



12089 - Persistence - Part 2

Cycle: 17, Proposal Category: CAL/WFC3

(Availability Mode: RESTRICTED)

INVESTIGATORS

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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	DARK TUNGSTEN	S/C WFC3/IR	2	02-Jun-2010 22:10:50.0	yes
02	DARK TUNGSTEN	S/C WFC3/IR	2	02-Jun-2010 22:11:18.0	yes
03	DARK TUNGSTEN	S/C WFC3/IR	2	02-Jun-2010 22:11:48.0	yes
04	DARK TUNGSTEN	S/C WFC3/IR	2	02-Jun-2010 22:12:15.0	yes
05	DARK TUNGSTEN	S/C WFC3/IR	2	02-Jun-2010 22:12:42.0	yes
11	DARK TUNGSTEN	WFC3/IR	2	02-Jun-2010 22:13:04.0	yes

<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>
12	DARK TUNGSTEN	WFC3/IR	2	02-Jun-2010 22:13:18.0	yes

14 Total Orbits Used

ABSTRACT

The IR detectors on WFC3, like other IR detectors, trap charge when exposed to sources near or above the full well of the detector diodes. This charge leaks out, producing detectable afterglow images for periods which can last for several hours, depending on the amount of over exposure. These visits, which consist of tungsten lamp exposures of varying durations followed by darks, are intended to provide a better calibration of persistence over the full area of the IR detector of WFC3.

OBSERVING DESCRIPTION

This proposal is intended to provide a better characterization of persistence in the IR detector.

The current best information suggests this is entirely determined by the time since the highest illumination level. The amount of persistence is not linear with flux, but exhibits a saturation effect near full well, above which the afterglow images stays there more persistently.

Each visit will consist of an exposure with the Tungsten lamp that is intended to fill the diodes to a well-defined level compared to full well, followed by darks in which the persistence will be measured. The exposure levels will span the range 0.5, 1, 3, 10 and 30x full well (which we take to be 100,000 electrons). Darks extend to 5300 s after the illumination, well into the second exponential for the readout. In most cases, the readout pattern for the darks consists of a series of configured SPARS25 sample sequences, since this is the fastest readout pattern that can provide uninterrupted readouts. In a few cases, where it does not cause an interruption in the flow of readouts, a rapid is inserted as the first read after the Tungsten lamp exposure.

The visits extend for more than 1800 s, the nominal time for an internal calibration visit. This is necessary however, since we want to determine the

persistence as a function of time and persistence has been observed over several orbits.

Special commanding is required to assure that the CSM is in the UVIS position when the DARKs are being obtained. This is necessary to assure that scattered light does not affect the observations

To check that readout pattern does not affect the persistence, the exposure level of the Tungsten flat in visit 1, namely 300,000 electrons, is duplicated in visits 11 and 12. However, in this case the readout sequence involves one Rapid dark to measure the early decline of persistence and then SPARS50 or SPARS100 darks to provide readouts at about half or 1/4 of the rate of the others. Thus, Visits 11 and 12 provide a consistency check both on whether the results are the same for the same exposure level, and whether factors in the readout pattern that could affect persistence.

Assuming an illumination lamp rate through the f110w filter of 1500 e-/s and full well of 100,000 e-, we want exposures of

50,000 e --> 33 s --> rapid, nsamp 11
100,000 e --> 67 s --> spars10, 8
300,000 e --> 200 s --> spars25, 9
1,000,000 e --> 667 s --> spars50, 14
3,000,000 e -> 2000 s --> spars200, 11

For visits with exposure levels of 300,000 e- or more, it may be desirable to inhibit any WFC3/IR observations for several orbits following the observation, since it may be hard to determine whether persistence is present in these observations. Alternatively, it may be sufficient for STScI to check for high background levels in the subsequent exposure since the PI will not be aware of this. These are visits - 1, 3, 4, 11, 12.

CALIBRATION JUSTIFICATION

The observations are needed to develop accurate calibration files to remove persistence from images obtained with the IR channel. Although all pixels seem to exhibit a similar behavior, the amount of persistence varies from pixel to pixel and hence one can not simply use individual stars or even many stars in a globular cluster to accurately determine persistence. The flatfield illumination approach resembles the testing done in the DCL

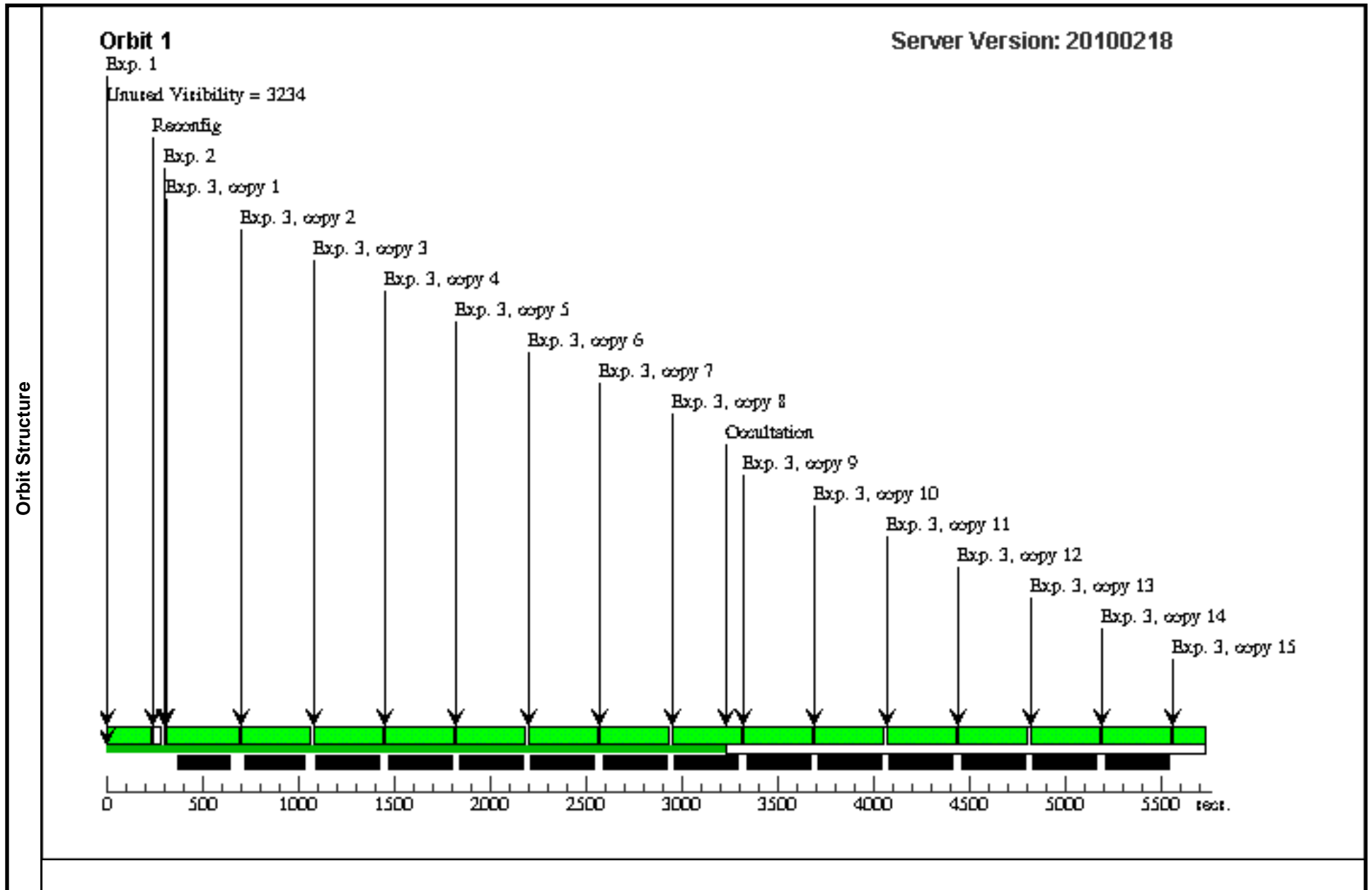
and so provides direct contact with it.

