Basic Chartwork

Chartwork

Version 1.4

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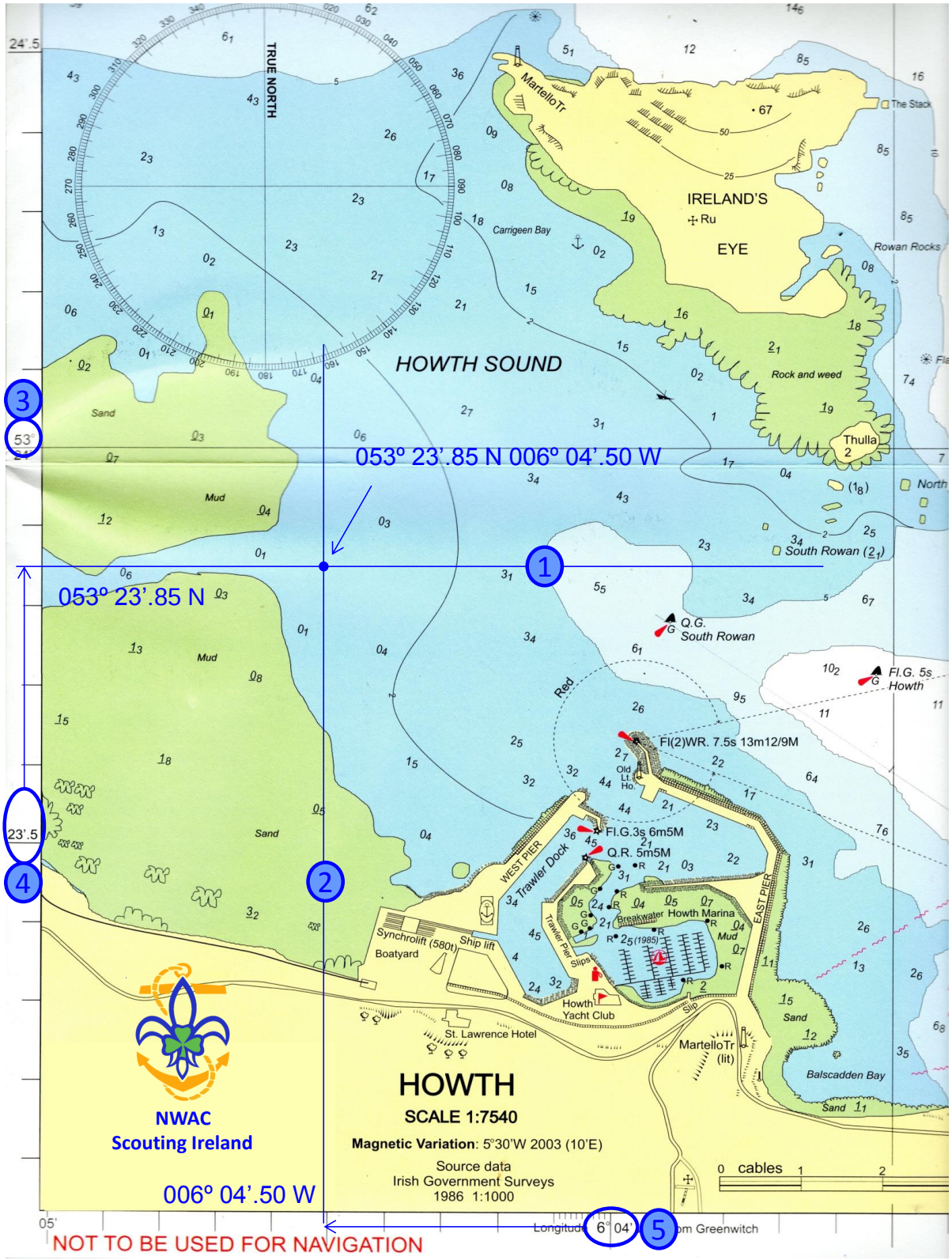

Figure 1: Referencing a position

Referencing a position

Referencing a position on a chart is achieved by applying the following steps.

1. Using the Portland plotter draw a pencil line from the point to be plotted to the vertical edge of the chart.
2. Now draw a line from the point to the horizontal scale.
3. Look at the side of the chart for the line of latitude. You will find the number of degrees north or south of the equator, in this example it is 53º north of the equator.
4. Using the nearest defined minute calculate the minute that the line intersects. In this case 23'.85. We can now say the point is on the line of latitude 053º 23'.85 N.
5. Following a similar process we can calculate the intersection point on the line of longitude. In this case we determine that 006º 04'.50 W.

