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INSTRUCTIONS

Coasting Computer and Cross Drift Detector

AMERICAN HYDROMATH COMPANY

This computer is specially designed for readily determining the DISTANCE OFF ABEAM from TWO BEARINGS to a landmark and the RUN between bearings. In addition, the computer offers a simple and reliable method for detecting cross current and correcting therefor.

The computer comprises:

(1) A circular scale for Distance Run in miles, on the periphery of the rotary slide;
(2) A scale for the Second Angle in degrees, on the right hand window edge;
(3) A scale for the Second Angle in degrees, on the left hand window edge;
(4) A circular scale for Distance Off in miles, on the periphery of the base;
(5) A system of curves graduated for First Angle, appearing in the window and registering with either (2) or (3).

The scales are so related that when the First Angle in (5) is set to register with the Second Angle on (2), the Distance Run on (1) is opposite the DISTANCE OFF WHEN ABEAM on (4).

Similarly, when the left hand scale (3) is used for the Second Angle, the result read on scale (4) is the DISTANCE OFF ON SECOND BEARING.

Example:

Distance Off Abeam

First Angle on the bow..................30°
Second Angle on the bow................70°
Distance run between bearings..........6.75 Mi.

Turn rotary slide until the curve for 30° in the window registers with 70° on the RIGHT hand window edge. Locate point 6.75 Mi. Run on periphery of slide.

Read across...4.93 Mi DISTANCE OFF WHEN ABEAM.

Distance Off on Second Bearing:

Data same as above.

Turn rotary slide until the curve for 30° in the window registers with 70° on the LEFT hand window edge. Locate point 6.75 Mi Run on periphery of slide.

Read across...5.25 Mi DISTANCE OFF ON SECOND BEARING.

Set and Drift:

A particular feature of this computer is the easy handling of drift problems, and its use as a Cross Drift Meter. Each drift influence may be considered to consist of two components:

(1) A current in the direction of the run (counter-current, or following current), which causes an inaccuracy in the Distance Run over ground when determined from propeller pitch and RPM.

(2) A cross current, causing a "Drift Angle", by which the measured angle on the bow differs from the true angle between bearings and course made good.

In coasting, (2) is by far the greater and more dangerous influence; in cases where the First Angle is small, cross current may falsify the Distance Off by 30 per cent or more, whereas the error from counter-current seldom exceeds 10 per cent.

Example:

Angles the same as above, with however a known current of one knot velocity at an angle of 45° on the seaside bow. Ship speed 13.5 knots relative to the water, (determined from propeller RPM).

A one knot current under an angle of 45° to the Heading may be considered to be composed of a counter current of .7 kn i.e. (cos 45°), and a cross-current of equal velocity. The counter-current reduces the speed over ground from 13.5 to 12.8 knots and accordingly the distance run in 30 minutes from 6.75 to 6.4 Mi.

The cross-current causes the True Course over the ground to differ from the Heading relative to which the bearing angles are measured. The difference between True Course and Heading is the drift angle.

$$\text{Drift angle in degrees} = 57 \times \frac{\text{cross-current}}{\text{ship's speed}} = \frac{57 \times .7}{12.8} = 3°$$

The trigonometric problem which was considered before with respect to the Heading is the same with respect to the True Course but with all bearing angles reduced by a 3° drift angle.

Thus, in order to properly take into consideration the known current, turn slide until

30° − 3° = 27° in the window registers with
70° − 3° = 67° on the right hand window edge.

Locate point 6.4 Mi Run on periphery of slide.

Read across....4.15 Mi Distance Off When Abeam.

By comparing this new distance off with the former result of 4.93 Mi, it is apparent that if one disregards the current, the Distance Off Abeam will be over-estimated by as much as 19 per cent, most of which will be due to cross-current.

Use of Computer as DRIFT METER:

If one does not know whether there is a current, or how strong it is, the computer can nevertheless detect and even measure the most important influence; i.e., the cross-current component.

At unchanged course and RPM, take three bearings to one landmark at equal time intervals.

Example:				
Time	0	15	30	minutes
Observed angle on the bow	30	43	70	degrees

This affords two pairs of bearings each 15 minutes apart. For each pair, the Distance Run and the Distance Off Abeam are the same, assuming that course and speed over ground are constant during these 30 minutes.

Hence, the rotary slide ought to remain in one and the same position for 30° as First Angle, and 43° as Second or for 43° as First and 70° as Second Angle.

However, setting 30° in the window opposite 43° on the right hand window edge establishes a position of the slide in which 43° First Angle **does not** register with 70° Second Angle. Thus the computer, by the mere setting of the observed angles, shows that they cannot be the true angles between bearings and course made good, therefore immediately indicating the presence of a cross-current.

To determine the angle of drift, and the Distance Off corrected for drift, try the same setting with all angles one degree larger or smaller, then with two degrees, etc. With a little practice only a few moments are necessary to determine that 3° should be subtracted in order to correspond to one and the same setting of the computer:

27° registers with 40°
40° registers with 67°

all with the rotary slide held in one fixed position.

Thus the computer indicates a **3° Drift Towards Shore,** and, without further resetting, the DISTANCE OFF ABEAM corrected for drift. The Run for every 15 minutes being 3.2 Mi, locate this point on periphery of the slide and

Read across....4.15 Mi DISTANCE OFF WHEN ABEAM.

In the above example 3° had to be **subtracted**, indicating a **Drift Towards Shore.** Where degrees have to be **added** it indicates a **Drift Towards Sea.**

The above trial and error method may be replaced by a definite and very simple procedure in cases where it is possible to maintain a certain relation between the first and second angle, viz:

For a First Angle of	22°,	24°,	26°,	28°,	30°,	32°
Keep Second Angle close to	31°,	34°,	37°,	40°,	43°,	47°

The method then to be applied may be shown by using the data of the above example:

Set 30° First Angle opposite of 43° Second Angle (on right hand window edge). Locate the curve for 43° First Angle and read across...........67°, which is 3° under the measured angle of 70°. This difference directly indicates the drift angle by which all measured angles have to be reduced:

$$30° - 3° = 27°$$
$$43° - 3° = 40°$$
$$70° - 3° = 67°, \text{ as above}$$

This procedure however, gives accurate results only where a relation between first angle and second angle is maintained approximately according to the above table.

Finally, it must be kept in mind that all of the mentioned methods for determining drift are based on the assumption that the drift remains constant, and are not applicable to cases where a substantial change in current is to be reckoned with during the period of measurement.

NOTES