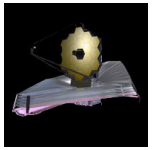

1174 - Optical Shorts Identification and Masking

Cycle: 0, Proposal Category: COM/NIRSPEC

INVESTIGATORS

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OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Observation Folder				
	2	Exposures 195	NIRSpec Internal Lamp	NONE
	4	Exposures 196	NIRSpec Internal Lamp	NONE
	6	Exposures 197	NIRSpec Internal Lamp	NONE
	8	Exposures 198	NIRSpec Internal Lamp	NONE
	10	Exposures 199	NIRSpec Internal Lamp	NONE
	12	Exposures 237	NIRSpec Internal Lamp	NONE

ABSTRACT

For each optical short identified in the diagnostic exposures, the NIRSpec instrument model can be used to infer their positions to within +/-1 shutter. The shorts are then located more precisely by sequentially updating the zero-potential mask (ZPM) in a series of test masks, that iteratively mask the three rows and three columns around the best-guess location(s). The test masks can include rows/cols for every new optical short, so this procedure only needs to be run once to locate several new shorts. An RTCP is used to uplink all 6 test masks into the pre-defined RTS slots. Then RTCPs are used to activate each test mask in turn. Interleaved between the RTCP activations, OTP visits are executed to obtain dark exposures with the MSA configured with two different 3x3 checkerboard patterns. The procedure ends with the reactivation of the original ZPM masks (i.e. the end state does

not include the new optical shorts).

Note that on request, the OPGS visits to perform RTS activations were removed from this APT file.

Update for 24-Mar (first execution of PID1115, CAR-881 in flight):

During recent lamp exposures, we found double-failed open columns (two adjacent columns running in cross-dispersion direction which fail open due to a short) in Q1 and would like to remove those. Therefore some of the test masks, rather than have masked rows and columns as described above, will instead, attempt to mask one or the other or both of these adjacent columns. This change only affects the content of the test masks, and is transparent to both this APT file and the procedure to execute this CAR.

However, in order to see which test mask is successful for removing those failed open columns, we add a third exposure per test, using the test lamp to illuminate the CROSS5-C pattern, which we know will trigger the issue when it exists.

Update for 1st Run of 881 (MS 26-MAR) - Planning and Scheduling asked to remove the non-interruptible requirement and just to make it as a SEQUENCE. Note for normal OPS the non-interruptible requirement should be reinstated. Selecting SEQUENCE requirse a time span and the minum allowed is 5hr.

OBSERVING DESCRIPTION

There is a high likelihood that the electrical shorts masking activity (CAR NIRSpec-014) does not capture all MSA shorts, i.e. that additional weak shorts exist. MSA shorts of this kind would not exceed the current thresholds monitored in NIRSpec-014. Instead, they can be identified via unwanted signal in NIRSpec exposures arising from thermal emission of the shorted (warm) shutters. For this reason, diagnostic dark exposures are obtained in Part-2 of NIRSpec-014 (proposal 1115). In case these exposures reveal the presence of such ‘optical’ MSA shorts, CAR NIRSpec-043 will be run to locate and mask them.

For each optical short identified in the diagnostic exposures, the NIRSpec instrument model can be used to infer their positions to within +/-1 shutter. The shorts are then located more precisely by sequentially updating the zero-potential mask (ZPM) in a series of test masks, that iteratively mask the three rows and three columns around the best-guess location(s). The test masks can include rows/cols for every new optical short, so this procedure

only needs to be run once to locate several new shorts. An RTCP is used to uplink all 6 test masks into the pre-defined RTS slots. Then RTCPs are used to activate each test mask in turn. Interleaved between the RTCP activations, OTP visits are executed to obtain dark exposures with the MSA configured with two different 3x3 checkerboard patterns as well as a lamp exposure through the CROSS5-C configuration (to verify the success of removing full/partial failed open columns - this is an addition for the first execution of PID1115, CAR-881 in flight). The procedure ends with the reactivation of the original ZPM masks (i.e. the end state does not include the new optical shorts). The sequence is therefore as follows:

