Operations at the La Silla 2.2 metres telescope

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Since 2013, the operations at the La Silla 2.2 metres telescope involve minimal support by ESO. This guide intends to familiarise observers with the operations.

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1 — Introduction

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

1.1 Control room

First of all, the control room, is located below the main ESO building, the one with the dining room. It is still shared with the two ESO telescopes, the NTT and the 3.6 m. If everything works without technical issue, you can do everything from there without any need to access the telescope building.

Figure 1.1 below shows the location of the different components of the controls. Screens, keyboards, and mice are labeled to avoid confusion.
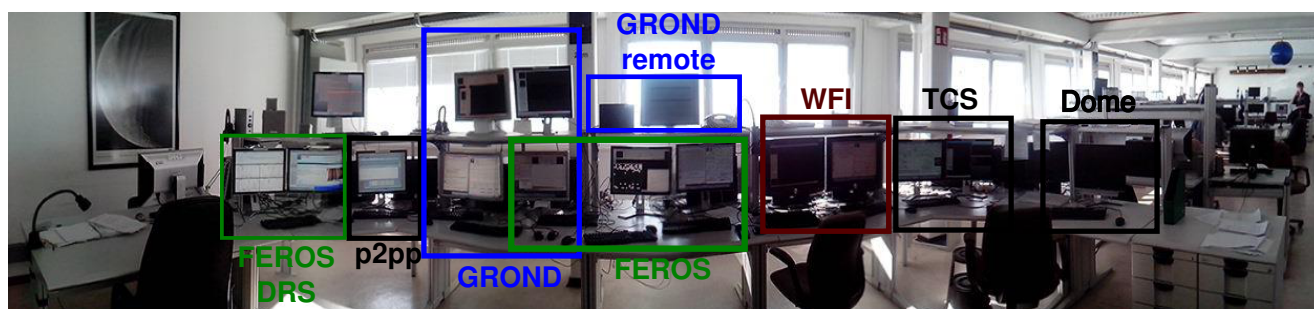
Figure 1.1: Layout of the telescope controls. From right to left: Windows desktop controlling and monitoring the dome, telescope control software, WFI controls, FEROS controls (bottom) and skype laptop connected to the GROND remote observers (top), GROND controls, p2pp machine where OBs are crafted and loaded by the visiting astronomer, and, finally, the FEROS data reduction software.

1.2 Overview of operations

In most nights, a support astronomer is present in the afternoon and the first part of the night, freeing the visitor of the afternoon and evening twilight calibration duties. Sometimes visitors are ask to perform all duties alone. In that

case, an experienced observer can start operations 2.5 hours before sunset to minimise working time, while giving a small time buffer to solve the commonest technical issues. Inexperienced ones should plan to start earlier or accept possible downtime in the very beginning of the night. Figure 1.2 shows a time-optimised chart of operations in the afternoon and both twilights.
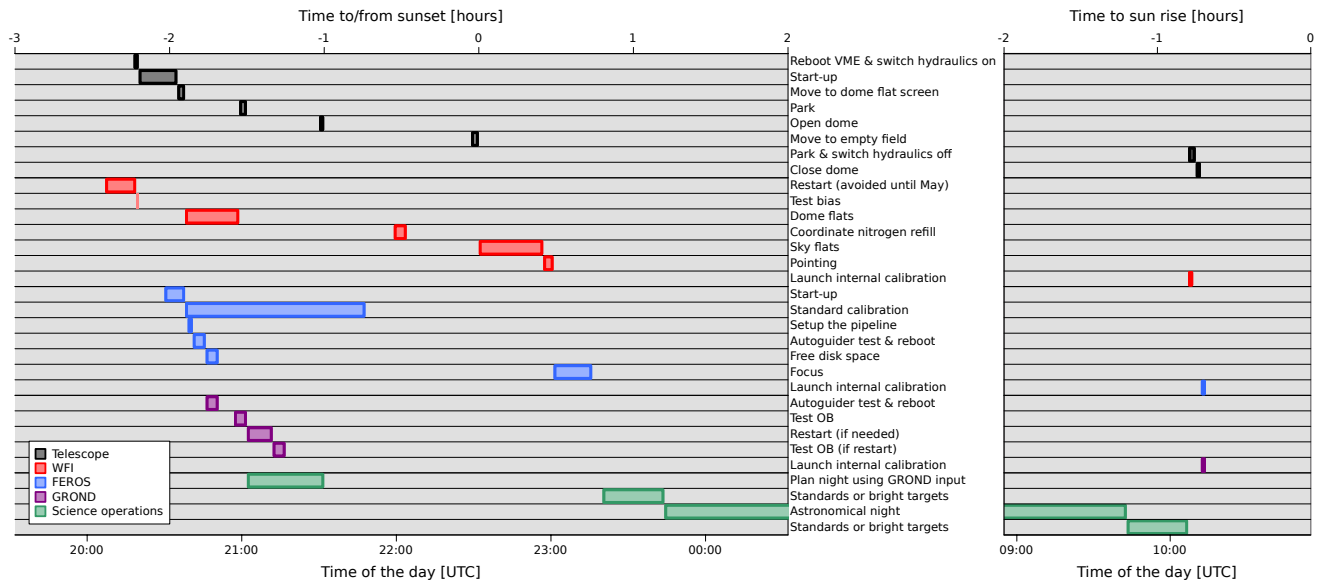
Figure 1.2: Time flow of operations in the afternoon and twilights. Afternoon setup and calibrations should be started at least 2.5 hours before sunset to leave a small buffer for technical issues. This example is giving for a late fall night (May 15th), with presence required for about 15 hours.

When no service astronomer is present (e.g. last part of the night), visiting astronomers will be asked to perform service observations for other groups, both for the follow-up of gamma-ray bursts and time-domain programmes. The number of allocated nights for visitors takes the average time loss into account, in case more down time, compensation will be considered in service mode. Since 2017, a long-term monitoring of quasi-stellar objects takes 1.5 to 2 hours daily, and targets of opportunity about 1 hour (15% long-term average). MPIA observers may be ask for additional service observations for the MPIA.

Sections 2–6 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 8. Section 9 lists fixes to common issues at the telescope. We present the software components more in detail in Section 10.

1.3 Security

The main guidelines to avoid bodily harm are:

- Don't move the telescope or dome before checking no one is in the way. During the day, ESO technicians may address some issues or refill the instrument with nitrogen. If you operate from the remote control room, check the dome webcam.
- If you need to go to the dome, leave a conspicuous message in the control room and put the telescope in local control from the computer room of the telescope building.
- If you drive by night, go very slowly and defensively as you may not see a pedestrian or a dark donkey.
- If you walk, take the incoming traffic side and be very careful at night. Drivers don't use lights.

ESO has the duty to ensure telescope safety but you have to be proactive, too. In particular:

- If you are not able to close when you must (sunrise and inclement weather), you need to ask to the operators present at the NTT or the 3.6m. They have the duty to assist.
- The weather officer or the NTT operator will tell you when you need to close and when you may reopen, stick to it.
- If you have any doubts whether you may open in the afternoon, wait for the NTT to open or ask the ESO day-time operator.
- If the meteo monitor shows that the closing limits are reached (wind, humidity, clouds), close.
- If a sea of clouds below the observatory was present at sunset, be attentive as it is common for them to raise and increase humidity to 100% within minutes.

1.4 Telescope building

It is sometimes necessary to physically access the telescope building where there is an old control room (Fig. 1.3), a computer room to physically access some relevant workstations (Fig. 1.4), the FEROS room, and, obviously, the dome (Fig. 1.5).

Some subsystems are controlled by machines gathered in big rack towers, these machines are called LCU or sometimes VME. There are also workstations controlling coordinating with one or more LCUs, they look like a normal desktop computer tower usually with no screen or keyboard.

In the dome itself, many electronic boxes attached at the telescope (see Fig. 1.5) may need being "power cycled", that is switched off and on. It is also possible to locally take control of telescope, dome, and mirror motion.

Figure 1.3: Entering the old control room in the telescope building

Figure 1.4: Entering the computer room in the telescope building. In front slightly to the left is the VME rack.

Figure 1.5: Entering the dome, from left to right: the ADAM controls, a computer to use the TCS, the dome controls, the bottom of the telescope.

2 — Early afternoon: daily start-up

Start-up should take about one hour, but small technical issues can lengthen it significantly. Ideally, it should be done early enough in the afternoon (2–3 pm in Winter, 3–4 pm in Summer), so that dome flat fields can be done before the nitrogen of wide-field imager (WFI) is refilled. Also, complicated issues should be diagnosed early, so that you benefit from the day-time support from ESO engineers. Night time support is not provided except for emergencies.

For an experienced observer alone in Winter, a later start-up can be done by optimising and hoping for the best (see Fig. 2.1), but the risk is to lack time to perform dome flats and/or losing the very beginning of the night to technical issues.

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.

2.1 Outline

To be on the safe side, the start-up sequence shall be performed in this order below. To gain a bit more time one can do 2a–2b during 1a–1e and 2e–2h during 1h–1j. FEROS, GROND, the AG and the DRS (3, 4, 5, 6a) can be handled in parallel as soon as the TCS is booted (2h).

If under time pressure, you can also do some day-time calibrations in parallel. Figure 2.1 gives a time-optimised flow of the day-time start-up and calibrations, showing what can be done in parallel. It should be started latest 2.5 hours before sunset.

Procedure 2.1. Telescope and instrument startup

1. **WFI restart (8 min, in case of problems, see Fig. 2.2)**
    If no problem occurred during the last night, try steps 1i–1j. If an issue happens, do the full start-up.
    (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 (Fig. 2.2(a)).
    (c) On the dialog, choose `DAILY` startup (Fig. 2.2(b)).
    (d) Click `START` on the appearing window (`ESO220 WEEKLY FULL STARTUP`, see Fig. 2.2(c)).
    (e) Wait until the start-up window says `SCRIPT finished` (about 11 minutes).
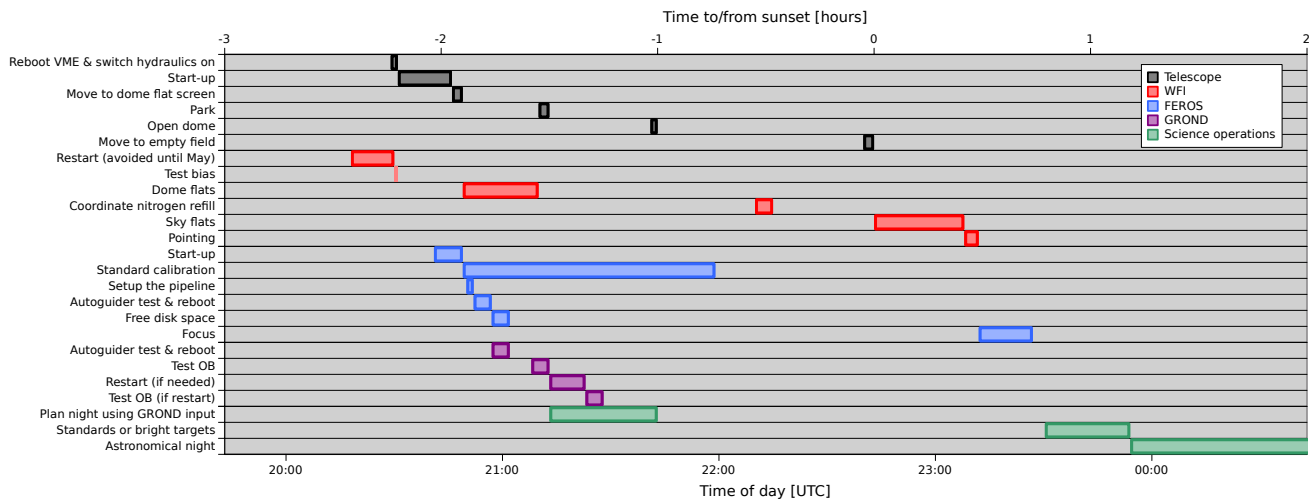
Figure 2.1: Operations time flow in the evening, doing start-up, calibrations, and tests in parallel. It should start latest 2.5 hours before sunset (see horizontal axis at the top). The time of the day, given in universal time on the bottom horizontal axis, corresponds to a date close to fall equinox (September 15th).

      A black text window gives indication on the process (Fig. 2.2(d))
(f) Close the startup window (Fig. 2.2(c))
(g) Close the emerging PDF (Fig. 2.2(e)).
(h) Rearrange windows to the corresponding desktops (1 min, see Fig. 2.2(f))
- 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.
(i) Wait for the filter wheel to be set to a specific filter (1–2 min)
- Locate the `Filter` field on the `WFI General State` panel
- If it stays in `MOVING` or you skipped full restart, reset filtre wheel (Sect. 9.3.8).
(j) In `bob`, execute `testBias.obd` (1 min)
- Import it with window menu `File→Load OBs→From file....`
- Click the `Start` button.

2. **TCS restart (17 min, daily, see Fig. 2.3)**
(a) Go to web browser on screen `Dome webcam & hydraulics` to activate hydraulics (Fig. 2.3(a)).
- Find the Dome Auxiliary Functions (tab called `ADAM 6000...`)
  If it is not there, open it with the bookmark `Dome controls`.
  Use the good seeing password if necessary.
- 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.
(b) On the screen `Telescope Control Software`, go the the `StartUp` virtual desktop.
(c) If a `Cannot read "@w2p2wfi..."` pop-up can be seen on the TCS screen (Fig. 2.3(b)), click `OK`.
(d) In a terminal type `lccBoot lte2p2` and wait for command to end (2 min, Fig. 2.3(c))
  If none is there, you can open one with left-click mouse menu `TCS User→tcs xterm`.
  If an error message appears on the WFI screen, click `OK`.
(e) On the TCS screen, type `osf2p2StartUp ini ALL F8`, where ini is your initials. (Fig. 2.3(d))
  Make sure WFI is fully booted (1e) before going on with the TCS start-up.
(f) Click `START` on the appearing startup window titled `ESO220 DAILY STARTUP` (Fig. 2.3(e))
(g) Be proactive to handle some appearing pop-ups (in a 14 minutes lapse)
  i. One asking to check hydraulics and telescope is parked among other things (Fig. 2.3(f)).

You can check each point and then click `OK`

    ii. One asking to switch on flat-field lamp (Fig. 2.3(g))

Lamp should be on, check no one is in the dome, then click `OK`.

If it's off, on `FAUX functions` panel on desktop `TCS Status`, select 200V under `FLAT FIELD LAMP`

Then, telescope will do movement checks.

    iii. One asks to check for CCD alarms to be enabled (Fig. 2.3(h))

Go to the large, black text window where all numbers below the two `Al Enab` should be ones.

    iv. One asks to check that the flat-field lamp is off.

If not, on `FAUX functions` panel on desktop `TCS Status`, select `OFF` under `FLAT FIELD LAMP`

(h) The `Telemetry` panel should have appeared and start-up window say `SCRIPT finished`.

(i) Close startup window.

(j) Close emerging PDF.

(k) Rearrange windows to the corresponding desktops (1 min)

- `skycat` 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. 2.9) if it pops up on the WFI screen.

3. **FEROS restart (daily, 7 min, see Fig. 2.4).**

Only start after TCS is back online and doing telescope movements (2(g)ii).

Under time pressure, you can skip points 3a–3j, accepting an increased risk of night-time issues.

(a) On the screen `FEROS BOB`, go the the `StartUp` virtual desktop.

(b) In a terminal type `osf2p2StartUp ini FEROS F8`, where ini is your initials. (Fig. 2.4(a))

If none is available, use left-click mouse menu `FEROS User`→`feros xterm`.

(c) Click `FULL` on popup `Select StartUp Type` (Fig. 2.4(b))

(d) Click `START` on the start-up window `ESO220 WEEKLY FULL STARTUP` (Fig. 2.4(c)).

A black text window should appear and give indications on the progress. (Fig. 2.4(d))

(e) Close `ESO220 WEEKLY FULL STARTUP` it says `SCRIPT finished` (2 minutes)

(f) Click `START` on `Instrument Startup` window (Fig. 2.4(e)).

If a timeout error occurs, see Sect. 9.7.1.

(g) The pop-up panel will close by itself after the ICS started

(h) After Start-up is finished a pdf will open, and can be closed

(i) Wait for windows to appear.

(j) Rearrange windows to the corresponding desktops (1 min, see Fig. 2.4(f))

- RTD goes to all desktops, on the left screen.
- Other windows go to the desktop bearing their names, on the right screen.
- There are two `rtds` and two `logMonitors`, you can close one of each.

(k) On `FEROS General State` panel, use window menu `Instrument`→`ONLINE`.

(l) In bob, run `FEROS_ech_cal_bias.obd` (1–2 min)

    i. Fetch it with window menu `File`→`Load OBs`→`From file...`(/OBD/Templates/).

    ii. Click `Start` (takes about 1 min).

    iii. If points 3a–3j were skipped, it will fail on the first attempt and proceed.

    iv. Click `OK` on the error popups, one should say `error closing w2p2cam`

    v. Wait for the exposure to finish

    vi. In bob, click on `Reset status`

    vii. Click on start again.

    viii. Wait for OB to finish.

(m) On `FEROS General State` panel, use window menu `Instrument`→`IGNORE`.

4. **GROND restart (daily, 5–11 min)**

(a) Go to screen `GROND BOB`.

