14440 - COS Imaging TA and Spectroscopic WCA-PSA/BOA offset verifications

Cycle: 23, Proposal Category: CAL/COS

(Availability Mode: RESTRICTED)

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	(2) WD-1657+343 WAVE	COS/FUV COS/NUV	1	29-Jul-2016 13:34:23.0	yes
02	(3) HIP66578 WAVE	COS/FUV COS/NUV	1	29-Jul-2016 13:34:27.0	yes
03	(1) 206W3	COS/FUV COS/NUV	1	29-Jul-2016 13:34:29.0	yes

3 Total Orbits Used

ABSTRACT

This program builds upon the monitoring and calibration of the FGS-to-SI alignment program (14452 - HST Cycle 23- Focal Plane Calibration (SI-FGS Alignment)). HST 14452 performs back-to-back PSA/MIRRORA & PSA/MIRRORB ACQ/IMAGEs, from which all the results herein are bootstrapped.

The FGS-to-SI program is repeated twice a year (every cycle) and we will use its COS exposures as the baseline for this TA co-alignment program.

The historical list of FCS-to-SI proposals, & cycles, are:
11878 (C17) ->12399 (C18) ->12781 (C19) ->13171 (C20) ->13616 (C21) ->14035 (C22) ->14452 (C23)
The order in which the alignment is checked is : STIS->WFC3->ACS->COS

The FGS-to-SI program (14452) performs a PSA/MIRRORA ACQ/IMAGE on a target that should be centered in the aperture. This verifies the COS NUV PSA aperture position in the SIAF. After this PSA+MIRRORA ACQ/IMAGE, a PSA+MIRRORB ACQ/IMAGE is then performed. This exposure bootstraps the PSA+MIRRORB centering to the PSA+MIRRORA SIAF verification. This allows us to monitor the properties of the PSA+MIRRORB image in a controlled way on a centered target. No spectra are taken in 14452 due to time constraints, but we are currently planning on adding in PSA/MIRRORA and PSA/MIRRORB lamp images.

Visits 01 & 02 of this program extend the COS SIAF/FGS-to-SI verification of Visit 02 of 14452 to the other two ACQ/IMAGE combinations (BOA+MIRRORA & BOA+MIRRORB) by bootstraping from the PSA+MIRRORB verification to co-align all the COS TA imaging modes. The details of the observations are given is the observing section.

Visit 01 of this program bootstraps off Visit 02 of 14452 to co-align the PSA+MIRRORB ACQ/IMAGE mode to the BOA+MIRRORA. We prefer that Visit 01 of this program executes within 45 days of Visit 02 of 14452, to ensure that no long term instrument or telescope focus changes impact our results.

Visit 02 of this program follows the style of Visit 01, and bootstraps from the BOA+MIRRORA mode to the BOA+MIRRORB TA imaging mode. Visit 02 should also occur within 45 days of visit 02 of 14452 and within 45 days of Visit 01 of this program.

Visit 3 of this program is an on-hold, contingency visit that would be used to replace the 14452 Visit 02 in case this program is, for whatever reason, not executed as planned. In this case the 1st ACQ/IMAGE is PSA/MIRRORA and the 2nd ACQ/Image is PSA/MIRRORB. This visit also takes several lamp images to measure the WCA-to-PSA imaging offset FSW patchable constants.

In all visits, lamp+target images are taken before and after the TA imaging mode that is being co-aligned (the second ACQ/IMAGE of the program.)

All visits in this program are single orbit visits, this program is very similar to the C22 version (13972). Due to the change in OSM2 Home position, some NUV spectra have been re-ordered for efficiency AND some NUV cenwaves were changed to those that are known to have good stripe B

WCA spectra.

OBSERVING DESCRIPTION

The process is to perform back-to-back ACQ/IMAGES in two different modes (e.g., PSA/MIRRORB then BOA/MIRRORA). This will allow us to test the cross-calibration to ensure that all TA modes are centering the target to the same point in the aperture. Lamp+target exposures are interleaved throughout the visit to measure and verify the imaging TA AD (along-dispersion and XD (cross-dispersion) WCA-to-PSA offsets. Images will usually use the PtNe#2 (P2) lamp, as it is the primary TA lamp, but some images will use PtNe#1 (P1) to monitor the lamps in imaging mode.

Program 14452 contains a back-to-back PSA/MIRRORA & PSA/MIRRORB ACQ/Images on the target 206W3, should visit 02 of 14452 not execute, we will activate Visit 03 as a replacement.

Visit 01 of this program takes back-to-back PSA/MIRRORB & BOA/MIRRORA ACQ/Images and images (with flashes) and also takes G230L, G285M, G130M, and G140L spectra to test the WCA-to-PSA offsets.

Visit 02 of this program takes back-to-back BOA/MIRRORA & BOA/MIRRORB ACQ/Images and images (with flashes) and also takes G225M, G185M, and G160M spectra to test the WCA-to-PSA offsets. To test Ywalk, we also take G160M/1600 exposures at +/- 0.7"

Visit 02 of this program also takes a "family portait" of all the P1/P2 MIRRORA/B WCA lamp images to track any drifting of the centroids, or changes in the lamps.

Visit 03 is an on-hold contigency visit in case, for whatever reason, visit 2 of 14452, does not execute as planned in the fall of 2016. This visit (which is not expected to be executed) would compare the PSA/MIRRORA and PSA/MIRRORB imaging WCA-to-PSA offsets and those of several important FUV cenwaves, G140L/1280, G130M/1309, & G160M/1600.

All lamp+target images now use the QESIPARMS USECURRENT and CURRENT to specificially set the lamp and current values.

See the comment of the first exposure of Visit 03 for a description of the expected count rates, exposure times, & buffer times (for the lamps).
--------- Additional Comments ----------

Must be performed on 2 guidestar fine-lock and must not use FGS2. Guidestar pair must be reviewed by the PC.