- UPLINK 6 x test masks
- ACTIVATE test mask in RTS195
- 3 x EXPOSURE (dark CHKBD3x3-1 & CHKBD3x3-3 and lamp=TEST CROSS5-C)
- ACTIVATE test mask in RTS196
- 3 x EXPOSURE (dark CHKBD3x3-1 & CHKBD3x3-3 and lamp=TEST CROSS5-C)
- ACTIVATE test mask in RTS197
- 3 x EXPOSURE (dark CHKBD3x3-1 & CHKBD3x3-3 and lamp=TEST CROSS5-C)
- ACTIVATE test mask in RTS198
- 3 x EXPOSURE (dark CHKBD3x3-1 & CHKBD3x3-3 and lamp=TEST CROSS5-C)
- ACTIVATE test mask in RTS199
- 3 x EXPOSURE (dark CHKBD3x3-1 & CHKBD3x3-3 and lamp=TEST CROSS5-C)
- ACTIVATE test mask in RTS237
- 3 x EXPOSURE (dark CHKBD3x3-1 & CHKBD3x3-3 and lamp=TEST CROSS5-C)
- (ACTIVATE original mask in RTS211 - may be skipped by an OSCR depending on telemetry seen during final test mask)

On-ground inspection, by the NIRSpec Science Operations Team, of the diagnostic exposures will allow the identification of the row/col required to mask each of the new optical shorts.

The update of the masks in the ground segment, and onboard the spacecraft, will proceed in the following manner. The NIRSpec Science Operations Team will convert the updated masks into RTS input files (*.rts), OSS format files (*.zro, *.tri) and MSA Shutter Operability Files (*.msl), and begin the delivery procedure by opening a JSOCOPS ticket detailing the various steps. These steps start with the MESA/RedCat Team, who generates PRD and SOC CRs. The *.msl files are included in the SOC PR and contain the non-operable shutters information; there are 3 files (failed open/closed, masked rows/columns, and shutters vignetted by the field stop). MESA/RedCat convert the *.msl files into a single JSON file and delivered to the

Science Pipeline and APT/MPT. The OSS team modifies the PRD CR with an updated MSS load specification file. The FOT retrieves the RTSs, OSS formatted masks and MSS specification files from the PRD CR. The FOT than generates uplink loads and includes them in PRD CR. After the PRD CR is reviewed and approved by the Ops CCB, the table and file loads are transferred to the FOS and uplinked to the ICDH FSW and RAM file store respectively.

NOTE: The optical short detection sequence ends with the old masks activated in the MSA. Therefore, the ground segment mask update procedure is critical to ensure that the instrument is using the most up-to-date masks, and must be completed before normal MSA operations can resume.

NOTE: If OSS gains the ability to execute RTS activation, the need to interleave RTCP with OTP visits would be eliminated.

Observation

Proposal 1174, Observation 2: Exposures 195

Sat Mar 26 12:00:12 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec Internal Lamp

Diagnostics

(Exposures 195 (Obs 2)) Warning (Form): NO SLEW Risk

(Exposures 195 (Obs 2)) Warning (Form): PARALLEL requirement expected.

(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Spectral Elements

#	Operating Mode	Subarray	Lamp	MSA Configuration	Grating	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	IMAGE	FULL	NONE	CHKBD3x3-1	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
2	IMAGE	FULL	NONE	CHKBD3x3-3	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
3	IMAGE	FULL	TEST	CROSS5-C	MIRROR	NRSIRS2RAPID	5	1	1	87.533	

Special Requirements

No Slew
No Parallel
Special Commanding Special Commanding No Slew; Approval will indicate confirmation that the MCE resolver conversion, tri-state, zero-potential masks and the predefined MSA configuration (allopen/allclosed) files needed for this visit will be in the ISIM file store before it begins.

Observation

Proposal 1174, Observation 4: Exposures 196

Sat Mar 26 12:00:12 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec Internal Lamp

Diagnostics

(Exposures 196 (Obs 4)) Warning (Form): NO SLEW Risk

(Exposures 196 (Obs 4)) Warning (Form): PARALLEL requirement expected.

(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Spectral Elements

#	Operating Mode	Subarray	Lamp	MSA Configuration	Grating	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	IMAGE	FULL	NONE	CHKBD3x3-1	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
2	IMAGE	FULL	NONE	CHKBD3x3-3	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
3	IMAGE	FULL	TEST	CROSS5-C	MIRROR	NRSIRS2RAPID	5	1	1	87.533	

Special Requirements

No Slew
No Parallel
Special Commanding Special Commanding No Slew; Approval will indicate confirmation that the MCE resolver conversion, tri-state, zero-potential masks and the predefined MSA configuration (allopen/allclosed) files needed for this visit will be in the ISIM file store before it begins.

