

board a vessel of 12 tons the accuracy is still less. In all cases the errors due to rolling are greater than those produced by short period perturbations. In these circumstances, the author remarks that, in the middle of the oscillation of the roll, the acceleration f , and consequently d , are nil. At this moment, the bubble gives the true horizontal plane. Thus if a pendulum, whose proper period is fairly short, be made to follow the oscillations of rolling and to close an electric circuit exactly at the middle of the oscillation, thus actuating a sound signal, sextant observations could be taken in the best circumstances. In this case the mean error for 5 consecutive observations falls to about 15'.

THE NEW SPHERICAL COMPASS.

(Extract from *Zapiski po Hidrographii*, Leningrad, 1934, No. 3, p. 148).

In the March 1934 number of *Marine Engineering* there is a note on the new KELVIN-WHITE spherical compass, invented and improved by Wilfred O. WHITE, of Boston.

Four years ago, Mr. WHITE, after various attempts to obtain a more stable compass, became convinced that if the compass bowl were spherical, instead of flat as in the ordinary type, it would give greater stability to the compass card at sea.

The principle of the instrument is based on the fact that the movement of the ship when rolling and/or pitching always gives rise to a force acting vertically; in the flat-topped compass, at each vertical movement the liquid strikes the glass and causes turbulence round the bowl in a horizontal direction, drawing the card with it and causing instability in the latter. In the spherical bowl, the liquid, taking up the same spherical form, with the card at its centre, remains quiet even when the bowl oscillates in all directions.

Further, in the spherical compass the "magnetic element" is established in such a way that the inertia and the magnetic moment are in harmony, giving excellent results.

The combination of the spherical glass of the bowl and of the liquid which completely fills it forms a kind of meniscus which magnifies the card considerably on the side opposite that from which one is looking.

Thanks to its great stability and better visibility, the spherical compass is now widely used in the American Mercantile Marine. For instance, after trying out these compasses on board various ships, the American Hawaiian Line has ordered twenty-five spherical compasses for its fleet.

G. B.

THE CHIEF RULES FOR THE TREATMENT OF MAGNETIC COMPASSES ON BOARD SHIP.

by

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(Extract from *Der Seewart*, Altona-Elbe, Heft 1, 1935, page 2). (*)

In many industrial or commercial establishments it is the custom to extract the essentials from the innumerable instructions, rules and precautions to be observed, to group them in a clear, synoptic form, and to exhibit them as near as possible to the places where work is going on so that they may be continually exposed to the view of the employees. The favourable results obtained from this practice would seem to encourage its application to the principal points to be observed in the treatment of magnetic compasses on board ship, i. e. to group these points in rules easy to understand, without inconvenient extra work. It is reasonable to hope that their observation

(*) *Original text in German.*

would put an end to those breakdowns and troubles of compasses, announced from time to time, which are invariably due to inappropriate treatment. After enumerating the different points we shall give a few brief explanations, (†) when they appear necessary to a better understanding of these points.

Ten rules for the Treatment of Magnetic Compasses on board ship.

1. *The place where the compass is, especially the bearing compass, must be made "taboo". Its surroundings must never be used as a rendezvous for passengers, nor for lumber.*

See that no mass of iron or source of electrical disturbance capable of influencing the compass is installed in the vicinity of the place.

2. *During stays at ports, remove unprotected compasses on deck from their binnacles and keep them in a safe place.*

Attend to the stones and pivots of dry-card compasses by removing the card from the pivot and protecting the latter with a piece of cork.

Always close the bowl with the cover, to prevent sand or other minute particles of dirt from getting in.

If extensive work (such as caulking) has to be done near the compass, remove the latter to a position free from vibration.

3. *Keep the spare compasses and spare parts as they should be kept.*

Do not oil or grease the pivots. Keep them dry.

Verify beforehand that the spare parts fit their own compasses, and arrange them so that they cannot be mixed up.

Pile the dry cards on each other with their contrary poles superposed.

4. *Check the directive force of the compasses on as many courses as possible and as often as opportunity offers, preferably on definite days but in any case after abnormal or irregular alteration of the deviation. If the adjustment leaves anything to be desired, change the pivot or the stone (or the card if necessary) in the case of dry cards; liquid compasses must be re-examined as soon as possible by a compass adjuster.*

5. *Observe the compasses with particular care after loading large cargoes of iron stowed near the compasses. Never lose sight of the danger arising from the use of electromagnetic cranes used in certain ports for handling scrap.*

6. *At sea, see that compasses exposed to the open air are always protected by the binnacle cover against the sun and inclemencies of the weather except when they are in use for taking bearings, and that the bowl is hermetically sealed by the cover.*

If the compass is electrically lighted, switch off the light as soon as it is no longer required.

7. *See that when taking a bearing the compass hangs true and that the bearing fittings (sight and pin) are in perfect condition.*

Keep the bearings of the ring and of the trunnions of the gymbals clean so that the compass will always hang horizontally.

8. *Besides the usual check on the deviation, observe the latter with meticulous care after a large alteration of course, particularly when the ship has been on a steady course for some time.*

Determine the deviation after large changes of latitude by swinging the ship through 32 points (without semi-permanent magnetism!).

In ships with a gyro-compass, treat the magnetic compass as if the gyro-compass did not exist.

9. *If it is necessary to readjust compasses at sea, first determine the cause of the deviation or the perturbation. Think of the principle of all compensation, Every force must be compensated by a reaction of the same nature. Eliminate the perturbing influence with care, systematically and with due deliberation, after noting the position up till then of the means of compensation.*

10. *Never forget that the compass is the essential instrument of navigation, and that on it often depends the safety of a vessel. Consequently always treat it, as well as its accessories, with the greatest care. It will then be all the more faithful and sure a friend in difficult situations.*

(†) *Not reproduced here.*