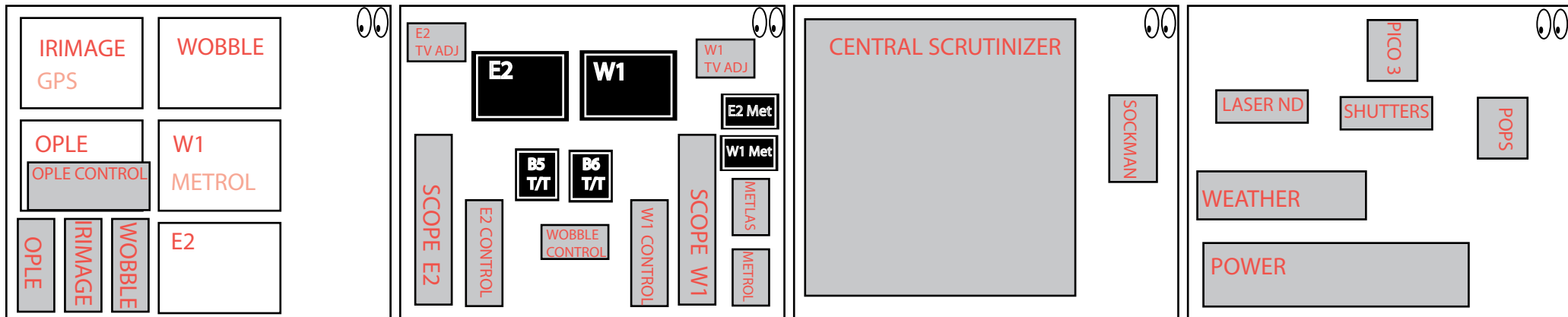


Jason's Notes on the CHARA Control Software

Version 1.4 2005 June 21



Legend



①

This is document is not indended to replace proper training, just to jog Jason's memory when he forgets what to do next.

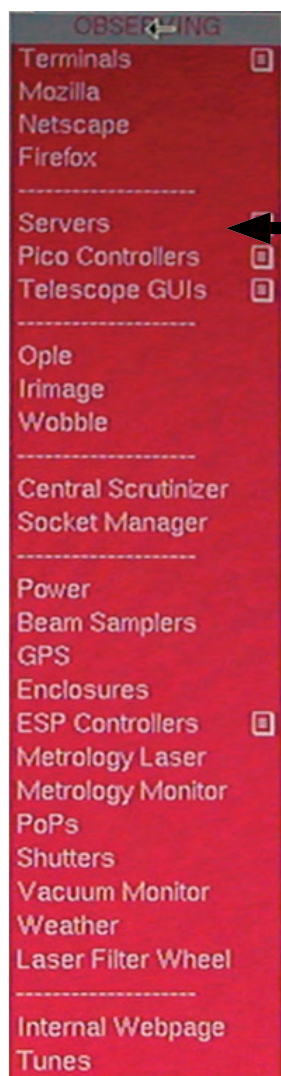
Start Up

From background: Restart X

At unix prompt:

> startx

Start Servers



Start Servers

-
- * GPS
- * OPLE
- * METROL
- * WOBBLE
- * IRIMAGE
- * Telescope Servers

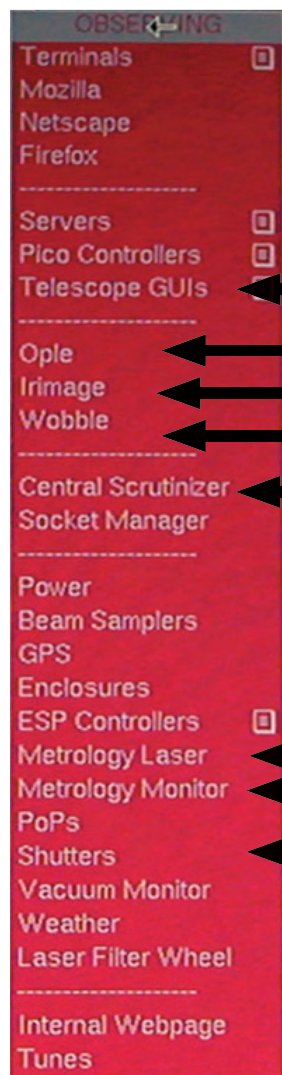
New Rule: **All** telescope servers should be running on Zoot.

Mirror cover status monitor now exists.

If "no TCS comm" in the telescope server window... type "otcs".

Likewise for TEMA... type "otema"

Start Control GUIs



Power
Socket Manager
Weather

Start Control GUIs

-
- * OPLE
- * IRIMAGE
- * WOBBLE
- * METLAS
- * METROL
- * SCOPE E2 (for example)
 E2 CONTROL (click CONTROL)
- * SCOPE W1 (for example)
 W1 CONTROL (click CONTROL)
- * CENTRAL STRUCTINIZER
- * SHUTTERS

Don't forget to type "tdate" in the telescope server windows.