We now have the reference for the point. It is 053º 23'.85 N 006º 04'.50 W.

Points to note:

- As Ireland is West of Greenwich the numbers on the longitude scale increase from right to left.
- Leading zeros in the degrees are not dropped i.e. 006º not 6º or even 06º.

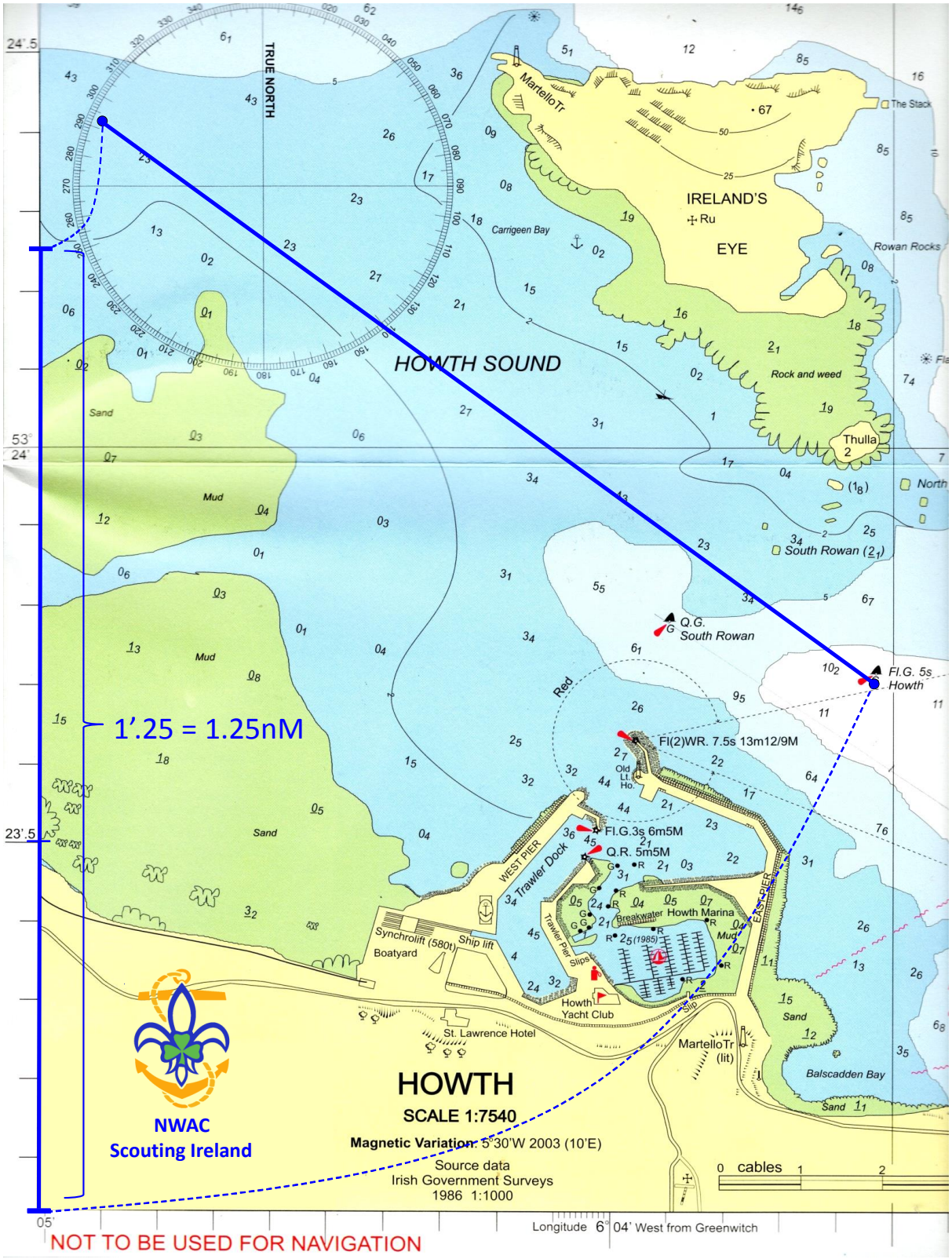

Figure 2: Distance between points

Distance

To calculate the distance between two points on a chart the vertical or latitude scale proves invaluable.