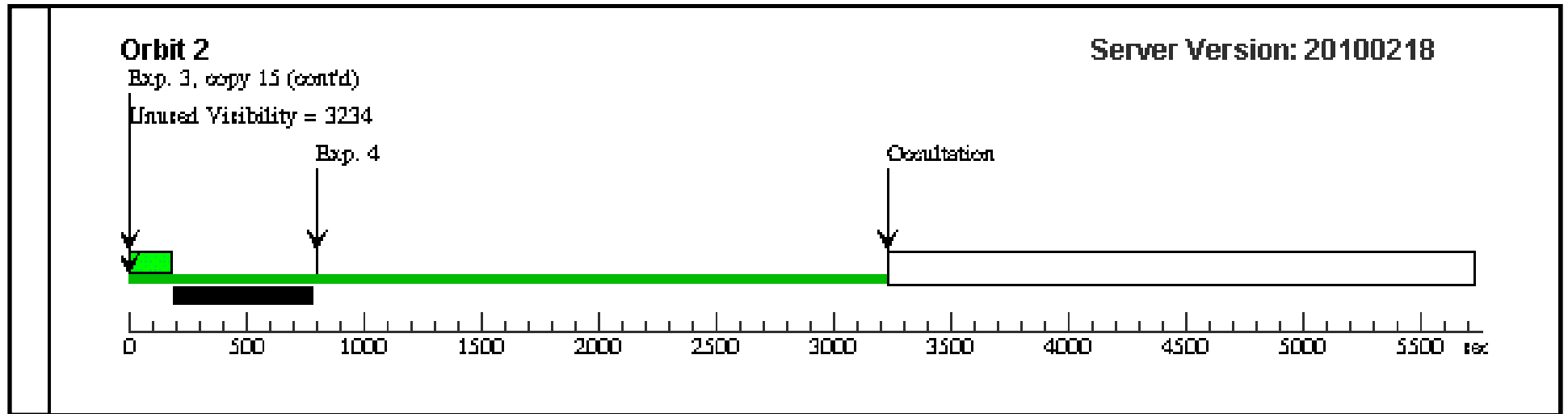
Proposal 12089 - Visit 01 - Persistence - Part 2

Visit	<p>Proposal 12089, Visit 01, completed Thu Jun 03 02:13:27 GMT 2010 Diagnostic Status: Warning Scientific Instruments: WFC3/IR, S/C Special Requirements: PARALLEL <i>Comments: This is intended to reach an exposure level of 300,000 e</i></p>
Diagnostics	<p>(Visit 01) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU</p>

Proposal 12089 - Visit 01 - Persistence - Part 2

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures	1	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 25; NSAMP=9		Sequence 1-4 Non-Int	[==>]	[1]
	2	DARK	S/C, DATA, NONE			SPEC COM INSTR RIHDTUOD; NEW ALIGNMENT ; QASISTATES WFC 3 SI OBSERVE OB SERVE; QASISTATES WFC 3 DET HOLD IROC C	Sequence 1-4 Non-Int	10 Secs [==>]	[1]
	3	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 25; NSAMP=15		Sequence 1-4 Non-Int	[==>(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]
	4	DARK	S/C, DATA, NONE			SPEC COM INSTR RIUOTHDD; NEW ALIGNMENT ; QASISTATES WFC 3 SI OBSERVE OB SERVE; QASISTATES WFC 3 DET IROCC HOL D	Sequence 1-4 Non-Int	10 Secs [==>]	[2]



