SEA KAYAK NAVIGATION

Franco Ferrero

A PRACTICAL MANUAL

ESSENTIAL KNOWLEDGE FOR FINDING YOUR WAY AT SEA

2nd edition

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THE AUTHOR

Franco Ferrero

Franco began sea kayaking at the age of fifteen, and was lucky enough to be brought up in the Channel Islands. The small scattered islands, fast tidal streams and summer fogs ensured that navigation was a key skill learnt at an early age.

In 1978 he was one of a team of three Jerseymen who completed the first circumnavigation of Ireland by sea kayak. In 1989, with Kevin Danforth, he made a record breaking unsupported crossing of the North Sea. Since then he has paddled in many parts of the world including Nepal, Scandinavia, the coast of Brittany in France, the European Alps, Peru and Western Canada.

He is the managing director of Pesda Press and still occasionally manages to fit in some freelance coaching (as a BCU Level 5 Coach). He lives in Wales, escaping the office to go sea and whitewater kayaking, rock and ice climbing, and ski-mountaineering. His current passion is a twenty-nine foot yacht called 'Firebird'.

INTRODUCTION

The aim of this book is to provide a concise manual of navigation aimed specifically at sea kayakers. In this respect this second edition is no different from the first.

There is no glossary of terms as things are explained as I go along. To compensate there is a comprehensive index.

The devil is in the detail. Feedback from readers of the first edition has changed my views on 'what sea kayakers need to know and are likely to use'. I have added to several topics, but have taken care to keep it short and simple.

Using the book

Each chapter ends with a number of suggested exercises. Make use of them – they will help to ensure that what you have read is understood and remembered.

EXERCISES

Check your answers to each of the exercises at: pesdapress.com/answers

The ultimate test of whether or not the lessons have been absorbed is the first time you plan and execute a trip relying on your own navigation. Be cautious; plan simple trips and aim for big targets to start with.

Ask someone more experienced to check your calculations the first few times. Get someone else on the trip to make independent plans and compare your results. If they are a near match, carry on – if they disagree, start again!

Always take into account the weather forecast, and base your planning on the abilities of the weakest members of your group.

Build up slowly.

Enjoy the book and enjoy your paddling.

The illustrations and diagrams throughout the book are available to download as a teaching resource for use in your slideshow presentations at pesdapress.com/presentations

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I would like to thank Danny Finton, Danny Jones, Joan Ferrero, Trys Morris, Nigel Robinson, Olly Sanders and Bob Timms for their help with the first edition.

For their help with the second edition, I would like to thank: Nigel Robinson for suggesting and giving examples of the exercises that are now to be found at the end of each chapter; Andy Stamp, with his impressive knowledge of both the theory and practice of navigating using GPS, who suggested numerous improvements to that chapter; Kevin Mansell, whose practical experience of GPS led to a number of improvements; Gordon Brown who, drawing on his vast experience, suggested numerous improvements throughout the book; Mike Mclure and Oisin Hallissey whose work on developing a BCU Coastal Navigation and Tidal Planning modules pointed out a couple of omissions. Peter Wood for help with the photography and the new design of this edition.

Finally, a special thanks is due to Bill Ayles who introduced me to the delights of navigation theory and Dave Thelland who first helped me to use it for sea kayaking.

Photographic Acknowledgements

A special thank you is due to the people who allowed me to use their photographs. I'd also like to thank those people who sent photos that I didn't end up using. Unless indicated below, all photos were taken by Franco Ferrero or Peter Wood.

Jeff Allen p14; Doug Cooper, p51, p96 (title); Joan Ferrero p42; Derek Hairon p13; Laurie Bell iStockphoto.com p15; Howard Jeffs p96 (inset); Kevin Mansell p77; Mark Rainsley p36, Douglas Wilcox p29, p67, p90.