(b) Locate or open a terminal with user `grondmgr`.
You can use left-click mouse menu `GROND user`→`grondmgr on wgrond`

(c) In the case of a power cut or issues with GROND, restart the instrument (5 min)
    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(c)i.
    iv. Rearrange windows.
    v. Use window menu `Instrument`→`ONLINE` in the GROND control panel (Fig 10.11(b)).

(d) Do some preventive reinitialisations (1.5 min)
    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).

(e) From bob, execute the test OB `1min1TD_test.obd`, see Fig. 10.11(a) (1 min)
    i. Ensure TCS is `OFF` (red button) by clicking `TCS OFF`.
    ii. Fetch OB with window menu `File`→`Load OBs`→`From file...`
    iii. Click `Start`.

(f) Repeat the last step using communication with the TCS (2 min)
    i. Ensure TCS is `ON` (green button) by clicking `TCS ON`.
    ii. Fetch OB with window menu `File`→`Load OBs`→`From file....`
    iii. Click `Start`.
    iv. If you haven't done the full start-up, the first attempt should fail, you need to
- Click `OK` on the error popups, one should say `error closing w2p2cam`
- 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 (0.5 min)
In a terminal type, `grondM3 WFI && grondMC CLOSE && grondCS CLOSE`.

(g) If a restart (point 4(c)iii) was done, set the image displays (1 min).
    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. 2.10(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. 2.10(b)).
If it is gray with text `Start`, click it so that it gets as describe above.
    vii. Check that the image is horizontally flipped (see Fig. 2.10(b)).
    viii. Check that the image has positive pixel values
Find menu option `Negative real time image`

5. **FEROS** and **GROND** **guide cameras setup** (3–8 min)
(a) Go to the `Autoguider GROND & FEROS` screen.
(b) Rearrange windows to their corresponding virtual desktops (1 min)
`Autoguiding` window should go to all desktops.
(c) Use numbers 6, 3, 0.02 below `Autoguider control` and click `Apply`.
(d) Check the GROND autoguider (1–4 min)
    i. select GROND below `CCD change` (see Fig. 2.5)

        ii. Use `Start exposure` to change `CCD Status` to `Infinite loop`
           (proceed to troubleshooting (Sect. 9) if `CCD Status` is not `Infinite loop`)
       iii. find window `Telescope R.T.D.`
       iv. use window menu `TCS`→`Attach camera`
        v. a bias image should be seen within seconds
       vi. if it fails go to (3 min)

(e) Check the FEROS autoguider (1–4 min)
        i. select FEROS below `CCD change` (see Fig. 2.5)
       ii. Use `Start exposure` to change `CCD Status` to `Infinite loop`
           (proceed to troubleshooting (Sect. 9) if `CCD Status` is not `Infinite loop`)
       iii. find window `E2P2 Real Time Display`
       iv. click checkbox `Camera on/off` so that checkbox gets green
        v. a bias image should be seen within seconds
       vi. check that the image is horizontally flipped.
      vii. if it fails go to (3 min)

6. **FEROS data reduction software setup** (2–5 min)
  (a) Change the date (1 min)
        i. Go to the `DRS:main` workspace of screen `FEROS pipeline`
       ii. If FEROS DRS window is not there, open it with left-click mouse menu `FEROS User`→`FEROS DRS`
       iii. Stop the `Reduce Queued Image Status`
       iv. Stop the `Midas Session Status`
        v. Change the date
       vi. Start the `Midas Session Status`
      vii. Start the `Reduce Queued Image Status`

  (b) Free disk space (1–4 min)
        i. Go to `Visitor` workspace of screen `FEROS pipeline`
       ii. Use or open a terminal
       iii. If df -h /data indicates more than 80% disk usage, proceed
       iv. Delete the oldest nights in `/data/raw`, `/data/reduced`, and `/data/reduced/FEROS`
           Leave at least the last three nights.
           Example: `rm -rf /data/reduced/2018-01-* /data/reduced/FEROS/2018-01-*`

2.2 WFI startup
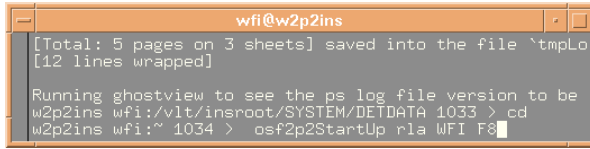
(a) Launch the reboot from the terminal.

(b) Choose full startup.

(c) Click start.
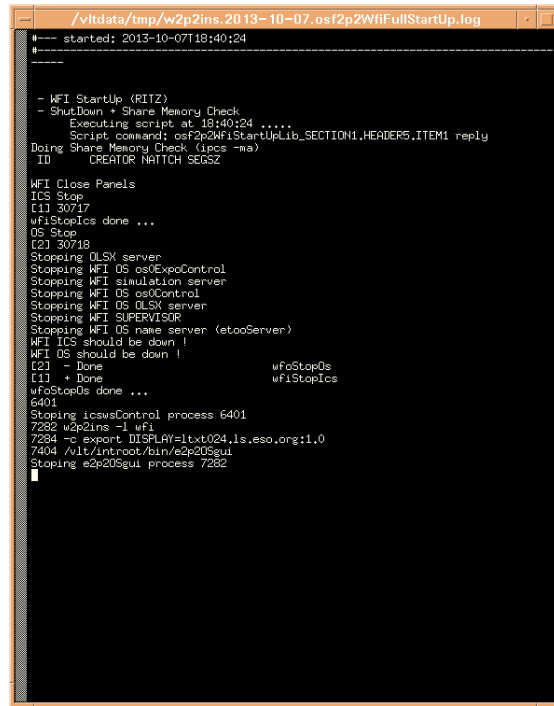
(d) A log terminal opens. Process takes ≈ 10 min.
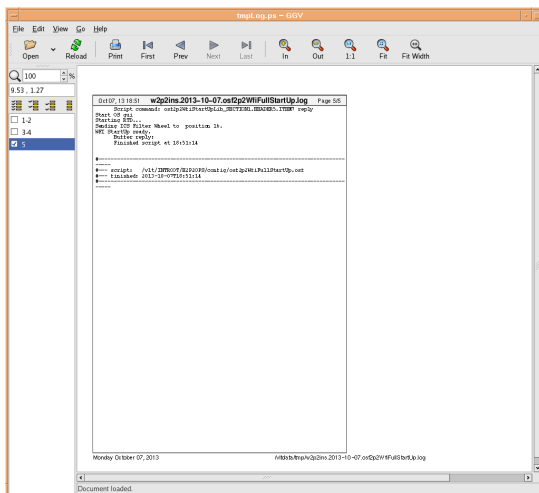
(e) When finished select File → Quit from window of Fig. 2.2(c). This PDF log opens. You can close it.
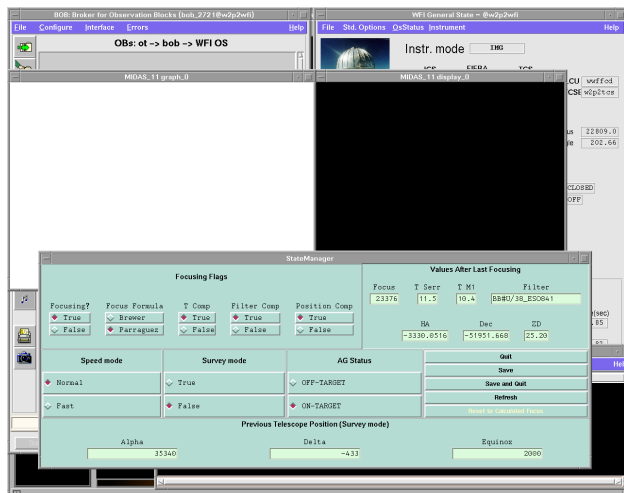
(f) Don't forget to rearrange all these windows.

Figure 2.2: WFI restart. When done, don't forget to take a test bias.

2.3 TCS startup
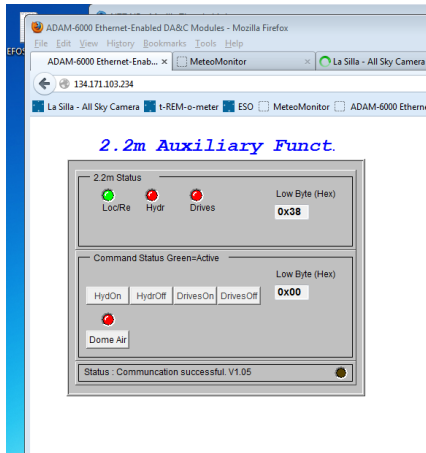
(a) Turn hydraulics and drives on, Windows desktop.

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

(c) Reboot lte2p2 machine.

(d) Launch the reboot from the terminal.
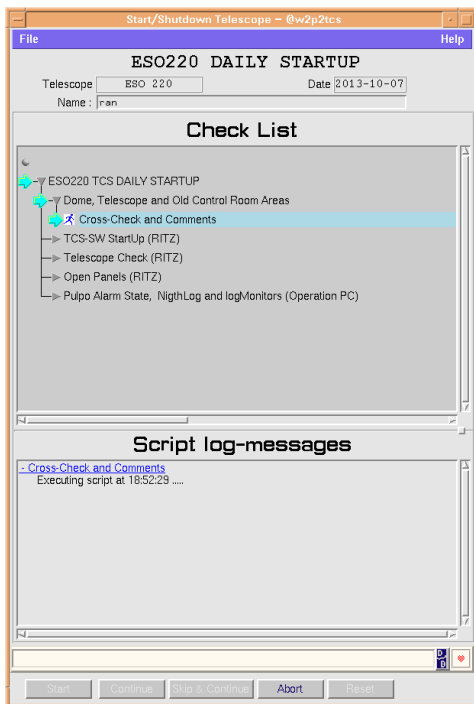
(e) Click start.
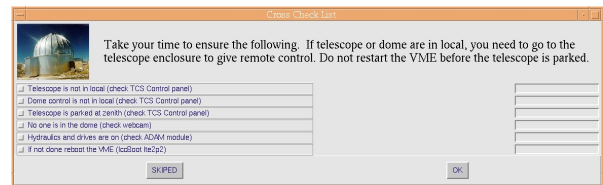
(f) Check elements then click OK to incoming pop-up.
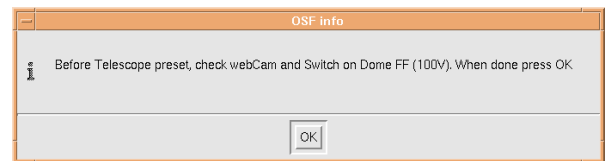
(g) Check flat lamp is on or switch it on. After clicking OK, telescope should move.
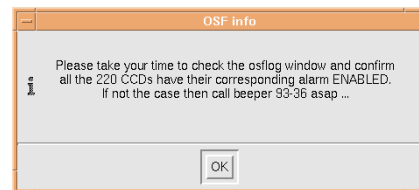
(h) Check that CCD alarms are on in the black text window.
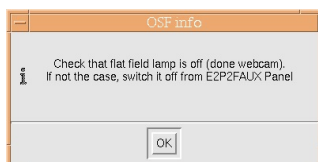
(i) Check flat field lamp is off, if not, turn it off

Figure 2.3: TCS restart. As for WFI there is a black terminal log) and process ends with a PDF log being popped up. Emergent windows hould be rearranged to their respective desktops. The RTD isplay should go to all desktops on the left screen, the other windows n the right screen.

2.4 FEROS startup

(a) Restart FEROS from terminal. Ensure that telescope is enabled in the FEROS control window.

(b) Click `FULL`.

(c) Click `START`.
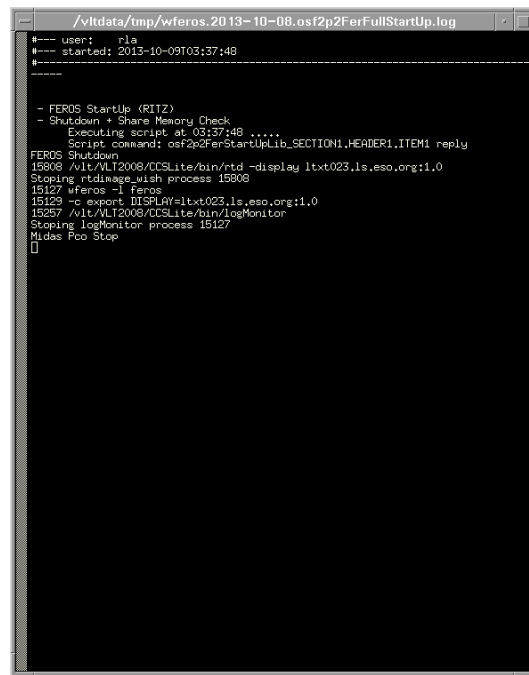
(d) This black log opens. Later on a PDF will pop-up.
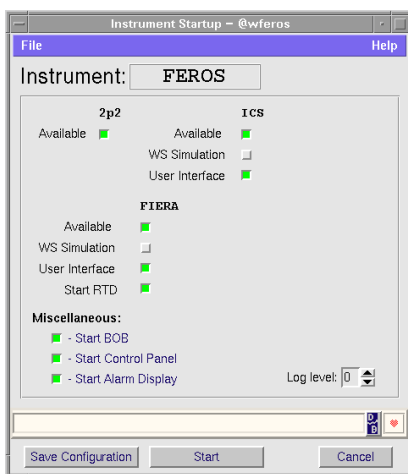
(e) Click `START`.
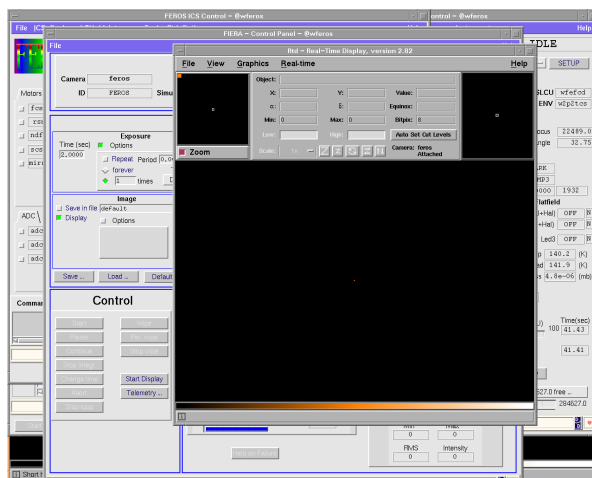
(f) When finished, rearrange the windows to their corresponding desktops. RTD, `bob` and FEROS control go to `BOB+OS`.

Figure 2.4: FEROS restart.

2.5 GROND and FEROS AG
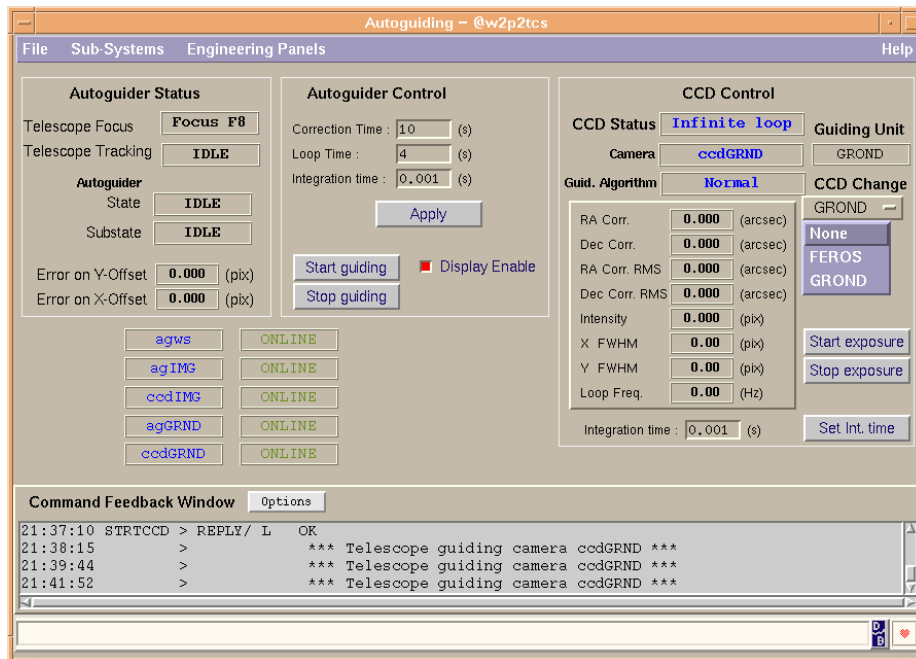
Figure 2.5: Switching between GROND and FEROS guide camera.

Check that the GROND and FEROS guide cameras work by switching between them on the AG window (see Fig. 2.5). 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. 9.2).

2.6 FEROS DRS
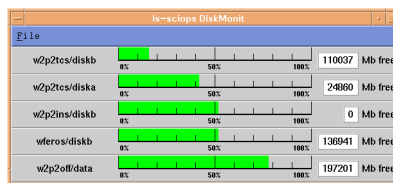
Figure 2.6: FEROS DRS Disk Monitor to check free disk space.

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.