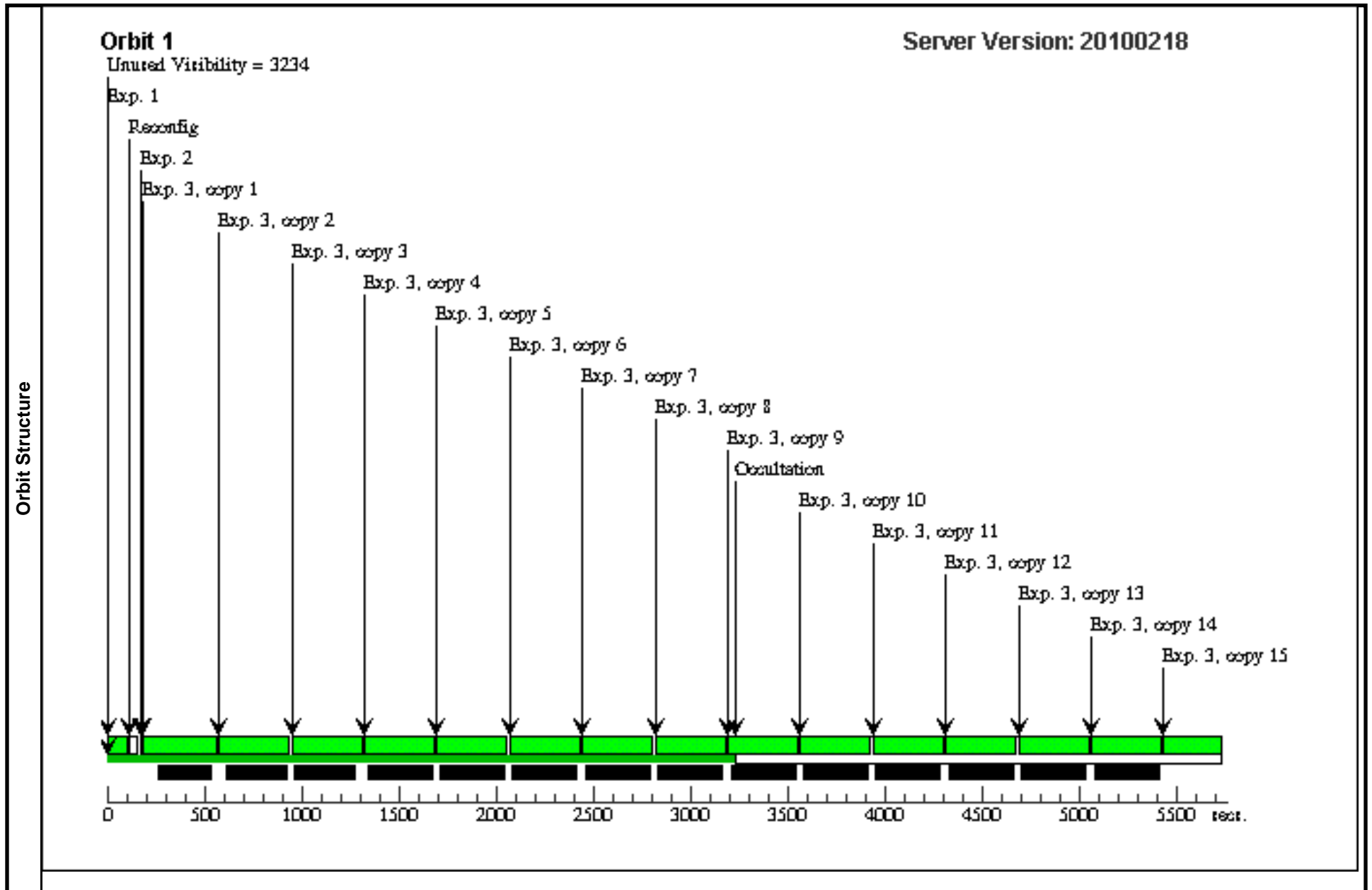


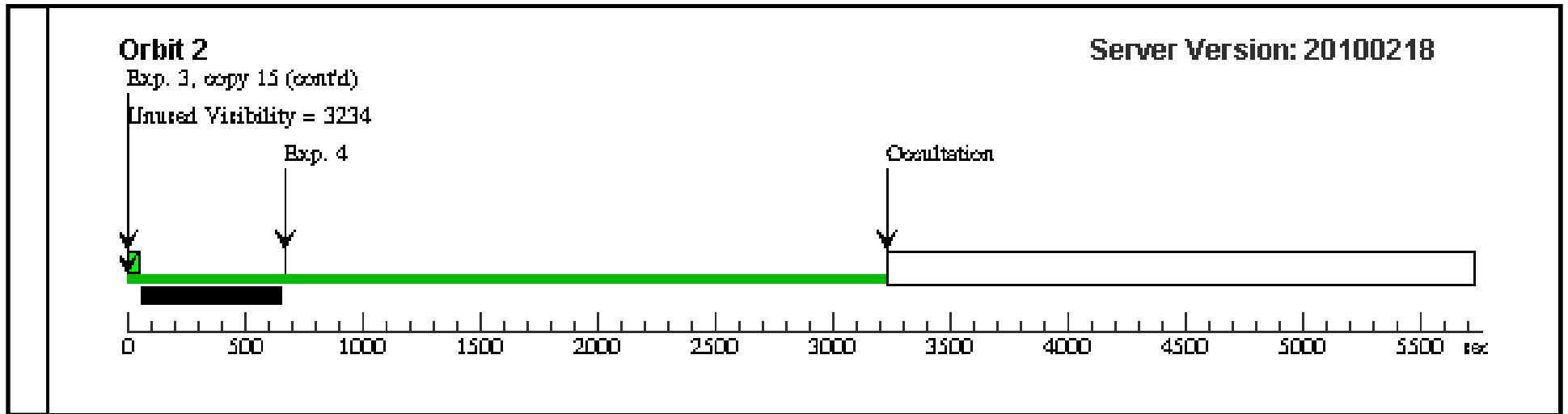
Proposal 12089 - Visit 02 - Persistence - Part 2

Visit	<p>Proposal 12089, Visit 02, completed Thu Jun 03 02:13:32 GMT 2010 Diagnostic Status: Warning Scientific Instruments: WFC3/IR, S/C Special Requirements: AFTER 01; PARALLEL <i>Comments: This is intended to reach an exposure level of 100,000 e</i></p>
Diagnostics	<p>(Visit 02) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU</p>

Proposal 12089 - Visit 02 - Persistence - Part 2

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures	1	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 10; NSAMP=8		Sequence 1-4 Non-Int	[==>]	[1]
	2	DARK	S/C, DATA, NONE			SPEC COM INSTR RIHDTUOD; NEW ALIGNMENT ; QASISTATES WFC 3 SI OBSERVE OB SERVE; QASISTATES WFC 3 DET HOLD IROC C	Sequence 1-4 Non-Int	10 Secs [==>]	[1]
	3	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 25; NSAMP=15		Sequence 1-4 Non-Int	[==>(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]
	4	DARK	S/C, DATA, NONE			SPEC COM INSTR RIUOTHDD; NEW ALIGNMENT ; QASISTATES WFC 3 SI OBSERVE OB SERVE; QASISTATES WFC 3 DET IROCC HOL D	Sequence 1-4 Non-Int	10 Secs [==>]	[2]



