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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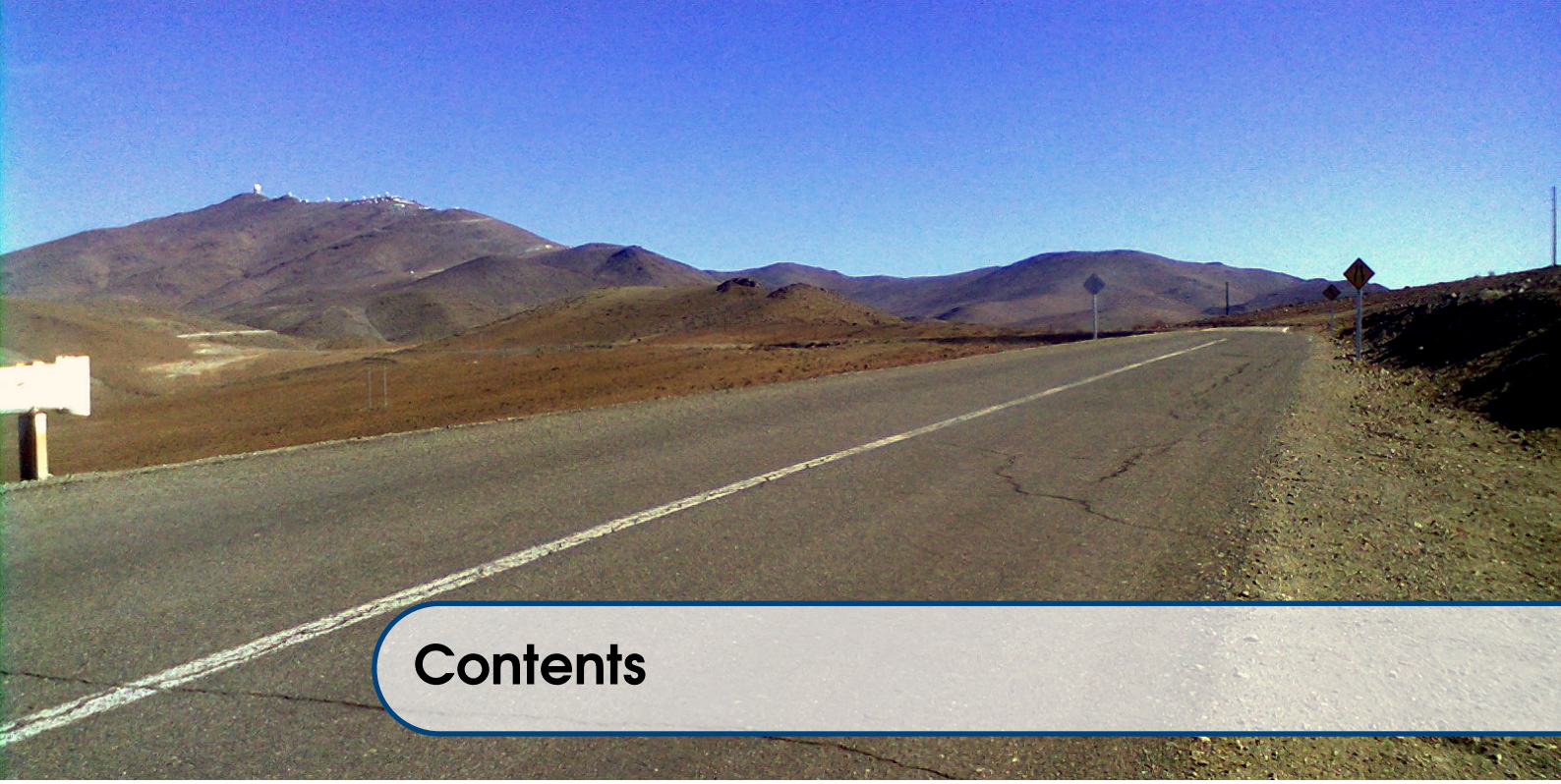

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1 — Introduction

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, p. 19 below shows the location of the different components of the controls. Screens, keyboards, and mice are labeled to avoid confusion.

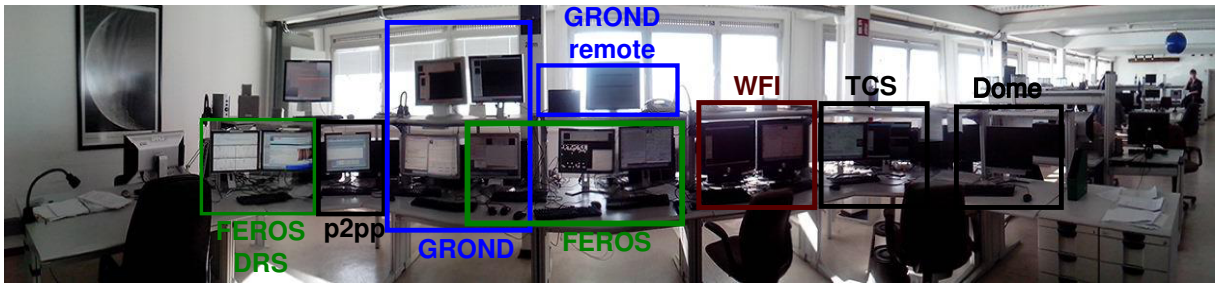


Figure 1.1: Layout of the telescope controls. From right to left: Windows desktop controlling and monitoring the dome, telescope control software, WFI controls, FEROS controls (bottom) and skype laptop connected to the GROND remote observers (top), GROND controls, / machine where s are crafted and loaded 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, p. 20 shows a time-optimised chart of operations in the afternoon and both twilights.

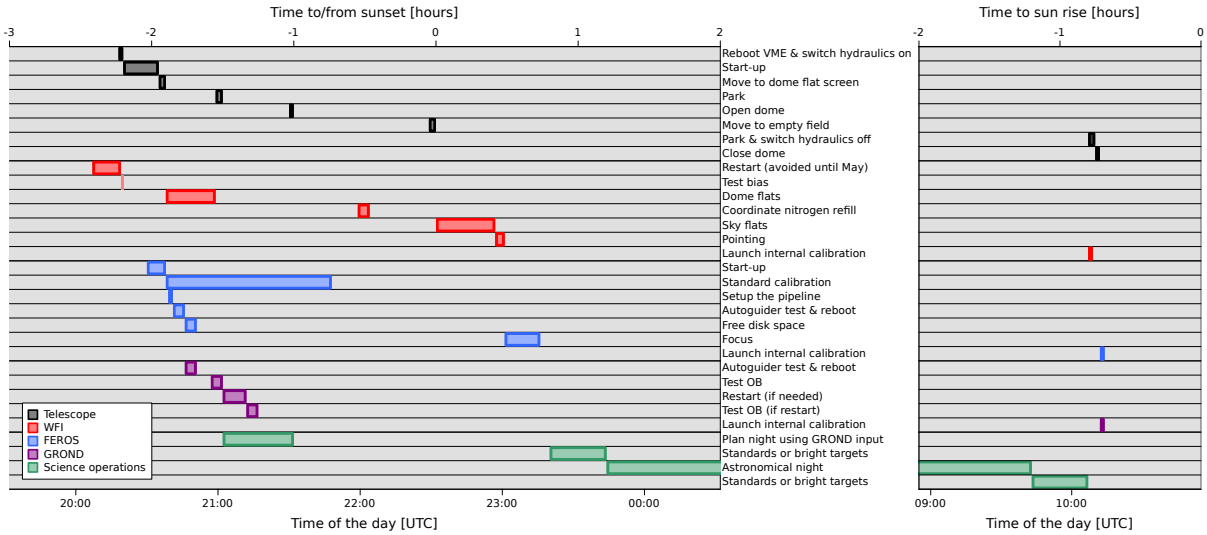


Figure 1.2: Time flow of operations in the afternoon and twilights. Afternoon setup and calibrations should be started at least 2.5 hours before sunset to leave a small buffer for technical issues. This example is giving for a late fall night (May 15th), with presence required for about 15 hours.

Support astronomers perform or help to perform observations in service mode for the follow-up of gamma-ray bursts and transients (15% of time as of 2019) and time-domain programmes (15% of time as of 2019). They ensure that visitors correctly share their time with these other programmes. In addition, during Max-Planck Institut für Astronomie. (MPIA) time, they also have they monitor the different MPIA programmes and ensure they are observed according to their priority and weather conditions. It includes real-time assessment and decisions, guided by the instructions of the different PIs, in particular during service mode. During Max-Planck Institute for extraterrestrial Physics. (MPE) and Chilean time, they are mostly supporting observations and are not expecting to take real-time decisions concerning these programmes. If service mode for MPE or Chile is offered, it is more similar to a “delegated visitor” mode where instructions by the PI are expected.

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.

Chapters 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 OB management and of the `bob` interface, which are presented in Chapter 8. Chapter 9 details monthly preventive software maintenance. Chapter 10 lists fixes to common issues at the telescope. We present the software components more in detail in Chapter 11.

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 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, p. 22), a computer room to physically access some relevant workstations (Fig. 1.4, p. 22), the FEROS room, and, obviously, the dome (Fig. 1.5, p. 23).

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, p. 23) may need a power cycle, that is being switched off and on. It is also possible to locally take control of telescope, dome, and mirror motion.

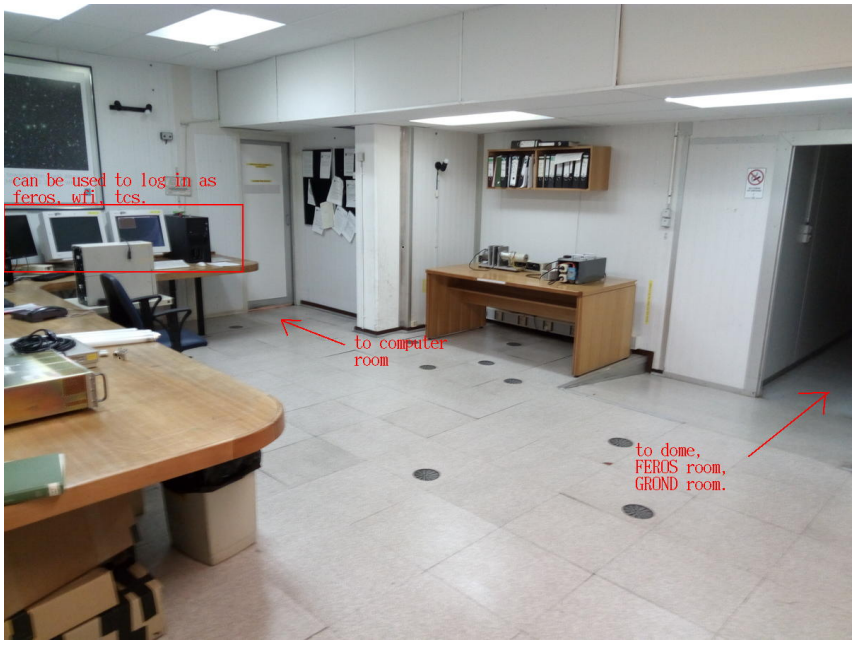


Figure 1.3: Entering the old control room in the telescope building

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

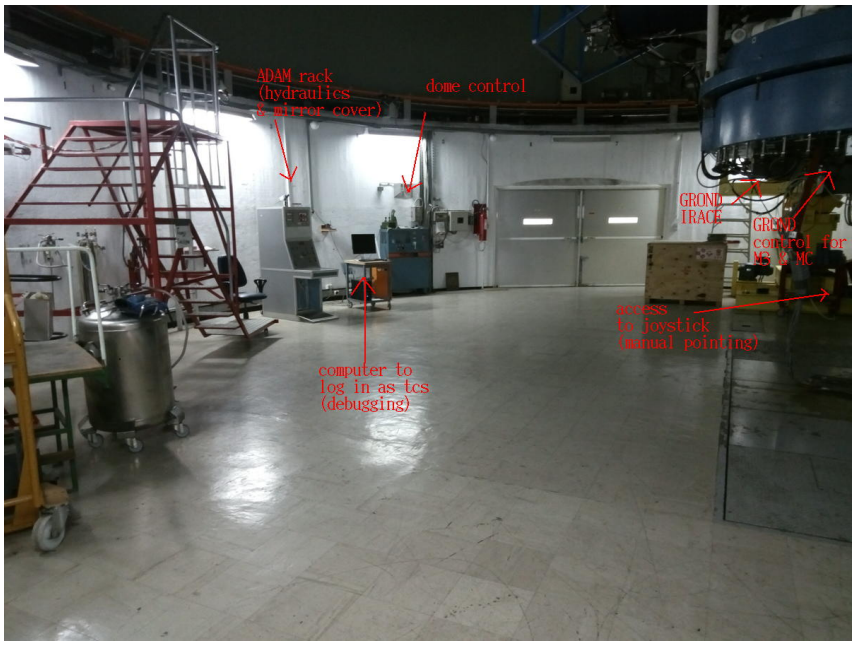


Figure 1.5: Entering the dome, from left to right: the ADAM controls, a computer to use the TCS, the dome controls, the bottom of the telescope.

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, p. 26), but the risk is to lack time to perform dome flat fields 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, Gamma-Ray Burst Optical/Near-Infrared Detector (GROND) and Fibre-fed Extended Range Optical Spectrograph (FEROS), are more independent and need a later restart. Also, the FEROS and GROND AG should be checked and the FEROS data reduction software (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 B1–B2 during A1–A5 and B5a–B7a during A8–A10. FEROS, GROND, the autoguider and the data reduction software (C, D, E, F1) can be handled in parallel as soon as the TCS is booted (B7a).

If under time pressure, you can also do some day-time calibrations in parallel. Figure. 2.1, p. 26 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

A. **WFI restart (8 min, in case of problems, see Fig. 2.2, p. 31)**
   - A1. On the screen `BOB Wide Field Imager`, go to the `StartUp` virtual desktop.
   - A2. In a terminal, `osf2p2StartUp ini WFI F8`, where ini is your initials (Fig. 2.2(a), p. 31).
   - A3. On the dialog, choose `DAILY` startup (Fig. 2.2(b), p. 31).

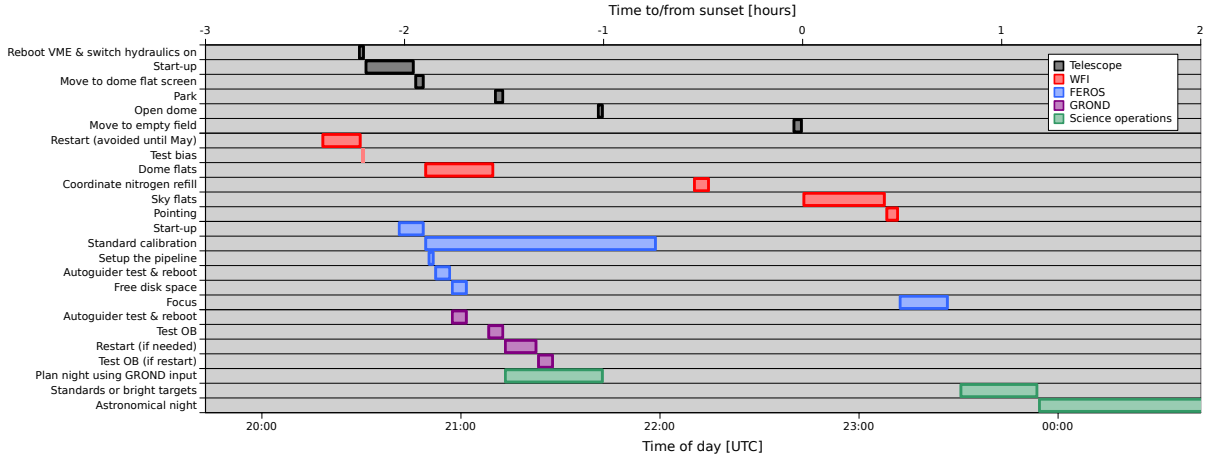


Figure 2.1: Operations time flow in the evening, doing start-up, calibrations, and tests in parallel. It should start latest 2.5 hours before sunset (see horizontal axis at the top). The time of the day, given in universal time on the bottom horizontal axis, corresponds to a date close to fall equinox (September 15th).

A4. Click `START` on the appearing window (`ESO220 WEEKLY FULL STARTUP`, see Fig. 2.2(c), p. 31).
A5. Wait until the start-up window says `SCRIPT finished` (about 11 minutes).
A black text window gives indication on the process (Fig. 2.2(d), p. 31)
A6. Close the startup window (Fig. 2.2(c), p. 31)
A7. Close the emerging PDF (Fig. 2.2(e), p. 31).
A8. Rearrange windows to the corresponding virtual desktops (1 min, see Fig. 2.2(f), p. 31)
- `rtd` goes to all virtual desktops, on the left screen.
- other windows go to the virtual desktop bearing their name, on the right screen.

A9. Wait for the filtre wheel to be set to a specific filtre (1–2 min)
a. Locate the `Filter` field on the `WFI General State` panel
b. If it stays in `MOVING` for more than 2 minutes or you skipped full restart, reset filtre wheel (Procedure 10.13, p. 92).
A10. In `bob`, execute `testOB.obd` (1 min)
a. Import it with window menu `File`→`Load OBs`→`From file...`.
b. Click the `Start` button.

B. **TCS restart (18 min, daily, see Fig. 2.4, p. 33)**
B1. Switch hydraulics and drives on
a. Go to web browser on screen `Dome webcam & hydraulics` (Fig. 2.4(a), p. 33).
b. 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.
c. Click `HydOn`, then button `Hydr` goes green.
d. Click `DrivesOn`, then button `Drives` goes green.
It may be needed to click two or three times to get green buttons.
B2. On the screen `Telescope Control Software`, go the the `StartUp` virtual desktop.
B3. If `Cannot read "@w2p2wfi..."` pop-up can be seen on the TCS screen (Fig. 2.4(b), p. 33), click `OK`.
B4. In a terminal type `lccBoot lte2p2` and wait for command to end (2 min, Fig. 2.4(c), p. 33)
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`.

B5. Launch the start-up script
   a. In the terminal type `osf2p2StartUp ini ALL F8`, with `ini` = your initials. (Fig. 2.4(d), p. 33)
      Make sure WFI is fully booted (A5) before going on with the TCS start-up.
   b. Click `START` on the appearing startup window titled `ESO220 DAILY STARTUP` (Fig. 2.4(e), p. 33)

B6. Be proactive to handle some appearing pop-ups (14 min)
   a. One asking to check hydraulics and telescope is parked among other things (Fig. 2.4(f), p. 33).
      Take your time to check each point and then click `OK`
   b. One asking to switch on flat-field lamp (Fig. 2.4(g), p. 33)
      Lamp should be on, check no one is in the dome, then click `OK`.
      If it's off, on `FAUX functions` panel select `200V` under `FLAT FIELD LAMP`
      Then, telescope will do movement checks you can monitor on the webcam.
   c. One asks to check for CCD alarms to be enabled (Fig. 2.4(h), p. 33)
      Go to the large, black text window where all numbers below the two `Al Enab` should be ones.
   d. One asks to check that the flat-field lamp is off and telemetry active.
      (i) If flat-field lamp is on, turn it off unless you will do dome flat fields.
      On `FAUX functions` panel select `OFF` under `FLAT FIELD LAMP`
      (ii) On the `Telemetry` panel, ensure that the FEROS telemetry module is `active`
      If not, activate it on the FEROS screen using `fcdTelemetry` (see Procedure 10.23, p. 96)
      (iii) On the `Telemetry` panel, ensure that the WFI telemetry module is `active`
      If not, activate it on the WFI screen using `fcdTelemetry` (see Procedure 10.23, p. 96)
      (iv) If a telemetry was restarted, panel must be closed and reopened (see Procedure 10.23, p. 96)

B7. Perform some post-start-up tidying
   a. Make sure the start-up window indicates `SCRIPT finished`.
   b. Close startup window.
   c. Close emerging PDF.
   d. Rearrange windows to the corresponding virtual desktops (1 min)
      - `skycat` go to all virtual desktops, on the right screen.
      - Other windows go to the virtual desktop bearing their name, on the left screen.
      - Ignore window `CSS ALARM DISPLAY` (Fig. 2.10, p. 36) if it pops up on the WFI screen.

B8. Check and set up the WFI AG (1 min)
   a. Go to the `TCS Control Panel`
   b. Under `AG Field Acquisition`, click `Retrieve Field`
   c. Under `Autoguider` look that `CCD Stat` goes to `Pending` and `integrating` (10–15 s)
   d. Check that an image is read out on the `skycat` window (30 s)
   e. Select window menu `View`→`Autoscale`
   f. If steps B8c–B8d do not work, see Procedure 10.6, p. 87.
   g. On the `skycat` window, use window menu `TCS`→`Pick Reference Star...`
   h. On emerging window (title `Pick Reference Star`), click `Cancel Operation`

B9. Ensure that the pointing model is correct (1 min).
   a. Check that the sidereal time is correct.
      Compare the `TCS Control Panel` and the wall clock

b. Select WFI pointing model.
   (i) On the TCS Status Panel, use window menu Instrument selection→WFI
   (ii) On the emerging popup select Continue
c. Check the pointing model parameters are non zero
   (i) Locate the TCS Setup Panel
   (ii) Look values of ID, IH, and CH under Pointing Model Data
d. If they are zero, fix the pointing model.
   (i) Locate or open a tcs terminal
   (ii) Type ~/bin/fixPointing.sh and wait for command to return (15 s)
   (iii) Redo steps B9b–B9c

C. **FEROS restart (daily, 8–9 min, see Fig. 2.5, p. 34).**
Only start after TCS is back online and doing telescope movements (B6b).
Under time pressure, you can skip points C1–C4, accepting an increased risk of night-time issues.

C1. On the screen FEROS BOB, go the the StartUp virtual desktop.
C2. Launch the weekly full start-up script (2 min)
   a. In a terminal type osf2p2StartUp ini FEROS F8, where ini is your initials. (Fig. 2.5(a), p. 34)
   If none is available, use left-click mouse menu FEROS User→feros xterm.
   b. Click FULL on popup Select StartUp Type (Fig. 2.5(b), p. 34)
   c. Click START on the start-up window ESO220 WEEKLY FULL STARTUP (Fig. 2.5(c), p. 34).
   A black text window should appear and give indications on the progress. (Fig. 2.5(d), p. 34)
   d. Wait for the weekly full start-up to indicate finished and close it (2 min)
      (i) Close ESO220 WEEKLY FULL STARTUP when it says SCRIPT finished
      (ii) Close the emerging PDF
C3. Perform the instrument start-up (4 min)
   a. Locate the Instrument Startup window and click START (Fig. 2.5(e), p. 34).
   b. A large, grey window giving details on the process should open.
   If a timeout error occurs, see Sect. 10.8.1, p. 96.
   c. Wait for the large, grey window to close itself (3 min)
   d. Put the instrument online (1 min)
      (i) On FEROS General State panel, use window menu Instrument→ONLINE
      (ii) Wait for State to indicate ONLINE
C4. Rearrange windows to the corresponding virtual desktops (1 min, see Fig. 2.5(f), p. 34)
   - rtd goes to all virtual desktops, on the left screen.
   - Other windows go to the virtual desktop bearing their names, on the right screen.
   - There are two rtds and two logMonitors, you can close one of each.
C5. Perform a test OB with telescope communication (1–2 min)
   a. On FEROS General State panel, select window menu Telescope→ENABLE
   b. In bob, run testOB.obd (1–2 min)
      (i) Fetch it with window menu File→Load OBs→From file...(/OBD/Templates/).
      (ii) Click Start
      (iii) Wait for the exposure to finish (takes about 1 min).
      (iv) If points C1–C4 were skipped, it will fail on the first attempt and proceed.
      (v) Click OK on the error popups, one should say error closing w2p2cam
      (vi) In bob, click on Reset status
      (vii) Re-run it (point C5bii).
   c. FEROS General State panel, select window menu Telescope→IGNORE

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

D1. Go to screen GROND BOB.
D2. Locate or open a terminal with user grondmgr.
You can use left-click mouse menu GROND user→grondmgr on wgrond
D3. In the case of a power cut or issues with GROND, restart the instrument (5 min)
a. Type grinsStop, wait for shutdown window to finish and disappear.
b. Type grinsStart and click Continue on the pop-up.
c. 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 D3a.
d. Rearrange windows.
e. Use window menu Instrument→ONLINE in the GROND control panel (Fig. 11.12(b), p. 130).
D4. Do some preventive reinitialisations (1.5 min)
a. Close bob.
b. Launch bob from the terminal as user grondmgr (type bob &).
c. In the same terminal, execute grondGRI.
d. In the same terminal, execute grondSHUTTER && grondFM (might take 1 min).
D5. From bob, execute the test OB testOB.obd, see Fig. 11.12(a), p. 130 (1 min)
a. Ensure TCS is OFF (red button) by clicking TCS OFF.
b. Fetch OB with window menu File→Load OBs→From file...
c. Click Start.
D6. Repeat the last step using communication with the TCS (2 min)
a. Ensure TCS is ON (green button) by clicking TCS ON.
b. Fetch OB with window menu File→Load OBs→From file....
c. Click Start.
d. If you haven't done the full start-up, the first attempt should fail, you need to
(i) Click OK on the error popups, one should say error closing w2p2cam
(ii) Wait for the exposure to finish
(iii) In bob, click on Reset status
(iv) Click on start again.
(v) If error persists, close bob and open it again
e. Set telescope back to FEROS/WFI (0.5 min)
In a terminal type, grondM3 WFI && grondMC CLOSE && grondCS CLOSE.
D7. If a restart (point D3c) was done, set the image displays (1 min).
a. Go to the GROND optical (FIERA) screen.
b. Find the rtd window (griz images).
c. Check that image is flipped along both axes and rotated (see Fig. 2.11(a), p. 37).
d. Go to the GROND infrared (IRACE) screen.
e. Find the irtd window (JHK images).
f. Check that images are received live.
The left column should have a green button with text Stop (see Fig. 2.11(b), p. 37).
If it is gray with text Start, click it so that it gets as describe above.
g. Check that the image is horizontally flipped (see Fig. 2.11(b), p. 37).
h. Check that the image has positive pixel values
Find menu option Negative real time image

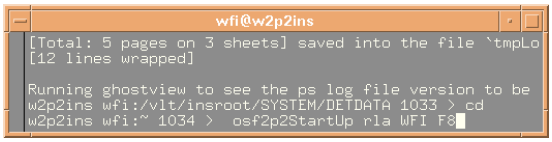
E. **FEROS and GROND guide cameras setup** (3–8 min)
E1. Go to the Autoguider GROND & FEROS screen.
E2. Rearrange windows to their corresponding virtual desktops (1 min)
Autoguiding window should go to all virtual desktops.

E3. Use numbers 6, 3, 0.02 below `Autoguider control` and click `Apply`.
E4. Check the GROND autoguider (1–4 min)
   a. Go to virtual desktop `GROND AG`
   b. Select GROND below `CCD change` (see Fig. 2.6, p. 35)
   c. If necessary, use `Start exposure` to change `CCD Status` to `Infinite loop`
   d. Find window `Telescope R.T.D`
   e. Use window menu `TCS`→`Attach camera`
   f. A bias image should be seen within seconds
   g. If it fails in the previous steps, go to Procedure 10.4, p. 86 (3 min)
   h. Use window menu `TCS`→`Pick Reference Star`
   i. On emerging window `Pick Reference Star`, click `Cancel operation`
E5. Check the FEROS autoguider (1–4 min)
   a. Go to virtual desktop `FEROS AG`
   b. Select FEROS below `CCD change` (see Fig. 2.6, p. 35)
   c. If necessary, use `Start exposure` to change `CCD Status` to `Infinite loop`
   d. Find window `FEROS AG Real Time Display`
   e. Click checkbox `Camera on/off` so that checkbox gets green
   f. A bias image should be seen within seconds
   g. Check that the image is horizontally flipped.
   h. If it fails in the previous steps, go to Procedure 10.5, p. 86 (3 min)
   i. Click `Set Reference`
   j. On emerging window `Pick Reference Star`, click `Cancel`

F. **FEROS data reduction software setup** (2–5 min)
F1. Change the date (1 min)
   a. Go to the `DRS:main` virtual desktop of screen `FEROS pipeline`
   b. Locate or open FEROS DRS window
      It opens with left-click left-click mouse menu `FEROS User`→`FEROS DRS`
   c. `Stop` the `Reduce Queued Image Status`
   d. `Stop` the `Midas Session Status`
   e. Change the date
   f. `Start` the `Midas Session Status`
   g. `Start` the `Reduce Queued Image Status`
F2. Free disk space (1–4 min)
   a. Go to `Visitor` virtual desktop of screen `FEROS pipeline`
   b. Use or open a terminal
   c. If df -h /data indicates more than 80% disk usage, proceed
   d. 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-*`

G. **Afternoon calibrations can be done right after start-up** (see Chapter 3, p. 39)
- WFI dome flat fields may be done in parallel starting from point B6b
- FEROS standard calibration may be done in parallel starting from point D

2.2 WFI startup

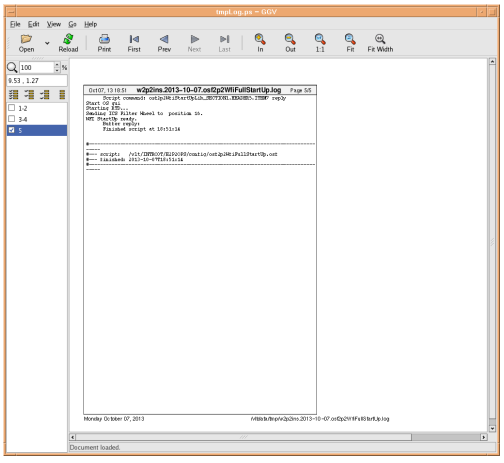


(a) Launch the reboot from the terminal.

(b) Choose full startup.

(c) Click start.

(d) A log terminal opens. Process takes ≈ 10 min.



(e) When finished select menu `File` → `Quit` from start-up window of Fig. 2.2(c), p. 31. 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.

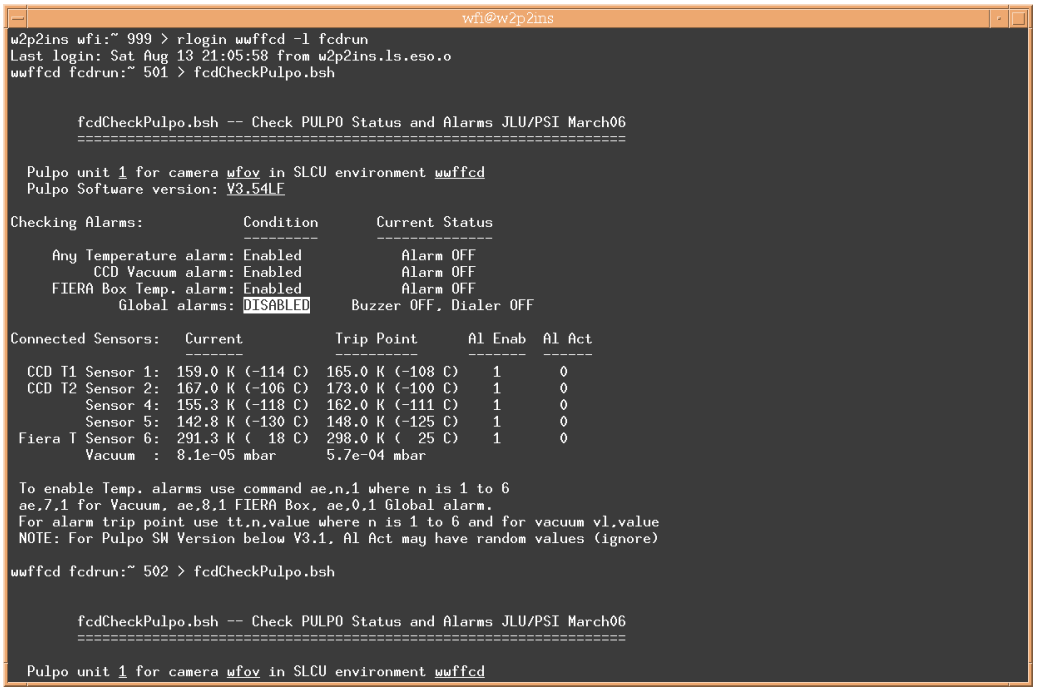
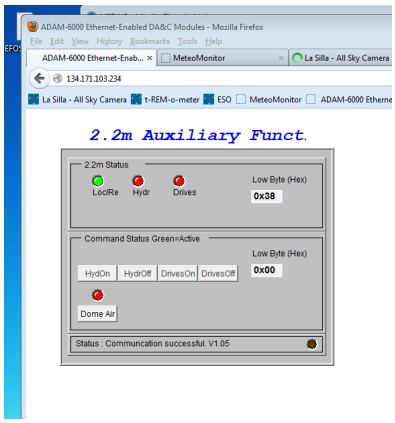


Figure 2.3: Obtaining the WFI pulpo status (e.g. CCD temperatures)

2.3 TCS startup

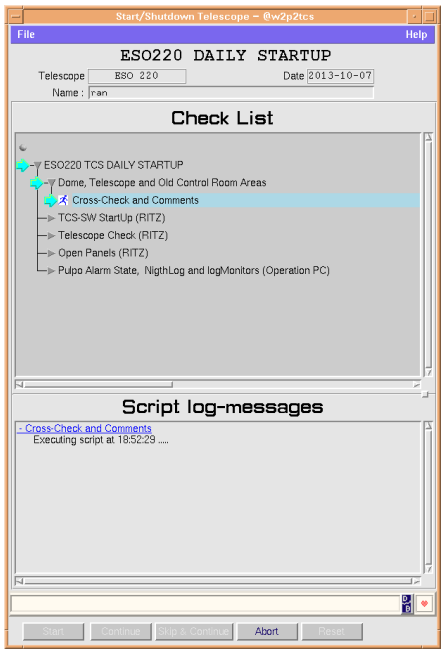


(a) Turn hydraulics and drives on, Windows desktop.

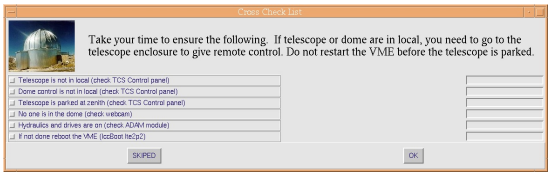
(b) On the TCS machine, give `OK` to this error.

(c) Reboot `lte2p2` machine.

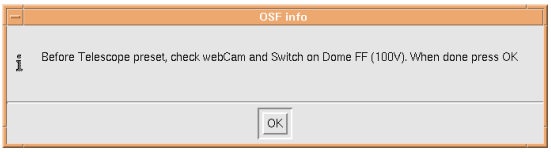
(d) Launch the reboot from the terminal.



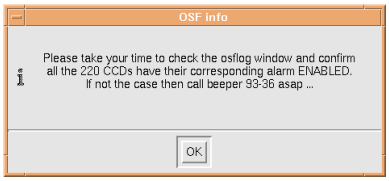
(e) Click start.



