Why Upgrade Your Nexus Classic Server?

If your Nexus Server is a Classic model, with no serial computer plug, and you are a regular racer, the new NEXUS NX2 FDX server is for you. New features make the NEXUS NX2 FDX Server *a must have.*

Some of the new features include…

Port AND starboard speed calibrations… to match SOG on both tacks. Accurate boat speed on both tacks means accurate True Wind Values on both tacks and accurate True Wind Direction on all tacks.

Downwind wind speed calibration to correct the typical false increase in wind speed

Upwash correction to compensate for masthead jib up flow.

Automatic basic and advanced calibration and setup with additional manual adjustments as needed.

Calibration of heading against COG to build correction table for HPC compass.

T.R.U.E. on race course calibration to fine tune for that day's conditions.

RS232 and USB (with included adapter) computer connections.

FDX Race Software provides a virtual computer dashboard of all **NEXUS** data, and navigation and gps info. Displays a digital or analog picture, or a strip chart for long term data tracking, such as True Wind Direction.

FDX Race Software displays Target Boat Speed from easily constructed files. See target speed on a Multi, Multi XL (Classic or NX2) in knots or as a percent of target speed achieved. Or as a comparison reference on a **NEXUS** Speed Trim or Digital Wind display. Software easily and quickly switches target files.

FDX Race Software records your on-the-water boat performance data for later conversion to an Excel spreadsheet so you can analyze your performance post race and fine tune your polar tables and calibrations.

FDX Race Software sets your Nexus Steer Pilot to show optimum downwind angle. Just keep your Steer Pilot pointer on "0". (*If you're racing, you must have a Steer Pilot!! Please ask why!*)

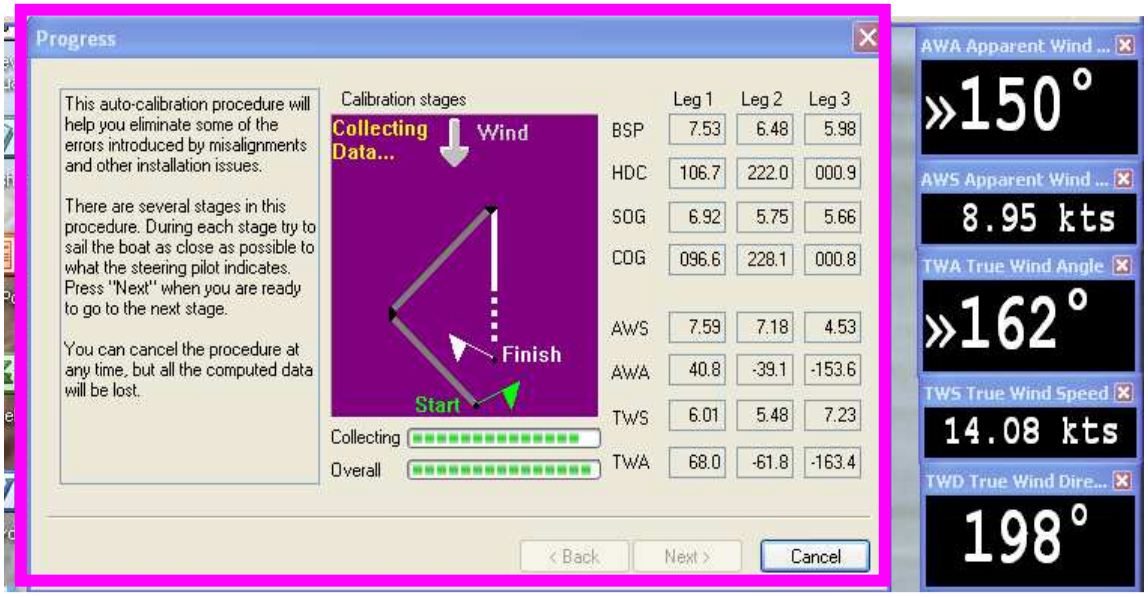
FDX Race Software connects via virtual port* to navigation software on the same laptop, sending heading and speed to the navigation software, and receiving waypoint data back from your navigation software to display on your **NEXUS** displays. (*with Windows XP or newer OS. Win 7 thru 10 may require drivers update.)

Allows for use of RP4N/Race Box Performance Module for start line features not available with server, and target boat speed and data recording without a power hungry laptop.

