15689 - COS/FUV Mapping of FCA Light Leak Between +5'' and +6''

Cycle: 26, Proposal Category: CAL/COS

(Availability Mode: RESTRICTED)

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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	1	28-Mar-2019 13:06:16.0	yes

1 Total Orbits Used

ABSTRACT

The goal of this program is to determine where the FCA light leak starts when the PSA aperture is moved and the wavecal lamp is flashed, betweeen +5" and +6" from LP1.

Program 12677 mapped the whole range of aperture mechanism motion, between -6" and +6" at 1" intervals, to identify aperture position mechanism

locations that suffered from an FCA light leak when the wavecal lamp is flashed. A light leak was only observed at +6". In order to evaluate the feasibility of another lifetime position above LP2 (at +3.5") we need to determine where the light leak starts, between +5" and +6". This is done with a setting also used in program 12677 (G160M/1577/FP-POS =4), using PtNe2 with current=LOW, and taking 10 sec exposures between +5" and +6", at 0.1" intervals.

OBSERVING DESCRIPTION

The wavecal lamp is flashed at 0.1" intervals between +5" and +6" from LP1 in order to determine where FCA light leak starts.

The exposures follow what was done in program 12677 to avoid health and safety concerns with the light leaking.

The G160M/1577 setting is used for all exposures, with FP-POS=4, CURRENT = LOW, and LAMP = PtNe2

The first exposure is at LP1 to decrease the length of the ApM move as it comes from the home position, LP4 (at -5.0"). The LP4 position is outside of the mechanism range of linearity. The second exposure is then at the LP2 position and subsequent XAPER moves are relative to this location.
The following exposure is at +4.8". This is because we are being very conservative in case the ApM location has accumulated a ~2step error, because we need to probe the physical +5" location on the detector regardless of what is reported as the position.
Then the aperture is moved to +5" and a 10 sec exposure is taken. The aperture is then moved at 0.1" intervals and a 10 sec lamp exposure is taken at each point. In the final exposure the aperture is returned to +5" and a 10 sec exposure is repeated.

XSTEPS qesiparms are needed, with the relative move between one exposure and the next.
All the exposures after the LP2 initial exposure have LIFETIME-POSITION = LP2 - this affects only the HV at which the data are taken.
All the exposures are inside a non-interruptible sequence to facilitate visit scheduling around SAA interruptions.

>>> Please note that SQL will be needed to by-pass calibration. <<<

In program 12677 the G160M/1577/4 exposure at +6" (lboz2nncq) was 15 sec with two, 3 sec lamp flashes
The wavecal lamp does not output at top count rate immediately, there is a warm-up period.
For FUVA - the count rate in the FCA (leak) area was ~ 1600 cts/sec (7693 cts for FCA area for full exposure)
For FUVB - the count rate in the FCA (leak) area was ~2800 cts/sec (14181 cts for FCA area for full exposure)

COS CARD states: The FUV detector should not be exposed to a light source which would result in exceeding an average global count rate of 60,000 counts/sec per segment during an interval of 10 sec. [CARD = Constraints And Requirements Document]

Based on count rates seen in exposure above, having the wavecal lamp on for a full 10 sec will lead to:
- ~16000 cts per exposure in FUVA, 28000 cts per exposure in FUVB
These are the higher limits for the counts expected, as they are based on exposure at +6", and it is expected that light leak will start slowly as opposed to being on/off as ApM is moved

This will allow us to map more precisely where the leak starts and how it changes in Y, as there might be scenarios where the leak is so small that is not an issue.

Proposal 15689 - Visit 01 - COS/FUV Mapping of FCA Light Leak Between +5'' and +6''

Visit	**Proposal 15689, Visit 01, implementation** Thu Mar 28 17:06:18 GMT 2019 **Diagnostic Status: Warning** Scientific Instruments: COS, COS/FUV Special Requirements: (none)
Diagnostics	(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	Wave_LP1	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; LIFETIME-POS=LP1		Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs) *[==>]*	*[1]*
	Comments: Initial exposure taken at LP1 with G160M/1577/4 to shorten the ApM move in subsequent exposures. *SQL needed to by-pass calibration*								
2	Wave_LP2	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; LIFETIME-POS=LP2		Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs) *[==>]*	*[1]*
	Comments: Exposure taken at LP2 with G160M/1577/4 to shorten the ApM move in subsequent exposures. *SQL needed to by-pass calibration*								
3	Ap_move_+4.8	NONE	COS, ALIGN/APER		XAPER=-27; YAPER=0	QESIPARM XSTEPS -27	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	*[1]*
	Comments: In this exposure we move the aperture from +3.5" (LP2) to +4.8". *So, (4.8"-3.5")/0.0476 arcsec/aperture step => XAPER= -27 steps* *Conversion is* *XAPER = 21 steps per arcsec or 1 step = 0.0476"*								
4	Wave_+4.8	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs) *[==>]*	*[1]*
	Comments: Exposure at +4.8" *SQL needed to by-pass calibration*								
5	Ap_move_+5.0	NONE	COS, ALIGN/APER		XAPER=-32; YAPER=0	QESIPARM XSTEPS -5	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	*[1]*
	Comments: In this exposure we move the aperture from +4.8" to +5". *So, (5-3.5)"/0.0476 arcsec/aperture step => XAPER= -32 steps* *Conversion is* *XAPER = 21 steps per arcsec or 1 step = 0.0476"*								
6	Wave_+5.0	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs) *[==>]*	*[1]*
	Comments: Exposure at +5" *SQL needed to by-pass calibration*								
7	Ap_move_+5.1	NONE	COS, ALIGN/APER		XAPER=-34; YAPER=0	QESIPARM XSTEPS -2	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	*[1]*
	Comments: In this exposure we move the aperture from +5" to +5.1". *So, (5.1-3.5)"/0.0476 arcsec/aperture step => XAPER= -34 steps*								
8	Wave_+5.1	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs) *[==>]*	*[1]*
	Comments: Exposure at +5.1" *SQL needed to by-pass calibration*								
9	Ap_move_+5.2	NONE	COS, ALIGN/APER		XAPER=-36; YAPER=0	QESIPARM XSTEPS -2	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	*[1]*
	Comments: In this exposure we move the aperture from +5.1" to +5.2". *So, (5.2-3.5)"/0.0476 arcsec/aperture step => XAPER= -36 steps*								

