

Operations at the La Silla 2.2 metres telescope

R. Angeloni
rangelon@astro.puc.cl

A. Hempel
ang.hmp1@gmail.com

I. Lacerna
ialacern@astro.puc.cl

R. Lachaume
lachaume@astro.puc.cl

M. Rabus
mrabus@astro.puc.cl

The new operational scheme at the La Silla 2.2 metres telescope involves minimal support by ESO. This guide intends to familiarise observers with the operations.

Version: September 24, 2018.



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Introduction

The new operational scheme at the La Silla 2.2 metres telescope involves minimal support by ESO. This guide intends to familiarise observers with the operations.

First of all, the control room, located below the main building, is still shared with the ESO telescopes. Figure 1 below shows the location of the different components of the controls.

It is sometimes necessary to physically access the telescope building where there is an old control room (Fig. 2), a computer room to physically access some relevant workstations (Fig. 3), and, obviously, the dome (Fig. 4). Some subsystems are controlled by machines gathered in big rack towers, these machines are called **LCU** or sometimes **VME**.

Sections 1–5 can be seen as a step-by-step guide of the operations from the daily startup to the night time. Many of the steps need some knowledge of the **observing block (OB)** management and of the **broker for observing blocks (bob)** interface, which are presented in Section 7. Section 8 lists fixes to common issues at the telescope. We present the software components more in detail in Section 9.

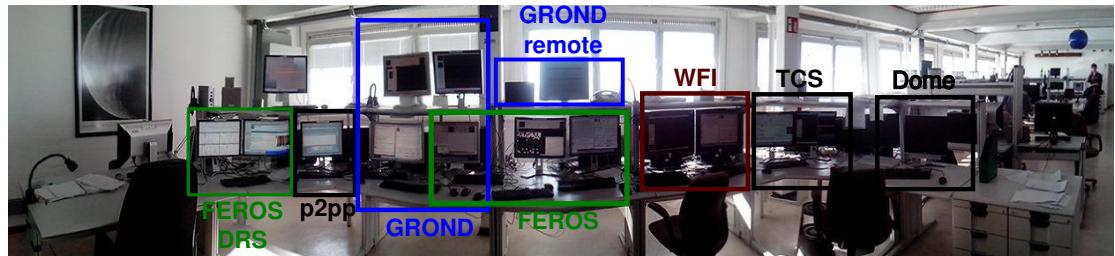


Figure 1: Layout of the telescope controls. From right to left: **Windows desktop** controlling and monitoring the dome, **telescope control software**, **WFI** controls, **FEROS** controls (bottom) and skype laptop connected to the **GROND** remote observers (top), GROND controls, **p2pp** machine where **OBs** are crafted and loaded by the visiting astronomer, and, finally, the **FEROS data reduction software**.



Figure 2: Entering the old control room in the telescope building



Figure 3: Entering the computer room in the telescope building. In front slightly to the left is the VME rack.



Figure 4: Entering the dome, from left to right: the **ADAM** controls, a computer to use the **TCS**, the dome controls, the bottom of the telescope.



1 — Early afternoon: daily start-up

Start-up should take about one hour. It should be done early enough in the afternoon (2–3 pm in Winter, 3–4 pm in Summer), before the nitrogen of [wide-field imager \(WFI\)](#) is refilled.

The [TCS](#) and the [WFI](#) are entangled. In particular, the [WFI instrument control software \(ICS\)](#) controls the focus and pointing, and the [TCS](#) controls the [WFI autoguider \(AG\)](#). For this reason, the [WFI](#) should be rebooted before the [TCS](#). The other instruments, [GROND](#) and [FEROS](#), are more independent and need a later restart. Also, the [FEROS](#) and [GROND AG](#) should be checked and the [FEROS DRS](#) set to the right date.

1.1 Outline

To be on the safe side, the startup sequence shall be performed in this order below. To gain a bit more time one can do [2a–2c](#) during [1a–1e](#) and [2d–2g](#) during [1h–1j](#). [FEROS](#), [GROND](#), the [AG](#) and the [DRS](#) ([3](#), [4](#), [5](#), [7](#)) can be handled in parallel as soon as the [TCS](#) is booted ([2g](#)).

Procedure 1.1. Telescope and instrument startup

1. [WFI](#) (daily, see Fig. 1.1)
 - (a) On the screen BOB Wide Field Imager, go to the StartUp virtual desktop.
 - (b) In a terminal, osf2p2StartUp ini WFI F8, where ini is your initials.
 - (c) On the dialog, choose FULL startup.
 - (d) Click START on the appearing window (ES0220 WEEKLY FULL STARTUP).
 - (e) Wait until the start-up window says SCRIPT finished (about 11 minutes).
 - (f) Close the startup window.
 - (g) Close the emerging PDF.
 - (h) Rearrange windows to the corresponding desktops.
 - [real time display \(RTD\)](#) goes to all desktops, on the left screen.
 - other windows go to the desktop bearing their name, on the right screen. (The FIERA panel goes to the Sensors desktop.)
 - (i) Check that the filter wheel is set to a specific filter and not in a moving state. In that case, try troubleshoot Sec. [8.3.8](#)
 - (j) In [bob](#), execute `testBias.oob`
 - Import it with menu File → Load OBs → From file....

- Click the Start button.
- (k) If Cannot read "@w2p2wfi..." pops up on the **TCS** screen (Fig. 1.7), click OK.
2. **TCS** (daily, see Fig. 1.2)
- (a) On the screen Telescope Control Software, go to the StartUp virtual desktop.
 - (b) In a terminal type lccBoot lte2p2.
If an error message appears on the **WFI** screen, click OK.
 - (c) Go to web browser on screen Dome webcam & hydraulics to activate hydraulics.
 - Find the **Dome Auxiliary Functions** (tab called ADAM 6000...)
 - If it is not there, open it with the bookmark Dome controls.
 - Click HydOn, then button Hydr goes green.
 - Click DrivesOn, then button Drives goes green.

It may be needed to click two or three times to get green buttons.
Make sure **WFI** is fully booted (1e) before going on with the **TCS** start-up.
 - (d) On the **TCS** screen, type osf2p2StartUp ini ALL F8, where ini is your initials.
 - (e) Click START on the appearing startup window (ES0220 DAILY STARTUP).
 - (f) Click away some appearing pop-ups (in a 13 minutes lapse)
 - i. SKIP a large one asking to check hydraulics among other things.
 - ii. OK to one asking to switch on flat-field lamp (lamp will be on anyway).
 - iii. SKIP one asking to check night log is open (we don't care).
 - iv. OK to asking for alarms to be enabled (check it in the black log window).
 - (g) Wait for startup window to say SCRIPT finished (1 additional minute).
 - (h) Close startup window.
 - (i) Close emerging PDF.
 - (j) Rearrange windows to the corresponding desktops.
 - skycat and two small black terminals go to all desktops, on the right screen.
 - Other windows go to the desktop bearing their name, on the left screen.
 - Ignore window CSS ALARM DISPLAY (Fig. 1.8) if it pops up on the **WFI** screen.
 - (k) On desktop TCS Status, use menu TCS User (left click with the mouse on the background screen) → TCS panels → Aux Functions.
3. **FEROS** (weekly, see Fig. 1.3).
Only start after **TCS** has been restarted (2g).
- (a) On the screen FEROS BOB, go to the StartUp virtual desktop.
 - (b) osf2p2StartUp ini FEROS F8, where ini is your initials.
 - (c) Click START on the start-up window (ES0220 WEEKLY FULL STARTUP).
 - (d) Close ES0220 WEEKLY FULL STARTUP it says SCRIPT finished (2 minutes)
 - (e) Click START on Instrument Startup.
If a timeout error occurs, see Sect. 8.7.1.
 - (f) The pop-up panel will close by itself after the ICS started
 - (g) After Start-up is finished a pdf will open, and can be closed
 - (h) Wait for windows to appear.
 - (i) Rearrange windows to the corresponding desktops.
 - **RTD** goes to all desktops, on the left screen.
 - Other windows go to the desktop bearing their names, on the right screen.
 - (j) On FEROS Control, use menu Instrument → ONLINE.
 - (k) In **bob**, run FEROS_ech_cal_bias.obi
 - Fetch it with menu File → Load OBs → From file...(/OBD/Templates/).
 - Click Start (takes about 1 min).
4. **GROND** (daily)
All operations in a terminal require user grondmgr.

- (a) Go to screen GROND BOB.
 - (b) In the case of a power cut or issues with GROND, restart the instrument.
If GROND was unstable the night before or there was a power outage
 - i. Type grinsStop, wait for shutdown window to finish and disappear.
 - ii. Type grinsStart and click Continue on the pop-up.
 - iii. Wait for startup window to finish and disappear (a few minutes). If an error about "reply timed out" appears, then close the startup window and repeat from [4\(b\)i](#).
 - iv. Rearrange windows.
 - v. Use menu Instrument → ONLINE in the GROND control panel (Fig [9.11\(b\)](#)).
 - (c) Do some preventive reinitialisations
 - i. Close [bob](#).
 - ii. Launch [bob](#) from the terminal as user grondmgr (type bob &).
 - iii. In the same terminal, execute grondGRI.
 - iv. In the same terminal, execute grondSHUTTER && grondFM (might take 1 min).
 - (d) From [bob](#), execute the test OB 1min1TD_test.obd (see Fig. [9.11\(a\)](#)).
 - i. Ensure TCS is OFF (red button) by clicking TCS OFF.
 - ii. Fetch OB with File → Load OBs → From file....
 - iii. Click Start.
 - (e) If time allows, repeat the last step with the TCS on.
 - i. Ensure TCS is ON (green button) by clicking TCS ON.
 - ii. Fetch OB with File → Load OBs → From file....
 - iii. Click Start.
 - iv. If it fails after the optical exposure has started
 - Click OK on the error popups
 - Wait for the exposure to finish
 - In [bob](#), click on Reset status
 - Click on start again.
 - If error persists, close [bob](#) and open it again
 - v. Set telescope back to FEROS/WFI
In a terminal type, grondM3 WFI && grondMC CLOSE && grondCS CLOSE.
 - (f) If a restart (point [4\(b\)iii](#)) was done, set the image displays.
 - i. Go to the GROND optical (FIERA) screen.
 - ii. Find the RTD window (griz images).
 - iii. Check that image is flipped along both axes and rotated (see Fig. [1.9\(a\)](#)).
 - iv. Go to the GROND infrared (IRACE) screen.
 - v. Find the irtd window (JHK images).
 - vi. Check that images are received live.
The left column should have a green button with text Stop (see Fig. [1.9\(b\)](#)).
If it is gray with text Start, click it so that it gets as described above.
 - vii. Check that the image is horizontally flipped (see Fig. [1.9\(b\)](#)).
5. Check the guide cameras on the screen Autoguider GROND & FEROS.
Repeat the following procedure for [FEROS](#) and [GROND](#).
- (a) Go to the Autoguider screen.
 - (b) Rearrange windows to their corresponding virtual desktops.
Autoguiding window should go to all desktops.
 - (c) Use numbers 2, 1, 0.5 below Autoguider control and click Apply.
 - (d) Select the instrument below CCD change (see Fig. [1.4](#)).
 - (e) Use Start exposure to change CCD Status to Infinite loop.

- (Use Stop exposure to change CCD Status to Completed before selecting other instrument).
- (f) Proceed to troubleshooting (Sect. 8) if CCD Status is not Infinite loop.
 - (g) If checking the **GROND** autoguider
 - i. find window Telescope R.T.D.
 - ii. use menu TCS → Attach camera
 - iii. a bias image should be seen within seconds
 - (h) If checking the **FEROS** autoguider
 - i. find window E2P2 Real Time Display
 - ii. click checkbox Camera on/off so that checkbox gets green
 - iii. a bias image should be seen within seconds
 - iv. check that the image is horizontally flipped.
 - (i) Set the numbers to 6, 3, 0.02.
6. On the FEROS pipeline screen, check that there is enough free disk space under w2p2off/data (Fig 1.5).
If low on disk space, delete nights (leave only the last three night) in w2p2off/data/raw, w2p2off/data/reduced and w2p2off/data/reduced/FEROS.
 7. On the FEROS pipeline screen, set **DRS** to the right date (Fig 1.6).
If closed, left-click menu and select Feros DRS.
 - (a) Stop the Reduce Queued Image Status
 - (b) Stop the Midas Session Status
 - (c) Change the date
 - (d) Start the Midas Session Status
 - (e) Start the Reduce Queued Image Status
 8. If telescope will stay idle for hours, switch off hydraulics.

1.2 WFI startup

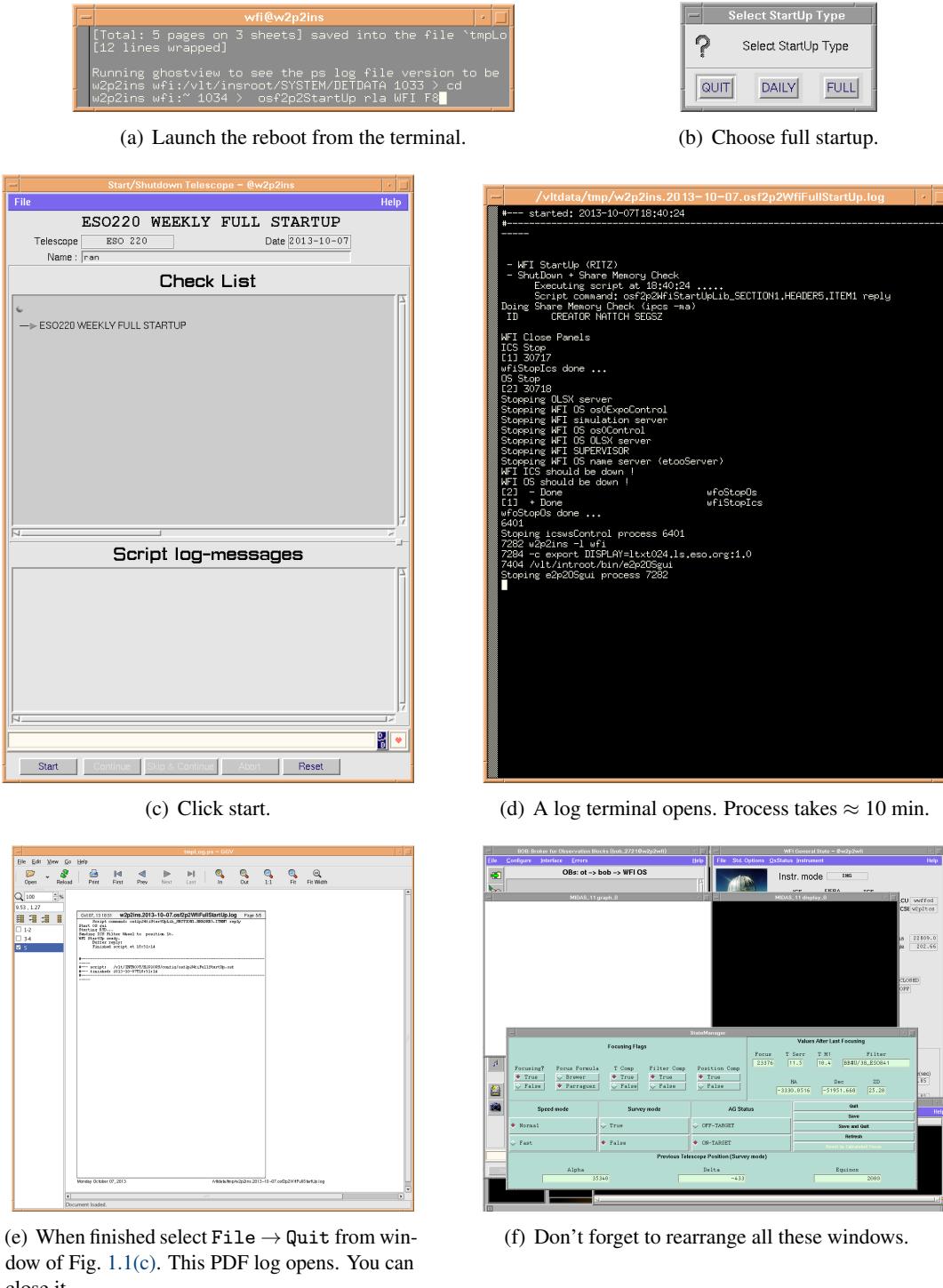
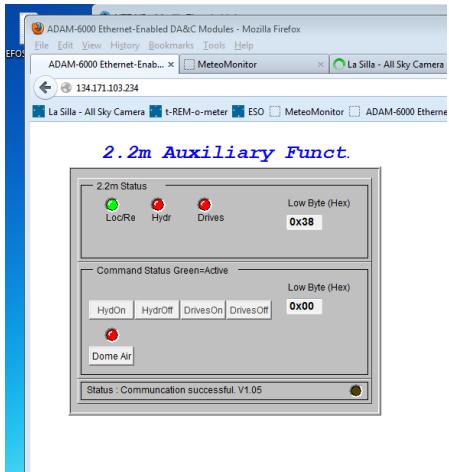


Figure 1.1: WFI restart. When done, don't forget to take a test bias.

1.3 TCS startup



(a) Switch on hydraulics and drives on the Windows desktop.



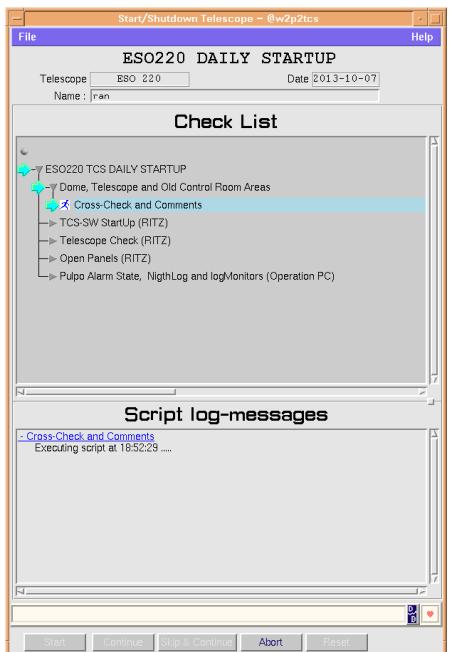
(b) On the TCS machine, give OK to this error.



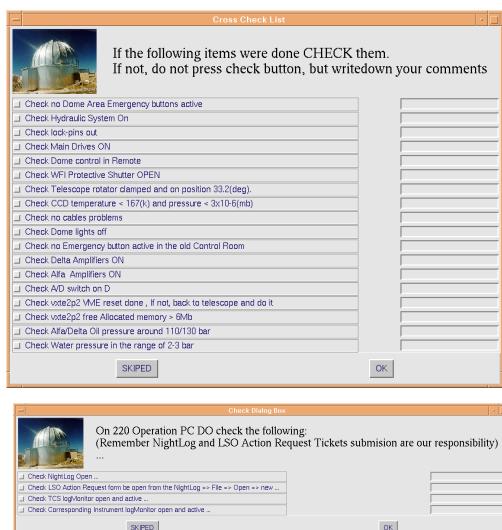
(c) Reboot lte2p2 machine.



(d) Launch the reboot from the terminal.



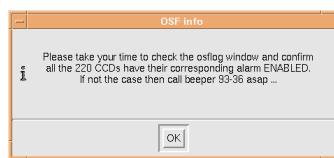
(e) Click start.



(f) Click OK to incoming pop-ups.



(g) Check flat lamp is on or switch it on. After clicking OK, telescope should move.



(h) Check that CCD alarms are on in the log (black terminal).

Figure 1.2: **TCS** restart. As for **WFI** there is a black terminal (log) and process ends with a PDF log being popped up. Emergent windows should be rearranged to their respective desktops. The **RTD** display should go to all desktops on the left screen, the other windows on the right screen.

1.4 FEROS startup

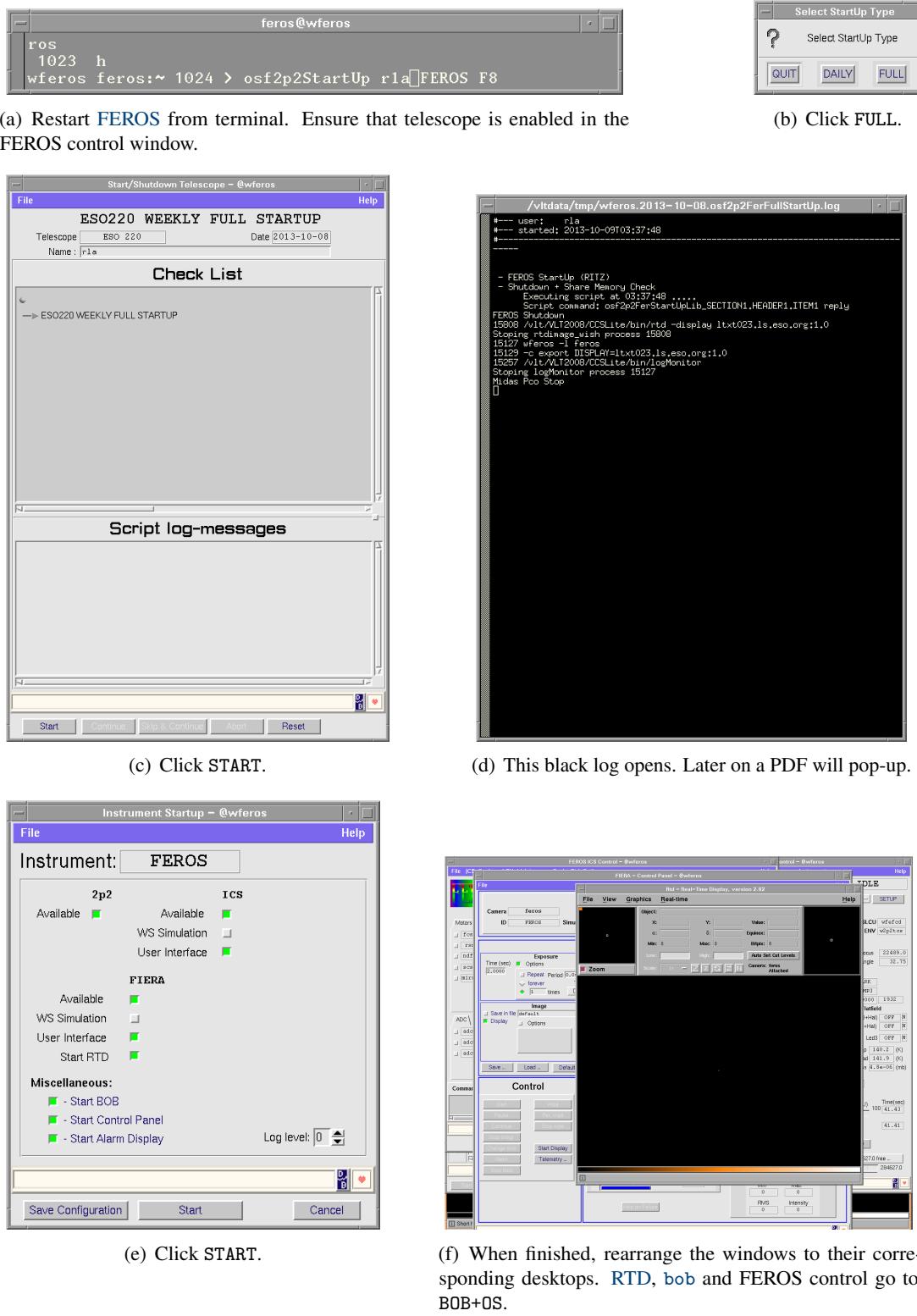


Figure 1.3: FEROS restart.

