for the lower atmosphere. Sky observations near Mars are critically important to accurately subtract the background geocoronal and interplanetary emissions. For

the OI 1304 emission the STIS G140L with 52x0.5 arc sec aperture will be used to spectrally separate the different emissions with imaging along the slit. From prior spectra, there is sufficient sensitivity to detect the hot O emission to an altitude above 1000 km in a single HST orbit. We request four visits of 3 orbits each, for a program total of 12 orbits.

The ACS/SBC clear (F115) images will be taken during the portion of the HST orbit when HST is in shadow, and filtered (F140) images when HST is in sunlight, to minimize the geocoronal background brightness at Ly alpha. In the 2007 observations, one orbit each on target and sky provided a signal to noise ratio and accuracy of sky background subtraction that permits detection of the martian corona to the level of 150-200 Rayleighs. To accurately subtract the background geocoronal and interplanetary emissions, it is imperative to measure its brightness versus HST orbital location. One HST orbit will be used in each visit for a series of clear images taken several arc min away from Mars, since the field of view near Mars will be filled with coronal emission. Although only the sky background (geocoronal and interplanetary emissions) will be observed, an accurate subtraction is key to determining the brightness of faint emission far from Mars. Experience with past programs has shown that the geocoronal conditions are too highly variable to be modeled with a high accuracy for this subtraction. A side benefit of this will be to build up a Ly alpha flat field of the ACS MAMA, for comparison with the general UV flat field used for calibration. A low order Ly alpha flat field obtained during the 2007 observations has been delivered to STScI for distribution to the public, and it will be improved by new observations. Each visit will thus consist of 2 orbits observing Mars (ACS and STIS) and 1 on the sky background (ACS).

In more detail, in GO program 11170 we obtained ACS SBC images of H Ly alpha emission from the hydrogen corona in three visits near solar minimum in Fall 2007 (Figure 1a). The image is the scaled difference between F115LP and F140LP images to remove the reflected solar continuum from the disc of Mars, and the disk portion has been replaced by a scaled FUV image. Above ~200 km altitude the emission is purely H Ly alpha. It is important to obtain time-series images of the geocoronal sky background close in time to the martian images to accurately subtract the background emission, as was done with these data. In Figure 1b one can see from the intensity traces that the emission steadily decreased, maintaining a shape consistent with a single ~300 K H population but decreasing in intensity by more than 30 % over 4 weeks' time. The model profiles correspond to H fluxes by Jean's escape of 2.6, 2.1, and 1.8 x 108 cm^-2-sec^-1. The same general decrease in martian Ly alpha emission was detected by SPICAM from within the atmosphere in coordinated observations. We note that better fits are obtained to the ACS profiles with a lower temperature plus a hot component. This requires a detailed comparison with an exosphere / radiative transfer model, work which is ongoing.

HST is the only facility that has the UV sensitivity and angular resolution necessary for these observations. While the SPICAM instrument on Mars Express can also measure Ly alpha, its location in an orbit within the martian H corona and operational constraints do not permit mapping of the extended emission. The same constraints will apply to MAVEN, whose apoapse distance will be ~ 4000 km. We will schedule coordinated

SPICAM observations of the limb altitude profile of the Ly alpha emissions from inside the atmosphere (J.-L. Bertaux), for comparison and cross-calibration of the H distribution measurements. However, the SPICAM instrument now responds intermittently to commands, and may or may not be available for new observations. If data are forthcoming, this will aid the modeling effort to derive the distribution of H atoms with altitude and local time, and confirm any long-term trends in the coronal emission.

The count rates for ACS SBC clear (F115) imaging of Mars from GO 11170 range from 5000 - 40000 counts/sec, well below the limit of 200,000 counts/sec, and the local count rate limits are also not exceeded. Count rates with F140LP are much lower since the Ly alpha emission is blocked. The roll angle will be unconstrained for this program. The fact that Mars moves across the sky generally makes it possible to locate good guide stars within any week-long observing window, and we have shown in GO 11170 that bright object protection and counting rate limits will not hinder the observations. Count rates with STIS G140L are much lower than with ACS SBC, and well below the maximum allowed.

Visit

Proposal 13794, Visit 01, completed Sun Sep 27 01:04:38 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: STIS/FUV-MAMA, ACS/SBC

Special Requirements: ORIENT 97D TO 100 D; BETWEEN 15-SEP-2014:20:00:00 AND 16-SEP-2014:01:00:00

Diagnostics

(Visit 01) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

Solar System Targets

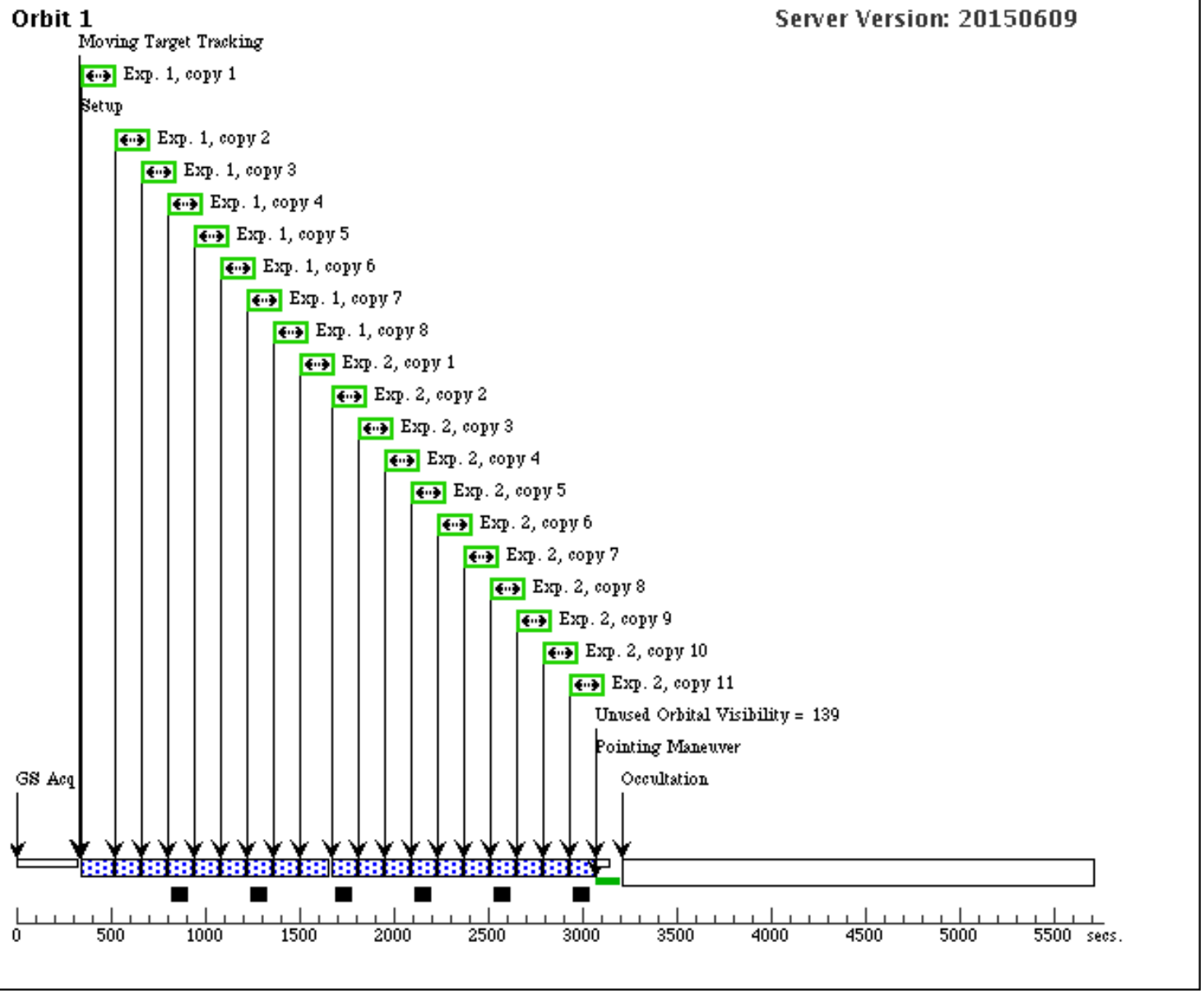
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	MARS-ACS-OFFSET-1	STD=MARS	TYPE=POS_ANGLE,RAD=13,ANG=339,REF=NORTH			EARTH
Comments: Offset Mars disc to corner of ACS/SBC FOV to image H coronal emissions far from the planet in sunward direction.						
(4)	SKY-NEAR-MARS	STD=MARS	TYPE=POS_ANGLE,RAD=295,ANG=0,REF=NORTH			EARTH
(5)	MARS-STIS	STD=MARS				EARTH