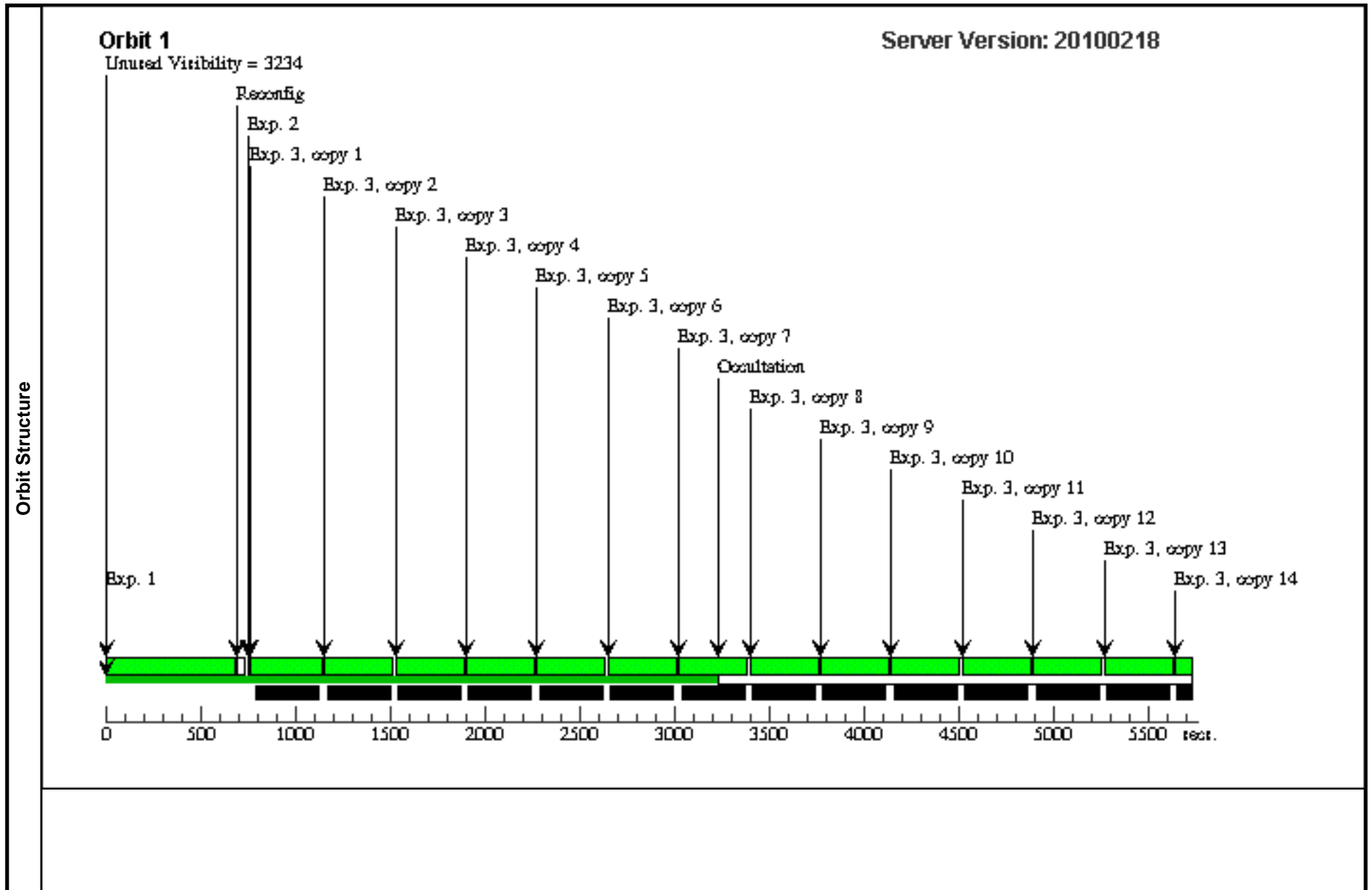


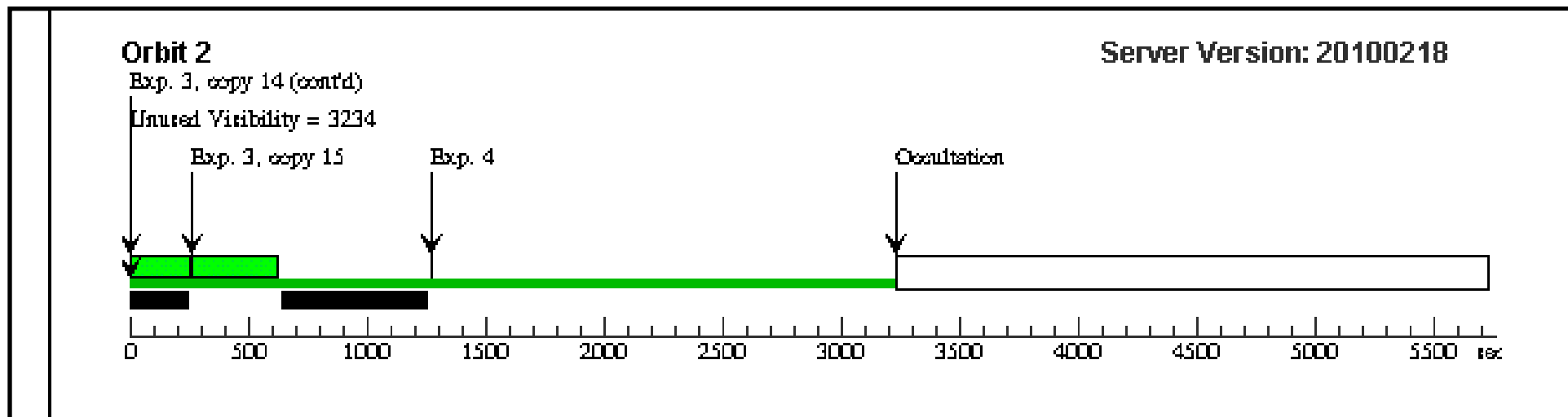
Proposal 12089 - Visit 03 - Persistence - Part 2

