Section D

NAUTICAL SKILLS

There are two main skills associated with sailing the seas – seamanship and navigation. This section does not attempt to deal with the practical skills of the seaman, though it does suggest ways in which a curator might acquire some of them. The material relics of pure seamanship, such as handling sails, steering and emergency equipment, are largely to be found in other sections of this manual dealing with fittings and tools.

In the later Middle Ages Chaucer's shipman carried the navigational data in his head.

But as for craft, to calculate his tides,
His currents and the dangerous watersides,
His harbours, and his moon, his pilotage,
There was none such for Hull to far Carthage …

He knew well all the havens, how they were,
From Gottland to the Cape of Finisterre,
And every creek in Brittany and Spain …

Since that time, most of the material has been written down in pilot books and nautical tables or drawn on charts, so literacy and numeracy were essential for a navigator who wanted to venture outside his local area. Much of the work, especially astral and ocean navigation, required elaborate and difficult calculation. Ships' officers had a certain grounding in practical seamanship, but they also learned navigation – which distinguished them from the crew. At its highest level navigation needs an understanding of mathematics, astronomy, geography and climate, and it required many different instruments and publications to carry it out. These are often very good for display, though they might need some explanation. The sextant, for example, seems very esoteric and technical to the outsider but it is simply an instrument for measuring angles very accurately.

Charts are the most obvious navigational publications, and in many ways the most useful in a museum context (whereas a volume of navigational tables is not an attractive display item). Early charts, up to the 18th century, often contain information beyond the purely navigational, e.g. drawings, which are a primary source for early ships and their operations, as well as many coastal and land features – but for some reason they hardly ever show details of shipbuilding facilities or dry docks. Early charts are mostly beautifully drawn and often coloured, though often made in delicate material and possibly very large. Later charts tend to be more functional, though the tradition of coastal views continued well into the 20th century. Charts can often provide a vital insight into a local area, illustrating the characteristics of a particular port or showing the dangers of shipwreck or the local fishing areas.

With electronic aids, navigation is no longer the art that it once was. On the other hand, modern techniques have opened up the sea to many different users without a long training, and made it much safer than it ever was. The third chapter in this section promotes the benefits, to the maritime curator, of learning to sail, including practical advice of how to go about this.

1 NAVIGATION

BY BRIAN LAVERY, CURATOR EMERITUS, NATIONAL MARITIME MUSEUM

Navigation was the skill that distinguished ships' officers from ordinary seamen. It produced a great variety of instruments over the centuries, some crude and some very sophisticated, some common and some very rare. Most maritime collections are likely to have navigational instruments of some kind, and it is essential for a curator to understand their purpose and usage to catalogue and display them effectively.

BASIC PRINCIPLES

There are two main problems in navigation: to know where one is, and to find the best way to one's destination.

Sea navigation differs from land navigation because:

1. Unless there is prior knowledge in the form of past experience, sailing directions or a chart, it is often difficult to know what is under the water and how deep it is;
2. Water is a fluid medium, so the ship might be swept one way or another by the currents or winds;
3. The level of water might vary with tides or rainfall and a passage which is available at one moment might not be available a few hours later;
4. Ships are often out of sight of land with no means of fixing the position;
5. Ships are often at the mercy of the weather, far more than on land.

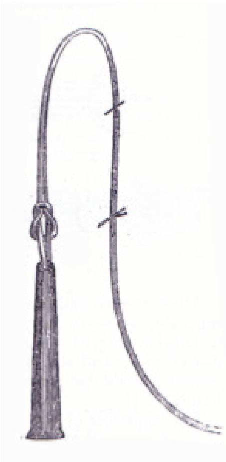
Navigation can be divided into three types:

1. Pilotage, close to or in a harbour or estuary, when the channel is often narrow and land features are in sight except in fog;
2. Coastal navigation, along a coast or on a short sea passage, for example across the English Channel or the Irish Sea. Land features are in sight for most of the time;
3. Ocean navigation, when a ship goes for many days without any sight of land.

FINDING THE DEPTH

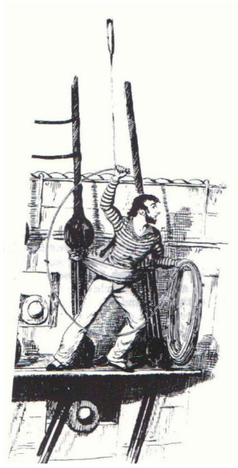
In shallow water and close to land, the navigator needs continuous information on depth. This can sometimes be done by thrusting a stick into the water, but it was mostly done by means of the lead line, one of the simplest and oldest navigational instruments. As the name implies, it was a piece of lead on the end of a line, which was marked with various objects according to the depth – for example a piece of black leather at two fathoms, a white rag at five fathoms and black leather again at 13 fathoms.

The typical lead was shaped like a rather narrow cone, with the head rounded and sometimes with flattened sides. The line was attached to a hole in the upper, narrower end. The lower end was usually hollowed out and could be filled with tallow. This would pick up a sample of the bottom, which might be sand, gravel etc. That might give some idea of the position if the nature of the bottom was marked on the chart, and it would help to decide where the place was suitable for anchoring in.



A mid-19th-century lead with part of its line

from Seamanship, by George Strong Nares, 1865



A seaman casting the lead, c 1830, by Cruikshanks

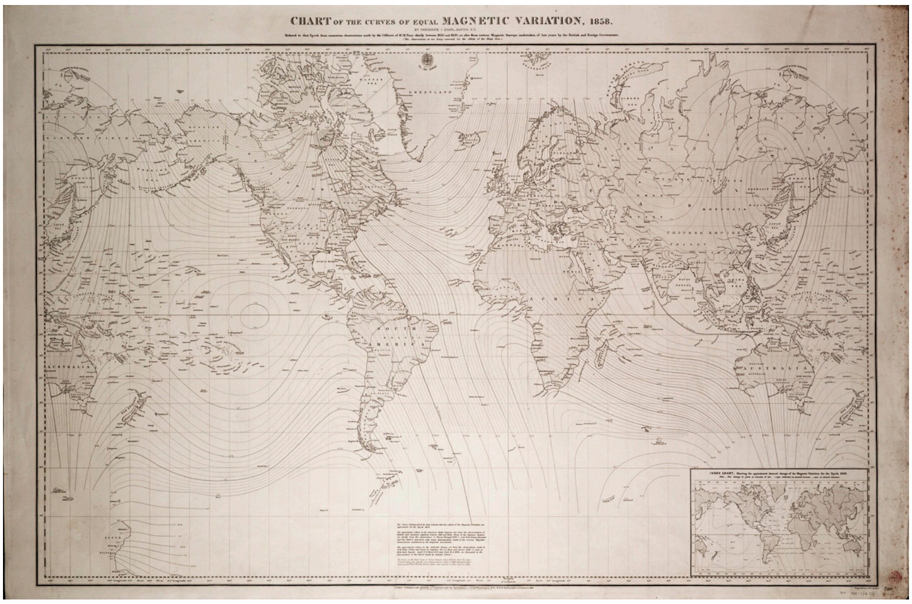
© National Maritime Museum, Greenwich, London

Modern ships use echo sounders to find the depth.

FINDING THE DIRECTION

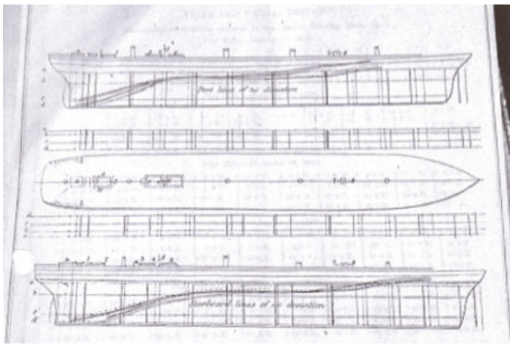
Before the invention of the compass, great feats of navigation were performed by the Polynesian islanders who navigated by the stars and by their knowledge of currents, the flight of birds and many other features. In the much less hospitable seas of the North Sea and north Atlantic, the Vikings used an instrument called the sun shadow board to keep their direction when the sun and stars were obscured.

But it was the compass, invented by the Chinese and introduced to Europe by the 12th century that made navigation in bad weather much simpler. The essence of the compass is a magnetised needle which will point towards magnetic north if allowed to pivot freely. It should be noted that it does not point to true north, and magnetic north will usually be a few degrees different. The difference is called variation, and is not constant from place to place or time to time.



A chart of 1858, showing magnetic variation throughout the world, by Frederick J Evans.

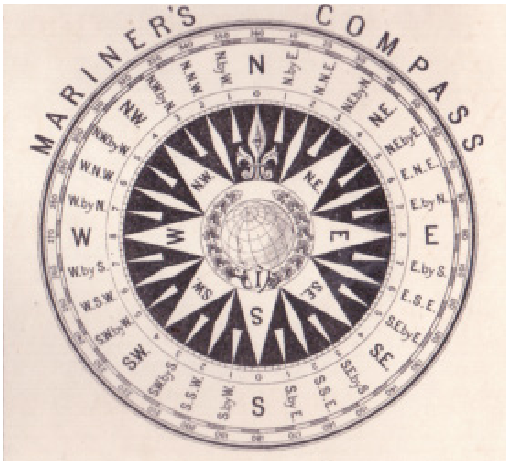
STK201:1/4(2) © National Maritime Museum, Greenwich, London



The lines of magnetic deviation in different parts of the Great Britain, the first large iron ship, as shown in a report of 1857.
© ss Great Britain Trust

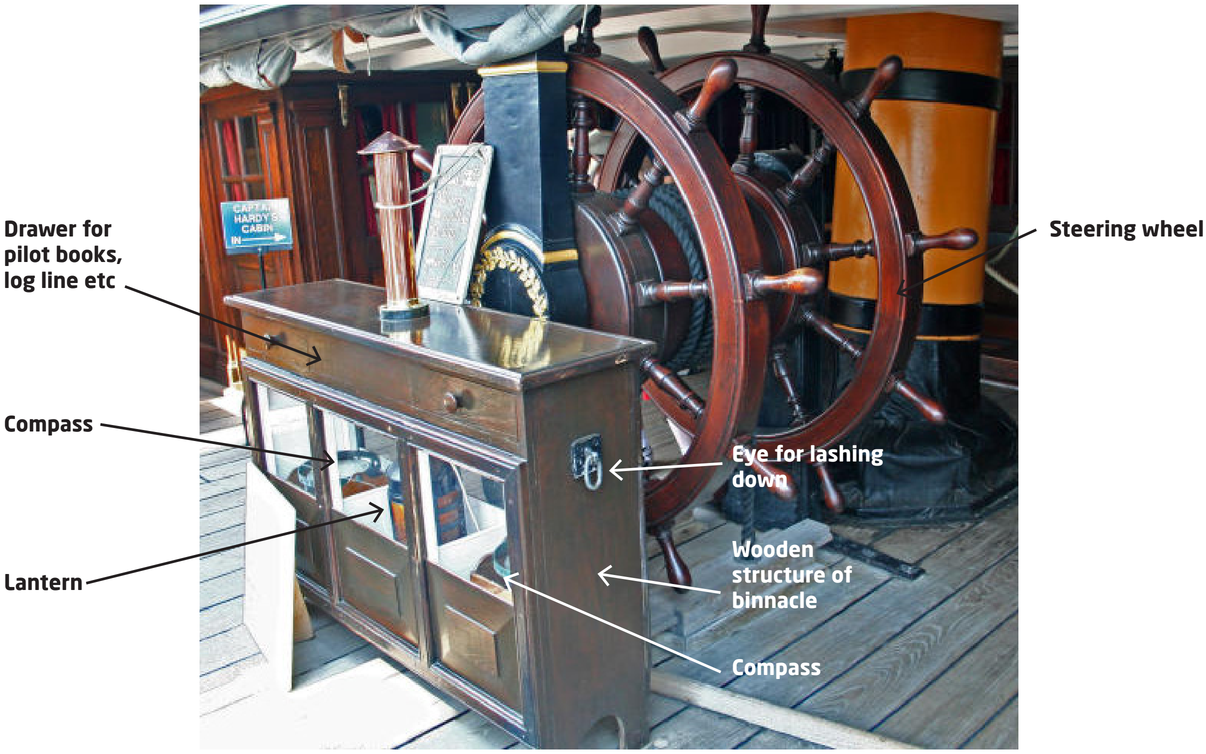
The compass is also subject to deviation which is caused by iron and steel objects placed near it in the ship. This was a great problem with the first metal ships, until spheres known as Newton's Balls were placed on either side and adjusted to give a truer reading.

The compass needle is not normally visible, for a circular card is usually placed on top of it. For most of the age of sail this was marked with the 'cardinal' points of the compass – north, south, east and west. These were subdivided into intermediate points such as south-west, then further subdivisions until there were a total of 32 points.



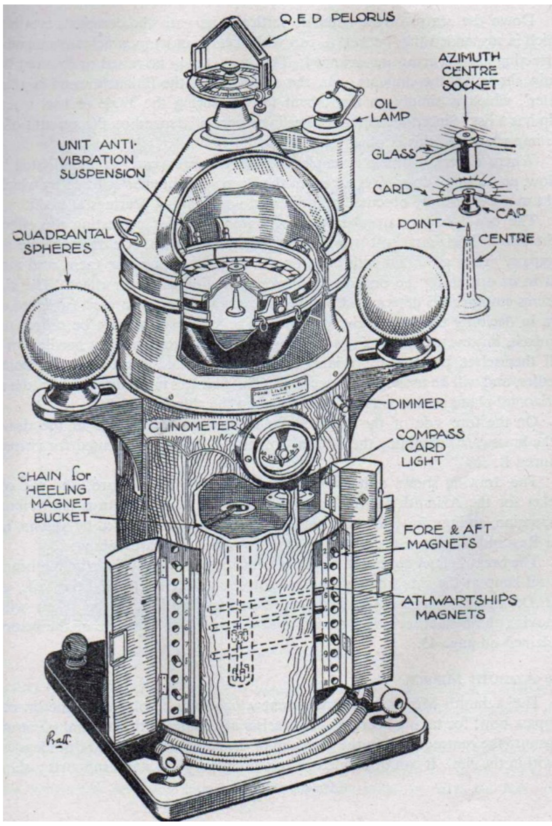
Modern compasses are marked in degrees, with 360 or 0 degrees being north, and 180 degrees due south.
Picture from 'A self-instructor in navigation and nautical astronomy and the Deviation of the Compass' by William Henry Rosser, 1885

The compass was usually placed inside a brass bowl and mounted on gimbals so that it stayed reasonably level in rough weather. This example dates from after 1920.
NAV0400 © National Maritime Museum, Greenwich, London



On deck, compasses were sited inside a structure known as the binnacle. In the age of sail this was a wooden box, shown here on *HMS Victory*. Since the helmsman might stand on either side of the wheel, there was a compass on each side, with a lantern between them for night-time use.

© Brian Lavery with kind permission of HMS Victory NOT CONFIRMED



Iron and steel ships usually had a pillar-like structure, with Newton's balls on either side. This example dates from 1939. The pelorus on top was used for taking bearings of objects.

Taken from The Yachtmaster's guide and Coaster's Companion, by Frank Carr, 1948

The gyro compass has the advantage that it is not subject to deviation and variation, but it needs a good deal of maintenance and is mostly used on larger vessels. This example dates from c 1952 and is shown without the compass card on top to expose the mechanism.

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The gyro compass on HMS Cavalier

© Brian Lavery, with permission of Chatham Historic Dockyard Trust

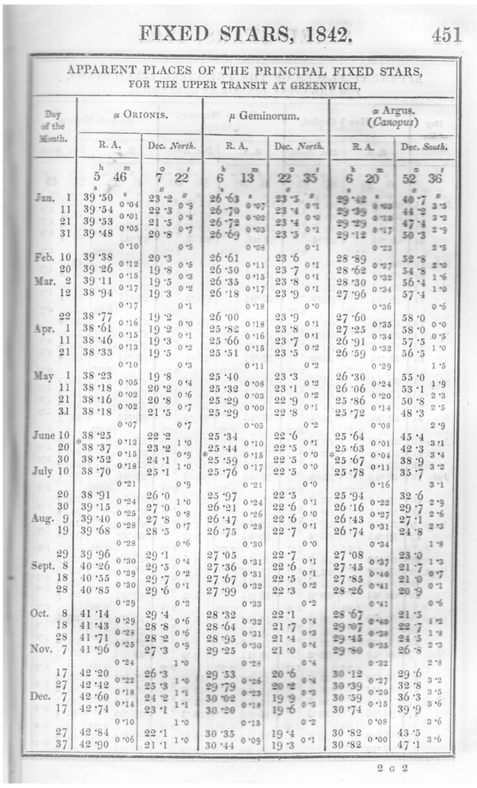
PUBLICATIONS

Early navigators used lore which was learned from experience and stored in the head, like Chaucer's schipman

He knew wel alle the havens as thei were,
From Scotland to the cape of Finsterre,
And every creek in Bretayne and in Spayne

This is not completely obsolete – local fishermen today still rely on unwritten information, but the widespread use of navigation demands written and printed material.

Many different types of navigational books have been published over the last few centuries, many by the British Admiralty. These include pilot books which describe the entry into different ports and the passage between them, and almanacs which are based on 'ephemeral' information such as tides and the movements of celestial bodies.



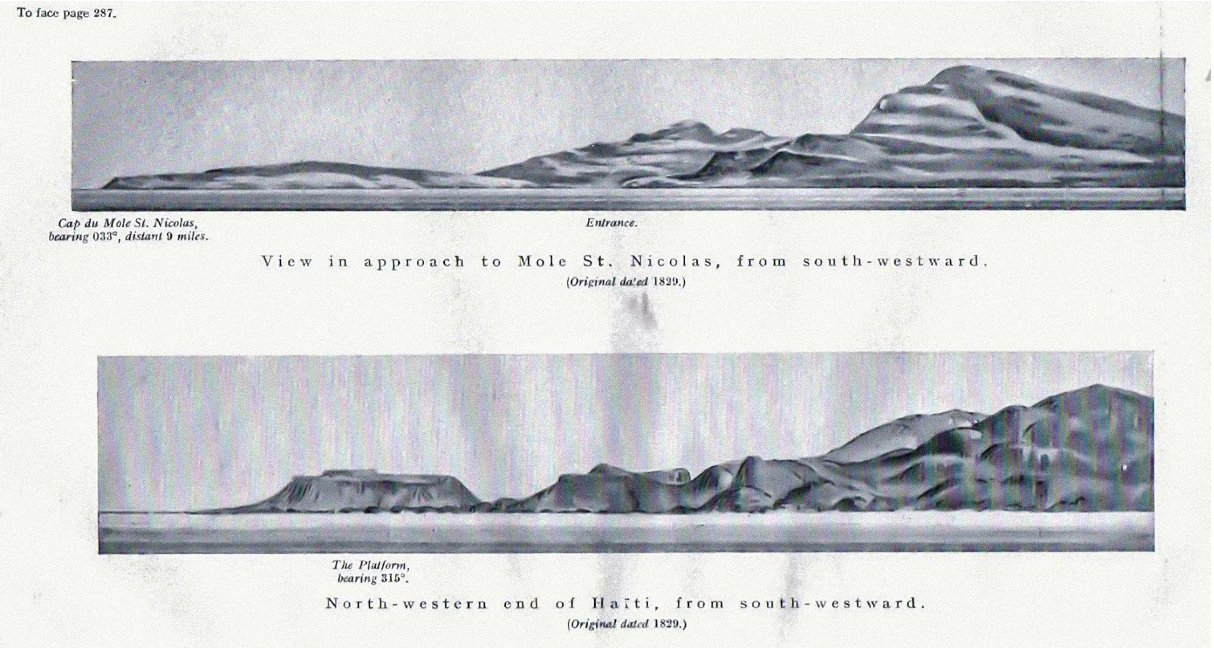
FIXED STARS, 1842. 451

APPARENT PLACES OF THE PRINCIPAL FIXED STARS, FOR THE UPPER TRANSIT AT GREENWICH.

