



NIKA2 System Recovery

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Abstract

The present document summarizes the main thing that must be checked to be sure that the NIKA2 acquisition is running smoothly at the 30m telescope, and the steps to follow in order to perform a system recovery in case of need. Procedures to connect (remotely or locally), start, check, and reboot the system if necessary are described. Some of the procedures listed below involving reboots of the electronics should be taken with caution and are not recommended for non-experienced observers. In case of doubt, please contact the IRAM staff or a NIKA2 instrument expert for assistance.

1 Connection to Work on NIKA2

1.1 Remote connection

Follow these steps if you are not currently at the Pico Veleta site.

1. Open the tunnel to various NIKA2 machines, in particular nika2-a , Mac8, Mac12, PC31 and PC38:
 - **For Mac:** go in `./NIKA/Processing/NIKA_ lib/Acquisition/appli/` and launch the script **tunnel.command**.
 - **For Linux:**
`ssh -L 2222:nika2-a.iram.es:22 -L 5901:nika2-a.iram.es:5901 -L 5902:nika2-a.iram.es:5902 -L 5908:150.214.224.24:5908 -L 5912:150.214.224.24:5912 -L 5936:mrt-nika1.iram.es:5901 -L 5931:150.214.224.24:5931 -L 5938:150.214.224.24:5938 t21@mrt-lx2.iram.es`
2. Open a ssh window on nika2:
 - `ssh -X -p 2222 -t localhost -l nika2`
 - `cd ./NIKA/Processing/NIKA_ lib/Acquisition/Appli`
 - `bash`
3. Open a series of VNC windows: 2 on nika2-a, one on Mac 12, as well as one on either the PC31 or the PC38 for the cryostat control:
 - **open vnc://localhost:5901** : first window open on the nika2-a machine, used to launch the acquisition program
 - **open vnc://localhost:5902** : second window open on the nika2-a machine, used to run the lecture and monitor programs
 - **open vnc://localhost:5912** : a data acquisition Mac used for an overview of the KIDs status. It typically runs an extra copy of lecture, plus the 'trace' program to check the time traces of the NIKA2 detectors and their level of noise.
 - **open vnc://localhost:5931 (or :5938)** : a NIKA2 PC to control the cryostat status.

1.2 Local connection

If you are at the Pico Veleta site, you don't need to open tunnels: you can directly work on the NIKA2 desk (at the center of the control room), which has two Mac: Mac8 (on the left) and Mac12 (on the right). The steps to follow are in this case the following:

1. **On Mac8**, double-click on the shortcut called “ssh nika2”. This opens a ssh terminal on nika2-a, already in the *appli* folder.
2. Still **On Mac8**, double-click on the shortcut called “fenetres_nika”. It will open two VNC windows connected to nika2-a, respectively on port 5901 (named 'nika2-a:1') and on port 5902 (named 'nika2-a:2'). If this does not work, try the first instruction of the next point.
3. **On Mac12**, from a shell window, open a VNC connection to the PC31 (or 38) to check the cryostat:

- **open vnc://192.168.1.38** (or .31)

2 Start the Acquisition with the NIKA2 Equipment via Mac8

It is now time to launch the acquisition software, that communicates with all the electronics boards and the various data acquisition subsystems. Do this on the Mac8 if you are at the telescope.

1. Start the acquisition software '**acqui**' on nika2-a:
 - In the ssh terminal on nika2-a do **./reset_nika.pl**. This resets all the VNCs and applications that could still be running. Sometimes it does not work at once, so better to launch this command twice.
 - In the window **nika2's X desktop (nika2-a:1)** click on the “**LAUNCH ACQUI**” icon (or “**LAUNCH ACQUI_AB_OB**” if using the new version of the software). This starts all the applications necessary for the acquisition: elvin, antenna, control and acqui. Wait until a blue rectangular window opens on the top part of the screen. It will have a series of small rectangles ('Aamc', 'Bamc', ...), that should all be blinking.
 - If everything is OK go to next point . If on the other hand one card does not respond or a card is stuck, there should be message. In this case, go to the Section 5 ('Verification of Amc Card Crates'), follow the steps therein, and finish by restarting the acquisition (**./reset_nika.pl** and so on).
2. Start the software which reads and saves the data in the correct format '**lecture**' on nika2-a:
 - in the window **nika2's X desktop (nika2-a:2)**, click on the icon “**LAUNCH LECTURE**” (if using the 'old' version of the program)
 - if you are using the new version of the program, in the window **nika2's X desktop (nika2-a:2)** open an xterm window and launch the program
~ /NIKA/Processing/NIKA_ lib_AB_OB/Acquisition/appli/launch_lecture.sh
 - Check that you have a rectangle saying **SYNCHRO OK** in green. If it is so, go to the next Section 3. If it is not in green, click on “**stop**” and “**start**” on the blue Acquisition on the window nika2-a:1 and then click on “**reload file**” on the Lecture window in nika2-a:2. Often this does not work and it is necessary to completely restart the acquisition (go back to point 1: **./reset_nika.pl** and so on).

