

# Electronic Velocity Probe



Our new Electronic Port Velocity probe is very small compared to standard pitot tubes, even our exclusive Mini Intake. This lets you check velocity in very small ports and very tight locations in regular sized ports (Fig 1). Fig 5 shows the standard electronics probe with lead.

In addition to mapping out port velocity, you can attach the small "remote" tip (sold separately) to the valve and check the velocity all around the "curtain area" of the port (Figs 2 and 3). This lets you check how efficiently you are using the entire flow area, giving you ideas on how to improve flow (Fig 4).

To do this you need the Remote Velocity Tip and Indexed Valve Retainer (Fig 6). You also need the signal conditioning and connector provided with the upgraded Plus Electronic Probe (Fig 7). A great feature of the Remote Velocity Tip is it can be installed by any customer to most any location on the valve, either the top or bottom side. You can also easily remove the sensor and continue using the valve in the head, and move the sensor to a different valve yourself.

Probes are designed to connect directly to Performance Trends' Black Box USB flow bench logger, or older Black Box IIs or SuperFlow's FlowCom (with adapters).

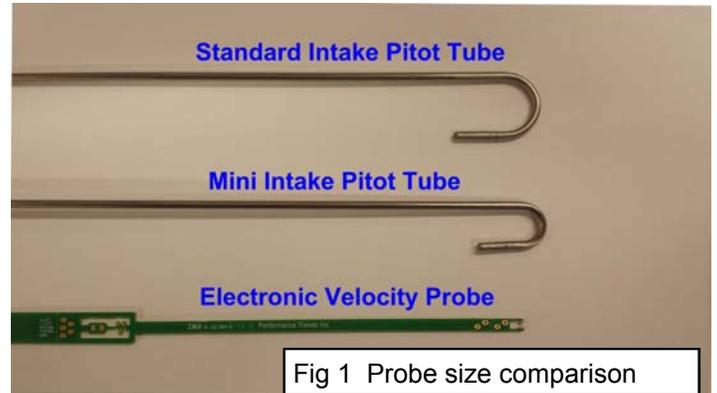


Fig 1 Probe size comparison

Fig 2 Detail of Remote Velocity Tip installed on top of valve

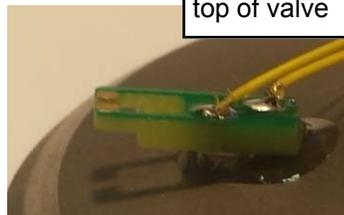


Fig 3 Attaching Remote Velocity Tip with UV cured glue

Fig 4 Graph of valve flow velocity showing change around edge of valve

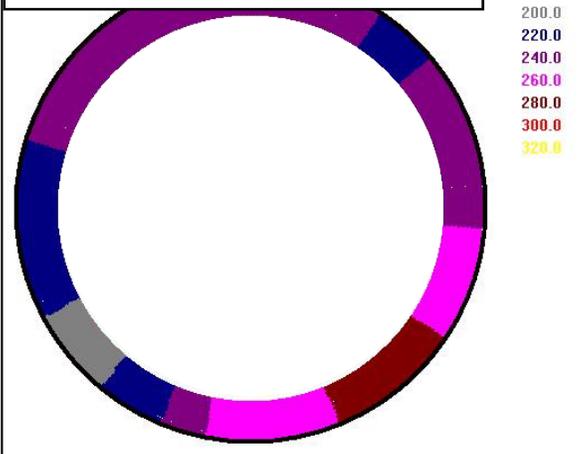


Fig 5 Standard Electronic Velocity Probe

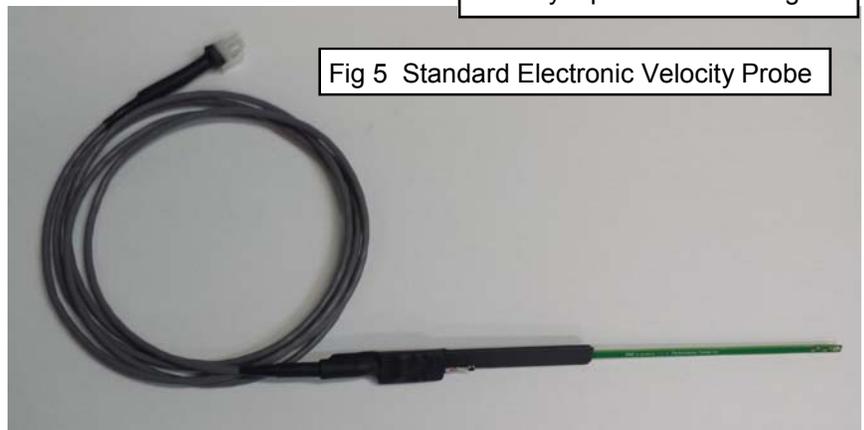
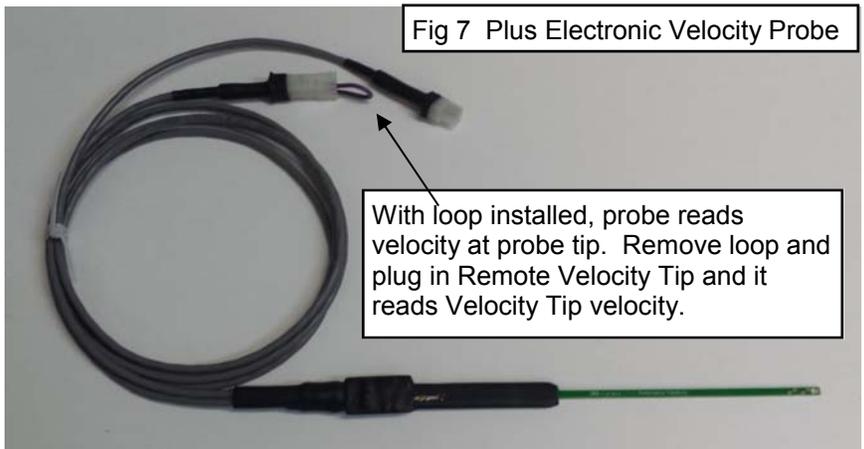


Fig 6 Remote Electronic Velocity Tip and Indexed Retainer



Fig 7 Plus Electronic Velocity Probe



With loop installed, probe reads velocity at probe tip. Remove loop and plug in Remote Velocity Tip and it reads Velocity Tip velocity.

