

GUIDE TO ELECTRONIC CHARTING

Today's mariner is looking for something with the same standards of quality as the traditional paper chart, but which fits the demands of a new navigational era.

Electronic navigation, although still relatively new and unfamiliar, is becoming increasingly more commonplace, particularly onboard commercial vessels. This guide aims to provide answers to some of the most commonly asked questions regarding electronic charts.

What are Electronic Charts?

Electronic charts are the next generation of navigational charts, and can enhance safety of navigation through improved situational awareness, especially in busy or confined waters. Digital technology is used to develop electronic charts from traditional paper charts and directly from marine survey data.

The importance of using official data is, as with paper charts, absolutely paramount to maximising safety and other related benefits. Official electronic charts currently take two forms: ENCs, Electronic Navigational Charts, and RNCs, Raster Navigational Charts.

ENCs



ENCs use 'intelligent' vector data. This data is held in layers and records every feature on a chart such as coastlines, buoys, lights, etc. These features and their attributes (position, colour, shape, etc.) are held in a database that allows them to be selectively displayed and queried. Therefore, ENCs can appear quite different to traditional paper charts.

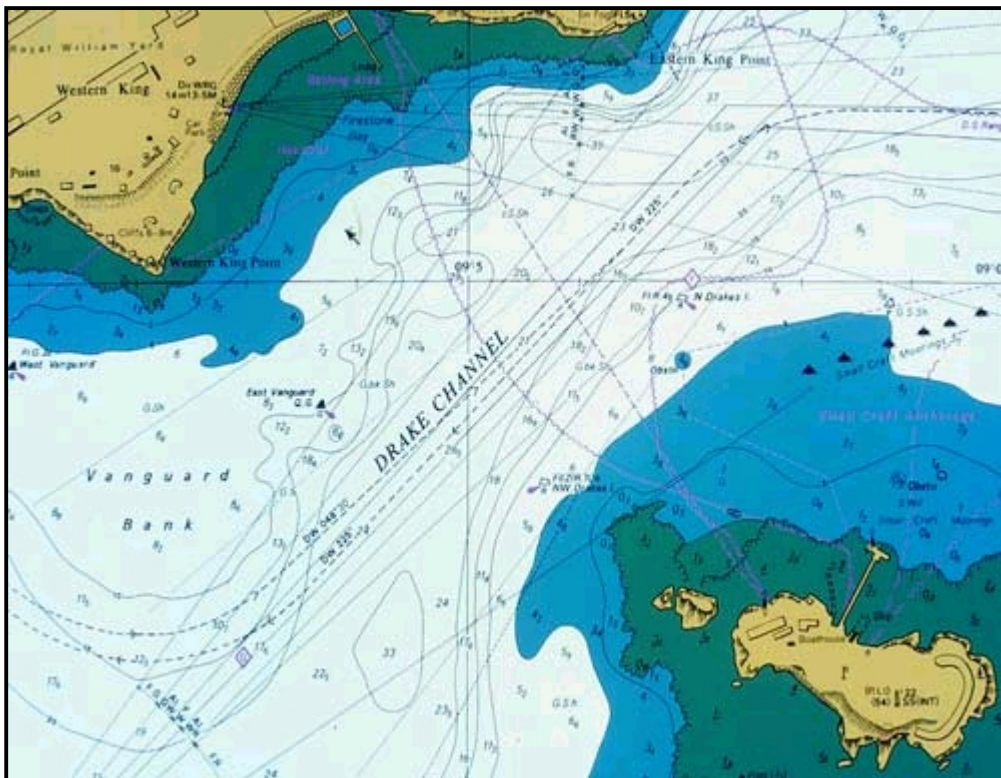
ENC data must be issued by, or on the authority of, a government-authorized Hydrographic Office. Each country is responsible for producing its own ENCs, which must be updated

systematically with all safety-critical information and be fully compliant with the International Hydrographic Organisation's (IHO's) S57 Version 3 product standard.

The UKHO is committed to an ongoing program of ENC production and to date has released ENC cells of major UK ports, approaches, the English Channel and parts of the North Sea, and under bilateral agreement with Egypt, cells within the Mediterranean, the Suez Canal and the Red Sea.

While some nations have produced substantial amounts of ENCs, unfortunately many others still have little or no coverage at all. ENC coverage of high priority areas such as the world's main shipping routes will gradually become available over the next few years, but other areas could take far longer.

RNCs



RNCs use raster data to reproduce paper charts. Raster images consist of thousands of tiny dots that together make a flat digital image. RNCs comply with the IHO's S61 data standard and are geographically referenced, allowing accurate display of positional information such as vessel location.

RNCs offer real time navigational benefits. Positions can be continually updated from GPS showing users exactly where they are at all times. Additional information such as automatic position fixing, waypoint insertion and bearing and distance measurements can be overlaid on top of the raster image, but unlike ENCs, chart features cannot be selectively displayed or queried.

The UKHO has over 2800 raster charts currently available in its global Admiralty Raster Chart Service (ARCS), which carry the same guarantee of quality and accuracy as the Admiralty paper chart.



How are Electronic Charts displayed?

To display an ENC or RNC you need an Electronic Chart System (ECS) or an Electronic Chart Display Information System (ECDIS). An ECS can be anything from a laptop with simple navigational software installed, to a fully integrated Bridge System. An ECDIS is an official, type-approved ECS that meets stringent IHO defined criteria for primary navigation.



What are the regulations regarding Electronic Charts?

If electronic charts are used as a primary navigational tool and to reduce the number of paper charts carried and kept up to date, the combination of chart and display system must conform to International Maritime Organisation (IMO) and national regulatory authority rules.