Day of the Month.	α Orionis. R. A.		α Orionis. Dec. North.		μ Geminorum. R. A.		μ Geminorum. Dec. North.		α Argus. (Canopus) R. A.		α Argus. (Canopus) Dec. South.	
	h m 5 46		° ′ 7 22		h m 6 13		° ′ 22 35		h m 6 20		° ′ 52 36	
	s	s	″	″	s	s	″	″	s	s	″	″
Jan. 1	39 ·50		23 ·2		26 ·63		23 ·5		29 ·42		40 ·7	
		0 ·04		0 ·9		0 ·07		0 ·1		0 ·03		3 ·5
11	39 ·54		22 ·3		26 ·70		23 ·4		29 ·39		44 ·2	
		0 ·01		0 ·8		0 ·02		0 ·0		0 ·10		3 ·2
21	39 ·53		21 ·5		26 ·72		23 ·4		29 ·29		47 ·4	
		0 ·05		0 ·7		0 ·03		0 ·1		0 ·17		2 ·9
31	39 ·48		20 ·8		26 ·69		23 ·5		29 ·12		50 ·3	
		0 ·10		0 ·5		0 ·08		0 ·1		0 ·23		2 ·5
Feb. 10	39 ·38		20 ·3		26 ·61		23 ·6		28 ·89		52 ·8	
		0 ·12		0 ·5		0 ·11		0 ·1		0 ·27		2 ·0
20	39 ·26		19 ·8		26 ·50		23 ·7		28 ·62		54 ·8	
		0 ·15		0 ·3		0 ·15		0 ·1		0 ·32		1 ·6
Mar. 2	39 ·11		19 ·5		26 ·35		23 ·8		28 ·30		56 ·4	
		0 ·17		0 ·2		0 ·17		0 ·1		0 ·34		1 ·0
12	38 ·94		19 ·3		26 ·18		23 ·9		27 ·96		57 ·4	
		0 ·17		0 ·1		0 ·18		0 ·0		0 ·36		0 ·6
22	38 ·77		19 ·2		26 ·00		23 ·9		27 ·60		58 ·0	
		0 ·16		0 ·0		0 ·18		0 ·1		0 ·35		0 ·0
Apr. 1	38 ·61		19 ·2		25 ·82		23 ·8		27 ·25		58 ·0	
		0 ·15		0 ·1		0 ·16		0 ·1		0 ·34		0 ·5
11	38 ·46		19 ·3		25 ·66		23 ·7		26 ·91		57 ·5	
		0 ·13		0 ·2		0 ·15		0 ·2		0 ·32		1 ·0
21	38 ·33		19 ·5		25 ·51		23 ·5		26 ·59		56 ·5	
		0 ·10		0 ·3		0 ·11		0 ·2		0 ·29		1 ·5
May 1	38 ·23		19 ·8		25 ·40		23 ·3		26 ·30		55 ·0	
		0 ·05		0 ·4		0 ·08		0 ·2		0 ·24		1 ·9
11	38 ·18		20 ·2		25 ·32		23 ·1		26 ·06		53 ·1	
		0 ·02		0 ·6		0 ·03		0 ·2		0 ·20		2 ·3
21	38 ·16		20 ·8		25 ·29		22 ·9		25 ·86		50 ·8	
		0 ·02		0 ·7		0 ·00		0 ·1		0 ·14		2 ·5
31	38 ·18		21 ·5		25 ·29		22 ·8		25 ·72		48 ·3	
		0 ·07		0 ·7		0 ·05		0 ·2		0 ·08		2 ·9
June 10	38 ·25		22 ·2		25 ·34		22 ·6		25 ·64		45 ·4	
		0 ·12		1 ·0		0 ·10		0 ·1		0 ·01		3 ·1
20	*38 ·37		23 ·2		25 ·44		22 ·5		25 ·63		42 ·3	
		0 ·15		0 ·9		0 ·15		0 ·0		0 ·04		3 ·4
30	38 ·52		24 ·1		*25 ·59		22 ·5		*25 ·67		38 ·9	
		0 ·18		1 ·0		0 ·17		0 ·0		0 ·11		3 ·2
July 10	38 ·70		25 ·1		25 ·76		22 ·5		25 ·78		35 ·7	
		0 ·21		0 ·9		0 ·21		0 ·0		0 ·16		3 ·1
20	38 ·91		26 ·0		25 ·97		22 ·5		25 ·94		32 ·6	
		0 ·24		1 ·0		0 ·24		0 ·1		0 ·22		2 ·9
30	39 ·15		27 ·0		26 ·21		22 ·6		26 ·16		29 ·7	
		0 ·25		0 ·8		0 ·26		0 ·0		0 ·27		2 ·6
Aug. 9	39 ·40		27 ·8		26 ·47		22 ·6		26 ·43		27 ·1	
		0 ·28		0 ·7		0 ·28		0 ·1		0 ·31		2 ·3
19	39 ·68		28 ·5		26 ·75		22 ·7		26 ·74		24 ·8	
		0 ·28		0 ·6		0 ·30		0 ·0		0 ·34		1 ·8
29	39 ·96		29 ·1		27 ·05		22 ·7		27 ·08		23 ·0	
		0 ·30		0 ·4		0 ·31		0 ·1		0 ·37		1 ·3
Sept. 8	40 ·26		29 ·5		27 ·36		22 ·6		27 ·45		21 ·7	
		0 ·29		0 ·2		0 ·31		0 ·1		0 ·40		0 ·7
18	40 ·55		29 ·7		27 ·67		22 ·5		27 ·85		21 ·0	
		0 ·30		0 ·1		0 ·32		0 ·2		0 ·41		0 ·1
28	40 ·85		29 ·6		27 ·99		22 ·3		28 ·26		20 ·9	
		0 ·29		0 ·2		0 ·33		0 ·2		0 ·41		0 ·6
Oct. 8	41 ·14		29 ·4		28 ·32		22 ·1		28 ·67		21 ·5	
		0 ·29		0 ·6		0 ·32		0 ·4		0 ·40		1 ·2
18	41 ·43		28 ·8		28 ·64		21 ·7		29 ·07		22 ·7	
		0 ·28		0 ·6		0 ·31		0 ·3		0 ·38		1 ·8
28	41 ·71		28 ·2		28 ·95		21 ·4		29 ·45		24 ·5	
		0 ·25		0 ·9		0 ·30		0 ·4		0 ·35		2 ·3
Nov. 7	41 ·96		27 ·3		29 ·25		21 ·0		29 ·80		26 ·8	
		0 ·24		1 ·0		0 ·28		0 ·4		0 ·32		2 ·8
17	42 ·20		26 ·3		29 ·53		20 ·6		30 ·12		29 ·6	
		0 ·22		1 ·0		0 ·26		0 ·4		0 ·27		3 ·2
27	42 ·42		25 ·3		29 ·79		20 ·2		30 ·39		32 ·8	
		0 ·18		1 ·1		0 ·23		0 ·3		0 ·20		3 ·5
Dec. 7	42 ·60		24 ·2		30 ·02		19 ·9		30 ·59		36 ·3	
		0 ·14		1 ·1		0 ·18		0 ·3		0 ·15		3 ·6
17	42 ·74		23 ·1		30 ·20		19 ·6		30 ·74		39 ·9	
		0 ·10		1 ·0		0 ·15		0 ·2		0 ·08		3 ·6
27	42 ·84		22 ·1		30 ·35		19 ·4		30 ·82		43 ·5	
		0 ·06		1 ·0		0 ·09		0 ·1		0 ·00		3 ·6
37	42 ·90		21 ·1		30 ·44		19 ·3		30 ·82		47 ·1	

2 G 2

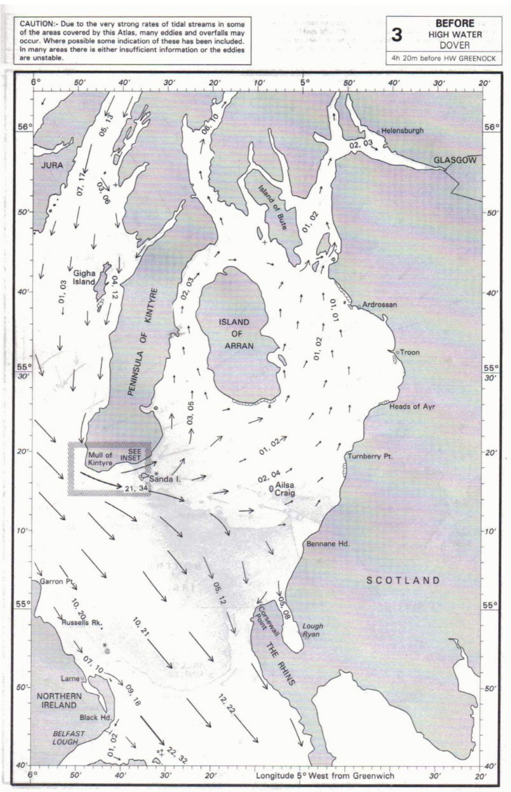
A page from the 1842 Nautical Almanac showing the positions of certain stars.



Coastal views from the West Indies Pilot, 1957, still using pictures drawn in 1829.

TIDES

Tide Tables are particularly important in British waters, where currents are often very strong – the Bristol Channel has the third highest tidal range in the world. Tides are caused by the gravitational pull of the moon and to a lesser extent of the sun – when these two are in line they cause fortnightly 'spring' tides which are especially strong, compared with 'neap' tides at other times. Tides have two main effects on navigation. They create currents which vary from hour to hour and have to be taken into account when using dead reckoning. The navigator usually draws a triangle on his chart showing the course he is steering by compass, the effect of the tide on this, and the course he will actually sail.



One page of the Admiralty Tide Table for the Firth of Clyde. Calculations are usually based on the time of high water at a particular port, in this case Dover. Each arrow shows the direction of the tide during the hour in question. The numbers represent the rate of the tide in knots without the decimal point – eg, 21 means 2.1 knots. The two figures are for spring and neap tides – between these two the navigator will have to interpolate the rate.

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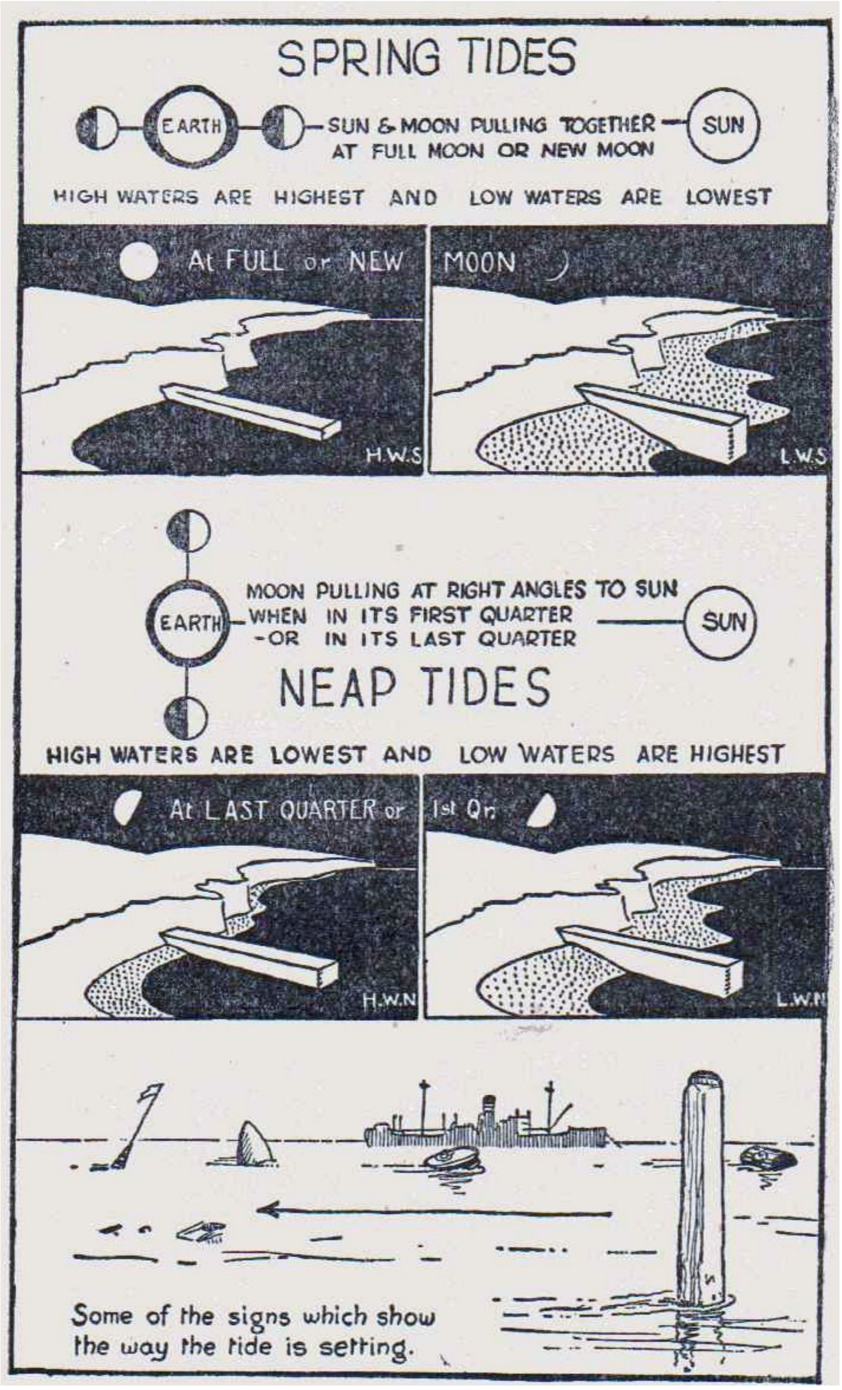
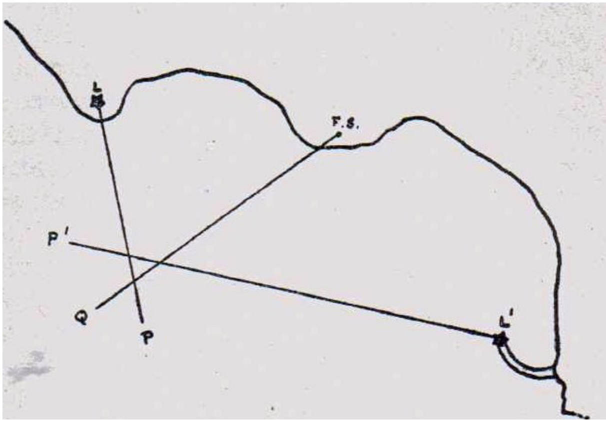


The other effect is the vertical rise and fall of the water level. The navigator needs to know this to enter certain ports, such as Chichester in West Sussex and Salcombe in Devon. This page from the Seaman's Manual of 1943 shows the differences between spring and neap tides, and the signs to look out for to show the tide's direction.

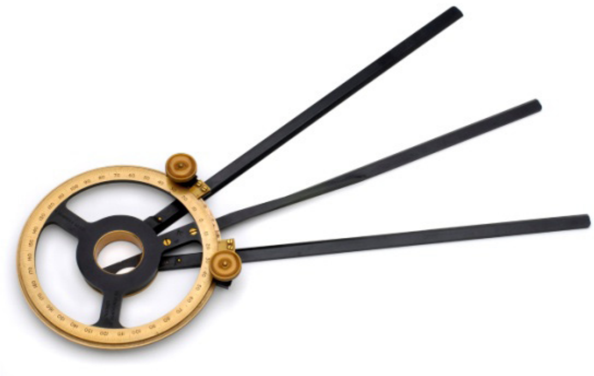
The tidal stream on a buoy in the River Mersey.

FIXES



Within sight of land, a navigator can find his position by taking compass bearings on at least two points. He prefers to use at least three points if possible as a check. It is rare for all three bearings to coincide exactly, the triangle between them is known as a cocked hat and its size gives a good indication of the accuracy.

Taken from The Yachtmaster's guide and Coaster's Companion, by Frank Carr, 1948



It is also possible to use a station pointer, as in this 1910 example, which is independent of the compass. One arm is pointed to each of the three points on land, and then it is moved on the chart so that it touches all three and the centre is over the ship's position.

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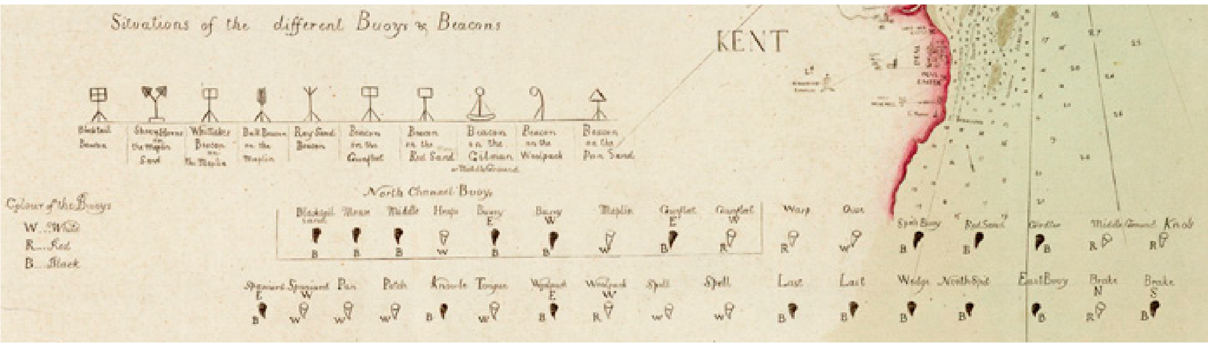
SEA MARKS

For many centuries the users of harbours have found ways to mark shallow water. The simplest and perhaps the oldest is by means of tree branches or 'withies' stuck into the sand or mud. This can still be seen today, for example in the Beaulieu River in Hampshire.

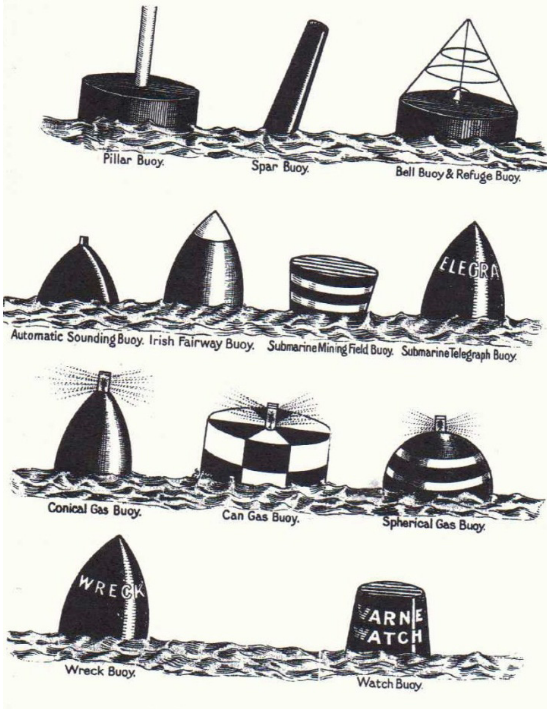
Standard systems of buoyage came rather late in the day and each port used its own method, which the navigator would have to know about.



