12.8A Chartwork With Local additions

Contents

12.8A Chartwork

INTRODUCTION

1. The primary function of all NCI Watchkeepers is to spot any vessel or person in difficulty or at risk, whether on land or at sea, and immediately report the essential facts to HMCG.

2. Watchkeepers must be able to provide a target's position accurately. An approximate position is all that will be required initially; a more exact position will be necessary thereafter. This process is summarised by NCI as **SPOT, PLOT, REPORT AND RESPOND**

SPOT	Visual observation of the incident
PLOT	Establish location of the incident
REPORT	Notify HMCG in a timely manner
RESPOND	Follow directions of HMCG

3. Locating a target, using a chart, enables a Watchkeeper to monitor the situation accurately and help direct other SAR assets speedily and precisely.

4. This section looks at the 'PLOT' phase of the process.

SUPPLEMENTARY READING

5. This comprises:
   - ✓ Weather – Section 12.6
   - ✓ Tides – Section 12.7

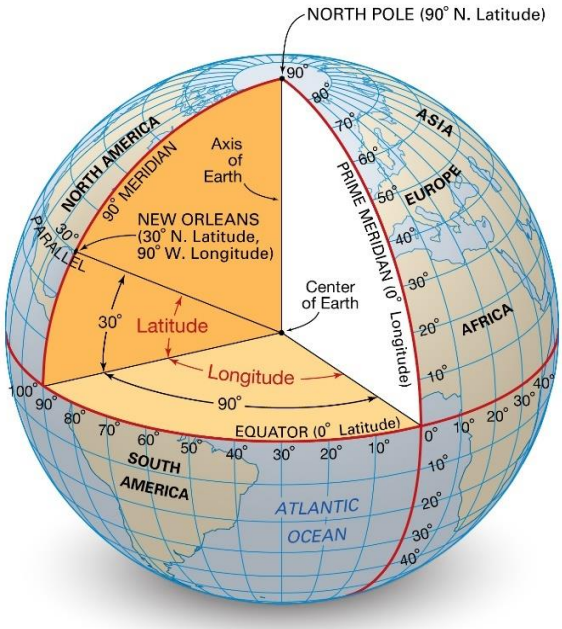
BASIC INFORMATION

6. The position of any vessel or object is determined by its latitude and longitude on a nautical chart.

7. **Latitude** – is the angular distance of a point either side of the equator measured from 0-90° (degrees) North or South.

8. **Longitude** – is the angular distance of a point either side of the Greenwich Meridian measured from 0-180° East or West.

9. There are 360 degrees in a circle, and 60 minutes of arc to a degree. Latitude and longitude are generally expressed in degrees (°) and minutes ('), providing a geographical coordinate, as in:
   - London's Big Ben Tower 51° 30.37' N 000° 7.0' W
   - Sydney Opera House 33° 51.22' S 151° 12.54' E



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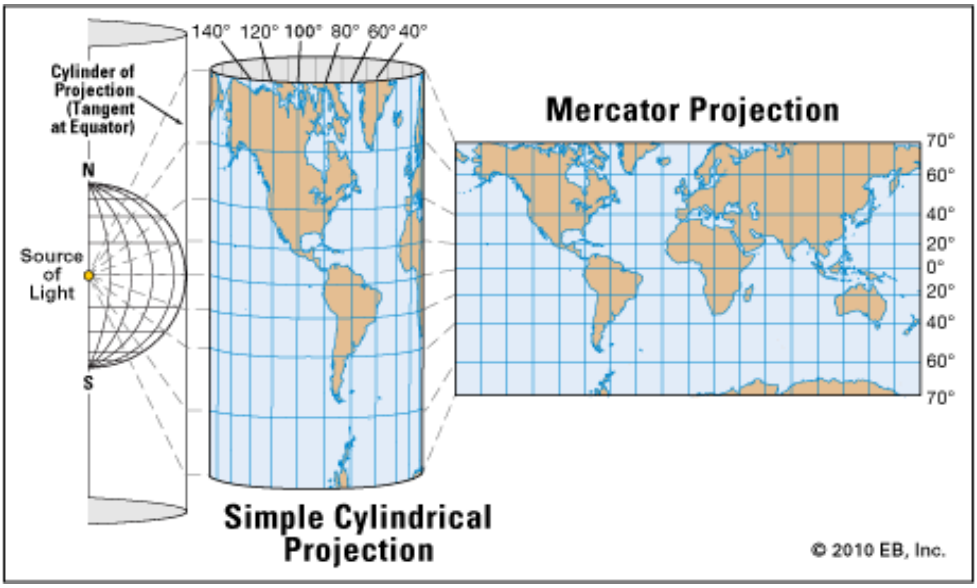
10. A chart is a map used by mariners. It is a graphical representation of the earth's curved surface projected on to a cylinder and then onto paper. The result shows compass bearings and courses as straight lines.