1.5 GROND and FEROS AG

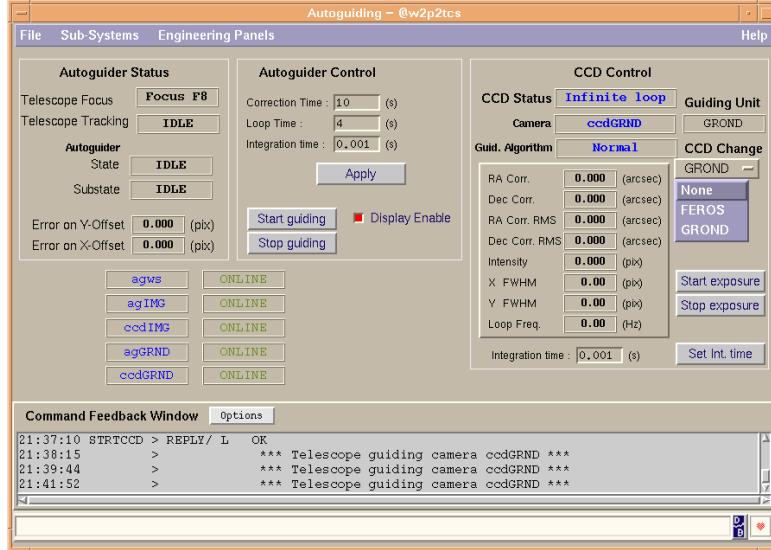


Figure 1.4: Switching between **GROND** and **FEROS** guide camera.

Check that the **GROND** and **FEROS** guide cameras work by switching between them on the **AG** window (see Fig. 1.4). The switching should set the camera in CCD status **Infinite loop**. It may be necessary to click on **Start exposure** after switching to obtain this status. If status is **Fail**, the camera must be restarted (see Sect. 8.2).

1.6 FEROS DRS

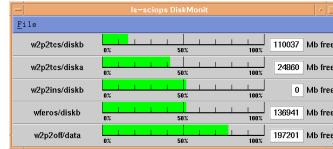


Figure 1.5: **FEROS DRS** Disk Monitor to check free disk space.

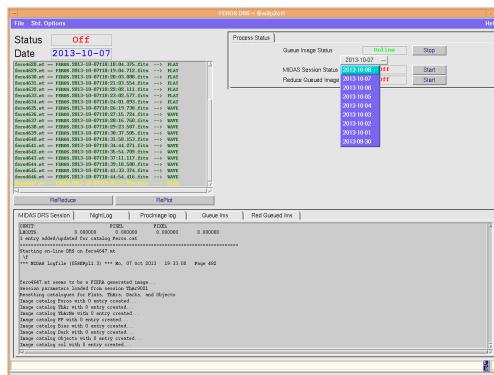


Figure 1.6: Changing the date of the **FEROS DRS**.

The **FEROS DRS** should be set to process the data of the current night. In the process the MIDAS session (with its characteristic blue window) is closed and reopened.

1.7 Additional material

1.7.1 Harmless error messages

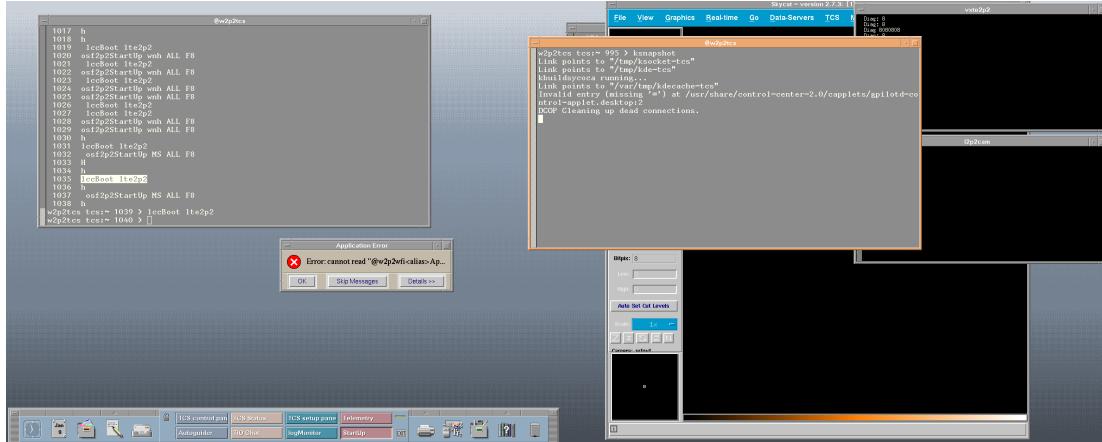


Figure 1.7: When restarting WFI, the TCS generally issues a harmless error message. Get over it and click OK.



Figure 1.8: CSS ALARM DISPLAY will typically pop-up on the WFI screen with a line in red when the TCS is restarted. Get over it and hide the window.

1.7.2 Display settings

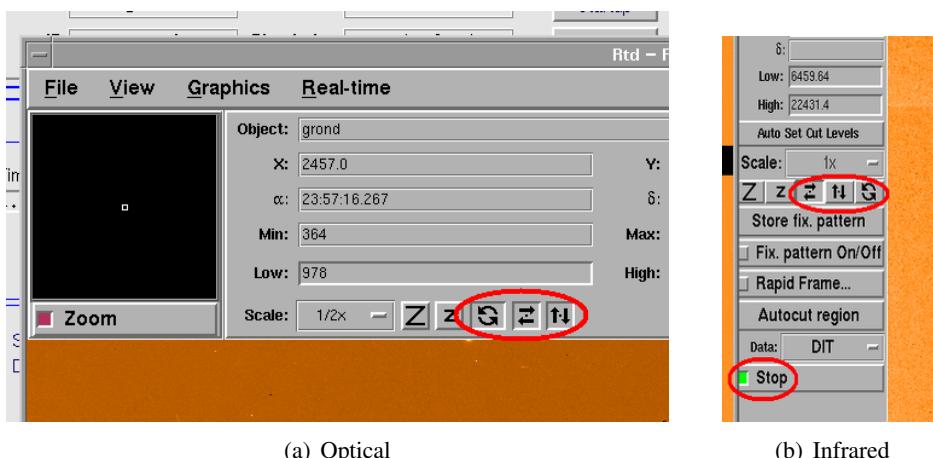


Figure 1.9: Correct sky orientation of the GROND displays. The infrared one is receiving data in real time (green checkbox).



2 — Afternoon: Day-time calibrations

The day-time observations use **OBs** either stored in **bob** or in a observing tool (**ot**) queue. Managing **OBs** with **bob** and **ot** is explained in more detail in Sect. 7.

2.1 WFI

Internal calibrations and health checks are typically left running in the morning after the dome has been closed. See Sect. 6.6.

Procedure 2.1. WFI afternoon calibrations

1. If necessary execute dome flats
 - (a) Ensure that no one is in the dome nor will enter it.
 - (b) Prepare the telescope.
 - i. If hydraulics is off, switch it on and initialize telescope.
 - ii. Go to the TCS Setup Panel (Fig. 9.2) on screen Telescope Control Software.
 - iii. Put Dome on automatic.
 - iv. Preset the telescope to flat-field screen.
Click FF Scr below Fixed Presets
 - v. Wait for the movement to complete (2 min).
On the TCS Control Panel (Fig. 9.1) telescope status is Slew.
 - vi. Open the Main Mirror Cover.
 - vii. Open the **WFI** protective shutter.
In the **Auxiliary Functions** (Fig. 9.5), OPEN the WFI PROTECTIVE SHUTTER.
 - (c) Go to **bob** on the screen BOB Wide Field Imager.
 - (d) Fetch **bob** from file (menu File → Load OBs → From file...) looking in sub-folder DomeFlats.
 - Standard filters: DomeFlatCalPlan_new.oob (25 min).
 - Other filters: DomeFlatGeneric_new.oob.
 - One flat in each of the 40+ filters: DomeFlatAllSnapshot.oob (2 hrs 30 min).
 - (e) If not doing UBVRI flats, customise **OB**.
 - With DomeFlatGeneric_new.oob change filter name in the fetched **OB**.
 - i. Open the flat template, left-clicking on the triangle of **WFI_img_cal_DomeFlat_new**

- ii. Open the instrument section, left-click on the triangle of section INS
- iii. Use menu Interface → Engineering.
- iv. Middle-click the filter name, fill in value, and type enter.
(In virtual desktop OS GUI, a filter list is found below SETUP Instrument)
- With DomeFlatCalPlan_new.oob, deactivate the filters you don't want.
(Right-click the triangles to get a thumb down, order is I, R, V, B, U)
- (f) Execute **OB**.
- (g) Once flats have been done, park the telescope.
 - i. Go to the TCS Setup Panel on screen Telescope Control Software.
 - ii. Close to the Main Mirror Cover.
 - iii. Set the dome in Manual.
 - iv. Click Zenith below Fixed Presets.
- (h) Close the **WFI** protective shutter. In the **Auxiliary Functions** (Fig. 9.5), CLOSE the WFI PROTECTIVE SHUTTER.
- (i) If telescope will stay idle for hours, switch hydraulics off.

2.2 FEROS

A linearity check is left running in the morning (see Sect. 6.6). The standard **FEROS** calibration is generally done after startup.

Procedure 2.2. FEROS afternoon calibrations

1. Go to screen FEROS BOB.
2. Execute StanCalNorm.oob from **bob** (45 min).
 - (a) Use menu File → Load OBs → From file....
 - (b) Click Start.
3. Check that the **DRS** has processed it.
 - (a) Find a white graphics with title OBJ FIB GUESS.
 - (b) The wavelength solution should have 4×10^{-3} Angstroem rms or less and look flat.
 - (c) If not, restart calibration if possible.

This internal calibration takes place in a separate room. It can be run at any time, including during a **WFI** or **GROND** observation.

2.3 GROND

GROND calibrations are left running in the morning after the dome has been closed. See Sect. 6.6.



3 — Sunset: Getting ready

3.1 Opening (one hour before sunset)

Opening should take place about one or two hours before sunset if conditions allow it.

Procedure 3.1. Dome opening.

1. Go to the screen Telescope Control Software.
 2. Ensure the main mirror cover is closed.
 - (a) Go to the [TCS](#) setup panel (Fig. 9.2)
 - (b) Check that the value below Main Mirror Cover is closed.
 - (c) If not, click Close.
 3. Open the slit.
On the [TCS](#) setup panel (Fig 9.2), below slit, click Open.
 4. Do these steps around sunset.
 - (a) If hydraulics is off, switch it on and initialize telescope (on TCS Setup Panel under Telescope, Fig. 9.2).
 - (b) Preset to an empty field in the East.
 - i. Go to the [TCS](#) Control Panel (Fig. 9.1)
 - ii. Below Catalogue Handling click Cat. Select.
 - iii. Choose Empty Fields 2011
 - iv. Select field with Up and Dwn.
- Right ascension should be about 1 hour more than sidereal time at sunset.**
- Consider field quality: excellent, good, OK, poor.
- v. Click Preset.
 - (c) Set the dome motion in automatic.
On the [TCS](#) setup panel (Fig 9.2), below Dome, select the checkbox Automatic.
 - (d) Open the mirror cover.
On the [TCS](#) setup panel (Fig 9.2), below Main Mirror Cover, click Open.
 - (e) Turn on the Dome Air in the [Dome Auxiliary Functions](#) (Windows desktop, Fig. 9.13).

3.2 Making the instruments ready (at sunset)

Procedure 3.2. Making instrument ready

1. If hydraulics is off, switch it on and initialise telescope.
2. Activate the connection between instruments and telescopes
 - (a) On the **FEROS** control panel (Fig. 9.9), use menu Telescope → Enable.
 - (b) On the **GROND** control panel (Fig. 9.11(b)), click TCS ON.
 - (c) Refresh the **WFI** general state panel (Fig. 9.8).
 - Use menu Std. Options → Refresh Database values.
 - Check that TCS is ONLINE.
3. Open the instrument covers
 - (a) In the **Auxiliary Functions** (Fig. 9.5), open the **WFI** protective shutter.
 - (b) For **GROND** observations, in a terminal open the main cover, the cold shutter, and the optical ones through these commands
 - i. grondMC OPEN
 - ii. grondCS OPEN
 - iii. grondSHUTTER
4. Check for mirrors
 - (a) Check **FEROS** mirror (M3 Selected Mirror) on the **FEROS** control panel (Fig. 9.9).
If necessary, set **mirr3** motor on the **ICS** (Fig. 9.10)
 - to **WFI** for observations with **WFI** or **GROND**;
 - to **FEROS** for observations with **FEROS**.

(Select the **mirr3** check box, select instrument, click SETUP, unselect checkbox.)
 - (b) Check **GROND** mirror on the **GROND** control (Fig 9.11(b)).
If necessary, type
 - grondM3 WFI for **FEROS** or **WFI** observations
 - grondM3 GROND for **GROND** observations.
5. If no test OB with TCS on was done during the start-up, try to run a **GROND** test OB (1min1TD_test.oob) on sky using **bob** (Fig. 9.11(a)).
 - (a) Fetch **OB** with menu File → Load OBs → From file....
 - (b) Click Start.
 - (c) If an error occurs after the optical exposure has started
 - Click OK on the error popups
 - Wait for the exposure to finish
 - In **bob**, click on Reset status
 - Click on start again.
 - If error persists, close **bob** and open it again
 - (d) For other errors, do a grondSHUTTER, close bob and open it again.

3.3 Refining the night plan

On the GROND remote observer screen at the side of the small laptop, one of the GROND team members should have contacted you by slack to indicate their observing plan, if they have some monitoring to do.

If slack is closed, open a browser with the following link: <https://slack.com/signin>. Sign in to workspace grondobs.slack.com and continue. Use the credentials given on the cover of the laptop, account lasillaskype with password pwd*★★★.

Under channel remote_observing you can usually find the observing plan (late afternoon).



4 — Twilight: On-sky calibrations

4.1 Outline

Flat-fielding

1. **WFI** flats can be done from sunset to sun at -10 degrees elevations depending on filtre.
Standard filters have that order: U, V, R, I, and B.
2. **GROND** flats are extensive and run from sun at -4 to -9 degrees elevation.
To be started when 2s J-band exposures feature a relatively flat field with 20 000 counts.

Pointing & Focus

1. Pointing should be performed daily with **WFI** using an **OB** from **bob**.
2. **FEROS** focus should be performed nightly using an **OB** from the **ot** calibration queue.
3. **WFI** focus should be done closest to science observations.

Standards

1. **FEROS** focus includes an optional spectrophotometric standard.
2. **WFI & GROND** standard fields are available from their respective **bobs**.

4.2 WFI

4.2.1 Sky flats

Sky flats in most narrow-band filtrs and the darkest broad-band ones (*U & V*) should be started right at sunset or slightly before sunrise. The brightest broad band filtrs (*R, I, B*) can be obtained with the sun at -6 to -9 degrees approximately. It is possible to obtain the five standard filtrs in one twilight provided they are started at sunset or in the morning twilight when the sun is at -9 degrees.

The procedure has been somehow modified (January 2014).

Procedure 4.1. Taking sky flats with WFI

1. If not done, check that dome and main mirror cover are open (Sect. 3.1, point 3.1).

2. If not done, check **GROND** and **FEROS** mirrors (Sect. 3.2, point 4).
3. If not done, check that the WFI main cover is open (Sect. 3.2, point 3).
4. If not done, point the telescope to an empty field (Sect. 3.1, point 4b).
 - (a) Go to TCS control panel the on screen Telescope Control Software.
 - (b) Below Catalogue handling click Cat. Select.
 - (c) Choose Empty Fields 2011
 - (d) Select field with Up and Dwn.
Right ascension should be about 1 hour from sidereal time, opposite to the Sun.
Consider field quality: excellent, good, OK, poor.
 - (e) Click Preset.
5. Go to **bob** on screen BOB Wide Field Imager.
6. Fetch sky flat **OB** from file (menu File → Load OBs → From file...).
(Go to folder .../TEMPLATES/OBD/SkyFlats/)
 - For standard filters use SkyFlatsEveningCalPlan.oob
(SkyFlatsMorningCalPlan.oob in the morning)
 - Some other filters have their own flat OBs (e.g. SkyFlatsI203).
 - For a set of non standard filters use SkyFlatsGeneric.oob.
7. If not doing the standard filters, customise **OB**.
 - (a) For non standard filters, edit the filter names.
 - i. Open the flat template, left-clicking on the triangle of WFI_img_cal_DomeFlat
 - ii. Open the instrument section, left-click on the triangle of section INS
 - iii. Use menu Interface → Engineering.
 - iv. Middle-click the filter name, fill in value, and type enter.
(In virtual desktop OS GUI, a filter list is found below SETUP Instrument)
 - (b) Deactivate unneeded templates.
Right-click the triangles to get a thumb down.
8. Execute **OB**
 - (a) Click Start.
 - (b) For each template
 - i. Click OK to pop-up asking to preset.
 - ii. After one minute, a pop-up estimates the exposure time.
In the evening, if the message is
 - an error message and a dimm test image (≤ 400 ADU), skip this template
 - In the morning, if the message is
 - an error message and a bright test image (≥ 20 kADU), skip this template

4.2.2 Pointing

TEMPORARY: WFI pointing chip is not working so we use a standard star with FEROS.

Procedure 4.2. Ensure that pointing is correct using FEROS

1. Update the model parameters
 - (a) Go to the Telescope Control Software workstation.
 - (b) Open or use a UNIX terminal.
 - (c) Type `~/bin/fixPointing.sh`
2. Change pointing model to FEROS.
 - (a) Go to the TCS Status Panel (workspace Status, see Fig. 9.4).
 - (b) Use menu Instrument selection → FEROS
3. Check the sidereal time
 - (a) On the digital clock of the control room, switch display to sidereal time.

- (b) Go to the TCS Control Panel (workspace Control).
- (c) The sidereal time of the TCS Control Panel should lag by approximately 5 s.
- 4. Point at a FEROS focus/standard star. See Sect. 4.3.1.

TEMPORARY: the following is no longer done.

Pointing with **WFI** is important even if the instrument is not used; for **GROND** and **FEROS** use it to define their pointing model. If things go well, the bright star that is pointed at should fall a few tens of pixels from the centre of the mozaic in the South-East direction, on pixel (4150,3950). The telescope pointing has an rms accuracy of better than 10 – 20 arcsecs (4 pixels correspond roughly to 1 arcsec). If not, ensure that point 1 has been done properly before going on with the procedure.

Procedure 4.3. WFI pointing

1. Switch the instrument to **WFI** on the **TCS** status panel.
(Instrument Selection, Fig. 9.4. Do it even if it already says **WFI**).
2. If not done, check that dome and main mirror are open, and dome is in automatic.
(Refer to Sect. 3.1, points 3, 4d and 4c).
3. If not done, check **GROND** and **FEROS** mirrors (Sect. 3.2, point 4).
4. If not done, check that the WFI main cover is open (Sect. 3.2, point 3).
5. Go to **bob** on screen BOB Wide Field Imager.
6. Fetch pointing **OB** from file (menu File → Load OBs → From file...).
(Go to folder .../TEMPLATES/OBD/Pointing/)
 - OBs are Pointing-<ra>.h.oob, where <ra> is the right ascension.
 - Choose an OB with <ra> close to sidereal time.
7. After the exposure is taken, accept “refine acquisition”.
A small form asking for the star’s coordinates will appear.
8. Use Pick Object in the view option of the **RTD** to obtain the star’s pixel coordinates.
9. Input the pixel coordinates.
Copy them with the mouse from the Pick Object popup to the small form.
10. Check that the offset is not larger than about 20/30 arcsec. After offset and quit a popup should have appeared.
Click OK if satisfied with the offset values (in arcsec).
11. If values are too large, or no star at all is seen, see Sect. 8.11.1 to check that:
 - (a) You did not forget Points 1-4.
 - (b) The sidereal time of the **TCS** is correct within seconds.
 - (c) The pointing parameters of the **TCS** are correct.
 - (d) Check that the star does not fall into the gap between two CCDs. (Give coordinates falling in the gap to the pop-up, offset and reacquire.)
 - (e) Once you have a star, as long as the offset is large, use offset and reacquire
 - (f) If the correct pointing model is selected, that should not take more than 2-4 repeats (max 10 min).
12. At that point, the pointing is done, and a small test of the autoguider is done.
If it crashes, it has no impact on the pointing check. You can skip it if you do not intend to use the WFI autoguider.
13. When asked, acquire a guide star on the **TCS**.
On the **TCS** Control Panel, follow the steps of Sect. 5.1.3
If it is still too bright to click on a guide star, click on background.
14. Click OK to the popup asking for guiding on the **WFI** workstation.
15. Wait for a short exposure to read out (30 sec).

