the sea-bottom. A device of this type was built with a cylindrical float at the top of a long wooden frame weighted at the bottom, the frame serving as a track for guiding the core-tube. A hammer slid on the tube and was operated with the same cable that lowered the instrument to the sea-bottom. The instrument was modified during the course of ten offshore coring trips. In spite of makeshift construction, it took satisfactory cores five feet long in water 200 feet deep. It was not possible to core at greater depth because of the collapse of the float.

An instrument designed to take cores in water 3500 feet deep is now being constructed (see Figure 1). The float, cast in an aluminium alloy, is an 18-inch sphere with a buoyancy of 65 pounds. Bosses on its sides are machined to receive both rollers for the running cables and shackles for the standing cables. A flange-braced sleeve cast integral with the bottom of the float, grips the end of a guide-tube on which the upper part of the core-barrel slides. The core-barrel is a steel tube 15 feet long and 1.5 inches in outside diameter. The hammer, tripped to fall free of the cable, has a stroke of 6.5 feet; it pounds against a clamp bolted around the core-barrel. The two submerging weights, half discs of iron, are connected with the float by standing cables. To ease the handling, the weights are lifted on and off while the instrument hangs alongside the boat in the water.

An important and effective feature of the instrument is the small-bore auxiliary tube, which eliminates suction during the core-barrel's withdrawal from the sediments. It is kept closed while the core-barrel is being driven into the sediments, but opens and lets water into the potential cavity below the barrel, as the barrel is drawn out. This device reduces greatly tension on the cable while the core-barrel is being withdrawn, and renders a catch or valve unnecessary for retaining any but very loose cores.

The cable for operating the instrument is 5/32-inch galvanized airplane strand. It is wound on a hand winch supplied with a quick-acting clutch and a brake of large area. For work at depths greater than 1000 feet, however, a motor-drive will be necessary. As the motion of the boat jerks the cable dangerously and interferes with the hammering action, the cable should be run over a sheave mounted on a spring-suspended boom. Alternate heaving in the cable by hand and suddenly slacking, has been the method of hammering. This has not been very satisfactory, and in the future, with the aid of the hammertrip, the cable will be managed entirely on the winch.

The weight of the assembled instrument in air is 200 pounds; as handled on the boat's halyards without the submerging weights, it weighs 130 pounds; in water it weighs about 70 pounds. The total length is 17 feet. When the instrument is dismantled, all parts but the core-barrel can be stowed below deck.

The preliminary work was begun in September 1934 under the direction of Professor U.S. GRANT of the Geology Department, University of California at Los Angeles. The work is being continued with the help of a research grant to the writer from the Committee on Sedimentation of the National Research Council.

It is hoped that in another year more detailed information can be published on the operation of the instrument and on the nature of the subsurface sediments in the Santa Monica Basin.

THE MOUNTBATTEN RULER FOR CHART WORK, ETC...

The following information was communicated to the Bureau by Commander Lord Louis MOUNTBATTEN, K.C.V.O., R.N., at the time of the visit to Monaco of the British Destroyer *Wishart*. More complete details concerning this interesting instrument are given in a small pamphlet published by the makers, Messrs ELLIOT Brothers Ltd., Century Works, Lewisham, London, S.E. 13.

ADVANTAGES:

In the days when courses and bearings were laid off with regard to the varying Magnetic north, the nearest magnetic compass rose on the chart was selected, in order to approximate as closely as possible to the Variation at the place concerned. A parallel ruler was then necessary to transfer the course or bearing to the desired position.

Now that the unchanging True north is used as the datum for laying off courses and bearings, it is possible to simplify the process by transferring the true compass rose to the desired position, by means of a transparent protractor ruler, using the nearest parallel of latitude or meridian of longitude as a datum line.

It is on this principle that the Mountbatten Ruler is constructed.

The following advantages are claimed for this ruler over any parallel ruler giving an approximately equal degree of accuracy :–

1. — It is cheaper.

(*Note.* — The best parallel ruler costs 3 or 4 times as much.)

2. — It is easier and quicker to use.

3. — Greater accuracy can be obtained owing to the roses being of larger diameter than those usually engraved on charts.

4. — The possibility of error in transferring a course or bearing is avoided, since no movement is necessary.

(*Note.* — Rolling a parallel ruler back to the compass rose or course concerned proves only that the ruler has not slipped on the way, since any mechanically introduced error whilst rolling the ruler one way is automatically removed on rolling it back again.)

5. — Errors due to distortion of the chart paper are reduced to a minimum, observing that courses and bearings are laid off with respect to the adjacent parallel of latitude or meridian of longitude, which is usually closer to the desired position than the nearest charted compass rose.

6. — It can be used on charts or plotting boards on which no compass roses are engraved.

7. — It can be used on a plain sheet of paper, by using an edge as a datum line.

8. — Its transparency enables the chart to be visible underneath, whilst a complete compass rose is visible in bold relief at the most convenient working position.

9. — In spite of its greater width, judicious use of the three roses engraved on it, combined with a suitable parallel of latitude or meridian of longitude, will usually enable the ruler to be operated in corners of chart tables where the movement of a parallel ruler would be restricted.

10. — The lightness of the instrument and the absence of rollers render it less liable to be damaged or to cause damage if left unsecured in bad weather. This same lightness also enables the instrument to be operated easily with one hand by means of the centre handle, thus leaving the other hand free for support in bad weather.