3 Resonances Control via nika2's X desktop (nika2-a:2)

1. In the vnc connected to nika2-a port 5902 (nika2-a:2), find the pink (old software) or gray (new software) “**kid_monitoring**” window.
2. To search for resonances, inside this window click on the tab labelled **Recover lost pixel**. Then, in the window that appears, do the following:
 - Click on “**load freq.**”
 - Set the width of the scan: **100 points on a cold sky, 250 points if one is open on 300K or a bad sky.**
 - Click on “**measure**” and wait until the end of the measurement and the display of the curves in the graph. They should look like some gaussians (or.. kind of!).
 - Click on “**apply shift**”.
 - Click on “**full tuning**”. The program should now return to the main control window. If it does not do it on its own, click on the label 'main control'

After this, and always in the 'kid_monitoring' window, you have a series of graphs allowing a general check of the system status:

- The histogram on the left indicates whether the tuning is of good quality. If all KIDs are well tuned, the histogram should look almost like a 'delta' distribution, with all KIDs placed around 0.
 - The rising balls indicate the number of usable KIDs, so all the sliders should be quite high (say above approx. 80% of full scale).
 - The histogram on the right gives an idea of the noise on the measurement.
 - Eventually, click on “**mise a jour des bons kid**” (update the good KIDs) so that the noise is calculated on the good KIDs.
3. If the above mentioned checks are all ok, **tick the small box saying “Auto_tune”** so that the system starts to tuning automatically: the Elvin commands will trigger the tuning when needed. The system is now ready for observations: **YOU CAN START THE SCANS!**
 4. It can now be useful to launch the data reading also on Mac12, as well as the 'trace' program to look at the KIDs time traces:
 - If the **lecture** program is not already running, click, on the left, on the icon representing a small green frog with big eyes to start it. If on the other hand it is already running and you have just re-launched 'acqui' on nika2-a, click on the “**reconnect**” button of 'lecture'. Check that the messages are scrolling in the right part of the green 'lecture' window.
 - If “**trace**” is not already running, click on the icon representing an orange elephant to start it. A small orange window should appear: it is the 'trace' main window.
 - In the “trace” main window, in the drop down menu, choose 'trace_tout' to open a window from which you'll be able to plot the KIDs time traces.
 - **For more details on the steps to take on Mac12 for plotting data/checking data quality, refer to the document 'CheckingNoiseSpectra'**

4 Check-list for Running Processes

On Mac 8 (or more in general in the nika2-a VNC windows):

1. On the **nika2's X desktop (nika2-a:1)** blue (or grey for new software) window (**Acqui**):
 - All the LEDs blink correctly. If a LED does not blink, then restart (“**stop**” and “**start**”).
 - All the needles are facing upwards (and orange).
 - The intermediate files are well recorded (**filename is blinking**).
2. On the **nika2's X desktop (nika2-a:2)** green window (**Lecture**):
 - The data scroll regularly in the table on the right.
 - **The sync indicator is green and does not blink.**
 - The file name is displayed correctly and flashes (blinks)
 - The options 'interne' and 'comprime' are ticked, the 'mini', 'nika2' and 'normal' are not ticked
3. Again in the **nika2's X desktop (nika2-a:2)**, but this time in the pink window (**Monitor**):
 - The 'auto_tune' option is ticked
 - The text at the top left, next to Auto_tune, blinks.
 - The histogram of the KIDs must be rather sharp and near to zero. Notice that they can drift during long scans (no tunings are performed while scanning) but should recover a 'delta-like' shape at the end of a scan.
 - The circles of the scroll bars must be fairly high (high number of good kids)
4. On the monitoring Mac:
 - On the orange window (trace and trace_tout): if you have opened the KID traces, they should be scrolling by. You can check also the noise level. Refer to the dedicated document, 'CheckingNoiseSpectra'
 - On the VNC connection to PC31 or PC38:
 - The temperature of the mixing box (MC) is ~ 170 mK (190 mK if considering the temperature sensor nearer to the detectors).
 - The level of the cryostat. Check that it is stable.
 - Check that the **duoPOMP**, the **COMP**, and the **HP400** turbo are on.