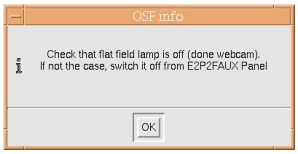
(f) Check elements then click `OK` to incoming pop-up.



(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

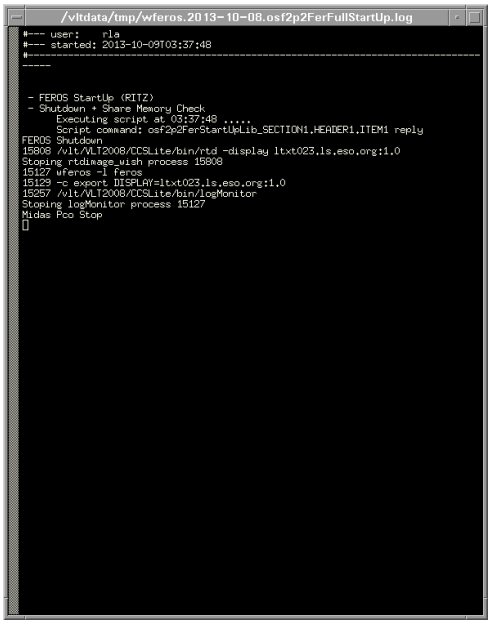
Figure 2.4: TCS restart. As for WFI there is a black terminal log) and process ends with a PDF log being popped up. Emergent windows should be rearranged to their respective virtual desktops. The `rtd` display should go to all desktops on the left screen, the other windows n the right screen.

2.4 FEROS startup

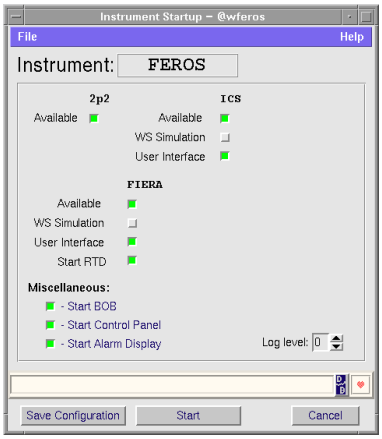
(a) Restart FEROS from terminal. Ensure that telescope is enabled in the FEROS control window.

(b) Click `FULL`.

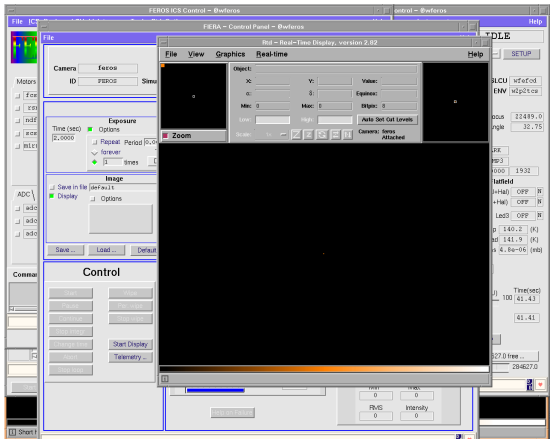
(c) Click `START`.



(d) This black log opens. Later on a PDF will pop-up.



(e) Click `START`.



(f) When finished, rearrange the windows to their corresponding virtual desktops. `rtd`, `bob` and FEROS control go to `BOB+gen state`.

Figure 2.5: FEROS restart.

2.5 GROND and FEROS AG

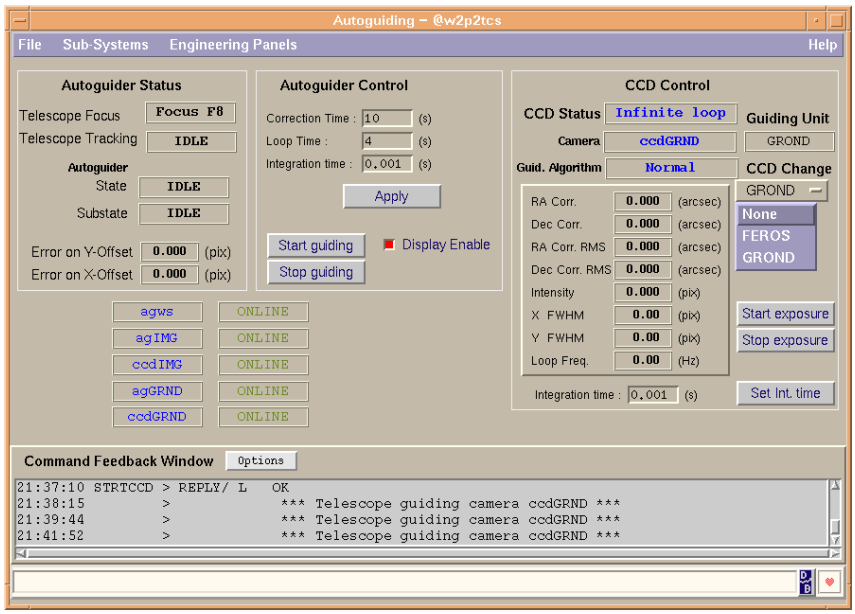


Figure 2.6: Switching between GROND and FEROS guide camera.

Check that the GROND and FEROS guide cameras work by switching between them on the AG window (see Fig. 2.6, p. 35). 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. 10.3, p. 86).

2.6 FEROS DRS

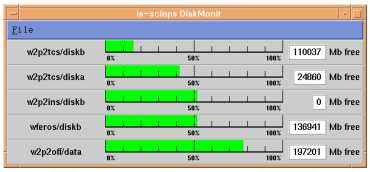


Figure 2.7: FEROS DRS Disk Monitor to check free disk space.

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

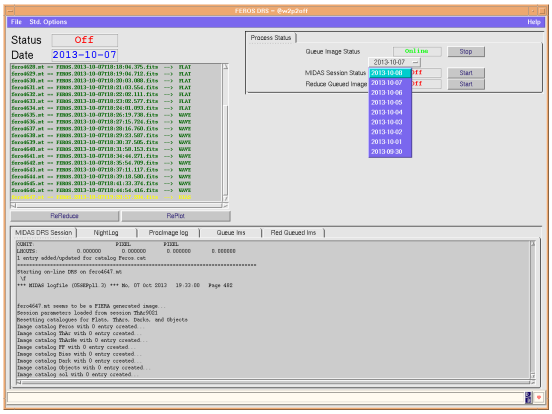


Figure 2.8: Changing the date of the FEROS DRS.

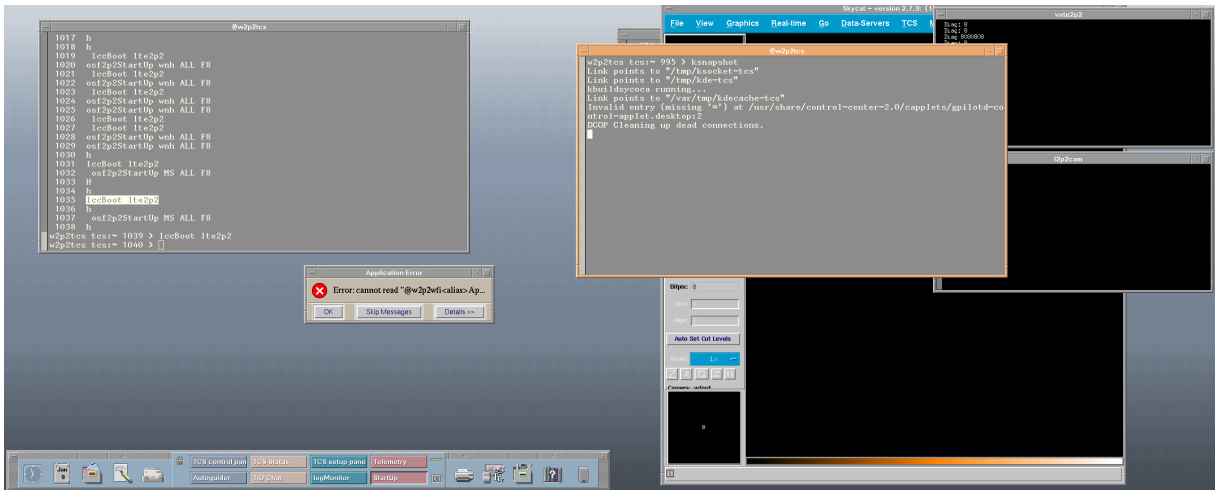
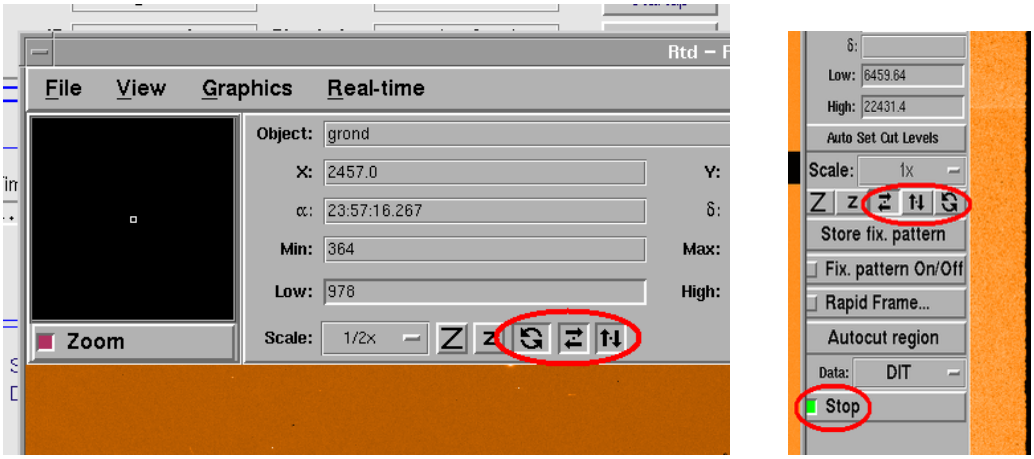


Figure 2.9: When restarting WFI, the TCS generally issues a harmless error message. Get over it and click `OK`.

Figure 2.10: `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 2.11: Correct sky orientation of the GROND displays. The infrared one is receiving data in real time (green checkbox).

3 — Afternoon: Day-time calibrations

The day-time observations use OBs either stored in `bob` or in a `vot` queue. Managing OBs with `bob` and `vot` is explained in more detail in Chapter 8, p. 79.

3.1 WFI

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

Procedure 3.1. WFI dome flat-fields

A. Ensure that no one is in the dome nor will enter it before starting the dome flat fields.
B. Prepare the telescope.
   B1. If hydraulics is off, switch it on and wait for connection with VME
      a. On the Dome Auxiliary Functions panel click `Hydr On` then `Drives On`.
      b. On the `TCS Control Panel`, check if red message appears `no connection`.
      c. If it is the case, wait for it to disappear (about 2 min)
   B2. If hydraulics were off, initialise telescope
      a. On the `TCS Setup Panel`, click `Tel Init`
      b. Wait for the telescope status on the `TCS control panel` to go from `WaitIni` to `Slew` (2 min)
   B3. Preset to flat-field screen
      a. Go to the `TCS Setup Panel` (Fig. 11.3, p. 123) on screen `Telescope Control Software`.
      b. Put `Dome` on `automatic`.
      c. Preset the telescope to flat-field screen.
         Click `FF Scr` below `Fixed Presets`
      d. Wait for the movement to complete (2 min) before starting the flat-field OB.
         On the `TCS Control Panel` (Fig. 11.2, p. 122) telescope status is `Slew`.
   B4. Prepare shutters and mirrors
      a. Click `Open` under the `Main Mirror Cover`.
      b. Wait for opening to complete (2 min) before starting the flat-field OB
      c. Open the WFI protective shutter.
         In the Auxiliary Functions (Fig. 11.6, p. 125), `OPEN` the `WFI PROTECTIVE SHUTTER`.

   d. Ensure the GROND M3 mirror is on WFI
   e. Ensure the FEROS mirr3 mirror is on FEROS

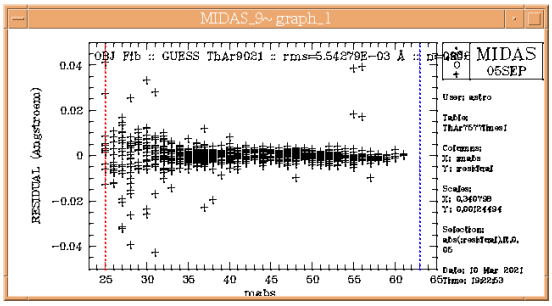
C. Prepare the flat-field OB
   C1. Go to bob on the screen BOB Wide Field Imager.
   C2. Fetch bob from file (window menu File→Load OBs→From file...) looking in sub-folder DomeFlats.
      - If observing in UBVRI standard filtres: DomeFlatCalPlan_new.obd (25 min).
      - During an observing period or a visitor run, a custom OB may be used
        For instance: DomeFlatsP103.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).
   C3. If choosing filtres on the fly, customise the ob
      a. Open the dome flat fields template, left-clicking on the triangle of WFI_img_cal_DomeFlat_new
      b. Open the instrument section, left-click on the triangle of section INS
      c. Use window menu Interface→Engineering.
      d. Middle-click the filtre 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 filtre list is found below SETUP Instrument
      e. Deactivate the filtres you don't want.
        Right-click the triangles to get a thumb down
D. Execute OB (15–30 min usually).
E. If no other types of flats fields are done, park the telescope
   E1. Go to the TCS Setup Panel on screen Telescope Control Software.
   E2. Close to the Main Mirror Cover.
   E3. Set the dome in Manual.
   E4. Click Zenith below Fixed Presets (2 min)
   E5. Close the WFI protective shutter.
      In the Auxiliary Functions (Fig. 11.6, p. 125), CLOSE the WFI PROTECTIVE SHUTTER.
F. If telescope will stay idle for hours, switch hydraulics off.

3.2 FEROS

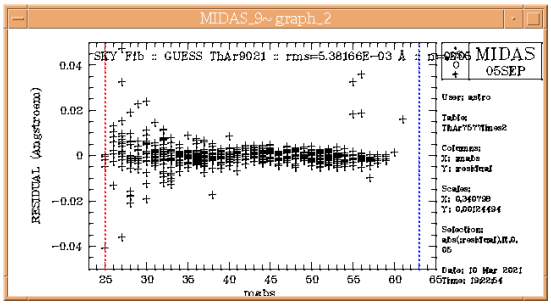
A linearity check is left running in the morning (see Sect. 7.6). The standard FEROS calibration is generally done after startup. It is internal in a separate room, so it can be done while doing telescope movements, going to the dome, or even WFI or FEROS observations.

Procedure 3.2. FEROS afternoon calibrations

A. Go to screen FEROS BOB.
B. Check that FEROS does not communicate with the telescope
   On the FEROS General State panel, use window menu Telescope→Ignore.
C. Execute StanCalNorm.obd from bob (≈ 1 h).
   C1. Use window menu File→Load OBs→From file....
   C2. Click Start.
D. Check that the DRS has processed it. **While Fabry-Pérot stays installed, it will fail.**
   D1. Find a white graphics with title OBJ FIB GUESS (Figure. 3.1, p. 41).
   D2. The wavelength solution should have 4×10^{-3} Angstrom rms or less and look flat.
   D3. The measured flux in both fibers (Figure. 3.2, p. 41). If the flux in object and sky fiber is very different, it might be necessary to adjust the position of the calibration lamp.
   D4. If not, restart calibration if possible.

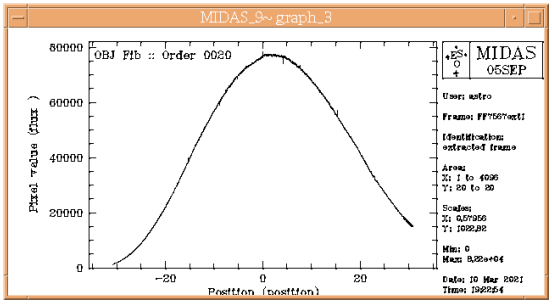


(a)

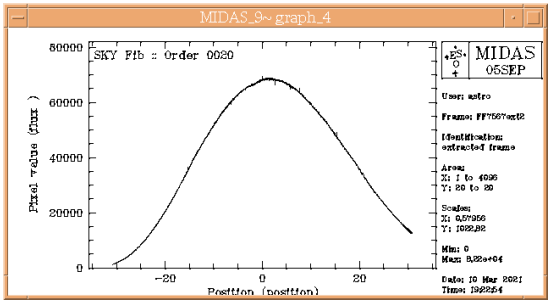


(b)

Figure 3.1: RMS of wavelength calibration in object- and sky fiber



(a)

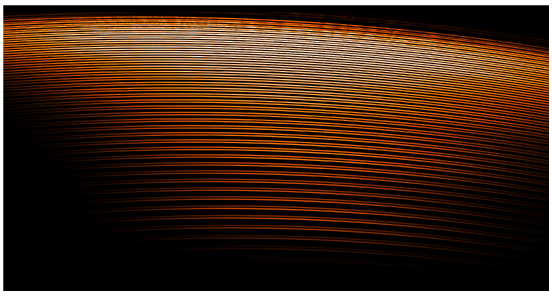


(b)

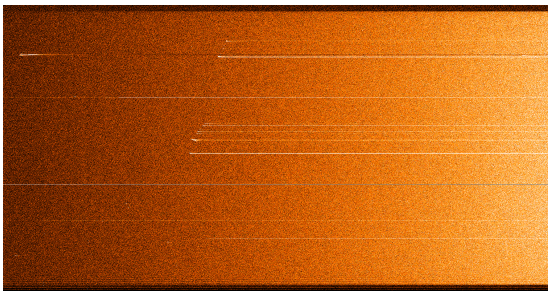
Figure 3.2: Flux in object- and sky-fiber

One reason for a bad wavelength calibration can be problems with one of the calibration lamps, e.g. flat-lamp (lamp 2). Check if the flat-field exposures recorded any flux above the bias level (Figure. 3.3, p. 41). If no flux above the bias level is measured, check:

A. Position of M3 (should be `FEROS`)
B. All lamps should be set to "Remote" in the electronic rack (Figure. 3.4, p. 42).



(a)



(b)

Figure 3.3: Example of `FEROS` flat field image, with lamp 2 ON (a) and lamp 2 OFF (b)

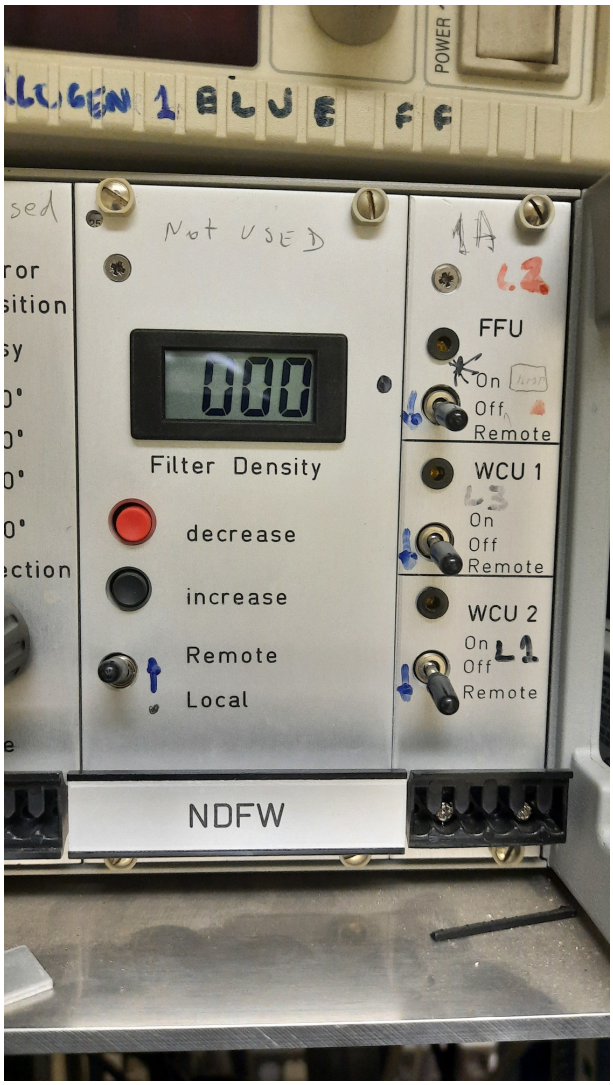


Figure 3.4: Settings for FEROS calibration lamps (FEROS room in telescope building).

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 flat fields, providing the observing blocks and a detailed explanation.

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

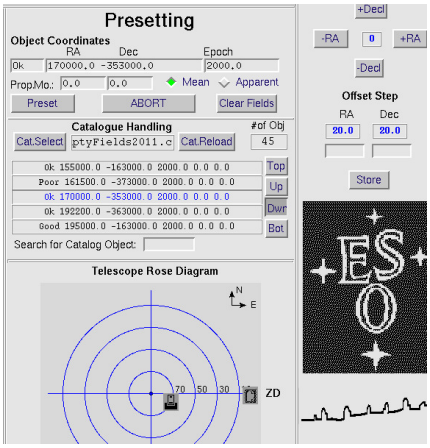
A. Check that the dome slit is oriented opposite to the Sun. It does not apply when opening at night.
   A1. On the `rose diagram` of the `TCS Control Panel`, it should be to the East
   A2. If not, rotate manually in the `TCS Setup Panel`
B. Open the dome slit
   B1. Go to the TCS setup panel (Fig. 11.3, p. 123)
   B2. Check that the value below `Main Mirror Cover` is `closed`.
   B3. If not, click `Close` (2 min).
   B4. n the TCS setup panel (Fig. 11.3, p. 123), below `slit`, click `Open` (1 min)
C. Turn on the Dome Air in the Dome Auxiliary Functions (Windows desktop, Fig. 11.14, p. 131).
D. If opening during the night, you can directly prepare the telescope (Procedure 4.2, p. 45).

4.2 Telescope readying

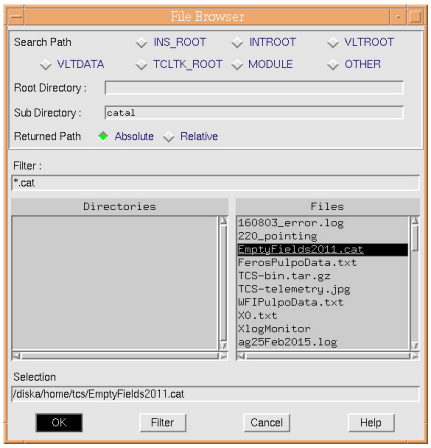
A bit before sunset if doing sky flat fields or at sunset otherwise, you can ready the telescope and point to an empty field.

Procedure 4.2. Telescope readying

A. Prepare the telescope
   A1. If hydraulics is off, switch it on and wait for connection with VME
      a. On the Dome Auxiliary Functions panel click `Hydr On` then `Drives On`.
      b. On the `TCS Control Panel`, check if red message appears `no connection`.
      c. If it is the case, wait for it to disappear (about 2 min)
   A2. If hydraulics were off, initialise telescope
      a. On the `Telescope Setup` panel, click `Tel Init`
      b. Wait for the telescope status of the `TCS Control Panel` to go from `WaitIni` to `Slew`



(a) Sky flat field selection



(b) Catalogue selection

Figure 4.1: Presetting to an empty field for flat-fielding. The `Presetting` section allows the user to select a catalogue (`Cat.Select`), select a field within the selected catalogue (arrows `Up`/`Dn`), and presetting there (`Preset`).

(2 min)

A3. Open the main mirror cover
   a. Click `Open` under the `Main Mirror Cover`.
   b. Wait for opening to complete (2 min) before starting the flat-field OB

B. Preset to an empty field if doing sky flat fields, a test with GROND, or readying before sunset (Fig. 4.1, p. 46)
   B1. Go to the `TCS Control Panel` (Fig. 11.2, p. 122)
   B2. Below `Catalogue Handling` click `Cat. Select` (Fig. 4.1(a), p. 46).
   B3. Choose `Empty Fields 2011` (Fig. 4.1(b), p. 46)
   B4. Select field with `Up` and `Dwn`. (Fig. 4.1(a), p. 46)
   Right ascension should be about 1 hour more than sidereal time at sunset.
   Consider field quality: excellent, good, OK, poor.
   B5. Click `Preset`. (Fig. 4.1(a), p. 46)

C. Set the dome motion in automatic.
   On the TCS setup panel (Fig. 11.3, p. 123), below `Dome`, select the checkbox `Automatic`.

4.3 Making the instruments ready (at sunset)

Procedure 4.3. Making instrument ready

A. Activate the connection between instruments and telescopes
   A1. On the FEROS control panel (Fig. 11.10, p. 128), use window menu `Telescope`→`Enable`.
   A2. On the GROND control panel (Fig. 11.12(b), p. 130), click `TCS ON`.
   A3. Refresh the WFI general state panel (Fig. 11.9, p. 127).
      - Use window menu `Std. Options`→`Refresh Database values`.
      - Check that `TCS` is `ONLINE`.

B. Open the instrument covers
   B1. In the Auxiliary Functions (Fig. 11.6, p. 125), open the WFI protective shutter.
   B2. For GROND observations, in a terminal open the main cover, the cold shutter, and the optical ones through these commands
      a. `grondMC OPEN`

b. grondCS OPEN
c. grondSHUTTER

C. Check for mirrors
C1. Check FEROS mirror (M3 Selected Mirror) on the FEROS control panel (Fig. 11.10, p. 128).
If necessary, set mirr3 motor on the FEROS ICS Control (Fig. 11.11, p. 129)
- to WFI for observations with WFI or GROND;
- to FEROS for observations with FEROS.

(Select the mirr3 check box, select instrument, click SETUP, deselect checkbox.)
C2. Check GROND M3 mirror on the GROND control (Fig. 11.12(b), p. 130).
If necessary, type
- grondM3 WFI for FEROS or WFI observations
- grondM3 GROND for GROND observations.

D. 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. 11.12(a), p. 130).
D1. Fetch OB with window menu File→Load OBs→From file....
D2. Click Start.
D3. 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

D4. 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

Procedure 5.1. Summary of evening twilight operations

A. Flat-fielding
   A1. WFI sky flat fields can be done from sunset to sun at −10 degrees elevations depending on filtre.
   Standard filtres have that order: U, V, R, I, and B.
   Done daily if possible.
   A2. GROND sky flat fields 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.
   Done weekly.

B. Pointing & Focus
   B1. Pointing check should be performed daily. One basically points at a bright star and checks it falls where expected. You may use one of these methods:
      - with WFI, using an OB from `bob`.
      - with FEROS, using a spectrophotometric standard or focus OB.
   B2. Focus is best done daily. If conditions are stable, at the beginning of the night, but may be delayed in case of bad seeing, fast varying temperature, or late opening.
      a. FEROS focus should be performed nightly using an OB from `bob`
      b. WFI focus should be done closest to science observations.
      c. GROND focus is usually not performed.

C. Standards
   C1. The FEROS standards are
      a. Spectrophotometric standards included in the Focus+Standard OBs.
      b. Radial velocity standards by IAU and Soubiran, available from `bob`
   C2. WFI Landolt standard fields are available from `bob`.
   C3. GROND SDSS standard fields are available from `bob`.
   The GROND team usually explicitly asks for them.

5.2 WFI

5.2.1 Sky flats

Sky flat fields 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 5.2. Taking sky flats with WFI

A. If not done, check that dome and main mirror cover are open (Procedure 4.1, p. 45).
B. If not done, check GROND M3 and FEROS mirr3 mirrors (Procedure 4.3, p. 46, point C).
C. If not done, check that the WFI protective shutter is open (Procedure 4.3, p. 46, point B).
D. If not done, point the telescope to an empty field (Procedure 4.2, p. 45, point B).
   D1. Go to `TCS control panel` the on screen `Telescope Control Software`.
   D2. Below `Catalogue handling` click `Cat. Select` (Fig. 4.1(a), p. 46).
   D3. Choose `Empty Fields 2011` (Fig. 4.1(b), p. 46)
   D4. Select field with `Up` and `Dwn`. (Fig. 4.1(a), p. 46)
   Right ascension should be about 1 hour from sidereal time, opposite to the Sun.
   Consider field quality: excellent, good, OK, poor.
   D5. Click `Preset`. (Fig. 4.1(a), p. 46)
E. Go to `bob` on screen `BOB Wide Field Imager`.
F. Fetch sky flat fields 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`.
G. If not doing the standard filtres, customise OB.
   G1. For non standard filtres, edit the filtre names.
      a. Open the sky flat fields template, left-clicking on the triangle of `WFI_img_cal_DomeFlat`
      b. Open the instrument section, left-click on the triangle of section `INS`
      c. Use window menu `Interface`→`Engineering`.
      d. Middle-click the filtre name, fill in value, and type enter.
      (In virtual desktop `ICS`, a filtre list is found below `SETUP Instrument`)
   G2. Deactivate unneeded templates.
   Right-click the triangles to get a thumb down.
H. Execute OB
   H1. Click `Start`.
   H2. For each template
      a. A test exposure is taken. (1 min)
      b. A pop-up estimates the exposure time. (a few seconds)
      c. If it is too late (too dim in the evening), the template will be skipped.
      d. If it is too early (too bright in the evening), the template will restart from point H2a.

5.2.2 Pointing

Pointing with FEROS

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

Procedure 5.3. Ensure that pointing is correct using FEROS

A. Update the pointing model parameters
   A1. Go to the `Telescope Control Software` workstation.
   A2. Open or use a UNIX terminal.
   A3. Type `~/bin/fixPointing.sh`
B. Change pointing model to FEROS.
   B1. Go to the `TCS Status Panel` (virtual desktop `Status`, see Fig. 11.5, p. 125).
   B2. Use window menu `Instrument selection`→`FEROS`
C. Check the sidereal time
   C1. On the digital clock of the control room, switch display to sidereal time.
   C2. Go to the `TCS Control Panel` (virtual desktop `Control`).
   C3. The sidereal time of the TCS Control Panel should lag by approximately 5 s.
D. Point at a FEROS focus/spectrophotometric standard star. See Sect. 5.3.1, p. 55.

Pointing and autoguider test with WFI

If things go well, the bright star used for the pointing test should fall a few hundreds of pixels from the centre of the mosaic in the North-West direction (as of 2019).

Procedure 5.4. WFI pointing

A. Switch the instrument to WFI on the TCS status panel.
   (`Instrument Selection`, Fig. 11.5, p. 125. Do it even if it already says WFI).
B. If not done, check that dome and main mirror are open, and dome is in automatic.
   (Refer to Sect. 4.1, p. 45, points B, A3 and C).
C. If not done, check GROND M3 and FEROS mirr3 mirrors (Sect. 4.3, p. 46, point C).
D. If not done, check that the WFI protective shutter is open (Sect. 4.3, p. 46, point B).
E. Go to `bob` on screen `BOB Wide Field Imager`.
F. 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.
G. After the exposure is taken, accept "refine acquisition".
   A small form asking for the star's coordinates will appear.
H. Use window menu `View`→`Pick Object` in the `rtd` to obtain the star's pixel coordinates.
I. Input the pixel coordinates.
   Copy them with the mouse from the `Pick Object` popup to the small form.
J. After `offset and quit` a popup should have appeared.
   Click `OK` if satisfied with the offset values (in arcsec).
K. If no star at all is seen, see Sect. 10.12.1, p. 103 to check that:
   K1. You did not forget Points A-D.
   K2. The sidereal time of the TCS is correct within seconds.
   K3. The pointing parameters of the TCS are correct.
   K4. Check that the star does not fall into the gap between two CCDs. (Give coordinates falling in the gap to the pop-up, offset and reacquire.
   K5. Once you have a star, as long as the offset is large, use `offset and reacquire`

K6. If the correct pointing model is selected, that should not take more than 2-4 repeats (max 10 min).

L. 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.

M. When asked, acquire a guide star on the TCS.
On the `TCS Control Panel`, follow the steps of Sect. 6.1.4, p. 64
If it is still too bright to click on a guide star, click on background.

N. Click `OK` to the popup asking for guiding on the WFI workstation.

O. Wait for a short exposure to read out (30 sec).

5.2.3 Focus

focus with WFI should be preferrably done close in time and telescope position to the target's. It is not necessary to use the same filtre as the observation, but using the same one saves about 2 min. in particular if the observation uses a narrow band or a dimm filtre (U), for WFI knows the focus offsets between filtres. Using the same filtre saves about 2 min.

It is possible to skip the focus if an acquisition or test image shows sharp, round stars or if the seeing is too bad ($\gtrsim 2$). It is advisable to (re)focus once conditions have stabilised, a few hours into the night, if on-chip seeing is critical.

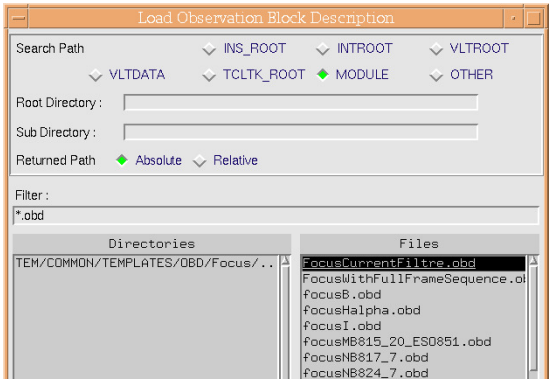
Procedure 5.5. Focusing with WFI

This procedure lasts a bit less than 10 minutes.