Sync GPS Clocks

On 'CENTRAL SCRUTINIZER' GUI click:

- 1) SYNC GPS CLOCK
- 2) SYNC MY CLOCK
- 3) SYNC ALL CLOCKS

The screenshot shows the 'CENTRAL SCRUTINIZER' GUI with the following details:

- LOCAL TIME: 21:34, CHARA TIME: 04:34, SIDEREAL TIME: 13:01
- Calibrator 1: NOT SET
- Calibrator 2: WHEN: >> zeL_Her_A <<
- Object: zeL_Her_A (RA: 16 41 17.1603, DEC: +31 36 09.812, Vmag: 2.81, Kmag: 0.00, Type: G0IV)
- Job Queue: 0, START JOB QUEUE, STOP JOB QUEUE, CLEAR JOB QUEUE, REF: 30, 0.0
- Beams: BEAM 5 (S1, S2, E1, E2, W1, W2, POP1, POP2, POP3, POP4, END) and BEAM 6 (S1, S2, E1, E2, W1, W2, POP1, POP2, POP3, POP4, END). Beam 5 is reference, Beam 6 is reference.
- Star acquisition action: Do nothing, Initialize scope, Collect Tpoint data
- K BAND: Scan: 200 Hz, 150 Hz, 100 Hz, 66 Hz, Wob (mS): 5, Center (m): 0.000, Range (m): 0.010
- Problem categories: HARDWARE PROBLEM, SOFTWARE PROBLEM, OTHER PROBLEM
- Buttons in 'HARDWARE PROBLEM': SYNC GPS CLOCK, SYNC MY CLOCK, SYNC ALL CLOCKS (all circled in red), ALIGN ACQ B5, ALIGN ACQ B6, WOB COM, TRACK SOCKET, COMMENT, SCAN
- Buttons in 'SOFTWARE PROBLEM': ALIGN TO REF, SET DISPLAY, RECORD DITH
- Buttons in 'OTHER PROBLEM': SEEING, SOCKMAN, ALIGN NIRO, RESTART ASTROMOD, STOW, REOPEN LOG, RECORD SCAN, OPLE INFO
- Log output (bottom):

```
next target is CALIBRATOR 2. CHARA# 107233 HD_150000 zeL_Her_A
wobble: Sample time 5 mS
astromod command: rsh ctrscrut astromod -b E2 5 -b W1 6 -f E2 -p E2 5 -p W1 1 -s -o 167233 &
Telescope E2 slew complete.
Telescope W1 slew complete.
Telescope E2 failed to find star.
ople: New reference: 30.000000 0.000000
ople: Reference cart E2 set to 30.000000m and 0.000000m/s.
Telescope W1 failed to find star.
wobble: E2 Detector RMS = 0.36" r0 = 6.5cm Seeing 1.01"
wobble: W1 Detector RMS = 0.34" r0 = 2.3cm Seeing 2.41"
Star sequence complete.
Beam 5: E2 END Beam 6: W1 POP1 Reference: E2
Telescope E2 tip/tilt communications working.
Telescope W1 tip/tilt communications working.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
metrol: Metrology on W1_UNK may have failed.
metrol: Metrology on E2_UNK may have failed.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
```
- Bottom buttons: REMOTE, VERBOSE, PING, REOPEN, END NIGHT, QUIT

Set Beam Configuration

On Central Scrutinizer
set Telescope and POP under 'BEAM 5' and 'BEAM 6'

For example:

Click E2, END, and Ref under 'BEAM 5'

and

Click W1, POP1 under 'BEAM 6'

The screenshot shows the Central Scrutinizer interface with the following details:

- LOCAL TIME:** 21:34, **CHARA TIME:** 04:34, **SIDEREAL TIME:** 13:01
- CALIBRATOR 1:** NOT SET
- CALIBRATOR 2:** WHEN: >> zeL_Her_A <<
- NUM:** 187233, **IRC:** +30294, **HR:** 6212, **HD:** 150680, **SAO:** 65485
- RA:** 16 41 17.1603, **DEC:** +31 36 09.812, **Vmag:** 2.81, **Kmag:** 0.00, **Type:** G0IV
- JOB QUEUE:** 0, **START JOB QUEUE:**, **STOP JOB QUEUE:**, **CLEAR JOB QUEUE:**, **REF:** 30, **0.0**
- BEAM 5:** S1, S2, E1, E2, W1, W2, POP1, POP2, POP3, POP4, END. Beam 5 is reference.
- BEAM 6:** S1, S2, E1, E2, W1, W2, POP1, POP2, POP3, POP4, END. Beam 6 is reference.
- SKIP BAD SCANS:**, **TARGET MEM:**, **Star acquisition action:** Do nothing, Initialize scope, Collect Tpoint data
- 1000 Hz 2x2**, **750 Hz 2x2**, **500 Hz 2x2**, **250 Hz 2x2**, **1000 Hz 1x1**, **750 Hz 1x1**, **500 Hz 1x1**, **250 Hz 1x1**
- K BAND:**, **Scan:** 200 Hz, 150 Hz, 100 Hz, 66 Hz, **Wob (mS):** 5, **Center (m):** 0.000, **Range (m):** 0.010
- HARDWARE PROBLEM:** SYNC GPS CLOCK, SYNC MY CLOCK, SYNC ALL CLOCKS, ALIGN ACQ B5, WOB COM, COMMENT
- SOFTWARE PROBLEM:** ALIGN TO REF, SET DISPLAY, RECORD DITH
- OTHER PROBLEM:** SEEING, SOCKMAN, ALIGN NIRO, RESTART ASTROMOD, STOW, REOPEN LOG, OPLE INFO
- Log Output:**