Proposal 14440 - PSA/B & BOA/A (01) - COS Imaging TA and Spectroscopic WCA-PSA/BOA offset verifications

Visit

Proposal 14440, PSA/B & BOA/A (01), implementation Fri Jul 29 17:34:30 GMT 2016

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 100%; GROUP 01,02 WITHIN 45D

Comments: Test to compare the centering of PSA/MIRRORB to BOA/MIRRORA. The target will be the standard star WD1657+343. 100% Schedubility. This Visit (01) should be executed within 45 days of Visit 02 of 14452. Visits 01 & 02 of this program should also execute within 45 days of each other, but in no particular order. The closer in time that they can all be executed, the better. We also take some G230L, G285M, G130M, and G140L spectra to test the WCA-to-PSA offsets.

Diagnostics

(PSA/B & BOA/A (01)) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.

Fixed Targets

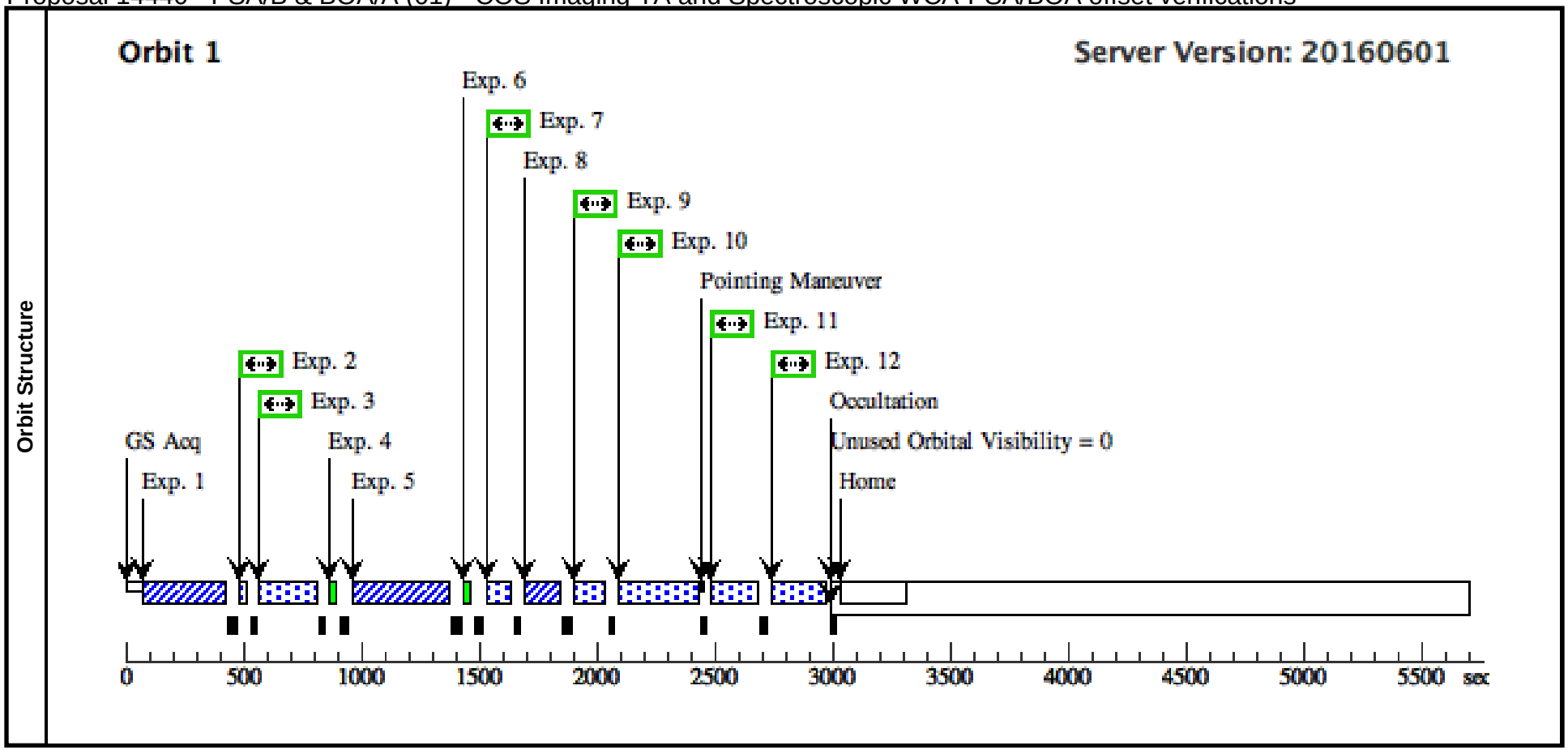
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	WD-1657+343	RA: 16 58 51.1200 (254.7130000d) Dec: +34 18 53.30 (34.31481d) Equinox: J2000		V=16.1	Reference Frame: ICRS