2.7 Additional material

2.7.1 Harmless error messages

2.7.2 Display settings
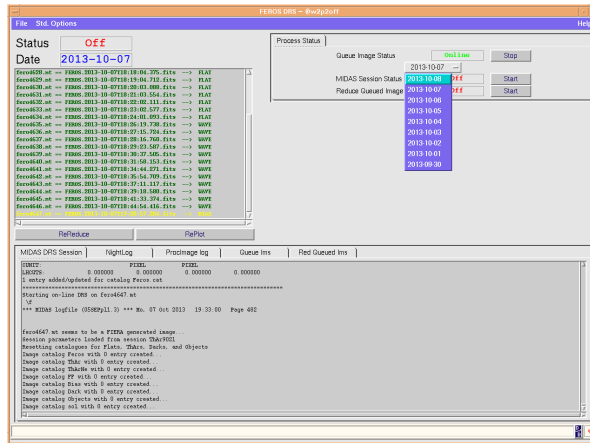
Figure 2.7: Changing the date of the FEROS DRS.
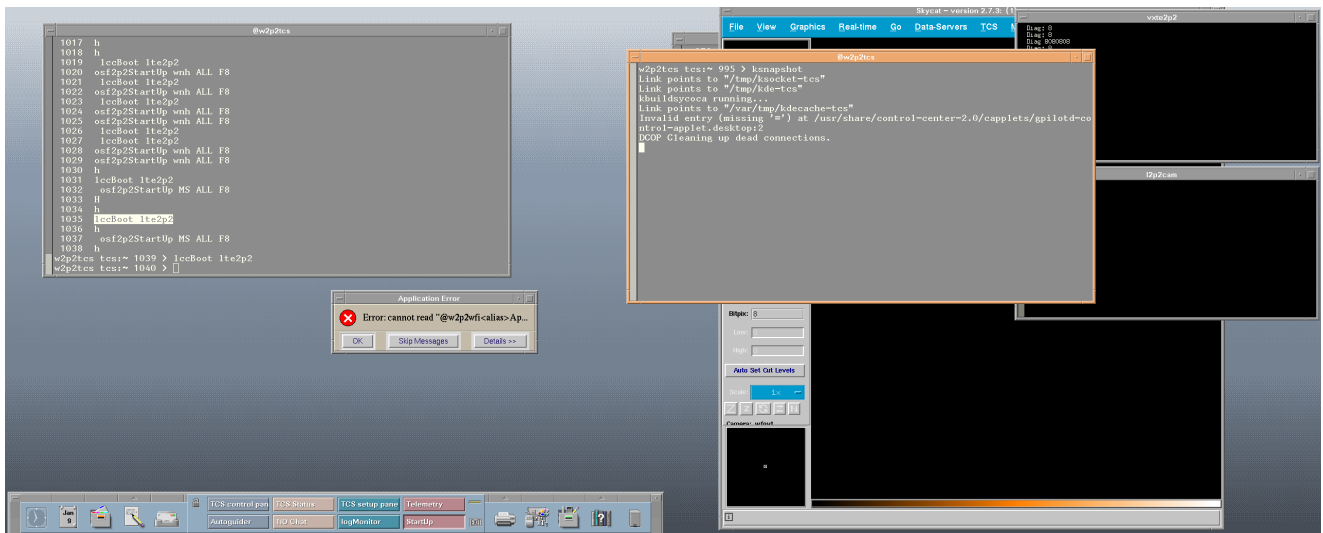
Figure 2.8: When restarting WFI, the TCS generally issues a harmless error message. Get over it and click OK.
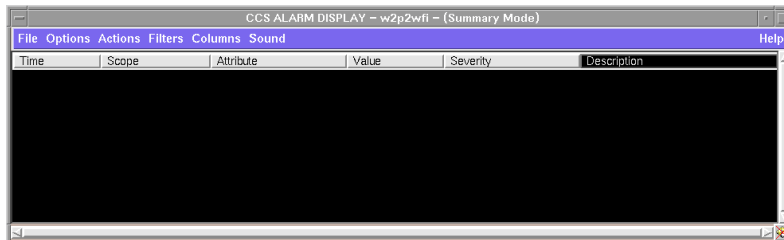
Figure 2.9: CSS ALARM DISPLAY will typically pop-up on the WFI screen with a line in red when the TCS is restarted. Get over it and hide the window.

(a) Optical   (b) Infrared
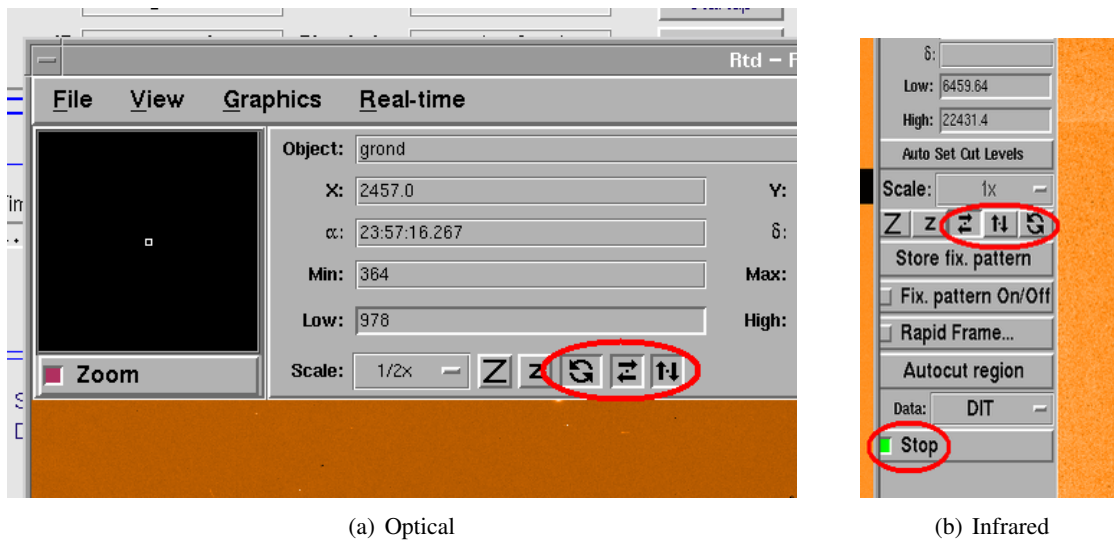
Figure 2.10: Correct sky orientation of the GROND displays. The infrared one is receiving data in real time (green checkbox).

WFI
FEROS
GROND

3 — 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. 8.

3.1 WFI

Internal calibrations and health checks are typically left running in the morning after the dome has been closed. See Sect. 7.6.

Procedure 3.1. WFI dome flat-fields

1. Ensure that no one is in the dome nor will enter it.
2. Prepare the telescope.
   (a) If hydraulics is off, switch it on and wait for connection with VME
       i. On the `Dome Auxiliary Functions` panel click `Hydr On` then `Drives On`.
       ii. On the `Telscope Control` panel, check if red message appears `no connection`.
       iii. If it is the case, wait for it to disappear (about 2 min)
   (b) If hydraulics were off, initialise telescope
       i. On the `Telescope Setup` panel, click `Tel Init`
       ii. Wait for the telescope status of the `Telescope Control` to go from `WaitIni` to `Slew` (2 min)
   (c) Preset to flat-field screen
       i. Go to the `TCS Setup Panel` (Fig. 10.2) on screen `Telescope Control Software`.
       ii. Put `Dome` on `automatic`.
       iii. Preset the telescope to flat-field screen.
           Click `FF Scr` below `Fixed Presets`
       iv. Wait for the movement to complete (2 min) before starting the flat-field OB.
           On the `TCS Control Panel` (Fig. 10.1) telescope status is `Slew`.
   (d) Prepare shutters and mirrors
       i. Click `Open` under the `Main Mirror Cover`.
       ii. Wait for opening to complete (2 min) befor starting the flat-field OB
       iii. Open the WFI protective shutter.
           In the Auxiliary Functions (Fig. 10.5), `OPEN` the `WFI PROTECTIVE SHUTTER`.
       iv. Ensure the GROND mirror is on WFI

           v. Ensure the FEROS mirror is on FEROS
3. Prepare the flat-field OB
    (a) Go to `bob` on the screen `BOB Wide Field Imager`.
    (b) Fetch `bob` from file (window menu `File→Load OBs→From file...`) looking in subfolder `DomeFlats`.
        • If observing in UBVRI standard filtres: `DomeFlatCalPlan_new.obd` (25 min).
        • During an observing period or a visitor run, a custom OB may be used: `DomeFlatsP102.obd` or `DomeFlatsVisitorName.obd`
        • To choose filtres on the fly: `DomeFlatGeneric_new.obd`.
        • To test all filtres: `DomeFlatAllSnapshot.obd` (1 flat per filtre, 2 hrs 30 min).
    (c) If choosing filtres on the fly, customise the 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 window menu `Interface→Engineering`.
      iv. Middle-click the filter name, fill in value, and type enter.
          Name is `ESONNN_name/width` (`NNN`: number, `name`: filtre name or wavelength)
          In virtual desktop `WFI ICS`, a filter list is found below `SETUP Instrument`
       v. Deactivate the filtres you don't want.
          Right-click the triangles to get a thumb down
4. Execute OB (15–30 min usually).
5. If no other types of flats are done, park the telescope
    (a) Go to the `TCS Setup Panel` on screen `Telescope Control Software`.
    (b) `Close` to the `Main Mirror Cover`.
    (c) Set the dome in `Manual`.
    (d) Click `Zenith` below `Fixed Presets` (2 min)
    (e) Close the WFI protective shutter. In the Auxiliary Functions (Fig. 10.5), `CLOSE` the `WFI PROTECTIVE SHUTTER`.
6. If telescope will stay idle for hours, switch hydraulics off.

3.2 FEROS

A linearity check is left running in the morning (see Sect. 7.6). The standard FEROS calibration is generally done after startup. It is internal in a separate room, so it can be done while doing telescope movements, going to the dome, or even WFI or FEROS observations.

Procedure 3.2. FEROS afternoon calibrations

1. Go to screen `FEROS BOB`.
2. Check that FEROS does not communicate with the telescope
   On the `FEROS General State` panel, use window menu `Telescope→Ignore`.
3. Execute `StanCalNorm.obd` from `bob` (≈ 1 h).
    (a) Use window menu `File→Load OBs→From file...`.
    (b) Click `Start`.
4. Check that the DRS has processed it. **While Fabry-Pérot stays installed, it will fail.**
    (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.

3.3 GROND

GROND calibrations are left running in the morning after the dome has been closed (see Sect. 7.6). Some observers may ask for GROND linearity calibration using dome flats, providing the observing blocks and a detailed explanation.

Opening
Telescope readying
Making the instruments ready (at sunset)
Refining the night plan

4 — Sunset: Getting ready

4.1 Opening

Opening should take place about one or two hours before sunset if conditions allow it. In case of doubts, always ask to the day-time Telescope & Instrument Operator of ESO.

Procedure 4.1. Dome opening and telescope readying

1. Check that the slit is oriented opposite to the Sun. It does not apply when opening at night.
    (a) On the `rose diagram` of the `TCS Control Panel`, it should be to the East
    (b) If not, rotate manually in the `TCS Setup Panel`
2. Open the slit
    (a) Go to the TCS setup panel (Fig. 10.2)
    (b) Check that the value below `Main Mirror Cover` is `closed`.
    (c) If not, click `Close` (2 min).
    (d) n the TCS setup panel (Fig 10.2), below `slit`, click `Open` (1 min)
3. Turn on the Dome Air in the Dome Auxiliary Functions (Windows desktop, Fig. 10.13).
4. If opening during the night, you can directly prepare the telescope (Procedure 4.2).

4.2 Telescope readying

A bit before sunset if doing sky flats or at sunset otherwise, you can ready the telescope and point to an empty field.

Procedure 4.2. Telescope readying

1. Prepare the telescope
    (a) If hydraulics is off, switch it on and wait for connection with VME
        i. On the `Dome Auxiliary Functions` panel click `Hydr On` then `Drives On`.
        ii. On the `Telscope Control` panel, check if red message appears `no connection`.
        iii. If it is the case, wait for it to disappear (about 2 min)
    (b) If hydraulics were off, initialise telescope
        i. On the `Telescope Setup` panel, click `Tel Init`
        ii. Wait for the telescope status of the `Telescope Control` to go from `WaitIni` to `Slew` (2 min)
    (c) Open the main mirror cover
        i. Click `Open` under the `Main Mirror Cover`.

  ii. Wait for opening to complete (2 min) befor starting the flat-field OB
2. Preset to an empty field if doing sky flats, a test with GROND, or readying before sunset
    (a) Go to the TCS Control Panel (Fig. 10.1)
    (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 more than sidereal time at sunset.
         Consider field quality: excellent, good, OK, poor.
    (e) Click `Preset`.
3. Set the dome motion in automatic.
    On the TCS setup panel (Fig 10.2), below `Dome`, select the checkbox `Automatic`.

4.3 Making the instruments ready (at sunset)

Procedure 4.3. Making instrument ready

1. Activate the connection between instruments and telescopes
    (a) On the FEROS control panel (Fig. 10.9), use window menu `Telescope`→`Enable`.
    (b) On the GROND control panel (Fig. 10.11(b)), click `TCS ON`.
    (c) Refresh the WFI general state panel (Fig. 10.8).
         • Use window menu `Std.   Options`→`Refresh Database values`.
         • Check that `TCS` is `ONLINE`.
2. Open the instrument covers
    (a) In the Auxiliary Functions (Fig. 10.5), 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`
3. Check for mirrors
    (a) Check FEROS mirror (`M3 Selected Mirror`) on the FEROS control panel (Fig. 10.9).
         If necessary, set `mirr3` motor on the ICS (Fig. 10.10)
         • 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 10.11(b)).
         If necessary, type
         • `grondM3 WFI` for FEROS or WFI observations
         • `grondM3 GROND` for GROND observations.
4. If no test OB with TCS on was done during the start-up, try to run a GROND test OB (`1min1TD_test.obd`)
    on sky using bob (Fig. 10.11(a)).
    (a) Fetch OB with window 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.

4.4 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. It generally consists of 1–3 targets to be observed within a time range, so that you try to accommodate with your own and/or other service observations. If it is detrimental to the other observations, there is sometimes some flexibility on which days they have their monitoring done, ask, but they have precedence.

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).

5 — Twilight: On-sky calibrations

5.1 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`.

5.2 WFI

5.2.1 Sky flats

Sky flats in most narrow-band filtres and the darkest broad-band ones ($U \& V$) should be started right at sunset or slightly before sunrise. The brightest broad band filtres (R, I, B) can be obtained with the sun at -6 to -9 degrees approximately. It is possible to obtain the five standard filtres 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 5.1. Taking sky flats with WFI

1. If not done, check that dome and main mirror cover are open (Sect. 4.1, point 4.1).
2. If not done, check GROND and FEROS mirrors (Sect. 4.3, point 3).

3. If not done, check that the WFI main cover is open (Sect. 4.3, point 2).
4. If not done, point the telescope to an empty field (Sect. 4.1, point 2).
   (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 (window menu `File→Load OBs→From file...`).
   (Go to folder `.../TEMPLATES/OBD/SkyFlats/`)
   • For standard filtres use `SkyFlatsEveningCalPlan.obd`
     (`SkyFlatsMorningCalPlan.obd` in the morning)
   • Some other filtres have their own flat OBs (e.g. `SkyFlatsI203`).
   • For a set of non standard filtres use `SkyFlatsGeneric.obd`.
7. If not doing the standard filtres, customise OB.
   (a) For non standard filtres, 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 window menu `Inteferface→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 ($\leq 400\,\mathrm{ADU}$), skip this template
           In the morning, if the message is
           • an error message and a bright test image ($\geq 20\,\mathrm{kADU}$), skip this template

5.2.2 Pointing

Pointing with FEROS

If starting with FEROS, you can use the focus and/or standard star OB to check pointing.

Procedure 5.2. 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. 10.4).
   (b) Use window 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. 5.3.1.

Pointing and autoguider test with WFI

If things go well, the bright star used for the test that should fall a few hundreds of pixels from the centre of the mozaic in the South-West direction.

Procedure 5.3. WFI pointing

1. Switch the instrument to WFI on the TCS status panel.
   (`Instrument Selection`, Fig. 10.4. 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. 4.1, points 2, 1c and 3).
3. If not done, check GROND and FEROS mirrors (Sect. 4.3, point 3).
4. If not done, check that the WFI main cover is open (Sect. 4.3, point 2).
5. Go to `bob` on screen `BOB Wide Field Imager`.
6. Fetch pointing OB from file (window menu `File`→`Load OBs`→`From file...`).
   (Go to folder `.../TEMPLATES/OBD/Pointing/`)

   - OBs are `Pointing-<ra>h.obd`, where `<ra>` is the right ascension.
   - Chose 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. **TEMPORARY: if offset values are large, it's normal, WFI pointing was modified.** After `offset and quit` a popup should have appeared.
    Click `OK` if satisfied with the offset values (in arcsec).
11. If no star at all is seen, see Sect. 9.11.1 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 reaquire.
    (e) Once you have a star, as long as the offset is large, use `offset and reaquire`
    (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. 6.1.3
    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).

5.2.3 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 instable, 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).

5.2.4 Standard fields (quick tips)

Procedure 5.4. 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. 10.4).
3. Fetch standard OB from list
    (a) Use window 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 filtres are needed, edit filtre names (see Sect. 5.2.1, 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 filtre
       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.

5.3 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).

5.3.1 Focus

Procedure 5.5. FEROS focusing

1. Check that dome and main mirror are open (Sect. 4.1, point 4.1).
2. Check GROND and FEROS mirrors (on WFI and FEROS, respectively. Sect. 4.3, point 3).
3. Check that the WFI main cover is open (Sect. 4.3, point 2).
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 window 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. 6.2.1, point 4, & Sect. 6.2.2).
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.

