

Position Finding in Captivity

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(*Port Line*)

IN December 1940 some 500 captured allied seamen, including the author, were transferred from a German commerce raider to an ex-Norwegian tanker under the command of a German prize crew, with the original crew still aboard. The ship was in the Southern Indian Ocean—in about S. 32°, E. 70°—just cruising about aimlessly, apparently awaiting orders to proceed. The captured Chinese and Indian ratings were accommodated aft somewhere, the shipmasters and passengers were housed amidships; and the rest were forward.

This vessel was very effective for the purpose to which it was being put as it was easy to position machine guns to cover all ways of approaching the midship house; in particular the fore part of the bridge was a solid wall right up from the foredeck to the high dodgers. Nothing could be seen of those on watch and no bells were struck, so that the officer prisoners were denied the sight of anything which might help them to guess what was happening, and any sound to give them an idea of the passage of ship's time.

The ports in the fo'c'sle had been painted over inside and out and tightened up with a tommy bar, so that incarceration was pretty complete and life settled down to the mere process of continuing to live. One day, after about a week of this, the engines were put at full speed, about 10 knots, and the vessel set off in a south-westerly direction. This meant going into a colder climate (the present direction being towards Cape Horn) and inspired lively and slightly apprehensive speculation. The ship's progress became a matter of keen interest to the prisoners who, some after many months of captivity, were at last bound somewhere. As the first light of each successive dawn was seen through cracks in the storm-boards it was eagerly watched to see where the Sun was rising, and thus if the vessel was holding her course.

It is interesting to note when the whole and undivided attention is concentrated on a very limited field of vision, how much more acutely the available details imprint themselves on the mind. One of the many thoughts which this watching inspired was the fact that the only times in the day when an observer, unaided by instruments, can know the altitude of the Sun is at sunrise and at sunset. This led to wondering just what odd bits of navigational stuff was possessed by our community. One thing which had been overlooked when we were searched, because at a cursory glance it was not working, was a watch. Actually, it was working but had been kept on G.M.T. which was then five hours slow on ship's time and had been handed back to its owner.

The next piece of equipment came from an engineer who had religiously

kept a diary in a pocket book which turned out to contain a table of natural sines and tangents to integral degrees. The Germans did, however, provide lavatory paper and someone had a few pencils; thus, at this stage, the sum total of resources was a knowledge of the Sun's altitude of zero twice a day, a table of natural sines and tangents to whole degrees, G.M.T., pencils and a supply of continuous stationery. Much thought was devoted to the problem of how these things could be brought into effective use.

By harking back to the days of studying for Board of Trade Certificates,

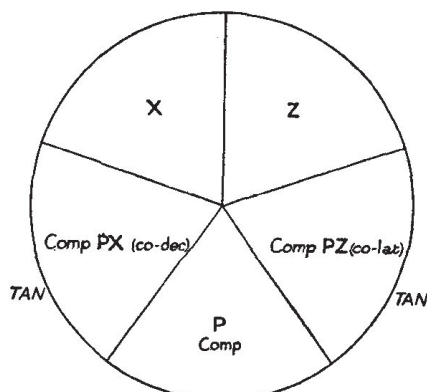


Fig. 1

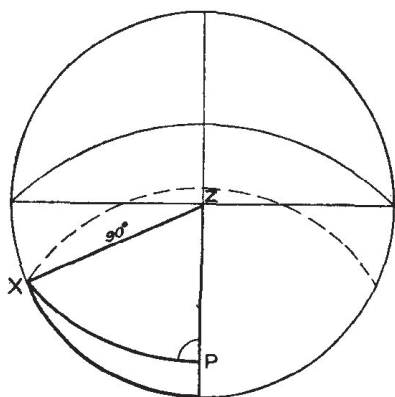


Fig. 2

a vague memory of some mnemonic diagram (Fig. 1) to assist in the solution of quadrantal spherical triangles was revived and after a good bit of head-scratching, re-drawing and messing about, the way to apply the diagram was remembered. It only needed twisting round a bit from the customary way in which it is used to show just what was required in the way of information before we could have a shot at establishing the ship's position (Fig. 2).

The next problem was to estimate the proper total altitude correction for a height of eye of about 15 ft. and for zero altitude. This was done by remembering what values of dip and refraction had been used and the amount and trend of the Sun's semi-diameter. Applying the altitude corrections showed that the true altitude was zero when the lower limb was half-way between the horizon and the Sun's centre (Fig. 3). Thus it was possible to gauge the time of this occurrence. There now

remained three unknown values: the Sun's declination, the equation of time (or Greenwich hour angle) and the latitude.