10	Wave_+5.2	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs)	[==>]	[1]
Comments: Exposure at +5.2" *SQL needed to by-pass calibration*										
11	Ap_move_+5.3	NONE	COS, ALIGN/APER		XAPER=-38; YAPER=0	QESIPARM XSTEPS -2	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs)	[==>]	[1]
Comments: In this exposure we move the aperture to +5.3". *So, (5.3-3.5)"/0.0476 arcsec/aperture step => XAPER= -38 steps*										
12	Wave_+5.3	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs)	[==>]	[1]
Comments: Exposure at +5.3" *SQL needed to by-pass calibration*										
13	Ap_move_+5.4	NONE	COS, ALIGN/APER		XAPER=-40; YAPER=0	QESIPARM XSTEPS -2	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs)	[==>]	[1]
Comments: In this exposure we move the aperture to +5.4". *So, (5.4-3.5)"/0.0476 arcsec/aperture step => XAPER= -40 steps*										
14	Wave_+5.4	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs)	[==>]	[1]
Comments: Exposure at +5.4" *SQL needed to by-pass calibration*										
15	Ap_move_+5.5	NONE	COS, ALIGN/APER		XAPER=-42; YAPER=0	QESIPARM XSTEPS -2	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs)	[==>]	[1]
Comments: In this exposure we move the aperture to +5.5". *So, (5.5-3.5)"/0.0476 arcsec/aperture step => XAPER= -42 steps*										
16	Wave_+5.5	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs)	[==>]	[1]
Comments: Exposure at +5.5" *SQL needed to by-pass calibration*										
17	Ap_move_+5.6	NONE	COS, ALIGN/APER		XAPER=-44; YAPER=0	QESIPARM XSTEPS -2	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs)	[==>]	[1]
Comments: In this exposure we move the aperture to +5.6". *So, (5.6-3.5)"/0.0476 arcsec/aperture step => XAPER= -44 steps*										
18	Wave_+5.6	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs)	[==>]	[1]
Comments: Exposure at +5.6" *SQL needed to by-pass calibration*										
19	Ap_move_+5.7	NONE	COS, ALIGN/APER		XAPER=-46; YAPER=0	QESIPARM XSTEPS -2	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs)	[==>]	[1]
Comments: In this exposure we move the aperture to +5.7". *So, (5.7-3.5)"/0.0476 arcsec/aperture step => XAPER= -46 steps*										

	20	Wave_+5.7	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs) *[==>]*	***[1]***
		Comments: Exposure at +5.7" *SQL needed to by-pass calibration*								
	21	Ap_move_+5.8	NONE	COS, ALIGN/APER		XAPER=-48; YAPER=0	QESIPARM XSTEPS -2	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	***[1]***
		Comments: In this exposure we move the aperture to +5.8". *So, (5.8-3.5)"/0.0476 arcsec/aperture step => XAPER= -48 steps*								
	22	Wave_+5.8	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs) *[==>]*	***[1]***
		Comments: Exposure at +5.8" *SQL needed to by-pass calibration*								
	23	Ap_move_+5.9	NONE	COS, ALIGN/APER		XAPER=-50; YAPER=0	QESIPARM XSTEPS -2	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	***[1]***
		Comments: In this exposure we move the aperture to +5.9". *So, (5.9-3.5)"/0.0476 arcsec/aperture step => XAPER= -50 steps*								
	24	Wave_+5.9	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs) *[==>]*	***[1]***
		Comments: Exposure at +5.9" *SQL needed to by-pass calibration*								
	25	Ap_move_+6.0	NONE	COS, ALIGN/APER		XAPER=-53; YAPER=0	QESIPARM XSTEPS -3	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	***[1]***
		Comments: In this exposure we move the aperture to +6.0". *So, (6.0-3.5)"/0.0476 arcsec/aperture step => XAPER= -53 steps*								
	26	Wave_+6.0	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs) *[==>]*	***[1]***
		Comments: Exposure at +6.0" *SQL needed to by-pass calibration*								
	27	Ap_move_+5.0	NONE	COS, ALIGN/APER		XAPER=-32; YAPER=0	QESIPARM XSTEPS 21	Sequence 1-28 Non-Int in Visit 01	0 Secs (0 Secs) *[==>]*	***[1]***
		Comments: In this exposure we move the aperture back to the starting point +5.0". *So, (5.0-3.5)"/0.0476 arcsec/aperture step => XAPER= -32 steps*								
	28	Wave_+5.0	WAVE	COS/FUV, TIME-TAG, WCA	G160M 1577 A	FP-POS=4; CURRENT=LOW; LIFETIME-POS=LP2	QESIPARM USELAMP LINE2	Sequence 1-28 Non-Int in Visit 01	10 Secs (10 Secs) *[==>]*	***[1]***
		Comments: Exposure at the end of the series at +5.0" *SQL needed to by-pass calibration*								

Orbit Structure