5 Verification of Amc Card Crates

- Go to the terminal in which the ssh connection to nika2-a is active. Normally you are in the *appli* folder. If not do:
`cd ~/NIKA/Processing/NIKA_lib/Acquisition/appli/` , or
`cd ~/NIKA/Processing/NIKA_lib_AB_OB/Acquisition/appli/`
if using the new version of the software.
- Send the command `./control.py nika`. It indicates the state of the 3 Crates as well as of all 20 boards. Verify that the 20 boards are present.

After this, different cases may arise:

- The 3 Crates are not presents: it is necessary to **restart everything (power cycle them)**. Go to → 1.
- The 3 Crates are present but there are some missing boards in the list: reboot the Crate in which boards are missing. Go to → 2)
- The 20 boards are present but some are marked **KO instead of OK**: restart the doubtful boards. Go to → 3.
- Everything seems OK but the acquisition refuses to start a precise board: **restart the board indicated by the acquisition**. Go to → 3.

1. Complete restart of the Crates (power cycle):

- Connect with firefox or safari from the Mac 8 or Mac 12 on the PSE538 switch: IP-address: **192.168.1.58**, user: **admin**, pass: **admin**
- Each Crate is powered separately by the **220V P1 (for Array 1), 220V P2 (for Array 2), and 220V P3 (for Array 3)** power supplies.
- Click off 220V Px and wait 20 seconds.
- Click on 220V Px and wait 40 seconds. **WARNING: only touch the P1, P2, or P3 power supplies, nothing else.**
- Check with **./control.py nika** that the Crates are present. If they are, restart **./reset_nika.pl**.

2. Rebooting a Crate: if there are missing boards in the Crate (there must be $8(A1) + 4(A2) + 8(A3)$): **./control.py 192.168.1.xxx crateColdReboot**, where xxx is the IP-Address of the Crate: array1 = 150, array2 = 160, array3 = 170. Wait some seconds then check with **./control.py nika**.

3. Restart an individual board:

- To restart a board, you must know the IP-Address of the crate and the slot number of the board. Everything is indicated after a **./control.py nika**.
- Nonetheless, it could happen that on the **./control.py nika** command output, all boards are shown with OK status but on the Acqui or kid_monitoring windows, a board shows a problem (e.g. blinking in different colors or arrow not vertical on the Acqui display, or board level drop in the kid_monitoring display). In this case, to reboot the board it is necessary to identify its IP-Address to find its slot number and Crate IP in the **./control.py nika** output. For this, check the corresponding RunXX.ini file to relate the NICKEL Board name, to the corresponding IP-Address shown by the **./control.py nika** command.
- To restart a board, stop it and then restart it with the following commands: **./control.py 192.168.1.xxx deactivate n**, where xxx is the IP-Address of the Crate: array1 = 150, array2 = 160, array3 = 170, and where n is the number of the slot (read the slot number with the command **control.py nika**). Wait some seconds and then: **./control.py 192.168.1.xxx activate n**. Wait some seconds then check with **./control.py nika**.

6 Log Information in Case of a System Crash

In case of a system crash, it is important to properly record the information of the errors showed by the system so it can be further investigated. Therefore, if a crash happens, please record the following information:

- Time of the crash.
- Kind of problem: board crash?, crate crash?, synchro lost?, etc.
- Error message if available: check in the nika2-a:1 VNC the blue output window of **ACQUI**.

And please inform P. García, M. Calvo, O. Bourrion, A. Ritacco, or S. Sánchez about the problem.