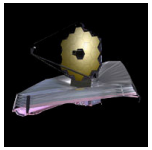

4431 - JWST Routine Wavefront Sensing and Control for Cycle 1 - Part 4

Cycle: 1, Proposal Category: CAL/OTE

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	232		WFSC NIRCam Fine Phasing	(47) 2MASS-14583629-0349393
Routine Sensing w/out LOS				
	233		WFSC NIRCam Fine Phasing	(48) 2MASS-10585904+3026298
	234		WFSC NIRCam Fine Phasing	(49) 2MASS-11080621+0901252
	235		WFSC NIRCam Fine Phasing	(50) 2MASS-10114767-0651556
	236		WFSC NIRCam Fine Phasing	(51) 2MASS-12114924+5856270
	237		WFSC NIRCam Fine Phasing	(51) 2MASS-12114924+5856270
Observation Folder				
	191		WFSC NIRCam Fine Phasing	(52) 2MASS-11504530-5745581

ABSTRACT

The JWST Cycle 1 routine wavefront sensing and control (WFS&C) maintenance calibration program is necessary to fulfill a Level 1 Mission requirement on image quality. These routine WFS&C measurements will execute every ~2 days throughout Cycle 1 (and every cycle thereafter).

The nominal plan is that the majority of observations will be sensing measurements only, wavefront control visits will execute only as needed. The wavefront control activities are estimated to be carried out at most once every 2 weeks to ensure optimal JWST image quality performance. The Cycle 1 WFS&C maintenance observations are fashioned following the similar program that will be executed every 2 days during the latter half of JWST commissioning (OTE-26; APT PID 1163).

This is a copy of 2725:232 so it can be reprocessed quickly for a high priority WOPR.

OBSERVING DESCRIPTION

The Routine Cycle 1 Calibration for WFS&C uses the Fine Phasing (FP) template with observations defined for:

-FP using the NIRCam weak lenses
And
-LOS Jitter using a small subarray in NIRCam.
These are the base observations for monitoring the JWST image quality.

The overall program is set up with the grid of four hundred stars (Kmag=7.0+/-0.1) and 5 copies of each observation. For APT performance reasons, the total of 2000 visits are split across 4 APT programs, which jointly make up the entire Cycle 1 calibration program. The PIDs are 2586, 2724, 2725, 2726.

This PID 2725 has 100 targets with RA from ~12h to 18h. The visits are set up to be able to have a wavefront control file added down-stream of APT, if it is deemed necessary.

One visit from any of these 4 programs should be scheduled every two days, selecting from any target which is conveniently close to the current observatory pointing at that time. The monitoring cadence has a loose tolerance, notionally 48 hours plus or minus 12 hours between successive visits; this provides flexibility to schedule wavefront monitoring with minimal constraints to the timing of science visits.

We expect only 182 of the total 2000 visits to be executed in 1 year. The remaining >90% will not be executed. This is intentional to provide a grid of WF sensing targets across the entire sky and then only use ones that minimize slew times based on the targets in the science plan. With 400 targets the average spacing between targets is ~10 degrees; from any point on the sky JWST can slew ~5 deg or less to a nearby WFS target.

The operations concept for wavefront monitoring is that we have a continuous stream of WFSC routine monitoring and maintenance visits every two days, drawn from these 4 APT programs. These visits are by design interchangeable and all identical except for choice of target star.
The JWST WF maintenance plan is to correct the mirrors using a wavefront control file as needed, only when needed. This, by design, is expected to be no more often than once every 14 days. Corrections will not be made every 14 days if the mirrors haven't drifted out of alignment; conversely if monitoring visits show significant misalignments on shorter timescales we will not wait the 14 days to issue a control - we'd issue a control in the next WFS visit two days later. The observatory was designed to be stable enough to need corrections no more often than every couple of weeks. Based on current modeling, observatory stability may substantially exceed this requirement and corrections may be much less frequent than the 14 day cadence.