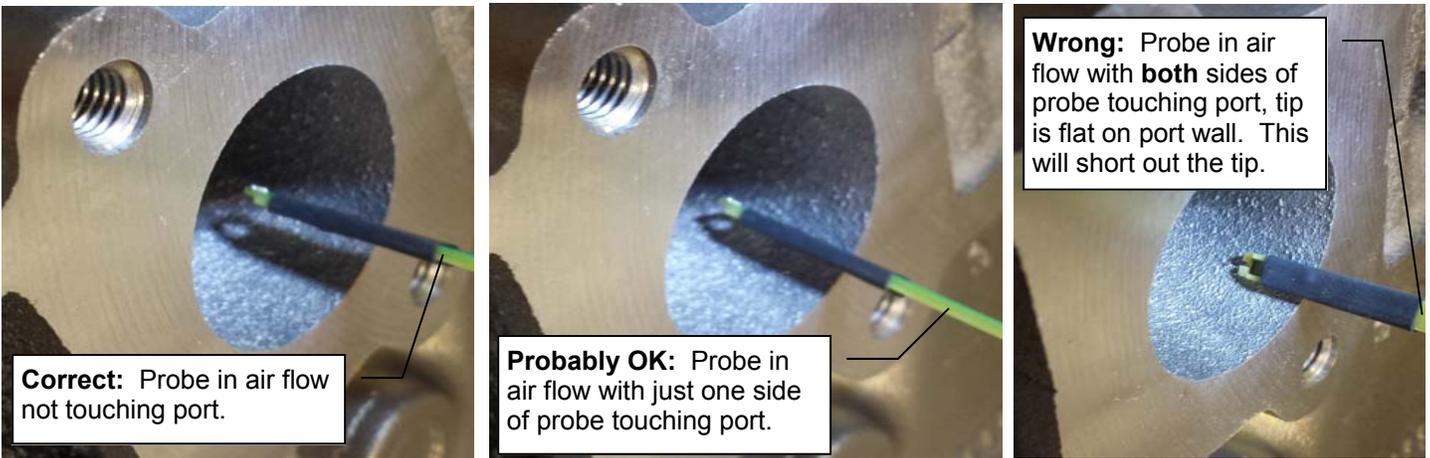
The Electronic Velocity Probe is made up of 3 primary electronic components:

- The control board
- The ambient air (room air) temperature sensor.
- The electronic sensing tip.



The tip of the Electronic Velocity Probe runs hot. Typically it is not hot enough to burn you, but be careful. It is also electrically charged. If you touch the sensing element to metal, you could possibly damage the entire probe. If you short out one side of the probe to the other, **you will definitely damage the entire probe and controller board.**

Also, do not lay the probe with the tip flat on a metal surface. This will also short out the tip just like touching the wall of the port with both sides touching the metal surface.



When you use the remote "Valve Velocity" tip which comes with the Plus version, also watch the fine wires connecting the tip to the probe body. If the insulation become frayed or exposed, the 2 wires could short together and do the same damage as shorting out the tip.

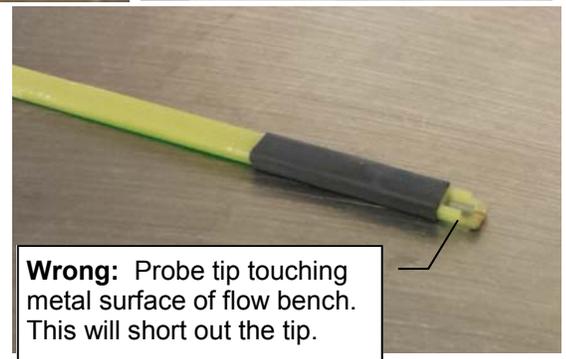
The remote tip is designed to be very small allowing you to glue it to the edge of the valve. You want it as close to the edge as practical.

These wires are very fine so they bend easily and do not disrupt the air flow. These wires can be routed away from the valve and out the port. If you do this, you should fasten them to the port wall with some tape. Be sure to leave enough slack in the wires so you can turn the valve as much as necessary.

These wires can also exit down into the bore adapter. If you do this, you must also route them out the top or bottom of the bore adapter as shown in picture at upper right of next page. The advantage of this method is the wires will not disrupt flow in the intake port if you are flowing in the intake direction. One disadvantage is you can not zero out the valve lift because the wire keeps the valve from fully seating. The thickness of the wire currently used is about .020". With a typical valve angle of 45 degrees, the wire is holding the valve open about 1.4 times as much as the thickness, or about .028". So with the valve fully seated on the wire, set your dial indicator to .028".

Another disadvantage is you can fray the wire insulation by clamping it between the valve and valve seat. You definitely do not want to turn the valve with the valve seated on the wire. But just the valve pressure with a light duty test valve spring can eventually wear away the insulation. If this happens, and the 2 wires short together, it is as bad as shorting the tip out. **You will damage the entire probe with the controller board.**

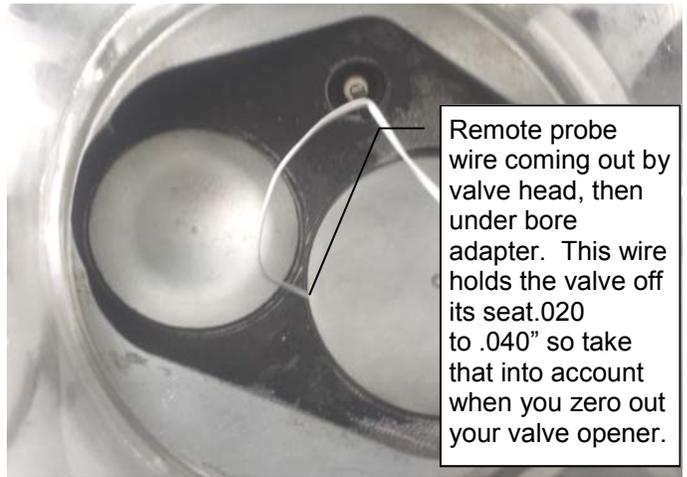
**IMPORTANT: If you are connected to the Black Box Mini USB logger, your must power this logger with a 12 VDC power supply. For all other functions of this logger, the USB provides enough power, but not this probe.**



# Remote Valve Vel. Probe Installation



Attaching Remote Tip with UV cured glue. This glue works well because it sets up very fast, but can be broken loose from the valve easily.