A selection of buoys and beacons in the Thames Estuary, 1790

(Detail of Chart of the River Thames from London to the Nore, Margate and the Downs, North, Middle and South Channels, from a survey taken in 1789 and 1790) G218:8/1

© National Maritime Museum, Greenwich, London



A selection of late-19th-century buoys

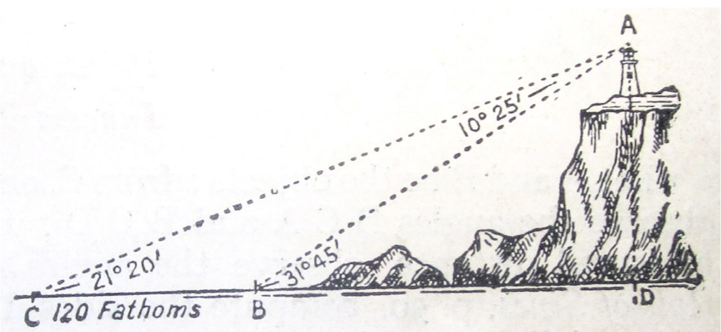
Taken from The Pilot's Handbook for the English Channel, J W King, JD Potter, London, 1882

The title 'beacon' can be misleading as these are not necessarily lighted but are just fixed marks, such as a post in the water. Beacons are likely to be painted in the same way as buoys in the region. Lighted buoys came into use during the 19th century, using gas and then electricity.

The purpose of a lighthouse is not just to mark out a danger. Each light has its own pattern of flashing lights, which helps the navigator arriving after a long voyage to find what area he is in. He can also calculate his position more accurately by taking a compass bearing on the light, and using his sextant to measure his distance from it, for the height of the light is recorded in his pilot book.

This is a model of the fourth Eddystone Lighthouse made by one of its keepers, George Knott, around 1865. It was replaced by the present lighthouse in 1882.

SLR2902 © National Maritime Museum, Greenwich, London

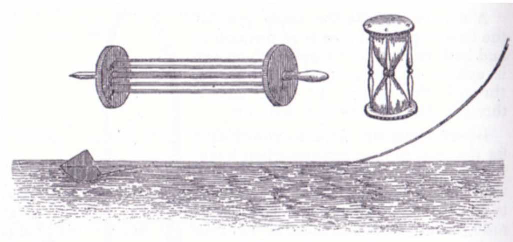


Using a sextant to measure the distance from a lighthouse.

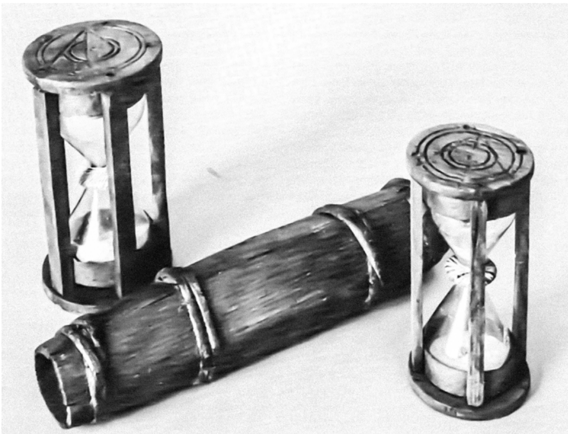
Taken from The Yachtmaster's guide and Coaster's Companion, by Frank Carr, 1948

SPEED AND DISTANCE

The navigator has to know how far the ship has travelled to use dead reckoning. In the past this was done by casting a piece of wood (the log) over the side to measure the speed. In the simplest form the time it took to travel the length of the ship was measured. In a more sophisticated method, a piece of wood shaped like a sector of a circle was dropped over the side, attached to a line. The line was allowed to run out for a fixed period of time, measured by a small sandglass. The number of knots the line had run out was found, and that gave the speed of the ship at that moment. It did not give a continuous reading, so the log had to be run out at intervals during each watch and then an average speed found to give some indication of the distance covered.

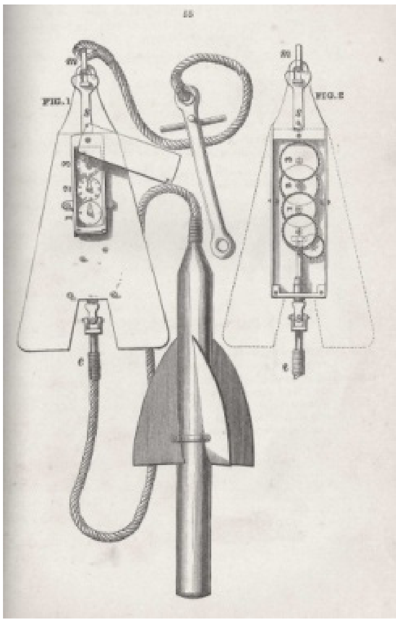


A log and its line, the reel to which it is attached, and the sandglass used for timing.
From William Falconer, Universal Dictionary of the Marine, various editions from 1769, and reprints from 1970



Sandglasses recovered from the wreck of the Invincible, with an ink container between them.
© Chatham Historic Dockyard Trust

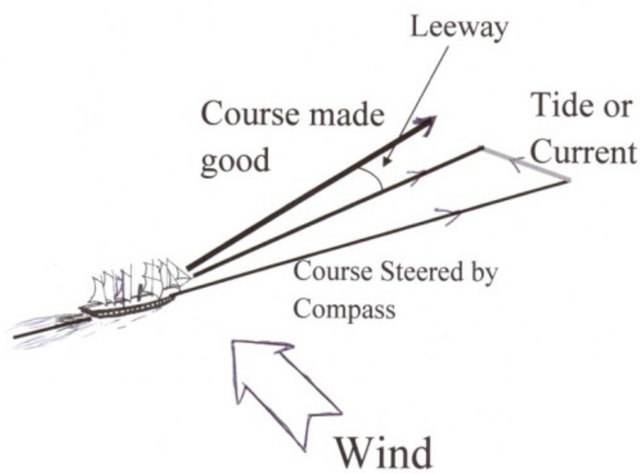
Ship's officers using a log line, c 1880
Taken from The Maritime Compendium, Conway, London, 1998



A patent log, showing the line and impeller
From Nares's Seamanship of 1842

DEAD RECKONING

If he does not have any sight of land and the sky is covered by cloud, then the navigator has to rely on dead reckoning as a method to estimate his position (the name may come from 'deduced' reckoning). This is calculated by working out the distance covered in a given period (see section above) and the direction travelled. Neither of these could be calculated with complete accuracy except in ideal conditions. The compass is the main means of finding the direction travelled but has to be corrected for deviation and variation (the difference between the compass and true north); leeway, i.e. the amount the ship is pushed sideways by the wind; and any tide or current.

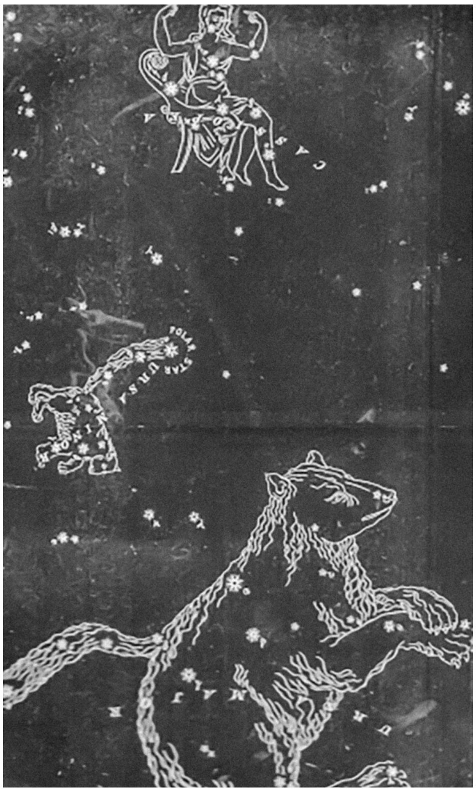


Moreover, in a sailing ship it is not always possible to steer a steady course over a period. This is calculated using a traverse board, in which the helmsman inserts a peg on a compass rose to record what he was able to steer during a short period, usually half an hour, which allows an estimate of the actual course to be calculated.

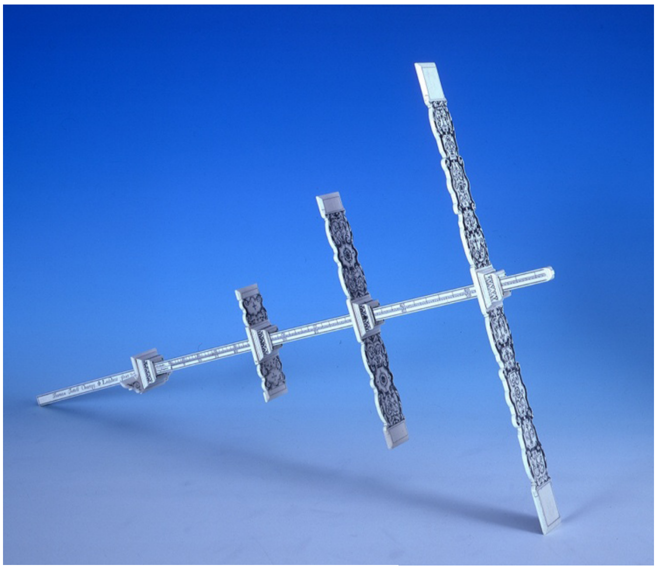
A traverse board from c 1800
NAV1698
© National Maritime Museum, Greenwich, London

ASTRAL NAVIGATION

When out of sight of land for any length of time, the navigator had to rely on sightings of celestial bodies to check on his dead reckoning. In many ways the sun was the most useful. By measuring its angle at noon it was possible to determine the ship's latitude quite accurately. The stars are also useful in that a fix of three or more can give an accurate position.

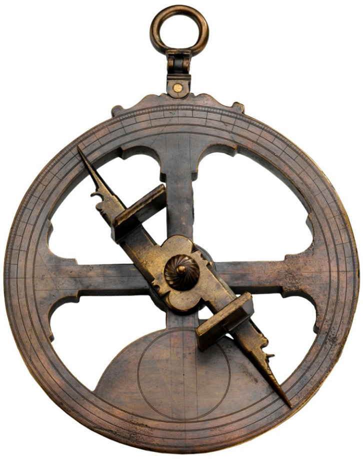


Star charts like this one from Rosser's Navigation, 1885 were used to explain and simplify the heavens for mariners.



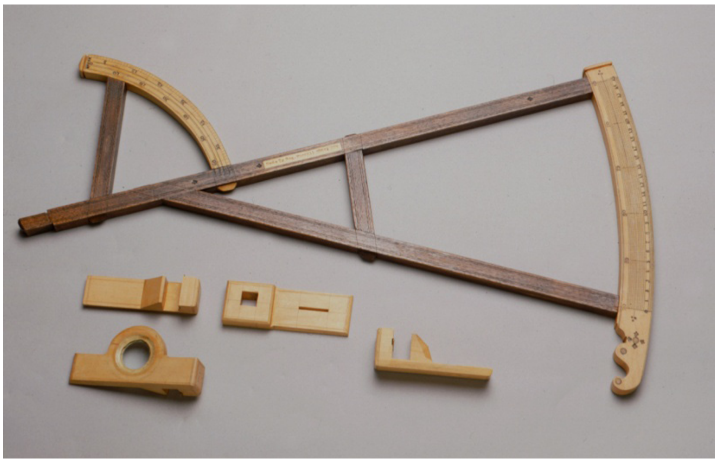
One of the most important issues in celestial navigation was to measure angles as accurately as possible. The cross staff used moveable vanes along a central staff – though only one was normally fitted at a given moment, according to the size of the angle. It could not be used to measure the angle of the sun without the danger of blindness. This example by Thomas Tuttell dates from around 1700.

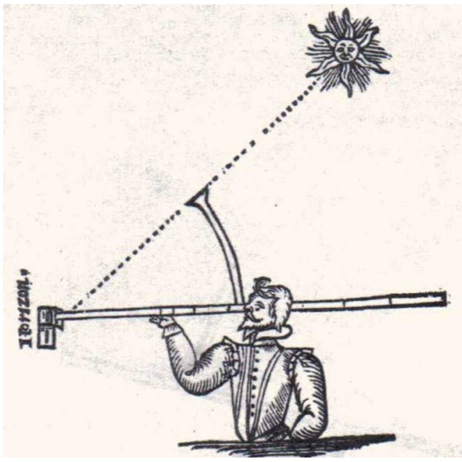
NAV0505



The astrolabe solved the problem of the sun by letting it shine through two holes in the moveable arm in the centre. It was heavy to keep it vertical when suspended, but it was difficult to use in a moving ship.

1985 copy of Mariner's Astrolabe, NAV0027





The backstaff solved the problem in a different way by having the observer's back to the sun. Its use is shown in this drawing of 1595.

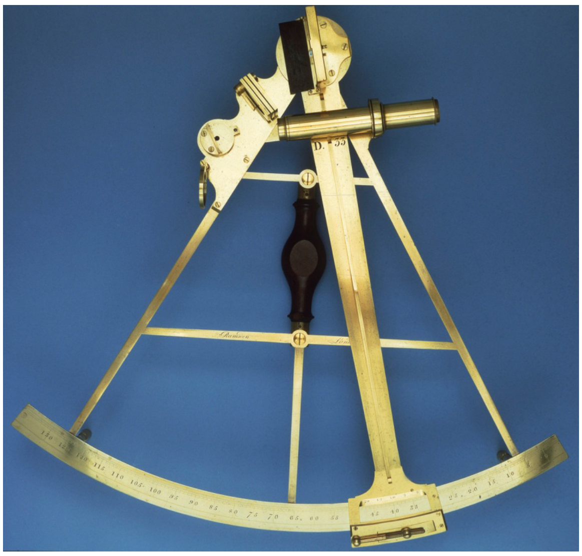
Replica backstaff, 1981, NAV0047 © National Maritime Museum, Greenwich, London

With the quadrant, one edge was pointed towards the celestial body and a pendant indicated the angle. This example of a horary quadrant by Henry Sutton is from 1658.

NAV1042

The octant, often confusingly known as the quadrant, solved the problem more efficiently by using shades when looking at the sun. Though it only had an angle of 45 degrees or an eighth of a circle, this was doubled by the use of mirrors so that it could measure the angle of any celestial body. It was usually made of wood and ebony in this example by Troughton of around 1770, with features in brass.

NAV1318



The sextant was a development of the octant and the ultimate solution to the problems of measuring angles. It comprised a sixth of a circle or 60 degrees, increased to 120 degrees by mirrors, which was useful for measuring the angles between objects on shore. It was usually made of brass and is still in use in modern times. This example by Jesse Ramsden of circa 1772.

NAV1236

FINDING THE TIME

The navicula was a form of portable sundial used in late medieval times. This example dates from 1425–75.

Navicula de Venetiis. AST1146

Seamen need to measure the time for routine purposes such as timing the log and changing watches, but only a limited accuracy is needed for these purposes. For celestial navigation, especially for measuring longitude, it is essential to know the time far more accurately and any error over a period is likely to be cumulative. In the 18th century Thomas Harrison famously developed the chronometer as a very accurate clock for this purpose.

This example by Langford, William & Son dates from 1883 and is kept in a box to protect it.

ZAA0082

ELECTRONIC NAVIGATION

Since 1945 various electronic aids have become available to the navigator, including radar which can be used to take bearings and distances on objects on shore, and which is fitted to vessels as small as yachts. Other aids use radio beams to determine position.

The simplest aid was the radio direction finder which had to be pointed at a number of radio stations to take a fix. This example dates from around 1965.

Navicator (sic) ZBA2292

© National Maritime Museum, Greenwich, London

Loran (LOng RAnge Navigation) was an American system developed late in the Second World War. It was based on the time difference between the receipt of signals from a pair of radio transmitters. It has been run down since 2009 with most of its signals being shut off. Image:

from http://en.wikipedia.org/wiki/LOng_RAnge_Navigation by Morn the Gorn, 2010

The Decca navigator also used a chain of shore-based radio stations, mostly in European waters, and was mainly useful in coastal areas. It was switched off in 2000. This is a set from around 1969.

Decca Navigator Mk30 ACO1423

© National Maritime Museum, Greenwich, London. ACO collection

Modern Satnav systems provide a continuous reading on a visual map, so navigation is largely de-skilled unless it breaks down. Modern navigation aids do not make particularly attractive displays and are difficult to interpret without some reading on them, but they give a history both of navigation and modern electronics.

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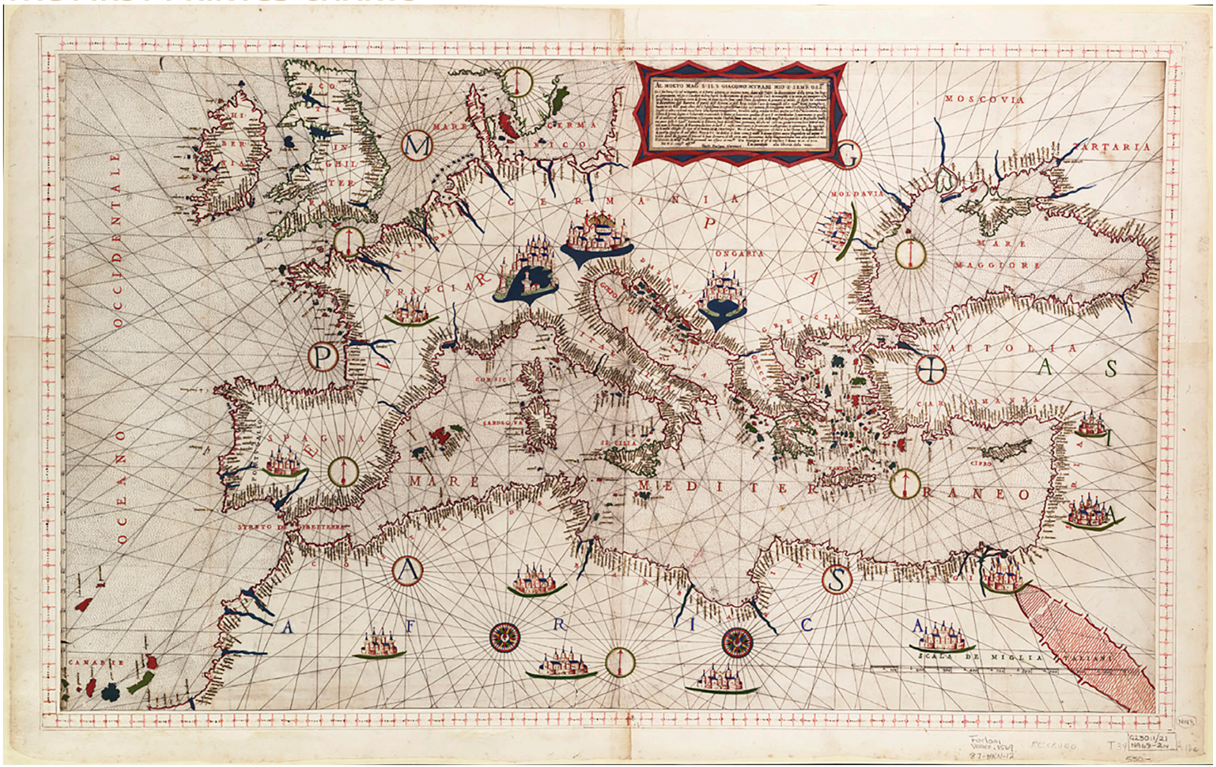
2 CHARTS

BY BRIAN LAVERY, CURATOR EMERITUS, NATIONAL MARITIME MUSEUM

By definition a sea chart differs from a land map in that it places the main emphasis on sea features. It usually shows land features that are relevant, including dangers, ports and prominent landmarks, such as church steeples, that can be used for fixes. As well as forming part of the collection of a museum, charts can also guide the curator on the maritime history of the local area, which makes it important to be able to source and understand them.