The IMO requires that when using a type-approved ECDIS:

ENCs can be used for primary navigation in place of paper charts, provided there is a suitable backup (e.g. another ECDIS with a separate power supply, or an appropriate folio of up to date paper charts**).

RNCs, when used in conjunction with ENCs (to fill the gaps in coverage) can be used for primary navigation together with an appropriate folio of up to date paper charts**.

** What is considered 'an appropriate folio of up to date paper charts' will vary between flag states, and may or may not represent a reduction in the number of paper charts required to be carried.

These are only guidelines, there are regional exceptions to these rules. Users must consult their own flag state's regulatory authority (e.g. the MCA for the UK) to find out exactly which regulations govern their electronic chart carriage requirements, as regulations can vary.

What are the main advantages of ENCs and RNCs?

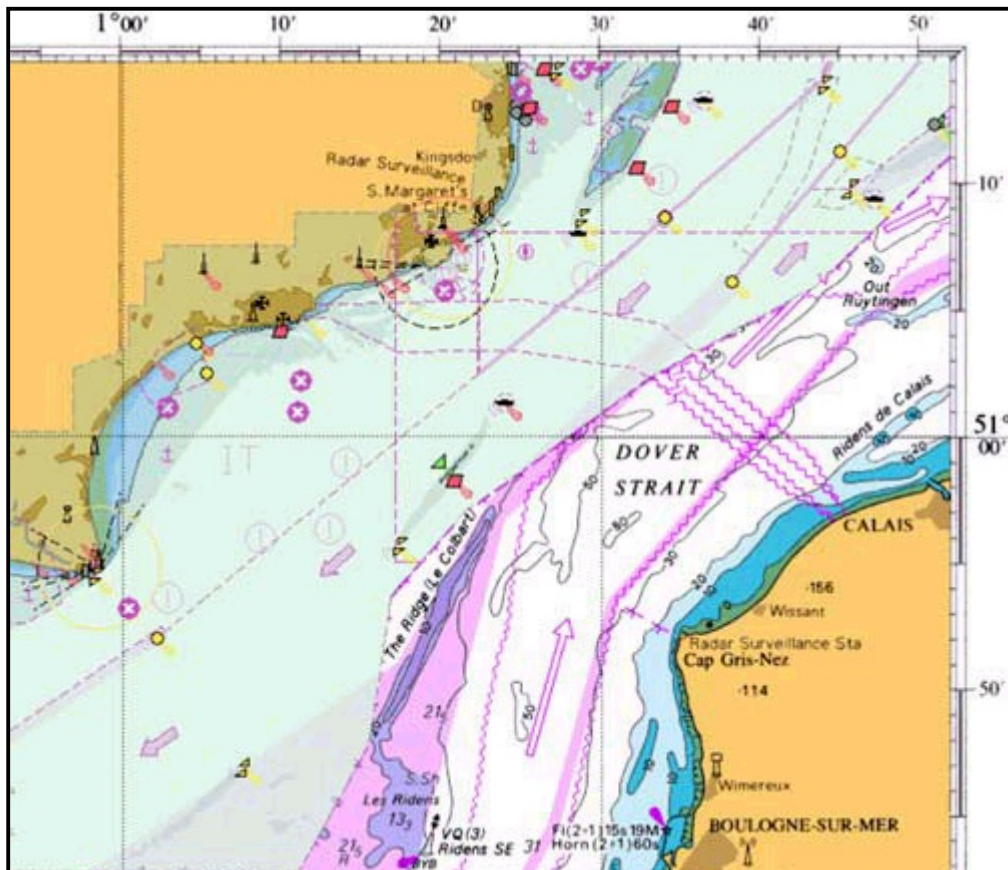
ENCs and RNCs are official electronic charts produced from approved Hydrographic Office data of the highest quality.

Both ARCS and ENC can be updated automatically on a weekly basis, thus reducing the amount of time the mariner has to spend manually correcting charts.

Vessels subject to SOLAS regulations are permitted to use ENC in a type-approved ECDIS for primary navigation, but at present, ENC coverage is available in some areas and not in others, and although ENC coverage is steadily increasing, growth is still relatively slow.

ENCs offer the prospect of paper chart equivalency and more functionality than RNCs, but it will clearly be some years before coverage of all major ports and routes become available. Due to the relative infancy of both ENC and ECDIS, regulations for their use can vary from country to country and can be confusing.

RNCs such as ARCS already offer virtually worldwide coverage, providing navigators with the safety benefits of official electronic charts virtually everywhere in the world, but current regulations do not support the use of RNCs for primary navigation when used independently of ENCs, and without some form of paper backup.



Which is best for me?

Where electronic charts are displayed within a type approved ECDIS, it is likely that official vector and official raster charts will be used in conjunction. Combining ENC and ARCS within ECDIS can fulfil a vessel's SOLAS chart carriage requirements - allowing use of electronic charts for primary navigation worldwide.

Initially, the raster component of this 'dual-fuel' combination is likely to form the majority of coverage, so a reasonable paper backup will still be required, but this will gradually change as more ENCs become available.

Where electronic charts are displayed within an ECS purely as an aid to navigation, it is likely that official RNCs such as ARCS will continue to offer the mariner the best overall package for some years to come.



Glossary of Terms

UKHO United Kingdom Hydrographic Office
ENC Electronic Navigational Chart
RNC Raster Navigational Chart
ECS Electronic Charting System
ECDIS Electronic Chart Display & Information System
GPS Global Positioning System
SOLAS Safety of Life at Sea
ARCS Admiralty Raster Chart Service
IMO International Maritime Organisation
IHO International Hydrographic Organisation
MCA Marine Coastguard Agency
RENC Regional ENC Co-ordinating Centre