



13083 - UVIS CTE Monitor (star clusters)

Cycle: 20, Proposal Category: CAL/WFC3

(Availability Mode: RESTRICTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
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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	(2) NGC-6791	WFC3/UVIS	1	15-Oct-2012 21:22:53.0	yes
02	(1) NGC-104	WFC3/UVIS	2	15-Oct-2012 21:23:10.0	yes
03	(2) NGC-6791	WFC3/UVIS	1	15-Oct-2012 21:23:22.0	yes
04	(1) NGC-104	WFC3/UVIS	2	15-Oct-2012 21:23:37.0	yes
05	(2) NGC-6791	WFC3/UVIS	1	15-Oct-2012 21:23:47.0	yes
06	(1) NGC-104	WFC3/UVIS	2	15-Oct-2012 21:24:02.0	yes

9 Total Orbits Used

ABSTRACT

This program extends the Cycle 17 to 19 external CTE calibration (CAL/WFC3 IDs 11924, 12379, 12692) program for WFC3/UVIS over Cycle 20.

Targets are (i) the sparse cluster NGC 6791 observed in Cycle 17, to continue a consistent set of observations that allows to isolate the time evolution of the CTE, and (ii) a denser field in 47 Tuc (NGC 104). The latter will provide data to measure the dependence of the CTE on field

crowding. It will also provide a consistent comparison between the CTE evolution of WFC3/UVIS and that of ACS/WFC at the same time into the flight, because ACS/WFC CTE data were based on 47 Tuc observations. Additional observations of 47 Tuc over a range of sky backgrounds will provide a wide range of background levels to measure the background dependence of the UVIS CTE.

Goals are (i) the continued monitoring of the time evolution of the WFC3/UVIS CTE, (ii) establishing the detector X,Y dependence of the CTE, (iii) CTE dependence on the source flux and the background level and (iv) an improved CTE correction model based on these measurements. These goals include CTE effects on both photometry and astrometry.

OBSERVING DESCRIPTION

We observe two star fields of different densities, the open cluster NGC 6791 and a field in 47 Tuc (NGC 104) in order to investigate the effects of crowding, differing background levels, detector position and count rates on the WFC3/UVIS channel detectors' Charge Transfer Efficiency (CTE). Sets of 2 visits, one for each target, are observed 3 times during cycle 20, spaced approximately 3-4 months apart. Exposure times are set to maximize the signal to noise over a brightness range of X-Y magnitudes.

These data will be used to measure the CTE, and compare these values to the CTE measurements obtained during Cycle 17,18,19, SMOV and ground testing. We will also compare the rate of change in the WFC3 CCDs' CTE with those of the ACS CCDs.

We expect to measure the CTE to a precision of 1% in point source photometry and 5% in point source centroid shift (astrometry).

For NGC 6791 (Visits 01,03,05), observations will be similar to those in Cycle 17,18,19 CAL/WFC3 Proposals 11924,12379, with equal exposure times, coordinates, filters, but a reduced dither pattern that was applied in Cycle 19 (CAL/WFC3 Proposal 12692): 2 pointings, one dithered approx. 2000 pixel in detector Y, omitting the 2000 pixel X dither. The long and short exposures, and the measurements of the same stars on both detectors, provide data to establish a CTE model as a function of various parameters.

For 47 Tuc (Visits 02,04,06), we will only use a detector Y direction dither to measure the main CTE component's dependence on field crowding, as well as its comparison between ACS/WFC3 and WFC3/UVIS.

The observations in the F606W filter, obtained in previous cycles to extend the range of sky background levels, will be dropped in this cycle. Instead, we perform all observations in the F502N filter and obtain a broader, better defined range of backgrounds using the UVIS post-flash mode. For NGC

Proposal 13083 (STScI Edit Number: 1, Created: Monday, October 15, 2012 8:24:13 PM EST) - Overview

6791, the former F606W exposures will be substituted by F502N exposures with a 12 electron per pixel post-flash background level, the background level recommended to observers to strongly mitigate CTE losses at a moderate added noise penalty. For NGC 104/47 Tuc, we will obtain F502N exposure pairs dithered by 2000 pixels in detector Y direction, one pair without post-flash (approximately zero background), and 6 pairs sampling backgrounds from 6 to 100 electrons per pixel, bracketing the approximate range of backgrounds from low background, post-flashed exposures to long (1000 seconds), high background exposures. The range of background levels was estimated from Baggett & Anderson 2012 (HST WFC3 ISR 2012-12).

Scheduling:

The CTE long-term monitoring observations (Visits 01 to 06) will be taken at 3 epochs in Cycle 20, the first epoch as soon as possible in Oct/Nov 2012, the following two epochs spaced evenly throughout the cycle.

We ask that pairs of NGC 6791 and 47 Tuc observations (Visits 01-02, Visits 03-04, Visits 05-06) are taken within 7 days from each other, to sample the CTE at similar epochs.

We have set visit-level timing requirements for visit groups accordingly.