THE FIRST PRINTED CHARTS



Printed charts were very rare until the second half of the 16th century, about a century after printing was introduced to Europe. This example, by Forlani and Homem, dates from 1569. It shows the Mediterranean and west coasts of Europe quite well, but northern Britain and Denmark are inaccurate.

G230:1/21 © National Maritime Museum, Greenwich, London

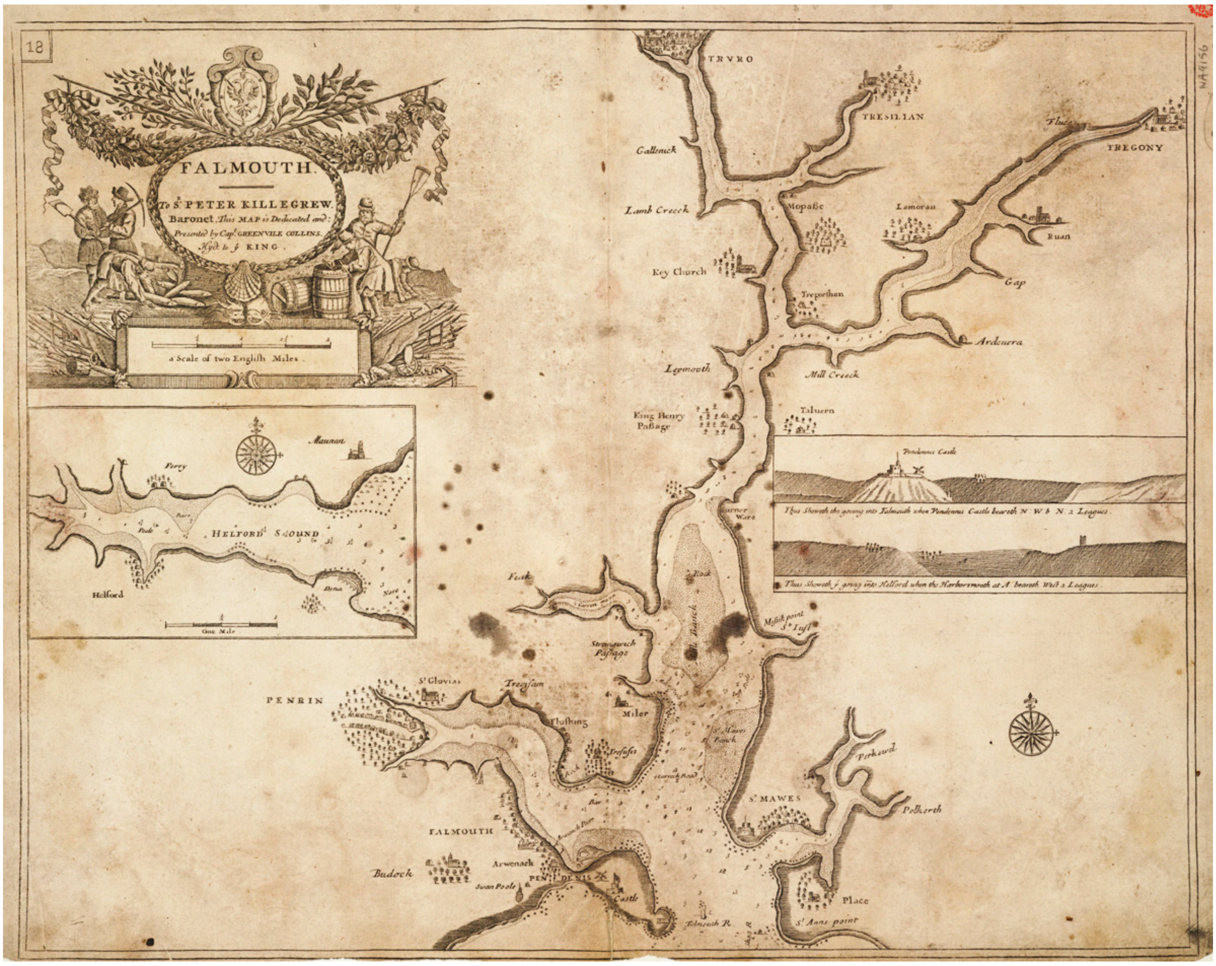
'WAGGONERS'

The first printed charts in common use were to be found in the Dutchman Lucas Janszoon Waghenaer's atlas *Spieghel der Zeevaerdt* of 1583. It was copied and translated into English as *The Mariner's Mirror* in 1588. It became popular and charts were known as 'Waggoners'. Estuaries and river mouths are often exaggerated.

This example shows the Firth of Forth with Edinburgh near the top centre, with the rivers Tay and Montrose basin to the left, then the Dee at Aberdeen.

GREENVILE COLLINS

Greenvile Collins (d. 1694) was the first to conduct a systematic survey of the British coast, replacing the outdated Waggoners. It was conducted between 1683 and 1693 and many of the results were published in *Great Britain's Coasting Pilot* in 1694.



This example shows Falmouth in 1693, a relatively new port at the time.
G223:2/140 © National Maritime Museum, Greenwich, London

A GOLDEN AGE

There was a kind of golden age of chartmaking in the second half of the 18th century. Among the gems was Captain James Cook's survey of New Zealand of 1769–70, conducted during his voyage in the *Endeavour*.

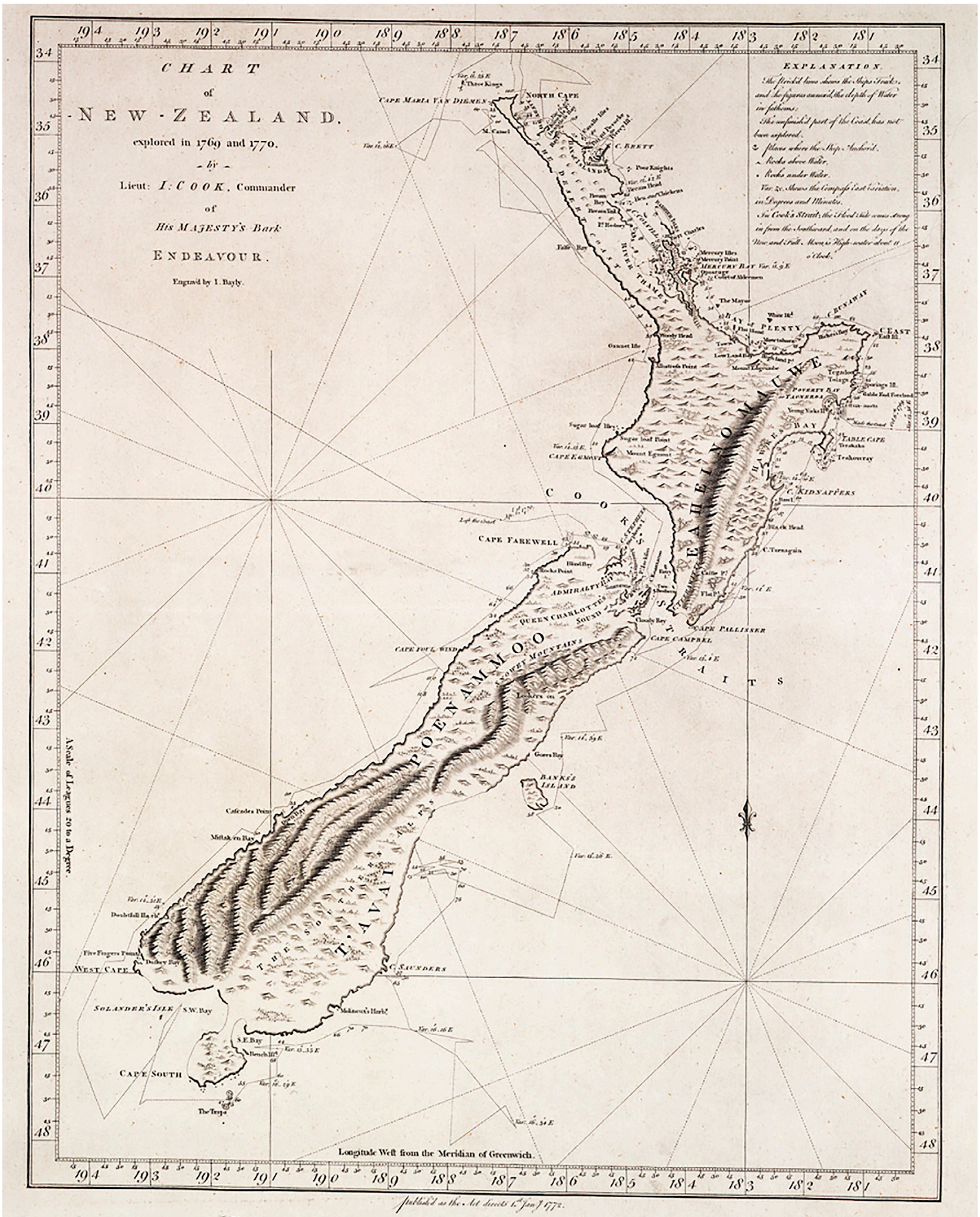
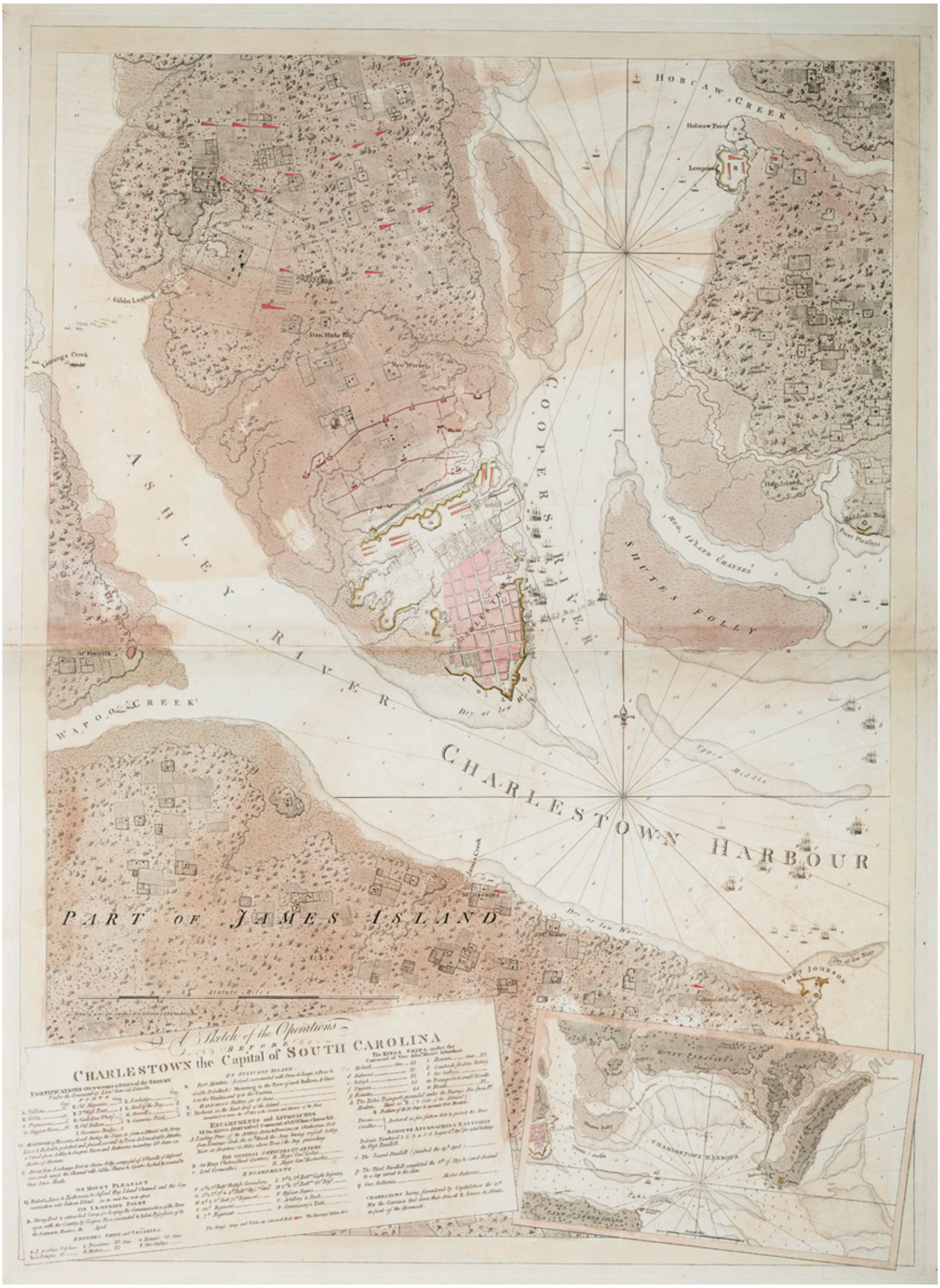


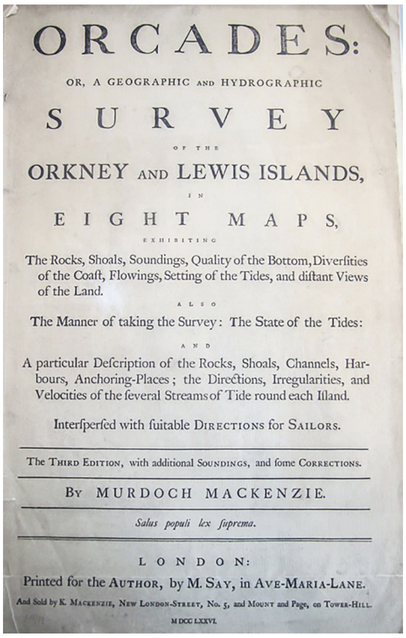
Chart of New Zealand, explored in 1769 and 1770 by Lieut. J. Cook.
G263:1/2 © National Maritime Museum, Greenwich, London

W. Des Barres was a Swiss man who served with the British army and produced a beautiful detailed series of charts of North America just as the colonies declared their independence.



This chart shows the siege of Charleston in 1780.
HNS 164 © National Maritime Museum, Greenwich, London

THE MACKENZIES


ORCADES:

OR, A GEOGRAPHIC AND HYDROGRAPHIC

SURVEY

OF THE

ORKNEY AND LEWIS ISLANDS,

IN

EIGHT MAPS,

EXHIBITING

The Rocks, Shoals, Soundings, Quality of the Bottom, Diverſities of the Coaſt, Flowings, Setting of the Tides, and diſtant Views of the Land.

ALSO

The Manner of taking the Survey: The State of the Tides:

AND

A particular Deſcription of the Rocks, Shoals, Channels, Harbours, Anchoring-Places; the Directions, Irregularities, and Velocities of the ſeveral Streams of Tide round each Iſland.

Interſperſed with ſuitable DIRECTIONS for SAILORS.

The THIRD EDITION, with additional SOUNDINGS, and ſome CORRECTIONS.

BY MURDOCH MACKENZIE.

Salus populi lex ſuprema.

LONDON:

Printed for the AUTHOR, by M. SAY, in AVE-MARIA-LANE.

And Sold by K. MACKENZIE, NEW LONDON-STREET, No. 5, and MOUNT and PAGE, on TOWER-HILL.

MDCCLXXVI.

Murdoch Mackenzie (c 1712–97) was an Orkney schoolmaster who surveyed his native islands. His main innovation was to base it on land surveys by triangulation, which made it far more accurate. He published his Orcades in 1751 (left and below). After that he was commisioned by the Admiralty to survey parts of the west coast of Scotland, England and Ireland.

Mackenzie's charts showed much detail of the tricky tidal streams in Orkney, as indicated by arrows and text.

Mackenzie's work was taken up by his nephew, Murdoch Mackenzie the younger (1743–1829), a naval officer. He continued to survey the coast from the Bristol Channel and the south and east coasts. In the Thames Estuary he discovered a new channel which became one of the main ones for shipping.

This chart shows Portsmouth and the Isle of Wight, a vital area for naval operations and anchorages.
(St.Helen's Road Spithead Portsmouth and Langstone harbours. Surveyed in 1783 by Lieut. Murdoch Mackenzie Junr.)
G223:2/77 © National Maritime Museum, Greenwich, London

THE ADMIRALTY HYDROGRAPHIC OFFICE

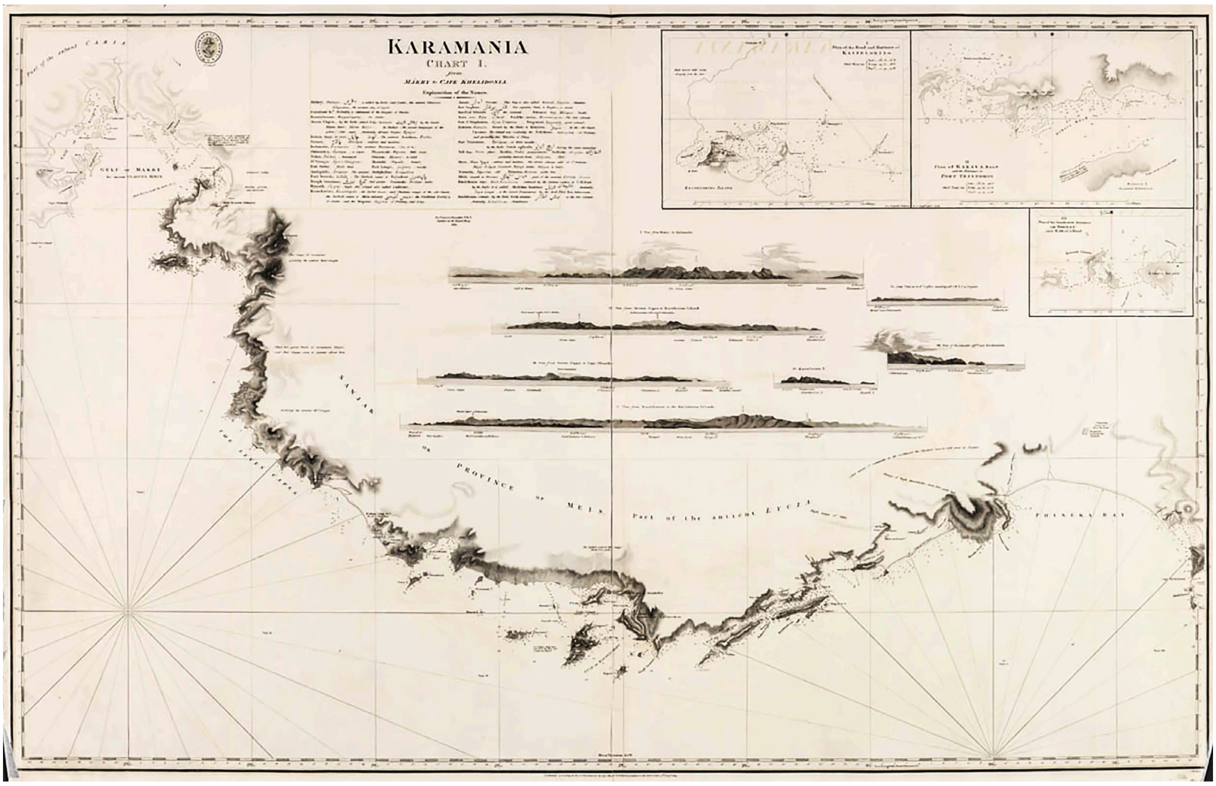
The Admiralty Hydrographic Office was set up in 1795 under the very experienced but controversial surveyor Alexander Dalrymple (1737–1808). Initially the brief was to organise the collection that had been accumulated in the office, then from 1800 new charts were printed, based on captains' observations, manuscripts already in the office, and foreign charts.

A chart of the harbour of Valetta in Britain's new possession of Malta. It was published by Thomas Hurd in 1808, the year in which he succeeded Dalrymple at the Admiral Hydrographic Office. Hurd copied the map from the Frenchman Choiseul-Goffier.

