



11930 - IR Gain Measurement

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	WFC3/IR	1	23-Mar-2009 22:08:11.0	yes
02	TUNGSTEN	WFC3/IR	1	23-Mar-2009 22:08:15.0	yes
03	TUNGSTEN	WFC3/IR	1	23-Mar-2009 22:08:18.0	yes
04	TUNGSTEN	WFC3/IR	1	23-Mar-2009 22:08:20.0	yes
05	TUNGSTEN	WFC3/IR	1	23-Mar-2009 22:08:22.0	yes
06	TUNGSTEN	WFC3/IR	1	23-Mar-2009 22:08:25.0	yes
07	TUNGSTEN	WFC3/IR	1	23-Mar-2009 22:08:28.0	yes
08	TUNGSTEN	WFC3/IR	1	23-Mar-2009 22:08:31.0	yes

8 Total Orbits Used

ABSTRACT

The gain of the IR channel of WFC3 will be measured using a series of internal flat fields. Using knowledge gained from ground testing, we propose to collect flat field ramps which will be used to create photon transfer curves and give a measure of the gain. By using two filters centered at similar wavelengths but differing bandwidths, we will be able to search for any flux-dependent changes in the the measure of the gain.

OBSERVING DESCRIPTION

We want to collect flat field ramps in pairs. This is the same strategy with which gain data were collected in ground testing, and should give directly comparable results. Exposure times have been chosen such that signal in the flat fields is kept below the level where persistence will have a large effect on the data. Initially we collect 2 pairs of ramps, one each through the F140W and F139M filters. The pattern of observations and data dumps for this orbit match that used in ground testing, and should provide a direct comparison to those results. By using multiple filters, we vary the flux level on the detector which will allow for a search of any flux dependence on the final calculated gain values.

Other orbits in this program switch the order of ramp collection, in order to check for any systematic effects on the gain resulting from the order in which the data are taken. For two of the orbits, we also collect 4 identical ramps back-to-back through the F139M filter, rather than having only 2 ramps between data dumps. This will also help to investigate any effects on the final gain due to observation order. Finally, we spend one orbit collecting 2 pairs of ramps through the F153M filter, where we limit the signal level in the ramps to roughly half that collected in the other orbits. The most reliable gain calculations in ground testing were produced using only the low signal reads of the ramps. In this orbit, we will obtain better sampling in the low signal level regime, in order to search for any effects in the final gain calculation.

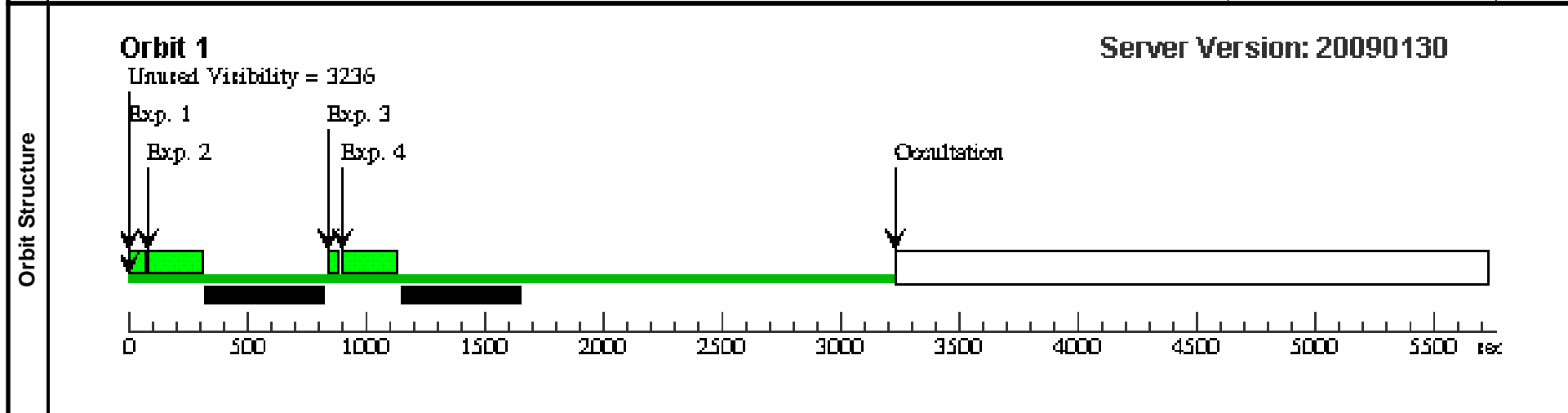
CALIBRATION JUSTIFICATION

The commanded gain for WFC3-IR is 2.5 e-/ADU. However, for proper calibration and data reduction of science data, we must measure the actual gain in the IR channel. By collecting pairs of flat fields, we can generate photon transfer curves, measure the true gain of the system, and propagate these values into the data reduction pipeline for WFC3-IR. This will provide the proper factor for converting science data into units of electrons.

