

Basic Startup Guide for OPTIC at WIYN

Last updated May 18/2010

Steps likely completed by your instrument support person

1. Booting **mrbill** - choose kernel: linux-up2.4.20-8
2. Edit the file `/usr/local/inst/config/filters.def` on **mrbill** and place the names of your filters in it. These are then read by the OPTIC gui.
3. Get filter names into the OPTIC FITS file header:
 - a. On **ivory**, have the telescope operator change to the tonry directory:
`cd tonry`
 - b. Edit the filter file: `vi filters.tcl` (read by `simplesock.tcl`) and type the filter names in the line, `Set FILTERS`. This line will look like:
`Set FILTERS "? U B V W013 Ha R I"`
-- where the ? IS needed followed by the eight filter names separated by spaces. The line starts and ends with double quotes (")
 - c. from within the `tonry` directory on **ivory** run:
`startserver`

Observer Daily Startup Procedure

OPTIC's data acquisition software runs on the computer *mrbill* but is displayed on the two flat, wide screens of the Mini-Mac computer called **wiyn-1**.

4. If not logged in to the imaging workstation, **wiyn-1**, log in as observer with the usual WIYN password.
5. Double click on the desktop icon for OPTIC

This will bring up the *otcom*, *OTGUI*, and a *DS9* displayed from *mrbill*

For better OPTIC performance, use one of the monitors for OPTIC's controls and the others for video display (e.g., *DS9*) and *iraf*

6. You will need to bring up a *terminal* window for ssh into *mrbill*.
`% ssh mrbill`
no password needed.

In this terminal , in the `/data0/observer/` directory, make a directory for the entire run's data (for this example *ObsRun* is used). Then make a subdirectory for tonight's data and cd to tonight's directory:

```
cd ObsRun/n051510
-- for Observing Run, May 15, 2010.
```

7. From the GUI, using the mouse to click:

- a. **INIT DOWNLOAD**
- b. **INIT POWER**
- c. Change the CCD temperature to -95 C

8. You will need to bring up another *terminal* window for ssh into pearl.

a. Remote log-in to pearl (no user name, or password is required):
ssh pearl

b. From pearl type:
start-fsa
filter init

9. Back in OTCOM, type:

```
restore vanilla_wiyn
```

-- error 2 will occur if the FSA socket is not yet started (see step #3, above).

10. Back to the OTGUI, in the **PREFIX** entry field:

Set the filename prefix to the data path, e.g., (using the above example for observing run and tonight's directory) `/data0/observer/ObsRun/n080707/x`, where x represents the root filename. This can be one or more characters. For example, if x = t, the FITS files OPTIC writes are t.001.fits, t.002.fits, etc.

11. **Very Important:** In the OTGUI, make sure you set the detector temperature to **-95°**. By default it is set to a different temperature for observing in Haiwii.

12. To start and *iraf* session you will need to bring up one more *terminal* window for ssh into *mrbill*.

At the *mrbill* prompt, in the home directory, type:

```
% xgterm &
```

Then, in the *xgterm* type:

```
% cl
```

Now you can change to tonight's data taking directory.

At this point, you may wish to test the filter movement and can begin taking images.

Take Data

Note, for the steps below, commands typed in the OTCOM window are identical to those with buttons in the OTGUI. The user may input commands in either or both modes. For example:

1. Define exposure time in OTCOM terminal window: *et 10 for a 10-sec exposure*
2. Define the title for the picture: *object M17*
3. Define the image type if desired (see below)
4. Click on the **GO** button

Here is one way to focus using the video mode of OPTIC:

1. Define the guide stars in the OTCOM terminal window click: **fgs**
2. Using the mouse, point to a star in each of the 4 boxes and press:
 - a. **f** to select the star for readout during focus (if a green circle does not appear around a guide star you typed 'f' at, click on the green **INPUT** button and try again - or, click the title bar of the FGS window to activate it).
 - b. **e** to ignore that box during readout
3. Select an exposure time as above, perhaps 60 seconds to give yourself enough time to adjust focus.
4. Then click on the **MORE** button in the GUI and select **VIDEO**. Clicking on VIDEO starts a video display of real-time images from the CCD. This video display will last as long as the current exposure time and you can have the OA do a real-time focus. If it stops, simply click **VIDEO** again. Sometimes this feature hangs and simply stops sending video images. If this happens, all is really OK (except for the screen display) simply wait for the integration (or video) time to timeout, and click **CLEAR** a few times and try again.

[See below for Autofocus routine instructions](#)

Common normal CCD options within the OT GUI by point and click are:

1. Adjust the CCD binning (click on **1X1** or **2X2**)
2. Select filter (click on the filter you wish to select)

To define the image type (and write the *imtype* keyword into the FITS file header), in the OTCOM window type:

```
imtype #
```

-- where # is as listed below,

Number	Image Type (imtype)
1	Object
2	Bias
3	Dark
4	Dome flat
5	Sky flat
6	Focus
7	Standard field

To define the picture title, (and write the keyword into the FITS file header), in the OTCOM window type:

```
object Picture Title
```

-- where "Picture Title" can be an unquoted string with spaces.