11. **Nautical Charts** – provide very detailed information, on a wide range of data, needed by mariners; for example, they can show:
    - water depths
    - shoreline
    - nature of the seabed
    - tide predictions
    - commercial shipping routes, port approaches and harbour berthing
    - obstructions to navigation (such as rocks and shipwrecks)
    - navigational aids

LET'S HAVE A LOOK AT OUR CHART

It is an Admiral chart in Mercator projection

It is Chart No 1149 & is metric

Our Chart cover area from:-

50°- 10' North to 50°- 35' North

005°- 00' West to 006°- 00' West

Our Primary port is 'Milford Haven'

Our chart shows 3 compass roses

Tidal diamonds and numerous symbols

Symbols and Abbreviations Used on Admiralty Charts. Chart No 5011
(which can be found under the chart table)
Sea Beds pages 27/28/29

Buoys & beacons Pages 4952

Lighthouses Page 44

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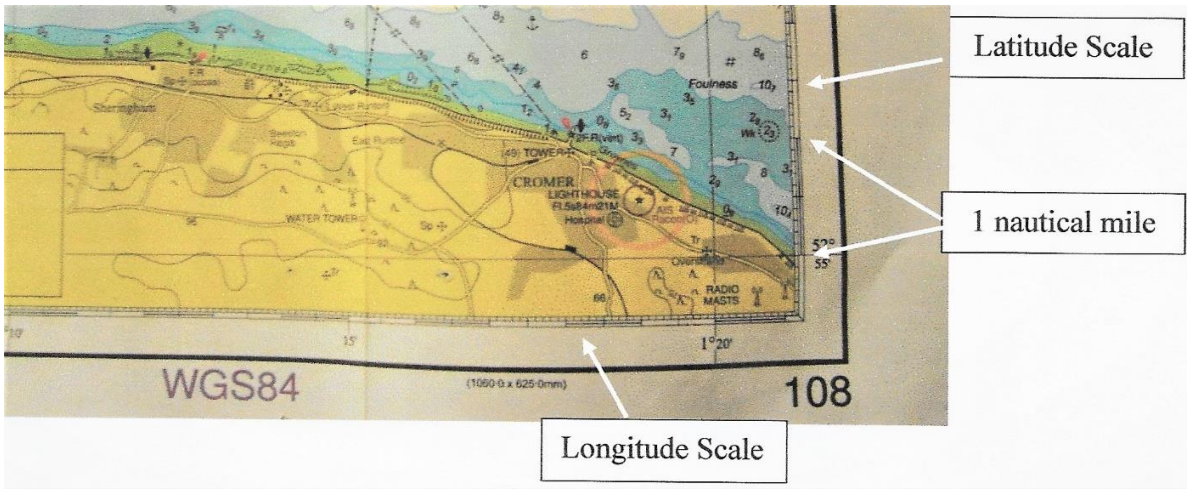
12. On a nautical chart, latitude is shown as a vertical scale at the sides of the chart and longitude as a horizontal scale at top and bottom.