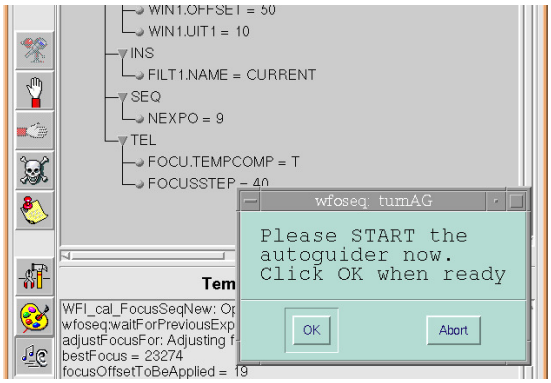
A. Prepare telescope and filtre for focusing (1–3 min)
  A1. If focusing in the same field and filtre as a target's, use the target OB's preset.
    a. Load OB for the target.
    b. Thumb-down all templates except the acquisition.
    c. If template contains an acquisition image, decrease exposure time to 10 s.
    d. Start ob.
    e. If it asks for autoguider, acquire it (Procedure 6.3, p. 64).
    f. If it asks to refine acquisition after an image pops-up, skip it.
    g. If an image pops-up and stars appear round and sharp enough for the science goal, you may skip the focusing altogether.
  A2. If focusing in another field and filtre, do it manually
    a. In the `TCS Control Panel`, enter the coordinates and click `Preset`
    b. In the `WFI ICS Control`, choose the filtre and click `Apply`
    c. Wait for telescope and filtre movements to complete (2–3 min).
    d. In the `TCS Control Panel` and `skycat`, acquire autoguider (Procedure 6.3, p. 64, 1 min)

B. Start the focus OB (Fig. 5.1(a), p. 53 and perform AG acquisition if required (Fig. 5.1(b), p. 53)
  B1. In bob, use window menu `File→Load OB→from file...`
  B2. Double-click subfolder `.../TEMPLATES/OBD/Focus`
  B3. Choose ob, e.g. `focusV.obd` or `focusCurrentFiltre.obd`
  B4. Click `OK`
  B5. Click `Start` on the OB
  B6. If a pop-ups asks for AG, acquire it (Procedure 6.3, p. 64, 1 min)

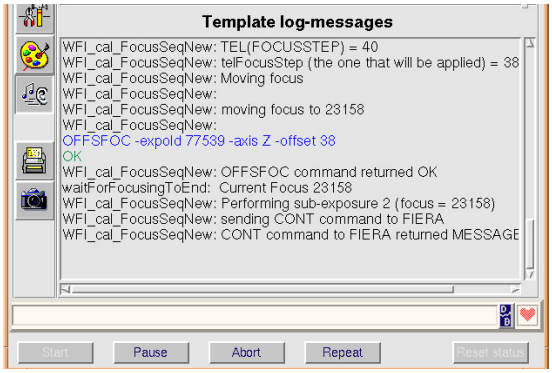
C. Monitor the progress of the focus sequence on `bob` and `skycat` (Fig. 5.1(c), p. 53, 6 min).
  - Guide star will disappear and reappear between all subexposures.
  - If bob repeats a message about a focus order for more than 10-15 s, you will need to enter the



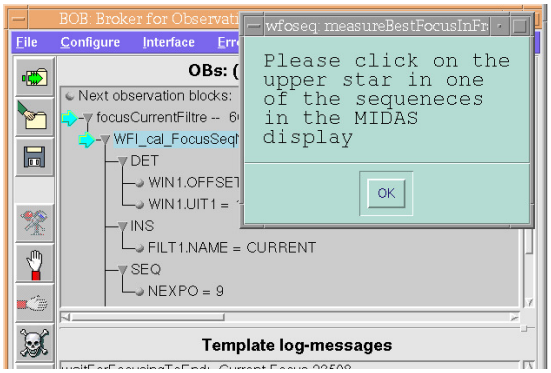
(a) Selecting focus OB



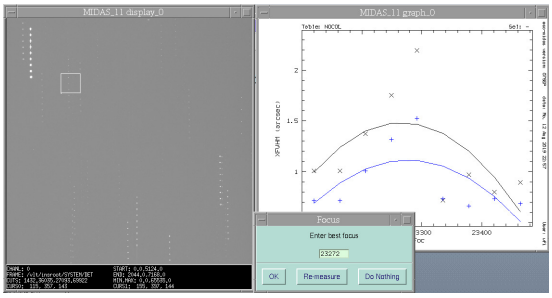
(b) Start the WFI autoguider



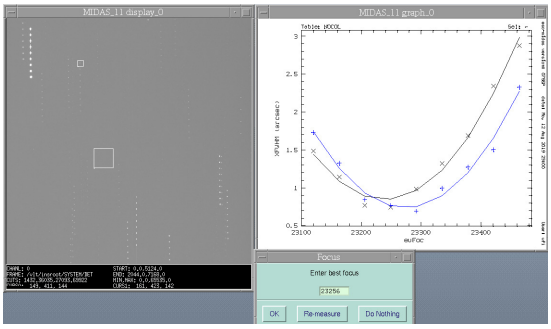
(c) Monitor focus offsets



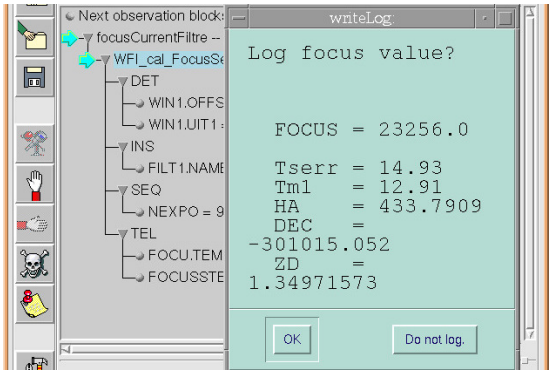
(d) Click on the upper star (MIDAS)



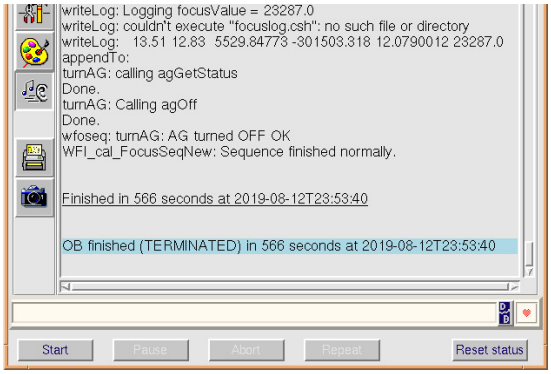
(e) If 1st measurement is useless, `Re-measure`



(f) If 2nd measurement if fine, `OK`



(g) Choose to log if it went fine



(h) OB fully executed

Figure 5.1: Main steps in the focus sequence of WFI.

target values in the TCS Control Panel for all subexposures starting from the one where problem appears (second one). Otherwise, the ob will crash. See Procedure 10.15, p. 93.

D. Perform a dummy focus measurement (bug workaround)
   D1. Click OK on the pop-up asking to pick a star in MIDAS window (Fig. 5.1(d), p. 53)
   D2. Go to virtual desktop MIDAS (Fig. 5.1(e), p. 53)
   D3. Locate a black MIDAS window intended for graphics
   D4. Left-click, then right-click close to its centre
   D5. On the pop-up asking for confirmation, click Redo

E. Perform focus measurement (Fig. 5.1(f), p. 53)
   E1. Click OK on the pop-up asking to pick a star in MIDAS window
   E2. Find a vertical star sequence that is relatively separated from other ones
   E3. On the same black window, use arrow keys to dimension a box centred on the cursor, so that it encompasses a star of the sequence, but not two.
   E4. Left-click, then right click the upper star of the sequence
   E5. Look at the graphics displaying the FWHM fit as a function of focus offset
   E6. Decide what to do (confirm exact labels...)
      - If the fit and optimum focus offset value are correct, click OK
      - If the fit is not correct but you can spot the best focus value, Enter best focus in the popup and click OK
      - If you are not sure, click Re-mesure and pick another star sequence
      - If it is clear that conditions have messed the focus, click Do Nothing.
   E7. Wait for a pop-up to ask whether to log the value (Fig. 5.1(g), p. 53, 20 s)
      - If you are happy with the focus, click OK
      - Otherwise, click Do not log
   E8. Wait for OB to finish (Fig. 5.1(h), p. 53, 10 s)

5.2.4 Standard fields (quick tips)

Procedure 5.6. WFI photometric standard fields

A. Go to screen BOB Wide Field Imager.
B. If not done, switch the instrument to WFI on the TCS status panel (Fig. 11.5, p. 125).
C. Fetch standard field OB from list
   C1. Use window menu File→Load OBs→From file....
   C2. Go to folder .../TEMPLATES/OBD/Standards/.
   C3. 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).
D. Customize OB.
   - If non-standard filtres are needed, edit filtre names (Sect. 5.2.1, p. 50, item G1).
   - Deactivate unneeded templates.
     (Right-click the triangles to get a thumb down.)
E. Execute OB (20 min).
   E1. Click Start.
   E2. For each filtre
      a. Guide if required by a pop-up and click OK.
      b. 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 spectrophotometric standard, which takes only 5 min more. A radial velocity standard can be taken any time needed (they take 5-10 minutes with overheads).

5.3.1 Focus

Focusing with FEROS takes about 5 minutes. It is summed up in Fig. 5.2, p. 56 and detailed in Procedure 5.7, p. 55.

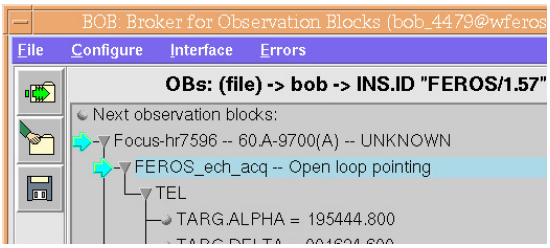
Procedure 5.7. FEROS focusing

A. Perform the necessary checks and preparations for FEROS
   - A1. Check that dome and main mirror are open (Procedure 4.1, p. 45).
   - A2. Check GROND M3 and FEROS M3 mirrors (see Sect. 4.3, p. 46, point C).
   - A3. Check that the WFI protective shutter is open (Sect. 4.3, p. 46, point B).
   - A4. Select instrument `feros` on the `TCS Status Panel` (screen `Telescope Control Software`).

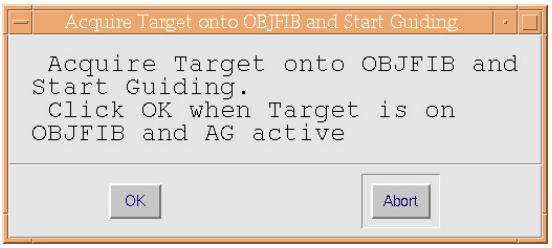
B. Start the focus OB
   - B1. Go to `bob` on screen `FEROS OB` and fetch focus OB:
   - B2. Use window menu `File`→`Load OBs`→`From file...`.
   - B3. Select directory `.../TEMPLATES/OBD/Focus/`.
   - B4. Select `Focus-<ra>....obd` with `<ra>` close to sidereal time.
   - B5. Click `Start` (Fig. 5.2(a)).

C. Acquire object on fibre and guide (see Sect. 6.2.1, p. 66, point D, & Sect. 6.2.2, p. 68)
   - C1. Click centering on the `FEROS AG Real Time Display`
     It is located on virtual desktop `FEROS AG`, screen `Autoguider GROND & FEROS`
   - C2. Click on the bright star
   - C3. Once on fibre, click start guiding on the `Autoguiding` panel.
   - C4. Once guiding, click on popup asking for acquisition (Fig. 5.2(b)).

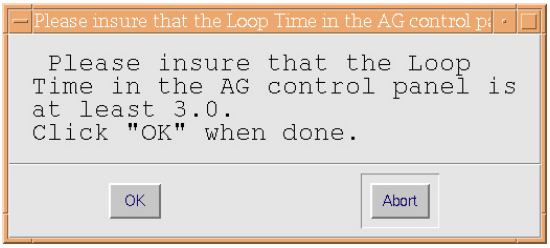
D. Perform the focus
   - D1. On the `Autoguiding` window, select numbers 6, 3, 0.2.
   - D2. After about 30 s, click `OK` to pop-up asking to ensure loop time is more than 3 (Fig. 5.2(c))
   - D3. A pop-up asks and suggest a focus estimate
     a. If number is in range 300–500, it should be fine, click `OK`.
     b. If not, fill in last remembered value or, if you don't have any, 400, then click `OK`.
   - D4. Shortly after, a pop-up asks to select a star to focus on (Fig. 5.2(e))
     a. A MIDAS image appears, left and right-click on a non-saturated source (Fig. 5.2(f)).
     b. Click `OK` to pop-up
   - D5. Wait for the focus to finish (5 min)
     a. The white graph window should have points a two curves fitting them (Fig. 5.2(g))
     b. A pop-up appears asking action to take about focus fit (Fig. 5.2(h))
   - D6. Take time to examine the focus fit quality and answer the popup:
     a. If it seems correct, click `OK`.
     b. If it seems incorrect, but you can spot a good focus value by eye
        - Click `No`
        - Give your guesstimate to new pop-up and click `OK`
     c. If you think you can try on another star, click `Retry` and go to step D4 ($\leq$ 1 min).
     d. If you have no clue, just abort. No focus is performed.



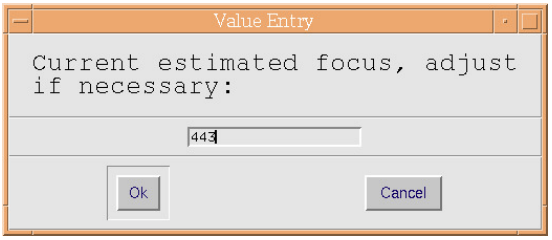
(a) Started focus OB



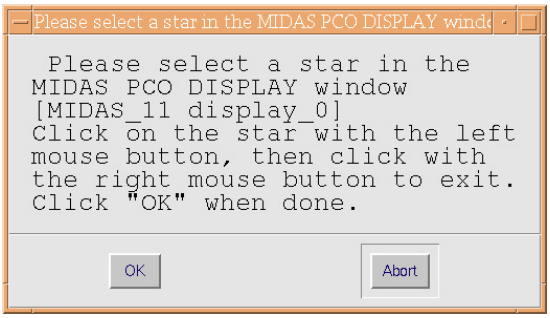
(b) Acquire the bright star onto fibre



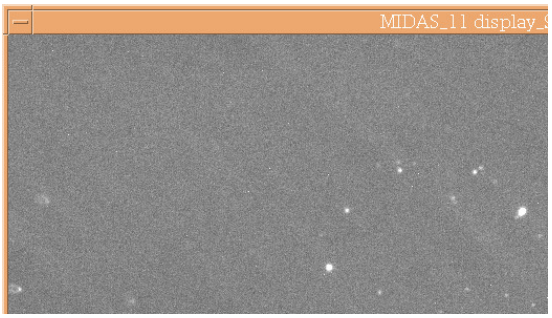
(c) Check loop time in the autoguider



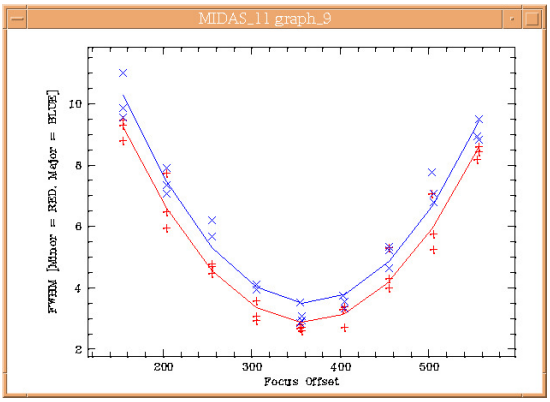
(d) Confirm old focus value



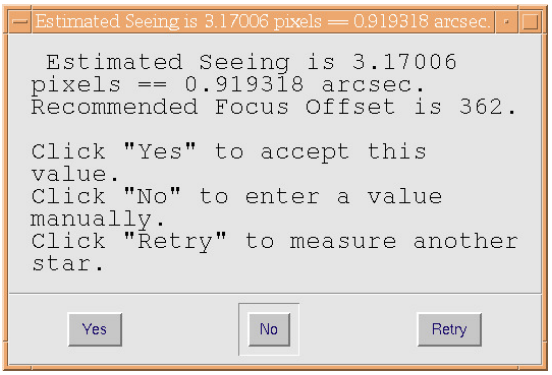
(e) Select a focus star in MIDAS window



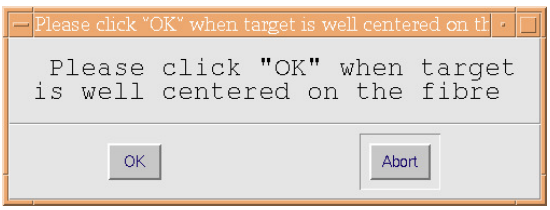
(f) MIDAS window



(g) Focus fit



(h) Confirm the focus value (or not)



(i) Check correct centring of the bright star

Figure 5.2: Focus with FEROS.

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 5.8. Focus and/or spectrophotometric standard

A. Perform steps of Sect. 5.3.1, p. 55 except that
   - OB directory is .../TEMPLATES/OBD/Focus+Standard
   - OB name is Focus+Standard-<ra>....obd with <ra> close to sidereal time.
B. After focus is done, change integration time to 0.01 on the Autoguiding window.
C. Two pop-ups will ask to wait for object to be centred on the fibre. Wait for it to occur and click OK.
D. Wait for spectrophotometric standard template to integrate and read out (1 min)

5.3.3 Radial velocity standards

Procedure 5.9. FEROS radial velocity standards

A. Got to bob on screen FEROS OB and fetch radial velocity standard OB:
   A1. Use window menu File→Load OBs→From file....
   A2. Select directory ../TEMPLATES/OBD/RVStandard.
   A3. Select RVStandard...<ra>....obd with <ra> close to sidereal time.
B. Proceed with guiding and answer popups, that's a normal observation (about 5 - 10 min).
   B1. In the e2p2 RTD window, click Centering (below Image Control), then click on the object.
   B2. In the Autoguiding window, set the integration time if necessary.
   B3. OK on popups (FEROS OB) when the object is centred.

5.4 GROND

5.4.1 Sky flats

Evening flats

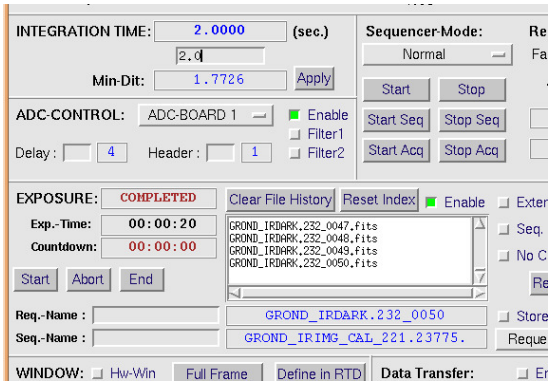
Before taking evening flat fields, check the relevant items of "no flux or little flux" in Sect. 10.2, p. 85. In particular the main mirror cover should be open and the dome set in automatic. The sky flat fields typically start when the sun is 4 degrees below the horizon. To be able to start on time, the following procedure should be started right at sunset.

Procedure 5.10. GROND evening flat fields

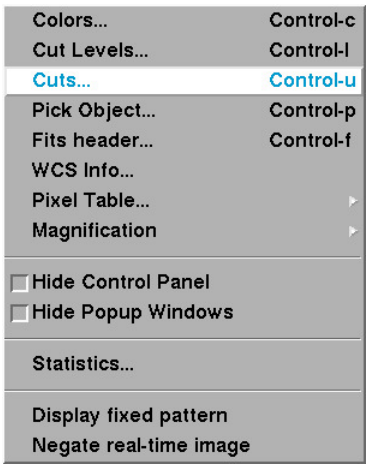
GROND flat field OB lasts about 30 min.

A. If not done, check that dome and main mirror are open (Procedure 4.1, p. 45).
B. If not done, point the telescope to an empty field (Procedure 4.2, p. 45, point B).
C. If not done, set the dome in automatic.
D. Go to GROND BOB screen.
E. If not done in the evening, do some prophylaxis (Procedure 2.1, p. 25, points D4 and D6)
   E1. Close bob.
   E2. In the terminal, type grondGRI.
   E3. In the terminal, type grondSHUTTER && grondFM (may last 1 min).
   E4. From the terminal, launch a new bob with bob &.
   E5. Execute a 1min1TD_test.obd with TCS ON.
F. Insert M3 mirror and open shutters
   F1. In the terminal, type grondM3 GROND.

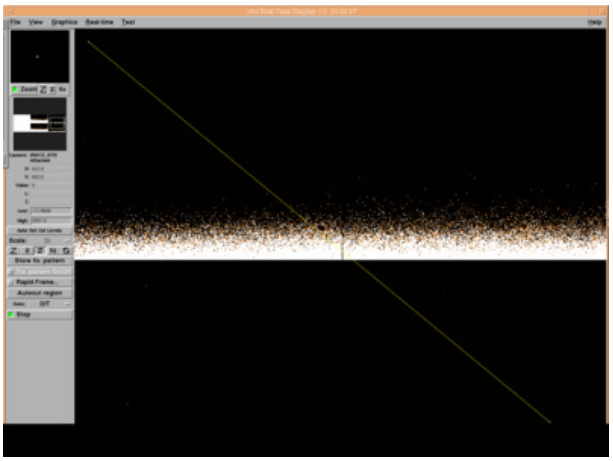
(a) Loaded sky flat-field OB



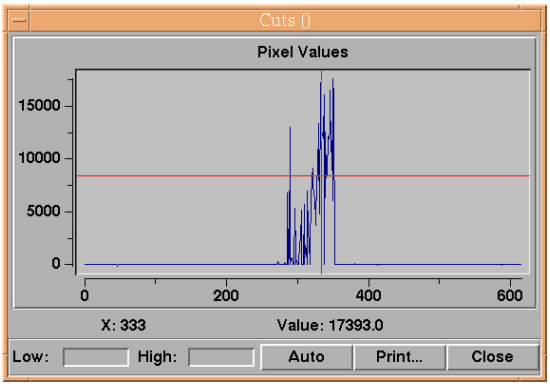
(b) Setting integration time to 2 s



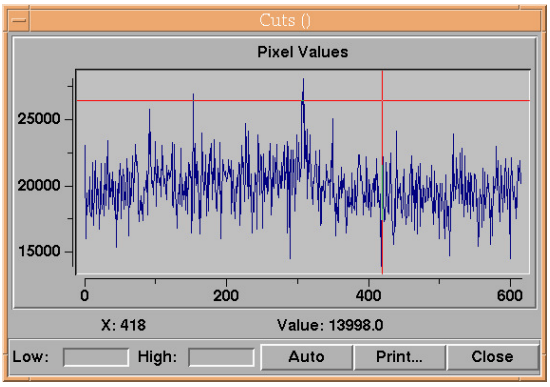
(c) Menu View→Cuts



(d) Cut line drawn on *J*-band detector



(e) Cuts for saturated *J*-band detector



(f) Cuts at 20,000 counts, ready to start flats

Figure 5.3: GROND evening sky flat fields.

F2. In the terminal, type `grondMC OPEN`.
F3. In the terminal, type `grondCS OPEN`.

G. Get sky flat fields OB ready (Fig. 5.3(a), p. 58)
In `bob`, fetch OB `GROND_img_cal_skyflats_ev`
(use `Flats/` folder).

H. Monitor the *J*-band counts.
H1. Go the the `GROND infrared (IRACE)` screen.
H2. Set the IR integration time to 2 s (Fig. 5.3(b), p. 58).
- Find window `Infrared Acquisition Module` (see Fig. 11.13(b), p. 130).
- Close to the `INTEGRATION TIME`, fill in value 2.
- Press enter (Don't do `Apply`.)

H3. 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 (Figures 5.3(c)–5.3(d)).
- Draw a diagonal on the image with the mouse.

H4. Wait for the cuts to look flat and with about 20 000 counts. (Figures 5.3(e)–5.3(f))
This should occur when the sun is about 4 degrees below the horizon.

I. When counts are OK, on the `GROND BOB` screen, click `Start` in `bob`.

Standards

Procedure 5.11. GROND standard field observation

The procedure lasts 7 min.

A. Select an SDSS standard field close to the meridian
In `bob` use window menu `File`→`Load OBs`→`From file...` and select one in sub-folder `Standards`
B. Execute it by clicking `Start`
C. You can ignore guiding and click `OK` if the `ob asks for it`

Morning flats

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

Procedure 5.12. GROND morning flat fields

A. Point the telescope to an empty field as explained in Sect. 4.1, p. 45.
B. Go to `GROND BOB` screen.
C. Insert M3 mirror and open shutters (if you were not already with GROND)
C1. In the terminal, type `grondM3 GROND`.
C2. In the terminal, type `grondMC OPEN`.
C3. In the terminal, type `grondCS OPEN`.
D. Get sky flat fields OB ready
In `bob`, fetch OB `GROND_img_cal_skyflats_mo`.
(Use `Flats/` folder.)
E. 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 General State` panel (Fig. 11.12(b), p. 130), 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 refine acquisition (Sect. 6.1.3, p. 63), i.e. 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, enter the pixel coordinates of the object, and whether to offset and/or refine again.
- to acquire the guiding (Sect. 6.1.4, p. 64), which you will click once you have done it. Almost all science observations will ask for it.

During an observation, it can happen that guiding acquisition is asked for several time

- For an observation with large dithers (`COMBINED.OFFSET` is `F`) the guiding will be asked at the beginning of each exposure.
- For an observation with different filtres, it will be asked for if at each filtre change.

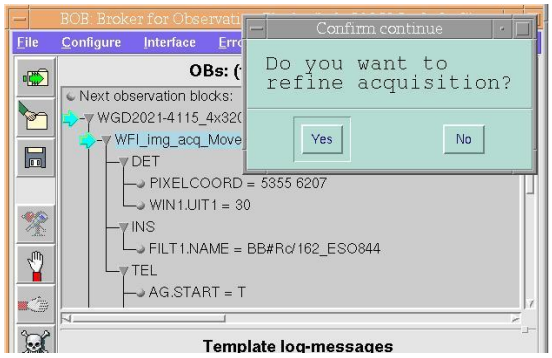
Error popups may also appear, see Chapter 10, p. 85.

6.1.2 Switching to WFI

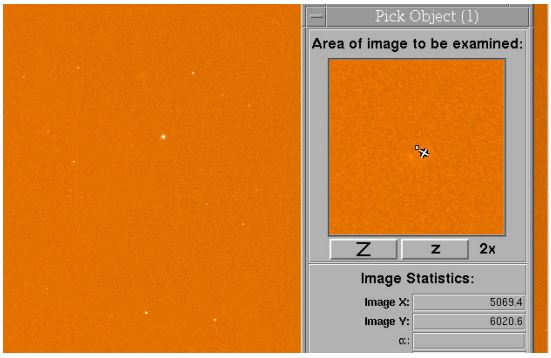
You may start an OB once point B has been done. This minimises overheads by parallelising preset and mirror movements. However, beware that someacquisition templates (movetopixel and movetogap) don't ask before taking the acquisition image, so you should be faster than preset.

Procedure 6.1. Switch to WFI observations

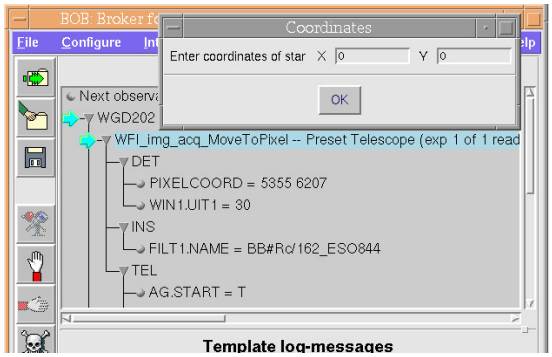
A. Open the WFI protective shutter.
B. Switch the pointing model to WFI.
   B1. Go to screen `Telescope Control Software`.
   B2. Go to the `TCS Status Panel` (virtual desktop `Status`, see Fig. 11.5, p. 125).
   B3. Use window menu `Instrument selection`→`WFI`



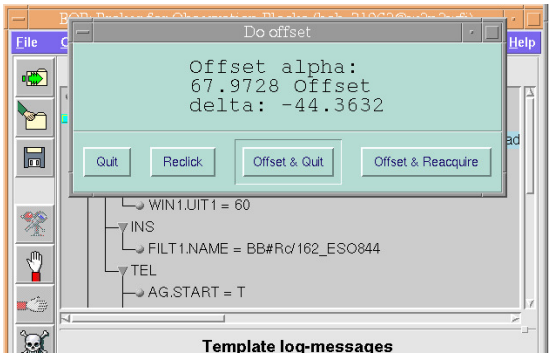
(a) Whether to refine acquisition



(b) Pick the target on the rtd



(c) Enter its pixel coordinates



(d) By default, choose to `Offset and quit`

Figure 6.1: Refining the WFI acquisition for the `WFI_img_acq_MoveToPixel` template.

C. Check the GROND M3 mirror.
   Go to screen `GROND BOB`.
   C1. Ensure that the M3 mirror is on WFI.
      a. Go to the GROND General State panel (virtual desktop `BOB+gen state`).
      b. Check the value of `GROND M3`.
   C2. If it is on GROND, set it to WFI.
      In a terminal, type `grondM3 WFI`.
      Redo point C1 (value should be MOVING then WFI).

D. Check the FEROS `mirr3` mirror.
   Go to screen `FEROS BOB`.
   D1. Ensure that the mirror is on WFI
      a. Go to the `FEROS General State` panel (virtual desktop `BOB+gen state`).
      b. Check the value of `M3 Selected Mirror`.
   D2. If it is on FEROS, set it to WFI.
      a. Go to the `FEROS ICS Control` panel (virtual desktop `ICS`).
      b. Select the `mirr3` checkbox (in green) under the `Motors` section.
      c. Select `WFI` on the same line.
      d. Click `SETUP` at the bottom of the panel.
      e. Deselect the `mirr3` checkbox.

6.1.3 Refining acquisition

It is possible to refine the acquisition with WFI if the OB has explicitly planned for it. Technically speaking, if the template is `WFI_img_acq_MoveToPixel` or `WFI_img_acq_MoveToGap`, the observer will be asked whether to offset the telescope so that a given target falls on a specific pixel of the CCD matrix or a gap of between the CCDS.

Refining takes place after telescope preset and before acquisition of the AG.

Procedure 6.2. Refine the acquisition of WFI

A. Wait for acquisition image
   - A1. Wait for the acquisition image to read out (≈ 1 min)
     On screen `WFI BOB`, window `rtd` you can change the cuts of the image and the scale.
   - A2. Wait for a pop-up asking to refine acquisition (a few seconds)
     It may appear on any of the two screens.

B. Accept or decline refining by answering the pop-up Confirm continue (Fig. 6.1(a), p. 62
   - B1. With `Yes`, this procedure continues and a second pop-up appears.
   - B2. With `No`, this procedure ends and observation goes on without recentring.

C. Pick target (Fig. 6.1(b), p. 62)
   - C1. Locate the target by means of a finding chart.
     Inspect the `rtd` window of screen `WFI BOB`
   - C2. Open the `Pick Object` window.
     On the `rtd`, use window menu `View`→`Pick OBject`
   - C3. Select the target.
     a. Click on the target
     b. Check the cross is centred on target in the `Pick Object` window
     c. If it isn't zoom out `z` and `Z` to achieve centring of the cross

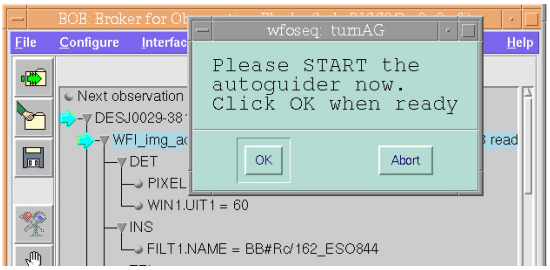
D. Enter coordinates on pop-up `Coordinates` (Fig. 6.1(c), p. 62)
   - D1. On `Pick Object`, copy the value of `Image X`
   - D2. On popup `Coordinates`, paste the value in `X coordinate`
   - D3. Do the same for `Image X`
   - D4. Click `OK` on the popup `Coordinates`

E. If a pop-up asks for the coordinates of the gap, attend it.
   It occurs for template `WFI_img_acq_MoveToGap`. Its handling is similar to steps C–D.

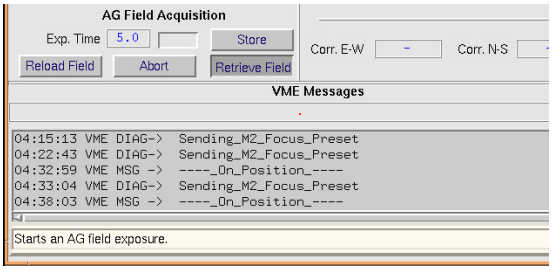
F. Examine the offset proposition on pop-up `Do offset` (Fig. 6.1(d), p. 62)
   Read the offset values (in arcseconds) and decide whether they make sens.

G. Answer pop-up `Do offset` (Fig. 6.1(d), p. 62)
   - G1. `Offset and quit`: the recentring will be performed.
     This is the most common action.
   - G2. `Offset and reaquire`: the recentring will be performed, and procedure starts again from step A for an additional centring to increase precision.
     This is used when an accuracy of the order of a pixel is needed or it is important to ensure the target is in the gap.
   - G3. `Quit`: no offset will be performed and this procedure ends.
     Mostly used when the OB will be aborted.
   - G4. `Reclick`: no offset is performed and this procedure starts again from step C.
     Mostly used if an obvious clicking or copying error has been done in steps C–D.

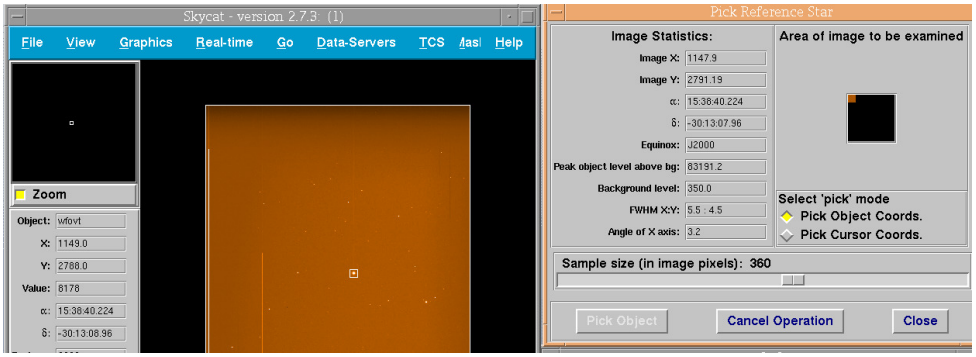
H. Wait for telescope offset (recentring) to complete (≈ 30 s)
   After that, either AG acquisition will be asked or science observations will start.



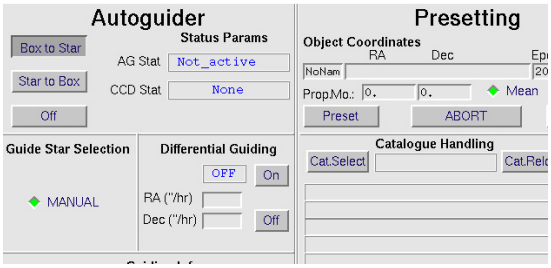
(a) Whether to guide, answer once AG is active



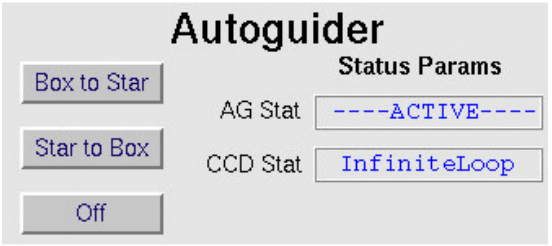
(b) Retrieve the AG field on `TCS Setup Panel`



(c) Pick the guide star on `skycat`



(d) Start guiding with box to star



(e) Wait for guiding to get ACTIVE

Figure 6.2: Setting the WFI AG for targets outside the solar system

6.1.4 Guiding

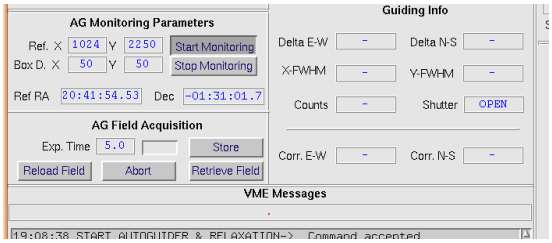
Procedure 6.3. Guide with WFI

A graphical outline of the procedure is given in Fig. 6.2, p. 64 in the case no differential guiding (for solar system bodies) is needed.

