16052 - Testing for Systematics When Moving the COS Aperture Block

Cycle: 27, 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	NONE WAVE	COS COS/FUV COS/NUV	3	07-Nov-2019 13:01:21.0	yes

3 Total Orbits Used

ABSTRACT

When operating at LP5, the G160M wavecal exposures will need to occur at LP2 due to light leaking through the FCA at 5.5". As such, we need to investigate if there are systematic effects introduced by obtaining science at LP5 and wavecal exposures at LP2, that would affect the wavelength calibration for G160M when operating at LP5. With that goal in mind, this program is designed to determine whether there is movement on the

detector in the dispersion (x) or cross-dispersion direction (y) when moving the aperture between LP2 and LP5.

The basic design of the program is to obtain a series of lamp flashes at LP2 and LP5 on the detector, emulating how G160M operations coupld potenatially occur at LP5 if wavecals cannot be taken concurrently with the science exposures. At each LP, we perform 5x50s lampflashes before moving to the next LP. Each LP will be sampled 5 times. The spectra will then cross-correlated to assess changes in pixel space to check for aperture shift and/or drift in x-dispersion and dispersion direction.

OBSERVING DESCRIPTION

The aperture is moved between LP2 and LP5 five times. Each time, the wavecal lamp is flashed for 50s every 200s. This will allow us to investigate the existence of shift/drift in the dispersion and cross-dispersion direction due to movement of the COS aperture.

From program 16006 we know that WCA FUVA G160M/1577 can be operated at LP5 (+5.4") without light leak

All lamp exposures to be taken with G160M/1577/FUVA, FP-POS=4 and the default lamp setting (LAMP = PtNe1 with current = Medium)

In order to minimize the amount of OSM drift, we start the program with a lamp image using mirror A (i.e. engaging the OSM position at NCM1 before we move to G160M). We do this because OSM drift studies have shown that the settling time for OSM drift is shorter when the OSM mechanism moves from NCM1->G160M compared to G130M->G160M. Then, in order to isolate shift/drift due to aperture movement *only*, the program takes a long lamp exposure at LP2 for t=2000s using 50s flashes every 200s, to allow OSM1 to fully settle. There are no OSM movements in subsequent exposures, with all G160M/1577/FUVA exposures taken at the LP2 focus.

Program design:
(1) Lamp image with mirror A to move OSM mechanism to NCM1
(2) Settling exposure at LP2
(3) LP2 lampflash exposure
(4) Aperture move to LP5
(5) LP5 lampflash exposure
(6) Aperture move to LP2
(7) Repeat (2)-(5) 4 times.

Exposure times:
-50s gives peak counts of 20-50 in G160M/FUVA lines which are ~0.4-1 cnts/s
-Flash sequence of 50s on every 200s (50:150, on:off) is consistent with 1:3 on:off lamp flash ratio deemed safe for temperature offset between the lamp and the chamber.

XSTEPS qesiparms are needed, with the relative move between one exposure and the next.
All the exposures have LIFETIME-POSITION = LP2

In order for us to accurately test for drift due to aperture movement, it is essential that the exposures after an aperture movement are not interrupted. As such, aperture movements and the exposure following an aperture movement are inside a non-interruptible sequence to facilitate visit scheduling around SAA interruptions.

>>> Please note that SQL will be needed to by-pass calibration. <<<
>>> Files should not be associated <<<

Proposal 16052 - Visit 01 - Testing for Systematics When Moving the COS Aperture Block

