



CERRO TOLOLO INTER-AMERICAN OBSERVATORY

Observing Procedures
Cassegrain Spectrograph + ArCon
for NOAO and SMARTS Observers

1.5 m Telescope

March 2003

Introduction

CCD SPECTROMETER OBSERVER

Dear Visiting Observer:

Observer Support personnel will set the detector and equipment during the first afternoon of your run. They will carry out a preliminary check out of its operation. Besides they will act as the first point of contact if you require further information, or if problems arise. Observer Support personnel will be also happy to render any additional assistance that may become necessary during your run.

Please record equipment problems or special request in the "Nightly Telescope Report" kept at each telescope. The daytime staff will respond to your comments. Recording equipment problems resulting in lost observing time will help us to set priorities corrective action.

Report forms are found at:

http://www.ctio.noao.edu/org/actr/nightreports/nightly_reports.html

HELP ON THE MOUNTAIN:

From about 12:00 pm until midnight:

Observer's Support : Phone Ext. 421 : Edgardo Cosgrove / Arturo Gomez

Observer's Support : Phone Ext. 420 : Ricardo Venegas / Daniel Maturana

Data Reduction Support : Phone Ext. 422 : Hernan Tirado / Patricio Ugarte

AFTER MIDNIGHT:

Phone Ext. : 400 - 401 = 4 m Telescope : Night Assistant

PAGING SYSTEM:

In case you cannot reach any of the above persons by calling their extensions, you can page them by dialing 17, your page call will be heard in all facilities of the observatory. This paging system is always enabled at all times.

What follows is, therefore, only intended to serve as a guideline.

HAVE A GOOD OBSERVING RUN.

Edgardo Cosgrove V.
Sergio Gonzalez H.
March 2003

FIRST AFTERNOON

CONTROL ROOM:

At the CONTROL room you will find the following terminals and other equipment for the observation:

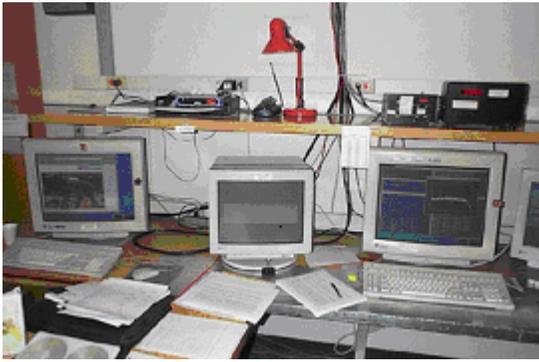
- SUN CTIO60, that may be used for data reduction, e-mail, and Internet access. However this SUN is not enabled for dumping data into tapes since the tape driver is associated to ctioa2 SUN
- REAL TIME DISPLAY
- MONITOR #2 ctioa2 with ARCON Acquisition (blue colored window), and IRAF reduction (red colored window). This is the terminal you will use for data acquisition, and displaying objects.
- XIMTOOL monitor. You may use this XIMTOOL monitor for displaying your objects, or you may implot them in the ctioa2.
- On top shelf: above ctioa2:
- Slit Width Control Box: this is the Comp Lamp Source, it has ON and OFF switches. Green light indicates lamps are OFF, red light indicates lamps are ON. It also has switches for closing and opening the slit. There are also two new switches for Quartz/Neon. Ask the observer support for instruction of how to use them.
- Telescope Focus
- Dome Flats Lamp Switch
- GAM PC GUIDER (Guider Acquisition Module). Attached to this GAM PC there is a gray hand paddle for moving the guide probe used to find guiding stars
- GAM PC Monitor. This PC monitor displays the field of view of the instrument, and the field where the probe moves to find guiding stars
- Telescope Control System PC, hereafter the TCS
- SLIT VIEWER MONITOR that displays the targets you are to observe. This device is used for adjusting the Slit Viewer Monitor image. Attached to this device is the hand paddle for manually slewing the object to the slit, which also has two buttons for adjusting the focus
- On top Shelf: above TCS:
- MODEL 62 TELESCOPE CONTROLLER with the following switches:
 - DRIVES
 - TRACK
 - DOME logic switch
 - DOME tcs
- TELESCOPE MONITOR STATUS
- PC Monitor displaying weather conditions
- np60 Printer

MANUALS:

-Manual (hard copy) may be found on one of the shelves in the control room

If you need to be reached on the telescope extension, the following numbers must be dialed from abroad:

0-11-56-51 205464-466



ctio60 real time display



ctioa2 ximtool monitor PC Guider GAM PC



Slit width control box – Telescope Focus DomeFlat light switch



TCS – slit viewer monitor - telescope status monitor



MODEL 62 TELESCOPE CONTROLLER

INITIAL SETUP AND CHECKOUTS:

The Observer Support staff, at the start of your observing run, will check that the instrument is operating correctly, and that all hardware functions.

A. SPECTROGRAPH SETUP AND CHECKOUTS:

The Observer Support personnel will assist in setting up the spectrograph during the first afternoon of your run and will carry out some preliminary checkouts of its operation.

The instrument set up procedure includes the following steps:

- Setting the detector parameters.
- Spectrograph collimator and camera focusing
- Adjustment of detector rotation
- Selection of appropriate grating tilt.
- Selection of slit width.

B. CCD PARAMETERS:

The Observer Support will set some instrument parameters:

- Gain
- CCD Readout Format.ROI (Region-Of-Interest)

For full detail of parameters files refer to Telescopes & Instruments section on <http://www.ctio.noao.edu>

D. PARAMETERS FILES:

Most of the details are inside the parameters files. You can check those parameters files by typing on the ARCON Acquisition window (blue-colored):

<i>ccdinfo</i>	ccdinfo = Print detpars contents and gain table
<i>lpar detpars</i>	detpars = A parameter set defining the detector parameters
<i>lpar instrpars</i>	instrpars = A parameter set defining the instrument parameters
<i>lpar telpars</i>	telpars = A parameter set defining the telescope parameters
<i>lpar obspar</i>	obspar = A parameter set defining the observing parameters

You will find a "**1.5 m CCD SPECTROMETER SETUP**" sheet with all parameters you want for your observing run.

D. DATA STORAGE:

On the ARCON Acquisition window (blue-colored) type:

disk To check that you have lots of disk space

show home To know where your home directory is. /ua21/vxx (vxx, visitor account)

show imdir To know where your pixel files are stored. /ua23/iraf/vxx

E. DAT/ EXABYTE TAPES:

About the Dat/Exabyte drive refer to the "CTIO.web pages".

The Observer Support will provide you with the information about the dat/Exabyte tape's procedure during your run. Dat/Exabyte drives are located at the back area of the control room.

**IT IS YOUR RESPONSIBILITY TO CHECK THAT THE INSTRUMENT IS
OPERATING TO YOUR SATISFACTION.**

DAILY ROUTINE

IN THE AFTERNOON

SAVING DATA.

Record on tape all raw data from the night before.
Make sure you have enough tapes for your observing night.

DISKS SPACE.

For checking the space disk type the following commands:

disk it displays disk space.

imdel command to make room on the observing disk.

POINTING THE TELESCOPE FOR CALIBRATIONS.

Make sure the telescope is pointing at the white spot.
Usually the Observer Support staff points the telescope at the white spot for dome flat fields.

TAKING ZEROS or BIAS.

Further ahead is explained the procedure for taking Zeros or Bias exposures.

TAKING DOME FLAT FIELDS.

The Observer Support staff usually points the telescope at the white spot for flat fields,
Further ahead it is explained the procedure for taking DOME FLAT FIELDS exposures.

Make sure that all your calibration exposures are completed early enough to allow opening the dome one hour before sunset to ventilate the dome in order to minimize "dome seeing" and refill the dewar with liquid nitrogen.

DINNER TIMES.

Dinner: 5:30 p.m. during March, April, May, September, 5:00 p.m. during June, July and August and 6:30 p.m. during October, November, December, January, February.
If you are going to take Sky flats, be at the telescope before sunset.

AT SUNSET **TAKING SKY FLAT FIELDS.**

Usually the Observer Support staff points telescope for sky flat fields.
Right after sunset, start test for sky flats. See How to take Sky Flat Fields.

NIGHTLY ROUTINE **SETTING THE TELESCOPE.**

The Observer Support will assist you by pointing the telescope on a bright star near the zenith. He will center the star on the SLIT VIEWER monitor.

FOCUSING THE TELESCOPE.

The Observer Support will assist you during the focus frame procedure that will be explained further ahead.

OBSERVING.

You may now start (or "Do Science") your observing programme.

REFILLING THE DEWAR.

Refill the dewar during the night at scheduled hour (midnight and end of night).

AT THE END OF THE NIGHT

- Close the dome and refill the DEWAR.
- Fill out the "Nightly Report Form", please record any equipment problems encountered during the night, or special requests.
- It is advisable to turn off all monitors and room lights as you leave the telescope.

NOTE: It is your responsibility to refill the DEWAR at the scheduled hours mentioned above. After those times it is the Observer Support on shift who will perform this operation in the morning and in the afternoon when opening the telescope dome for starting the observation.

BEFORE STARTING CALIBRATION YOU SHOULD CHECK THE FOLLOWING

On the platform:

DOME FLATS

- Go to the platform and check that all the flat field lamps are ON by noting that three lamps are lit on the top of the telescope.
- Check if the telescope is pointing at the white spot.
- Make sure mirror cover is open.

On the Spectrograph:

- Check that both Newall masks are open
- Keep the grating tilt.
- Select DECKER position according to your set up.
- Check that filter control knob is in CLEAR or FILTER position, depending on whether a blocking filter is in use.

CALIBRATION EXPOSURES PROCEDURES

Take calibration exposures during daylight hours. Observer Support staff will help you to take these calibrations on the first afternoon of your run.

Make sure that all your calibration exposures are completed early enough to allow opening the dome one hour before sunset to ventilate the dome in order to minimize "dome seeing" and refill the DEWAR with liquid nitrogen

Before starting up with calibrations please be reminded that you have to create your own directory where data will be stored. You will also have to edit the obspar parameters.

HOW TO TAKE ZEROS or BIAS

In control room:

- Turn on the monitors.

On the platform:

- Make sure dome lights are OFF.

In the control room:

Use the **Observe** command to start a Zero (or Bias) sequence.

