

east; but to the left hand, if it be west; the observer being supposed to be placed in the centre of the compass, looking towards the point on which the variation is to be allowed. . . .

To Find the Leeway and Allow for it

Leeway is the angle the ship's real course makes with her intended course, occasioned by contrary winds or a rough sea; and may be estimated by observing the angle which the wake of the ship makes with the point right a-stern, or in the direction of her keel. This may be done by a compass cut in lead (or other metal) on the poop, or some other convenient part of the ship's stern. It would be very conducive to the accuracy of a ship's reckoning, if the leeway was marked on the log-board every watch, according to an estimation made at the time, instead of leaving it till the day's work is calculating, and then guessing at it, as is the general practice.

Leeway is to be allowed on all courses steered, in the following manner: Count the nearest way of the compass from the wind to the course set, and as many points and parts beyond as the leeway amounts to, and it gives the correct course: or, allow it to the right hand of the course steered when the larboard tacks are aboard, and on the left hand when the starboard tacks are aboard, the person making the allowance being supposed to be looking towards the point of the compass the ship is sailing upon.

To Correct the Dead Reckoning

After having calculated your days' work, you must compare the latitude by dead reckoning with the latitude by observation; if they agree your day's work is probably correct, but if they differ you must try to discover the causes of it. Examine your log-line and half-minute-glass, to find whether the distance is given exactly by the log; inquire whether the ship came-to or fell-off her course, by bad steerage or sudden squalls, etc.; see if you have made sufficient allowance for variation and leeway; but above all, you ought to discover (if possible) whether there is a current, with its setting and drift. If, after making proper allowance for these things, there is still a difference between the latitude by dead reckoning and by observation, and you feel confident that the error does not arise from an unknown current, you may make a further correction, depending on the following principles: When the course is within three points of the meridian, the error is probably in the distance, because it

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The decided preference given the American editions of the "New Practical Navigator" [by John Hamilton Moore] since its appearance in 1799, calls on the proprietor for his acknowledgements of gratitude. To the honour of the American mariners, and through the good offices of the American book-sellers, be it said, that within two years seven thousand copies have been sold in the United States. He was preparing to put a third edition of the same work to press, but has since been induced to relinquish Moore's treatise for the present more correct and perfect work, furnished by Mr. Bowditch.

While he is tendering his thanks to such as have assisted in the establishment of the work, it would be highly criminal to omit those due to *John Hamilton Moore*; and with the greatest frankness it is acknowledged that he contributed largely to its establishment, as his late editions have been so erroneous that no person would hazard his interest, much less life, in navigating his vessel by the rules there laid down, and it is well known that in all the English West India islands the American edition has invariably been purchased when a supply could be obtained.

EDMUND M. BLUNT.

Newburyport, Jan. 1802.

AN ADVERTISEMENT FOR THE "NEW PRACTICAL NAVIGATOR"

would require a greater error in the course, to cause that difference of latitude, than can be supposed probable to have been committed.—When the course is above five points from the meridian, the error is probably in the course, because a small error in the course would cause a considerable error in the difference of latitude, but an error in the distance would affect it but little. When the course is between three and five points, the error may be either in the course, or in the distance, or in both; and an allowance ought to be made on both of them.

To Correct for Several Days

The preceding rules will serve for correcting any single day's work; but if an observation has been wanting for several days, you must proceed in the following manner.

Take the latitude by observation and longitude in at the time of last observation (or the latitude and longitude of the place you took your departure from, if you have had no observation since) and also the latitude in by observation, and the longitude by account; find the differences of these latitudes and longitudes, and the middle latitude; with the middle latitude and difference of longitude, find the departure; with this departure, and the difference of latitude by account (which is found by taking the difference between the latitude left by observation and the latitude in by account) find the course and distance corresponding, and see what case this course falls under, and correct the de-

parture by it; then having the correct departure, you may find the true difference of longitude and longitude in. . . .

A journal being kept in the preceding manner, the situation of the ship may be known nearly at any time, and the bearing and distance of the place of destination may be found. When the mariner is fearful that his longitude by account is inaccurate, and he has no lunar observations to correct it; he must get into the latitude of the place, and (if possible) run east or west according to his situation and the prevailing state of the winds.

[The "Journal of a Voyage from Boston to Madeira" is too long and too mathematical to reprint in this place, but those interested will find it still being used, 130 years after, to illustrate text-books on the principles of navigation.—Ed.]

Science News Letter, December 12, 1931

PHYSICS

Need Good "Ear" to Play Fixed-Key Instruments

FLUTES, bassoons, trumpets or other wind instruments with fixed finger keys need players with just as good an "ear" as violins or slide trombones where the notes are not made at a fixed position. This result was announced at Cleveland to the Acoustical Society of America by John B. Taylor of the General Electric Company.

The player's mouth cavity, whose air vibrates in tune with that in the column of the instrument, gives him the means of sharpening or flattening at will the note produced, it was explained.

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