Comments: COS.ta.432603 indicates this is a good PSA/MIRB to BOA/MIRA target PSA/MIRB counts = S/N=60 in 11.6s (S/N = 40 in 5.2s); COS.ta.432604 gives S/N=60 in 150.7s for BOA/MIRA Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (PSA/MIRRORB/P2/MED) (COS.ta.433946)	(2) WD-1657+343	COS/NUV, ACQ/IMAGE, PSA	MIRRORB		GS ACQ SCENARIO BASE1B3	Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	13 Secs (13 Secs) *[==>]*	***[1]***
	*Comments: COS.ta.433946 gives S/N=60 in 11.65s. BP = 43 cps. We observed this target in 13124 and the target count rate was 400 cts/s, total cts = 4800 total , BP=24 cts/s That's sqrt(2/3 * 4800) = 56 (S/N)*								
2	PSA/MIRRORB/P2/MED + Target (COS.ta.433946)	(2) WD-1657+343	COS/NUV, TIME-TAG, PSA	MIRRORB	FLASH=S0040D016; BUFFER-TIME=500	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	16 Secs (16 Secs) *[==>]*	***[1]***
	Comments: COS.ta.433946 gives S/N=60 in 11.65s. BP = 42 cps. *A previous exposure of this target (lcgq01q7q) yielded a total (lamp+target+background) count rate of 24617 counts in 16s (1538 cps).* *So buffer time should be < 0.67 *(2.35E6/1538.) = 1024. Just be safe, we go with 500s.* *We insert a 16s lamp flash to make sure we get enough counts in the lamp image*								
3	BOA/MIRRORA/Target (no lamp) (COS.ta.433949)	(2) WD-1657+343	COS/NUV, TIME-TAG, BOA	MIRRORA	BUFFER-TIME=2000		Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	150 Secs (150 Secs) *[==>]*	***[1]***
	Comments: COS.ta.433949 gives S/N=60 in 150s, followed by a wavecal. The exposure time is driven by the target. We observed this target in 13124, the target count rate was 18.2 cps (2736 counts in 150s : ~312 background in 150s over a 50x50 box). This is a BOA image, so we need to add a WAVE image after this exposure. The WAVECAL=YES parameter does not trigger a separate lamp image. *Buffer should be < 0.67 * (2.35E6/20.) or < 7800. We use 2000 just to be safe.*								
4	WCA/MIRRORA/P2/LOW (no target)	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORA		QESIPARM USELAMP LINE2; QESIPARM CURRENT LOW	Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	9 Secs (9 Secs) *[==>]*	***[1]***
	Comments: For P2/LOW/MIRRORA we get 2900 counts in 7s. Buffer Time is calculated automatically.								
5	ACQ/IMAGE (BOA/MIRRORA/P2/LOW) (COS.ta.433949)	(2) WD-1657+343	COS/NUV, ACQ/IMAGE, BOA	MIRRORA			Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	150 Secs (150 Secs) *[==>]*	***[1]***
	Comments: COS.ta.433949 gives S/N=60 in 150s								
6	WCA/MIRRORA/P2/LOW (no target)	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORA		QESIPARM USELAMP LINE2; QESIPARM CURRENT LOW	Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	10 Secs (10 Secs) *[==>]*	***[1]***
	Comments: For P2/LOW/MIRRORA we get 2900 counts in 7s								
7	PSA/MIRRORB/P2/MED + Target (COS.ta.433946)	(2) WD-1657+343	COS/NUV, TIME-TAG, PSA	MIRRORB	FLASH=S0040D016; BUFFER-TIME=500	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	16 Secs (16 Secs) *[==>]*	***[1]***
	Comments: COS.ta.433946 gives S/N=60 in 11.65s. BP = 42 cps. *A previous exposure of this target (lcgq01q7q) yielded a total (lamp+target+background) count rate of 24617 counts in 16s (1538 cps).* *So buffer time should be < 0.67 *(2.35E6/1538.) = 1024. Just be safe, we go with 500s.* *We insert a 16s lamp flash to make sure we get enough counts in the lamp image*								

	8	ACQ/IMAGE (PSA/MIRRORB/P2/MED) (COS.ta.433946)	(2) WD-1657+343	COS/NUV, ACQ/IMAGE, PSA	MIRRORB			Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	13 Secs (13 Secs) *[==>]*	***[1]***
		*Comments: COS.ta.433946 gives S/N=60 in 11.65s. BP = 43 cps. We observed this target in 13124 and the target count rate was 400 cts/s, total cts = 4800, BP=24 cts/s That's sqrt(2/3 * 4800) = 56 (S/N)*								
	9	PSA/G230L/2950 (COS.sa.433964)	(2) WD-1657+343	COS/NUV, TIME-TAG, PSA	G230L 3000 A	BUFFER-TIME=700; FP-POS=3; FLASH=S0100D021	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	21 Secs (21 Secs) *[==>]*	***[1]***
		*Comments: COS.sa.4333964 gives S/N=40 in 2 s, we go for 21s. BT=2/3*1270 = 800 (we use 700 just to be safe) Based upon the data from 13124, we expect 3800 counts in 30s in the B-stripe. We set the lamp to the exposure time to get more counts.*								
	10	PSA/G285M/2676 (COS.sp.744073)	(2) WD-1657+343	COS/NUV, TIME-TAG, PSA	G285M 2676 A	BUFFER-TIME=1400; FP-POS=3; FLASH=S0100D050	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	151 Secs (151 Secs) *[==>]*	***[1]***
		*Comments: COS.sp.744073 gives S/N=30 in the XD (per stripe) in 151 seconds, BT=2/3 * 2470 = ~1600. Normal Tagflashing is not sufficient for our WCA needs, so we go for 100s. To allow for lamp counts, we drop the BT down to 1400.*								
	11	PSA/G130M/1309/3 (COS.sp.433966)	(2) WD-1657+343	COS/FUV, TIME-TAG, PSA	G130M 1309 A	FP-POS=3; BUFFER-TIME=220; FLASH=S0060D025	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	25 Secs (25 Secs) *[==>]*	***[1]***
		*Comments: COS.sp.433966, BT=2/3*442=295, We use 220 just to be safe. We previously used a 30s lamp flash and got 4750 counts. We have reduced that to match the exposure time (25s). This should give us ~4000 counts, which is plenty for our purposes*								
	12	PSA/G140L/1280/3 (COS.sp.433967)	(2) WD-1657+343	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=3; BUFFER-TIME=400; FLASH=YES	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-12 Non-Int in PSA/B & BOA/A (01)	10 Secs (10 Secs) *[==>]*	***[1]***
		*Comments: COS.sp.433967, BT=2/3*647<430 ET=17s, Normal TAGFLASH. In 13124, we got 71K in 30s, we need <10K to get an excellent centroid, so we are taking this exposure time down to 10s, The lamp duration is 7s (2700 counts).*								


Orbit 1
Server Version: 20160601
Orbit Structure
Exp. 6
Exp. 7
Exp. 8
Exp. 9
Exp. 10
Pointing Maneuver
Exp. 11
Exp. 12
Occultation
Unused Orbital Visibility = 0
Home
Exp. 2
Exp. 3
Exp. 4
GS Acq
Exp. 1
Exp. 5
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14440, BOA/A & BOA/B (02), implementation Fri Jul 29 17:34:30 GMT 2016

