BTO Software Operating Manual

June 14, 2006

BTO Operating Procedures

Initial Startup

Several things need to be done at the beginning of every LGS run. The first step is to power on all of the motor controllers used by the BTO computer, followed by the BTO computer itself. Then all of the motors need to be homed in order to properly set their encoders. The trolley will need to be run to the bottom of its track in order to remove the protective covers from M2. Finally, all of the mirrors will need to be moved to their proper positions at zenith.

Power on ESP300 in Coude Room

Power on equipment on the telescope:

- `telnet 198.202.125.148`
- `/on C2`
- `/on C3`
- `/on Trolley`
- `/on BTO`
- `/x`

Log into the BTO computer as aousr and run the BTO Command GUI. This will be used primarily for display purposes, as nearly every command can be run from harbor.

- `ssh -X aousr@bto`
- `bto_cmd_gui`

Log into harbor as aousr. This window will be used for high-level command execution

- `ssh -X aousr@harbor`

Home all of the motors

- `reset_all_motors`

From harbor, move the trolley to the bottom of its track:

- `trolley_down`

Once the covers have been removed from M2, move all of the mirrors to their zenith positions

- `track`

Nightly Startup

Each night of the run, the BTO must be set up

Log into the BTO computer as aousr and run the BTO Command GUI. This will be used primarily for display purposes, as nearly every command can be run from harbor.

- `ssh -X aousr@bto`
- `bto_cmd_gui`

Log into harbor as aousr. This window will be used for high-level command execution

- `ssh -X aousr@harbor`
- `track`

Acquisition at Zenith

Move the telescope to the zenith position and propogate the red beam. From the harbor window,

- `lock`

Open the shutter and propagate the yellow laser.

Acquisition Off-Zenith

Acquisition off-zenith is slightly more complicated, due to the current inability to slew in declination with the servo loops locked. This procedure explains how to move from one target to the next.

First, the telescope needs to be moved to the meridian by slewing in hour angle only:

- `slew_ha`

- Slew the telescope to the meridian by moving in hour angle only.
- `lock`

Next, the telescope needs to be moved to the declination of the target object by moving in declination only:

- `slew_dec`
- Slew the telescope, moving in declination only.
- `lock`

Move the telescope to the desired object:

- `slew_ha`
- Slew the telescope.
- `lock`

Open the shutter and propagate the yellow laser.

Nightly Shutdown

At the end of each night of observing, the BTO should be shut down. This entails turning off the BTO servo loops, moving the telescope and BTO motors to the zenith, and then turning off BTO control of all the motors.

- `track`
- Move the telescope to zenith
- `manual`

Final Shutdown

At the end of the run, the BTO must be stowed and powered off. First, follow the procedures for the Nightly Shutdown. Then move the trolley to the "down" position, in order to cover the mirrors on M2. Finally, stow the trolley and power off all motors and then the BTO computer itself.

- `trolley_down`
- Cover the optics on M2
- `trolley_stow`

BTO High-Level Command Reference

The high-level commands are run from a harbor xterm. They are used for all standard BTO operations

lock Lock the BTO servo loops. This mode sets all motors to servo, and sets M1 to look at Q3 to maximize servo performance.

manual Turn off the servo loops and tracking. This command is ordinarily used only at the end of the night. It may also be used to switch control to the bto_cmd_gui in order to run the low-level commands.

reset_all_motors Move all of the motors to their home positions. This command needs to be run whenever the motor controllers are power-cycled. This ordinarily occurs only at the beginning of the run.

slew_dec Prepare the bto for a slew in declination. This mode sets M1 to servo and M2 and M3 to open-loop tracking.

slew_ha Prepare the bto for a slew in hour angle. This mode sets all motors to servo, and sets M1 to look at Q1 to maximize servo stability.

track Turn off the BTO servo loops and sets all motors to open-loop tracking.

trolley_down Move the trolley to the bottom of its track.

trolley_stow Move the trolley to its stow position at the primary mirror.