This command takes one or more ccd exposures, as in the following example:

On the ARCON Acquisition window type:

cl> **observe**

Exposure type (|zero|dark|object|dflat|sflat|focus) (zero): **zero**

Number of exposures to take (1:) (1): **15**

Title of picture (. .): **Bias Night1 (or so)**

- At the end of the sequence a message will be printed stating: **sequence finished**

```

ARCON Acquisition
c1> observe
Exposure type (|zero|dark|object|comp|pflat|dflat|sflat|focus) (zero): zero
Number of exposures to take (1:) (10): 10
Title of picture (Bias): Bias/Zero
c1>
Image zero001 written to disk
Image zero002 written to disk
Image zero003 written to disk

Image zero004 written to disk
Image zero005 written to disk
Image zero006 written to disk
Image zero007 written to disk
Image zero008 written to disk

Image zero009 written to disk
Sequence finished...
Image zero010 written to disk
  
```

DOME FLAT FIELDS

TELESCOPE POINTING:

The Observer Support usually comes to the telescope at noon and points the telescope at the white spot for dome flat fields

HOW TO TAKE DOME FLAT FIELDS:

Depending on your particular setup (grating, observing tilt, slit width,) you should take one dome flat, covering the whole spectral range. Take a set of two dome flats at two different slit width if you should also observe flux standard stars using a wide slit.

If you have to take one dome flat covering the whole spectra range then the sequence will be:

- Dome Flat Field.

If you have to take set of two dome flats at two different slit width, then the sequence is:

- Dome Flat Field, using a narrow slit, and
- Dome Flat Field, using a wide slit,

In control room:

Set slit width by using the OPEN/CLOSE switches on the slit control box

TURN ON dome flat lamp light switch located on the rack where SPEC T° is displayed.

On the ARCON Acquisition window (blue-colored) type:

cl> **test**

Exposure type (|zero|dark|object|comp|dflat|pflat|sflat|) (comp): dflat

Number of exposures to take (1:) (1): 10

Exposures time (zero. .): (120.): 60

Title of picture (. . .): I.e., Dome Flat 2" slit n1

If everything is ok, repeat the task by typing: **observe**

Loral1K_1 [1:1200, 150:649] bin=[1:1], gain 5

At the end of the sequence **TURN OFF** the dome flat lights.

Taking PFLAT

Go to the platform

On the spectrograph

- Move the prism (HeAr or Neon knob) to Quartz position

On the gray box at the opposite side of the spectrograph:

- Disable He-Ar or Neon lamp, moving the switch down.

- Enable Quartz lamp, moving the switch up.

In the control room:

On the slit width control box turn lamp on, moving the switch up and red light should be on.

Take **test** pflat sequence.

On the ARCON Acquisition window (blue-colored) type:

c|> **observe**

Exposure type (|zero|dark|object|comp|dflat|pflat|sflat|) (comp): **pflat**

Number of exposures to take (1:) (1): **10**

Exposures time (zero. :) (120.): **10**

Title of picture (. . .): I.e., **Pflat**

Loral1K_1 [1:1200, 150:649] bin=[1:1], gain 5

When the PFLAT sequence is finished do the following:

Go to the platform, on the spectrograph:

- Move the prism (Quartz knob) to HeAr or Neon position

On the gray box at the opposite side of the spectrograph:

- Disable Quartz lamp, moving the switch down
- Enable He-Ar or Neon lamp, moving the switch up.

In the control room:

On the slit width control box turn lamp off, moving the switch down and green light should be on.

DOME OPENING PROCEDURE

The Observer Support performs the dome opening procedure before sunset. Nevertheless, if you are going to open the dome by yourself after midnight, since the weather conditions did not permit to do so earlier you will be informed by the 4 m telescope Night Assistant that you may proceed to open the dome. Therefore you will have to do the following steps assuming that the telescope is at the ZENITH position, and the dome is facing the east.

Please be reminded that the 4 m telescope Night Assistant is entitled to order the immediate closure of all telescopes if the weather conditions are not good for keeping the observations.

In control room:

- Turn on telescope drives
- Do not enable track switch

On the platform:

Since the dome will be dark, for safety reasons turn on some dome lights, and make sure there are no objects in the surrounding of the telescope so no damage might occur.

On the old platform console you will find the switches for:

- Turning on Power
- Pressing reset panic red button
- Turning on telescope drives
- Lowering windscreen
- Opening dome shutter
- Opening the Dome Slides, (for doing this follow the instructions below)
- Opening mirror cover

For opening the Dome slides

- You will find a switch on the handrail as you reach the top of the stairs (to your left) that must be turned on.
- Next to the dome shutter there is a panel, here you have to press just once the OPEN button.
- Once all slides are open, you will have to turn off the switch located on the stairs.

TWILIGHT/SKY FLAT FIELDS

TELESCOPE POINTING

The Observer Support will reach the telescope one hour early before sunset to perform the following:

- Turn on DRIVES
- Open the dome
- Open dome slides
- Open mirror cover
- Refill the dewar, and
- Set the telescope for Sky Flat Field position, usually the ZENITH, yet telescope position may change upon the observer request.

When you arrive to the telescope everything will be already set for starting to take these calibrations.

HOW TO TAKE SKY FLAT FIELDS

In control room:

Set slit width by using the OPEN/CLOSE switches on the slit control box

- Make sure the dome flat lamplights, and dome lights are OFF.
- Enable TRACK and auto dome
- Start sky flats sequence right after sunset.

Take a short **test** exposure so that an exposure of 1 or 2 seconds gives . 20,000 counts.

On the ARCON Acquisition window (blue-colored) type:

c|> **test**

Exposure type (|zero|dark|object|comp|dflat|pflat|sflat) (comp): **sflat**

Number of exposures to take (1:) (1): **1**

Exposure time (0.:) (120.): **2**

Title of picture (. . .): i.e. **Sflat night**

When the amount of counts needed are reached do the observation by typing:

c|> **observe**

Exposure type (|zero|dark|object|comp|dflat|pflat|sflat|focus) (comp): **sflat**

Number of exposures to take (1:) (1): **1**

Exposure time (0.:) (120.): **e.g 30**

Title of picture (. . .): i.e. **Sflat night**

Loral1K_1 [1:1200, 150:649] bin=[1:1], gain 5

During the read-out between each sky exposures, you may jog (offset) the telescope a few seconds. You should have time to take 3-4 sky flats.

COMPARISON PROCEDURE

In some spectral regions it may be necessary to take both long and short exposures to get sufficient signal-to-noise. Take long exposure for the weak lines. Take short exposure so as not to saturate the strongest lines.

Comparison Lamps are He-Ar and Neon

In control room:

Set slit width on the slit width control box.

Turn on the comparison source. The switch is on the slit width control box. Green light indicates lamps are OFF, red light indicates lamps are ON

On the ARCON Acquisition window type:

c|> **observe**

Exposure type (|zero|dark|object|comp|dflat|pflat|sflat) (comp): **comp**

Number of exposures to take (1:) (1): **1**

Exposure time (0.:) (120.): **5**

Title of picture (. . .): i.e. **HeAr night**

Loral1K_1 [1:1200, 150:649] bin=[1:1], gain 5

Turn off the switch for the comparison source when exposure is over.

PROCEDURE FOR STARTING THE NIGHT

An Observer Support staff will be available to help you getting started at the beginning of your first night.

CHECKOUT:

In the control room: turn on the following:

- All monitors: if either of them is OFF
 - o Telescope Status Monitor
 - o TCS monitor (Dell)
 - o Slit viewer monitor (Sony)
 - o GAM PC monitor (Dell)
 - o PC guider

On MODEL 62 TELESCOPE CONTROLLER

- Drives
- Track
- DOME logic switch
- DOME tcp
- GUIDER switch (this switch may remain ON all night long since guiding operations are enabled when the GAM PC GUIDER is ON)

ZPOINT:

On the first night the Observer Support will check the telescope pointing on a bright star near the zenith. He will position the telescope so that the star is on the center of the slit viewer monitor.

Selecting a bright star for ZPOINT

For finding a bright star near the ZENITH, refer to the ASTRONOMICAL ALMANAC and select a star by writing down the star HR number in the B. Slew Bright section of the TCP Main Menu screen. Before slewing the telescope to the target, check coordinates on the Telescope Status Monitor.

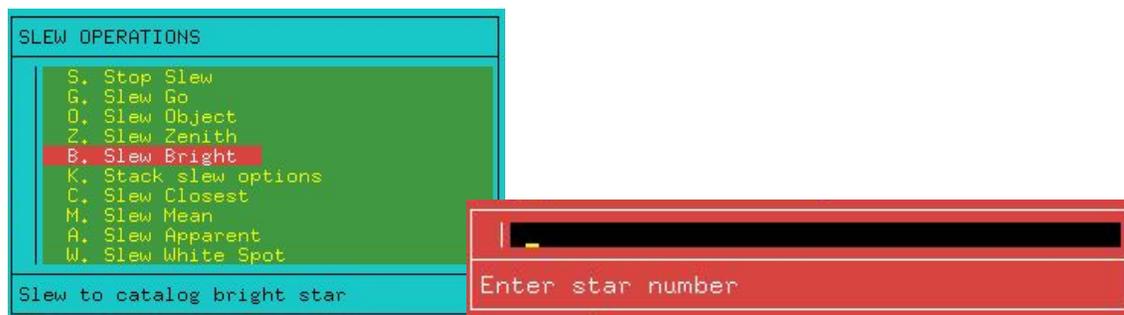
On the TCS terminal:

The TCS monitor should display the TCP Main Menu screen

NOTE: if the TCP Main Menu has another sub screen open, for going back to the TCP Main Menu window always press <ESC> key, since every command e.g. Slewing, Offset motion, etc., open a sub window

On the TCP Main Menu screen type the following:

- S. Slewing
- On the SLEW OPERATION window select
 - o B (slew bright)
 - o Enter star HR number from the ASTRONOMICAL ALMANAC



