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# Appendix F5

**NIRISS Dithering Details**

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## Introduction

This Appendix provides the details to support dithering for NIRISS templates.

## NIRISS AMI

The following tables specify the offsets for dithering as described in Chapter 40. The offsets in the tables are relative to the aperture center.

Tables F5.1 and F5.2 are relevant for AMI science exposures. Table F5.3 is relevant for AMI direct images (which are only taken if selected by the user).

The offsets in Table F5.1 are used based on the number of **PRIMARY DITHERS**. If **PRIMARY DITHERS=N**, all of the offsets from 1 to N, inclusive, are used.

For subpixel positions, all of the listed offsets in the corresponding section of Table F5.2, for a given value of **SUBPIXEL POSITIONS (NONE, 4, or 9)**, are used. For example, if **SUBPIXEL POSITIONS = 9**, dither points 1 through 9 will be used. All the selected subpixel positions are used around each primary dither point.

Table F5. 1 – Primary Dither Offsets for AMI science observations

|  |  |  |
| --- | --- | --- |
| **PRIMARY DITHERS** | **x"** | **y"** |
| **1** | 0.0000″ | 0.0000″ |
| **2** | +2.3544″ | 0.0000″ |
| **3** | +2.6160″ | +2.6320″ |
| **4** | 0.0000″ | +2.6320″ |

Table F5. 2 – Subpixel Positions Offsets for AMI Science Observations

|  |  |  |
| --- | --- | --- |
| **N** | **x"** | **y"** |
| **SUBPIXEL POSITIONS = NONE** | | |
| 1 | 0.0000” | 0.0000” |
| **SUBPIXEL POSITIONS = 4** | | |
| 1 | 0.00000” | 0.00000” |
| 2 | +0.01308” | 0.00000” |
| 3 | +0.01308” | +0.01316” |
| 4 | 0.00000” | +0.01316” |
| **SUBPIXEL POSITIONS = 9** | | |
| 1 | 0.0000" | 0.0000" |
| 2 | +0.0216" | 0.0000" |
| 3 | +0.0216" | +0.0217" |
| 4 | 0.0000" | +0.0217" |
| 5 | -0.0216" | +0.0217" |
| 6 | -0.0216" | 0.0000" |
| 7 | -0.0216" | -0.0217" |
| 8 | 0.0000" | -0.0217" |
| 9 | +0.0216" | -0.0217" |

If direct imaging is selected in an AMI observation, all of the listed offsets in the corresponding section of Table F5.3, for a given value of **IMAGE DITHERS,** are used for the direct images**.**

Table F5. 3 – Dither Offsets for AMI Direct Imaging

|  |  |  |  |
| --- | --- | --- | --- |
| **IMAGE DITHERS** | **** | **x "** | **y "** |
| **2** | 1 | 0.0000″ | 0.0000″ |
| 2 | +0.2943″ | +0.2961″ |
| **3** | 1 | 0.0000″ | 0.0000″ |
| 2 | +0.2832″ | +0.2849″ |
| 3 | +0.5670″ | +0.5705″ |
| **4** | 1 | 0.0000″ | 0.0000″ |
| 2 | +0.3924″ | +0.1645″ |
| 3 | +0.1635″ | +0.4606″ |
| 4 | -0.2289″ | +0.2961″ |

## NIRISS WFSS

The following table specifies the offsets for dithering as described in Chapter 40. The offsets in the tables are relative to the aperture center.

All of the listed offsets in the corresponding section of Table F5.4, for a given value of **IMAGE DITHERS** and **PATTERN SIZE**, are used.