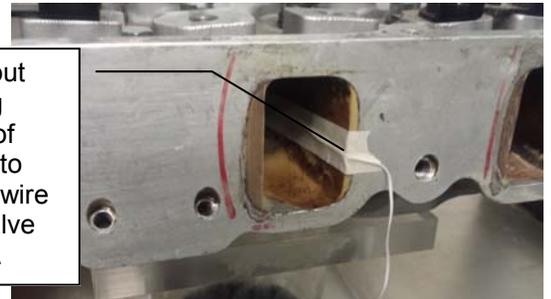


Remote probe wire coming out by valve head, then under bore adapter. This wire holds the valve off its seat. .020 to .040" so take that into account when you zero out your valve opener.



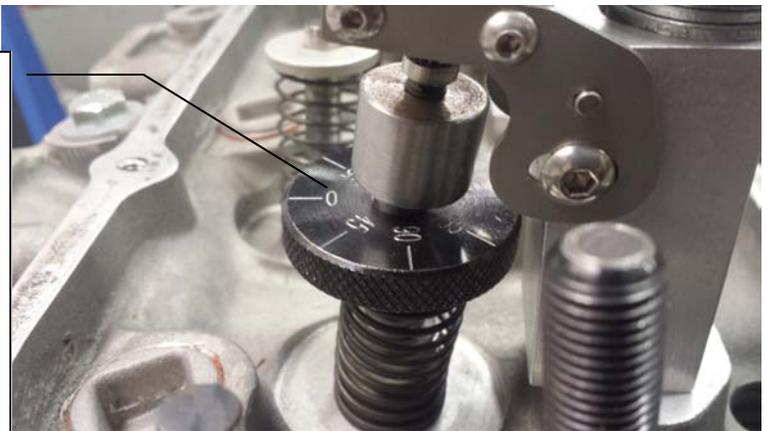
Use a hard plastic scraper or carefully with a small screwdriver on the glue itself (not the remote sensing tip) and tap it with a hammer and it should pop right off the valve. Remove excess glue with a grinder and tip is ready to be reused on another valve.

Wire coming out port and being taped to side of port. Be sure to leave enough wire by valve so valve can be turned.

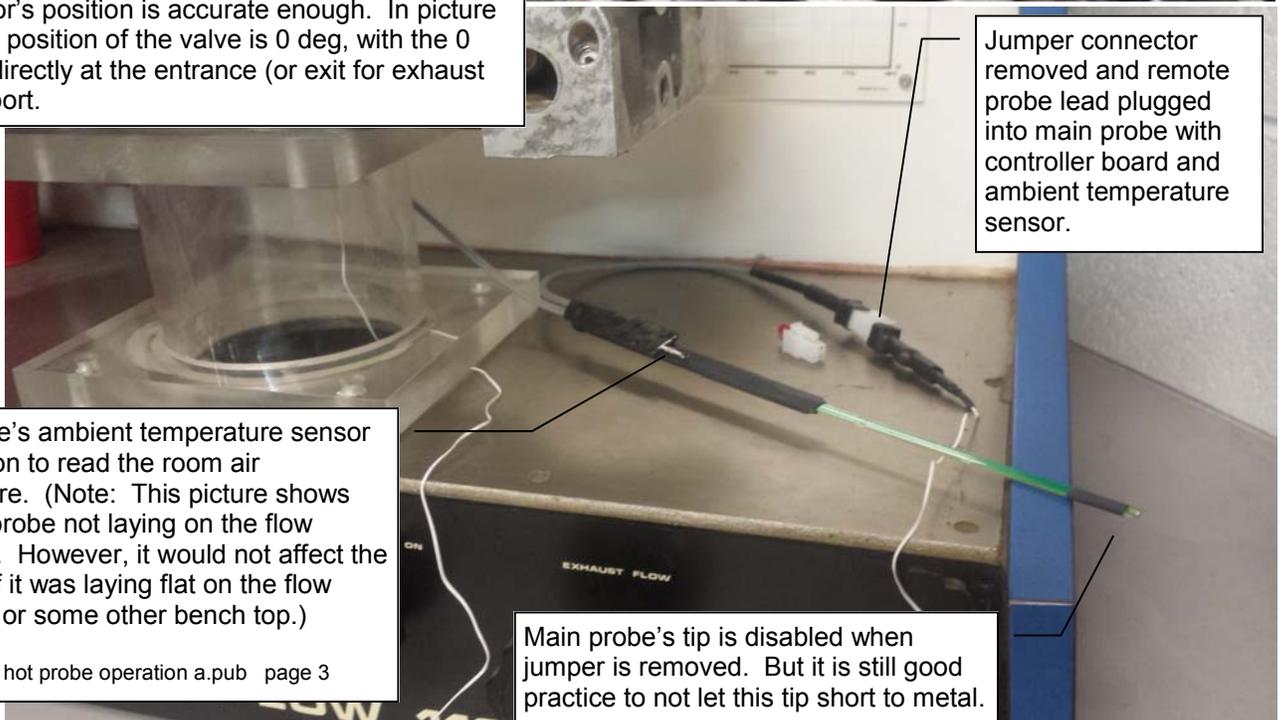


Install dial knob which comes with kit near top of valve. Align the 0 deg reading on knob with the remote tip on the valve. See page 6. Gently tighten set screw on to valve. Position knob's set screw in an area of the valve where set screw will not damage valve retainer grooves. The knob is designed to be large enough to accommodate most all valves. If your valve is smaller than typical V8 valves, the knob will be slightly off center. However, that introduces almost no error in reading the valves rotary position.

You may want to devise a pointer to more precisely read the knob's dials. For most work, your eyeball estimate of the valve sensor's position is accurate enough. In picture to the right, the position of the valve is 0 deg, with the 0 marking point directly at the entrance (or exit for exhaust valves) of the port.



