

4.4 Task 9: Lay-off the Courses, Clear of Hazards and Dangers

The Navigation Officer must lay the charts in sequence and mark the sequence number on the back of the charts so that they stay in the correct order. Place the sequence number on the back of the chart between the '(Folio No. ... Consecutive No. ...)' and the chart title. Use a 2B pencil so that it can be erased when the voyage is over.

The Navigation Officer will by now have selected the route, marked the predicted areas of dangers and calculated the tidal streams. The next step is to lay-off the courses clear of all the dangers.

Complete these tasks:

- Adopt a pattern for marking on charts. For examples of the legends to be used for Chartwork, refer to Appendix 7
- lay-off courses that are clear of dangers, as recommended by '*Sailing Directions*'. Complete the 'Passage Planning Notebook' and fill in the 'Passage Plan Sheet'. Also see 'Additional Requirements for ECDIS' in Appendix 1. Remember that courses are laid down from berth to berth
- once the courses are laid down, mark:
 - course (always true with 'T' on chart) and distance with each leg
 - waypoint number(s) (WPT) along with DTG to destination – for example, pilot station. Use this to refer to the passage plan sheet, GPS and ECDIS (if used)
 - wheel-over points
 - ranges and bearings of landmarks used
 - CIR for parallel indexing
 - clearing bearings/lines, to clear a specific hazard, particularly when making approaches in narrow channels
- cross track errors/margins of safety
- pilot boarding/disembarkation position(s)
- speed reduction points
- abort points/points of no return
- the sequence of charts for the passage
- the set and rate of current and height of tide
- the next chart and its number
- transit bearings, for quick check of compass error
- the position on the chart where it will be necessary to switch on certain navigations aids, such as the echo sounder
- navigational warnings and preliminary and temporary chart corrections, as taken from notices to mariners
- specific meteorological information available, for example, dust storms, restricted visibility, sea, swell and wind conditions
- areas where specific marine environmental protection considerations apply
- chart datum is usually given on the chart. The standard used by GPS systems is WGS84. But if any chart has a different datum, highlight this to make the OOWs aware of it
- minimum UKC required, particularly in shallow water areas
- references to contingency plans for alternative actions to maintain the safety of life, environment, ship and the cargo.

While laying down the course, as directed by the circumstances and the information given in the Admiralty or other publications, the Navigation Officer can add notes in the bridge notebook under the column '*General Notes (Own Notes for Navigation of Ship)*' for execution and monitoring of the passage plan. This makes sure that the Watchkeeping Officers have clear and precise instructions on how to conduct the passage.