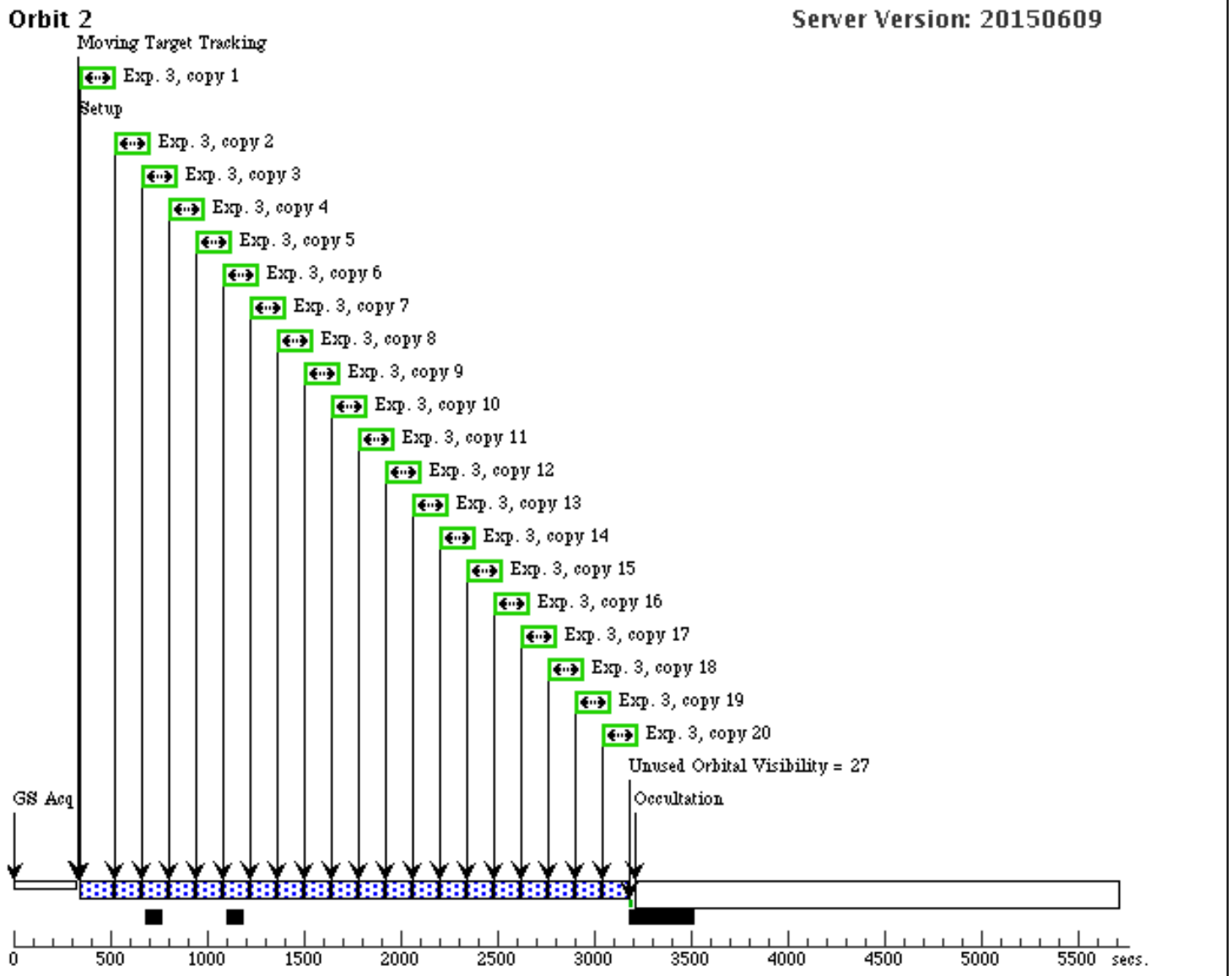
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(0)	(1) MARS-ACS-OFFSET-1	ACS/SBC, ACCUM, SBC	F140LP		GS ACQ SCENARIO BASE1B3		100 Secs X 8 (800 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[1]***
2	(0)	(1) MARS-ACS-OFFSET-1	ACS/SBC, ACCUM, SBC	F115LP				100 Secs X 11 (1100 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[1]***
3	(0)	(4) SKY-NEAR-MARS	ACS/SBC, ACCUM, SBC	F115LP		NEW OBSET FULL ACQ; GS ACQ SCENARIO BASE1B3		100 Secs X 20 (2000 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)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]*	***[2]***

	4	(0)	(5) MARS-STIS	STIS/FUV-MAMA, TIME-TAG, 52X0.5	G140L 1425 A	BUFFER-TIME=3000	NEW OBSET FULL ACQ; GS ACQ SCENARIO BASE1B3	2400 Secs (2400 Secs) *[==>]*	***[3]***

Orbit Structure

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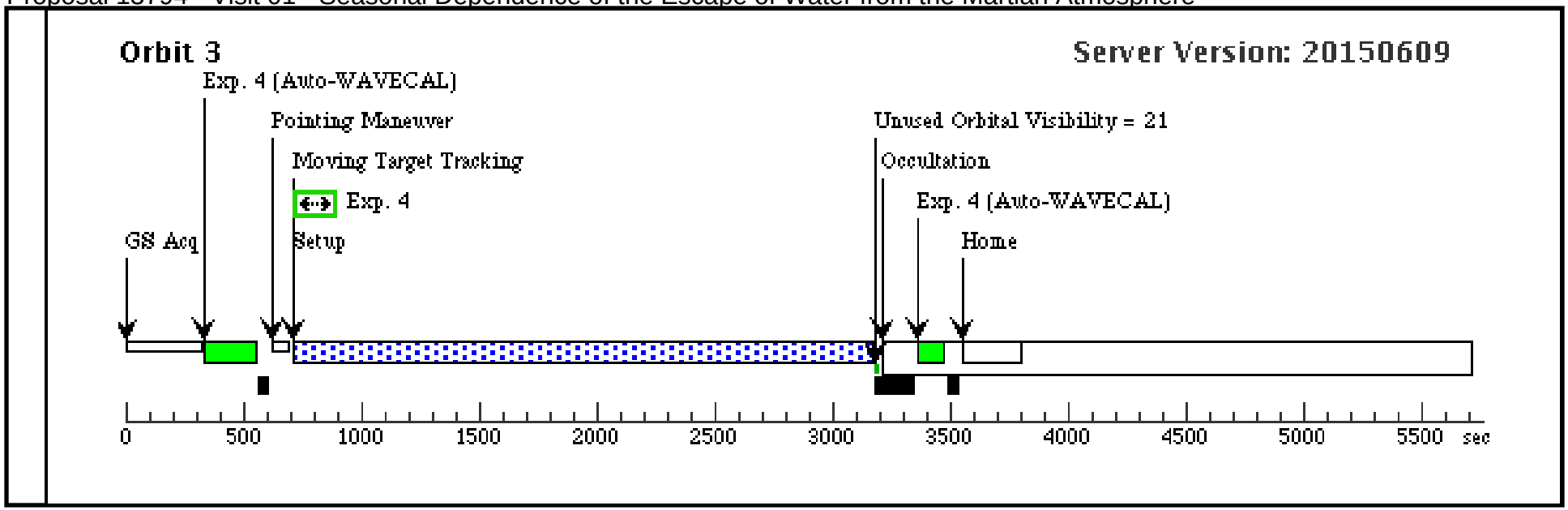
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Proposal 13794 - Visit 02 - Seasonal Dependence of the Escape of Water from the Martian Atmosphere

Visit

Proposal 13794, Visit 02, completed Sun Sep 27 01:04:38 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: STIS/FUV-MAMA, ACS/SBC

Special Requirements: ORIENT 94D TO 97 D; BETWEEN 05-OCT-2014:10:00:00 AND 05-OCT-2014:15:00:00