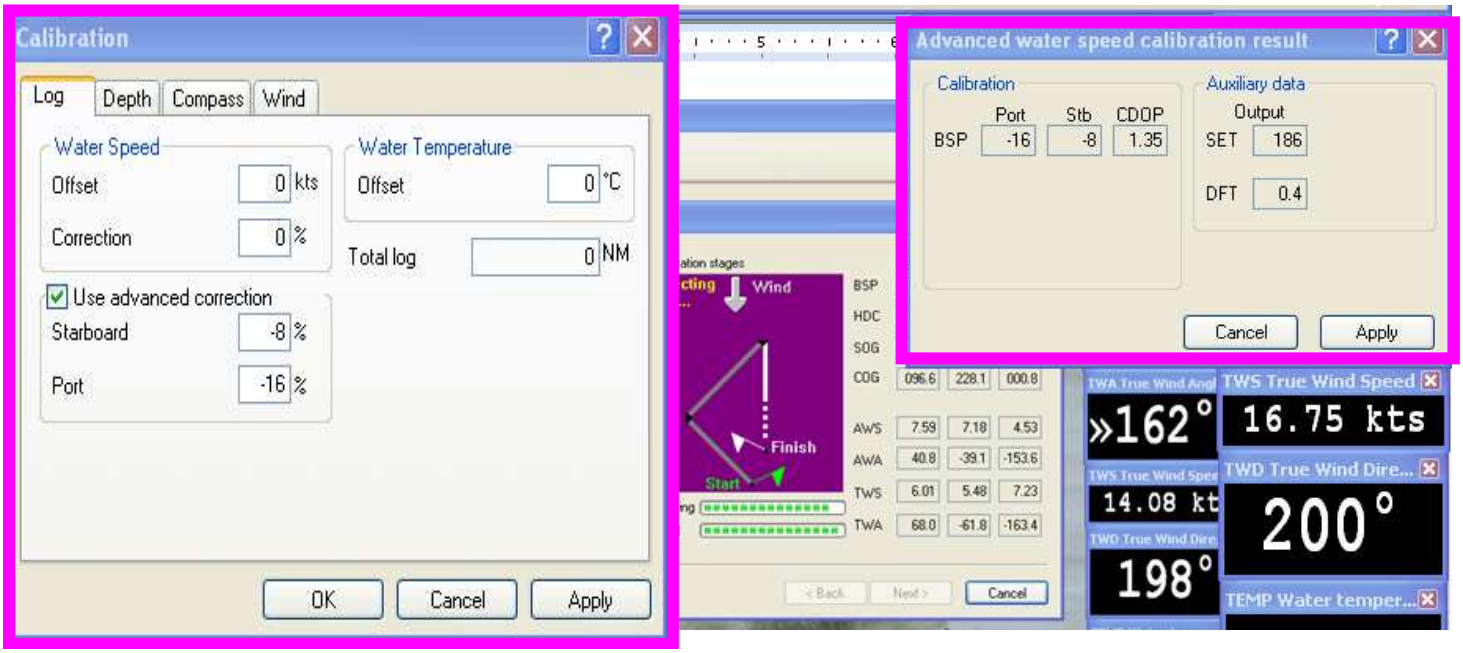
And here's the best part… the new NEXUS NX2 FDX Server is *compatible* with all NEXUS Classic displays and transducers except the 43mm 185 kHz depth transducer.

Laptop and FDX needed for all server calibration. Classic Multis and Remote should not be used for calibration.

And please review then next pages for more information.



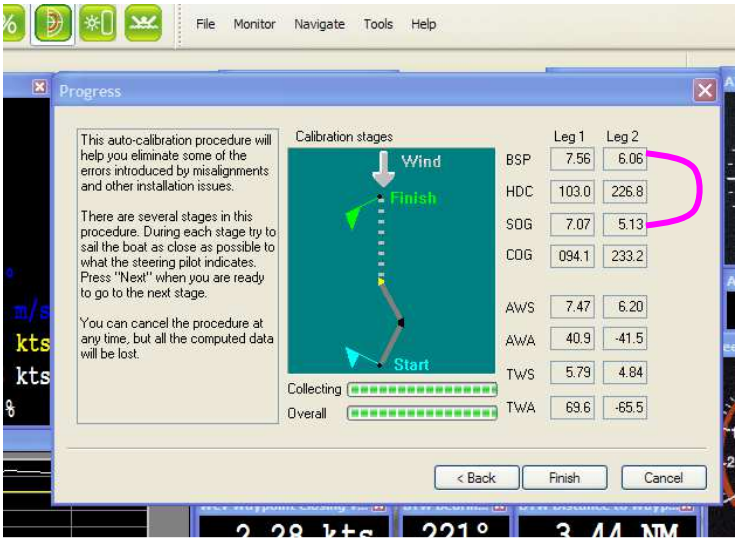
In this purple boxed screen shot, the auto calibration process about to complete the down wind Leg 3. Note that BSP's on leg 1 and 2 are different, the result of transducer mounting. Also note that AWA on legs 1 and 2 are very close, but TWA is 7 degrees off. That is because Leg 1 BSP is higher than SOG and in need of calibration. Note that heading on Leg 1 is 10 deg greater than COG while it is 6 degrees less on Leg 2 and a match on Leg 3. This calibration was likely done with too much current or tide and should be re-done in a more tide/current free area. As you are calibrating, write down the final number in all 8 boxes for each leg AND your best guess of the average True Wind Direction (198°) above lower right. See last two pages for more instructions and a worksheet.