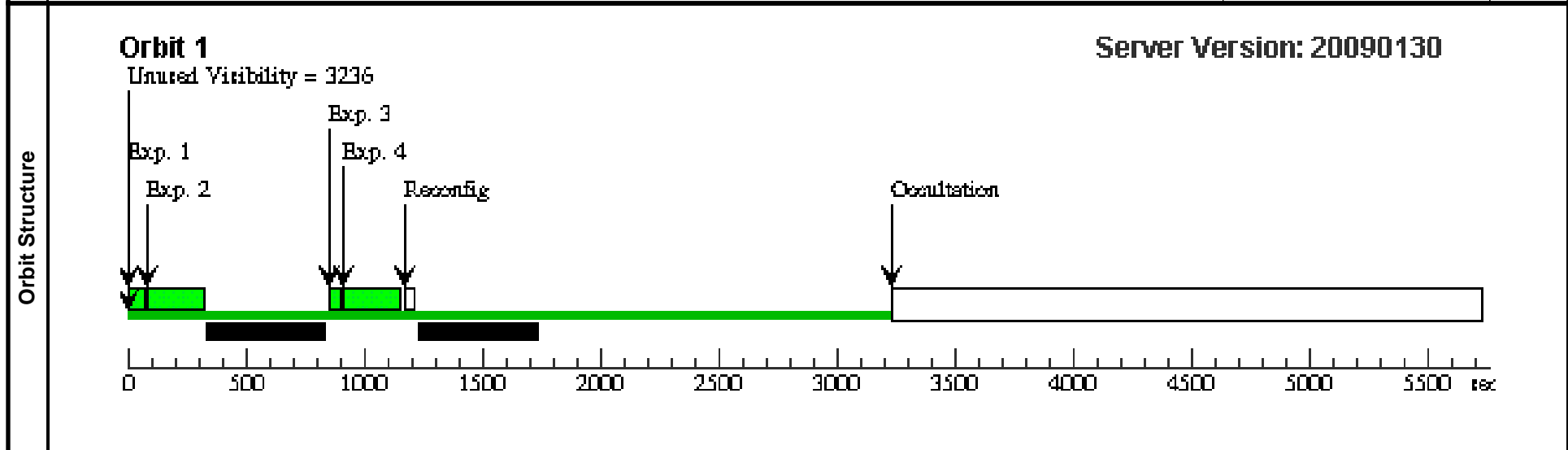
ADDITIONAL COMMENTS

Gain values for each quadrant of the detector will be calculated separately for each pair of ramps. From a given pair of ramps, we will construct a photon transfer curve, plotting the measured mean signal versus variance for each read. A best-fit line to this plot will produce the measured gain value. The expected accuracy of the final calculated gain values is ~2%, based on results from ground testing. (see WFC3 ISR 2008-50) Using the data collected in Cycle 17, we will calculate effective gain values for the IR channel, which will be collected in the CCDTAB file, which is used in the CALWF3 pipeline for data reduction. With data being collected at three separate intervals in Cycle 17, we will also monitor the effective gain in the IR channel for any changes over time. All results will be published in an ISR.

Visit	Proposal 11930, Visit 01, implementation									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: WFC3/IR										
Special Requirements: (none)										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	Rapid Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=RAPID ;			[==>]	[1]
	2	Spars25 Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 25;			[==>]	[1]
	3	Rapid Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=RAPID ;			[==>]	[1]
	4	Spars25 Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 25;			[==>]	[1]
						NSAMP=10				



