**Using the BOT-TARGET for Testing**

To facilitate testing of the BOT, we have created a special target to allow the tester to define what the magnitude and spectral type of the star is. When this target is used in an exposure, BOT does NOT search the GSC2/GALEX/2MASS catalog for field stars, but instead reads the magnitude information in the OTHER FLUXES field to define the star to be processed. This document describes these special targets for each catalog BOT searches.

# GSC2 Catalog

For the GSC2 catalog, the name of the target must be **BOT-TARGET-GSC2\***, where you can replace the \* with anything (e.g. **BOT-TARGET-GSC2-1**). It does not matter what you insert for the coordinates (but you must insert something) or the coordinate uncertainties (these are only required for COS, and if you don’t include them you can ignore the APT diagnostic), since the GSC2 catalog is not being searched, nor does the V magnitude matter (this does not need to be specified, and you can ignore the APT diagnostic that you get if you do not specify it). The OTHER FLUXES field is used to provide the magnitude using one of the following formats.

## Bright Stars

If you want to check a bright star (V<12), then you can specify the V and B-V with the format:

V = XX.X, BV=X.XX

For example, V=10.4, BV=-0.1. Note that you can also specify an error for both values (VError and BVError), but these are not used by BOT. Note that if you insert a V magnitude of 12.0 or fainter, BOT will ignore the value (just like it does if you searched the GSC2 catalog).

## Faint Stars

If you want to check a faint star, then you can specify the GSC2 F and J magnitudes with the format:

Fpg=XX.X, Jpg=XX.X

For example, Fpg=16.7, Jpg=17.0. You can also specify an error for both values (FpgError and JpgError), and these values are used by BOT to adjust the magnitude and color (for large errors). Note that you cannot supply just one magnitude and have BOT assume the other (as it does for catalog searches). The V magnitude and B-V color are derived from the F and J magnitudes via the following equations (see the BOT detector documents):

**V** = **F** + 0.03 + 0.44\*(**J**-**F**) - 0.03\*(**J**-**F**)2 + 0.02\*(**J**-**F**)3

**B-V** = 0.158 + 0.665\*(**J**-**F**)

## Conversion to Spectral Type

As specified in the BOT detector documents, the B-V color is used to determine the spectral type of the star via the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| B-V | Spectral Type | B-V | Spectral Type |
| -0.32 | O5 | -0.24 | B1 |
| -0.14 | B5 | +0.03 | A1 |
| +0.14 | A5 | +0.31 | F0 |
| +0.43 | F5 | +0.63 | G2 |
| +0.66 | G5 | +0.82 | K0 |
| +1.15 | K4 | +1.49 | M2 |

To interpolate, always take the bluest color (e.g. if the star has B-V=0.85, select K0). Remember that when processing, BOT assigns all stars with B-V<+0.1 with a type of O5V, as well as objects above a Vcrit value (see the respective BOT documents for details).

## Not a star flag

If you want to do any testing of BOT’s ability to properly process an object that is marked as “not a star”, then you can also specify the following in the OTHER FLUXES field:

type = ? (indicates the object is not a star)

type=star (indicates the object is a star)

If you do not specify this parameter, the object is assumed to be a star.

# GALEX Catalog

For the GALEX catalog, the name of the target must be **BOT-TARGET-GALEX\***, where you can replace the \* with anything (e.g. **BOT-TARGET-GALEX-1**). As with GSC2, you can put anything into the coordinates fields, and you can leave the V magnitude blank. The OTHER FLUXES field is used to provide the magnitude using the following format:

FuvMag=XX.X, NuvMag=XX.X

For example, FuvMag=16.4, NuvMag=16.1. You can also specify an error for both values (FuvMagError and NuvMagError), but these are not used by BOT. (BOT also supports the use of Fuv and Nuv for the magnitudes.) Note that you only need to specify one of the two magnitudes. As when using the actual catalog, all objects with GALEX are assumed to be O5V stars. Also note that the check for the need to use the new linearity correction, as well as the check for the object being too bright, are also performed just like when using the actual catalog (see the BOT detector documents for details).

# 2MASS Catalog

For the 2MASS catalog (the WFC3/IR detector), the name of the target must be **BOT-TARGET-2MASS\***, where you can replace the \* with anything (e.g. **BOT-TARGET-2MASS-1**). As with GSC2, you can put anything into the coordinate fields, and you can leave the V magnitude blank. The OTHER FLUXES field is used to provide the magnitude using the following format:

HMag=XX.X, JMag=XX.X

For example, HMag=15.0, JMag=14.5. You can also specify an error for both values (HMagError and JMagError), but these are not used by BOT. Note that you only need to specify one of the two magnitudes. You can also specify the cc\_flg field, which is used in 2MASS to indicate contamination and confusion. If the value is set to anything other than 0, the object is not processed.

Unlike the other catalogs, there is only a minor dependence on spectral type, and that dependence is part of the lookup table. Therefore, no spectral type is derived or assumed in BOT processing.