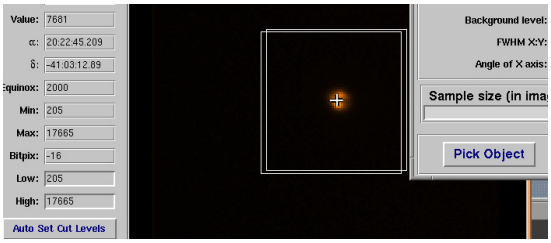
A. On the TCS workstation, acquire the guide field (Fig. 6.2(b), p. 64)
   - A1. Go to screen `Telescope Control Software`.
   - A2. Locate the `TCS Control Panel` (Fig. 11.2, p. 122).
   - A3. Click `Retrieve Field` below `AG Field Acquisition`.

B. For solar system objects, set-up the differential guiding n
   - B1. Locate the `Differential guiding` section on the `TCS Control Panel` (Fig. 11.2, p. 122)
   - B2. Enter the target's proper motion in arcseconds per hour
   - B3. Click `ON`

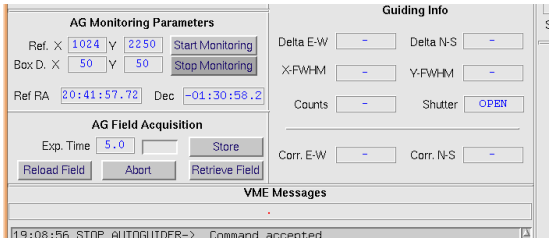
C. On the autoguider windows (Fig. 11.4, p. 124), choose the guide star (Fig. 6.2(c), p. 64)
   - C1. Wait (≈ 30 s) for `skycat` to read out the guide field.
   - C2. On the same window, click `Auto Set Cut Levels`.



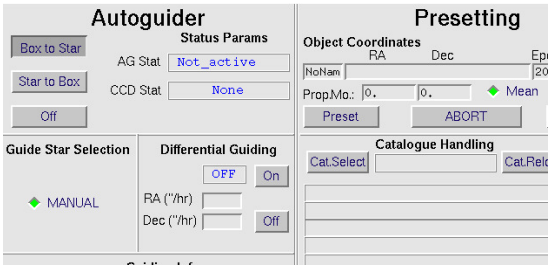
(a) Start monitoring



(b) `Pick Reference Star` on `skycat`



(c) Stop monitoring



(d) Start guiding with `Box to Star`

Figure 6.3: Fast guiding acquistion with WFI

C3. Open the `Pick Reference Star` window if necessary.
In `skycat` chose window menu `TCS`→`Pick Reference Star`.
C4. 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.

D. On the `TCS Control Panel` (Fig. 11.2, p. 122) start the guiding
D1. Activate the guiding (Fig. 6.2(d), p. 64)
Click `Box to Star` below `Autoguider`.
D2. Wait for guiding to start (Fig. 6.2(e), p. 64)
In a few seconds `ACTIVE` should appear in `AG Stat`.

E. Proceed with the observation, typically by clicking on pop-up asking for guiding (Fig. 6.2(a), p. 64)

After a filtre 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 6.4. Restart guiding with WFI

A graphical outline of the procedure is given in Fig. 6.3, p. 65. Stopping monitoring and picking reference star can be performed in any order.

A. On the TCS machine, go to screen `Telescope Control Software`.
B. On the `TCS Control Panel` (Fig. 11.2, p. 122)
B1. Click `Start monitoring` (Fig. 6.3(a), p. 65)
B2. Click `Stop monitoring` (Fig. 6.3(c), p. 65)
C. Select the star on the autoguider windows (Fig. 11.4, p. 124)
C1. Click `Pick object` in the `Pick Reference Star` window.
C2. Click on the star in the `skycat` window (Fig. 6.3(b), p. 65).
D. On the `TCS Control Panel` (Fig. 11.2, p. 122) start the guiding
D1. Activate the guiding (Fig. 6.3(d), p. 65)
Click `Box to Star` below `Autoguider`.

D2. Wait for guiding to start (Fig. 6.2(e), p. 64)
In a few seconds ACTIVE should appear in AG Stat.

E. Proceed with the observation, typically by clicking on pop-up asking for guiding (Fig. 6.2(a), p. 64).

6.2 FEROS

6.2.1 Switching to FEROS

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

Procedure 6.5. Switch to FEROS observation

A. Switch the pointing model to FEROS.
   A1. Go to screen Telescope Control Software.
   A2. Go to the TCS Status Panel (virtual desktop Status, see Fig. 11.5, p. 125).
   A3. Use window menu Instrument selection→FEROS
B. Ensure the FEROS mirr3 mirror is on FEROS.
   B1. Go to he FEROS General State panel on virtual desktop BOB+gen state on screen FEROS BOB.
   B2. If the value of M3 Selected Mirror is WFI, set it to FEROS
      a. Go to the FEROS ICS Control panel (virtual desktop ICS).
      b. Select the mirr3 checkbox (in green) under the Motors section.
      c. Select FEROS on the same line.
      d. Click SETUP at the bottom of the panel.
      e. Deselect the mirr3 checkbox.
C. Ensure the GROND M3 mirror is on WFI.
   C1. Go to he GROND general state panel on virtual desktop bob+gen space of screen GROND BOB
   C2. If the value GROND M3 is GROND send it to WFI.
   In a terminal, type grondM3 WFI.
   C3. Check that value GROND M3 goes to MOVING then WFI (2 min)
D. Set up the autoguider
   D1. Go to the FEROS virtual desktop of screen Autoguider GROND & FEROS
   D2. Set up the autoguiding properties. (See Fig. 2.6, p. 35)
      a. Go to window Autoguider
      If necessary open with left-click mouse menu CAM user→Autoguider.
      b. Change the guiding unit to FEROS
      Select FEROS under Guiding unit in the CCD Control area.
      c. 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).
      d. 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.
   D3. Set up the autoguider real time image.
      a. Go window FEROS AG Real Time Display.
      If necessary open with left-click mouse menu CAM user→E2P2...

b. Activate the guide camera image flow if necessary.
If checkbox `Camera On/Off` is not green, click on it.
c. Ensure autoguider refreshes image
On the `Autoguider control` the checkbox Display Enable should be red
d. Ensure the image is horizontally flipped.
Right of scale the button ↔ should be pressed.

D4. Set the fibre reference position if GROND was used
a. Open or activate window `Pick Reference Star` (Fig. 6.4, p. 67).
Click `Set Reference` on window `FEROS AG Real Time Display`.
b. Ensure the reference is set on the cursor's clicking position.
On window `Pick Reference Star`, select checkbox `Pick Cursor`.
c. Back on window `FEROS AG 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.

E. Start the observation.
E1. Go the the `bob+gen state` virtual desktop of screen `FEROS BOB`
E2. In `bob`, fetch OB and click `Start`

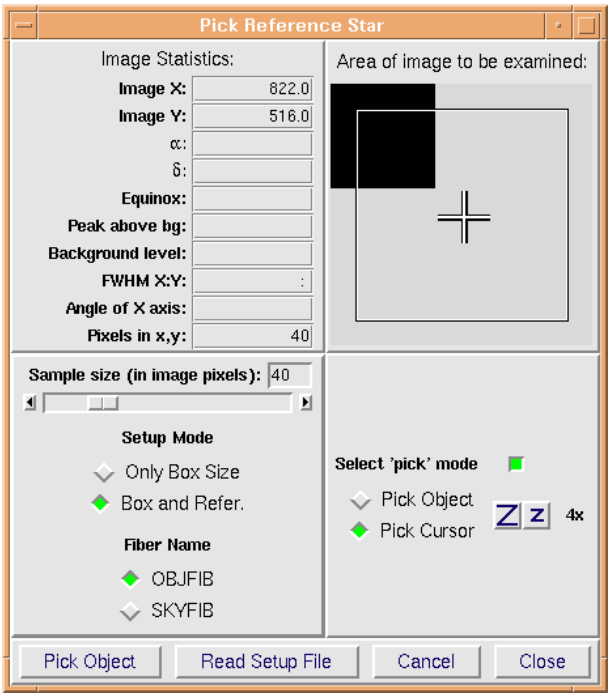


Figure 6.4: Window to set FEROS fibre reference position `Pick Reference Star`. Select checkbox `Pick Cursor`.

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 ≈ 4–5000 counts) or with bad weather.

Procedure 6.6. Guide a FEROS observation using reflection on the fibre head

A. Check that WFI AG is off.
   A1. Go to the `Control` virtual desktop of screen `Telescope Control Software`
   A2. On the `TCS Control Panel`, below `Autoguider`, check that `Ag Stat` is `Not_active`
   A3. If active, click `OFF`
B. Centre the target onto the fibre.
   B1. Go to screen `Autoguider GROND & FEROS`, virtual desktop `FEROS`
   B2. In window `FEROS AG Real Time Display`, change scale back to full field (1/2)
   B3. Change cuts (`Autoset Cut Levels`)
   B4. Click `Centering` below `Image Control`
   B5. Click on the target.
   B6. Wait for target to be centred (5–10 s).
C. Adapt guiding integration time to the stellar brightness
   C1. In `Autoguiding` window, fill values
      a. `Correction Time` (usually 6)
      b. `Loop Time` (usually 3, must be ≤`Correction Time`)
      c. `Integration time` (depends on star, must be <`Loop Time`)
   C2. Click `Apply`
D. Click `Start guiding`.
E. Ensure that brightness is sufficient for guiding
   E1. In window `FEROS AG Real Time Display`, check that the counts on the doughnut around the fibre are above 4 000 to 5 000
   E2. In `Autoguiding` window, adapt `Integration time`
   E3. Click `Set Int. time`.
   E4. If you need an integration time larger than `Loop time`,
      a. Click `Stop guiding`
      b. Perform point C again with larger values (e.g. 8, 8, 7.99)
      c. Click `Start guiding`
F. If running the acquisition of an OB
   F1. Wait for star to be well-centred on the fibre (5–30 s).
   F2. Go to screen `FEROS BOB`, virtual desktop `bob+gen. state`
   F3. Click `OK` to the pop-up asking for guiding.

It is possible to guide blindly 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 6.7. Guide a FEROS observation blindly using off-fibre reference

A. Check that WFI AG is off.
   A1. Go to the `Control` virtual desktop of screen `Telescope Control Software`
   A2. On the `TCS Control Panel`, below `Autoguider`, check that `Ag Stat` is `Not_active`
   A3. If active, click `OFF`
B. Centre the target precisely onto the fibre.
   B1. Go to screen `Autoguider GROND & FEROS`, virtual desktop `FEROS`

B2. In window FEROS AG Real Time Display, change scale back to full field (1/2)
B3. Change cuts (Autoset Cut Levels)
B4. Click Centering below Image Control
B5. Click on the target.
B6. Wait for target to be centred (5–10 s).
B7. Repeat if necessary to achieve close to perfect centering.

C. Adapt guiding integration time to the off-fibre guide star brightness
C1. In Autoguiding window, fill values
a. Correction Time to 6
b. Loop Time to 3
c. Integration time to a value <Loop Time)
C2. Click Apply

D. Select the guide star
D1. Click Set reference
D2. In window Pick Reference Star, under Select 'pick' mode select Pick Object
D3. In window FEROS AG Real Time Display, click on star

E. Click Start guiding.

F. Ensure that brightness is sufficient for guiding
F1. In window FEROS AG Real Time Display, check that the counts on the star are above 4 000 to 5 000
F2. In Autoguiding window, adapt Integration time
F3. Click Set Int. time.

G. If running the acquisition of an OB
G1. Wait for star to be well-centred on the fibre (5–30 s).
G2. Go to screen FEROS BOB, virtual desktop bob+gen. state
G3. Click OK to the pop-up asking for guiding.

H. When the OB is finished, set the reference back to fibre (see point D4 of Procedure 6.5, p. 66).

Using the WFI autoguider

This is the preferred method 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. In case of clouds, guiding will do a random walk...

Procedure 6.8. Guide a FEROS observation with the WFI guide camera

A. Check that WFI AG is off.
A1. Go to the Control virtual desktop of screen Telescope Control Software
A2. On the TCS Control Panel, below Autoguider, check that Ag Stat is Not_active
A3. If active, click OFF

B. Adapt guiding integration time to quick visual monitoring
B1. In Autoguiding window, fill values to allow a quick visual monitoring, yet bright enough to see target:
a. Correction Time to 1–3
b. Loop Time to 1–3
c. Integration time to 0.99–2.99
B2. Click Apply

C. Change WFI filtre to limit the defocus in the WFI AG
C1. Go to the workstation WFI BOB, virtual desktop ICS.
C2. In panel WFI ICS Control, select filtre under SETUP Instrument.
- If FEROS ADC is used, select Cousins *I*.

- Other wise, use standard *R*.

C3. In the same panel, click apply.
C4. Wait for filtre change (≈ 1–2 min), to start step F
- On the panel, field `Filtre Name` will first display `Moving`.
- When the right filtre name appears, proceed

D. Centre the target onto the fibre.
D1. Go to screen `Autoguider GROND & FEROS`, virtual desktop `FEROS`
D2. In window `FEROS AG Real Time Display`, change scale back to full field (1/2)
D3. Change cuts (`Autoset Cut Levels`)
D4. Click `Centering` below `Image Control`
D5. Click on the target.
D6. Wait for target to be centred (5–10 s).
D7. Zoom in to check centring (scale ∼ 5)
D8. If not using the ADC, repeat centring until you achieve close to perfect centering.

E. If executing an OB with the ADC
E1. Go to screen `FEROS BOB`, virtual desktop `bob+gen. state`
E2. Click `OK` on the first pop-up asking for guiding
E3. Wait for the first exposure to start
E4. In `FEROS General State`, click `PAUSE`

F. Proceed with guiding as for a WFI OB (Procedure 6.3, p. 64).

G. Recentre the target on the fibre
G1. Go to the workstation `Telescope Control Software`.
G2. On the `TCS Main Panel` find the virtual racket.
G3. Select `Offset` and tick checkbox `Combined Offsets`.
G4. Enter offset values for both axes (0.3) and click `Store`.
G5. While monitoring the `FEROS AG Real Time Display` on screen `Autoguider GROND & FEROS`, use arrows to centre the target
A full fibre width is 5 arrow clicks.
Keep in mind the centring will have a delay of 10–15 s.

H. Attend the OB on screen `FEROS BOB`, virtual desktop `bob+gen. state`
H1. If using the ADC, click `CONT` in the `FEROS General State`
H2. Click `OK` on any pop-up asking for centring on the fibre

I. When the OB is finished, turn off the WFI autoguider
I1. Go to the `Control` virtual desktop of screen `Telescope Control Software`
I2. On the `TCS Control Panel`, below `Autoguider`, click `OFF`
I3. Check that `Ag Stat` turns to `Not_active`

6.3 GROND

6.3.1 Switching to GROND

You can start an OB once point A 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 6.9. Switch to GROND observations

A. Ensure the GROND main cover is closed to avoid pointing at 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.

A1. Go to screen GROND BOB.
A2. In a terminal, type grondMC CLOSE.
A3. Wait for cover to close (10-15 s) on panel GROND General State
Due to a bug, it will say Moving, Open, then Closed

B. 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.

C. To gain time, ensure the GROND M3 mirror is on GROND
C1. Go to window GROND General State on screen GROND BOB
C2. If M3 says WFI, send it to GROND.
In a terminal, type grondM3 GROND and wait for it to go from MOVING to GROND

D. Check that WFI AG is off
D1. Go to the Control virtual desktop of screen Telescope Control Software
D2. On the TCS Control Panel, below Autoguider, check that Ag Stat is Not_active
D3. If active, click OFF

E. Set up the autoguider
E1. Go to the GROND virtual desktop of screen Autoguider GROND & FEROS
E2. Set up the autoguiding properties. (See Fig. 2.6, p. 35)
a. Go to window Autoguider,
If necessary open it with left-click mouse menu CAM user→Autoguider.
b. Change the guiding unit to GROND
Select GROND under Guiding unit in the CCD Control area.
c. 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.
d. 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.

E3. Set up the autoguider real time image.
a. Go window Telescope R.T.D.
If necessary open it with window menu CAM User→Autoguider RTD Grond
b. Activate the guide camera image flow if necessary.
Use window menu TCS→Attach camera.
c. Ensure autoguider refreshes image
On the Autoguider control the checkbox Display Enable should be red
E4. Ensure the reference picking window Pick Reference Star is open
If necessary open it from rtd with window menu TCS→Pick Reference Star

F. Start the observation
F1. Go the the bob+gen state virtual desktop of screen FEROS BOB
F2. In bob, fetch OB and click Start
F3. Wait for preset to near or reach target
Look on the Rose Diagram of the TCS Setup Panel on the TCS screen.
F4. Open the main cover
a. Go to screen GROND BOB.
b. In a terminal, type grondMC OPEN.
c. 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.
F5. Acquire guide star is needed or asked

6.3.2 React to an automatic trigger

When the RRM of GROND is activated, it is possible that the detection of a transient by a satellite sends an automatic notice that will result in GROND taking command of the telescope.

Procedure 6.10. React to an automatic trigger

A. Check that your exposure is being read out automatically, if not, do it manually
   - *(FEROS)* click `END` on `FEROS General State`
   - *(WFI)* click `END` on `WFI General State` panel.
     If WFI wasn't read out and preset is started, frame is lost.

B. Click `OK` on the trigger to start preset.
   Preset will be automatic after 30 seconds.

C. Set up the autoguider (unless you were observing with GROND).
   Go to the screen `Autoguider GROND & FEROS`

D. Switch off the WFI autoguider if needed
   D1. Set up the autoguiding properties. (See Fig. 2.6, p. 35)
      a. Go to window `Autoguider`, open it if necessary.
         To open: left-click on the background, choose `Autoguider` from menu `CAM user`.
      b. Change the guiding unit to GROND
         Select `GROND` under `Guiding unit` in the `CCD Control` area.
      c. 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.
      d. You may need to `Start exposure`.
   D2. Set up the autoguider real time image.
      a. Go window `Telescope R.T.D.`, open it if necessary.
         To open: left-click the screen background, choose `Autoguider RTD Grond` from menu `CAM user`.
      b. Activate the guide camera image flow if necessary.
         Use window window menu `TCS`→`Attach camera`.
   D3. Ensure the reference picking window is open
      a. Look for window: `Pick Reference Star`
         To open: from `rtd` window use window menu `TCS`→`Pick Reference Star`

E. Start the guiding (Sect. 6.3.3, p. 72 below).

6.3.3 Guiding

Procedure 6.11. Guide with GROND

A. Prepare the guiding field
   A1. Go to `Telescope R.T.D` on screen `Autoguider GROND & FEROS`, virtual desktop `GROND AG`
   A2. Set the scale to 1/2
   A3. Set cuts (`Autoset Cut Levels`)

B. Adapt guiding integration time to the guide star brightness
   B1. In `Autoguiding` window, fill values
      a. `Correction Time` (usually 8)
      b. `Loop Time` (usually 4, must be ≤`Correction Time`)
      c. `Integration time` (depends on star, must be <`Loop Time`)
   B2. Click `Apply`

C. Acquire a guide star

C1. On the Pick Reference Star window, click Pick Object
(It can be open from the Telescope R.T.D, using window menu TCS→Pick Reference Star)
C2. Click on a star at least 100 pixels off any border
C3. On the Autoguiding window, click Start guiding.

D. Ensure that brightness is sufficient for guiding
D1. In window Telescope R.T.D check that counts are $\gtrsim 4000$.
D2. In Autoguiding window, adapt Integration time
D3. Click Set Int. time.
D4. If you need an integration time larger than Loop time,
a. Click Stop guiding
b. Perform point B again with larger values (e.g. 8, 8, 7.99)
c. Click Start guiding

E. If running the acquisition of an OB
E1. Go to screen GROND, first virtual desktop
E2. Click OK if there is a pop-up asking for guiding.

6.4 All instruments

6.4.1 Run an observing block

There are two ways to run an OB: use a template in bob and modify it on the fly or call it from the vot 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 6.12. Skip the preset

A. Generic method
A1. In bob, open the acquisition template
Use left click on the triangle.
A2. Edit the PRESET field to F
You need to set bob to "engineering" mode.
Middle click on the value, it should be T by default.
A3. Start the guiding if needed
For WFI, see quick guiding Procedure 6.4, p. 65
A4. Start the OB.

B. Standard observation with FEROS or GROND
B1. In bob, deactivate the acquisition template
Use right click on the triangle.
B2. Ensure guiding is working if needed
B3. Start the OB.

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.

A. On the TCS screen, ensure that the Auxiliary Functions (Fig. 11.6, p. 125) is open.
   If not, left-click on an empty region and select window menu `TCS User`→`Panels`→`ux Functions`.
B. On the Windows desktop, ensure mozilla shows the dome webcam (Fig. 11.15, p. 132).
   The tab named `TRENDNET...` can be opened with bookmark `Dome Webcam`.
C. 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. 11.14, p. 131).

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

A. Close the main mirror cover.
   In the `TCS Setup Panel` (Fig. 11.3, p. 123), click `Close` below `Main Mirror Cover`.
B. Wait ≈ 2 min until it says closed.
   In the same panel, it should state `Closed` below `Main Mirror Cover`.
C. Park the telescope.
   In the same panel, click `Zenith` under `Fixed preset`.
D. Wait for preset to complete.
   In the `TCS Control Panel`, the telescope should be at the zenith in the `rose diagram`.
E. Put the dome in manual.
   In the `TCS Setup Panel`, click the `Manual` checkbox under `Dome`.
F. Close the dome slit.
   In the same panel, click `Close` under `Slit`.
G. Switch on the light in the dome (Fig. 11.15, p. 132).
   In the Auxiliary Functions (Fig. 11.6, p. 125), select `200V` under `Flat Field Lamp`.

H. Check the dome slit is closed and telescope at zenith
Use the dome webcam (Fig. 11.15, p. 132) on the mozilla tab TRENDNET on the Windows desktop.
I. 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 10.33, p. 100).

If nothing works, you must ask for support from an ESO telescope and instrument operator (TIO). ESO is still responsible for the safety of the facilities.

7.3 Instruments

One should close the protective shutter of WFI and main cover of GROND, cut the communication between instruments and TCS, and ensure mirrors let light directly to WFI for dome flat fields.

Procedure 7.2. Put the instruments offline

A. Close the WFI protective shutter.
Check on the WFI General State panel in the WFI monitor (Fig. 11.9, p. 127) that Protective Shutter State is CLOSED.
If not, go to Auxiliary Functions (Fig. 11.6, p. 125) and CLOSE the WFI Protective Shutter.
B. Deactivate FEROS communication.
In the FEROS control panel (Fig. 11.10, p. 128) select from window menu Telescope→IGNORE.
C. Deactivate GROND communication.
In the GROND General State panel (Fig. 11.12(b), p. 130), click RRM STANDBY and TCS OFF
D. With GROND, close the cold shutter and main cover.
In a terminal, type grondCS CLOSE and grondMC CLOSE.
E. Ensure FEROS mirr3 mirror is not in the way.
In panel FEROS General State (Fig. 11.10, p. 128), M3 Selection Mirror should state WFI
If not, int the FEROS ICS Control control panel (Fig. 11.11, p. 129), check the mirr3 box, select WFI, click SETUP.
F. Ensure GROND M3 mirror is not in the way.
In panel GROND General State (Fig. 11.12(b), p. 130), 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. 11.14, p. 131). If it is required, use the good seeing password.

A. Turn off the dome ventilation.
Click Dome Air if the button just above it is green.
B. 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 sub-directory 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

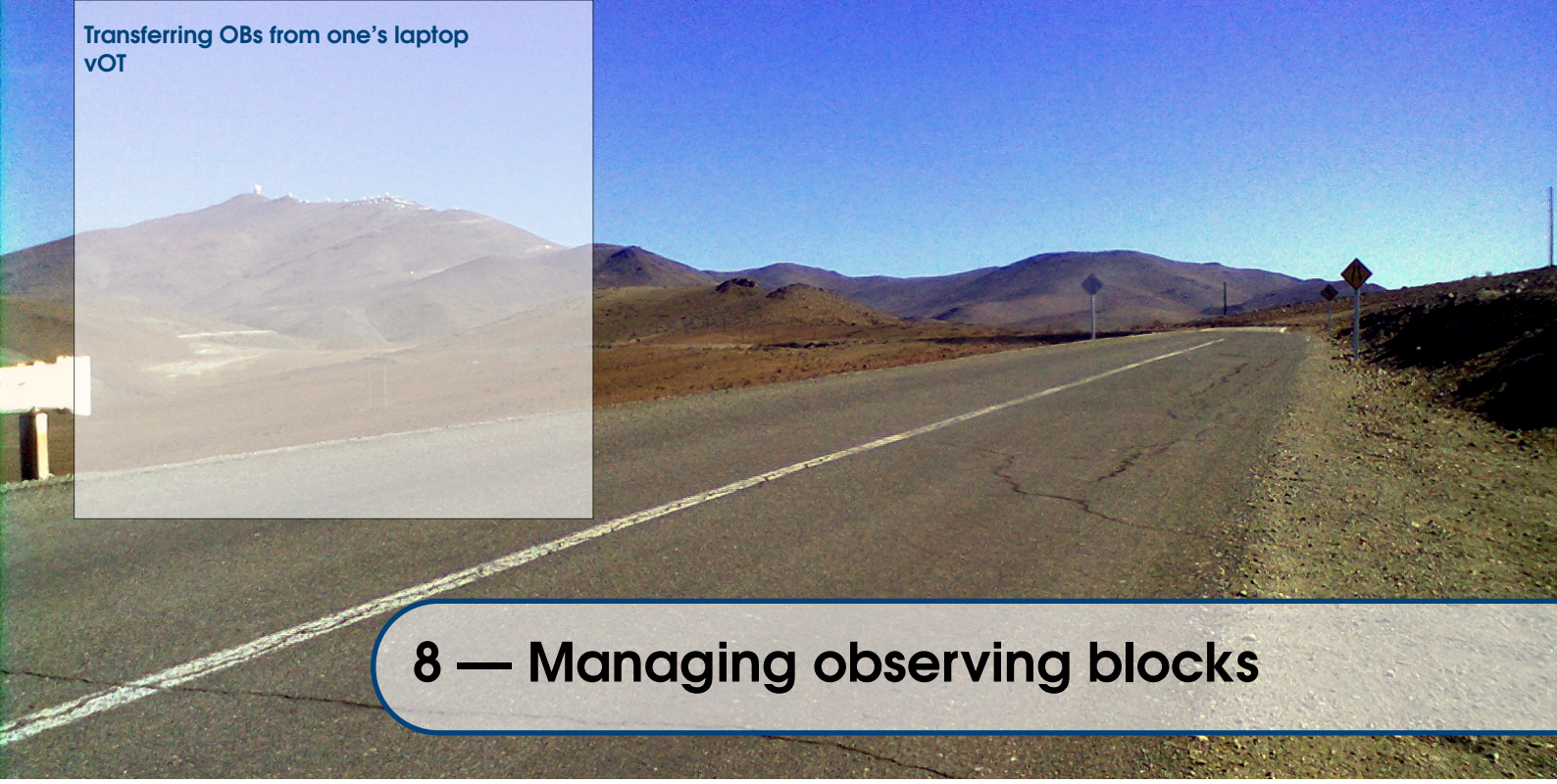
A. On the WFI screen, type `~/bin/sciopsTidyMess.sh` in a terminal (wfi xterm).
B. On the FEROS screen, type `~/bin/sciopsTidyMess.sh` in a terminal.

7.6 Health checks & internal calibrations

Launch health checks and internal calibrations.

Procedure 7.4. Launch morning health checks and internal calibrations

A. 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.
B. 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.
C. 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

- On your laptop open p2 in a browswer
- Log in and select all your OBs.
- Use window menu `File`→`Check-in`
- Use window menu `Readme`→`CheckIn Readme` if necessary

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 p2/vot 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 vot with your credentials
- Select your program ID on the left column
- Use window menu `File`→`Import`

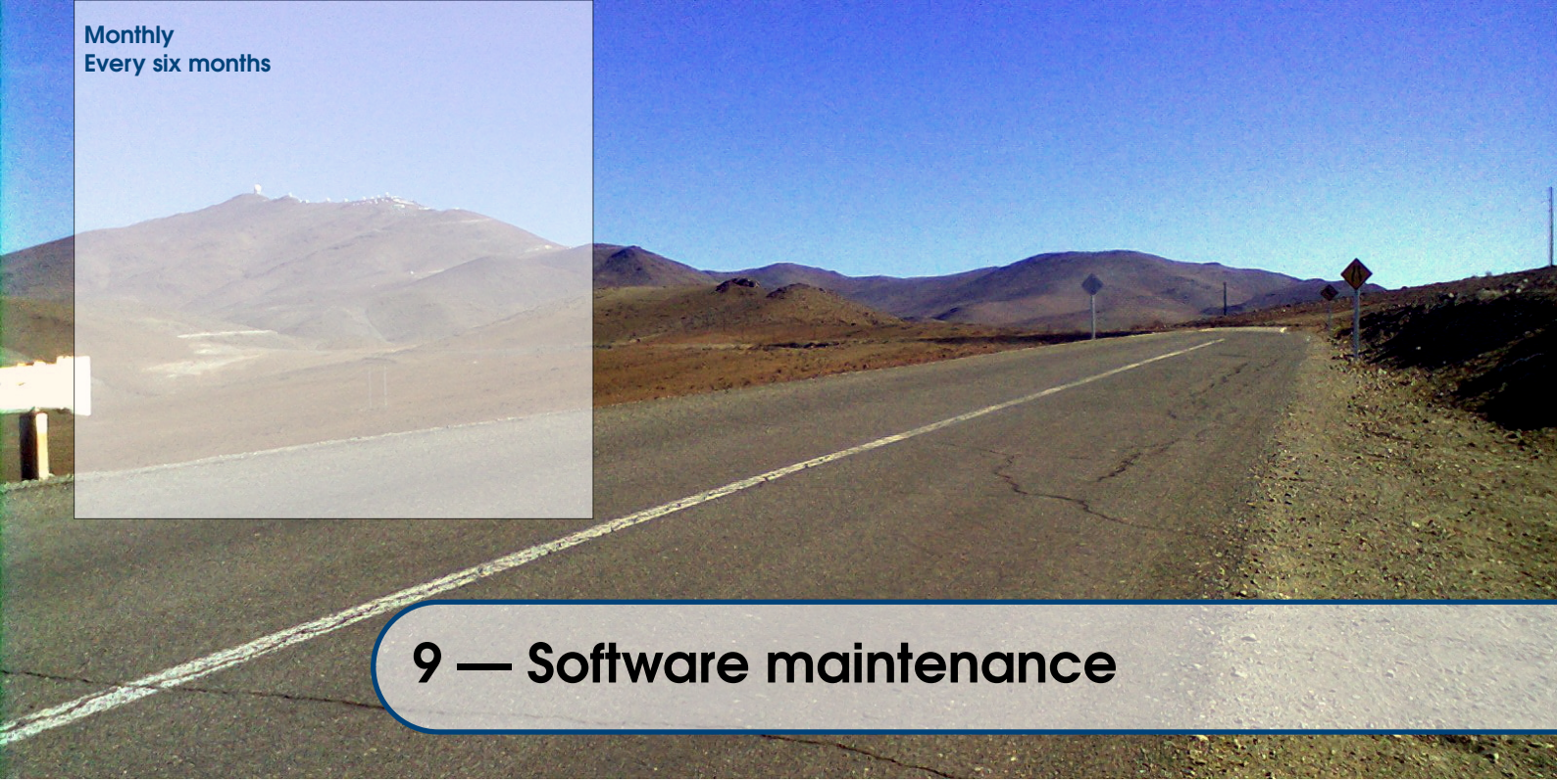
Note: if you cannot activate ssh services on your laptop, use a USB stick and someone else's computer. Alternatively, send an e-mail you will open on the p2/vot machine (not advised).

8.2 vOT

On the p2/vot machine, there is a virtual desktop to use OBs from the observing tool (vot). In the Repository Browser of the vot, 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 window menu Configure→Environment. In the Process use vot. Now you can fetch the OB from vot.



9 — Software maintenance

9.1 Monthly

About once a month a software maintenance should be done for prophylaxis.

Procedure 9.1. Monthly software maintenance

A. Stop some processes and applications (2 min)
   A1. On the `vOT/p2` screen, exit applications
      a. Locate the main `vot` window with the execution sequence and exit it.
      b. Locate any open web browswer with open `p2` and exit it
   A2. On the pipeline screen, stop pipeline processes
      a. Open or locate a terminal
      b. Type `doControl stop`
      c. Type `stopRBS`
   A3. On the FEROS DRS screen, stop data processes following the first two points of Procedure 10.20, p. 95
      a. Stop and close the data subscriber and the FEROS DRS panel (point B)
      b. Kill processes and remove lock files (point C)
B. Exit all sessions except GROND (1 min)
   B1. On the TCS screen, exit the X environment
   B2. On the WFI screen, exit the X environment
   B3. On the FEROS screen, exit the X environment
   B4. On the GROND and FEROS AG screen, exit the X environment
   B5. On the GROND screen, exit the X environment
   B6. On the `p2/vot screen`, exit the X environment
   B7. On the pipeline workstation, exit the X environment
   B8. On the FEROS DRS workstation, exit the X environment
C. Power cycle all black Dell boxes except GROND's (2 min)
D. Log into all sessions (2 min)
   D1. On the TCS screen, login as `tcs`
   D2. On the WFI screen, login as `wfi`
   D3. On the FEROS screen, login as `feros`
   D4. On the FEROS and GROND AG screen, login as `cam`

D5. On the GROND screen, login as `grond`
D6. On the `p2`/`vot` workstation, login as `dhs`
D7. On the pipeline workstation, login as `pipeline`
D8. On the FEROS DRS workstation, login as `astro`

E. Reboot workstations (except GROND)
E1. On the TCS screen, open a tcs terminal and type `reboot`
E2. On the WFI screen, open a wfi terminal and type `reboot`
E3. On the FEROS screen, open a feros terminal and type `reboot`
E4. On the FEROS DRS screen, open a terminal type `reboot` as root
E5. On the pipeline screen, open a terminal type `reboot` as root
E6. On the `p2/vot` screen, open a terminal type `reboot` as root

F. Wait for the reboots to complete (20–30 min). You can check with any of the following:
- The terminal disappears when clicked on
- From a grond terminal, type `ping <machine>`.
  - <machine> can be `w2p2tcs`, `w2p2ins` (WFI), `wferos`, `w2p2dhs` (vOT/p2), `w2p2pl` (pipeline), `w2p2off` (FEROS DRS).
  - Reboot is not done if `No route to host` is answered.
  - When ping starts sending internet speed stats reboot is almost complete (less than one minute left).