Table F5. 4 – Dither Offsets for WFSS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **IMAGE DITHERS** | **N** | **PATTERN SIZE** | | | | | |
| **LARGE** | | **MEDIUM** | | **SMALL** | |
| **x**″ | **y**″ | **x**″ | **y** ″ | **x** ″ | **y**″ |
| 2 | 1 | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ |
| 2 | +0.8175″ | +0.8225″ | +0.4251″ | +0.4277″ | +0.2289″ | +0.2303″ |
| 3 | 1 | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ |
| 2 | +0.8066″ | +0.8115″ | +0.4142″ | +0.4167″ | +0.2833″ | +0.2851″ |
| 3 | +1.6132″ | +1.6231″ | +0.8284″ | +0.8335″ | +0.5668″ | +0.5703″ |
| 4 | 1 | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ |
| 2 | +1.0464″ | +0.5593″ | +0.5232″ | +0.2961″ | +0.3270″ | +0.1645″ |
| 3 | +0.4905″ | +1.4476″ | +0.2289″ | +0.7238″ | +0.1635″ | +0.3948″ |
| 4 | -0.4905″ | +1.0199″ | -0.2289″ | +0.4935″ | -0.1635″ | +0.2961″ |
| 6 | 1 | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ |
| 2 | −0.5232″ | +0.9541″ | −0.2616″ | +0.4935″ | −0.1308″ | +0.2303″ |
| 3 | −0.9592″ | +1.8753″ | −0.5014″ | +0.9541″ | −0.3052″ | +0.5593″ |
| 4 | +0.4360″ | +1.4476″ | +0.2398″ | +0.7238″ | +0.1744″ | +0.3948″ |
| 5 | +0.9374″ | +0.5264″ | +0.4796″ | +0.2632″ | +0.2834″ | +0.1316″ |
| 6 | +1.3516″ | −0.4935″ | +0.6976″ | −0.2303″ | +0.4360″ | −0.1645″ |
| 8 | 1 | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ | 0.0000″ |
| 2 | +1.0464″ | +0.5593″ | +0.5232″ | +0.2961″ | +0.3270″ | +0.1645″ |
| 3 | +0.4905″ | +1.4476″ | +0.2289″ | +0.7238″ | +0.2289″ | +0.4606″ |
| 4 | −0.4905″ | +1.0199″ | −0.2289″ | +0.4935″ | −0.0981″ | +0.2961″ |
| 5 | −0.5232″ | −0.2632″ | −0.2616″ | −0.1316″ | −0.1635″ | −0.0658″ |
| 6 | +0.5232″ | +0.2961″ | +0.2616″ | +0.1645″ | +0.1635″ | +0.0987″ |
| 7 | −0.0327″ | +1.1844″ | −0.0327″ | +0.5922″ | +0.0654″ | +0.3948″ |
| 8 | −1.0137″ | +0.7567″ | −0.4905″ | +0.3619″ | −0.2616″ | +0.2303″ |

## NIRISS IMAGING

The following table specifies the offsets for dithering as described in Chapter 40. The offsets in the tables are relative to the aperture center.

All of the listed offsets in the corresponding section of Table F5.5, for a given value of **IMAGE DITHERS** is used.

Table F5. 5 – Dither Offsets for IMAGING

|  |  |  |  |
| --- | --- | --- | --- |
| **IMAGE DITHERS** | **** | **x "** | **y "** |
| **2** | 1 | 0.0000″ | 0.0000″ |
| 2 | +0.2943″ | +0.2961″ |
| **3** | 1 | 0.0000″ | 0.0000″ |
| 2 | +0.2832″ | +0.2849″ |
| 3 | +0.5670″ | +0.5705″ |
| **4** | 1 | 0.0000″ | 0.0000″ |
| 2 | +0.3924″ | +0.1645″ |
| 3 | +0.1635″ | +0.4606″ |
| 4 | -0.2289″ | +0.2961″ |

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## NIRISS MIMF

The following table specifies the offsets for dithering as described in Chapter 40. The offsets in the tables are relative to the aperture center.

All of the listed offsets in the corresponding section of Table F5.6, for a given value of **IMAGE DITHERS** is used.

Table F5. 6 – Dither Offsets for MIMF

|  |  |  |  |
| --- | --- | --- | --- |
| **IMAGE DITHERS** | **** | **x "** | **y "** |
| **2** | 1 | 0.0000″ | 0.0000″ |
| 2 | +0.3270″ | +0.0000″ |

## NIRISS EXTERNAL CALIBRATION

The following table specifies the parameters for dithering as described in Chapter 40.

The dither patterns used for the External Calibration mode map directly to the dither patterns used for the other NIRISS modes, as indicated in Table F5.7 below.

Table F5.7– Dither Parameters for NIRISS external calibration

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PATTERN**  **TYPE** | **IMAGE**  **DITHERS** | **PRIMARY**  **DITHERS** | **SUBPIXEL POSITIONS** | **PATTERN SIZE** |
| **AMI** | Table F5.3 (direct image) | Table F5.1 | Table F5.2 |  |
| **IMAGING** | Table F5.5 |  |  |  |
| **MIMF** | Table F5.6 |  |  |  |
| **WFSS** | Table F5.4 |  |  | Table F5.4 |