When a correction is needed (based on the analysis of some observation N), it can be attached to the next observation N+1 in the sequence. This is done by the OTE/WFSC team delivering a wavefront control file to PPS, and requires no changes in APT.

Note: For the observations here, using the ROUTINE wavefront sensing special requirement, APT conservatively assumes the overheads for Wavefront control and for subsequent confirmation sensing after the control are included, ~8330s per visit. If a control file is not attached to the visit downstream, the visit will only do the sensing/monitoring measurements, which take ~4340s. Furthermore, APT assumes the default slew time of 1800s per visit, but by construction since the slew distances will always be 5 degrees or smaller, slew times should generally be less than roughly 1000s.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(47)	2MASS-14583629-0349393	RA: 14 58 36.2987 (224.6512446d) Dec: -03 49 39.40 (-3.82761d) Equinox: J2000	Proper Motion RA: 2.665886883 mas/yr Proper Motion Dec: -18.24812548 mas/yr Epoch of Position: 2015.5	
Comments: K-magnitude = 6.971 *Category=Calibration* *Description=[Focus test]*				
(48)	2MASS-10585904+3026298	RA: 10 58 59.0363 (164.7459846d) Dec: +30 26 29.70 (30.44158d) Equinox: J2000	Proper Motion RA: -3.345595523 mas/yr Proper Motion Dec: -1.003040428 mas/yr Epoch of Position: 2015.5	
Comments: K-magnitude = 7.08 *target 82 from 2724 (obs. 407)* *Category=Calibration* *Description=[Focus test]*				
(49)	2MASS-11080621+0901252	RA: 11 08 6.2251 (167.0259379d) Dec: +09 01 25.10 (9.02364d) Equinox: J2000	Proper Motion RA: 7.075165016 mas/yr Proper Motion Dec: -5.553555168 mas/yr Epoch of Position: 2015.5	
Comments: K-magnitude = 7.032 *target 85 from 2724 (obs. 422)* *Category=Calibration* *Description=[Focus test]*				
(50)	2MASS-10114767-0651556	RA: 10 11 47.6556 (152.9485650d) Dec: -06 51 55.79 (-6.86550d) Equinox: J2000	Proper Motion RA: -23.67045297 mas/yr Proper Motion Dec: -2.98621669 mas/yr Epoch of Position: 2015.5	
Comments: K-magnitude = 7.042 *target 70 from 2724 (obs. 348)* *Category=Calibration* *Description=[Focus test]*				
(51)	2MASS-12114924+5856270	RA: 12 11 49.2336 (182.9551400d) Dec: +58 56 26.76 (58.94077d) Equinox: J2000	Proper Motion RA: -3.28379859 mas/yr Proper Motion Dec: -22.65647436 mas/yr Epoch of Position: 2015.5	
Comments: K-magnitude = 7.069 *target 2 from 2725, (Obs 10)* *Category=Calibration* *Description=[Focus test]*				
(52)	2MASS-11504530-5745581	RA: 11 50 45.3323 (177.6888846d) Dec: -57 45 58.25 (-57.76618d) Equinox: J2000	Proper Motion RA: 8.48498822076431 mas/yr Proper Motion Dec: 3.4891133903157785 mas/yr Epoch of Position: 2015.5	
Comments: *Category=Calibration* *Description=[Focus test]*				

Observation

Proposal 4431, Observation 232

Wed Jul 19 17:08:09 GMT 2023

Diagnostic Status: Warning

Observing Template: WFSC NIRCam Fine Phasing

Diagnostics

(Visit 232:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(47)	2MASS-14583629-0349393	RA: 14 58 36.2987 (224.6512446d) Dec: -03 49 39.40 (-3.82761d) Equinox: J2000	Proper Motion RA: 2.665886883 mas/yr Proper Motion Dec: -18.24812548 mas/yr Epoch of Position: 2015.5	

Comments: K-magnitude = 6.971
Category=Calibration
Description=[Focus test]

