Vertical Sextants Give Good Sights

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For most ship navigators, this discussion is now purely academic – which does not make it less interesting.

A sextant is a simple instrument but the use of it requires a lot of practice. In the 1950s, navigation reached a high level of accuracy because the technology was there (good instruments – daily radio signals – good bridges) and because the will and interest of the seafarers was there as well.

In my company, no sextants were provided (against the Rule), and a cadet/midshipman joining the fleet and wishing for promotion to 4th Mate had to work hard (10 hours/day) for six weeks to be able to acquire his own sextant. If he wished to discern the suspicion of approval in the eyes of his 1st Mate, he could not board with less than a Plath with a 6×30 telescope. The day that his observations and calculations were good enough to be relied upon, he was ready for promotion. Some had the knack of it after a few months, some needed 6–8 months, some still had problems a long time after this.

Practice was all day long in his spare time, 10–12 shots in the morning or afternoon depending on his watch (watch was for working, not for practising). If he got the sympathy of the Officer of the Watch, they took sights together – the quickest way to find errors and learn from mistakes. Once the Sun was mastered, the boy spent every evening on the bridge shooting stars (cutting hours off his sleep). Today, people cannot realise the application and the will necessary to earn any promotion.

The 3rd Mate took at least three Sun sights in his morning watch of 0800–1200; all Officers joined together for Noon; the 2nd took a last Sun around 1600; the Ch/Mate and 4th took a star at evening and at dawn. When you came on the bridge, the first sight you had was of a battery of sextants, from three to five, ready for use. As in other trades before industrialization, a very high level of skill and craftsmanship was achieved (as in cargo handling/care). The Sun was tracked between and behind clouds, the horizon between showers; a few seconds was enough to get a workable sight. The best Officers knew up to 70 stars; 30 stars was the minimum. Stars were identified through the telescope so that you were sure you had the right one.

In the beginning, calculations were made the long way, all by hand. Later, some Officers bought their own HO214. With these tables, I could regularly put seven stars on the plotting sheets within 15 minutes of the first observation, and I was not the fastest. The NP401 were slower. On the plotting sheet, a fine-pointed pencil was used to give very high precision. It was expected that from these seven stars sights between four and six would cross at *one* point – on a good day, all seven. The three or four stars, of first magnitude nearly always crossed at one point; the fainter stars might be slightly away, but their lines of position would give a 'mean' very near the 'crossing' (Figure 1).

At Noon, when at least three Officers were observing (up to six on passenger ships) the senior officers *always* achieved the same results to within $\frac{1}{4}$ min. Which means there was no, or negligible, 'personal' error. The same could be said when more than one Officer took stars; they came to the same position within one sea-mile.

A marine sextant should be heavy (Plath), the telescope clean and adapted to the sight of the observer (personal sextant). The way a person takes a sextant out of its box and keeps it in *both* hands will tell you who he is.

Most cadets had problems with technique: (1) eye sight-keeping (adapting telescope to the eye); (2) the way of 'kissing', light or too heavy; (3) swinging body and sextant around 'spine', finding the vertical plane; (4) rocking the sextant to keep it vertical. Points 2 and 3 give big errors, 1 and 4 very small ones. Ship movements should have no influence on the quality of a

https://doi.org/10.1017/S0373463398008169 Published online by Cambridge University Press

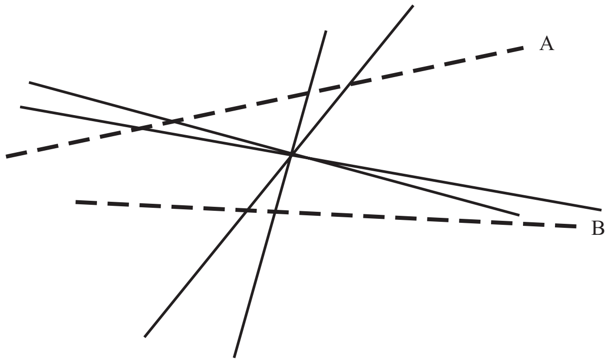

Fig. 1. A&B being outside the position was attributed to 'dip', never to a sextant out of vertical.

sight. Rhythmic movements like rolling, pitching, heaving are compensated by the body – that is why they are seamen. Unexpected surging can hamper, and heavy airing of the propeller can make a sight very difficult; but then, so is reading and writing in such conditions. Wind can be a problem, but that is why a marine sextant should be heavy, having more inertia.

In hazy weather, the 2nd Officer took a sight on the maindeck, as low as possible, and in many cases a reasonable fix was obtained. Poor fixes were attributed to poor horizon (dip), sometimes taking the Sun through clouds or in a 'flash' between two clouds. But the experienced Officer had a very good idea of the quality of his sight. At that time, any good Officer could take a sight 'with his eyes closed'.

The best sights were between 30 and 60° above horizon. Below 15° there were some doubts, below 10°, it was not worth taking. Above 80° you needed a minimum of experience and at 89°, correct Noon positions were always possible. One day I had 90°!

The vertical edge of the horizon glass will give no clue, as it will be not discernible. But no Officer should have doubt about the verticality of his sextant; that is why the 'kiss' should be light. Verniers (1/10 min) were seldom used or fitted and did not improve position. Sights were rounded to $\frac{1}{2}$ minute, calculations to one mile. This precision is more than enough for ocean navigation, and closing a danger to less than five miles (ocean) is poor seamanship. Coastal navigation is a different thing.

Special shades were considered as gadgets, and never did improve the sight. On the other hand, choosing the correct shades for both mirrors could make the difference between a good and a poor sight. Astro positions by sextant were very accurate – less than a mile out. This was proved over and over again by correct landfalls within less than six hours. Officers (and ratings) were proud of their trade, and sights and calculations were regularly compared and analysed. Job satisfaction was the result of lengthy application.

Satellite navigation systems were the beginning of the end of the art; dead reckoning became sloppy, radio signals were forgotten, chronometers were not wound, etc. It was also the end of 'sea sense'; currents and meteorology were no longer studied.

The coming of GPS put an end to it all. The sextant (one per ship) is hidden in a lower drawer; the chronometer is not connected to its battery. Time is given by the GPS. If one day the satellites should be switched off, 99% of the ships would be 'lost'. In the, 1950s and, 1960s, a good ship had at least two mechanical chronometers. The 'top' was taken daily at the same time, and they were compared with each other. Some ships had lamps in the chronometers to keep them at an even temperature. If one of them stopped working it was a major event, and the Master informed. The daily rate was quite correct. Later came battery-operated chronometers. To the general surprise of all, they were no better; only one was provided. With the coming of GPS, the younger Officers took time from the set; some were using their wristwatch (Seiko), which was often steadier than the chronometer! Older Captains lost their health. Nowadays 'a 2nd engineer' can get a position by pushing a button.

The last 10 years have seen a revolution in water transport of the same importance as during the demise of the sailing ship the change from steam tramp to cargo liners which occurred in the, 50s. It is another trade, another job. Let us hope the new 'sea-men' obtain the same level of satisfaction and pride as we had. Seven sights in five minutes was the norm.

reference

Dixon, M. and Richey, M. W. (1997). Vertical sextants give good sights (Forum). This *Journal*, **50**, 137 and 464.

key words

1. Sea. 2. Astro. 3. Navigation practice. 4. History.