11. — The desired figures (and they alone) appear exactly the right way up when the ruler has been set, whereas on a charted compass rose the desired figures may be upside down, and those that are the right way up may be the wrong figures.

DESCRIPTION OF THE INSTRUMENT :

The construction of the Mountbatten Ruler is such that a few minutes practice by those familiar with parallel rulers and protractors will bring conviction of the ease and rapidity with which it can be operated.

It is primarily designed for use with charts on Mercator's projection.

Three roses are provided on the ruler, any one of which may be used as a protractor with any parallel of latitude or meridian of longitude as a datum line. It is, however, recommended that the nearest parallel or meridian should be used in order to minimise the effect of distortion of the chart paper.

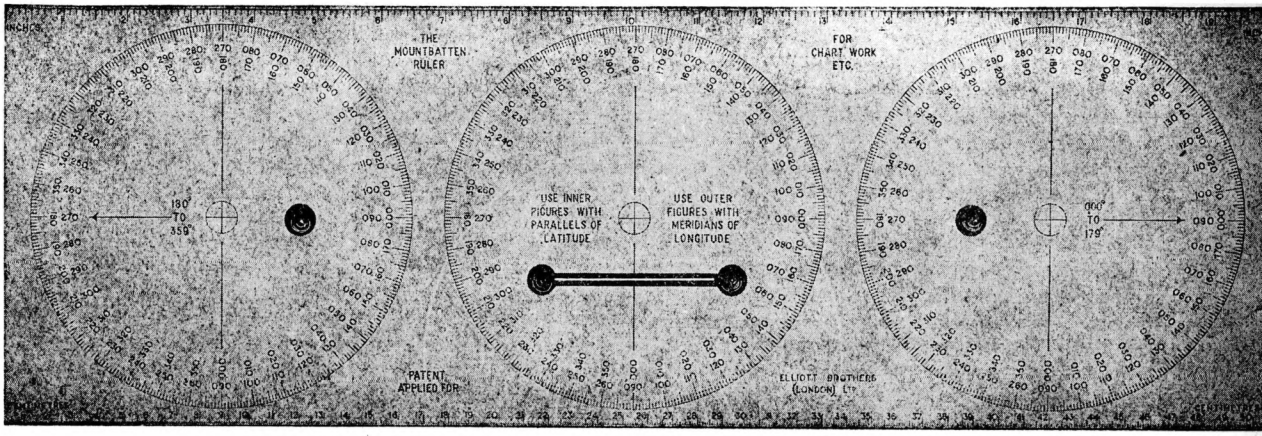
Each of the three roses is graduated with two sets of figures.

a) The inner set is designed for use with parallels of latitude or horizontal datum lines, and is so arranged that only the actual figures required appear horizontal at the parallel of latitude in use.

b) The outer set is designed for use with meridians of longitude or vertical datum lines, and is so arranged that only the actual figures required appear horizontal at the meridian in use.

Each rose is divided by a diameter line through the centre, at right angles to the long edges of the ruler. Only figures between 000° and 179° appear to the right of this line, and only those between 180° and 359° appear to the left. When the direction of a course or bearing is towards the right on a chart (i. e., easterly) the figures to the right of the diameter line are used, and, conversely, when the direction is to the left (i. e., westerly) the figures to the left of the diameter line are used.

For greater accuracy it is desirable to make sure that the meridian or parallel in use passes through the correct reciprocal graduation.



INSTRUCTIONS FOR USE :

To lay off a true course or bearing from a given point on a chart.

Place the centre of one of the roses on the nearest convenient parallel of latitude or meridian of longitude and turn the ruler until the desired graduation cuts the parallel or meridian. Then slide the ruler along the parallel or meridian, keeping it approximately at the same angle, until it reaches the given point. A slight final adjustment must then be made.

To measure a course or bearing already laid off on a chart.

Lay one edge (preferably the upper edge) along the line already drawn on the chart. Slide the ruler along this line until the centre of one of the three roses cuts the nearest convenient parallel of latitude or meridian of longitude. A slight final adjustment must then be made before reading off the course or bearing.

To use the ruler on a chart containing no meridians of longitude or parallels of latitude.

Although comparatively rare, such a situation presents no difficulties, since all charts are bounded by straight lines which can be used in conjunction with one of the end roses. The width of the standard chart does not exceed 28 inches, which the ruler is designed to embrace.

In the even rarer event of a chart exceeding 28 inches and containing no engraved parallels of latitude or meridians, it will be necessary to draw one near the centre of the chart. This can be done quickly, using the ruler for this purpose.

PROGRAMME FINDER FOR USE WITH PRISMATIC ASTROLABE.

(Extract from article by W. HORSFIELD and W. A. ERRITT in the *Empire Survey Review*, No. 21, Vol. III - London, July 1936 - page 398).

Hydrographic Review Vol. XII, No. 2, November 1935, contains, page 116, a description of the COOKE 45° prismatic astrolabe. The following description of the mechanical programme finder developed for use with this instrument is extracted from the above-mentioned article in the *Empire Survey Review*.

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In order to work out a programme of observations for any night a mechanical programme finder is used. This consists of an aluminium plate on one side of which are plotted 540 stars with northern declinations and on the other side 416 stars with southern declinations. The plate may be thus described as a double planisphere. Fitting over this plate and swivelling round its centre are ten separate celluloid quadrants