CALIBRATION JUSTIFICATION

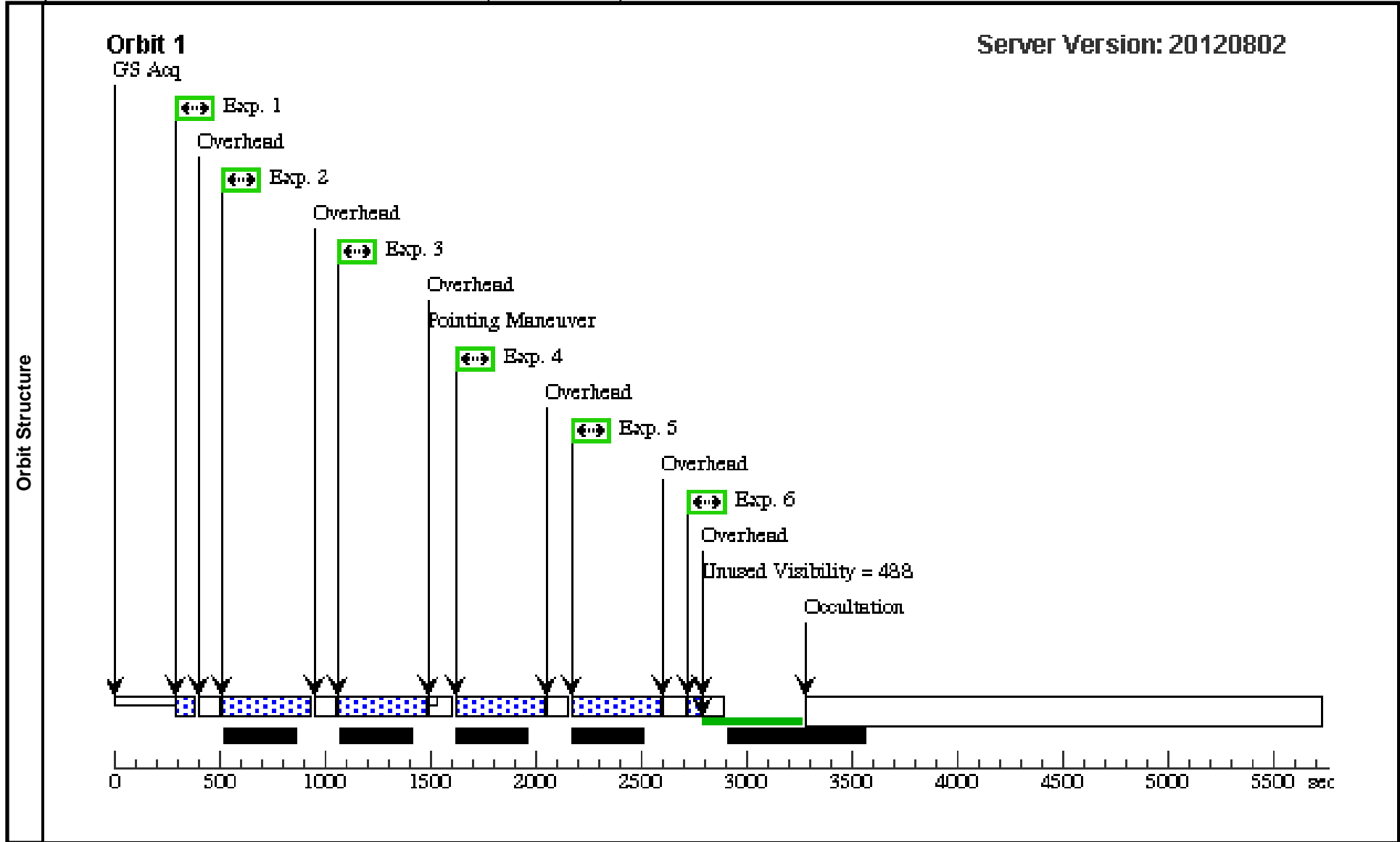
These data will be used to determine the rate of change of the CTE with time, and with position on the detector. Results will be compared to CY 17,18,19 CTE measurements for WFC3/UVIS CCDs, as well as to ACS/CCDs, and where possible to CTE measurements of first and second generation HST instruments.

The analysis of the data will be used to continue calibrating a model of CTE-induced losses in both FLT and DRZ UVIS images, with a precision of better than 1% for stellar photometry and less than 5% for astrometric effects from CTE-induced source centroid shifts.

Proposal 13083 - Visit 01 - UVIS CTE Monitor (star clusters)

Tue Oct 16 01:24:14 GMT 2012

Visit	Proposal 13083, Visit 01, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: BETWEEN 20-OCT-2012 AND 01-DEC-2012 <i>Comments: USE SAME GUIDE STAR THROUGHOUT VISIT. USE SAME ORIENTATION THROUGHOUT VISIT.</i>																																																																														
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Proposal 13083 - Visit 02 - UVIS CTE Monitor (star clusters)

