Fine Tuning Flow Sensor

Sometimes the electronic flow sensor's readings do not exactly match a flow manometer or some other calibration standard, like in the table below. You will see the readings match at the high end and match at zero, but are slightly low in the middle. So you m

may want to		
"fine tune" the flow readings to	Black Box Flow Reading	Manometer
more closely match at all	0%	0%
readings. This	48%	50%
can be done in the more	72.5%	75%
advanced Head	90%	90%
Porter version for Port Flow	100%	100%
Analyzer.		

First, you must turn on the "Fine Tuning" option by going into Preferences, then the "Gen Operation, cont" tab, then set "Allow Fine Tuning for Flow Sensor" to Yes, then clicking OK at upper right to save this setting. See picture to right.

	low Analyzer v2.58 Derformance Tren	de Ellask Box II on SE1101
	Bench Electronics Calibrations	
Now go into Flow Bench specs, then	Back (ok) File Weather Station (Calibrations Swirl/Tumble Meter Type More Details Help Int #5
button at lower left for the	Flow Pres. (inclined man.) Offse	et 505
Calibrations screen shown to the	Calibrate OffeettEaster	tor 0024
right. Click on More Details, then	Comment Calib on: 07-15-16 11:4	45 am Comment
	Test Pres. (vert. man.) Offset	·314 Flow Temp (T2) Offset
	Calibrate Offset&Factor Fact	tor 00751 Calibrate Offset&Factor Factor
16	Comment Calib on: 02-03-07 12:5	58 pm Comment
	Port Velocity (pitot tube) Offset	t Other Sensors
1	Calibrate Offset&Factor Fact	tor Swirl Meter Offset
	Comment	Calibrate Offset&Factor Factor
	Help The offset in the calibration curve for Pressure (inclined manometer) sensor. curve of Pres=A*Volts+B*, the Dffset i	the Flow In a calibration Tumble Meter Offset
1	on the 'Lalibrate' button to calibrate se the electronics. p 161	ensor through
1	Help	
		Fine Tune Flow Readings?
You are first given some instructions at	pout using this feature.	Do you want to fine tune the sensor calibration for the Flow Sensor (inclined manometer) readings?
		IMPORTANT: It is critical that you have calibrated the Flow Sensor to be as close as possible to the true readings, and also have zeroed out the Flow Sensor before doing this 'Fine Tuning'.

To turn Off 'Fine Tuning', go into Preferences, then 'Calculations, cont.' tab and set 'Fine Tuning' to 'No'.

Yes

No

Cancel

Preferences Emailing oĸ Definitions (calcs) **Engine Specs** Printing / Graphing File Options Cancel **General Operation** Gen. Operation, cont. Setting Test Pressure Test Points Restart Allow Test Pressure Set Points No • Showing Help Tips Automatically Set Test Pressure No Ŧ Auto Step Through Test Stop No, user must prompt program to record data Ŧ Showing Help Tips Allow Higher/Lower Pressures Normal Pressures • Black Box Reads +/- Pres. No • Help Black Box II Weather Sensors None • Click on 'JKM Info' button for info on using weather JKM Info Set readings, even without Black Box II. Graph Colors Prompt for Recording Single Vel. Pt. No -Early (pre 1998) FlowCom? Maybe, check and ask • Don't FlowCom Swirl Channel Ask Let Program Pick Ŧ About FlowCom, Require Exact Data Frame for Fast Yes Updating • Computers SF60, Allow temp. sensors to be reversed Reset to Yes 💌 Defaults Allow Fine Tuning for Flow Sensor Yes Ŧ

You are next presented the Sensor Calibration Table shown to right. Here you will let the program read the sensor "Counts" in the first column by clicking on the Read Flow Sensor button. Then you will tell the program how different the computer's reading is from the "True" reading, which could be the actual manometer reading.