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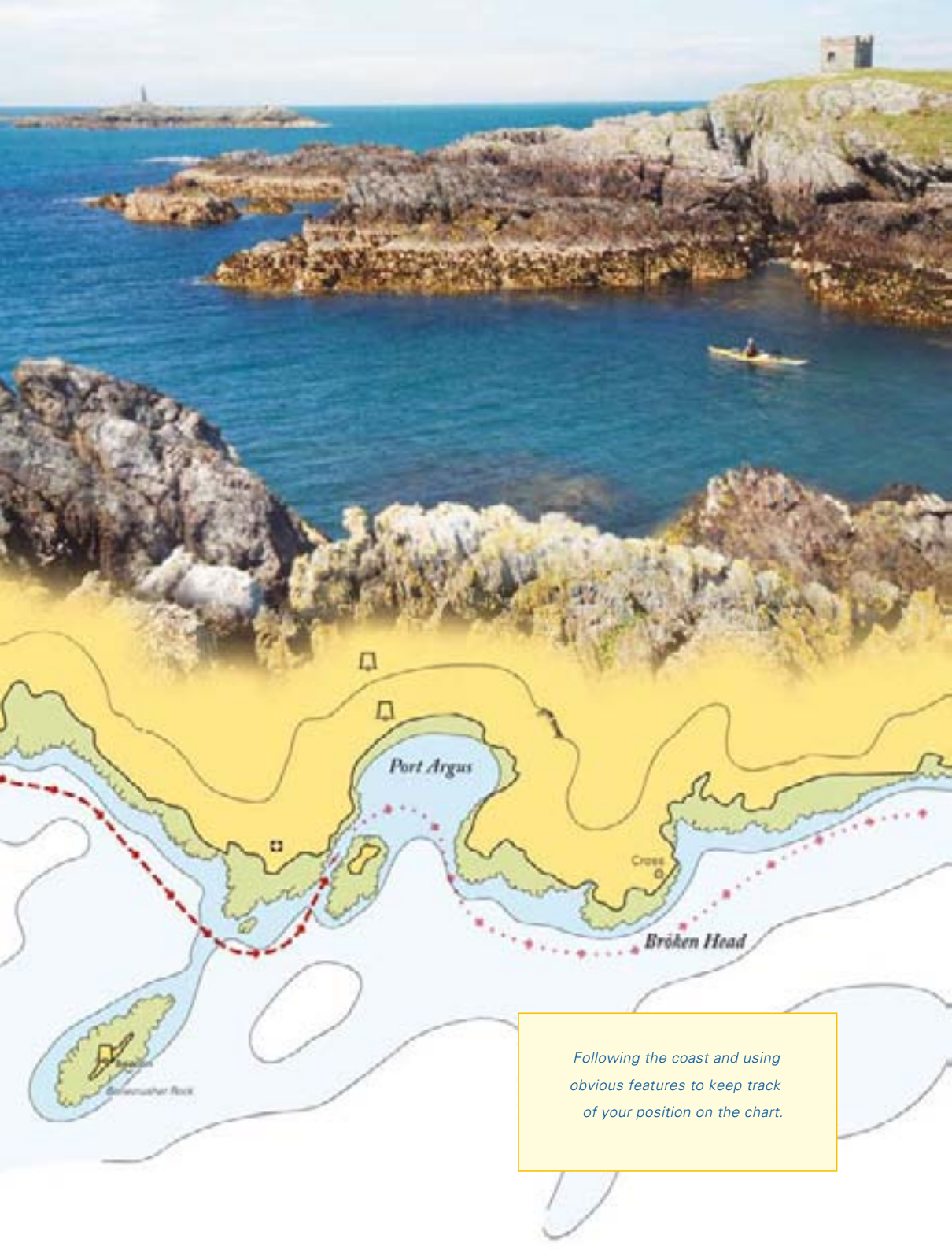


Following the coast and using obvious features to keep track of your position on the chart.

1 KEEPING IT SIMPLE

Ask yourself if you need to do any chart work. If you are paddling across to a small island that is out of sight, your chart work will need to be precise. On the other hand if you are 10 nautical miles out to sea off the west coast of the United States, it may be quite accurate enough to head due east (090°) until you sight land; and then work out precisely where you are when you get there.