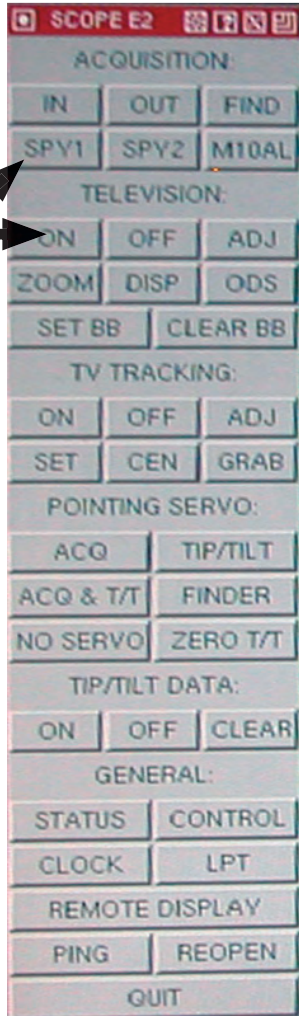
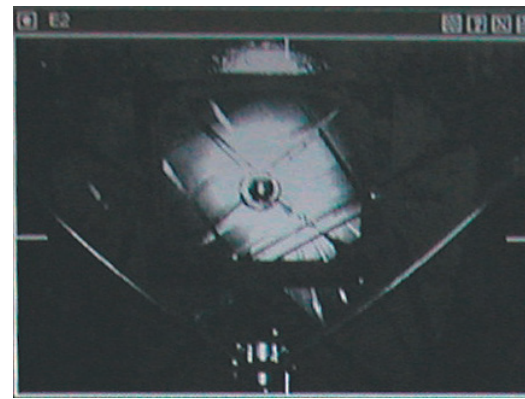
```
next target is CALIBRATOR 2: CHARA# 187233 HD_150680 zeL_Her_A
wobble: Sample time 5 mS

astromod command: rsh ctrscrut astromod -b E2 5 -b W1 6 -f E2 -p E2 5 -p W1 1 -s -o 187233 &
Telescope E2 slew complete.
Telescope W1 slew complete.
Telescope E2 failed to find star.
ople: New reference: 30.000000 0.000000
ople: Reference cart E2 set to 30.000000m and 0.000000m/s.
Telescope W1 failed to find star.
wobble: E2 Detector RMS = 0.36" r0 = 6.5cm Seeing 1.01"
wobble: W1 Detector RMS = 0.34" r0 = 2.3cm Seeing 2.41"
Star sequence complete.
Beam 5: E2 END Beam 6: W1 POP1 Reference: E2
Telescope E2 tip/tilt communications working.
Telescope W1 tip/tilt communications working.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
metrol: Metrology on W1_UNK may have failed.
metrol: Metrology on E2_UNK may have failed.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
```
- REMOTE:**, **VERBOSE:**, **PING:**, **REOPEN:**, **END NIGHT:**, **QUIT:**

Be careful to set beam Reference correctly!

Are the carts HOME?

Open Telescopes and Mirrors



1) Turn on TV displays

Click ON button under 'TELEVISION' on SCOPE E2 (for example)

2) Open telescopes slits

Click SLIT OPEN button under 'DUST COVERS' on E2 CONTROL (for example)

Wait for slits to open.

Watch them open with SPY 1 button under 'ACQUISITION' on SCOPE E2 and SCOPE W1

3) Turn heaters off via HEAT OFF button (this only works for S1 and S2. Look at the white board and walk to the telescopes if necessary).

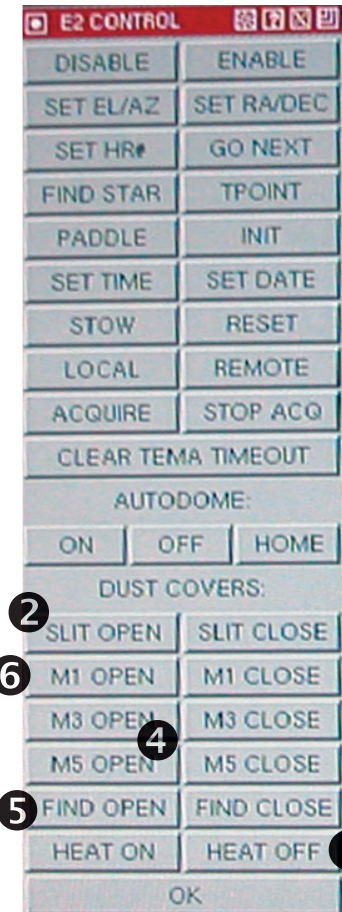
4) Open M3 and M5 mirrors

Click M3 and M5 buttons under 'DUST COVERS' on E2 CONTROL (for example)

5) Open Finder!