13. One minute (1') of latitude equals one nautical mile; one degree (1°) of latitude equals sixty minutes (60') or sixty nautical miles. An international nautical mile is 6080 feet, 1.151 statute miles or 1853 metres – this about 2000 yards, therefore one tenth of a nautical mile = 200 yards.

14. The techniques used to map the earth's surface onto a flat image result in a latitude scale that expands as latitude increases. For this reason, distances should only be measured from the latitude scale adjacent to the section of chart in use. The longitude scale cannot be used to measure distances.

15. It is every Watchkeeper's duty to be familiar with their local charts and understand all the various symbols, abbreviations and marginal notes they contain. Admiralty Chart symbols booklet 5011 should be available at every Station.

KEY PLOTTING SKILLS

- Reporting and plotting a position, as both a bearing and distance, from your Station and a latitude and longitude
- Understanding reciprocal bearings and the bearing and distance between two objects
- Predicting the future position of a target at sea, allowing for wind and tide

BEARINGS AND DISTANCE

16. To establish the position of a target within visual range of your Station, it is necessary to determine its bearing and distance from the Station.

17. The position is then expressed as:
    - the bearing in degrees (0-360°) from your Station, normally read from a Pelorus, and
    - a visually estimated distance in nautical miles

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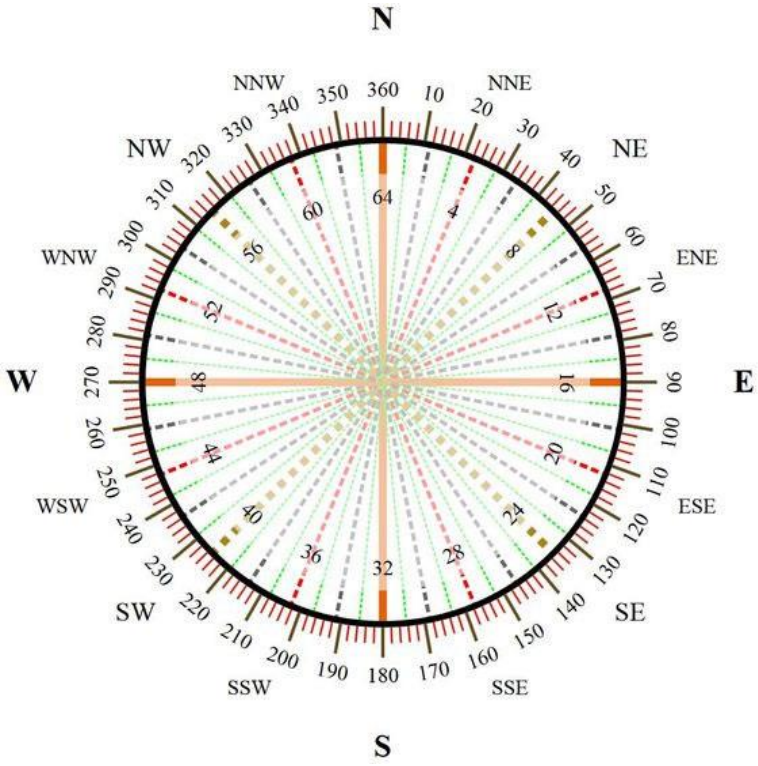
18. The Pelorus is like a compass rose, that is a circle marked with degrees. If the sighting device is aligned with the target, its bearing from the Station can be read from the numbered scale.



19. **Bearings** are measured clockwise from 0° (north) and are expressed in three figures, for example. 045° (north east), 090°(east), 270°(west).

20. With a bearing from a charted object (a fixed known point such as your Station) and an estimated distance, it is possible for anyone with a nautical chart to plot the position of the target.

21. On a nautical chart, there are a series of compass roses from which bearings can be measured, and they also show the magnetic variation for that area.