5.3.2 Focus and spectrophotometric standard

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

Procedure 5.6. Focus and/or spectrophotometric standard

1. Perform steps of Sect. 5.3.1 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`.

5.3.3 Radial velocity standards

Procedure 5.7. FEROS radial velocity standards

1. Got to bob on screen `FEROS OB` and fetch standard OB:
    (a) Use window 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.

5.4 GROND

5.4.1 Sky flats

Evening flats

Before taking evening flat fields, check the relevant items of "no flux or little flux" in Sect. 9.1. 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 5.8. GROND evening flat fields

Procedure lasts about 30 min.

1. If not done, check that dome and main mirror are open (Sect. 4.1, point 4.1).
2. If not done, point the telescope to an empty field (Sect. 4.1, point 2).
3. If not done, set the dome in automatic.
4. Go to `GROND BOB` screen.
5. If not done in the evening, do some prophylaxis (Sect. 2, points 4d and 4f)
    (a) Close `bob`.
    (b) In the terminal, type `grondGRI`.
    (c) In the terminal, type `grondSHUTTER && grondFM` (may last 1 min).
    (d) From the terminal, launch a new `bob` with `bob &`.
    (e) Execute a `1min1TD_test.obd` with `TCS` ON.
6. Set mirror 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. Get sky flat `OB` ready
    In `bob`, fetch `OB` `GROND_img_cal_skyflats_ev`
    (use `Flats/` folder).
8. 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. 10.12(b)).
        • Close to the `INTEGRATION TIME`, fill in value 2.
        • Press enter (Don't do `Apply`.)
    (c) Draw cuts in the infrared image.
        • Go the the `irtd` window.
        • Go the the *J*-band (right handside)
        • Use window 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 occurr when the sun is about 4 degrees below the horizon.
9. When counts are OK, on the `GROND BOB` screen, click `Start` in `bob`.

Standards

Procedure 5.9. GROND standard field observation

The procedure lasts 7 min.

1. Select an SDSS standard field close to the meridian
    In `bob` use window menu `File→Load OBs→From file...` and select one in subfolder `Standards`

2. Execute it by clicking `Start`
3. You can ignore guiding and click `OK` if the `ob asks for it`

Morning flats

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

Procedure 5.10. GROND morning flat fields

1. Point the telescope to an empty field as explained in Sect. 4.1.
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.

5.4.2 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).

5.4.3 Photometric standard fields

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

5.4.4 RRM online

In the GROND Control panel (Fig. 10.11(b)), click `RRM ONLINE` at the end of the twilight (beginning of the night) to allow for remote observations with this instrument.

6 — Night: Observing

6.1 WFI

6.1.1 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. 9.

6.1.2 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 6.1. 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. 10.4).
    (c) Use window 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.

6.1.3 Guiding

Procedure 6.2. 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. 10.1).
    (c) Click `Retrieve Field` below `AG Field Acquisition`.
2. On the autoguider windows (Fig. 10.3), 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 `skycat` chose window menu TCS→`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. 10.1) 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 6.3. Restart guiding with WFI

1. On the TCS machine, go to screen `Telescope Control Software`.
2. On the `TCS Control Panel` (Fig. 10.1)
    (a) Click `Start monitoring`
    (b) Click `Stop monitoring`
3. Select the star on the autoguider windows (Fig. 10.3)
    (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. 10.1) 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.

6.2 FEROS

6.2.1 Switching to FEROS

You can start an OB once point 2 has been done. This minimises overheads by parallelising preset, mirror movements, and autoguider settings

Procedure 6.4. 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. 10.4).
     (c) Use window menu `Instrument selection`→FEROS
2. Ensure the FEROS `mirr3` mirror is on FEROS.
     (a) Go to he `FEROS Control` panel on workspace `BOB+gen state` on screen `FEROS BOB`.
     (b) If the value of `M3 Selected Mirror` is 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.
3. Ensure the GROND M3 mirror is on WFI.
     (a) Go to he `GROND general state` panel on workspace `bob+gen space` of screen `GROND BOB`
     (b) If the value `GROND M3` is GROND send it to WFI.
        In a terminal, type `grondM3 WFI`.
     (c) Check that value `GROND M3` goes to `MOVING` then `WFI` (2 min)
4. Set up the autoguider
     (a) Go to the `FEROS` workspace of screen `Autoguider GROND & FEROS`
     (b) Set up the autoguiding properties. (See Fig. 2.5)
         i. Go to window `Autoguider`
          If necessary open with left-click mouse menu `CAM user`→`Autoguider`.
        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 targets adapt last number to magnitude (0.001–2.999).
       iv. Restart exposure so that guider takes new values into account.
         • If `CCD Status` is `Infinite loop`, click `Stop exposure`
         • Wait a few seconds for it to change to `Inactive` (check the exact word)
         • Click `Start exposure`.
     (c) Set up the autoguider real time image.
         i. Go window `E2P2 Real Time Display`.

               If necessary open with left-click mouse menu `CAM user`→`E2P2...`
- ii. Activate the guide camera image flow if necessary.
  If checkbox `Camera On/Off` is not green, click on it.
- iii. Ensure autoguider refreshes image
  On the `Autoguider control` the checkbox Display Enable should be red
- iv. Ensure the image is horizontally flipped.
  Right of scale the button ↔ should be pressed.

  (d) Set the fibre reference position if GROND was used
- i. Open or activate window `Pick reference star` (Fig. 6.1).
  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 on window `E2P2 Real Time Display`, click on fibre position.
  Coordinates are x=822 and y=516, zooming to 3 or 4× helps to click accurately.
  A box centred on the pixel should appear.

5. Start the observation.
  (a) Go the the `bob+gen state` workspace of screen `FEROS BOB`
  (b) In `bob`, fetch OB and click `Start`
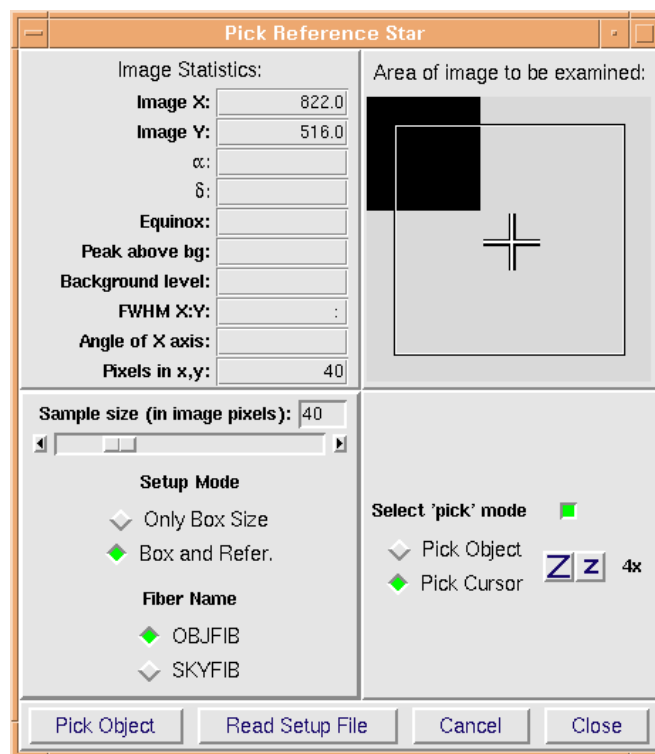
Figure 6.1: Window to set FEROS fibre reference position `Pick reference star`. Select checkbox `Pick Cursor`.

6.2.2 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 $\approx$ 4–5000 counts) or with bad weather.

Procedure 6.5. 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 6.6. 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 6.7. 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 ($\approx$ 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. 6.1.3).
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.

6.3   GROND

6.3.1   Switching to GROND

You can start an OB once point 1 has been done. This minimises overheads by parallelising preset, mirror movements, and autoguiding configuration. If the Moon is between the first target and the current position or you are on a bright star, you should manually preset with the main cover closed to avoid blinding the IR detector.

Procedure 6.8. Switch to GROND observations

1. Ensure the GROND main cover is closed to avoid pointing a bright target with open shutters
   Your FEROS targets may be very bright or you might slew over the moon in your first GROND observation.
   (a) Go to screen `GROND BOB`.
   (b) In a terminal, type `grondMC CLOSE`.
   (c) Wait for cover to close (10-15 s). on panel `GROND General state`
       Due to a big, it will say `Moving`, `Open`, then `Closed`
2. There is no need to switch the pointing model to GROND
   GROND does it automatically, but you can do it to be consistent with FEROS and WFI.
3. To gain time, ensure the GROND M3 mirror is on GROND
   (a) Go to window `GROND General State` on screen `GROND BOB`
   (b) If `M3` says WFI, send it to GROND.
       In a terminal, type `grondM3 GROND` and wait for it to go from `MOVING` to `GROND`
4. Set up the autoguider on workspace
   (a) Go to the `GROND` workspace of screen `Autoguider GROND & FEROS`
   (b) Set up the autoguiding properties. (See Fig. 2.5)
         i. Go to window `Autoguider`,
            If necessary open it with left-click mouse menu `CAM user`→`Autoguider`.
        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 or decreased (0.001–3.999) depending on guide star.
        iv. Restart exposure so that guider takes new values into account.
            • If `CCD Status` is `Infinite loop`, click `Stop exposure`
            • Wait a few seconds for it to change to `Inactive` (check the exact word)
            • Click `Start exposure`.
   (c) Set up the autoguider real time image.
         i. Go window `Telescope R.T.D.`
            If necessary open it with window menu `CAM User`→`Autoguider RTD Grond`
        ii. Activate the guide camera image flow if necessary.
            Use window menu `TCS`→`Attach camera`.
       iii. Ensure autoguider refreshes image
            On the `Autoguider control` the checkbox Display Enable should be red
   (d) Ensure the reference picking window `Pick Reference Star` is open
       If necessary open it from RTD with window menu `TCS`→`Pick Reference Star`
5. Start the observation

(a) Go the the `bob+gen state` workspace of screen `FEROS BOB`
(b) In `bob`, fetch OB and click `Start`
(c) Wait for preset to near or reach target
    Look on the Rose Diagram of the `TCS Setup Panel` on the TCS screen.
(d) Open the main cover
    i. Go to screen `GROND BOB`.
    ii. In a terminal, type `grondMC OPEN`.
    iii. Wait for cover to close (10-15 s) by checking value on panel `GROND General State`
        Due to a bug, it will say `Moving`, `Closed`, then open `Open`.
(e) Acquire guide star is needed or asked

6.3.2 React to an automatic trigger

Procedure 6.9. React to an automatic trigger

1. Check that your exposure is beeing 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`
4. Switch off the WFI autoguider if needed
   (a) Set up the autoguiding properties. (See Fig. 2.5)
       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`
5. Start the guiding (Sect. 6.3.3 below).

6.3.3 Guiding

Procedure 6.10. Guide with GROND

1. Chose 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`.

6.4 All intruments

6.4.1 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.

6.4.2 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 6.11. 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 6.3
- 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.

Panels referred to
Telescope
Instruments
Dome
Tidying folders
Health checks & internal calibrations

7 — Morning: Closing & Calibrations

7.1 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. 10.5) 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. 10.14).
   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 10.13).

7.2 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 7.1. Close the dome.

1. Close the main mirror cover.
   In the `TCS Setup Panel` (Fig. 10.2), click `Close` below `Main Mirror Cover`.
2. Wait $\approx 2\,$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 10.14).
   In the Auxiliary Functions (Fig. 10.5), select 200V under `Flat Field Lamp`.

8. Check the slit is closed and telescope at zenith
   Use the dome webcam (Fig. 10.14) 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 9.22).

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

7.3 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 7.2. Put the instruments offline

1. Close the WFI protective shutter.
   Check on the General State panel in the WFI monitor (Fig. 10.8) that `Protective Shutter State` is `CLOSED`.
   If not, go to Auxiliary Functions (Fig. 10.5) and `CLOSE` the `WFI Protective Shutter`.
2. Deactivate FEROS communication.
   In the FEROS control panel (Fig. 10.9) select from menu `Telescope` → `IGNORE`.
3. Deactivate GROND communication.
   In the GROND Control panel (Fig. 10.11(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. 10.9), `M3 Selection Mirror` should state `WFI`
   If not, int the ICS control panel (Fig. 10.10), check the `mirr3` box, select `WFI`, click `SETUP`.
6. Ensure GROND mirror is not in the way.
   In panel GROND Control (Fig. 10.11(b)), `GROND M3` should state `WFI`.
   If not, type `grondM3 WFI` in a terminal.

7.4 Dome

Turn off ventilation and hydraulics using the Dome Auxiliary Functions (Windows desktop, Fig. 10.13). If it is required, use the good seeing password.

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.

7.5 Tidying folders

Scripts move the data of the previous nights are to a subdirectory directory and and remove old ones (already in the ESO archive) if disk space is needed. It can be done any time (night, day) on a daily basis for WFI and FEROS. The GROND team manages the data.

Procedure 7.3. 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.

7.6 Health checks & internal calibrations

Lauch health checks and internal calibrations.

Procedure 7.4. 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/)`.

8 — Managing observing blocks

8.1 Transferring OBs from one's laptop

8.1.1 Standard way

Procedure 8.1. 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

8.1.2 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 8.2. 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 `/yourname/OBs`
- On the same machine, type `scp -r yourlogin@youripaddress:pathtoOBs /yourname/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).

8.2   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.

9 — Troubleshooting

9.1 No flux or little flux

Procedure 9.1. Investigate and fix the reason for the absence of flux in an instrument

. Ensure that

- the slit is `OPEN` (TCS setup, Fig. 10.2).
- the dome is on automatic (TCS setup, Fig. 10.2) and the slit is aligned (TCS, Fig. 10.1).
- the Main Mirror Cover is `OPEN` (TCS setup, Fig. 10.2).
- the `mirr3` mirror is on `WFI` or `FEROS` (FEROS ICS, Fig. 10.10) 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, 10.11(b)). Use `grondM3 WFI` or `grondM3 GROND` in the terminal if necessary.
- *(WFI)* the protective shutter is `OPEN` (Auxiliary Functions on the TCS machine, 10.5).
- *(GROND)* the protective and cold shutters are `OPEN` (GROND control, Fig. 10.11(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`.

9.2 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 9.2. Observe when the autoguider fails

1. On screen `Telescope Control Software` go to textttStatus workspace
2. On the `TCS Status` panel locate the modules section (Fig. 10.4)
3. Check ignore for the corresponding modules
   - For GROND, `ag_ccdGRND` and `ccdGRND`
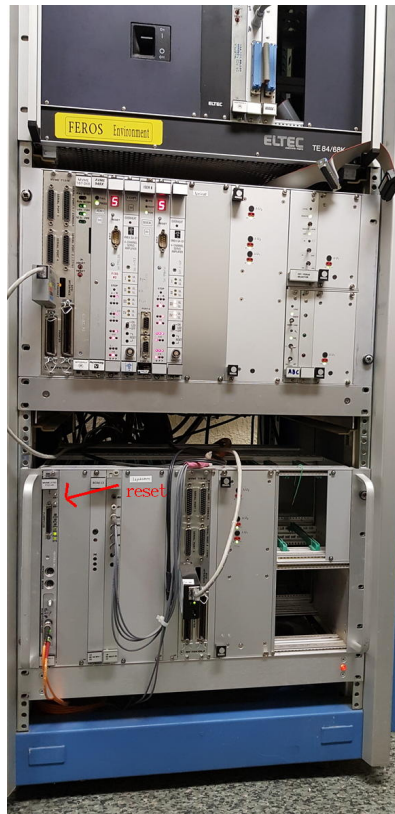
(a) Rack tower   (b) l2p2cam reset   (c) l2p2cam power cycle

Figure 9.1: Rack with the FEROS AG LCU.
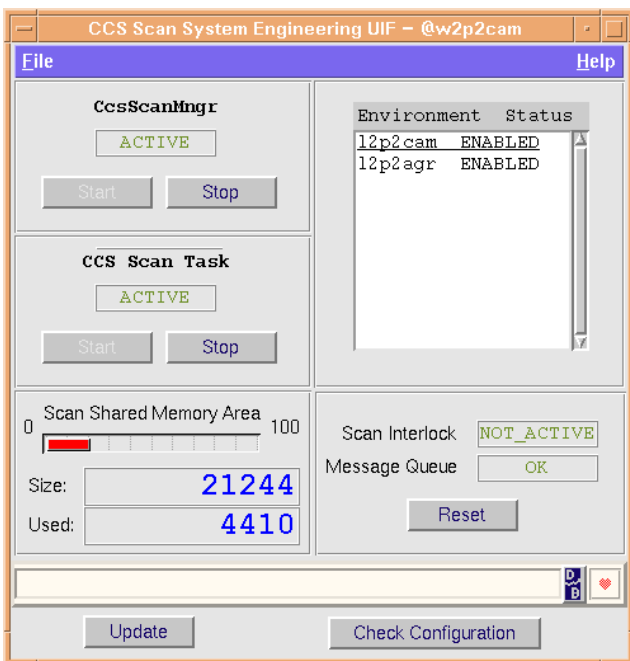
(a) `scanei`

(b) Click on l2p2cam or l2p2agr (top right)
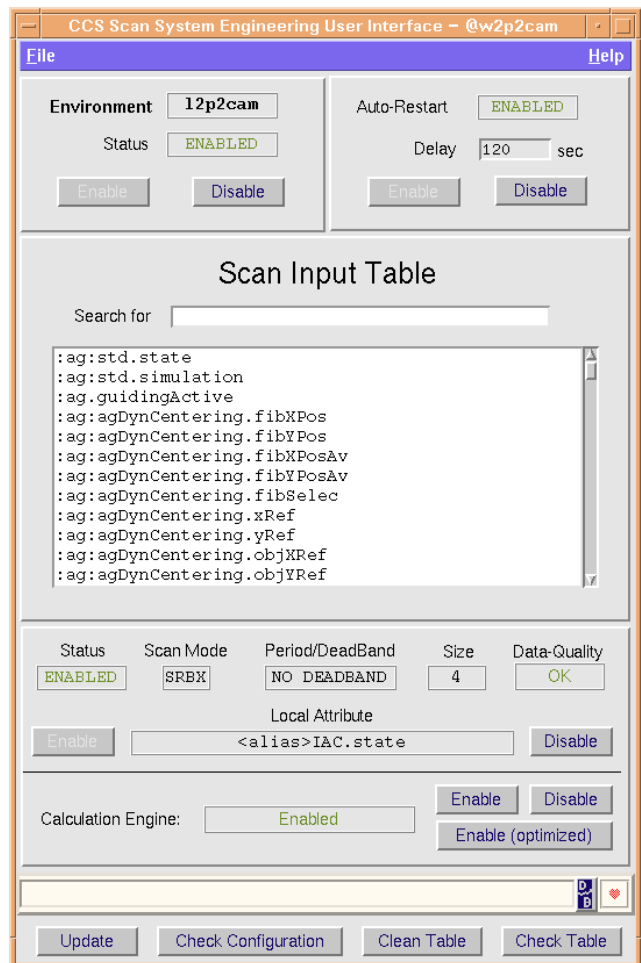
(c) Click enable or disable (top left)

Figure 9.2: `scanei` on the FEROS and GROND AG machine.