The first point you should read is the zero flow reading. It will be filled into the first row. You can not manually enter readings directly into the first or second row, as these are saved for the zero flow reading and full scale reading. The program assumes that both zero and full scale are reading correctly, and the fine tuning is needed in the middle of the calibration curve.

If there is nothing in the first row, the program will likely warn you as shown below.

re You Setting Zero Pressure?	×		Counts
You need a zero reading (readings in the	top row of this table) to continue 'Fine	Clear Row	Read Flow Sensor
Tuning'. Are you setting Zero Pressure, 1	with the flow bench motors turned Off?	Keep Specs	Help Cancel Print
	Yes No	Points 'A' (for zero full scale pressure directly. Click on info.	pressure) and 'B' (for) can not be entered Help button for more

So, with the blower motors OFF, click the Read Flow Sensor button and it will come back with a message like to the right. Enter 0 for the True Reading. This lets the program know this data should be filled into the first row.



0

A

BC

D E F

G

н

ı

J

Sensor Calibration Table

Counts Corr.

As Read

True

The program will ask you to confirm this is your zero flow reading, so answer Yes. The program will fill in the first row of the table with the zero reading, and then also the second row with the Full Scale counts. In both cases, the program will assign the "Corr." (sensor correction) a value of 1, which means there is no



correction to be done at these counts. For example, 45% flow times 1 remains 45% flow ($45 \times 1 = 45$).

Next, take a reading in an area where the flow readings do not match, like about 75% flow. Set up a 75% flow reading with the bench on and click the Read Flow Sensor button.

The program will read the "counts" and % Flow from the Black Box II and will ask what the True reading was (similar to picture below). Based on the "As Read" and "True" readings, it will calculate the "Corr." or flow correction. In the table to the lower right, you see the True reading of 78.5 which you read on the manometer is 2.7% higher than what the program read on 75.47. This produces a "Corr." correction factor of 1.027. This means the readings at this point in the calibration curve will be multiplied by 1.027, or increased by 2.7%.

ose Options I	Help	T Davas
		hange
28 "	.00 "	Int 3
)ata Point	Valve Lift	Flow Reading
1 -	.100	77.15
Fest Temp (T1)	Flow Temp (T2).	Corr. CFM Flow
0.0	0.0	
		Swirl
		0

Take another reading, say at 90% flow, as shown below. At 90% flow, the manometer agrees with what the computer reads, which will produce a Corr. of 1, or no correction.

his data is for Row 4	ОК
he program read the Flow as 2442 counts, resulting in Flow Reading of 90.67	Cancel
/hat was the True Flow Reading	

What the Calibration Table and graph to the right are showing is at zero flow (2099 counts), the sensor reads correctly. Between 2099 and 2342 counts, a correction should be multiplied to the "as read" counts. The correction starts at 1 at 2099 counts and slowly increases to a maximum of 1.027 at 2343 counts. Then the correction slowly drops back to 1 (no correction) at 2442 counts and stays at 1 all the way to the maximum counts of 4095.

Done correctly, the readings should now agree through the full range.

Black Box Flow Reading	Manometer
0%	0%
50%	50%
75%	75%
90%	90%
100%	100%

	Counts	Lorr.	Irue	e	AST	lead
٩.	2099	1	0		0	
3	4095	1				
5	2343	1.027	78.	.5	76.4	47
2	2442	1.000	90.0	67	90.0	67
Ξ.		-				
-		-				
-		-				_
		-				_
	-	-				_
1	2099.	C	ounts		41	095.
1	2099.	C	ounts	d Fl	41 ow St	D95. ensor
1	2099. Clear F	. C	ounts	nd Fl Inse	41 ow St	D95. ensor
1	2099. Clear F Delete I	. C low	ounts	nd Fl Inse Iear	41 ow Si art Ro All Ro	D95. ensor w
1	Clear F Delete I	Low C Row Sow	ounts Rea Cl	nd Fl Inse Car	41 ow St art Ro All Ro ncel	D95. ensor w ows Prin

X