



12094 - WFC3/UVIS image skew

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	(1) OMEGACEN	WFC3/UVIS	1	24-Mar-2010 21:05:30.0	yes
02	(1) OMEGACEN	WFC3/UVIS	1	24-Mar-2010 21:05:32.0	yes
03	(1) OMEGACEN	WFC3/UVIS	1	24-Mar-2010 21:05:34.0	yes
04	(1) OMEGACEN	WFC3/UVIS	1	24-Mar-2010 21:05:35.0	yes
05	(1) OMEGACEN	WFC3/UVIS	1	24-Mar-2010 21:05:37.0	yes
06	(1) OMEGACEN	WFC3/UVIS	1	24-Mar-2010 21:05:38.0	yes
07	(1) OMEGACEN	WFC3/UVIS	1	24-Mar-2010 21:05:39.0	yes
08	(1) OMEGACEN	WFC3/UVIS	1	24-Mar-2010 21:05:41.0	yes
09	(1) OMEGACEN	WFC3/UVIS	1	24-Mar-2010 21:05:42.0	yes

9 Total Orbits Used

ABSTRACT

This proposal will provide an independent check of the skew in the ACS astrometric catalog of Omega Cen stars, using exposures taken in a 45-deg range of telescope roll. The roll sequence will also provide a test for orbital variation of skew and field angle dependent PSF variations. The astrometric catalog of Omega Cen, improved for a skew, will be used to derive the geometric distortion to all UVIS filters, which has preliminarily been determined from F606W images and an astrometric catalog of 47 Tuc.

OBSERVING DESCRIPTION

Nine 40-second F606W CR-SPLIT=NO exposures of the standard astrometric and L-Flat calibration target Omega Cen are obtained in a 3-orbit scheduling window. The very small fraction of stellar images affected by detector artifacts, or cosmic rays will be rejected during data reduction, thereby avoiding the need for redundant CR-SPLIT/dither exposures. Each exposure is taken at a different roll of the OTA. The set of 9 exposures samples the full allowed range of roll angles at the ecliptic latitude of Omega Cen, approximately 45 degrees. Three exposures are obtained in each of the three orbits in the following sequence of off-nominal rolls: Orbit #1 - +22 deg, +11 deg, & -22 deg; Orbit #2 - -22 deg, 0 deg, & +22 deg; and Orbit #3 - +11 deg, -11 deg, & -11 deg. In order to improve schedulability, a small range of roll is allowed at each specific roll angle. The order of the exposures in each orbit is specified by a SEQUENTIAL Special Requirement and the order of the orbits is specified by AFTER Special Requirements. The various off-nominal roll exposures are executed twice, at different orbital phases in order to test for variations that could be a function of orbit phase (e.g. breathing, or temperature). To maintain accurate pointing control, 2-guide star acquisitions are used. If suitable guide stars can be found, the same pair of guide stars are used for all 9 exposures. If target visibility does not permit scheduling 3 exposures per orbit, the proposed exposures at +11 deg, +22 deg, and 0 deg off-nominal to be dropped are identified.

REAL TIME JUSTIFICATION

Not applicable

CALIBRATION JUSTIFICATION

The geometric distortion of WFC3 images were calibrated using the technique of transforming translationally overlapping images to an astrometric catalog. The two used catalogs (47 Tuc and Omega Cen) were constructed from a large number of ACS images and are believed to be free of

systematic errors, except possibly small errors in the skew between the catalog coordinate axes. However, such catalog errors would be impressed upon the WFC3 distortion solutions. Preliminary results from SMOV observation, early Cycle 17 calibration, and tests with ACS images suggest that skew errors as large as $\sim 3 - 9$ arcseconds may exist in the ACS astrometric catalogs. This preliminary finding does not rule out the possibility of larger errors, or that other sources (e.g., orbital breathing, centroid measurement technique, etc.) may be responsible for part of the measured skew. A 3-arcsecond skew error will cause a 0.06-pixel displacement across the UVIS FOV. Such an error could be significant in combining UVIS mosaics images.

The objective of this proposal is to make a direct determination of the skew in UVIS geometric distortion, independent of the ACS astrometric catalogs. By taking exposures of the dense Omega Cen field at a sequence of position angles separated by up to 45 deg, this program will measure the skew angle between the image of the detector rows and columns.