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 100%; ORIENT 120D TO 30 D; GROUP 02,01 WITHIN 45D

Comments: Test to compare the centering of BOA/MIRRORA to BOA/MIRRORB. 100% Schedubility. This Visit (02) should be executed with 45 days of Visit 02 of 14035. Visits 01 & 02 of this program should also execute within 45 days of each other, in no particular order. The closer in time that they can all be executed, the better. The Orientation Requirement avoids a potential nearby bright object. This roll angle constraint means that this Visit (02) must execute after Sept 14, 2015. We also take G185M, G225M, and G160M spectra to test the WCA-to-PSA offsets. To test Ywalk, we also take G160M/1600 exposures at +/- 0.7"

Diagnostics

(BOA/A & BOA/B (02)) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	HIP66578	RA: 13 38 50.4757 (204.7103154d)	Proper Motion RA: -403.65 mas/yr	V=12.773+/-0.024	Reference Frame: ICRS
	Alt Name1: PG1337+705	Dec: +70 17 7.66 (70.28546d)	Proper Motion Dec: -22.0 mas/yr	F(1300)=1.3E-12,	
	Alt Name2: GRW+70.5824	Equinox: J2000	Parallax: 0.03829"	F(1800)=5.2E-13	
			Epoch of Position: 2000		
			Radial Velocity: 26 km/sec		

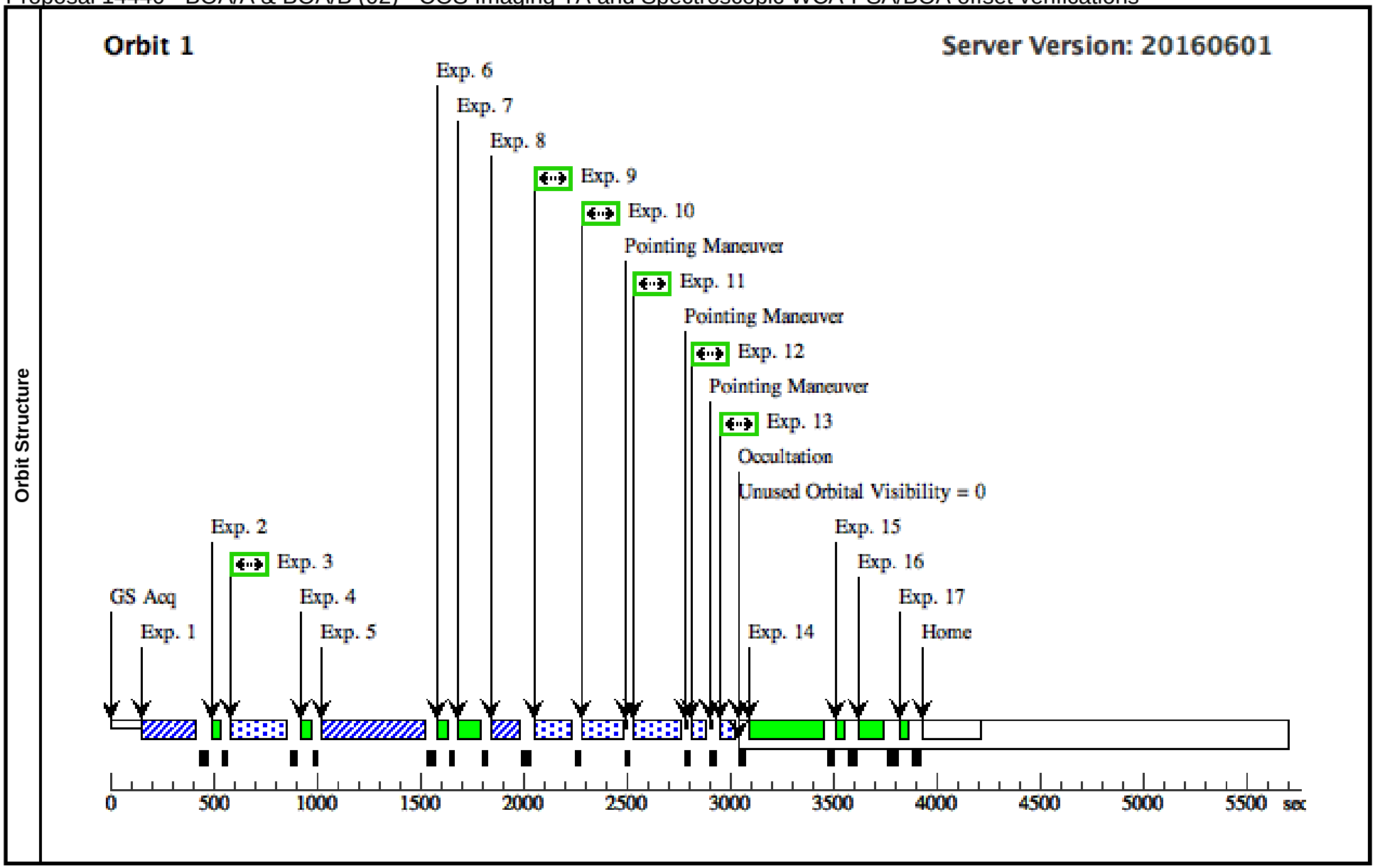
Comments: COS.ta.432623 S/N=60 in 12s BOA/MIRRORA, BOA/MIRRROB (COS.ta.432624) in 175s
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ/IMAGE (BOA/MIRRORA/P2/LOW) (COS.ta.432623)	(3) HIP66578	COS/NUV, ACQ/IMAGE, BOA	MIRRORA		GS ACQ SCENARIO BASE1B3	Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	16 Secs (16 Secs) *[==>]*	***[1]***
	Comments: Using the standard star HIP66578 to compare the centerings between the BOA/MIRRORA and BOA/MIRRORB ACQ/IMAGE centering options. The ETC gives 12 seconds to reach S/N=60 with this target in the BOA/MIRRORA mode. We observed this target in 13124, with 2961 counts in 12s (target +background in 50x50 box). We will need to follow this with a P2/LOW/WCA/A image.								
2	WCA/MIRRORA/P2/LOW (no target)	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORA	BUFFER-TIME=270	QESIPARM USELAMP LINE2; QESIPARM CURRENT LOW	Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	14 Secs (14 Secs) *[==>]*	***[1]***
	Comments: For P2/LOW/MIRRORA we get 2900 counts in 7s. The BT for this must be < 0.37(2.35E6/4800) or < 270*								
3	BOA/MIRRORB/Target (no lamp) (COS.ta.432624)	(3) HIP66578	COS/NUV, TIME-TAG, BOA	MIRRORB	BUFFER-TIME=1000		Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	183 Secs (183 Secs) *[==>]*	***[1]***
	*Comments: Followup BOA/MIRRORB calibration IMAGE with a wavecal to verify proper initial centering (The ETC gives 175 seconds to reach S/N=60 with this target in the BOA/MIRRORA mode.) The BT is ~ 0.67 *2.35E6/(1000) < 1575. as we are only getting about 20 cps from the source, most of the counts are noise. This is a BOA image, so we need to add a WAVE image after this exposure. The WAVECAL=YES parameter does not trigger a separate lamp image*								
4	WCA/MIRRORB/P2/MED (no target)	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORB	BUFFER-TIME=2000	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	24 Secs (24 Secs) *[==>]*	***[1]***
	Comments: For P2/MED, we expect 300-460 cps, with a Brightest Pixel = 9 cts/s. So BT < 0.67(2.35E6/460) < 3400.*								
5	ACQ/IMAGE (BOA/MIRRORB/P2/MED) (COS.ta.432624)	(3) HIP66578	COS/NUV, ACQ/IMAGE, BOA	MIRRORB			Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	183 Secs (183 Secs) *[==>]*	***[1]***
	Comments: Compare the centerings between the BOA/MIRRORA and BOA/MIRRORB ACQ/IMAGE centering options. The ETC gives 175 seconds to reach S/N=60 with this target in the BOA/MIRRORB mode.								
6	WCA/MIRRORB/P2/MED (no target)	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORB	BUFFER-TIME=2000	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	24 Secs (24 Secs) *[==>]*	***[1]***
	Comments: For P2/MED, we expect 300-460 cps, with a Brightest Pixel = 9 cts/s. So BT < 0.67(2.35E6/460) < 3400.*								
7	WCA/MIRRORA/P2/LOW (no target)	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORA	BUFFER-TIME=270	QESIPARM USELAMP LINE2; QESIPARM CURRENT LOW	Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	14 Secs (14 Secs) *[==>]*	***[1]***
	Comments: For P2/LOW/MIRRORA we get 2900 counts in 7s. The BT for this must be < 0.37(2.35E6/4800) or < 270*								
8	ACQ/IMAGE (BOA/MIRRORA/P2/LOW) (COS.ta.432623)	(3) HIP66578	COS/NUV, ACQ/IMAGE, BOA	MIRRORA			Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	16 Secs (16 Secs) *[==>]*	***[1]***
	Comments: Using the standard star HIP66578 to compare the centerings between the BOA/MIRRORA and BOA/MIRRORB ACQ/IMAGE centering options. The ETC gives 12 seconds to reach S/N=60 with this target in the BOA/MIRRORA mode. We observed this target in 13124, with 2961 counts in 12s (target +background in 50x50 box). We will need to follow this with a P2/LOW/WCA/A image.								