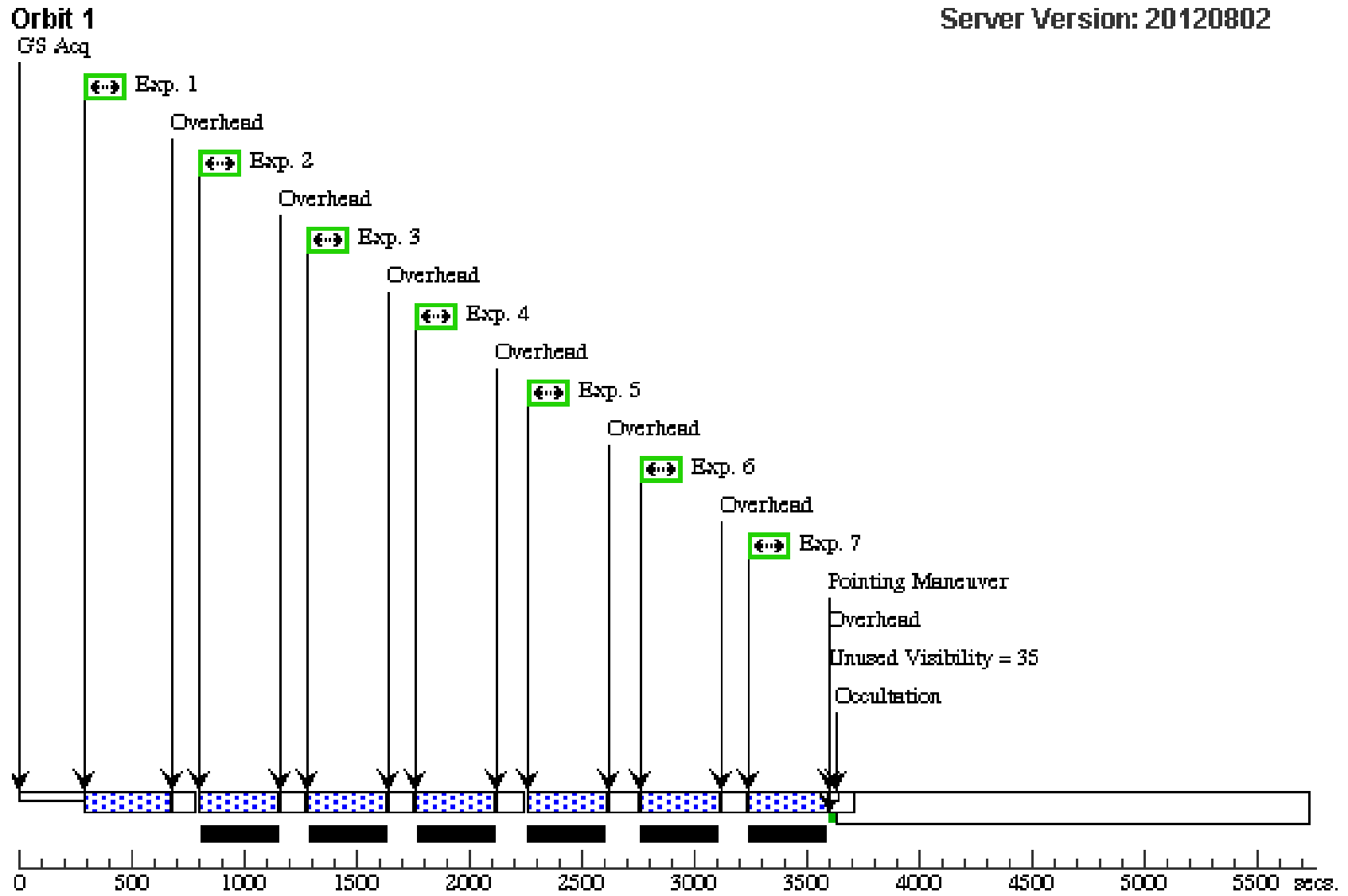
Tue Oct 16 01:24:16 GMT 2012

Visit	Proposal 13083, Visit 02, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: GROUP 02,01 WITHIN 7D <i>Comments: USE SAME GUIDE STAR THROUGHOUT VISIT. USE SAME ORIENTATION THROUGHOUT VISIT.</i>																												
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Proposal 13083 - Visit 02 - UVIS CTE Monitor (star clusters)

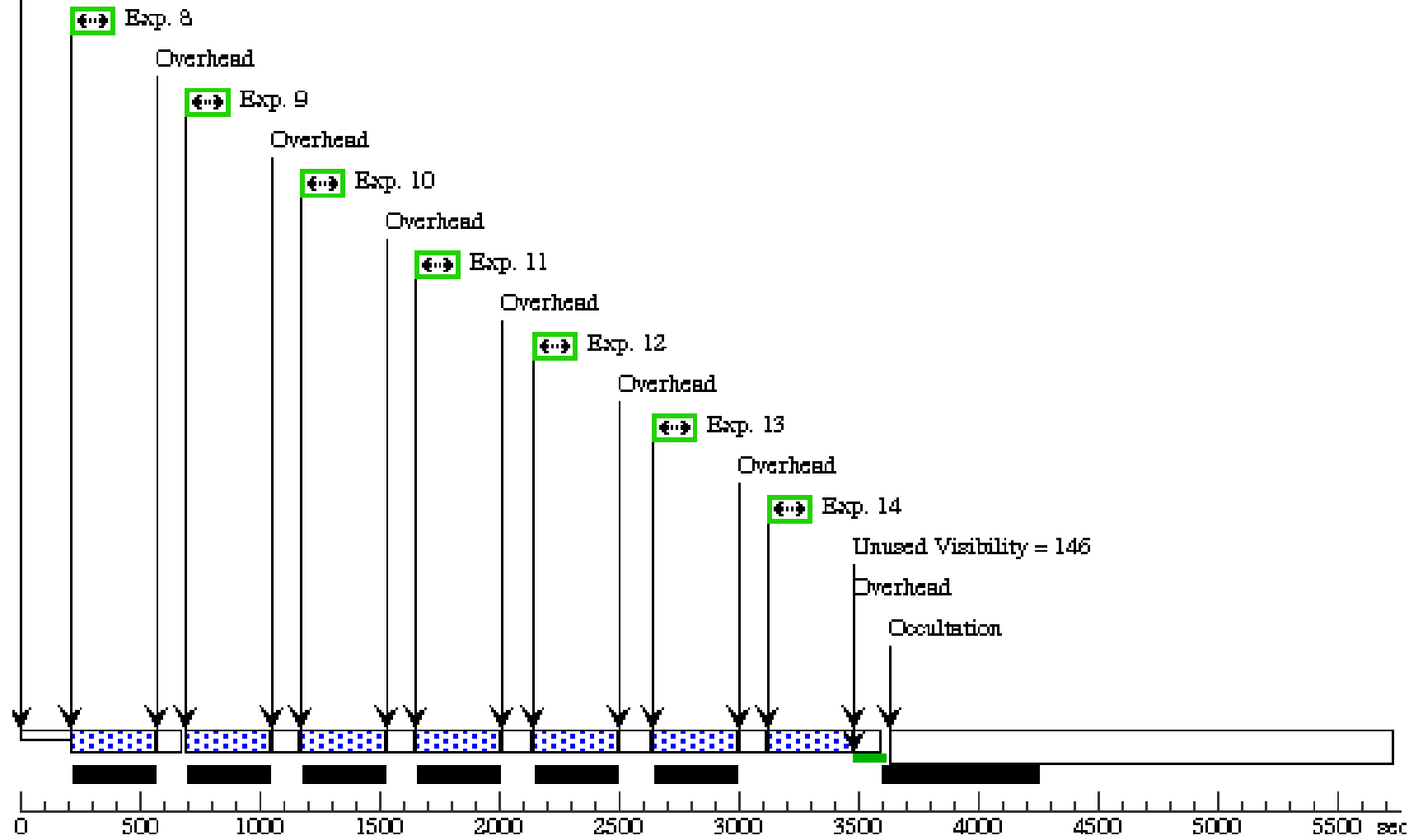
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									[==>]	[1]
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									[==>]	[1]
	3		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=12.	POS TARG 0.,0.		348 Secs	
									[==>]	[1]
	4		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=13.	POS TARG 0.,0.		348 Secs	
									[==>]	[1]
	5		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=21.5			348 Secs	
									[==>]	[1]
	6		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.24	POS TARG 0.,0.		348 Secs	
									[==>]	[1]
	7		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.59	POS TARG 0.,0.		348 Secs	
								[==>]	[1]	
8		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO	POS TARG 0.,81.6		348 Secs		
								[==>]	[2]	
9		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=6.	POS TARG 0.,81.6		348 Secs		
								[==>]	[2]	
10		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=12.	POS TARG null,81.6		348 Secs		
								[==>]	[2]	
11		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=13.	POS TARG null,81.6		348 Secs		
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12		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=21.5	POS TARG 0.,81.6		348 Secs		
								[==>]	[2]	
13		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.24	POS TARG null,81.6		348 Secs		
								[==>]	[2]	
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Orbit Structure