From the equator to the North pole the planet is divided into 90º. Each of these degrees is subdivided into 60 *minutes*. Each minute is also equal to 1 *nautical* or *sea mile*. There are therefore 5400 nM from the equator to the north pole.

1 nautical mile = 1852 metres

Another measure we find in chartwork is a *cable*. A cable is 1/10 of a nautical mile. A cable is therefore approximately equal to 185 metres.

Calculating the distance between points

- Use a dividers or page to find the physical distance on the chart between the two points.
- Align this against the side scale on the chart.
- Each minute is considered to be 1 nautical mile (1nM).
- In the example in Figure 2 it is 1’.25 minutes which is therefore 1.25nM.

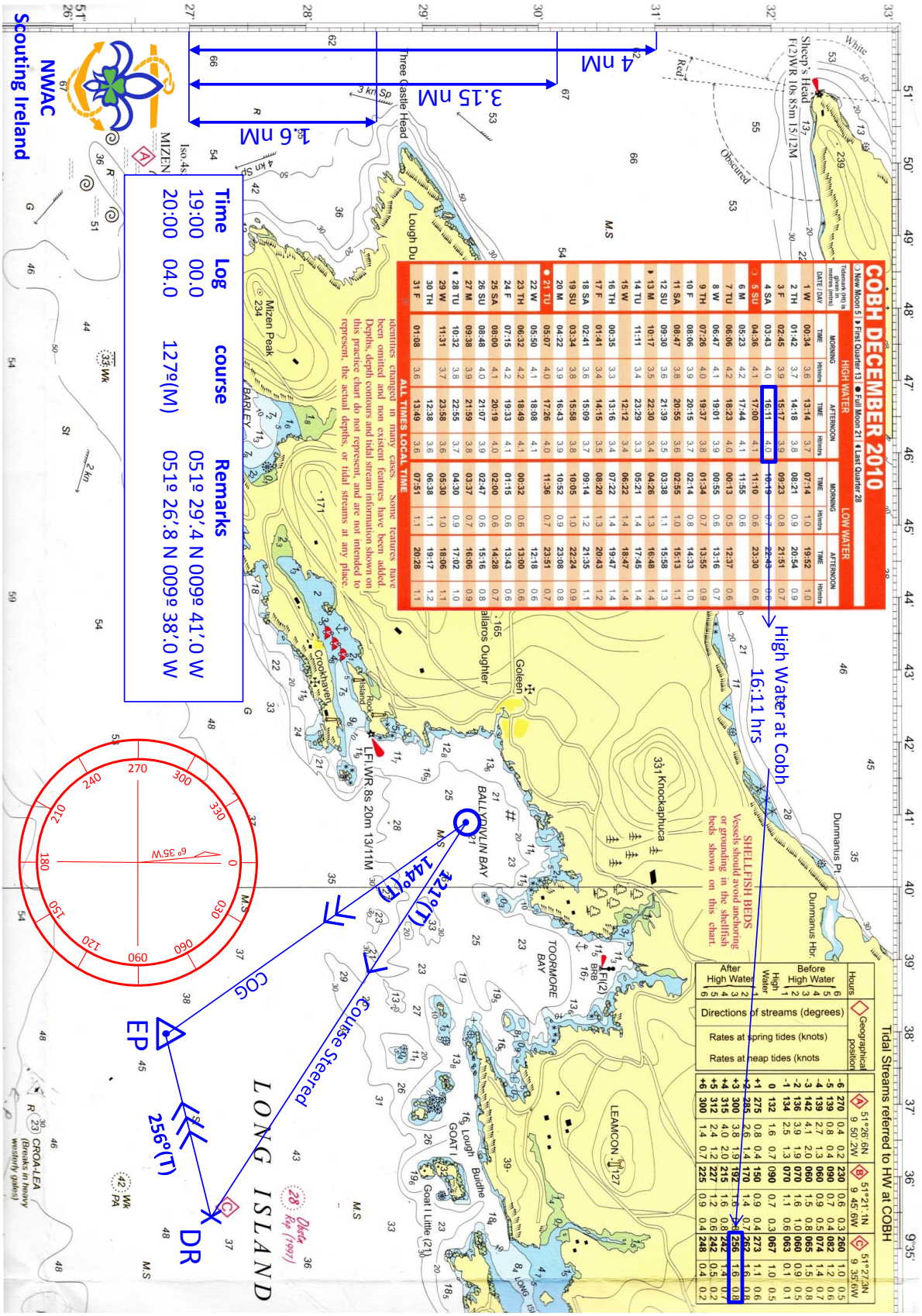

Figure 3: Estimated your position

Estimating your position

Referring to the diagram in Figure 3, a vessel left Balldivlin Bay at 19:00 on the 4/1/2010 on a course of 127º(M) for 4 nM where is it one hour later?