4.2.3 Focus (quick tips)

Focus as close to your field in time and space.

Preset the telescope to the field to be observed.

Then, fetch a file from folder `.../TEMPLATES/OBD/Focus/`. Focus in the band to be observed. Otherwise, V-band should be OK (`focusV.obd`).

Try to guide. If guiding is unstable, better to have it off.

When focus sequence has been taken (≈ 6 min), click **OK** before you go to the MIDAS window (in the Midas desktop), then left-click and right-click on the upper star in whatever vertical sequence to measure focus.

Many times, you cannot adjust the measuring box with the up and down keys, so the focus is badly estimated (the fits do not have a parabolic shape). In that case, choose to remeasure it and the box should become adjustable (e.g. choose the upper star on other sequence).

4.2.4 Standard fields (quick tips)

Procedure 4.4. WFI photometric standards

1. Go to screen BOB Wide Field Imager.
2. If not done, switch the instrument to **WFI** on the **TCS** status panel (Fig. 9.4).
3. Fetch standard **OB** from list
 - (a) Use menu **File** → **Load OBs** → **From file...**
 - (b) Go to folder `.../TEMPLATES/OBD/Standards/`.
 - (c) Select OB
 - If good image quality in *U* is needed, select `Standard-<RA>-<name>-UBVRI.obd`.
 - If not, select `Standard-noAG-<RA>-<name>-UBVRI.obd` (no guiding).
4. Customize OB.
 - If non-standard filters are needed, edit filter names (see Sect. 4.2.1, item 7a).
 - Deactivate unneeded templates.
(Right-click the triangles to get a thumb down.)
5. Execute OB (20 min).
 - (a) Click **Start**.
 - (b) For each filter
 - i. Guide if required by a pop-up and click **OK**.
 - ii. A pop-up with number of dithers to skip must be answered (with value 0).
If it doesn't appear it is hidden behind a window. If left unanswered, observation will just pause.

4.3 FEROS

You can choose focus only, or focus and standard, which takes only 5 min more. Radial Velocity (RV) standard can be taken any time needed (they take 5-10 minutes with overheads).

4.3.1 Focus

Procedure 4.5. FEROS focusing

1. Check that dome and main mirror are open (Sect. 3.1, point 3.1).
2. Check **GROND** and **FEROS** mirrors (on **WFI** and **FEROS**, respectively. Sect. 3.2, point 4).
3. Check that the WFI main cover is open (Sect. 3.2, point 3).

4. Select instrument `feros` on the TCS Status panel (screen Telescope Control Software).
5. Got to `bob` on screen FEROS OB and fetch focus OB:
 - (a) Use menu File → Load OBs → From file....
 - (b) Select directory .../TEMPLATES/OBD/Focus/.
 - (c) Select Focus-<ra>....obd with <ra> close to sidereal time.
6. Click Start.
7. Acquire object on fibre and guide (see Sect. 5.2.1, point 4, & Sect. 5.2.2).
8. Perform the focus
 - (a) On the Autoguiding window, select numbers 6, 3, 0.2.
 - (b) After about 30 s, click OK to pop-up asking to ensure loop time is more than 3.
 - (c) A pop-up asks and suggest a focus estimate
 - i. If number is in range 300–500, it should be fine, click OK.
 - ii. If not, fill in last remembered value or, if you don't have any, 400, then click OK.
 - (d) Shortly after, a pop-up asks to select a star to focus on
 - i. A MIDAS image appears, left and right-click on a non-saturated source.
 - ii. Click OK to pop-up
 - (e) After about 5–10 min a fit to focus is done and a pop-up asks whether it is correct
 - i. If it seems correct, click OK.
 - ii. If it seems incorrect, but you can spot a good focus value by eye
 - Click No
 - Give guesstimate to new pop-up
 - iii. If you have no clue, just abort.

4.3.2 Focus and spectrophotometric standard

You may deactivate the focus sequence by thumbing down the second template in `bob` (10 min without focus).

Procedure 4.6. Focus and/or spectrophotometric standard

1. Perform steps of Sect. 4.3.1 except that
 - OB directory is .../TEMPLATES/OBD/Focus+Standard
 - OB name is Focus+Standard-<ra>....obd with <ra> close to sidereal time.
2. After focus is done, change integration time to 0.01 on the Autoguiding window.
3. Two pop-ups will ask to wait for object to be centred on the fibre. Wait for it to occur and click OK.

4.3.3 Radial velocity standards

Procedure 4.7. FEROS radial velocity standards

1. Got to `bob` on screen FEROS OB and fetch standard OB:
 - (a) Use menu File → Load OBs → From file....
 - (b) Select directory .../TEMPLATES/OBD/RVStandard.
 - (c) Select RVStandard...<ra>....obd with <ra> close to sidereal time.
2. Proceed with guiding and answer popups, that's a normal observation (about 5 - 10 min).
 - (a) In the e2p2 RTD window, click Centering (below Image Control), then click on the object.
 - (b) In the Autoguiding window, set the integration time if necessary.
 - (c) OK on popups (FEROS OB) when the object is centred.

4.4 GROND

4.4.1 Sky flats

Evening flats

Before taking evening flat fields, check the relevant items of “no flux or little flux” in Sect. 8.1. In particular the main mirror cover should be open and the dome set in automatic. The sky flats typically start when the sun is 4 degrees below the horizon. To be able to start on time, the following procedure should be started right at sunset.

Procedure 4.8. GROND evening flat fields

1. If not done, check that dome and main mirror are open (Sect. 3.1, point 3.1).
2. If not done, point the telescope to an empty field (Sect. 3.1, point 4b).
3. If not done, check **GROND** and **FEROS** mirrors (Sect. 3.2, point 4).
4. If not done, check that the WFI main cover is open (Sect. 3.2, point 3).
5. Go to GROND BOB screen.
6. Set mirrors and open shutters
 - (a) In the terminal, type grondM3 GROND.
 - (b) In the terminal, type grondMC OPEN.
 - (c) In the terminal, type grondCS OPEN.
7. Circumvent possible errors (if not done at sunset)
 - (a) Close **bob**.
 - (b) In the terminal, type grondSHUTTER.
 - (c) From the terminal, launch a new **bob** with bob &.
8. Get sky flat **OB** ready

In **bob**, fetch **OB** GROND_img_cal_skyflats_ev
(use Flats/ folder).
9. Monitor the *J*-band counts.
 - (a) Go the the GROND infrared (IRACE) screen.
 - (b) Set the IR integration time to 2 s.
 - Find window Infrared Acquisition Module (see Fig. 9.12(b)).
 - Close to the INTEGRATION TIME, fill in value 2.
 - Click. (Don't do Apply.)
 - (c) Draw cuts in the infrared image.
 - Go the the irtd window.
 - Go the the *J*-band (right handside.)
 - Use menu View → Cuts..., then click OK on the pop-up.
 - Draw a diagonal on the image with the mouse.
 - (d) Wait for the cuts to look flat and with about 20 000 counts. This should occur when the sun is about 4 degrees below the horizon.
10. When counts are OK, on the GROND BOB screen, click Start in **bob**.

Morning flats

Morning flat fields are trickier to get, but should be started when the sun is at 9 degrees below horizon.

Procedure 4.9. GROND morning flat fields

1. Point the telescope to an empty field as explained in Sect. 3.1.
2. Go to GROND BOB screen.
3. Set mirrors and open shutters (if you were not already with GROND)

- (a) In the terminal, type grondM3 GROND.
 - (b) In the terminal, type grondMC OPEN.
 - (c) In the terminal, type grondCS OPEN.
4. Get sky flat **OB** ready
In **bob**, fetch **OB** GROND_img_cal_skyflats_mo.
(Use **Flats/** folder.)
 5. When sun is at 9 degrees below horizon, click Start on **bob**.

4.4.2 Focus

The focus of **GROND** is stable and managed periodically by the MPE team. Defocused observations can be obtained by specifying a focus offset in the **OB**.

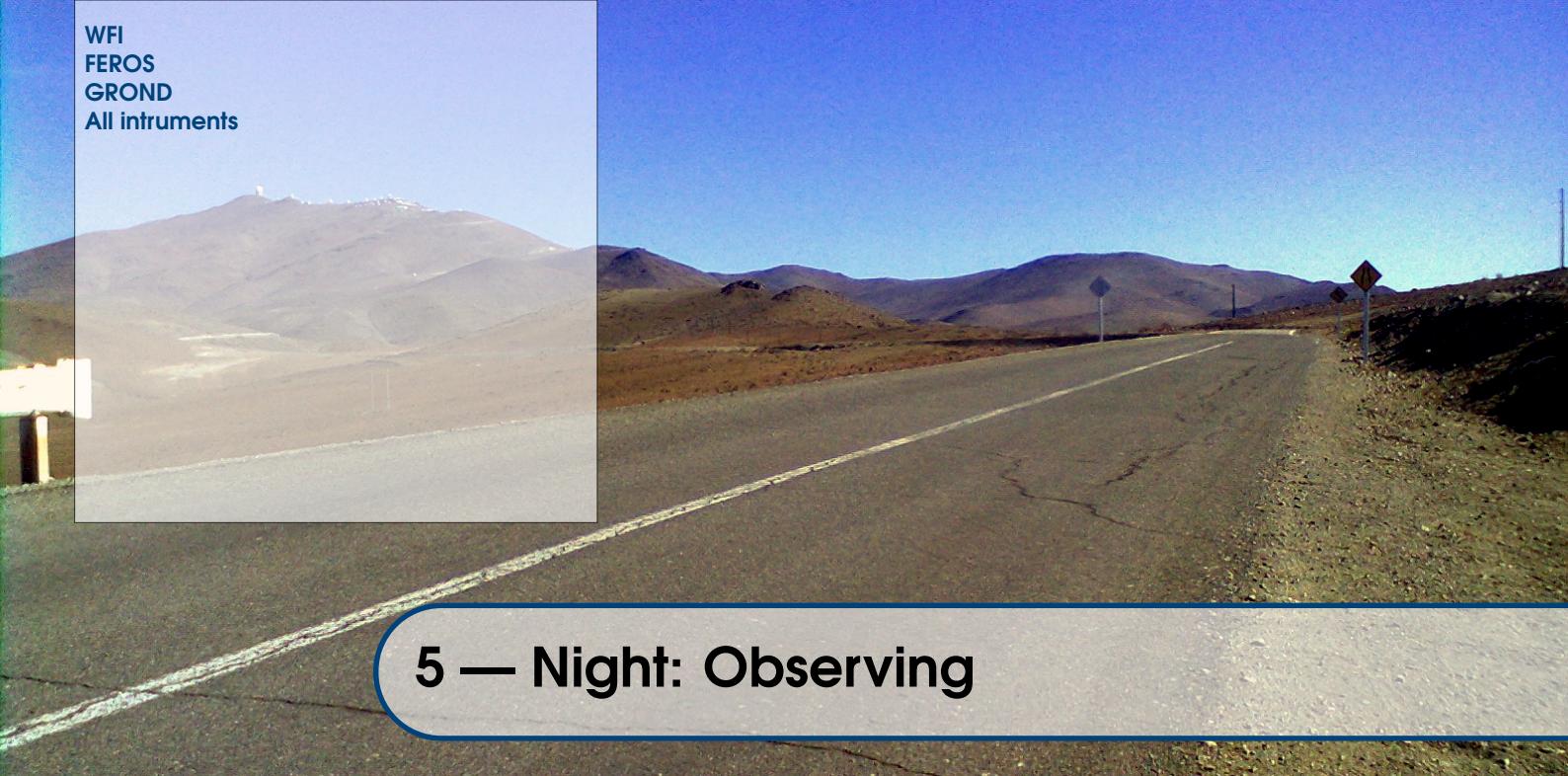
The **AG** can also be focused separately from the instrument, in case of defocused observations (I don't remember how to open the new GUI though).

4.4.3 Photometric standard fields

There are **OBs** for Landolt and SDSS standard fields that can be fetched from file with **bob** (10 min).

4.4.4 RRM online

In the GROND Control panel (Fig. 9.11(b)), click **RRM ONLINE** at the end of the twilight (beginning of the night) to allow for remote observations with this instrument.



5 — Night: Observing

5.1 WFI

5.1.1 Popup handling

`bob` will generally throw a few pop-ups during a typical observation. Failing to answer them, nothing will happen and time will be irremediably lost. These pop-ups may appear behind windows, so be proactive.

At the beginning of an observation, you may have have popups asking

- to recentre the object of interest if the observer has specifically asked for a precise position of his target. Three successive popups will ask whether to recenter, the pixel coordinates of the object, and whether to `Offset` and `quit`.
- to acquire the guiding, which you will click once you have done it. Almost all science observations will ask for it.

For an observation with large dithers (`COMBINED.OFFSET` is F) the guiding will be asked at the beginning of each exposure. It will also be asked for if at the beginning of a new template if the filtre is changed.

Error popups may also appear, see Sect. 8.

5.1.2 Switching to WFI

You may start an OB once point 2 has been done. This minimises overheads by parallelising preset and mirror movements. However, beware that some acquisition templates (`movetopixel` and `movetogap`) don't ask before taking the acquistion image, so you should be faster than preset.

Procedure 5.1. Switch to WFI observations

1. Open the **WFI** main cover.
2. Switch the pointing model to **WFI**.
 - (a) Go to screen Telescope Control Software.
 - (b) Go to the TCS Status Panel (workspace Status, see Fig. 9.4).
 - (c) Use menu Instrument selection → WFI
3. Check the **GROND** M3 mirror.

- Go to screen GROND BOB.
- (a) Ensure that the mirror is on **WFI**.
 - i. Go to the GROND Control panel (workspace BOB+OS).
 - ii. Check the value of GROND M3.
 - (b) If it is on **GROND**, set it to **WFI**.
In a terminal, type grondM3 WFI.
Redo point 3a (value should be MOVING then WFI).
4. Check the **FEROS** **mirr3** mirror.
Go to screen FEROS BOB.
- (a) Ensure that the mirror is on **WFI**
 - i. Go to the FEROS Control panel (workspace BOB+OS).
 - ii. Check the value of M3 Selected Mirror.
 - (b) If it is on **FEROS**, set it to **WFI**.
 - i. Go to the FEROS ICS Control panel (workspace ICS).
 - ii. Select the **mirr3** checkbox (in green) under the Motors section.
 - iii. Select **WFI** on the same line.
 - iv. Click **SETUP** at the bottom of the panel.
 - v. Unselect the **mirr3** checkbox.

5.1.3 Guiding

Procedure 5.2. Guiding with WFI

1. On the **TCS** workstation, acquire the guide field
 - (a) Go to screen Telescope Control Software.
 - (b) Locate the TCS Control Panel (Fig. 9.1).
 - (c) Click **Retrieve Field** below AG Field Acquisition.
2. On the autoguider windows (Fig. 9.3), chose the guide star
 - (a) Wait (≈ 30 s) for skycat to read out the guide field.
 - (b) On the same window, click Auto Set Cut Levels.
 - (c) Open the Pick Reference Star window if necessary.
In the menu of skycat window, chose TCS \rightarrow Pick Reference Star.
 - (d) Pick the reference star
On the Pick Reference Star window click Pick
On the skycat window, click a bright star not too close to the border.
3. On the TCS Control Panel (Fig. 9.1) start the guiding
 - (a) Activate the guiding
Click Box to Star below Autoguider.
 - (b) Wait for guiding to start
In a few seconds ACTIVE should appear in AG Stat.
4. Proceed with the observation, typically by clicking on pop-up asking for guiding.

After a filter change or when running several observing blocks on the same field, it is possible to reacquire guiding within a few seconds instead of the full procedure (1 min).

It is not possible to do it after a focus sequence.

Procedure 5.3. Restart guiding with WFI

1. On the **TCS** machine, go to screen Telescope Control Software.
2. On the TCS Control Panel (Fig. 9.1)
 - (a) Click Start monitoring
 - (b) Click Stop monitoring

3. Select the star on the autoguider windows (Fig. 9.3)
 - (a) Click Pick object in the Pick reference star window.
 - (b) Click on the star in the skycat window.
4. On the TCS Control Panel (Fig. 9.1) start the guiding
 - (a) Activate the guiding
Click Box to Star below Autoguider.
 - (b) Wait for guiding to start
In a few seconds ACTIVE should appear in AG Stat.
5. Proceed with the observation, typically by clicking on pop-up asking for guiding.

5.2 FEROS

5.2.1 Switching to FEROS

You can start an OB once point 1 has been done. This minimises overheads by parallelising preset and mirror movements.

Procedure 5.4. Switch to FEROS observation

1. Switch the pointing model to **FEROS**.
 - (a) Go to screen Telescope Control Software.
 - (b) Go to the TCS Status Panel (workspace Status, see Fig. 9.4).
 - (c) Use menu Instrument selection → FEROS
2. Check the **GROND** M3 mirror.
Go to screen GROND BOB.
 - (a) Ensure that the mirror is on **WFI**.
 - i. Go to the GROND Control panel (workspace BOB+OS).
 - ii. Check the value of GROND M3.
 - (b) If it is on **GROND**, set it to **WFI**.
In a terminal, type grondM3 WFI.
Redo point 2a (value should be MOVING then WFI).
3. Check the **FEROS** **mirr3** mirror.
Go to screen FEROS BOB.
 - (a) Ensure that the mirror is on **FEROS**
 - i. Go to the FEROS Control panel (workspace BOB+OS).
 - ii. Check the value of M3 Selected Mirror.
 - (b) If it is on **WFI**, set it to **FEROS**.
 - i. Go to the FEROS ICS Control panel (workspace ICS).
 - ii. Select the **mirr3** checkbox (in green) under the Motors section.
 - iii. Select FEROS on the same line.
 - iv. Click SETUP at the bottom of the panel.
 - v. Unselect the **mirr3** checkbox.
4. Set up the autoguider.
Go to the screen Autoguider GROND & FEROS
 - (a) Set up the autoguiding properties. (See Fig. 1.4)
 - i. Go to window Autoguider, open it if necessary.
To open: left-click the workspace, choose Autoguider from menu CAM user.
 - ii. Change the guiding unit to **FEROS**
Select FEROS under Guiding unit in the CCD Control area.
 - iii. Select autoguiding loop times.
Under Autoguider control fill in the numbers from top to bottom

- For focus: 6, 3, 0.02
 - For science target: adapt last numer to magnitude (2 for $V = 10$?).
- (b) Set up the autoguider real time image.
- i. Go window E2P2 Real Time Display, open it if necessary.
To open: left-click the workspace, choose E2P2... from menu CAM user.
 - ii. Activate the guide camera image flow if necessary.
If checkbox Camera On/Off is not green, click on it.
 - iii. Ensure the image is horizontally flipped.
Right of scale the button \leftrightarrow should be pressed.
- (c) Set the fibre reference position.
- i. Open or activate window Pick reference star (Fig. 5.1).
Click Set Reference on window E2P2 Real Time Display.
 - ii. Ensure the reference is set on the cursor's clicking position.
On window Pick reference star, select checkbox Pick Cursor.
 - iii. Back window E2P2 Real Time Display. Indicate the position of the fibre by clicking the pixel coordinates ($x=822$, $y=516$). A box centred on the pixel should appear.

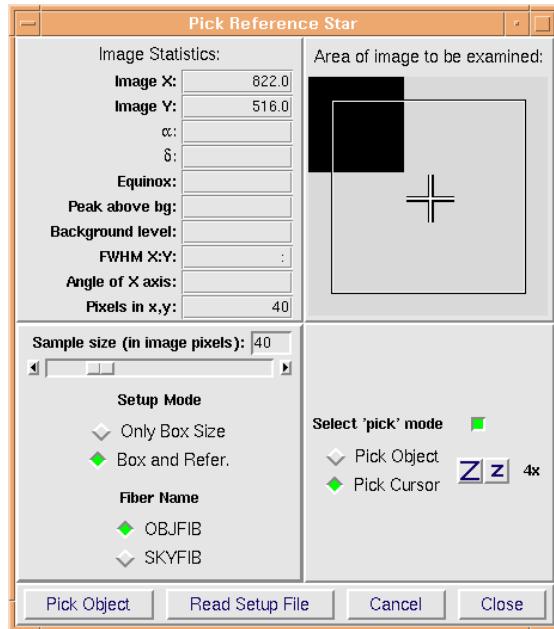


Figure 5.1: Window to set **FEROS** fibre reference position **Pick reference star**. Select checkbox **Pick Cursor**.

5.2.2 Guiding

On fibre

The fastest way to guide with FEROS is using the reflection on the fibre head. It is not adequate for faint stars (try to get $\approx 4\text{--}5000$ counts) or with bad weather.

Procedure 5.5. Guide a FEROS observation using reflection on the fibre head

1. Check that **WFI AG** is off.
2. Centre the target onto the fibre.
In window E2P2 Real Time Display, click Centering below Image Control and click on the target.
3. In Autoguiding window, choose integration times (6, 3, x for bright targets with $x < 3$).
4. Click Start guiding.

It is possible to guide blind using another star of the field in the fibre head viewer. It is not recommended and should be used as a last resort.

Off fibre

Procedure 5.6. Guide a FEROS observation blindly using off-fibre reference

1. Check that **WFI AG** is off.
2. Centre the target onto the fibre.
3. Choose integration times (6, 3, x for bright targets with $x < 3$).
4. Set reference to a star of the field.
5. Start guiding.
6. **Important:** at the end of the OB, set the reference back to fibre position.