G. Restart some processes and applications
G1. On the `vOT/p2` screen, open `vot`
G2. On the pipeline workstation
a. Open a terminal
b. Type `dhsSubscribeControl start pipeline -backsince <date>`
pick <date> a few days ago
c. Type `doControl start wfi,feros`
d. Type `startRBS pipeline.config`
G3. On the FEROS DRS workstation, follow the last point of Procedure 10.20, p. 95 in order to
a. Open and configure data subscriber (point D1)
b. Open the FEROS DRS panel (point D2)

H. Perform a full TCS restart

9.2 Every six months

Every six months a weekly software maintenance has an additional step with the reboot of the user workstation.

Procedure 9.2. Biannual software maintenance

A. Stop processes and exit sessions (steps A–B of Procedure 9.1, p. 81)
B. Reboot the user workstation (Procedure 9.3, 15 min)
C. Power cycle dell boxes, log into sessions, reboot workstations, restart processes, and start-up TCS (steps C–H)

Procedure 9.3. Reboot the user workstation

A. Ensure that you exit all screens (TCS, WFI, FEROS, AG, GROND, DHS, FEROS DRS, pipeline).
B. On any screen open an `uws2p2` terminal
Use right-click menu window menu `Utilities`→`User WS xterm`
C. Gain root access
In the terminal, type `su` and enter the usual root password

D. Type `reboot` and wait 15–20 min
E. Powercycle all black boxes connected to the screens
F. Enter each session (tcs, wfi, feros, cam, grond, dhs, astro, pipeline)

10 — Troubleshooting

10.1 Power outage

In case of a power outage or a after a switch back to the outer electric network a micro powercut occurs. In that case, it is best to

Procedure 10.1. Recover from a power outage

A. Check the state of the main mirror cover.
   If necessary set it back manually to closed or open, Procedure 10.34, p. 100.
B. Check the state of the grondM3 mirror.
   If necessary set it back manually to GROND or WFI, Procedure 10.37, p. 102 (Fig. 10.15, p. 114).
C. Check the power switches of the telescope drives.
   Go to the dome, see Fig. 10.10, p. 111.
D. Do a full restart of the telescope and instruments

10.2 No flux or little flux

Procedure 10.2. Investigate and fix the reason for the absence of flux in an instrument

. Ensure that

- the dome slit is `OPEN` (TCS setup, Fig. 11.3, p. 123).
- the dome is on automatic (TCS setup, Fig. 11.3, p. 123) and the slit is aligned (TCS, Fig. 11.2, p. 122).
- the Main Mirror Cover is `OPEN` (TCS setup, Fig. 11.3, p. 123).
- the `mirr3` mirror is on `WFI` or `FEROS` (FEROS ICS, Fig. 11.11, p. 129) 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, 11.12(b)). Use `grondM3 WFI` or `grondM3 GROND` in the terminal if necessary.
- *(WFI)* the protective shutter is `OPEN` (Auxiliary Functions on the TCS machine, 11.6).
- *(GROND)* the main cover and cold shutter are `OPEN` (GROND control, Fig. 11.12(b), p. 130). 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.

10.3 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 (Technical CCD), provided that the modules are deactivated on the TCS. However, you need to reactivate them to do the last step of restarting the autoguider (glse2p2StartTCCDs).

Procedure 10.3. Observe when the autoguider fails

A. On screen Telescope Control Software go to Status virtual desktop
B. On the TCS Status Panel locate the modules section (Fig. 11.5, p. 125)
C. Check ignore for the corresponding modules
   - For GROND, ag_ccdGRND and ccdGRND
   - For FEROS, ag_ccdGRND and ccdGRND
D. Remember to uncheck them for e2p2StartTCCDs to work!

10.3.1 GROND

If you want to observe while fixing the issue you need to deactivate the modules in the TCS, see Procedure 10.3, p. 86. You will need to uncheck them just before starting the guider software with e2p2StartTCCDs.

Procedure 10.4. Restart the GROND autoguider

A. If in a hurry try the quick restart (1–2 min)
   A1. On screen Autoguider GROND & FEROS, find or open a terminal.
   A2. Stop the GROND Technical CCD
   Type e2p2StopTCCDs gag and wait for command to finish
   A3. Start the GROND Technical CCD
   Type e2p2StartTCCDs gag and wait for command to finish
B. If you have time or A does not solve the issue, go for the full restart (3–4 min)
   B1. On screen Autoguider GROND & FEROS, find or open a terminal.
   B2. Type lccBoot l2p2agr
   B3. Wait for the command to finish (1–2 min)
   B4. Type scanei to open the scanei GUI
      a. Check that l2p2agr is ENABLED
      b. If not, enable l2p2agr (see Fig. 10.2, p. 107)
      c. Close the GUI
   B5. Start the Technical CCD with command e2p2StartTCCDs gag

10.3.2 FEROS

If you want to observe while fixing the issue you need to deactivate the modules in the TCS, see Procedure 10.3, p. 86. You will need to uncheck them before starting the guider (Technical CCD) with e2p2StartTCCDs (step A4).

Procedure 10.5. Restart the FEROS autoguider

A. Restart the AG software (1–2 min).

A1. On screen `Autoguider GROND & FEROS`, find or open a terminal.
A2. Stop the FEROS Technical CCD with command `e2p2StopTCCDs fag` and wait for command to finish
A3. Start the FEROS Technical CCD with command `e2p2StartTCCDs fag`
A4. Wait for about 1–2 min for the command to exit successfully.

B. If the problem persists or an error pops up in step A4, reboot the AG LCU (3–4 min)
B1. Type `lccBoot l2p2cam` and wait for command to finish (2 min)
B2. Type `scanei` to open the scanei GUI
a. Check that l2p2cam is ENABLED
b. If not enable l2p2cam (see Fig. 10.2, p. 107)
c. Close the GUI
B3. Perform steps A1, A3, A4.

C. If the problem persists, step B1 does not terminate with minutes, or an error pops up at some point in step B, perform a hardware reset of the FEROS AG LCU (15 min)
C1. Go to the FEROS room located in the telescope enclosure.
C2. Locate the big blue rack tower (Fig. 10.1(a), p. 106).
C3. On the lower racks, near to l2p2cam label, push a small RST button (Fig. 10.1(b), p. 106).
C4. Perform steps A1, A3, A4.

D. If this does not solve the issue, power cycle the LCU (15 min)
D1. Go to the FEROS room located in the telescope enclosure.
D2. On the back of the rack tower, unplug and replug the lower rack (Fig. 10.1(c), p. 106).
D3. Perform steps A1, A3, A4.

10.3.3 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 10.6. Fix WFI autoguider issues

Try in this order

A. On the telescope control software screen, restart the autoguider (30 s)
A1. Use left-click menu `Stop Autoguider`
A2. Use left-click menu `Start Auoguider`
If window closes quickly (less than 10 s), it is a failure and the next step should be done.

B. Restart the WFI Technical CCD.
This should be done if `Retrieve Field` gives the error `Error opening RPC connection` or if point A does not solve the issue.
B1. On the WFI screen, locate or open a terminal.
B2. Stop the WFI Technical CCD with command `wfinsStopTCCDS` and wait for it to finish
B3. Start the WFI Technical CCD with command `wfinsStartTCCDS` and wait for it to complete (2 min)
B4. Perform the AG restart of point A

C. If an autoguider process is suspended, restart the TCS
C1. In a terminal, type `i`
C2. If there is an AG-related suspended process, proceed as follow
C3. Deactivate the connection between FEROS and TCS

- On the FEROS screen (Fig. 1.1, p. 19), locate the FEROS control panel (Fig. 11.10, p. 128)
- Select window menu `Telescope→IGNORE`

C4. Perform a full restart the TCS including VME reboot (Procedure 2.1, p. 25)

C5. Reactivate the connection between FEROS and TCS

- On the FEROS screen (Fig. 1.1, p. 19), locate the FEROS control panel (Fig. 11.10, p. 128)
- Select window menu `Telescope→ENABLE`

D. 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 A), not sure here if TCS restart is needed.

10.4 OB doesn't work

10.4.1 OB doesn't load

If an OB import fails with error message `Could not communicate with OH`.

Procedure 10.7. Fix OB communication issue

Try, in the following order

A. Check that the source is set on `vot`.
   A1. In `bob` and use the window menu `Configure→Environment`.
   A2. Ensure that `Process` is set to `vot`.

B. Check that `vot` is open
   B1. Go to screen `vOT / p2`
   B2. Open `vot` either from a terminal or the menu

C. Check that only one `vot` is running
   C1. On screen `vOT / p2`, locate or open a terminal
   C2. Type `ps gaux | grep vot`
   C3. For all process listed, type `kill <pid>` where `<pid>` is the process number
   C4. Open `vot` (step B).

10.4.2 OB gives an error when started

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

Procedure 10.8. Fix OB start error

A. If OB was already executed or aborted, click `Reset status`.

B. Check that the object is observable (above 20 degrees).

C. If telescope preset is needed, check that the communication with the TCS is on
   - *(FEROS)* Use window menu `Telescope→Enable`.
   - *(GROND)* Click `TCS ON`.

D. 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 window menu `Interface`→`Engineering`.)

10.4.3 OB stalls before starting to observe

It may happen that an OB stalls, that means, nothing is happening. No error is reported but the telescope does not move, no integration seems to take place and the `bob` windows has stopped to give information about what is going on.

Procedure 10.9. 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 `TCS Control Panel` (Fig. 11.2, p. 122).
  Note: A permanent fix is to restart the TCS (see Sect. 10.9.1, p. 99).
- *(GROND)* If IR exposure does not start after the optical one has, reset the IR flip mirror.
  In a terminal, type `grondFM`
- *(FEROS)* If the exposure time is not marking and the Exposure status stays in RUNNING after readout, the scan links must be reinstalled with `feinsInstallScanLinks wfefcd`.

10.4.4 Crash before an exposure

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

Procedure 10.10. Investigate and fix a crash occurring before the start of an optical exposure

A. Close `bob` and launch a new one.
B. FEROS
   B1. Restart FIERA
   On the `FIERA Control Panel` do `Shutdown` / `Startup`.
   B2. Restart the instrument with telescope enabled
   (In particular if the second exposure of the night fails.)
      a. On the `FEROS General State` panel, use window menu `Telescope`→`enabled`.
      b. Do the full start-up procedure.
C. GROND
   C1. If error `closing w2p2cam environment`
      a. If a FIERA exposure is running in `GROND General State`, click `End` or let it finish.
      b. Type `grondSHUTTER` in a terminal.
   C2. If the error mentions IRACE
      a. Go to monitor `GROND IRACE`.
      b. Locate the `Infrared Acquisition Module` (Fig. 11.13(b), p. 130)
      c. Click `Reset` on the lower left part of the panel
      d. Select from window menu `Online`→`Online`
      e. If it fails, you may need ≈ 40 min to deep restart (Procedure 10.39, p. 102) IRACE.
   C3. Ensure only one `bob` is running
      a. Find all `bobs` (`ps gaux | grep bob`)
      b. `kill` them
      c. launch a new `bob`.
   C4. *(GROND)* Restart FIERA (see B1).
   C5. *(GROND)* Restart GROND.

a. Type `grinsStop`
b. Type `grinsStart`
c. In `GROND General State` panel, put instrument `ONLINE`.

C6. *(GROND)* Reboot GROND.

C7. *(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.

D. WFI

D1. 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)

a. On the `WFI ICS Control` (Fig. 11.7, p. 126) click `Abort Exp./Seq.`
b. The GUI should display the text `ABORT > INVOKED`
c. Wait for a few seconds for the answer `ABORT > REPLY/ L OK`.
d. If it works, problem is solved, if not go to next point.

D2. Do a `DAILY` startup of WFI (5 min).

D3. Do a full restart of FIERA and WFI (10-15 min).

a. Go to a `wfi` terminal or open it from menu `wfi xterm`.
b. Shut down the instrument.
Type `wfinsShutDown`
c. Check that the environment are enabled.
(i) Type `scanei &`
(ii) Go to the opening GUI titled `CSS Scan System`.
(iii) Check that `wwffcd` and `w2p2tcs` are `ENABLED`
(iv) If either environment is `DISABLED`, proceed with these points
(v) Click on `DISABLED`
(vi) In emerging GUI, click `Enable` just below `Environment`.
(vii) Close it with window menu `File`→`Quit`.
(viii) Close `CSS Scan System` with window menu `File`→`Quit`.
d. Restart the CCD managing components
(i) Stop Technical CCD by typing `wfinsStopTCCDS`
(ii) Stop Science CDD by typing `wfinsStopTCCDS`
(iii) Start SCCDs by typing `wfinsStartSCCDS`
(iv) Start TCCDs by typing `wfinsStartTCCDS`
e. Restart the instrument.
Type `wfinsStartUp`.
f. Restart the AG
(i) Go to screen `Telescope Control Software`.
(ii) Left-click on an empty space to open the menu `TCS User`.
(iii) Use window menu `TCS User`→`Stop autoguider`.
(iv) Use window menu `TCS User`→`Start autoguider`.
g. Open missing windows on screens `Wide Field Imager`.
(i) `bob` with left-click mouse menu `WFI User`→`WFI`→`BOB (WFI)`.
(ii) `rtd` with left-click mouse menu `WFI User`→`WFI`→`WFI RTD`.
h. Take a test bias.

D4. Restart the instrument. You will need to restart the autoguider on the TCS machine.

10.4.5 Crash during an exposure

Procedure 10.11. Fix a crash during an exposure

A. FEROS
  A1. OB crashes with "error closing cam environment" while an exposure (usually the first of the night) is running
    a. Let the current exposure finish and read out, it will be fine.
    b. In the meantime, close and relaunch `bob`.
B. WFI
  B1. WFI stalls just before the read out of an exposure.
    Abort it manually, if unsuccessful restart FIERA (follow point D in Sect. 10.4.4, p. 89)
C. GROND
  C1. OB crashes with "error closing cam environment" while an optical exposure is running
    a. End the optical exposure (if it's a long one)
      On the grond control panel, click `END`.
    b. Wait for exposure to read out
    c. Restart the OB without presetting
      (In `bob` deactivate preset and reset status.)
  C2. OB stalls or crashes during an exposure
    a. In a terminal, execute `grondFM` to reset the flip mirror. If issue is not fixed, proceed.
    b. 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.
    c. Launch `bob`
      Type `bob &` in a terminal.
    d. In the same terminal, execute `grondGRI` and `grondSHUTTER`
    e. Wait for `grondSHUTTER` command to end (10 s to 1 min).

10.4.6 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. 10.9.1, p. 99).

10.4.7 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. 10.5.4, p. 93.

10.4.8 Crash at the beginning of WFI sky flats

The typical crash is before the first exposure with a timeout error on the first telescope movement.

Procedure 10.12. Fix a WFI sky flats crash

A. Abort the current exposure in the `WFI ICS Control`.
  In the `ICS` virtual desktop, use `Abort Exp./Seq.` on the panel.
B. Do one of the following
  B1. If the dome is in manual, set it to automatic. (Likely fix).

B2. If the dome is in automatic, try a daily restart of WFI.
B3. If a restart of WFI did not help, try a quick TCS restart.

C. Run the flat field OB again.

10.4.9 Crash during filtre change in WFI

Procedure 10.13. Fix a WFI filtre change crash

If the OB crashes at the moment to change the filtre using WFI and the `Filter Name` status is `Moving` on the `WFI General State` panel (Fig. 11.9, p. 127)

A. On the `WFI ICS Control` (Fig. 11.7, p. 126), select the filtre on the `Filter` option below `Setup Instrument`.
B. Click on the `Apply` button.
C. Wait for filtre `Filter Name` to change from `Moving` to selected filtre (up to to 2 min)
D. In case of error: "icswsERR_MOVE_FILTER : Error during movement of filtre. ErrNo:7 ErrString: NO DETECTION", reset the filtre controller
   D1. On the Auxiliary Functions (Fig. 11.6, p. 125) in the TCS, click on the `RESET` button below `WFI FILTER CONTROLLER`.
   D2. Repeat steps A–C.

10.5 Focus issues

10.5.1 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.

10.5.2 FEROS focus starts with wrong M2 position

The FEROS focus sequence may start with the wrong M2 position (you see extremely defocused stars in the FEROS AG REal Time Display). In that case, check that M2 Focus value in the FEROS General State panel, the value should be somewhere around 23000. If this is not the case, reset this value in the database (Fig. Fig. 10.3, p. 107):

Procedure 10.14. Fix the FEROS focus start value

A. in a terminal type `ccsei`
B. Click on CCS database monitor
C. Look for `Appl_data, TCS, m2 ->`
D. Select checkbox `Enable Editing`
E. set `focuValue` to 23000
F. Close GUI

10.5.3 Defocused wih FEROS ACS

See Sect. 10.6.2, p. 94.

10.5.4 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.

Procedure 10.15. Fix the WFI focus sequence timeout

A. Quick workaround
   A1. Start a focus OB or restart the crashed one.
   A2. When the focus sequence starts, repeat the following
      a. Wait for the previous subexposure to finish
         There is no readout, so messages in bob should be monitored
      b. Identify the focus offset required for the new subexposure
         The lower part of `bob` will give several lines with `current value -> target value`, one every few seconds.
      c. Manually preset the focus to the target value
         In the `TCS Control Panel`, below `M2 Focus`, enter the target value and click `Preset to`.
   A3. Once exposure is read out, proceed as usual (Procedure 5.5, p. 52)
   A4. Science observations will not be impacted.
B. Clean fix (30 min)
   B1. Do a full restart of WFI (10 min)
   B2. Do a full restart of the TCS (20 min).
C. When the problem becomes recurrent, the WFI workstation should be rebooted.

10.5.5 No focus offset when filters are changed

The focus sequence is run for a specific filtre, when changing filtres 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.

10.6 FEROS ADC

10.6.1 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 Control` panel (Fig. 11.11, p. 129) the line `adca` of the `adc` field contains `ERROR` in red.

Procedure 10.16. Remove the ADC from the optical path of FEROS

. Try in order the following items.

- Manually put it off from the `FEROS ICS Control` panel (Fig. 11.11, p. 129)
  - 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 Control` panel
  - Use window menu `Device`→`Select all devices`, then
  - Use window menu `Device`→`OFF`
  - Use window 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 window menu LCU→Reboot LCU1
  - Use window menu Device→Select all devices
  - Use window 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.

10.6.2 Telescope focus is not corrected when ADC enters

If the focus is not corrected at ADC insertion, try the items of the following procedure.

Procedure 10.17. 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 Control Panel
- If repeated red messages concerning M2 preset appear below VME messages on the TCS Control Panel (Fig. 11.2, p. 122), 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. 10.9.1, p. 99).

10.7 FEROS-DRS

10.7.1 FEROS exposure number is close to 10 000

If it goes past 10 000, the reduction software will fail. It is very easy to fix before it has reached the limit.

Procedure 10.18. Reset the exposure number

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

If the exposure number has reached the limit, the observations for that night will not be reduced, unless the following procedure is performed.

Procedure 10.19. Fix a FEROS exposure number going above 10 000

A. Stop data subscriber and DRS (point B of Procedure 10.20, p. 95).
B. Kill processes and tidy lock files (point C of Procedure 10.20, p. 95).
C. Remove the night directory of the reduced data
   In a terminal, type rm -rf /data/reduced/FEROS/yyyy-mm-dd, where the date is yyyy-mm-dd
D. Change the FEROS exposure number (Procedure 10.18, p. 94)
E. Restart the data subscriber (point D1 of Procedure 10.20, p. 95).
F. Restart the DRS (point D2 of Procedure 10.20, p. 95).

10.7.2 FEROS DRS fails

Check that

- A full standard calibration has been done
  It should be on the same day with the same setup (binning and readout speed).
- The exposure number is smaller than 10 000.
  In a terminal, write `cat /data/reduced/FEROS/.feroNNNN`.
  If number is above 10 000, go to Procedure 10.19, p. 94.

10.7.3 Problems to restart the FEROS-DRS and data subscriber

If you cannot start the FEROS DRS this might be for the following reason: when rebooting `w2p2off` without bringing down the pipeline before, a hidden watch-dog file and several locks may survive. It also happens in other contexts and the aetiology is unclear (most likely a bug). If all other attempts have failed to start the DRS, follow these steps.

Procedure 10.20. Restart the FEROS data reduction software and data subscriber

A. If the workstation `w2p2off` was rebooted, remove the watch-dog that may have survived.
   A1. To check when station was last rebooted, you can use `uptime` in the terminal.
   A2. In a terminal execute `cd $DHS_LOG` (should be `/data/msg`)
   A3. Get root access using `su`
   A4. Remove the PID files therein with `rm *.pid`
   A5. Exit root access with `exit`

B. Stop data subscriber and DRS at the DRS computer (Fig. 10.4(a), p. 108).
   B1. Stop and close the data subscriber
   If window is frozen, you can use `xkill` from a terminal.

   B2. Stop and close the DRS panel
   If window is frozen, you can use `xkill` from a terminal.

C. Kill processes and tidy lock files
   C1. Type `killall -9 ferosReduceQueuedIms`
   It either returns `no process killed` or nothing.
   C2. Type `rm -f /data/reduced/.ferosQueueIms/.ferosReduceQueuedIms*.pid`
   It is either silent or gives error `no file removed`
   C3. Type `killall -9 ferosQueueIms`
   It either returns `no process killed` or nothing.
   C4. Type `rm -f /data/reduced/.ferosQueueIms/.ferosQueueIms*.pid`
   It is either silent or gives error `no file removed`

D. Restart the data subscriber and DRS
   D1. Left click start data subscriber and configure it (Fig. 10.4(b), p. 108).
      a. `Program ID: service`
      b. `Observer Name: service`
      c. `Rename to Keyword: Name on INS ws`
   D2. Left click start `FEROS DRS`, and start from top to bottom
      a. Start `Queue Image Status`
      b. Start `MIDAS Session Status`
      c. Start `Reduced Queued Image`
   The statuses may take several dozen of seconds turn `Online`.

10.7.4 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 10.21. Restart the data handler.

A. Go to screen `w2p2pl Pipeline`
B. In a terminal you will need to type some of the following
   B1. `dhsSubscribeControl start pipeline -backsince <date>`
   where <date> in the format YYYY-MM-DD is where you want to start again.
   B2. (needed?) `pipelineControl stop`
   B3. (needed?) `pipelineControl start`
   B4. (needed?) `stopRBS`
   B5. (needed?) `startRBS pipeline.config`
   B6. `doControl stop`
   B7. `doControl start wfi,feros`

10.8 Startup issues

10.8.1 FEROS

There are a few issues that may pop-up at startup.

Timeout

If there is an error about process `feoControl` stating "accepted PING but did not reply properly within 10000 msec"', you need to restart environment using Procedure 10.22, p. 96 and go on with startup.

Procedure 10.22. Restart FEROS environment

A. Type `vccEnvStop -e $RTAPENV`
B. Type `vccEnvStart -e $RTAPENV`
C. Redo the full FEROS startup procedure

Telemetry is not active

There is a problem with the FEROS telemetry at TCS (window should show some graphs, Fig. 10.6(a), p. 110), activate the telementry using Procedure 10.23, p. 96

Procedure 10.23. Activate FEROS or WFI telemetry

The telemetry module is activated following these steps:

A. Go to FEROS or WFI screen
B. Open or locate a terminal and type `fcdTelemetry &`
C. On the emerging `FIERA - Telemetry` GUI, press `Start`
D. Close the GUI
E. Go to TCS screen
F. Close the `ESO 220 General Telemetry Panel`
G. Open or locate a terminal and type `sciops2p2Telemetry &`

Instrument stays in STANDBY

If the instrument does not go `ONLINE`, it is possible that the ADC is in the way. Check if `ADC` is `IN` in the General State panel. If it is the case, you have to remove it manually using Procedure 10.24, p. 96.

Procedure 10.24. Remove the ADC at startup

A. Go the the `ICS Control` panel on virtual desktop `ICS`
B. Simulate motors that are not online

B1. Select motors (e.g. scsm)
B2. Use window menu Devices→Simulate HW
B3. Wait for the motors to indicate SIM (a few seconds)
B4. De-select motors (e.g. scsm)

C. Remove ADC
C1. Select adca
C2. Choose OUT
C3. At the bottom of the ICS Control, click SETUP
C4. De-select adca

D. Use motors that are simulated and put them online
D1. Select motors (e.g. scsm)
D2. Use window menu Devices→Use HW
D3. Wait for SIM to disappear (a few seconds)
D4. Use window menu Decives→ONLINE
D5. De-select motors (e.g. scsm)

E. Wait for the instrument to be ONLINE (a few seconds to a minute).

Instrument stays in STANDBY and all devices are OFF

Another reason for the instrument to stay in STANDBY are bad scan links to the ICS LCU lfeics1. In that case, the General State panel will show several red FAILED statuses for lamps and the ICS Control will have all devices OFF.

Procedure 10.25. Restore scan links to the FEROS ICS LCU

A. Install scan links to ICS LCU, In a terminal, type feinsInstallScanLinks lfeics1
B. Optional: Install scan links to FEROS FIERA SLCU In a terminal, feinsInstallScanLinks wfefcd
C. Optional: Install scan links to the TCS In a terminal, feinsInstallScanLinks w2p2tcs
D. Restart the instrument

The optional steps may shorten troubleshooting as all scan links may have been compromised.

10.8.2 WFI

The commonest issues are:

- TCS is OFF after startup on the General State Panel
  This is harmless. Use window 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 10.26. Fix WFI init error

A. Determine whether WFI passes the hardware self-test
A1. Locate or open a logMonitor
A2. If it was not active, choose to inspect the last 500 lines
A3. Find red error “Failed to dispatch command for camera LOADED OK”.
A4. Lines below and above contain “C40 ping failed” and “Could not download FIERA config”
A5. You can also check directly whether WFI passes the self-test (Fig. 10.8, p. 110)

a. In a terminal, type rsh -l fcdrun wwffcd "export DISPLAY=$DISPLAY; fcdtestseq"
b. Locate a newly opened terminal with a lot of text scrolling
c. Wait for the test to finish with fcdlDetOnline complete or with an error message (1–2

min)

B. Reboot the FIERA workstation
   B1. In a terminal, type `rsh -l fcdrun wwffcd reboot`
   B2. Wait for 1–2 minutes for it to get back online
   You may check in a terminal using `ping wwffcd`

C. If WFI doesn't pass the self-test, power cycle the WFI electronics
   C1. Go to the telescope floor
   C2. Locate the WFI power unit close to the FIERA electronics (Fig. 10.7, p. 110)
   C3. Switch it off
   C4. Wait for 30 seconds.
   (On a 2nd or 3rd attempt, you may try to unplug/replug the electronics boards if you dare.)
   C5. Switch it on.

D. If WFI passes the self-test, do a restart of the FIERA
   D1. In a terminal, type `fcdCtrl`
   D2. On the emerging GUI, click `Shutdown`
   D3. On the emerging GUI, click `Startup`
   D4. Wait for FIERA to restart (1 min ?)

E. Do a full WFI restart (see Proc. 2.1 point A and Fig. 2.2, p. 31)

F. You may have to redo steps B–E until WFI can finish the full restart.

10.8.3 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 10.27. Set the hydraulics for remote control

A. Go to the dome.
B. Locate the gray 1.5-metre-high ADAM rack (Fig. 1.5, p. 23).
C. Locate the switch for `ADAM Remote` / `Local` (Fig. 10.12, p. 112, lower left).
D. Put it towards `ADAM Remote`.

10.8.4 TCS

Start-up fails with `l2p2cam` error

If the start-Up stops 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 10.28. Fix FEROS AG LCU during start-up

A. Try a software restart of the FEROS AG LCU (likely to fail).
   A1. On the TCS screen, find or open a terminal
   A2. Type `rsh l2p2cam reboot`
   If it gives an error, proceed to step B
   A3. Wait for 1–2 min for the reboot to complete
   A4. Check that the LCU is up using `ping l2p2cam`
   A5. Press `CONTINUE` in the Start/Shutdown panel
   If it gives the same error popup, proceed to step B.

B. Go to the dome and try, in that order (see Procedure 10.5, p. 86).
   B1. A hard reset of the LCU

B2. A power cycle of the LCU

Start-up fails with telescope not initialised

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

Procedure 10.29. Fix the telescope not initialized popup

A. Ensure hydraulics and drive are on
   A1. Locate the Dome Auxiliary Functions tab on screen `Dome webcam & hydraulics`.
   A2. Check that the `Hydr` and `Drives` buttons are green.
   A3. If not, switch the hydraulics and drives on (step B1 in Procedure 2.1, p. 25).
B. Manually initialise the telescope ()
   B1. In a terminal type `~/bin/telinit`
   B2. If an error reads "cannot initialise the telescope at more than 45 degrees from zenith"
      a. Go to the dome and manually park it (Procedure 10.42, p. 104).
      b. Repeat step B1
   B3. If an error reads "NO_CURRENT_DELTA_PRELOAD" or there has been a power outage
      a. Go to the computer room in the telescope building
      b. Locate the ALPHA and DELTA drive in the VME rack (Fig. 10.10, p. 111)
      c. Turn its power switch on (black switch up)
      d. Repeat step B1
   B4. Wait for 2–3 min for initialisation to complete.
C. On the error popup, press `SKIPIT`

10.9 TCS issues

10.9.1 Quick TCS restart

Many TCS issues are solved by a fast restart, with a time loss of $\approx$ 10 min. Before, it is important move the telescope to zenith since one cannot initialize it later if the telescope is at $\leq$ 45 degrees above the horizon.

Procedure 10.30. Quick TCS restart

- preset to zenith
  - On the TCS setup panel (Fig. 11.3, p. 123), 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. 11.3, p. 123) press `Initialize` under `Telescope`. On the TCS control panel (Fig. 11.2, p. 122), the VME messages should declare that the command was accepted and finished and Telescope Status will change from `Initialized` to `TCS slew`. The TCS Rose Diagram will show the telescope moving and then stop at zenith. Remember to run the fixPointing script (type `~/bin/fixPointing.sh` in a terminal) and to set the `Dome` back to `Automatic` in the TCS setup panel.

10.9.2 No connection with VME

If the `TCS Control Panel` indicates “No connection” in red, just below `VME messages`, it means that the TCS workstation has lost connection to the VME (telescope LCU). You can try the following:

Procedure 10.31. Solve the connection issue with the VME

A. If you just switched hydraulics on, wait for a few minutes to see if connection is back.
B. Do a remote reboot of the VME.
   Type `lccBoot lte2p2` in a terminal.
C. Do a manual reboot of the VME in the dome.
   C1. Go to the computer room of the telescope enclosure.
   C2. Locate the VME (Fig. 1.4, p. 22) in front of the entrance, slightly to the left.
   C3. Press the small red/pinkish button (Fig. 10.11(b), p. 112).
   C4. Locate the VME monitor, behind you if you face the VME.
   C5. Wait for boot sequence to finish with "end of boot script" (Fig. 10.11(c), p. 112)

A quick restart the TCS (Sect. 10.9.1, p. 99) is generally needed right after a reboot of the VME.

10.9.3 TCS is OFF on an instrument

The General State 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`.

10.9.4 Telescope doesn't take focus orders

Procedure 10.32. Fix telescope focus issues

- *(WFI)* OB stalls when focus order is sent by `bob`.
  Set it manually from the `TCS Control Panel` (Fig. 11.2, p. 122)
- *(FEROS)* Focus is not corrected after insertion of the ADC.
  See Sect. 10.6.2, p. 94.
- Focus cannot be set from the `TCS Control Panel`.
  Restart the TCS, see Sect. 10.9.1, p. 99.

10.9.5 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 10.33. Unstuck the TCS Setup panel

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

10.9.6 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.

pf 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 10.34. Manually close the main mirror cover

The main mirror cover is closed following these steps:

A. Go to the dome
B. Locate the gray 1.5-metre-high ADAM control box (Fig. 1.5, p. 23).
C. Locate the `Main Mirror Cover` controls (Fig. 10.12, p. 112, upper right)

D. If the mirror was MOVING, press the yellow Local/Remote button.
E. Press the red Mirror Close button.
F. If any noise is heard, wait for the cover to be closed.
G. Press the yellow Local/Remote button.

10.9.7 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 10.35. Set the dome for remote control

A. Go to the dome.
B. Locate the dome controls (Fig. 1.5, p. 23), placed on the wall opposite to the entrance.
C. On the dome controls (Fig. 10.13, p. 113) turn the leftmost button from local to remote

10.9.8 Slit does not open or close

If the slit does not open or close, check if urgent mechanical intervention is needed.

Procedure 10.36. Slit does not open or close

A. Ensure that the main mirror cover is closed.
B. Go to the observing floor in the dome.
C. Access the TCS Setup Panel
   C1. Locate and turn on the monitors.
   C2. If necessary, log in to the tcs account.
   C3. If necessary, open the TCS Setup Panel.
D. Try to move the slit doors
   D1. If slit status is MOVING, click STOP.
   D2. Wait for status to say STOP (a few seconds).
   D3. If the slit seems closed, click OPEN
   D4. If the slit is ajar or open, click CLOSE
E. If the motor turns on and stays on but slit doors do not move
   E1. Click STOP
   E2. Turn off the monitors
   E3. Seek assistance from the someone in the Mechanical group
   E4. File a remedy ticket with a high urgency (4 hours)

10.9.9 Dome slit and telescope are not aligned

For small zenithal angles there is an apparent misalignment between dome slit and telescope orientation as shown on the rose diagram on the TCS control panel. 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.

10.10 GROND issues

10.10.1 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 10.37. Unlocking the grond M3 mirror

- Switch back-and-forth using `grondM3 WFI` and `grondM3 GROND`.
- Write the mirror position in the database (Fig. 10.14, p. 113)
  A. In a terminal type `ccsei`
  B. Click on `CCS database monitor`
  C. Look down `Appl_data,GROND,ICS,DEVICES,M3→.`
  D. Select checkbox `Enable Editing`
  E. set `newPos` value to 2 for GROND position or 0 for WFI.
  F. Check on GROND control that mirror indeed moves.
  G. Close the GUI.
- Reset the mirror from the dome.
  A. In the dome, locate the M3/MC box below the main mirror (Fig. 1.5, p. 23).
  B. On the box (Fig. 10.15, p. 114), press the grondM3 WFI button.

10.10.2 GROND OB only crashes with TCS on

It sometimes happen that GROND works well when `TCS` is `OFF` (testOB works) but fails when it is `ON` (testOB fails with a weird TELESCOP keyword error). It can be a very tricky problem, many times solved by a simple restart, but sometimes very persistent.