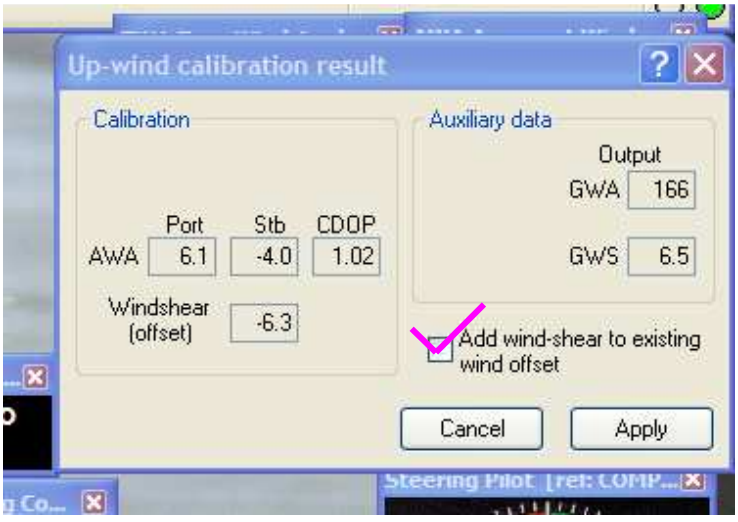
Here are the speed calibrations results in the right hand purple box... -16 port and -8 starboard. Those are minus from the basic speed calibration which should be performed first. The 1.35 CDOP indicates the accuracy of the calibrations. A perfect calibration is 1.00. 1.35 says this should be re-done in a more tide or current free area. Also note the partial screen capture in the left purple box showing the port and starboard calibrations in place and ready to be applied. To increase the accuracy of these calibrations, I apply the results here, adjust the wind transducer alignment to balance the apparent wind angles if needed, and then immediately re sail the advanced calibration process. This will fine tune speed calibrations based on proper wind transducer alignment. I

again write down all 8 boxes for all 3 legs and make note of the best estimate True Wind Direction for each leg. The over all goals of this process are boat speed calibration and wind transducer alignment which should yield the same TWD on all three legs, after accounting for any real shifts that happened during calibration so noting TWD each leg is important.

The T.R.U.E. calibration is race day fine tune calibration which needs to be done in clear air but up wind only. It fine tunes the speed and wind calibrations for the day's conditions. The first step is to sail port and then starboard upwind, which will provide this screen after both legs. The first screen shows the leg and overall progress. The second screen shows the results.



Note that the pink line indicates current or tide on Leg 2, or a need for Speed Calibration Adjustment. The box below show the final results and gives the option to add the wind shear to the existing wind offset. This will closely balance your wind angles on both upwind tacks. This also eliminates the coriolis effect which usually allows you to sail a tighter apparent wind angle close hauled on starboard tack in the Northern hemisphere. It also shows the Ground Wind Direction on the compass (this case is 166 degrees or south southeast). To accept these calibration values, check "Add wind-shear to existing wind offset", and click apply. Note that this will update your already stored calibration values, which you should have written down as "base" values. You can always manually re-enter the "base" calibration values manually after the day's sailing. Note that the CDOP is 1.02, indicating a very good calibration.