MAP & CHART SYMBOLS

Maps and charts aimed at leisure users have a 'legend' or 'key' that shows you what symbols are used to indicate various features. We will look at maps and charts in detail in Chapter 4.

Handrails

Let's not forget that "turn left and follow the coastline until you get there" is often quite appropriate! The coastline itself provides the 'handrail' for you to follow. Keeping track of your position is done by simply 'ticking off' prominent features as you pass them by. These features are anything that is easy to recognise on the chart and in the real world. They could be natural features such as sea stacks, isolated rocks, inlets and prominent points, or man made features such as buoys, radio masts and prominent buildings.

JUDGING DISTANCE

A simple way to estimate distance is to gauge how much detail you can make out. Below is the resolvable detail method from *Sea Kayak* by Gordon Brown.

100m		Can identify people by facial recognition.
200m		Can make out faces and colours of clothing.
500m		Can identify people by movement and mannerisms, small buoys are visible, paddle blades visible.
1km		People are dots, can count individual windows on houses, large buoys can be seen.
1.5km		Can count individual trees, can see 'paddle flash'.
2km		Can count individual houses, identify cars from bigger vehicles, almost at limit of kayak to kayak visibility.
3km		Limit of kayak-to-kayak visibility, may see 'paddle flash', can separate trees from other greenery.

4 MAPS & CHARTS

An Ordnance Survey Landranger (1:50,000) map in use at sea; note that I've added tidal information in pencil.

In order to navigate in strange places and over large distances we need to use some form of map. The two choices are nautical charts or land maps.

Charts

Nautical charts only show the land detail that is visible from the sea. This is great when you are on the water, but useless when you have to make an unforeseen landing because of changing weather and are trying to find the quickest way back to your vehicle. They do, however, have several definite advantages:

1. They show the shape and depth of the seabed, which may enable you to make educated guesses about sea conditions or tides where there is not much information available.
2. They show the position of buoys and details of any lights (useful on night paddles, planned or accidental).
3. They give tidal information.

British Admiralty and US National Ocean Service charts are similarly colour coded which makes things easy. Yellow areas are dry land, green bits are covered in water at high tide and dry (or very shallow) at low tide. White and blue bits are always underwater.

Yachtsmen's charts produced by firms such as Imray may differ in colour coding, but the principles are the same.

Standard charts for shipping are large and unfolded but there are also more convenient 'Leisure Series' charts designed for use by yachtsmen. These are often in useful scales, so that you only need one chart instead of three or four overlapping charts, and they come in folded and unfolded versions.

Maps

The main advantage of land maps is that many people are already familiar with them.

Land maps have the advantage of showing all land details, including such essentials as pubs, public toilets, access roads and paths. They show all coastal features, including anything that shows at low water. On the other hand, they don't show buoys, lights (except lighthouses) or any features of the seabed (below the low water mark).