9	PSA/G225M/2306 (COS.sp.433936)	(3) HIP66578	COS/NUV, TIME-TAG, PSA	G225M 2306 A	BUFFER-TIME=540; FLASH=S0200D035; FP-POS=3	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	53 Secs (53 Secs) [==>]	[1]
*Comments: COS.sp.433936 gives s/n/re =10 in 53 seconds. BT=2/3 * 851 < 567. We want to get a good lamp flash, so 35s should be ok. FPPOS=3.*									
10	PSA/G185M/1913 (COS.sp.744079)	(3) HIP66578	COS/NUV, TIME-TAG, PSA	G185M 1913 A	BUFFER-TIME=390; FLASH=S0070D035; FP-POS=3	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	40 Secs (40 Secs) [==>]	[1]
*Comments: COS.sp.744079 gives s/n/re =10.7 in 40 seconds. BT=2/3 * 612 < 408. We want to get a good lamp flash, so 35s should be ok. FPPOS=3*									
11	PSA/G160M/1600/3-0.0 (COS.sp.615394)	(3) HIP66578	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FP-POS=3; BUFFER-TIME=200; FLASH=S0100D021; SEGMENT=A	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	22 Secs (22 Secs) [==>]	[1]
*Comments: COS.sp.615394 gives us 4200 counts/s (seg A only). We set the lamp flash to be ET - 1 s. Buffer time set to min. The actual BT calculation gives 0.67 * (2.35E6/4200) < 374, to be safe we'll use 200. Segment B is too bright and must be turned off.*									
12	PSA/G160M/1600/3+0.7 (COS.sp.615394)	(3) HIP66578	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FP-POS=3; BUFFER-TIME=200; FLASH=S0100D024; SEGMENT=A	POS TARG null,+0.7; QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	25 Secs (25 Secs) [==>]	[1]
*Comments: COS.sp.615394 gives us 4200 counts/s (seg A only). We set the lamp flash to be the same as the 0" position flash (24s). At 0.7", the target should be vignetted 13% (87% original). We want the same # of counts here on SEGA, so the exposures time is 22/0.87= 25 s, which gives ET = 137s. The BT could be as large as 2/3 * 120/0.87 = 535s, We'll just use 200 to be safe. Segment B is too bright and must be turned off.*									
13	PSA/G160M/1600/3-0.7 (COS.sp.615394)	(3) HIP66578	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FP-POS=3; BUFFER-TIME=200; FLASH=S0100D024; SEGMENT=A	POS TARG null,-0.7; QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-13 Non-Int in BOA/A & BOA/B (02)	25 Secs (25 Secs) [==>]	[1]
*Comments: COS.sp.615394 gives us 4200 counts/s (seg A only). We set the lamp flash to be the same as the 0" position flash (24s). At -0.7", the target should be vignetted 13% (87% original). We want the same # of counts here on SEGA, so the exposures time is 22/0.87= 25 s, which gives ET = 137s. The BT could be as large as 2/3 * 2.35E6/4200 = 535s, We'll just use 200 to be safe. Segment B is too bright and must be turned off.*									
14	WCA/MIRRORA/P1/LOW (no target)	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORA		QESIPARM USELAMP LINE1; QESIPARM CURRENT LOW	Sequence 14-17 Non-Int in BOA/A & BOA/B (02)	14 Secs (14 Secs) [==>]	[1]
Comments: For P1/LOW/A, we expect 2620 counts/s. BP = 45 cp/s. This is derived from data in program 13124.									
15	WCA/MIRRORA/P2/LOW (no target)	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORA		QESIPARM USELAMP LINE2; QESIPARM CURRENT LOW	Sequence 14-17 Non-Int in BOA/A & BOA/B (02)	24 Secs (24 Secs) [==>]	[1]
Comments: For P2/LOW/MIRRORA we get 2900 counts in 7s									