Visit	<p>Proposal 12089, Visit 03, completed Thu Jun 03 02:13:33 GMT 2010 Diagnostic Status: Warning Scientific Instruments: WFC3/IR, S/C Special Requirements: AFTER 01; PARALLEL <i>Comments: This is intended to reach an exposure level of 1,000,000 e</i></p>
Diagnostics	<p>(Visit 03) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU</p>

Proposal 12089 - Visit 03 - Persistence - Part 2

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures	1	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 50; NSAMP=14		Sequence 1-4 Non-Int	[==>]	[1]
	2	DARK	S/C, DATA, NONE			SPEC COM INSTR RIHDTUOD; NEW ALIGNMENT ; QASISTATES WFC 3 SI OBSERVE OB SERVE; QASISTATES WFC 3 DET HOLD IROC C	Sequence 1-4 Non-Int	10 Secs [==>]	[1]
	3	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 25; NSAMP=15		Sequence 1-4 Non-Int	[==>(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] [2]
	4	DARK	S/C, DATA, NONE			SPEC COM INSTR RIUOTHDD; NEW ALIGNMENT ; QASISTATES WFC 3 SI OBSERVE OB SERVE; QASISTATES WFC 3 DET IROCC HOL D	Sequence 1-4 Non-Int	10 Secs [==>]	[2]



