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Electronic Charts
What Can Be Used Under SOLAS?

The last few years have seen a steady increase in the use at sea of electronic chart systems and the associated electronic chart data. Unfortunately, this increased use appears to have been accompanied by growing confusion regarding the "electronic chart" solution and what is, and what is not, legitimate for vessels subject to the requirements of SOLAS chapter V (SOLAS V). The purpose of this paper is to explain the various contributing elements of the "electronic chart" solution, their interrelationship, and their status under SOLAS V.

Chart carriage requirement
The requirement for a vessel to carry charts derives from Chapter V of the SOLAS Convention. This was previously contained in Regulation V20 but, since the coming into force of the revised Chapter V in July 2002, it is now contained in Regulation V19, supported by Regulations V2, V9 and V27.

Regulation V19 defines a vessel's chart carriage requirements. It also states that these may be met by the use of an Electronic Chart Display and Information System (ECDIS) supported by back-up arrangements. It is only ECDIS that is capable of meeting the minimum performance standards set by the IMO and referenced in Regulation V19.

Regulation V2 specifies that the charts, whether paper or electronic, must be "issued by or on the authority of a Government, authorized hydrographic office or other relevant government institution". These are often referred to in the literature as "official charts".

Regulation V27 states that the charts used by the mariner must be "up-to-date"; that is, they must be kept corrected for notices to mariners.

Regulation V9 states that contracting governments must provide hydrographic services, one component of which is the provision of notices to mariners to keep their charts up-to-date.

Three key components
Derived from the above, we have three key components if a vessel is to satisfy the chart carriage requirement in SOLAS V by electronic means. These are:

(i) ECDIS equipment as specified in the IMO ECDIS Performance Standards (IMO Resolutions A.817 (19), MSC.64 (67) and MSC.86 (70)). To meet the carriage requirements, the ECDIS must be "type approved".

(ii) A back-up arrangement for the ECDIS. The ECDIS Performance Standards specify the requirements, which the back-up must meet but does not specify which solutions meet those requirements. However, Regulation V19 states that an "appropriate folio of paper charts" may be used. The suitability of other, by implication non-paper, back-up solutions must be decided by the relevant maritime administration.

(iii) Charts, to be used by the ECDIS. These are Electronic Navigational Charts (ENCs), which conform to standards defined by the International Hydrographic Organization (IHO). These are often referred to as "official" ENCs.

In 1998 the ECDIS Performance Standard was amended to permit ECDIS to operate optionally in the Raster Chart Display System (RCDS) mode of operation using Raster Navigational Charts (RNC). The RCDS mode of operation is only to be used for those areas where ENCs have not been published. An additional condition is that when operating in RCDS mode, ECDIS must be "used together with an appropriate folio of up-to date-paper charts". The interpretation of "appropriate folio" is a matter for maritime administrations to decide. As is the case with ENCs, RNCs must conform to standards defined by the IHO. These are often referred to as "official" raster charts.

As explained above, ENCs conform to the ENC Product Specification contained in IHOS-57 Edition 3.1. When used in an ECDIS, the ENC contents are translated from the S-57 ENC format into the internal data format used by that ECDIS. This internal format is referred to as the System Electronic Navigational Chart (SENC). There are currently more than a dozen different SENC formats used by different ECDIS manufacturers.

It was recently agreed by the IHO (IHO Technical Resolution A3.11) that the ENC distributor could perform this translation on shore. However, this is an optional practice and subject to the approval of the hydrographic office producing the ENC. In these circumstances, the ECDIS receives ENC data in an internal, SENC, format. This is often referred to as "SENC delivery". However, all ECDIS are still required to be able to read ENCs in the IHO S-57 format.

Non-SOLAS V Electronic Charting Options
The development of the relevant IMO and IHO standards took place over the last 15 years. During this time some equipment manufacturers started to produce display systems able to superimpose vessel position on an "electronic chart". These systems were referred to generically as Electronic Chart Systems (ECS) and normally used "electronic charts" produced by commercial companies. This use continues today.

Electronic Chart Systems are defined in IHO publication S-52 Appendix 3 as a "Generic term for equipment which displays chart data but which is not intended to comply with the IMO Performance Standard for ECDIS, and is not intended to satisfy the SOLAS Chapter V requirement to carry a navigational chart".

Because ECS do not meet SOLAS requirements, there is no IMO ECS standard. However, the US-based Radio Technical Commission for Maritime Services (RTCM) has produced Recommended Minimum Standards for Electronic Chart Systems. For the same reason, there are no IHO standards for ECS charts. However, the International Standards Organization is currently developing a standard for ECS charts (ISO 19379).

Although both standards are extremely useful, it should be stressed that they relate to a solution that is not SOLAS compliant. An ECS cannot meet a vessel's SOLAS chart carriage requirements, even if the charts used in an ECS are ENCs or RNCs. Similarly, commercial "electronic charts" whether used in an ECS or an ECDIS do not meet a vessel's chart carriage requirements. In all these circumstances, a vessel's SOLAS V chart carriage requirements can only be met by the use of a normal folio of paper charts.