Jumper connector removed and remote probe lead plugged into main probe with controller board and ambient temperature sensor.

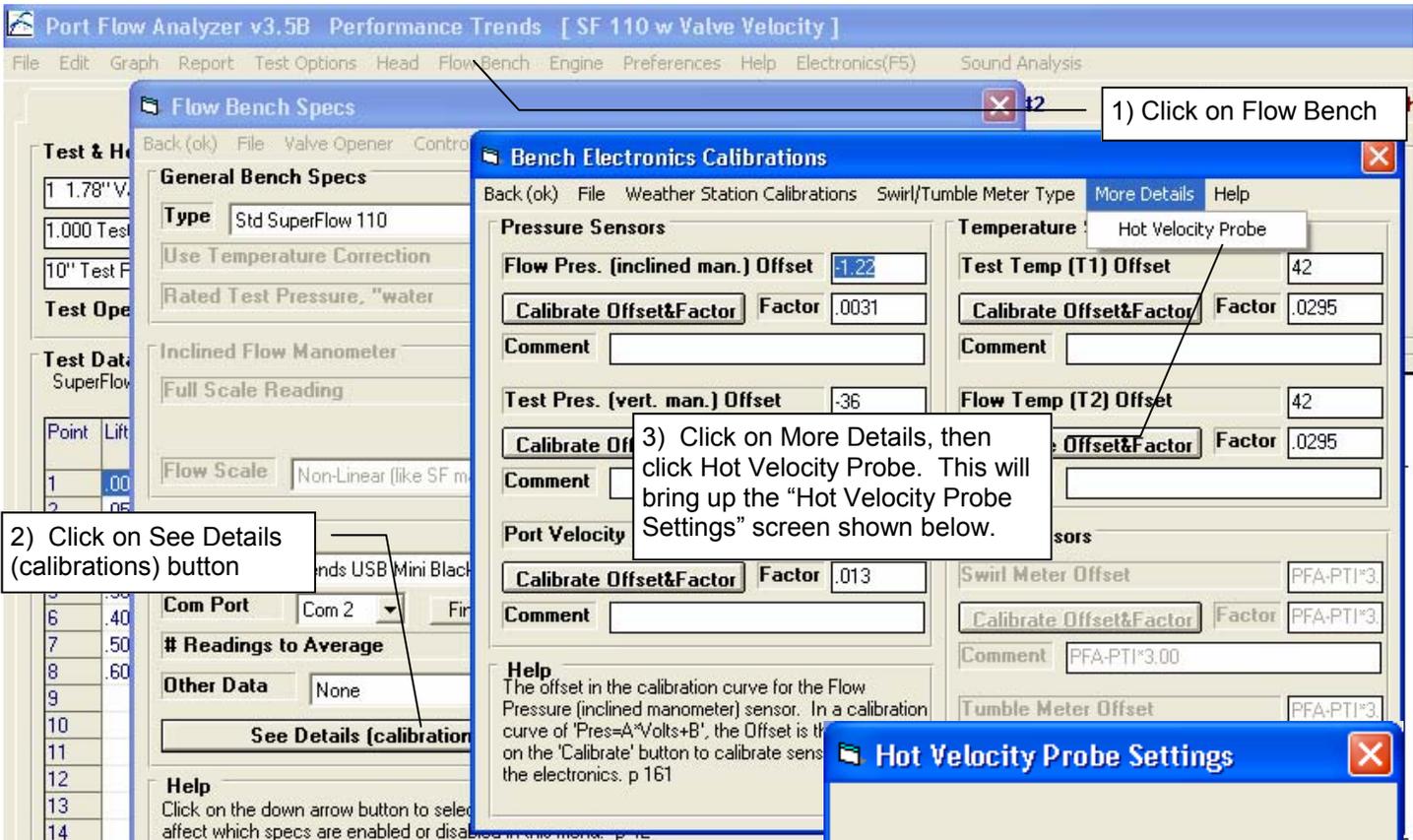


Main probe's ambient temperature sensor in a position to read the room air temperature. (Note: This picture shows the main probe not laying on the flow bench top. However, it would not affect the readings if it was laying flat on the flow bench top or some other bench top.)

Main probe's tip is disabled when jumper is removed. But it is still good practice to not let this tip short to metal.

# Electronic “Hot” Velocity Probe, Software Setup:

The Hot Velocity Probe feature is only available if you have purchased the Head Porter version of the Port Flow Analyzer. You need version 3.5 B.074 or later for all the features described here. First, you must load in the calibration numbers which come with your particular probe. This is done by clicking on Flow Bench, then “See Details (calibrations)” button, then “More Details”, then “Hot Velocity Probe” as shown below.



