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ECDIS buyers guide

ADMIRALTY



ECDIS buyers guide

A wide-angle photograph of a large industrial pier or offshore platform structure extending into a body of water. The structure is made of metal and concrete, with various cranes and equipment visible. The water is a murky brown color, and the sky is overcast with grey clouds. In the background, there are more industrial buildings and structures along the shore.

The UK Hydrographic Office (UKHO) is committed to the safe and efficient adoption of the Electronic Chart Display and Information System (ECDIS) in accordance with SOLAS requirements.

This guide is one in a series of initiatives taken by UKHO to provide the global shipping industry with clear, unambiguous guidance on making the transition from traditional to digital navigation.



The Admiralty publication “Are you ready for the new ECDIS regulations?” outlined the nine stages a shipping company should consider for the transition to digital navigation, this guide expands on this important subject.

Identifying and implementing the most suitable ECDIS for your fleet will help you in making the transition to digital navigation by ensuring that the full benefits of Electronic Navigational Charts (ENC) are available on a reliable and stable system.

Although all ECDIS will be manufactured and type-approved to the required standards, there will be

significant variations on the interpretation of these standards. Different manufacturers offer value-added options above the minimum requirements, which may contribute to the safety and efficiency of operating ECDIS.

A shipping company looking to procure ECDIS should be fully aware of the questions to ask prospective manufacturers, to ensure their final decision is based on an informed process that guarantees the most suitable system is purchased for their fleet.

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The regulatory environment

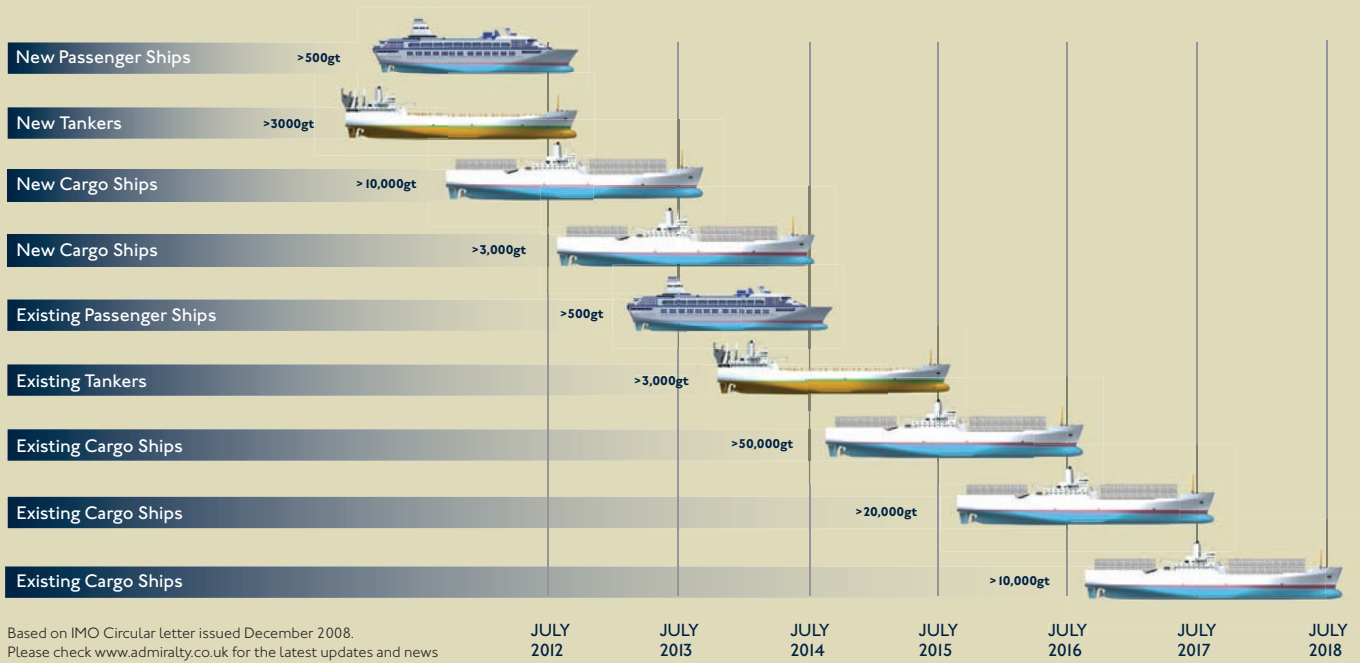
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When should you purchase and install your ECDIS?

The fitting of ECDIS to vessels worldwide has become mandatory, in line with a rolling timetable that started in July 2012. Mandatory fitting of ECDIS is to be phased-in by vessel type and size, and will eventually apply to almost all large merchant and passenger ships.

ECDIS compliance dates by ship type and size

Use this diagram to determine which of your ships will be affected and when.



You may wish to establish a time line working backwards from the mandatory date to ensure your ECDIS is fully operational before the deadline. Actually procuring ECDIS is your first consideration, as this defines the installation process, supporting procedures and requirements for training your crew.

You will also find the installation plan of your prospective ECDIS supplier a valuable tool, which will include guidance on duration. Many shipyards will have preferred ECDIS suppliers and will have detailed specifications and duration for such installations.

Bear in mind that the installation will probably take more than one day. It may take several days, in fact, depending on the complexity of the system and the number of hardware upgrades required.

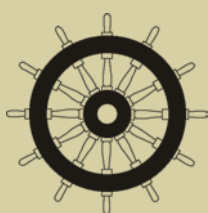
Perhaps the most important consideration at this stage is whether the installation can be completed while the ship is trading, during a port visit or during a refit. The most likely opportunity will be during a refit, so it must be planned in advance and added to the specifications for the shipyard.

Once the ECDIS has been installed, you must make allowances for mandatory surveys and tests, which may need to be included in sea or harbour trials.

European legislation

The European Commission has developed the Marine Equipment Directive (MED) which requires that ECDIS be certified by a Notified Body (see Glossary).

