

Phoenix Setup Checklist – 2.1-m

Version 1.0
4 June 2013

The initial preparation for Phoenix use on the 2.1-m is done in the downstairs standby station to allow Phoenix to be cooled down and checked out well in advance of being installed on the telescope. This is necessary because the cooldown itself takes about 72 hours.

1. Pumping out: The vacuum jacket should be pumped on prior to cooling down the instrument. Use one of the Tribodyn pumps and the vacuum actuator used with the CCD dewars. Monitor the pressure using the Convecatron gauge installed on Phoenix.

There have been occasions when the pressure in Phoenix rises to large values (several Torr) because of an apparent leak in one of the vacuum feedthroughs. Therefore we recommend that one check the internal Phoenix pressure before opening the valve to the vacuum pump. If the pressure is high, pump on the line to the instrument using only the mechanical Scroll pump, then open the valve and pump the vacuum down to the 100 – 200 mTorr range; one can then open the valve to the Tribodyn pump to achieve a final pressure in the 10 mTorr range.

2. Electrical power: There are two 120VAC lines which have to be plugged into the wall outlets. These power the Motor Control and Instrument Power boxes, as well as the drivers for the cold head motors.

3. High pressure He lines: Check that both of the He compressors in the outdoor shed are plumbed in parallel to the Y-block manifold and that the output of this manifold is routed into the building and hooked into the building He lines. The instrument He lines are hooked up to the two standpipes on the opposite side of the basement room (next to the elevator shaft). The two T-connections (which have small lines going to the differential pressure sensor) hook directly into the manifold on the instrument. The Return (large) hose then connects to the T-connection. The Supply line goes to the bottom connection on the cylindrical heater, and the short line goes between the connector on the top of the heater to the supply T-connection. Refer to Figure 1.

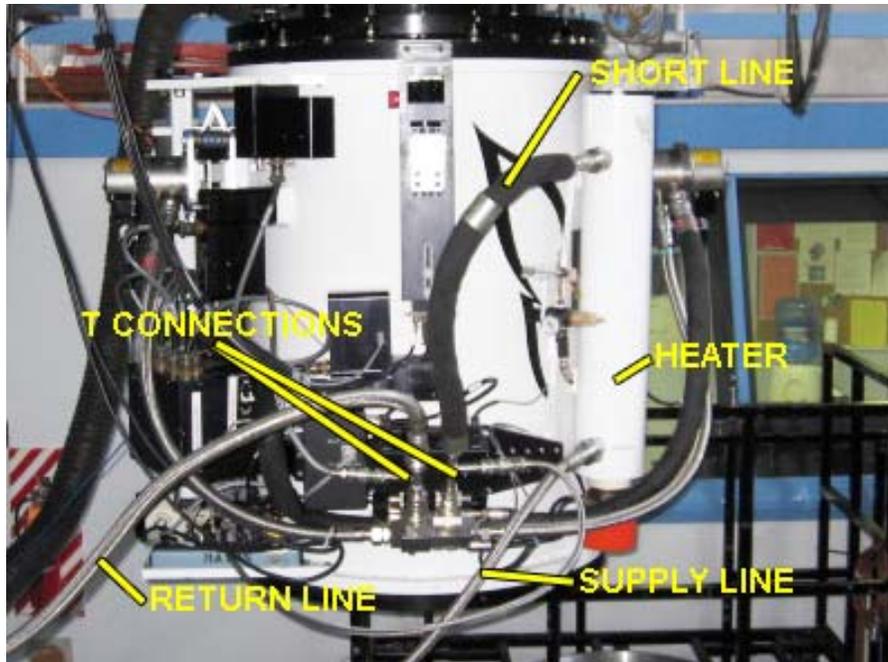


Figure 1: Phoenix, showing the He line connections.

4. Optical fibers: These must be hooked up in two locations, in the computer room and in the basement.

a. In the basement, locate the ~ 3 m long black fiber optic bundle with six fibers. Hook up one set of fibers to the four active connections on the side of the instrument power box (Transmit 1, Receive 1, Transmit 2, Receive 2), keeping the labels matched (i.e., T1 to T1, R1 to R1, etc.). Hook up the other end of the fiber bundle to the connectors on the fiber junction box on the wall (again keeping 1:1 correspondence).

b. In the computer room, check that there are fibers plugged into the four fiber connectors on the *back* of the DSP Heurikon box; these should be the standard orange fibers which should disappear into the cable trays below the ceiling. On the far north back wall behind the rack with the Ethernet servers, there should be three fiber optic junction boxes (Coude Feed, Telescope, IR Lab). Hook the fibers from the DSP box, which should be labeled “Phoenix”, to the connectors on the IR Lab junction box.