Diagnostics

(Visit 02) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

Solar System Targets

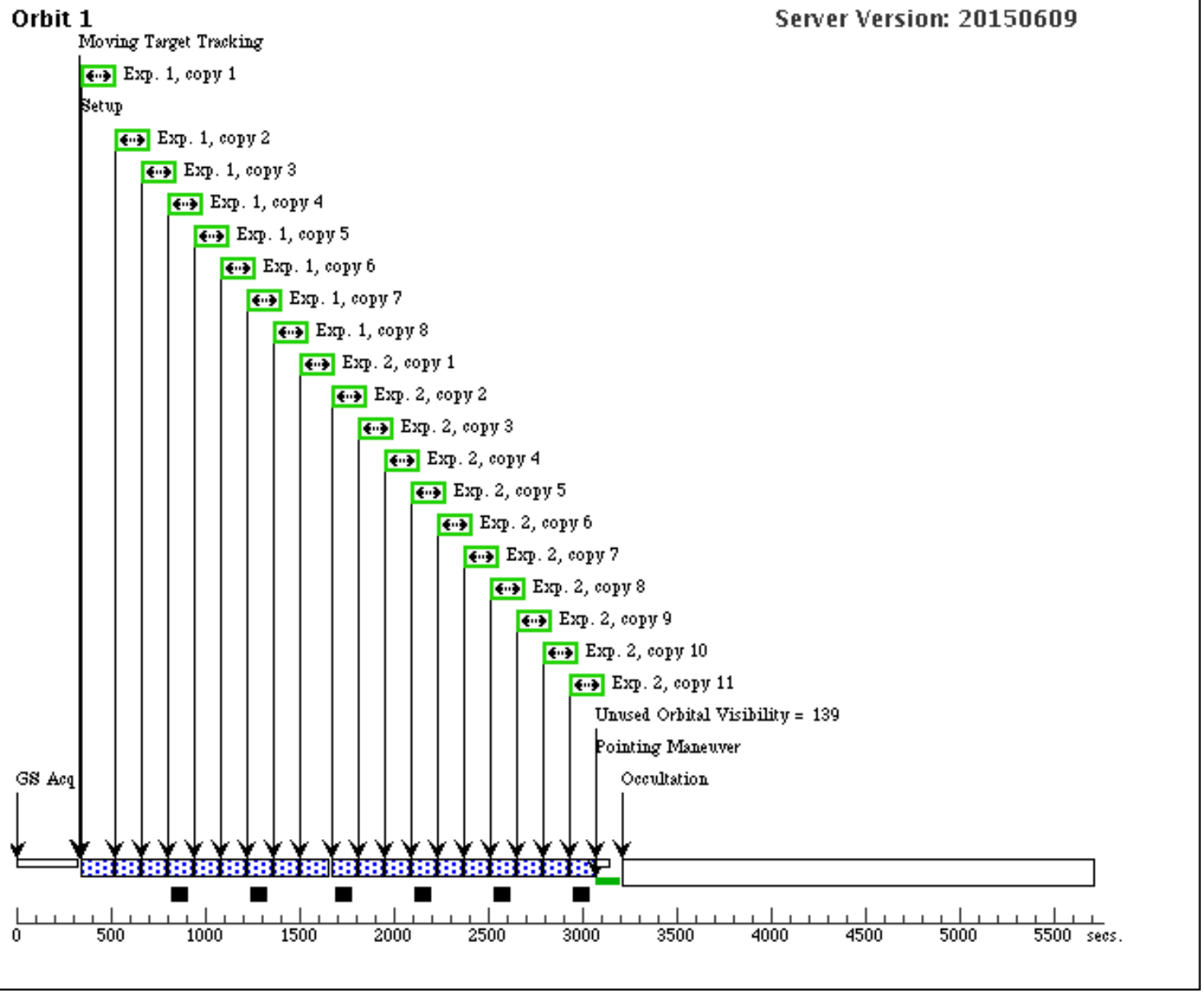
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	MARS-ACS-OFFSET-2	STD=MARS	TYPE=POS_ANGLE,RAD=13,ANG=338,REF=NORTH			EARTH
Comments: Offset Mars disc to corner of ACS/SBC FOV to image H coronal emissions far from the planet in sunward direction.						
(4)	SKY-NEAR-MARS	STD=MARS	TYPE=POS_ANGLE,RAD=295,ANG=0,REF=NORTH			EARTH
(5)	MARS-STIS	STD=MARS				EARTH

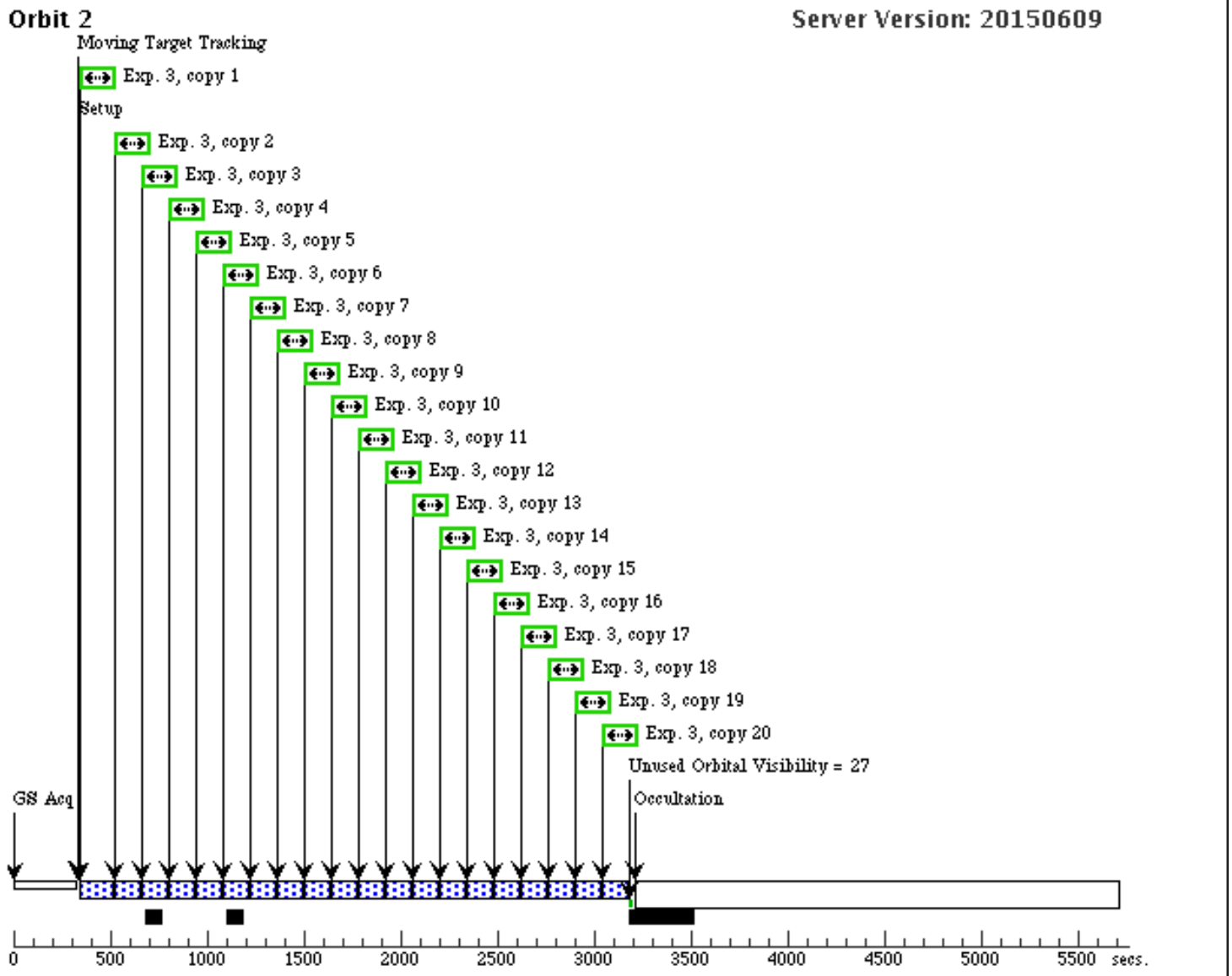
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(0)	(2) MARS-ACS-OFFSET-2	ACS/SBC, ACCUM, SBC	F140LP		GS ACQ SCENARIO BASE1B3		100 Secs X 8 (800 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[1]***
2	(0)	(2) MARS-ACS-OFFSET-2	ACS/SBC, ACCUM, SBC	F115LP				100 Secs X 11 (1100 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[1]***
3	(0)	(4) SKY-NEAR-MARS	ACS/SBC, ACCUM, SBC	F115LP		NEW OBSET FULL ACQ; GS ACQ SCENARIO BASE1B3		100 Secs X 20 (2000 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)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]*	***[2]***

	4	(0)	(5) MARS-STIS	STIS/FUV-MAMA, TIME-TAG, 52X0.5	G140L 1425 A	BUFFER-TIME=3000	NEW OBSET FULL ACQ; GS ACQ SCENARIO BASE1B3	2400 Secs (2400 Secs) *[==>]*	***[3]***