Bright Stars from Astronomical Almanac

HR N	NAME	RA	DEC	EPOCH	COMMENTS
35	θ Scl	00 11 43.9	-35 07 59	2000	5.25, F4V
118		00 30 22.6	-23 47 16	2000	5.19, A5Vn
293	σ Scl	01 02 26.3	-31 33 07	2000	5.50, A2V
441		01 31 43.2	-30 17 00	2000	5.82, KOIII
612	ν For	02 04 29.4	-29 17 49	2000	4.69, B9.5pSi
749		02 33 50.6	-28 13 57	2000	4.90, B9.5V
914		03 01 37.6	-28 05 29	2000	5.89, G5IV
1088	τ5 Eri	03 33 47.2	-21 37 59	2000	4.27, B8V+B8V
1275		04 05 37.4	-27 39 07	2000	5.59, F1IV
1439		04 30 40.3	-35 39 13	2000	5.96, KOII
1628		05 02 09.8	-26 16 31	2000	5.02, K1III
1862		05 31 12.7	-35 28 14	2000	3.87, K1IIIa
2140		06 03 15.5	-26 17 04	2000	5.04, K3III
2361		06 28 10.1	-32 34 49	2000	4.48, B4V
2646		07 01 43.1	-27 56 06	2000	3.47, K7Ib
2881		07 30 42.5	-30 57 44	2000	4.65, G3Ib
3170		08 04 16.1	-32 40 30	2000	5.31, M1Ib
3362		08 30 28.5	-32 09 34	2000	5.65, K2III
3628		09 08 02.8	-25 51 30	2000	4.58, K4III
3790		09 31 32.8	-35 42 54	2000	5.87, K4III
3956		10 02 49.2	-30 34 39	2000	6.54, K1III
4118		10 29 35.3	-30 36 26	2000	5.56, B9.5V
4314		11 05 19.9	-27 17 36	2000	4.94, F3IV
4449		11 32 54	-31 05 14	2000	5.04, M2IIIb
4623		12 08 24.7	-23 43 44	2000	4.02, F2III-IV
4786		12 34 23.2	-23 23 48	2000	2.65, G5II
4947		13 06 54.2	-35 51 43	2000	5.65, AOIV-III
5097		13 32 35.8	-28 41 34	2000	5.69, A1Vn
5287		14 06 22.2	-26 40 56	2000	3.27, K2III-IIIbC
5407		14 28 10.3	-29 29 30	2000	4.97, B8V
5595		15 02 59.1	-32 38 37	2000	5.44, B3V
5794		15 37 01.4	-28 08 06	2000	3.58, K3III
5967		16 03 24	-38 36 09	2000	4.89, B6IV
6165		16 35 52.9	-28 12 58	2000	2.82, BOV
6310		17 00 09.4	-24 59 21	2000	5.75, F4V
6316		17 01 52.6	-32 08 37	2000	5.03, B8V
6508		17 30 45.7	-37 17 45	2000	2.69, B2IV
6746		18 05 48.4	-30 25 27	2000	2.99, KOIII
6960		18 33 57.7	-33 01 00	2000	5.28, B2IV-V
7194		19 02 36.6	-29 52 49	2000	2.60, A2II+A4IV
7431		19 36 01.6	-24 43 09	2000	5.65, Am
7623		19 59 44.1	-35 16 35	2000	4.37, B3IV
7832		20 30 56.7	-29 06 45	2000	6.39, d:A6
8039		21 01 17.4	-32 15 28	2000	4.67, G6II
8230		21 32 14.5	-33 56 41	2000	5.97, A2Ivv
8386		22 00 50.1	-28 27 13	2000	5.42, B8Ve

Filename : Sao.z, std.

Focus stars

SAO#	R.A.	DEC	EPOCH	Mag. V
192338	00 00 31.90	-35 22 30.07	1950	9.9
192598	00 30 13.45	-35 42 03.34	1950	9.0
192883	01 00 00.88	-30 39 38.73	1950	9.2
193175	01 30 56.77	-35 08 58.44	1950	9.4
193463	02 00 00.91	-30 07 43.95	1950	9.5
193760	02 30 15.16	-30 43 51.28	1950	9.9
194050	03 00 13.00	-30 40 46.33	1950	9.2
194363	03 30 23.57	-33 40 06.78	1950	8.8
194707	04 00 02.22	-30 36 25.74	1950	8.6
195111	04 30 21.12	-30 12 45.92	1950	8.8
195515	05 00 51.52	-30 54 21.29	1950	9.2
195933	05 30 03.17	-30 53 08.26	1950	9.2
196431	06 00 24.51	-30 00 45.77	1950	8.4
196921	06 30 53.95	-30 28 10.96	1950	9.5 double
197506	07 00 30.98	-30 17 22.17	1950	9.7
198108	07 30 42.07	-30 09 26.75	1950	9.3
198729	08 00 32.72	-30 04 19.83	1950	9.3
199346	08 30 40.06	-30 40 39.02	1950	9.2
199903	09 00 13.20	-30 42 34.43	1950	9.1
200477	09 30 21.33	-31 10 03.84	1950	9.2
200996	10 00 47.09	-30 01 40.02	1950	9.0
201489	10 30 06.35	-30 32 15.64	1950	9.0
202038	11 00 51.80	-30 26 58.28	1950	9.3
202554	11 30 25.42	-30 48 39.64	1950	5.2
203074	12 00 44.57	-30 59 23.98	1950	9.3
203579	12 30 24.31	-31 22 10.35	1950	8.5
204083	13 00 57.80	-30 18 47.47	1950	9.1 double
204582	13 30 28.26	-31 37 40.44	1950	9.0
205131	14 00 37.84	-30 21 28.36	1950	8.4
205688	14 30 21.82	-30 35 11.57	1950	8.9
206254	15 00 42.44	-30 43 29.97	1950	9.9
206755	15 30 22.91	-30 58 25.12	1950	9.9
207283	16 00 26.53	-30 50 53.10	1950	9.8
207765	16 30 07.40	-31 59 41.49	1950	9.3
208353	17 00 17.76	-30 04 02.45	1950	9.0
208958	17 30 19.34	-30 36 21.62	1950	9.0
209652	18 00 33.50	-32 52 42.68	1950	8.4
210297	18 30 03.43	-30 18.00	1950	9.4
212675	21 00 39.44	-30 55 10.30	1950	9.4
213085	21 30 02.89	-30 21 44.22	1950	8.6
213506	22 00 32.89	-31 50 50.03	1950	8.9
213906	22 30 41.84	-30 35 31.64	1950	9.8
214266	23 00 10.52	-30 07 19.67	1950	9.1
214614	23 30 16.27	-31 29 44.68	1950	9.6

The previous two lists of stars are intended for focusing the telescope. You may select either of them depending on the grating setup for your run. This means for some gratings, stars from the first list will get saturated, therefore you may select stars from the second list.

- The telescope status monitor will display the star coordinates on the NEXT OBJECT line, and prompt saying SLEW REQUEST will blink
- Press G. Slew go for slewing the telescope to the target
- Once slew stops, the star will be displayed on the slit viewer monitor
- Center the star on the slit by using the hand paddle, according to the position you want the star to be set.
- If you want to make sure the star is centered on the detector, on the ARCON terminal, you may take a short 1 sec. test exposure, and once the star is on the desired position on the slit press F8
- When pressing <F8> the following prompt will be displayed:

```
| Are you sure object is centered? (yes/no) No
```

Type YES and Zero Point will be set

FOCUSING:

On the first night the Observer Support will show you the way for focusing the telescope, the steps for doing that are as follows:

- You may focus by using either your first target or a star near the ZENITH listed below
- Slew telescope to the your selected target for focusing, always on the TCP Main Menu window press the following keys:

```
SLEW OPERATIONS
S. Stop Slew
G. Slew Go
O. Slew Object
Z. Slew Zenith
B. Slew Bright
K. Stack slew options
C. Slew Closest
M. Slew Mean
A. Slew Apparent
W. Slew White Spot

Slew to catalog bright star
```

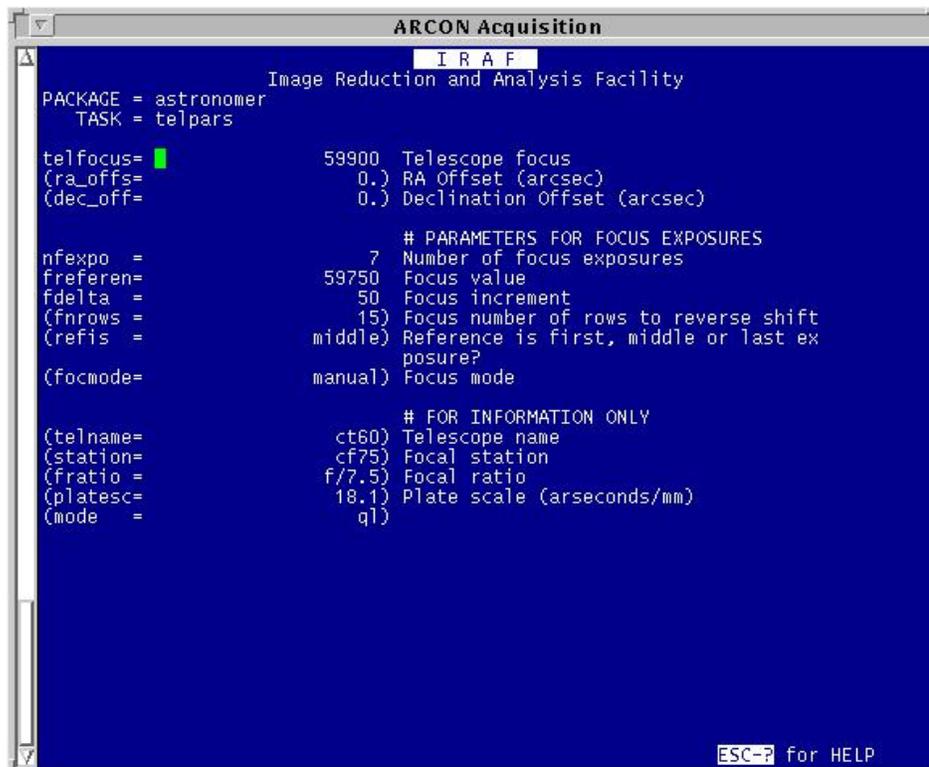
```
Enter star number
```

- Enter star catalogue number <ENTER>
- Press G. for slewing telescope to selected star
- Center star at your desired position in the slit
- Star the focus sequence by typing focus in the ARCON window

NOTE: please notice that focus is not incremented automatically therefore you will have to use the hand paddle to do the increase by pressing the IN/OUT buttons

Before starting focus sequence edit the telpars parameters by typing:

1. ***epar telpars*** <Return>



```

ARCON Acquisition
  I R A F
Image Reduction and Analysis Facility
PACKAGE = astronomer
TASK = telpars

telfocus= 59900 Telescope focus
(ra_offs= 0.) RA Offset (arcsec)
(dec_off= 0.) Declination Offset (arcsec)

# PARAMETERS FOR FOCUS EXPOSURES
nfexpo = 7 Number of focus exposures
preferen= 59750 Focus value
fdelta = 50 Focus increment
(fnrows = 15) Focus number of rows to reverse shift
(refis = middle) Reference is first, middle or last exposure?
(focmode= manual) Focus mode

# FOR INFORMATION ONLY
(telname= ct60) Telescope name
(station= cf75) Focal station
(fratio = f/7.5) Focal ratio
(platesc= 18.1) Plate scale (arseconds/mm)
(mode = q1)

ESC-P for HELP
  
```

The parameters to be edited in this option are:

- a. Focus number of rows to reverse shift = 15
- b. Focus mode = manual

To quit type:
<SHIFT>:wq

2. On the ARCON acquisition window type:

cl> **focus**

```

ARCON Acquisition
c\> focus
Exposure time (0.:) (10.): 10
Title of picture (focus): focus
Number of focus exposures (7): 7
Middle exposure (number 4) of sequence to have Focus value (59700): 59800
Focus increment (50):

Enter focus value
-OR-
  abort - abort sequence
  last - stop sequence after next exposure
  nexposures - change number of exposures

Telescope focus (59650.0000000):
First focus exposure finished...
Telescope focus (59700.0000000):
...additional focus exposure finished...
Telescope focus (59750.0000000):
...additional focus exposure finished...
Telescope focus (59800.0000000):
...additional focus exposure finished...
Telescope focus (59850.0000000):
...additional focus exposure finished...
Telescope focus (59900.0000000):
...additional focus exposure finished...
Telescope focus (59950.0000000):

REMINDER: The double space marks the beginning of the sequence!
c\>
...focus frame complete.
Image focus1001 written to disk

```

Telescope focus (e.g. 58000.0000000):

NOTE: before the first exposure sequence adjust the focus value to the one presented in parenthesis by using the hand paddle. In order to obtain the value presented you will have to move downward, by pressing the IN button on the paddle, about 100 units before you reach the first focus value in the parenthesis, by pressing the OUT button on the paddle.

