

REGULATORY ASPECTS OF ELECTRONIC CHARTING THE PERSPECTIVE OF THE UNITED KINGDOM MARITIME AND COASTGUARD AGENCY

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Paper already presented at the SASMEX Conference 1999, 12-14 April 1999, Rotterdam, The Netherlands.

Abstract

The development of electronic charting systems is one of the most exciting applications of marine technology to have taken place since the widespread introduction of radar aboard merchant ships in the aftermath of World War II. Such systems bring a new dimension to bridge watchkeeping and navigation through the integration of satellite position fixing and other shipboard sensors with advanced, electronically-derived, chart information. Properly implemented, electronic charts have a tremendous amount to offer the mariner for effective, safe and efficient navigation.

This paper seeks to identify the current legal status of electronic charts within the UK's merchant shipping regulatory regime to ensure that shipping companies and mariners, taking advantage of such systems, do so within the law.

1. INTRODUCTION

The IMO performance standards for electronic chart display and information systems - ECDIS - are contained within an annex to Assembly Resolution A817(19) and specify the functional requirements of such systems (See

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Appendix I). In addition complimentary recommendations, developed by the International Hydrographic Office, are incorporated into this Resolution to ensure that the electronic navigational chart database and the content, structure and format of the information provided and displayed is standardized throughout.

Since 1996, Resolution A817(19) has been amended on two further occasions to incorporate back-up requirements (new Appendix 6) and a raster chart display system (RCDS) optional mode of operation (new Appendix 7).

In the meantime the International Electrotechnical Commission has worked to create the detailed operational and performance requirements, methods of testing and desired test results for ECDIS and published their standard - IEC 61174 - in late 1998.

The development of the IEC standard coupled with the adoption of the amendments for the RCDS mode of operation by the IMO Maritime Safety Committee meeting in December 1998 and the validation of the Model Course on the operational use of ECDIS by the Sub-committee on Standards of Training, Certification and Watchkeeping (STW) in January 1999 have all been instrumental, certainly in the UK, on directing a national maritime administration to examine closely the potential regulatory impact of future widespread conversion from paper to electronic charts and other nautical publications.

Non-ECDIS equipment has, however, been used aboard a number of UK-registered vessel now for a number of years. Although several of these vessels participated in the so-called 'SOLAS I/V trials' in 1997/98 to provide feedback from professional mariners on the use of raster chart systems, they were in no way exempted from the carriage requirements imposed under the Safety of Life at Sea (SOLAS) Convention.

2. CURRENT CARRIAGE REQUIREMENTS

Regulation 5 of SOLAS Chapter 1 enables an Administration to allow alternative arrangements to prevail aboard ship if it is satisfied that, by trial or otherwise, such alternative arrangements are at least as effective as those required by the present regulations.

In doing so, the Administration is obliged to report the outcome of such trials to the IMO which, in turn, circulates the particulars to other IMO Member States.

The I/5 trials nevertheless convinced the UK authorities that raster chart system could make a significant contribution to safe navigation aboard ship and the results of the trials were presented to IMO last July in support of a change to the ECDIS performance standards.

The current requirement for charts and nautical publications stem from Regulation 20 of SOLAS Chapter V . This regulation requires all ships to carry:

- adequate and up-to-date charts,
- sailing directions,
- lists of lights,
- notices to mariners,
- tide tables, and
- all other nautical publications necessary for the intended voyage.

In the UK legal effect to this requirement comes about through the Merchant Shipping (Carriage of Nautical Publications) Regulations 1998.

Whilst these regulations apply to UK-registered vessels wherever they may be, they also apply to all other vessels, *irrespective of flag*, while in UK waters.

With regards to charting requirements the UK Regulations stipulate that charts must be of such a scale and contain sufficient detail to show clearly all navigational marks which may be used by the ship when navigating the charted waters.

They must also show all known dangers affecting those waters and information concerning any ships' routing and ship reporting measures applicable to those waters.

In addition, the charts must be published by the Hydrographer of the Navy, be the latest obtainable editions and kept up to date by application of the relevant notices to mariners and radio navigational warning.