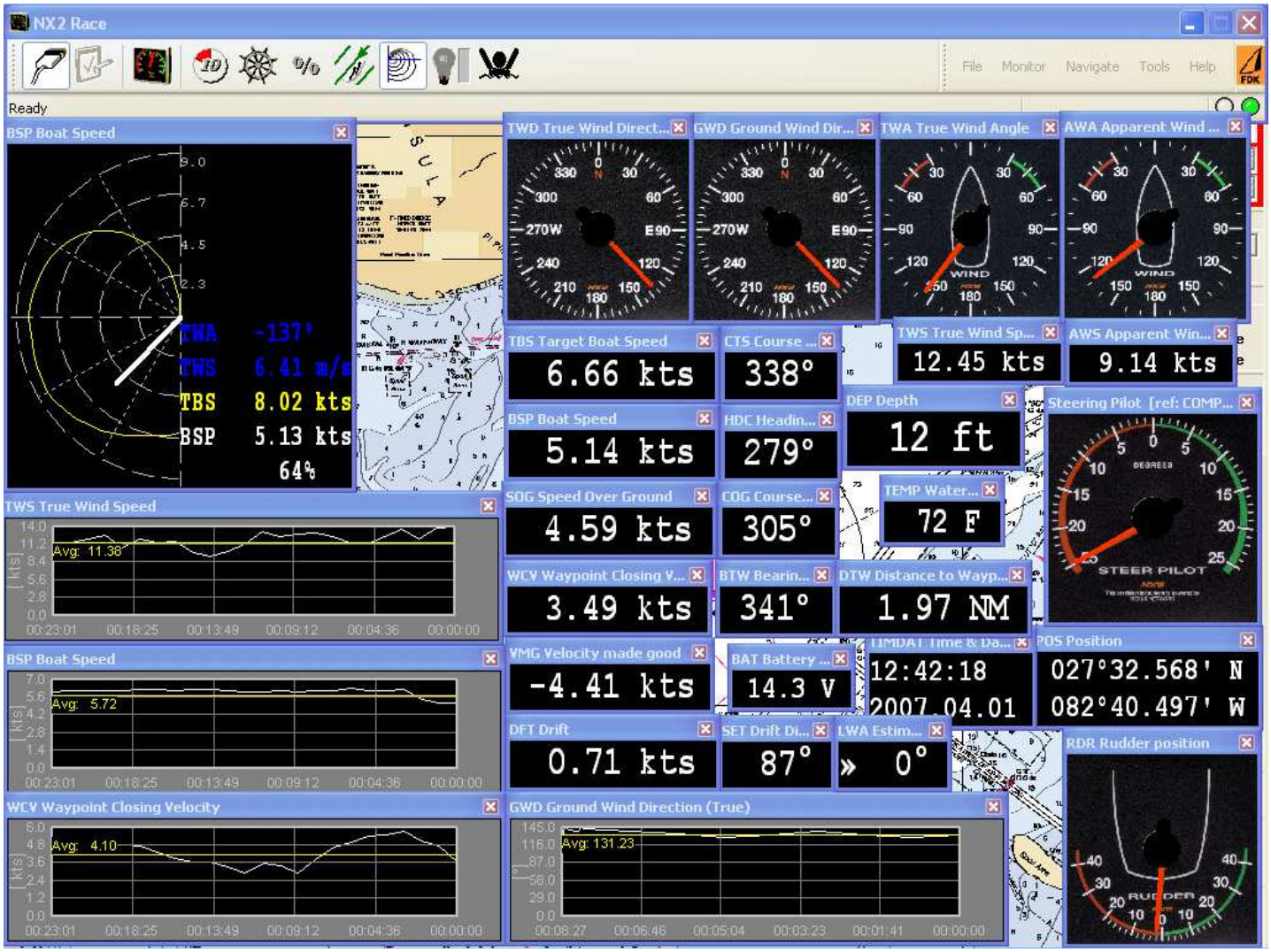


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	DATE	TIME	LAT	LON	AWA	AWS	BOD	BSP	BTW	CMG	COG	CTS	DEP	DFT	DMG
2	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
3	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
4	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
5	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
6	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
7	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
8	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
9	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
10	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
11	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
12	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
13	5521	47692	27.5246	-82.6372	-156.83	4.9	316.956	6.34	318.554	285.754	295.34	319.296	2.99	0.95	1.23
14	5521	47693	27.5246	-82.6372	-157.912	4.9	316.956	6.4	318.565	285.754	295.34	319.318	3.01	0.9	1.23
15	5521	47694	27.5246	-82.6372	-155.841	4.9	316.956	6.07	318.565	285.776	295.455	319.318	3.01	0.9	1.23
16	5521	47695	27.5246	-82.6372	-155.649	4.8	316.956	6.17	318.593	285.798	295.455	319.345	3.01	0.92	1.23
17	5521	47696	27.5247	-82.6373	-158.033	4.6	316.956	6.03	318.593	285.809	295.236	319.345	3.01	0.92	1.24
18	5521	47697	27.5247	-82.6373	-158.505	4.5	316.956	6.12	318.604	285.831	295.236	319.356	3.03	0.9	1.24
19	5521	47698	27.5247	-82.6374	-162.021	4.3	316.956	6.07	318.604	285.842	295.054	319.356	3.04	0.9	1.24
20	5521	47699	27.5247	-82.6374	-160.543	4.2	316.956	6.12	318.642	285.864	295.054	319.389	3.06	0.88	1.24
21															
22															
23	DST	DTW	HDC	LOG	RDR	SET	SOG	TBS	TEMP	TWA	TWS	VAR	VMG	WCV	
24	16	3.955	299.064	84.86	0.483398	149.689	5.3	6.85	22	-167.08	7.55	-4.20227	-6.01	4.85	
25	16	3.955	299.064	84.86	0.483398	149.689	5.3	6.85	22	-167.08	7.55	-4.20227	-6.01	4.85	
26	16	3.955	299.064	84.86	0.483398	149.689	5.3	6.85	22	-167.08	7.55	-4.20227	-6.01	4.85	