- Draw a line on the map from the start point 051º 29'.4 N 009º 41'.0 W for 4 nM along a course of 121º(T) (note the magnetic variation in the compass rose is 6º 35'W). As the start point is a position there is a fix for it and as such is indicated with a circle. The distance can be obtained from the side of the chart as shown in Figure 3. This is called the course steered or the Water track. The point should be marked with an X and indicated with the letters DR (Dead Reckoning). A chevron should be added to this line in the direction of travel.
- Look up the map to find the tidal stream reference port. In this case it is Cobh, Co. Cork.
- Obtain the relevant tide tables and look up the Cobh table for the month. For the date of departure:
    - Identify which is nearer a spring or neap tide, in this case a spring tide.
    - Obtain the nearest high tide to the expected time of departure. In this example it is 16:11 hrs. We are going to travel roughly 3 hours after high tide in Cobh.
- Go to the chart tidal streams table. For the nearest tidal diamond (in this case <C>). Look at the entry for +3 hours and as this is for a spring tide take the bearing and the speed in the left hand column. i.e. 256º(T) at 1.6 knots. In other words for the time and place the vessel travelled, the tide travelled at 1.6 knots on a bearing of 256º(T).
- From the DR position draw a line on a bearing of 256º(T). Make the line 1.6 nM by measuring from the vertical scale. The new point is called the EP (Estimated Position) and is indicated with a triangle around the point. On the line add three chevrons in the direction of the tide.
- To complete join this new point from the original point and add two chevrons to indicate the Course over the Ground (COG). Measure this path to determine the actual distance travelled over the ground. It is approximately 3.15 nM.

In summary while the vessel travelled on a course of 121º(T) for 4 nM the tide had the effect on the vessel such that it actually travelled on a course of 144º(T) for 3.15nM.