ECDIS units which have been approved under the MED will carry the Wheel Mark, see below:

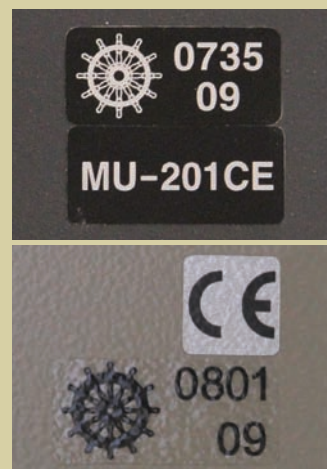


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The wheel mark comprises three elements:

- **The stylized steering wheel**
- **The identification number of the Notified Body which performed the type-approval procedure**
- **The two digit production year of the ECDIS.**

See right: examples of certification marks on approved ECDIS.



What is Type Approval?

SOLAS chapter V, regulation 18 requires that ECDIS shall be of a "type" approved by the Flag State Administration. Type Approval is the certification process that ECDIS equipment must undergo before it can be considered as complying with the IMO Performance Standards for ECDIS.

The testing process is conducted by recognised Notified Bodies or approved test houses against Standard IEC 61174 – ECDIS operational and performance requirements, methods of testing and required test results.

Where an ECDIS meets the criteria of the relevant international standards, the Notified Body involved must issue a type-examination certificate to the ECDIS manufacturer. The type-examination certificate (also called the type-approval certificate) must include:

- **the name and address of the manufacturer**
- **details of the ECDIS equipment**
- **the conclusions of the examination**
- **the conditions of its validity**
- **the necessary data for identifying the approved ECDIS.**

The type approval certificates will state the IMO performance standards (see Glossary) against which the ECDIS was approved:

- **If installed before 1 January 2009, the ECDIS should conform to Resolution A.817(19)**
- **If installed on or after 1 January 2009, the ECDIS should conform to MSC.232(82).**

When considering which ECDIS to buy, check their type-approval certificate. It may also be helpful to send a copy of the certificate to the Flag State to ensure it is acceptable to them.

What are the **Flag State** requirements for ECDIS installation?

Alongside type approval, Flag States will have their own requirements for the installation of ECDIS with particular reference to back up systems and redundancy. Appendix 6 of the IMO ECDIS Performance Standards specifies the requirements for adequate independent back-up arrangements that can take over in the event of system failure. The main requirement here is the ability to make a timely transfer to the back-up system during critical navigation situations.

The specific back-up requirement is determined by each Flag State, which differ in their interpretation of this IMO requirement. Some may require a second ECDIS, for example, while others allow a Chart Radar and yet others require a mixture of paper charts and electronic redundancy. It is vital to establish and agree this requirement with your Flag State, as it could directly affect your choice of ECDIS manufacturers.

The majority of Flag States' back-up requirements consist of an independent second ECDIS or a folio of adequate and up-to-date paper charts. However, each flag state may have differences in the interpretation of the SOLAS regulations. This may lead to differences in the back-up systems and the level of redundancy required for the primary ECDIS. This level of redundancy would include power supply and connection to heading, speed and position sensors.

While some ECDIS manufacturers have built redundancy into their systems, others aim to meet the minimum requirements and require shipping companies to consider back-up systems appropriate to their operations.

What are the **Port State** requirements for ECDIS installation?

Port State Control Officers (PSCOs) will usually inspect an ECDIS installation based on the Flag State requirements of the port the ship is in. This can lead to different interpretation of the requirements. It is therefore important to ensure that the proposed installation of the ECDIS and type-approval certificate will be accepted by the PSCOs in the ports the ship may visit.

Who will survey the ECDIS installation?

The installation survey will usually be a part of the Safety Equipment Survey that is conducted by the Flag State or on its behalf by a Classification Society.

Some Flag States will issue a letter confirming that the ECDIS is installed in accordance with their requirements. This may be useful to have during a Port State inspection, as it demonstrates your compliance with a particular Flag State's ECDIS installation requirements.

Obtaining these survey requirements before purchasing the ECDIS will allow you to compare the specification offered by the manufacturer directly with that which is required. You may be able to include these requirements in the shipyard's or contractor's specification for installation and obtain a realistic quotation before you make your final decision on an ECDIS type.

What other considerations are there?

Insurance providers may also require information about your ECDIS installation. This may take the form of documentation, inspection reports or certification. It is advisable to contact hull underwriters and P&I clubs alike to obtain a list of any requirements they may have.

Some insurers may additionally require that the ECDIS is regularly updated in line with IMO recommendation SN.1/Circ.266/Rev.1 (see Glossary). You should therefore factor a maintenance contract into the cost.

Charterers and vetting inspectors may also have requirements for ECDIS, and these should be consulted to ensure your proposed system will comply.

Some Maritime Administrations are now recommending that their Port Authorities check that an ECDIS has been maintained to the latest applicable IHO standards required by its type approval. Failure to comply can result in a ship being detained until the deficiency has been rectified. For an example see Australian Maritime Safety Authority Marine Notice 11/2012 (opposite).

The following diagram is an extract from Australian Maritime Safety Authority Marine Notice 11/2012.



Notes:

ENCs (and any RNCs) with latest updates and corrections are to be used in ECDIS for navigation. Use of the following is unacceptable (Code 30):

1. Unofficial or private charts.
2. Raster charts in an area with full and adequate ENC coverage.
3. All masters and officers in charge of a navigational watch should undertake generic ECDIS training.

4. All masters and officers in charge of a navigational watch should undertake ECDIS familiarisation training that includes training on the type of ECDIS units installed on board.

Action code 17: Rectify deficiency before departure
 Action code 18: Rectify deficiency within three months
Action code 30: Detainable deficiency



Procurement



What procurement options are there?

Some manufacturers enable you to rent your ECDIS, but the majority expect a one-off payment for purchase and installation.

Ongoing maintenance agreements with the manufacturer are important to keep your ECDIS software up to date and can often be used to negotiate a competitive installation cost. Discuss your various options with the prospective suppliers to ensure the costs involved match your company's budget.

What's the difference between new build and retro fit?

With a new build, the ECDIS can be included in the fitting of the bridge navigation systems. It may be possible to obtain cost savings provided this is considered at specification stage, as the bridge system can be designed with the ECDIS already incorporated. You should consider using one of the shipyard's preferred ECDIS suppliers, as the yard will have experience with them and may even impose additional costs for dealing with another supplier.

Installing an ECDIS on an existing ship will often require its current navigation systems and power supplies to be modified. It is important to ensure that a pre-installation technical survey is conducted, as this will identify any hardware upgrades or additional modifications that are required. While some ECDIS suppliers will provide this service as part of their contract, others will apply additional costs.