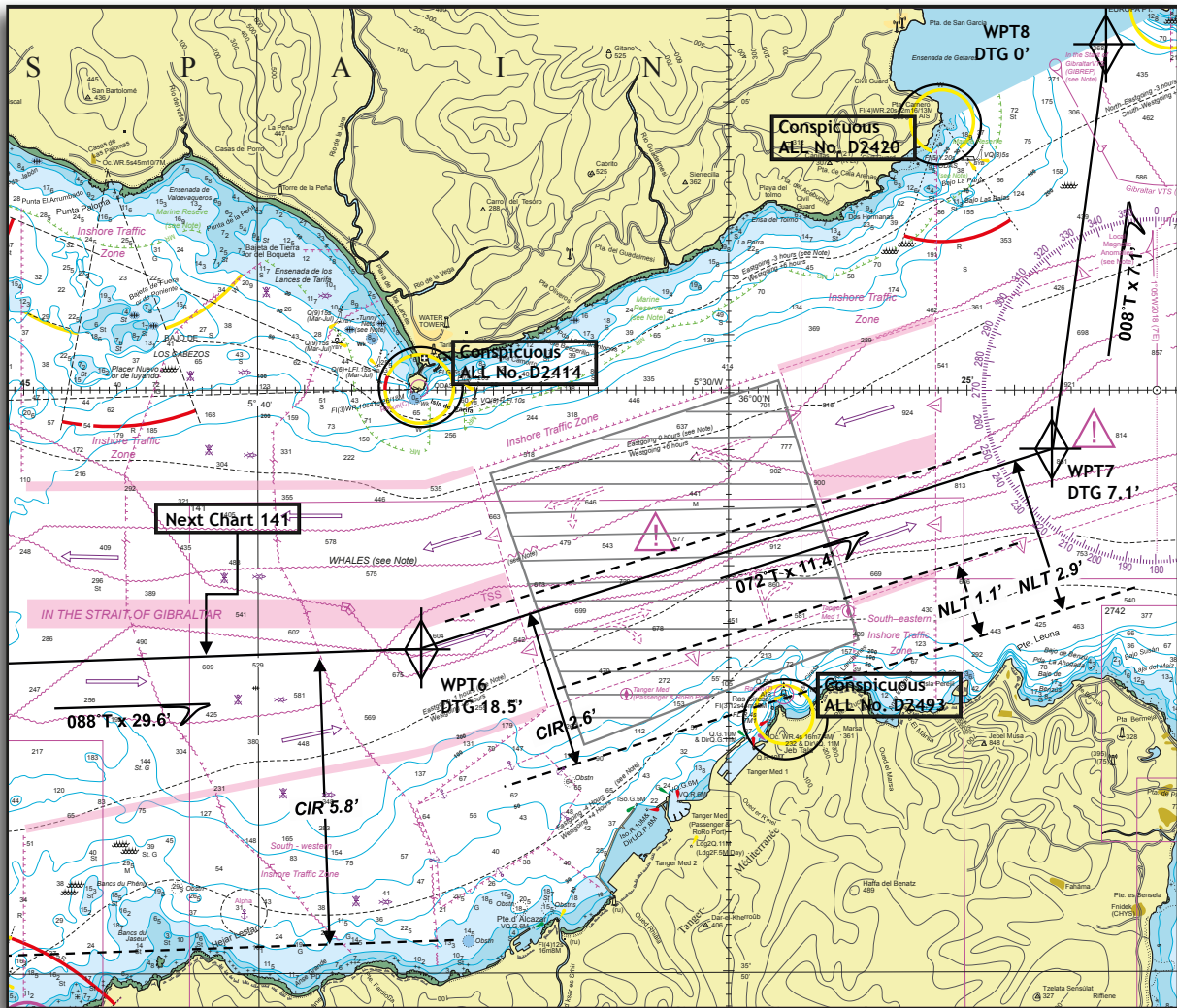


Figure 9 – BA Chart 142 – example of conspicuous lights and marking on chart

ECDIS provides a 'Route Check' function to check the route drawn by the Navigation Officer against the parameters set by them. Once the route check is complete, ECDIS gives a list of hazards identified. Each of these hazards must be investigated by the Navigation Officer before accepting the route or calculating the schedule, as any alterations as a result of hazards may have an impact upon the schedule

as well (see Figure 10). ECDIS allows the Navigation Officer to produce a report similar to the Passage Planning Sheet given in Appendix 2. The information that can be inserted in the report is limited by design, therefore some ships may use additional paper sheets to note any comments or use ECDIS' inbuilt functions to record information that can be displayed to the OOWs.