Using WFI

This is the preferred method in bad weather or for faint targets. When the FEROS **atmospheric diffraction corrector (ADC)** is used the WFI guide field is extremely defocused and this guiding method may be unstable.

Procedure 5.7. Guide FEROS observation with the WFI guide camera

1. Centre the target on the fiber.
In window E2P2 Real Time Display, click Centering below Image Control and click on the target.
2. Change filtre to limit the defocus in the **WFI AG**
 - (a) Go to the workstation WFI BOB, workspace OS GUI.
 - (b) In panel e2p2 OS GUI, select filtre under SETUP Instrument.
 - If **FEROS ADC** is used, select Cousins *I*.
 - Other wise, use standard *R*.
 - (c) In the same panel, click apply.
 - (d) Wait for filtre change (≈ 1 min)
 - On the panel, field Filtre Name will first display Moving.
 - When the right filtre name appears, proceed with guiding.
3. Proceed with guiding as for a **WFI OB** (Sect. 5.1.3).
4. Recentre the target on the fibre
 - (a) Go to the workstation Telescope Control Software.
 - (b) On the TCS Main Panel find the virtual racket.
 - (c) Select Offset and tick checkbox Combined Offsets.
 - (d) Enter offset values for both axes (0.3) and click Store.

- (e) Use the arrows to centre if necessary.
5. **Important:** stop guiding at the end of the **FEROS OB**.
In the TCS Control Panel, click Stop Monitoring (under AG Monitoring Parameters) and click Off (in the panel Autoguider).
6. **Note:** when observing with the ADC, don't lose time centering on the first pop-up. No second pop-up will be issued after ADC has entered the beam path, so you should Pause the exposure if you take time acquiring guiding and centring the target.

5.3 GROND

5.3.1 Switching to GROND

You can start an OB once point 2 has been done. This minimises overheads by parallelising preset and mirror movements. If the Moon is between the first target and the current position, you should manually preset with the main cover closed.

Procedure 5.8. Switch to GROND observations

1. **Important (security):** Ensure the **GROND** main cover is closed.
 - (a) Go to screen **GROND BOB**.
 - (b) In a terminal, type **grondMC CLOSE**.
 - (c) Wait for cover to close (10-15 s).
 - Check value on panel **GROND Control** (Moving, then Closed).
2. Switch the pointing model to **GROND**.
 - (a) Go to screen **Telescope Control Software**.
 - (b) Go to the **TCS Status Panel** (workspace **Status**, see Fig. 9.4).
 - (c) Use menu **Instrument selection → GROND**
3. Check the **GROND M3 mirror**.

Go to screen **GROND BOB**.

 - (a) Ensure that the mirror is on **GROND**.
 - i. Go to the **GROND Control panel** (workspace **BOB+OS**).
 - ii. Check the value of **GROND M3**.
 - (b) If it is on **WFI**, set it to **GROND**.
In a terminal, type **grondM3 GROND**.
Redo point 3a (value should be **MOVING** then **GROND**).
4. Set up the autoguider.
Go to the screen **Autoguider GROND & FEROS**
 - (a) Set up the autoguiding properties. (See Fig. 1.4)
 - i. Go to window **Autoguider**, open it if necessary.
To open: left-click the workspace, choose **Autoguider** from menu **CAM user**.
 - ii. Change the guiding unit to **GROND**
Select **GROND** under **Guiding unit** in the **CCD Control area**.
 - iii. Select autoguiding loop times.
Under **Autoguider control** fill in the numbers from top to bottom
8, 4, 1 is usually fine, then 1 can be increased if necessary.
 - iv. You may need to **Start exposure**.
 - (b) Set up the autoguider real time image.
 - i. Go window **Telescope R.T.D.**, open it if necessary.
To open: left-click the workspace, choose **Autoguider RTD Grond** from menu **CAM user**.
 - ii. Activate the guide camera image flow if necessary.

Use menu TCS → Attach camera.

- (c) Ensure the reference picking window is open
 - i. Look for window: Pick Reference Star

To open: from RTD window use menu TCS → Pick Reference Star

On the first observation with grond, it is possible that nothing is seen on the guider. In that case ensure that shutters are open typing grondMC OPEN && grondCS OPEN in a terminal (as user grondmgr). You may gain time doing after the telescope has started to move towards the field, if it does not go over or close to the Moon.

5.3.2 React to an automatic trigger

Procedure 5.9. React to an automatic trigger

1. Check that your exposure is being read out automatically, if not, do it manually
 - (*FEROS*) click END on FEROS Control
 - (*WFI*) click END on WFI General State panel.
If WFI wasn't read out and preset is started, frame is lost.
2. Click OK on the trigger to start preset.
Preset will be automatic after 30 seconds.
3. Set up the autoguider (unless you were observing with GROND).

Go to the screen Autoguider GROND & FEROS

 - (a) Set up the autoguiding properties. (See Fig. 1.4)
 - i. Go to window Autoguider, open it if necessary.
To open: left-click the workspace, choose Autoguider from menu CAM user.
 - ii. Change the guiding unit to **GROND**
Select GROND under Guiding unit in the CCD Control area.
 - iii. Select autoguiding loop times.
Under Autoguider control fill in the numbers from top to bottom
8, 4, 1 is usually fine, then 1 can be increased if necessary.
 - iv. You may need to Start exposure.
 - (b) Set up the autoguider real time image.
 - i. Go window Telescope R.T.D., open it if necessary.
To open: left-click the workspace, choose Autoguider RTD Grond from menu CAM user.
 - ii. Activate the guide camera image flow if necessary.
Use menu TCS → Attach camera.
 - (c) Ensure the reference picking window is open
 - i. Look for window: Pick Reference Star
To open: from RTD window use menu TCS → Pick Reference Star
4. Start the guiding (Sect. 5.3.3 below).

5.3.3 Guiding

Procedure 5.10. Guide with GROND

1. Choose typical 8, 4, x values in the autoguider, with $x \leq 4$.
2. When RTD has loaded an image, click Auto Set Cut Levels.
3. In the TCS option, select Pick Reference Star.
4. Click on a good star at least 100 pixels from the border.
5. In Autoguiding window, click Start guiding.

5.4 All instruments

5.4.1 Run an observing block

There are three ways to run an OB: use a template in [bob](#) and modify it on the fly; call it from [phase 2 preparation tool \(p2pp\)](#); call it from the [ot](#) execution sequence. The last method allows to automatically fetch and run OBs in a sequence, without lost time, but popups must be attended, of course.

5.4.2 Skip the preset

If the telescope is already on the right target, you can skip the preset when starting an OB. For observations requiring guiding, you should make sure that it is already on or acquire it right after the first exposure begins. On [WFI](#), it should be avoided if the observing template sets RETURN to F (false) and pointing position is important.

Procedure 5.11. Skip the preset

- Generic method
 - 1. In [bob](#), open the aquisition template
Use left click on the triangle.
 - 2. Edit the PREST field to F
You need to set bob to “engineering” mode.
Middle click on the value, it should be T by default.
 - 3. Start the OB.
 - 4. Start the guiding if needed
For [WFI](#), see quick guiding Procedure 5.3
- Standard observation with FEROS or GROND
 - 1. In [bob](#), deactivate the preset template
Use right click on the triangle.
 - 2. Ensure guiding is working if needed
 - 3. Start the OB.



6 — Morning: Closing & Calibrations

6.1 Panels referred to

When closing, you may need panels that are not automatically opened at startup. Here is how to find and open them.

1. On the [TCS](#) screen, ensure that the [Auxiliary Functions](#) (Fig. 9.5) is open.
If not, left-click on an empty region and select TCS panels → Aux Functions.
2. On the [Windows desktop](#), ensure mozilla shows the [dome webcam](#) (Fig. 9.14).
The tab named TRENDNET... can be opened with bookmark Dome Webcam.
3. On the [Windows desktop](#), ensure mozilla has a tab with [Dome Auxiliary Functions](#).
Tab tab named ADAM 6000... can be opened with bookmark Dome Controls (Fig 9.13).

6.2 Telescope

To put the telescope to a safe parking position one has to follow steps in a definite order, in particular, it is best to close the main mirror cover before anything else. (Except in an emergency closing of the dome.)

Procedure 6.1. Close the dome.

1. Close the main mirror cover.
In the TCS Setup Panel (Fig. 9.2), click Close below Main Mirror Cover.
2. Wait ≈ 2 min until it says closed.
In the same panel, it should state Closed below Main Mirror Cover.
3. Park the telescope.
In the same panel, click Zenith under Fixed preset.
4. Wait for preset to complete.
In the TCS Control Panel, the telescope should be at the zenith in the rose diagram.
5. Put the dome in manual.
In the TCS Setup panel, click the Manual checkbox under Dome.
6. Close the slit.
In the same panel, click Close under Slit.
7. Switch on the light in the dome (Fig 9.14).

In the [Auxiliary Functions](#) (Fig. 9.5), select 200V under Flat Field Lamp.

8. Check the slit is closed and telescope at zenith

Use the [dome webcam](#) (Fig. 9.14) on the mozilla tab TRENDNET on the Windows desktop.

9. Switch off the light in the dome.

In the [Auxiliary Functions](#), select OFF under Flat Field Lamp

If the panel is frozen, you can execute commands from a terminal, in directory bin: closemirror, presetzenith, closeslit, domemanual. Or you can try to revive the panel (See procedure [8.21](#)).

If nothing works, you must ask for support from an ESO TIO. ESO is still responsible for the safety of the facilities.

6.3 Instruments

One should close the protective shutters of [WFI](#) and [GROND](#), cut the communication between instruments and [TCS](#), and ensure mirrors let light directly to [WFI](#) for dome flats.

Procedure 6.2. Put the instrument offline.

1. Close the [WFI](#) protective shutter.

Check on the General State panel in the WFI monitor (Fig. 9.8) that Protective Shutter State is CLOSED.

If not, go to [Auxiliary Functions](#) (Fig. 9.5) and CLOSE the WFI Protective Shutter.

2. Deactivate [FEROS](#) communication.

In the FEROS control panel (Fig. 9.9) select from menu Telescope → IGNORE.

3. Deactivate [GROND](#) communication.

In the GROND Control panel (Fig. 9.11(b)), click RRM STANDBY and TCS OFF

4. With [GROND](#), close the cold and protective shutters.

In a terminal, type grondCS CLOSE and grondMC CLOSE.

5. Ensure [FEROS](#) mirror is not in the way.

In panel FEROS Control (Fig. 9.9), M3 Selection Mirror should state WFI

If not, int the [ICS](#) control panel (Fig. 9.10), check the mirr3 box, select WFI, click SETUP.

6. Ensure [GROND](#) mirror is not in the way.

In panel GROND Control (Fig. 9.11(b)), GROND M3 should state WFI.

If not, type grondM3 WFI in a terminal.

6.4 Dome

Turn off ventilation and hydraulics using the [Dome Auxiliary Functions](#) (Windows desktop, Fig. 9.13). If it is required, use the password on left side of the screen.

1. Turn off the dome ventilation.

Click Dome Air if the button just above it is green.

2. Turn off the hydraulics.

Click HydrOff. The button above Hydr should go red.

3. Turn off the drives.

Click DrivesOff. The button above Drives should go red.

6.5 Tidying folders

Night data are moved to a night directory and disk space is checked.

Procedure 6.3. Tidy folders

1. On the **WFI** screen, type `~/bin/sciopsTidyMess.sh` in a terminal (wfi xterm).
2. On the **FEROS** screen, type `~/bin/sciopsTidyMess.sh` in a terminal.
3. On the **GROND** workstation, <check it with GROND team>.

6.6 Health checks & internal calibrations

Launch health checks and internal calibrations.

Procedure 6.4. Launch morning health checks and internal calibrations

1. Run **FEROS** linearity check.
In **bob**, load and run the daily linearity OB using `Fetch an OB from file`.
Name is `linearity-#-weekday` where `weekday` is that at the start of the night.
2. Run the **WFI** health check, biases, and dark.
In **bob**, load and run the daily calibration OB using `Fetch an OB from file`.
Name is `WFI_cal_#-weekday` where `weekday` is that at the start of the night.
3. Run **GROND** calibrations.
In **GROND bob**, load and run `GROND_cal.obd` using `Fetch an OB from file`
`(.../TEMPLATES/OBD/)`.



7 — Managing observing blocks

7.1 Transferring OBs from one's laptop

7.1.1 Standard way

Procedure 7.1. Transfer OBs from one's computer to the telescope, using p2pp check-in

- On your laptop's [p2pp](#) select all your [OBs](#).
- Use menu File → Check-in
- Use menu Readme → CheckIn Readme if necessary
- If using [ot](#) (advised)
 - From main [ot](#) window, use menu Queues → Repository Browser
 - Select OB name checkbox in the Repository Browser window
 - Empty all fields and enter your [p2pp](#) username
 - Click Query
 - Select all the [OBs](#) you need with the mouse (they should have status Defined)
 - Select Mark Status and chose (V)erified
 - Select the same [OBs](#) again
 - Append to queue, typically MPIA-YYYY-MM (named by year and month)
 - Find the window corresponding to this queue and use Menu → Save
- If using [p2pp](#)
 - TBW

7.1.2 Loading manually

If this fails, for instance for [OBs](#) longer than one hour, you should ssh them from your laptop and load them manually into the dhs computer.

Procedure 7.2. Transfer OBs from one's computer to the telescope, using manual file transfer.

- Check that your laptop accept ssh connections.
- Connect it to the cable network.
- Find your laptop's IP address. With linux or mac, /sbin/ifconfig or ifconfig should give it.

- On the [p2pp](#) machine create a directory let's say `/yourusername/OBs`
- On the same machine, type `scp -r yourlogin@youripaddress:pathtoOBs /yourusername/OBs` and type your password.
- Open [p2pp](#) with your credentials
- Select your program ID on the left column
- Use menu `File → Import`

Note: if you cannot activate ssh services on your laptop, use a USB stick and someone else's computer. Alternatively, send an e-mail you will open on the p2pp machine (not advised).

7.2 OT

On the [p2pp](#) machine, there is a workspace to use OBs from the observing tool ([ot](#)). In the Repository Browser of the [ot](#), find your OB using fields such as instrument, period, ID, username, position, etc. Click on the OB and then on a tab called Execution Sequence that it is in the same panel.

There should be an open window which is called Execution Sequence. The selected OB will be listed there, maybe with a list of others. Use the buttons move up (or move down) to move the OB you want to run next to the top of the list since it has to be the first one.

Then, go to [bob](#) and use the menu `Configure → Environment`. In the Process tab change [p2pp](#) by [ot](#). Now you can fetch the OB from [ot](#).

No flux or little flux
Autoguider camera fails
OB doesn't work
Focus issues
FEROS ADC
FEROS-DRS
Startup issues
TCS issues
GROND issues
Freezing issues
Pointing issues
Web pages



8 — Troubleshooting

8.1 No flux or little flux

Procedure 8.1. Investigate and fix the reason for the absence of flux in an instrument

. Ensure that

- the slit is OPEN ([TCS setup, Fig. 9.2](#)).
- the dome is on automatic ([TCS setup, Fig. 9.2](#)) and the slit is aligned ([TCS, Fig. 9.1](#)).
- the Main Mirror Cover is OPEN ([TCS setup, Fig. 9.2](#)).
- the `mirr3` mirror is on WFI or FEROS ([FEROS ICS, Fig. 9.10](#)) if observing with [WFI](#) or [FEROS](#). If necessary, click its checkbox and SETUP.
- the M3 mirror is on [GROND](#) if observing with [GROND](#) and on [WFI](#) otherwise ([GROND control, 9.11\(b\)](#)). Use `grondM3` WFI or `grondM3` GROND in the terminal if necessary.
- ([WFI](#)) the protective shutter is OPEN ([Auxiliary Functions on the TCS machine, 9.5](#)).
- ([GROND](#)) the protective and cold shutters are OPEN ([GROND control, Fig. 9.11\(b\)](#)). Use `grondMC` OPEN and `grondCS` OPEN in the terminal if necessary.
- ([GROND](#)) If images look like biases, restart FIERA.
On the FIERA Control Panel do Shutdown / Startup.

8.2 Autoguider camera fails

The [GROND](#) and [FEROS](#) autoguider use the same system on screen Autoguider GROND & FEROS, between the GROND and FEROS screens. [WFI](#) has its own system on screen Telescope Control Software.

It is possible to go on observing with GROND and FEROS while restarting the autoguider, provided that the modules are deactivated on the [TCS](#). However, you need to reactivate them to do the last step of restarting the autoguider (`e2p2StartTCCDs`).

Procedure 8.2. Observe when the autoguider fails

1. On screen Telescope Control Software go to `texttStatus` workspace
2. On the TCS Status panel locate the modules section (Fig. 9.4)
3. Check ignore for the corresponding modules

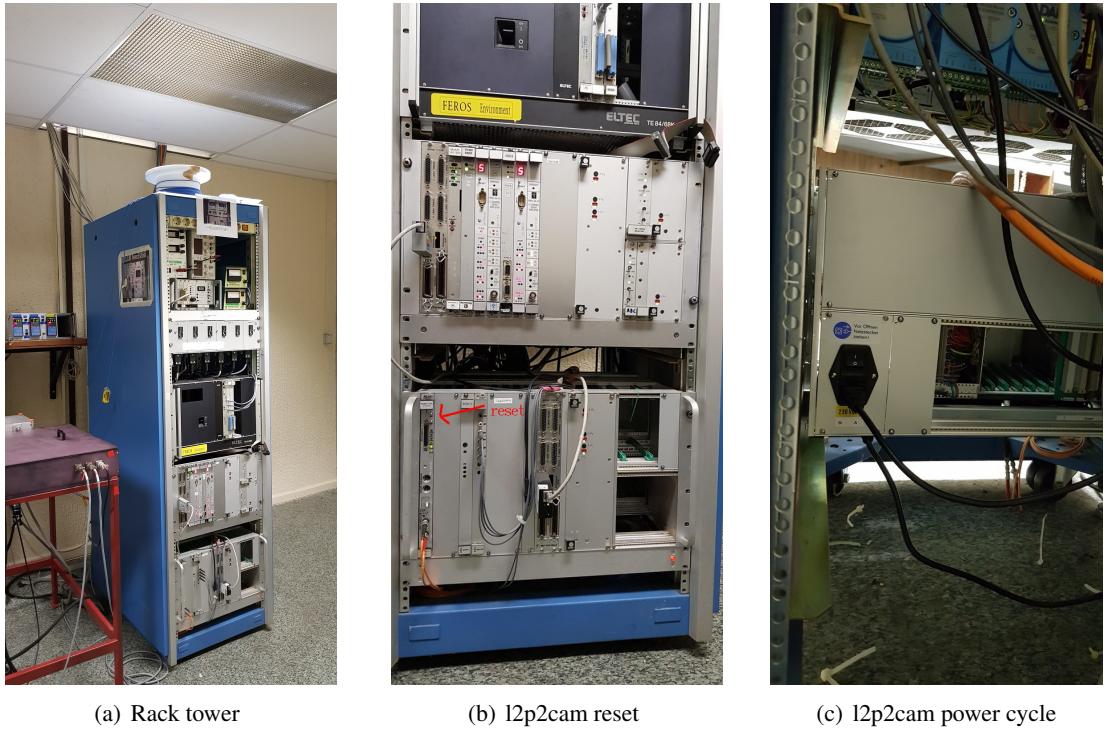


Figure 8.1: Rack with the FEROS AG LCU.

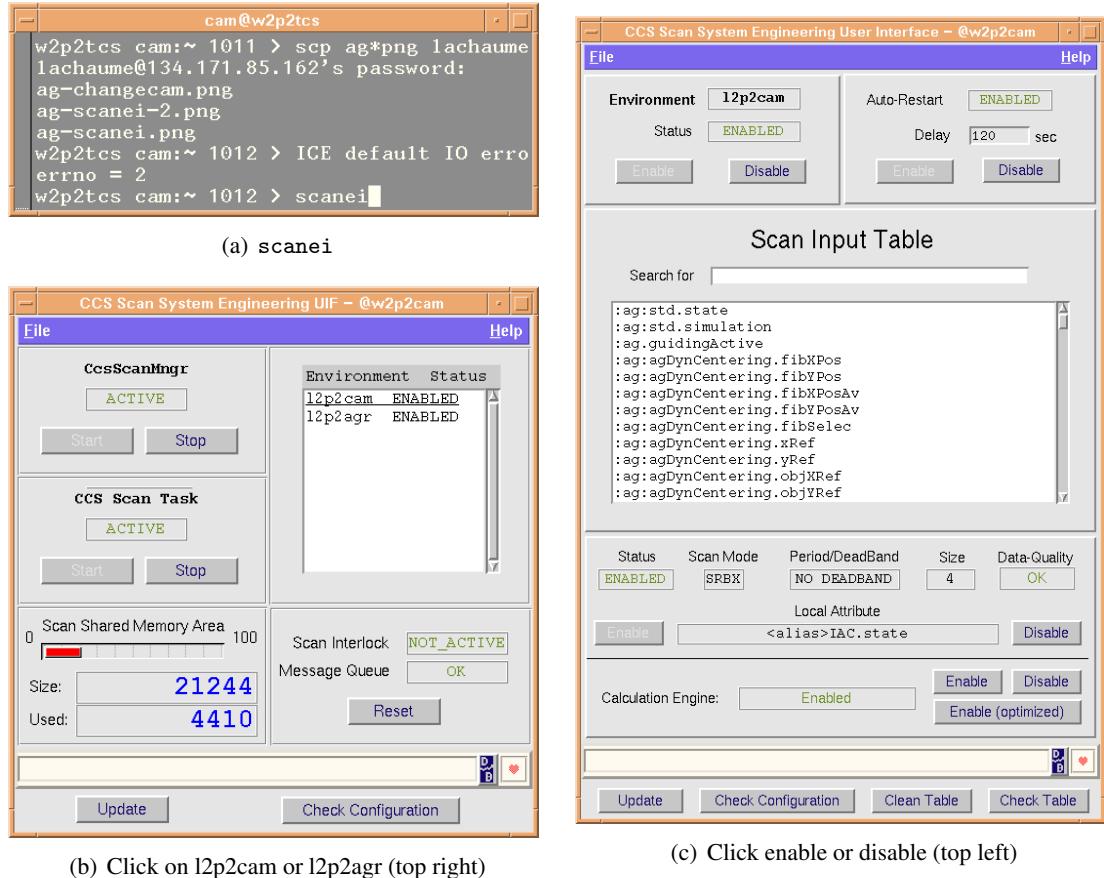


Figure 8.2: scanei on the FEROS and GROND AG machine.