Orbit Structure

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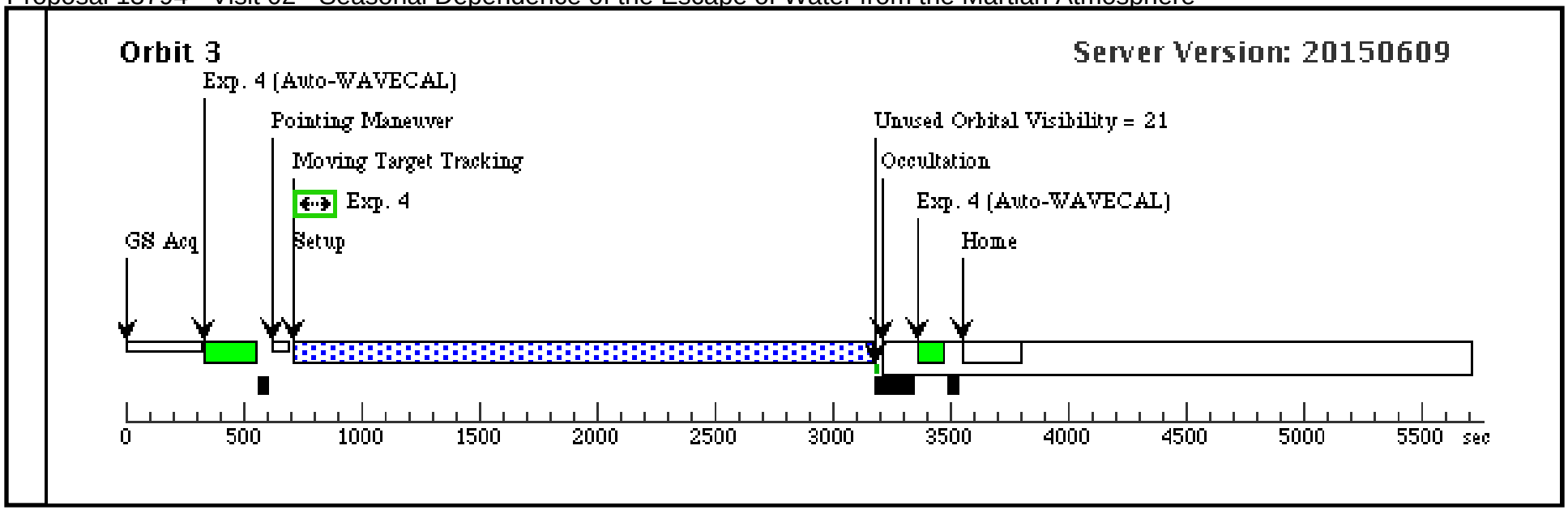
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Server Version: 20150609
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Pointing Maneuver
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Exp. 4
GS Acq
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Proposal 13794 - Visit 03 - Seasonal Dependence of the Escape of Water from the Martian Atmosphere

Visit

Proposal 13794, Visit 03, failed Sun Sep 27 01:04:39 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: STIS/FUV-MAMA, ACS/SBC

Special Requirements: ORIENT 92D TO 95 D; BETWEEN 20-OCT-2014:00:00:00 AND 23-OCT-2014:00:00:00

Diagnostics

(Visit 03) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

Solar System Targets

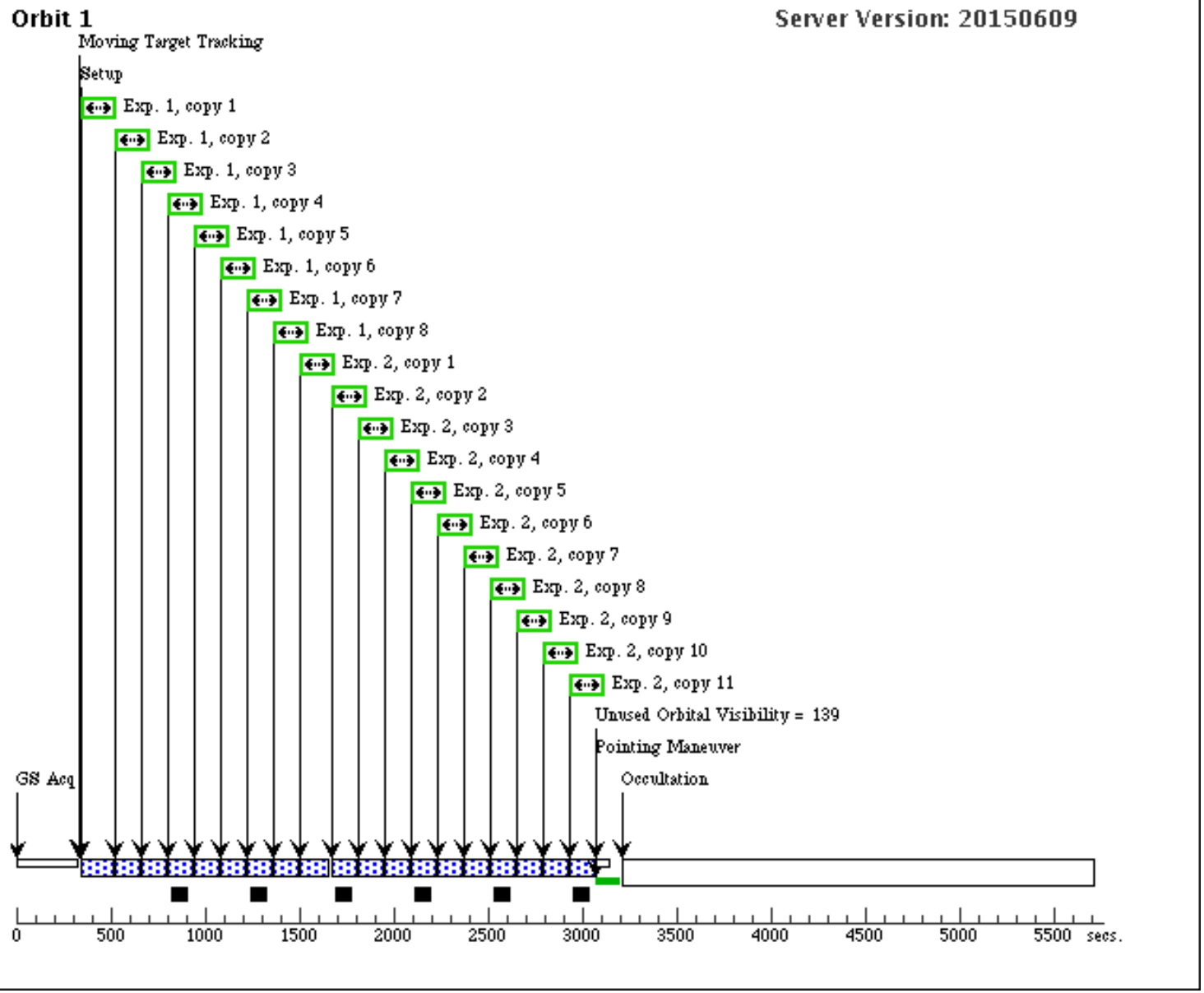
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(3)	MARS-ACS-OFFSET-3	STD=MARS	TYPE=POS_ANGLE,RAD=13,ANG=333,REF=NORTH			EARTH
Comments: Offset Mars disc to corner of ACS/SBC FOV to image H coronal emissions far from the planet in sunward direction.						
(4)	SKY-NEAR-MARS	STD=MARS	TYPE=POS_ANGLE,RAD=295,ANG=0,REF=NORTH			EARTH
(5)	MARS-STIS	STD=MARS				EARTH

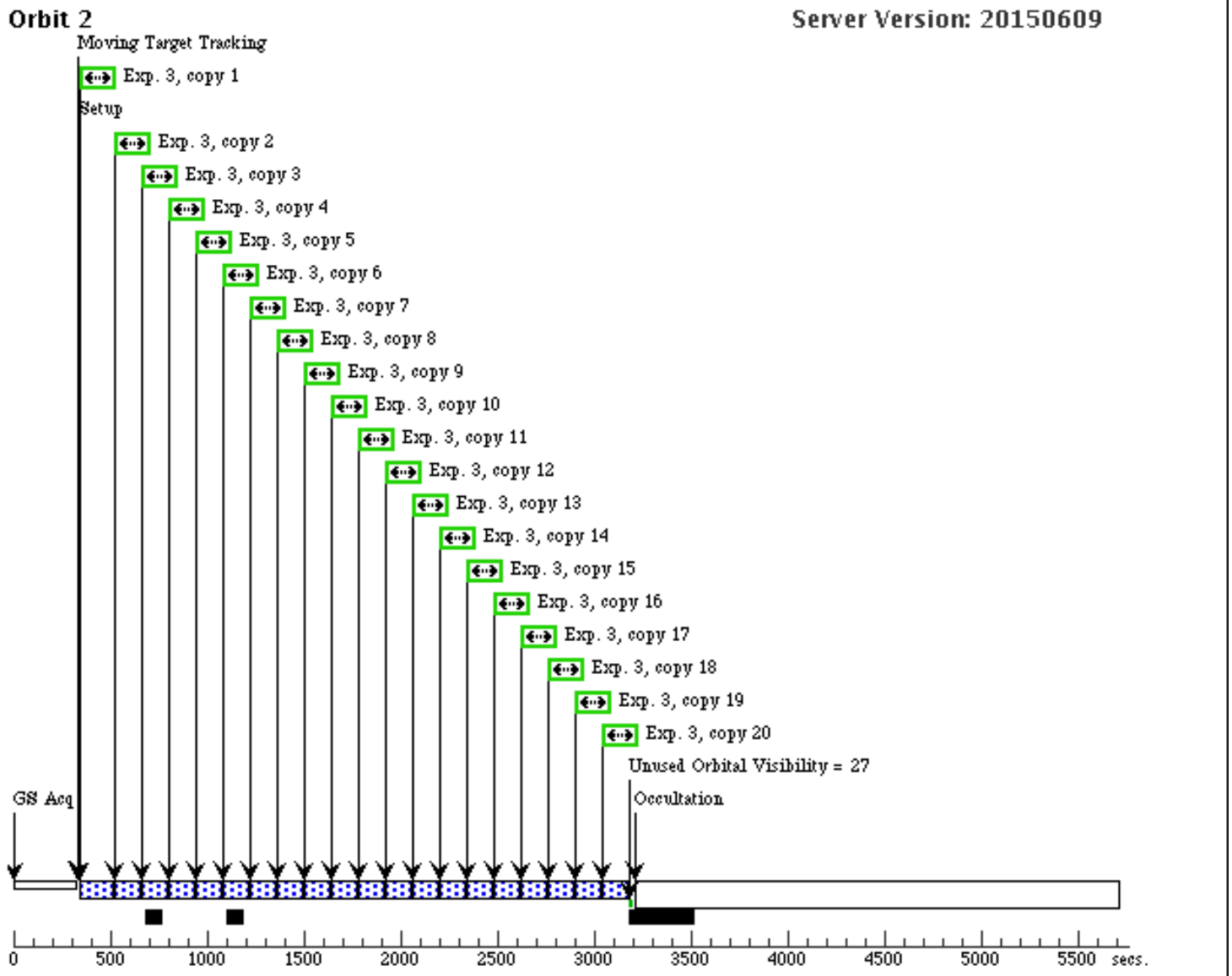
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(0)	(3) MARS-ACS-OFFSET-3	ACS/SBC, ACCUM, SBC	F140LP		GS ACQ SCENARIO BASE1B3		100 Secs X 8 (800 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[1]***
2	(0)	(3) MARS-ACS-OFFSET-3	ACS/SBC, ACCUM, SBC	F115LP				100 Secs X 11 (1100 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[1]***
3	(0)	(4) SKY-NEAR-MARS	ACS/SBC, ACCUM, SBC	F115LP		NEW OBSET FULL ACQ; GS ACQ SCENARIO BASE1B3		100 Secs X 20 (2000 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)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]*	***[2]***