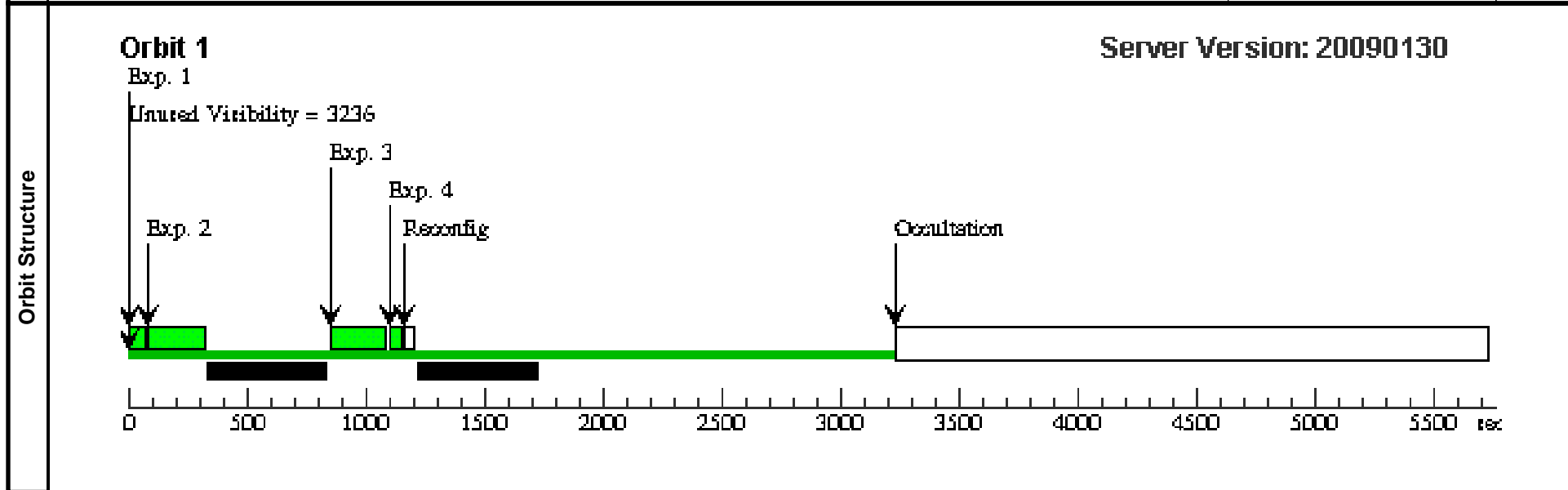
Visit	Proposal 11930, Visit 02, implementation										
	Diagnostic Status: No Diagnostics										
Scientific Instruments: WFC3/IR											
Special Requirements: AFTER_01 BY 0 D TO 1 D											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	F140W_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ;				[==>]	[1]
	2	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25;				[==>]	[1]
	3	F140W_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ;				[==>]	[1]
	4	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25;				[==>]	[1]
						NSAMP=13					
						NSAMP=10					
						NSAMP=13					
						NSAMP=10					



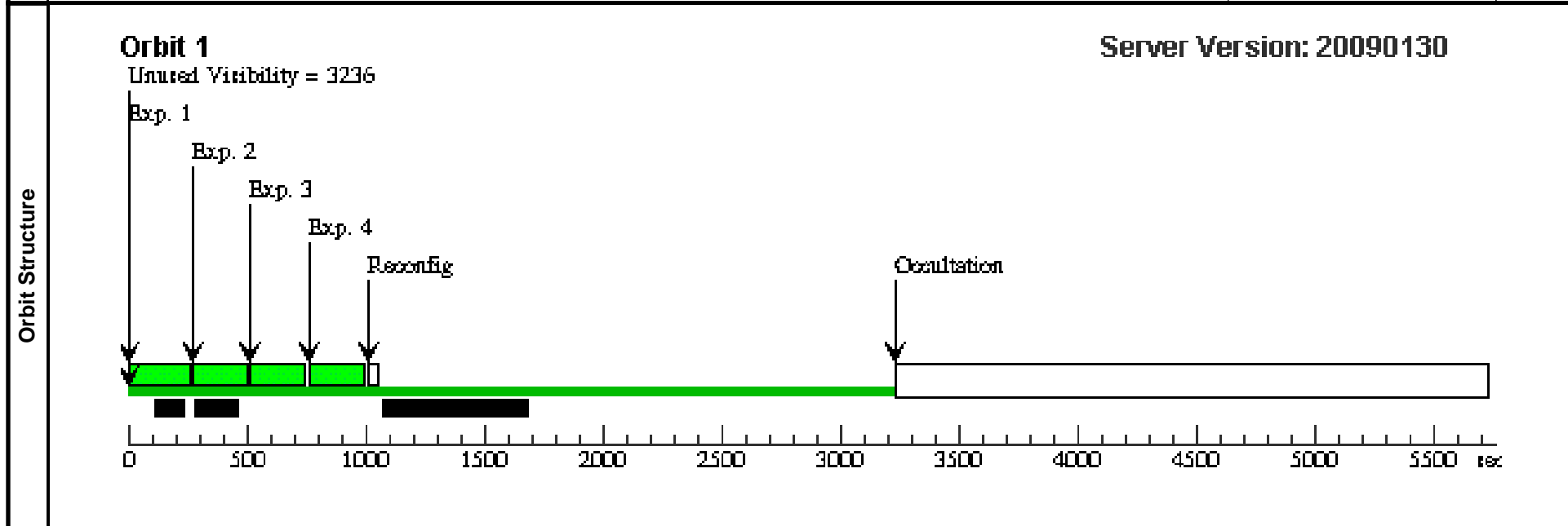
Proposal 11930 - Visit 03 - IR Gain Measurement