At this juncture it is only fair to say that had this been about March or September it would have been extremely difficult to fix the present amount and be aware of the daily change in the value of declination. As it was, from the daily change of values noted prior to capture, and the knowledge of the date and maximum value, a sort of graph was evolved of the change of declination over the turn of the year. The trend of the equation of time was rather more difficult to remember, but it was, and satisfactory values were deduced in just the same way. The more recent

prisoners had been position finding continuously for a period of some 12 days prior to capture and it was really a matter of digging up from the memory items of information which in the usual course of work were taken out of the tables in use and promptly forgotten.

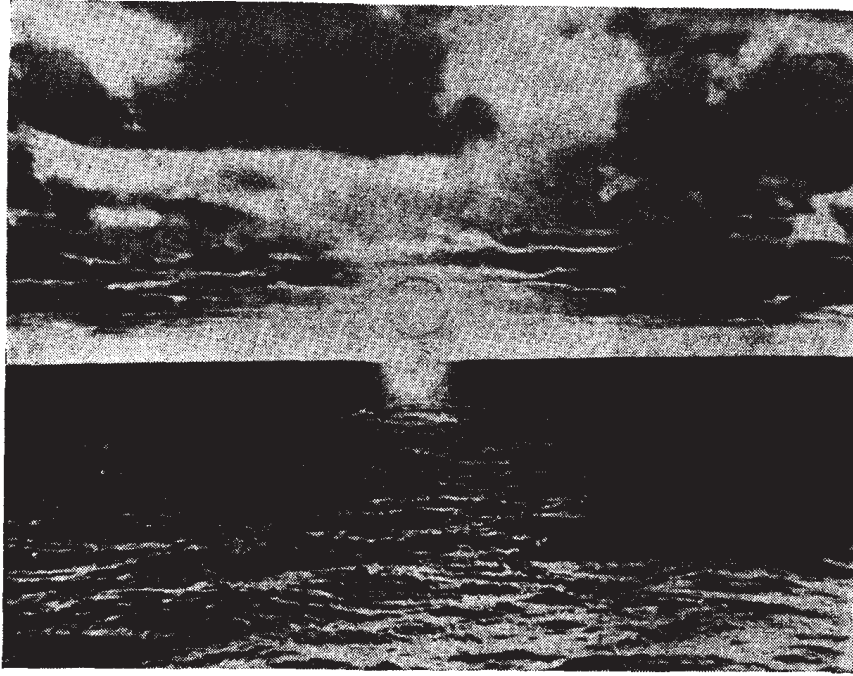


Fig. 3. Sun's true altitude zero.

The Germans provided some ersatz honey in cardboard containers sealed with a circular cardboard top. From experience in using a bubble sextant the way to go about things was quite clear. A compass rose from one of the illustrations in *Nicholls Concise Guide* was carefully cut out, trimmed round the circumference and then stuck with honey on to a circular cardboard top from the carton (to give the compass rose rigidity). The next thing was to find someone who could be persuaded to part with a needle and cotton—and strangely enough these things were obtained. A small piece of heavy stuff was tied by a length of cotton to the 180° mark on the card and the needle very carefully pushed through the exact centre of the card.

All that had to be done then was to find a chink of sunlight somewhere, put the card in the plane of the Sun's direction and observe the shadow of the needle cutting across the graduated edge of the compass rose, giving the altitude. In practice it took some time before the right weight and length of cotton were found so that the card would stay sufficiently still with respect to the ray of light despite the pitch and roll of the vessel, which in the foc's'le was pronounced. However, this was finally achieved and so observations began. Of course to start with, there was no clear

idea of the time of noon. It meant at first just waiting for about one half to three quarters of an hour watching the shadow in the chink of sunlight as it recorded increasing altitude until it was apparent that the maximum had been passed; it was just a question of judgment as to when that was.

After this, estimation of course and distance run to sunset was comparatively easy. Thus the noon position line of latitude was brought forward. It was rather exciting to watch the Sun go down from a position in the booby hatch waiting to take the time at which the lower limb descended to that critical position just above the horizon, hoping that the German lookout would not come forward to batten the hatch and take up his patrol too soon.

The tables of sines and tangents gave natural values only for whole degrees, and once the G.M.T. had been taken the real work of calculating values to minutes of arc began. Eventually a position was evolved and announced to a somewhat sceptical audience; all that remained was to await the next sunrise to enable the position lines to be carried forward and crossed again, and so on to the next noon. By this time our technique was improving rapidly and a survey and re-hash of the information to date enabled plotting of the position to begin. Fortunately, someone had a map of the North and South Atlantic oceans which was about six or seven inches long and five inches wide. Thus a record of the ship's progress was maintained, and it became apparent which way the German minds were working; the principle was at least clear, which was helpful.