Orbit 2

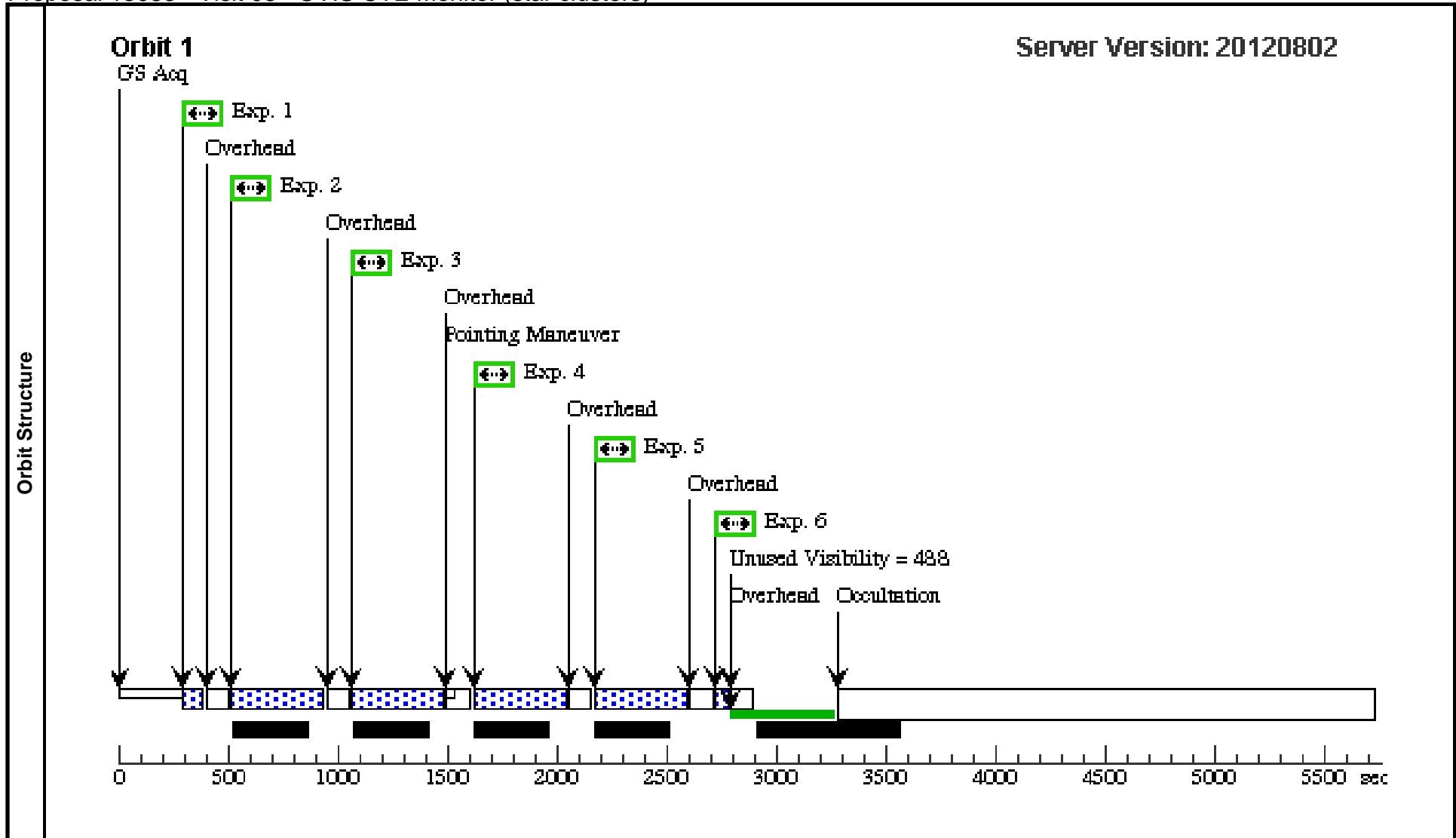
GS Req



Proposal 13083 - Visit 03 - UVIS CTE Monitor (star clusters)