22. **Magnetic or True** – a Magnetic bearing is relative to the earth's magnetic North Pole and is shown, for example, as 123ºM. A True bearing is relative to the geographic North Pole and is shown, for example, as 123ºT. In September 2019 for the first time in 360 years, True North and Magnetic North aligned at the Prime Meridian Line at Greenwich. Thereafter, the variation will slowly continue to increase, as magnetic north moves eastward.

23. If your Station is constructed of steel, all magnetic compasses will give inaccurate readings and should not be used within, or near, the Station.

24. **Estimating Distance** – distance at sea is measured in nautical miles. Estimating distance is a skill which benefits from practice, and the following points are useful to bear in mind:

- familiarise yourself with local land and sea marks and remember their distances from each other/your Station
- know the estimated distance between your Station and the horizon
- where available, compare distance shown on AIS and / or radar with your estimate

PLOTTING A TARGET'S POSITION

25. After information regarding the target's bearing and estimated distance from your Station has been passed to HMCG, the target's latitude and longitude may be required and can be obtained either by use of an electronic chart, if installed, or the nautical paper charts available in your Station.

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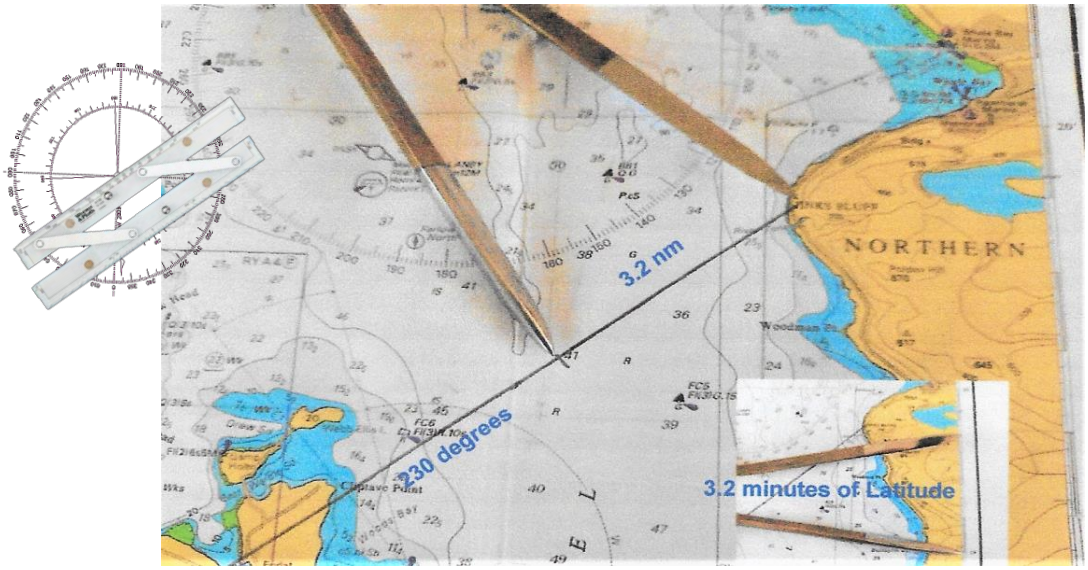
26. **Nautical Paper Chart** – a target's position can be determined by:

- transferring the pelorus bearing by running a parallel line from the nearest compass rose on the chart to your Station
- then, using a non-permanent marker, draw a line from the Station along this bearing
- using dividers, measure the estimated distance from your Station to the target using the latitude scale on the chart
- then transfer the dividers to the bearing line and mark the position on the chart



- latitude and longitude of the target can now be calculated

27. Accuracy is the most important factor and Watchkeepers may use whichever instrument(s) they prefer.

28. **Latitude Calculations**

	**Roller Ruler** – line up the ruler with the nearest printed line of latitude (horizontal line) whilst also covering the nearest latitude scale on the side of the chart. Then roll the ruler until it touches the marked target position. Note the latitude reading on the scale. If the ruler is too short to reach the scale, draw a line to the scale.