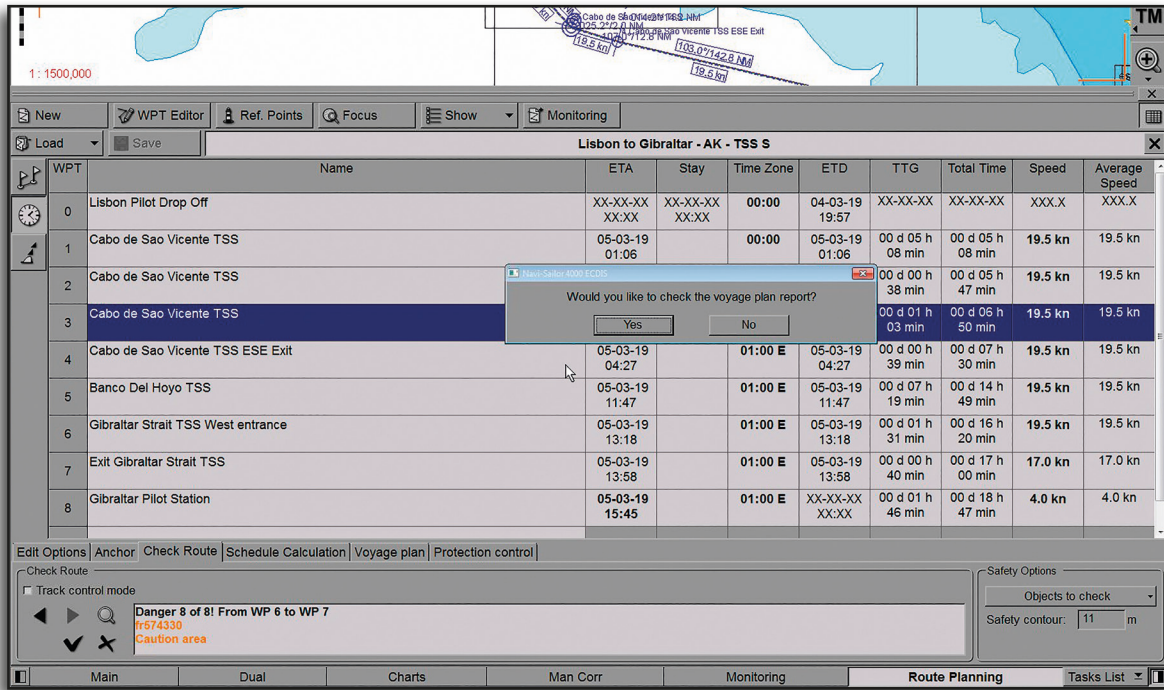


Figure 10 – ECDIS route check complete

4.5 Calculation of Wheel-Over Point

| 10° Rudder - Speed Full Ahead – Draught 8.9 m Fully Loaded | | | |
|--|--------------------------|---------|-------------------|
| Course Alteration (Deg) | Speed after Turn (Knots) | Advance | Transfer (Cables) |
| 64° (WPT7 to WPT8) | 20 | 5.14 | 1.96 |

4.6 Steps to Draw Wheel-Over Point

1. From the manoeuvring data of the ship, obtain advance and transfer as shown in the above table.
2. As shown in Figure 11, extend the present course line (072°T) beyond the alter course waypoint (WPT7).
3. Mark the intersection of the new course (008°) and present course (072°) as point 'B'.
4. From any point on present course (072°), draw a line perpendicular (at 90°) to the present course line (use parallel rulers or set squares).
5. On the perpendicular line, draw a line (shown in green in the diagram) parallel to present course (072°) at a distance equal to transfer (1.96 cables) from the present course (072°).
6. The point where this parallel line (green) intersects the new course (008°) is point C.

7. Draw a line from point C to the extension of the present course line (072°). The point where this line intersects the extension of the present course is point D.

The distance CD is equal to transfer and line CD is perpendicular to present course (072°).

8. From point D beyond point B, on the present course line (072°), draw a line equal to advance (5.14 cables) as shown in the diagram (blue). This point is called W and is the wheel-over point for alteration of course to 008° .
9. Determine bearing of the lighthouse (Punta Carnero Light) and write on the chart to use for commencement of course alteration.

Note: This WO point (W) is only valid if the ship does not have cross track error. The ship will follow curved path WC (in red) as shown in diagram. The range is given for reference from the light, but if radar is being used the range should be adjusted.

