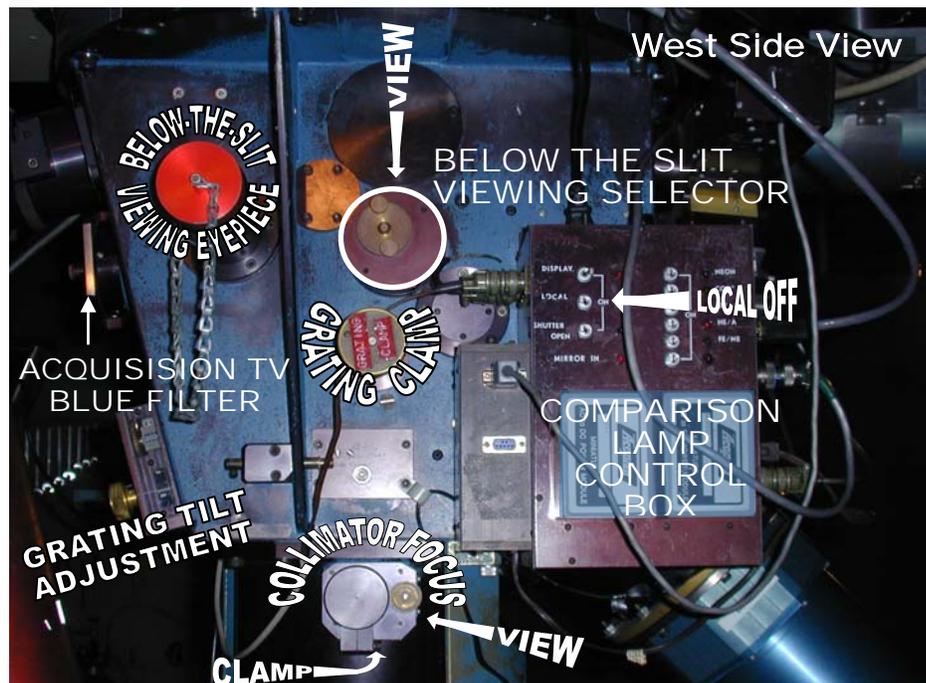
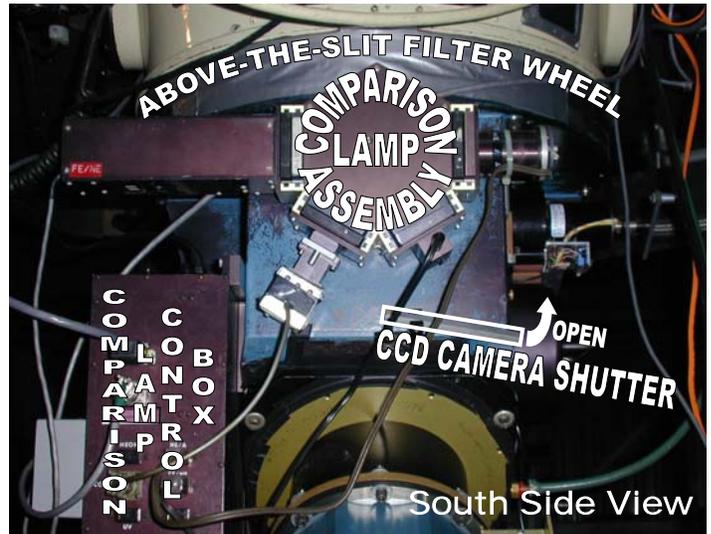




Bok 90'' Boller & Chivens Spectrograph Start-up Checklist (Nstars)

- I. Following the light path (labels in CAPS)
 1. **Close CCD CAMERA SHUTTER!!**
 2. **ABOVE-THE-SLIT FILTER WHEELS**
6 slots on N & S sides
remove any filters
 3. **COMPARISON LAMP ASSEMBLY**
remove any filters (except on FeNe)
 4. **SLIT SELECTOR: 2.5''**
Don't forget the clutch!
instructions posted to left
 5. **GRATING**
loosen screws to remove cover
600 l/mm, 6681 [red] for Nstars,
2nd order most efficient at 3340 Å
 6. **BELOW-THE-SLIT FILTER bolt: Shot8612**
instructions posted with slit selector (4)
 7. **GRATING TILT** (loosen clamp!)
-- HeAr 4471 Å on CCD column 690
-- set initially at 17.05
-- check with HeAr spectrum
 8. **ACQUISITION TV BLUE FILTER:**
"in"
 9. **BELOW-THE-SLIT VIEWING SELECTOR:**
"thru"
 10. **COMPARISON LAMP CONTROL BOX:**
"local" off
 11. **COLLIMATOR FOCUS** for testing
initial at 6.0 or 8.0, up from 0.0
 12. **Open CCD CAMERA SHUTTER** for tests