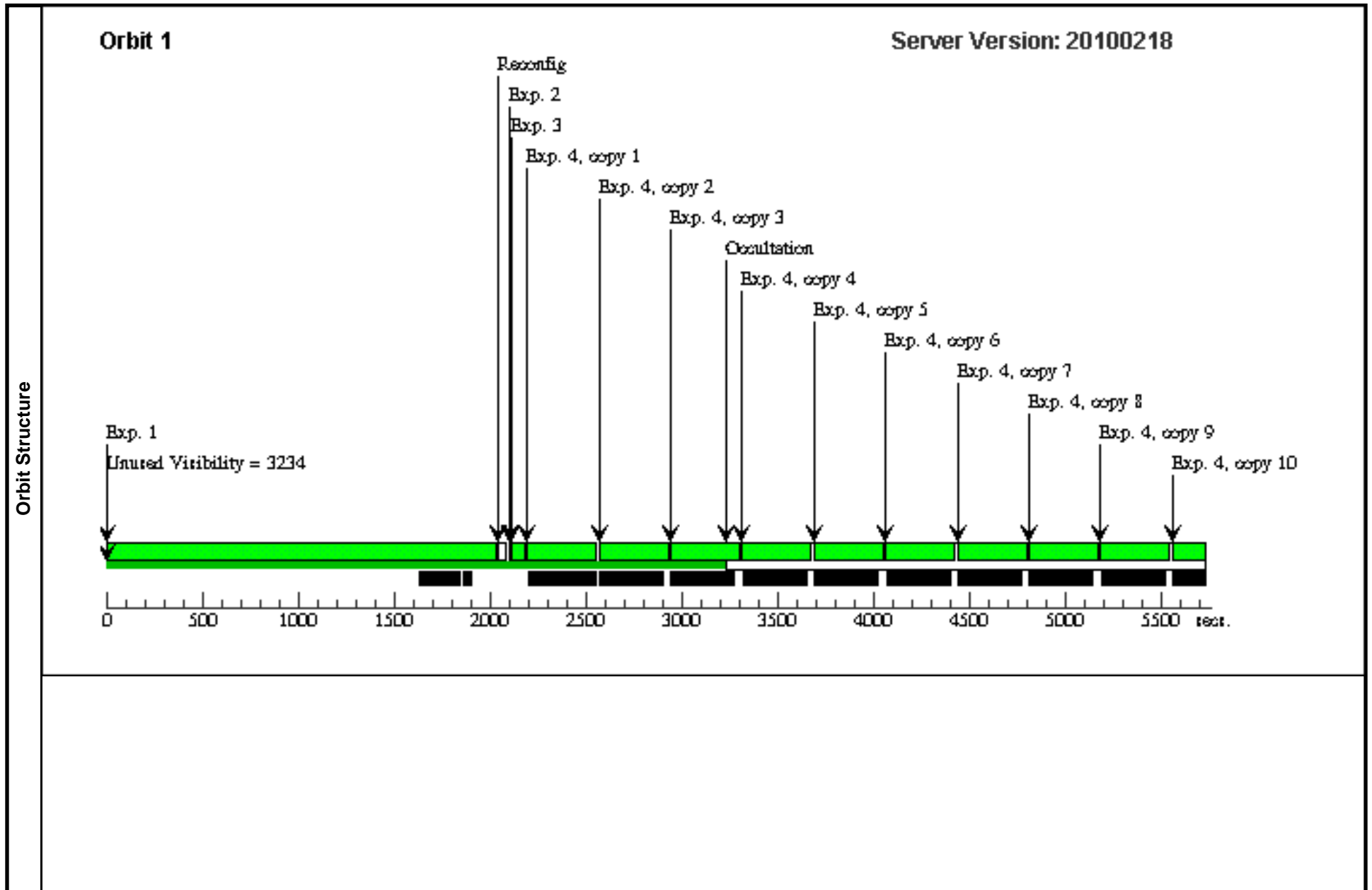


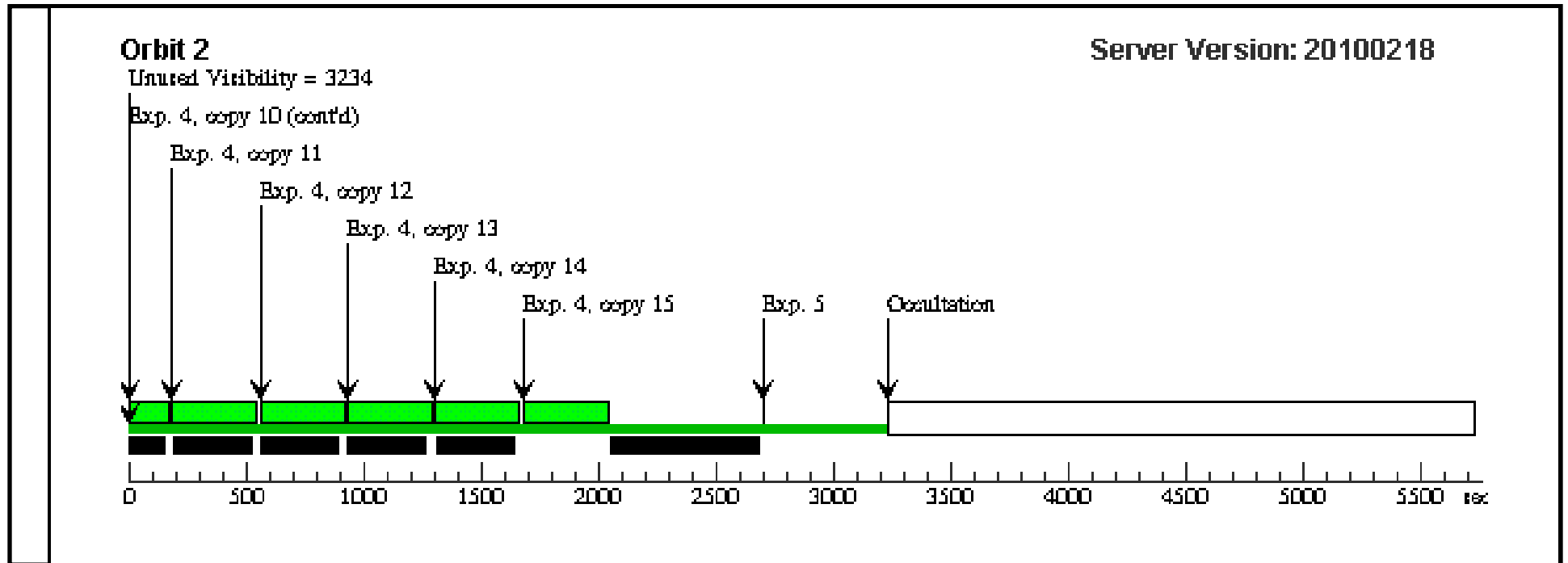
Proposal 12089 - Visit 04 - Persistence - Part 2

Visit	<p>Proposal 12089, Visit 04, completed Thu Jun 03 02:13:34 GMT 2010 Diagnostic Status: Warning Scientific Instruments: WFC3/IR, S/C Special Requirements: AFTER 01; PARALLEL <i>Comments: This is intended to reach an exposure level of 3,000,000 e</i></p>
Diagnostics	<p>(Visit 04) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU</p>

Proposal 12089 - Visit 04 - Persistence - Part 2

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures	1	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 200; NSAMP=11		Sequence 1-5 Non-Int	[==>]	[1]
	2	DARK	S/C, DATA, NONE			SPEC COM INSTR RIHDTUOD; NEW ALIGNMENT ; QASISTATES WFC 3 SI OBSERVE OB SERVE; QASISTATES WFC 3 DET HOLD IROC C	Sequence 1-5 Non-Int	10 Secs [==>]	[1]
	3	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=RAPID ; NSAMP=15		Sequence 1-5 Non-Int	[==>]	[1]
	4	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 25; NSAMP=15		Sequence 1-5 Non-Int	[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)] [==>(Copy 10)]	[1]
								[==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)]	[2]
5	DARK	S/C, DATA, NONE			SPEC COM INSTR RIUOTHDD; NEW ALIGNMENT ; QASISTATES WFC 3 SI OBSERVE OB SERVE; QASISTATES WFC 3 DET IROCC HOL D	Sequence 1-5 Non-Int	10 Secs [==>]	[2]	



