

# User Manual for Pyrometer, an Open Source Hardware Project

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A tire pyrometer is a fancy word for thermometer except in this case it's used to measure tire temperatures. A racing team would want to have an optimal contact of tires with the road, or maximum traction. So this device measures the temperatures on the outside edge, in the middle, and the inner edge of tires so they can determine whether or not the tires are making full contact with the ground so they can make finer adjustments to try and correct that.

The goal is to make a low cost alternative to some of the higher-priced options in the racing community.

Demo:

1. Start the pyrometer up by switching it on. It boots quickly into this main menu and you have a few options here: RECORD, RECALL and SETTINGS.



2. To take a temperature measurement:

The left buttons are for moving around, the right button is like hitting the enter button. Navigate to RECORD and click the right button. You get to this menu and your selections are: FULL SET, INSTANT, CALIBRATE, and BACK:



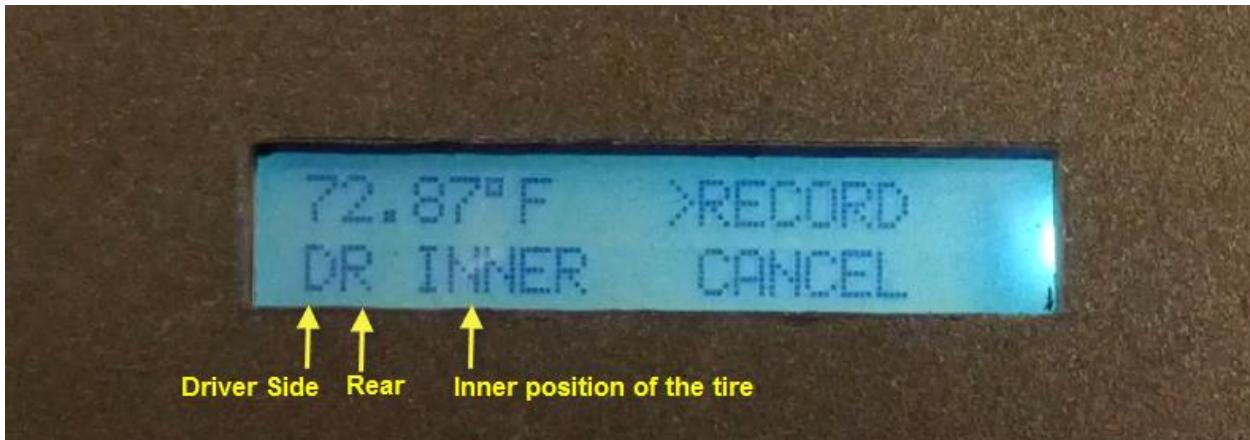
FULL SET means that you will be probing all four tires and taking three temperature measurements per tire for 12 measurements total. Or you can go into the instantaneous (INSTANT) mode which will show you a live temperature feed. So I navigate to INSTANT using the left bottom button. Since I'm indoors it looks like this:



This just shows you the live temperature feed right now.

To record a set:

FULL SET is 12 pieces of temperature data. Select >FULL SET, and it shows you the current temperature, but notice on the bottom line of the display: it says the pyrometer expects to be taking the temperature of the driver side, rear tire, on the inner most probe inner edge position, in that order. Recall that we said there would be three temperatures per tire.



So for the first measurement you will be on the driver side, at the rear tire, and place the probe at the innermost position of the tire. Once the instantaneous read stabilizes, you press the right button to record.