It should be noted that any reference to the Hydrographer to the Navy is also taken to mean any authority in countries outside the UK exercising similar functions to the Hydrographer.

Within the context of the Regulations, however, the requirement to '*carry nautical publications*' does not implicitly include electronic versions of such publications.

Nevertheless the IMO Assembly Resolution A 817(19) notes that:

the up-to-date chart required under SOLAS V/R20 can be provided and displayed electronically on board ship by ECDIS as well as other nautical publications required by SOLAS V/R20.

Therefore, as far as the IMO is concerned, an ECDIS that fully conforms to performance standards not inferior to those set out in the Annex to Resolution A817(19) has the legal equivalence of those charts and publications required under SOLAS V/R20.

Prior to the most recent amendment to performance standards in December 1998, ECDIS had to be used specifically with electronic navigational charts (ENCs) if they were to fulfill the mandatory chart carriage requirements.

Only digital charts that had been officially sanctioned by the Hydrographer of the Navy and complied with the Product Specification contained within the International Hydrographic Office's Transfer Standard for Digital Hydrographic Data (IHO S-57 Edition 3) were permitted and any electronic chart product that did not meet these two basic conditions was not legally an ENC and could not be used to satisfy the statutory carriage requirements in the UK.

It should be stressed that as far as the Maritime and Coastguard Agency are concerned, these requirements do not specifically exclude commercial companies from developing official digital products provided that they do so within some form of official partnership with the UK Hydrographic Office.

Interestingly no UK shipping company have ever approached the Maritime and Coastguard Agency to replace their paper chart folios with electronic equivalents. This is despite the fact that the IMO ECDIS performance standards have been adopted for well over three years.

While existing merchant shipping legislation does not refer to an electronic publication option directly, the Maritime and Coastguard Agency has taken legal advice from its parent Ministry and has been informed that a reasonable interpretation of the IMO Assembly Resolution would allow the Agency to permit the use of ECDIS.

This view, however, is liable to be challenged in a court of law and the Agency has therefore been advised to consider amending current legislation in order to guard against any future legal confrontation.

Apart from any uncertainty in the strict legal interpretation of the IMO Resolution, there have been other reasons why no UK shipowners have sought to fit ECDIS aboard their vessels to meet their SOLAS obligations. Although the availability of ENC cover has been very limited, a major problem has been linked to verifying compliance of the electronic charting system with the IMO performance standards.

3. TYPE TESTING AND TYPE APPROVAL

In accordance with its international and national responsibilities, the Maritime and Coastguard Agency and its predecessors has for many years undertaken the 'type approval' of marine equipment for use aboard UK ships. To gain such type approval, a prototype which is representative of the build standard of the equipment is subjected to a technical appraisal of its design, examined and tested. If the equipment is found to be satisfactory, a type approval certificate is issued.

Since March 1996, the Maritime and Coastguard Agency no longer carries out type approval directly in the majority of cases. Instead, the function has been deferred to 'Nominated Bodies' who now undertake the examination, testing and certification on the Agency's behalf.

These Nominated Bodies in the UK consist of six major Classification Societies and the UK Defence Evaluation and Research Agency.

The current UK type approval process requires type testing to be undertaken in a test laboratory accredited by either the United Kingdom Accreditation Services (UKAS) or a foreign equivalent. A test laboratory, using an approved method, tests the system for compliance with the agreed performance standards and produces a Test Report for presentation to the appropriate Nominated Body. Where the system has been deemed to meet the necessary provisions, the Nominated Body issues a UK certificate of type approval to the applicant.

The traditional policy within the UK has been to require type approval for equipment only if there is a mandatory carriage requirement for such equipment under the SOLAS Convention.

No such requirement currently exists for electronic charts.