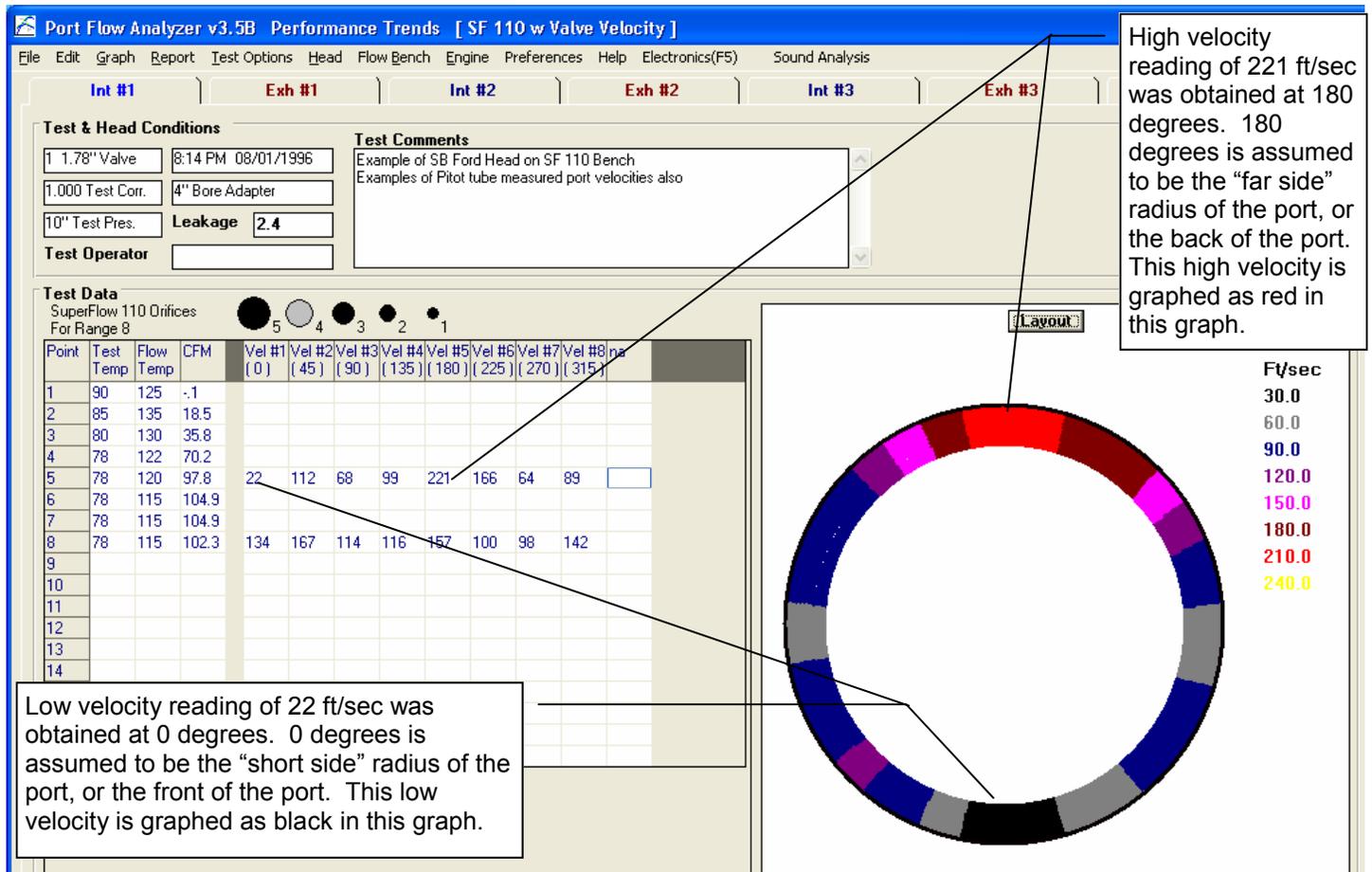
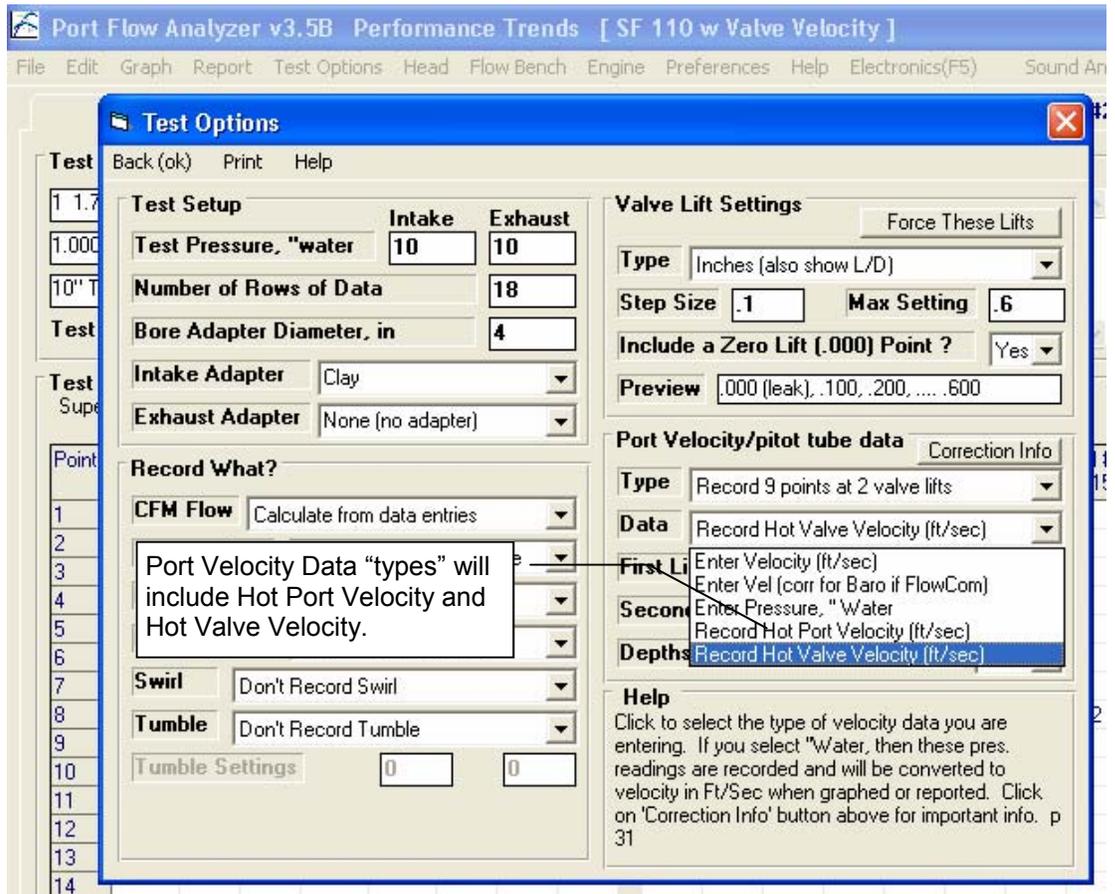
In the “Hot Velocity Probe Settings” screen shown to the right, first set “Use Hot Probe” to Yes. Then enter the calibration numbers you got with your probe. If you got the Plus version with the remote tip, enter them in the “Hot **Valve** Velocity Probe Settings” section