c. Even if a 1:1 correspondence was kept throughout this connection process, it is necessary to verify the connections, since according to some conventions, the Transmit cables should be hooked to the Receive connectors (!). To do this, turn on both the DSP box (if it is not already on) and the Phoenix instrument power box. Both of these have a set of three LED indicator lights; there should be a green LED indicating that the power is on. The other two LEDs, which are red, should be off. If one or both of the red LEDs is lit, then no signal is being received. Begin by switching the Transmit and Receive fibers for that channel; 90% of the time, this will repair the problem and the red LED will

go out. Much less likely is that channels 1 and 2 are switched. If the problem persists, try cleaning the fiber tips with alcohol wipes. As a last resort, try switching one of the “spare” fibers for the one which is giving the problem.

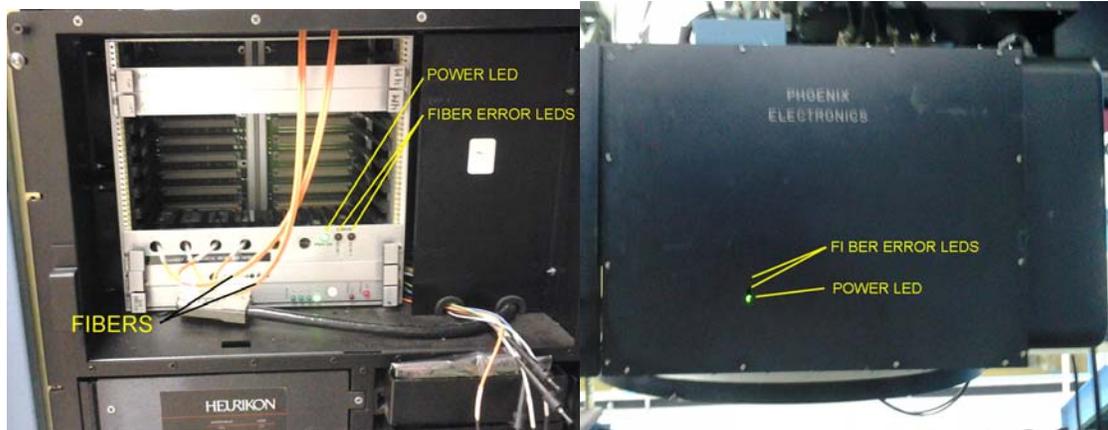


Figure 2: (left) View of the Heurikon DSP, showing the fibers, the Power LED (green, should be on), and Fiber Error LEDs (red, should be off). (right) The Phoenix Instrument Power box, showing the power and Fiber Error LEDs.

Once the fibers are hooked up correctly, leave the DSP powered on, but turn the Phoenix Instrument Power off, as this will be part of the computer booting procedure.

5. Ethernet cable: There should be a dedicated white Ethernet cable from the computer room. This should be plugged into the “Ethernet” port on the Phoenix motor controller box. Note that Bob Marshall has set up a private network for Phoenix using ports 19 – 22 on the HP ProCurve switch with permanent Ethernet cables running to both the basement standby station and the telescope.

6. Cooling down Phoenix: Ideally, we prefer to have the WildFire software running during the cooldown, as this permits us to monitor the temperature and compare to the nominal cooling curve to ensure that there are no problems with either the instrument or the cryocoolers. Usually, this will involve either Ken or Dick logging in remotely to royal and monitoring the status as the cooldown progresses. However, in order to get WildFire running for the first time after Phoenix is hooked up, some on-site attention is required. At present, it is possible to reboot the computer royal and cycle both the DSP and Instrument Power remotely. **In order to cycle the Instrument Power from a remote site, the power switch must be in the ON position.**

However, assuming that one wants to try this on-site, here is a very quick description. For a more detailed instruction, refer to the User Manual.

a. At Phoenix, turn the Motor Controller box ON and the Instrument Power box OFF. As long as the He compressor is not turned on, the cryocooler heads will not turn on, even with the Motor Controller on.

b. Go up to the computer room, turn the DSP box OFF for about 30 sec, then ON. (Note: because the Instrument Power is off, the red LEDs will probably be lit—this is OK).

c. Using the terminal and monitor attached to royal, reboot royal. This may be possible by simply entering 'system royal reboot'; otherwise, one may have to enter 'su' and the staff password, then enter 'reboot'. After a while, one should be presented with the X windows login screen, where one logs in as '2meter' with the normal mountain password. As a reminder, this reboot needs to have the Phoenix Instrument Power OFF and the DSP box ON.

d. On the royal terminal, enter 'start_phoenix'. You will be greeted and asked a number of questions, such as:

“Has the DSP been turned off since the last time you ran startwf?” (answer 'y')

“Was the computer rebooted with the DSP power on and the instrument power off?” (answer 'y')

“Is the instrument power on now?” (answer 'n')

You will be instructed to turn on the Instrument Power and hit <CR>. Do so.

