# PRACTICAL HINTS FOR HYDROGRAPHIC SURVEYORS

TO PLOT A STATION POINTER FIX GRAPHICALLY

In *Hydrographic Review*, Vol. X, No. 2, pages 252-3 and Vol. XI, No. 1, pages 155-6, methods were described of plotting a station pointer fix graphically. The writer's attention has been called to the following very simple and quick method, using the Traverse Table, which is described in detail in *Wrinkles in Practical Navigation* by Capt. LECKY (*) (pp. 157-164) under the name "Fry's Fix".

Using the observed angle as a Course, and half the distance between the two objects as Departure, look up the Distance in the Traverse Tables. With this Distance as radius and each observed object as centre, sweep small arcs; and from the position where they cut, using the same Distance, sweep another arc in the direction of the estimated position of the ship or boat. Repeat this for the other observed angle and the other two objects, and where the two final arcs cut is the position of the ship or boat. If a third cut is required as a check, the whole angle and half the distance between the two extreme objects can be plotted.

NOTE. — If the observed angle is less than 90° the centre of the circle will be on the same side of the line joining the objects as the ship or boat; if greater than 90°, on the opposite side.
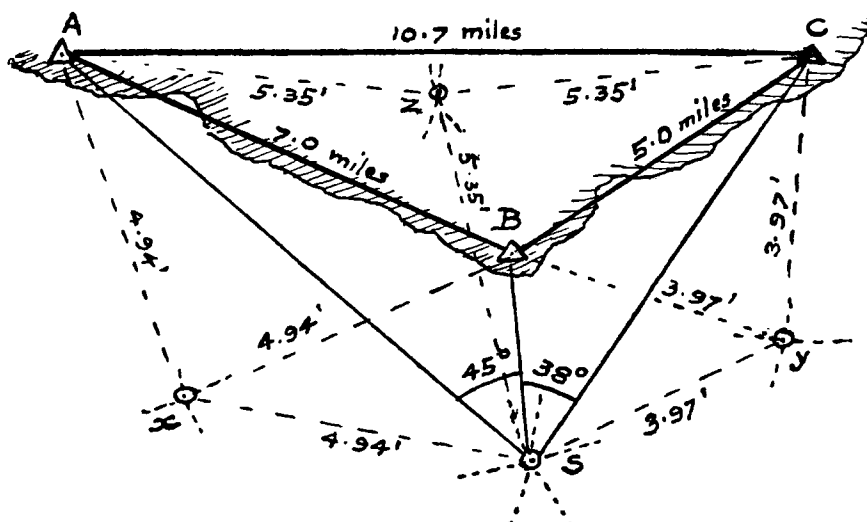
Thus, in the figure, the Distance $A — B = 7$ miles and observed angle 45°; using 3.5 miles as Departure and 45° as Course, the Distance in Traverse Tables will be found to be 4.94 miles; using this 4.94 as radii, sweep arcs from centres A and B cutting one another at x and from x with same radius sweep another arc in the direction of the assumed position of ship or boat. Similarly with half the distance $B — C$, 2.5 miles, as Departure and observed angle between B and C, 38°, as Course, the Distance will be found to be 3.97 miles and the centre of circle will be found at y, from which a second arc with radius 3.97 miles is drawn and the position of the ship or boat is found at S. Finally, using half the Distance $A — C$, 5.35 miles, and the whole angle between A and C, 83°, the centre of circle will be found at z from which a third arc can be drawn as a check.

It will be observed that although in the example given the conditions afford a very good "Station Pointer" Fix, the arcs drawn from x and y cut one another at an oblique angle and, when plotting the whole angle, those drawn from A and C also cut even more obliquely ; therefore, unless extreme accuracy in obtaining the Distances from the Traverse Tables and plotting same is observed, the resulting cuts at S may form a "cocked hat" with consequent doubt as to the exact position. This graphic method of plotting is therefore hardly suitable for Marine Surveying although it may be very useful for ordinary Navigation.

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THE CARE OF INSTRUMENTS

(Extract from *The Military Engineer*, No. 147, Washington, May-June, 1934, page 230).

The following notes on the care of surveying instruments are furnished by the Coast and Geodetic Survey :

No matter with what ruggedness surveying instruments may be designed, they are, nevertheless, of a precision character, and a certain respect must be accorded them in their care and handling. It is usually necessary to construct them of materials of a fairly soft character. It is also necessary to keep their weight down to a reasonable figure ; consequently, they are to a certain extent structurally weak, or better, not strong. This means that they must be protected against sudden and violent shocks.

Cleanliness in a precise instrument is perhaps as important as it is in the hospital. If the bearing surfaces become dirty, or if the oil becomes at all gummy or thick, the quality of the bearing may be destroyed for the time being. Metal bearings really are not a metal to metal contact. When such contact obtains, friction results. Consequently a lubricant, such as oil, is introduced and the one part actually floats on a thin film of oil, which separates it from the other. If this oil film becomes thick or viscous, the bearing parts will be separated too far, the oil film will yield, allowing the bearing to cant and, in the case of theodolites, will cause an irregular eccentricity. It is recommended that the bearings be carefully cleaned with alcohol or benzine (alcohol preferred) and fresh oil used. The oil should be applied with a lintless cloth, and only an absolute minimum applied where bearings must be a close fit.

It is recommended that graduated surfaces of precision instruments never be wiped. If dust accumulates on them, it should be carefully blown away or removed with a clean camels' hair brush. Graduations are usually on very soft silver, and grit will quickly imbed itself into this surface and cause scratches if any pressure is brought to bear upon it, such as would be the case in wiping.

In packing equipment for shipment, it should be remembered that the case may be inverted, and care should be taken that nothing can come loose and rattle about. This should be particularly observed where a number of items are packed in one box. There have been instances in which instruments of a fairly precise character were packed in a box which also contained a heavy weight which was not fastened down, with resultant detriment to everything except the weight. Sawdust should never be used in packing instruments, as the extremely fine dust from it seems to be able almost to penetrate hermetically sealed joints. It has the disadvantage that it is a very ready absorbent of oil and if it gets on an oiled bearing the bearing promptly becomes dry and the instrument, in all likelihood, inoperative. Sawdust also readily holds moisture, and damage may occur through this cause. It is also advisable not to use excelsior, if it can be avoided, for the same reason. Shredded paper, of a good quality, is probably best.