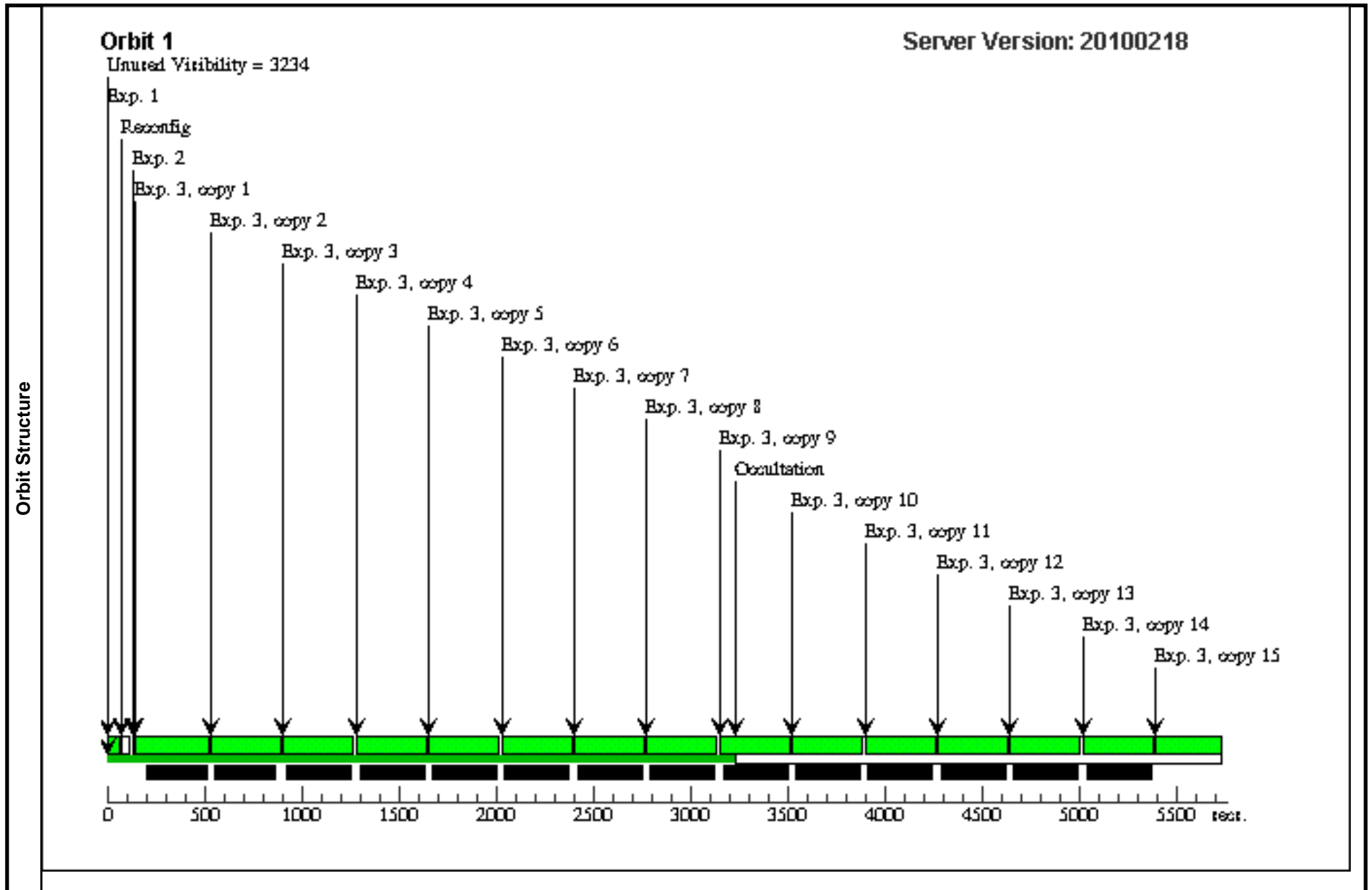


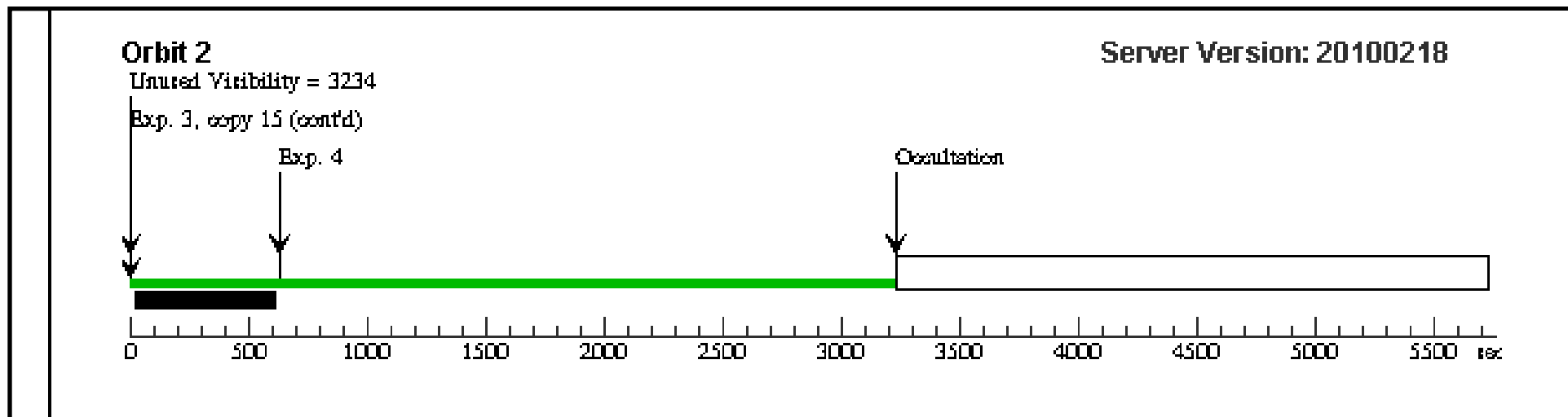
Proposal 12089 - Visit 05 - Persistence - Part 2

Visit	<p>Proposal 12089, Visit 05, completed Thu Jun 03 02:13:35 GMT 2010 Diagnostic Status: Warning Scientific Instruments: WFC3/IR, S/C Special Requirements: AFTER 01; PARALLEL <i>Comments: This is intended to reach a typical exposure level of 50,000 e</i></p>
Diagnostics	<p>(Visit 05) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU</p>

Proposal 12089 - Visit 05 - Persistence - Part 2

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
Exposures	1	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=RAPID ; NSAMP=11		Sequence 1-4 Non-Int	[==>]	[1]
	2	DARK	S/C, DATA, NONE			SPEC COM INSTR RIHDTUOD; NEW ALIGNMENT ; QASISTATES WFC 3 SI OBSERVE OB SERVE; QASISTATES WFC 3 DET HOLD IROC C	Sequence 1-4 Non-Int	10 Secs [==>]	[1]
	3	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 25; NSAMP=15		Sequence 1-4 Non-Int	[==>(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]
	4	DARK	S/C, DATA, NONE			SPEC COM INSTR RIUOTHDD; NEW ALIGNMENT ; QASISTATES WFC 3 SI OBSERVE OB SERVE; QASISTATES WFC 3 DET IROCC HOL D	Sequence 1-4 Non-Int	10 Secs [==>]	[2]