Procedure 10.38. Fix GROND OB crash with TCS on

A. Restart GROND
   Use `grinsStop`, `grinsStart`, and prophyllaxy (`grondSHUTTER`, etc.)
B. If the last point doesn't fix the issue, do a full reboot of GROND and TCS
   B1. Stop the instrument (`grinsStop`)
   B2. Reboot the `wgrond` workstation
   B3. Do a full TCS restart
   B4. Start the instrument (`grinsStart`, etc.)
   B5. Start the logging of the telemetry
C. If the last point doesn't work, replace the reboot by a last resort reboot
D. You may need to repeat the steps a few times until it works or you are bussed to a mental institution.

10.10.3 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 10.39. Deep reset of GROND IRACE (verify this!)

A. In a GROND terminal, do `grinsStop` as user `grondmgr`.
B. Go to the computer room of the telescope building.
C. Locate the IRACE workstation (Fig. 1.4, p. 22) and shut it down.
D. Go to the dome
E. Locate the power switch of the IRACE box (Fig. 10.16, p. 114) below the main mirror.
F. Switch it off for 10 seconds then on again.

Table 10.1: Pointing model parameters for each instrument, as of November 2022.

Parameter	FEROS	GROND	WFI
ID	−150.86	−60.04	−294.28
IH	−3802.80	−3787.00	−3793.83
CH	110.55	28.89	−83.18
NP			15.78
ME			−127.72
MA			3.79
FO			95.55
TX			−32.88
HCEC			−17.98
HCES			−13.24

G. Go back to the computer room and start the IRACE workstation.
H. Go back to the control room and reboot the GROND workstation.
I. Do `~/bin/lastResortBeforeReboot.sh` as user `grondmgr`
J. Reboot GROND workstation.
K. Do `~/bin/lastResortAfterReboot.sh` as user `grondmgr`
L. Put the instrument `ONLINE` in the GROND panel
M. Do `grondSHUTTER && grondFM`
N. close and open bob

10.11 Freezing issues

10.11.1 Mouse pointer does not move

This is common on the WFI screens.

Procedure 10.40. Recover the mouse pointer

A. 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)
B. Log in
For WFI, user wfi (other logins in Table 11.1).
C. Open the panels from a terminal.
For WFI, type `~/bin/openPanels.sh`.

10.12 Pointing issues

10.12.1 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 10.41. Fix WFI pointing issues.

A. If not done, check the right instrument is selected on the `TCS Status Panel` (Fig. 11.5, p. 125).
B. Check if the current pointing model parameters in Table. 10.1 for WFI are selected on the TCS Setup Panel (blue numbers in the bottom right-hand panel of Fig. 11.3, p. 123). Typically the first three values ID, IH, CH are 0 because of a database issue.
In a hurry:

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

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

C. 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 telescope building and reboot the VME.
D. Otherwise, it might be a problem with the TCS.
   Try a quick TCS restart (Sect. 10.9.1, p. 99).

10.12.2 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 10.42. Preset manually to zenith.

A. Go to the computer room in the telescope enclosure.
B. Locate the VME rack (Fig. 1.4, p. 22).
C. On the VME, set the switch away from d (Fig. 10.11(a), p. 112).
D. Go to the dome and find the joystick (Fig. 10.17, p. 115).
E. Using the controls put the telescope approximately to zenith.
F. Go to the computer room in the telescope enclosure.
G. On the VME rack, set the switch to d.
H. Go to the control room below the dining room.
I. Initialise the telescope
   Click `Initialize` below `Telescope` in `TCS Setup Panel`

10.13 Web pages

10.13.1 2.2m Environmental Monitor stuck

If the 2.2m Environmental Monitor is stuck.

Procedure 10.43. Restart the 2.2m environmental monitor

A. Go to screen `Telescope Control Software`.
B. In a terminal, execute command `e2p2StartEnvMon`
C. After a few minutes refresh `http://www.ls.eso.org/lasilla/sciops/2p2/EnvMon`.

10.13.2 All sky camera

If the all sky camera LASCAM is stuck

A. Use the Danish 1.54m camera at `http://allsky-dk154.asu.cas.cz/`
B. Ask an ESO TIO to restart LASCAM

10.13.3 Dome webcam doesn't show image

It may happen that the dome dome webcam doesn't show a live image of the dome—it may still carry sound though. In that case

Procedure 10.44. Power cycle the dome webcam

A. Go to the observing floor in the telescope enclosure
B. Locate the webcam, close to the big ADAM rack and monitors.
C. Unplug the AC cable.
D. Plug the AC cable again.

10.14 ESO database issues

Procedure 10.45. Data do not appear in the database

A. Wait for one or two days after the data is taken because there may be a lag
B. If all observations including the calibrations do not show up, you can restart the data handler
See Procedure 10.21, p. 96
C. If only a particular set of observations loaded directly from bob are impacted, check that the PID is correct
   C1. Open the OBs (usually in OBD directory on bob machine)
   C2. 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)
   C3. Check that the ESO PID has been assigned
      a. Open the ESO Observing Schedule Query Form
         `http://archive.eso.org/wdb/wdb/eso/sched_rep_arc/form`
      b. Fill telescope (`La Silla -- 2.2 m`) and period
      c. Click `Search`
   C4. If not assigned or invalid format, contact User Support Department at ESO to fix it.
D. Data taken as `TEST` (daily checks) do not appear in the archive.

10.15 Miscellaneous

10.15.1 No sound from bob

If `bob` does not play sounds to indicate pop-ups or observation finishing, the sound server should be restarted.

Procedure 10.46. Restart the sound server

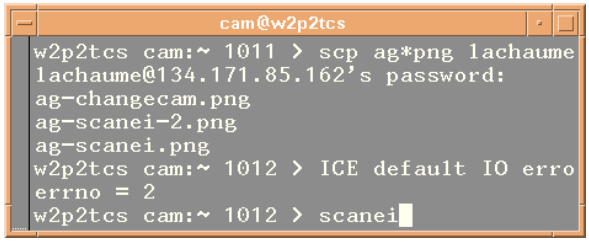
A. On any of the workstation, locate or open a terminal
B. Type `ssh grondmpe@wgrondoff "pulseaudio --kill; pulseaudio --start"`
C. Enter password (see Table 11.3)

(a) Rack tower

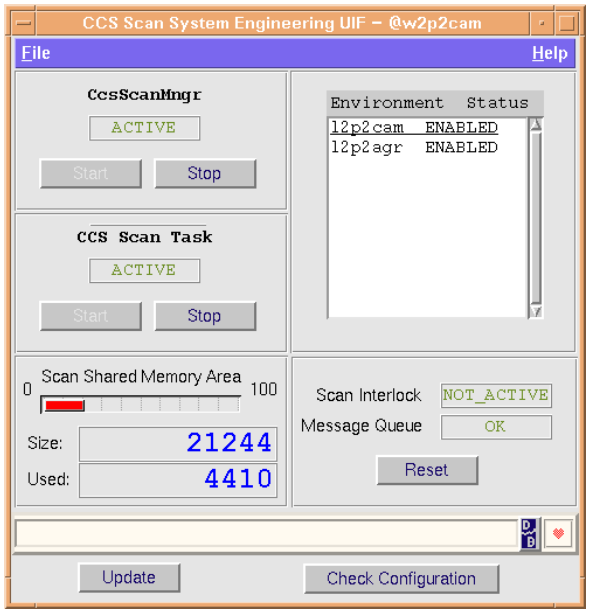
(b) `l2p2cam` reset

(c) `l2p2cam` power cycle

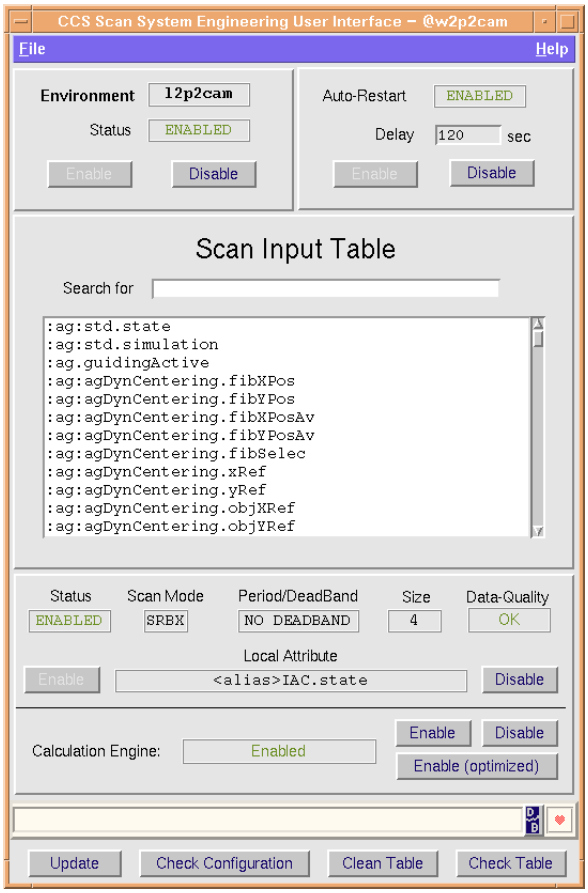
Figure 10.1: Rack with the FEROS AG LCU.



(a) `scanei`



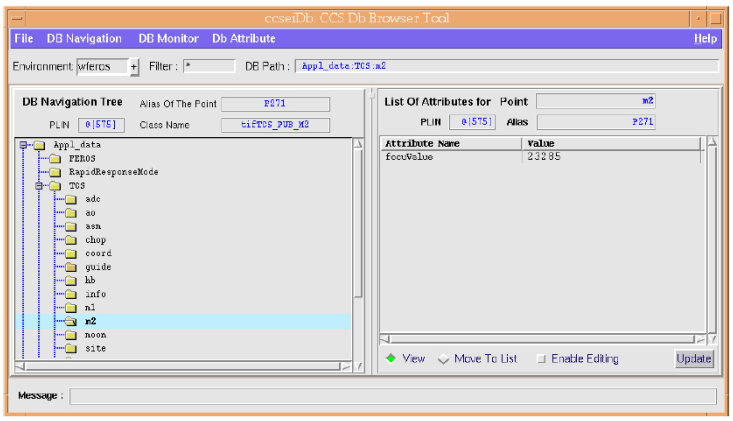
(b) Click on `l2p2cam` or `l2p2agr` (top right)



(c) Click enable or disable (top left)

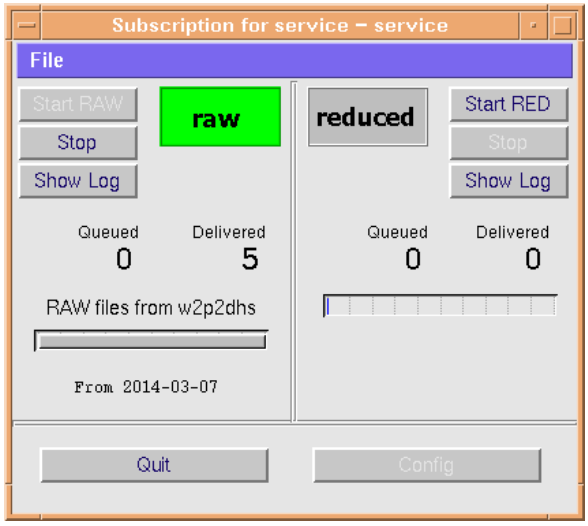
Figure 10.2: `scanei` on the FEROS and GROND AG machine.

(a) FEROS `ccsei window.`

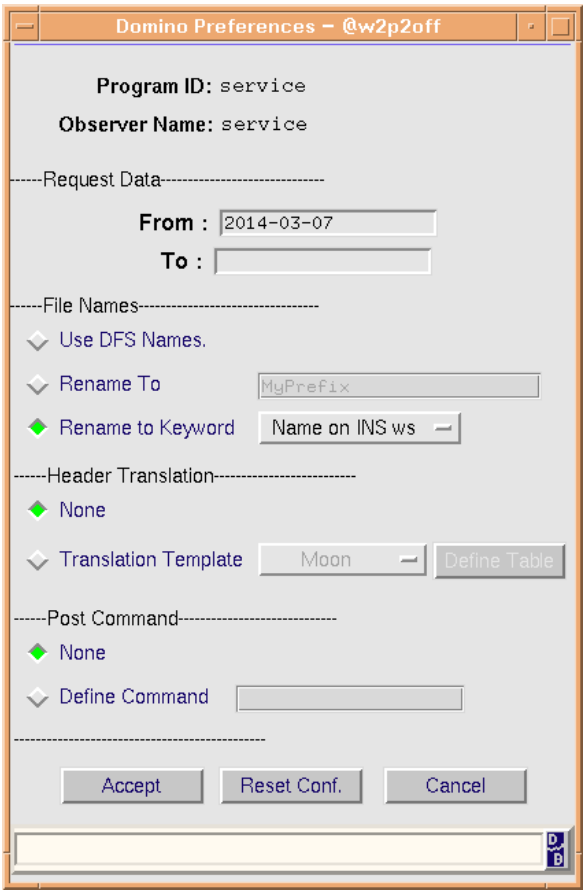


(b) FEROS `M2 in the database.`

Figure 10.3: Writing the M2 position in the FEROS database.



(a) FEROS data subscriber.



(b) FEROS data subscriber configuration window.

Figure 10.4: FEROS data subscriber.

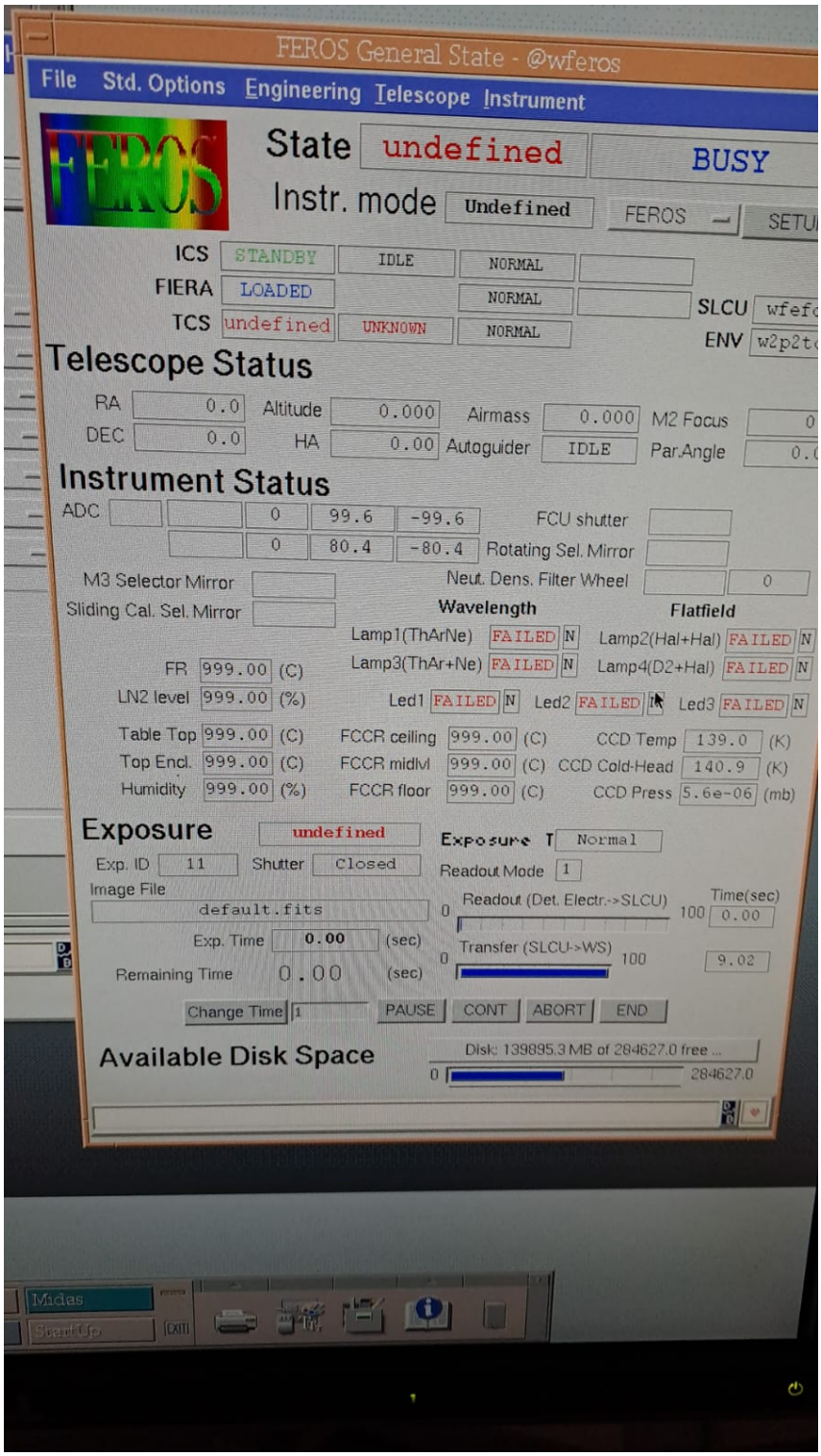
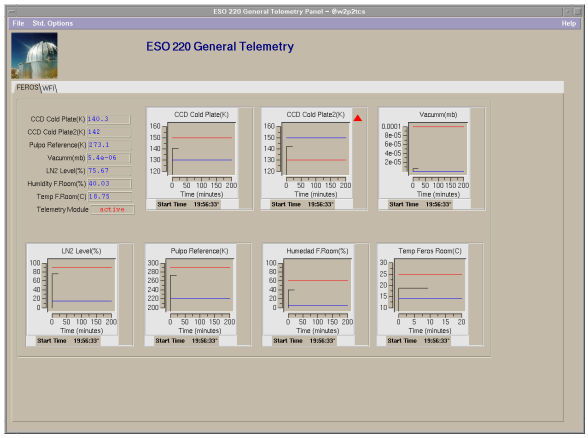
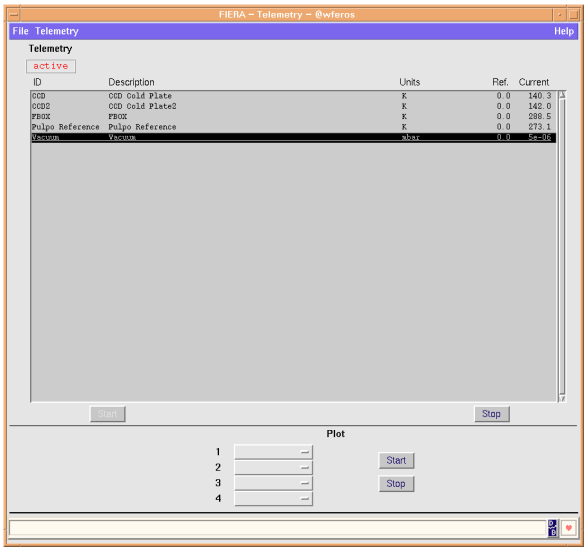


Figure 10.5: FEROS General state when scan links are compromised and need Procedure 10.25.



(a) Telemetry window at TCS, should show some graphs normally.



(b) FEROS telemetry window.

Figure 10.6: Telemetry window.

Figure 10.7: 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.

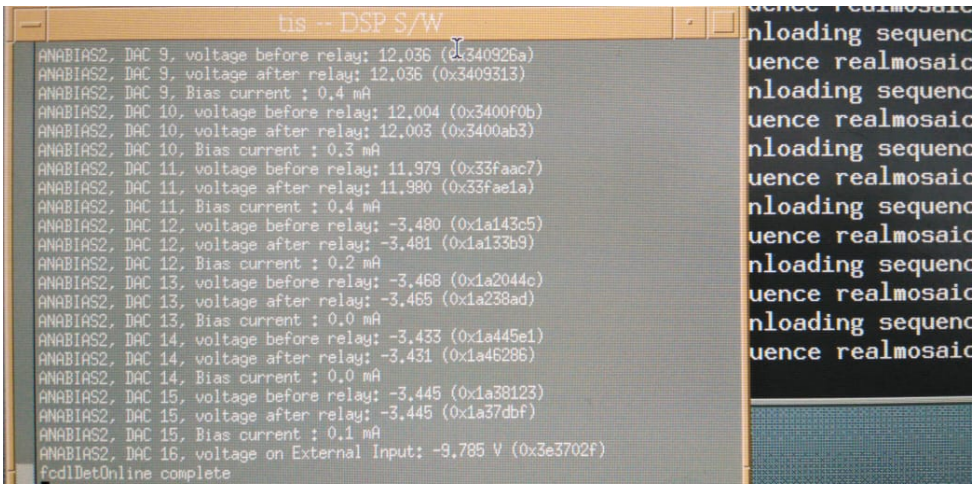


Figure 10.8: Successful self-test run of WFI electronics

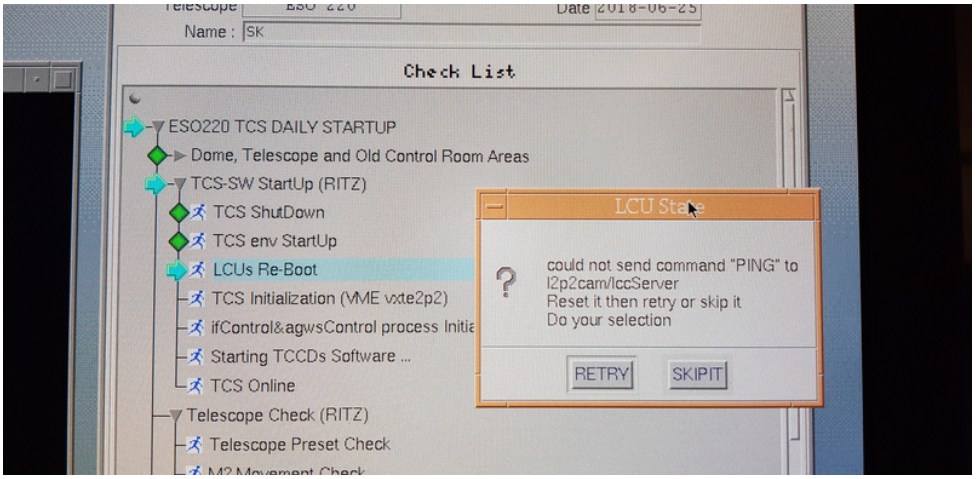
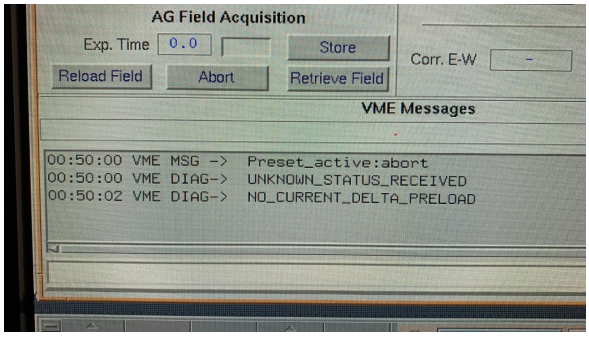
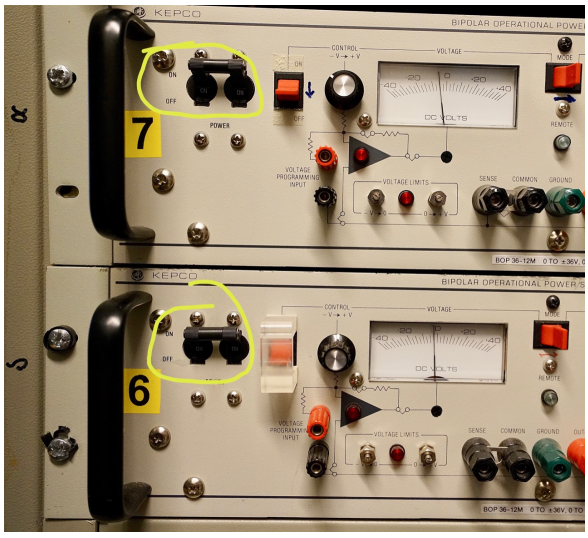


Figure 10.9: When TCS restart fails to reboot the FEROS AG LCU

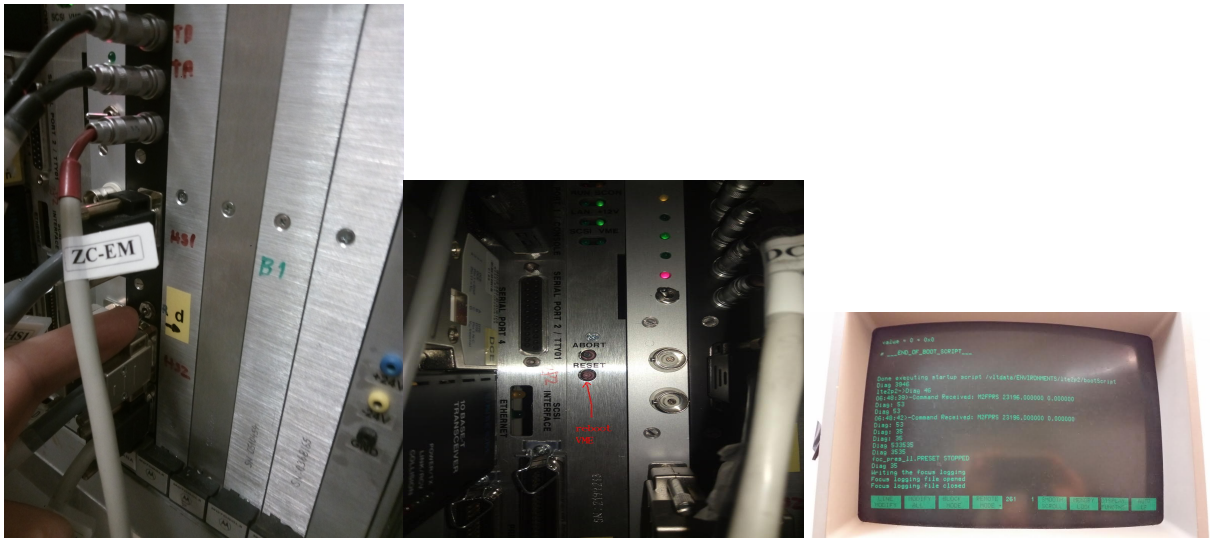


(a) Drive error



(b) Drives switches to push up

Figure 10.10: Fixing drive errors during telescope initialisation

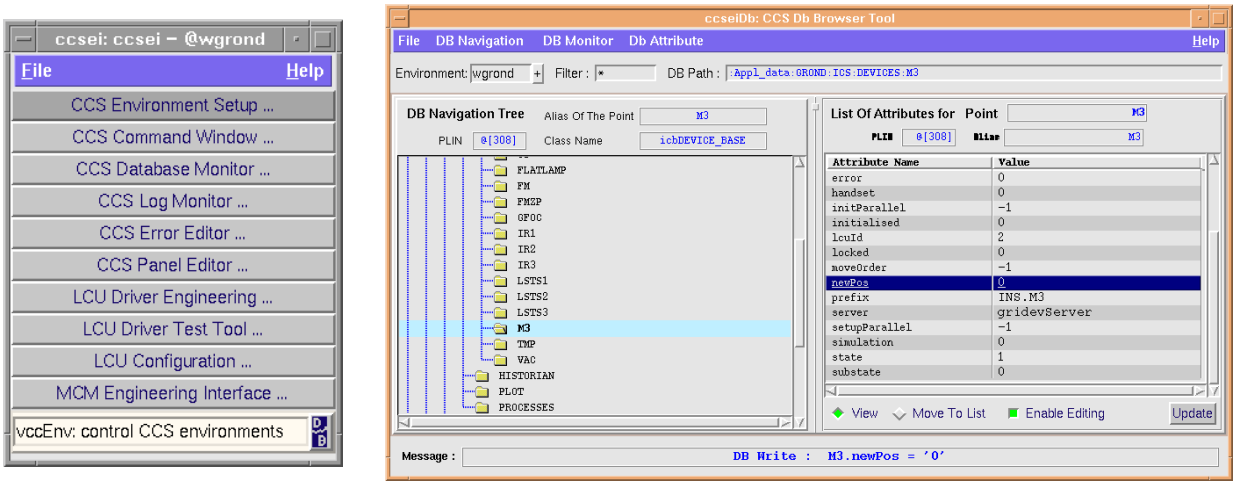


(a) Remote/local pointing control (b) Reboot of the VME (c) VME monitor

Figure 10.11: 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.

Figure 10.12: Controlling the hydraulics and mirror cover

Figure 10.13: Local control of the dome. Local or remote control is set with the leftmost button. Other two bottons on the same row set the direction and speed of rotation in the local control mode. Just below, a start and stop button are used to initiate and finalise rotation.



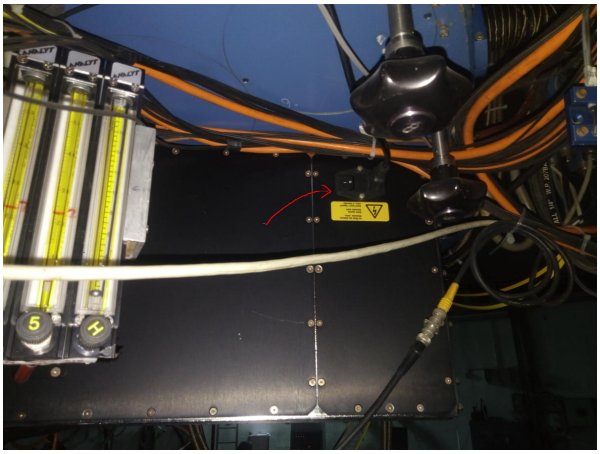
(a) ccsei window.

(b) M3 in the database

Figure 10.14: Writing the M3 position in the database

Figure 10.15: The GROND M3 mirror and main cover control box

(a) GROND IRACE box

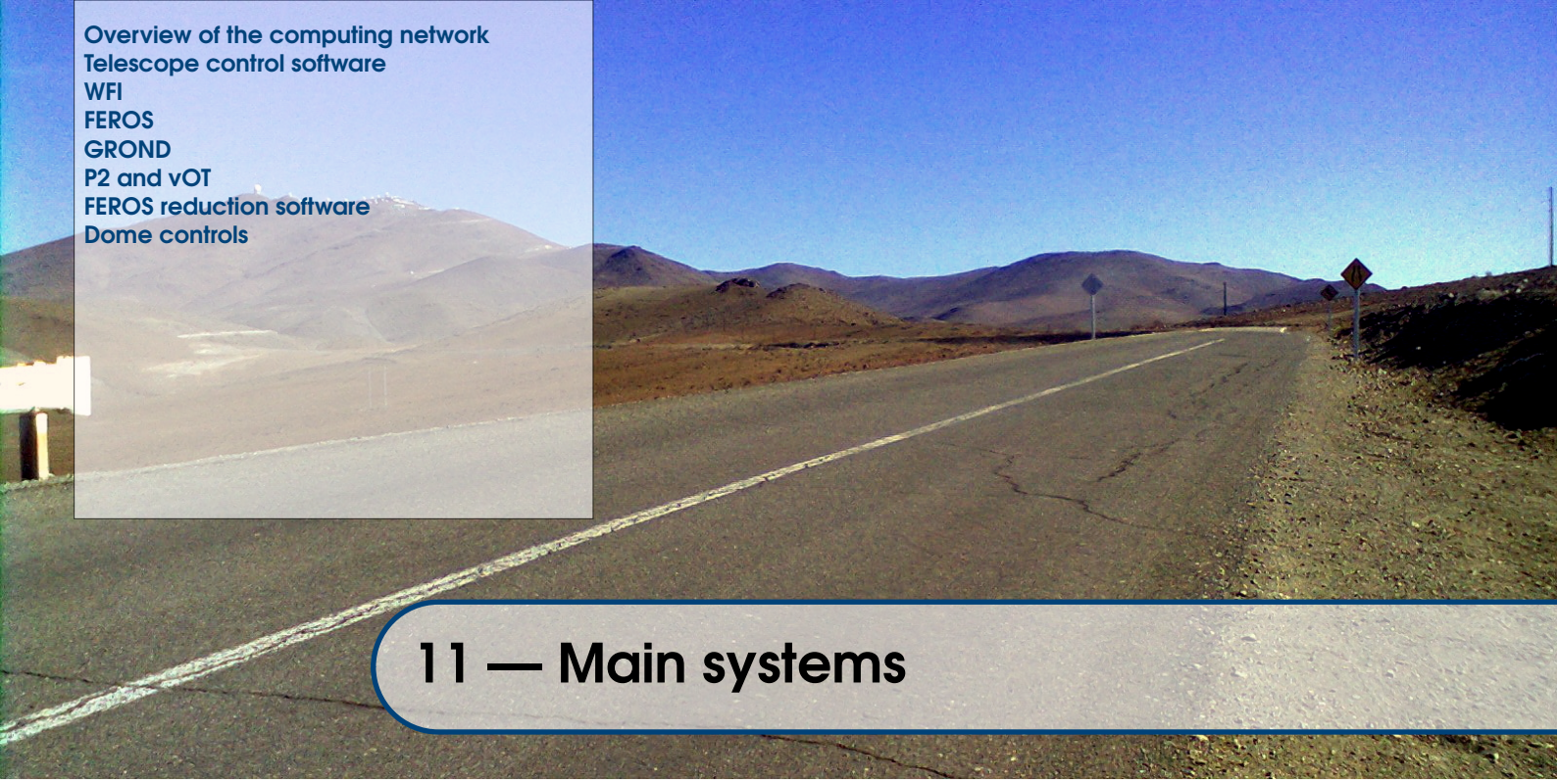


(b) GROND IRACE switch

Figure 10.16: The GROND infrared electronics (IRACE) box below the main mirror of the telescope. In order to power cycle, use the power switch located towards the pier.

(a) Location of the joystick (b) Joystick

Figure 10.17: The “joystick” can be used to manually point the telescope.



11 — Main systems

11.1 Overview of the computing network

11.1.1 Principles

The operations can be separated in "atomic" tasks related to hardware such as driving the electronics of the FEROS CCD or managing the mechanics inside the instrument. Figure 11.1 displays the hardware tasks in the first row.

Ideally, each of these tasks is driven by a single workstation or local control unit (e.g. `lfeics1` for the internals of the FEROS instrument and `wfefcd` for the detector electronics), which is indicated with a black arrow. These LCUs and workstations are in turn are controlled by more generic workstations (e.g. `wferos` for the whole FEROS operations) who also can communicate between themselves. These workstations and LCUs are given in the second and fourth rows in Fig. 11.1.

To facilitate operations, graphical user sessions can be opened from dedicated terminals to access the generic workstations (e.g. graphic user `feros` will open a session on `wferos` as user feros). These sessions are sketched on the third row of Fig. 11.1. The graphical environment runs on the user workstation `uws2p2` but menu applications and terminals log into the dedicated workstation (e.g. `wferos` for user FEROS). These logins are represented as red arrows going from the third to the second or fourth row of Fig. 11.1.