Visit	**Proposal 16052, Visit 01** Thu Nov 07 18:01:23 GMT 2019 **Diagnostic Status: Warning** Scientific Instruments: COS, COS/FUV, COS/NUV Special Requirements: (none)
Diagnostics	(Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) Warning (Orbit Planner): LAMP EXPOSURE EXCEEDS 300 SECONDS (Visit 01) 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 (Total)/[Actual Dur.]	Orbit
1	Lamp image	WAVE	COS/NUV, TIME-TAG, WCA	MIRRORA				10 Secs (10 Secs) *[==>]*	*[1]*
Comments: Lamp image to engage OSM mechanism at NCM1 before we move to G160M									
2	Long lamp settling OSM drift	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; LIFETIME-POS=LP2; SEGMENT=BOTH			2000 Secs (2000 Secs) *[==>]*	*[1]*
Comments: Long lamp exposure to allow for OSM settling									
3	Wave_LP2_1	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; SEGMENT=A; LIFETIME-POS=LP2			1000 Secs (1000 Secs) *[==>]*	*[1]*
Comments: Exposure at LP2 *SQL needed to by-pass calibration*									
4	Ap_move_+5.4	NONE	COS, ALIGN/APER		XAPER=-40; YAPER=0		Sequence 4-5 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	*[1]*
Comments: In this exposure we move the aperture from +3.5" (LP2) to +5.4". *So, (5.4-3.5)"/0.0476 arcsec/aperture step => XAPER= -40 steps* *Conversion is* *XAPER = 21 steps per arcsec or 1 step = 0.0476"* --- *XSTEPS is not required for first aperture move because it is relative to previous XAPER move, of which there was none.*									
5	Wave_LP5_1	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; SEGMENT=A; LIFETIME-POS=LP2		Sequence 4-5 Non-Int in Visit 01	1000 Secs (1000 Secs) *[==>]*	*[1]*
Comments: Exposure at +5.4" *SQL needed to by-pass calibration*									
6	Ap_move_LP2	NONE	COS, ALIGN/APER		XAPER=0; YAPER=0	QESIPARM XSTEPS 40	Sequence 6-7 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	*[1]*
Comments: In this exposure we move the aperture from +5.4" (LP5) to +3.5" (LP2). Observations are defined as being at LP2. *So, (3.5-3.5)"/0.0476 arcsec/aperture step => XAPER= 0 steps* *Conversion is* *XAPER = 21 steps per arcsec or 1 step = 0.0476"* --- *XAPER is set to = 0. *HOWEVER*, because of the TRANS rules, the "QESIPARM XSTEPS +40" [(0 - -40) = +40] Special Requirement is necessary to move the aperture to the correct location.*									

7	Wave_LP2_2	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; SEGMENT=A; LIFETIME-POS=LP2		Sequence 6-7 Non-Int in Visit 01	1000 Secs (1000 Secs) *[==>]*
								[1]

Comments: Exposure at LP2
SQL needed to by-pass calibration

8	Ap_move_+5.4	NONE	COS, ALIGN/APER		XAPER=-40; YAPER=0	QESIPARM XSTEPS -40	Sequence 8-9 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*
								[2]

Comments: In this exposure we move the aperture from +3.5" (LP2) to +5.4".
So, (5.4-3.5)"/0.0476 arcsec/aperture step => XAPER= -40 steps

Conversion is
XAPER = 21 steps per arcsec or 1 step = 0.0476"
---
*XAPER is set to = -40. *HOWEVER*, because of the TRANS rules, the "QESIPARM XSTEPS -40" [(-40 - 0) = -40] Special Requirement is necessary to move the aperture to the correct location.*

9	Wave_LP5_2	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; SEGMENT=A; LIFETIME-POS=LP2		Sequence 8-9 Non-Int in Visit 01	1000 Secs (1000 Secs) *[==>]*
								[2]

Comments: Exposure at +5.4"
SQL needed to by-pass calibration

10	Ap_move_LP2	NONE	COS, ALIGN/APER		XAPER=0; YAPER=0	QESIPARM XSTEPS 40	Sequence 10-11 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*
								[2]

Comments: In this exposure we move the aperture from +5.4" (LP5) to +3.5" (LP2). Observations are defined as being at LP2.
So, (3.5-3.5)"/0.0476 arcsec/aperture step => XAPER= 0 steps