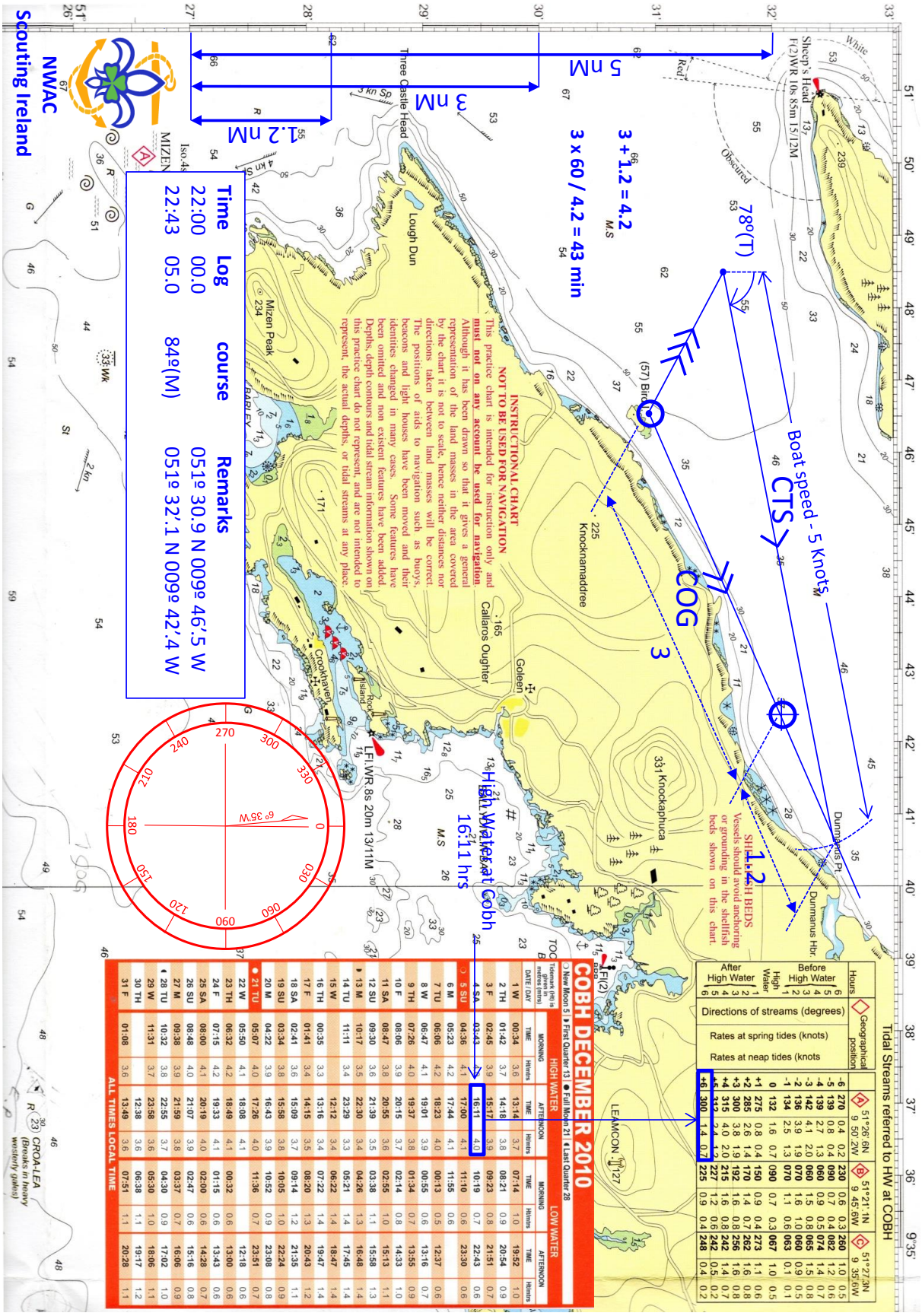

Figure 4: Calculating ETA

Calculating Estimate Time of Arrival (ETA)

A vessel at a position 051º 30.9 N 009º 46'.5 W at 22:00 hrs on Saturday 4 December 2010 wishes to get to a position 051º 32'.1 N 009º 42'.4 W over the shellfish beds. How long will it take if it travels at 5 knots ? and what course will it need to use to allow for tidal current ?

- Draw a line from its position through the point it wishes to get to and beyond, this is called a a rhumb line and will be the Course over Ground (COG). This line should be marked with 2 chevrons pointing in the direction of travel.
- Look up the map to find the tidal stream reference port. In this case it is Cobh again.
- Obtain the relevant tide tables and look up the Cobh chart for the month. For the date of departure:
    - Identify which is nearer a spring or neap tide, in this case a spring tide.
    - Obtain the nearest high tide to the expected time of departure. In this example it is 16:11 hrs. The vessel is going to travel roughly 6 hours after high tide in Cobh (22:00 hrs).
- Go to the chart tidal streams table. For the nearest tidal diamond (in this case <A>). Look at the entry for +6 hours and as this is for a spring tide take the set (direction of stream (degrees)) and the speed in the left hand column. i.e. 300º(T) at 1.4 knots. In other words for the time and place the vessel will travel, the tide will travel at 1.4 knots on a set of 300º(T).
- From the start point mark a line 1.5 nM long on a bearing of 300º(T). Mark this line with 3 chevrons.
- Set the dividers to 5 nM and from the start point, rotate the dividers until it intersects with the rhumb line. Mark this point. (Note do not join the end of the tidal line with the point the vessel wishes to get to).
- Join the intersection point with the end of the tidal line and mark with a single chevron in the direction of travel. This indicates where the vessel would get if it travelled at 5 knots for 1 hour on a course of 84º(M). It is also known as the Course To Steer (CTS).
- Establishing the distance as the crow flies between the start point and the point the vessel want to get to, plus the distance from the start point to the intersection point on the rhumb line. These give a ratio of 3 : 4.2. Therefore we can calculate the time to travel to the shellfish beds as 3 x 60 / 4.2 = 43 minutes.