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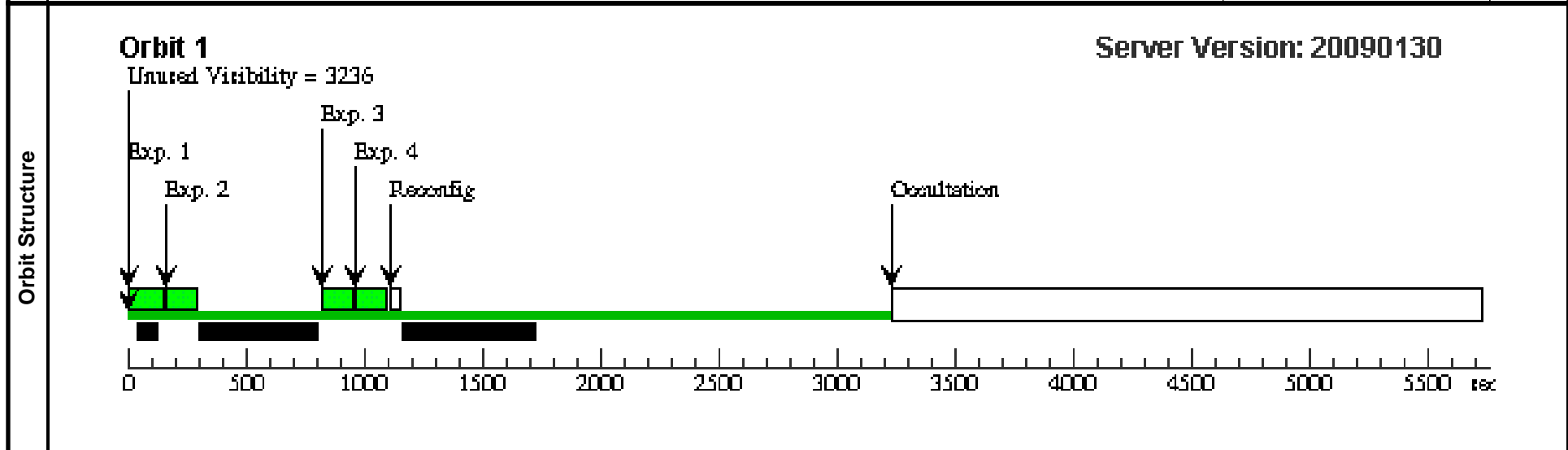
Visit	Proposal 11930, Visit 03, implementation										
	Diagnostic Status: No Diagnostics										
Scientific Instruments: WFC3/IR											
Special Requirements: AFTER_01 BY 0 D TO 1 D											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	F140W_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ;				[==>]	[1]
	2	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25;				[==>]	[1]
	3	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25;				[==>]	[1]
	4	F140W_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ;				[==>]	[1]
						NSAMP=13					
						NSAMP=10					
						NSAMP=10					
						NSAMP=13					