What's included?

Your ECDIS supplier may offer a number of additional features and services, which makes the comparison between the systems less clear. **It is always important to ensure the requirements stated in this guide are the minimum included.** Some ECDIS suppliers will include training and documented procedures in their offer, which is an important consideration.

Upgrade options

Before purchase, it is essential to consider the ability to upgrade the ECDIS. Some manufacturers offer a basic entry-level ECDIS that satisfies all the requirements and can subsequently be upgraded to use enhanced features. These features can improve the efficiency of navigation, and could be considered within a cost/benefit analysis. Other manufacturers, meanwhile, offer systems that are considered complete with no upgrade options.

It is always advisable to ensure that your ships' masters and bridge watch-keeping officers are consulted regarding the navigational functionality of the proposed ECDIS, as they may have valuable operational experience of a variety of ECDIS installations from other ships they have sailed on.

How long will procurement take?

Many factors affect the duration of the procurement process, not least your company's own purchasing procedure.

You should allow sufficient time for the review of specifications and agreement of any changes, which could take months rather than weeks. This needs to be considered when developing the time line from the mandatory date for fitting ECDIS.

Single or multiple ECDIS suppliers?

When purchasing ECDIS for your fleet, consideration should be given to whether a single or multiple suppliers should be used.

Using one ECDIS manufacturer can drive the total cost of purchase and fitting down. It also means Navigators will only need to attend one ECDIS type specific training course, potentially reducing costs, and will enable the movement of Navigators across the fleet without the need for additional training. Additionally, management of ECDIS software and hardware maintenance is reduced as you only have to deal with one supplier.

However, there are also benefits to having more than one supplier, in that software upgrades can be applied at different times across the fleet and you will not be reliant on a single manufacturer for your equipment.



Training

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What training requirements are there?

On any ship fitted with ECDIS, international regulations require that the master and all bridge watch-keepers should be trained in both generic and type-specific ECDIS operation.

Whether this training is included in, or is additional to, the cost of the ECDIS is a significant consideration during the procurement process.

The potential safety and operational benefits that navigating with ECDIS offers will only be realised if officers are competent and confident in the use of ECDIS. The UKHO therefore strongly recommends that all navigating officers undertake an approved 5 day ECDIS classroom based training course.



Generic ECDIS training

If this course is offered by the ECDIS supplier or manufacturer, it is important to check that it is acceptable to the Flag State. Any training provided to meet the requirements of the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) Convention and Code has to be approved by a Flag State on the STCW White List. Flag States will often publish a list of their approved training providers.

If in doubt, it is advisable to send a copy of the certificate issued by the training establishment to the Flag State to confirm whether it is acceptable to them.

This training should be delivered either by the manufacturer, by the manufacturer's approved agent or by a trainer who has attended the manufacturer's training programme.

Type-specific ECDIS training

Type-specific ECDIS training should relate to the make and model of the equipment fitted on the ship on which the trainees are currently serving.

Technical training

The manufacturer may also offer technical training which would be useful to a ship's Electro-Technical Officer (ETO) and Technical Superintendents as well as assisting in the ongoing support of the ship and its ECDIS.

Where should training take place?

The location, duration and frequency of ECDIS-related training courses need to be carefully considered. Training all the ship's officers can take a long time and needs to be carefully arranged to ensure that the mandatory date is met.

Possible locations include a training centre, the manufacturer's premises, on board ship or at the shipping company offices. It is important to check that Flag State approval for the generic training covers the proposed location.

Some manufacturers offer Computer-Based Training (CBT) as a convenient solution. This might be accepted by the Flag State provided the company adopts proper procedures for assessment. It is always advisable to check the CBT programme is acceptable to your Flag State.





ECDIS functionality



What functionality should you consider when purchasing ECDIS?

As well as the information already covered in this guide, you may want to consider the following aspects specifically related to ECDIS functionality.



A table is included at the back of this guide for your notes.

Additional layers

A number of additional datasets can overlay the navigational chart data to provide greater situational awareness when route-planning and navigating. However, not all ECDIS will display the full range of additional layers available. It is worth investigating what layers a system currently supports and if its manufacturer has any future plans to extend support for additional layers.

If this is a factor in the buying process, it is also worth considering how the ECDIS will be updated and maintained to incorporate the new capabilities.

Customisation

ECDIS screen layout

A key factor in ECDIS design and usability is how much the user can customise the layout of the screen, including where menus are located as well as control panel colours and sizes.

User profiles

ECDIS are complex systems with many user settings that can be configured to give the exact navigational view required for a voyage. This customisation is a key feature, and you may find the ability to set up and store ECDIS user profiles to be an advantage.

ENC alarm management

Type-approved ECDIS must as a minimum provide a set of alarms and indications within its planning and monitoring modes.

The ability to manage the alarms is a key factor in the safety of bridge operations, so bear in mind that different ECDIS allow varying degrees of customisation.

Pick reports

Feature highlight

ENC data contain much information in addition to the visible symbols displayed on screen. To access this extra information, use the cursor to pick a feature of interest; the ECDIS will then return on-screen information of all the features at that location. This information is known as a 'pick report' (see Glossary). The layout and usability of, pick reports varies between manufacturers although the same basic information should always be present.

A key feature to look out for is the highlight function, which enables the features returned at point to be individually highlighted, allowing for quicker visual inspection.

Mouse-over information

As it can take some time to obtain extra information from the ECDIS pick report, manufacturers are now building in functions that return key information if you simply hover the mouse over the feature.

Chart handling

Data loading

ECDIS vary greatly in the speeds at which they load data. Some systems will do additional ENC validation-checking on official S-63 data before converting to SENC.

This process not only increases the ENC load times but also delivers a number of warning and error messages that can be misleading and confusing. Check this with your ECDIS supplier and ask where the validation tests come from, how many are there and how are they kept up-to-date.



Other ECDIS features

Dead Reckoning (DR) position fixing

There is a general misconception that ECDIS is entirely dependent upon Global Navigation Satellite Systems (GNSS) to function. This is not the case, as every type-approved ECDIS must be able to plot positions manually from any source, be it visual bearings, radar or even astronomical observations. ECDIS perform this function in different ways, and you should consider ease of use in this regard.