- For **GROND**, ag_ccdGRND and ccdGRND
 - For **FEROS**, ag_ccdGRND and ccdGRND
4. Remember to uncheck them for e2p2StartTCCDs to work!

8.2.1 GROND

If you want to observe while fixing the issue you need to deactivate the modules in the **TCS**, see Procedure 8.2. You will need to uncheck them just before starting the guider software.

Procedure 8.3. Restart the GROND autoguider

1. In a terminal of the Autoguider GROND & FEROS screen, try steps c & d. If it doesn't work, do steps a-d:
 - (a) lccBoot 12p2agr
 - (b) scanei, disable and enable l2p2agr (See Fig. 8.2)
 - (c) e2p2StopTCCDs gag
 - (d) e2p2StartTCCDs gag
2. In a terminal:
 - (a) Check that the autoguider machine answers ping with ping 12p2agr.
 - (b) If it does, log into it with rlogin 12p2agr
 - (c) Reboot it with reboot

8.2.2 FEROS

If you want to observe while fixing the issue you need to deactivate the modules in the **TCS**, see Procedure 8.2. You will need to uncheck them before starting the guider software (step 1d).

Procedure 8.4. Restart the FEROS autoguider

1. Restart the **AG** software.
 - (a) On screen Autoguider GROND & FEROS, find or open a terminal.
 - (b) Type e2p2StopTCCDs fag
 - (c) Type e2p2StartTCCDs fag
 - (d) Wait for about 1–2 min for the command to exit successfully.
2. If the problem persists or an error pops up in step 1d, reboot the **AG LCU**.
 - (a) Type lccBoot 12p2cam
 - (b) Type scanei to open the scanei GUI
 - i. Check that l2p2cam is ENABLED
 - ii. If not enable l2p2cam (see Fig 8.2)
 - iii. Close the GUI
 - (c) Perform steps 1a, 1c, 1d.
3. If the problem persists or an error pops up in step 1d, perform a hardware reset of the **LCU**.
 - (a) Go to the FEROS room located in the telescope enclosure.
 - (b) Locate the big blue rack tower (Fig. 8.1(a)).
 - (c) On the lower racks, near to l2p2cam label, push a small RST button (Fig. 8.1(b)).
 - (d) Perform steps 1a, 1c, 1d.
4. If this does not solve the issue, power cycle the **LCU**
 - (a) Go to the FEROS room located in the telescope enclosure.
 - (b) On the back of the rack tower, unplug and replug the lower rack (Fig. 8.1(c)).
 - (c) Perform steps 1a, 1c, 1d.

8.2.3 WFI

Failure of the **WFI** autoguider will generally be silent. It will just do nothing when asked to retrieve field or start monitoring.

If the quick 30 seconds fix does not work, it is not possible to observe with WFI during the 15–35 minute-long fix, but it should be possible to go on with GROND or FEROS with no guarantee though—the **TCS** has the bad habit of communicating with the WFI computers for focus.

Try in this order

Procedure 8.5. Fix WFI autoguider issues

1. On the **TCS** screen, restart the autoguider (30 s)
 - (a) Use left-click menu Stop Autoguider
 - (b) Use left-click menu Start Auoguider
2. If an autoguider process is suspended, restart the **TCS**
 - (a) In a terminal, type `i`
 - (b) If there is an AG-related suspended proces, proceed as follow
 - (c) Deactivate the connection between **FEROS** and TCS
 - On the **FEROS** screen (Fig. 1), locate the **FEROS** control panel (Fig. 9.9)
 - From menu select Telescope → IGNORE
 - (d) Perform a full restart the **TCS** including VME reboot (Sect. 1.1)
 - (e) Reactivate the connection between **FEROS** and TCS
 - On the **FEROS** screen (Fig. 1), locate the **FEROS** control panel (Fig. 9.9)
 - From menu select Telescope → ENABLE
 3. Reboot the **WFI** SPARC station and dependencies (15–35 min).
 - From a terminal type `rlogin wffcd -l fcdrun`
 - Once logged in, type `reboot`
 - Wait for reboot to complete (a few minutes)
In a terminal type `ping wffcd` and wait until it shows packets.
 - Reboot **WFI** computer (a few minutes)
On screen Wide Field Imager, type `reboot` in a terminal.
 - Do the **WFI** weekly startup (10 min)
 - Restart the **TCS** or just autoguider (see point 1 1), not sure here if **TCS** restart is needed.

8.3 OB doesn't work

8.3.1 OB gives an error when started

If an OB issues an error within seconds of being started.

Procedure 8.6. Fix OB start error

1. If OB was already executed or aborted, click `Reset status`.
2. Check that the object is observable (above 20 degrees).
3. If telescope preset is needed, check that the communication with the **TCS** is on
 - (**FEROS**) Use menu Telescope → Enable.
 - (**GROND**) Click **TCS ON**.
4. If telescope preset is not needed (e.g. calibrations), deactivate it in
 - (**FEROS**, **GROND**) Right-click the triangle of the acquisition template. (A thumb down should appear. If you get a stop, go on clicking.)
 - (**WFI**) Set **PRESET.NEW** to **F** in the acquisition template.

(This needs menu Interface → Engineering.)

8.3.2 OB stalls before starting to observe

Procedure 8.7. Fix stalling of an OB

- (*WFI, FEROS*) Try to find a hidden pop-up asking for interaction (behind a window).
- (*WFI*) If OB stalls when focus order is sent by `bob`, set it manually.
In the TCS screen, enter focus value in the main panel (Fig. 9.1).
Note: A permanent fix is to restart the **TCS** (see Sect. 8.8.3).
- (*GROND*) If IR exposure does not start after the optical one has, reset the IR flip mirror.
In a terminal, type `grondFM`

8.3.3 Crash before an exposure

Here are possible fixes, from shortest to longest. Try each one in this order, until problem is fixed.

Procedure 8.8. Investigate and fix a crash occurring before the start of an optical exposure

1. Close `bob` and launch a new one.
2. **FEROS**
 - (a) Restart **FIERA**
On the FIERA Control Panel do Shutdown / Startup.
 - (b) Restart the instrument with telescope enabled
(In particular if the second exposure of the night fails.)
 - i. On the FEROS Control panel, use menu Telescope → enabled.
 - ii. Do the full start-up procedure.
3. **GROND**
 - (a) If error closing `w2p2cam` environment
 - i. If a FIERA exposure is running in GROND Control, click End or let it finish.
 - ii. Type `grondSHUTTER` in a terminal.
 - (b) If the error mentions **IRACE**
 - i. Go to monitor GROND IRACE.
 - ii. Locate the Infrared Acquisition Module (Fig. 9.12(b))
 - iii. Click Reset on the lower left part of the panel
 - iv. Select from menu Online → Online
 - v. If it fails, you may need ≈ 40 min to deep restart (Procedure 8.25) IRACE.
 - (c) Ensure only one `bob` is running
 - i. Find all `bobs` (`ps aux | grep bob`)
 - ii. kill them
 - iii. launch a new `bob`.
 - (d) (*GROND*) Restart **FIERA** (see 2a).
 - (e) (*GROND*) Restart **GROND**.
 - i. Type `grinsStop`
 - ii. Type `grinsStart`
 - iii. In GROND Control panel, put instrument ONLINE.
 - (f) (*GROND*) Reboot **GROND**.
 - (g) (*GROND*) If the GROND control has many TCS-related fields with gray background or the error says something about the FITS keyword TELESCOP, a last resort reboot of GROND may be needed. **BUT** in case of the first scenario, take a separate exposure with **FIERA** (in the control panel) first and check if these fields turn back

to their usual color.

4. WFI

- (a) Abort a possible running exposure manually, in particular if **bob** issues the error message “Cannot start exposure before the last one has read out” or some equivalent message (10 sec)
 - i. On the e2p2 OS GUI (Fig. 9.6) click Abort Exp./Seq.
 - ii. The GUI should display the text ABORT > INVOKED
 - iii. Wait for a few seconds for the answer ABORT > REPLY/ L OK.
 - iv. If it works, problem is solved, if not go to next point.
- (b) Do a DAILY startup of **WFI** (5 min).
- (c) Do a full restart of **FIERA** and **WFI** (10-15 min).
 - i. Go to a wfi terminal or open it from menu wfi xterm.
 - ii. Shut down the instrument.
Type wfinsShutDown
 - iii. Check that the environment are enabled.
 - A. Type scanei &
 - B. Go to the opening GUI titled CSS Scan System.
 - C. Check that wwffcd and w2p2tcs are ENABLED
 - D. If either environment is DISABLED, proceed with these points
 - E. Click on DISABLED
 - F. In emerging GUI, click Enable just below Environment.
 - G. Close it with File → Quit.
 - H. Close CSS Scan System with menu File → Quit.
 - iv. Restart the CCD managing components
 - A. Type wfinsStopTCCDS
 - B. Type wfinsStopSCCDS
 - C. Type wfinsStartSCCDS
 - D. Type wfinsStartTCCDS
 - v. Restart the instrument.
Type wfinsStartUp.
 - vi. Restart the **AG**
 - A. Go to screen Telescope Control Software.
 - B. Left-click on an empty space to open the menu TCS User.
 - C. Use menu TCS User → Stop autoguider.
 - D. Use menu TCS User → Start autoguider.
 - vii. Open missing windows on screens Wide Field Imager.
 - A. **bob** with menu WFI User → WFI → BOB (WFI).
 - B. **RTD** with menu WFI User → WFI → WFI RTD.
 - viii. Take a test bias.
- (d) Restart the instrument. You will need to restart the autoguider on the **TCS** machine.

8.3.4 Crash during an exposure

Procedure 8.9. Fix a crash during an exposure

1. FEROS

- (a) **OB** crashes with “error closing cam environment” while an exposure (usually the first of the night) is running
 - i. Let the current exposure finish and read out, it will be fine.
 - ii. In the meantime, close and relaunch **bob**.

2. [WFI](#)
 - (a) [WFI](#) stalls just before the read out of an exposure.
Abort it manually, if unsuccessful restart [FIERA](#) (follow point 4 in Sect. 8.3.3)
3. [GROND](#)
 - (a) [OB](#) crashes with “error closing cam environment” while an optical exposure is running
 - i. End the optical exposure (if it’s a long one)
On the grond control panel, click END.
 - ii. Wait for exposure to read out
 - iii. Restart the OB without presetting
(In [bob](#) deactivate preset and reset status.)
 - (b) [OB](#) stalls or crashes during an exposure
 - i. In a terminal, execute `grondFM`. If issue is not fixed, proceed.
 - ii. Close and/or kill all [bob](#) instances
Find them by typing `ps aux | grep bob` in a terminal.
Kill them with `kill -9 <pid>` where `<pid>` is the job number.
 - iii. Launch [bob](#)
Type `bob &` in a terminal.
 - iv. In the same terminal, execute `grondGRI` and `grondSHUTTER`
 - v. Wait for `grondSHUTTER` command to end (10 s to 1 min).

8.3.5 Crash during telescope offset

Here are possible fixes, from shortest to longest. Try each one in this order, until problem is fixed.

- Close [bob](#) and launch a new one. (Works with [WFI](#)).
- Restart the [TCS](#) (see Sect. 8.8.3).

8.3.6 Crash during a telescope focus offset

If a timeout error occurs relating to `FOCOFF` or some message about focus that cannot be done:

- ([GROND](#)) Disable and enable `w2p2tcs` in `scanei`.
- ([WFI](#)) See Sect. 8.4.3.

8.3.7 Crash at the beginning of sky flats

If the OB crashes before the pop-up asking for manual preset, it means [bob](#) must be killed and restarted.

8.3.8 Crash during filter change in WFI

If the OB crashes at the moment to change the filter using [WFI](#) and the `Filter Name` status is `Moving` on the [WFI General State](#) panel (Fig. 9.8)

1. On the [e2p2 OS GUI](#) (Fig. 9.6), select the filter on the `Filter` option below `Setup Instrument`.
2. Click on the `Apply` button.

In case one gets an error message like this: “`icswsERR_MOVE_FILTER : Error during movement of filter. ErrNo:7 ErrString: NO DETECTION`”, reset the filter controller

- On the [Auxiliary Functions](#) (Fig. 9.5) in the [TCS](#), click on the `RESET` button below

WFI FILTER CONTROLLER.

- Repeat steps 1 & 2.

8.4 Focus issues

8.4.1 GROND autoguider defocused

If the [GROND AG](#) is highly defocused:

- When switching from [WFI](#) or [FEROS](#), focus fixes itself after the observing template starts.
- If the problem persists, FOC.OFFSET in the OB allows a manual workaround.

8.4.2 Defocused with FEROS ACS

See Sect. [8.5.2](#).

8.4.3 WFI focus sequence fails with a timeout

The [WFI](#) focus sequence may fail to communicate the focus offsets to the telescope. In that case, [bob](#) will display several lines of focus orders ending with a timeout message. Then an error pop-up will appear.

- Quick workaround: each time that [bob](#) displays a focus order, enter it manually in the [TCS](#) Control Panel, below M2 Focus, and click Preset to. This focus bug will not impact science OBs during the night, so don't worry.
- Clean fix: full restart of [WFI](#) and [TCS](#) (30 min).
- When the problem becomes recurrent, the [WFI](#) workstation should be rebooted.

8.4.4 No focus offset when filters are changed

The focus sequence is run for a specific filter, when changing filters during an OB, the TCS should apply a focus offset, which should be seen in the TCS Control Panel, M2 Focus. If no offset is applied, check if in the [WFI](#) state manager, the Focusing flag should be True. The ESO people were not really clear on that.

8.5 FEROS ADC

8.5.1 ADC cannot be put off

At the start of an observation there is a message that the [ADC](#) cannot be put off. This happens after an observation using the [ADC](#). On the [FEROS ICS](#) (Fig. [9.10](#)) the line adca of the adc field contains ERROR in red.

Procedure 8.10. Remove the ADC from the optical path of FEROS

- . Try in order the following items.
 - Manually put it off from the [ICS](#) panel (Fig. [9.10](#))
 - Select the checkbox of adca
 - Select OFF from the menu of adca
 - Click SETUP on the bottom of the panel.
 - Wait for ERROR to be replaced by OFF
 - If it fails with a timeout error, restart the devices on the ICS panel

- Use menu Device → Select all devices, then
- Use menu Device → OFF
- Use menu Device → ONLINE
- Wait for about one minute for STATE to be ONLINE
- If in the last step there is an error that one of the devices that cannot be set ONLINE
 - Use menu LCU → Reboot LCU1
 - Use Device → Select all devices
 - Use menu Device → ONLINE
 - Wait for about one minute for STATE to be ONLINE
- If problem occurs repeatedly, FEROS needs a restart, and problem should be reported. Risk of the ADC getting physically stuck, needing intervention on the instrument.

8.5.2 Telescope focus is not corrected when ADC enters

Try in order the items of the following procedure.

Procedure 8.11. Fix the absence of focusing after FEROS ADC enters

- If no red messages appear below VME messages, manually preset to the theoretical focus displayed on the [TCS](#) main panel.
- If repeated red messages concerning M2 preset appear below VME messages on the [TCS](#) main panel (Fig. 9.1), break the infinite set-focus loop
 - Under M2 Focus on the same panel, click Set >
 - Click Apply
 - Maybe play around more presetting M2 manually until red messages disappear
 - Re-execute the [FEROS OB](#) from preset.
- If the red messages don't disappear, restart the [TCS](#) (Sect. 8.8.3).

8.6 FEROS-DRS

8.6.1 FEROS exposure number is close to 10 000

If it goes past 10 000, the reduction software will fail.

Procedure 8.12. Reset the exposure number

- Close the DRS.
- Open file /data/reduced/FEROS/.feroNNNN and replace number by 0000.
- Open the DRS again.

8.6.2 FEROS DRS fails

Check that

- There has been a full standard calibration done on the same day with the same setup (binning and readout speed).
- The exposure number is smaller than 10 000.

8.6.3 Problems to restart the FEROS-DRS and Data Subscriber

If you cannot start the FEROS DRS this might be for the following reason: when rebooting w2p2off without bringing down the pipeline before, a hidden lock file may survive. If all other

attempts have failed to start the DRS, follow these steps.

Procedure 8.13. Restart the FEROS data reduction software and data subscriber

- Stop Data Subscriber and **DRS** at the **DRS** computer (Fig. 8.3(a)).
- Type `killall -9 ferosReduceQueuedIms`
- Type `rm -f /data/reduced/.ferosQueueIms/.ferosReduceQueuedIms*.pid`
- Type `killall -9 ferosQueueIms`
- Type `rm -f /data/reduced/.ferosQueueIms/.ferosQueueIms*.pid`
- Then restart the Data Subscriber and FEROS DRS:
 - Left click start Data Subscriber
 - Configure Data Subscriber (Fig. 8.3(b)).
 - * Program ID: service
 - * Observer Name: service
 - * Rename to Keyword: Name on INS ws
 - Left click start FEROS DRS, start from top to bottom
 - * Start Queue Image Status
 - * Start MIDAS Session Status
 - * Start Reduced Queued Image

Similarly, when rebooting the w2p2off with active Data Subsriber, the watch-dog log file may survive. Do:

- Start `cd $ DHS_LOG` (which corresponds currently to `/data/msg`)
- Remove the PID files therein

8.6.4 Data won't show up

If data taken with FEROS do not show up in the ESO archive and/or in the FEROS DRS, you will need to restart processes on the data handling machine w2p2pl (username pipeline).

Procedure 8.14. Restart the data handler.

1. Go to screen w2p2pl Pipeline
2. In a terminal you will need to type some of the following
 - (a) `dhsSubscribeControl start pipeline -backsince <date>`
where `<date>` in the format YYYY-MM-DD is where you want to start again.
 - (b) (needed?) `pipelineControl stop`
 - (c) (needed?) `pipelineControl start`
 - (d) (needed?) `stopRBS`
 - (e) (needed?) `startRBS pipeline.config`
 - (f) `doControl stop`
 - (g) `doControl start wfi,feros`

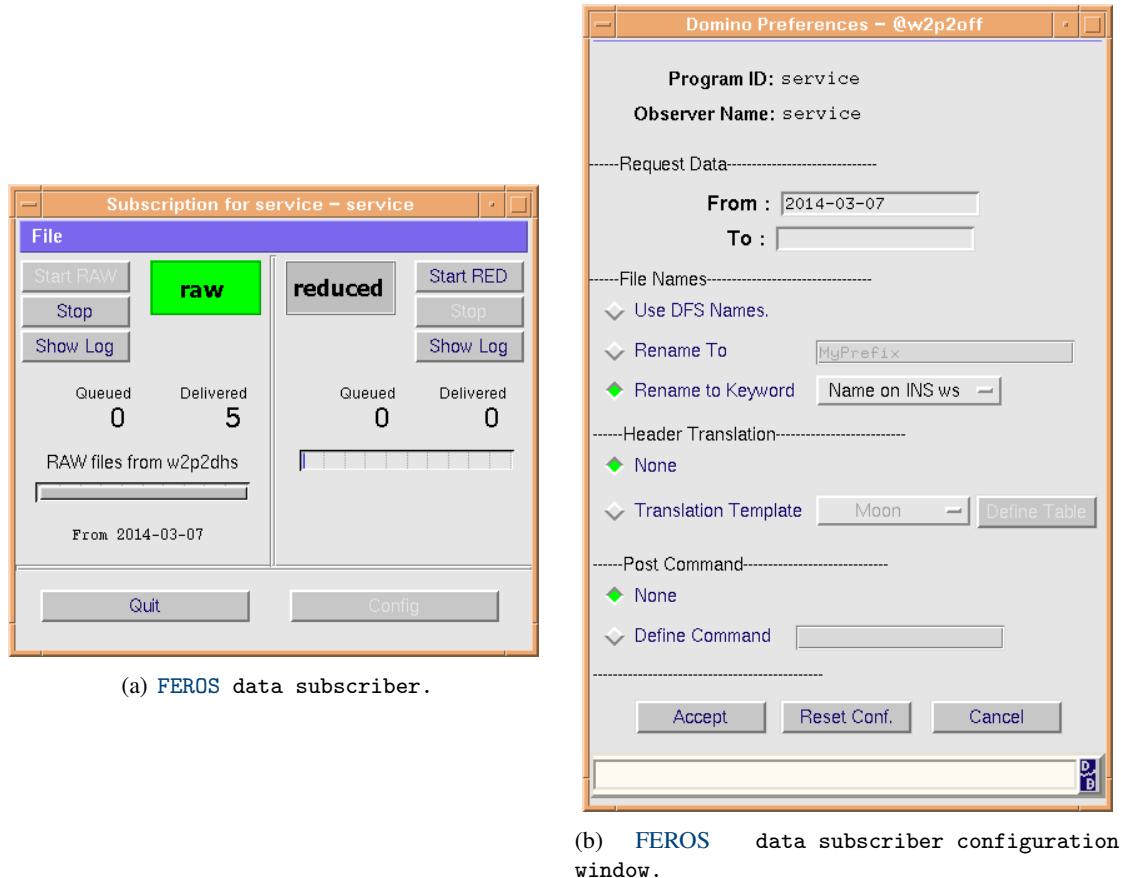


Figure 8.3: FEROS Data Subscriber.