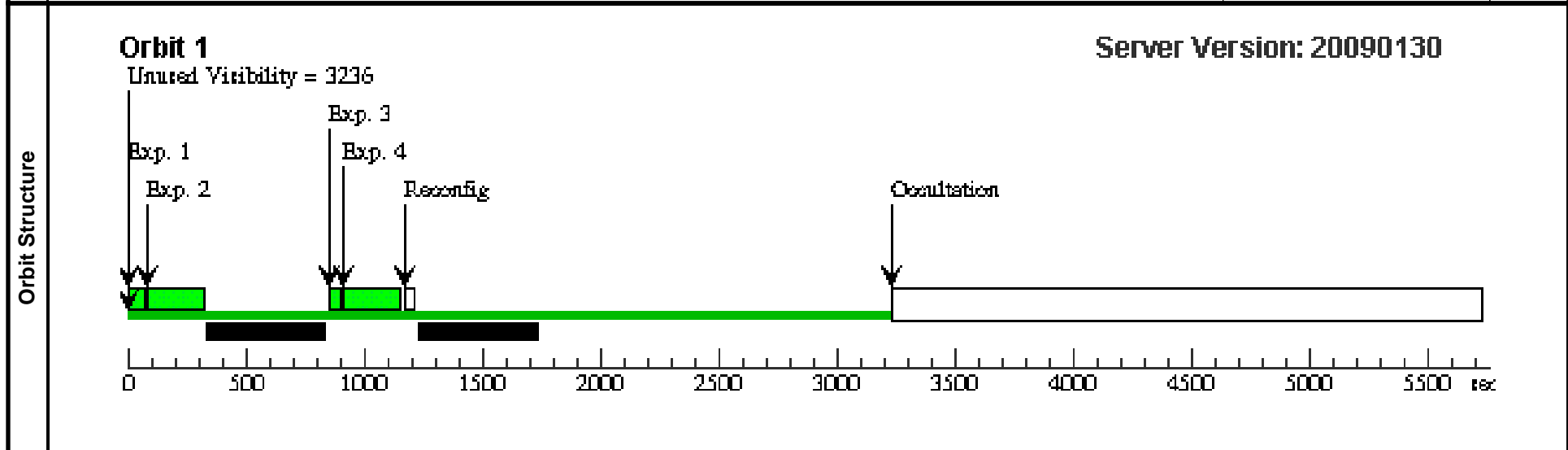
Visit	Proposal 11930, Visit 04, implementation									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: WFC3/IR										
Special Requirements: AFTER_03 BY 90 D TO 120 D										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25; NSAMP=10			[==>]	[1]
	2	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25; NSAMP=10			[==>]	[1]
	3	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25; NSAMP=10			[==>]	[1]
	4	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25; NSAMP=10			[==>]	[1]



Visit	Proposal 11930, Visit 05, implementation									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: WFC3/IR										
Special Requirements: AFTER_04 BY 0 D TO 1 D										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	F153M_low signal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F153M	SAMP-SEQ=SPARS 10; NSAMP=13			[==>]	[1]
	2	F153M_low signal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F153M	SAMP-SEQ=SPARS 10; NSAMP=13			[==>]	[1]
	3	F153M_low signal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F153M	SAMP-SEQ=SPARS 10; NSAMP=13			[==>]	[1]
	4	F153M_low signal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F153M	SAMP-SEQ=SPARS 10; NSAMP=13			[==>]	[1]



Visit	Proposal 11930, Visit 06, implementation										
	Diagnostic Status: No Diagnostics										
Scientific Instruments: WFC3/IR											
Special Requirements: AFTER_04 BY 0 D TO 2 D											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	
	1	F140W_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ;				[==>]	[1]
	2	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25;				[==>]	[1]
	3	F140W_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ;				[==>]	[1]
	4	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25;				[==>]	[1]
						NSAMP=13					
						NSAMP=10					
						NSAMP=13					
						NSAMP=10					



Visit	Proposal 11930, Visit 07, implementation									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: WFC3/IR										
Special Requirements: AFTER_06 BY 90 D TO 120 D										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	F140W_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ; NSAMP=13			[==>]	[1]
	2	F140W_low signal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ; NSAMP=7			[==>]	[1]
	3	F140W_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ; NSAMP=13			[==>]	[1]
	4	F140W_low signal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ; NSAMP=7			[==>]	[1]
	5	F140W_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ; NSAMP=13			[==>]	[1]
	6	F140W_low signal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F140W	SAMP-SEQ=RAPID ; NSAMP=7			[==>]	[1]

Orbit Structure	Orbit 1									
	Unused Visibility = 3236									

Server Version: 20090130

Visit	Proposal 11930, Visit 08, implementation									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: WFC3/IR										
Special Requirements: AFTER_07 BY 0 D TO 1 D										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25; NSAMP=10			[==>]	[1]
	2	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25; NSAMP=10			[==>]	[1]
	3	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25; NSAMP=10			[==>]	[1]
	4	F139M_hig hsignal	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F139M	SAMP-SEQ=SPARS 25; NSAMP=10			[==>]	[1]