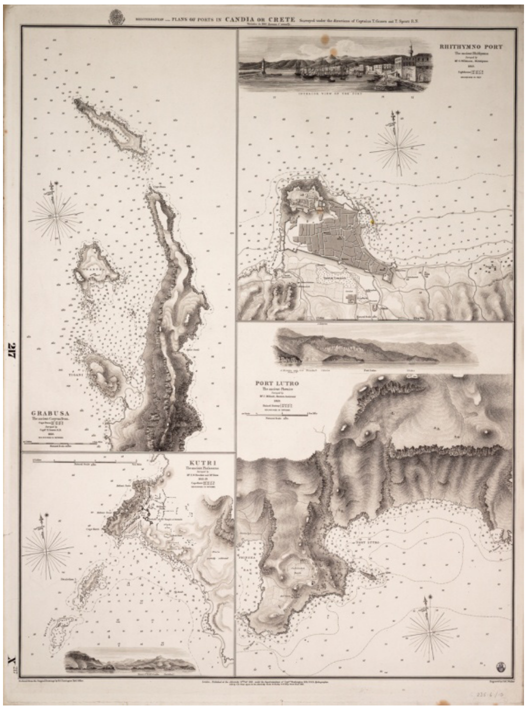
G234:4/10 © National Maritime Museum, Greenwich, London

FRANCIS BEAUFORT

Francis Beaufort (1774–1857) became Hydrographer of the Navy in 1829, having already conducted a notable survey of Turkish waters. As well as developing the famous wind scale, he ordered new surveys of the British Isles and much of the world, setting new standards for accuracy. More than a thousand of his surveys were published between 1835 to 1855.

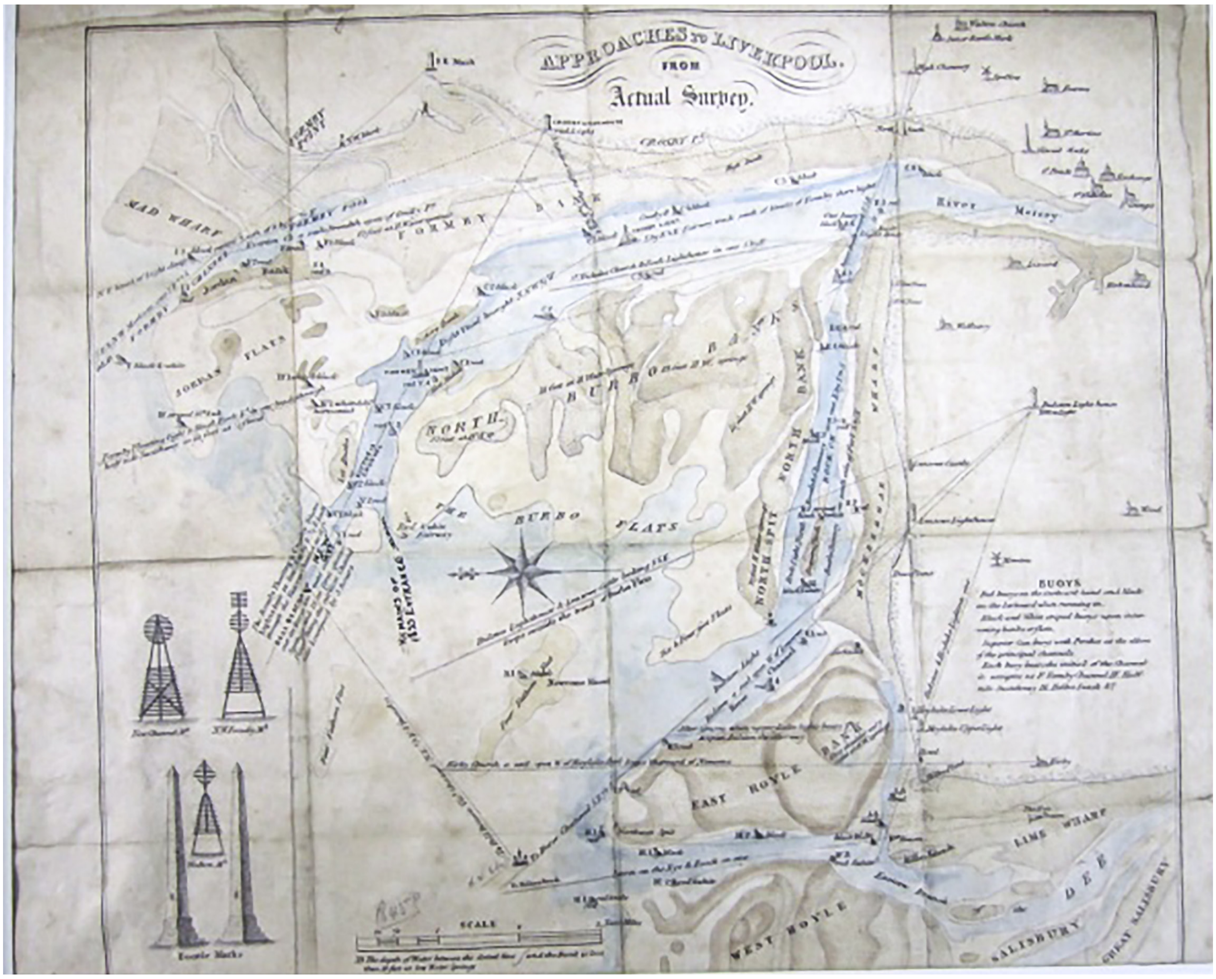


One of Beaufort's Turkish charts: Karamania Chart I from Makry to Khelidonia, 1811.
G235:8/6 © National Maritime Museum, Greenwich, London



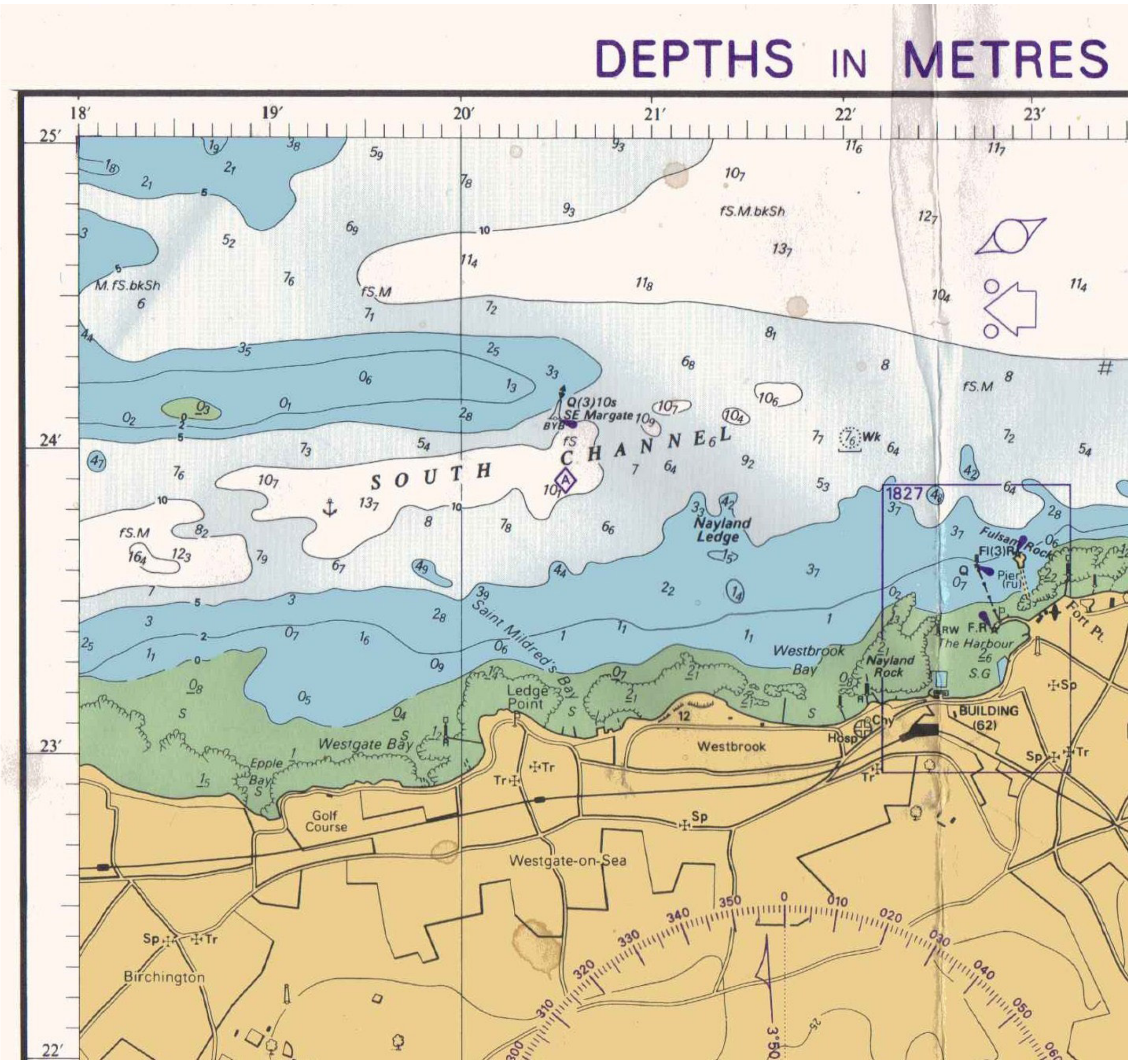
Plans of ports of Crete surveyed under the direction of Captains T. Graves and T. Spratt in 1850 on behalf of the Admiralty.
G235:6/10 © National Maritime Museum, Greenwich, London

LOCAL CHARTS



Many local charts were produced in the 19th century, including this one of the approaches to Liverpool, dating from around 1845.
With kind permission of National Museums Liverpool

METRICATION

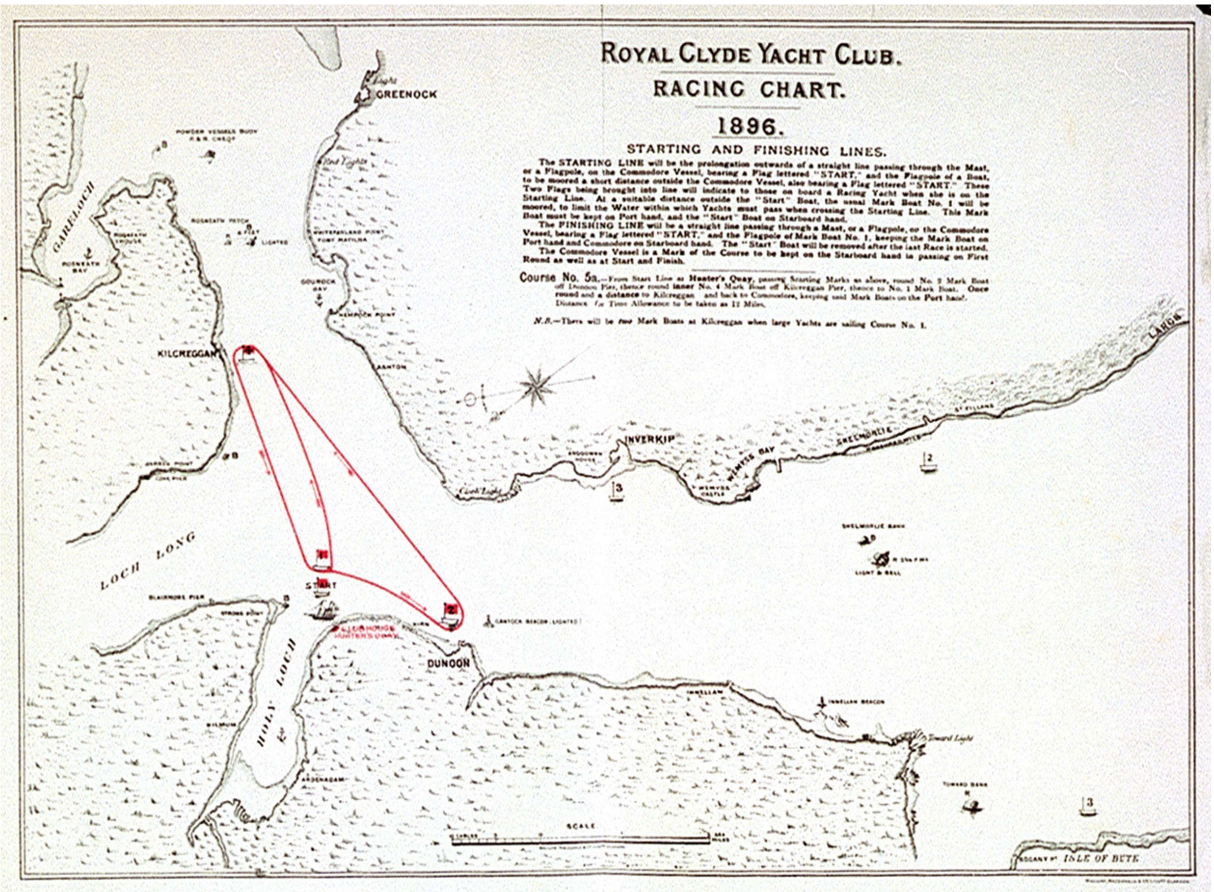


Example of modern Admiralty charts
© National Maritime Museum, Greenwich, London

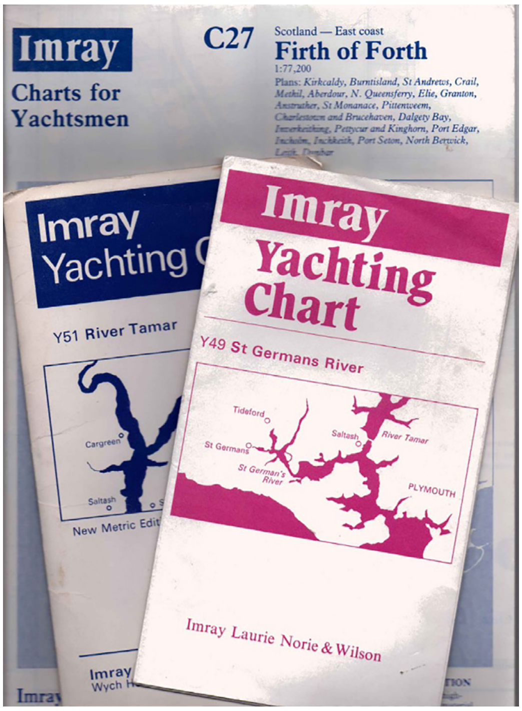
In modern metric charts, the land is marked in yellow and the 'drying' areas, which are exposed at low tide, in green. Water less than five metres deep is in solid blue, with lighter blue for up to ten metres. The depth is marked in meters and tenths, i.e. 137 equals 13.7 metres. The chart datum is not the 'lowest astronomical tide' in modern Admiralty charts. The 'lowest astronomical tide' is the level below which tides almost never fall as they are theoretically the lowest possible tide achievable by the combined actions of the moon and sun.

YACHTING CHARTS

Yachtsmen can always use standard Admiralty charts, but often they prefer to use ones tailored to their needs, perhaps smaller and folding, rather than rolled, with different levels of information.



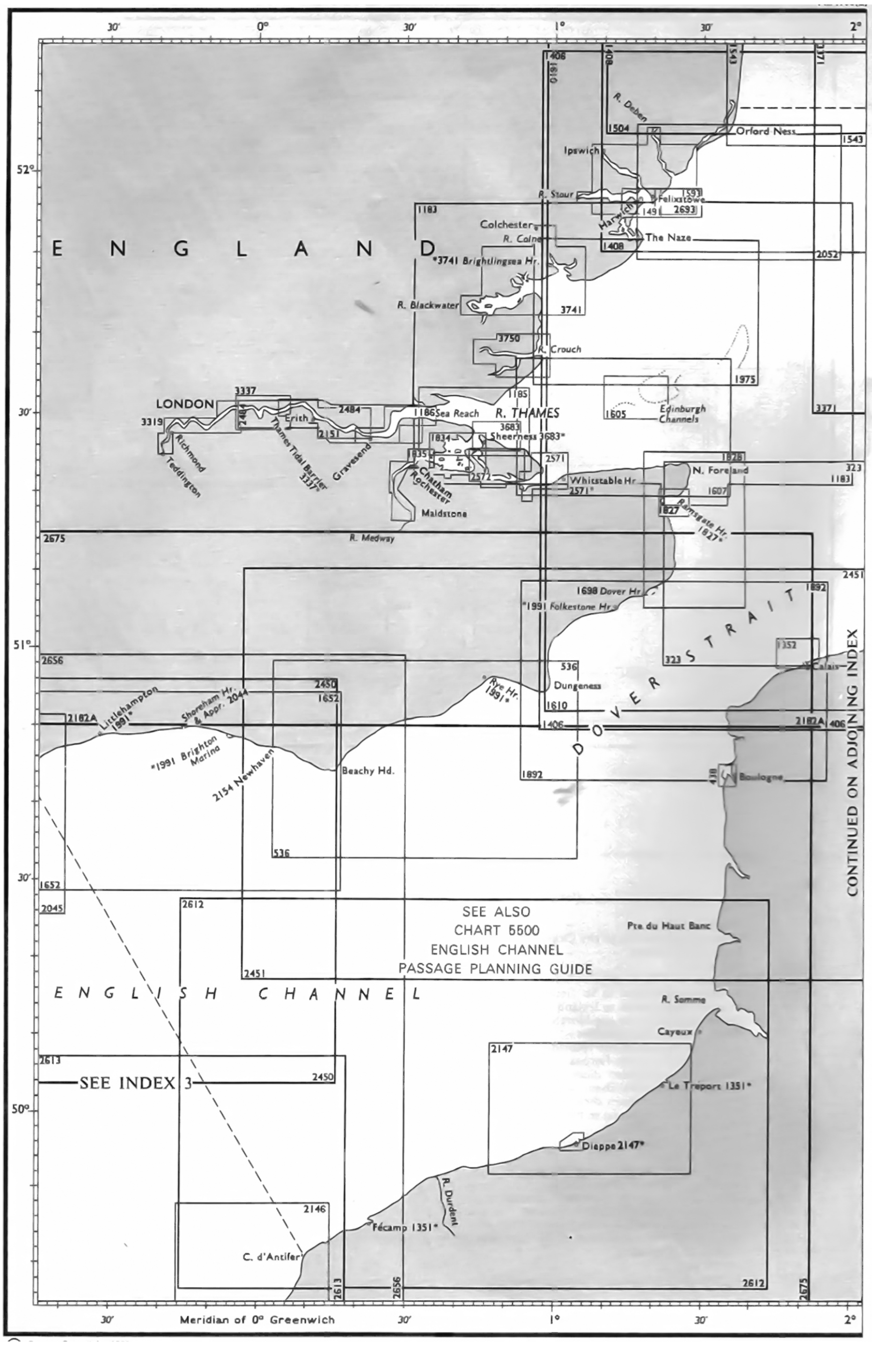
An early example of a chart for yachtsmen, showing the course of a race in the Firth of Clyde in 1896.
PAE0610 © National Maritime Museum, Greenwich, London



Many different types of yachting charts are produced by firms such as Imray.