Acquisition

#	Target	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	SUB64FP1A	F212N	RAPID	3	1	1	0.203	0

Template

Module	Sensing type	Diversity	Expected No. of WFC Commands
A	Both	PM8	170

Dithers

#	Primary Dither Type
1	WFSC

Spectral Elements

#	Subarray	Short Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SUB8FP1A	F212N	RAPID	72	750	1	750	120.57	

Spectral Elements

#	Short Pupil	Short Filter	Long Pupil	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	WLM8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	
2	WLP8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	

Special Requirements	
	No Parallel Attachments Wavefront Sensing SENSING_CONTROL DMS Priority ELEVATED

Observation

Proposal 4431, Observation 233

Wed Jul 19 17:08:09 GMT 2023

Diagnostic Status: Warning

Observing Template: WFSC NIRCam Fine Phasing

Diagnostics

(Visit 233:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(48)	2MASS-10585904+3026298	RA: 10 58 59.0363 (164.7459846d)	Proper Motion RA: -3.345595523 mas/yr	
		Dec: +30 26 29.70 (30.44158d)	Proper Motion Dec: -1.003040428 mas/yr	
		Equinox: J2000	Epoch of Position: 2015.5	

Comments: K-magnitude = 7.08
target 82 from 2724 (obs. 407)
Category=Calibration
Description=[Focus test]

Template

Module	Sensing type	Diversity	Expected No. of WFC Commands
A	Fine Phasing	PM8	170

Dithers

#	Primary Dither Type
1	WFSC

Spectral Elements

#	Short Pupil	Short Filter	Long Pupil	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	WLM8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	
2	WLP8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	

Special Requirements

No Parallel Attachments
Wavefront Sensing ROUTINE
OTE Temperature Monitoring
DMS Priority ELEVATED

Observation

Proposal 4431, Observation 234 Wed Jul 19 17:08:09 GMT 2023

Diagnostic Status: Warning

Observing Template: WFSC NIRCam Fine Phasing

Diagnostics

(Visit 234:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(49)	2MASS-11080621+0901252	RA: 11 08 6.2251 (167.0259379d)	Proper Motion RA: 7.075165016 mas/yr	
		Dec: +09 01 25.10 (9.02364d)	Proper Motion Dec: -5.553555168 mas/yr	
		Equinox: J2000	Epoch of Position: 2015.5	

Comments: K-magnitude = 7.032
target 85 from 2724 (obs. 422)
Category=Calibration
Description=[Focus test]

Template

Module	Sensing type	Diversity	Expected No. of WFC Commands
A	Fine Phasing	PM8	170

Dithers

#	Primary Dither Type
1	WFSC

Spectral Elements

#	Short Pupil	Short Filter	Long Pupil	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	WLM8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	
2	WLP8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	

Special Requirements

No Parallel Attachments
Wavefront Sensing ROUTINE
OTE Temperature Monitoring
DMS Priority ELEVATED

Observation

Proposal 4431, Observation 235

Wed Jul 19 17:08:09 GMT 2023

Diagnostic Status: Warning

Observing Template: WFSC NIRCam Fine Phasing

Diagnostics

(Visit 235:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(50)	2MASS-10114767-0651556	RA: 10 11 47.6556 (152.9485650d)	Proper Motion RA: -23.67045297 mas/yr	
		Dec: -06 51 55.79 (-6.86550d)	Proper Motion Dec: -2.98621669 mas/yr	
		Equinox: J2000	Epoch of Position: 2015.5	

Comments: K-magnitude = 7.042
target 70 from 2724 (obs. 348)
Category=Calibration
Description=[Focus test]

Template

Module	Sensing type	Diversity	Expected No. of WFC Commands
A	Fine Phasing	PM8	170

Dithers

#	Primary Dither Type
1	WFSC

Spectral Elements

#	Short Pupil	Short Filter	Long Pupil	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	WLM8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	
2	WLP8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	

Special Requirements

No Parallel Attachments
Wavefront Sensing ROUTINE
OTE Temperature Monitoring
DMS Priority ELEVATED