Scale

UNITS

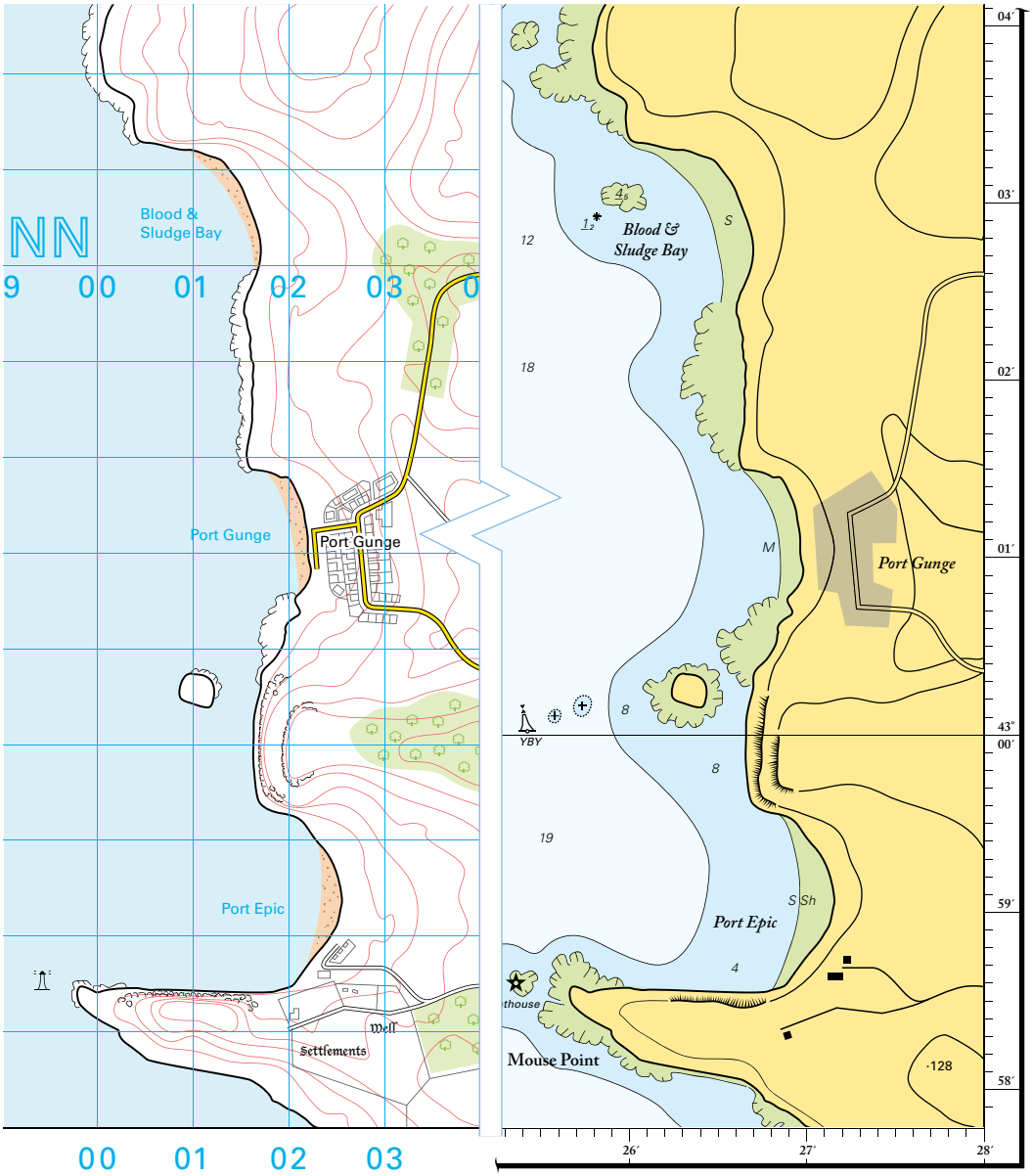
A nautical mile (NM) is slightly greater than one land mile (1.15 to be precise), and is roughly equivalent to 2km. 1 knot (kn) = 1 nautical mile per hour. It is easier to work in nautical miles, rather than miles or kilometres, because all tidal information is given in knots.

Small Scale (1:1,000 where 1cm on the map = 1,000cm or 10m on the ground). A small ratio means lots of detail but you'll need an awful lot of maps. These are usually used to provide detail of harbours and are seldom of use to kayakers.

Large Scale (1:1,000,000 where 1cm on the map = 1,000,000cm or 10km on the ground). A map of this scale would cover the whole west coast of Ireland (great for planning, but no use for day-to-day navigation).

I find the most useful scales to be between these two extremes 1:50,000 or 1:100,000 for both charts and land maps.

Comparison of Ordnance Survey Landranger map and Admiralty Leisure Series chart styles (both 1:50,000 scale). OS maps also have a latitude scale along the outer edge of the sheet.



A pair of dividers or a piece of string will be useful for taking measurements from the diagrams in this book.