Use this formula to determine the distance backwards from the waypoint for marking the wheel-over point:

$$\text{Distance backwards from WPT} = \text{Advance} - (\text{transfer} \div \tan \text{ of course alteration}^\circ)$$

In the example above, for a course alteration of 64° with advance and transfer of 6.7 and 1.3 respectively:

$$\text{Distance backwards from WPT} = 5.07 - (1.96 \div \tan 64^\circ) = \mathbf{4.1 \text{ cables}}$$

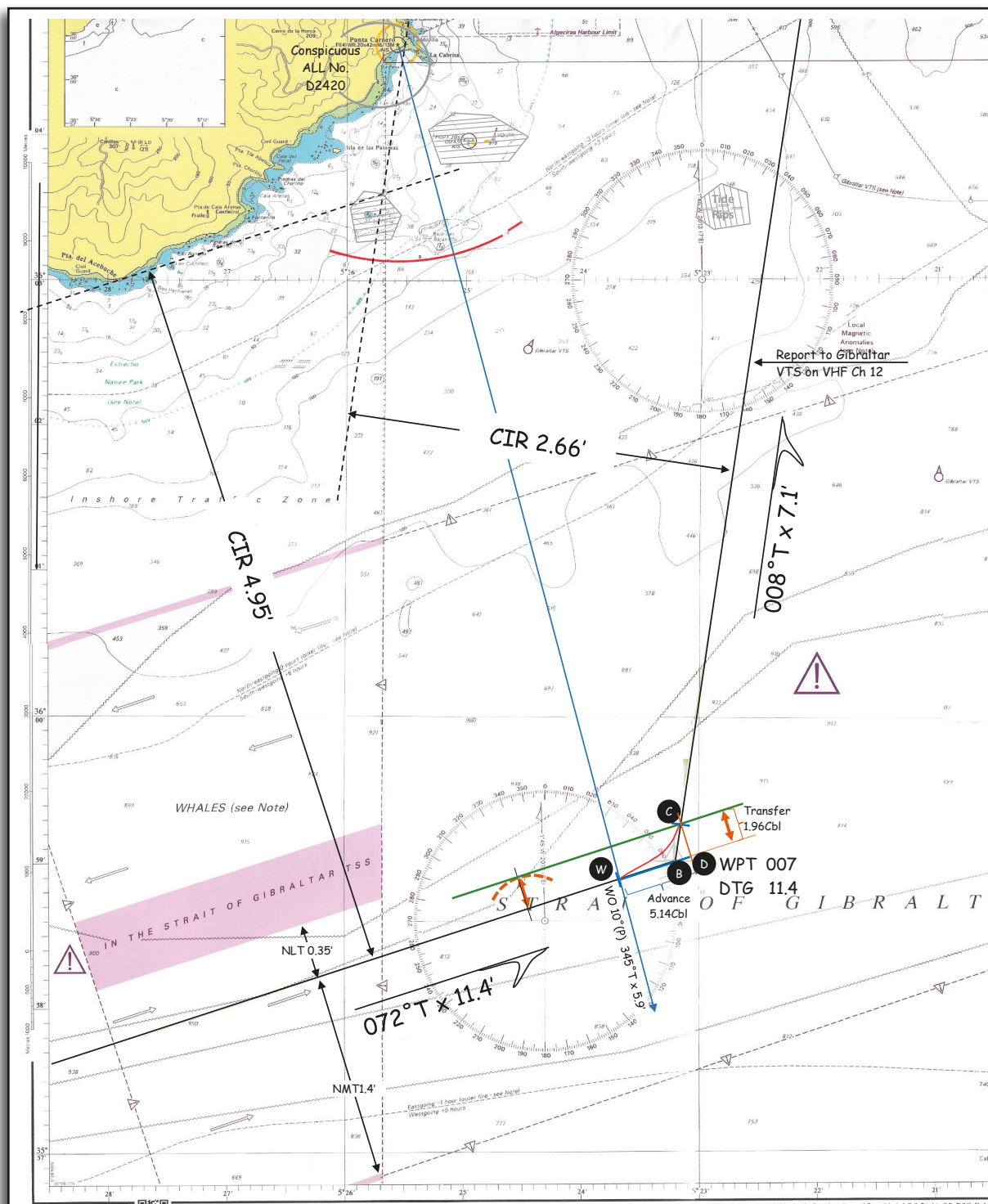


Figure 11 – Wheel-over calculation

The ECDIS however simplifies the wheel-over calculation because all the parameters are already programmed into it. As seen in Figure 12, the ECDIS marks the range and bearing from a selected point where the wheel should be put over to the

required angle to make an alteration. The fact remains that the ship never actually arrives at the planned waypoint but takes a curved path to turn towards the next course.