“Do you want to activate the array?” (answer 'n' – VERY IMPORTANT)

e. Eventually, you will be greeted by the “Initialization complete” message and a number of screens, one of which will be the Instrument Status window, which should have a mixed display of temperatures and filter positions.

f. Enter the command 'status t' in the Phoenix window. The display in the Instrument Status window should update to a list of temperatures (actually diode voltages) at various sites within the instrument (Figure 3). See the temperature graph at the end of this manual (Figure 4) for a conversion.

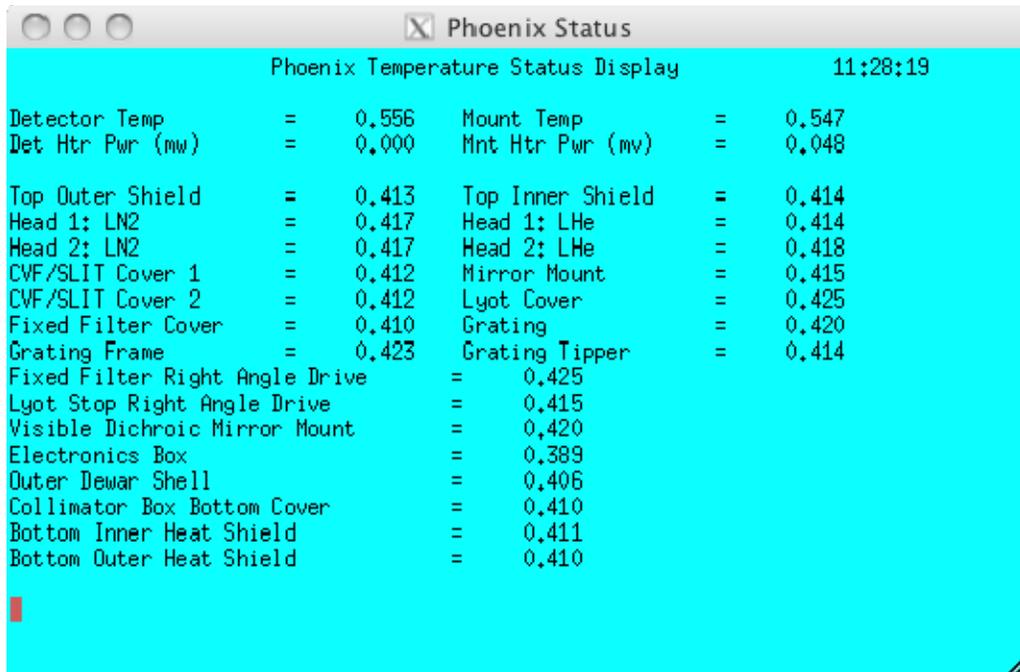


Figure 3: Phoenix Status window after entering 'status t'. The instrument is warm at this point, and all of the 1N914 diodes will read approximately 0.400 v.

7. Cooling Phoenix (for real): Once the temperature status is being monitored, either on-site or remotely, and the vacuum within the instrument is good, it is time to turn on the cryocoolers. Since the Motor Controller box is already turned on, the cold heads will start up automatically once the Differential Pressure Switch detects at least 90 psi difference between the Supply and Return line pressures.

Go outside to the shed containing the He compressors and prop the two vents at least halfway open (perhaps fully open in warm weather). Turn on the compressors by turning on the breaker boxes for the compressors, then pushing the Power switch on the compressor itself until it starts up. Once they are both running, return inside. By this time, the cold heads themselves should be both working. They will be quite noisy when initially starting up and, after about 5 minutes, the Return lines from the cold heads should be quite warm. This is a good sign, indicating that the cold heads are removing head from the instrument.

NOTE: The static pressure in the He lines with the compressors off should be at least 200 – 210 psi. With the compressors running, the supply and return pressures should be around 280 and 100 psi, respectively. If the supply line pressure is significantly lower, additional He gas should be added to the lines to maintain proper efficiency of the coldheads and to prevent the compressors from overheating.