However this situation is liable to change if the revision to SOLAS Chapter V are eventually adopted by the IMO. Several of the new proposed regulations deal with aspects of charting and nautical publications. For example:

- Regulation 2(3) - defines a *Nautical chart* as a special purpose map or specially compiled digital database, from which such map can be derived, designed to meet the requirement of marine navigation.
- Regulation 2(4) states that an *Official nautical chart or other official nautical publication is one that* has been issued by or on the authority of a Government, authorised Hydrographic office or other relevant government institution.
- Regulation 19(1) - will require navigational systems and equipment fitted after [1 July 2002] to meet the requirements of this chapter shall be of a type approved by the Administration.
- Regulation 25(2) - states that where the requirement to carry a chart is satisfied by a specially compiled database displayed on an electronic chart display system, the system and its back-up arrangements shall meet the standards not inferior to those adopted by the Organisation.

Regardless of a future need to type approve electronic chart systems if they are intended to meet a mandatory carriage requirement, it may surprise some members of the audience to find out that no UK accredited test laboratories presently have developed ECDIS test methods to undertake type testing.

This situation has caused some UK equipment manufacturers to look to other European countries for their type testing and approval needs.

Fortunately the introduction of EC Directive - 96/98/EC - on Marine Equipment on 1st January 1999 has created a new certification scheme within Europe. This has resulted in the replacement of the former national systems in European Union countries by a single certification scheme, based on both design and production conformity assessments.

Any marine equipment, listed in Annex A.1 of the Directive, that has been type approved in one EU Member State ('wheelmarked') must be accepted by all other Member States, plus Norway and Iceland.

Annex A.1 deals only with marine equipment for which detailed testing standards already exist in international instruments. In its original un-amended form, only equipment that had to be carried on board on a mandatory was contained in this annex. This approach has changed somewhat in the amended version of the Directive.

A second annex - Annex A.2 - lists marine equipment for which no detailed testing standards exist in international instruments or existed at the time the Directive was published. Any equipment in this annex will continue to be type approved on a national basis only. ECDIS currently falls into this category as, irrespective of various international standards associated with ECDIS, there is no requirement for type approval under the existing SOLAS Convention. This situation would change, however, if the revisions to Chapter V (particularly draft Regulation 19.1) are adopted by IMO.

For UK ECDIS manufacturers the situation remains that, whilst ECDIS remains listed in Annex A.2, type approval will still be carried out by the appropriate UK Nominated Body for use of the equipment aboard UK registered vessels.

In the case of electronic navigation equipment only the Defence Evaluation and Research Agency (DERA) is authorised by the Maritime and Coastguard Agency to undertake this activity and to issue a UK type approval certificate on satisfactory completion.

Actual type testing could, however, be done outside of the UK so the absence of test facilities within the UK need not be a major impediment for national manufacturers. If ECDIS is subsequently moved to Annex A.1 at some future date, type testing and approval will then revert to the new simplified EU single certification scheme.

For this reason the Maritime and Coastguard Agency made representation to the European Commission in early April to consider transferring ECDIS out of Annex A.2 by virtue of the recent publication of the international testing standard - IEC 61174. A decision will be taken at a future EC meeting in Brussels in May.

4. TRAINING AND CERTIFICATION FOR ELECTRONIC CHART USERS

The IMO ECDIS Model Course describes ECDIS as :

a complex, sophisticated navigation system which includes not only a large number of direct navigational functions but also components of an advanced computer-based information system involving hardware, software, sensor inputs, specific ECDIS data and their presentation rules, status indicators, alarms, man-machine interfaces etc.

For these reasons, therefore, mariners intending to use ECDIS must be properly trained in its correct use so as not to compromise safety of navigation and to avoid misinformation and malfunctions.

At present in the UK there is no direct requirement for training in the use of ECDIS over and above that which is required under the 1995 revision of the IMO International Convention on Standards of Training, Certification and Watchkeeping (STCW).

One of the features of the revised Convention is a new STCW Code, which contains both mandatory requirements (in 'Part A' of the Code) and recommendatory guidance (in 'Part B'). The Code establishes new uniform standards of competence for a particular skill for the first time and lays down specific criteria for standards of knowledge, understanding and proficiency to be achieved in each element of competence, as well as methods of evaluation.