8.7 Startup issues

8.7.1 FEROS

- There is an error about process feoControl stating “accepted PING but did not reply properly within 10000 msec”
 - Type vccEnvStop -e \$RTAPENV
 - Type vccEnvStart -e \$RTAPENV
 - Redo the full startup procedure
- There is a problem with the FEROS telemetry at TCS (window should show some graphs, Fig. 8.4(a)):
 - Go to FEROS screen
 - Type fcdTelemetry &
 - Press START
 - Go to TCS
 - Close Telemetry window
 - Type sciops2p2Telemetry &

8.7.2 WFI

- TCS is OFF after startup on the Control Panel
This is harmless. Use menu Gen. Options → Refresh Database Events.

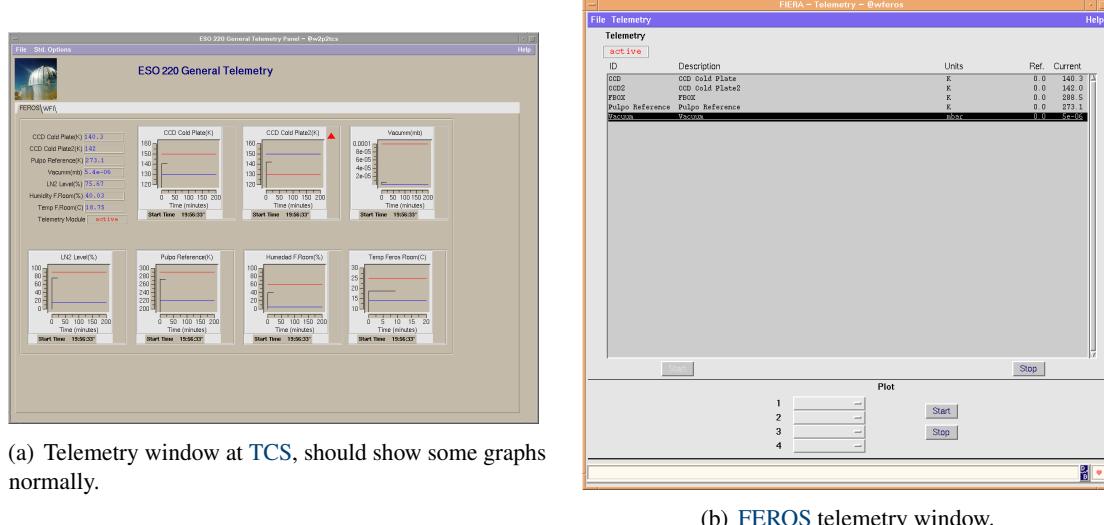


Figure 8.4: Telemetry window.

8.7.3 Hydraulics cannot be switched on/off

If you see that the Loc/Re button is red on the 2.2m Auxiliary Function on the Windows computer, it means that the hydraulics system is for local control in the dome.

You need to go to the dome.

Procedure 8.15. Set the hydraulics for remote control

1. Go to the dome.
2. Locate the gray 1.5-metre-high **ADAM** rack (Fig. 4).
3. Locate the switch for ADAM Remote / Local (Fig. 8.7, lower left).
4. Put it towards ADAM Remote.

8.8 TCS issues

8.8.1 Start-up fails with l2p2cam error

If the start-up stalls with error could not send command "PING" to l2p2cam/lccServer, you probably need to hard reboot the **FEROS AG LCU** in the dome, but try a software reboot first to save time.

Procedure 8.16. Fix FEROS AG LCU during start-up

1. Try a software restart of the **FEROS AG LCU** (likely to fail).
 - (a) On the **TCS** screen, find or open a terminal
 - (b) Type `rsh l2p2cam reboot`
If it gives an error, proceed to step 2
 - (c) Wait for 1–2 min for the reboot to complete
 - (d) Check that the LCU is up using `ping l2p2cam`
 - (e) Press **CONTINUE** in the Start/Shutdown panel
If it gives the same error popup, proceed to step 2.
2. Go to the dome and try, in that order (see Procedure 8.4).
 - (a) A hard reset of the LCU
 - (b) A power cycle of the LCU

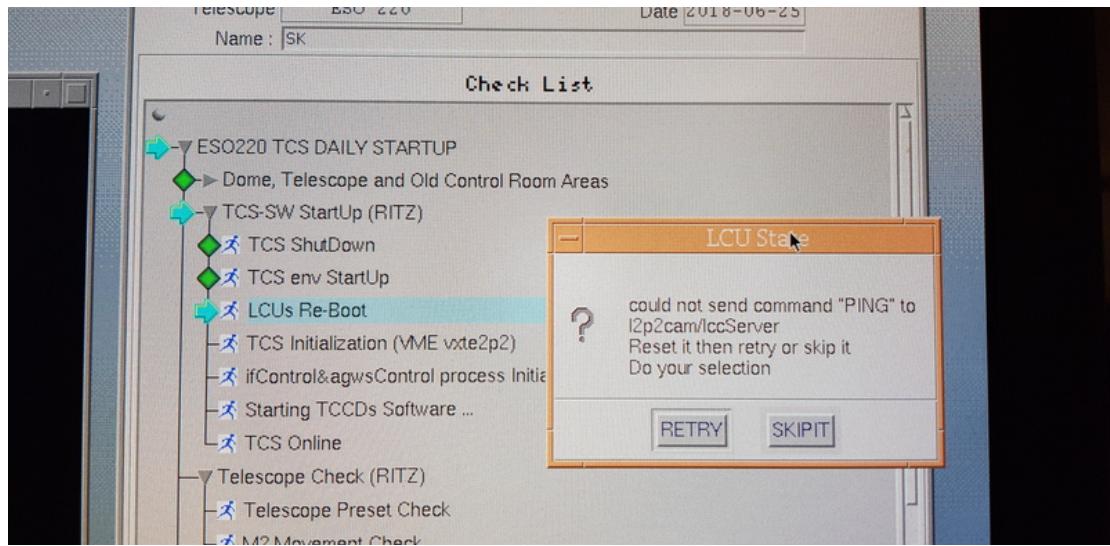


Figure 8.5: When TCS restart fails to reboot the FEROS AG LCU

8.8.2 Start-up fails with telescope not initialised

If the start-up stalls with telescope not initialised, you probably forgot to switch the hydraulics and/or drives on or the telescope was not parked at zenith.

Procedure 8.17. Fix the telescope not initialized popup

1. Ensure hydraulics and drive are on
 - (a) Locate the [Dome Auxiliary Functions](#) tab on screen Dome webcam & hydraulics.
 - (b) Check that the Hydr and Drives buttons are green.
 - (c) If not, switch the hydraulics and drives on (step [2c](#) in Procedure 1.1).
2. Manually initialise the telescope
 - (a) In a terminal type `~/bin/telinit`
 - (b) If an error reads "cannot initialise the telescope at more than 45 degrees from zenith"
 - i. Go to the dome and manually park it (Procedure 8.28).
 - ii. Repeat step [2a](#)
 - (c) Wait for 2–3 min for initialisation to complete.
3. On the error popup, press SKIPIT

8.8.3 Quick TCS restart

Many [TCS](#) issues are solved by a fast restart, with a time loss of ≈ 10 min. Before, it is important move the telescope to zenith since one cannot initialize it later if the telescope is at ≤ 45 degrees above the horizon.

Procedure 8.18. Quick TCS restart

- Type `e2p2NewShutDown` and wait for it to complete.
- Type `e2p2NewStartUp` and wait for it to complete.
- On the [TCS](#) setup panel (Fig 9.2) press Initialize under Telescope.

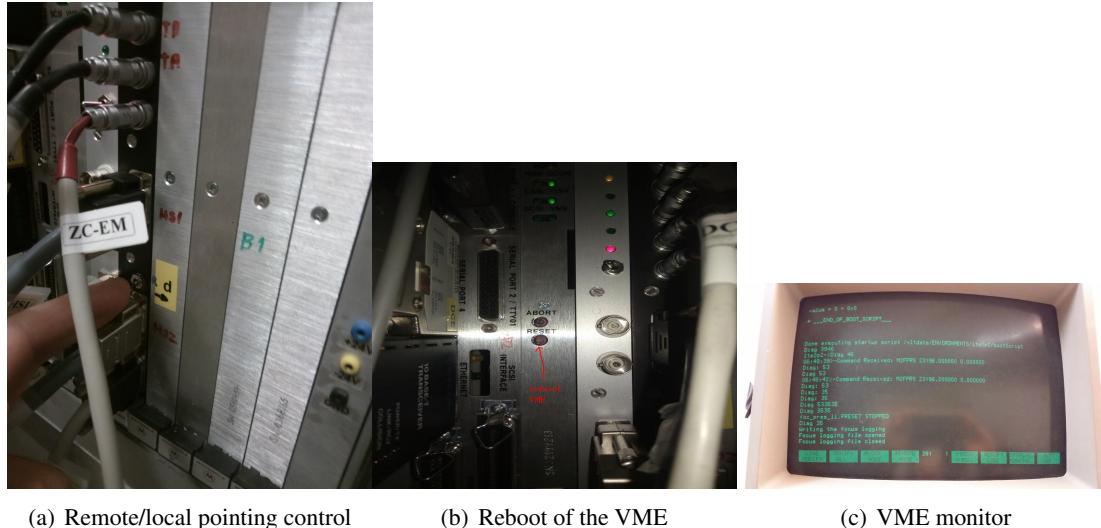


Figure 8.6: VME rack in the computer room of the telescope building *Left*: to manually point the telescope to zenith, you need to switch away from the yellow 'd' label. *Centre*: To hard reboot the VME, press the small red/pinkish reset button. *Right*: the VME monitor with the “end of boot script” after a reboot.

8.8.4 No connection with VME

If the TCS Control Panel indicates “No connection” in red, just below VME messages, you can try the following:

Procedure 8.19. Solve the connection issue with the VME

1. If you just switched hydraulics on, wait for a few minutes to see if connection is back.
2. Do a remote reboot of the VME.
Type `lccBoot 1te2p2` in a terminal.
3. Do a manual reboot of the VME in the dome.
 - (a) Go to the computer room of the telescope enclosure.
 - (b) Locate the VME (Fig. 3) in front of the entrance, slightly to the left.
 - (c) Press the small red/pinkish button (Fig. 8.6(b)).
 - (d) Locate the VME monitor, behind you if you face the VME.
 - (e) Wait for boot sequence to finish with “end of boot script” (Fig. 8.6(c))

A quick restart the **TCS** (Sect. 8.8.3) is generally needed right after a reboot of the VME.

8.8.5 TCS is OFF on an instrument

The Control Panel of an instrument the TCS is in the state **OFF**. You should check the corresponding modules on the TCS Status panel. If red, try to bring them **ONLINE**.

8.8.6 Telescope doesn't take focus orders

Procedure 8.20. Fix telescope focus issues

- (**WFI**) OB stalls when focus order is sent by **bob**.
Set it manually from the **TCS** main panel (Fig. 9.1)
- (**FEROS**) Focus is not corrected after insertion of the ADC.
See Sect. 8.5.2.



Figure 8.7: Controlling the hydraulics and mirror cover.

- Focus cannot be set from the **TCS** main panel.
Restart the **TCS**, see Sect. 8.8.3.

8.8.7 TCS Setup panel is stuck

If you need to close when the panel is stuck, a few command lines are available in /home/tcs/bin:
`closemirror`, `closeslit`, `presetzenith`, `domemanual`.

Procedure 8.21. Unstuck the TCS Setup panel

- Identify the process id of the panel
Type `ps aux | grep tcsSetup` in a terminal.
- See which process depends on it
Type `pstree -a <process id>`
- If process `rs232` (dome controls) is listed, kill it.
Type `ps aux | grep rs232`
Type `kill <process id>`

8.8.8 Main mirror cover cannot be moved

If the Main Mirror Cover state in the TCS Setup Panel says LOCAL you need to go to the dome, close it, and set it to remote control.

If the Main Mirror Cover state in the TCS Setup Panel stays in MOVING whatever order you send, you need to go to the dome, set it for local control, close it, and set it to remote control.

Procedure 8.22. Manually close the main mirror cover

1. Go to the dome
2. Locate the gray 1.5-metre-high ADAM control box (Fig. 4).
3. Locate the Main Mirror Cover controls (Fig. 8.7, upper right)
4. If the mirror was MOVING, press the yellow Local/Remote button.
5. Press the red Mirror Close button.



Figure 8.8: Local control of the dome

6. If any noise is heard, wait for the cover to be closed.
7. Press the yellow Local/Remote button.

8.8.9 Dome doesn't move

If the Dome Status is Local on the TCS Control Panel, it means that the dome is for local control from the dome.

You need to go to the dome.

Procedure 8.23. Set the dome for remote control

1. Go to the dome.
2. Locate the dome controls (Fig. 4), placed on the wall opposite to the entrance.
3. On the dome controls (Fig. 8.8) turn the control from local to remote

8.8.10 Dome slit and telescope are not aligned

For small zenithal angles, it is a normal setting since the telescope is not exactly at the centre of the dome. If you need to avoid the wind you need to orient the dome manually but be weary of vignetting!

8.9 GROND issues

8.9.1 GROND M3 is stuck

If GROND M3 mirror cannot be moved with the grondM3 command try in order the items of the procedure below.

Procedure 8.24. Unlocking the grond M3 mirror

- Switch back-and-forth using grondM3 WFI and grondM3 GROND.
- Write the mirror position in the database (Fig. 8.9)
 1. In a terminal type ccsei
 2. Click on CCS database monitor
 3. Look down Appl_data → GROND → ICS → DEVICES → M3.

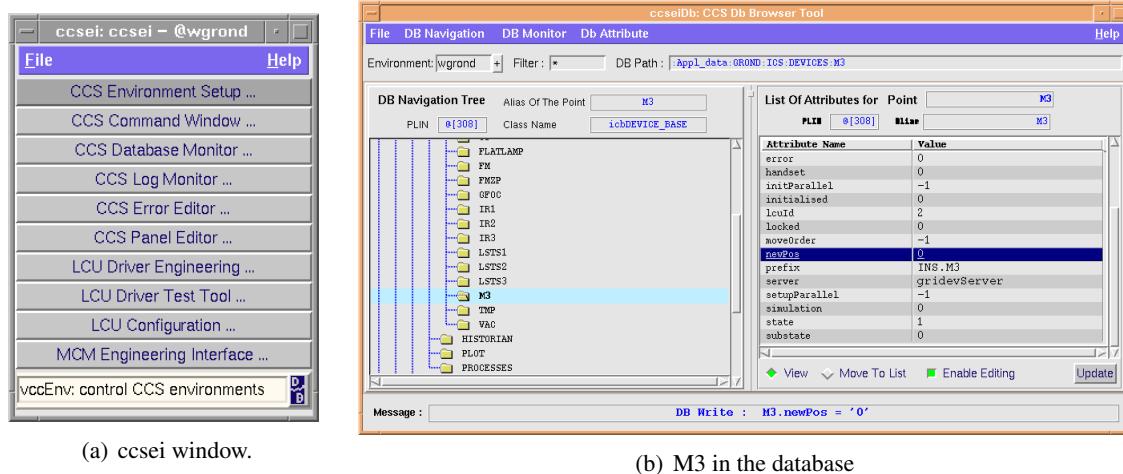


Figure 8.9: Writing the M3 position in the database

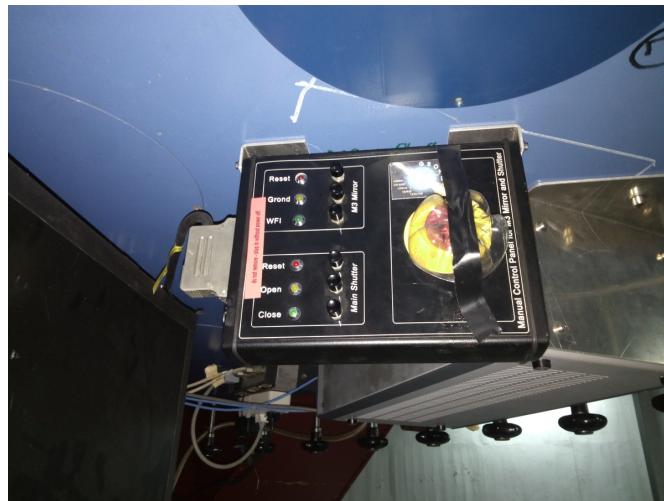


Figure 8.10: The GROND mirror and main cover control box.

4. Select checkbox **Enable Editing**
 5. set **newPos** value to 2 for GROND position or 0 for WFI.
 6. Check on GROND control that mirror indeed moves.
 7. Close the GUI.
- Reset the mirror from the dome.
 1. In the dome, locate the M3/MC box below the main mirror (Fig. 4).
 2. On the box (Fig. 8.10), press the grondM3 WFI button.

8.9.2 GROND OB only crashes with TCS on

It is a very tricky problem, randomly solved by a string of last resort reboots of GROND and TCS restarts.

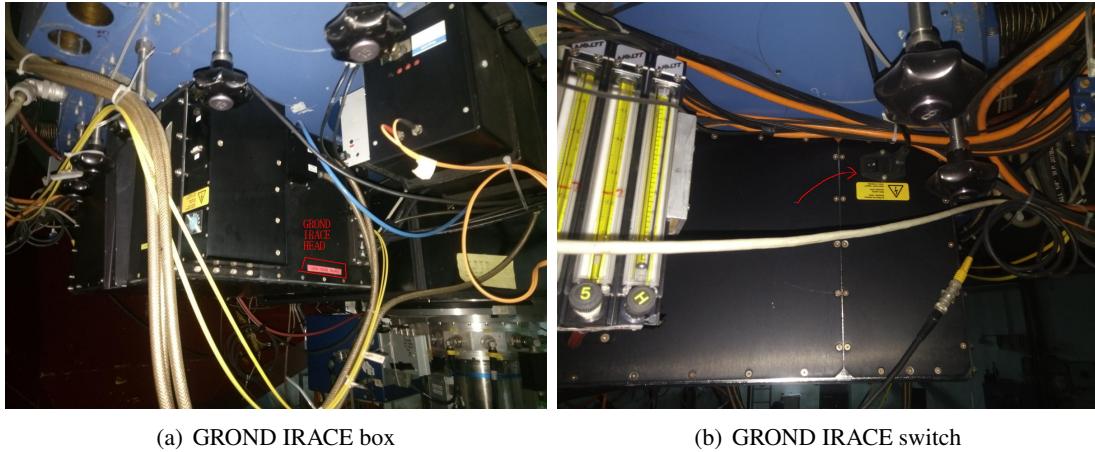


Figure 8.11: The GROND infrared electronics (IRACE) box below the main mirror of the telescope. The power switch is located towards the pier.

8.9.3 GROND IR exposure won't start

An OB starts with the optical exposure but nothing happens in the infrared and the OB stalls. If grondFM doesn't solve the issue, this may need a full reset of the IRACE (IR electronics).

Procedure 8.25. Deep reset of GROND IRACE (verify this!)

1. In a GROND terminal, do grinsStop as user grondmgr.
2. Go to the computer room of the telescope building.
3. Locate the IRACE workstation (Fig. 3) and shut it down.
4. Go to the dome
5. Locate the power switch of the IRACE box (Fig. 8.11) below the main mirror.
6. Switch it off for 10 seconds then on again.
7. Go back to the computer room and start the IRACE workstation.
8. Go back to the control room and reboot the GROND workstation.
9. Do ~/bin/lastResortBeforeReboot.sh as user grondmgr
10. Reboot GROND workstation.
11. Do ~/bin/lastResortAfterReboot.sh as user grondmgr
12. Put the instrument ONLINE in the GROND panel
13. Do grondSHUTER && grondFM
14. close and open bob

8.10 Freezing issues

8.10.1 Mouse pointer does not move

This is common on the [WFI](#) screens.

Procedure 8.26. Recover the mouse pointer

1. Power cycle the black Intel box connected to the failing screen.
Press power button for 5 s, wait 5–10 s, switch it on, wait for start-up (1–2 min)
2. Log in
For WFI, user wfi (other logins in Table 9.1).

Table 8.1: Pointing model parameters for each instrument, as of November 2015.

Parameter	FEROS	GROND	WFI
ID	-183.81	-230.04	-157.69
IH	72.92	-20.23	94.11
CH	136.07	28.89	31.41
NP			17.13
ME			-113.61
MA			2.22
FO			91.83
TX			-26.92
HCEC			-18.57
HCES			-22.55

3. Open the panels from a terminal.
For WFI, type `~/bin/openPanels.sh`.

8.11 Pointing issues

8.11.1 Pointing is incorrect

After doing the pointing with **WFI** the target is not close to the central position (4150,3950). Also, it can happen during an observation with any instrument during the night that the object is not centred where it should.

Procedure 8.27. Fix WFI pointing issues.

1. If not done, check the right instrument is selected on the **TCS Status Panel** (Fig. 9.4).
2. Check if the current Pointing Model parameters in Table. 8.1 for **WFI** are selected on the **TCS Setup Panel** (blue numbers in the bottom right-hand panel of Fig. 9.2). Typically the first three values ID, IH, CH are 0 because of a database issue.

In a hurry:

- Reset the database values
In a terminal type `~/bin/fixPointing.sh`
(Note: it can be done manually using `ccseiDb`)
- Select the instrument again

Otherwise, a quick TCS restart will generally solve the issue.

3. Check that the Sidereal time on the **TCS Control Panel** is fine.
It should be within seconds of the actual one. You can get it from the digital clock in the control room using a switch on its right.
If not, you need to go to the dome and reboot the VME.
4. Otherwise, it might be a problem with the **TCS**.
Try a quick **TCS** restart (Sect. 8.8.3).

8.11.2 Telescope is stuck at low elevation

If telescope goes out of safe zone, reaching 20 degrees elevation, a too high hour angle, it will be stuck (by software). It also occurs if a restart or a reboot of the VME is done when the telescope points lower than 45 degrees.

In that case, the telescope should be parked to zenith manually.