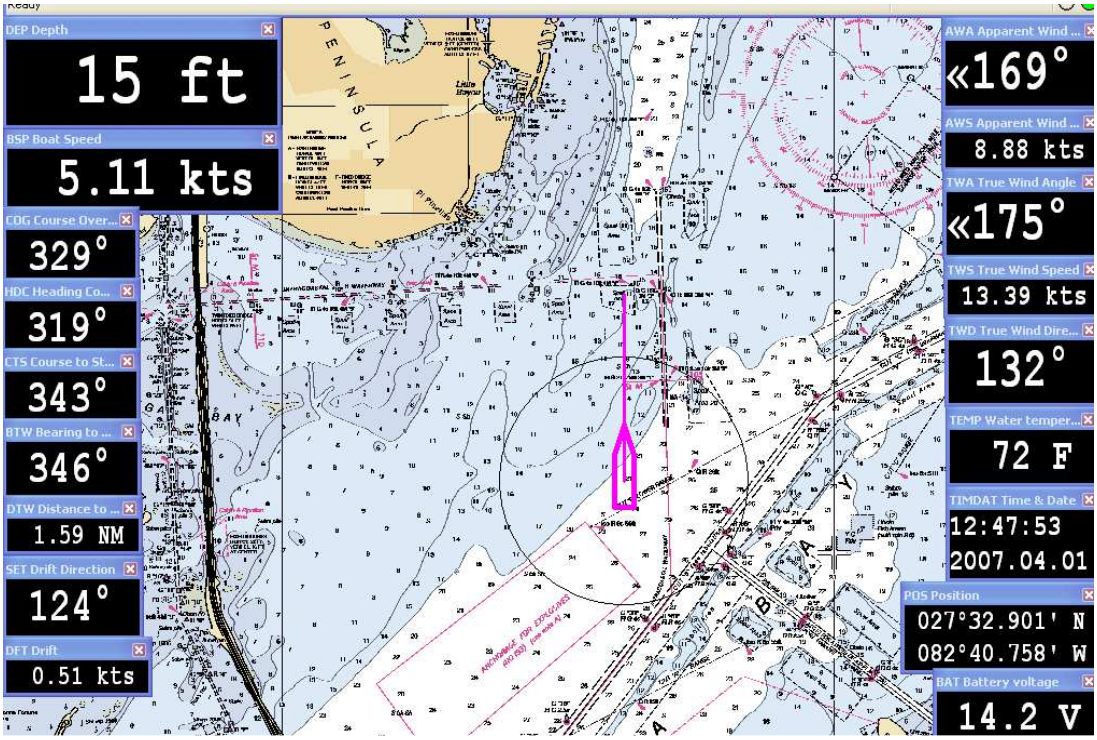
Above and below are Excel spreadsheet pages showing data recorded by the Nexus FDX software during a race. The data labels in row 23 would be to the right of column O and are moved to row 23 to get all data columns to show on one screen.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	TIME	AWA	AWS	TWA	TWS	SOG	BSP	bsp % sog	TBS	sog % tbs	COG	HDC	VMG
2130	49860	-58.8373	7.8	-69.8071	6.65	3.43	4.7	137%	4.34	79%	198.177	202.676	1.74
2131	49861	-56.7444	7.5	-69.4556	6.35	3.63	4.93	136%	4.4	83%	199.539	203.434	1.8
2132	49862	-57.2882	7.3	-70.0873	6.19	3.63	4.85	134%	4.4	83%	199.539	203.406	1.55
2133	49863	-55.5304	7.2	-68.7854	6.1	3.83	4.88	127%	4.45	86%	199.88	204.066	1.68
2134	49864	-56.6675	7	-70.8838	5.94	3.83	4.96	130%	4.51	85%	199.88	204.208	1.75
2135	49865	-51.9324	7.3	-66.1981	6.04	4.03	5.15	128%	4.56	88%	200.715	202.742	1.81
2136	49866	-49.0375	7.5	-62.4957	6.14	4.03	5.18	129%	4.56	88%	200.715	203.604	2.4
2137	49867	-50.9601	7.6	-64.1327	6.36	4.23	5.03	119%	4.61	92%	201.302	203.483	2.32
2138	49868	-49.6912	7.3	-63.9624	6.01	4.23	5.18	122%	4.66	91%	201.302	204.044	2.2
2139	49869	-47.6038	7.6	-61.7651	6.21	4.36	5.25	120%	4.71	93%	201.819	204.922	2.09
2140	49870	-60.7434	7.5	-77.4371	6.56	4.36	5.37	123%	4.71	93%	201.819	204.192	1.9
2141	49871	-53.9648	8.1	-67.5549	6.93	4.46	5.06	113%	4.76	94%	202.324	203.983	1.48
2142	49872	-58.689	7.3	-74.9268	6.33	4.46	5.14	115%	4.81	93%	202.324	204.813	1.84
2143	49873	-55.2118	9.3	-67.7856	8.11	4.57	5.19	114%	4.86	94%	202.077	204.208	1.46
2144	49874	-52.9596	8.2	-68.3844	6.91	4.57	5.48	120%	4.86	94%	202.077	204.933	1.94
2145	49875	-55.025	7.9	-71.554	6.72	4.67	5.46	117%	4.91	95%	202.017	204.703	2.06
2146	49876	-54.0253	8.8	-68.2745	7.55	4.67	5.4	116%	4.96	94%	202.017	204.088	1.88
2147	49877	-59.892	9.1	-75.3168	8	4.77	5.7	119%	5.01	95%	202.374	202.275	1.91
2148	49878	-56.6125	8.4	-72.4493	7.22	4.77	5.54	116%	5.01	95%	202.374	201.319	1.72
2149	49879	-50.7733	8.8	-65.9839	7.36	4.87	5.77	118%	5.06	96%	202.088	203.038	1.69
2150	49881	-57.7936	8.4	-74.7729	7.26	4.87	5.77	118%	5.11	95%	202.088	199.303	2.09
2151	49882	-51.015	9.4	-64.2151	8.04	5.04	5.51	109%	5.16	98%	203.143	200.039	1.57
2152	49883	-49.2407	8.4	-65.4181	6.91	5.04	5.87	116%	5.16	98%	203.143	198.243	2.49
2153	49884	-49.2627	8.7	-65.929	7.22	5.16	6.05	117%	5.2	99%	203.033	196.232	1.92