Tue Oct 16 01:24:19 GMT 2012

Visit	Proposal 13083, Visit 03, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: BETWEEN 01-MAR-2013 AND 30-APR-2013 <i>Comments: USE SAME GUIDE STAR THROUGHOUT VISIT. USE SAME ORIENTATION THROUGHOUT VISIT.</i>																																																																														
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6		(2) NGC-6791	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO	POS TARG null,81.6		60 Secs [==>]	[1]																																																																						



Proposal 13083 - Visit 04 - UVIS CTE Monitor (star clusters)

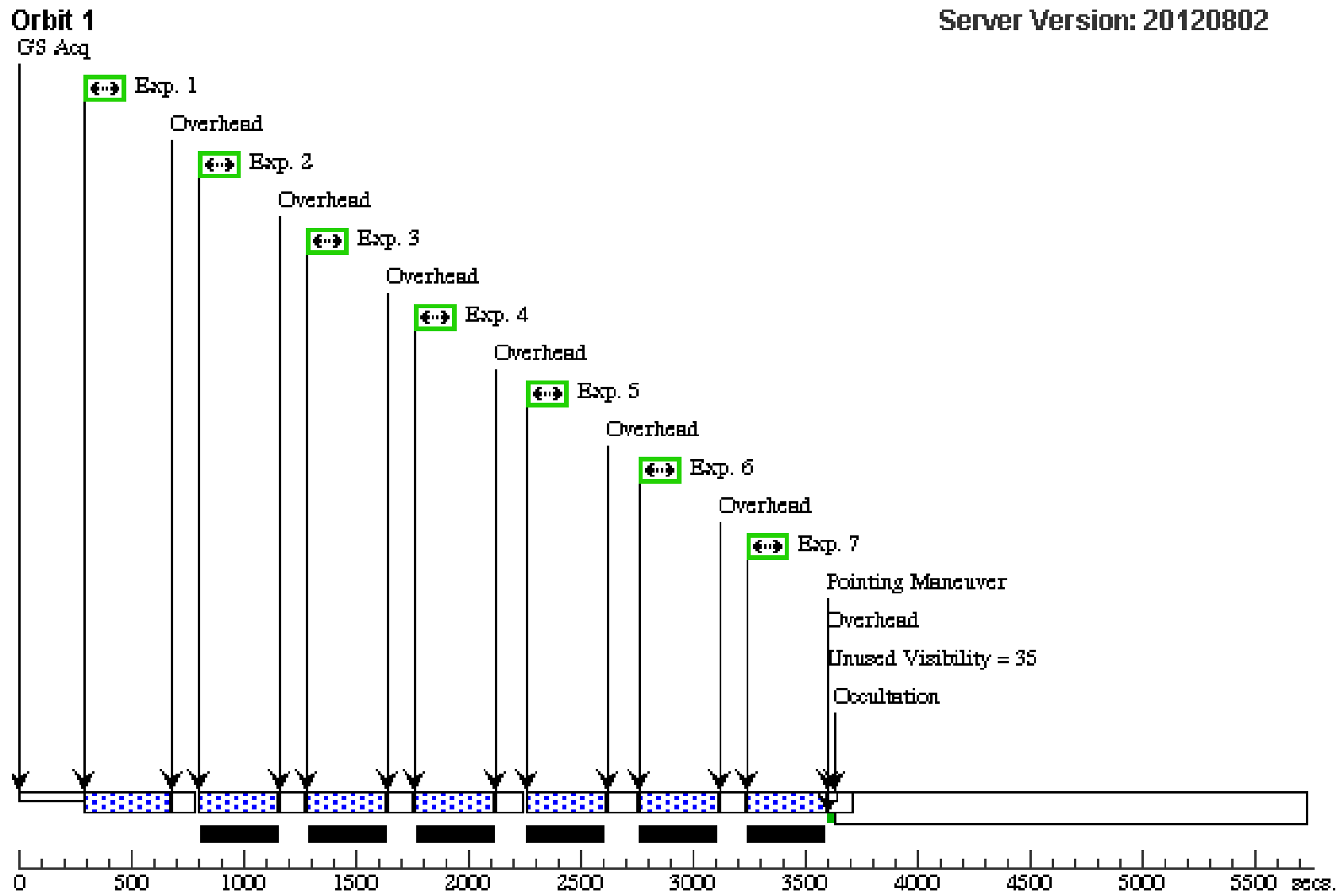
Tue Oct 16 01:24:20 GMT 2012

Visit	Proposal 13083, Visit 04, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: GROUP 04,03 WITHIN 7D <i>Comments: USE SAME GUIDE STAR THROUGHOUT VISIT. USE SAME ORIENTATION THROUGHOUT VISIT.</i>																												
	Diagnosics (Visit 04) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 04) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 04) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 04) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 04) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 04) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 04) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE																												
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<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>																													

Proposal 13083 - Visit 04 - UVIS CTE Monitor (star clusters)