Measuring distance

To measure a distance on a map or chart, I suggest either a pair of dividers (looks professional, especially the expensive brass ones, preserves mystique, are slightly more accurate and are easier to use on the kitchen table), or a piece of string (cheaper and easier to use when afloat). Simply open the dividers to the required distance and then measure off against the latitude scale which you will find at either edge of the chart.

1 minute (1') of latitude = 1 nautical mile (NM)
1° = 60 minutes or 60NM

Consequently, on the example chart opposite, the distance from Blood and Sludge Bay to Port Epic is 4NM (or 4' of latitude).

LATITUDE AND LONGITUDE

The earth is a sphere. (It's actually slightly squashed at the poles but for the purposes of navigation we can ignore that). Lines of **Latitude** begin at 0°, bisecting the globe around the Equator and slice the globe into rings at regular intervals toward each of the poles. Degrees of latitude are measured from the centre of the Earth, north and south of the Equator.

Lines of **Longitude** are drawn bisecting the globe from pole to pole at angles east or west of what is known as the Prime Meridian, or 0° of longitude (this could be anywhere but historically the line runs through the Greenwich Observatory, Great Britain). Lines of longitude converge at the poles (think of the segments of an orange). Thus a minute of longitude becomes progressively smaller in terms of distance as you go towards the poles. For this reason we do not use longitude for measuring distance.

MAP PROJECTIONS

In order to make a map, a 3D shape has to be projected onto a flat surface. Most maps and charts use one of the variants of the **Mercator** projection. The advantage of this map projection is that it preserves angles. A constant course heading is shown as a straight line. To keep the proportions needed to achieve this, minutes of latitude have to be drawn proportionally bigger as we move towards the poles. This is only really obvious on charts that cover large areas. The way we cope with this is to measure distances on the latitude scale as close to the latitude of the location we are measuring as possible.

With problems towards the poles in the Mercator projection, map makers turn to one or other form of polar projection, which you may encounter when planning trips within the high arctic.

For ocean crossing voyages, large scale **gnomonic** projection charts are used (find out more about this if you plan such a voyage!) You may encounter the gnomonic projection on some detailed charts of harbours but at such scales the differences between projections are negligible for the kayaker.

Symbols & abbreviations

Maps and charts aimed at leisure users usually have a key (or legend) which show the symbols and abbreviations used.

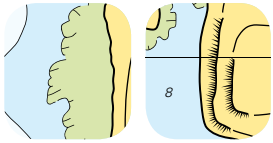
Booklets describing in detail all the symbols used on nautical charts are available. Admiralty charts are covered by the publication 'Symbols and Abbreviations used on Admiralty Charts 5011'. US charts are covered by the pamphlet 'Chart No 1, Nautical Chart Symbols and Abbreviations'. Any yacht chandlers will have these and publications listing all the charts that these agencies produce.

Chart No 1 (above right) is now out of print and available as a download only.

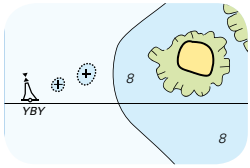
For this section it is vital that you constantly refer to the chart on page 24.

Commonly used chart symbols and abbreviations

Blood and Sludge Bay is marked with the abbreviation S. This means that the bottom consists of sand. Port Gunge, however, is marked with an M which stands for mud so, although a useful escape route, Port Gunge is not a desirable landing place. Port Epic has the abbreviation S Sh, sand and shells, nice place for a picnic.

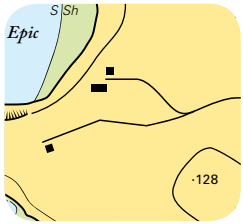


The shore between Blood and Sludge Bay and Port Gunge is marked by a symbol that indicates a rocky foreshore, whereas between Port Gunge and Port Epic the symbols indicate cliffs.