	16	WCA/MIRRORB/P1/LOW (no target)	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORB	QESIPARM USELAMP LINE1; QESIPARM CURRENT LOW	Sequence 14-17 Non-Int in BOA/A & BOA/B (02)	30 Secs (30 Secs) *[==>]*	***[1]***
	Comments: For P1/LOW, we expect 82 cts/s, to get 1600 counts in the primary spot, we need 2400 counts. 2400./82 = 30 seconds								
	17	WCA/MIRRORB/P2/MED (no target)	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORB	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 14-17 Non-Int in BOA/A & BOA/B (02)	24 Secs (24 Secs) *[==>]*	***[1]***
	Comments: For P2/MED, we expect 300-460 cps, with a Brightest Pixel = 9 cts/s								


Orbit 1
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Orbit Structure
Exp. 6
Exp. 7
Exp. 8
Exp. 9
Exp. 10
Pointing Maneuver
Exp. 11
Pointing Maneuver
Exp. 12
Pointing Maneuver
Exp. 13
Occultation
Unused Orbital Visibility = 0
Exp. 2
Exp. 3
Exp. 4
Exp. 5
Exp. 15
Exp. 16
Exp. 17
GS Acq
Exp. 1
Exp. 14
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14440, PSA/A & PSA/B (03), implementation Fri Jul 29 17:34:30 GMT 2016

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 100%; ON HOLD

Comments: This visit has been reconfiguded to test the most important FUV cenwaves after the PSA/A vs PSA/B comparison

On Hold Comments: This is a on-hold contingency replacement for visit 02 of 14452

Diagnostics

(PSA/A & PSA/B (03)) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	206W3	RA: 06 08 55.4600 (92.2310833d)	Proper Motion RA: 0.5 mas/yr	V=14.53+/-0.1	Reference Frame: ICRS
	Alt Name1: MCNAM209	Dec: +24 15 39.59 (24.26100d)	Proper Motion Dec: -2.2 mas/yr	J=13.441,	
	Alt Name2: J060855.46+241539.7	Equinox: J2000	Epoch of Position: 2012.7	B=14.930	

Comments: Target previously observed in Visit 2 of 12781.
According to Colin, the target coordinates given here have been adjusted to ~2012.7. I include the UCAC3 PM in case this visit is used again at a later date.
The PSA/MIRRORA had 21,063 counts in 60s (351 ct/s). Max pixel = 1965/60 = 32.75 ct/s
The PSA/MIRRORB had 12,570 counts in 300s (41.9 cts/s). Max pixel = 238/300 = 0.8 ct/s
So, PSA MirrorA/MirrorB = 351.0/41.9 = 8.4 (for this target)
This target is N8CV022007 in GSC2.3.2

From SIMBAD:

Basic data :
Cl NGC 2168 M 178 -- Star in Cluster*
*Other object types: *iC (Cl*), IR (2MASS)*
ICRS coord. (ep=J2000) : 06 08 55.46 +24 15 39.8 (Infrared) [70 60 0] B 2003yCat.2246....0C
FK5 coord. (ep=J2000 eq=2000) : 06 08 55.46 +24 15 39.8 [70 60 0]
FK4 coord. (ep=B1950 eq=1950) : 06 05 51.62 +24 16 12.1 [70 60 0]
Gal coord. (ep=J2000) : 186.6569 +02.1612 [70 60 0]
Fluxes (6) :
B 14.930 [~] D ~
V 14.481 [~] D ~
R 14.600 [~] E 2003yCat.2246....0C
J 13.441 [0.023] C 2003yCat.2246....0C
H 13.354 [0.022] C 2003yCat.2246....0C
K 13.227 [0.026] C 2003yCat.2246....0C
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	PSA/MIRRORA ACQ/IMAGE (P2/LOW) (COS.ta.634846)	(1) 206W3	COS/NUV, ACQ/IMAGE, PSA	MIRRORA		GS ACQ SCENARIO BASE1B3	Sequence 1-10 Non-Int in PSA/A & PSA/B (03)	15.0 Secs (15 Secs) *[==>]*	***[1]***

Comments: This target has previously been observed in 13171.