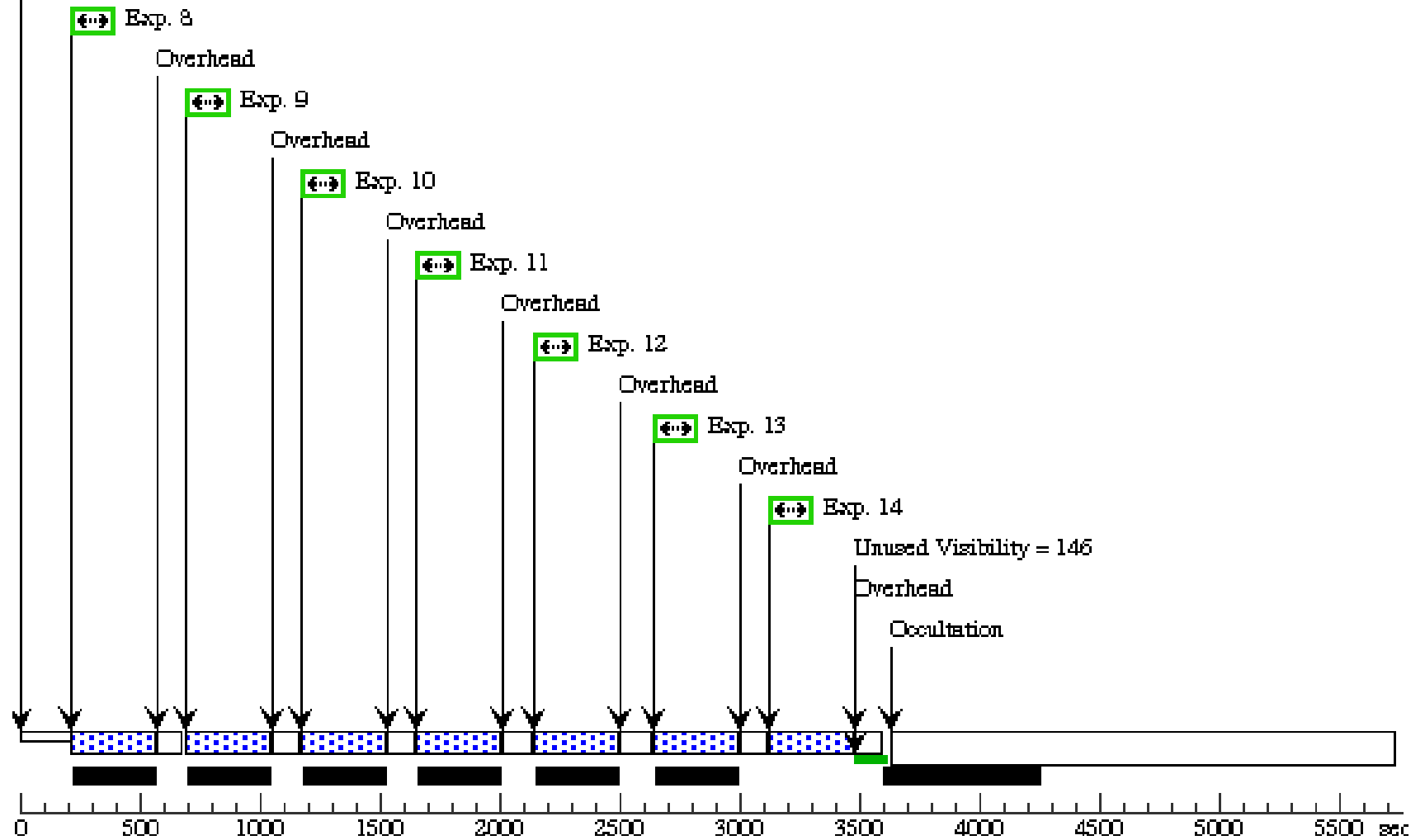
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO			348 Secs	
									[==>]	[1]
	2		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=6.			348 Secs	
									[==>]	[1]
	3		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=12.	POS TARG 0.,0.		348 Secs	
									[==>]	[1]
	4		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=13.	POS TARG 0.,0.		348 Secs	
									[==>]	[1]
	5		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=21.5			348 Secs	
									[==>]	[1]
	6		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.24	POS TARG 0.,0.		348 Secs	
									[==>]	[1]
	7		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.59	POS TARG 0.,0.		348 Secs	
								[==>]	[1]	
8		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO	POS TARG 0.,81.6		348 Secs		
								[==>]	[2]	
9		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=6.	POS TARG 0.,81.6		348 Secs		
								[==>]	[2]	
10		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=12.	POS TARG null,81.6		348 Secs		
								[==>]	[2]	
11		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=13.	POS TARG null,81.6		348 Secs		
								[==>]	[2]	
12		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=21.5	POS TARG 0.,81.6		348 Secs		
								[==>]	[2]	
13		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.24	POS TARG null,81.6		348 Secs		
								[==>]	[2]	
14		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.59	POS TARG null,81.6		348 Secs		
								[==>]	[2]	