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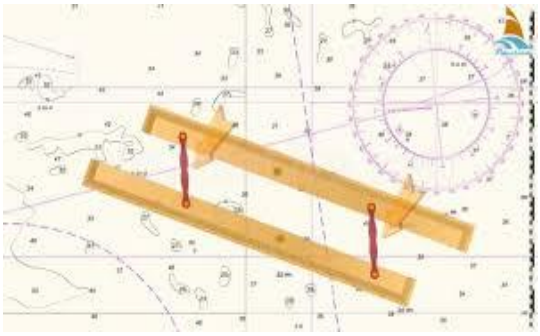	**Parallel Ruler** – line up the parallel rulers on the nearest printed line of latitude (horizontal line) whilst also covering the nearest latitude scale on the side of the chart. Then open them up until the other edge touches the marked target position. Note the latitude reading on the scale. If the ruler is too short to reach, or has moved away from the scale, draw a line to the scale.
	**Portland Plotter** – line up one edge of the plotter so that it touches the target position and covers the latitude scale at the edge of the chart. Adjust the plotter so that one of the fixed lines of the plotter is aligned with one of the printed vertical or horizontal lines on the chart. Note the latitude reading on the scale. If the ruler is too short to reach the scale, draw a line from the target to the scale.
	**Dividers** – set the dividers from the marked target position to the nearest printed line of latitude. Transfer the dividers to the scale at the side of the chart with one point on the chosen printed line of latitude and note the latitude reading shown by the other point of the dividers.

29. **Longitude Calculations** – longitude is then calculated using the same instruments as above but aligning with the vertical printed lines on the chart and using the longitude scale at the top or bottom of the chart.

PLOTTING A GIVEN POSITION

30. Plotting a position on the chart from a known latitude and longitude is the reverse of the above procedure. Using the preferred instrument, draw intersecting lines from the given points on the scales at the edge of the chart, ensuring the lines are parallel with their respective lines of Latitude and Longitude. Where the lines intersect will be the correct position.

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	Using a draughtsman's T-square with the vertical scale of the right-hand side of the chart drawn along its long edge. It is then aligned with the bottom of the chart when the T-square is held firmly against the bottom of the chart table. **Note**: this works only where the chart and table are permanently fixed to each other. A marked-out set square with a shallow angle may also serve this function. First align the bottom of the vertical edge with the latitude scale along the bottom of the chart. Then read off the longitude position on the marked long straight edge. This is a simple device to make and affords a very rapid means of reading a latitude and longitude position.

PLOTTING OTHER GIVEN POSITIONS

31. To plot the position of a given bearing and distance from a charted object other than the Station:

Roller and Parallel Rulers	Portland Plotter
▪ place an edge of the roller ruler or parallel ruler so it touches the centre of one of the printed compass roses on the chart and the given bearing on the outer ring of the rose ▪ move the ruler in the prescribed way to touch the charted object, draw a line and measure the distance given ▪ the latitude and longitude of that position can now be calculated	▪ turn the wheel of the plotter to select the given bearing ▪ place an edge of the plotter so that it touches the given charted position with the large blue arrow pointing in a rough direction of the bearing ▪ without touching the centre wheel adjust the main body of the plotter until one of the grid lines on the wheel align with a printed horizontal or vertical line of the chart and the two small blue arrows on the wheel point north ▪ draw a line from the charted object along the edge of the plotter and measure the distance given ▪ the latitude and longitude of that position can now be calculated