ECDIS Chart 1

The display of ENC data in ECDIS is specified by the IHO S-52 Presentation Library. There are two different types of symbology within ECDIS, simplified and traditional, both of which are different from that used on paper charts. If there is a feature shown on ECDIS that a mariner does not recognise, they can either use the pick report function (see page 13) or consult ECDIS Chart 1 (see Glossary).

This is a digital glossary of symbols, grouped according to the layout of International Chart 1 (INT 1). This is usually available for viewing in the ECDIS and includes details of the presentation in both traditional and simplified forms. Access to Chart 1 differs across ECDIS makes and models, and can prove difficult to find in some cases.

Sensors

The IMO Performance Standards for ECDIS require a system to be connected to position, heading and speed sensors, each of which will require redundancy support in case of failure. This may also require the installation of additional navigation systems to be integrated with the ECDIS.

In addition to this minimum requirement, many ECDIS offer integration with other sensors, which can significantly improve situational awareness and integrity monitoring.

RADAR

When a radar image is overlaid on top of an ENC chart image, uncharted hazards such as other ships are shown on the same display as charted hazards such as shoals relative to the ship's position. This is a significant help for the watchkeeper in assessing the overall traffic situation in relation to navigational hazards. In addition, a radar image of a fixed object can be compared with the same charted object to confirm the integrity of the position and heading sensors.

AIS

Automatic Identification System (AIS) integration assists in identifying other ships in the vicinity, plus additional information that may be available from electronic aids to navigation such as virtual buoyage.



NAVTEX

Navtex messages are a key part of a Global Maritime Distress & Safety System (GMDSS), and the integration of this service into the ECDIS provides the mariner with crucial information in one location.

Other systems for potential integration could include the Voyage Data Recorder, alarm and monitoring system, Bridge Navigational Watch Alarm System (BNWAS), echo sounder and environment sensors.

If you already have a number of sensors that need to be connected to the ECDIS, ensure they are compatible and that there are enough input ports to support your existing infrastructure. It is advisable to conduct a technical audit prior to purchase to determine the compatibility of all the sensor, power and networking systems you require.

Updating ECDIS software and the IHO Check Dataset

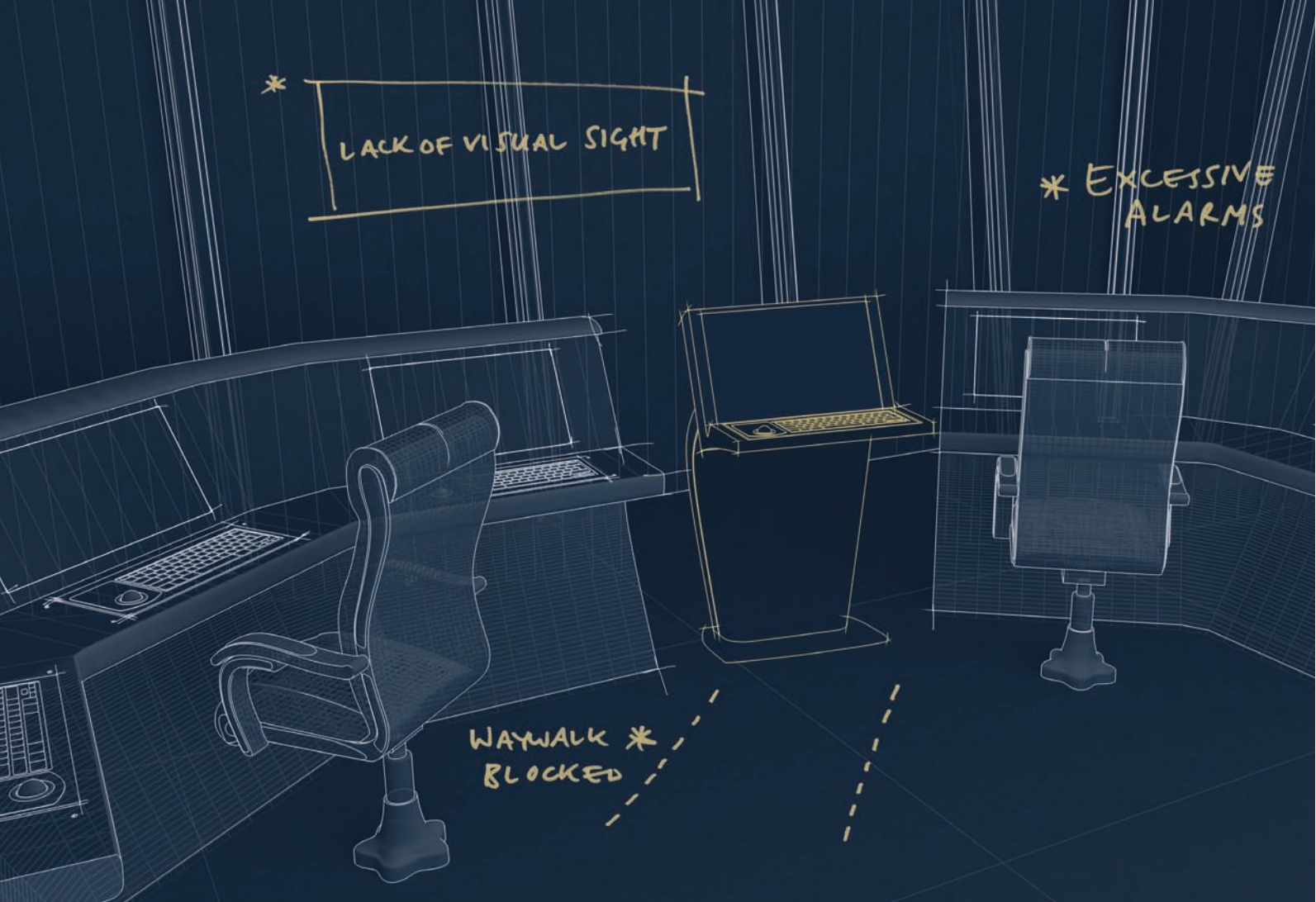
In 2011, IHO took a leading role in promoting the maintenance of ECDIS software. In an attempt to alert mariners to the issues involved in updating systems, and to address a number of ENC issues regarding chart display, the IHO has published its first ENC Check Dataset. This consists of two ENCs, designed to test which version of the IHO S-52 Presentation Library the ECDIS is running. It also details a number of different scenarios that have before now caused some ECDIS to react in an unexpected manner.