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

9.2.1 GROND

If you want to observe while fixing the issue you need to deactivate the modules in the TCS, see Procedure 9.2. You will need to uncheck them just before starting the guider software with `e2p2StartTCCDs`.

Procedure 9.3. Restart the GROND autoguider

1. If in a hurry try the quick restart (1–2 min)
    (a) On screen `Autoguider GROND & FEROS`, find or open a terminal.
    (b) Type `e2p2StopTCCDs gag` and wait for command to finish
    (c) Type `e2p2StartTCCDs gag` and wait for command to finish
2. If you have time or 1 does not solve the issue, go for the full restart (3–4 min)
    (a) On screen `Autoguider GROND & FEROS`, find or open a terminal.
    (b) Type `lccBoot l2p2agr`
    (c) Wait for the command to finish (1–2 min)
    (d) Type `scanei` to open the scanei GUI
         i. Check that l2p2agr is ENABLED
        ii. If not, enable l2p2agr (see Fig 9.2)
       iii. Close the GUI
    (e) Type `e2p2StartTCCDs gag`

9.2.2 FEROS

If you want to observe while fixing the issue you need to deactivate the modules in the TCS, see Procedure 9.2. You will need to uncheck them before starting the guider software with `e2p2StartTCCDs` (step 1d).

Procedure 9.4. Restart the FEROS autoguider

1. Restart the AG software (1–2 min).
    (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 succesfully.
2. If the problem persists or an error pops up in step 1d, reboot the AG LCU (3–4 min)
    (a) Type `lccBoot l2p2cam`
    (b) Type `scanei` to open the scanei GUI
         i. Check that l2p2cam is ENABLED
   ii. If not enable l2p2cam (see Fig 9.2)
       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 (15 min)
    (a) Go to the FEROS room located in the telescope enclosure.
    (b) Locate the big blue rack tower (Fig. 9.1(a)).
    (c) On the lower racks, near to l2p2cam label, push a small RST button (Fig. 9.1(b)).
    (d) Perform steps 1a, 1c, 1d.
4. If this does not solve the issue, power cycle the LCU (15 min)
    (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. 9.1(c)).
    (c) Perform steps 1a, 1c, 1d.

9.2.3 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.

Procedure 9.5. Fix WFI autoguider issues

Try in this order

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 `Retrieve Field` gives the error `Error opening RPC connection`, restart the WFI technical CCD.
   (a) On the WFI screen, locate or open a terminal.
   (b) Type `wfinsStopTCCDS` and wait for it to complete
   (c) Type `wfinsStartTCCDS` and wait for it to complet (2 min)
   (d) Perform the AG restart of point 1
3. 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. 1.1), locate the FEROS control panel (Fig. 10.9)
      - From menu select `Telescope → IGNORE`
   (d) Perform a full restart the TCS including VME reboot (Sect. 2.1)
   (e) Reactivate the connection between FEROS and TCS
      - On the FEROS screen (Fig. 1.1), locate the FEROS control panel (Fig. 10.9)
      - From menu select `Telescope → ENABLE`
4. Reboot the WFI SPARC station and dependencies (15–35 min).
   - From a terminal type `rlogin wwffcd -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.

9.3 OB doesn't work

9.3.1 OB gives an error when started

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

Procedure 9.6. 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`.)

9.3.2 OB stalls before starting to observe

Procedure 9.7. 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. 10.1).
  Note: A permanent fix is to restart the TCS (see Sect. 9.8.3).
- *(GROND)* If IR exposure does not start after the optical one has, reset the IR flip mirror.
  In a terminal, type `grondFM`

9.3.3 Crash before an exposure

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

Procedure 9.8. Investigate and fix a crash ocurring 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. 10.12(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 9.26) IRACE.
   (c) Ensure only one bob is running
       i. Find all bobs (`ps gaux | 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. 10.6) 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.

9.3.4 Crash during an exposure

Procedure 9.9. 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 unsuccessfull restart FIERA (follow point 4 in Sect. 9.3.3)
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, proceeed.
      ii. Close and/or kill all bob instances
        Find them by typing `ps gaux | 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).

9.3.5 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. 9.8.3).

9.3.6 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. 9.4.3.

9.3.7 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.

9.3.8 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. 10.8)

1. On the `e2p2 OS GUI` (Fig. 10.6), 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. 10.5) in the TCS, click on the `RESET` button below WFI FILTER CONTROLLER.
    - Repeat steps 1 & 2.

9.4 Focus issues

9.4.1 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.

9.4.2 Defocused wih FEROS ACS

See Sect. 9.5.2.

9.4.3 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 appears.

- 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.

9.4.4 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.

9.5 FEROS ADC

9.5.1 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. 10.10) the line `adca` of the `adc` field contains `ERROR` in red.

Procedure 9.10. Remove the ADC from the optical path of FEROS

. Try in order the following items.

- Manually put it off from the ICS panel (Fig. 10.10)
    - 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.

9.5.2 Telescope focus is not corrected when ADC enters

Try in order the items of the following procedure.

Procedure 9.11. 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. 10.1), 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. 9.8.3).

9.6 FEROS-DRS

9.6.1 FEROS exposure number is close to 10 000

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

Procedure 9.12. Reset the exposure number

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

9.6.2 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.

9.6.3 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 pipline before, a hidden lock file may survive. If all other attempts have failed to start the DRS, follow these steps.

Procedure 9.13. Restart the FEROS data reduction software and data subscriber

- Stop Data Subscriber and DRS at the DRS computer (Fig. 9.3(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`
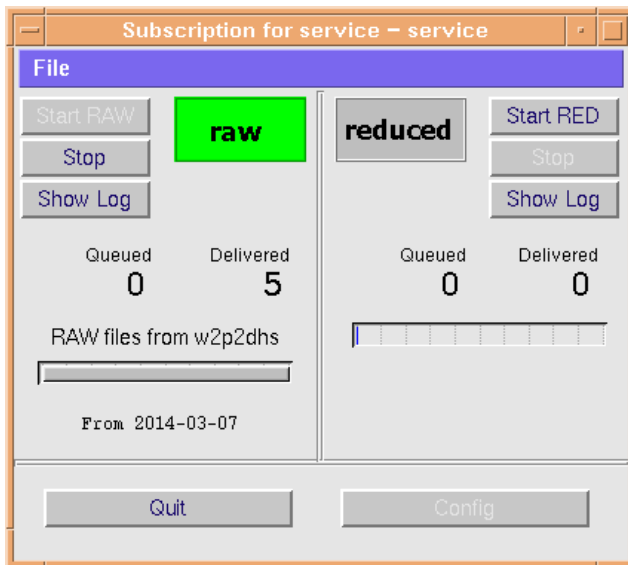
(a) `FEROS data subscriber.`
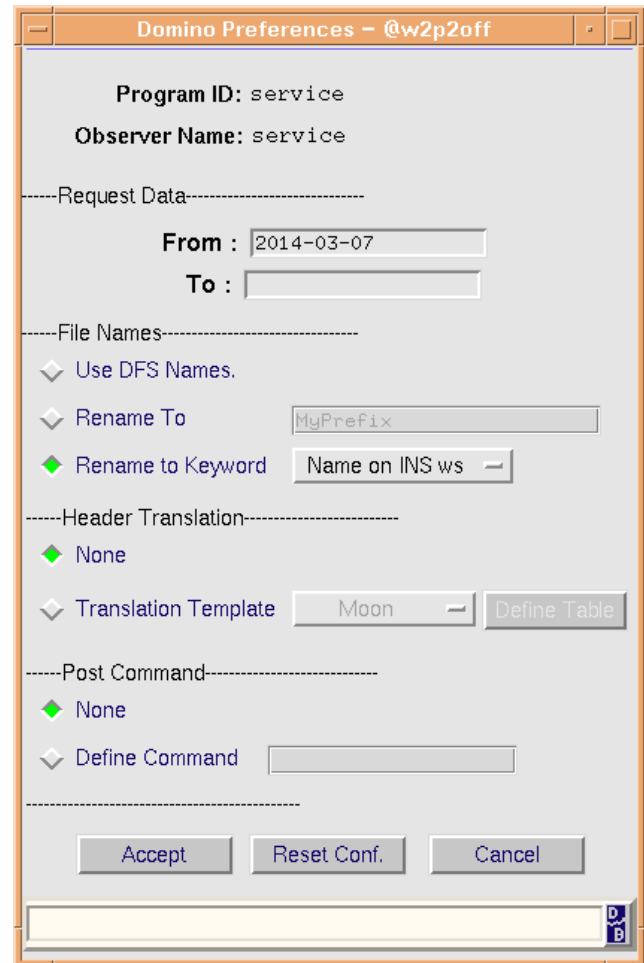

(b) `FEROS data subscriber configuration window.`

Figure 9.3: FEROS Data Subscriber.

- Then restart the Data Subscriber and FEROS DRS:
  - Left click start Data Subscriber
  - Configure Data Subscriber (Fig. 9.3(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

9.6.4 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 9.14. Restart the data handler.

1. Go to screen `w2p2pl Pipline`
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`
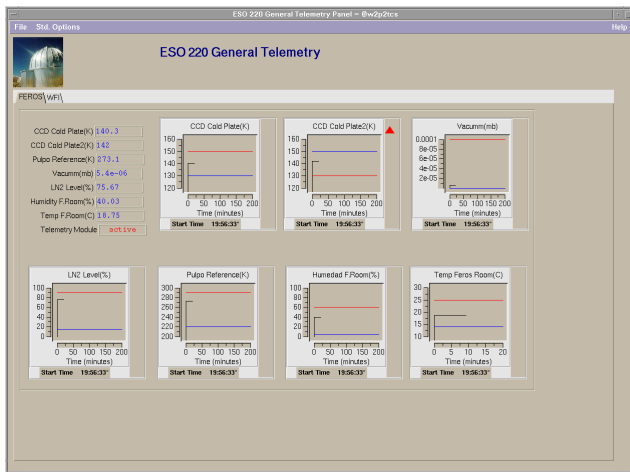
(a) Telemetry window at TCS, should show some graphs normally.
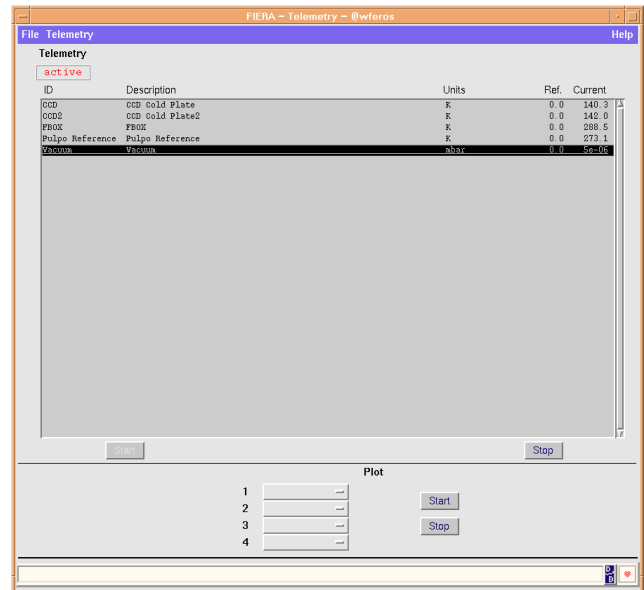
(b) FEROS telemetry window.

Figure 9.4: Telemetry window.

9.7 Startup issues

9.7.1 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. 9.4(a)):
  - Go to FEROS screen
  - Type `fcdTelemetry &`
  - Press `START`
  - Go to TCS
  - Close Telemetry window
  - Type `sciops2p2Telemetry &`

9.7.2 WFI

The commonest issues are:

- TCS is `OFF` after startup on the Control Panel
  This is harmless. Use menu `Gen.  Options` → `Refresh Database Events`.
- WFI startup stops with an error during `WFI Init/Online`
  It most likely requires a power cycle of the WFI electronics, see below.

Procedure 9.15. Fix WFI init error

1. Determin whether WFI passes the hardware self-test
   (a) Locate or open a `logMonitor`
   (b) If it was not active, choose to inspect the last 500 lines

Figure 9.5: WFI electronics. The box on the right controls the power and can be used to power cycle. The box on the left contains the electronics boards that one may need to unplug and replug.

    (c) Find red error "Failed to dispatch command for camera LOADED OK".
    (d) Lines below and above contain "C40 ping failed" and "Could not download FIERA config"
    (e) You can also check directly whether WFI passes the self-test
        In a terminal, type `rsh -l fcdrun wwffcd "export DISPLAY=$DISPLAY; fcdtestseq"`

2. Reboot the FIERA workstation
    (a) In a terminal, type `rsh -l fcdrun wwffcdd reboot`
    (b) Wait for 1–2 minutes for it to get back online
        You may check in a terminal using `ping wwffcd`

3. If WFI doesn't pass the self-test, power cycle the WFI electronics
    (a) Go to the telescope floor
    (b) Locate the WFI power unit close to the FIERA electronics (Fig. 9.5)
    (c) Switch it off
    (d) Wait for 30 seconds.
        (On a 2nd or 3rd attempt, you may try to unplug/replug the electronics boards if you dare.)
    (e) Switch it on.

4. If WFI passes the self-test, do a restart of the FIERA
    (a) In a terminal, type `fcdCtrl`
    (b) On the emerging GUI, click `Shutdown`
    (c) On the emerging GUI, click `Startup`
    (d) Wait for FIERA to restart (1 min ?)

5. Do a full WFI restart (see Proc. 2.1 point 1 and Fig. 2.2)

6. You may have to redo steps 2–5 until WFI can finish the full restart.

9.7.3 Hydraulics cannot be switched on/off

If you see that the `Loc/Re` button is red on the `2.2m Auxiliary Funct` 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 9.16. Set the hydraulics for remote control

1. Go to the dome.
2. Locate the gray 1.5-metre-high ADAM rack (Fig. 1.5).
3. Locate the switch for `ADAM Remote / Local` (Fig. 9.8, lower left).
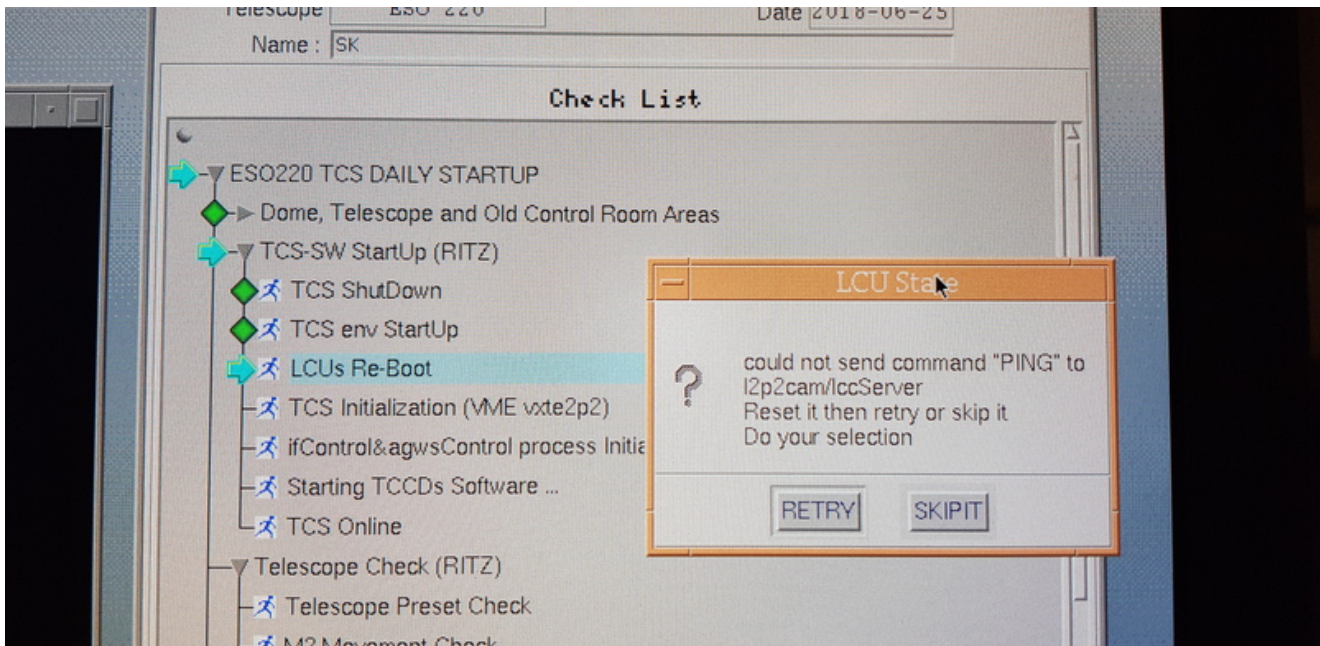4. Put it towards `ADAM Remote`.