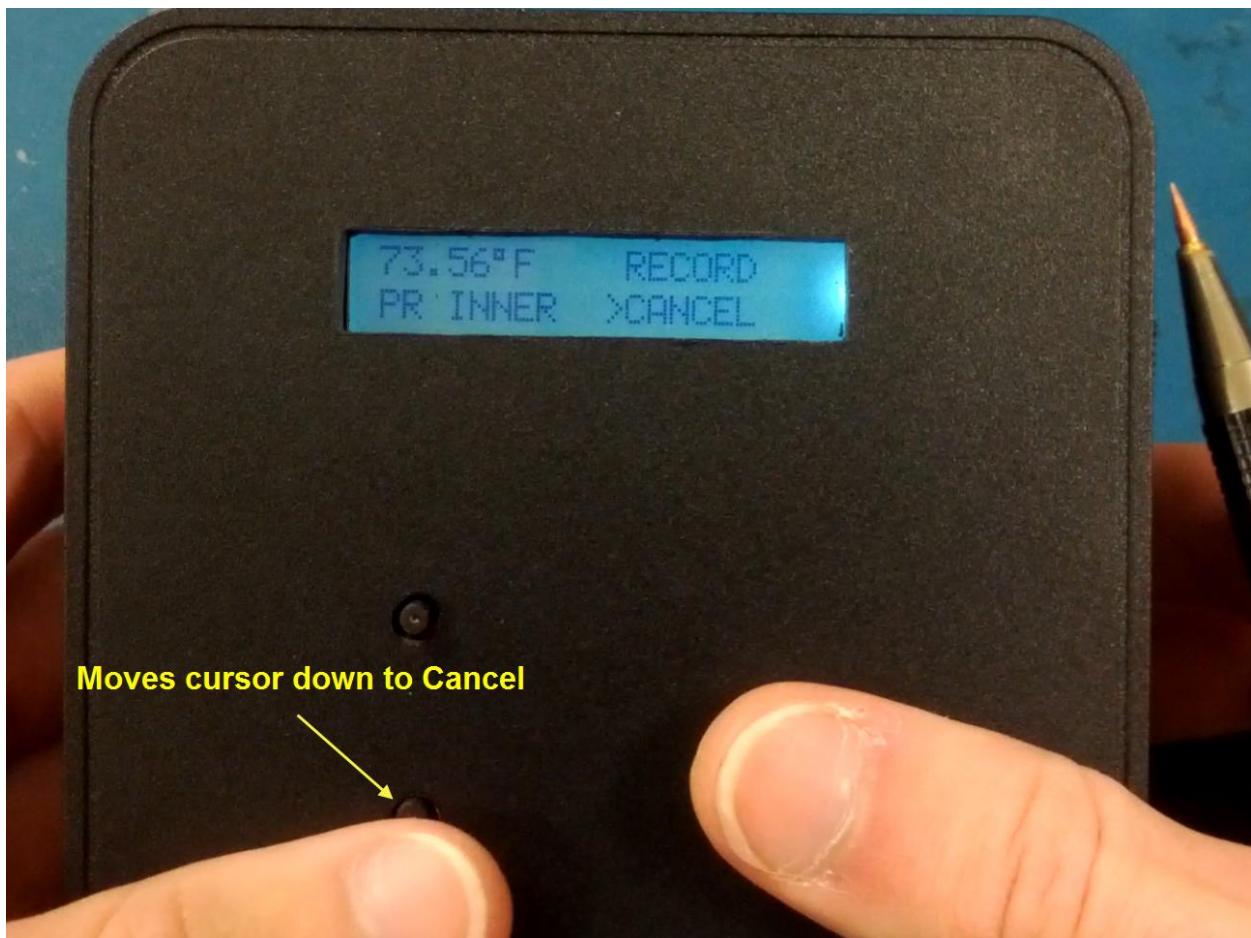


When you press the right button while on >RECORD, the pyrometer MCU immediately advances the menu to driver side (D), rear tire (R), CENTER probe position (on the tire.) So now you put the probe on the center of the same tire, wait for the temperature to stabilize, then hit record again. The menu then advances to DR OUTER.

This process continues through each tire as you press the record button and step through all of the probe positions. After DR tire, the menu progresses to

- DF for driver side, front tire: (INNER, CENTER, OUTER)
- PF for driver side, front tire: (INNER, CENTER, OUTER)
- PR for driver side, front tire: (INNER, CENTER, OUTER)

You have the option to cancel the data set by moving the cursor down to CANCEL on the menu:



Once the full data set of all 12 probe positions has been recorded the menu automatically advances to the following screen after you record the final probe position (PR OUTER). That screen looks like this:



This will record all 12 temperatures. Hit the right button to SAVE, and then the menu advances to ask you where you want to save this data set:

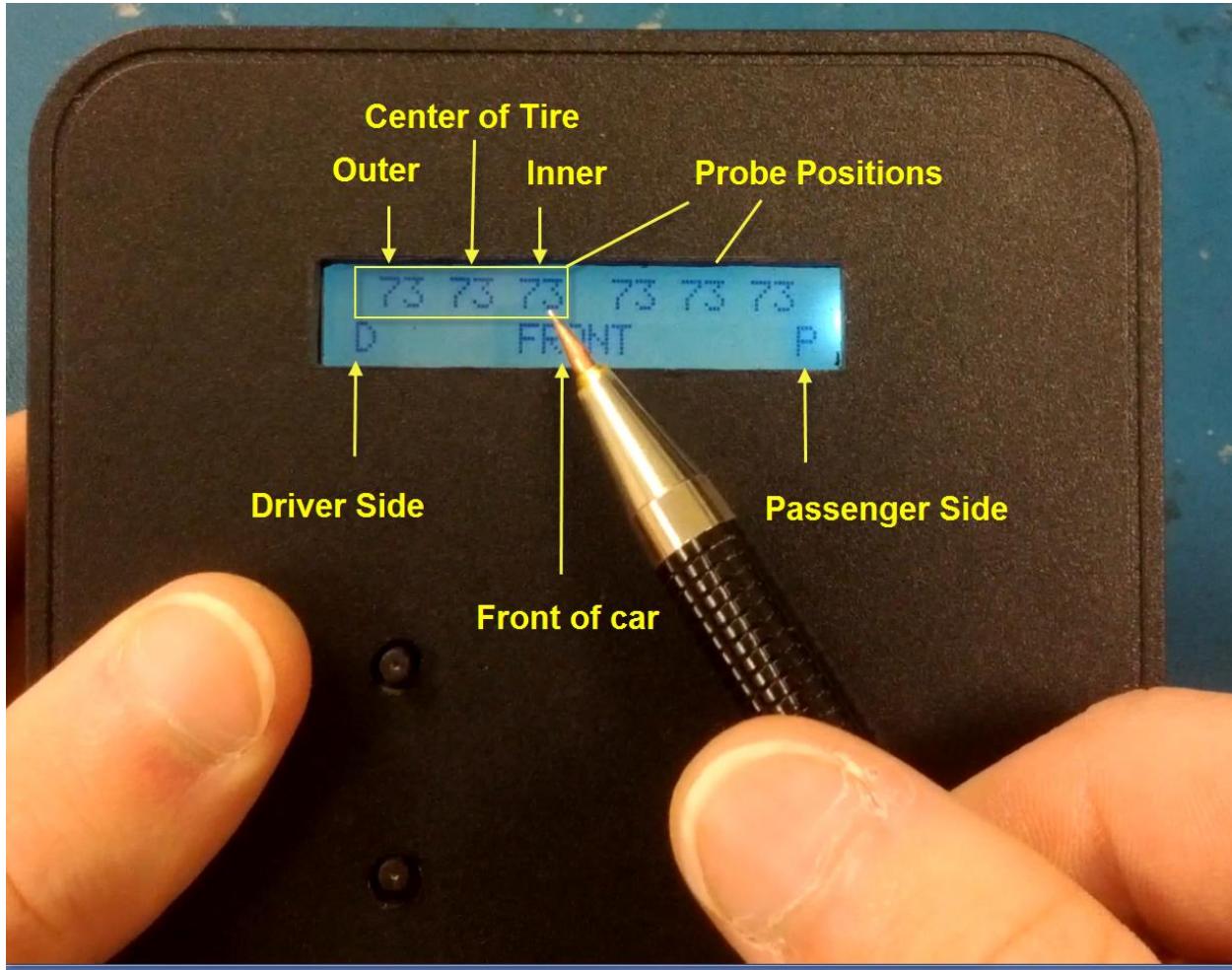


If you want to save it to another memory slot, just hit the navigation buttons on the left and then press the right button to select that memory slot. If there's any data already in a slot, it gets overwritten. (It does not prompt to ask you if you are sure you want to save in that slot; it immediately saves it and goes back to the main menu.)

It went and saved all of that data set into EEPROM memory so if you navigate and select BACK:



Next, navigate to RECALL, hit select, then navigate to the memory slot you want to look at and press select again. Then advances to the most complicated display on this pyrometer device:



Notice that it's displaying both front tires on the driver side and the passenger side (on the right). The first temperature in each set is the outside edge, the second is the middle or center of the tire, the right most temperature is the inner side of the tire.

Navigate down to see the rear tires:



You can scroll through the screens and end up at the main menu again:



If you go into the SETTINGS menu and then into MEMORY, it allows you to export your data to .CSV (comma separated) via the serial port at the top of the box:



A .CSV file will import easily into Excel. You can use a [serial-to-USB converter](#) since most computers these days to have a serial port anymore.

The full pyrometer project can be found here: <http://www.mouser.com/applications/automotive-tire-pyrometer-resources/>

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