Conversion is
XAPER = 21 steps per arcsec or 1 step = 0.0476"
---
*XAPER is set to = 0. *HOWEVER*, because of the TRANS rules, the "QESIPARM XSTEPS +40" [(0 - -40) = +40] Special Requirement is necessary to move the aperture to the correct location.*

11	Wave_LP2_3	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; SEGMENT=A; LIFETIME-POS=LP2		Sequence 10-11 Non-Int in Visit 01	1000 Secs (1000 Secs) *[==>]*
								[2]

Comments: Exposure at LP2
SQL needed to by-pass calibration

12	Ap_move_+5.4	NONE	COS, ALIGN/APER		XAPER=-40; YAPER=0	QESIPARM XSTEPS -40	Sequence 12-13 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*
								[2]

Comments: In this exposure we move the aperture from +3.5" (LP2) to +5.4".
So, (5.4-3.5)"/0.0476 arcsec/aperture step => XAPER= -40 steps

Conversion is
XAPER = 21 steps per arcsec or 1 step = 0.0476"
---
*XAPER is set to = -40. *HOWEVER*, because of the TRANS rules, the "QESIPARM XSTEPS -40" [(-40 - 0) = -40] Special Requirement is necessary to move the aperture to the correct location.*

13	Wave_LP5_3	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; SEGMENT=A; LIFETIME-POS=LP2		Sequence 12-13 Non-Int in Visit 01	1000 Secs (1000 Secs) *[==>]*	***[2]***

Comments: Exposure at +5.4"
SQL needed to by-pass calibration

14	Ap_move_LP2	NONE	COS, ALIGN/APER		XAPER=0; YAPER=0	QESIPARM XSTEPS 40	Sequence 14-15 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	***[2]***

Comments: In this exposure we move the aperture from +5.4" (LP5) to +3.5" (LP2). Observations are defined as being at LP2.
So, (3.5-3.5)"/0.0476 arcsec/aperture step => XAPER= 0 steps

Conversion is
XAPER = 21 steps per arcsec or 1 step = 0.0476"
---
*XAPER is set to = 0. *HOWEVER*, because of the TRANS rules, the "QESIPARM XSTEPS +40" [(0 - -40) = +40] Special Requirement is necessary to move the aperture to the correct location.*

15	Wave_LP2_4	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; SEGMENT=A; LIFETIME-POS=LP2		Sequence 14-15 Non-Int in Visit 01	1000 Secs (1000 Secs) *[==>]*	***[2]***

Comments: Exposure at LP2
SQL needed to by-pass calibration

16	Ap_move_+5.4	NONE	COS, ALIGN/APER		XAPER=-40; YAPER=0	QESIPARM XSTEPS -40	Sequence 16-17 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	***[2]***

Comments: In this exposure we move the aperture from +3.5" (LP2) to +5.4".
So, (5.4-3.5)"/0.0476 arcsec/aperture step => XAPER= -40 steps

Conversion is
XAPER = 21 steps per arcsec or 1 step = 0.0476"
---
*XAPER is set to = -40. *HOWEVER*, because of the TRANS rules, the "QESIPARM XSTEPS -40" [(-40 - 0) = -40] Special Requirement is necessary to move the aperture to the correct location.*

17	Wave_LP5_4	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; SEGMENT=A; LIFETIME-POS=LP2		Sequence 16-17 Non-Int in Visit 01	1000 Secs (1000 Secs) *[==>]*	***[2]***