After about 5 minutes, one should see both of the cold head temperature readings on the status display indicating a higher voltage (lower temperature), showing that the cooldown is on its way.

Before leaving, we suggest that one go back to the computer room and log out of Wildfire by entering 'exit' in the Wildfire window. This will let someone else log in remotely to monitor the progress of the cooldown.

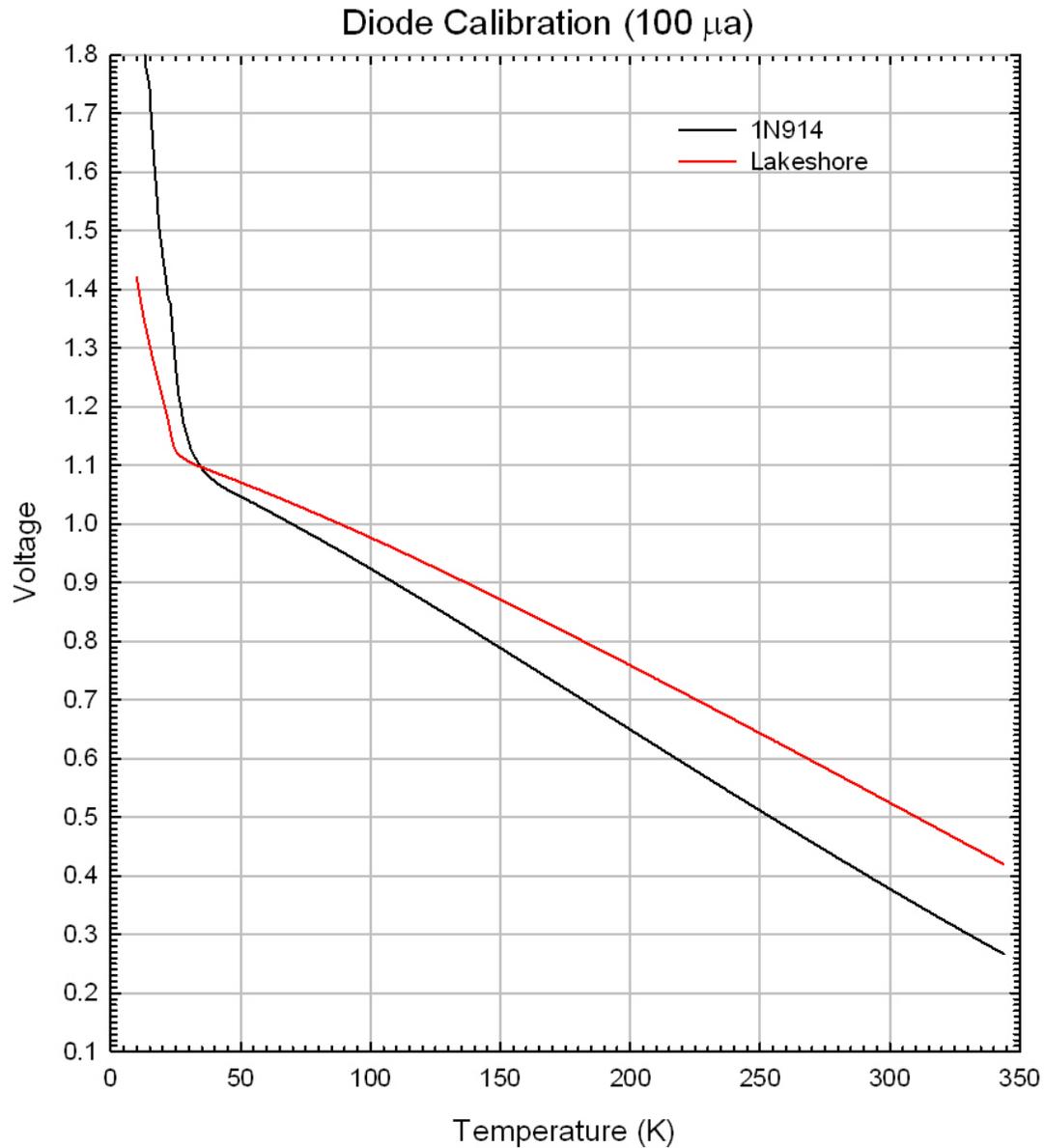


Figure 4: Calibration curves for the 1N914 and Lakeshore temperature diodes. All of the diodes within Phoenix are 1N914s, except for the two on the detector and detector mount.