After the first exposure sequence is finished you will have to use the hand paddle to increase in 50 units the focus by pressing the OUT button. Then press <Return>, and you will have to repeat this procedure for the exposure sequence.

When the focus sequence is finished, it will be displayed on the real time display.

For getting the FWHM do: `implot focus###` in the iraf window (red); on the xgterm (green/black) window type: `<SHIFT>: c600` and the seven frames focus sequence will be displayed; by getting the narrowest width, move the cursor to the bottom of each spectrum and press P in both lines:

```

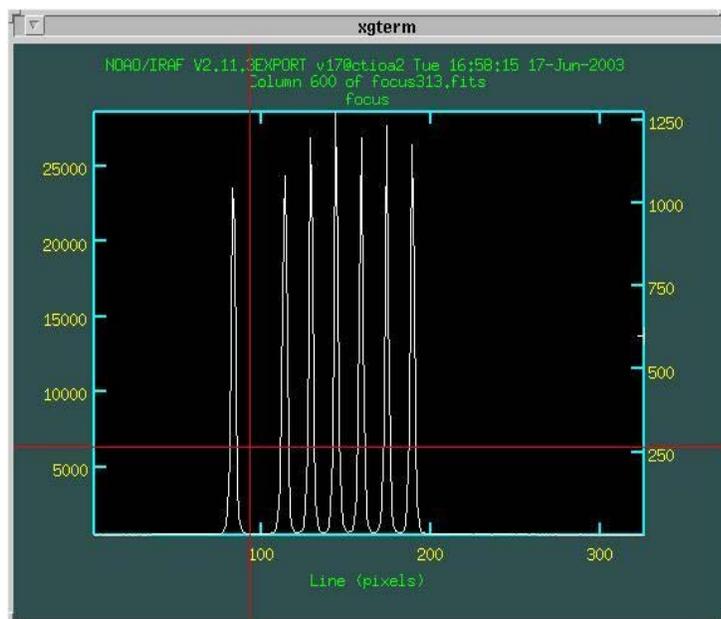
IRAF
NOAO Sun/IRAF Revision 2.11.3 Sat Sep  9 23:18:55 MST 2000
This is the EXPORT version of Sun/IRAF V2.11 for SunOS 4 and Solaris 2.7

Welcome to IRAF.  To list the available commands, type ? or ??, To get
detailed information about a command, type 'help command'.  To run a
command or load a package, type its name.  Type 'bye' to exit a
package, or 'logout' to get out of the CL.  Type 'news' to find out
what is new in the version of the system you are using.  The following
commands or packages are currently defined:

/ua21/v17/smarts/smartsdir.csh: Command not found.
ared.      dbms.      language.  obsolete.  stsdas.    xdmsum.
color.     dimsum.    lists.    plot.      system.
crutil.   finder.    mscred.   proto.     tables.
ctio.     fitsutil.  nmisc.    softtools. unixfocus
dataio.   images.    noao.     spptools.  utilities.

cl> implot focus1001

```



Once you settle you best focus, set it using the hand paddle, but remember you have to move downward about 100 units and reach the focus value from bellow by pressing the OUT button.

NOTE: if you feel you cannot handle this procedure, ask the Observer Support to perform the telescope focus on the platform, by using the “Knife edge” procedure.

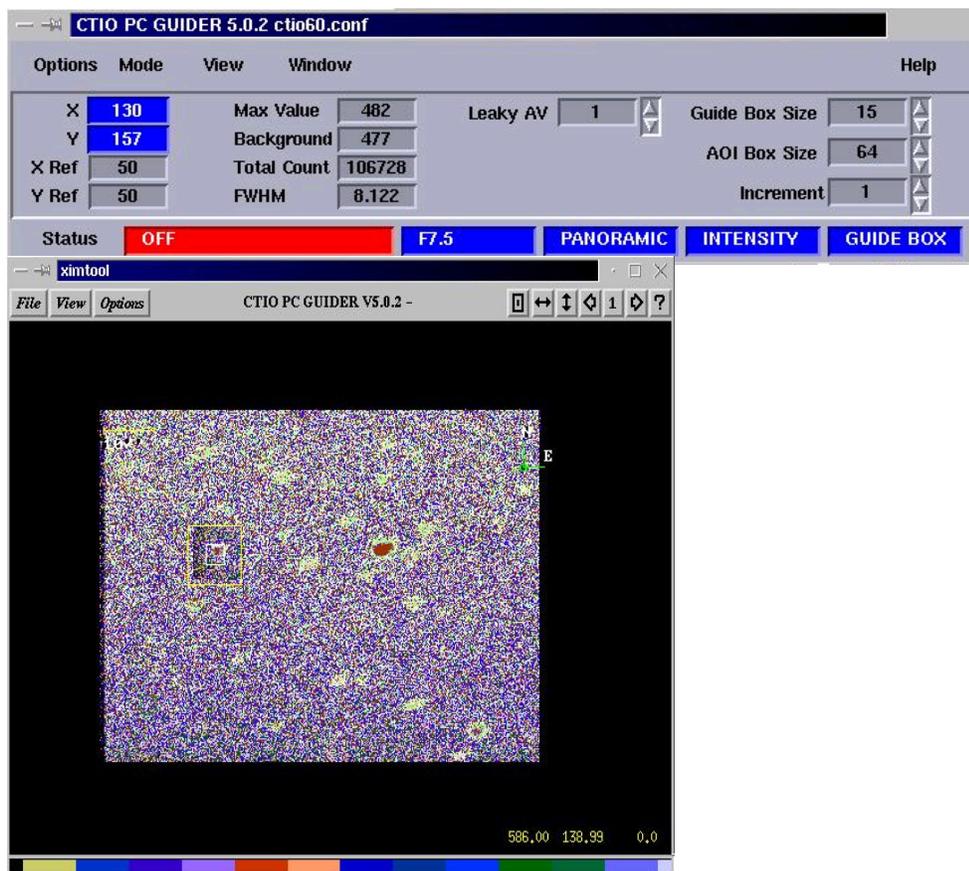
OBSERVING

Starting Observations:

PC GUIDER 5.0.2. Operations:

In order to start the guiding system, the CTIO PC GUIDER ctio60.conf must be enabled by keeping the cursor on the CTIO toolbar.

1. Use the hand paddle to find a guiding star, unless any star appears on the ximtool CTIO PC GUIDER V5.0.2. window.
2. Always keep the cursor on the CTIO PC GUIDER ctio60.conf, so that all functions are enabled at all times.
3. Move the white box towards the star till it is inside the box. For this task use the keyboard cursor arrows. You may increase the box speed by pressing the Increment section on the main CTIO PC GUIDER toolbar from 1 to 10.
4. Once the star is inside the box, press either <F3> or <F9> to star guiding. Remember to turn ON the GUIDER switch from the MODEL 62 TELESCOPE COTROLLER.
5. To stop guiding just press <F8>



NOTE: the <F> functions, <F3> and <F9> refer to two modes of guiding, the PAN and ROI modes. PAN mode displays the whole field of view of the guider ximtool window, and when enabled only the white box will contain the guiding star. This mode is mostly used when stars are rather faint. On the other hand the ROI mode is used with bright stars, in this case both the yellow and white boxes will be centered containing the guiding stars right in the center.

OBSERVING SOFTWARE:

The most useful commands are presented bellow. The "CCD Software Observer's Manual" describes many commands in detail.

Take this section as a quick reference.

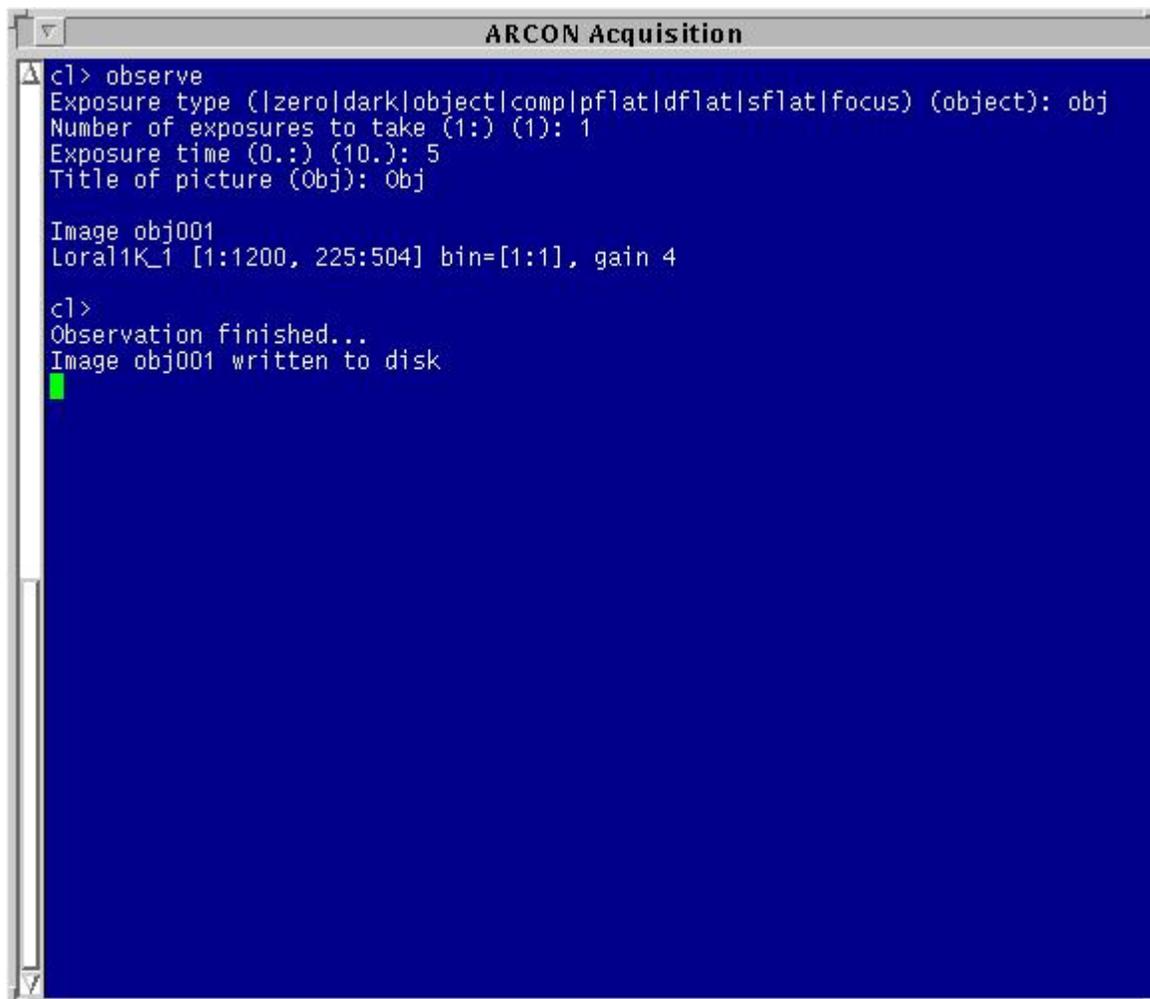
See "The ArCon-IRAF Interface. A Preliminary User's Guide for Direct Imaging."Version 31 March 1994. , 3. : Taking Data. : Observe - the only command you really need to know. Page 31