This writes the *title* key word somewhere into the header (not explicitly) but, the title will be visible if you use the IRAF *imheader* command in the it's short version.

Note that both **imtype** and **object** remain in effect until changed by the user.

Helpful Hints

- The FITS header keyword TELFILT is the correct one to use to get the correct filter for your observation as it comes from the WIYN FSA (i.e., the file the OA edits on **Ivory**).
- Bias exposures (ie., zero second exposures) spin the FSA shutter around once. So, for best true bias images, have the dome dark. Better yet, to keep the shutter closed you can disable the shutter in the closed position. To do this type in the FSA window (from step #9 above):

```
shutter reboot
```

IMPORTANT: Before you can take regular timed exposures again with the shutter opened you must type in the FSA window:

```
shutter init
```

- If, for some reason *ivory* is down or, *startserver* is not active you can still take data. There will, however, be a delay of approximately 2 minutes for an exposure to happen.
- Displaying OPTIC video files in IRAF:

```
% display file_vid.fits[*,*,N]
```

--where N=1 to as many video frames as you have.

- To take multiple images using the current parameters you can, in either the OTCOM or on the OTGUI command line, type:

```
go N
```

--where N is the number of images you want to take.

- **WARNING ABOUT FOCUSING:** Focusing in one corner of the array will not focus the entire image. You need at least two focus stars, if not 3 or 4, to get an accurate focus across the entire image. If needed, you can have the OA move the telescope a short distance to a more crowded field to focus then move back to you target to take data.
- **Rotation Limits at WIYN:** Because the OPTIC dewar was not originally designed for use at WIYN it spills liquid nitrogen when rotated beyond $\pm 90^\circ$. Therefore, offsets of the rotator (always orthogonal) are necessary when tracking of the sky brings the rotator into, or near, a limit.
- **Note About Changing Filters:** There is a second, very reliable way to change filters (besides clicking on the radio button in *OTGUI*). In the *pearl FSA* window type:

```
filter set #
```

with the # being 1-8(wiyn scheme).

If there is any doubt about if the filter position, or whether a filter has actually changed one should do this. **Note** that the *OTGUI* can lie (and has

been known to). And, **note** that when changing filter with the *FSA* the change *WILL NOT* show up in the *OTGUI*.

Quitting Out Of The OPTIC Control - at the end of each night

1. There are three different ways to power off OPTIC, choose one:
 - a. Type: `pof` on the *otcom* command line,
 - b. Type: `pof` in **otgui's** command line,
 - c. Select **Power** from the **otgui's Init** menu.You should see, echoed in both the **otgui's** blue, message window and, in the *otcom* window:

```
>> pof
High voltage off...
```
 2. Exit the **otgui** by clicking on the **Init** menu followed by **Exit**
 3. Quit *otcom*, at the prompt type:

```
> quit
```

answer no when asked if you want to save parameters
Note: There will be no prompt in the *otcom* window.
 4. Exit the *FSA*, type:

```
% exit
```

in the *pearl/FSA* window. Then, exit the *pearl* login.
-

Autofocus Routines (other than *Video Mode*)

There are two OPTIC scripts available for focusing the telescope. They are:

1. *call focus E*
2. *call autofoc E, F*

Each script is used by typing the line:

```
> call <routine name>
```

in the *otcom* window.

Focus Routine 1 - not automated

call focus E
where **E** = **5** seconds by default or, the user can enter a number for the exposure time

This routine gives 6 focus steps in the focus frame, and prompts the user to ask the OA to set the starting focus value, and at each step offset the telescope and change the focus value.

Focus Routine 2 - automated

call autofoc E, F

where **E** is the integration time and **F** is the relative focus offset step.

E defaults to **5** seconds and **F** defaults to **+20** units. + and - steps are allowed but **F** cannot be larger than **+/-300**. Typical step sizes to use are **50** and **20** units for rough and fine focus control.

This routine prompts the user to ask the OA to set the starting focus value. It was designed this way to make sure the user actually talks to the OA so all know a focus routine is happening. Once set the routine will move the telescope and change the focus by itself and produce 5 focus steps in the focus frame.

Note: The time reported per step will be 2 seconds less than the actual requested time, but this is just a "feature" of the OPTIC/WIYN shutter interaction - all is really correct in the integration time.

Autofoc steps **10"** east per step with a double step before the last focus value. It then resets the telescope back to the starting position before it ends.

The WIYN *focus matrix*, within the **SecTilt** GUI, has to have "instrument" selected for this to work as well as the server up and running to allow command I/O the WIYN OA executes both of these.