As an example, for the function of 'Navigation at the Operational Level' (Table A-II/1), there is no specific emphasis placed on ECDIS and, in fact, such systems are simply grouped under the general heading of 'charts'.

The mariner is required to be competent to ***'plan and conduct a passage and determine position'***.

To be able to undertake this function, the mariner must have ***'thorough knowledge of and ability to use navigational charts and publications*** and be able to demonstrate such competence by ***'using chart catalogues, charts (including electronic charts), navigational publications, electronic navigation equipment***.

The amendments to the STCW Convention are incorporated into UK domestic legislation through the Merchant Shipping (Safe Manning, Hours of Work and Watchkeeping) Regulations 1997 and the Merchant Shipping (Training and Certification) Regulations 1997.

The Safe Manning, Hours of Work and Watchkeeping Regulations define the responsibilities of the owners and others responsible for the operation of ships in

relation to certification and training of mariners on their ships, the availability of documentation and the provision of instructions on familiarisation of personnel who are newly appointed to their ships.

Among other things, Regulation 4 requires every company to ensure that the company provides written instructions to the Master of each of their ships.

Such instructions must set out the policies and procedures to be followed to ensure that all mariners, who are newly-employed, are given a reasonable opportunity to become familiar with the shipboard equipment, operating procedures and other arrangements needed for the proper performance of their duties before being assigned to those duties.

The policies and procedures must also include an allocation of a reasonable period of time during which the newly-employed mariner will have an opportunity to become acquainted with specific equipment the mariner will be using or operating. As well, the mariner has to be familiar with ship-specific watchkeeping, safety and environmental protections arrangements that need to be known to perform the assigned duties properly.

The UK Merchant Navy Training Board (MNTB), in consultation with the Maritime and Coastguard Agency, has produced various guidelines for those designing and delivering approved education and training courses and the criteria for meeting the standards of competence specified in the STCW Code.

The Guidelines for Navigation, Radar and ARPA Simulator Training has a requirement for the trainee to ***'understand and demonstrate the proper use of Electronic Chart Display Systems'*** (under Learning Outcome 4). This training is mandatory for candidates for certificates of competency as officer in charge of a navigational watch. This is in accordance with Regulation II/1 of the STCW Convention.

Performance criteria linked to this outcome are:

- The principles of the Electronic Chart Display System are clearly explained.
- The limitations of the Electronic Chart Display System are clearly identified.
- The information obtained from Electronic Chart Display System is interpreted and used correctly.
- The correct use of the Electronic Chart Display System is clearly demonstrated.

The recommended duration of the Navigation, Radar and ARPA Simulator course, when run as a full time block, is at least 150 hours (5 weeks). The IMO ECDIS Model course, by comparison, has been designed with a target duration of 40 hours and is devoted exclusively to electronic chart issues.

Feedback from other maritime administrations and maritime education establishments suggest that a minimum of two levels of training are needed to use ECDIS in a safe manner.

Generic training, in the form of approved college-based courses structured, for example, upon the IMO ECDIS Model course, would provide the underpinning knowledge needed to appreciate the advantages and disadvantages of electronic chart systems. Such courses could accommodate both new entrants and experienced mariners through integration into existing STCW core modules or stand-alone programs.

As the fitting of ECDIS becomes more prevalent, there is every likelihood that either the existing Navigation, Radar and ARPA Simulator Training course be significantly expanded in the UK to accommodate ECDIS fully or a separate, comprehensive STCW short course, based along the lines of the IMO ECDIS Model course, be developed by the MNTB.

Additionally, there is a perceived need for **type training** on a specific system that a trainee would shortly expect to use aboard ship.

In view of the lack of standardisation with ECDIS user interfaces, there is scope here for individual system manufacturers to develop approved computer-based learning packages based on criteria specified by the national administration. These learning packages could capitalise on multimedia techniques and be used either in stand-alone mode or integrated into the ECDIS as an on/off-line tutorial aid. This approach would ensure some flexibility in allowing a trainee the opportunity to become familiarised with the ECDIS equipment prior to joining the vessel or, having done so, before taking over a navigational watch.