The most useful commands are summarized here:

- observe - Take one or more exposures prompting for type
- zero - Take one or more bias or zero exposures
- dark - Take one or more dark exposures
- object - Take one or more object exposures
- comp - Take one or more comparison source (HeAr) exposures
- dflat - Take one or more dome flat exposures
- pflat - Take one or more dome pflat (quartz) exposures
- sflat - Take one or more sky flat exposures
- focus - Take a focus frame
- more - Take 1 more exposure of the previous type
- more <n> - Take <n> more frames just like the last one. Equal exposure time, same type and title.
- preview - Take one exposure preview frame. Data are shown on real time display but are not saved to the disk
- stop - Stop exposure and readout the detector
- tchange - Change exposure time
- pause - Pauses current exposure
- resume - Resume paused exposure

DATA ACQUISITION

For starting taking data you will have to type the following on the ARCON Acquisition window:
Whether is an object, zero, comp, sflat, etc.

A screenshot of a Windows-style window titled "ARCON Acquisition". The window has a blue background and contains a terminal session. The text in the terminal is as follows:

```
c] > observe
Exposure type (|zero|dark|object|comp|pflat|dflat|sflat|focus) (object): obj
Number of exposures to take (1:) (1): 1
Exposure time (0.:) (10.): 5
Title of picture (Obj): Obj

Image obj001
Lora11K_1 [1:1200, 225:504] bin=[1:1], gain 4

c] >
Observation finished...
Image obj001 written to disk
```

A small green cursor is visible on the line "Image obj001 written to disk".

Once the image is written to disk you may display it or implot it on the IRAF window

END OF NIGHT

In control room:

Turn off TRACK

- Slew telescope to the Zenith:



- After any slewing operation, press "G" to enable slewing
- Turn off AUTODOME switches, LOGIC SWITCH, ON DOME TCP, on the TCS control panel, when telescope reaches ZENITH position
- Turn off DRIVES

On the platform:

- Turn on dome lights
- Close mirror cover
- Turn off DRIVES
- Close dome shutter
- Close dome slides
- Lift up platform to refill the DEWAR.
- Lower the platform.
- Turn of console POWER
- Turn off dome lights

For closing the Dome slides

- You will find a switch on the hand rail as you reach the top of the stairs (to your left) that must be turned on
- Next to the dome shutter there is a panel, here you have to press just once the CLOSE button.
- Once all slides are closed, you will have to turn off the switch located on the stairs.

In control room:

- Turn off all monitors.
- Fill the CTIO nightly report, note any problems encountered during the night, or special request. Do please submit report and print it.
- Turn off all room lights

NOW SLEEP WELL.

Edgardo Cosgrove V.
Sergio Gonzalez H.

TCS Manual:

This is a brief guide manual for the TCS (telescope control system). We will describe the most used options for controlling the telescope:

This is the Main Menu screen



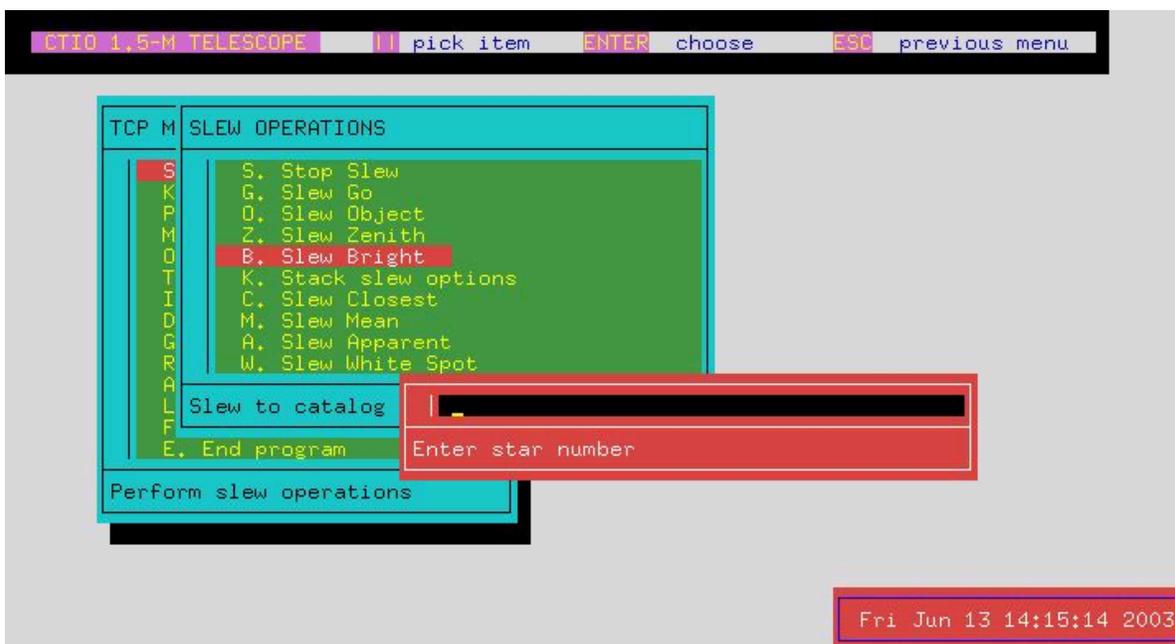
You may access to every options by either clicking with the mouse or by typing the capital letter of the option.

The most used commands you may require are found in the S. Slewing option, as SLEW OPERATIONS:



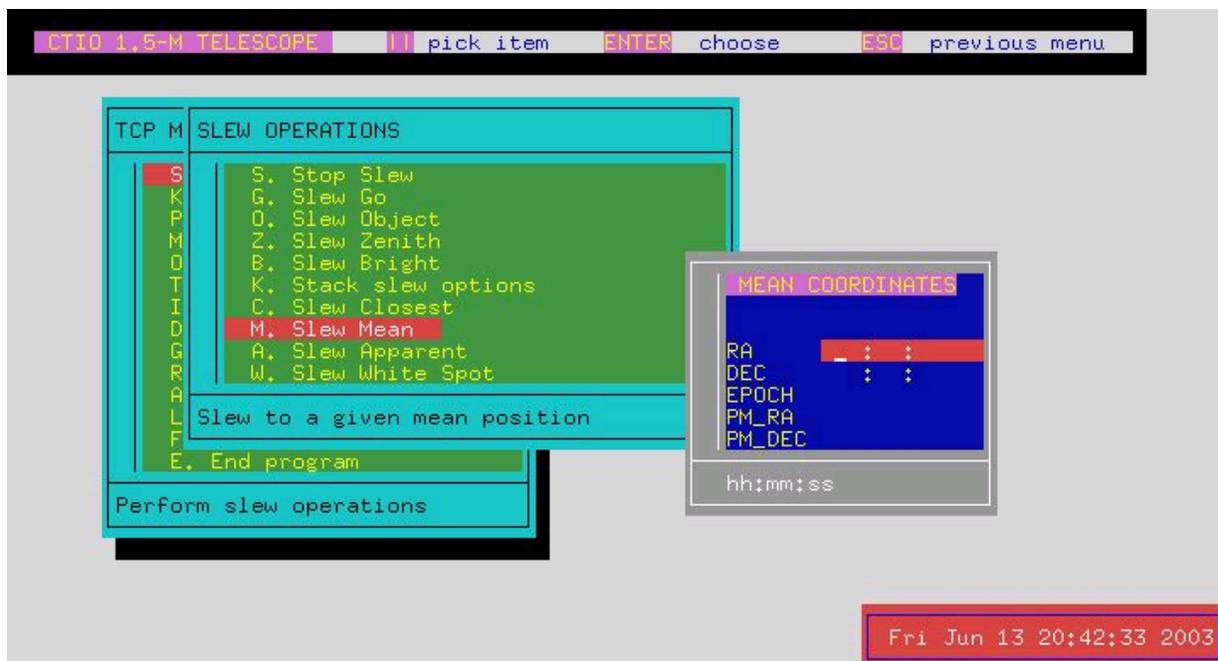
B. Slew Bright

This is the option for slewing the telescope to a bright star for doing the ZERO POINT, and checking the pointing. In the red screen you have to enter the star catalog number from the Astronomical Almanac, then press G to enable slewing.