II. Setting up Bokobs (shaded sections on 1st night only)

1. Start BOKOBS, Reset? Yes
login bokobs, password posted on white board.
2. Check disk space, clear if needed (use !rm -fr * in IRAF).
3. Make FITS images >set imtype="fits, noinherit"
in login.cl file, uncomment "set imtype" line and change to fits, noinherit
4. Make data directory for observers + each night
>mkdir /d1/bokobs/cyod/Nov26
>cd /d1/bokobs/cyod/Nov26 **← In both Acquisition & Reduction windows!**
5. Edit parameter lists using printouts (in acquisition window):
>epar displ
>instrpars
>detpars (use >ccdinfo to get info on the chip)
>obspars (rootname & sequence change for test & observing)
>telpars (telname changes for test & observing)
6. Test to see if system is bok is alive
>test >>number = 1, type = zero
no response ⇒ >ccdinf
no response ⇒ reboot bokccd (icon on top left of screen)
no response ⇒ hard reboot of bokccd (top right corner of bokccd rack)
& CCD power supply (on telescope)
no response ⇒ call Chris!

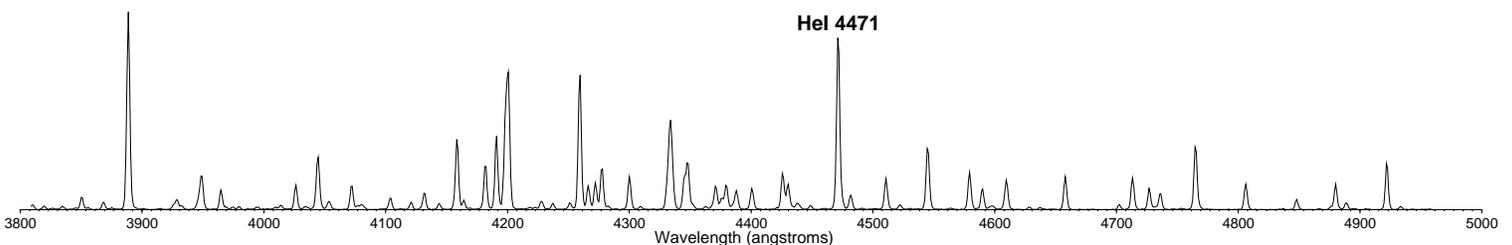
III. Collimator focus (west side, view setting from lower right))

1. Check parameters
>telpars (telname=`test`)
>obspars (rootname=`a`, sequence=1)
2. Run a test image
>test >>number = 1, type = zero
3. Observe HeAr lamp at different focuses from acquisition window
>comps >>time = 15s
>>comparison lamp = hear
>>name = focusXX (e.g. 6, 8, 10 ...)
4. Run nmisc specfocus in reduction window
> specfocus a*.fits focus="6x2" (for starting on 6 & up by 2's)
5. Check focus plot, choose a little below the ideal focus to compensate for night cooling.
6. Observe HeAr lamp at chosen focus (> comps, use for grating tilt test next)

IV. Grating tilt (west side)

1. Get HeAr line at 4471Å on column 690 (within 1 column)

Steward Observatory 90" HeAr Comparison Spectrum
600 l/mm, 2nd Order



V. Zeros

1. Check parameters

```
>obspars (rootname=`n", sequence=XXXX ... from observing program)
```
2. Run zeros

```
>zeros >>number = 10
>>name = zero
```
3. Check for weirdness (1st is often weird)

```
>imstat a*
```
4. Reboot bokccd if weirdness (inconsistent means) appears.

VI. Quartz Flats

1. Run Quartz Flats

```
>comps >>number = 10
>>time = 200s
>>comparison lamp = quartz
>>name = quartzflats
```
2. Check gradient, weirdness, reboot bokccd if weird.

```
>implot a*
```



VII. Darks (best at end of 1st or beginning of 2nd night after camera has been working)

1. **Close the CCD camera shutter + Dome Lights OFF**
2. Run Darks

```
>darks >>number = 10      (... at least 7 if time is crunched)
>>time = 900s           (... longest exposure expected)
```

VIII. Focus Telescope

1. **Open the CCD camera shutter.**
2. Check parameters

```
>telpars (telname=`bok")
```
3. Get 7th magnitude star (RA=sidereal time, Dec=90-□) on slit

```
>test >>number = 1
>>type = object
>>time = 15 sec (10 for 6th magnitude)
```

 - put spectrum in middle of chip by moving source along slit ... mark

```
>implot test
```

 - use "c" to plot columns, check focus (X)
 - reduce focus by 50, bring up to 10 below start, test, come up by 5's, test for best.

IX. Observing

1. **Open the CCD camera shutter.**
2. Check parameters (>telpars (telname=`bok"))
3. Play!

```
>observe >>type = object
>>title = name
>implot "c" shows clmns, "C" for #, ":l xx yy" displays lines
snr = sqrt [(counts@G-band - bkgd) x (# of lines) x (gain)]
>comps >>time = 15
>>lamp = hear
>>title = hear
```

**Close CCD Shuttter
for Supper, Sunset,
and maybe a snooze ...**