6) Open primary mirror

Click M1 button under 'DUST COVERS' on E2 CONTROL (for example)



Power-Up Telescopes and other systems

POWER								
S1	S2	E1	E2	W1	W2	LABPOW	RACK_1	RACK_2
<input type="checkbox"/> LOCK	<input type="checkbox"/> LOCK	<input type="checkbox"/> LOCK	<input type="checkbox"/> LOCK	<input type="checkbox"/> LOCK	<input type="checkbox"/> LOCK	<input type="checkbox"/> LOCK	<input type="checkbox"/> LOCK	<input type="checkbox"/> LOCK
TIP/TILT	TIP/TILT	TIP/TILT	TIP/TILT	TIP/TILT	TIP/TILT	CCD A	GDT	METSCOPE
FOCUS	FOCUS	FOCUS	FOCUS	FOCUS	FOCUS	CCD B	OPLE	DITHER
COMMS	COMMS	COMMS	COMMS	COMMS	COMMS	CCD COOL	WHITEZONE	SHUTTERS
TEL AZ	TEL AZ	TEL AZ	TEL AZ	TEL AZ	TEL AZ	T/T COMMS	GPS	VACMON
TEL EL	TEL EL	TEL EL	TEL EL	TEL EL	TEL EL	CHAN_5	IRIMAGE	REF CCD
TEMA	TEMA	TEMA	TEMA	TEMA	TEMA	CHAN_6	WOBBLE	T/T POW
Error: No error	Error: No error	Error: No error	Error: No error	Error: No error	Error: No error	Error: No error	Error: No error	Error: No error
Circ/Brk: ON	Circ/Brk: ON	Circ/Brk: ON	Circ/Brk: ON	Circ/Brk: ON	Circ/Brk: ON	Circ/Brk: ON	Circ/Brk: ON	Circ/Brk: ON
PING			REOPEN			QUIT		

Click TIP/TILT, COMMS, TEL AZ, TEL EL, TEMA under (for example) 'E2' and 'W1' on the POWER control GUI

Click T/T COMMS under 'LABPOW' on POWER control GUI

Click METSCOPE, SHUTTERS, VACMON, REF CCD, and T/T POW under 'RACK_2' on the POWER control GUI

METSCOPE was turned on during the metrology INIT. SHUTTERS and VACMON usually stay on.
 Telescope power (T/T, COMMS, TEL AZ, TEL EL) not needed to open enclosures, dome slits, or mirrors.
 TEMA or ACQ/TEMA power says on.

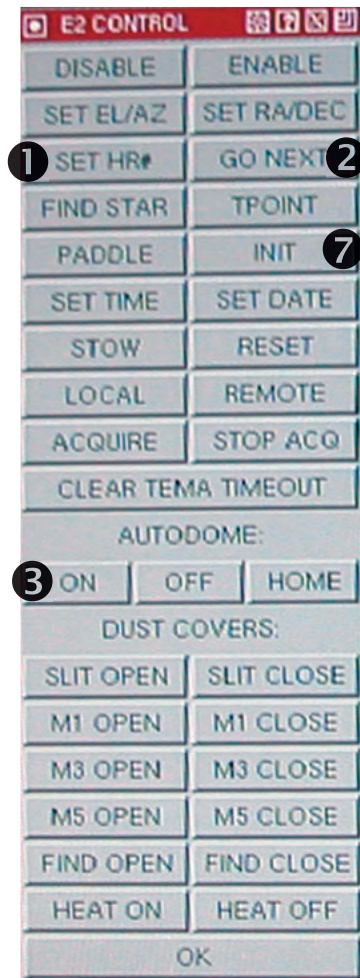
All the power on RACK_1 should be on. If not, servers won't start and you'll need to carefully reboot these machines.

Once all the powers are on don't forget to do a WOBCOM on Central Scrutinizer

Initialize Telescope Pointing (the telescope powers needs to be on first)

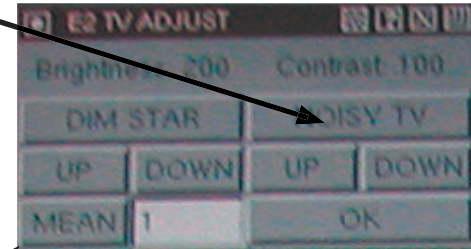
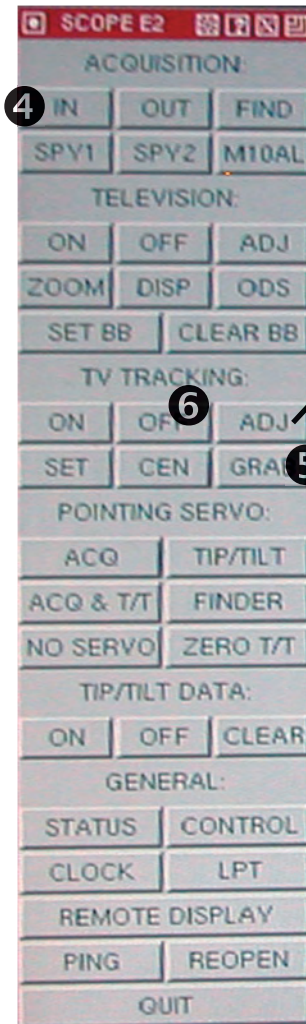
On E2 CONTROL GUI (for example)