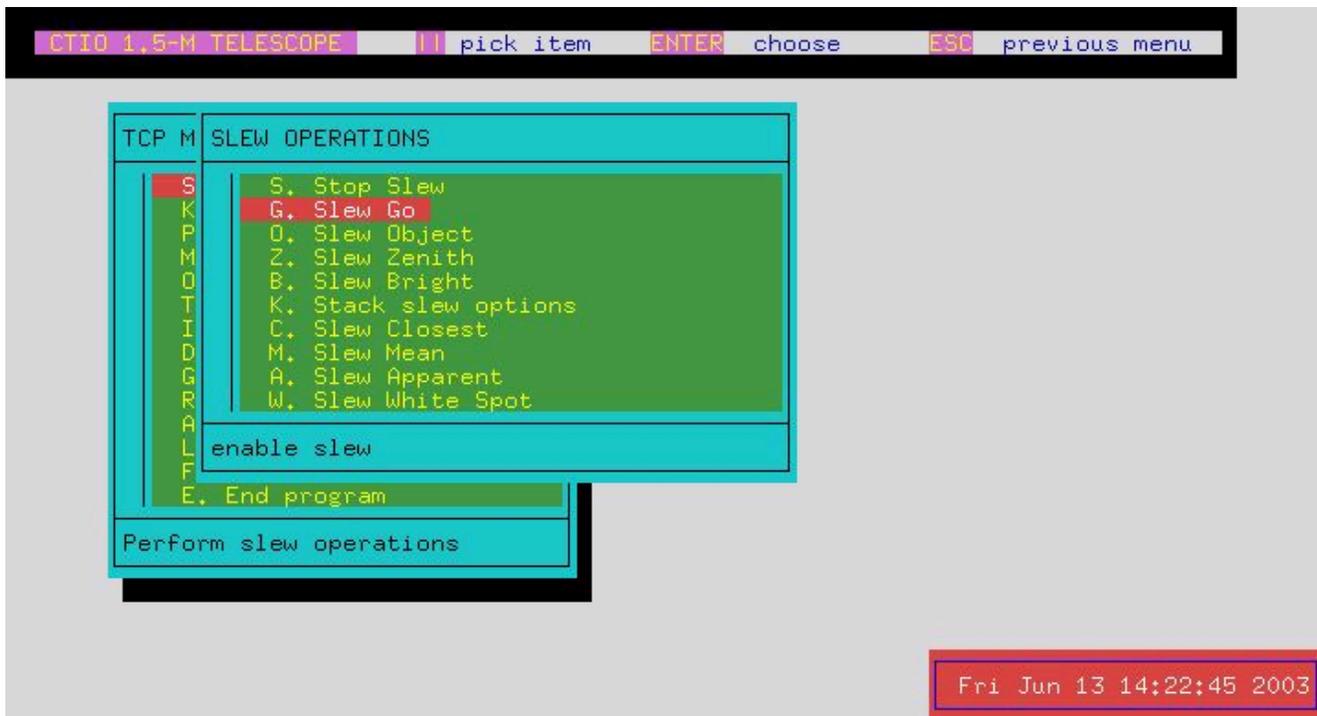


Once you have set the ZERO POINT and checked the telescope pointing, you may start your observations by typing your target coordinates in the following screen, and press <RETURN> after entering the coordinates:

M. Slew Mean



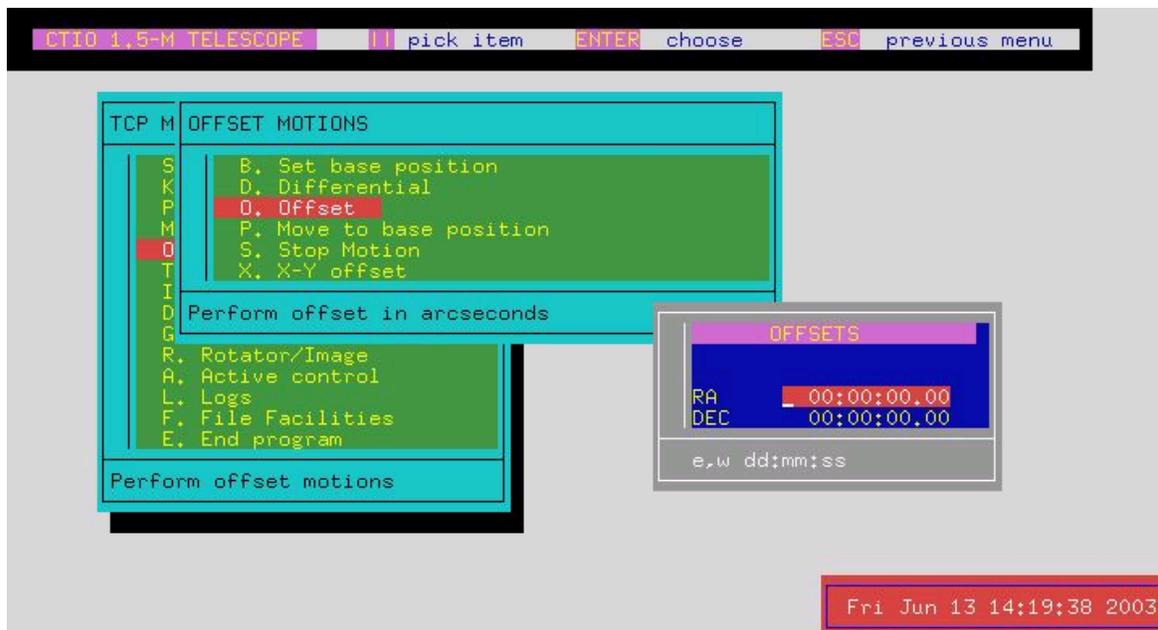
Once coordinates are entered, the Telescope Status Monitor will display a red blinking message saying: "Slew Requested", in order to enable slewing you will have to press G or clicking with the mouse in the following option:



If your target shows in the slit viewer monitor and you want to do some offsets, you may use this option:

From the MAIN MENU:

O. Offsets motion

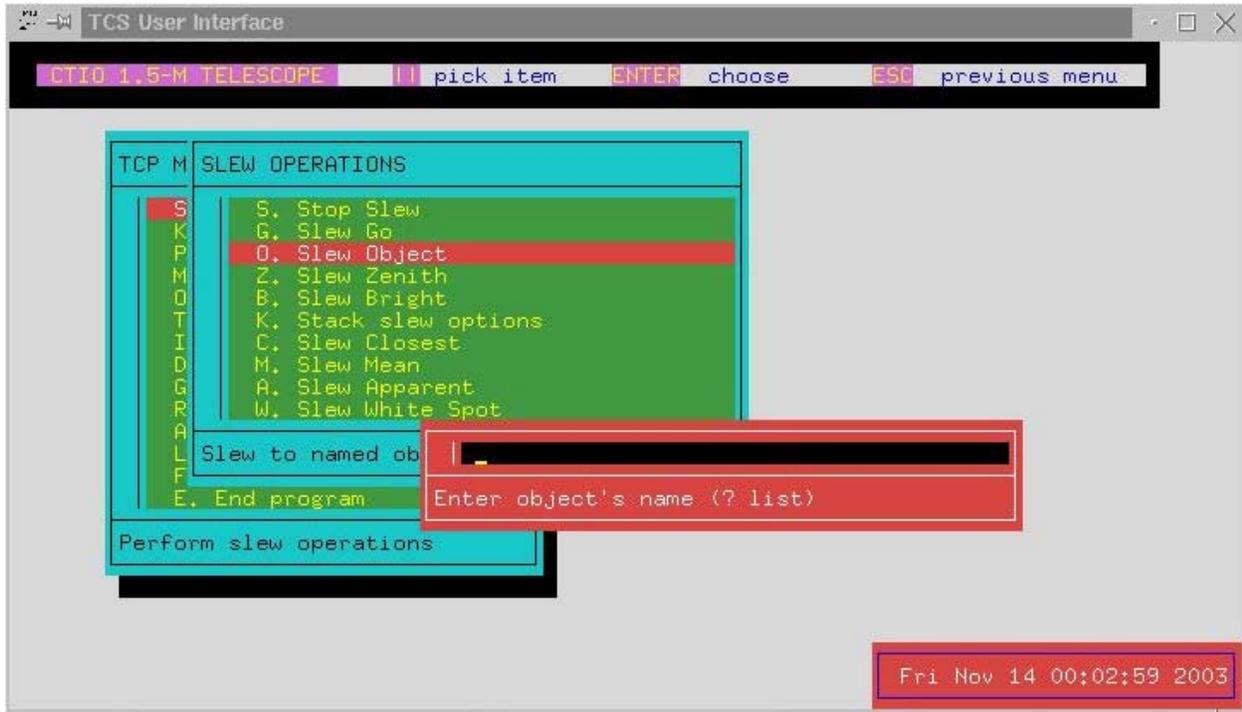


Offsets are performed in arcsec.

If you have a long list of targets you may use this option:

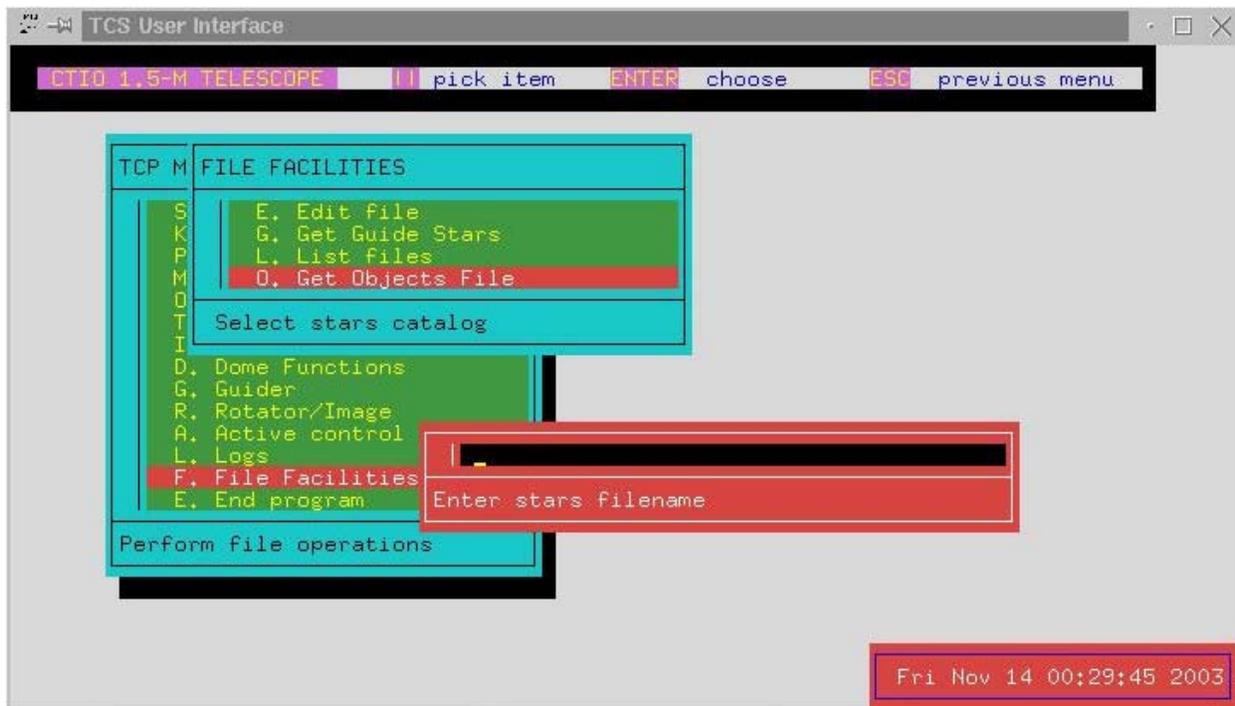
In the S. Slewing option select:

O. Slew Object



In the red square you simply type either the name or number of the object and then just G for slewing to the target position

For this option you will have to create a txt file and download it into: ctiotb in the tcp directory: /ux51/tcp60/tcp. Once the file is into the directory you will have to call it using the following



In the red square type the file name and this will be downloaded, then just use the O. Slew Object option for calling the targets. This is a faster way for slewing the telescope to the desired positions.