The main way the different workstations and LCUs communicate to coordinate operations is via environments—a set of processes and database values. User `feros@wferos` on the graphical user session `feros` will see local environment `wferos` but the remote environements `lfeics1` and `wfefcd` corresponding to the dedicated instrument LCU and detector workstation can be accessed. Remote control including communication with environments is sketched as green arrows between the third and second rows. Environment names, sometimes differing from the workstation or LCU names (in black), are indicated in the same colour. For the sake of readibility some environments and connections have been displayed for the graphical user session (e.g. `w2p2wfi` for user `wfi`, 3rd row), but strictly speaking they are defined on the corresponding workstation (e.g. `wfi` in the workstation `w2p2ins`, 2nd row).

There are quite a few exceptions to this mechanism: some generic workstations can directly control some tasks (e.g. `wgrond` and `w2p2ins` directly control the instruments such as shutter and filtre wheels) and `wgrond` controls the infrared electronics workstation `wgrdcs` without an environment. Also, several workstations have been virtualised (fourth row).

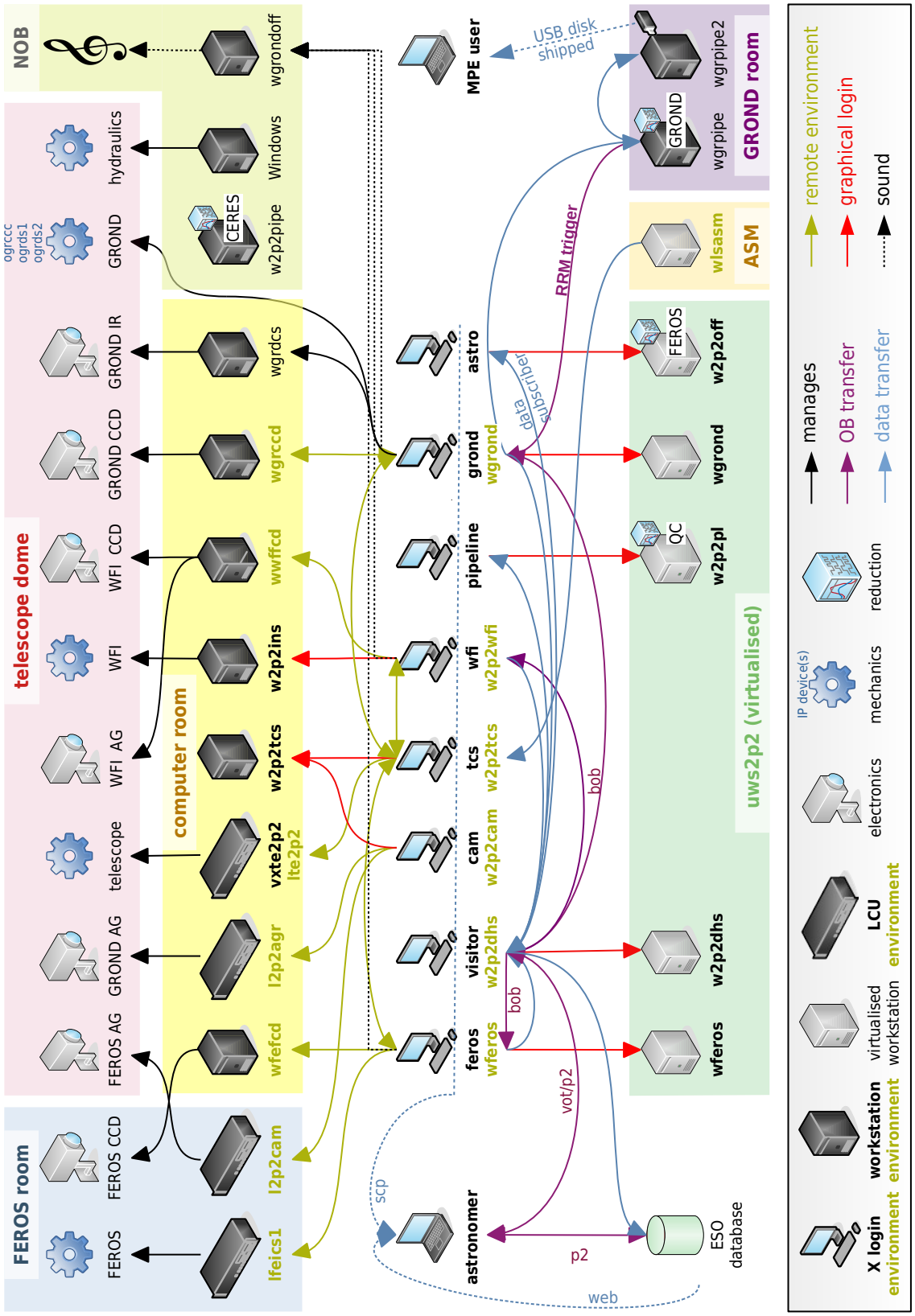


Figure 11.1: Simplified overview of the computing network and its interaction with telescope operations and data handling.

Table 11.1: Computers one can use a graphical login for to get access to instruments and controls. Except for wgrondoff, the login can be done from any terminal in the control room or the telescope building. 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	visitor	visitor	p2 & vot	visitor observations
w2p2off	astro	astro	FEROS pipeline	data & pipelines
w2p2pl	pipeline	pipeline	w2p2pl pipeline	WFI/FEROS data handling
wgrond	grond	grondmgr	GROND BOB / FIERA / IRACE	default user
wgrondoff	grondmpe	grondmpe	Left to FEROS DRS	sound server

Last, several workstations deal with software management such as sending the observing blocks for execution, transfering the data to another station or the ESO archive, processing data, or advising about errors via sound alerts. These software tasks are represented by the blue (data transfer) and violet (observing block transfers) arrows of Fig. 11.1.

11.1.2 Naming

Workstation and environments follow site-wide naming conventions:

- The first letter is `w` for a workstation, `l` for an LCU, and `o` for other IP devices.
- The following two or three letters indicate the system: `ls` for La Silla, `2p2` for the telescope, `wf` for WFI, `fe` for FEROS, `gr` for GROND. Sometimes, the name can be in full (`wferos`, `wgrond`).
- The last letters indicate the subsystem: `cam` for guide camera system, `agr` for the Autoguider of GROND, `dcs` for the IR detector control software, `ccd` or `fcd` for a science CCD with FIERA controller, `wfi` or `ins` for WFI, `ics` for an instrument control software, `tcs` for the telescope control software, `dhs` for the data handling system, `pl` or `pipe` for the data pipelining, `off` for the offline data reduction, `asm` for the astronomical site monitoring (meteo), `ccc` for a closed-cycle cooler, `ds` for a detector-related device.
- A number may be suffixed.

Examples:

- `lfeics1` is an LCU and LCU-base environment, for instrument FEROS, serving the instrument control software, and is the first (and only) one for that purpose.
- `ogrds1` and `ogrds2` are IP devices controlling some parts of a detector, for instrument GROND (respectively the temperature & motor controller and the turbopump monitor) and `ogrccc` its closed-cycle cooler controller.
- `w2p2dhs` is a workstation of the 2.2m telescope responsible for the data handling system (i.e. sending and receiving OBs and archiving data).

The LCU of the telescope `vxte2p2` and its environment `lte2p2` don not follow these guidelines.

11.1.3 Graphical user sessions

The telescope operations use eight graphical sessions opened in the terminals available at the control room, each with a username corresponding to a specific set of tasks. In most cases tasks are gathered in environments—a set of processes and database values. These sessions, sharing the same good seeing password, summed up in Table Fig. 11.1, p. 119, are

- `tcs` facilitates access to the account `tcs@w2p2tcs` (environment `w2p2tcs`) and deals with the telescope and dome movements as well as the WFI autoguider
- `cam` facilitates access to the account `cam@w2p2tcs` (environment `w2p2cam`) and deals the management of the autoguider cameras of FEROS and GROND
- `feros` facilitates access to the account `feros@wferos` (environment `wferos`)
- `wfi` facilitates access to the account `wfi@w2p2ins` (environment `w2p2wfi`)
- `grond` facilitates access to the account `grond@wgrond` (environment `wgrond`)
- `visitor` facilitates access to the account `visitor@w2p2dhs` (environment `w2p2dhs`) and deals with the management of observing blocks
- `astro` facilitates access to the account `astro@w2p2off` and deals with the reduction of FEROS data
- `pipeline` facilitates access to the account `pipeline@w2p2pl` and deals with the transfer of data.

It is possible to open these sessions from the observing floor or the old control room in the telescope enclosure.

In addition, it is possible to perform a graphical login into `wgrondoff` on the dedicated workstation at the control room. These machines need a reboot from time to time, using `reboot` in a terminal. For some tidying tasks or reboots, you need to root password.

All these graphical sessions use virtual desktops that can be selected in the dock, each for a subset of tasks or information. For instance, for FEROS the first desktop is for the general operations (execution of OBs), the second one called `ICS` for the control of the instrument, the third one `MIDAS` for the MIDAS procedures (focus and linearity checks) etc.

11.1.4 Data transfer

Astronomical data

Data acquired by the three instruments on `wgrond`, `wferos`, and `w2p2ins` (WFI) are transferred the the data handling system workstation `w2p2dhs` from where it is sent to the ESO archive. Reduction pipelines get their data from there: `w2p2off` for the FEROS DRS, `w2p2pl` for the data Quality Check, `wgrpipe` for GROND.

The astronomer can download from the ESO archive using the web site, but there may be a delay before the data appears. They can also secure copy (`scp`) the data from one of the machines (`wgrond`, `wferos`, `w2p2ins`, `w2p2off`, `w2p2dhs`, etc.) to their computers.

The GROND team also manage data backup with external disks mounted on `wgrpipe2` (labelled as `wgrsaruman`) and regularly shipped back to Germany.

Weather and sky quality data

Workstation `wlsasm` is responsible to distribute the weather and sky quality data to the telescopes, in particular to `w2p2tcs`. The different instruments will then obtain these data to include them in the FITS header of the astronomical data.

Table 11.2: Computer location and reboot methods. The computer room refers to the first floor of the telescope building.

Component	Location	Reboot methods
TCS WS	Computer room	`reboot` in `tcs@w2p2tcs` terminal
TCS LCU	Computer room	`lccBoot lte2p2`
		`rsh vxte2p2 reboot`
		Reset button, VME rack
WFI WS	Computer room	`reboot` in `wfi@w2p2ins` terminal
WFI FIERA	Computer room	`rsh -l fcdrun wwffcd reboot`
FEROS workstation	virtual	`reboot` in `feros@wferos` terminal
FEROS pipeline	virtual	`reboot` in `root@w2p2off` terminal
FEROS LCU	FEROS room	`lccBoot lfeics1`
		FEROS `ICS Control`, window menu `LCU`→`Reboot`
		`rsh -l fcdrun lfeics1 reboot`
FEROS AG LCU	FEROS room	`lccBoot l2p2cam`
		`rsh l2p2cam reboot`
		Reset button, rack, FEROS room at telescope
		Unplug rack, FEROS room at telescope
FEROS FIERA	Computer room	`rsh -l fcdrun wfefcd reboot`
GROND WS	virtual	`reboot` as `root@wgrond`
GROND FIERA	computer room	`rsh root@wgrccd reboot`
		Power switch, FIERA WS
GROND IRACE	computer room	`rsh root@wgrdcs reboot`
		Power switch, IRACE WS
GROND AG LCU	computer room	`lccBoot l2p2agr`
		`rsh l2p2agr reboot`
		manual reset (not tested)
vot/p2 WS	virtual	`reboot` in `service@w2p2dhs` terminal
User WS	?	`reboot` in User WS terminal

Observing blocks

On the data handling system workstation `w2p2dhs`, the application `vot` distributes OBs to the instruments on their workstations `wgrond`, `w2p2ins`, `wferos`. It gets them on realtime from the ESO archive and can modify them in the archive. In addition, the RRM of GROND on `wgrpipe` can send OBs directly to `wgrond` for immediate execution.

The astronomer will be able to prepare OBs from any place with immediate repercussion on the ESO archive and thus `w2p2dhs`.

11.1.5 Computer location and reboot methods

The computers and LCUs may be located on the first floor of the telescope building in three rooms (computer room, FEROS, GROND), in the control room of the New Operations Building (NOB), or can be virtual. The observing floor has only low-level electronic devices (e.g. FIERA & IRACE electronics to control detectors, ADAM module to control hydraulics &, mirror cover) plus a terminal to login remotely on a workstation.

Prior to a planned power outage or to reboot some detector electronics, it is advisable to shut down some workstations. LCUs are typically rebooted daily as a prophyllactic measure (by the start-up scripts), other

stations can be let accumulate an uptime of a few months (manual reboot needed). Note that virtualised workstations can be rebooted, but if halted, coordination with IT Paranal will be needed to get them up again.

Table 11.2 indicates the location of all relevant computers and LCUs, as well as the different reboot methods (soft and hard).

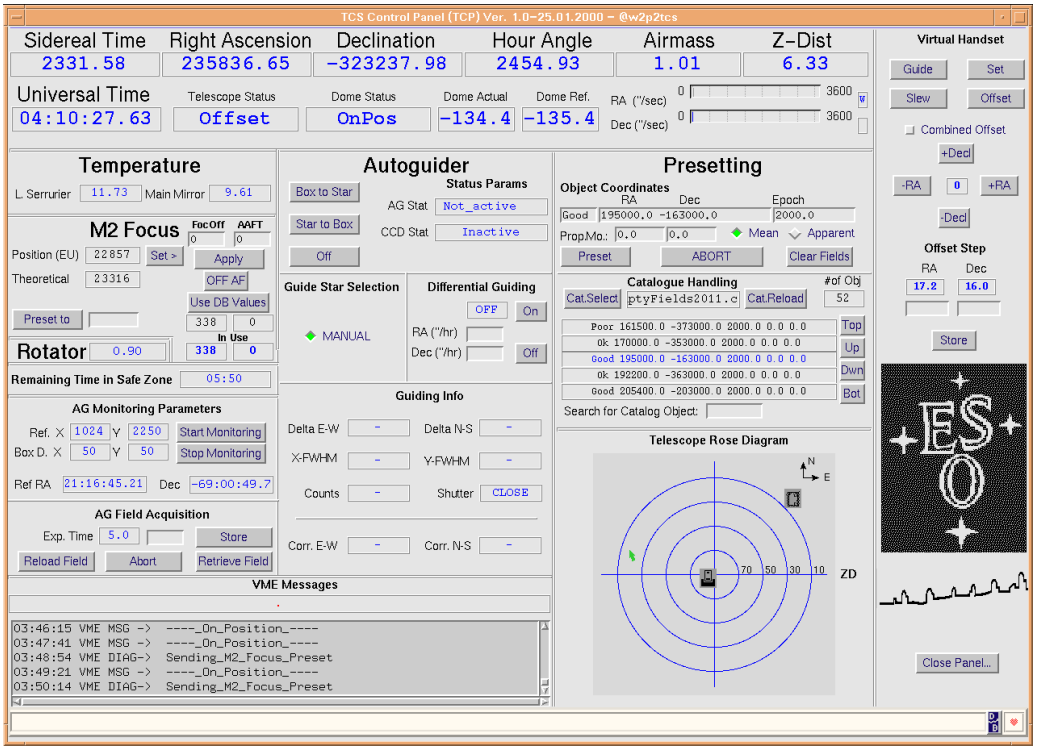


Figure 11.2: The `TCS Control Panel` allows to perform guiding with WFI and to manually preset or offset.

11.2 Telescope control software

The main panel of the TCS (Fig. 11.2, p. 122), called `TCS Control Panel`, gives a summary of focus, guiding, and pointing. The `rose diagram` gives telescope position, dome slit orientation (symbol just outside the outermost circle), Moon position (yellow circle), and some other info (green arrow). Telescope status and dome status indicate whether telescope is presetting, slewing, guiding, or offsetting. The panel also allows some interaction. The TCS setup panel (Fig. 11.3, p. 123) allows more interaction, in particular concerning closing and opening.

11.2.1 Manual preset

The presetting area of the main TCS panel (Fig. 11.2, p. 122) 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.

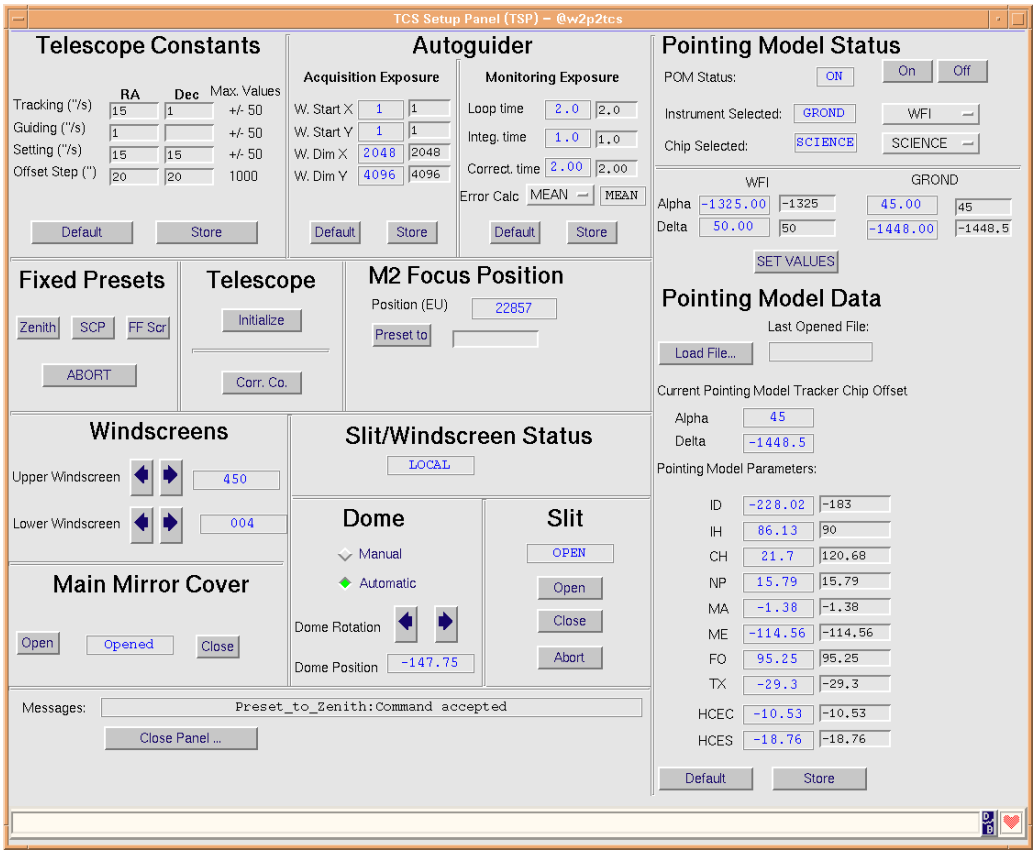


Figure 11.3: The TCS setup panel allows to open and close the dome, main mirror cover and setup the dome rotation. Additionally, fixed presets to zenith and flat screen can be sent.

11.2.2 Manual offset

The virtual handset area of the main TCS panel (Fig. 11.2, p. 122) 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.

11.2.3 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. 11.2, p. 122) give control over WFI AG. The buttons of interest are `Retrieve field` (to probe the AG field, displayed in Fig. 11.4, p. 124), `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. 11.3, p. 123).

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).

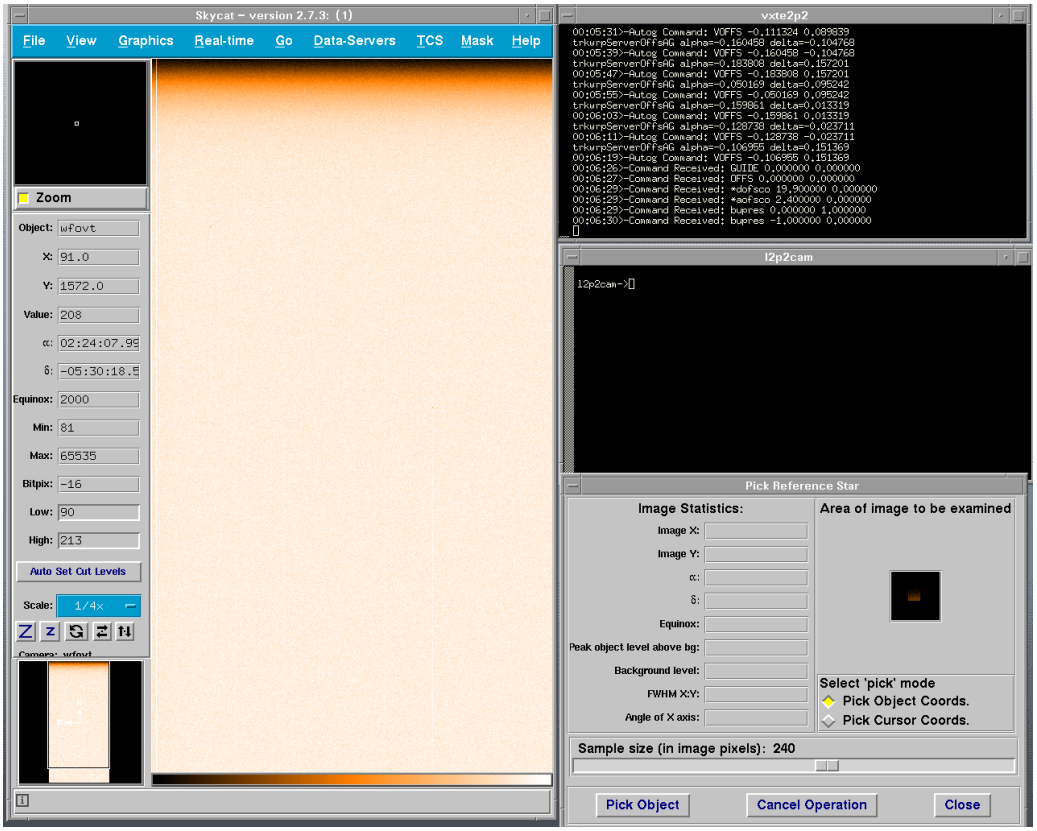


Figure 11.4: The AG field is displayed on the TCS `rtd` (left) where the reference star can be picked (using lower right window).

11.3 WFI

11.4 FEROS

11.5 GROND

11.6 P2 and vOT

11.7 FEROS reduction software

11.8 Dome controls

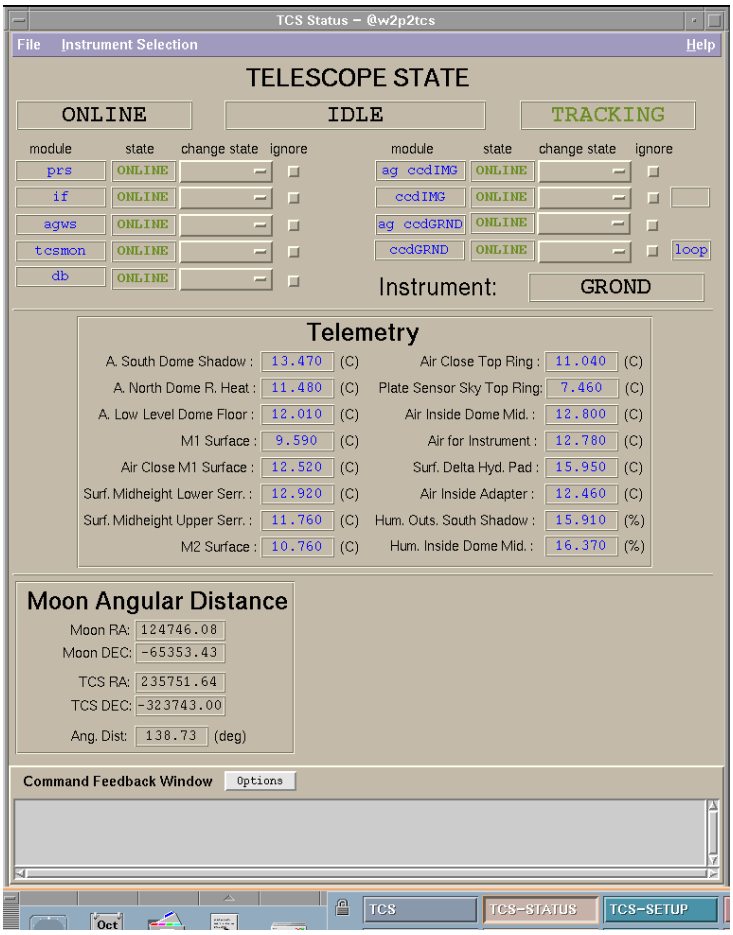


Figure 11.5: The `TCS Status Panel` is mostly used to switch the pointing model between instruments.

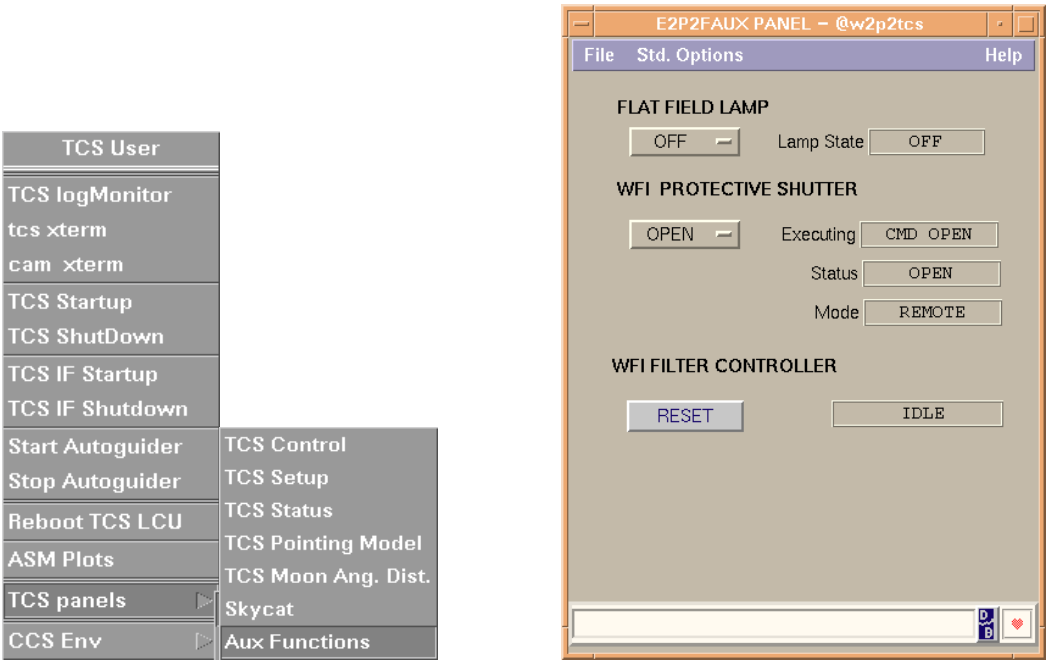


Figure 11.6: The Auxiliary Functions panel (right) is opened using the menu on the TCS machine (left). It is mostly used to switch the flat field lamp on and off, and to open or close the WFI protective shutter.

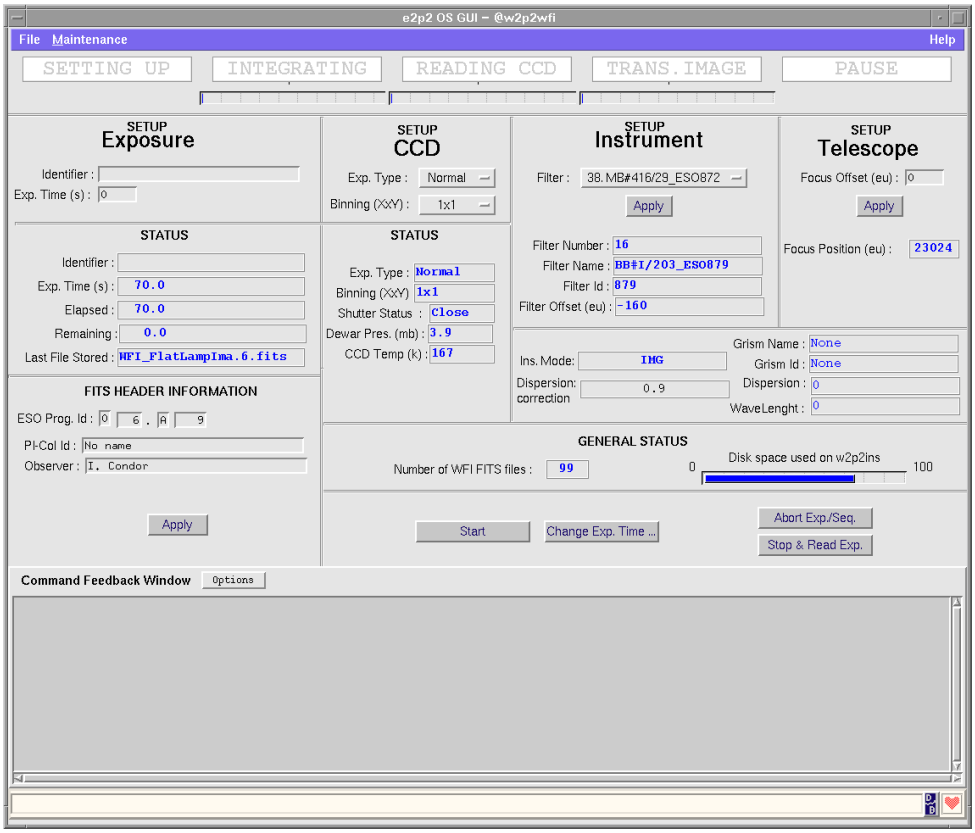


Figure 11.7: The `WFI ICS Control` can be used to change filtres manually or take/abort CCD exposures.

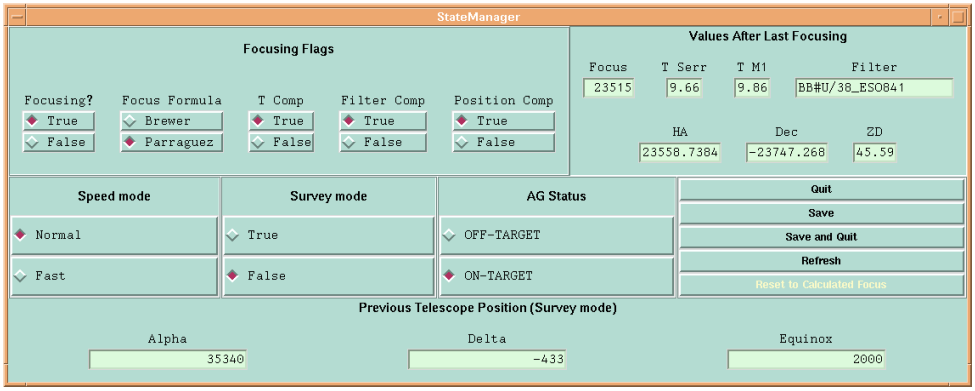


Figure 11.8: The WFI `State Manager` holds information on telescope focus, also used for FEROS. It can be used for quick-and-dirty focusing.

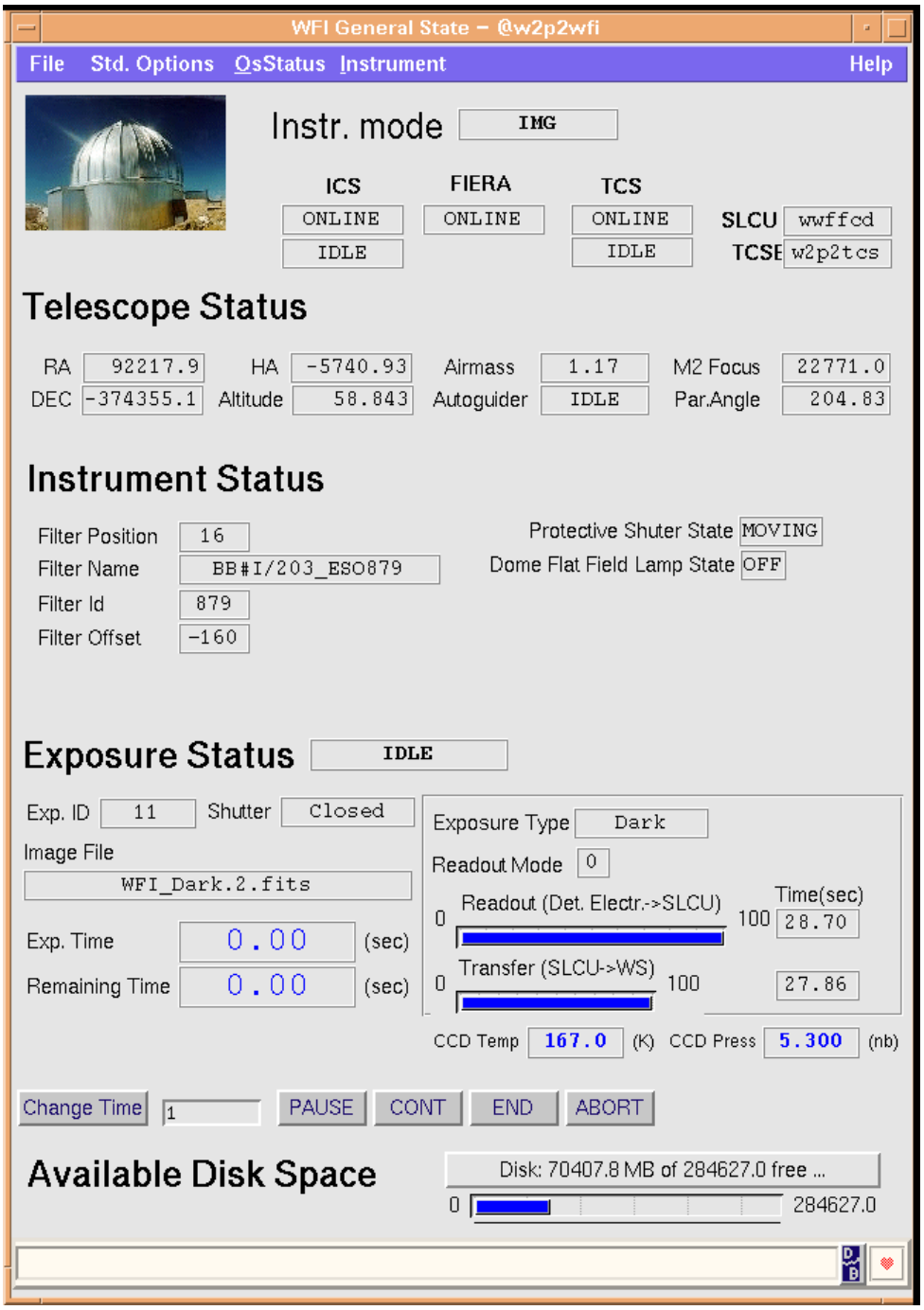


Figure 11.9: The WFI general state panel gives information about exposure, filtres, and connection to TCS.