1. Click SET HR button, enter 424 (Polaris) in pop-up window
2. Click GO NEXT
3. Click AUTODOME ON



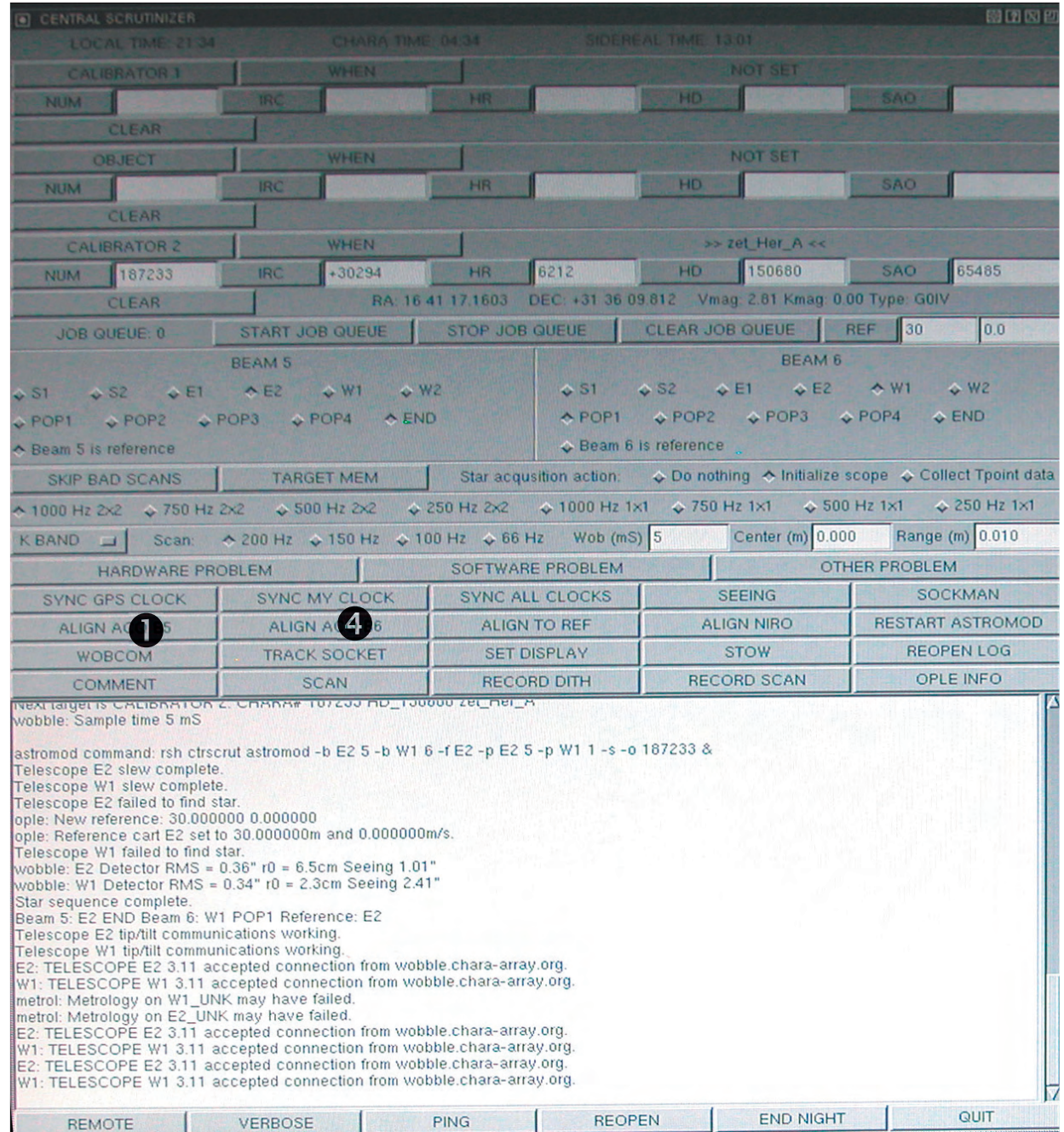
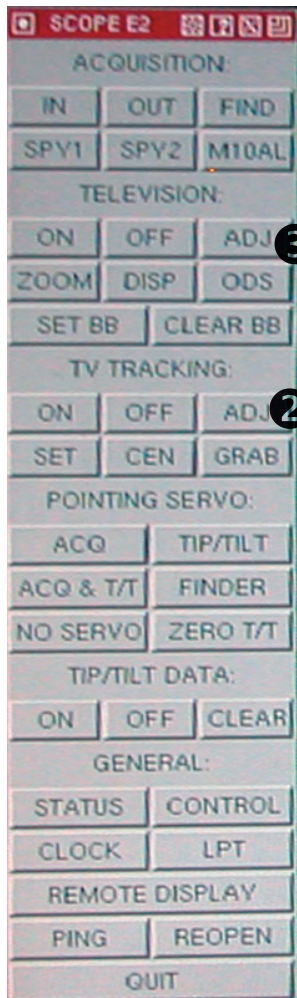
On E2 CONTROL GUI (for example)

4. Click IN (Click NOISY TV if noisy)
5. Click GRAB
6. Click OFF under 'TV Tracking'
7. Click INIT



Align TV Ticks with Reference Laser (You can do this while telescopes are slewing)

1. Click ALIGN ACQ B5 on CNTRLSCRT.
2. Move ticks to laser position. Click ADJ under 'TV TRACKING'.
3. If laser is difficult to see, brighten the TV and ADJ under 'TELEVISION'. Also check that the NDs are out on B5 and B6 for better laser visibility. Lasers can look different for the two beams.
4. Repeat for ALIGN ACQ B6



Settle down to routine observing! :)

The screenshot shows the CENTRAL SCRUTINIZER interface. The top section displays local time (21:34), CHARA time (04:34), and sidereal time (13:01). Below this are sections for CALIBRATOR 1, OBJECT, and CALIBRATOR 2. The CALIBRATOR 2 section is highlighted with a red circle and the number 2. The interface also displays various control buttons, a status bar, and a terminal window at the bottom showing system logs and telescope status.