The measured direct count rates are (S/N are just photon statistics of the lamp or target)
PSA/MIRRORA = 245 count/s (S/N = 40 in 7s, 60 in 15s)
PSA/MIRRORB = 15.6 count/s (S/N = 40 in 102s, 50 in 160, 60 in 230s)
A/B = 15.7 for this target

WCA/P2/MIRRORA@LOW = 7s produced 2900 counts(S/N = 54)
WCA/P2/MIRRORB@LOW = 30s produced 420 counts (S/N = 21)
WCA/P2/MIRRORB@MED = 10s is estimated to produce ~4000 counts (S/N = 52 in the primary spot)
WCA/P1/MIRRORB@LOW = 82 hz, so S/N =50 in 30s
WCA/A(LOW)/B(LOW) = 25-30
WCA/B(MED)/B(LOW) is estimated to be 15-20

To get everything at S/N = 50 we need at least the following exposure times
PSA(target)/A = 10s
PSA(target)/B = 160s
WCA/P2/LOW/A = 6s
WCA/P2/LOW/B = 180s (low current), S/N = 47 in 160s
WCA/P1/LOW/B is 5x brighter than lamp#2, so at least 36s
WCA/P2/MED/B is unknown, but we estimate it to be 15-20x the 2/LOW rate, so at least 12s

For each target image, we will use the 9x9 checkbox method, so the background for PSA exposures is 9x9(500/(50*300)/30s) based upon 500 counts in 30s in the WCA 50x300 box. This is 1 count in 10s, so we ignore this for the PSA.*

For the WCA images, we will be working a 50x300 box, so the rate here is 18 hz, but we are using a median to find the center, so it is not a straightforward S/N situation. We are interested in measuring the centroid in presence of the noise and 2500 lamp counts are sufficient for our needs for WCA/P2/LOW/B. Since, we are defining the WCA-to-PSA offset for WCA/P1/LOW/B and WCA/P2/MED/B, we will shoot for 3000 lamp counts.

*For the Buffer Time, we are shooting for S/N = 50. in both the target and the lamp. Lets overshoot to S/N of 60, that's 7200 counts -> BT = 2/3 * 326= 217. We'll be extra conservative and stay short of this.*

For PSA/MIRRORA: (COS.ta.634846) We Simulated in ETC as G5, V=13.5 (lit says 14.5), S/N = 60 gives: Time = 13 seconds.Target count rate = 275 cts/s Brightest Pixel 38 cps
PSA/MIRRORB: (COS.ta.634849) We Simulated in ETC as G5, V=13.5 (lit says 14.5), S/N = 50 gives: Time = 217 seconds. Target count rate = 11.6 cts/s Brightest Pixel 1.6 cps

This target was also previously observed in Visit A2 of 12781, with the following REAL count rates (imaging mode)

The PSA/A had 21,063 total counts in 60s (Target = 206W3), after background subtraction = 20,100 = 335 cts/s. PSA/A Brightest Pixel = 32.8 counts/s
The PSA/MIRRORB had 12,570 total counts in 300s, after background subtraction=7150 = 23.8 cts/s. PSA/B Brightest Pixel = 0.8 counts/s

PSA A/B = 14x (lbx1a2ffq/lbx1a2fhq) & PSA A/B (BP) = 41x

Remember that the SED of the target is important in this ratio as the two modes have different responses.

For PSA/A We get S/N = 60 in 3600/335 = 11s
For PSA/B, We get S/N = 60 in 3600/23.8 = 151s

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
2	PSA/MIRRORA IMAGE (P2/LOW) (COS.ta.634846)	(1) 206W3	COS/NUV, TIME-TAG, PSA	MIRRORA	BUFFER-TIME=150; FLASH=S0060D015; CURRENT=LOW	QESIPARM USELAMP LINE2; QESIPARM CURRENT LOW	Sequence 1-10 Non-Int in PSA/A & PSA/B (03)	15.0 Secs (15 Secs) *[==>]*	***[1]***

Comments: Lamp and target image to measure the WCA-to-PSA offset for PSA/MIRRORA/P2/LOW current. Expect 416 counts/s from lamp, about the same from the target. We need 12s of each

3	PSA/MIRRORB IMAGE (P2/MED) (OS.ta.634849)	(1) 206W3	COS/NUV, TIME-TAG, PSA	MIRRORB	BUFFER-TIME=200; FLASH=S0100D020; CURRENT=MEDIUM	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-10 Non-Int in PSA/A & PSA/B (03)	170.0 Secs (170 Secs) *[==>]*	***[1]***
Comments: Lamp and target image to measure the WCA-to-PSA offset for PSA/MIRRORB/P2/MED current. Expect ~400 counts/s from the lamp. We need 160s of target time, and at least 12s of lamp time. We'll get 2x20 to get a good measurement.									
4	PSA/MIRRORB ACQ/IMAGE (P2/MED) (OS.ta.634849)	(1) 206W3	COS/NUV, ACQ/IMAGE, PSA	MIRRORB			Sequence 1-10 Non-Int in PSA/A & PSA/B (03)	170.0 Secs (170 Secs) *[==>]*	***[1]***
Comments: PSA/MIRRORB ACQ/Image using P2/MED current. we setting the lampflash time in commanding to 12s. We may update the ACQ/Image MIRRORB time after we analyze this visit.									
5	PSA/MIRRORB IMAGE2 (P2/MED) (OS.ta.634849)	(1) 206W3	COS/NUV, TIME-TAG, PSA	MIRRORB	BUFFER-TIME=200; FLASH=S0100D020; CURRENT=MEDIUM	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-10 Non-Int in PSA/A & PSA/B (03)	170.0 Secs (170 Secs) *[==>]*	***[1]***
Comments: Lamp and target image to re-measure the WCA-to-PSA offset for PSA/MIRRORB/P2/MED current. Expect 225-400 counts/s from the lamp. We need 160s of target time, and at least 12s of lamp time. We'll get 2x20 to get a good measurement.									
6	PSA/MIRRORA IMAGE2 (P2/LOW) (COS.ta.634846)	(1) 206W3	COS/NUV, TIME-TAG, PSA	MIRRORA	BUFFER-TIME=200; FLASH=S0060D015; CURRENT=LOW	QESIPARM USELAMP LINE2; QESIPARM CURRENT LOW	Sequence 1-10 Non-Int in PSA/A & PSA/B (03)	15 Secs (15 Secs) *[==>]*	***[1]***
Comments: Lamp and target image to re-measure the WCA-to-PSA offset for PSA/MIRRORA/Lamp2/LOW current. Expect 416 counts/s from lamp, about the same from the target. We need at least 12s of each									
7	PSA/MIRRORA ACQ/IMAGE2 (COS.ta.634846)	(1) 206W3	COS/NUV, ACQ/IMAGE, PSA	MIRRORA			Sequence 1-10 Non-Int in PSA/A & PSA/B (03)	15 Secs (15 Secs) *[==>]*	***[1]***
Comments: Confirmation PSA/A ACQ/image, see first exposure of this visit for complete comment.									
8	PSA/G130M/1309/3 (COS.sp.753187)	(1) 206W3	COS/FUV, TIME-TAG, PSA	G130M 1309 A	FP-POS=3; FLASH=S0060D025; BUFFER-TIME=1000	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-10 Non-Int in PSA/A & PSA/B (03)	31 Secs (31 Secs) *[==>]*	***[1]***