IMO has stated that an ECDIS that has not been updated for the latest version of IHO Standards may not meet the chart carriage requirements as set out in SOLAS regulation V/19.2.1.4. The current version of the IHO S-52 Presentation Library is v3.4 which contains the new Archipelagic

Sea Lane and New Object features together with new attribute categories of Environmentally Sensitive Sea Areas (ESSA) and Particularly Sensitive Sea Areas (PSSA).

Every ECDIS should provide a function to display the version of the IHO standards being used by the software. However, the method for finding this information differs from system to system and is not always easy to locate. As detailed on page 19, the Ship Owner or Manager is responsible for the maintenance of ECDIS software.

The checks in the IHO dataset are not exhaustive, and you should report any unusual operation of your ECDIS to your Flag State authority as requested in IMO MSC.1/Circ. 1391. It is therefore recommended that your ECDIS should have passed all the tests detailed in the IHO Check Dataset.



Installation



Quality installation drives quality performance

Correct installation is essential to benefit from the optimum performance of the ECDIS. As the installation can be complex, depending on the level of integration or upgrades required, it is important to establish if the cost is included in the overall purchase price.

You should have clear definitions of responsibilities, such as who provides an emergency power supply. Is the ECDIS supplier including the cost of connecting to the emergency power supply or are they responsible for installing it?

Who should install the ECDIS?

Installation should be undertaken by the manufacturer or their approved agent. Although it may be less expensive to use local electrical engineers, this could prove to be a false economy. The long-term costs of service engineers and support should also be considered against any short-term savings.

The more complex the installation, the more involved the shipping company will need to be in monitoring the project. It would be advisable to ensure a project manager is appointed who would be able to ensure your company's interests are maintained during the installation and can be supported by expert knowledge from the manufacturer and third party suppliers.

This is particularly valuable if any conflict emerges between the manufacturer, installer and ship. The project manager will need a good level of ECDIS knowledge and would benefit from operational experience of a similar system.

Where to install the ECDIS?

The ergonomics of a bridge fitted with ECDIS need to be carefully considered. The views of the masters and bridge watch-keeping officers can be valuable when developing an initial plan. The ECDIS should be in such a position that

an officer on watch can make quick reference to the system while maintaining good visual and radar situational awareness.

The location of a second ECDIS should provide watch-keeping support, and not simply be used for passage-planning. Much naturally depends on the Bridge Resource Management policy within the ship's company, including the composition of the watch and the design of the bridge.

Consideration should also be given to having the ability to use the ECDIS for bridge team-briefing and master-to-pilot exchanges. Additional ECDIS repeaters with their own display screen and user interface may be required in masters' cabins and as part of the Safe Return to Port requirements for passenger ships.

What is a Failure Mode Effect Analysis?

You can request a Failure Mode Effect Analysis (FMEA) – a document stating the effect of a failure of any of the primary elements of ECDIS as installed on a particular ship – from your ECDIS manufacturer. This documentation is very helpful in developing an ECDIS risk assessment for an individual ship. You can also use the FMEA to develop procedures for handling and preventing an ECDIS failure.

Some manufacturers will offer this as a part of the installation contract while others will charge extra.

Will I need an Acceptance Test?

Your classification society and/or Flag State will often require an acceptance test before certifying ECDIS as your primary means of navigation. These tests will ensure the system has been correctly supplied and installed, and that it operates in accordance with company-specific and regulatory requirements.

These tests may be conducted as a:

- **factory test**
- **harbour test**
- **full performance test during a sea trial.**

Their duration and complexity will have a direct effect on the overall schedule and cost of adopting ECDIS.



Support and maintenance



A table is included at the back of this guide for your notes.

Should we consider maintenance contracts?

When the ECDIS is fitted on a ship it should be considered a critical system in the International Safety Management (ISM) Code and so fully adopted into the ship's Safety Management System. This will include planned maintenance requirements and critical spares.

Consideration should certainly be given to having a maintenance or service agreement with the manufacturer. It is also important to establish a method by which the ECDIS software is maintained, in accordance with IMO SN.1/Circ. 266/Rev.1 "Maintenance of ECDIS software". Some manufacturers offer remote diagnostics, while others have a diagnostic report procedure in which a report is emailed to the service department following an ECDIS error.

Consideration should also be given to any critical spares which the manufacturer may advise the ship carries. This will greatly assist if the ECDIS fails, especially if the ship is operating in a remote location.

The manufacturer should also be able to advise you on the maintenance routine for your ECDIS hardware.

What are the service level agreements in the support/maintenance contract?

Another important consideration is the manufacturer's ability to support your ships in those parts of the world where they trade. Some manufacturers will have extensive service and support networks, while others will be more locally focused.

You should consider remote support, particularly if your ships operate in remote areas. Remember, some ECDIS manufacturers offer 24/7/365 cover, while others offer only office hours.

There are remote diagnostic systems that work via a ship-to-shore link and even a web-based support system. ECDIS upgrades can also be provided over the internet as a patch, while others may need to be installed by a service engineer.

Some ECDIS systems have alarm and monitoring systems which allow the ship's staff to conduct regular self tests.

Hardware considerations

Consider the reputation and stability of your proposed ECDIS manufacturer, as it is important to select a system that will be supported over its lifetime.

The expected frequency of any hardware upgrades will also have an impact on the long-term costs of your ECDIS.

Your ECDIS manufacturer should be able to advise on the critical spares which your ships should carry and the on-board routine maintenance required to comply with ISM requirements.

Software considerations

Maintaining ECDIS software is the responsibility of the ship owner or manager, so it's advisable to understand a manufacturer's policy on software maintenance.

This is likely to cover any software upgrades to make improvements or

respond to issues such as changes of the IHO Presentation Library. Ensuring your software is backwards-compatible (ie that it can work with input generated by an older product or technology) will ensure that your present system will continue to function following an upgrade.

You can monitor the status of your manufacturer's updates either through a maintenance contract or by remaining in contact with the manufacturer after the delivery of the ECDIS. The method of delivery for the software upgrades will need to be considered. This can be by a variety of methods including online or hard media, (eg DVD/CD).



In my experience of navigation assessments, the majority of errors using ECDIS can be avoided. Comprehensive training and effective procedures are essential to ensure that ECDIS is used safely, efficiently – and to its full capacity.