ADDITIONAL COMMENTS

Execution of the 9 Visits in this proposal should require less than 3 orbits. However, APT requires each Visit to begin at the start of an orbit and therefore calculates that this proposal requires 9 orbits, each of which APT indicates is mostly unused. Accordingly, APT generates a Warning that the Visits will not fit within the required 3 orbits and 9 Warnings that the SEQUENTIAL sets cannot fit within one orbit. However, based upon known overheads for the moderate roll-slews used and overheads for full guide star acquisitions, the VISITs should be schedulable 3 orbits. If in scheduling these exposures the time required exceeds the target visibility, then 1 proposed exposure in each intended orbit is identified here that should be deleted from the proposal. Those exposures are: Orbit #1, Visit 02 = off-nominal roll +11 deg; Orbit #2, Visit 06, off-nominal roll +22 deg; and Orbit #3, Visit 08, off-nominal roll -10 deg.

Although ranges of angles are given specified in the Special Requirements, the preferred values are (from the reference visit, Visit 05, which is assumed to be scheduled at nominal roll): -25 deg, -12 deg, + 12 deg, and +25 deg. However, preference should first be given to using the same guide stars.

Proposal 12094 - Visit 01 - WFC3/UVIS image skew

Thu Mar 25 01:05:45 GMT 2010

Visit	Proposal 12094, Visit 01, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: PCS MODE FINE; ORIENT +20D TO +20D FROM 05; SEQ 01,02,03 WITHIN 1 Orbits <i>Comments: If possible, use the same guide star pair for all Visits (01 - 09).</i>									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
(1)		OMEGACEN	RA: 13 26 46.2800 (201.6928333d) Dec: -47 28 44.60 (-47.47906d) Equinox: J2000		V=16.8	Reference Frame: ICRS				
<i>Comments: This is the same target (and coordinates) as used in CAL/WFC3 11911, UVIS L-Flats and Geometric Distortion</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) OMEGACEN	(1) OMEGACEN	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=NO	GS ACQ SCENARI O BASE1B3		40. Secs [==>]	[1]
Orbit Structure	<p>Orbit 1 Server Version: 20100218</p> <p>The diagram shows a timeline from 0 to 5500 seconds. Key events include: GS Acq at 0s, Exp. 1 (highlighted in green) starting at approximately 300s and ending at 340s, Overhead from 300s to 340s, Unused Visibility = 3010s from 340s to 3410s, and Occultation starting at 3410s and ending at 5500s. A black bar is present on the timeline between approximately 500s and 800s.</p>									
	<p>Timeline labels: GS Acq, Exp. 1, Overhead, Unused Visibility = 3010, Occultation.</p> <p>Timeline axis: 0, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 5500 sec</p>									

Visit	Proposal 12094, Visit 02, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT +10D TO +12D FROM 05									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	OMEGACEN	RA: 13 26 46.2800 (201.6928333d) Dec: -47 28 44.60 (-47.47906d) Equinox: J2000		V=16.8	Reference Frame: ICRS	Comments: This is the same target (and coordinates) as used in CAL/WFC3 11911, UVIS L-Flats and Geometric Distortion			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) OMEGACEN	(1) OMEGACEN	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=NO	GS ACQ SCENARI O BASE1B3		40. Secs [==>]	[1]
Orbit Structure	Orbit 1 GS Acq Exp. 1 Unused Visibility = 3010 Overhead Occultation Server Version: 20100218									

Visit	Proposal 12094, Visit 03, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT -20D TO -20D FROM 05									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	OMEGACEN	RA: 13 26 46.2800 (201.6928333d) Dec: -47 28 44.60 (-47.47906d) Equinox: J2000		V=16.8	Reference Frame: ICRS				
Comments: This is the same target (and coordinates) as used in CAL/WFC3 11911, UVIS L-Flats and Geometric Distortion										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) OMEGACEN	(1) OMEGACEN	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=NO	GS ACQ SCENARI O BASE1B3		40. Secs [==>]	[1]
Orbit Structure	Orbit 1 GS Acq Exp. 1 Overhead Unused Visibility = 3010 Occultation Server Version: 20100218									
	<p>The diagram shows a horizontal timeline from 0 to 5500 seconds. At 0s, 'GS Acq' is indicated. A green bar represents 'Exp. 1' starting at approximately 300s. Above this bar, 'Overhead' and 'Unused Visibility = 3010' are labeled with arrows pointing to the start of the exposure. At 3400s, 'Occultation' begins, marked by a vertical line and a downward arrow. A black bar is shown below the main timeline between approximately 500s and 800s. The x-axis is labeled 'sec' at the end.</p>									