Comments: We have NUV G230L spectra which puts the target at about 1.5E-15 at 1750A.
This gives some pretty low counts:
Count rate Segment A 67.112
Count rate Segment B 278.346

We want at least 1600 counts, so the ET must be > 1600./67 = 23. We go for ~30s, which should get S/N ~ 45

9	PSA/G140L /1280/3 (COS.sp.753 189)	(1) 206W3	COS/FUV, TIME-TAG, PSA	G140L 1280 A	FP-POS=3; FLASH=YES; BUFFER-TIME=8000	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-10 Non-Int in PSA/A & PSA/B (03)	26 Secs (26 Secs) [==>]	[1]

Comments: We have NUV G230L spectra which puts the target at about 1.4E-15 at 1750A.

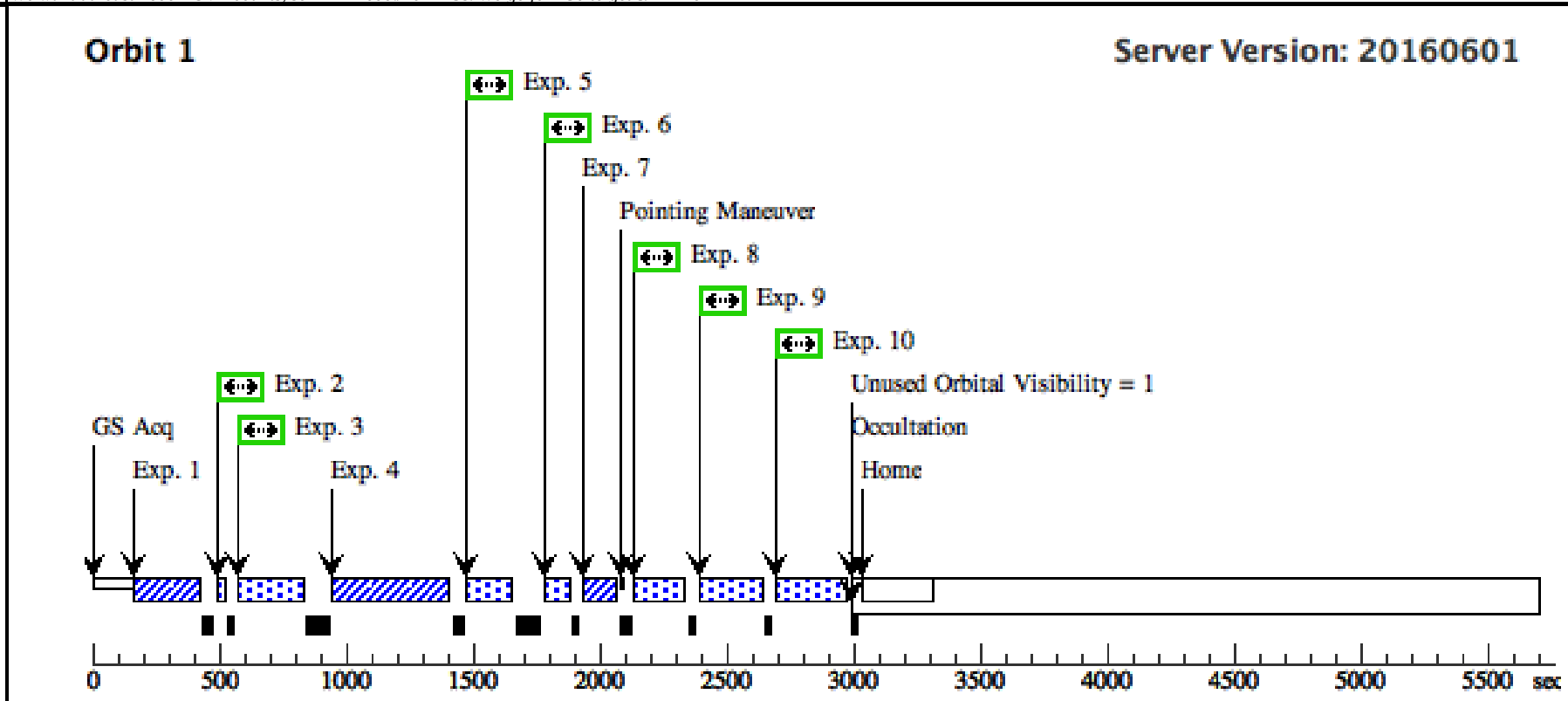
Count rate entire detector 151.888
Count rate Segment A 85.283
Count rate Segment B 66.606

We want at least 1600 FUVA counts, so the ET must be > 1600./85 = 18. We go for 25s, which should get S/N ~ 46

10	PSA/G160M/1600/3 (COS.sp.753 190)	(1) 206W3	COS/FUV, TIME-TAG, PSA	G160M 1600 A	FP-POS=3; FLASH=S0100D021; BUFFER-TIME=8000	QESIPARM USELAMP LINE2; QESIPARM CURRENT MEDIUM	Sequence 1-10 Non-Int in PSA/A & PSA/B (03)	31 Secs (31 Secs) [==>]	[1]

Comments: We have NUV G230L spectra which puts the target at about 1.4E-15 at 1750A.

Count rate entire detector 136.795
Count rate Segment A 70.104
Count rate Segment B 66.691

We want at least 1600 FUVA counts, so ET > 1600./70 = 23s. We go for ~30 to get S/N ~ 46

Orbit Structure