Captain Paul Hailwood MSc
Director, Hailwood Consultancy Ltd

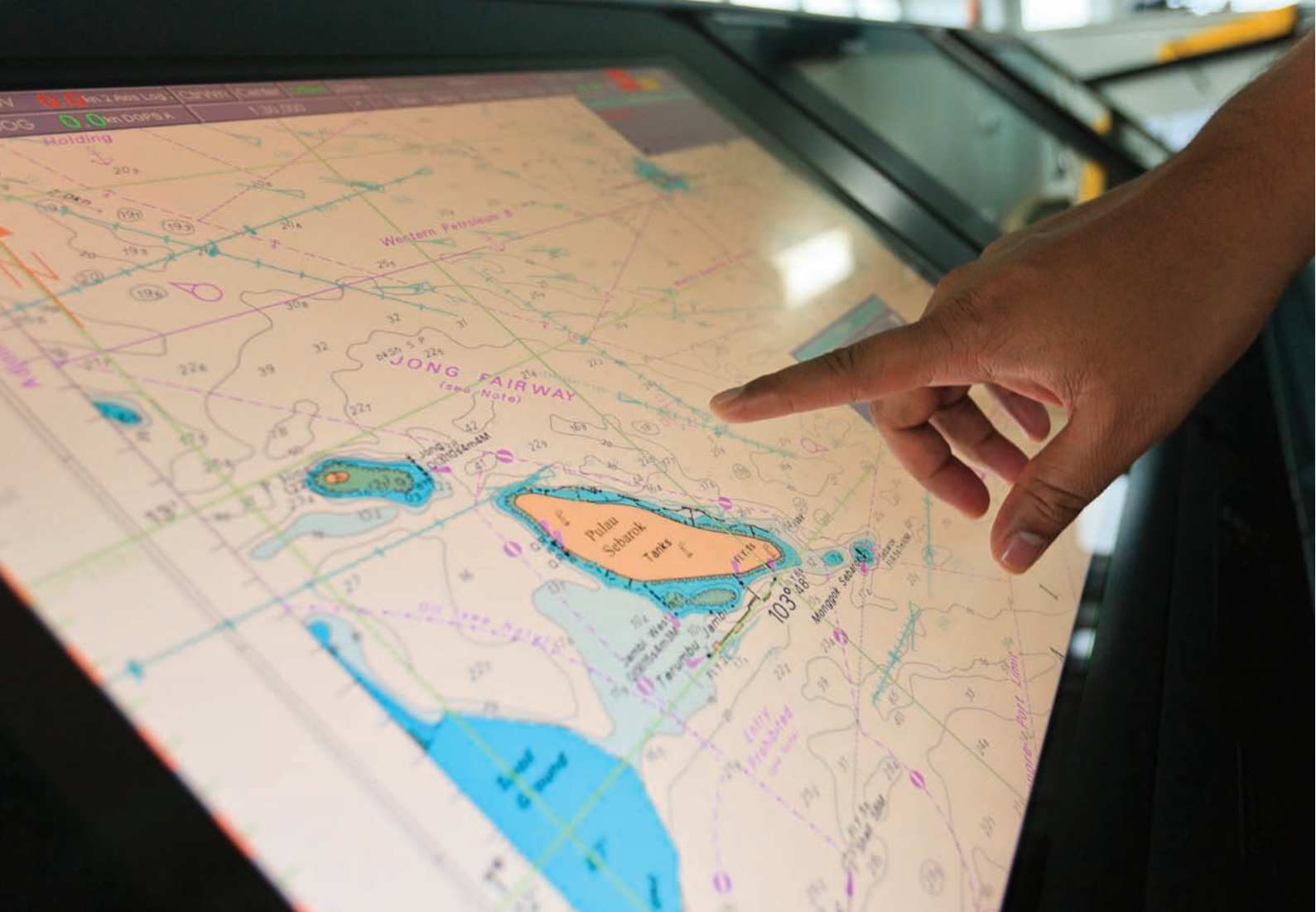


Chart supply

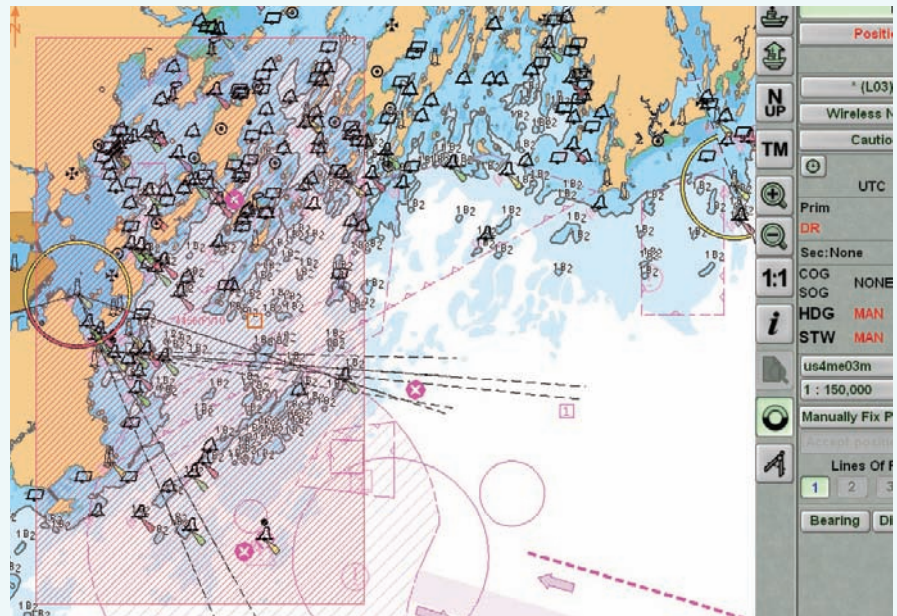
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What are Official Digital Charts?

SOLAS regulations stipulate that to be considered official, and therefore eligible to meet carriage requirements, all vector (ENC) and raster (RNC) electronic charts must be issued by or on the authority of a Government-authorized Hydrographic Office or other relevant Government institution.