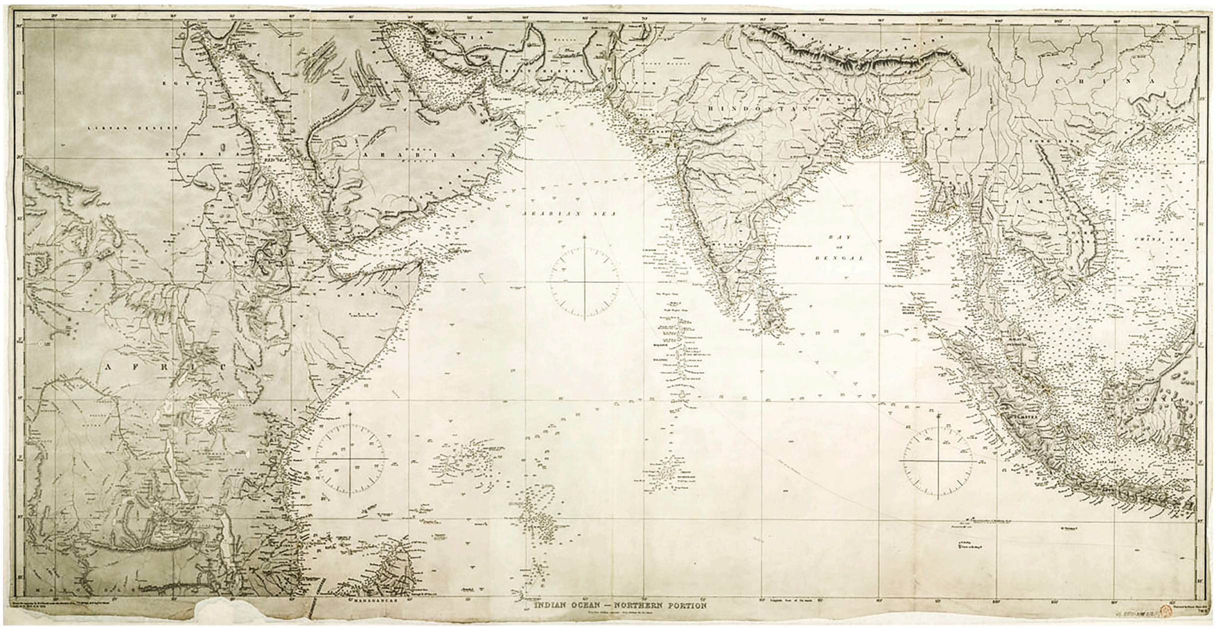
SCALES

There is no standard scale for sea charts, unlike land maps. They were often designed to fit the size of a ship's chart table rather than being made to a specific scale. Those listed in the 1984 *Catalogue of Admiralty Charts, Home Edition* include the Norwegian Sea at a scale of ten million to one, and charts of harbours such as Bridport and Cowes at 1:3500.



This diagram shows the charts available for part of the North Sea and English Channel.

From 1984 Catalogue of Admiralty Charts, Home Edition



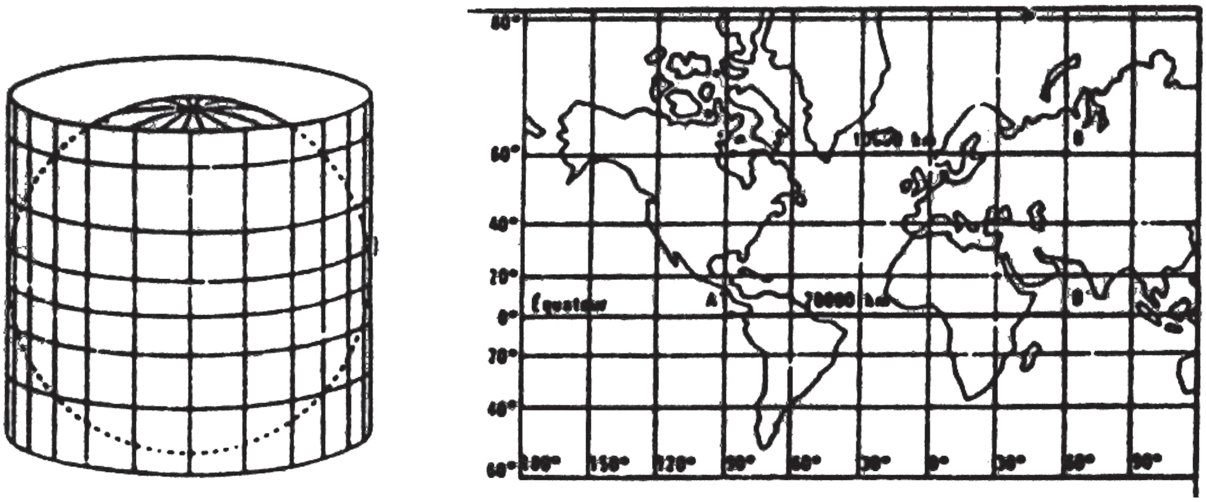
Even smaller scales were used on ocean charts. This Admiralty chart of part of the Indian Ocean from 1870 is to a scale of 1:8,220,000.

G250:2/2(1) © National Maritime Museum, Greenwich, London

Cowes Harbour by E W Brooker in 1865, to a scale of 1:2380.

G223:2/160 © National Maritime Museum, Greenwich, London

PROJECTIONS



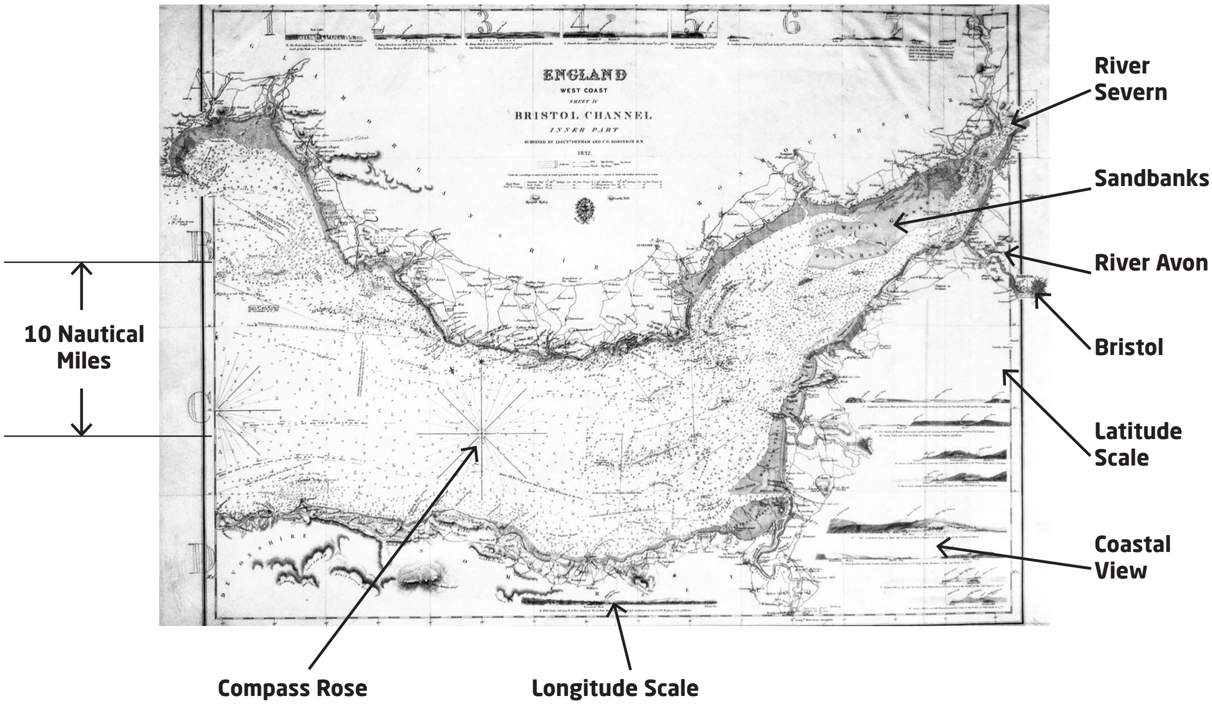
Most charts use Mercator's projection, showing a globe opened out and the distances expanded north and south away from the equator, from Chamber's Encyclopedia.

Mercator's projection does not work in the polar regions, so the gnomic projection is used.

Chart of the North Polar Sea, 1835

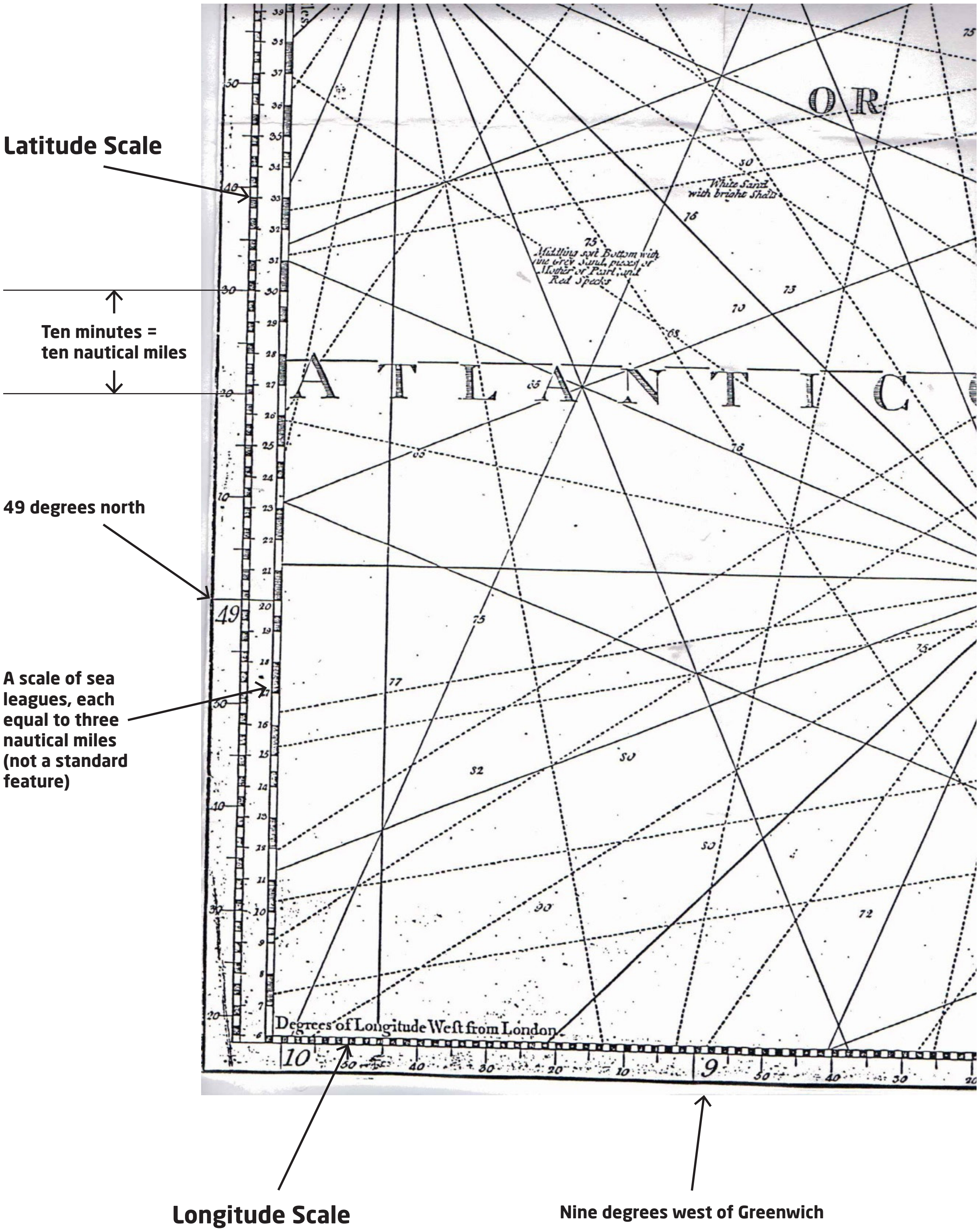
G282:1/4(2) © National Maritime Museum, Greenwich, London

FEATURES OF A CHART



The Bristol Channel in a chart of 1832
G222:1/11 © National Maritime Museum, Greenwich, London

LATITUDE AND LONGITUDE

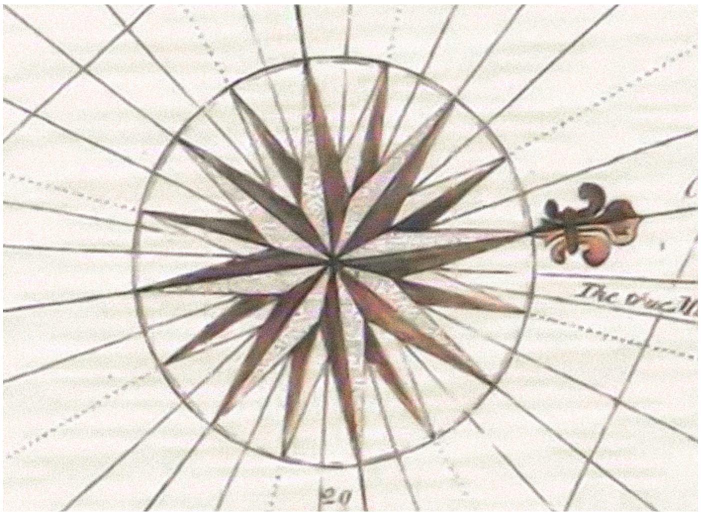


© National Maritime Museum, Greenwich, London

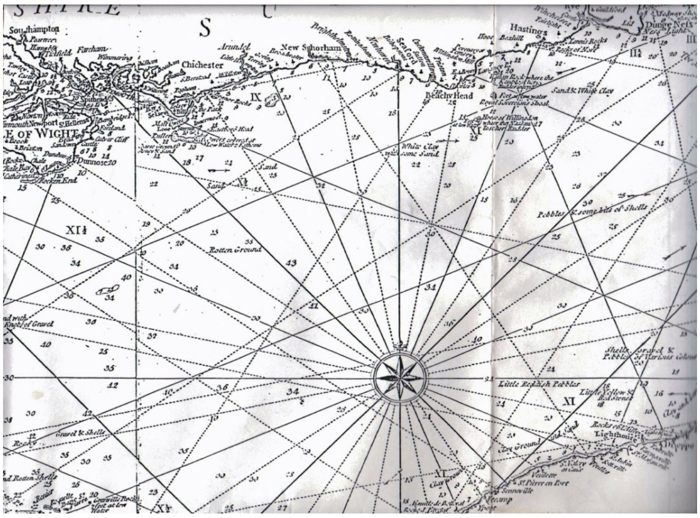
The navigator always measures nautical miles from the latitude scale, and the distance between the degrees of longitude reduces the further one moves away from the equator. The size of the degrees of latitude as marked on the chart also increases, even within a single chart if it is on a small scale. In that case it is important that the navigator takes their measurements on the same latitude as they are working.

THE COMPASS ROSE

A chart usually had a compass rose, showing north and other directions. Often they were drawn quite elaborately. Sometimes they showed magnetic as well as true north, though that might vary over the years.

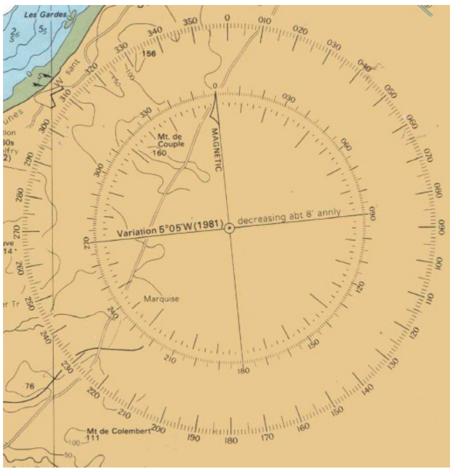


Charts were not always oriented to the north, as in this one by Lewis Morris in 1748.
© National Maritime Museum, Greenwich, London



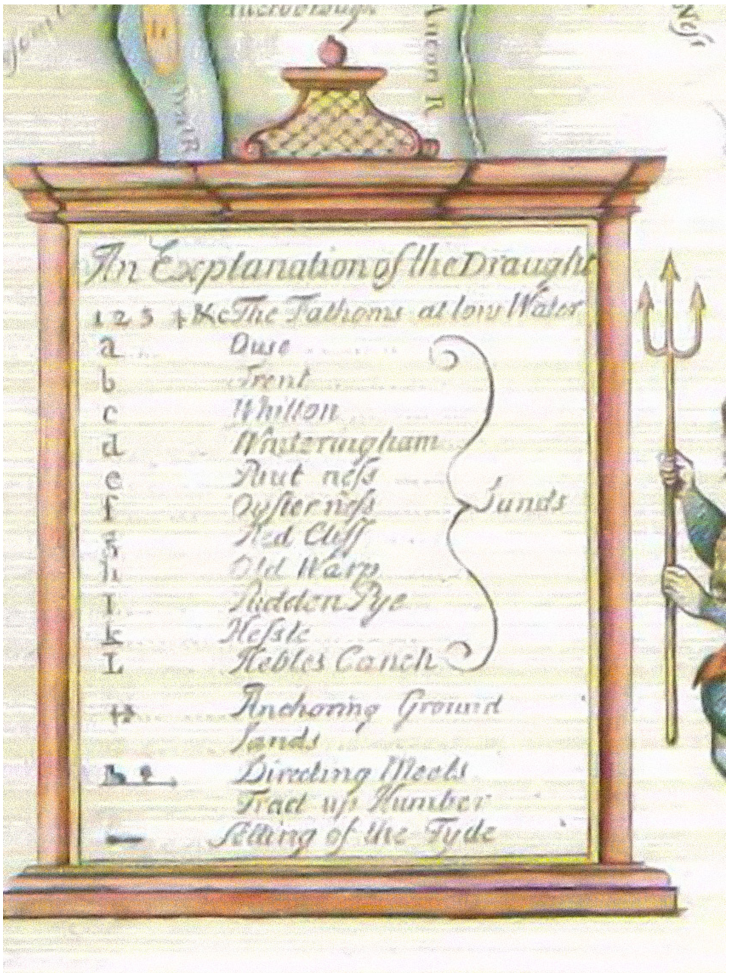
© National Maritime Museum, Greenwich, London

Many charts showed lines drawn parallel to the directions on the compass rose (loxodromes) to make it easier for the navigator to lay off courses using his parallel rule.



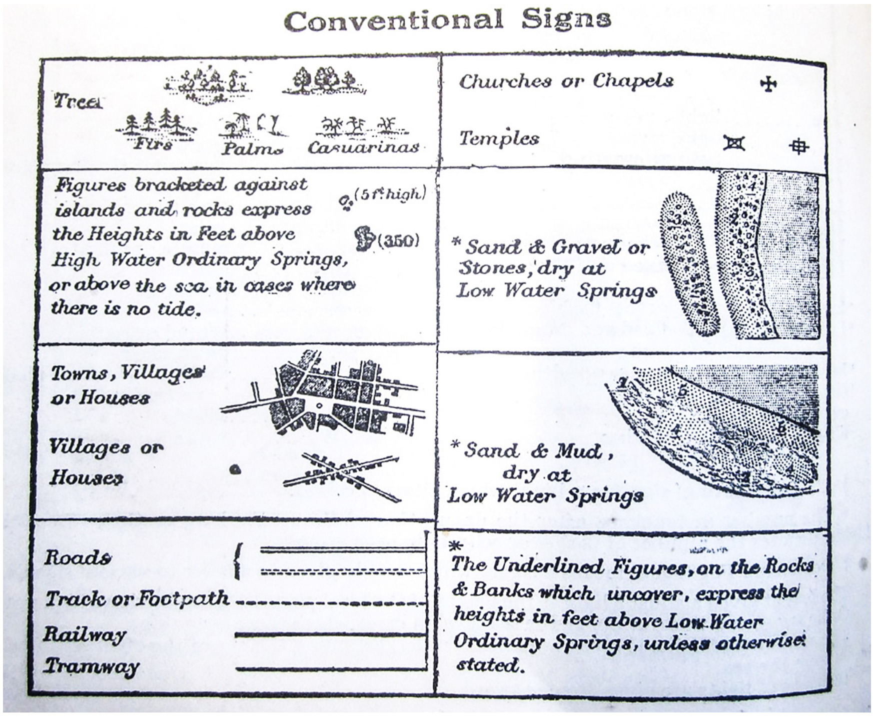
A compass rose on a modern chart, marked in degrees and showing variation, with an indication of how much it might change over the years.
© National Maritime Museum, Greenwich, London

SYMBOLS



In the early 18th century each chartmaker tended to use his own system of symbols, as shown on John Scott's chart of the Humber in 1714.