Figure 9.6: When TCS restart fails to reboot the FEROS AG LCU

9.8 TCS issues

9.8.1 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 9.17. 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 9.4).
   (a) A hard reset of the LCU
   (b) A power cycle of the LCU

9.8.2 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 9.18. 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 2a in Procedure 2.1).

(a) Remote/local pointing control   (b) Reboot of the VME   (c) VME monitor

Figure 9.7: 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.

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 9.29).
         ii. Repeat step 2a
    (c) Wait for 2–3 min for initialisation to complete.
3. On the error popup, press `SKIPIT`

9.8.3 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 9.19. Quick TCS restart

- Preset to zenith
    - On the TCS setup panel (Fig 10.2), click `Zenith` under `Fixed Presets`.
    - Alternatively, if panel is frozen, type `~/bin/presetzenith` in a terminal.
- Execute the fast restart.
  Type `e2p2NewStartUp` and wait for it to complete.
- Initialise the telescope
  On the TCS setup panel (Fig 10.2) press `Initialize` under `Telescope`.

9.8.4 No connection with VME

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

Procedure 9.20. 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 lte2p2` 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. 1.4) in front of the entrance, slightly to the left.
   (c) Press the small red/pinkish button (Fig. 9.7(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. 9.7(c))

A quick restart the TCS (Sect. 9.8.3) is generally needed right after a reboot of the VME.

9.8.5 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`.

9.8.6 Telescope doesn't take focus orders

Procedure 9.21. Fix telescope focus issues

- *(WFI)* OB stalls when focus order is sent by `bob`.
  Set it manually from the TCS main panel (Fig. 10.1)
- *(FEROS)* Focus is not corrected after insertion of the ADC.
  See Sect. 9.5.2.
- Focus cannot be set from the TCS main panel.
  Restart the TCS, see Sect. 9.8.3.

9.8.7 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 9.22. Unstuck the TCS Setup panel

1. In a terminal type `killall rs232`
   If "no process killed" appears, this procedure will not be useful.
2. If the panel gets stuck again quickly (10–20 s), a restart of the TCS usually fixes the issue.

9.8.8 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 9.23. Manually close the main mirror cover

1. Go to the dome
2. Locate the gray 1.5-metre-high ADAM contol box (Fig. 1.5).
3. Locate the `Main Mirror Cover` controls (Fig. 9.8, upper right)
4. If the mirror was `MOVING`, press the yellow `Local/Remote` button.
5. Press the red `Mirror Close` button.
6. If any noise is heard, wait for the cover to be closed.
7. Press the yellow `Local/Remote` button.

Figure 9.8: Controlling the hydraulics and mirror cover.

9.8.9 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 9.24. Set the dome for remote control

1. Go to the dome.
2. Locate the dome controls (Fig. 1.5), placed on the wall opposite to the entrance.
3. On the dome controls (Fig. 9.9) turn the control from local to remote

9.8.10 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!

9.9 GROND issues

9.9.1 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 9.25. Unlocking the grond M3 mirror

- Switch back-and-forth using `grondM3 WFI` and `grondM3 GROND`.
- Write the mirror position in the database (Fig. 9.10)
  1. In a terminal type `ccsei`
  2. Click on `CCS database monitor`
  3. Look down `Appl_data` → `GROND` → `ICS` → `DEVICES` → `M3`.

Figure 9.9: Local control of the dome
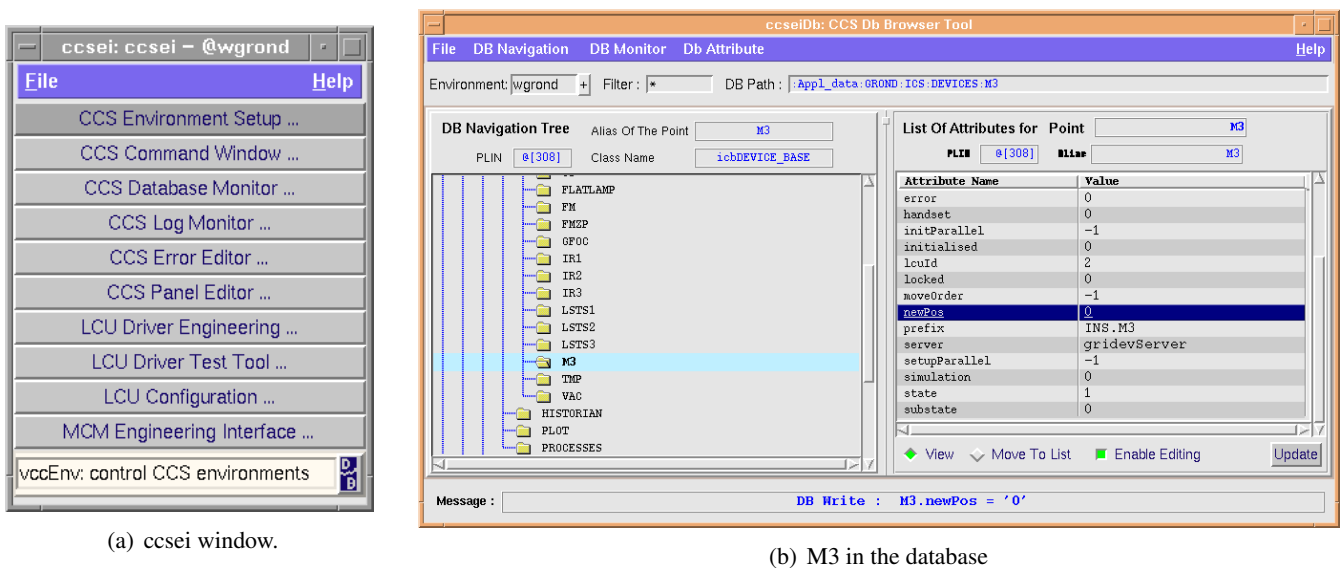
(a) ccsei window.

(b) M3 in the database

Figure 9.10: Writing the M3 position in the database

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. 1.5).
  2. On the box (Fig. 9.11), press the grondM3 WFI button.

9.9.2 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 9.11: The GROND mirror and main cover control box.

9.9.3 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 9.26. 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. 1.4) and shut it down.
4. Go to the dome
5. Locate the power switch of the IRACE box (Fig. 9.12) 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

9.10 Freezing issues

9.10.1 Mouse pointer does not move

This is common on the WFI screens.

Procedure 9.27. 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)

(a) GROND IRACE box   (b) GROND IRACE switch
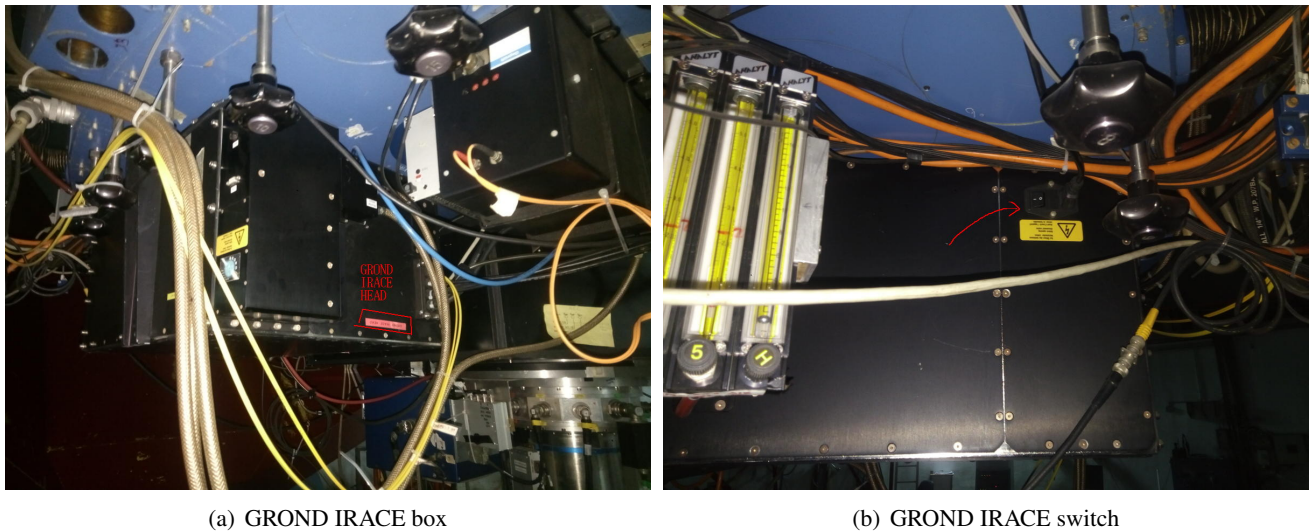
Figure 9.12: The GROND infrared electronics (IRACE) box below the main mirror of the telescope. The power switch is located towards the pier.

Table 9.1: 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

2. Log in
   For WFI, user wfi (other logins in Table 10.1).
3. Open the panels from a terminal.
   For WFI, type `~/bin/openPanels.sh`.

9.11 Pointing issues

9.11.1 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 9.28. Fix WFI pointing issues.

1. If not done, check the right instrument is selected on the TCS `Status Panel` (Fig. 10.4).
2. Check if the current Pointing Model parameters in Table. 9.1 for WFI are selected on the TCS Setup Panel (blue numbers in the bottom right-hand panel of Fig. 10.2). Typically the first three values ID, IH, CH are 0 because of a database issue.
   In a hurry:

(a) Location of the joystick   (b) Joystick

Figure 9.13: The "joystick" can be used to manually point the telescope.

- 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 withing 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. 9.8.3).

9.11.2 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 9.29. Preset manually to zenith.

1. Go to the computer room in the telescope enclosure.
2. Locate the VME rack (Fig. 1.4).
3. On the VME, set the switch away from d (Fig. 9.7(a)).
4. Go to the dome and find the joystick (Fig. 9.13).
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`

9.12 Web pages

9.12.1 2.2m Environmental Monitor stuck

If the 2.2m Environmental Monitor is stuck.

Procedure 9.30. Restart the 2.2m environmental monitor

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`.

9.12.2 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.

9.13 ESO database issues

Procedure 9.31. Data do not appear in the database

1. Wait for one or two days after the data is taken because there may be a lag
2. If all observations including the calibrations do not show up, you can restart the data handler
   See Procedure 9.14
3. If only a particular set of observations loaded directly from bob are impacted, check that the PID is correct
   (a) Open the OBs (usually in OBD directory on bob machine)
   (b) Check that the ESO PID has a valid format.
       - Science OBs must start with a leading zero for science PIDs, e.g. 0103.A-9001(A)
       - Calibration OBs should not have a leading zero, e.g 60.A-0040(Z)
   (c) Check that the ESO PID has been assigned
       i. Open the ESO Observing Schedule Query Form
          `http://archive.eso.org/wdb/wdb/eso/sched_rep_arc/form`
       ii. Fill telescope (`La Silla -- 2.2 m`) and period
       iii. Click `Search`
   (d) If not assigned or invalid format, contact User Support Department at ESO to fix it.
4. Data taken as `TEST` (daily checks) do not apear in the archive.

Telescope control software
WFI
FEROS
GROND
P2PP and OT
FEROS reduction software
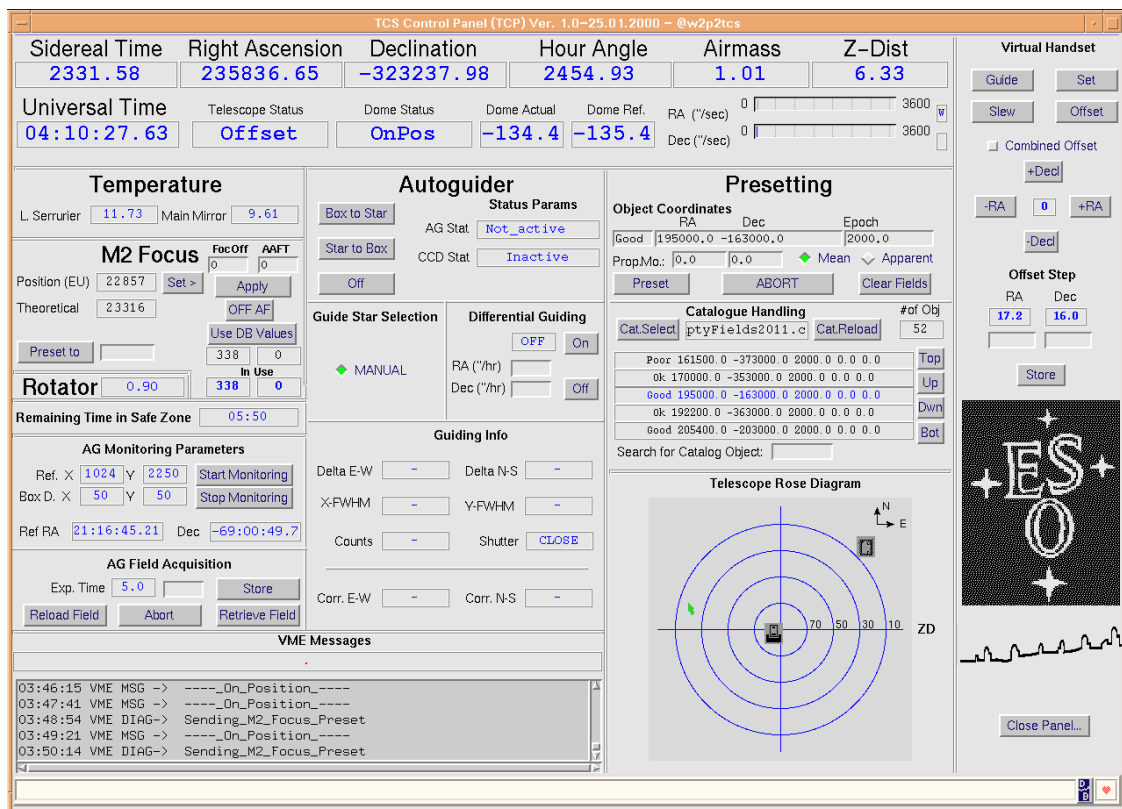Dome controls
Computers

10 — Main systems

Figure 10.1: The TCS main panel allows to perform guiding with WFI and to manually preset or offset.

10.1 Telescope control software

The main panel of the TCS (Fig. 10.1) 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,
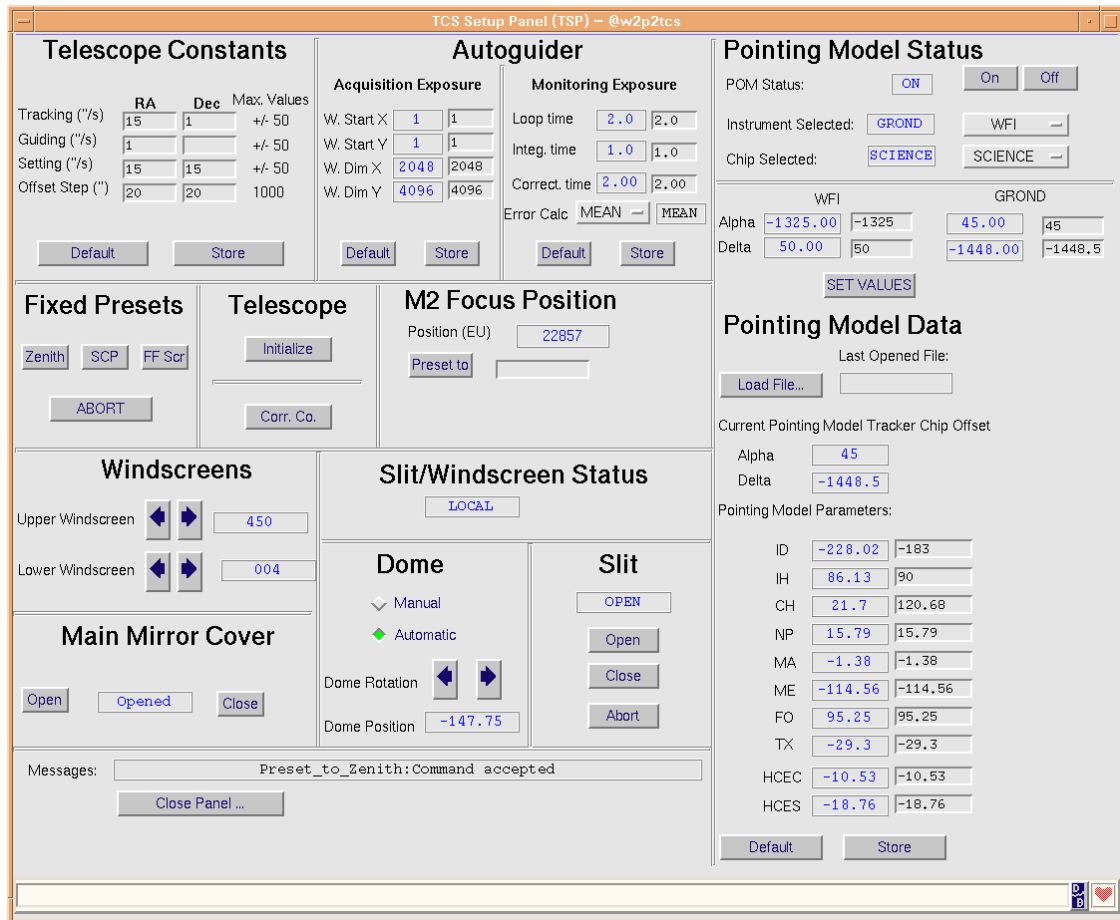
Figure 10.2: The TCS setup panel allows to open and close the dome, main mirror cover and setup the dome rotation. Additionally, fixed presets to zenith and flat screen can be sent.

guiding, or offsetting. The panel also allows some interaction. The TCS setup panel (Fig 10.2) allows more interaction, in particular concerning closing and opening.