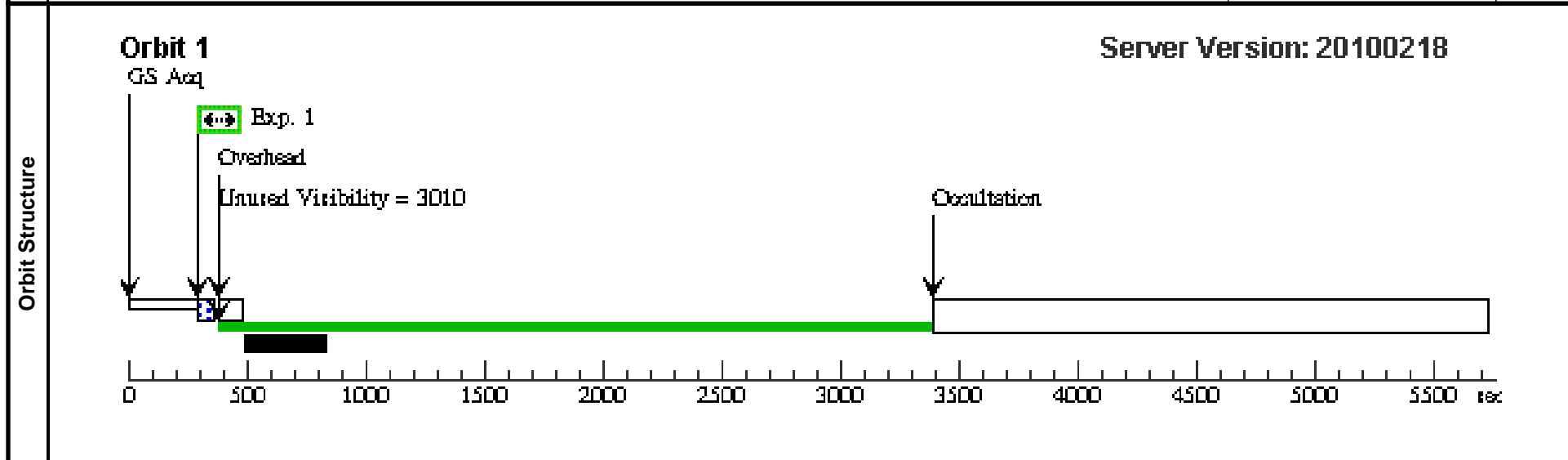
Visit	Proposal 12094, Visit 04, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT -20D TO -20D FROM 05; AFTER 03; SEQ 04,05,06 WITHIN 1 Orbits									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	OMEGACEN	RA: 13 26 46.2800 (201.6928333d) Dec: -47 28 44.60 (-47.47906d) Equinox: J2000		V=16.8	Reference Frame: ICRS				
Comments: This is the same target (and coordinates) as used in CAL/WFC3 11911, UVIS L-Flats and Geometric Distortion										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) OMEGACEN	(1) OMEGACEN	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=NO	GS ACQ SCENARI O BASE1B3		40. Secs [==>]	[1]
Orbit Structure	Orbit 1									
	GS Acq Exp. 1 Overhead Unused Visibility = 3010 Occultation Server Version: 20100218 									

Visit	Proposal 12094, Visit 05, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 20D TO 20 D									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
(1)		OMEGACEN	RA: 13 26 46.2800 (201.6928333d) Dec: -47 28 44.60 (-47.47906d) Equinox: J2000		V=16.8	Reference Frame: ICRS	Comments: This is the same target (and coordinates) as used in CAL/WFC3 11911, UVIS L-Flats and Geometric Distortion			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) OMEGACEN	(1) OMEGACEN	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=NO	GS ACQ SCENARI O BASE1B3		40. Secs [==>]	[1]
Orbit Structure	Orbit 1 GS Acq Exp. 1 Unred Visibility = 3010 Overhead Occultation Server Version: 20100218									