© National Maritime Museum, Greenwich, London



Conventional Signs

Trees — Firs, Palms, Casuarinas

Churches or Chapels

Temples

Figures bracketed against islands and rocks express the Heights in Feet above High Water Ordinary Springs, or above the sea in cases where there is no tide. (5 ft high) (350)

* Sand & Gravel or Stones, dry at Low Water Springs

Towns, Villages or Houses

Villages or Houses

* Sand & Mud, dry at Low Water Springs

Roads

Track or Footpath

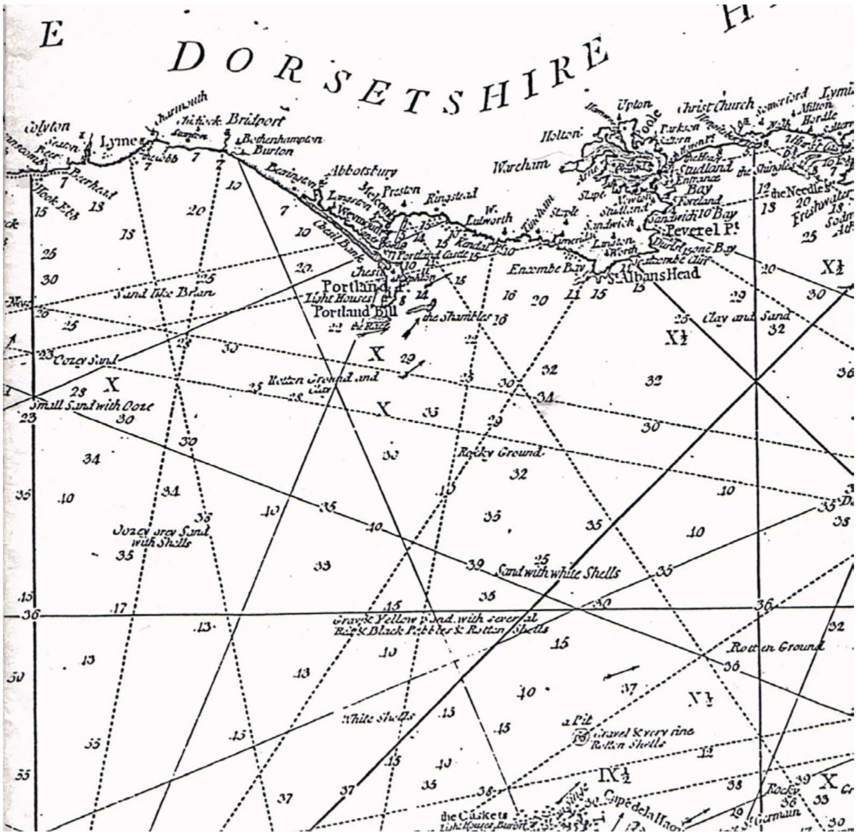
Railway

Tramway

* The Underlined Figures, on the Rocks & Banks which uncover, express the heights in feet above Low Water Ordinary Springs, unless otherwise stated.

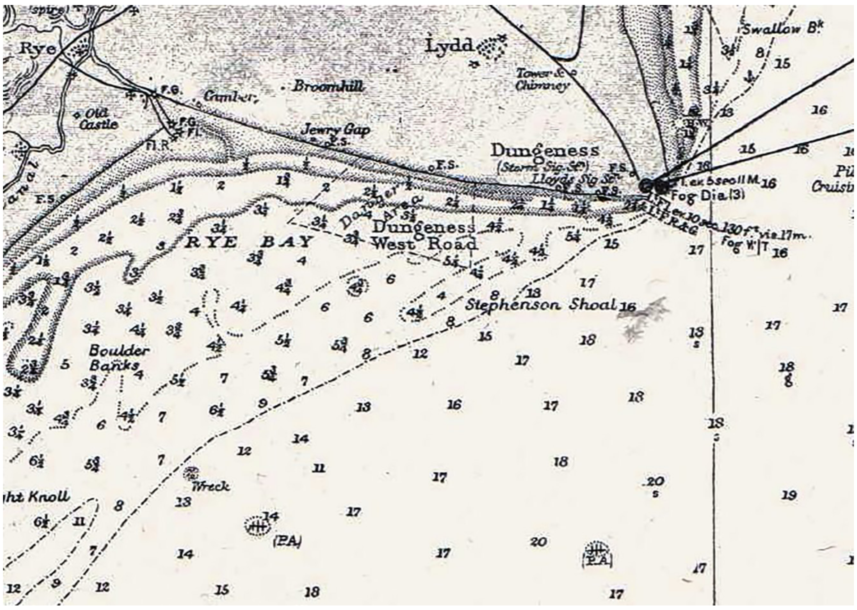
Conventional signs developed later, as shown in a sample page from Norie's Epitome of Navigation, c 1900.

DEPTHS



Depths were marked in fathoms (3ft each) on pre-metric charts such as this one of 1782. They were measured from 'chart datum', which was usually the mean of low water spring tides, so it was possible that there was less water during a very low spring tide.

© National Maritime Museum, Greenwich, London

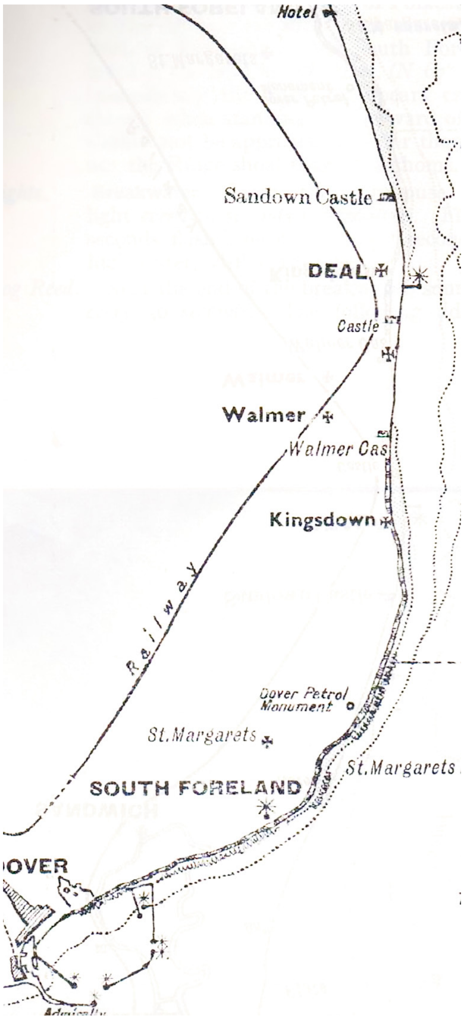


In shallow water more detail was needed, in halves and quarters of fathoms, as in this chart of c 1938.

Taken from The Yachtmaster's guide and Coaster's Companion, by Frank Carr, 1948

LAND FEATURES

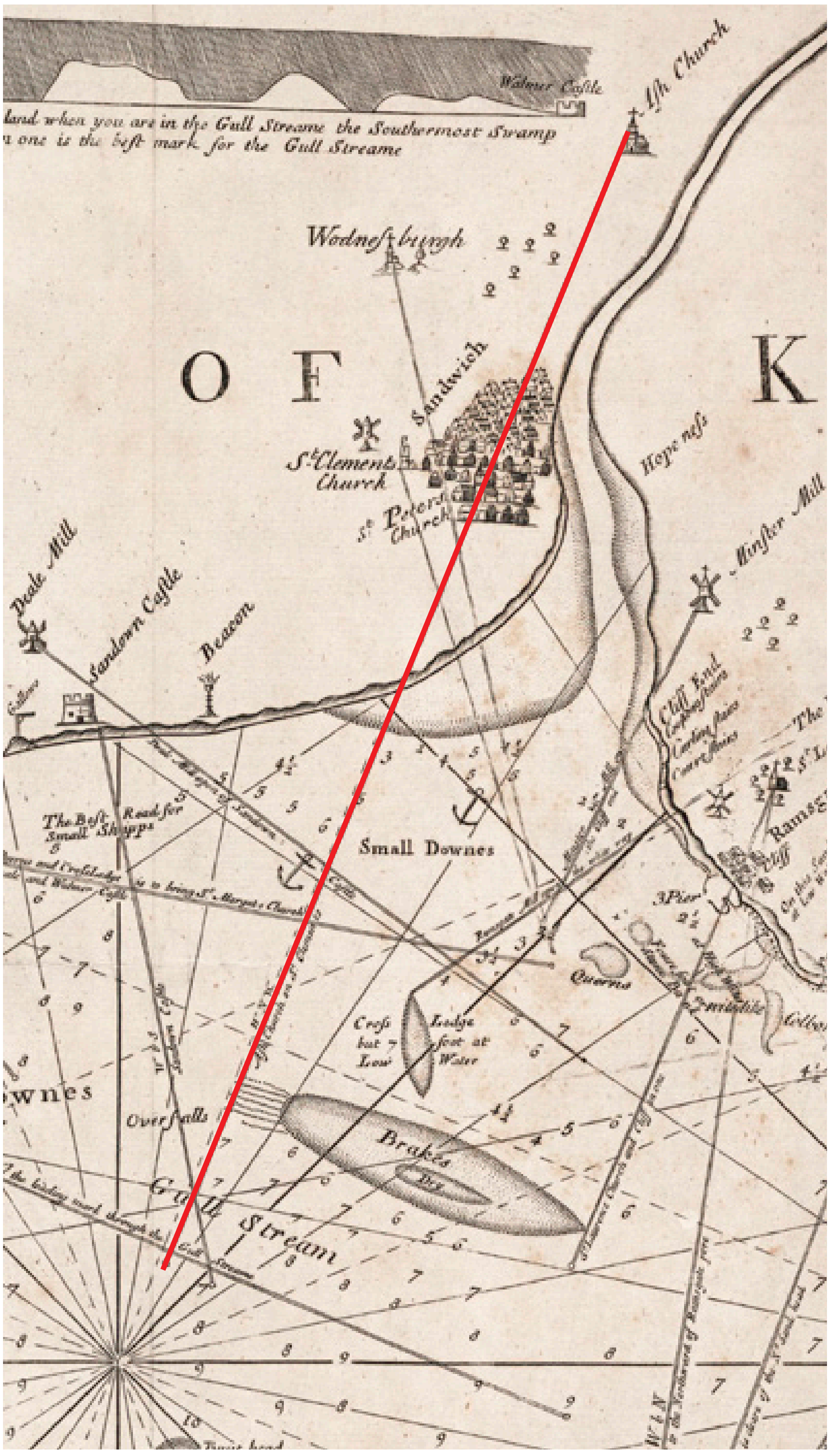
William Heather's 1786 chart of the Isle of Wight and the Solent includes more land features than most.
© National Maritime Museum, Greenwich, London



A pilotage chart of 1932 shows prominent land features such as church steeples and buildings.
Taken from The Pilot's Guide to the English Channel, J D Potter, London, 1937 edition

TRANSITS

Transits occurred when two significant land features were in line. A transit offered the navigator a position line which was more accurate than one measured by compass.

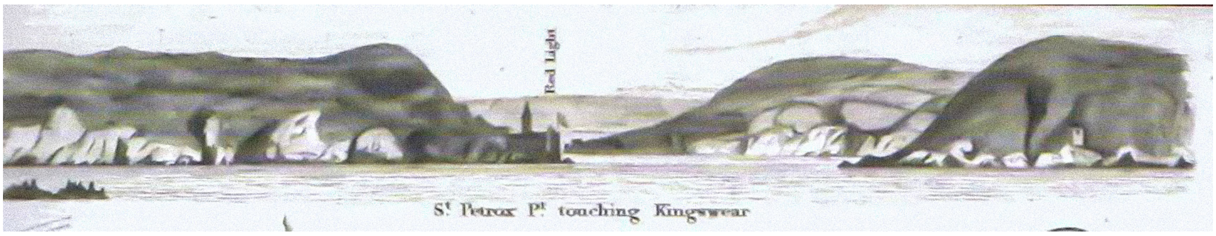


Transits were often marked on charts, such as this one of the Downs by Mount and Page c 1750. It is based on getting two church steeples in line to indicate the position of a safe anchorage.

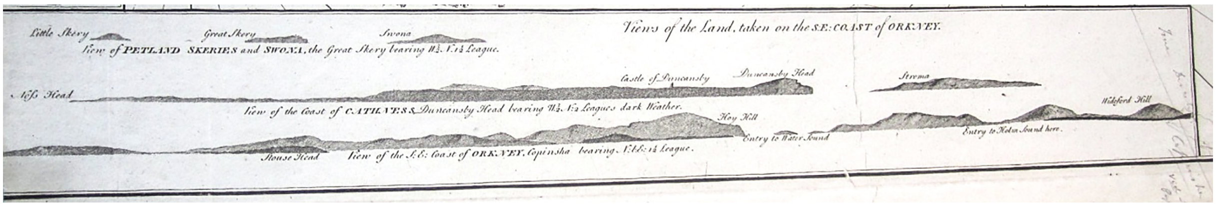
G218:6/3(1) © National Maritime Museum, Greenwich, London

COASTAL VIEWS

Coastal views were a common feature of charts, to help the mariner identify his position or find the entrance to a port.

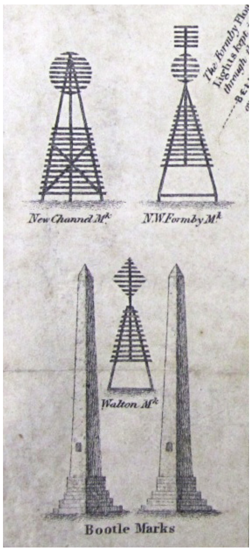


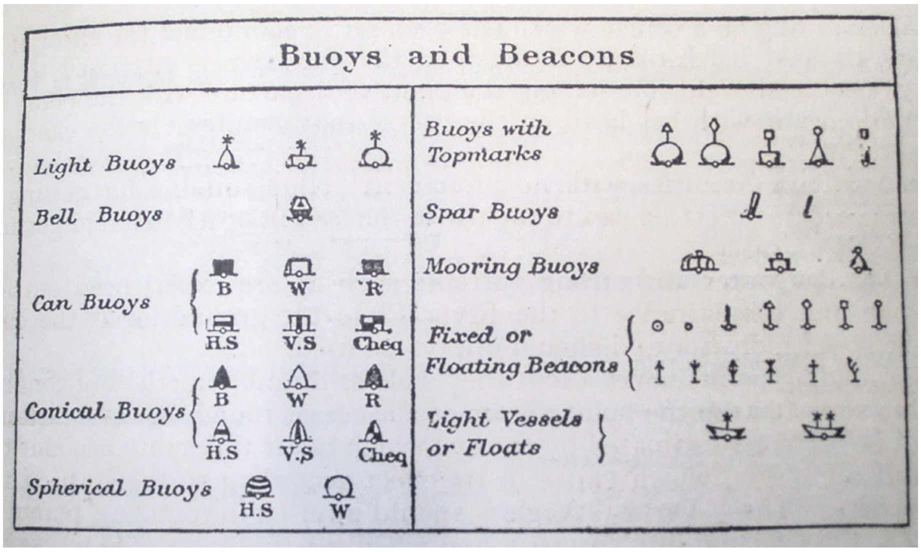
This one, on an 1826 chart of Dartmouth by William Heather, is particularly well drawn.



The features are more basic on Murdoch Mackenzie's Orkney charts.
© National Maritime Museum, Greenwich, London

SEA MARKS

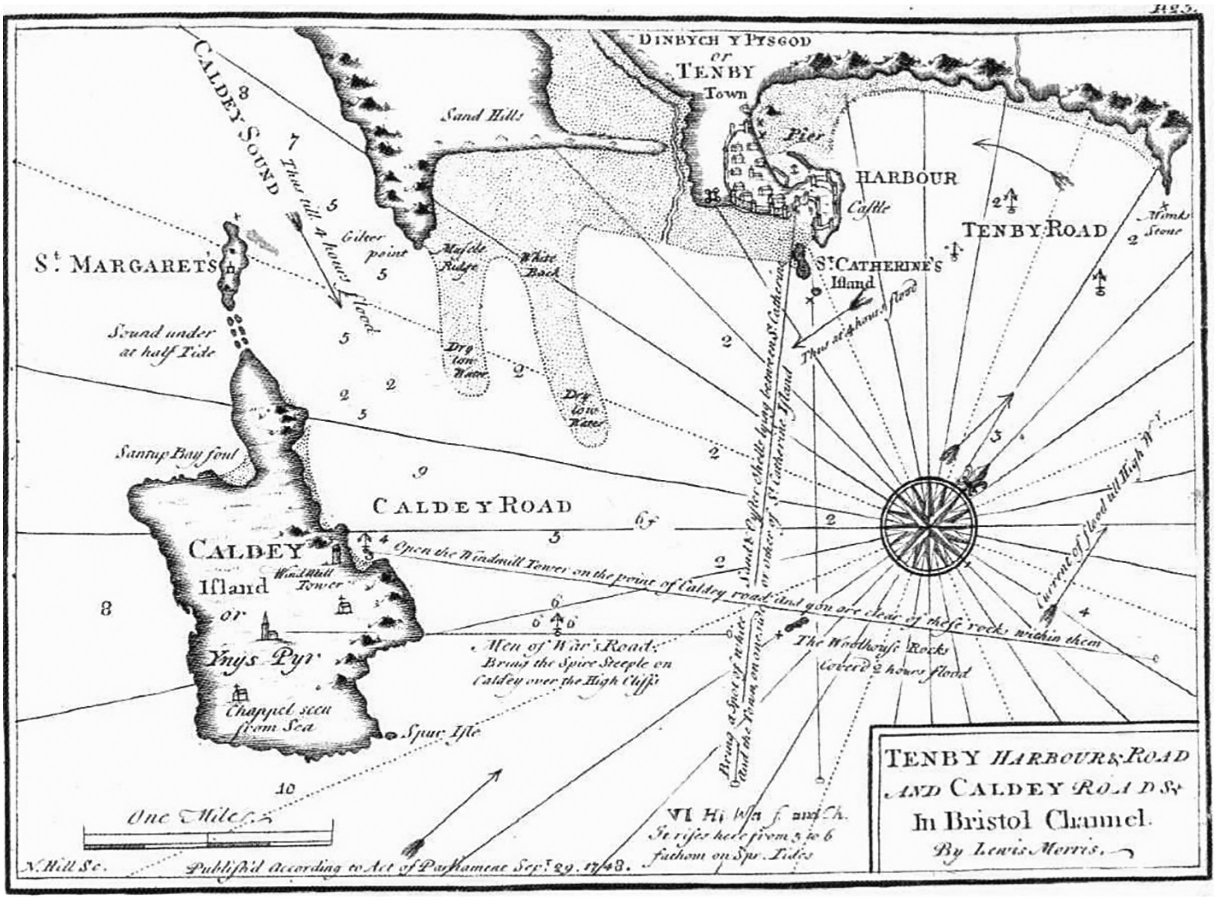




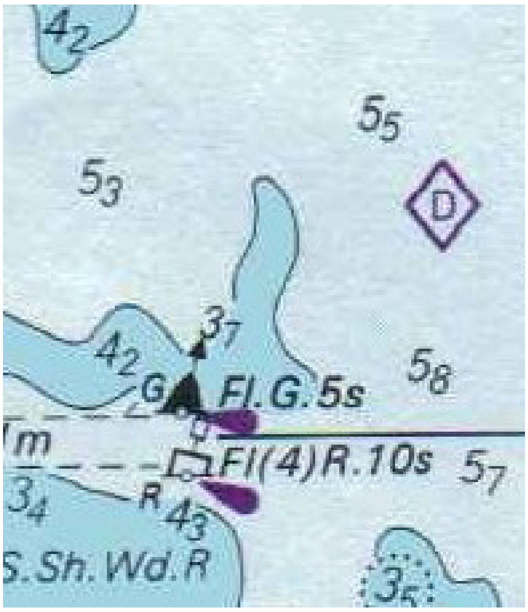
Left-hand image with permission of National Museums Liverpool
Right-hand image taken from The Pilot's Guide to the English Channel, J D Potter, London, 1937 edition

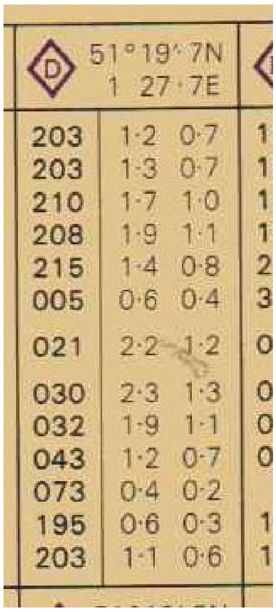
Sea marks such as beacons and buoys are quite rare on early charts, but become increasingly common during the 19th century. Originally they were often drawings of the marks in question, as shown from the chart of Liverpool, but a system of standard markings developed.