Our activity had a number of subsidiary effects. For instance, the stormboards were almost cut through across their centres in such a manner as to make this treatment pass close scrutiny; yet a hard blow in the right direction would have knocked them to pieces and we had to be careful to see they didn't get such a blow accidentally. A rivet hole was discovered in the upper-deck plating which allowed communication with those below and thus a coordinated plan of action was evolved for breaking out should the circumstances so necessitate. Also, by this means we learnt how the ratings were getting on in their quarters.

One early morning the engines stopped; this unaccustomed silence woke all hands. The Germans came forward, took out the stormboards and invited the prisoners to have a look round. They certainly had something to show them, for there, hove to, was the *Admiral Scheer* together with two or three refuelling tankers, all at a nice quiet rendezvous in the South Atlantic. The Germans took this opportunity to transfer one of the community who had never disguised his feeling towards them over to another vessel. For the remainder, the period of comparative ease of restraint was most welcome and the scene of mild activity all around quite interesting. As the time of noon approached there was a little anxiety as to whether the customary observation was going to be possible or not. It was hot and calm; the bridge dodger lanyards sagged a little—just enough to enable the white cap covers of those on the bridge to be seen for the first time, as they stood in line to take the meridian altitude.

This was watched with sudden acute interest, on the reasonable assumption that the moment the caps dipped, as their wearers bent to read their sextants, would be the time of apparent noon according to their observations. Down went the cap covers. Down went the G.M.T. and thereby the Germans unwittingly informed their prisoners that now, over five weeks since the most recent of them to be captured had had a sextant in his hands, they were just on a quarter of a degree out in observation of longitude: between fourteen and fifteen minutes west of the axis line. This check enabled a certain amount of work to be done on estimating the probable causes of the error and some minor adjustments to basic data were made with a view to starting off more accurately. The evening position line that day gave us something to work with; soon all was set ready for the next leg of the passage.

In due course the rendezvous broke up leaving the vessel to continue her voyage on to the north-west which made it certain that she was destined ultimately for occupied territory. The precise direction of this course made it obvious that the intention was to cross the air route between Africa and South America at right angles, in order to reduce the chance of being reported by any aircraft on that route. This insight into the German method of proceeding on the line of least mathematical probability of encountering allied detection was probably the most interesting piece of information which had been acquired.

It was frustrating to have to confine this knowledge to the vessel and we therefore devised a method of getting it to the outside world. For some unknown reason one fellow had retained a few pieces of carbon paper and these were put to use duplicating the log of events to date, together with a track-chart of progress. Many copies were made and were sealed in tins in which some of the foodstuff was now supplied. Right forward there was a small oil tank with pipes leading overboard so that in heavy weather some oil could be discharged into the sea. This tank still had some oil in it and the lid was removed and through the rivet hole in the deck the ratings were asked to pass up some strands of rope from the mooring lines. Pieces of cloth, &c., were then dipped in the oil and tied to the tins with ropeyarn. Under cover of darkness, these were dropped overboard one by one as the vessel crossed the air route. It was a pretty forlorn hope that something bright in the middle of a small oil slick in the middle of a vast ocean might attract attention, but it was all that could be done at this stage to apprise the outside world of the true destination of the 5000 tons of oil which the tanker still carried. Apparently nothing came of this attempt. The construction of an oil light and an electric signalling lamp was also effected. No chance came for using the latter, but the former was of very great benefit to the general life of the community.

The days which followed were of steady progress northwards. This was fortunate from the navigational point of view as, with the Sun more than twenty degrees south, the morning and evening position lines were

getting well off the right angle with the latitude, and accuracy of observation was essential to ensure a good fix. This got more acute daily but experience was increasing all the time. However, if the vessel was going to continue on up towards Iceland, it would make things too difficult altogether, and too cold as well. So the fear of climate, together with the approach to a lively theatre of conflict focused our interest on all possibilities which might arise. It was expected that the course would curve north-eastwards sooner or later, but just where the curve would begin and end was a matter of conjecture. Again, the curve, when it did start, was obviously based on the assumed radius of action of aircraft from the Azores. Thus, at this time, particular attention was paid to course. When it came right round to the parallel of N. 48° the knowledge of the principle of crossing all danger lines at right angles gave a good lead as to the port of destination.

Naturally, as the vessel progressed eastwards the thought of possible interception was uppermost in every mind. However, this hope was tempered by the fact that we could not see how we could be rescued without considerable loss of life. The only life-saving appliances forward were a number of 40-gallon oil drums lashed in pairs, stowed against the break of the foc's'le. These would have been hard enough to hang on to in the most favourable circumstances—by those few who could do so; the rest would have to sink or swim. So it was with mixed emotions that a continuous vigilant watch was maintained in case anything occurred to offer a chance of escape. Nothing did.

Calculations showed that by dawn on the 1 February 1941, the vessel would be off the Gironde. At 0800, escorted by two Italian submarines, she entered the river for Bordeaux.