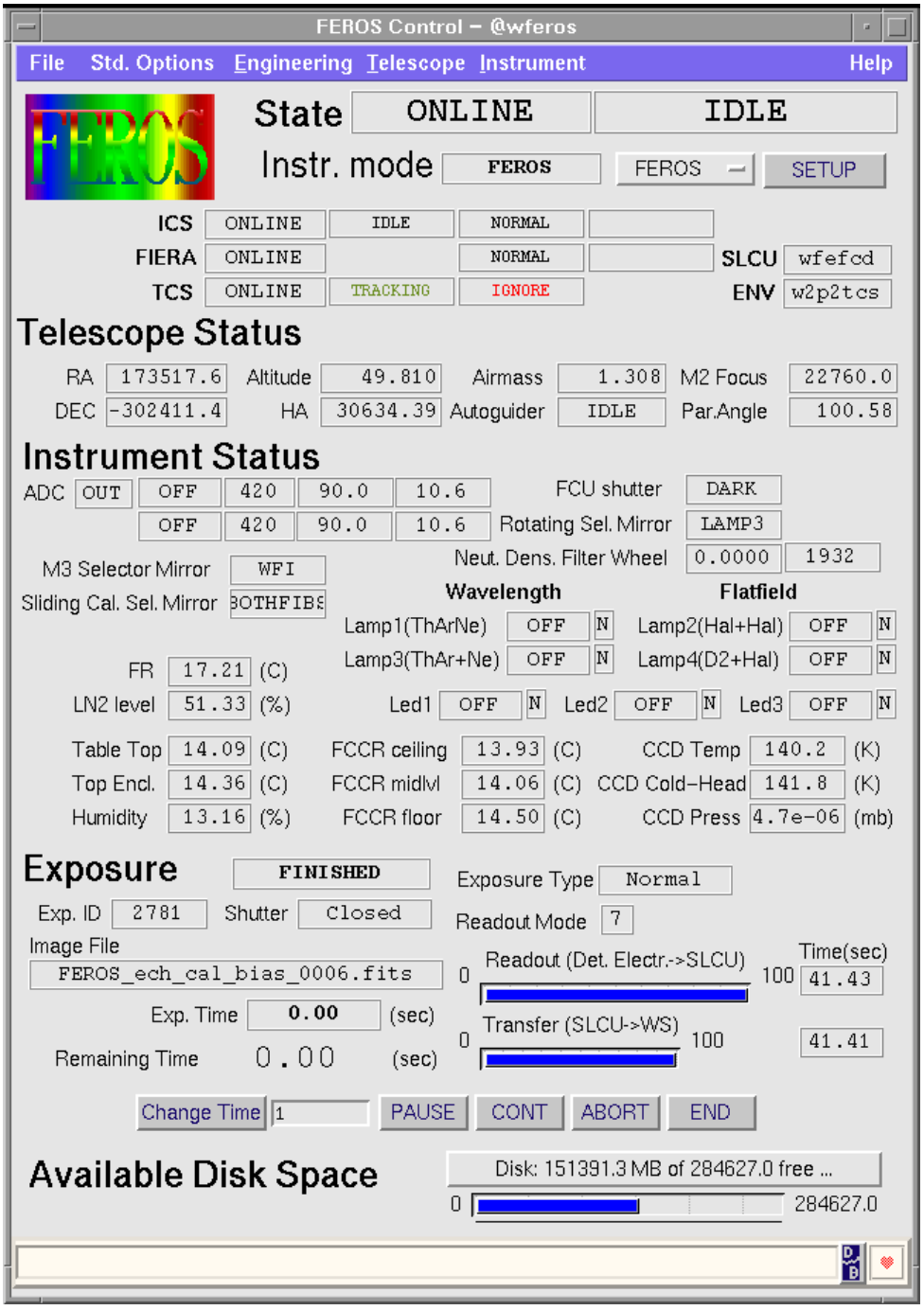


Figure 11.10: The FEROS control panel gives information about exposure, settings, lamps, and connection to TCS. Exposure times can be switched.

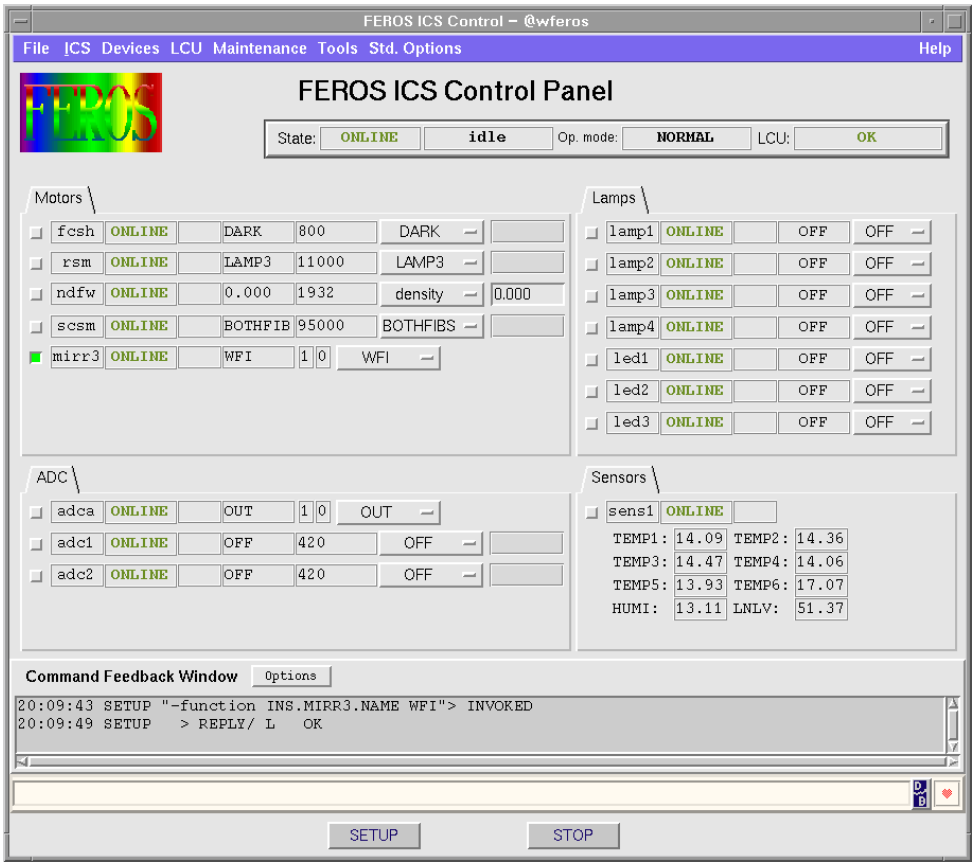
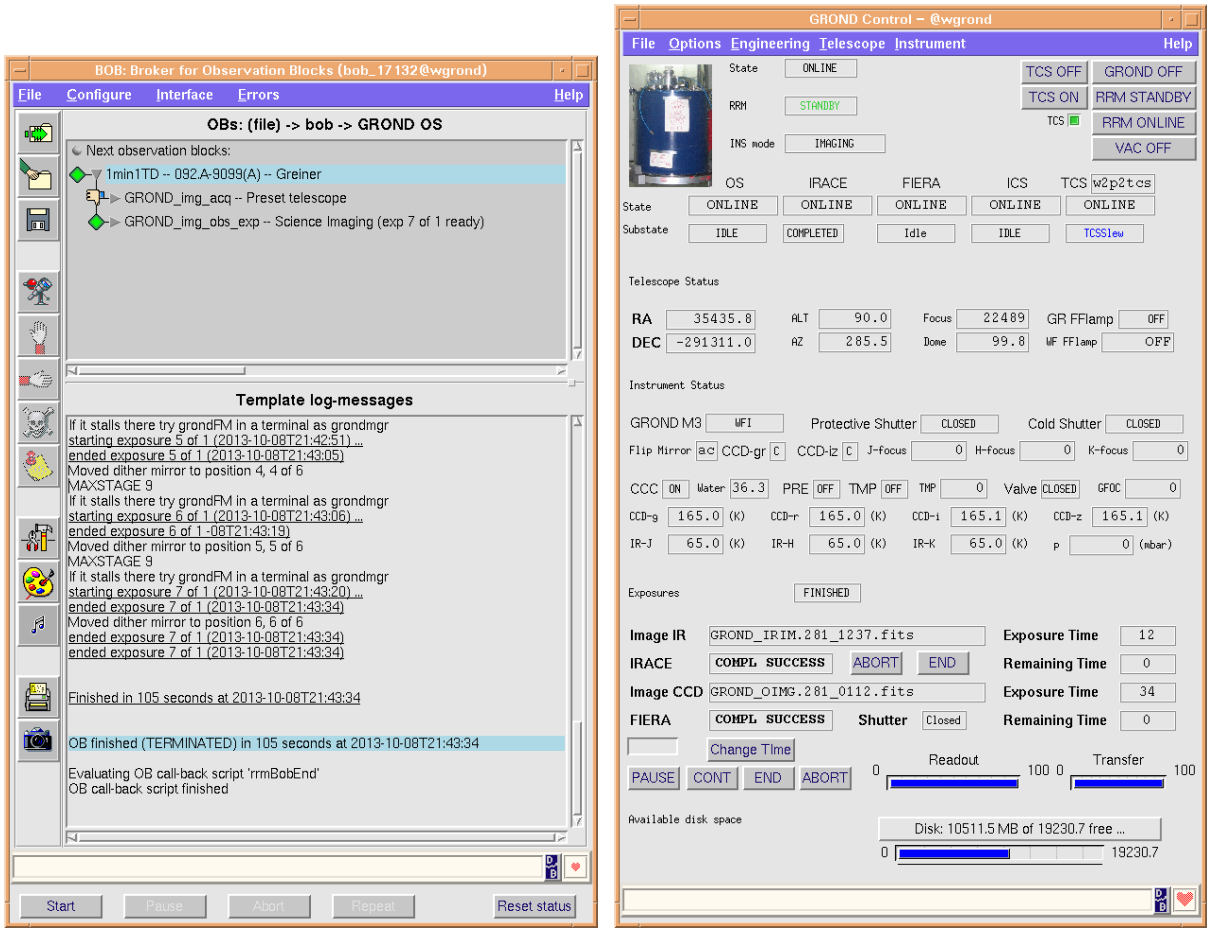


Figure 11.11: The `FEROS ICS Control` panel is mainly used to change the mirror `mirr3` from and back to WFI, but it gives wide access to the instrument control software.

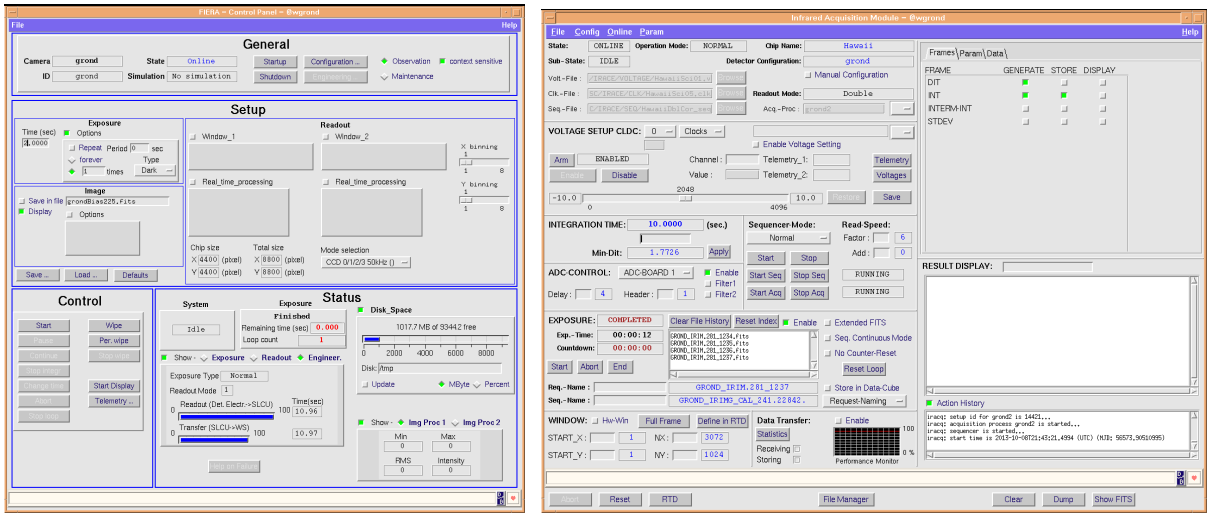
Table 11.3: Common passwords

Component	User name	Password hint
Graphical interface user	tcs, cam, feros, wfi, grond, dhs, pipeline	.5a···
Other users	visitor, service	.5a···
Instrument manager	ferosmgr, grondmgr, wfimgr	pin2···
GROND off (grondoff)	grondmpe	fixed···
Workstation administrator	root	2be1···
Remedy tickets	2p2	.5a···
Visitor observing tool (vot)	sciops2p2	alwaysB···
Dome auxiliary functions		.5a···
p2 for La Silla (p2ls)	MPGUtility, MPGDDT	MPG@···
	sciops2p2	alwaysB···



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

Figure 11.12: The main displays of GROND.



(a) GROND FIERA control panel (optical CCDs) (b) GROND IRACE control panel (IR detectors)

Figure 11.13: Control panels for the detectors.

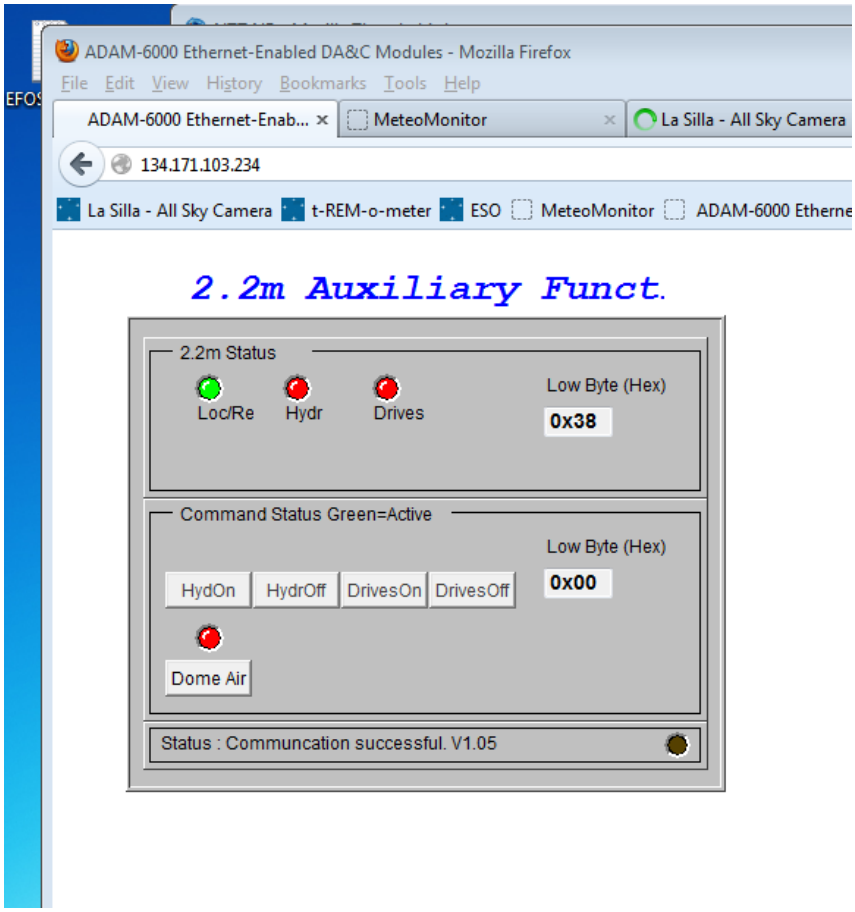


Figure 11.14: Dome Auxiliary Functions.

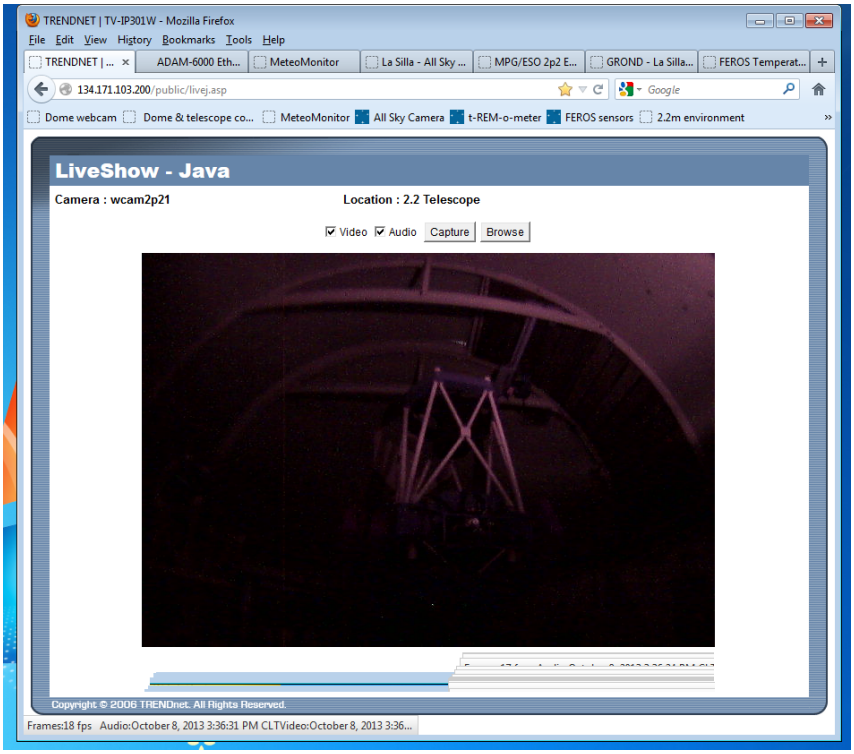


Figure 11.15: dome webcam

Glossary

acquisition
Part of an observing block that prepares the telescope (preset) and instrument (filtre change, mirror setups, etc.) for an observation. 51, 52, 61–63, 68, 69, 73, 89

ADAM
Telescope hydraulics and mirror cover control system. 23, 98, 100

ADC
atmospheric diffraction corrector 69, 70, 93, 94, 96, 97, 100

AG
autoguider 25, 27, 35, 52, 60, 63, 64, 66, 68, 69, 71, 81, 86, 87, 90, 92, 98, 106, 107, 111, 123, 124, 133, 134, 137, 138

`Autoguiding`
Window controlling the settings of the autoguider of FEROS and GROND 29, 55, 57, 68, 69, 72, 73

Auxiliary Functions
Panel with cryptic title `E2P2FAUX PANEL` (Fig. 11.6, p. 125) controlling WFI shutter and flat-field lamp. 39, 40, 46, 75, 76, 85, 92, 125

`bob`
broker for observing blocks, the application that reads s and sends commands to the telescope and instrument so that observation is performed. The `bob` panel is usually placed in the first virtual desktop `bob+gen. state` 20, 26, 28, 29, 34, 39, 40, 47, 49–52, 55, 57, 59–61, 73, 77, 80, 88–91, 93, 100, 105

cold shutter
Shutter of the infrared arm of GROND. It stays continuously open during and between observations. It will be closed during calibrations. Not to be confused with the main cover (protective shutter) or the shutters of the optical CCDs. 46, 76, 85

computer room
Computer room located in the first floor of the telescope building. (There is also a site-wide computer room below the main control room, but we don't have access to it, so it will not be mentioned in this manual.) 21, 22, 100, 102–104, 112

control room
Control room, located in the New Operation Building below the main building that contains the hotel and dining room. (There is also an old, partly functional, control room on the first floor of the telescope building, but otherwise specified, this manual refers to the main control room.) 19, 21, 51, 103, 104

data subscriber
Software that fetches the FEROS data for reduction. 81, 82, 94, 95, 108

dome
Part of the telescope building on the second floor containing the observing floor, telescope, and enclosure. It can also refer to the moving part of the enclosure. 19, 21, 23, 27, 39, 40, 43, 46, 50, 100–102, 104, 113, 122, 123

Dome Auxiliary Functions
`ADAM 6000` tab of mozilla on the Windows desktop that contains hydraulics and ventilation control of the dome. 26, 39, 45, 75, 76, 99, 131

dome flat fields
Flat fields acquired on the flat field screen on the dome, using a lamp for illumination. 25, 27, 30, 39, 40, 43, 76

dome slit
Dome slit, through which it is observed when open 39, 45, 75, 76, 85, 101, 122

dome webcam
View into the dome given by the `TRENDNET` tab of mozilla on the Windows desktop. 21, 75, 76, 105, 132

DRS
data reduction software 19, 25, 35, 36, 40, 81, 82, 94, 95, 120, 136, 139

`FEROS AG Real Time Display`
Window with the mage of the FEROS autoguider camera 30, 55, 66–70

`e2p2StartTCCDs`
Command to start the Technical CCDs (guiding cameras) of GROND and FEROS 86, 87

`e2p2StopTCCDs`
Command to stop the Technical CCDs (guiding cameras) of GROND and FEROS 86, 87

environment
A specific set of computer processes and database values dedicated to a specific job for the instrument and telescope operations. 10, 89–91, 96, 117

`fcdTelemetry`
Command to open the telemetry panel of GROND or WFI, used to activate telemetry if necessary. 27, 96

FEROS
Fibre-fed Extended Range Optical Spectrograph 19, 25, 28–30, 34–36, 40, 46, 47, 49–51, 55, 56, 62, 66, 67, 69, 72, 76, 77, 81, 82, 85–89, 91, 92, 94, 95, 98, 100, 106–108, 110, 111, 117, 120, 123, 126, 128, 133, 134, 136, 138, 139

`FEROS ICS Control`
FEROS instrument control software panel 47, 76, 93, 129

FIERA
Electronics systems controlling the optical detectors 85, 89–91, 97, 98, 119, 139, 140

flip mirror
Flip mirror, mirror in the infrared arm of GROND that enables fast dithering while optical is exposing. See grondFM 89, 91

focus
Telescope focusing uses the secondary mirror. GROND focus is usually not touched. WFI and FEROS focus need regular (about daily) focus sequences to be performed. 25, 49, 51–53, 55–57, 59, 65, 66, 87, 89, 91–94, 100, 122, 126, 138

General State
The `General State` panel of each instrument displays its status (integrations going on, basic telemetry, shutters, etc.). It is usually placed in the first virtual desktop `bob+gen. state` 10, 26, 28, 40, 60, 62, 66, 70–72, 76, 89, 90, 92, 96, 97, 100

`grinsStart`
Command used to start the GROND instrument 29, 90, 102

`grinsStop`
Command used to stop the GROND instrument 29, 90, 102

GROND
Gamma-Ray Burst Optical/Near-Infrared Detector 19, 25, 28–30, 35, 37, 46, 47, 49–51, 55, 57–59, 62, 66, 70–72, 76, 77, 81, 85, 86, 88–92, 102, 107, 121, 123, 130, 133–136, 138, 139

grondCS
Command controlling the shutter of the infrared arm of GROND 29, 47, 59, 76, 85

`grondFM`
Command that controls the infrared flip mirror of GROND 29, 57, 89

`grondGRI`
Command to reinitialise the event server of GROND 29, 57, 91

grondM3
GROND M3 mirror and command controlling it 29, 47, 57, 59, 62, 66, 71, 76, 85, 102

grondMC
Command controlling the main cover (a.k.a. protective cover or main shutter) of GROND 29, 46, 59, 71, 76, 85

`grondSHUTTER`
Command that resets the shutters of the optical CCDs of GROND 29, 47, 57, 89, 91, 102

ICS
instrument control software 25, 85, 102, 129, 134, 139

`ICS Control`
The `ICS Control` panel of an instrument allows to modify its state (mirrors, shutters, exposures). It is usually placed in the virtual desktop `ICS` 62, 66, 93, 96, 97, 121

IRACE
Electronics systems controlling the infrared detectors. 89, 102, 114, 119, 139

`irtd`
infrared real time display, an imaging application used to display the J, H, K bands of GROND. 29, 59

`l2p2agr`
Environment and eponymous LCU controlling the GROND autoguider 86, 107, 121

`l2p2cam`
Environment and eponymous LCU controlling the FEROS autoguider 87, 98, 106, 107, 121

LASCAM
La Silla all-sky camera 104

`lccBoot`
Command to reboot a workstation or a logical control unit (LCU/VME) 26, 86, 87, 100, 121

LCU
Local control unit, machine in a rack that controls an instrument or telescope subsystem. 21, 87, 94, 98, 99, 106, 111, 117, 119, 121, 138

`lfeics1`
Environment and eponyous LCU of the FEROS instrument control software 97, 117, 119, 121

`lte2p2`
Environment corresponding to the `vxte2p2` LCU of the telescope control software 26, 33, 100, 119, 121

M3
Tertiary mirror. There are two tertiary mirrors, one for GROND (trumps FEROS and WFI) and one for FEROS (trumps WFI). WFI is at the secondary focus and gets the light if, and only if, neither of the tertiaries is inserted in the optical path. 40, 47, 50, 51, 55, 57, 59, 62, 66, 71, 76, 85, 102, 113, 114

main cover
Refers to the protective shutter of GROND 46, 70, 71, 76, 85, 114

main mirror
Primary mirror of the telescope. It has a cover that needs to be open for observing and but should be closed when dome slit is being opened or closed. 46, 50, 51, 55, 57, 75, 85, 100, 102, 114

MIDAS
The infamous reduction software, used mostly for side calculations (flux level, focus) and data reduction software 35, 53–55, 95

mirr3
FEROS M3 mirror 40, 47, 50, 51, 62, 66, 76, 85, 129

MPE
Max-Planck Institute for extraterrestrial Physics. 20, 59

MPIA
Max-Planck Institut für Astronomie. 20, 138

OB
observing block, a file containing the information needed to instruct the telescope to perform an observation 19, 20, 28, 29, 39, 40, 46, 47, 49–52, 54, 55, 57, 59–61, 63, 66–71, 73, 77, 79, 80, 88, 89, 91–94, 100, 102, 105, 119–121, 133, 138, 139

`ogrccc`
Closed-cycle cooler controller for GROND. 119

`ogrds1`
IR temperature controllers and primary motor controller for GROND. 119

`ogrds2`
Turbopump monitor. 119

`osf2p2StartUp`
Command used to do a start-up of the telescope control software and the instruments WFI & FEROS. 25, 27, 28

`p2`
Phase 2, a web interface to create observing blocks and organise the execution sequence 19, 79–82, 119, 121

`Pick Object`
Graphical user interface that allows the observer to pick a star in an image to measure its size (e.g. seeing determination) and pixel position (e.g. refining acquisition). Also a menu option to open such a window. 51, 63

`Pick Reference Star`
: Graphical user interface that allows the observer to pick a guide star on the WFI and GROND autoguiders, and a fibre reference pixel for FEROS. Also a menu option to open such a window. 27, 30, 65, 67, 69, 71–73

pointing
: Pointing refers to the part of preset consisting of moving the telescope to the target. It may also refer to a check of the pointing accuracy. 25, 51, 52, 70, 73, 103, 122

pointing model
: Set of parameters controlling the pointing of the telescope. 27, 28, 51, 52, 61, 66, 71, 103, 125

power cycle
: Action consisting of switching off an electronic device, waiting for a few seconds, and switching it back on. 21, 81, 87, 97–99, 106, 110, 114

preset
: Telescope movements (right ascension, declination, and secondary mirror focusing) needed to point at a new source. It is also used as a verb to refer to the action of ordering the telescope to move. 39, 46, 61, 63, 66, 70–73, 91, 94, 99, 122

protective shutter
: Protective shutter of WFI, that remains open during the night. Not to be confused with the shutter of the optical CCDs that open for integration only. (For GROND it is generally called main cover, see grondMC) 39, 40, 46, 50, 51, 55, 61, 76, 85, 125

radial velocity standard
: A star with a stable radial velocity used to calibrate or check the calibration of FEROS. 49, 55, 57

`rose diagram`
: Diagram of the telescope position, slit orientation, and Moon displayed on the `TCS Control Panel`. 45, 75, 101, 122

RRM
: rapid response mode, the system that allows GROND to swiftly and automatically take command of the telescope to start observing when a satellite detects a possible transient. 60, 72, 76, 121

`rtd`
: real time display, an imaging application used to display the optical CCD images of WFI, FEROS, and GROND. 26, 28, 29, 33, 34, 51, 63, 71, 72, 90, 124

SCCD
: Science CDD 90, 139

service
: Service observing, service mode, or queue observing is when an observer does observations for different programmes, according to weather conditions and priorities. 20, 47, 129, 138

sky flat fields
: Flat fields acquired on the twilight sky. 45, 46, 49, 50, 57–59

`skycat`
: Imaging application developed at ESO that can be seen as a simplified `ds9`. 27, 52, 64, 65

spectrophotometric standard
: A star with a stable and well-known flux energy distribution used to determine the transmission of FEROS + telescope + atmosphere. 49, 51, 55, 57

stall
: Stalling refers to stopping doing anything without an error being displayed or reaching complete state. As it is silent, it is easy to lose time for a stalled OB... 89, 91, 100, 102

standard field
A field containing various standard star with well known magnitudes. It is used to calibrate the flux response of WFI (Landolt fields) and GROND (Landolt and SDSS fields). 49, 54, 59, 60

`State Manager`
WFI GUI giving the status of the telescope focus used by WFI and FEROS. 93, 126

TCCD
Technical CCD 86, 87, 90, 134, 139

TCS
telescope control software 19, 23, 25–29, 33, 36, 45, 46, 51, 52, 54, 57, 64, 65, 75, 76, 81, 82, 85–94, 97–104, 110, 119, 122–124, 127, 128, 136

`TCS Control Panel`
Graphical user interface showing the state of the telescope and WFI autoguider. Normally placed on the `Control` virtual desktop of the Telescope Control Software screen. 27, 39, 45, 46, 51, 52, 54, 64, 65, 68–71, 75, 89, 93, 94, 99–101, 104, 122, 137

`TCS Setup Panel`
Graphical user interface allowing to modify the state of the telescope (opening/closing) and WFI autoguiding (parameters). Normally place on the `Setup` virtual desktop of the Telescope Control Software screen. 28, 39, 40, 45, 64, 71, 75, 100, 101, 104

`TCS Status Panel`
Graphical user interface showing the state of the telescope modules and pointing model. Normally placed on the `Status` virtual desktop of the Telescope Control Software screen. 28, 51, 55, 61, 66, 86, 100, 103, 125

telemetry
Telemetry panels indicate the state of WFI and GROND detectors, in particular vacuum and temperature. A text-based telemetry module (logging) for GROND is to be manually started a reboot. 27, 96, 110, 134

`Telescope R.T.D`
Window displaying the image of the GROND autoguider 30, 72, 73

template
Atomic part of an , with a single function, such as the acquisition or a set of integrations with a single instrument configuration (filtre, readout mode). 40, 50, 54, 57, 61–63, 73, 89, 92

TIO
telescope and instrument operator 76, 104

`uws2p2`
User workstation of the 2.2m metre telescope. All workstation are virtually run on it. 82, 117

virtual desktop
A virtual desktop, or desktop, is a working environment showing on the screen of the linux/unix workstations. It is possible to switch between them on the same machine, achieving the same result as having more screens. 25–30, 33, 34, 40, 50, 51, 54, 55, 61, 62, 66–73, 80, 86, 91, 96, 120

visitor
Visitors, i.e. astronomers observing in visitor mode, mostly observe their own programme independently of weather constraints and other programmes' priorities. During MPIA there is no "pure" visitor, as some programmes should be observed in service year round. 19, 20, 40, 119, 129

VME
virtual machine environment, used metonymously to describe the local control unit controlling the telescope. (VME describes the operating system running on logical control units, but this manual will not use this definition.) 21, 22, 39, 45, 88, 94, 99, 100, 104, 112, 121

`vot`
: Visitor Observing Tool, a graphical user interface on the `w2p2dhs` workstation dealing with the distribution of observing blocks to each instrument. 19, 39, 73, 79–82, 88, 119, 121

`vxte2p2`
: LCU of the telescope control software 119

`w2p2cam`
: Environment corresponding to the autoguiders of GROND and FEROS (graphic user `cam`, workstation user `cam@w2p2tcs`) 28, 29, 89, 120

`w2p2dhs`
: Environment and eponymous workstation controlling the s 82, 119–121, 139

`w2p2ins`
: Workstation of WFI 82, 117, 119–121

`w2p2off`
: Workstation controlling the FEROS data reduction software 82, 95, 119, 120

`w2p2pl`
: Workstation controlling the communication with the ESO database 82, 95, 96, 119, 120

`w2p2tcs`
: Environment (user `tcs@w2p2tcs`) and eponymous workstation of the Telescope Control software 82, 90, 91, 119, 120

`w2p2wfi`
: Environment corresponding to WFI operations (user `wfi@w2p2ins`, graphic user `wfi`) 117, 120

`wfefcd`
: Environment and eponymous workstation controlling the FEROS detector electronics (FIERA) 117, 121

`wferos`
: Workstation of FEROS 82, 117, 119–121

WFI
: wide-field imager 19, 25–28, 30–33, 36, 39, 40, 46, 47, 49, 51–54, 61, 62, 66, 68–73, 76, 77, 81, 82, 85–93, 97, 98, 100, 103, 110, 120, 122, 123, 125–127, 129, 136, 138–140

`WFI ICS Control`
: WFI instrument control software panel 52, 69, 90–92, 126

`wfinsStartSCCDS`
: Command to start the WFI Science CDDs (main array) software 90

`wfinsStartTCCDS`
: Command to start the WFI Technical CCD (TCCD)s (guide camera) software 87, 90

`wfinsStopTCCDS`
: Command to stop the WFI Science CDDs (main array) software 90

`wfinsStopTCCDS`
: Command to stop the WFI TCCDs (guide camera) software 87, 90

`wgrccd`
: Environment and eponymous workstation controlling the GROND optical detector electronics (FIERA) 121

`wgrdcs`
: Workstation controlling the GROND infrared detector electronics (IRACE) 117, 121

`wgrond`
: Workstation of GROND 29, 102, 117, 119–121

`wgrondoff`
: GROND workstation for sound server and offline work 119

`wgrpipe`
: Workstation controlling the data reduction and the rapid response mode of GROND 120, 121

`wgrpipe2`
: Second pipeline machine for GROND, locally labelled as `wgrsaruman`. It is used for data backup on external disks, shipped to Germany on a regular basis. 120

`wgrsaruman`
: Label on the workstation seen as `wgrpipe2` over the network. 120

Windows desktop
: Rightmost computer in the control room that controls the dome. 19, 33, 45, 75, 76, 134

`wlsasm`
: Workstation responsible for the astronomical site monitoring, i.e. measurement of weather and sky quality. 120

workstation
: A computer, with or without a scree attached, that runs some unix or linux flavour. In opposition to LCU and terminal. 117, 119

`wwffcd`
: Environment and eponymous workstation controlling the WFI detector electronics (FIERA) 88, 90, 97, 98, 121