Electronic Navigational Charts (ENCs)

ENCs are official navigational vector charts for use in ECDIS, produced by or on the authority of a Government, authorised Hydrographic Office or other relevant Government institution. Each ENC is a database of navigational information that is interpreted by ECDIS to provide a chart display and other functionality, such as automated alarms. The content and format of ENC data are controlled by the IHO S-57 standard, and their display in ECDIS is controlled by the S-52 standard. Only carriage of ENCs which meet this description will satisfy IMO carriage requirements.

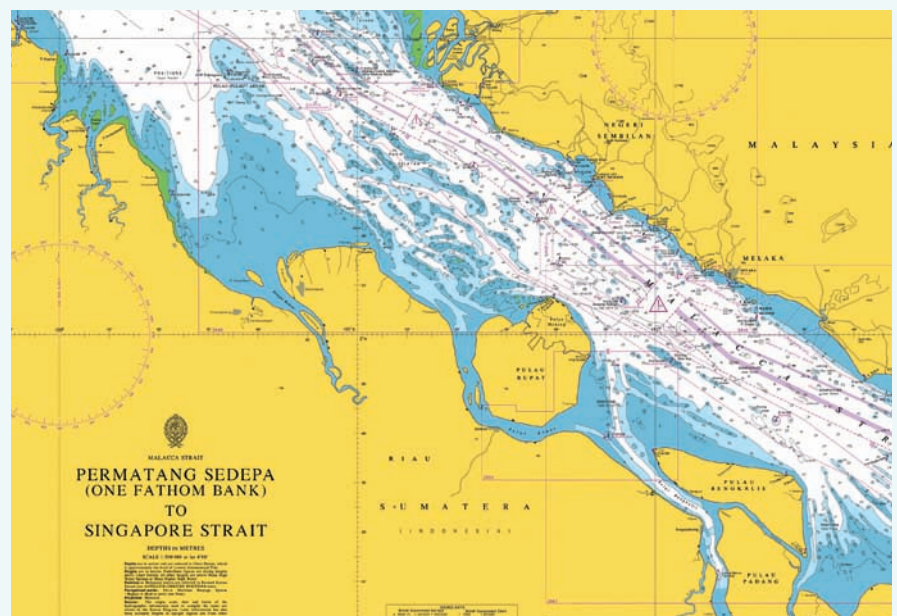


Raster Navigational Charts (RNCs)

RNCs are digital copies of paper charts. These can be used where official ENC coverage is not available, provided the ship also has appropriate paper chart back-up onboard. (Please refer to your Flag State's requirements for clarification; some, but very few, Flag States accept the use of RNCs alone as satisfying carriage requirements.) RNCs are also very useful for planning purposes.

There is no requirement for ECDIS to be able to display RNCs, and a number of ECDIS have no RNC display capability. When an ECDIS can display RNCs, it is worth checking if the charts display separately from one another or are "tiled" to give a seamless experience similar to ENC.

IMO SN.1/Circ.207/Rev.1 (see Glossary) details the differences between operating ECDIS with ENCs and operating the system in Raster Chart Display System (RCDS) mode when ENCs are not available.

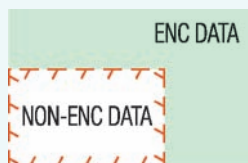


What is private chart data?

Many types of ECDIS will load and display privately produced chart data in either vector or raster formats. While these might superficially seem to be similar to official chart data, privately produced chart data does not meet SOLAS Carriage Requirements.

Private producers' chart-updating depends on the availability of the updated official chart products from which the charts have been derived. Consequently there can be delay, sometimes considerable, in chart updates being provided.

When any part of the ECDIS screen area displays data that is not generated from ENC then the ECDIS supplies an indication similar to: 'No official data available. Refer to the paper chart.' The boundary line between ENC and other chart data is also clearly identified on the ECDIS display by a special line style as shown below.



In what formats is ENC data available?

Authorised ENC data providers use two formats to deliver official ENC data to ECDIS:

S-63 Data Service

This is standard ENC distribution in accordance with IHO S-63 (see Glossary). This has the advantage that all type-approved ECDIS systems can receive and

display ENC data in this format. Only official ENCs can be delivered this way. An official ENC data service delivered in IHO S-63 is encrypted to prevent unauthorised use and to provide assurance that the ENC data has come from an approved source. Data providers frequently add a README.TXT file to the Exchange set (see Glossary) which includes important information regarding the ENC service and the safety-related data contained in the service.

Therefore the ability to access the README.TXT file direct from the ECDIS is considered an important feature, and you should consider the ease with which the ECDIS you are reviewing enables this.

System Electronic Navigational Chart (SENC) delivery

When ENC data is installed in an ECDIS, it is converted into a system-specific internal database called the SENC. While some types of SENC have been approved for the distribution of ENC data, some ENC producers only allow their data to be distributed using S-63 and their data cannot be distributed in SENC (see Glossary).

How is ENC data distributed?

Media

ENC data, regardless of its format, is normally supplied on physical media such as CD, DVD or a USB flash drive. Not all ECDIS are compatible with all media formats, however, so you need to check that your ECDIS will work with the media format that you prefer.

ECDIS software will most commonly be used on a computer with a Windows OS. As with any software it is possible for it to become infected by a virus, there are a number of measures which may help to prevent infection. It may be worth discussing options with the ECDIS supplier.

Internet

As the capability increases and the cost of receiving data-updates via the internet decreases, there has been growth in its use in supplying ENC data services. The ECDIS can receive ENC data either directly, if it is connected to the internet through a suitable firewall, or via software installed on a PC onboard ship.

However, because the initial data supply can involve a large volume of data, most users still rely on physical media for the initial data load. It's recommended that you retain the physical media as a backup to online services, so ensuring continuity of access in the absence of communications links.

How are digital charts updated?

It is essential that you regularly apply updates to the chart data in ECDIS to maintain compliance with SOLAS Carriage Requirements.

Updates to ENCs are issued in three forms:

- as individual ENC updates (equivalent to a paper chart Notice to Mariners)
- as new editions of existing ENCs
- and as new charts.

It is important to ensure that your updating service provides all three types of update.

Updates for official ENC and RNC charts are normally supplied weekly on the same media as the original service. The volume of data required for updating is significantly less than the initial data load, and online updating services such as Admiralty e-Navigator are becoming increasingly popular.

An important aspect to consider when using ENCs and ECDIS is how to show Port State Control inspectors that you are using up-to-date data; many ECDIS now enable you to generate printable ENC status reports.