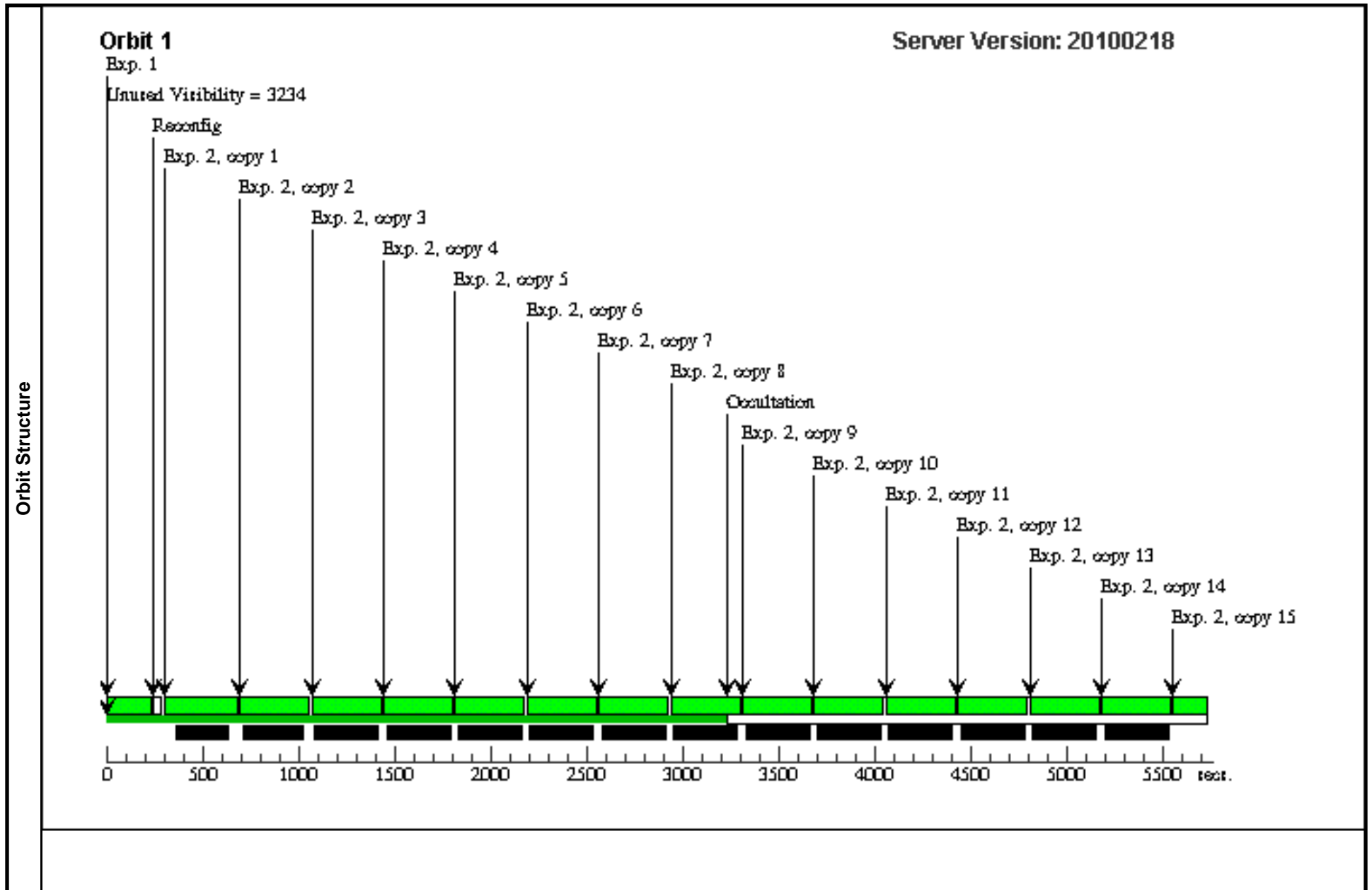


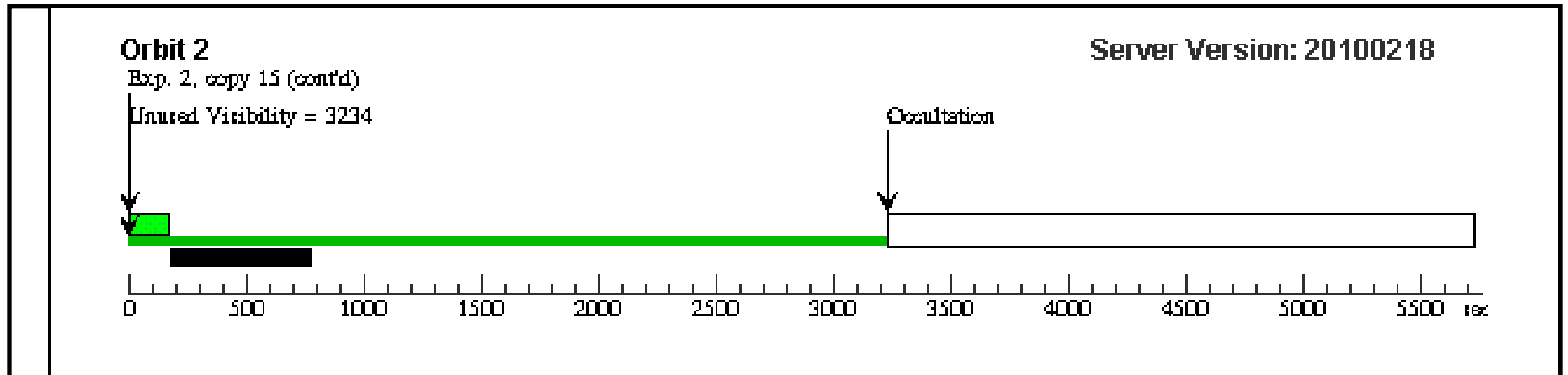


Proposal 12089 - Visit 11 - Persistence - Part 2

Thu Jun 03 02:13:38 GMT 2010

Visit	Proposal 12089, Visit 11, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/IR Special Requirements: AFTER 01 BY 60 D TO 180 D <i>Comments: This is intended to reach an exposure level of 300,000 e-. It is identical to visit 1, except that Spars50 is used for the Dark readout.</i>									
	Diagnostics (Visit 11) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 25; NSAMP=9		Sequence 1-2 Non-Int	[==>]	[1]
	2		DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 25; NSAMP=15		Sequence 1-2 Non-Int	[==>(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]





Proposal 12089 - Visit 12 - Persistence - Part 2

Thu Jun 03 02:13:40 GMT 2010

Visit	Proposal 12089, Visit 12, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/IR Special Requirements: AFTER 01 BY 60 D TO 180 D <i>Comments: This is intended to reach an exposure level of 300,000 e. It is identical to Visit 01, except it uses a different readout pattern SPARS100 for the Darks</i>									
	Diagnosics (Visit 12) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F105W	SAMP-SEQ=SPARS 25; NSAMP=9		Sequence 1-3 Non-Int	[==>]	[1]
	2		DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=RAPID ; NSAMP=15		Sequence 1-3 Non-Int	[==>]	[1]
	3		DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 50; NSAMP=15		Sequence 1-3 Non-Int	[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)]	[1]