Observation

Proposal 4431, Observation 236

Wed Jul 19 17:08:09 GMT 2023

Diagnostic Status: Warning

Observing Template: WFSC NIRCam Fine Phasing

Diagnostics

(Visit 236:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(51)	2MASS-12114924+5856270	RA: 12 11 49.2336 (182.9551400d)	Proper Motion RA: -3.28379859 mas/yr	
		Dec: +58 56 26.76 (58.94077d)	Proper Motion Dec: -22.65647436 mas/yr	
		Equinox: J2000	Epoch of Position: 2015.5	

Comments: K-magnitude = 7.069
target 2 from 2725, (Obs 10)
Category=Calibration
Description=[Focus test]

Template

Module	Sensing type	Diversity	Expected No. of WFC Commands
A	Fine Phasing	PM8	170

Dithers

#	Primary Dither Type
1	WFSC

Spectral Elements

#	Short Pupil	Short Filter	Long Pupil	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	WLM8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	
2	WLP8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	

Special Requirements

No Parallel Attachments
Wavefront Sensing ROUTINE
OTE Temperature Monitoring
DMS Priority ELEVATED

Observation

Proposal 4431, Observation 237

Wed Jul 19 17:08:09 GMT 2023

Diagnostic Status: Warning

Observing Template: WFSC NIRCam Fine Phasing

Diagnostics

(Visit 237:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(51)	2MASS-12114924+5856270	RA: 12 11 49.2336 (182.9551400d)	Proper Motion RA: -3.28379859 mas/yr	
		Dec: +58 56 26.76 (58.94077d)	Proper Motion Dec: -22.65647436 mas/yr	
		Equinox: J2000	Epoch of Position: 2015.5	

Comments: K-magnitude = 7.069
target 2 from 2725, (Obs 10)
Category=Calibration
Description=[Focus test]

Template

Module	Sensing type	Diversity	Expected No. of WFC Commands
A	Fine Phasing	PM8	170

Dithers

#	Primary Dither Type
1	WFSC

Spectral Elements

#	Short Pupil	Short Filter	Long Pupil	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	WLM8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	
2	WLP8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	

Special Requirements

No Parallel Attachments
Wavefront Sensing ROUTINE
OTE Temperature Monitoring
DMS Priority ELEVATED

Observation

Proposal 4431, Observation 191

Wed Jul 19 17:08:09 GMT 2023

Diagnostic Status: Warning

Observing Template: WFSC NIRCam Fine Phasing

Diagnostics

(Observation 191) Warning (Form): Record ETC Wkbk.Calc ID used to verify target acquisition.

(WFSC LOS Jitter Acq Exposure) Warning (Form): Record ETC Wkbk.Calc ID used to verify target acquisition.

(Visit 191:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Miscellaneous
(52)	2MASS-11504530-5745581	RA: 11 50 45.3323 (177.6888846d) Dec: -57 45 58.25 (-57.76618d) Equinox: J2000	Proper Motion RA: 8.48498822076431 mas/yr Proper Motion Dec: 3.4891133903157785 mas/yr Epoch of Position: 2015.5	

Comments:
Category=Calibration
Description=[Focus test]

Acquisition

#	Target	Subarray	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SAME	SUB64FP1A	F212N	RAPID	3	1	1	0.203	

Template

Module	Sensing type	Diversity	Expected No. of WFC Commands
A	Both	PM8	170

Dithers

#	Primary Dither Type
1	WFSC

Spectral Elements

#	Subarray	Short Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SUB8FP1A	F212N	RAPID	72	750	1	750	120.57	

Spectral Elements

#	Short Pupil	Short Filter	Long Pupil	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	WLM8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	
2	WLP8	F212N	CLEAR	F356W	RAPID	4	2	4	193.262	

Special Requirements	
	No Parallel Attachments Wavefront Sensing ROUTINE OTE Temperature Monitoring DMS Priority ELEVATED