

NICMOS Apertures and Orientation

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6.1 NICMOS Aperture Definitions

Each HST Science Instrument requires its own local coordinate system and apertures to support both target acquisition and small angle maneuvers (SAMs). Apertures are calibrated locations in the HST focal plane relative to the FGS frame. All acquisitions and SAMs are relative to apertures. Any location within the field of view of a NICMOS camera can be specified by the POSTARG special requirement (described in the HST Phase II Proposal Instructions).

The basic philosophy of the NICMOS aperture definitions follows that used by WF/PC-1 and WFPC2. Each NICMOS camera has two primary apertures. One is positioned at the geometric center of the detector and the other at an *optimal* position close to the center. The first of these apertures is anchored to that fixed location, while the second may be moved in the future. In this way the optimal aperture may be shifted to avoid array defects, even if these are time dependent. Observers with large targets which fill the field of view of a particular camera are generally advised to use the first type of aperture, the “FIX” apertures, while for observers with smaller targets the second type is recommended.

Additional apertures are defined in Camera 2 for use in the automated Mode 2 coronagraphic acquisition.

The names of the defined apertures are listed in Table 6.1 along with a description of their function and their current location.

Observers should note that while apertures are defined by their pixel position in each detector, displacements relative to the default aperture position given with POSTARG are expressed in arcseconds (see the Phase II Proposal Instructions for further details).

Table 6.1: NICMOS Aperture Definition

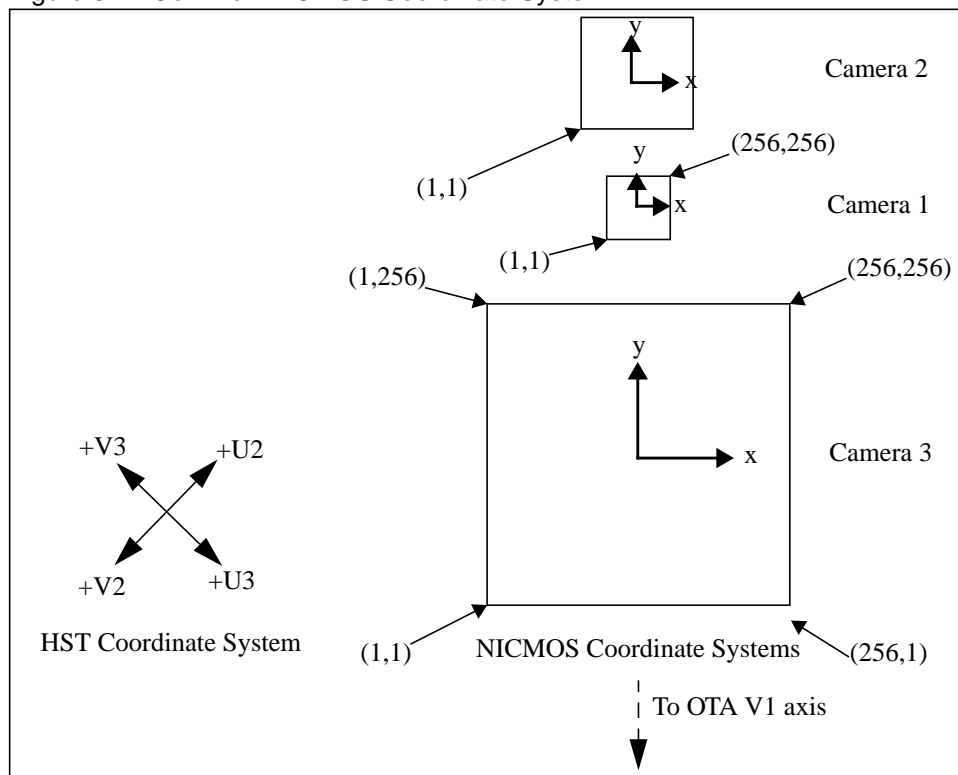
Aperture Name	Description	Position (detector pixels)
NIC1	Optimal center of Camera 1	162,100
NIC1-FIX	Geometric center of Camera 1	128,128
NIC2	Optimal center of Camera 2	149,160
NIC2-FIX	Geometric center of Camera 2	128,128
NIC2-CORON ^a	Center of coronagraphic hole	-
NIC2-ACQ	Center of Mode 2 ACQ region	157,128
NIC3	Optimal center of Camera 3	140,135
NIC3-FIX	Geometric center of Camera 3	128,128

a. NIC2-CORON aperture position not given here as it is time dependent and automatically determined onboard for each coronagraphic acquisition.

6.2 NICMOS Coordinate System Conventions

Figure 6.1 shows how the NICMOS cameras are arranged in the HST field of view. The alignment of each camera is not exact, and the internal coordinate systems attached to each of them differ by small rotations (< 1 degree). The FITS format data files generated for NICMOS observers will have a World Coordinate System specified appropriately for each camera. The adopted coordinate system for all three cameras is summarized in Figure 6.1.

Figure 6.1: Common NICMOS Coordinate System



6.3 Orients

NICMOS orientations are specified relative to the +y axis shown in Figure 6.1. Eastward rotations are counterclockwise (in the usual astronomical convention). Spacecraft orientations are specified relative to the U2-U3 telescope axis (Figure 6.2). The NICMOS coordinate system is rotated by approximately 225 degrees from U3 axis. The exact angles for NIC1, NIC2, and NIC3 are 224.6, 224.57, and 224.96 ± 0.02 degrees, respectively.

Due to the linear arrangement of the three NICMOS cameras on the sky, it may be advantageous to consider the specification of a unique telescope orientation. However, observers should be aware that such constraints may decrease the duration and number of scheduling opportunities for their observations and, under some circumstances, may make the identification of suitable guide stars impossible.

While the Phase II proposal instructions contain the definitive instructions and examples for specifying the desired orientation for HST, we provide a simple example in Figure 6.2. A binary star with a position angle (PA) 30° measured east from north is to be positioned with the southern star in Camera 3 and the northern star in Camera 2. That is, we want the line connecting the two stars to lie along the NICMOS +y axis. The resulting HST orientation is $225^\circ + 30^\circ = 255^\circ$. (HST ORIENT = PA + 225° for NICMOS).

Figure 6.2: Definition of Orient for NICMOS