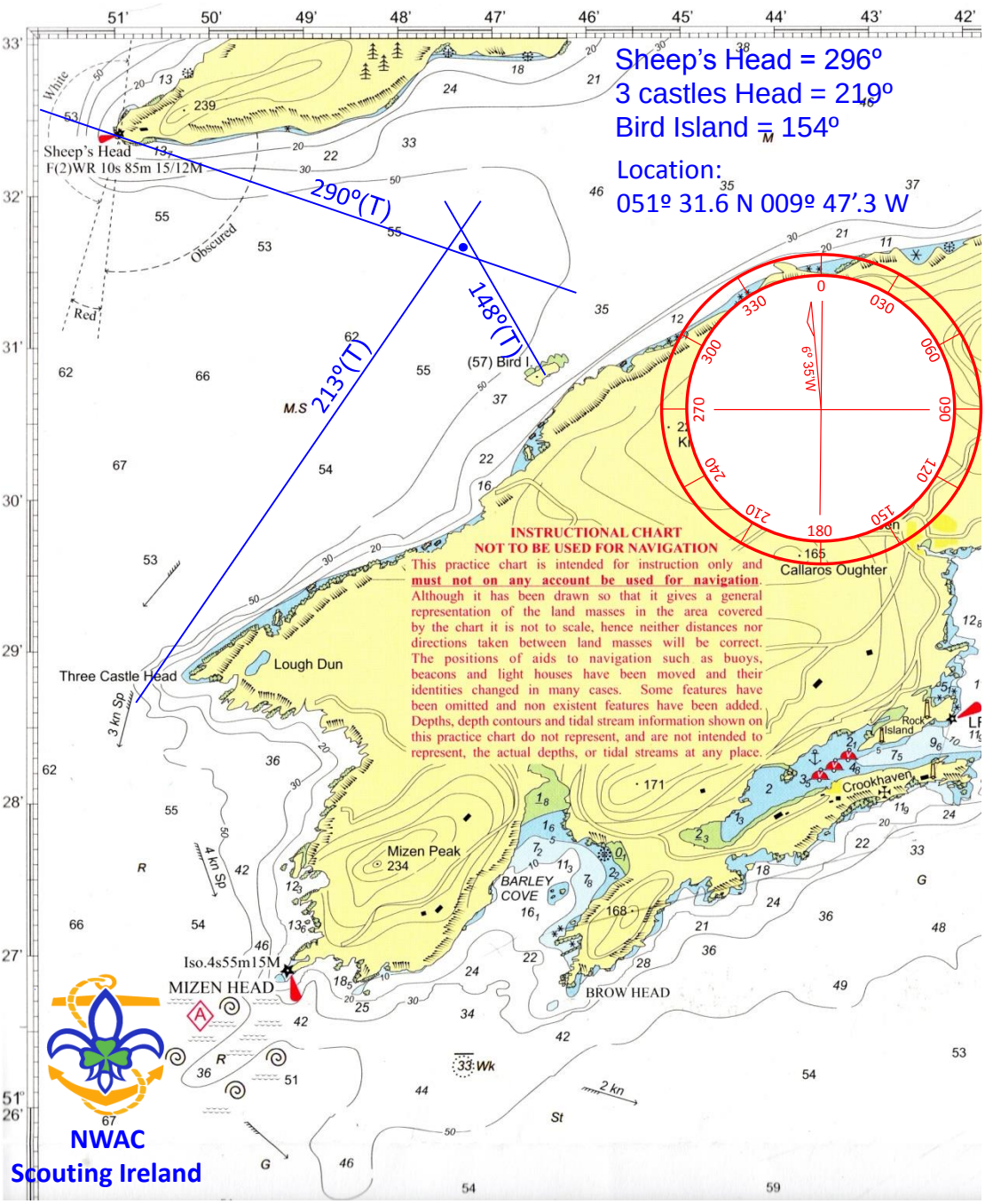

Figure 5: Triangulation

Triangulation of position

A vessel is lost somewhere north east of Mizen Head and visibility is clear enough for the skipper to identify some of the coast (Figure 5). How does the skipper find the vessels position?

- Take bearings to three known points.
  - Sheep's Head = 296º
  - 3 castles Head = 219º
  - Bird Island = 154º
- Convert these magnetic bearings to true bearings.
  - Sheep's Head = 290º
  - 3 Castles Head = 213º
  - Bird Island = 148º
- From the three points plot the bearings on the chart.
- They should intersect more or less at the same point. This is approximately the position of the vessel (051º 31.6 N 009º 47'.3 W).

Ref: *Eoghan Lavelle*

RYA yachtmaster

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