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FINDING A BEARING

Roller and Parallel Rulers	Portland Plotter
There may be occasions when it is necessary to find a bearing from a position other than your Station. This can be achieved using an electronic chart or a paper chart. ▪ place one edge the Roller or Parallel rulers on a line drawn between the point where the bearing is to be taken from and the target ▪ move the instrument in the prescribed fashion, ensuring it stays parallel with the drawn line, so that an edge passes through the centre of one on the compass roses printed on the chart ▪ the bearing of the line can now be read from the circle of the compass rose	▪ place an edge of the plotter on a line drawn between the point where the bearing is to be taken from and the target, with the large blue arrow pointing towards the target ▪ turn the centre wheel of the plotter so that it points to the north and the movable grid lines line up with a convenient printed line of latitude or longitude ▪ the bearing can now be read from the circle of the wheel

RECIPROCAL BEARINGS (aka back or reverse bearings)

32. The correct practice is to provide the bearing from a land object (for example, your Station) to a vessel. However, there may be times when a bearing is given from a vessel to a land object. This latter would be an example of a reciprocal bearing.

33. A reciprocal bearing is always plus or minus 180° of the forward bearing. To calculate a reciprocal bearing:

    a) if the forward bearing is less than 180°, add 180°; if it is more than 181°, deduct 180° **OR**

    b) add 200 and then subtract 20 to get the reciprocal of a bearing under 180°; if it is over 180° subtract 200 and add 20

34. A reciprocal bearing may be useful to a vessel having difficulty finding the location of a Station.

PLEASE NOTE

THE FOLLOWING PAGES ARE NOT PART OF THE OFFICIAL TRAINING MANUAL BUT ARE LOCALLY PRODUCED ADDITIONS THAT COULD BE OF USE

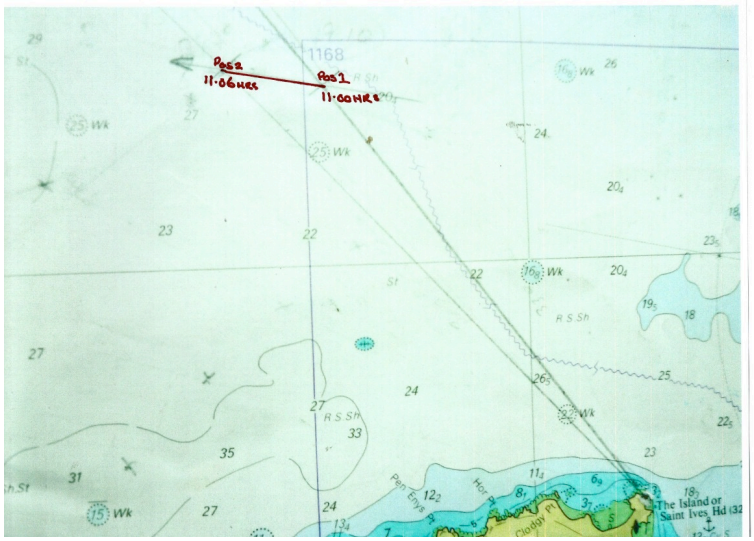
HOW TO CALCULATE THE COURSE (HDG) AND SPEED OF A VESSEL.

A vessel was seen at a position of Brg 323° @ 4.0 NM at a time of 11:00 hrs, this is plotted on the chart.

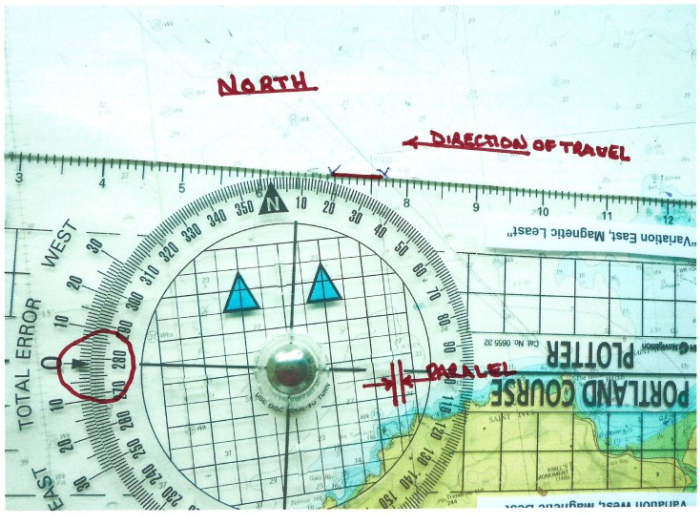
The vessel's position is now taken 6 mins later,

this is because 6 mins is one 10 tenth of 1 hour so that we can simply move the decimal point one point to the right in our speed calculations.