10.1.1 Manual preset

The presetting area of the main TCS panel (Fig. 10.1) 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.

10.1.2 Manual offset

The virtual handset area of the main TCS panel (Fig. 10.1) 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.

10.1.3 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. 10.1) give control over WFI
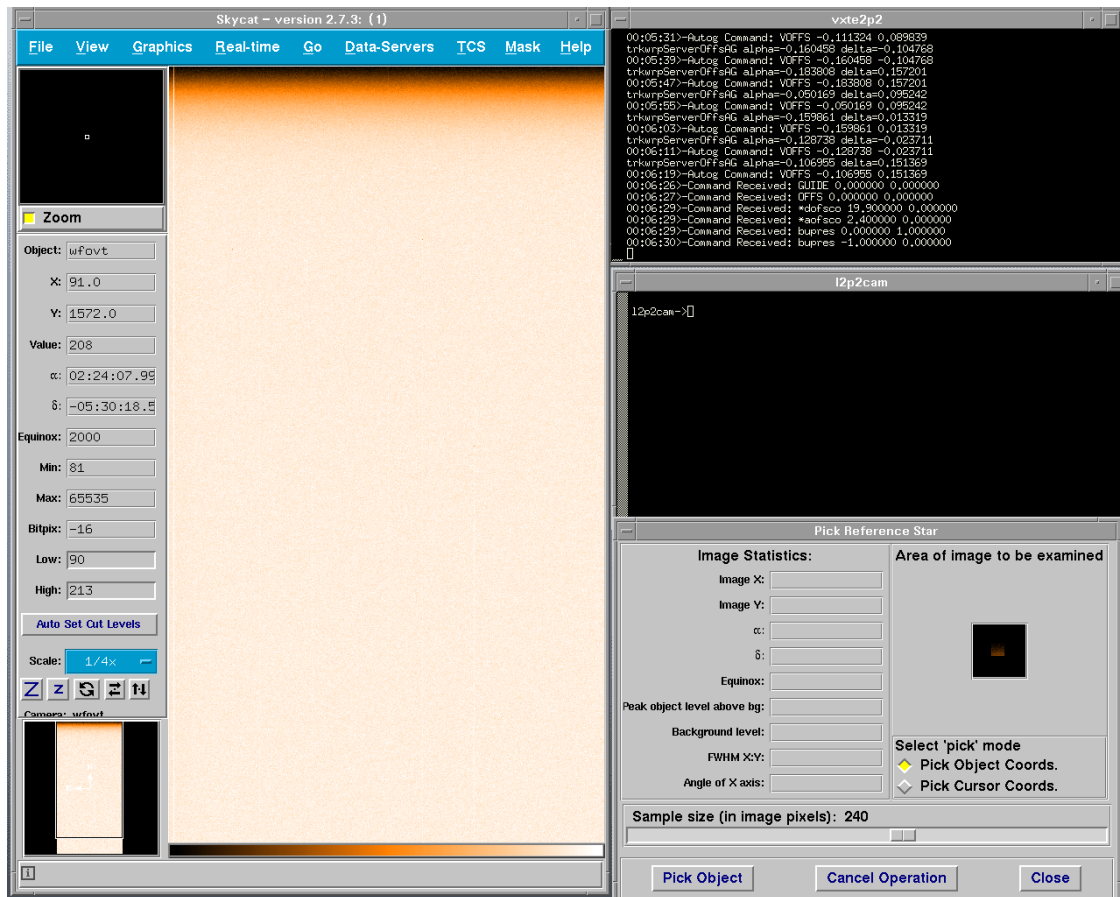
Figure 10.3: The AG field is displayed on the TCS RTD (left) where the reference star can be picked (using lower right window).

AG. The buttons of interest are `Retrieve field` (to probe the AG field, displayed in Fig. 10.3), `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 area of the TCS setup panel (Fig. 10.2).

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 filtres 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).

Figure 10.4: The TCS status window is mostly used to switch the pointing model between instruments.

10.2 WFI

10.3 FEROS

10.4 GROND

10.5 P2PP and OT

10.6 FEROS reduction software

10.7 Dome controls

10.8 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. 10.1 and generally have the famous good seeing password. These machines need a reboot from time to time, using `reboot` as the normal user.

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

Other components may need reboots, they are given in Table 10.3.

Table 10.1: 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 10.2: Common passwords.

Component	User name	Password hint
Graphical interface user	tcs, cam, feros, wfi, grond, astro, visitor, pipeline	.5a···
Instrument manager	ferosmgr, grondmgr, wfimgr	pin2···
Workstation administrator	root	2be1···
Remedy tickets	2p2	.5a···
Observing tool	0	OHS4good
Dome auxiliary functions		.5a···
p2pp for MPIA	MPGUtility, MPGDDT	MPG@···

Table 10.3: Reboots you may (will) have to do besides those of the aforementionned 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 wwffcd`⋆	`rsh -l fcdrun wwffcd reboot`
FEROS LCU	`lccBoot lfeics1`	FEROS ICS, menu LCU → Reboot
		`rsh -l fcdrun lfeics1 reboot`
FEROS AG	`lccBoot w2p2cam`	`rsh l2p2cam 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 l2p2agr reboot`
User WS		call at Paranal 5959 to reboot uws2p2, first close all terminals

* Untested.   ⋆ Manual reboot needed if soft fails.
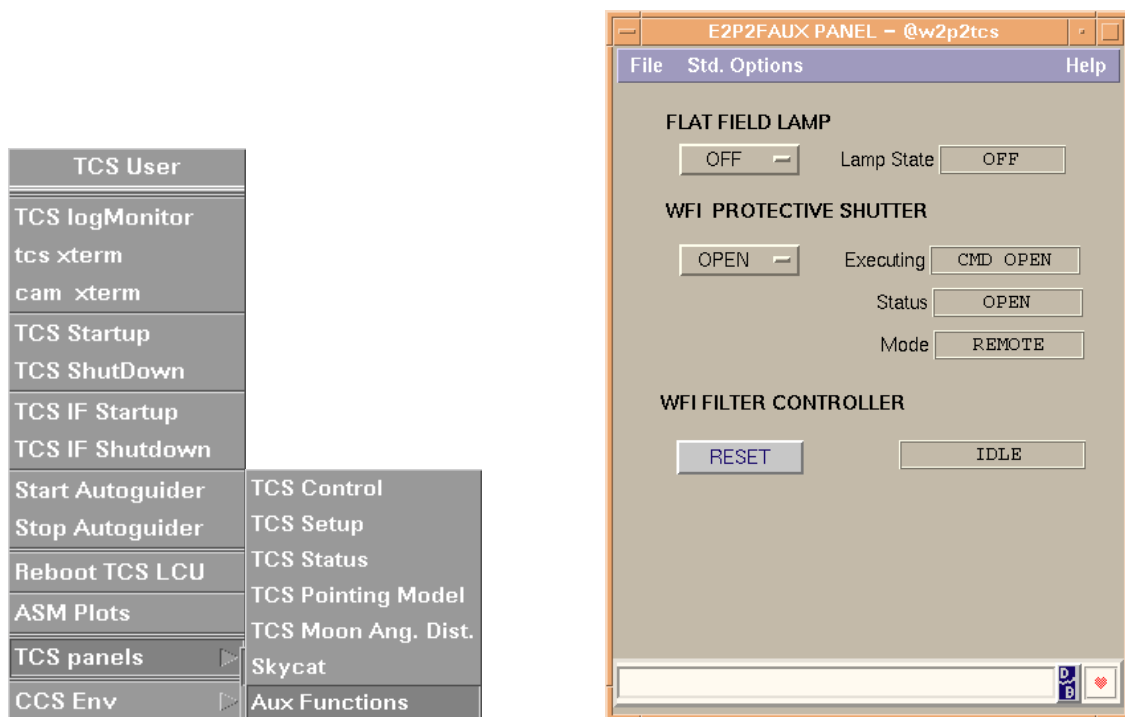
Figure 10.5: The Auxiliary Functions panel (right) is opened using the menu on the TCS machine (left). It is mostly used to switch the flat field lamp on and off, and to open or close the WFI protective shutter.
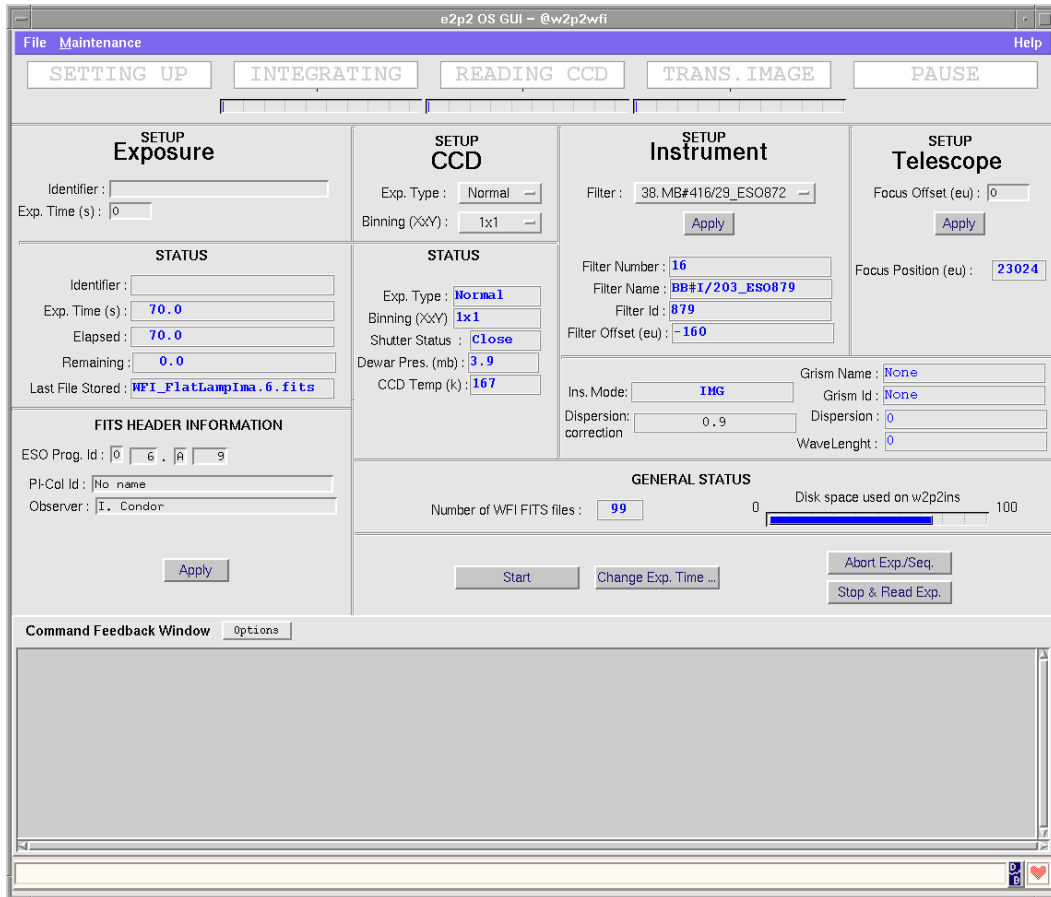
Figure 10.6: The WFI OS GUI can be used to change filtres manually or take/abort CCD exposures.

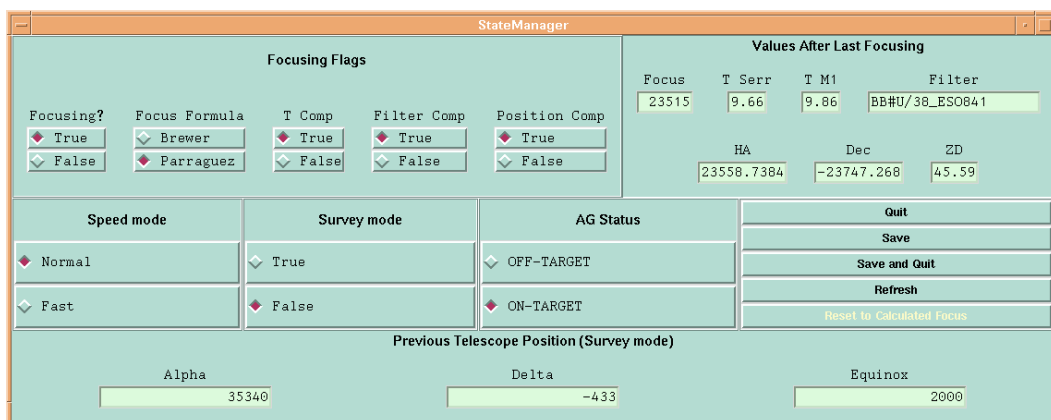Figure 10.7: The WFI state manager holds information on telescope focus, also used for FEROS.

