



The Zen of Calibration¹

All high-tech instrument systems require calibration to deliver the accurate outputs you've paid good money for. Good calibration produces believable numbers that help you win races. Calibration adjusts for sensor inaccuracies, installation misalignment and environmental issues (e.g. boundary layer and sail upwash).

Calibration is not all that difficult, requiring a few dedicated hours under good sailing conditions. Instrument calibration should not be combined with rig tuning or sail skepsis – it should have its own day. You will adjust boatspeed, heading and apparent wind to deliver a steady and reliable wind direction and current. See <http://www.ockam.com/sysman.pdf> page 56 for the correct procedures.

There is also an automated calibration helper application, DeWiggler, which makes the job easier and faster. See <http://www.ockam.com/dewiggler/> for details.

Setting up and maintaining an instrument system is not entirely or even mostly about the technical process. There are also important organizational structures to be created and maintained as well. Most calibration dysfunction and nightmare stories are related to social issues and not the hardware.

Examples of Calibration Pathology

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| The "Average Joe" | thinks that calibration is rocket science; expensive hired gun technicians need to be called in. They never do. |
| The "Rudderless" | Nobody's been tasked to work the instruments, so they never get operational. |
| The "Technoskipper" | knows all about instruments so nobody is delegated responsibility for maintaining them. Since there are a lot of other things that need his attention, calibration never gets to the top of the list. Technoskippers also tend to be Tinkerers. |
| The "Tinkerer" | likes turning knobs and trying the latest software. There is no consistency in the instrument readings because everything keeps changing. |
| The "Pros from Dover" | come onboard at random, imposing the calibration schema du mond. When they leave, the instruments stop working. Think about it. |
| The "Flat Earther" | thinks different wind angles on opposite tacks are 'bad instruments or calibration' instead of wind shear, so he keeps trying to adjust it out instead of using the information to his advantage. |
| The "Cloner" | thinks calibrations from his previous or neighbor's boat are going to work on his current boat. |

¹ This article is outside of my normal portfolio because it deals with social issues instead of instrumentation technology. However, I have seen so many cases of instrument pathology that it has become necessary to address them. R. S. McCurdy 5/07

The Instrument Guy (IG)

As much as the sails or winches do, instruments need a single responsible and knowledgeable individual who has been given authority to adjust and maintain them. Although there are elements of both in it, calibration is neither rocket science (only simple math skills are needed) nor voodoo ritual (not everything that affects the instruments is measured and corrected for – e.g. wind shear).

Characteristics of the IG:

- Needs basic math skills.
- Disciplined and organized.
- Not afraid to learn.
- Permanent crew member.

Duties of the IG:

- Does the spring checkup and cobweb banishment.
- Keeps a journal with observed conditions and resulting calibration entries.
- Understands his job.
- Knows what's going on.
- Exudes confidence.
- Knows the numbers – how many degrees the compass is off; how many degrees the wind direction changes tack to tack and jibe to jibe in all true wind conditions. Keeps track of QuikCal.
- Learns how to recognize wind shear and gradient and how to take advantage of them when they occur.
- Trains the rest of the crew on how to get the most out of the instruments – especially the helmsman and trimmers.
- Checks the calibrations frequently.
- Does PM on the instruments. Deteriorated wiring and loose sensors lead to inconsistent readings.
- Uses methodical procedures - one step at a time.
- Balances fear of change against pushing to the next level.
- Isn't afraid to try something as long as he can go back if it doesn't work.
- Only gets as fancy as he needs to get. Autocal spreadsheets are graduate level stuff and should not be used unless absolutely necessary.
- Is sure the onboard software isn't sending out calibration instructions he doesn't know about.
- Uses software or displays to try different calibrations, but once they've been established, sets them into the cal screws for added safety.

Duties of the owner/captain in regard to instruments:

A. Leadership

1. Be sure everybody knows why calibration is important.
If nobody believes in it, it won't get done right if at all.
2. Schedule a calibration day where the full racing crew attends.
Sloppy sailing leads to bad calibration.
3. Keep the pressure on to lock down the cals before the serious racing begins.
Getting calibration out of the way makes sailing more fun and successful.
4. Push it thru.
Moaning about the instruments won't make them work or win pickle dishes.

B. Delegation

Assign the job of calibrating and maintaining your instruments to a technically oriented and willing permanent crew member – the Instrument Guy (IG).

1. Give the IG the authority to do his job and hold him responsible for the health of the instruments.
2. Be sure the rest of the crew understands that the IG is in charge and they shouldn't mess around with the instruments without his knowledge and approval.
3. Trust him to get the job done. Don't mess around with the instruments just because you're the boss.
4. Assign him the resources he needs, particularly a calibration session early in the sailing season.
5. Let the IG know your feelings, and encourage him to tell you his.
6. Assign a new IG if your first choice doesn't get the job done.
7. When the owner is the IG, there will inevitably be less pressure to get the job done. It also goes without saying that he's untouchable, so responsibility/authority will be broken.

Why you can't get your dealer to "come out and calibrate"

Your dealer probably did the basic calibration when he originally installed the instruments. Subsequent season's calibration checks are much harder to get him to do, because:

- For subsequent calibrations, the dealer expects to be paid for his time. And remember, calibration takes the better part of the day.
- Calibration occurs at the peak season for dealers. They have lots of other clients demanding their time too.
- Rain days. The scheduled day may be unacceptable for calibration. By the time this is determined, the dealer loses half a day.
- If you hire the dealer to do calibration, your IG or some other crew member will denigrate the calibration afterward. This results in the dealer's reputation being trashed, and he'll likely be required to do a make-good. Of course, this doesn't fix the underlying problem.
- There are usually sail people aboard who want to do their thing, so the dealer spends the day enumerating seagulls and thinking about all those other clients he's not servicing.

For these reasons, it's imperative to have a regular crew member (the IG) calibrate and maintain the instruments. Call the dealer if something is broken, but expect him to be reluctant to commit to a calibration session.