The vessel was seen at a position of Brg 317°@ 4.5 NM at a time of 11:06 Hrs. The new position is now plotted on the chart.



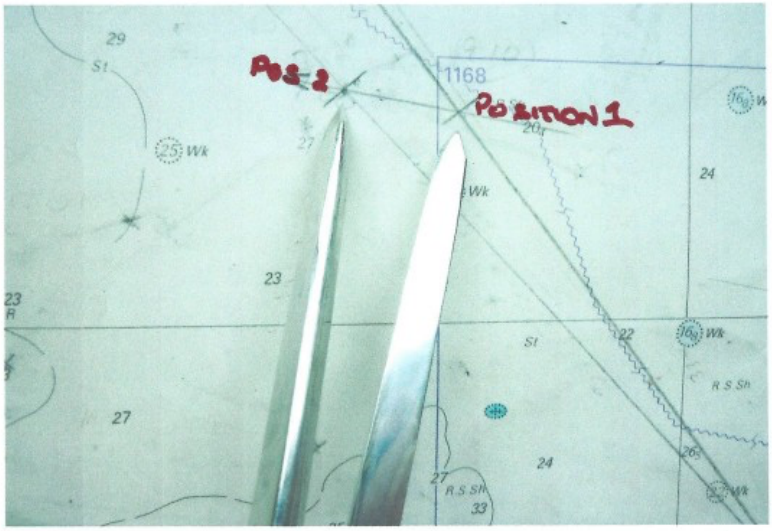
Next the Bretton Plotter is placed between these two positions and a line drawn between the two, the compass rose of th plotter is then turn to North.



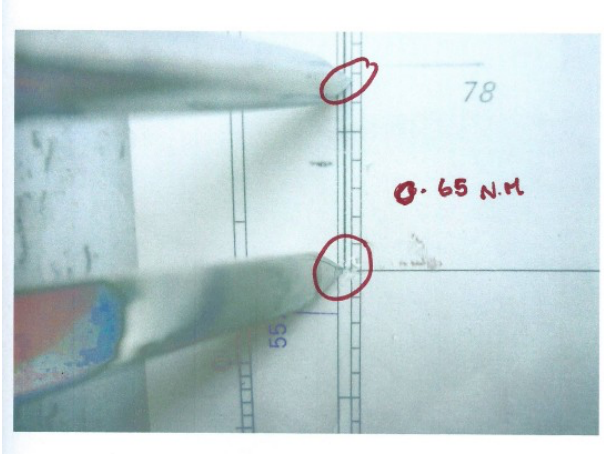
Reading the zero point on the plotter shows the vessels heading and in this example it is 278°

Next we need to calculate its speed.

Using the dividers we measure the distance covered in 6 mins by placing the points between the 1st and 2nd positions.



Once taken move the dividers to the Latitude scale



We know that 1° of latitude = 1 Nautical mile so the distance travelled in 6 minutes = 0.65 Nautical Miles.

We know that 6 minutes is one 10th of an hour. Therefore to make 0.65 into 1 hour we simply move the decimal point to the right which makes the distance travelled into NM per hour

Eg 0.65nm in 6 mins = 6.5nm in 1Hr

Therefore 1nm =1 knot = speed of 6.5 knots.

So the vessels course (HDG) is 278° at a speed of 6.5 knots.

Fact- The Earth rotates Eastwards (Anticlockwise) at a speed of 1000 miles per hour.