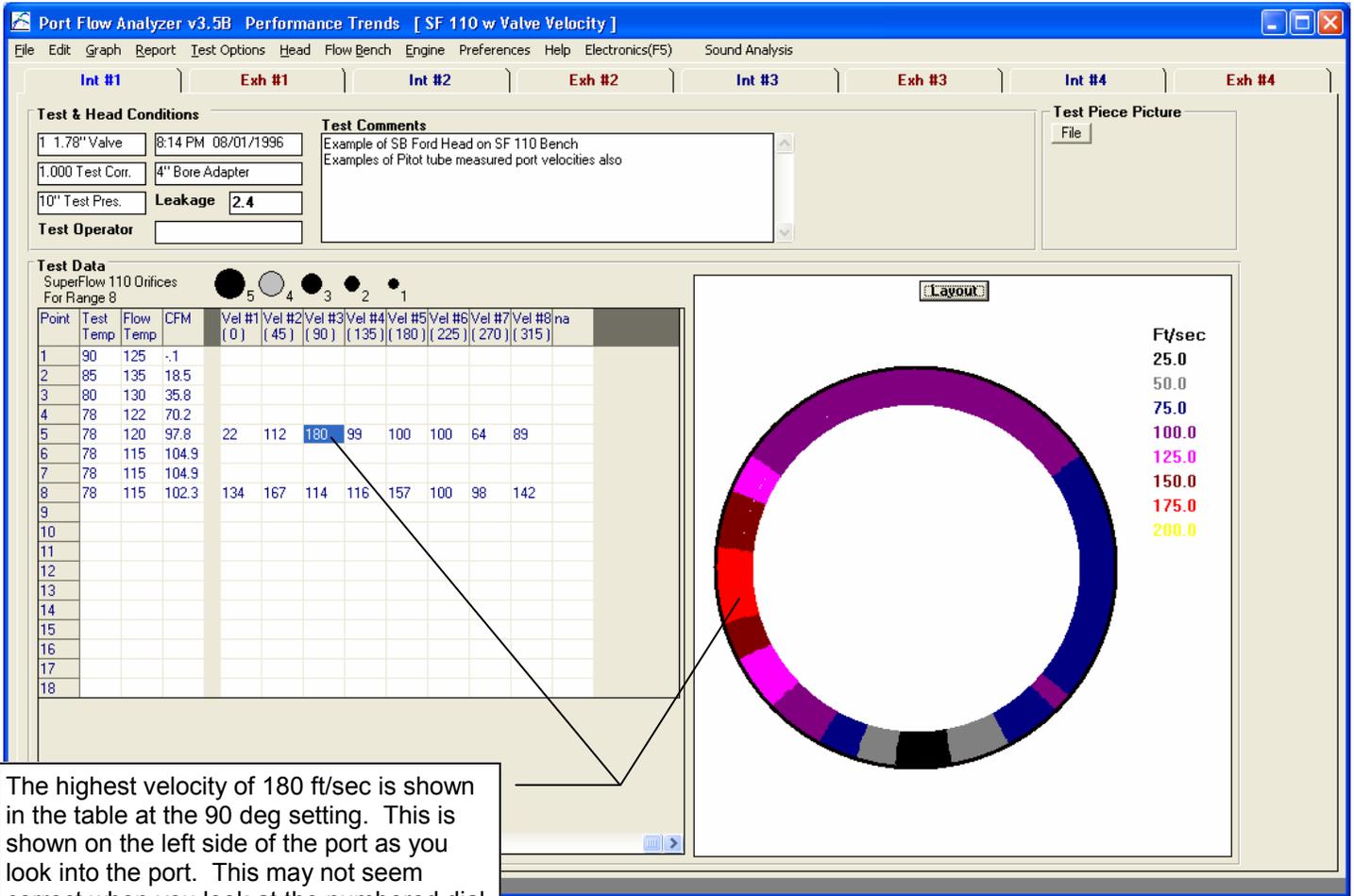
Then click the Keep Settings button to keep these calibration numbers.

**NOTE: Calibration numbers shown in screen to the right are NOT for your probe(s), but just example numbers. Use the numbers from your probe’s calibration sheet, typically with hand written numbers on page 8 of this booklet.**

The Hot Velocity Probe can be used for mapping out high and low velocity areas in the port, like a typical pitot tube. This is called "Hot **Port** Velocity" in the program. It can also have its remote tip attached to the valve to map out the high and low velocity regions of the valve. This is called "Hot **Valve** Velocity" in the program. See the figure to the right.

If you have selected to do "Hot **Port** Velocity", most all the "port velocity" descriptions and definitions in the user's manual apply. Check them out by looking up "velocity" in the index at the back on the user's manual.

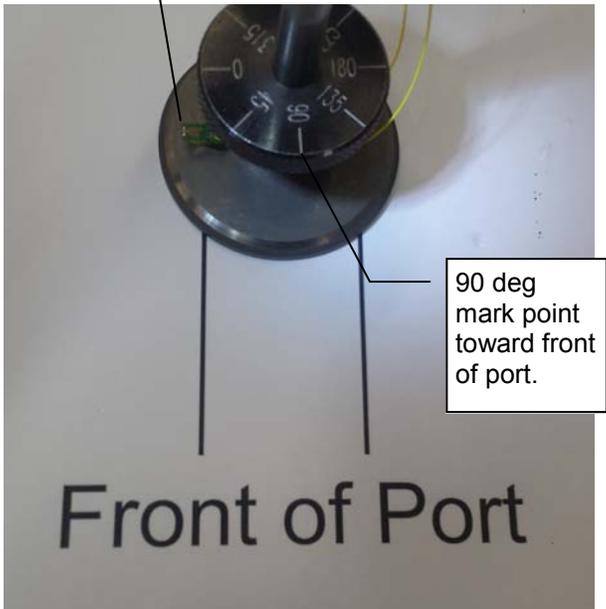
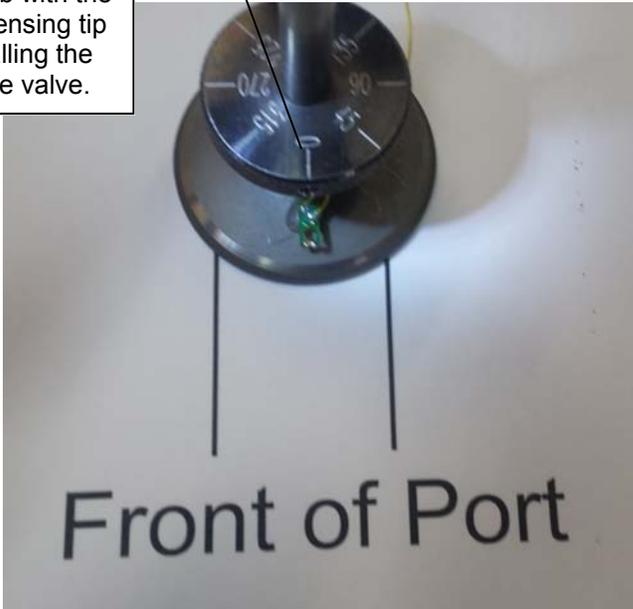