Observation

Proposal 1174, Observation 6: Exposures 197

Sat Mar 26 12:00:12 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec Internal Lamp

Diagnostics

(Exposures 197 (Obs 6)) Warning (Form): NO SLEW Risk

(Exposures 197 (Obs 6)) Warning (Form): PARALLEL requirement expected.

(Visit 6:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Spectral Elements

#	Operating Mode	Subarray	Lamp	MSA Configuration	Grating	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	IMAGE	FULL	NONE	CHKBD3x3-1	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
2	IMAGE	FULL	NONE	CHKBD3x3-3	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
3	IMAGE	FULL	TEST	CROSS5-C	MIRROR	NRSIRS2RAPID	5	1	1	87.533	

Special Requirements

No Slew
No Parallel
Special Commanding Special Commanding No Slew; Approval will indicate confirmation that the MCE resolver conversion, tri-state, zero-potential masks and the predefined MSA configuration (allopen/allclosed) files needed for this visit will be in the ISIM file store before it begins.

Observation

Proposal 1174, Observation 8: Exposures 198

Sat Mar 26 12:00:12 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec Internal Lamp

Diagnostics

(Exposures 198 (Obs 8)) Warning (Form): NO SLEW Risk

(Exposures 198 (Obs 8)) Warning (Form): PARALLEL requirement expected.

(Visit 8:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Spectral Elements

#	Operating Mode	Subarray	Lamp	MSA Configuration	Grating	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	IMAGE	FULL	NONE	CHKBD3x3-1	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
2	IMAGE	FULL	NONE	CHKBD3x3-3	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
3	IMAGE	FULL	TEST	CROSS5-C	MIRROR	NRSIRS2RAPID	5	1	1	87.533	

Special Requirements

No Slew
No Parallel
Special Commanding Special Commanding No Slew; Approval will indicate confirmation that the MCE resolver conversion, tri-state, zero-potential masks and the predefined MSA configuration (allopen/allclosed) files needed for this visit will be in the ISIM file store before it begins.

Observation

Proposal 1174, Observation 10: Exposures 199 Sat Mar 26 12:00:12 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec Internal Lamp

Diagnostics

(Exposures 199 (Obs 10)) Warning (Form): NO SLEW Risk

(Exposures 199 (Obs 10)) Warning (Form): PARALLEL requirement expected.

(Visit 10:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Spectral Elements

#	Operating Mode	Subarray	Lamp	MSA Configuration	Grating	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	IMAGE	FULL	NONE	CHKBD3x3-1	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
2	IMAGE	FULL	NONE	CHKBD3x3-3	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
3	IMAGE	FULL	TEST	CROSS5-C	MIRROR	NRSIRS2RAPID	5	1	1	87.533	

Special Requirements

No Slew
No Parallel
Special Commanding Special Commanding No Slew; Approval will indicate confirmation that the MCE resolver conversion, tri-state, zero-potential masks and the predefined MSA configuration (allopen/allclosed) files needed for this visit will be in the ISIM file store before it begins.

Observation

Proposal 1174, Observation 12: Exposures 237 Sat Mar 26 12:00:12 GMT 2022

Diagnostic Status: Warning

Observing Template: NIRSpec Internal Lamp

Diagnostics

(Exposures 237 (Obs 12)) Warning (Form): NO SLEW Risk

(Exposures 237 (Obs 12)) Warning (Form): PARALLEL requirement expected.

(Visit 12:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

Spectral Elements

#	Operating Mode	Subarray	Lamp	MSA Configuration	Grating	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	IMAGE	FULL	NONE	CHKBD3x3-1	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
2	IMAGE	FULL	NONE	CHKBD3x3-3	MIRROR	NRSIRS2RAPID	5	1	1	87.533	
3	IMAGE	FULL	TEST	CROSS5-C	MIRROR	NRSIRS2RAPID	5	1	1	87.533	

Special Requirements

No Slew
No Parallel
Special Commanding Special Commanding No Slew; Approval will indicate confirmation that the MCE resolver conversion, tri-state, zero-potential masks and the predefined MSA configuration (allopen/allclosed) files needed for this visit will be in the ISIM file store before it begins.