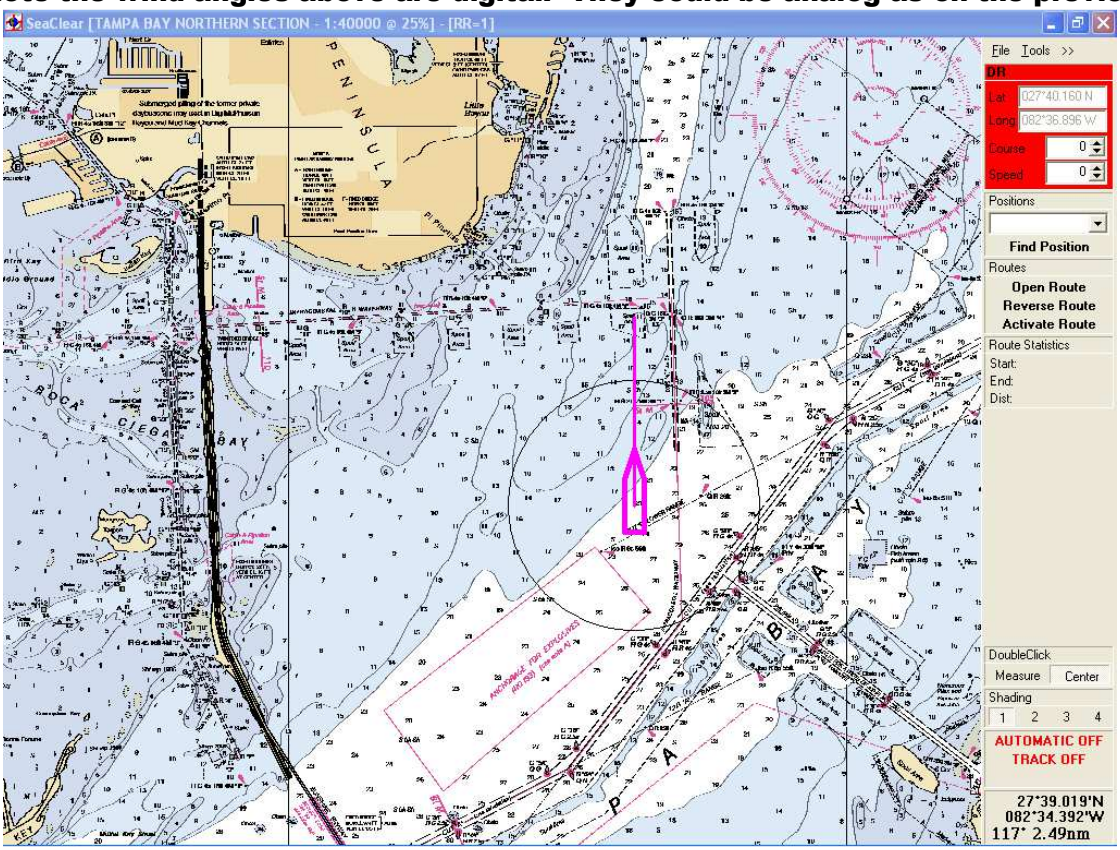
Above spreadsheet of FDX data has non essential (to this analysis) columns deleted and formula columns in blue and yellow inserted. Blue column compares BSP to SOG and yellow column compares SOG to TBS. Because BSP is 123% of SOG in row 2140, the Nexus speed calibration may need adjustment. Yellow column compares TBS to SOG for a better comparison of actual speed to Target until BSP is corrected. SOG is averaging about 95% or more of TBS, so the boat is doing well against Targets but the BSP (boat speed) needs re-calibration lower to match SOG.