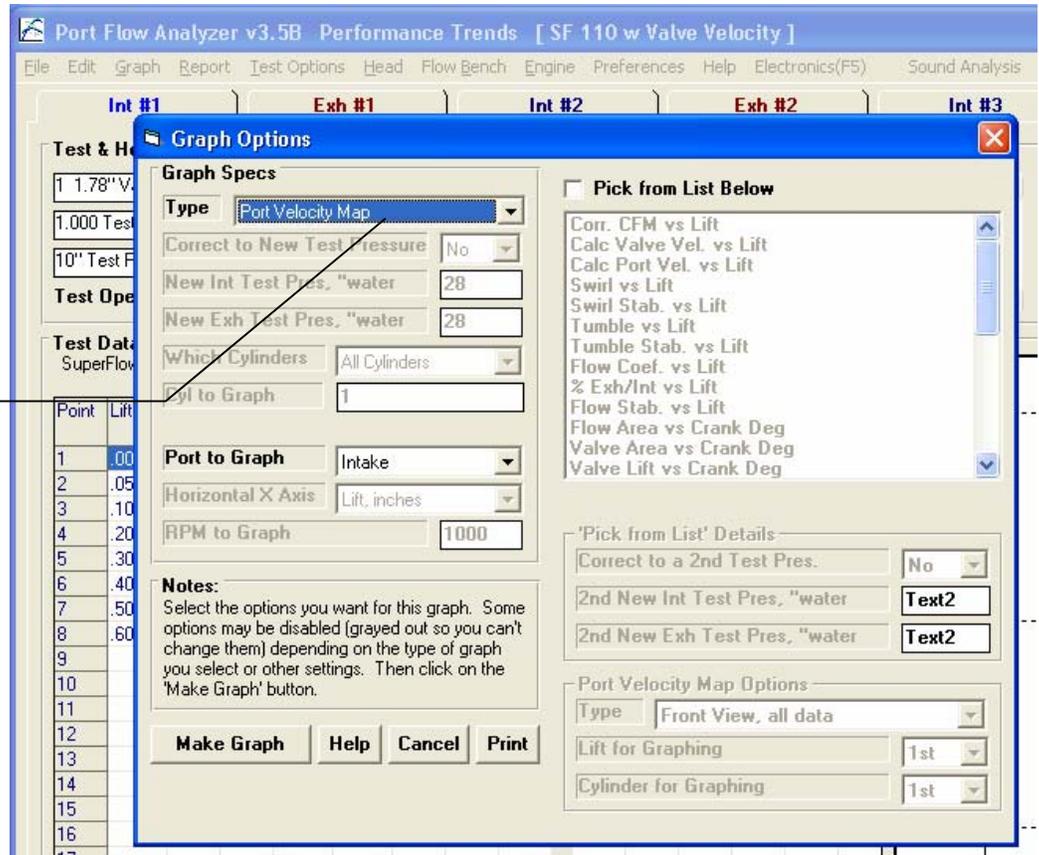
The highest velocity of 180 ft/sec is shown in the table at the 90 deg setting. This is shown on the left side of the port as you look into the port. This may not seem correct when you look at the numbered dial. However, when the 90 deg increment is pointing straight toward the port opening, the sensor at the 0 deg point on the valve is on the left side of the port.

It is recommended to align the 0 deg mark on the knob with the Remote Sensing tip when installing the knob on the valve.

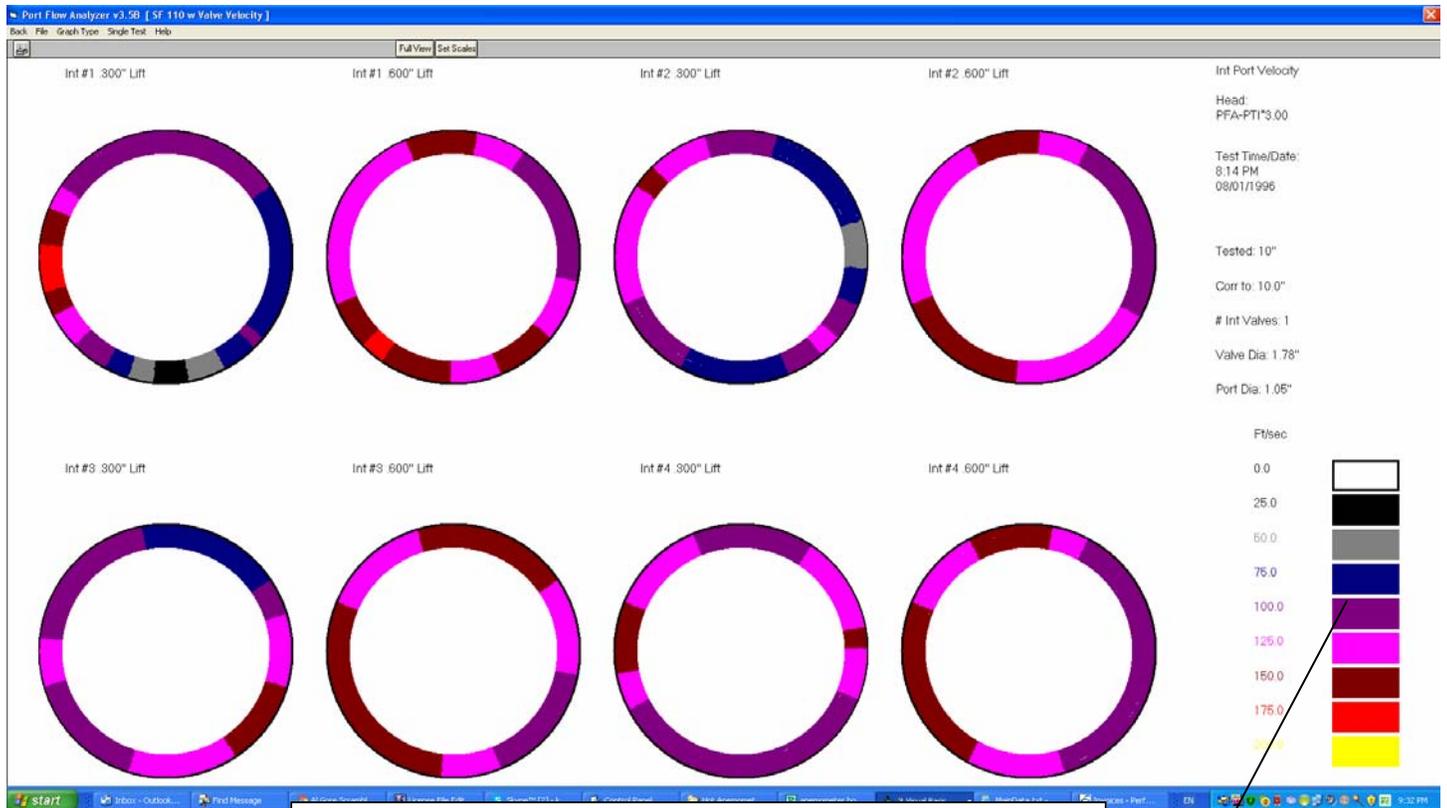
Sensing tip is here as shown in graph when the 90 deg mark is point at Front of Port.