Some form of certification would ideally be needed to verify that both components of training had been successfully undertaken and that the potential ECDIS user was fully competent in the operation of the system. For the generic training component, the institution providing approved training could issue a certificate to those trainees who have undertaken a course and successfully met the course's learning objectives.

For type training certification there are a number of options for issuing a certificate based upon a specific manufacturer's system including:

- Certificate issued directly by the trainee's employer;
- Certificate issued by the Master of the trainee's vessel
- Certificate printed out automatically on an attached printer on satisfactorily completing a manufacturer's computer-based interactive learning and assessment package.

The Maritime and Coastguard Agency will, however, seek views from a wide range of interests throughout the industry before implementing any specific training and certification requirements.

5. THE ISM CODE'S IMPACT ON TRAINING REQUIREMENTS

The ISM Code has been incorporated into the SOLAS Convention Chapter 9 and entered into force on 1st July 1998 world-wide for the following vessel types of over 500 GT:

- Passenger ships, including high-speed passenger craft;
- oil tankers;
- chemical tankers;
- bulk carriers; and
- high-speed cargo ships.

The Code has been incorporated into UK domestic shipping legislation through the Merchant Shipping (ISM Code) (Ro-ro passenger ferries) Regulations 1997 and the Merchant Shipping (International Safety Management) Regulations 1998.

Under the Code, the company has a responsibility to ***“establish procedures to ensure that new personnel and personnel transferred to new assignments related to safety and protection of the marine environment given proper familiarisation with their duties. Instructions which are essential to be provided prior to sailing should be identified, documented and given”*** (Section 6.3).

Additionally, the Company has to

- ensure that all personnel involved in the Company's Safety Management System (SMS) have an adequate understanding of relevant rules, regulations, codes and guidelines; (Section 6.4)
- establish procedures for identifying any training which may be required in support of the SMS; (Section 6.5)

Under the Section dealing with Emergency Preparedness, the Safety Management System must provide for measures to ensure that the Company organisation can respond at any time to hazards, accidents and emergency situations (ECDIS failure?) involving its ships (Section 8.3)

For vessels that must comply with the ISM Code, it would therefore appear that even in the absence of specific legislation for ECDIS training, there is a clear obligation on shipowners to ensure that mariners sailing with ECDIS are properly trained to safely use such equipment.

6. PROPOSED UK-SPECIFIC REQUIREMENTS FOR RCDS MODE

For the professional mariner, one of the big advantages of electronic chart systems is the ease with which the charts are corrected by applying weekly Notice to Mariners from update CD-ROMS. This contrasts with the traditional manual method of correcting chart folios, which is both time consuming and prone to mistakes and errors. ECDIS will inevitably lead to a reduction in the number of paper charts carried aboard ship and, in the case of ENC's, may replace them totally.

The December 1998 amendment to the IMO ECDIS performance standards now fully recognises a raster chart display system (RCDS) mode of operation within ECDIS provided certain conditions are met. The issue of verifying compliance with the ECDIS performance standards, when operating in RCDS mode, has still to be resolved as the existing IEC testing standard - IEC 61174 - was developed for ENC usage only.

On this issue, it would appear that the next version of the IEC standard that includes the requirements for an RCDS mode of operation may not be available until as late as 2001 - assuming that the proposed work goes according to timetable!

The Maritime and Coastguard Agency could, however, consider the procedure contained within its Merchant Shipping Notice - M.1440 - to approve the use of ECDIS operating in the RCDS mode aboard UK registered vessels as an interim solution.

M.1440 contains three categories of equipment for acceptance and approval:

Category 1 - items of equipment that may be accepted locally by a Maritime and Coastguard Agency surveyor on inspection and, in certain cases, on the basis of documentation issued by or on behalf of the Administration of the country of manufacture, or a recognised Classification Society or an accredited testing establishment.