	4	(0)	(5) MARS-STIS	STIS/FUV-MAMA, TIME-TAG, 52X0.5	G140L 1425 A	BUFFER-TIME=3000	NEW OBSET FULL ACQ; GS ACQ SCENARIO BASE1B3	2400 Secs (2400 Secs) *[==>]*	***[3]***

Orbit Structure

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Unused Orbital Visibility = 27
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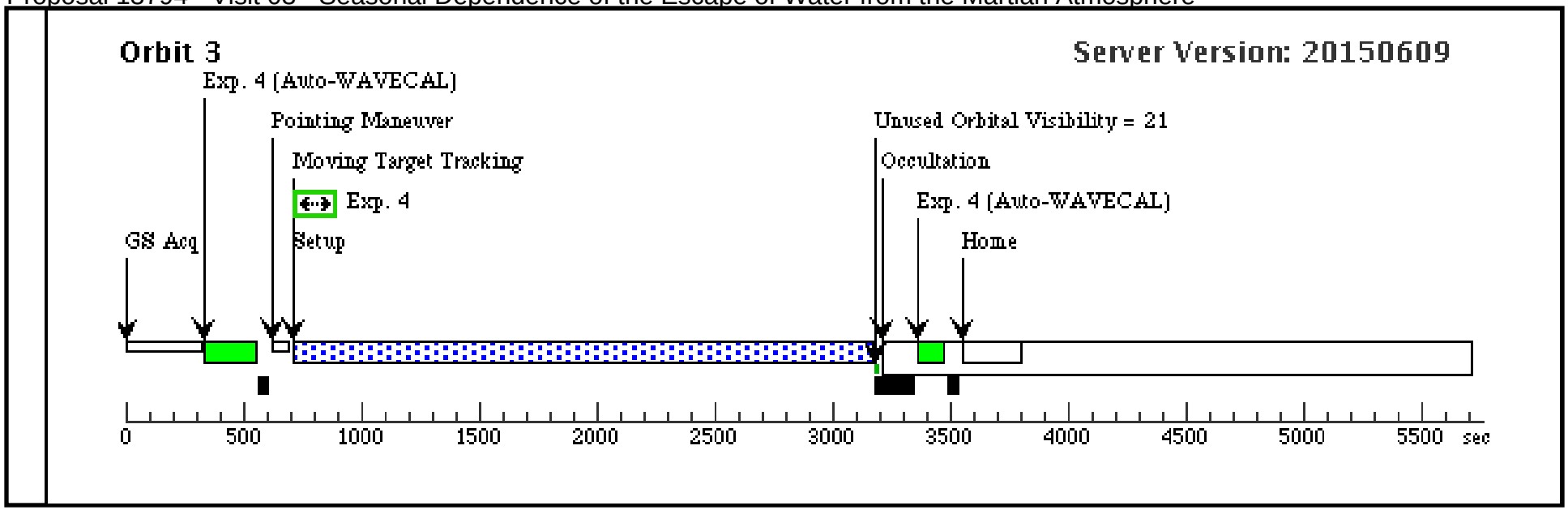
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Exp. 4 (Auto-WAVECAL)
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Exp. 4 (Auto-WAVECAL)
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Visit

Proposal 13794, Visit 04, completed Sun Sep 27 01:04:39 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: STIS/FUV-MAMA, ACS/SBC

Special Requirements: ORIENT 90D TO 93 D; BETWEEN 12-NOV-2014:00:00:00 AND 14-NOV-2014:00:00:00

Diagnostics

(Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 04) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

Solar System Targets

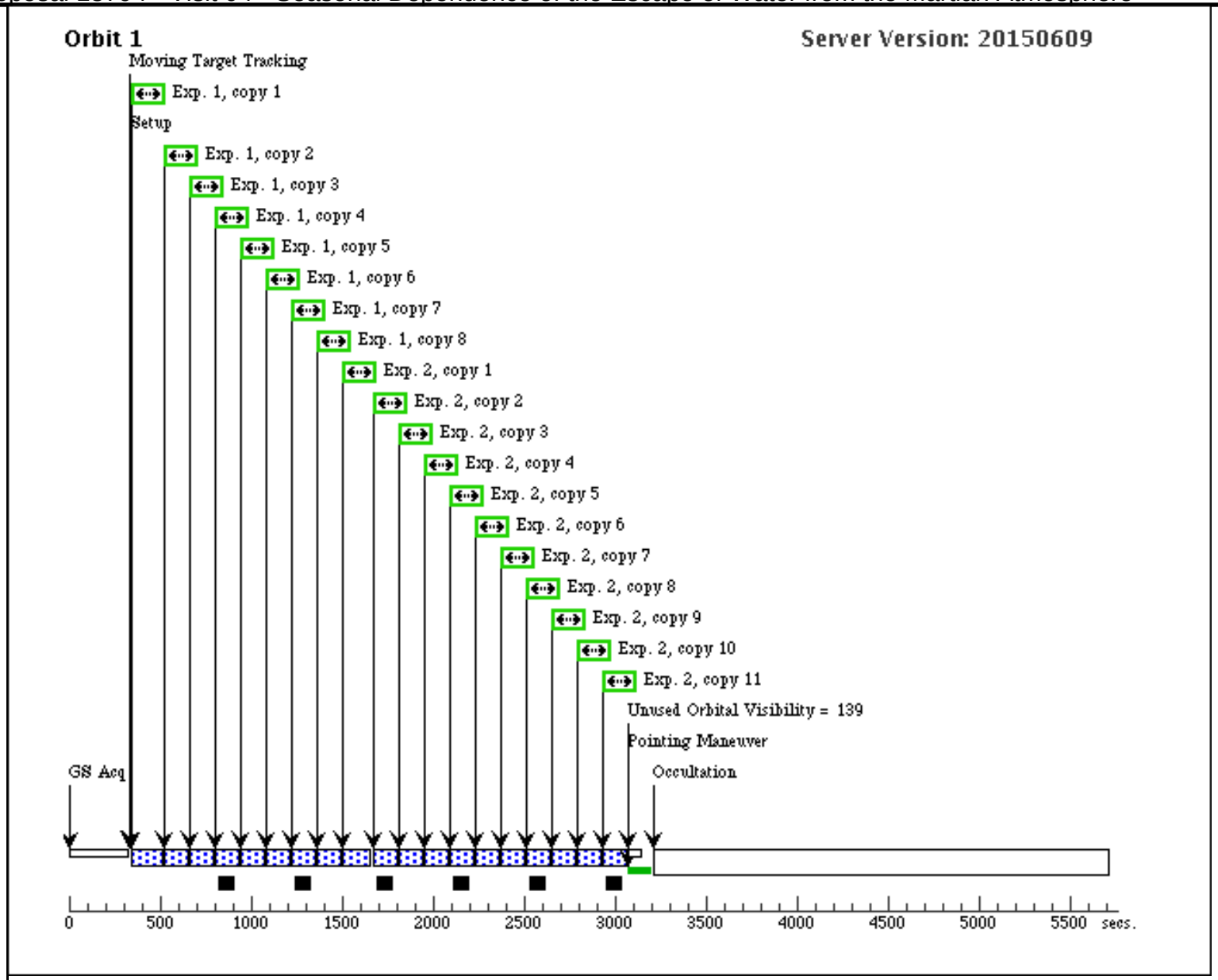
#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(3)	MARS-ACS-OFFSET-3	STD=MARS	TYPE=POS_ANGLE,RAD=13,ANG=333,REF=NORTH			EARTH
Comments: Offset Mars disc to corner of ACS/SBC FOV to image H coronal emissions far from the planet in sunward direction.						
(4)	SKY-NEAR-MARS	STD=MARS	TYPE=POS_ANGLE,RAD=295,ANG=0,REF=NORTH			EARTH
(5)	MARS-STIS	STD=MARS				EARTH