1
1
1

0. Make sure the carts are HOME and that Beam 5 and Beam 6 (and Reference) are correct in central Structinizer.

1. Enter Calibrator 1, Object, and Calibrator 2.

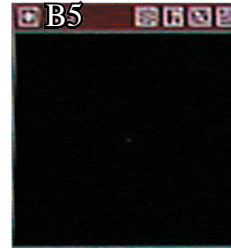
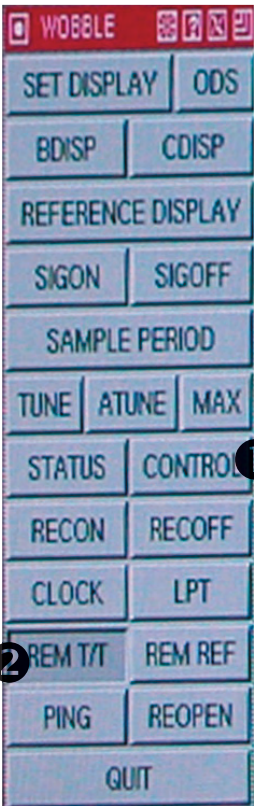
2. Don't forget to do an ALIGN TO REF after the tip tilt has locked (if star is bright enough).

2

```
astromod command: rsh ctrscrut astromod -b E2 5 -b W1 6 -r E2 -p E2 5 -p W1 1 -s -o 187233 &
Telescope E2 slew complete.
Telescope W1 slew complete.
Telescope E2 failed to find star.
opie: New reference: 30.000000 0.000000
opie: Reference cart E2 set to 30.000000m and 0.000000m/s.
Telescope W1 failed to find star.
wobble: E2 Detector RMS = 0.36" r0 = 6.5cm Seeing 1.01"
wobble: W1 Detector RMS = 0.34" r0 = 2.3cm Seeing 2.41"
Star sequence complete.
Beam 5: E2 END Beam 6: W1 POP1 Reference: E2
Telescope E2 tip/tilt communications working.
Telescope W1 tip/tilt communications working.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
metrol: Metrology on W1_UNK may have failed.
metrol: Metrology on E2_UNK may have failed.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
```

Manul Tip/Tilt Locking (... if the star sequence fails, which it does regularly)

1. Click CONTROL on WOBBLE control GUI to bring up WOBBLE CONTROL
2. Click REM T/T on WOBBLE control GUI to bring up T/T displays
3. Make sure T/T POWER is on. WOBCOM on CNTRL_SCRPT.



Sometimes the "OBJECT", or "CALIBRATOR" sequences on CNTRL_SCRPT will lock on the star with T/T. If this doesn't work, which is likely, you'll have to do it 'by hand'.

Acquiring Tip/Tilt 'by hand' (rather than through CNTRL_SCRPT "OBJECT")

1. With the star in Acquisition: click GRAB button
2. On SHUTTERS control GUI open TTB5 and TTB6

click CONTROL on WOBBLE control GUI to bring up WOBBLE CONTROL

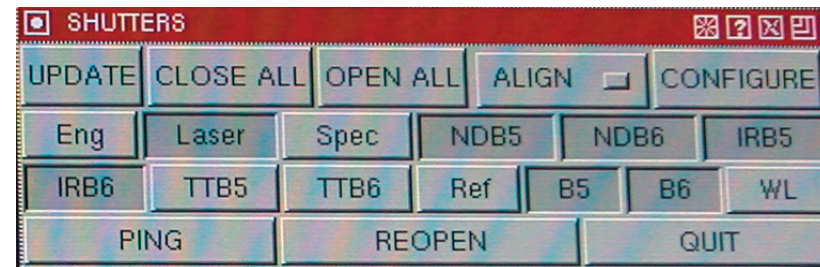
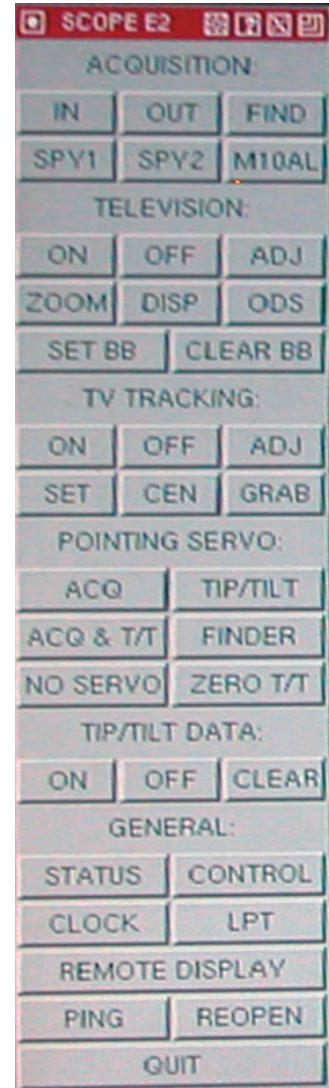
Click REM T/T on WOBBLE control GUI to bring up T/T displays