Comments: Exposure at +5.4"
SQL needed to by-pass calibration

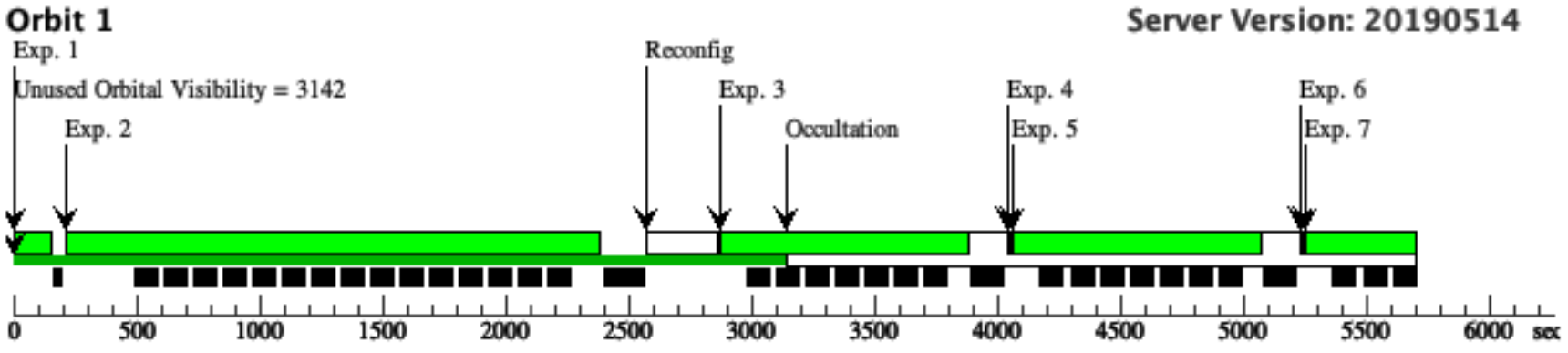
18	Ap_move_LP2	NONE	COS, ALIGN/APER		XAPER=0; YAPER=0	QESIPARM XSTEPS 40	Sequence 18-19 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	***[3]***

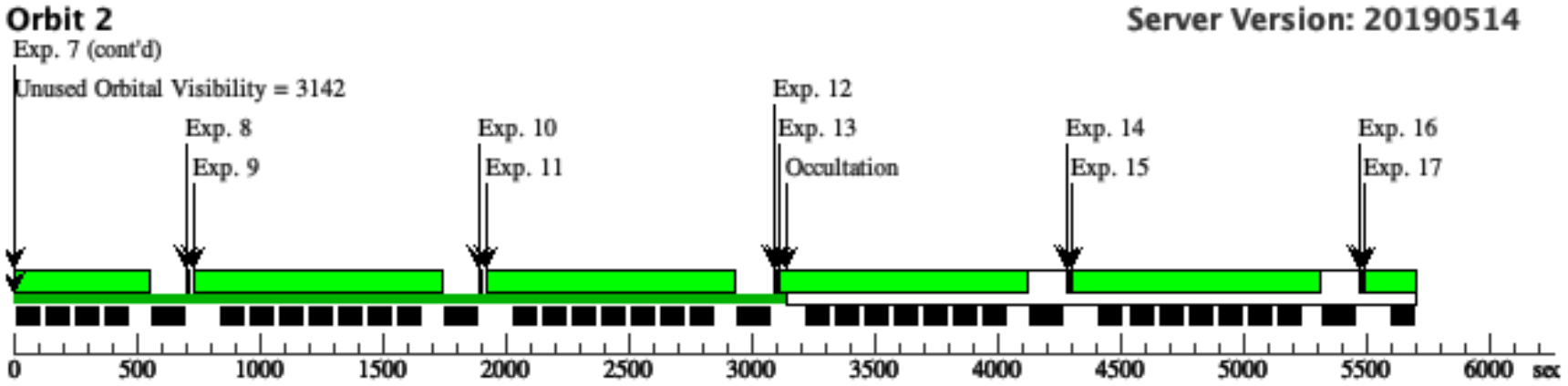
Comments: In this exposure we move the aperture from +5.4" (LP5) to +3.5" (LP2). Observations are defined as being at LP2.
So, (3.5-3.5)"/0.0476 arcsec/aperture step => XAPER= 0 steps