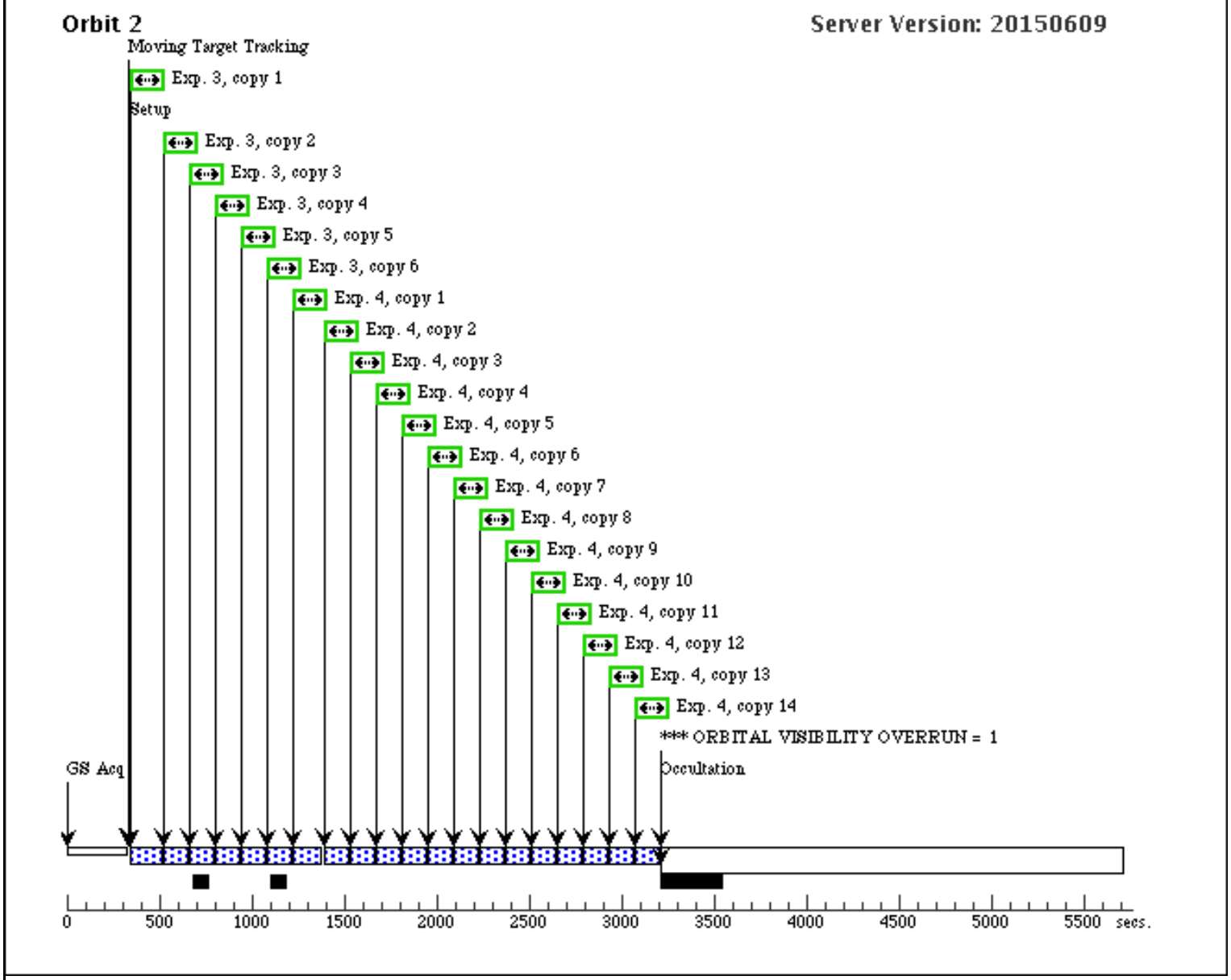
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(0)	(3) MARS-ACS-OFFSET-3	ACS/SBC, ACCUM, SBC	F140LP		GS ACQ SCENARIO BASE1B3		100 Secs X 8 (800 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[1]***
2	(0)	(3) MARS-ACS-OFFSET-3	ACS/SBC, ACCUM, SBC	F115LP				100 Secs X 11 (1100 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[1]***
3	(0)	(4) SKY-NEAR-MARS	ACS/SBC, ACCUM, SBC	F140LP		NEW OBSET FULL ACQ; GS ACQ SCENARIO BASE1B3		100 Secs X 6 (600 Secs)	
								[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]*	***[2]***
4	(0)	(4) SKY-NEAR-MARS	ACS/SBC, ACCUM, SBC	F115LP				100 Secs X 14 (1400 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)]*	***[2]***

	5	(0)	(5) MARS-STIS	STIS/FUV-MAMA, TIME-TAG, 52X0.5	G140L 1425 A	BUFFER-TIME=3000	NEW OBSET FULL ACQ; GS ACQ SCENARIO BASE1B3	2400 Secs (2400 Secs) *[==>]*	***[3]***

Orbit Structure




Orbit 2
Server Version: 20150609
Moving Target Tracking
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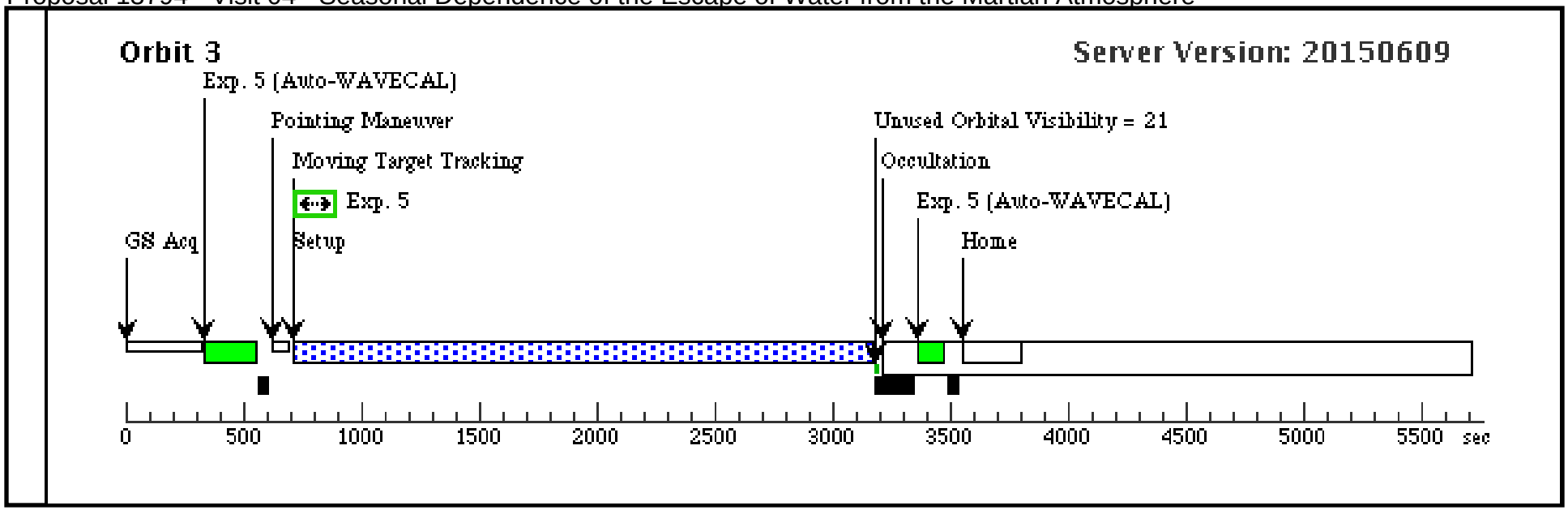
Setup
Exp. 3, copy 2
Exp. 3, copy 3
Exp. 3, copy 4
Exp. 3, copy 5
Exp. 3, copy 6
Exp. 4, copy 1
Exp. 4, copy 2
Exp. 4, copy 3
Exp. 4, copy 4
Exp. 4, copy 5
Exp. 4, copy 6
Exp. 4, copy 7
Exp. 4, copy 8
Exp. 4, copy 9
Exp. 4, copy 10
Exp. 4, copy 11
Exp. 4, copy 12
Exp. 4, copy 13
Exp. 4, copy 14
*** ORBITAL VISIBILITY OVERRUN = 1
GS Acq
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20150609
Exp. 5 (Auto-WAVECAL)
Pointing Maneuver
Moving Target Tracking
Exp. 5
GS Acq
Setup
Unused Orbital Visibility = 21
Occultation
Exp. 5 (Auto-WAVECAL)
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13794, Visit 13, completed Sun Sep 27 01:04:40 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: ORIENT 92D TO 99 D; BEFORE 03-NOV-2014:00:00:00