For the txt file you should create it as in the following example:

```
Ttau      04 21 59.43 +19 32 06.4      2000
UZTau    04 32 43.06 +25 52 31.3      2000
VYTau    04 39 17.4  +22 47 54        2000
NYOri    05 35 37   -05 12 24         2000
V1143Ori 05 38 03.8 -04 16 42         2000
V838Mon  07 04 04.8 -03 50 50         2000
```

First column is the target name, where Ttau is originally called T Tau, but for the TCS to recognize the object name, spaces must be eliminated. Also for making the process simpler and faster, you may shorten the target names or simply put numbers instead of names.

Once the file is created, log in ctiotb by doing an ftp to ctiotb.ctio.noao.edu, login name and password are written on the ctiotb monitor. Here you should download the file in the tcp directory by typing: cd tcp, and then call the file in the F. File facilities option on the main menu on the TCS. This is to be done in case you have got your file already created and just needs to be edited.

Another option is simply opening a konsole window in the ctiotb log into the tcp directory and create the file directly and then just call it using the F. File facilities option.

At the end of the night slew telescope to the Zenith by using this option:

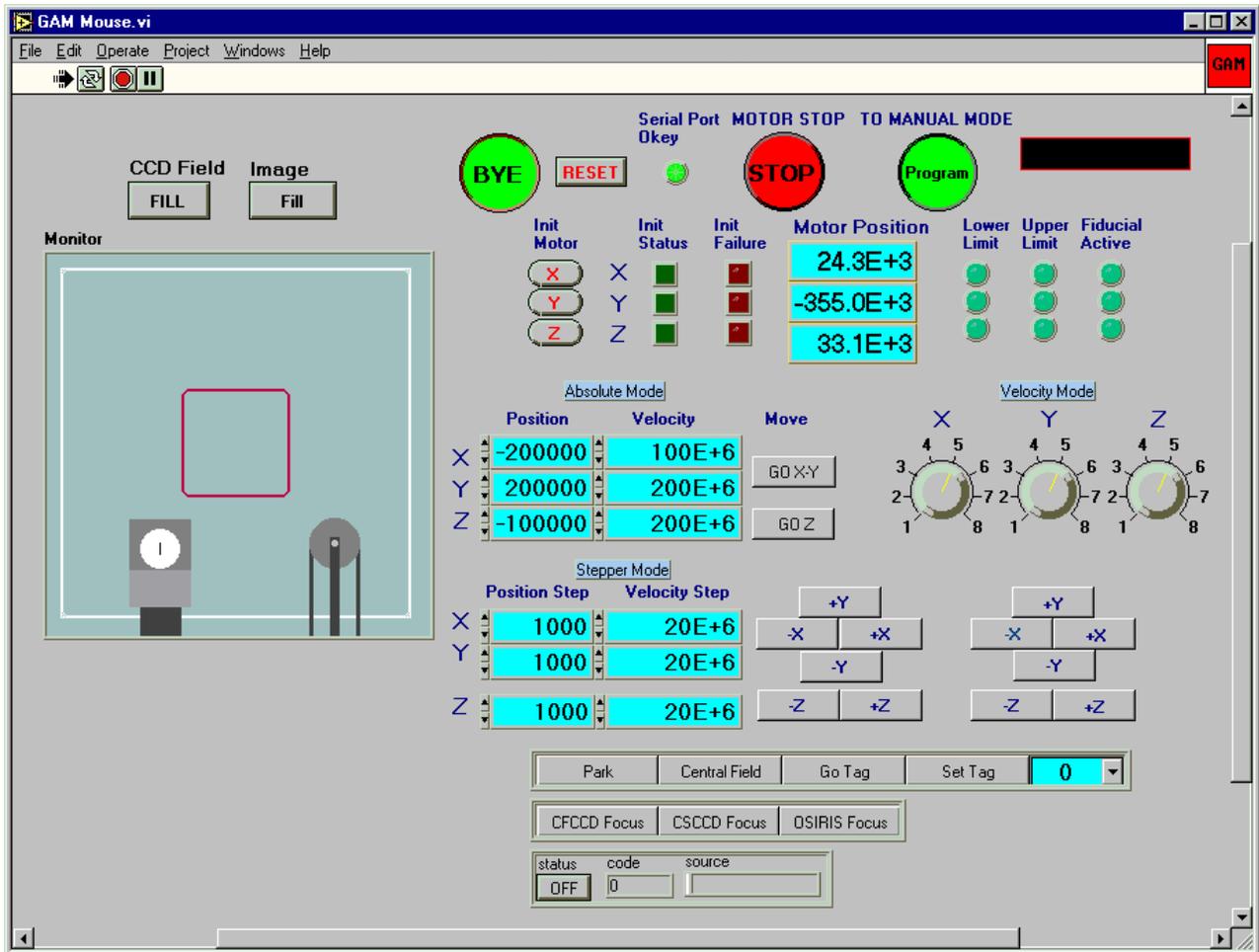
S. Slewing

Z. Slew Zenith



GAM Mouse.vi

The GAM PC MONITOR display the field of view of the instrument, and the probe used to find guiding stars.



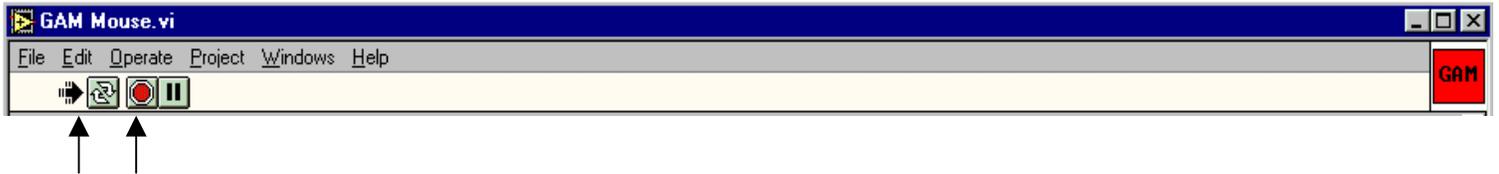
The light blue square has a red square in the center, this is the field of view of the instrument; below the field of view there is a probe that moves using the gray hand paddle. By clicking in the green circle PROGRAM you will see where the probe is. By clicking again you will be able to move the probe until you find a guiding star that will be displayed in the CTIO PC GUIDER V5 0 2, on the GAM PC Guider that is shown ahead.

GAM Mouse.vi Problems:

Restart the GAM Mouse.vi

If the GAM Mouse.vi is neither responding nor working correctly, you will have to do the following to restart it:

On the main toolbar as shown bellow:



1. Click the red button (abort)



2. On the File option click: Exit
3. Click on the GAM with Mouse.vi icon on the desktop screen:



4. Click the arrow to RUN GAM



Troubleshooting:

DOME Problems:

In the event that DOME stops, you will hear a sound through the speaker, that means DOME got jammed, so you will have to do the following to solve the problem:

1. Turn off Dome switches from Model 62 TELESCOPE CONTROLLER
2. Go to the platform and slew dome manually using the switch from the old console till it reaches Zenith position (East). There is a mark (a tape) indicating the correct Dome position. Once both tapes match, go back to the control room.
3. Back in the control room, type: <Alt> <F9> (DOME INIT)
4. Turn on Dome switches from the Model 62 TELESCOPE CONTROLLER. This will automatically reset Dome.



This task may also be performed in the control room:

1. Turn off both DOME switches from MODEL 62 TELESCOPE CONTROLLER
2. At the right end of panel press the black knob, it says CCW and keep it pressed till the red led at the HOME FIDUCIAL section is ON, you will hear the dome moving.
3. Once the red led is ON press <Alt> <F9>
4. Turn on DOME switches on MODEL 62 TELESCOPE CONTROLLER
5. If dome is OFF on the telescope status monitor, select D. Dome Functions from the main menu of TCS, and select T. Dome Track. Dome will be displayed now as ON and it will automatically go to the position of telescope

How to turn PC GUIDER OFF

1. First stop guiding by pressing <F8>
2. On the ximtool window select **quit** on the file option
3. Click YES on the dialog box
4. Click on “K” on the left corner of the screen and select logout



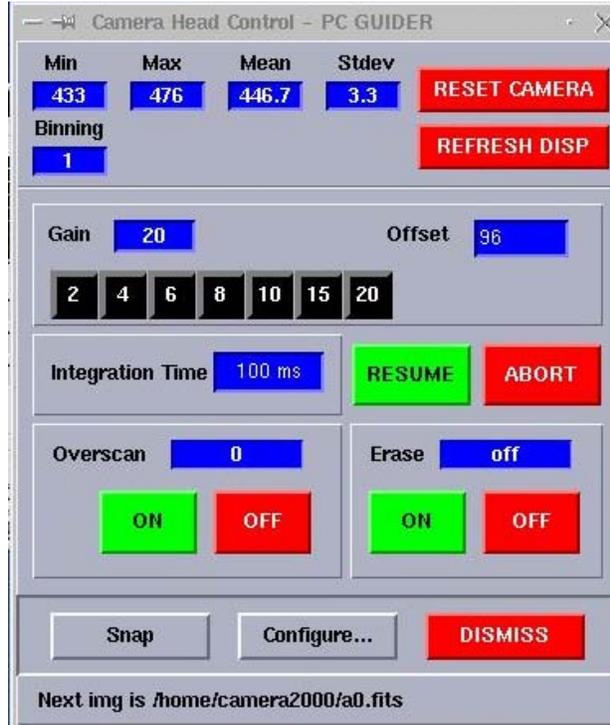
5. Press logout in the dialog box
6. Press “Shutdown” on the dialog box labeled Red Hat Linux [ctiox6]
7. Select “Shutdown” and press OK
8. Wait for the Shutdown sequence to finish and turn the computer OFF

How to get PC GUIDER running:

1. Turn the computer ON
2. Wait for the computer to boot the RTAI-Linux kernel
3. On the screen labeled Red Hat Linux [ctiox6] type:
 - a. Login: **camera2000**
 - b. Password: **ev500gate**
4. Press the “GO” button
5. Click the icon “**star_pcguider**” and wait for the programme to start



- 6. On the CTIO PC GUIDER 5.0.2. toolbar open the **Camera Head Control** on the Window option. When **Camera Head Control** is already on the screen, on the erase option press OFF, this must remain OFF during guiding; drag the camera window to one corner of the main screen so that the field of view of the guider is not covered by this window. This option is shown in the next graphic.