Category 2 - items of equipment which require reference to Maritime and Coastguard Agency HQ before acceptance because of increased complexity and requiring specialist knowledge - such as ECDIS operating in RCDS mode.

Category 3 - Items of equipment where full approval procedures are required because, for example, there are no established design or performance standards.

It may therefore be feasible for the Maritime and Coastguard Agency to authorise an ECDIS that has already been type tested and approved against the

current performance standards - A817(19) and IEC 61174 for use with ENCs to operate as a dual-fuel system under this scheme.

One of the conditions imposed in the December amendments is that when using ECDIS in RCDS mode, there will be a requirement to carry an 'appropriate' and 'up-to-date folio' of paper charts. To satisfy the IMO requirements, existing national regulations and to ensure that safety of navigation is not compromised if the ECDIS should fail, the Maritime and Coastguard Agency are currently *considering* the following operational conditions for vessels using ECDIS, as their primary navigation system, in RCDS mode:

- Vessels should carry sufficient number of small scale paper charts to cover the entire forthcoming voyage, supplemented by the largest scale charts published by the Hydrographic of the Navy for areas of the voyage covering ships' routing and ship reporting measures (including traffic separation schemes), intended ports of call and any other confined waters;
- Courses, waypoints and any other relevant information should be drawn on the relevant paper charts;
- Vessel's position should be manually plotted on the paper chart at a time interval commensurate with the chart scale;
- Paper charts should be kept updated by weekly Notices to Mariners.

Until such time as extensive experience has been gained in the operational use and reliability of the new technologies, the Maritime and Coastguard Agency must act in a prudent manner to ensure that electronic charts are used in a manner that enhances rather than detracts from navigational safety.

However, before a final decision is made, extensive discussions will be undertaken with the UK shipping industry representatives, seafarers' organisations and mariners, themselves, for their views on how the regulation of electronic chart systems can be sensibly implemented.

The carriage of paper charts for use with RCDS could also be used to satisfy the back-up arrangements for ECDIS. Appendix 6 of the IMO ECDIS Performance Standards describes the requirements of a back-up system to ensure that a vessel's safety is maintained during critical navigation situations in the event of ECDIS failure. Any back-up system must allow timely transfer from the primary to secondary chart system and enable the vessel to be safely navigated for the remaining part of the voyage.

There are various back-up options that would satisfy the UK administration if vessels were only using ECDIS with ENCs - such as the installation of a second independent ECDIS. The situation is compounded when using ECDIS in RCDS mode as the back-up requirements still prevail but there is the additional obligation to use paper charts in parallel with the electronic raster versions.

The availability of comprehensive ENC cover is several years into the future and most ECDIS will operate in RCDS mode exclusively or in 'dual-fuel' mode when ENCs are available for a given geographical area. The carriage of a reduced number of paper charts could therefore be used to provide an acceptable back-up system on the one hand and comply with the amended IMO Resolution for using ECDIS in RCDS mode on the other.

In the final analysis, the shipping company has to do its own assessment of the risks involved in using electronic charts and clearly identify the potential hazards associated with their electronic chart system. Once the hazards have been identified, the risk can be evaluated in terms of likely frequency of occurrence and the resulting consequences. Only then can a proper strategy be implemented in order to manage the risk.

The shipping company should therefore have their own views on what they consider constitutes an appropriate folio of paper charts to compliment the ECDIS, operating in RCDS mode, in the light of their vessels' trading patterns, the need to maintain safe navigational capability should the electronic chart system totally fail and the requirement to operate their vessels in such a manner so as not to invalidate any insurance cover.

The advice to have the vessel's intended passage plotted on an appropriate scale of chart and for manual fixes to be plotted on the chart periodically is to guard against complacency setting in. One only has to look at several recent incidents where high-tech vessels have stranded or collided because, it would appear, the bridge watchkeeper had become totally reliant on sophisticated electronic equipment and neglected to carry out the most basic and fundamental checks.

7. SUMMARY

In the absence of any changes to UK merchant shipping legislation, it would still appear that the Maritime and Coastguard Agency has acted reasonably if the view was taken that a vessel fitted with a fully compliant ECDIS meets its SOLAS V/R20 requirements. As this view may be challenged in a court of law, some amendments to existing legislation are desirable.