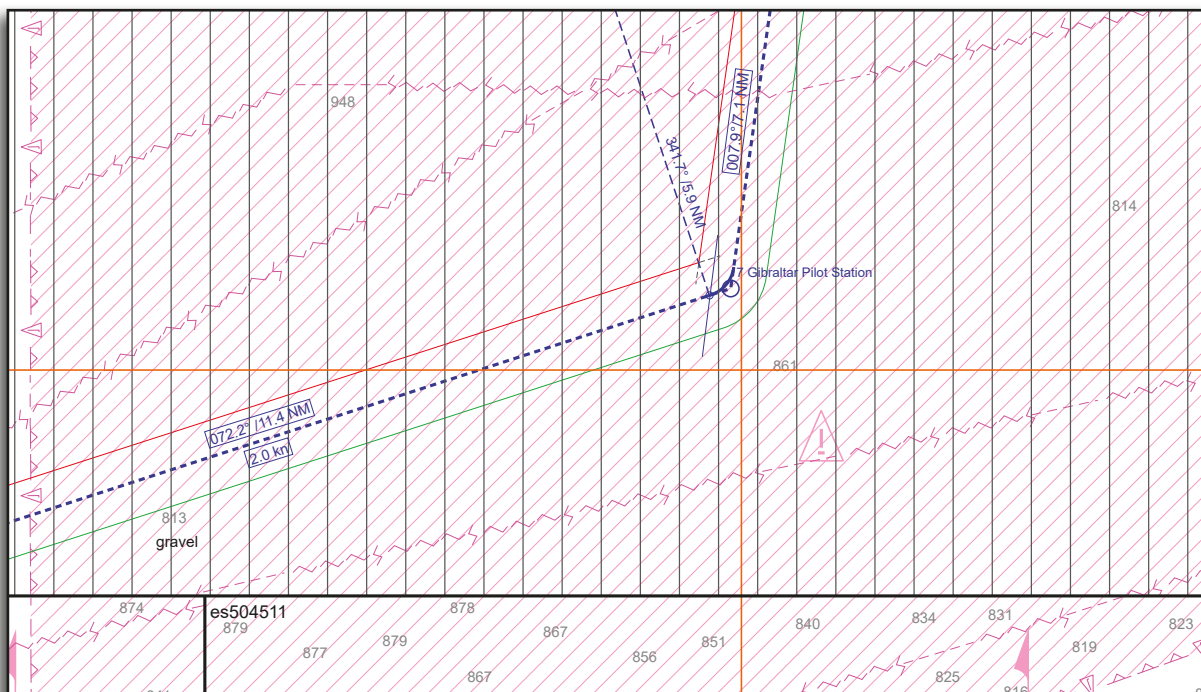


Figure 12 – Wheel-over calculation, track marking and reference point range and bearing on ECDIS

4.7 Use of Large Scale Plans within Small Scale Charts

Some charts show a large area of sea, but they often have a larger scale plan inset or a larger scale chart to show details of the coastal features. Make a note on the chart at the points where you intend to use the inset or the large scale chart.

4.8 Task 10: Mark all Identified Hazards and any Additional Information on Chart without any Information Overload

For accurate bridge team management, and for timely advice from port control and the pilot station, keep the passage information

organised and readily available. Highlight these items:

- Reporting points. If there are stations to be called or report ETAs to be sent, note the location, IDs and VHF channels in the passage plan sheet/notebook and on the chart
- the position where the engine room is given one hour's notice to place the engines on stand-by for manoeuvring
- on the course line, show where notices should be given to additional watchkeepers, helmsmen and lookouts
- on the chart, indicate where piracy watches must be kept, the pilot ladder is to be rigged and anchors and mooring lines kept ready.

4.9 Use of the 'Admiralty List of Lights'

While planning the passage, the Navigation Officer must check the current status of the lights/lighthouses and provide additional