What about supporting navigational applications?

With over 12,000 ENCs available worldwide, as well as a wide variety of other electronic navigation products such as RNCs and digital publications, automated data management systems like Admiralty e-Navigator ease the burden of managing, ordering and updating.

Such systems normally entail:

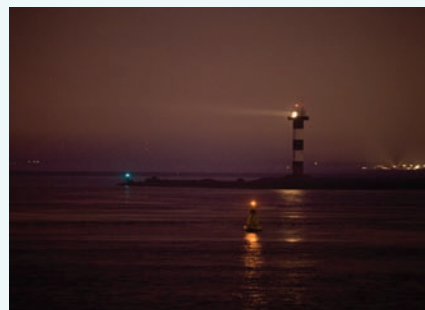
- a holdings-management module that looks after a ship's data holdings
- a catalogue and ordering module that allows new data to be ordered when required
- an updating module to manage the online updating of data
- ENC status print outs for port state control inspections.

They may also offer additional benefits, such as updating reports and the ability to display other products alongside electronic charts to support passage planning.

Some ECDIS will integrate with the supporting systems from other service providers, improving the management of electronic chart data by allowing the ECDIS and support system to exchange data automatically.

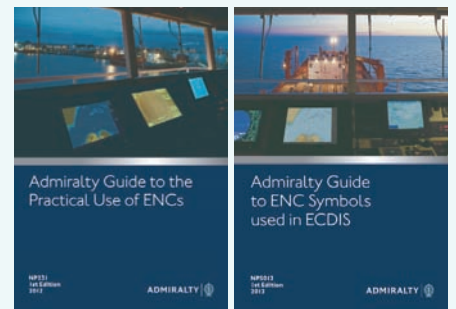
What about supporting navigational information?

A wide variety of additional digital information is also available, which can be used alongside ENCs in the navigation process. The following layers are already available and may be integrated into the ECDIS:



Admiralty Information Overlay

Designed to be used in conjunction with the Admiralty Vector Chart Service, the Admiralty Information Overlay contains all Admiralty Temporary & Preliminary Notices to Mariners (T&P NMs). It also provides additional preliminary information that is specific to ENCs, such as reported navigational hazards that have been incorporated on paper charts but have not yet been included in ENCs.



Other key layers include:

- tides
- maritime security
- weather
- ice

There are also useful reference guides available covering ENC use and the symbols used in ECDIS.

ECDIS buyers checklist

- Define the date of ECDIS implementation for ships in your fleet
- Establish the individual ship requirements, eg back-up power, sensors and other systems you may want to integrate with ECDIS
- Decide on the required ECDIS purchase date
- Confirm ECDIS Type Approval is acceptable to Flag State
- Define Flag State requirements including back-up system requirements
- Define any Port State requirements
- Define any Classification Society requirements
- Establish the procurement process
- Establish crew training requirements and if these are included in the ECDIS supply cost
- Consider ECDIS functionality and its implication for safety and efficiency at sea
- Establish installation process and costs
- Establish ongoing support and maintenance contracts
- Establish chart supplier and methods of maintaining and monitoring charts

Glossary

ECDIS An Electronic Chart Display and Information System, which, with adequate back-up arrangements, can be accepted as complying with the up-to-date chart required by regulation V/19 and V/27 of the 1974 SOLAS Convention, as amended.

It does this by displaying selected information from a system electronic navigational chart (SENC) with positional information from navigation sensors, to assist the mariner in route-planning and monitoring. If required, it can display additional navigation-related information.

ECDIS Chart I must be available in all systems and provides a reference set of the manufacturer's symbols for the ECDIS user.

Exchange set A set of ENC files including one catalogue file and associated text and TIFF files representing a complete data transfer.

IMO Circulars

- IMO SN.1/ Circ. 266/Rev.1 – Maintenance Of Electronic Chart Display And Information System (ECDIS) Software
- IMO SN/ Circ. 207 Differences between RCDS and ECDIS
- IMO MSC.1/Circ.1391 Operating Anomalies Identified within ECDIS.

Full details of IMO circulars can be found at: www.imo.org/OurWork/Circulars/Pages/IMODOCS.aspx

IMO Performance Standard For full details of IMO standards relating to ECDIS visit <http://www.iho.int/srv1/>

MARPOL 73/78 is the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978.

MED Marine Equipment Directive: The European Commission has developed the Marine Equipment Directive (Council Directive 96/98/EC of 20 December 1996 on marine equipment, as amended). In a move to harmonise standards for the design, construction and acceptance procedure for items of equipment referred to in SOLAS and MARPOL. The directive applies to ECDIS equipment manufactured from 1 January 1999 being placed on board a new or existing ship flying the flag of an EU country or Norway or Iceland (EFTA countries).

The aims are to:

- enhance safety at sea and prevent marine pollution through uniform application of international instruments (IMO Conventions, Resolutions, Circulars and relevant international testing standards) related to the equipment in question
- ensure the free movement of equipment within the European Economic Area (EEA).

MED requires that ECDIS be certified by a Notified Body and specifies basic requirements for manufacturers and their products. This assessment procedure, carried out by notified bodies, applies both to the design and the production phase of the system.

Pick report Only a portion of the characteristics of a particular chart feature can be communicated by its chart symbol alone. The pick report function allows access to attribute information that are included in the ENC data but not automatically displayed.

Raster Chart Display System (RCDS)

A navigation information system displaying raster charts with positional information from navigation sensors.

S-52 The IHO presentation standard for ECDIS. The presentation library is periodically updated and it is strongly recommended that systems are updated to the most recent version of the standard to ensure all features are portrayed correctly. The latest edition of the Presentation Library (as at August 2012) is 3.4 published in 2008.

S-57 The IHO standard defining ENC data and content.

S-63 The IHO standard defining its data protection scheme.

For full details of IHO standards currently in force visit: http://www.iho.int/mtg_docs/enc/ECDIS-ENC_Stdsln_Force.htm

System Electronic Navigational Chart (SENC)

a database in the manufacturer's internal ECDIS format, resulting from the lossless transformation of the entire ENC contents and updates. It is this database that is actually accessed by ECDIS for the display generation and other navigational functions, and is the equivalent of an up-to-date paper chart. The SENC may also contain information added by the mariner and information from other sources.

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ECDIS comparison notes

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