Procedure 8.28. Preset manually to zenith.



(a) Location of the joystick

(b) Joystick

Figure 8.12: The “joystick” can be used to manually point the telescope.

1. Go to the computer room in the telescope enclosure.
2. Locate the VME rack (Fig. 3).
3. On the VME, set the switch away from d (Fig. 8.6(a)).
4. Go to the dome and find the joystick (Fig. 8.12).
5. Using the controls put the telescope approximately to zenith.
6. Go to the computer room in the telescope enclosure.
7. On the VME rack, set the switch to d.
8. Go to the control room below the dining room.
9. Initialise the telescope

Click Initialize below Telescope in the TCS Setup Panel

8.12 Web pages

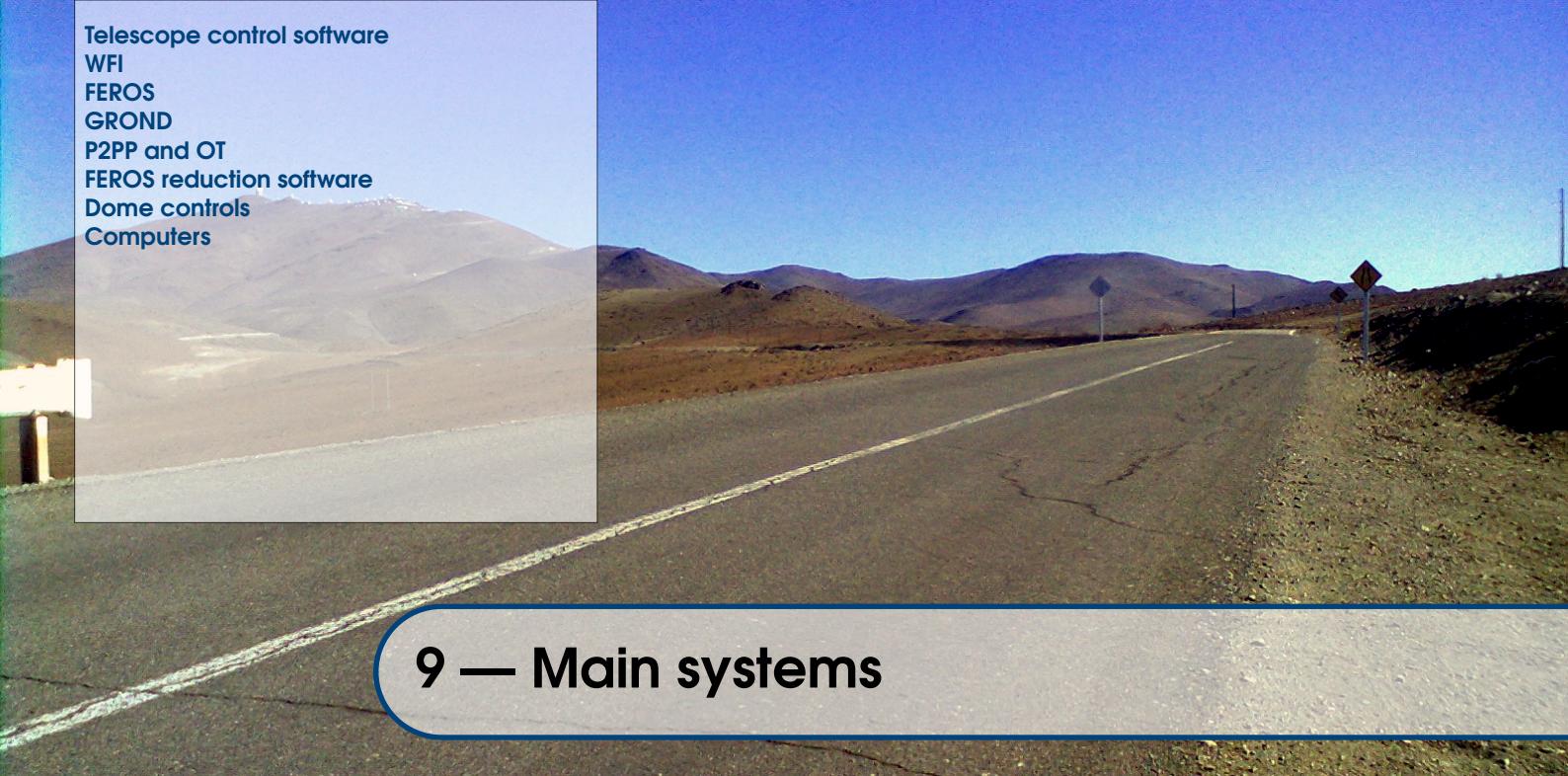
8.12.1 2.2m Environmental Monitor stuck

1. Go to screen Telescope Control Software.
2. In a terminal, execute command e2p2StartEnvMon
3. After a few minutes refresh <http://www.ls.eso.org/lasilla/sciops/2p2/EnvMon>.

8.12.2 All sky camera

If the all sky camera LASCAM is stuck

1. Use the Danish 1.54m camera at <http://allsky-dk154.asu.cas.cz/>
2. Ask an ESO TIO to restart LASCAM.



9 — Main systems

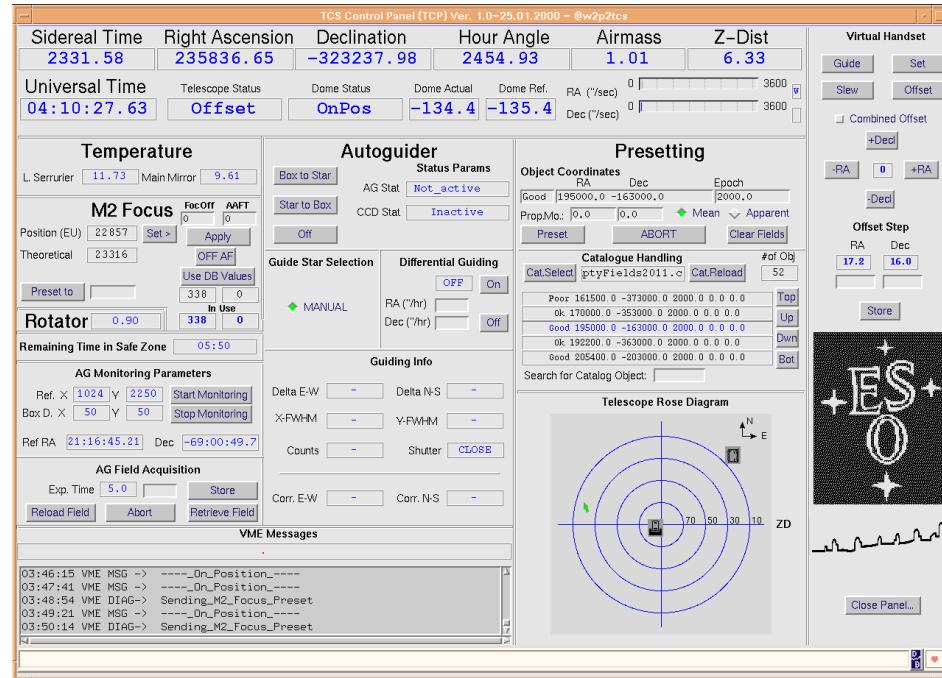


Figure 9.1: The **TCS** main panel allows to perform guiding with **WFI** and to manually preset or offset.

9.1 Telescope control software

The main panel of the **TCS** (Fig. 9.1) gives a summary of focus, guiding, and pointing. The rose diagram gives telescope position, slit orientation (symbol just outside the outermost circle), Moon position (yellow circle), and some other info (green arrow). Telescope status and dome status indicate whether telescope is presetting, slewing, guiding, or offsetting. The panel also allows some interaction. The **TCS** setup panel (Fig 9.2) allows more interaction, in particular

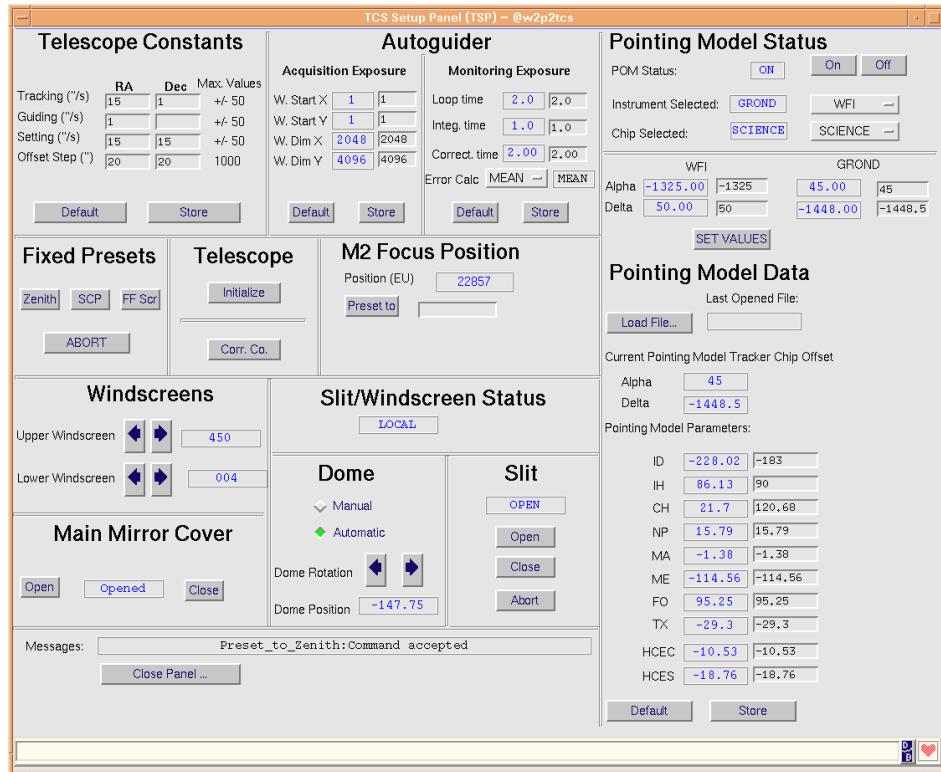


Figure 9.2: The **TCS** setup panel allows to open and close the dome, main mirror cover and setup the dome rotation. Additionally, fixed presets to zenith and flat screen can be sent.

concerning closing and opening.

9.1.1 Manual preset

The presetting area of the main **TCS** panel (Fig. 9.1) allows manual preset, which is used for flat fields and **WFI** focus. Catalogues can be loaded with CalSelect, in particular EmptyFields for flat fielding. The item of the catalogues is selected with Top, Up, Dwn, Bot before Preset is clicked.

9.1.2 Manual offset

The virtual handset area of the main **TCS** panel (Fig. 9.1) allows to give an offset which is used when looking for a guide star on **GROND** or centring a target on the **FEROS** fibre when guiding with the **WFI AG**. An offset is done by clicking Offset and selecting combined offset (useful when guiding). Offset steps are input with Store, then the racquet in the centre ($-RA$, $+RA$, $-Decl$, $+Decl$) can be used.

9.1.3 Autoguider

The **AG** in the **TCS** can be used for **WFI** and **FEROS** observations.

The **AG** Field Acquisition and Autoguider areas of the main **TCS** control panel (Fig. 9.1) give control over **WFI AG**. The buttons of interest are Retrieve field (to probe the **AG** field, displayed in Fig. 9.3), Box to star (to start the guiding when a guide star has been picked) and Off (to turn off the **AG**). Tuning of the **AG** (e.g. integration time) can be done on the Autoguider

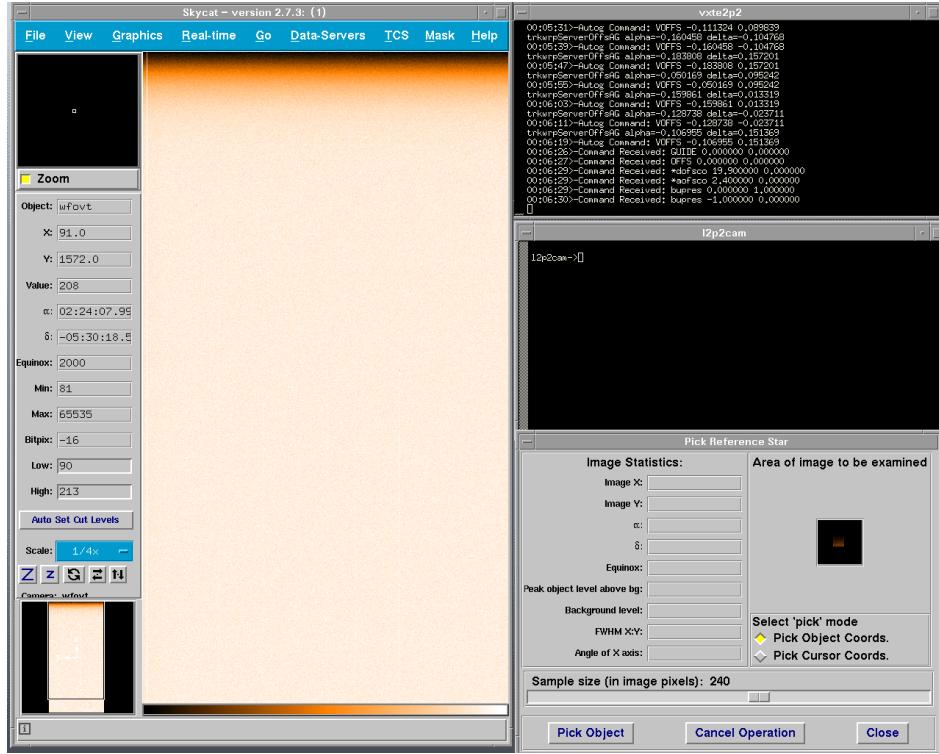


Figure 9.3: The [AG](#) field is displayed on the [TCS RTD](#) (left) where the reference star can be picked (using lower right window).

area of the [TCS](#) setup panel (Fig. 9.2).

Note that guiding must be set Off at the end of a [FEROS](#) observation using the [WFI AG](#). The buttons Stop Monitoring and Start Monitoring are useful after a change of filters on the same field, for they avoid a Retrieve Field.

Differential guiding can be set, but a particular care should be paid to units (here arcsec/hour).

9.2 WFI

9.3 FEROS

9.4 GROND

9.5 P2PP and OT

9.6 FEROS reduction software

9.7 Dome controls

9.8 Computers

Most components of the telescope can be accessed from any screen by using a graphical login: [tcs](#), [cam](#) (guiders), [wfi](#), [feros](#), [dhs](#) (OBs), [astro](#) (pipelines), [grond](#). They are detailed in Fig. 9.1 and generally have the famous good seeing password. These machines need a reboot from time to time, using [reboot](#) as the normal user.



Figure 9.4: The TCS status window is mostly used to switch the pointing model between instruments.

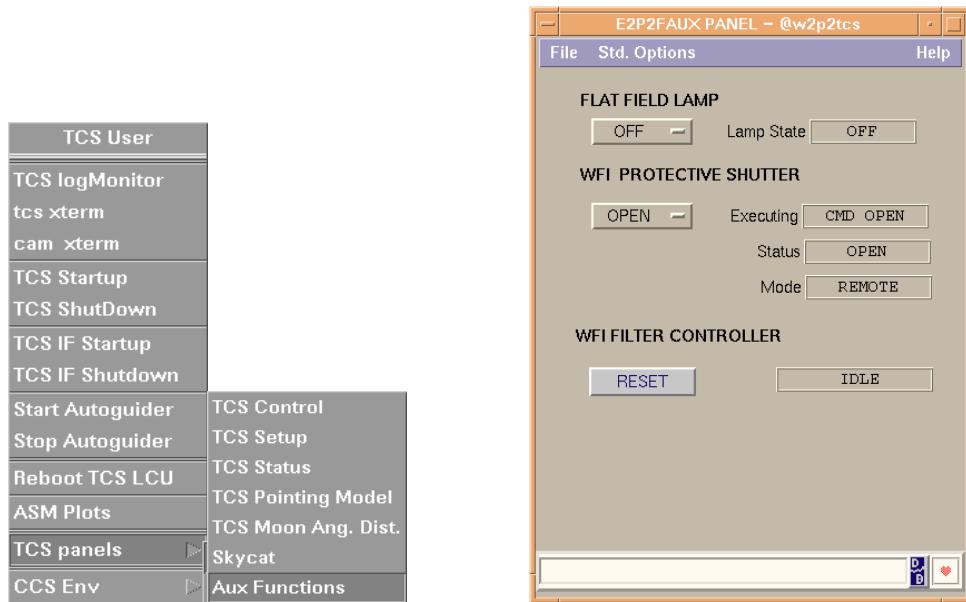


Figure 9.5: The Auxiliary Functions panel (right) is opened using the menu on the TCS machine (left). It is mostly used to switch the flat field lamp on and off, and to open or close the WFI protective shutter.

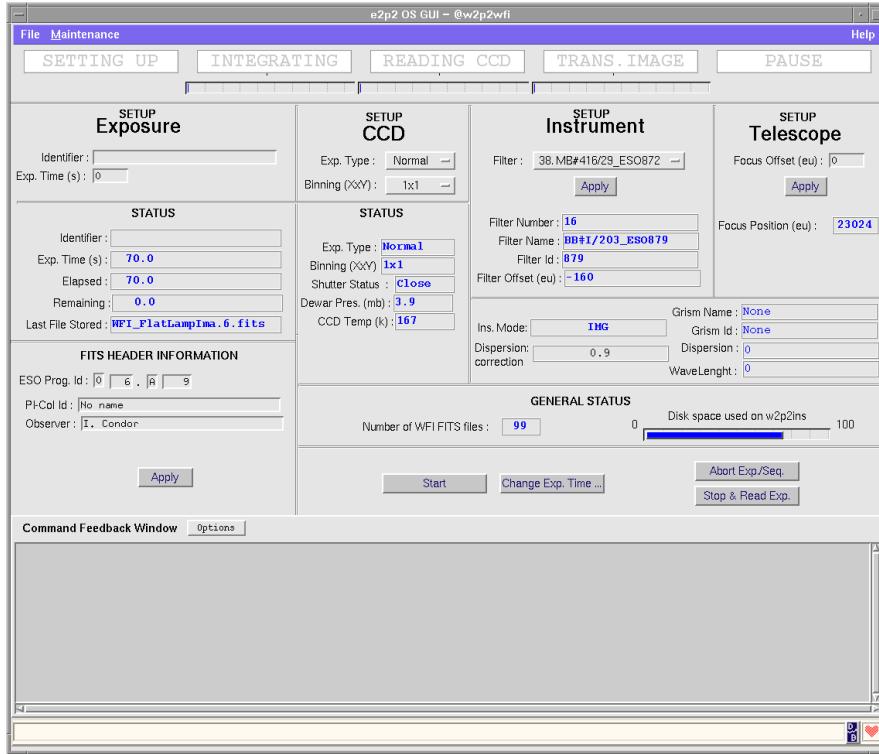


Figure 9.6: The **WFI** OS GUI can be used to change filters manually or take/abort CCD exposures.

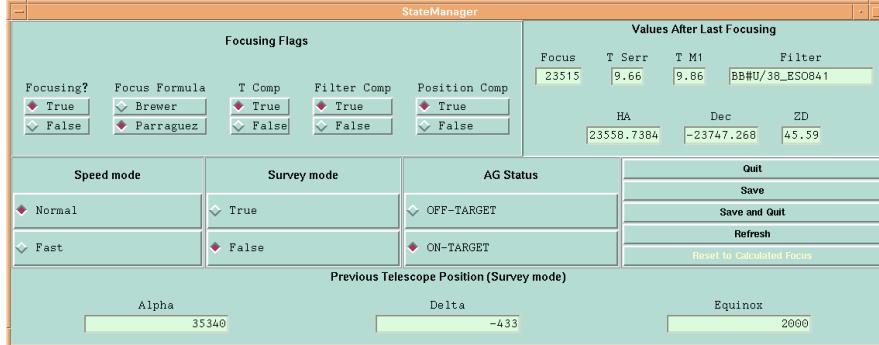


Figure 9.7: The **WFI** state manager holds information on telescope focus, also used for **FEROS**.

For some tidying tasks or reboots, you need to root password (hint: pirate).

Other components may need reboots, they are given in Table 9.2.

Table 9.1: Computers one can use a graphical login for, from any screen, to get access to instruments and controls. The password is the “good seeing” one shared by most La Silla computers. The screen they are normally shown on and the relevant unix users are also given.

Computer	Login	User	Monitor(s)	Description
w2p2tcs	tcs	tcs	Telescope Control Software	TCS
	cam	cam	Autoguider GROND & FEROS	Autoguiders
w2p2ins	wfi	wfi	Wide Field Imager BOB	WFI user
	wfimgr	—	—	manager account
wferos	feros	feros	FEROS BOB	basic user
	ferosmgr	—	—	manager account
w2p2dhs	dhs	service	p2p2 & ot	service observations (ot)
	visitor	—	p2pp & ot	visitors (p2pp)
w2p2off	astro	astro	FEROS pipeline	data & pipelines
w2p2pl	pipeline	pipeline	w2p2pl pipeline	WFI/FEROS data handling
wgrond	grond	grond	GROND BOB / FIERA / IRACE	basic user
		grondmgr	—	startup, bob , commands

Table 9.2: Reboots you may (will) have to do besides those of the aforementioned computers.

Component	Reboot command	Alternative reboots
TCS LCU/VME	lccBoot lte2p2	rsh vxte2p2 reboot Reset button, VME rack, computer room at telescope*
WFI FIERA	lccBoot wffffcd*	rsh -l fcdrun wffffcd reboot
FEROS LCU	lccBoot lfeics1	FEROS ICS, menu LCU → Reboot rsh -l fcdrun lfeics1 reboot
FEROS AG	lccBoot w2p2cam	rsh 12p2cam reboot Reset button, rack, FEROS room at telescope* Unplug rack, FEROS room at telescope*
FEROS FIERA	lccBoot wfefcd*	rsh -l fcdrun wfefcd reboot
GROND FIERA		rsh root@wgrccd reboot Power switch, FIERA WS, computer room at telescope*
GROND IRACE		rsh root@wgrdcs reboot Power switch, IRACE WS, computer room at telescope*
GROND AG	lccBoot w2p2agr	rsh 12p2agr reboot
User WS		call at Paranal 5959 to reboot uws2p2, first close all terminals

* Untested. * Manual reboot needed if soft fails.