Orbit Structure



Orbit 2

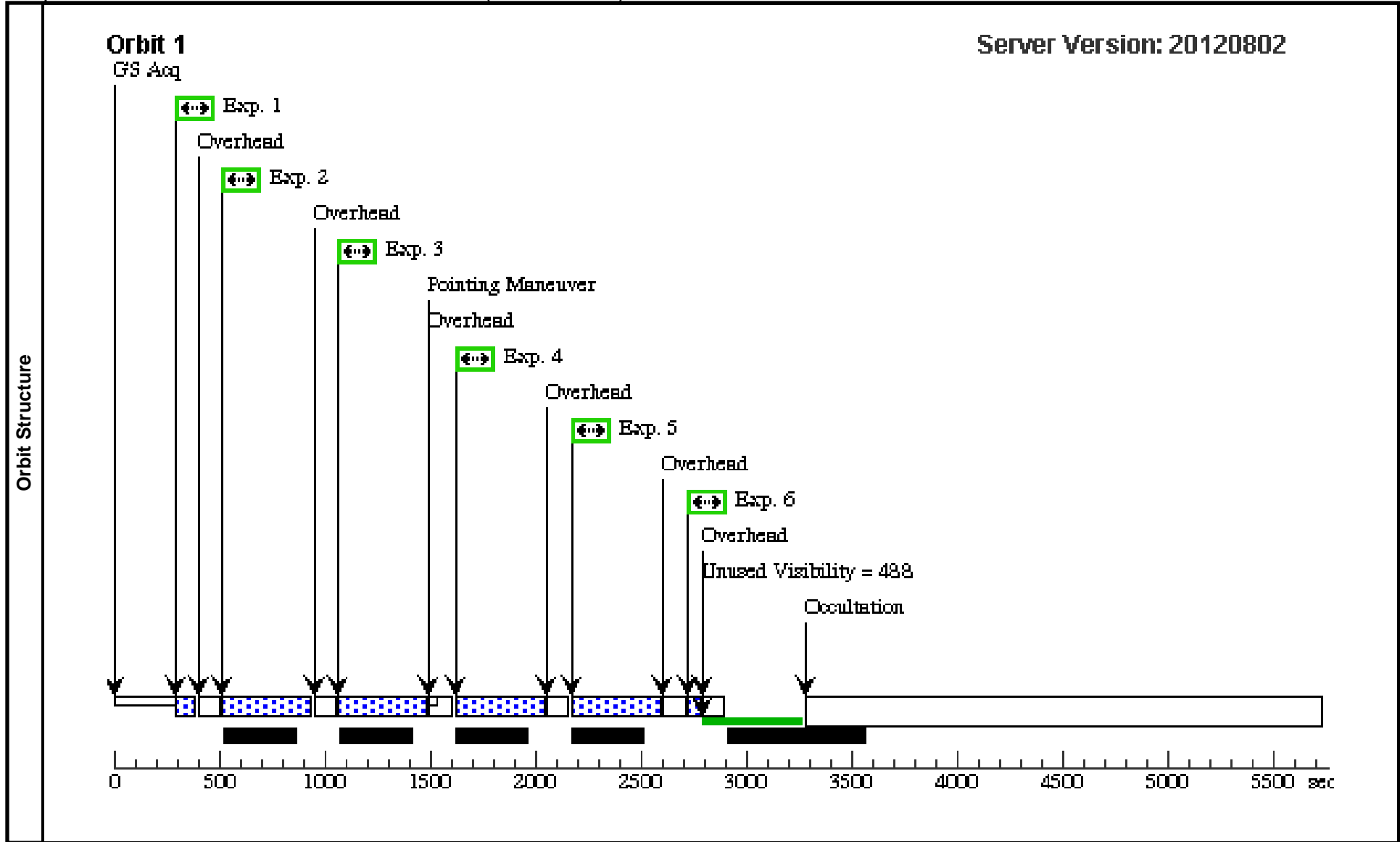
GS Req



Proposal 13083 - Visit 05 - UVIS CTE Monitor (star clusters)

Tue Oct 16 01:24:23 GMT 2012

Visit	Proposal 13083, Visit 05, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: BETWEEN 01-JUL-2013 AND 31-AUG-2013 <i>Comments: USE SAME GUIDE STAR THROUGHOUT VISIT. USE SAME ORIENTATION THROUGHOUT VISIT.</i>																																																																														
	(Visit 05) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 05) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 05) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE																																																																														
Diagnosics																																																																															
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Exposures	<table border="1"> <thead> <tr> <th>#</th> <th>Label</th> <th>Target</th> <th>Config,Mode,Aperture</th> <th>Spectral Els.</th> <th>Opt. Params.</th> <th>Special Reqs.</th> <th>Groups</th> <th>Exp. Time/[Actual Dur.]</th> <th>Orbit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td>(2) NGC-6791</td> <td>WFC3/UVIS, ACCUM, UVIS</td> <td>F502N</td> <td>CR-SPLIT=NO</td> <td></td> <td></td> <td>60 Secs [==>]</td> <td>[1]</td> </tr> <tr> <td>2</td> <td></td> <td>(2) NGC-6791</td> <td>WFC3/UVIS, ACCUM, UVIS</td> <td>F502N</td> <td>CR-SPLIT=NO</td> <td></td> <td></td> <td>420 Secs [==>]</td> <td>[1]</td> </tr> <tr> <td>3</td> <td></td> <td>(2) NGC-6791</td> <td>WFC3/UVIS, ACCUM, UVIS</td> <td>F502N</td> <td>CR-SPLIT=NO; FLASH=12.</td> <td></td> <td></td> <td>420 Secs [==>]</td> <td>[1]</td> </tr> <tr> <td>4</td> <td></td> <td>(2) NGC-6791</td> <td>WFC3/UVIS, ACCUM, UVIS</td> <td>F502N</td> <td>CR-SPLIT=NO</td> <td>POS TARG 0.,81.6</td> <td></td> <td>420 Secs [==>]</td> <td>[1]</td> </tr> <tr> <td>5</td> <td></td> <td>(2) NGC-6791</td> <td>WFC3/UVIS, ACCUM, UVIS</td> <td>F502N</td> <td>CR-SPLIT=NO; FLASH=12.</td> <td>POS TARG 0.,81.6</td> <td></td> <td>420 Secs [==>]</td> <td>[1]</td> </tr> <tr> <td>6</td> <td></td> <td>(2) NGC-6791</td> <td>WFC3/UVIS, ACCUM, UVIS</td> <td>F502N</td> <td>CR-SPLIT=NO</td> <td>POS TARG null,81.6</td> <td></td> <td>60 Secs [==>]</td> <td>[1]</td> </tr> </tbody> </table>									#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit	1		(2) NGC-6791	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO			60 Secs [==>]	[1]	2		(2) NGC-6791	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO			420 Secs [==>]	[1]	3		(2) NGC-6791	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=12.			420 Secs [==>]	[1]	4		(2) NGC-6791	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO	POS TARG 0.,81.6		420 Secs [==>]	[1]	5		(2) NGC-6791	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=12.	POS TARG 0.,81.6		420 Secs [==>]	[1]	6		(2) NGC-6791	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO	POS TARG null,81.6		60 Secs [==>]	[1]
	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit																																																																					
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Proposal 13083 - Visit 06 - UVIS CTE Monitor (star clusters)