Any future changes to SOLAS Chapter V would, in any case, also require amendments to the appropriate UK legislation. A new Chapter V would also acknowledge electronic versions of nautical charts and publications and require navigational systems and equipment fitted after an agreed date to be type approved.

Although there are currently no ECDIS type testing facilities in the UK - type approval, based on tests carried out abroad, can still be undertaken by the appropriate national Nominated Body for equipment use aboard UK-registered vessels. There is also provision for the Maritime and Coastguard Agency to approve

systems directly for use aboard UK registered vessels, should circumstances require it.

Only very general references to ECDIS training are made in the amended STCW Convention and these are presently addressed in the UK with the Navigation, Radar and ARPA Simulator Training Course.

UK legislation that gives legal effect to the amended STCW and ISM Codes nevertheless puts the onus firmly on the shipowner to ensure that mariners on their vessels are competent to carry out the duties they are expected to perform.

If the ship has ECDIS fitted, the shipowner has a duty to ensure that users of such a system are properly trained in the operation of electronic charts and familiar with the shipboard equipment before using it operationally at sea.

Finally, the UK has taken a leading role in the development of electronic charts over the last two decades and the Maritime and Coastguard Agency will work closely with all national and international shipping interests to ensure that electronic charts continue to develop for safe and efficient navigation into the 21st Century.

CITED UK LEGISLATION

Merchant Shipping (Training and Certification) Regulations. Statutory Instrument 1997 No. 348. Stationery Office. London.

Merchant Shipping (Safe Manning, Hours of Work and Watchkeeping) Regulations. Statutory Instrument 1997 No. 1320. Stationery Office. London.

Merchant Shipping (ISM Code) (Ro-Ro Passenger Ferries) Regulations. Statutory Instrument 1997 No. 3022. Stationery Office. London.

Merchant Shipping (International Safety Management (ISM) Code) Regulations. Statutory Instrument 1998 No. 1561. Stationery Office. London.

Merchant Shipping (Carriage of Nautical Publications) Regulations. Statutory Instrument 1998 No. 2647. Stationery Office. London.

Resolution A.817(19) adopted on 23 November 1995

**PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY AND
INFORMATION SYSTEMS**

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention of the International Maritime Organisation concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING ALSO regulation V/20 of the International Convention for the Safety of Life at Sea (SOLAS) 1974, which requires all ships to carry adequate and up-to-date charts, sailing directions, lists of lights, notices to mariners, tide tables and all other nautical publications necessary for the intended voyage,

NOTING that the up-to-date charts required under SOLAS regulation V/20 can be provided and displayed electronically on board ships by electronic chart display and information systems (ECDIS), and that the other nautical publications required by regulation V/20 may also be so provided and displayed,

RECOGNIZING the need to prepare performance standards in order to ensure the operational reliability of such equipment, and to ensure that the information provided and displayed electronically is at least equivalent to that of up-to-date charts and, when also provided and displayed, other nautical publications, and to avoid, as far as practicable, adverse interaction between ECDIS and other shipborne navigational and communication equipment,

NOTING FURTHER that the International Hydrographic Office (IHO) has, in cooperation with the IMO, developed complimentary recommendations on electronic navigational charts, thereby standardizing the database and their content, structure and format of the information provided and displayed,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its sixty-third session,

1. ADOPTS the Recommendation on Performance Standards for Electronic Chart Display and Information Systems (ECDIS) set out in the Annex to the present resolution;
2. RECOMMENDS Governments to ensure that ECDIS used on ships entitled to fly their flag conform to performance standards not inferior to those set out in the Annex to the present resolution;
3. REQUESTS the Maritime Safety Committee to keep these Performance Standards under review and to adopt amendments thereto, as necessary;
4. ALSO REQUESTS the Maritime Safety Committee to ensure that any proposed amendments to this resolution are agreed with the IHO prior to adoption.