TIDES



Directions and strengths of the tides are marked by arrows on this chart of Tenby in Wales.
© National Maritime Museum, Greenwich, London





D 51°19'·7N 1 27·7E		
203	1·2	0·7
203	1·3	0·7
210	1·7	1·0
208	1·9	1·1
215	1·4	0·8
005	0·6	0·4
021	2·2	1·2
030	2·3	1·3
032	1·9	1·1
043	1·2	0·7
073	0·4	0·2
195	0·6	0·3
203	1·1	0·6

On modern charts, certain spots are marked with diamonds, each of which contains a letter. This refers to a table on the chart, which gives the direction of the tide in hours before or after high water at the standard port.

CHART INSTRUMENTS

A 19th-century parallel rule used to transfer lines on a chart.
© National Maritime Museum, Greenwich, London

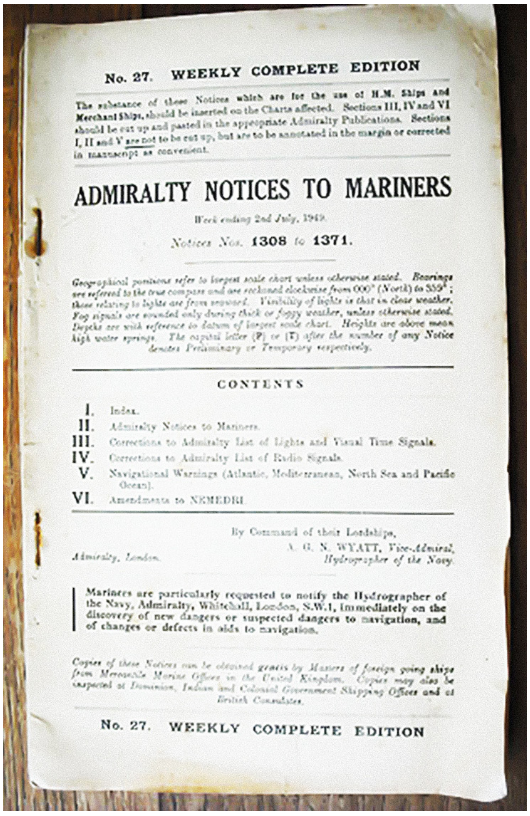
The dividers were the standard means of measuring distances. The curved shape of the arms allows the instrument to be opened and closed with one hand. The Breton plotter is one of many instruments used to measure angles on the chart.
© Brian Lavery

CORRECTIONS

Charts were designed to be kept up to date using the weekly *Admiralty Notices to Mariners*.

Most corrections were printed or handwritten on the chart, occasionally a piece of paper was issued to be cut out and pasted on. Lists of amendments were usually written near the bottom left-hand corner of the chart. Corrections can be made at several stages:

- by the publishers, to avoid making new plates – usually printed;
- by the chart agent before the chart is sold to keep it up to date – in manuscript;
- by the purchaser during the life of the chart – in manuscript.



No. 27. WEEKLY COMPLETE EDITION

The substance of these Notices which are for the use of H.M. Ships and Merchant Ships, should be inserted on the Charts affected. Sections III, IV and VI should be cut up and pasted in the appropriate Admiralty Publications. Sections I, II and V are not to be cut up, but are to be annotated in the margin or corrected in manuscript as convenient.

ADMIRALTY NOTICES TO MARINERS

Week ending 2nd July, 1949.

Notices Nos. **1308** *to* **1371.**

Geographical positions refer to largest scale chart unless otherwise stated. Bearings are referred to the true compass and are reckoned clockwise from 000° (North) to 359°; those relating to lights are from seaward. Visibility of lights is that in clear weather. Fog signals are sounded only during thick or foggy weather, unless otherwise stated. Depths are with reference to datum of largest scale chart. Heights are above mean high water springs. The capital letter (P) or (T) after the number of any Notice denotes Preliminary or Temporary respectively.

CONTENTS

By Command of their Lordships,
A. G. N. WYATT, *Vice-Admiral, Hydrographer of the Navy.*

Admiralty, London.

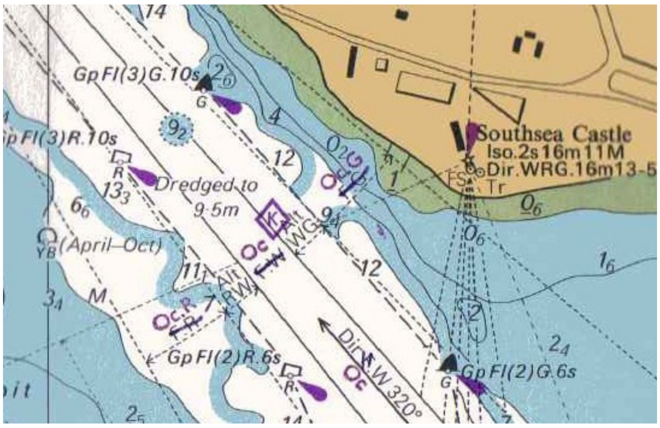
Mariners are particularly requested to notify the Hydrographer of the Navy, Admiralty, Whitehall, London, S.W.1, immediately on the discovery of new dangers or suspected dangers to navigation, and of changes or defects in aids to navigation.

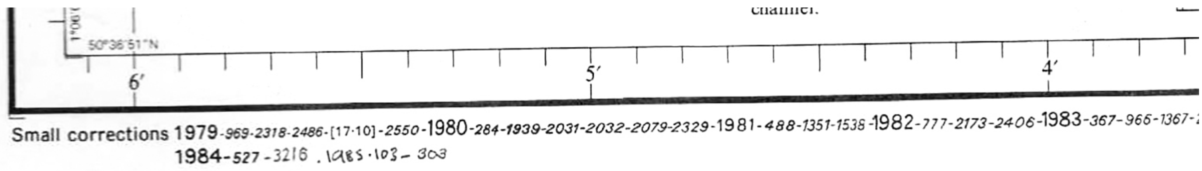
Copies of these Notices can be obtained gratis by Masters of foreign going ships from Mercantile Marine Offices in the United Kingdom. Copies may also be inspected at Dominion, Indian and Colonial Government Shipping Offices and at British Consulates.

No. 27. WEEKLY COMPLETE EDITION

A page from Admiralty Notices to Mariners, 1945

This chart shows corrections to the pattern of the lights at the entrance to Portsmouth Harbour.





Corrections as shown on the bottom left-hand corner of a chart

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3 MARITIME CURATORS AND THE SEA

BY BRIAN LAVERY, CURATOR EMERITUS, NATIONAL MARITIME MUSEUM

It is not essential for a maritime curator to go to sea – one longstanding and well-known expert on shipping suffers from chronic seasickness and never leaves the shore. But sailing in various forms can do a great deal to help the curator to understand the objects in his collection, and interpret them far better. For some years I ran the sailing programme of the National Maritime Museum, which had the following aims:

- to bring people from different departments and grades together for a common experience – this was important with a staff of several hundred;
- to see the world from a maritime point of view;
- to teach some elementary sailing skills, or improve those of experienced sailors.

We hired two boats for two weeks, so that four crews of seven or eight people could take part each year. It was entirely voluntary in that no-one was pressured into going, but if they did their time and expenses were all covered. Boats were chartered for the purpose, in the prime sailing areas of the Solent and the Devon/Cornwall coast. We did consider going to Scotland at one time, and even a trip to Gibraltar in preparation for the Trafalgar bi-centenary, but the logistics defeated us. But the Solent is probably the most suitable sailing area in the country. There is sheltered water in the channel between the Isle of Wight and the mainland, with plenty of ports to visit, small and large. If the weather is suitable it is possible to go over to France or the Channel Islands in a week's trip.

RYA CERTIFICATES

The certificates issued by the Royal Yachting Association are valuable both in assessing the qualifications of skippers and mates, and as something for the participants to work for. There are five different levels, which include practical and theoretical elements.

At the basic level, the Competent Crew course 'is for beginners and those who would like to become active crew members rather than just passengers'. Anyone completing the one-week course 'should be able to steer, handle sails, keep a lookout, row a dinghy and assist in all the day-to-day duties on board.' We never issued this qualification, but we tried to cover all the points in the syllabus during each voyage.

The Day Skipper course is for aspiring skippers with some yachting experience and basic navigation and sailing skills. Participants should 'Learn to skipper a short passage with the instructor on hand to give advice and encouragement and ensure your safety. Experience being in charge, taking credit when it all goes well and being responsible when it doesn't.' There is also a shore-based course which we ran inside the museum, eventually using staff to teach it.

The Coastal Skipper course needs more experience and it includes: 'Advanced skippering techniques for yachtsmen and women with considerable knowledge of sailing and navigation, wanting to undertake coastal passages by day and night. Like the Day Skipper course, this course consists of skippered passages in a variety of situations. Each trainee will skipper more challenging passages and learn more about passage planning, pilotage by day and night, boat handling, safety and emergency situations.It also involves a shore-based course on navigation.'

The Yachtmaster Certificate of Competence 'is often the ultimate aim of aspiring skippers. It is a well known, highly respected qualification worldwide, proving your experience and competence as a skipper.' We regarded this qualification as essential for our skippers.

At a higher level, the Yachtmaster Ocean entails being 'experienced and competent to skipper a yacht on passages of any length in all parts of the world', including astral navigation, but that is not likely to be relevant to sailing of this kind.

SAILING

We were fortunate in that our museum director of the time was a keen and experienced yachtsman. Even more useful, one of our trustees was the chief cruising instructor for the Royal Yachting Association and therefore the top sailing instructor in the country. The skipper of each boat had the Yachtmaster certificate, and it was essential to have a skilled first mate in case of accident (which thankfully never happened). We had a second mate on each boat, essentially a training position for someone working towards an RYA qualification. We made sure we had a first-aider on each boat, which is not difficult in a museum where many gallery staff are trained. Another vital role is the chef, who should organise the cooking rather than do it all, but there are usually plenty of volunteers for that, and the standard of cooking was often very high. Obviously the skipper and first mate had to be specially selected, but apart from that the crew members are chosen at random. Those whose names did not come up in the draw got priority for next year.

The galley and chart table on a typical modern yacht.
© Brian Lavery

Participants had to understand that life on board a sailing yacht is cramped and basic – the image of the billionaire's luxury yacht is very misleading. Participants almost certainly had to share a cabin, which often means just a double bed with barely room to stand up, and snoring can be a problem. Washing facilities are limited, though on nearly all nights it was possible to shower ashore in a yacht club or marina. Living is communal in the fullest sense, though most people threw themselves into that and enjoyed it thoroughly. It was useful to organize taster trips, perhaps during the middle weekend of the charter, so that people who are not sure if they would like it could come for just a few hours.

Janes Buoy was chartered by the NMM team in 2005 and 2007.
© Brian Lavery

ON BOARD

On arriving at the marina and taking charge of the boat, the skipper and first mate are shown round by the charterer, making note of all the points affecting performance and safety. Another party led by the chef goes to a local supermarket to get provisions for the week. An experienced sailor, perhaps the second mate, should go with them because it is important to know what can be cooked and stored easily in a cramped environment with limited facilities. The food is stowed and the skipper does a safety brief. After that the skipper has what may be the hardest part of the voyage. With his first touch of the helm he has to steer the boat out through the tight and crowded waters of the marina. It is best to do a short passage on the first day. A boat starting at Portsmouth or the Hamble River, for example, might be taken ten miles or so down the sheltered waters of the Solent to Yarmouth. There is time for a visit ashore and an exchange of information. If the weather looks suitable for both the outward and return passages, it might be possible next day to set out for 60 miles, perhaps ten hours sailing, to Cherbourg. Otherwise, there are plenty of ports to visit on this side of the Channel. The boat will mostly be at anchor or in a marina overnight, so cooking the evening meal is not difficult (and we also had a tradition of both crews eating ashore on one night near the end of the cruise). For lunch at sea, it is best to do simple meals like soup, or to prepare sandwiches in advance – cooking in rough weather is difficult and sometimes dangerous.

Janes Buoy at sea
both images © Brian Lavery

The crew relaxing after a day's sailing

Once at sea, the crew can have the achievement of moving a boat through the water with the use of wind alone – though if they are doing a channel passage and the wind drops it might be necessary to use the engine to get there at a reasonable time. They will see all sorts of different craft – fellow yachts, fishing boats streaming their nets, ferries and giant tankers and container ships. Once (not on a museum trip) we spotted a submarine periscope a few hundred yards ahead, and soon found ourselves in the middle of a naval exercise, with helicopters swooping and frigates turning (all in perfect safety, I might say). At the end of the day the crew might have the joy of entering a beautiful port for the first time, for example Dartmouth in the West Country or the Beaulieu River off the Solent. Everywhere looks the same nowadays when arriving by road, just a car park off the motorway, but every port entrance is different and it shows what the town is all about. The crew will enjoy the bonding that comes from the teamwork in operating the boat.

Of course very few museums have the maritime resources of what is now called Royal Museums, Greenwich, but smaller ones, and individual curators, can participate in different ways. At Chatham Historic Dockyard we were fortunate in that one of the staff had his own boat on the Medway. Failing that, it is still possible to charter one. If you do not have a suitable skipper, one can be hired with the boat. For an individual or a smaller group, it is usually possible to join a sailing school in the area for a weekend or a week. These can be found in yachting magazines and the internet.

SEASICKNESS

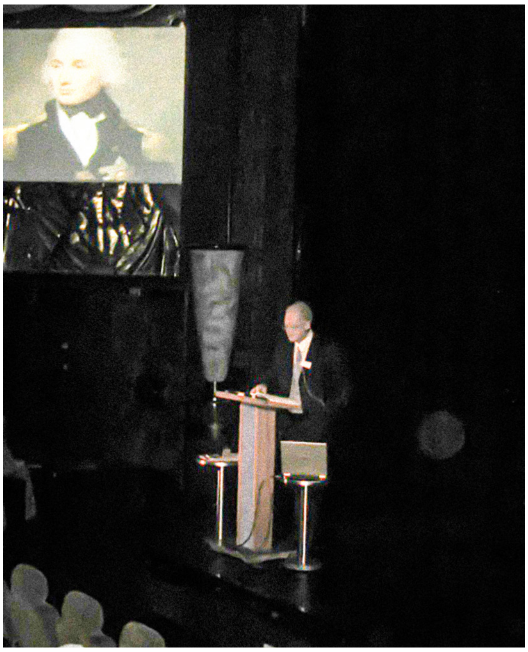
Returning to the subject of seasickness, it is probably the greatest deterrent to participation in a sailing programme. As an occasional sufferer myself, the best advice I can give is to know your limitations and be ready to cope with them. Just because you were not sick on a ferry or liner does not mean that you are immune. On the other hand, do not be put off by one bad experience, it can probably be managed with preparation. Good tips are:

- avoid fatty foods, spices and heavy drinking for a day or so before sailing;
- take any seasickness pills an hour or two before sailing – they do not work retrospectively. Stugeron is best and is available in chemists;
- in uncomfortable seas, stay on deck and keep an eye on distant objects. It is often useful to take part in an activity, especially steering, but do not go below to cook unless you are totally confident;
- another possibility is to lie flat on one's back if seasickness comes on.

OTHER SAILING

Apart from yachting, there are many ways to get to sea. Most maritime museums have good relations with local ferry companies, and it might be possible to visit the bridge during a passage. It is often possible to cultivate a relationship with the Royal Navy at various levels. If a naval ship bears the name of a local town it will be possible to arrange courtesy visits and events. At Chatham we had strong links with the frigate of that name, though I never went to sea in her. There may be a local unit of the Royal Naval Reserve, or one of the navy's patrol boats used for the training of members of the nearest University Royal Navy Unit.

It is not easy to arrange a trip in a large cargo vessel such as a container ship, and it needs the full co-operation of the owners. It once took five weeks to arrange a photo shoot on a P&O ship coming into Southampton – every time a ship was chosen, its schedule was changed so that it arrived in the middle of the night, or there was rough weather, or fog. When it finally happened, the photographer and I went out on a pilot cutter from Gosport. There was the terrifying experience of climbing a pilot ladder up the wall-like side of the ship. The bridge was the height of a tower block and the sea looks very different from there. In a yacht, one picks out the next buoy in a sequence with binoculars and steers for it, from the bridge you can see the whole pattern laid out rather like cat's eyes on a road. One cannot help admiring the skill of the pilot as they turn her round in a space little wider than the ship itself, then brings her alongside to be loaded and unloaded.



Lecturing on the Queen Mary 2

Both images © Brian Lavery

From the decks of the classic sailing ship, Sea Cloud

Cruise ships offer a different way of seeing the maritime world. Aims of cruises vary from pure hedonism to study tours, and naturally one recommends the second type for curators. I have lectured in the Caribbean, Mediterranean, north of Scotland and across the Atlantic in the *QM2*, though never anywhere near my employers at Chatham and Greenwich. But cruising is one of the best ways to see the maritime world, and lecturing adds an extra dimension. On the principle that one of the best ways to learn a subject is to teach it, one can add a great deal to one's maritime knowledge and insight. It is useful to get to know a particular port and do a commentary on the entry. My own favourite is Mahon in Menorca. As well as being one of the most dramatic harbours in the world, it was a British naval base for much of the eighteenth century and many of the buildings of the period survive. It changed hands six times and Admiral Byng was infamously shot for losing it (Voltaire later wrote in *Candide*, referencing the execution, that the English like to kill an admiral from time to time 'pour encourager les autres').

Thames barges on the River Blackwater
© Brian Lavery

For the most adventurous, tall ship sailing is an unforgettable experience. In a square-rigged ship such as the *Royalist* operated by the Sea Cadets, or the two brigantines run by the Sail Training Association, this involves going aloft to set and furl sails, so a good head for heights is essential. Crews of fore-and-aft rigged craft, such as schooners and cutters, rarely need to go aloft except for urgent maintenance. There are many groups which run such vessels, such as the Thames Barge Sailing Trust and the Humber Keel and Sloop Preservation Society.