Above is a screen shot of the Nexus NX2 FDX Software Virtual Instrument Panel showing analog, digital and strip chart displays with SeaClear Navigation software in background. You can have as many or as few displays as you want. This may be too many, but all the racing data is here. And the displays can be any size that fits your screen. Note the 4 analog wind displays in upper right with digital wind speeds below. You can also show wind angles as a digital number. To the left of them are the analog displays for True Wind and Ground Wind directions, which could be digital. And note the column of digital speeds: TBS, BSP, SOG, WCV, VMG and DFT, and the next column of headings: CTS, HDC, COG, BTW and SET (with BAT[tery] there but not related to headings). And in the upper left corner is the Target Boat Speed showing you true wind angle, target speed, actual boat speed and % of target achieved. This % of target achieved can also be shown in % as the Trim function on Nexus Multi XL and Digital Wind Data displays. Trim shows the % of TBS you are currently sailing so you could just sail by Trim % alone, always trying to maintain 100%, thus matching BSP to TBS.



Here is a Nexus FDX software screen layout for a cruiser. The speed and heading info is on the left and wind and misc info on right, leaving center of the screen for SeaClear to show through. A mouse click on the chart minimizes the Nexus boxes to give full access to SeaClear as seen next page. Note the wind angles above are digital. They could be analog as on the previous page.



Nexus displays are minimized here to show full screen SeaClear navigational software. It is FREE as are NOAA US charts it uses. Nexus FDX feeds GPS position, speed and heading to SeaClear and it sends back waypoint information*. Nexus FDX software also works with most other navigational (free or purchased) navigation programs. SeaClear also has an AIS receiver input to display AIS targets. *(requires NEMA GPS input and Win XP or newer Windows OS)

Instructions for Basic & Advanced Speed Calibration

1. **Motor into the wind on a no wind day and, as best as possible, adjust the wind transducer to be bow on 0 AWA with the Offset C55 on an NX2 multi or in the Race Software.**
2. **Note all existing speed calibrations in case you need to restore them, unless this is your first calibration after install.**
3. **Set two multis: one HDG/COG the other BSP/SOG top row/bottom row. Set damping for both displays to d2 or mid. Make sure magnetic is on or off (set the same) on both displays.**
4. **Check for any metals around the Nexus compass, either in storage (move items permanently) or in a temp bag. Move it as well.**
5. **Start Data Recording to file named Motor Cal 1 and today's date as in "motor cal 1 yyyy-mm-dd"**
6. **Un check Automatic Transitions. This allows you to determine when to start each leg.**
7. **Do Speed Calibration by motoring (about) N and S and accept calibration. Adjust compass alignment C37 on NX2 multi as needed based on difference between COG and HDG.**
8. **Note speed calibration value and compass adjustment value.**
9. **Do Speed Calibration motoring (about) E and W. Compare speed calibration value to first calibration value. Use your judgment as to change to new, split the difference or stay with first speed cal value. Adjust compass alignment as needed again using second, splitting the difference or staying with first alignment.**
10. **Change multis to show COG and HDG top row and make damping the same on both displays.**
11. **After you make all compass changes, note time, and motor N and S and then E and W and compare COG and HDG.**
12. **Adjust alignment C37 as needed making COG and HDG match as best as possible. Note that one direction will likely be off 2-3 degrees. If you have and HPC compass you can build a calibration table in the Race Software and correct errors every 45 degrees which makes your compass very accurate.**
13. **Change to BSP and SOG top and do same runs and comparisons. Adjust the Water Speed Correction if needed but make only small adjustments, which take 1 minute to average in.**
14. **Stop data recording of file motor cal 1 yyyy-mm-dd.**
15. **Open Water Calibration (advanced) screen and un check Automatic Transitions. This allows you to determine when to start each leg and allows you to fully trim the sails before each leg begins. Click Next to move from waiting to Leg 1 to waiting to Leg 2, etc.**
16. **Prepare to do the Advanced Calibration under sail with 8-10 knots of wind and a 135% jib. Boat must not be heeled much. No toe rail in the water, etc. Reduce sail to be flat. Important note. Do not gibe the wind transducer when doing the downwind leg 3 or it voids the whole process. Get close to 180 AWA downwind, but if the boat is rolling or the wind is oscillating use a 150 to 160 AWA to avoid an accidental jibe of the wind transducer.**
17. **Advanced Calibration first leg is upwind starboard best close hauled sail trim with no pinching. Then do the same on port and then downwind, NO spinnaker nor wing and wing but as close to 180 AWA as you can hold without gibing the wind transducer.**
18. **When ready to start, Start Data Recording with file "Advanced cal 1 yyyy-mm-dd".**