# Graphing Port Velocity



Choose Port Velocity Graph to obtain the graph shown below. If you are doing "Valve" velocity, the graph will appear as rings as shown below.



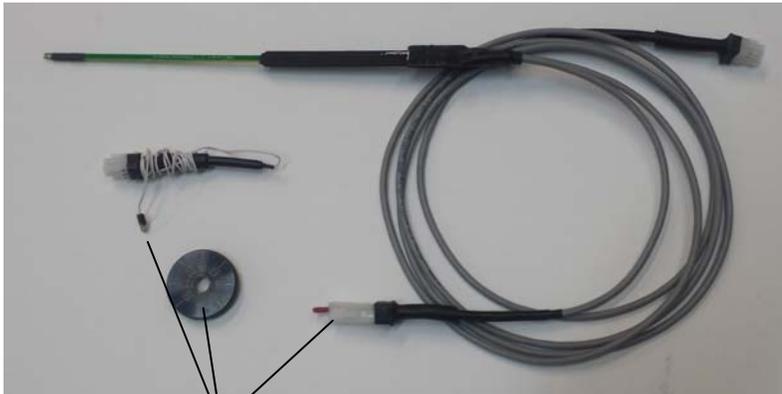
In Preferences, under the "Printing / Graphing" tab you can change the scaling or allow the program to automatically "auto-scale".

# Calibrations for Electronic "Hot" Velocity Probe

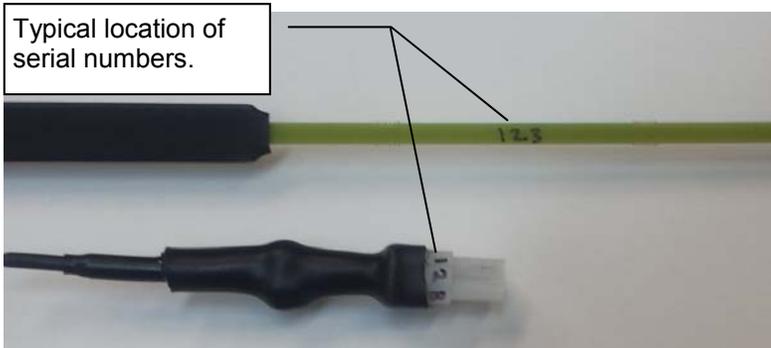
Click on Flow Bench, then See Details (calibrations) button at lower left, then "More Details", then "Hot Velocity Probe" to obtain the calibration screen shown to the right.

Set "Use Hot Probe" to Yes to enable these inputs. For most all loggers (DataMite Mini Black Box USB, and FlowComs) you will set the Probe Channel to "Temp Channel 1". For the Black Box II, you can use other channels in case Temp Channel 1 is being used to record temperature.

Then enter the numbers shown here for the calibration numbers. If you did not get the "Plus" version of the probe, you will not have numbers for the lower "Hot Valve Velocity Probe Settings" section.



"Packing slip" of what you get. This Plus version shows Degree Knob for valve, remote sensing tip with lead, and extra connector on main probe with jumper for when remote tip is not being used.



Typical location of serial numbers.

If you have our older Black Box II logger, you may want to select from these 3 channels for recording the Electronic Velocity Probe.

## Calibration Data:

Operator \_\_\_\_\_

Date \_\_\_\_\_

Probe Serial number \_\_\_\_\_

Remote Tip Serial number \_\_\_\_\_

# Troubleshoot Electronic “Hot” Velocity Probe

If your probe does not seem to be working properly, check the following:

- 1) If you have a Black Box Mini USB, do you have a 12 volt power supply plugged in addition to the USB cable?
- 2) The probe can occasionally get “confused” and produce no reading, especially if something has touched the “hot” tip or the ambient air sensor. This typically looks like a number like -1000 or so. Then if you unplug the sensor cable from the logger (and unplug power supply for SuperFlow adapters), then plug back in and restore power, this can get the probe back to giving good readings.
- 3) If you unplug the jumper and install the remote tip or vice versa, the probe can get “confused” also. See item 2 above for how to fix.
- 4) For a Black Box II, have you specified the proper channel on the logger?
- 5) Do you have the proper calibrations entered?
- 6) Are you requesting either Hot Port Velocity for using the probe, or Hot Valve Velocity for using the remote tip in Test Options screen?