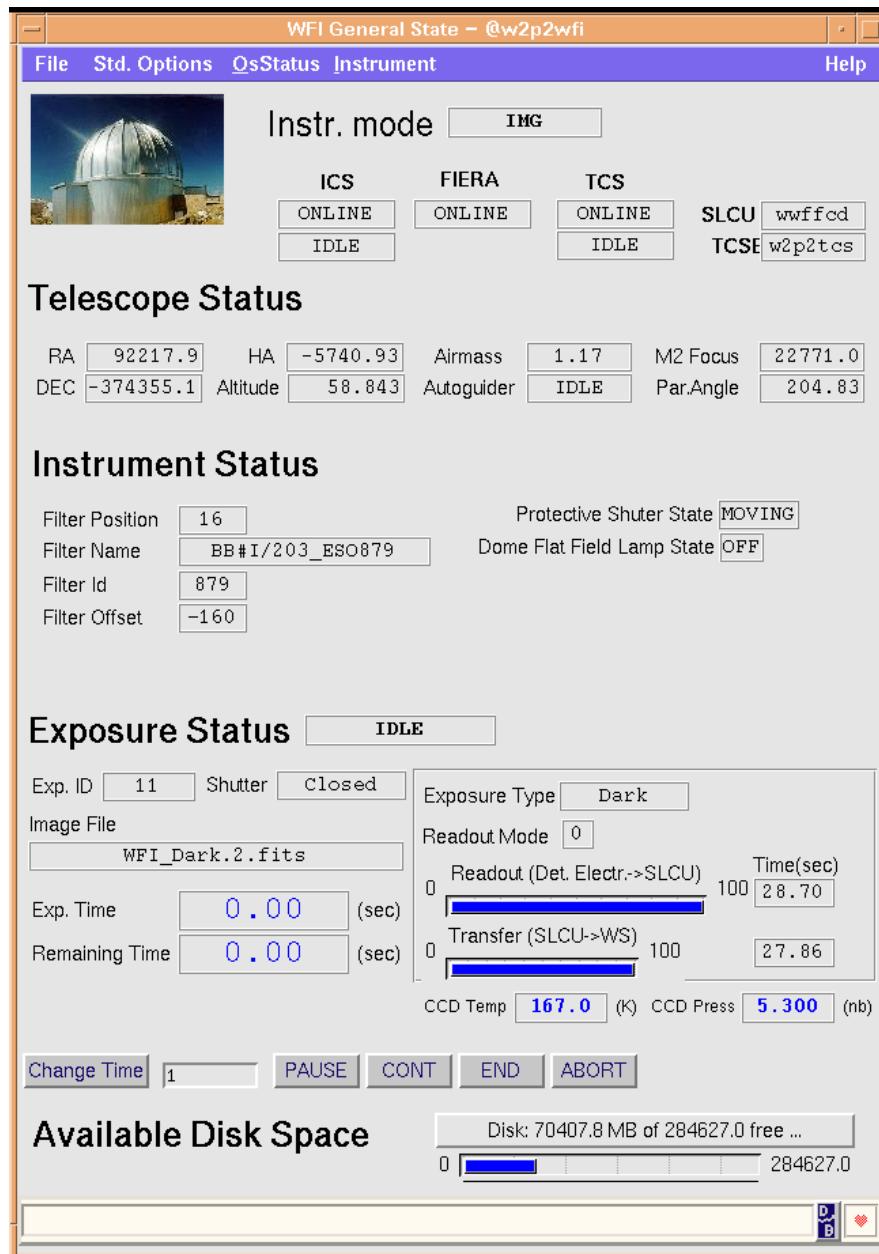


Figure 9.8: The **WFI** general state panel gives information about exposure, filters, and connection to **TCS**.

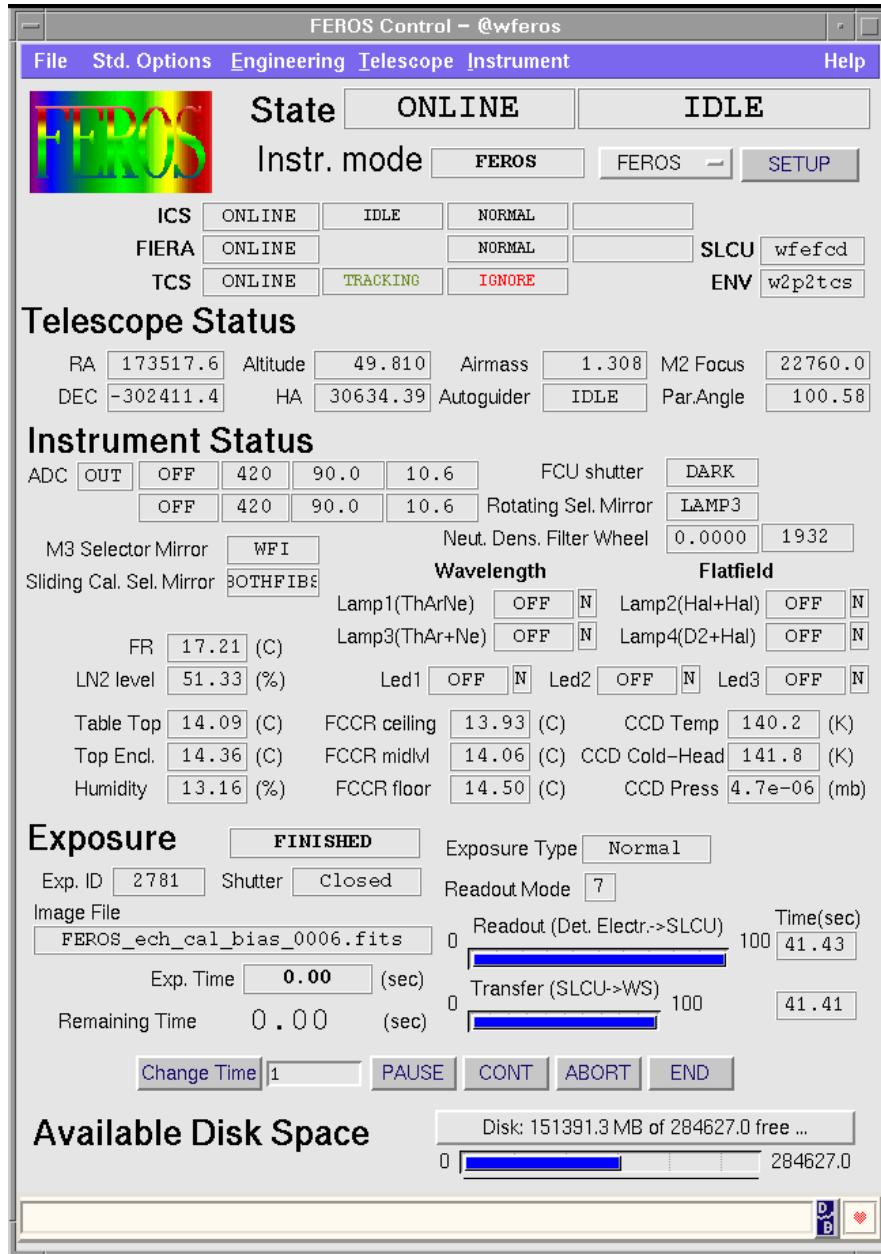


Figure 9.9: The **FEROS** control panel gives information about exposure, settings, lamps, and connection to **TCS**. Exposure times can be switched.

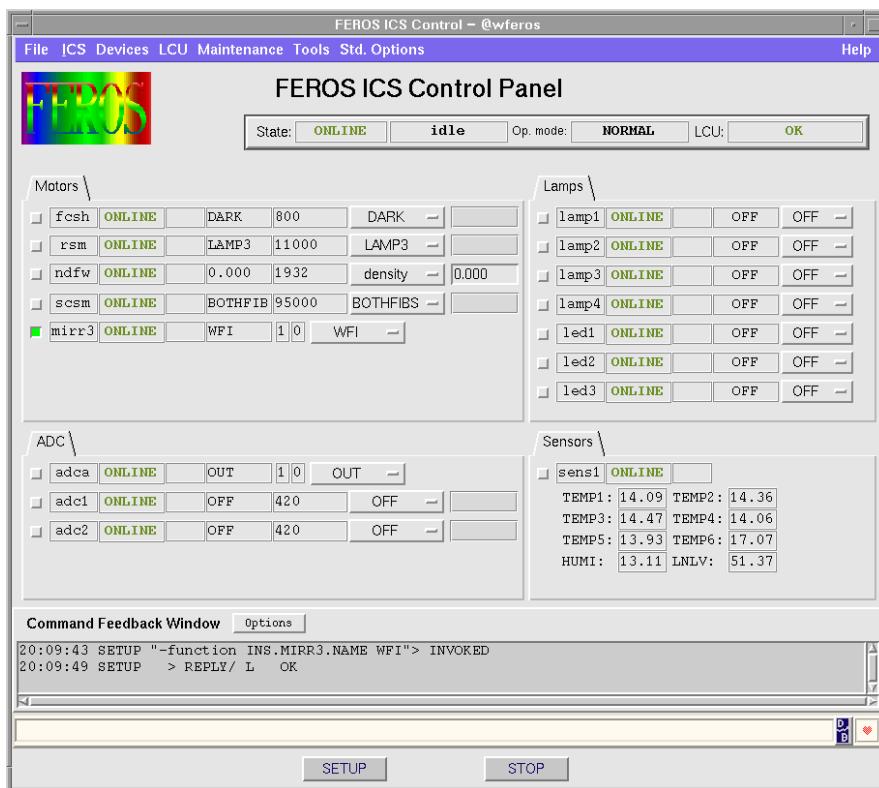


Figure 9.10: The FEROS ICS is mainly used to change the mirror mirr3 from and back to WFI.

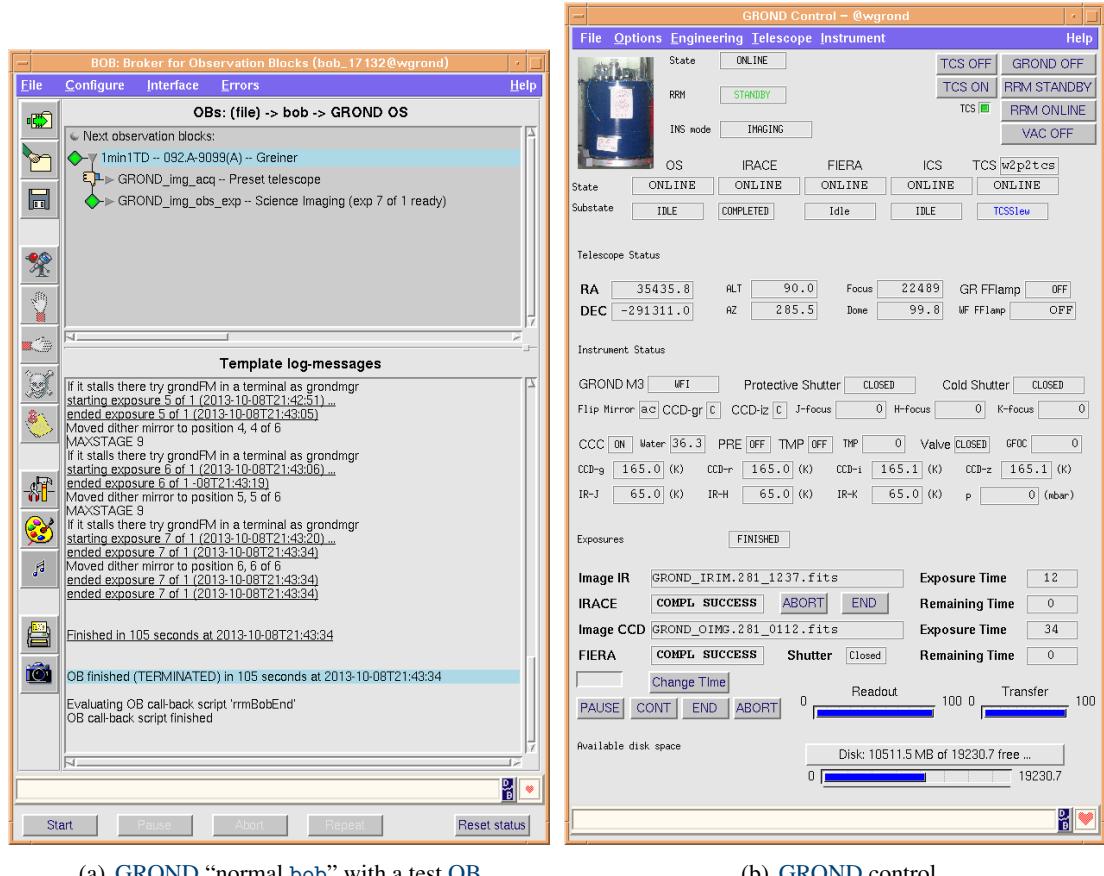


Figure 9.11: The main displays of GROND.

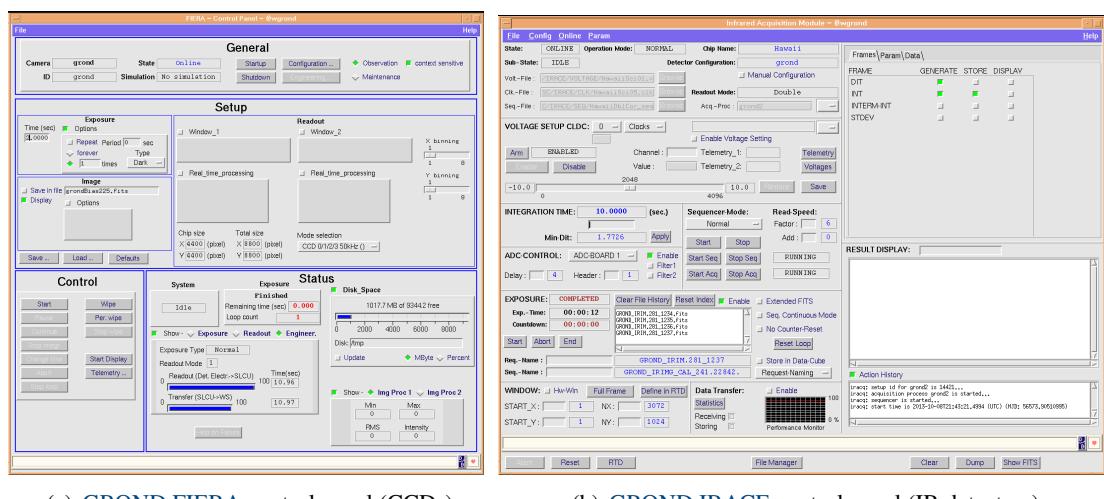


Figure 9.12: Control panels for the detectors.

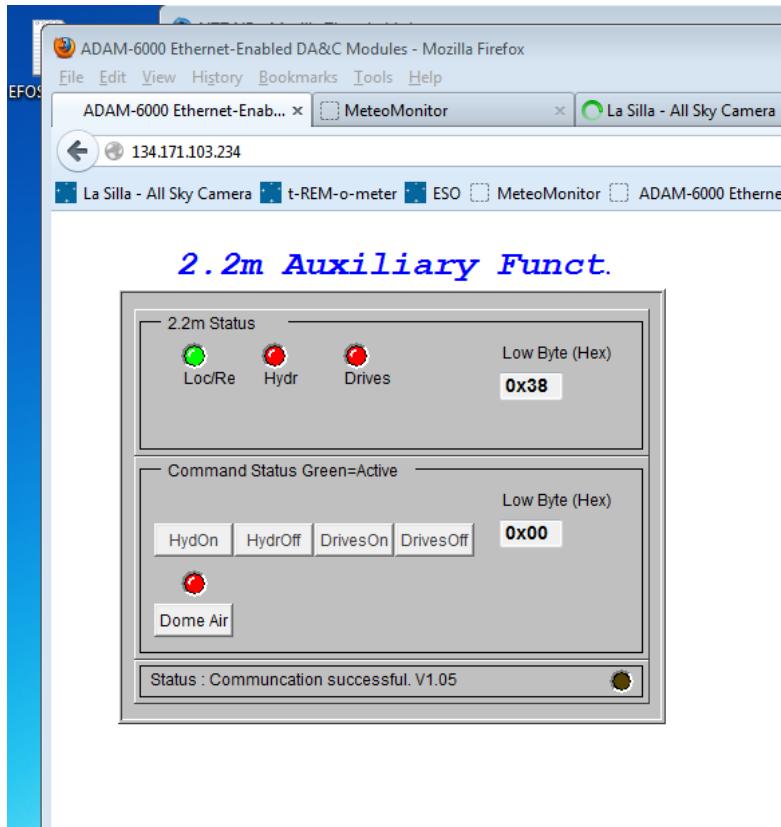


Figure 9.13: Dome Auxiliary Functions.

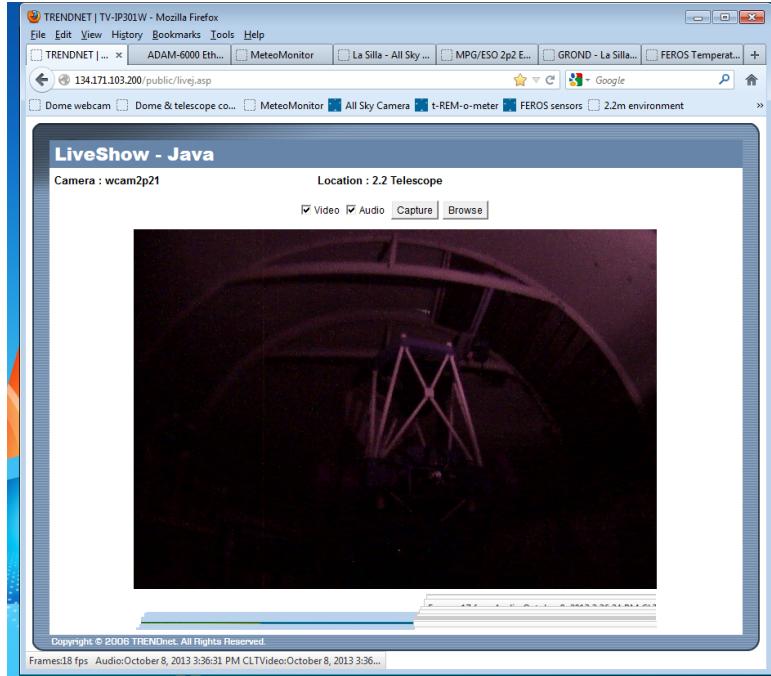


Figure 9.14: dome webcam



Glossary

ADAM

Telescope hydraulics and mirror cover control system [18](#), [65](#)

ADC

atmospheric diffraction corrector [45](#), [61](#)

AG

autoguider [19](#), [26](#), [39](#), [45](#), [56](#), [57](#), [59](#), [61](#), [74](#), [75](#)

Auxiliary Functions

Panel with cryptic title E2P2FAUX PANEL (Fig. 9.5) controlling WFI shutter and flat-field lamp. [29](#), [30](#), [32](#), [49](#), [50](#), [55](#), [60](#), [76](#)

bob

broker for observing blocks [15](#), [19–21](#), [25](#), [29](#), [30](#), [32–35](#), [37–39](#), [41](#), [48](#), [51](#), [54](#), [58–61](#), [67](#), [78](#), [82](#)

Dome Auxiliary Functions

ADAM 6000 tab of mozilla on the Windows desktop that contains hydraulics and ventilation control of the dome. [10](#), [20](#), [31](#), [49](#), [50](#), [83](#)

dome webcam

View into the dome given by the TRENDNET tab of mozilla on the Windows desktop. [10](#), [49](#), [50](#), [83](#)

DRS

data reduction software [9](#), [15](#), [19](#), [22](#), [26](#), [30](#), [62](#)

FEROS

Fibre-fed Extended Range Optical Spectrograph [9](#), [15](#), [19–22](#), [25](#), [26](#), [30](#), [32–36](#), [38](#), [42–47](#), [50](#), [51](#), [55](#), [56](#), [58](#), [59](#), [61–63](#), [65](#), [67](#), [74](#), [75](#), [77](#), [80](#), [81](#)

FIERA

Electronics systems controlling the optical detectors [58–60](#), [82](#)

GROND

Gamma-Ray Burst Optical/Near-Infrared Detector [10](#), [15](#), [19–22](#), [26](#), [27](#), [30](#), [32–36](#), [38](#), [39](#), [41–43](#), [46](#), [47](#), [50](#), [51](#), [55](#), [56](#), [58–61](#), [68](#), [74](#), [82](#)

ICS

instrument control software 19, 32, 50, 55, 61, 81

IRACE

Electronics systems controlling the infrared detectors. 58, 82

LCU

Logical control unit, machine in a rack that controls an instrument or telescope subsystem
15, 57

OB

observing block 15, 21, 29, 30, 32–39, 45, 46, 53, 60, 62, 82

ot

observing tool 29, 33, 48, 53, 54

p2pp

phase 2 preparation tool 15, 48, 53, 54

RTD

real time display 19–21, 24, 25, 35, 47, 59, 75

TCS

telescope control software 15, 18–21, 24, 27, 31, 35, 36, 42, 49, 50, 55, 57–62, 65–67, 71,
73–75, 78–80

WFI

wide-field imager 15, 19, 20, 23, 24, 27, 29, 30, 32, 33, 35, 36, 41–43, 45–48, 50, 51, 55,
57–61, 67, 71, 73–77, 79, 81

Windows desktop

Rightmost computer in the control room that controls the dome 15, 24, 31, 49, 50, 85