Visit	Proposal 12094, Visit 06, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: PCS MODE FINE; ORIENT +20D TO +20D FROM 05 Comments: If possible, use the same guide star pair for all visits (01, 02, 03, 04, 05, & 06).				
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	OMEGACEN	RA: 13 26 46.2800 (201.6928333d) Dec: -47 28 44.60 (-47.47906d) Equinox: J2000		V=16.8	Reference Frame: ICRS	
Comments: This is the same target (and coordinates) as used in CAL/WFC3 11911, UVIS L-Flats and Geometric Distortion						

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) OMEGACEN	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=NO	GS ACQ SCENARI O BASE1B3			40. Secs [==>]	[1]



Visit	Proposal 12094, Visit 07, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT +10D TO +12D FROM 05; AFTER 05; SEQ 07,08,09 WITHIN 1 Orbits									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
(1)		OMEGACEN	RA: 13 26 46.2800 (201.6928333d) Dec: -47 28 44.60 (-47.47906d) Equinox: J2000		V=16.8	Reference Frame: ICRS				
Comments: This is the same target (and coordinates) as used in CAL/WFC3 11911, UVIS L-Flats and Geometric Distortion										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) OMEGACEN	(1) OMEGACEN	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=NO	GS ACQ SCENARI O BASE1B3		40. Secs [==>]	[1]
Orbit Structure	Orbit 1 GS Acq Exp. 1 Unred Visibility = 3010 Overhead Occultation Server Version: 20100218									

Visit	Proposal 12094, Visit 08, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT -12D TO -10D FROM 05									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	OMEGACEN	RA: 13 26 46.2800 (201.6928333d) Dec: -47 28 44.60 (-47.47906d) Equinox: J2000		V=16.8	Reference Frame: ICRS				
Comments: This is the same target (and coordinates) as used in CAL/WFC3 11911, UVIS L-Flats and Geometric Distortion										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) OMEGACEN	(1) OMEGACEN	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=NO	GS ACQ SCENARI O BASE1B3		40. Secs [==>]	[1]
Orbit Structure	Orbit 1 GS Acq Exp. 1 Overhead Unused Visibility = 3010 Occultation Server Version: 20100218									
	<p>The diagram shows a timeline for Orbit 1. The x-axis represents time in seconds, ranging from 0 to 5500 with major ticks every 500 seconds. The timeline is divided into several phases: <ul style="list-style-type: none"> GS Acq: A vertical arrow pointing down at approximately 100 seconds. Exp. 1: A green box with a camera icon, starting at approximately 300 seconds and ending at approximately 340 seconds. Overhead: A vertical arrow pointing down at approximately 340 seconds. Unused Visibility = 3010: A vertical arrow pointing down at approximately 340 seconds, indicating the duration of unused visibility. Occultation: A vertical arrow pointing down at approximately 3400 seconds, marking the start of the occultation period. A thick green horizontal bar spans from approximately 300 seconds to 3400 seconds. A black horizontal bar is located below the green bar, spanning from approximately 500 seconds to 800 seconds. </p>									

Visit	Proposal 12094, Visit 09, scheduling Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT -12D TO -10D FROM 05									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	OMEGACEN	RA: 13 26 46.2800 (201.6928333d) Dec: -47 28 44.60 (-47.47906d) Equinox: J2000		V=16.8	Reference Frame: ICRS	Comments: This is the same target (and coordinates) as used in CAL/WFC3 11911, UVIS L-Flats and Geometric Distortion			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) OMEGACEN	(1) OMEGACEN	WFC3/UVIS, ACCUM, UVIS	F606W	CR-SPLIT=NO	GS ACQ SCENARI O BASE1B3		40. Secs [==>]	[1]
Orbit Structure	Orbit 1 GS Acq Exp. 1 Unred Visibility = 3010 Overhead Occultation Server Version: 20100218									