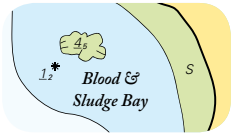
Port Gunge is to the south of a rock islet that is always uncovered. The two crosses further out to sea represent rocks which are always (but at low water only just) covered by water. These represent a danger to shipping, though not normally to kayakers, so they are marked by a buoy which is distinguished by its top mark, in this case two cones pointing inwards and coloured yellow, black, yellow. Buoyage is covered in detail in Chapter 6. For navigational purposes, in a kayak, all we need is to make sure we have identified the right one. Buoys are distinguished from one another by their colour, shape, or top mark. Important ones will also have a name or number painted on them. All this information is on the chart.

Weekly 'Notices to Mariners' appear on the Hydrographic Office website and should be used to update your chart. For example a light may change or a buoy may be moved.



These rocks could be a danger (or fun depending on your skill level) if a big swell is running, as the waves may build up and break over the submerged rocks (reef breaks). The point south of Port Epic has a light at its end; the structure on which the light is raised is usually painted white so you can see it in daylight.

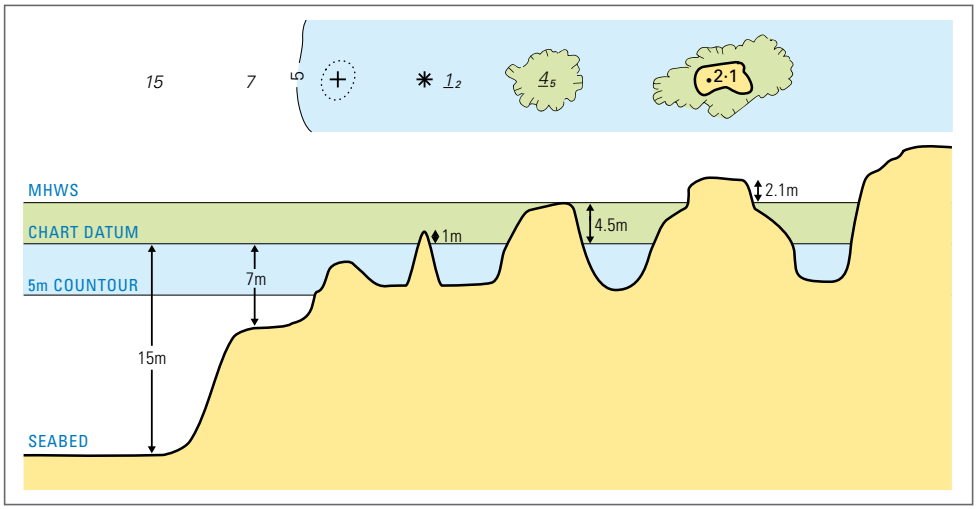
The figure ·128 tells us that the hill above Port Epic is 128 metres above sea level, (MHWS).



The rock off Blood and Sludge Bay is coloured green and marked with a drying height. We are told that it is a drying height by the fact that the 4 is underlined. For a detailed explanation of the

difference between heights, drying heights and depths study the illustration below. The larger figure indicates metres and the smaller one by its side tenths of metres. So $\underline{4}_5$ indicates a drying height of 4.5 metres. This means it would be covered at high water but, as the tide went out, it would dry out, in this case when the tide was 4.5 metres above chart datum. A mark like an asterisk indicates a small isolated drying rock. The figures offshore tell us the depths below chart datum (the lowest possible tide).

Heights and depths. Profile of the sea bed with inset of chart symbols.



EXERCISES

1 Find on a land map an example of as many of the symbols shown on the key (legend) as you can find.

2 Do the same for a chart that has a key.

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A PRACTICAL MANUAL

A short and simple explanation of how to find your way at sea, with practical tips for the kayaker.

This edition includes up to date information on the use of handheld GPS receivers – as well as other improvements throughout, such as exercises at the end of each chapter to help you test your knowledge.

Recommended by the British Canoe Union as supporting material for their navigation courses – this book will be useful to everyone paddling on the sea, with a kayak or sit-on-top.

THE BLACK ART DEMYSTIFIED

- PLANNING A TRIP
- CHART WORK
- THE COMPASS
- BUOYS & LIGHTS
- TIDES & CURRENTS
- PRACTICAL GPS
- OPEN CROSSINGS

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