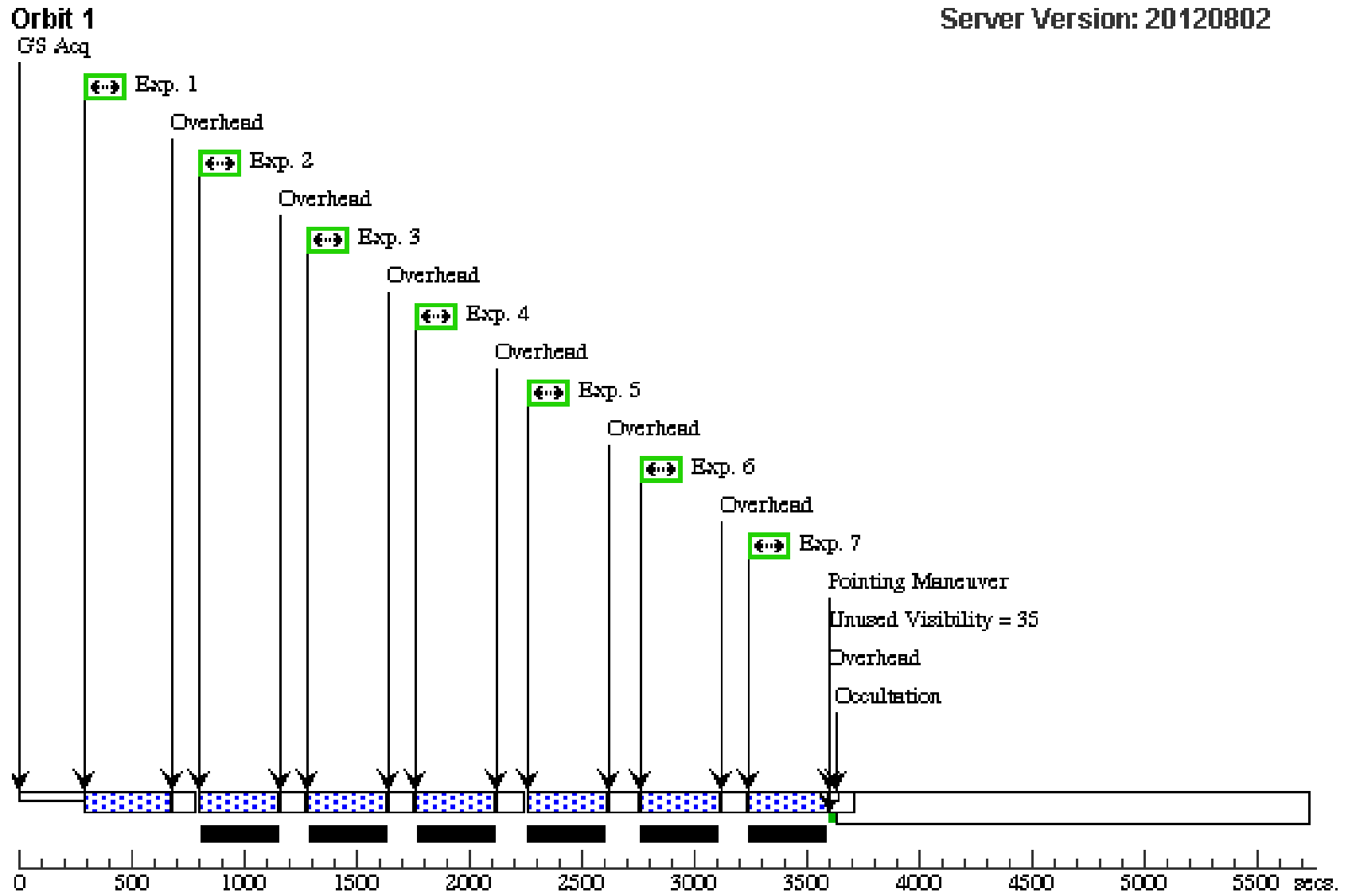
Tue Oct 16 01:24:24 GMT 2012

Visit	Proposal 13083, Visit 06, implementation Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: GROUP 06,05 WITHIN 7D <i>Comments: USE SAME GUIDE STAR THROUGHOUT VISIT. USE SAME ORIENTATION THROUGHOUT VISIT.</i>																												
	Diagnosics (Visit 06) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 06) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 06) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 06) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 06) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 06) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE (Visit 06) Warning (Orbit Planner): POS TARG OUTSIDE OF APERTURE																												
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<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>																													

Proposal 13083 - Visit 06 - UVIS CTE Monitor (star clusters)

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
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	2		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=6.			348 Secs [==>]	[1]
	3		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=12.	POS TARG 0.,0.		348 Secs [==>]	[1]
	4		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=13.	POS TARG 0.,0.		348 Secs [==>]	[1]
	5		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=21.5			348 Secs [==>]	[1]
	6		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.24	POS TARG 0.,0.		348 Secs [==>]	[1]
	7		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.59	POS TARG 0.,0.		348 Secs [==>]	[1]
	8		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO	POS TARG 0.,81.6		348 Secs [==>]	[2]
	9		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=6.	POS TARG 0.,81.6		348 Secs [==>]	[2]
	10		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASH=12.	POS TARG null,81.6		348 Secs [==>]	[2]
	11		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=13.	POS TARG null,81.6		348 Secs [==>]	[2]
	12		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=LOW; FLASHEXP=21.5	POS TARG 0.,81.6		348 Secs [==>]	[2]
	13		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.24	POS TARG null,81.6		348 Secs [==>]	[2]
14		(1) NGC-104	WFC3/UVIS, ACCUM, UVIS	F502N	CR-SPLIT=NO; FLASHCUR=MEDI UM; FLASHEXP=1.59	POS TARG null,81.6		348 Secs [==>]	[2]	

Orbit Structure



Orbit 2

GS Req