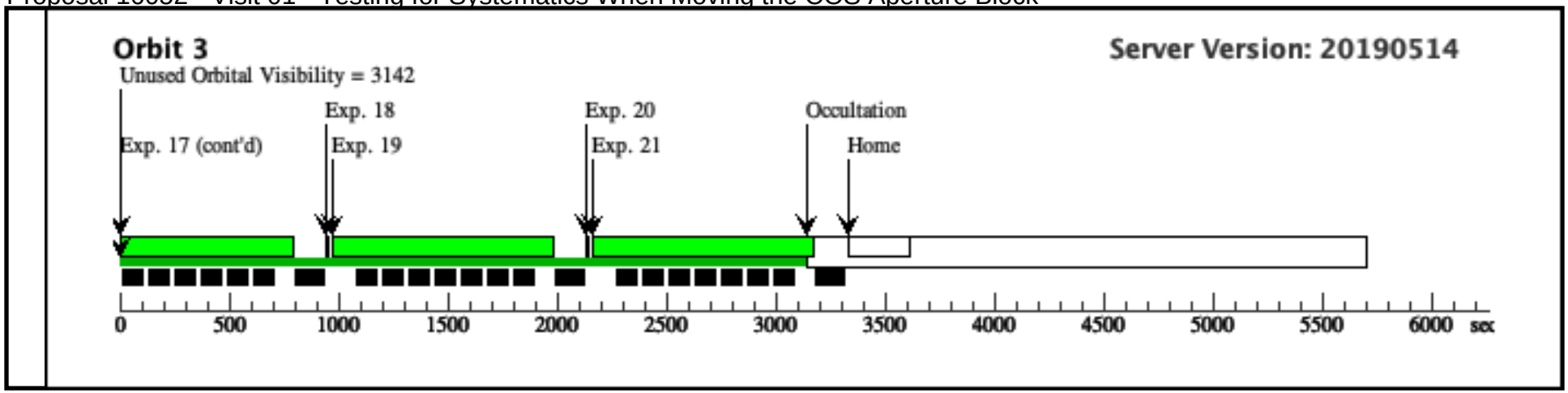
Conversion is
XAPER = 21 steps per arcsec or 1 step = 0.0476"
---
*XAPER is set to = 0. *HOWEVER*, because of the TRANS rules, the "QESIPARM XSTEPS +40" [(0 - -40) = +40] Special Requirement is necessary to move the aperture to the correct location.*

19	Wave_LP2_5 WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; SEGMENT=A; LIFETIME-POS=LP2		Sequence 18-19 Non-Int in Visit 01	1000 Secs (1000 Secs) *[==>]*	***[3]***
Comments: Exposure at LP2 *SQL needed to by-pass calibration*								
20	Ap_move_+5.4 NONE	COS, ALIGN/APER		XAPER=-40; YAPER=0	QESIPARM XSTEPS -40	Sequence 20-21 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	***[3]***
Comments: In this exposure we move the aperture from +3.5" (LP2) to +5.4". *So, (5.4-3.5)"/0.0476 arcsec/aperture step => XAPER= -40 steps* *Conversion is* *XAPER = 21 steps per arcsec or 1 step = 0.0476"* --- *XAPER is set to = -40. *HOWEVER*, because of the TRANS rules, the "QESIPARM XSTEPS -40" [(-40 - 0) = -40] Special Requirement is necessary to move the aperture to the correct location.*								
21	Wave_LP5_5 WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FLASH=S0200D050; FP-POS=4; SEGMENT=A; LIFETIME-POS=LP2		Sequence 20-21 Non-Int in Visit 01	1000 Secs (1000 Secs) *[==>]*	***[3]***
Comments: Exposure at +5.4" *SQL needed to by-pass calibration*								

Orbit Structure



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Server Version: 20190514
Unused Orbital Visibility = 3142
Exp. 17 (cont'd)
Exp. 18
Exp. 19
Exp. 20
Exp. 21
Occultation
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