On SCOPE E2 control GUI under 'POINTING SERVO' click TIP/TILT

Immediately click ON on WOBBLE CONTROL

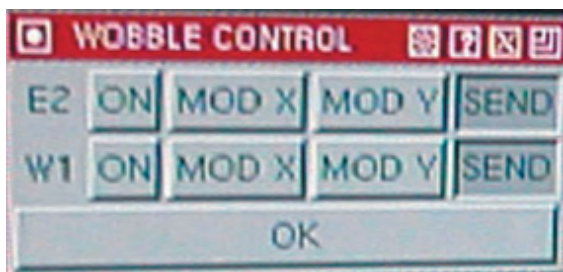
Next, click SET on SCOPE E2 under 'TV TRACKING'

Didn't work? See next page!



Tip/Tilt Tracking Tricks

1. It never hurts to do another WOBCOM if things are acting up.
2. ‘Standard “by hand” method’: Click grab, once centered on the crosshairs and you see decent counts, on the Telescope GUI click TT then go up to the TT CONTROL box and click ON
3. “With TV Off”: Also grab the star, wait until it’s centered and the counts are up, then click TV TRACK OFF then click AQ OUT...the TV display disappears... and look at the telescope server and wait 6 seconds until it reads AQ OUT and then, lock the TT.
4. Rotation in telescope server is not updating. Type “tcs start” in server window to reinitialize rotation updating.
5. Sometimes the T/T comm will drop a bit. Unclick and relick send.
6. If things still don’t work it’s time for some power down and power ups. Turn off T/T Comms, then Tip Tilt, and Comms power for each telescope. This helps sometimes (for example of the star is pushed to edge of the T/T field).
7. If things still won’t lock, try quitting the wobble server, the telescope servers and the central structinzers. Try again. Don’t forget to reopen on central scruturer, ‘tdate’ the telescope servers, and reopen the various control GUIs.
8. If you lock the star, but the lock is really bad and you think it should be better (bright star, good seeing). This probably means the photomultipliers need to be aligned. As an expert, like PJ or Judit. The CCD system will be coming soon!



Cart Operation Notes

1. To set position of reference cart, type position in Central Scrutinizer and click 'REF'.....

Wait....this reference position (here, 30 meters) should show up in the OPLE server. See E2 is Reference and the Target (m) is 30.0000001...

Here W1 is the moving cart. If it is tracking HOME and the target is less than zero, then move the reference cart back (if possible) by setting a new REF value in CNTRL_SCRT.

Be careful. Always watch for warnings on the OPLE server. Turn the carts OFF if there is a problem.

On the East-West Baselines, carts move fast. Minimize backward scanning of carts. Scan through fringes in the direction the carts are tracking.

Sometimes OPLE will behave funny. Make sure the clock on the OPLE is synched with GPS. Astromod could have the wrong time. One time OPLE refused to acknowledge the correct reference cart. When this case, restart of the OPLE server.

The screenshot shows the CENTRAL SCRUTINIZER interface. At the top, it displays LOCAL TIME: 21:34, CHARA TIME: 04:34, and SIDEREAL TIME: 13:01. Below this are sections for CALIBRATOR 1 and CALIBRATOR 2, each with fields for NUM, IRC, WHEN, HR, HD, and SAO. A 'REF' field is circled in red, showing the value 30. Below the calibration sections are buttons for JOB QUEUE operations and a section for BEAM 5 and BEAM 6 settings. At the bottom, there is a terminal window displaying the following log output:

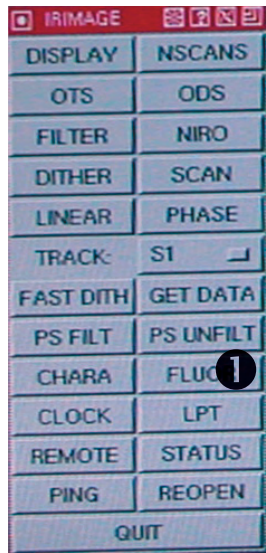
```

astromod command: rsh ctrscrut astromod -b E2 5 -b W1 6 -f E2 -p E2 5 -p W1 1 -s -o 187233 &
Telescope E2 slew complete.
Telescope W1 slew complete.
Telescope E2 failed to find star.
ople: New reference: 30.000000 0.000000
ople: Reference cart E2 set to 30.000000m and 0.000000m/s.
Telescope W1 failed to find star.
wobble: E2 Detector RMS = 0.36" r0 = 6.5cm Seeing 1.01"
wobble: W1 Detector RMS = 0.34" r0 = 2.3cm Seeing 2.41"
Star sequence complete.
Beam 5: E2 END Beam 6: W1 POP1 Reference: E2
Telescope E2 tip/tilt communications working.
Telescope W1 tip/tilt communications working.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
metrol: Metrology on W1_UNK may have failed.
metrol: Metrology on E2_UNK may have failed.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
E2: TELESCOPE E2 3.11 accepted connection from wobble.chara-array.org.
W1: TELESCOPE W1 3.11 accepted connection from wobble.chara-array.org.
  
