

Instruction set title (step label):

Testing Power Board (TPB)

Validity date of this instruction set:

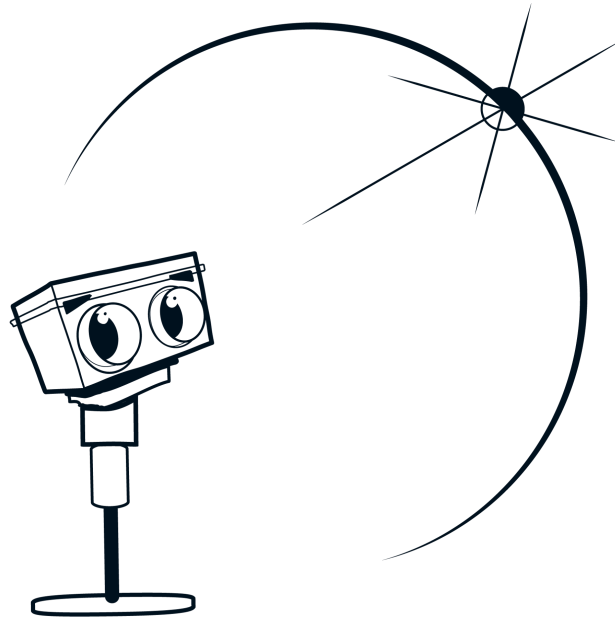
2018.12 - now

Prerequisite steps:

UPS, NUC, PBS

Overview:

This instruction set will help you test the v1 version of the power interface board.



PROJECT PANOPTES

DISCOVER NEW WORLDS

Something unclear? Please email info@projectpanoptes.org or post on the forum at <https://forum.projectpanoptes.org/>

This document will walk you through how to test all the functionalities of your PANOPTES v1 power board.

Step 1: Hardware setup

Connect the Arduino to the NUC using the appropriate USB cable (USB Type B 2.0 for Uno, or USB Micro for the Micro board). If the Arduino is receiving power, its onboard LED will light up.

Then, connect the temperature sensors to the power board via CON2, the DB9 connector.

Step 2: Load control software

 Open the Arduino IDE on the NUC. (There may be a shortcut on the desktop.)

To upload the PANOPTES power board sketch onto your Arduino, go to *File > Open* and select the script located at `/var/panoptes/POCS/resources/arduino_files/power_board/power_board_readable.ino(?)`

Then, select the device for the Arduino IDE to communicate with. Ensure that the correct board (Uno or Micro) is selected in both the *Tools > Board* and *Tools > Port* menus.

Now you can upload the sketch, by clicking on the Upload button  at the top right of the IDE. You'll get confirmation that this was successful after the code finishes compiling and uploading.

Step 3: Check Serial Monitor readings

The power board and Arduino are ready for testing. You can now plug the barrel jack connector from the UPS or Meanwell into the power board, which will provide ~13.5V to CON5. (If it is being used for the camera board, disconnect it and connect it to this board instead.)

The Arduino sketch from Step 2 will start running as soon as it finishes uploading. You can check what it is measuring by opening the Serial Monitor window, under *Tools > Serial Monitor* in the Arduino IDE menu. You should see text and numbers appear on the screen. They will report on the values measured by the various sensors on the board.

Humidity sensor

To test that the humidity sensor is doing the right thing, blow air from your mouth on it. You should see the humidity slowly rise along with a small increase in the temperature.

Temperature sensors

To test the temperature sensors, squeeze each one between your thumb and index finger for 30 seconds each. You should see the reading for that sensor increase due to your body heat.

Weather station, cameras, NUC, mount, fan

A couple things need to be done before you can check the current draw along the output lines of these instruments.

First, read `V_DC_SENSE` values (pin D4 of Micro and A4/SDA of Uno). Check with a multimeter that the analog voltage value of `V_DC_SENSE` is in the range of 3.8V to 4.05V if 13.5V is provided.

Next, you'll need to switch off all the 13.5V output lines corresponding to the weather station, cameras, NUC, mount, and fan. To do this, type the following commands into the Serial Monitor prompt and hit "Enter". You should see the corresponding red LED turning off next to the instrument's connector on the power board.

0, 0	Turns weather station off
1, 0	Turns camera board off
2, 0	Turns NUC off
3, 0	Turns mount off
4, 0	Turns fan off

Now you can use the dummy load you built (with the male barrel jack connector and the power resistor) to test that the individual output lines for each sensor is working as expected.

For the following procedure, **DO NOT remove the dummy load while current is flowing** as it may result in an **electric shock**. Always **turn off the channel** first!

To test the current draw and monitoring is working correctly, plug in the dummy load to one of the output lines (weather station, cameras, NUC, mount, or fan). Repeat these steps for the rest of the output lines once you've finished.

- 1) Switch ON the line you connected the dummy load to and check the reading of the current from the Serial Monitor. To turn on an individual line, type the command corresponding to the line you are testing.

0, 1	Turns weather station on
1, 1	Turns camera board on
2, 1	Turns NUC on

3, 1	Turns mount on
4, 1	Turns fan on

As you can see, the first number corresponds to an instrument's channel (ie. 3 = mount), and the second number corresponds to whether it is turned on (1) or off (0).

- 2) Check that the red LED on the power board turns on for that line.
- 3) From the serial monitor, check that the current being displayed for that line is ~0.54A (13.5V/25 ohms). (ie. for the fan line, you should see I_FAN go from 0 to 0.54A.)

Also check that the number provided by the main DC current sensor (I_MAIN) is similar to the individual current reading for each line.

- 4) If this line is behaving as expected, turn off the line once again (enter channel #, 0 into the Serial Monitor).
- 5) Move the dummy load to the next channel of your choosing.

From the Serial Monitor, also check that the AC_current sensor is providing readings close to 0 when all ports are turned off and/or the dummy load is removed and something non-zero when the dummy load is connected and powered.