Fixed Targets

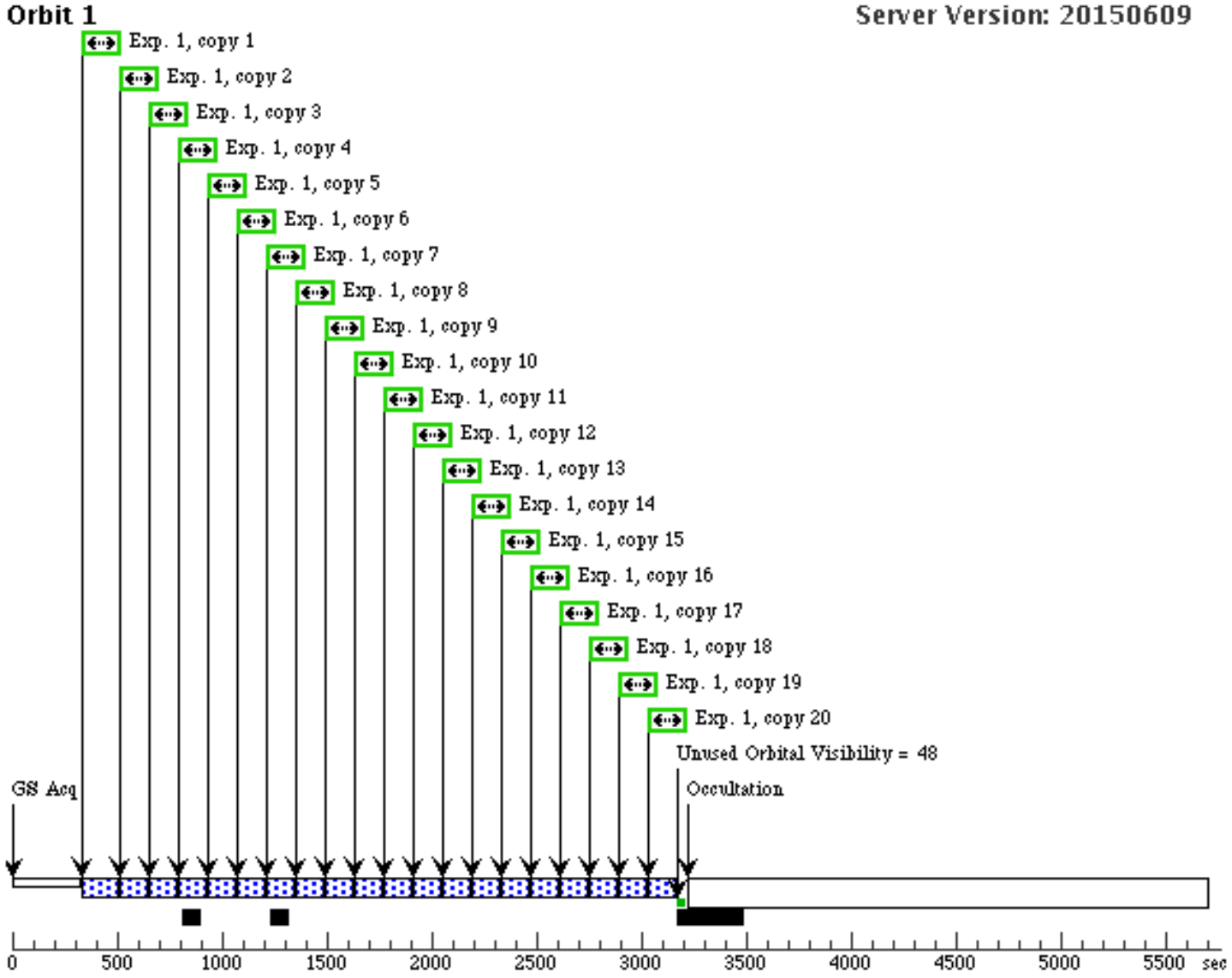
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	SKY-NEAR-MARS-OCT-20-2014	RA: 17 38 16.5909 (264.5691288d) Dec: -24 51 47.75 (-24.86326d) Equinox: J2000		V=0 Ly alpha emission from geocorona and interplanetary H 1-10 kRayleighs	Reference Frame: ICRS

Comments: The position of Mars at 00:20:30 UT on October 20, 2014.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(0)	(6) SKY-NEAR-MARS-OCT-20-2014	ACS/SBC, ACCUM, SBC	F115LP		NEW OBSET FULL ACQ; GS ACQ SCENARIO BASE1B3		100 Secs X 20 (2000 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)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]*	***[1]***

Orbit Structure



Proposal 13794 - Visit 23 - Seasonal Dependence of the Escape of Water from the Martian Atmosphere

Visit

Proposal 13794, Visit 23, implementation Sun Sep 27 01:04:40 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: STIS/FUV-MAMA, ACS/SBC

Special Requirements: ORIENT 289D TO 297 D; BETWEEN 23-NOV-2015:00:00:00 AND 08-DEC-2015:00:00:00

Diagnostics

(Visit 23) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

Solar System Targets

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(4)	SKY-NEAR-MARS	STD=MARS	TYPE=POS_ANGLE,RAD=295,ANG=0,REF=NORTH			EARTH
(5)	MARS-STIS	STD=MARS				EARTH
(7)	MARS-ACS-OFFSET-4	STD=MARS	TYPE=POS_ANGLE,RAD=13,ANG=50,REF=NORTH			EARTH

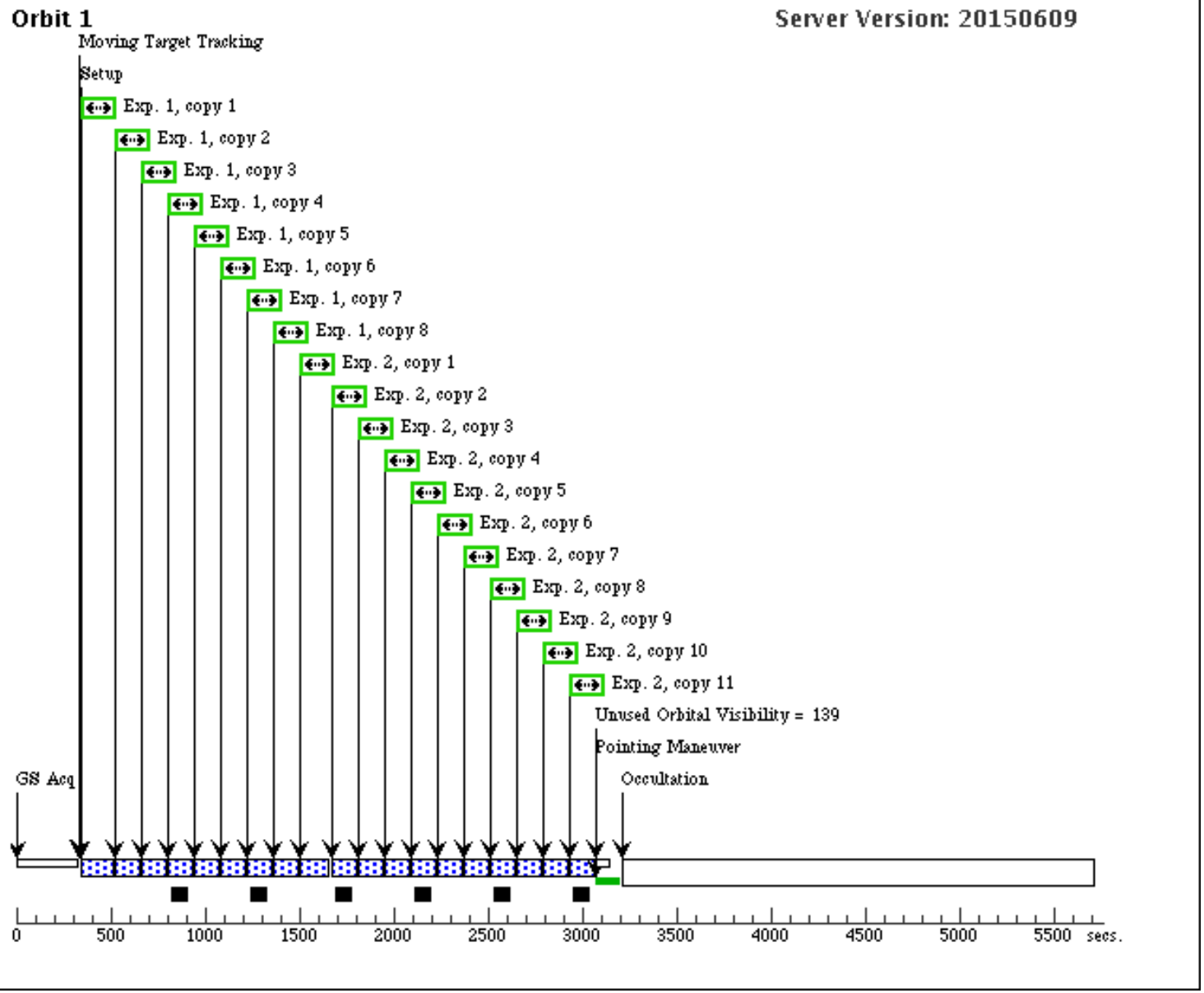
Comments: Offset Mars disc to corner of ACS/SBC FOV to image H coronal emissions far from the planet in sunward direction.