19. **During Advanced Calibration, write down your best average of true wind direction on all three legs for later comparison. Or use a TWD strip chart with a 1 min time frame. It is not noted anywhere in calibration data. Before you end Leg 3, be sure you have all 9 data points (TWD estimate is #9) for *each* leg written down.**
20. **Apply results and note time for reference to recorded data. Note that if you make changes in values you have to click "Apply" to have values take effect. *Apply blanks the screen of all data so be sure to write it down leg by leg and especially the third leg or it will be lost.***
21. **Adjust wind transducer alignment C55 if needed. Port and starboard apparent angles should be made the same with the wind Installation Offset number to "turn" the transducer. Check AWA Leg 1 against Leg 2. A 40 degree angle on starboard and a 30 degree angle on port are made 35 on each by entering 355 or -5 for C55 on an NX2 multi.**
22. **Note time and sail upwind on starboard and port tacks with BSP and SOG on multi and compare the two. Same on port tack. You may have to adjust P or S Advanced correction by 1-2%+/-**
23. **Stop and save recording Advanced cal 1 yyyy-mm-dd.**
24. **After all adjustments, repeat advance calibration and record it as Advanced cal 2 yyyy-mm-dd. Note that if you have made all adjustments correctly, T and A wind angles should match tack to tack and the boat speed should match SOG on both tacks under sail, except for tides and currents. And TWD should be the same on all three legs which is one of the goals. You will have to account for wind shifts when checking TWD tack to tack.**
25. **Again... save all calibration values on paper with the date after you are done.**
26. **Apply results and note time for reference in recorded data. Note that if you make changes in values you have to click "Apply" to have values take effect. Remember Apply blanks the screen of all data.**
27. **Adjust wind transducer alignment if needed as in step 21 above.**
28. **Repeat Step 22 above and adjust as needed.**
29. **Stop and save recording Advanced cal 2 yyyy-mm-dd.**
30. **If possible, repeat advance calibration and record it as Advanced cal 3 yyyy-mm-dd. Stop recording when done. If you have made all adjustments correctly, the boat should really be dialed in on the third calibration.**
31. **Again... save all calibration values on paper with the date after you are done.**
32. **Convert the calibration recorded data file to XL spreadsheet and open it and find your time stamps and start comparing data. Delete the columns not needed such as depth, waypoint info etc. Save speed, vmg, tbs, wind angles and speeds, heading, gps info, set, drift, etc. A comparison of HDG and COG will allow you to build HPC compass calibration table.**

Nexus Advanced Calibration Data Entry

DATE:

First Run	starboard	port	downwind
speed			
hdg			
sog			
cog			
app wind speed			
app angle			
true wind speed			
true wind angle			
true wind direction			
heel			
Calibration value:			CDOP:

Second Run	starboard	port	downwind
speed			
hdg			
sog			
cog			
app wind speed			
app angle			
true wind speed			
true wind angle			
true wind direction			
heel			
Calibration value:			CDOP:

Speed/Heading SOG/COG Work Sheet

	Pair One First Run				Pair Two Second Run			
Run	1		2		3		4	
N S E W								
BSP								
HDG								
SOG								
COG								

Calibration Conditions

wind speed:	sky condt:
wind direction:	date:
wind condt:	time start:
wave height:	time end:
air temp:	