Figure 10.8: The WFI general state panel gives information about exposure, filtres, and connection to TCS.
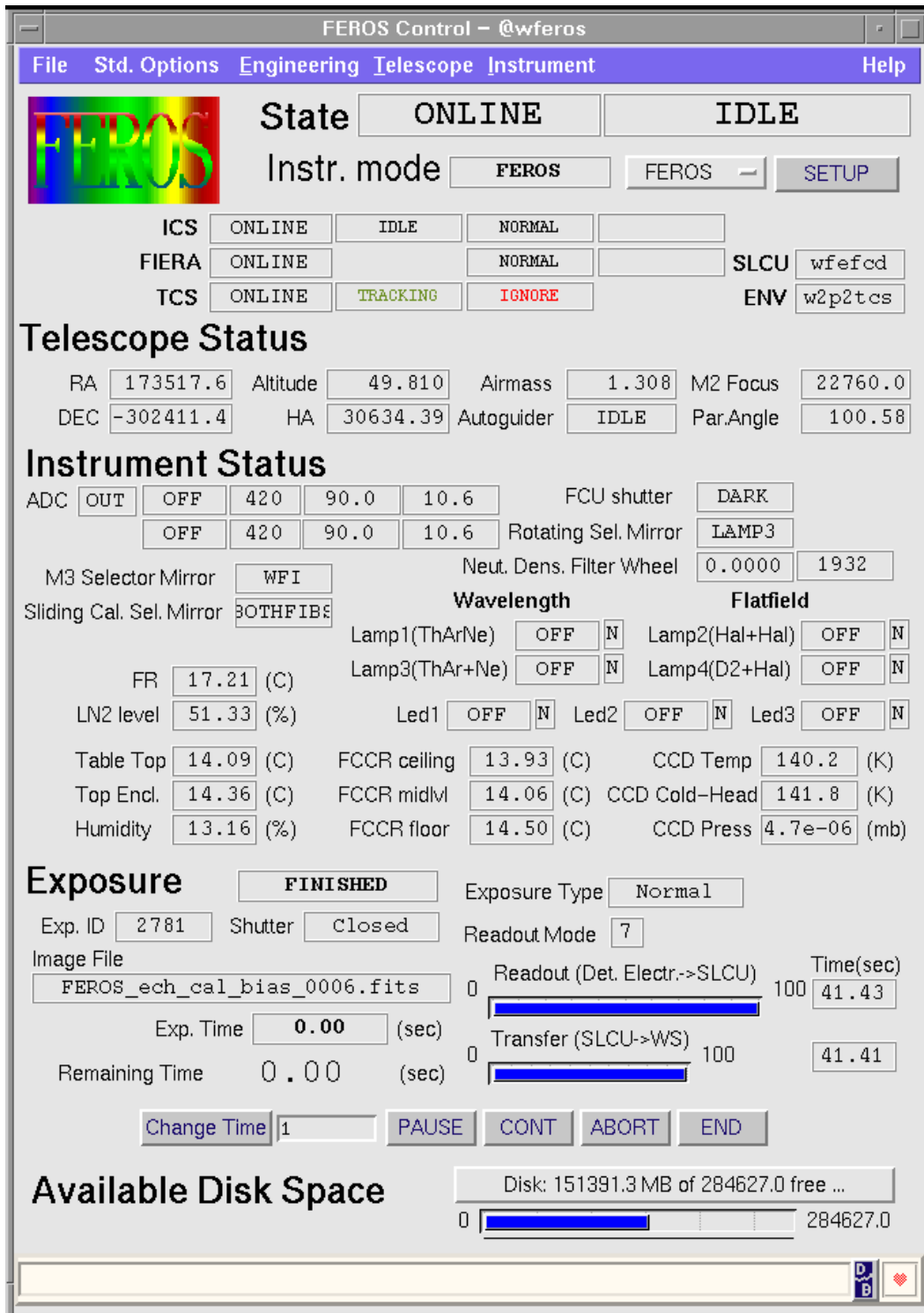
Figure 10.9: The FEROS control panel gives information about exposure, settings, lamps, and connection to TCS. Exposure times can be switched.
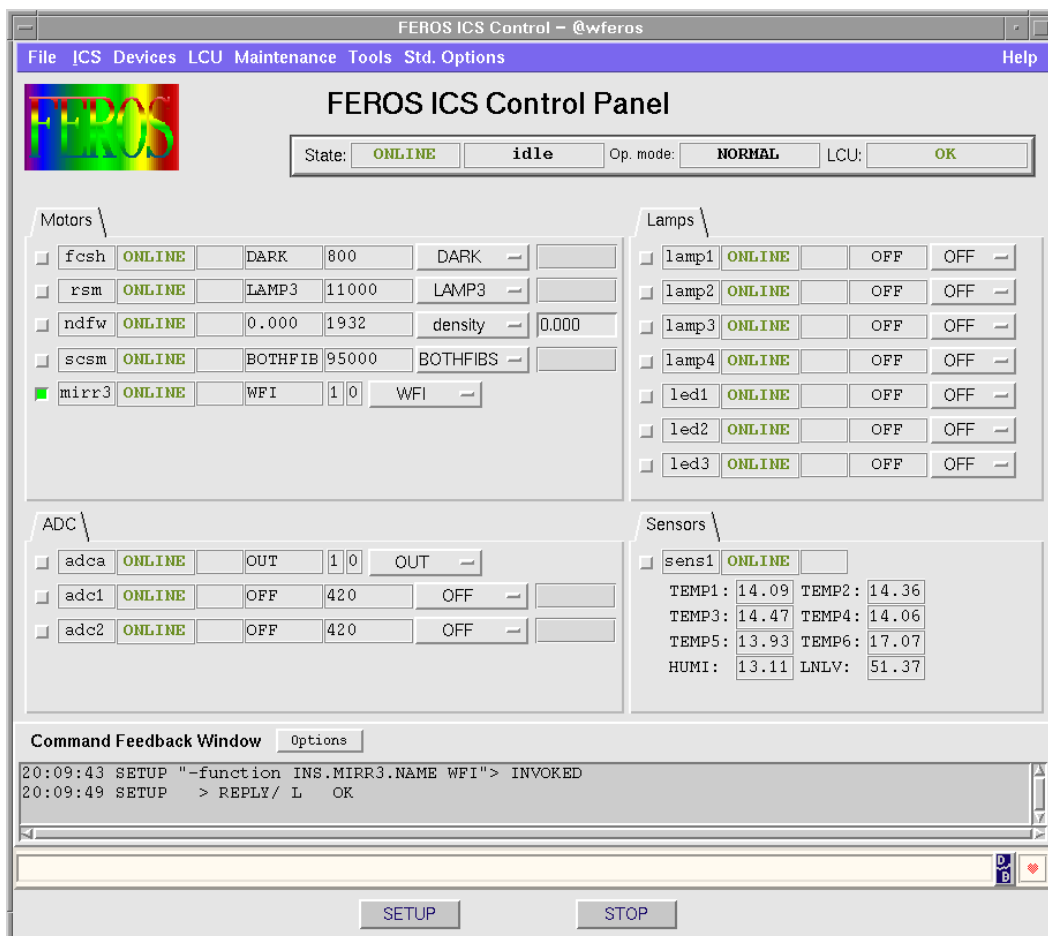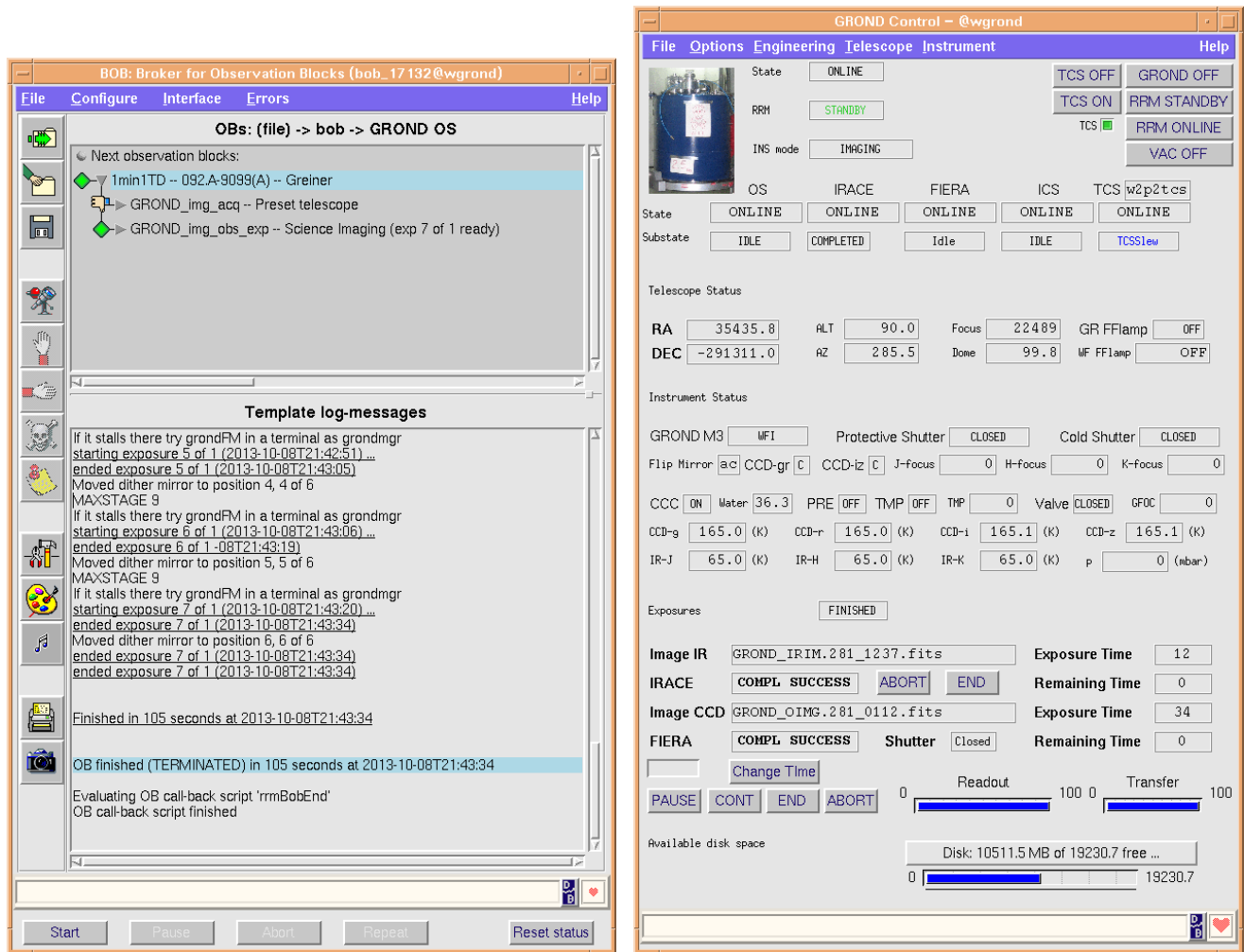
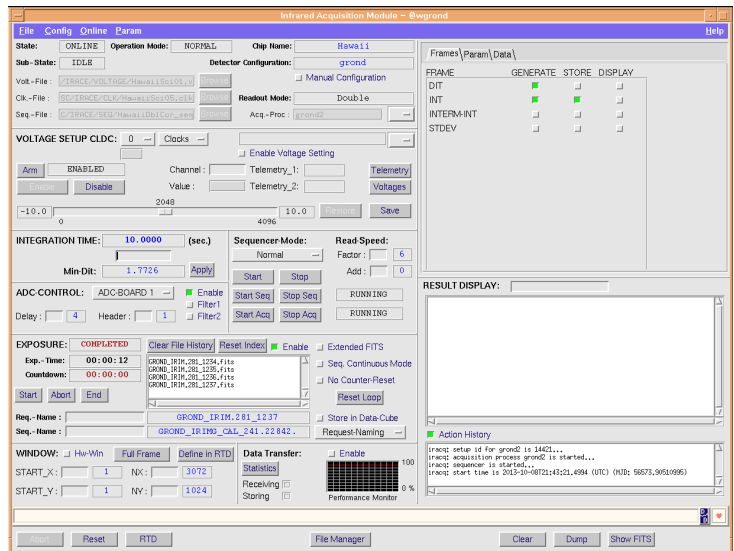Figure 10.10: The FEROS ICS is mainly used to change the mirror `mirr3` from and back to WFI.

(a) GROND "normal `bob`" with a test OB.   (b) GROND control

Figure 10.11: The main displays of GROND.

(a) GROND FIERA control panel (CCDs)

(b) GROND IRACE control panel (IR detectors)
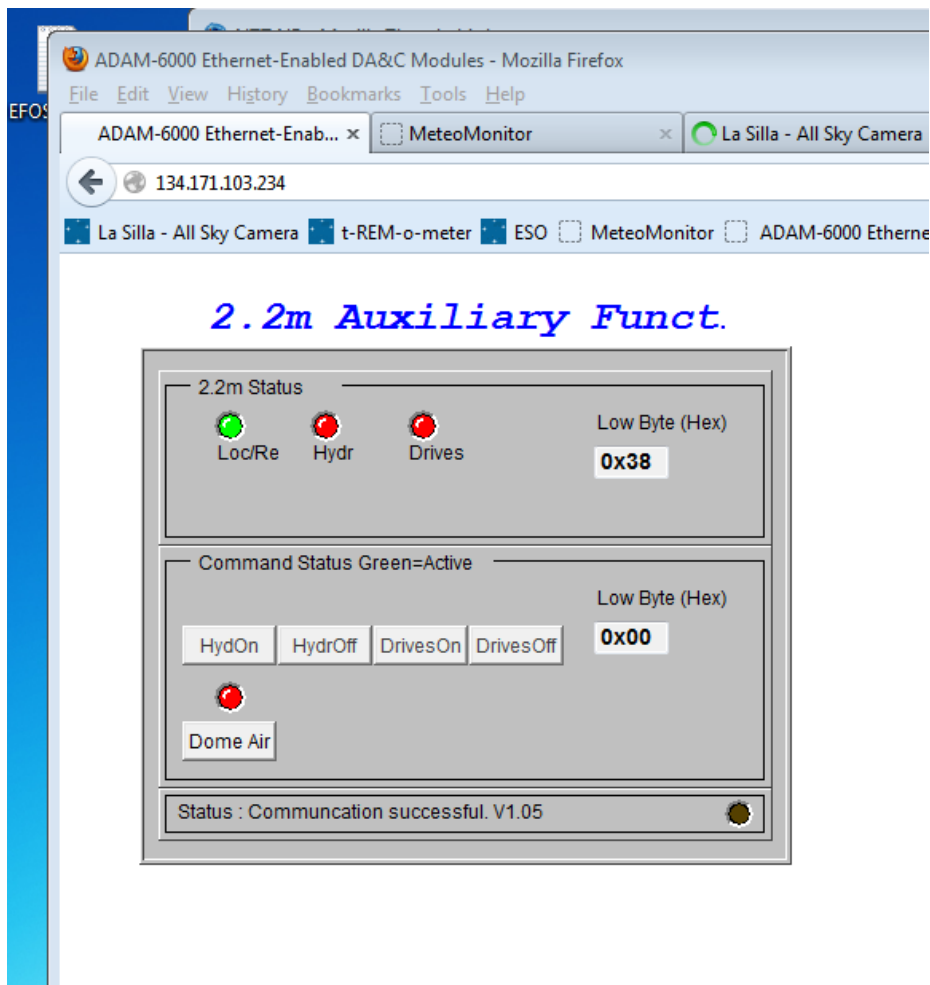
Figure 10.12: Control panels for the detectors.

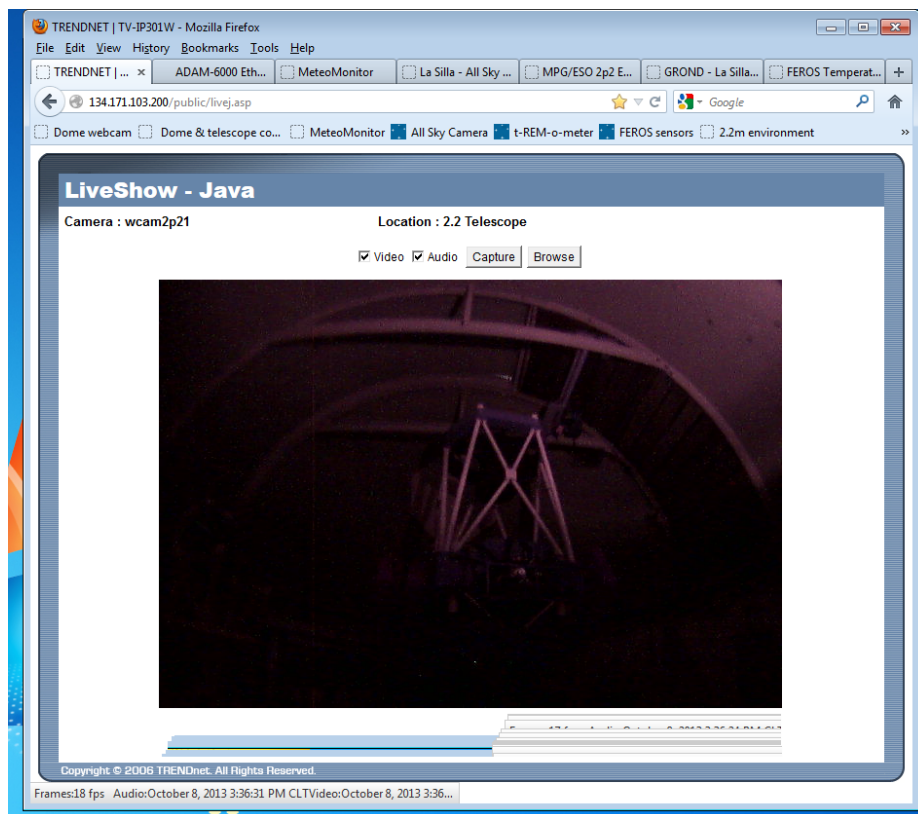
Figure 10.13: Dome Auxiliary Functions.

Figure 10.14: dome webcam

Glossary

ADAM

  Telescope hydraulics and mirror cover control system 20, 76

ADC

  atmospheric diffraction corrector 53, 71

AG

  autoguider 21, 29, 47, 53, 64–66, 69, 70, 77, 88, 89

Auxiliary Functions

  Panel with cryptic title `E2P2FAUX PANEL` (Fig. 10.5) controlling WFI shutter and flat-field lamp. 33, 34, 38, 57, 58, 63, 70, 92

`bob`

  broker for observing blocks 18, 22–24, 28, 33, 34, 38, 41–47, 49, 56, 59, 62, 68–71, 79, 91, 97

Dome Auxiliary Functions

  `ADAM 6000` tab of mozilla on the Windows desktop that contains hydraulics and ventilation control of the dome. 10, 22, 37, 57, 58, 77, 98

dome webcam

  View into the dome given by the `TRENDNET` tab of mozilla on the Windows desktop. 10, 57, 58, 99

DRS

  data reduction software 9, 17, 21, 29, 30, 34, 72

FEROS

  Fibre-fed Extended Range Optical Spectrograph 9, 10, 17, 21, 23–25, 28–30, 34, 38, 41, 43, 44, 50–53, 55, 58, 59, 63–73, 75, 77, 79, 88, 89, 93, 95, 96

FIERA

  Electronics systems controlling the optical detectors 68, 69, 98

GROND

  Gamma-Ray Burst Optical/Near-Infrared Detector 10, 17, 21, 23, 24, 29, 31, 38, 41, 43, 44, 47, 49–51, 54, 55, 58, 59, 63, 65, 67–70, 80, 88, 97, 98

ICS

  instrument control software 21, 38, 58, 63, 71, 96

IRACE

Electronics systems controlling the infrared detectors. 68, 98

LCU

Logical control unit, machine in a rack that controls an instrument or telescope subsystem 19, 64, 66, 77

OB

observing block 17, 18, 23, 24, 33, 34, 38, 41–47, 52, 53, 55, 61, 69, 70, 72, 97

`ot`

observing tool 33, 41, 56, 61, 62

`p2pp`

phase 2 preparation tool 17, 56, 61, 62

RTD

real time display 22–24, 27, 28, 43, 54, 55, 69, 89

TCS

telescope control software 17, 20–24, 27, 30, 37, 38, 43, 44, 46, 50, 57, 58, 63, 66–72, 75, 77–79, 83, 84, 87–89, 91, 94, 95

WFI

wide-field imager 17, 21–23, 26, 27, 30, 33, 34, 38, 41, 43, 44, 49–51, 53, 55, 56, 58, 59, 63, 67–71, 79, 82, 83, 87–89, 92–94, 96

Windows desktop

Rightmost computer in the control room that controls the dome 17, 27, 37, 57, 58