```

The screenshot shows the OPLE_SERVER interface. It displays local and chara times, and a table of cart status. The table has columns for OPLE Card Status, Laser E, Target m, Error m, and a set of flags (FH FS HM ES EH). The data is as follows:

OPLE Card Status	Laser E	Target m	Error m	FH FS HM ES EH
S1 SEL_TARGET_DONE	-6.632500132	+33.115175662	-39.747675794	X
S2 SEL_TARGET_DONE	+0.046343548	+31.718015211	-31.671671663	X
E1 SEL_TARGET_DONE	-6.694920173	+91.240934633	-97.935854806	
E2 HOMESSET_DONE	+29.591261888	+30.000000001	-0.408738113	
W1 HOMESSET_DONE	+4.305743251	+7.6878241939	-3.382080942	
W2 SEL_TARGET_DONE	+6.599838518	+29.260141658	-22.660303139	X

Scan for Fringes with CHARA



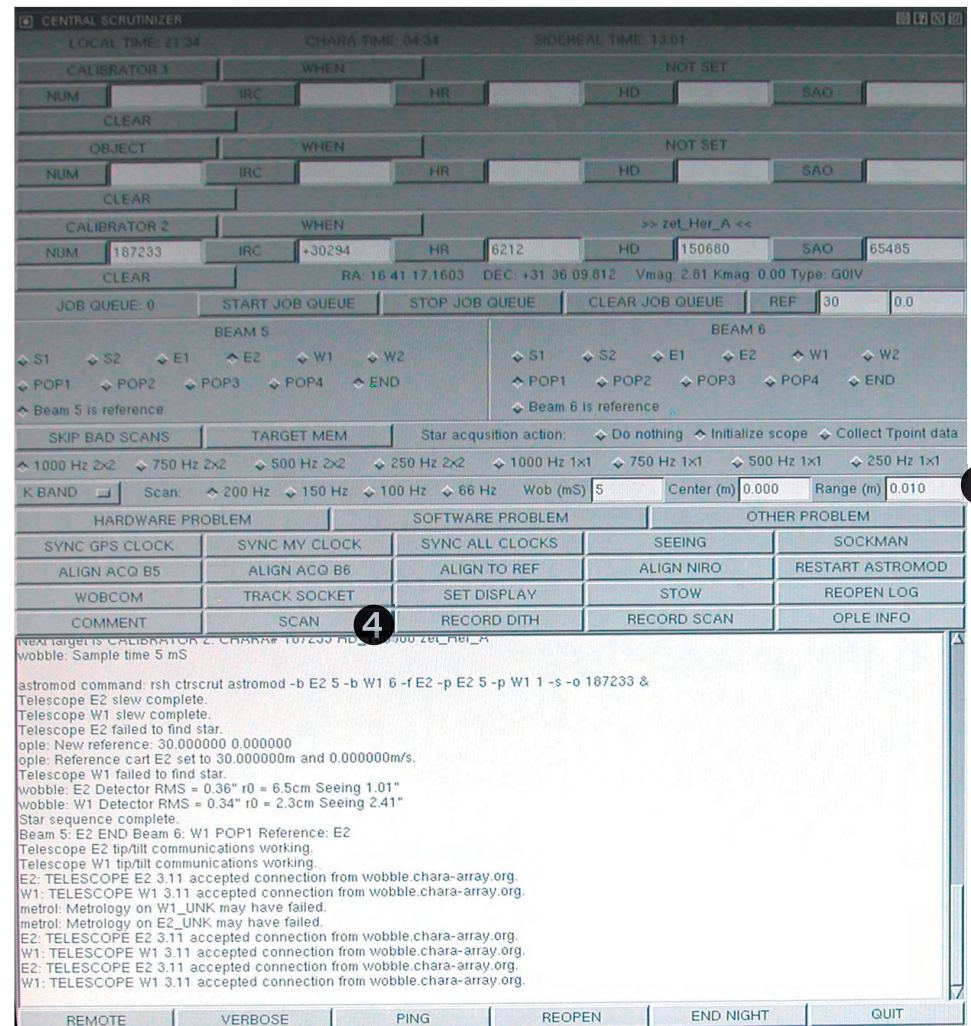
1. On IRIMAGE control GUI click the FLUOR button (you may have already done this)
2. On FLUOR OS click 'Send to CHARA'. Make sure you get sensible counts in the IRIMAGE server.
3. On CENTRAL SCRUTINIZER fill in Center (m) and Range (m) fields:

Center (m): 0.0
Range (m): 0.05 (5 cm)

4. click SCAN button on CNTRL SCRT to begin scan. Some times central struct complains the carts aren't tracking...this is probably nonsense. Click START JOB QUEUE

Displays and GUIs will pop up.

5. When you see fringes hit HOLD! then SEND!



Shut Down

1. Pull up the CHARA internal Documents shutdown list on Netscape. Follow these directions.
2. Make sure to close all mirrors **before** the dome slits.
3. Make sure all telescope enclosures are closed.
4. After the lab is shut down, double check doors are locked and closed and HVACs on ON!