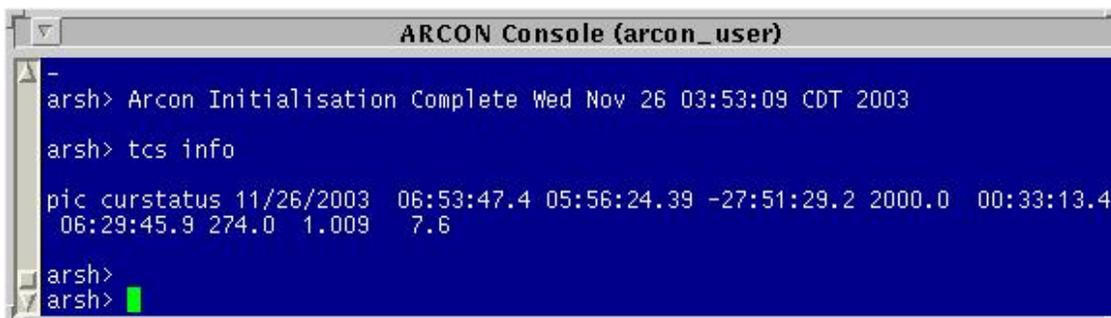


RESTART ARCON

NOTE: ARCON usually crashes down mostly due to static discharges (because of a very low humidity in the control room), and when an exposure is aborted; also this happens due to some error messages that show on the ARCON Acquisition window

If ARCON fails you will have to do the following to restart it:

1. Click the right button of the mouse on the desktop. A window will show, click on: **(RE) Start ARCON Session**, all the ARCON (blue windows) windows will disappear.
2. The first ARCON window that will show is the ARCON Console (arcon_user), and then the ARCON Acquisition.



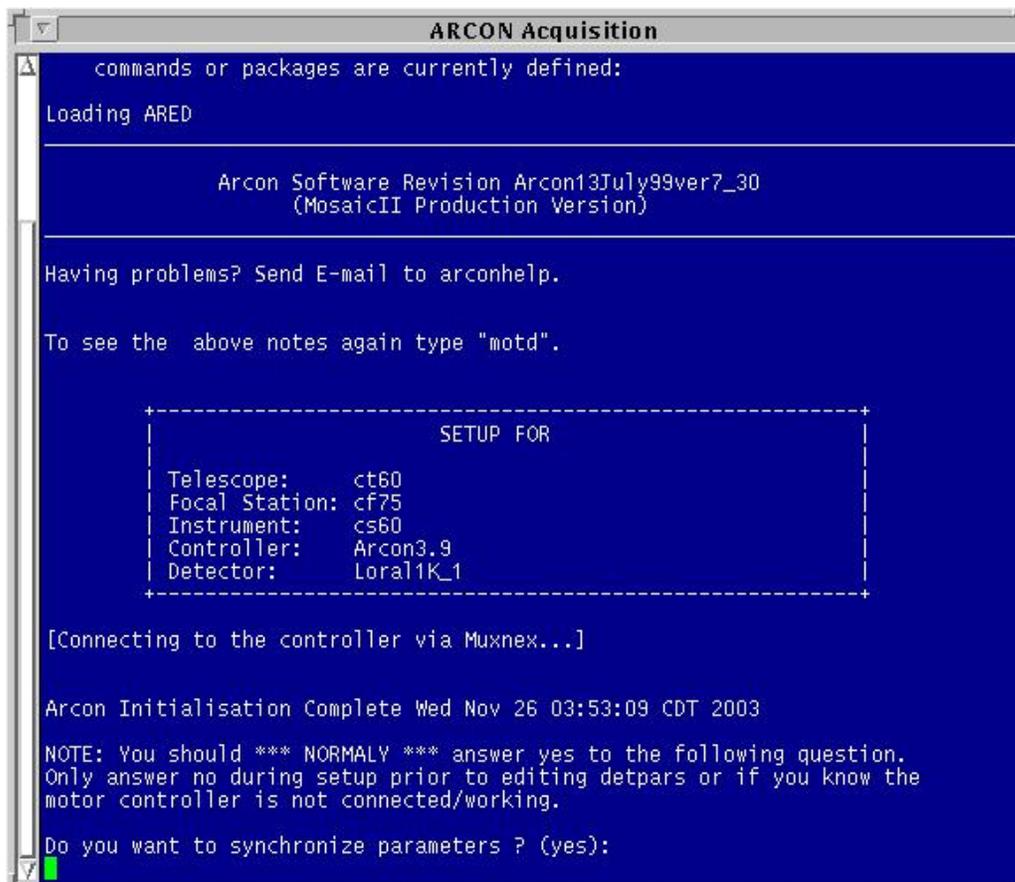
```

ARCON Console (arcon_user)
-
arsh> Arcon Initialisation Complete Wed Nov 26 03:53:09 CDT 2003
arsh> tcs info

pic curstatus 11/26/2003 06:53:47.4 05:56:24.39 -27:51:29.2 2000.0 00:33:13.4
06:29:45.9 274.0 1.009 7.6
arsh>
arsh>

```

3. Wait until the following message appears on the ARCON Acquisition window (blue window)



```

ARCON Acquisition
commands or packages are currently defined:
Loading ARED

Arcon Software Revision Arcon13July99ver7_30
(MosaicII Production Version)

Having problems? Send E-mail to arconhelp.

To see the above notes again type "motd".

+-----+
|                SETUP FOR                |
| Telescope:      ct60                      |
| Focal Station:  cf75                      |
| Instrument:     cs60                      |
| Controller:     Arcon3.9                  |
| Detector:       Loral1K_1                 |
+-----+

[Connecting to the controller via Muxnex...]

Arcon Initialisation Complete Wed Nov 26 03:53:09 CDT 2003

NOTE: You should *** NORMALLY *** answer yes to the following question.
Only answer no during setup prior to editing detpars or if you know the
motor controller is not connected/working.

Do you want to synchronize parameters ? (yes):

```

Just press <ENTER> for the default (yes) answer, and thus all the parameters will be loaded.

4. TO make sure ARCON was restarted correctly, in the ARCON Console (arcon_user) window, type: tcs info and this message should show on the window:

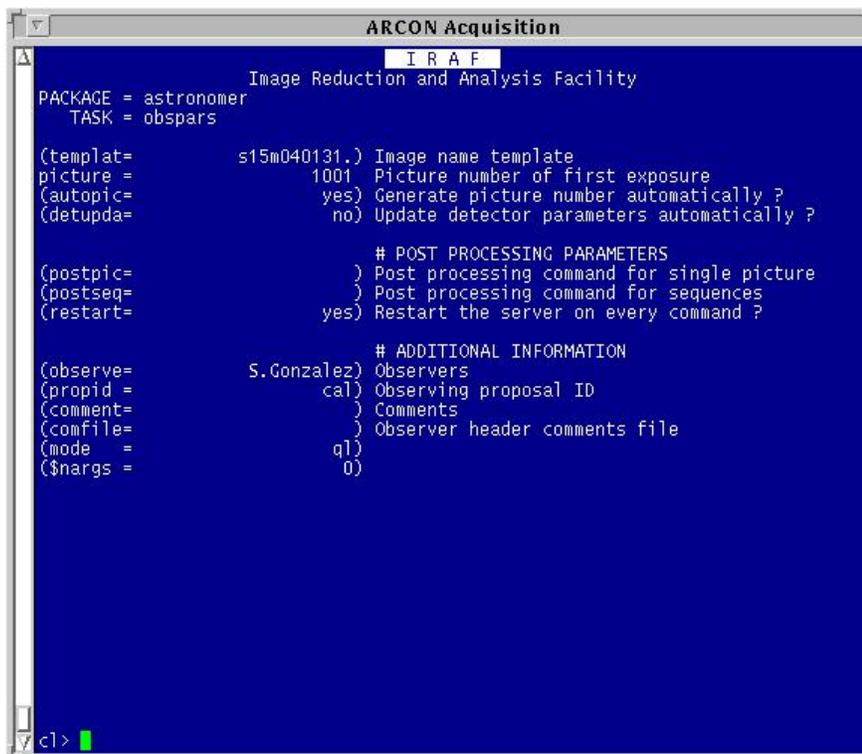


```

ARCON Console (arcon_user)
-
arsh> Arcon Initialisation Complete Wed Nov 26 03:53:09 CDT 2003
arsh> tcs info
pic curstatus 11/26/2003 06:53:47.4 05:56:24.39 -27:51:29.2 2000.0 00:33:13.4
06:29:45.9 274.0 1.009 7.6
arsh>
arsh>

```

5. When ARCON is working back normally, always take a test exposure as in:
 - cl> preview 0 (this is similar as taking a bias frame) and what this basically does is wiping out the CCD
6. Before restarting your observation, call your observation directory and always check the **obspar** parameters, so that you set the picture number correlative from your last frame.



```

ARCON Acquisition
IRAF
Image Reduction and Analysis Facility
PACKAGE = astronomer
TASK = obspars

(templat= s15m040131.) Image name template
(picture = 1001) Picture number of first exposure
(autopic= yes) Generate picture number automatically ?
(detupda= no) Update detector parameters automatically ?

# POST PROCESSING PARAMETERS
(postpic= ) Post processing command for single picture
(postseq= ) Post processing command for sequences
(restart= yes) Restart the server on every command ?

# ADDITIONAL INFORMATION
(observe= S.Gonzalez) Observers
(propid = cal) Observing proposal ID
(comment= ) Comments
(comfile= ) Observer header comments file
(mode = q1)
($nargs = 0)

cl>

```

7. You may now restart your observations.

Telescope lost pointing: if telescope loses pointing, do the following:

1. Turn off tracking from MODEL 62 TELESCOPE CONTROLLER
2. Slew Telescope to Zenith
3. Go to the platform, turn on readout lights (right side of console)
4. By using the hand paddle, slew telescope to:
 - a. HA 00 01 55.5
 - b. DEC -30 33 24 (upper dials)
5. Go back to control room and type: <Ctrl + F8> on the TCS, and turn track back ON

Since this might turn out to be something rather difficult to do, ask the Observer Support to perform this task.