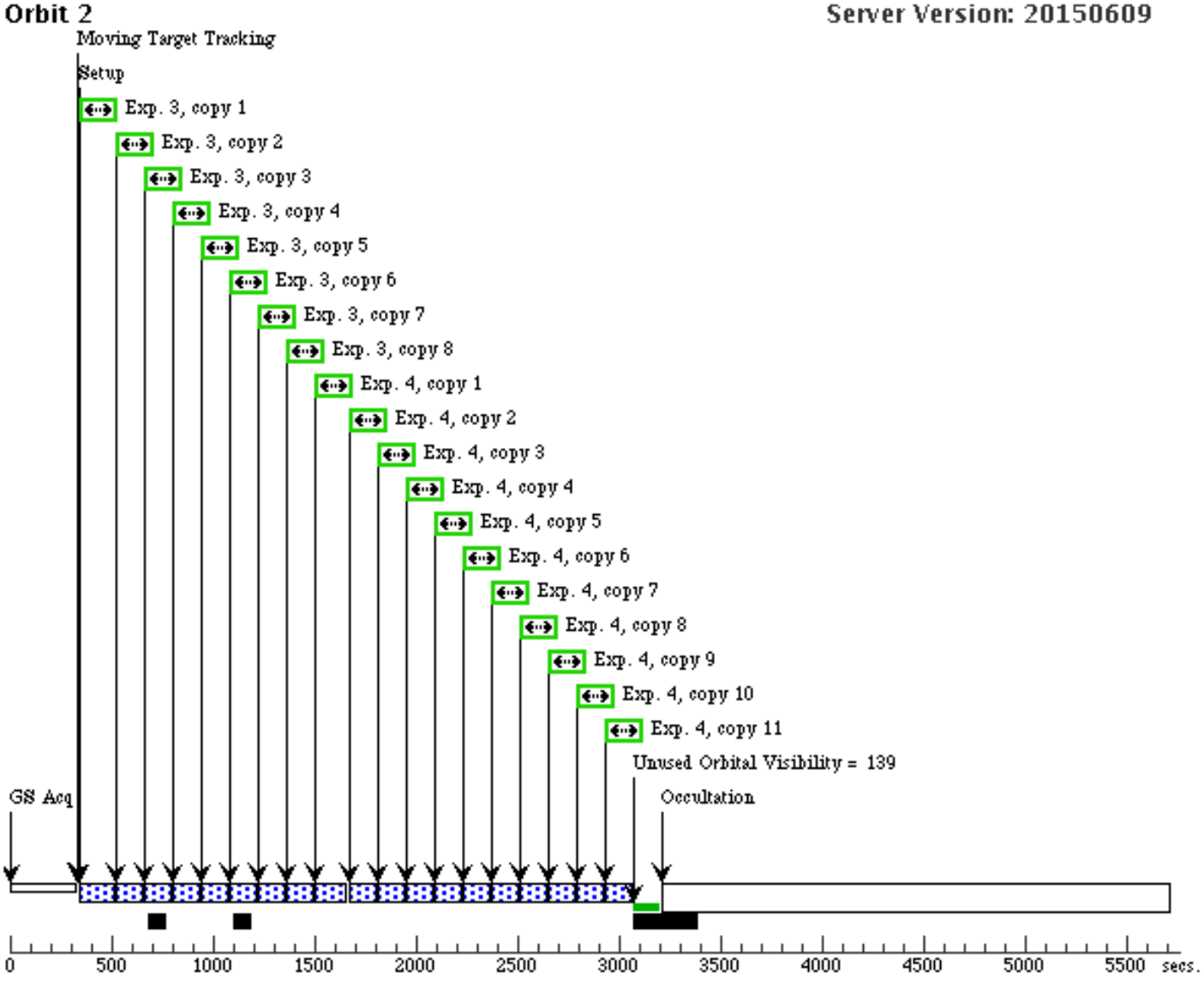
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(0)	(7) MARS-ACS-OFFSET-4	ACS/SBC, ACCUM, SBC	F140LP		GS ACQ SCENARIO BASE1B3		100 Secs X 8 (800 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[1]***
2	(0)	(7) MARS-ACS-OFFSET-4	ACS/SBC, ACCUM, SBC	F115LP				100 Secs X 11 (1100 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[1]***
3	(0)	(4) SKY-NEAR-MARS	ACS/SBC, ACCUM, SBC	F140LP				100 Secs X 8 (800 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]*	***[2]***
4	(0)	(4) SKY-NEAR-MARS	ACS/SBC, ACCUM, SBC	F115LP				100 Secs X 11 (1100 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]*	***[2]***

	5	(0)	(5) MARS-STIS	STIS/FUV-MAMA, TIME-TAG, 52X0.5	G140L 1425 A	BUFFER-TIME=3000	NEW OBSET FULL ACQ; GS ACQ SCENARIO BASE1B3	2400 Secs (2400 Secs) *[==>]*	***[3]***

Orbit Structure




Orbit 2
Server Version: 20150609
Moving Target Tracking
Setup
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Exp. 3, copy 2
Exp. 3, copy 3
Exp. 3, copy 4
Exp. 3, copy 5
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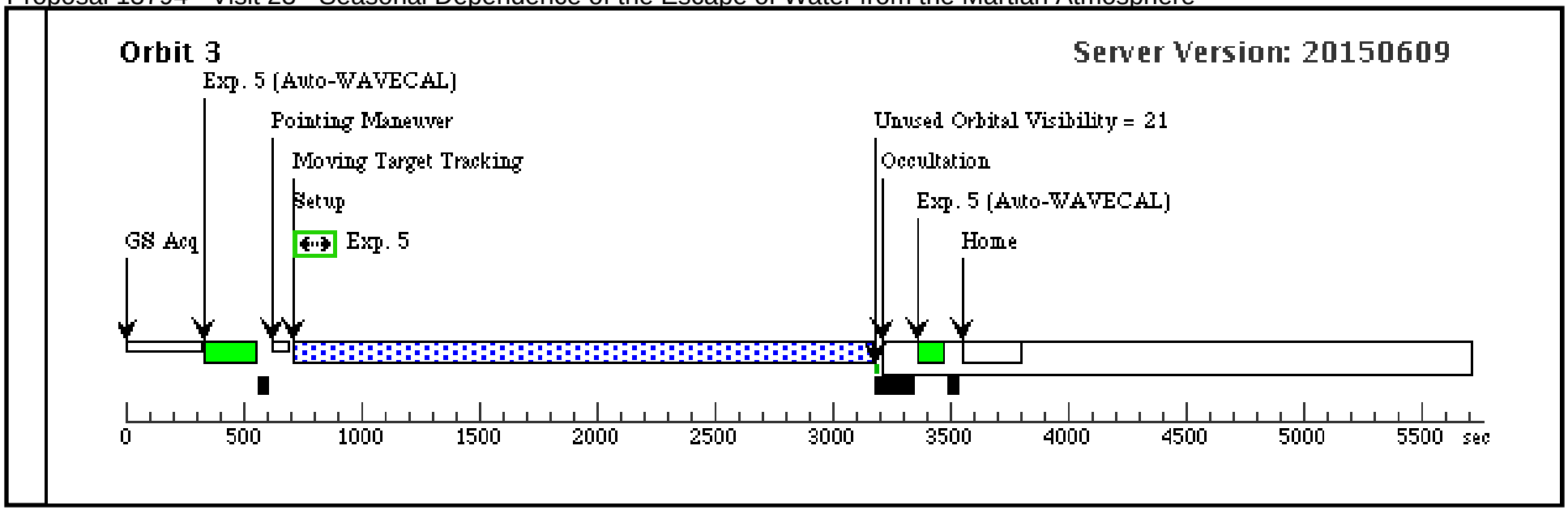
Exp. 3, copy 7
Exp. 3, copy 8
Exp. 4, copy 1
Exp. 4, copy 2
Exp. 4, copy 3
Exp. 4, copy 4
Exp. 4, copy 5
Exp. 4, copy 6
Exp. 4, copy 7
Exp. 4, copy 8
Exp. 4, copy 9
Exp. 4, copy 10
Exp. 4, copy 11
Unused Orbital Visibility = 139
GS Acq
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 3
Server Version: 20150609
Exp. 5 (Auto-WAVECAL)
Pointing Maneuver
Moving Target Tracking
Setup
Exp. 5
GS Acq
Unused Orbital Visibility = 21
Occultation
Exp. 5 (Auto-WAVECAL)
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec