INTERNATIONAL HYDROGRAPHIC ORGANIZATION

ORGANISATION HYDROGRAPHIQUE INTERNATIONALE

ENC UPDATING WORKING GROUP (EUWG)

[A Working Group of the Hydrographic Services and Standards Committee - HSSC]

Chairman: Yves Le Franc (SHOM)
Vice-Chairman: Richard Coombes (UKHO)

EUWG Letter 03/2010

Date 31 August 2010

To EUWG Members

Dear Colleagues,

As mentioned previously, we have to consider two aspects in the review of S-52 Appendix 1:

- One theme of Appendix 1 is to provide specific guidance for the production of ENC data (ENC and ER) by HOs. This should be reviewed and updated before inclusion in S-65 "ENC production guidance". This was the subject of the covering letter 02/2010.
- The second theme of Appendix 1 relates to the delivery of updates and acceptance by the ECDIS. It would be useful to examine this to see if elements of the appendix are already included in other publications. The objective is to review the remaining elements of S-52 Appendix 1 and consider which of them are still relevant. It will then be necessary to consider whether these should be retained in S52 Appendix 1 or placed in others documents.

So, France has examined the appendix regarding the following publications which could be concerned:

- M-3/ RT K2.9 "WEND principles"
- S-63 "IHO Data Protection Scheme"
- S-65 "ENC production guidance"
- IMO resolution A.817 (19) "Performance standards for electronic chart display and information system (ECDIS)"
- IMO resolution MSC.232(82) "Adoption of the revised performance standards for electronic chart display and information system (ECDIS)"
- IEC 61174 "Maritime navigation and radiocommunication equipment and systems - Electronic chart display and information system (ECDIS) – Operational and performance requirements, methods of testing and required test results". See Annex C.

The result is presented in Annex A with FR comments. The parts that relate to ENC data production or which are already contained in S-65 are highlighted in blue. These should

be reviewed in conjunction with the specific guidance for the production of ENC data before inclusion in S-65. Parts covered by A.817(19), MSC.232(82), IEC61174 and S-63 are highlighted in magenta.

The remaining text, (not highlighted and not covered by other publication) is mainly related to the distribution process between the ENC producer and the ECDIS. This process includes the RENCs and services to provide updated ENCs to the end-user/ECDIS.

Regarding the other existing publications, the description of the distribution process between the ENC producer and the ECDIS is the peculiarity of the S-52 appendix 1. As producer HOs will strive to ensure that an adequate distribution process exists (WEND principles refer), it follows that the description of the process should be transferred in S-65 after review by EUWG.

We now need to launch a review of the ENC service delivery process and associated requirements. I propose that members supplement my outline to question 5 of Annex B with their own ideas, suggestions and comments. This is necessary before a first draft can be written in the spirit of S-65.

Note also that the two RENC IC-ENC and PRIMAR are working together to harmonize their practices, in which case their input will be an important part of this work.

With regard to the parts highlighted in magenta, it is important to know that IEC61174 makes direct reference to some paragraphs in S-52 Appendix 1. A.817(19) and MSC.232(82) also quote this appendix but without referring to specific paragraphs. To avoid any impact on A.817(19), MSC.232(82) and IEC 61174, very schematically, the reviewed appendix 1 could be referenced with the S-65 (new edition with ENC service delivery included) and composed of elements relating to ECDIS especially those quoted in IEC61174.

A last point is RNW on ECDIS on which it seems important to liaise with WWNWS sub-committee. The French representative to WWNWS SC, François Lacroze, has reported some points to this sub-committee during its last meeting (Sydney, 9-13 August 2010). These elements are presented in the paper WWNWS2/3/5/1A & 4A Report on e-Navigation and GMDSS Review (§ 3). WWNWS SC will get involved in this subject.

Members are invited to provide their comments and opinions about these topics.

Please send your replies through the questionnaire in Annexe B before **11 October 2010**.

Yours sincerely,

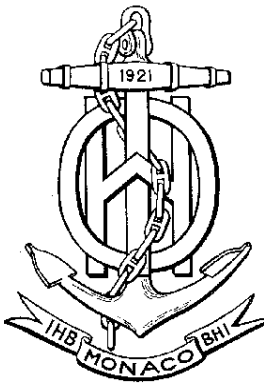
Yves Le Franc,
Chairman

Annex A: Analyse of S-52 appendix 1 with regard to IHO, IMO and IEC publications
Annex B: Questionnaire
Annex C: Edition 3 of IEC 61174 - Extracted cross references with S-52 Appendix 1

Annex A to EUWG letter 03/2010

Analyse of S-52 appendix 1 regarding IHO, IMO and IEC publications

INTERNATIONAL HYDROGRAPHIC ORGANIZATION



GUIDANCE ON UPDATING THE ELECTRONIC NAVIGATIONAL CHART

3rd Edition, December 1996

Special Publication No. 52
APPENDIX 1

published by the
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MONACO

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1 INTRODUCTION

1.1 Background and References

1.1.1 Background

This publication, Guidance on Updating the Electronic Navigational Chart (ENC), was developed by the Updating Working Group (UWG) of the IHO Committee On Hydrographic Requirements for Information Systems (CHRIS). There has been considerable progress in technology, knowledge and practical experience with ECDIS since the UWG was first constituted. The scope, aims and assumptions upon which this latest work is based are reviewed below.

1.1.2 References

Care has been taken to be consistent with and be guided by the contents of relevant reports with particular recognition being given to the latest edition of:

.1 IMO Performance Standards for ECDIS, Assembly Resolution A.817 (19)
.2 IHO Publication S-52 "Specifications for Chart Content and Display Aspects of ECDIS" with:
Appendix 2 - "Colour & Symbol Specifications for ECDIS"
Appendix 3 - "Glossary of ECDIS - related Terms".
.3 IHO Publication S-57 "IHO Transfer Standard for Digital Hydrographic Data".
.4 IHO CL 27/1994, Encl., "Worldwide Electronic Navigational Chart Data Base (WEND), Report of Activities of the Special Committee, 1994".

1.1.3 Terminology

Terminology used in this report is consistent with S-52 Appendix 3, "Glossary of ECDIS-related Terms". Additions and amplifications are described in Section 2 and Annex A.

1.1.4 Sea Trials

Various aspects of ECDIS have been evaluated and tested during the past few years. Project reports of these practical and, in most cases, at-sea experiences, have also been considered in this report. In particular:

.1 Canadian ECDIS Testbed Project
.2 The North Sea Project ("The North Sea Project - Final Report", Norwegian Hydrographic Service, 1989).
.3 The Seatrans Project ("The Seatrans Project", Norwegian Hydrographic Service, 1991).
.4 "Hamburg Ferry" ECDIS Testbed, Germany (1991).
.5 The Netherlands ECDIS Project ("Report of ECDIS Sea Trials", Netherlands Hydrographic Service, 1991).
.6 US ECDIS Test and Evaluation Program.
.7 BANET Trial, Germany, UK, Finland (1993-95)
.8 US Coast Guard Field Trial on Manual Updating (1996)

1.1.5 WEND Committee

The IHO Special Committee on a Worldwide Electronic Navigational Chart Data Base (WEND) has agreed on the following definition of WEND:

1. *The Worldwide Electronic Navigational Chart Database (WEND) System is a common, worldwide network of ENC datasets, based on IHO standards, designed specifically to meet the needs of international maritime traffic using ECDIS which conform to the IMO Performance Standards.*

2. *The System will utilize HO national ENC datasets, which are integrated and may be distributed and updated through regional centres.*

3. *WEND represents an IHO System based on the cooperation of participating Member States.*

A Regional Centre under the WEND concept is designated a Regional ENC Coordinating Centre (RENC). This Guidance on Updating the ENC addresses the updating support recommended to be provided by the RENC.

A number of principles adopted at the WEND meeting have a direct bearing on ENC updating:

1 Ownership and Responsibility

a) A Member State has responsibility for preparation and provision of digital data and its subsequent updating for waters of national jurisdiction.

b) A Member State responsible for originating the data should validate it.

f) Legal liability must be recognized by participants.

2 Cooperation and Coordination

e) Neighbouring Member States are encouraged to cooperate in boundary areas.

4 Standards and Quality Management

a) A recognized standard of quality management (e.g., ISO 9000) should be employed to ensure a high quality of the ENC services.

b) There should be compliance with all relevant IHO and IMO standards and criteria.

5 Distribution

a) Distribution of products may be separate from the data base management.

b) Methods to be adopted should ensure that data bear a stamp or seal of approval of the issuing HO.

6 Updating

a) Technically and economically effective solutions for updating should be established.

b) National HO's providing source data are responsible for advising the issuing HO of update information in a timely manner.

c) The issuing HO is responsible for providing timely updates to the ENC for the mariner.

d) Updating information to regional or greater area ENC datasets should be available world-wide.

The conceptual model agreed by the WEND Committee for the operation of an RENC is at Figure 1, with updating segments emphasized.

1.2 Scope and Objectives

The basic objective of this publication is the facilitation of the development of technically and economically feasible solutions for updating the ENC within a shipboard ECDIS to support safe and efficient navigation that:

.1 are efficient, effective, applicable world wide and easily verifiable, and
.2 maximize the speed, accuracy and reliability advantages of digital data transfer.

Specifically, this publication sets forth the guidance for the updating service and the ECDIS to support the updating of the official navigational data base specified by IMO Assembly Resolution A.817 (19), defined by IHO publications S-52 and S-57, and issued through an RENC. Some requirements may be satisfied by one of a variety of service options.

1.2.1 Updating of paper charts

The existing process for updating the paper chart is described at Annex B. Safety of navigation dictates that many of the processes described will need to have their counterpart in any update process for the ENC.

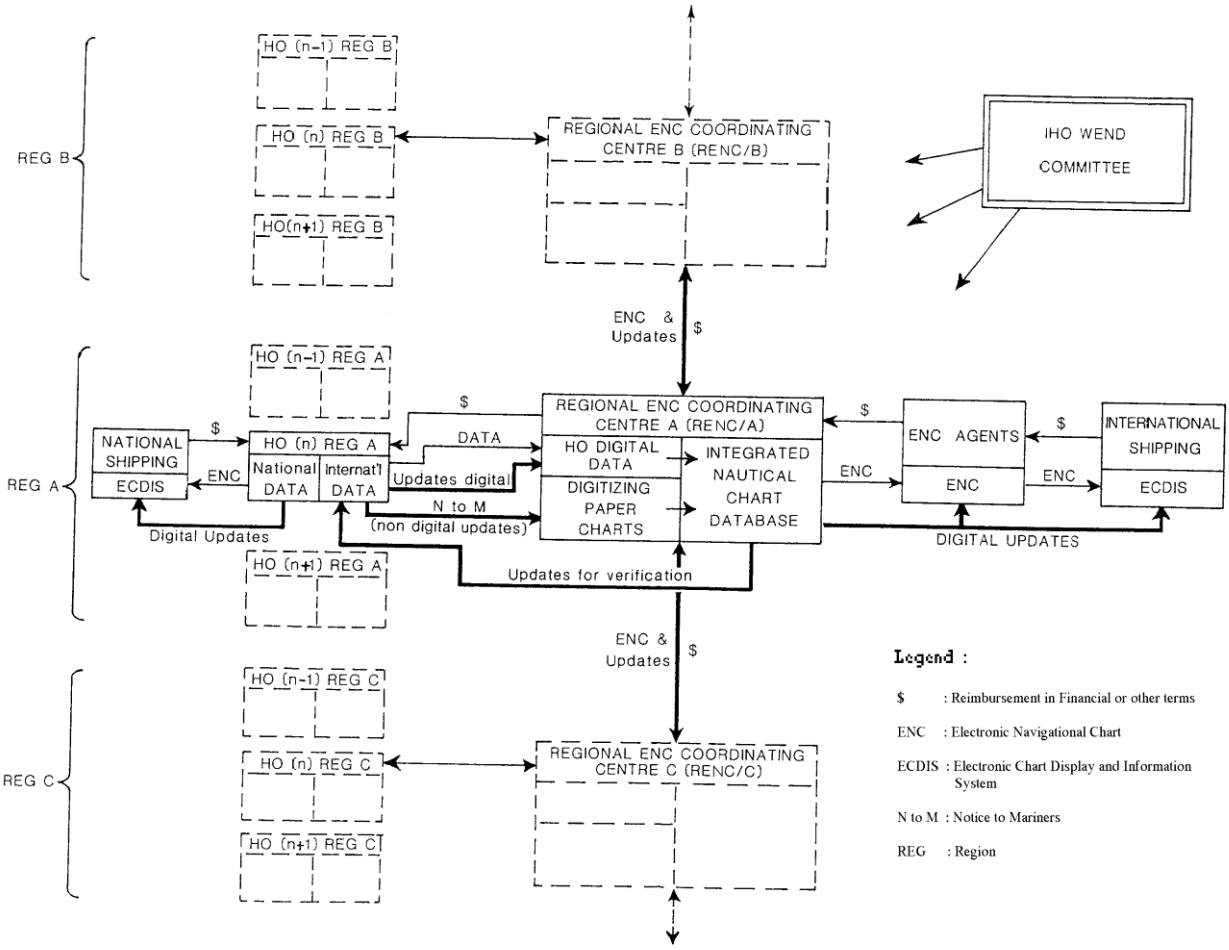
1.2.2 Volume of updates

An estimate of the anticipated volume of data required to update a worldwide set of ENCs is given in Annex C. The update mechanism described in S-57 should facilitate efficient updating by electronic means based on the estimated data volume given in Annex C.

1.2.3 Electronic Chart Systems

Electronic Chart Systems (ECS), which are not the equivalent of the conventional nautical (paper) chart, are not considered here.

Fig. 1 - Conceptual Model of a Regionally Integrated Database Service



(From the Report of the Special Committee on WEND, 1994)

2 MODEL OF UPDATING

2.1 Introduction

In this section, updating the Electronic Navigational Chart is considered an application process involving several real systems. The analysis which follows is concerned with the information exchange between the various entities involved with updating. No attempt is made, however, to describe internal functions within a participating system, such as the access to an update information file, or details of check procedures.

The **scope of the model** is:

.1 To define the possible transfer types capable of transferring the ENC update information for ECDIS,

.2 To identify any interfaces at the end systems and within the updating for each possible transfer type,

.3 To define the services required at the interfaces, and which of them need specification.

2.2 Terminology

(a) **ENC Update Information** encompasses the information necessary at a certain moment to render an ENC current and correct as required.

(b) **ENC Updating** is the process of producing, disseminating and incorporating the ENC update information in an ECDIS. To accomplish an update of an ENC, updates are applied to the SENC. Issuing a new edition of the ENC, and the reissuing of a version of the current edition ENC which incorporates all changes which have been disseminated as ENC Updates up to a specific date (the equivalent of a "corrected reprint" paper chart), although logically the most comprehensive update operations, are not treated here. ENC Updating involves:

.1 **Entities** engaged in processing the ENC update information;

.2 **Physical Media** used to carry the update information;

.3 **Update Operations**, chosen by the issuer of the update information and subject to his responsibility, to provide the update information to the SENC in the most efficient way;

.4 **Transfer Procedures** of update information, depending on the media and channels used as well as validation procedures required to secure correctness;

.5 **Data Base Operations** for incorporating the update information and verifying the updated data base.

2.3 Updating Entities

(a) The following entities are involved in updating (see Fig. 2):

.1 **Source Provider**: an originator, such as an originating HO, or another information source, such as a local authority, providing navigational warnings.

.2 **Issuing Authority**: an entity assembling an ENC update data set from update information provided from various sources, and being responsible for setting up the transfer of the update set. By definition, the Issuing Authority is the issuer of the ENC to which the update applies. The Issuing Authority under the WEND system is the Regional ENC Coordinating Centre (RENC).

.3 **Distributor**: an entity responsible for packaging, repackaging, and/or disseminating an update set to all users, or a group of users.

.4 **Receiver**: usually the mariner on board ship, or the telecom receiver linked to the ECDIS.

.5 **Applier**: an entity controlling the application of the update information, e.g. the mariner keying in update information, or the software inside ECDIS automatically processing the ENC update information.

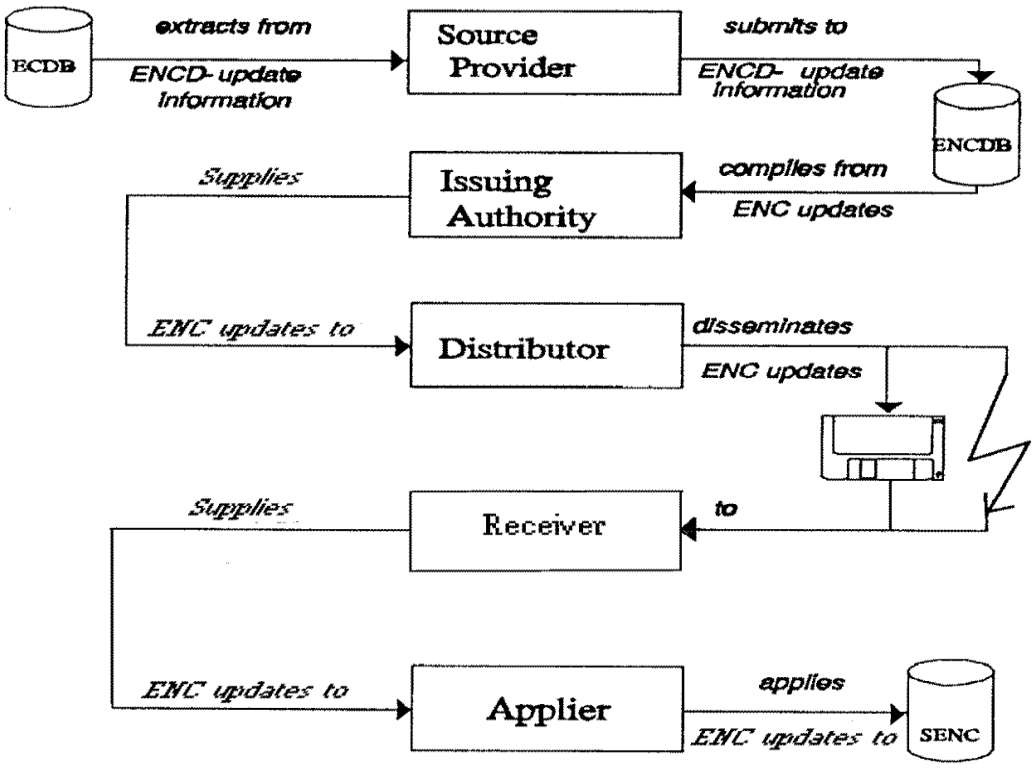
.6 **SENC**: the ECDIS data base to be ultimately updated, and actually being used for data access.

(b) **Source Provider** and **SENC** are the **primary entities** as they represent origin and target of the updating process. They must always be present. The other entities are called **transit entities** as they perform intermediary functions which are not required for all transfer media.

(c) Entities that actually participate in the updating depend on the media used for transferring the update information. For example, a direct link (e.g. via telephone) between a receiving ECDIS and an RENC does not involve an intermediate distributor.

(d) Entities do not necessarily have to be considered as organizationally distinct. Depending on the organizational concept adopted for updating, two or more entities (e.g. source provider and issuing authority, or issuing authority and distributor) may be coincident. The particulars of the organizational concept are beyond the scope of this Guidance.

Fig. 2 - Overview of Update Information Flow



Legend :

ECDB : Electronic Chart Data Base

ENC : Electronic Navigational Chart

ENCD : Electronic Navigational Chart Data

ENCDB : Electronic Navigational Chart Data Base

SENC : System Electronic Navigational Chart

2.4 Service Categories

(a) **Scheduled Service**. An updating service at regular intervals known in advance by both the sender and receiver. The dates of transmission can be those agreed upon in a bilateral contract between e.g., distributor and receiver, or a broadcast or mailing schedule of the distributor published in an official publication. There may be customized service modes, such as expedited transfer or direct on-line transfer, which still are considered scheduled as long as they follow a previously agreed schedule.

(b) **On-demand Service**. Any updating service at the expressed request of an individual user, e.g. transmission of updates called up by the user in a dial-up session with an official updating data base (another example is the request for retransmission of a missing Update Set). All update supply actions initiated by the user are regarded "on demand" unless the supplier itself relies on strict observation of a previously agreed schedule (and issues a "nil-message" if no updates are available).

(c) **Extraordinary Service**. Any updating transmission not following a regular schedule, and not individually requested by the user, such as an extraordinary navigational warning containing urgent ENC-related information.

2.5 Updating Categories

The updating methods can be subdivided into different categories:

2.5.1 Application Categories

(a) **Manual Updating** consists of a human operator entering information manually into the ECDIS, usually based on unformatted update information that is not machine-readable (such as printed NtMs, voice radio, verbal communication etc.). However, in order for the ECDIS to accept manual updates, the update information must be entered in a structured way at least compatible with the relevant ECDIS standards.

(b) **Automatic Updating** consists of an updating process by which the updating information is applied, within the ECDIS, to the SENC without operator intervention. All automatic updating requires the data to be formatted according to the relevant ECDIS standards. Automatic updating can be broken down into the following two sub-classes:

.1 **Fully-automatic Updating** is an updating method where the update data reaches the ECDIS directly from the distributor without any human intervention. This may be accomplished through a broadcast transmission, INTERNET, etc. Following an acknowledgement or acceptance procedure, the ECDIS automatically processes the update to the SENC.

.2 **Semi-automatic Updating** is an updating method requiring human intervention to establish a link between the media used for transferring the update information and the ECDIS (e.g. inserting an updating diskette, or establishing a telephone communication link).

Following an acknowledgement or acceptance procedure, the ECDIS automatically processes the update to the SENC.

Distinction between these two sub-classes will be made only when it is considered relevant. In all other cases the term "Automatic Updating" covers either sub-class.

2.5.2 Data Base-Related Categories

(a) **Integrated Updates** are those which alter (supersede) information contained in the previous SENC. The IMO PS calls for integrated updates as a minimum requirement.

(b) **Non-integrated Updates** (e.g. manual) are those that do not alter the official ENC contents of the SENC. As such, this form of update simply adds additional information to the SENC. However, it can be acted on by ECDIS software in the same manner as is the data from the ENC. This form of updating, the capability for which is also a minimum requirement of the IMO PS, should be used only when Automatic Updating cannot be effected in a timely manner (e.g., for transient, preliminary updates such as radio navigational warnings affecting chart information or local notices issued by port authorities).

2.5.3 Aggregation Categories

Updates shall be aggregated in at least one of the following categories:

(a) **Sequential Update**: The new correction information that is provided since the previous update set.

(b) **Cumulative Update:** The collection of all sequential correction information which has been issued since the last new edition of the ENC or since the last official update applied to the SENC.

(c) **Compilation Update:** The correction information which has been issued since the last new edition of the ENC or since the last official update applied to the SENC, compiled into a single, comprehensive ENC update. (Example: If a buoy has been relocated two or more times since the ENC Edition, only the last position, tailored to correct the position contained in the ENC Edition as issued, would be included. Thus, the application of a Compilation Update is to correct the effective ENC Edition at the time of its distribution to a user, which could be some months or years after the Editions initial distribution). Compilation update is implemented in S-57 by means of a re-issue of an ENC.

2.5.4 Formatting Categories

(a) **Unformatted Updating:** Any updating based on updating information provided in a format not complying with the IHO Standard or not being machine-readable.

(b) **Formatted Updating:** Updating based on machine-readable updating information provided in accordance with the IHO Standard.

2.5.5 Concepts of **Typical Information Flow**, **Application Flow** and **Delivery (At Sea) of Updates** are illustrated in Fig. 3, 4 and 5 respectively.

Fig. 3 - Typical Update Information Flow

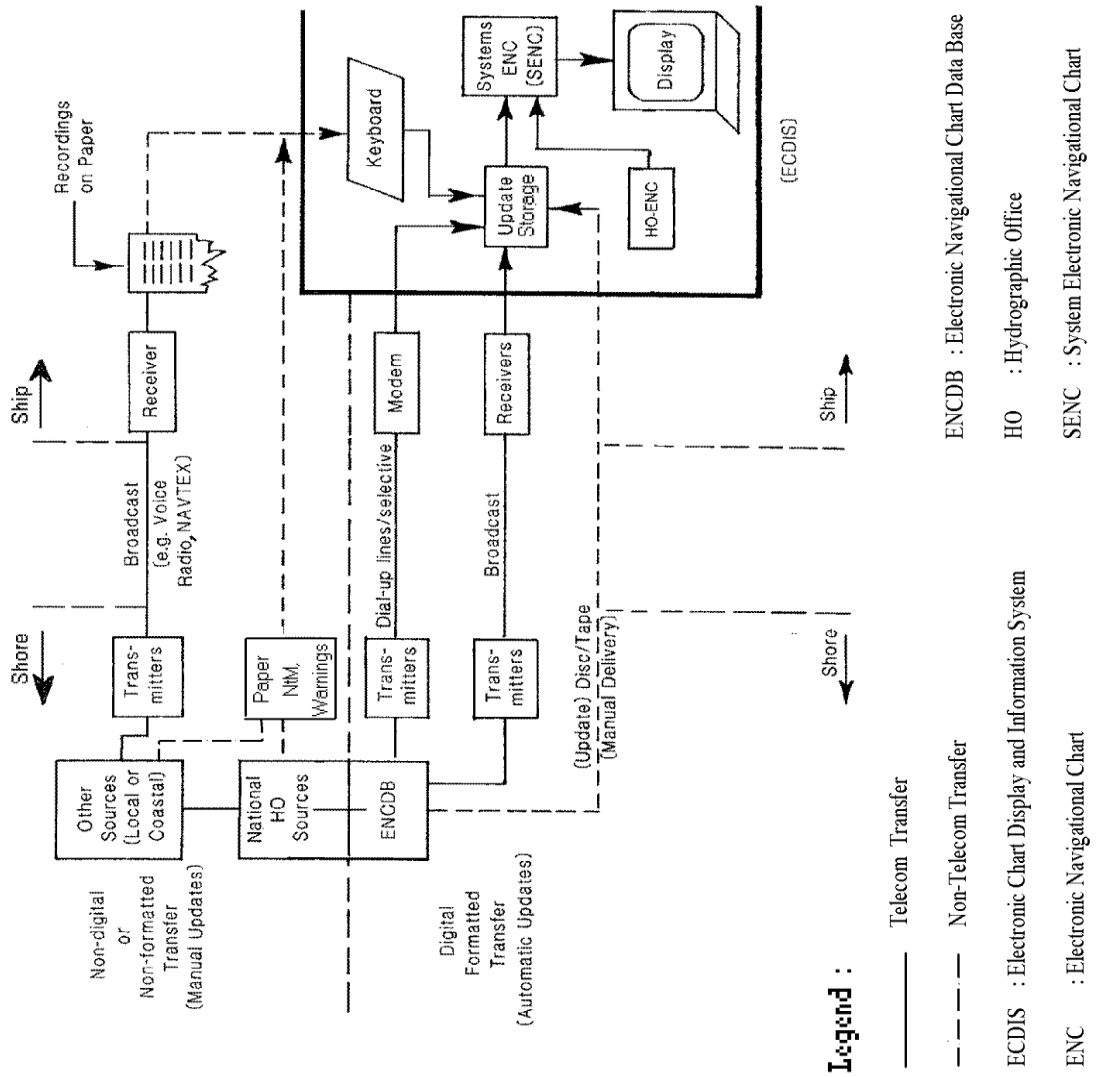


Fig. 4 - Typical Update Application Flow

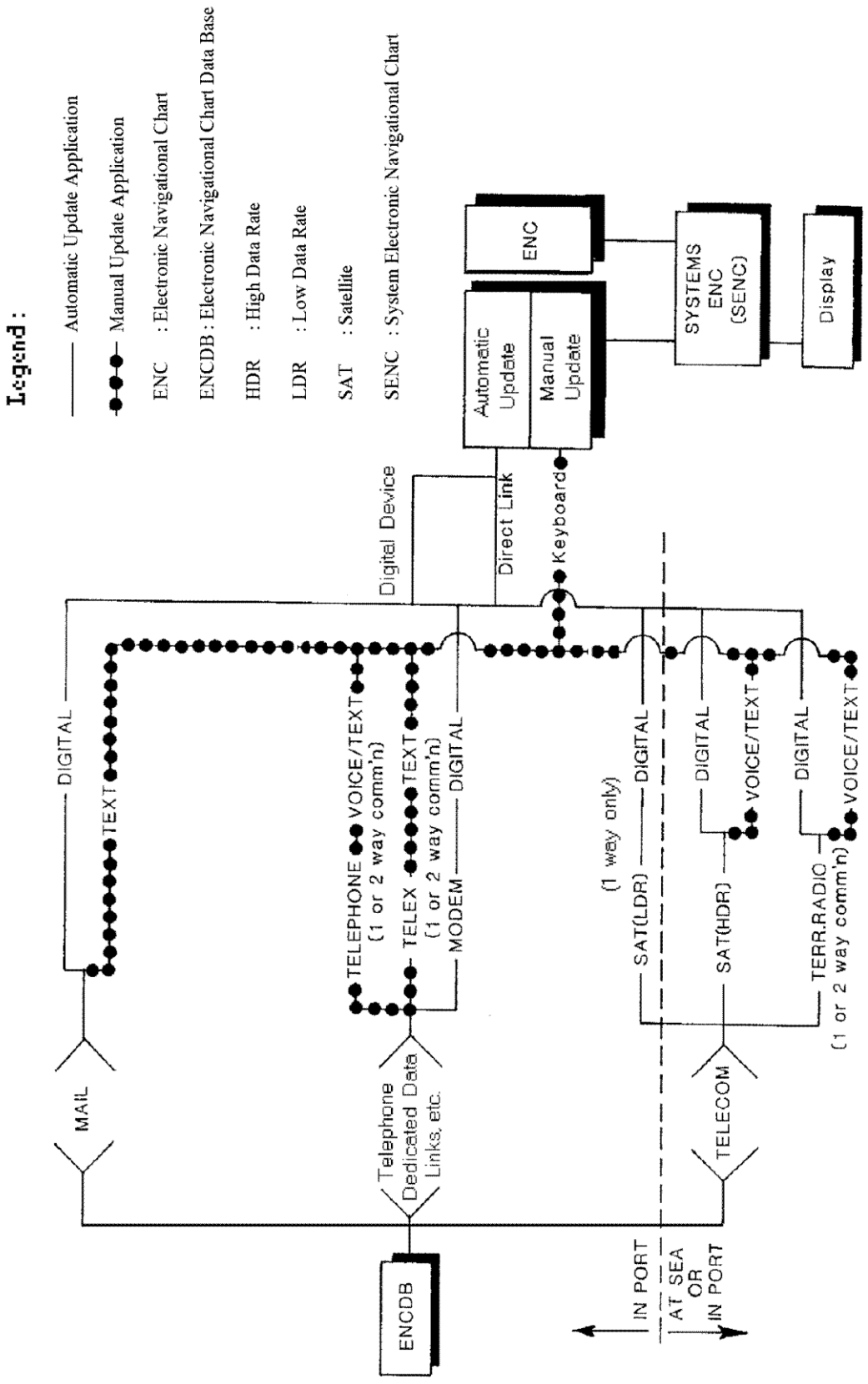
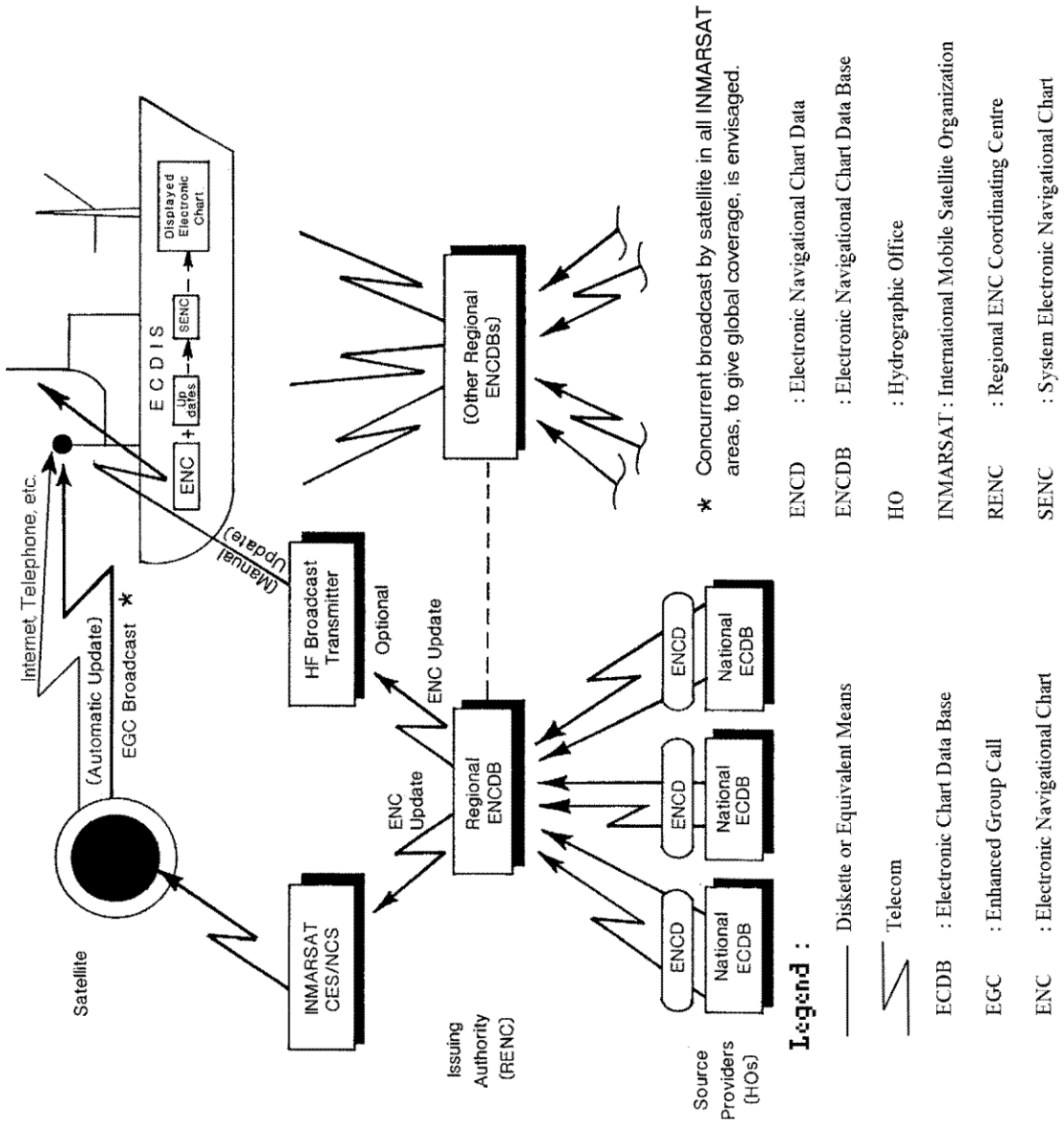


Fig. 5 - Typical Update Delivery (At Sea) Concept



3 SPECIFIC UPDATING GUIDANCE

An ENC may contain several cells for various areas and navigational purposes. However, for clarity in presenting Specific Updating Guidance, the ENC referred to in this section is an individual cell file based on the ENC Product Specification of S-57. An individual ENC cell fully complies with the ENC definition given in the Glossary of ECDIS-related Terms.

There are a number of ways the ENC data in the ECDIS SENC may be updated. Guidance is provided to define a minimum capability for the ECDIS on these methods, directed to:

.1 The Hydrographic Office (Source Provider) that originates the update information;
.2 The Issuing Authority responsible for the ENCDB, ENC, and ENC Update;
.3 The Distributor of the ENC Update;
.4 The Manufacturer of the ECDIS, and;
.5 The User (normally the mariner).

3.1 Source Provider (Hydrographic Office)

(a) **Provision of Update Information.** Hydrographic Offices which provide ENC Data (ENCD) to an Issuing Authority should take the same responsibility for updates as they do for the ENCD supplied. That is:

.1 the update information must be furnished in a manner such that the change it reflects can be distinguished by the Issuing Authority;
.2 the update information must accomodate all scales or navigational purposes, as appropriate, for which the ENCD was furnished.

(b) **Time Interval for Issuing of Updates**. According to accepted practice (Ref. IHO/IMO World-Wide Navigational Warning Service, Guidance Document, IHO Pub. S-53), the time interval from the initial broadcast of a Radio Navigational Warning to the issue of its corresponding Notice to Mariners should not exceed 42 days. All agencies involved in the preparation and distribution of ENC Updates should meet the same requirement. A considerable reduction in this time interval should be possible by taking advantage of existing digital and telecommunications technology.

(c) **Coordination of Boundary Area Updates.** Neighbouring HOs should coordinate the content and submission to the Issuing Authority of ENC Update information which impacts their boundary areas.

(d) **Quality Management**. HOs should establish appropriate quality management infrastructures for the production, management and distribution of ENC Update information.

(e) **Marine Safety Information (MSI).** Other information such as coastal radio warnings, local notices to mariners/notices to shipping, etc. provided to the mariner by other than hydrographic authorities may be relevant to ECDIS. While specific guidance to those providers for the purpose of manually updating the SENC is beyond the scope of this document, those providers should bear in mind that, with time, more mariners will be entering this information into their ECDIS.

They should therefore endeavour to ease this task for the mariner by adding whatever additional information might be appropriate to facilitate manual input.

3.2 Issuing Authority (Regional ENC Coordinating Centre)

(a) **Responsibility for ENC Updates**. The Issuing Authority for an ENC is responsible for official updates for that ENC.

(b) **Quality Management**. Issuing Authorities should establish appropriate quality management infrastructures for the production, management and distribution of ENC Updates.

(c) **Distribution Network**. It is the responsibility of the Issuing Authority to establish a distribution network for ENC updates.

(d) **Media and Schedule for Distribution**. In order to support at least Semi-automatic updating via hard media, ENC Updates shall be prepared and provided in adequate quantities for distribution on a regular schedule adequate to support safe navigation. The scheduled broadcast on INMARSAT-C SafetyNET of update information for Fully Automatic updating for the ENC at sea is desirable. Other updating services, such as direct access by the mariner via high speed telecommunications networks to the Issuing Authority's ENC update information, should be investigated.

(e) **Data Integrity.** The ENC will employ the error detection scheme designated in the ENC Product Specification in S-57.

(f) **Availability to Other Issuing Authorities**. ENC Updates should be made immediately available to other Issuing Authorities.

(g) **Method for Implementation.** Official ENC Updates shall conform to the ECDIS Revision (ER) Application Profile of S-57.

(h) **Distinguishable Update.** The ENC updates must allow the changes to be distinguished on the ECDIS display.

(i) **Identification**. Each update shall be clearly and uniquely identified as described in the Product Specification of S-57.

(j) **Broadcast Medium**. Scheduled broadcasts of ENC Updates, e.g. over the INMARSAT-C EGC SafetyNET service, should be established as early as feasible worldwide.

(k) **Non-availability of Updates**. A nil message should be issued if no updates are available for a scheduled broadcast.

(l) **Bilateral Arrangements.** The relationship and legal liability arrangements between the HO and the Issuing Authority for updating are matters to be determined between the parties involved.

(m) **New Editions of ENCs**. A new edition of an ENC should be announced at least 8 weeks, and made available at least 4 weeks, prior to its effective date to ensure

timely receipt by affected ECDIS users. On the effective date of the new edition, the previous edition will be superseded and no further Updates will be issued for it.

3.3 Distributors

3.3.1 General

(a) **Distribution Network**. A distribution network for ENC Updates will exist as established by the Issuing Authority.

(b) **Scheduling.** Updates received from the Issuing Authority should be made available to the mariner within a time interval adequate to support safe navigation.

(c) **Quality Management**. Distributors should establish appropriate quality management infrastructures for the distribution of ENC Updates.

3.3.2 Fully Automatic Updates

(a) **Broadcast Data Integrity**. To ensure the integrity of the broadcast update, effective safe transmission mechanisms and/or error detection methods should be employed.

3.3.3 Semi-automatic Updates

(a) **Hard Media.** ENC Updates should at least be made available on 3.5" high density diskettes.

(b) **Telecommunications.** On-demand service via a telecommunications link should be made available.

(c) **Stocks of Updates**. Distributors of ENCs should keep hard media stocks of all ENC Updates in effect against the ENC editions stocked.

(d) **ENC and its Updates**. All updates in force for an ENC edition should accompany that ENC upon distribution.

(e) **User-friendliness**. Semi-automatic Updating of the ENC occurs at the ECDIS equipment, and should be accomplished by the mariner without the need for the assistance of the Distributor or Manufacturer.

(f) **Repackaging**. Distributors may repackage the ENC Updates provided that the contents are not altered.

3.4 ECDIS Manufacturers

3.4.1 General

(a) **Data Integrity**. The ECDIS should be able to process ENC Updates without degradation of the information content of the ENC or ENC Update. For example,

all information regarding attributes, logical relationships, geometry, and topology must be accounted for.

(b) **Verification of Application**. The ECDIS should provide a method to ensure that updates have been correctly applied to the SENC. Those updates are either an Official ENC Update integrated into the SENC display or temporary information that was entered manually.

(c) **Integrated/Non-integrated Updates Distinction**. Updates should be clearly distinguishable on the display. Once accepted, integrated updates should be indistinguishable from ENC data. Non-integrated updates (i.e., those entered manually) shall be distinguishable as described in IHO S-52, App.2/2.3.4.

(d) **Storage Separation**. ECDIS should store all updates separately from the ENC. However, such separate storage may utilize the same data storage device.

(e) **Recall for Display.** It should be possible on demand to review previously installed updates.

(f) **Compatibility**. ENC Updates comply with the ENC Product Specification of IHO S-57.

(g) **Non-interference**. ECDIS should be able to receive updates without interfering with its current operation.

(h) **Log File**. ECDIS should keep a record of updates, including time of application and identification parameters described in paragraph 3.2 (i), through a logfile. The logfile should contain, for each update applied to or rejected by the SENC, the following information:

.1 date and time of application/rejection;
.2 complete and unique identification of update as described in the S-57 Product Specification;
.3 any anomalies encountered during application;
.4 type of application: manual/automatic.

(i) **Update out of sequence**. The ECDIS should warn the user when an ENC Update is applied out of sequence, terminate the update operation and restore the SENC as it was before the application of the Update File.

3.4.2 Automatic Update

(a) **Interface**

(i) **Fully Automatic Updates.** The ECDIS should be capable of being interfaced to an INMARSAT-C EGC SafetyNET-capable receiver for direct data transfer of ENC Updates.

(ii) **Semi-automatic Updates.** The ECDIS should be capable of receiving ENC Updates in standard IHO format by 3.5" high density diskette and through a telephone network.

(b) **Reception of ENC Updates**

(i) ENC Update data shall be recorded automatically in the update storage of the ECDIS.

(ii) The identification of the Issuing Authority of the ENC Update should be checked for conformance with the corresponding identifier of the ENC.

(iii) If any errors are detected from the receiving device, the reception procedure shall be terminated and the ENC Update flagged invalid in the record of updates. The user should be informed of the corruption.

(c) **Sequence Check**. The following sequence number checks should be performed at the time of application, for sequential and cumulative updates:

.1 File extension of the ENC Update
.2 Update number of the ENC Update
.3 Update sequence number of the individual records in the ENC Update

Refer to the ENC Product Specification of S-57 for details on how the sequence numbers are encoded in the ENC Update.

(d) **Consistency Check**. The mariner should be warned of any previous ENC Updates which have not been successfully applied.

(e) **Geographic Applicability**. ENC Updates not relating to a cell within the set of ENCs in the ECDIS may be discarded.

(f) **Summary Report**. A summary report for each of the Issuing Authority's Official Update Files should be given after completion of receipt containing at least:

.1 identification of Issuing Authority;

.2 update numbers of the Update Files;

.3 Cell Identifiers of cells affected;

.4 Edition Number and date of cell involved;

.5 number of updates in the affected cells.

(g) **Review of ENC Updates**. It should be possible for the mariner to review the updates applied through displaying the SENC contents with the updates highlighted.

(h) **Modification of Updates**. Rejection or amendment of an update by the mariner shall be achieved by the manual update method. The questionable update should be noted as an anomaly in the Log File [See 3.4.1 (h)].

(i) **Formatted Non-integrated Updates**, for example a temporary military exercise area, will be processed as manual updates.

3.4.3 Manual Update

(a) **Keying and Symbology**. The ECDIS should enable manual entry of updates for non-integrated presentation on the display. A capacity should exist to enable the mariner to:

.1 enter the update so it can be displayed as described in S-52 App.2.

.2 ensure all update text information relevant to the new condition and to the source of the update, as entered by the mariner, is recorded by the system for display on demand.

(b) **Indications and Alarms**. The ECDIS should be capable of sensing indications and alarms related to non-integrated (manual) updates, just as it does for integrated ENC Updates.

(c) **Presentation**. Manual updates shall be displayed as described in S-52, Appendix 2/2.3.4.

(d) **Text**. It should be possible to enter text into the ECDIS.

(e) **Archiving of Manual Updates**. It should be possible to remove from the display any manual update. The removed update should be retained in the ECDIS for future review until commencement of the next voyage, but will not be otherwise displayed.

3.5 ECDIS Users

3.5.1 General

(a) **Responsibility**. As they are for the paper nautical charts, mariners are responsible for maintaining an up-to-date SENC.

(b) **Legal Updates**. Only official ENC Updates, i.e. those provided in digital format by the Issuing Authority responsible for the ENC carried by the vessel, shall be integrated into the SENC. All other updates or other navigation safety information should be entered manually. This additional information could come from Notice to Mariners, local Notice of Mariners, radio navigational warnings, mariner's notes, etc.

(c) **Status of Manual Updates**. Manual updates shall be considered as interim measures only, and should be replaced at the earliest opportunity with ENC Updates from the Issuing Authority.

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ANNEX A - DEFINITIONS AND ACRONYMS

Automatic Update	Either the Semi-Automatic or the Fully Automatic (see definitions) means of updating the ENC/SENC.
Cell Identifier	Unique number assigned to each individual cell.
CCIR	International Radio Consultative Committee.
CHRIS	Committee on Hydrographic Requirements for Information Systems.
Corrupted Data	Any change in data introduced during, and as a result of, its transmission.
ECDB	The master data base for Electronic navigational Chart Data (ENCD), held in digital form by the national hydrographic authority, containing chart information and other nautical and hydrographic information.
ECDIS	Electronic Chart Display and Information System means a navigation information system which with adequate back-up arrangements can be accepted as complying with the up-to-date chart required by regulation V/20 of the 1974 SOLAS Convention, 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 route monitoring, and if required display additional navigation-related information.
EGC	Enhanced Group Call - A global automatic service by INMARSAT for addressing commercial messages (FleetNET) or marine safety information (MSI) (SafetyNET) to groups of ships or all vessels in both fixed and variable geographical areas. Data transmission is based on INMARSAT-C and takes place at an effective transmission rate of 600 bit/s.
ENC	Electronic Navigational Chart means the database, standardized as to content, structure and format, issued for use with ECDIS on the authority of government authorized hydrographic offices. The ENC contains all the chart information necessary for safe navigation and may contain supplementary information in addition to that contained in the paper chart (e.g. sailing directions) which may be considered necessary for safe navigation.
ENCD	Electronic Navigational Chart Data - The national data for an Electronic navigational Chart (ENC) in a format acceptable to an ENC Coordinator.
ENCDB	Electronic Navigational Chart Data Base -The master data base for production and maintenance of the ENC, compiled from national ENC data (ENCD).
Fully Automatic Updating	The application of corrections to ENC data in the SENC in a fully integrated state, without human intervention at the receiving end.

GMDSS	Global Maritime Distress and Safety System. The communication service, co-ordinated worldwide, comprising functions which include among others, the: - dissemination of marine safety information: broadcast of navigational and meteorological warnings, Notices to mariners, and urgent information to shipping; - general radio communications: those communications between ship stations and shore-based communication networks which concern the management of the ship and may have an impact on its safety, and - bridge-to-bridge communications: inter-ship VHF radiotelephone communications for the purpose of assisting the safe movement of the ship.
HO	Hydrographic Office.
IHO	International Hydrographic Organization.
IMO	International Maritime Organization.
IMO PS	International Maritime Organization Performance Standard for ECDIS, Assembly Resolution A.817 (19).
INMARSAT	International Mobile Satellite Organization.
Integrated Update	A correction to the ENC data in the SENC which is fully integrated into the ECDIS display and can be acted on by ECDIS software in the same manner as is the data from the basic ENC.
Issuing Authority	The official agency which issues the ENC and ENC updates. Its identity will depend on the organizational structure adopted for ECDIS support.
Local Updates	A generic term to indicate all update information other than official updates, regardless of source; for application as a manual update only.
MSI	Maritime Safety Information - Navigational and meteorological warnings, Notice to Mariners, meteorological forecasts, and other urgent safety messages.
NAVAREA	A geographical sea area established for the purpose of co-ordinating the transmission of long range Radio Navigational Warnings.
NAVINFONET	Navigational Information Network - A US (NIMA) automated service for providing Notice to mariners and other safety information via digital link at user request.
NAVTEX	Narrow-band direct-printing telegraphy system for transmission of navigational and meteorological warnings and urgent information to ships.
NBDP	Narrow Band Direct Printing.

NCS	Network Coordination Station, an INMARSAT Coast Earth Station (CES) configured to process messages in the EGC System.
NON-Integrated Updates	All correction information other than Official Updates to be applied only by manual update methods in a manner that does not alter the ENC content in the SENC or on the display.
NTM	Notice to Mariners - A periodical or casual notice issued by hydrographic offices, or other competent authorities, regarding changes in aids to navigation, dangers to navigation, important new soundings, and, in general, all such information as affects nautical charts, sailing directions, light lists and other nautical publications.
Official Updates	Updates provided in digital format by the Issuing Authority of the ENC being corrected, for integration with the ENC data in the SENC.
RENC	Regional ENC Coordinating Centre.
SafetyNET	INMARSAT Broadcast Service for MSI - A service provided through INMARSAT'S EGC system which will be used by Administrations for the promulgation of Maritime Safety Information, such as NAVAREA and storm warnings, Notice to Mariners, shore-to-shore distress alerts and routine weather forecasts to the high seas and those coastal waters not served by NAVTEX. IHO proposes to include promulgation of electronic chart corrections as well.
Semi-Automatic	The application of corrections to ENC data in the SENC Updating in a fully integrated state, by hard media or telecommunications transfer in a manner which requires human intervention at the ECDIS interface.
SENC	System Electronic Navigational Chart means a database resulting from the transformation of the ENC by ECDIS for appropriate use, updates to the ENC by appropriate means and other data added by the mariner. It is this database that is actually accessed by ECDIS for the display generation and other navigational functions, and is the equivalent to an up-to-date paper chart. The SENC may also contain information from other sources.
SES	INMARSAT Ship Earth Station.
SOLAS	Convention on Safety of Life at Sea.
Update Storage	An area on a physical storage device in the ECDIS where the ENC Updates are kept separately from the ENC.
Update Set	The collection of corrections to ENC data promulgated together by an Issuing Authority on a schedule basis. Equivalent to the periodic set of Notice to Mariners issued for the correction of paper charts and nautical publications.
WEND	Worldwide Electronic Navigational Chart Database.
WMO	World Meteorological Organization.

WWNWS	World Wide Navigational Warning Service - A coordinated global service for the promulgation by radio of information on hazards to navigation which might endanger international shipping.

ANNEX B - CURRENT UPDATING PRACTICE FOR PAPER CHARTS

1. NOTICE TO MARINERS

1.1 Traditional services provided by a National Hydrographic Authority include a routine system for the update of all conventional charts on regular sale or supply to users. Certain chart producing nations produce a global product; those countries with smaller portfolios cover only their areas of interest and responsibility.

1.2 Generically, these small corrections have been termed 'Notice to Mariners'. Normally they are collated on a weekly basis and mailed, through a series of agencies or directly, to the customer. Some authorities, however, also produce such Notices on a daily basis to spread out the load of the bulk stock chart correction within the office and at major sales agencies, and to expedite the information to other chart producing authorities.

1.3 The weekly edition of Notice to Mariners may contain several independent sections, viz:

(a) General explanatory notes (a standard item) and current index;

(b) Chart correcting notices;

(c) Notices announcing the publication of new charts, new editions, cancellation of existing charts and consequential effects on remaining charts;

(d) Notices affecting the total range of an HO's publications with regard to:

.1 content and change;

.2 supersession;

.3 recapitulatory listing of NAVAREA warnings in force for a particular area and adjacent areas. In addition, an edited listing of important messages for the remaining NAVAREAs worldwide may be included;

.4 corrections to List of Lights;

.5 corrections to Sailing Directions; and

.6 corrections to List of Radio Signals.

1.4 An individual Notice must be framed in such a way that it provides clear, concise and unambiguous instructions to the mariner for the correction of his copy of the chart.

1.5 As the selection of material for publication of an individual notice is governed only by considerations of safety of navigation, it follows that any collection of notices will interest all classes of vessels from small to large.

1.6 In addition to the conventional printed paper Weekly Edition published by National Hydrographic Authorities, certain supplementary services such as the United States' Navigation Information Network (NAVINFONET) exist. NAVINFONET provides access by digital data link via the telephone system to the data used to print the weekly Notice to Mariners, in-force Broadcast Warnings, corrections to Light Lists, etc. Although digital, the data can only be printed and is therefore equivalent to, but more immediately accessible than, the conventional means of obtaining this information. NAVINFONET can be accessed by telephone modem and therefore by ships at sea via telephone link using INMARSAT-A, and is available to all.

1.7 It is the mariners' responsibility to insert an individual Notice correctly on his chart. He is advised to adopt a standard format for symbology and to record the presence of a change on both his chart and his folio log.

1.8 To aid this procedure, each Notice is identified uniquely by a number which, after the correction is made, is added to the correctional block of the chart to provide a historical record. Notices are valid only until they are superseded by a New Edition or New Chart of the area concerned. The mariner is also advised as to the source of the correctional data.

1.9 As an aid to plotting, a tracing showing the correction to be applied may be produced by the National Hydrographic Authority. This is capable of being reproduced and distributed to chart users to aid the process of hand correcting. In some agencies the correctional load to a particular chart can be quite high if notices held are above the norm and the individual correction is complex (i.e. the insertion of a lengthy submarine cable, or the alteration of a multi-sectored light or routeing measure).

1.10 The time comes when material is at hand whose significance demands action by Notice to Mariners but which, by its very length or complexity, will overwhelm and confuse the individual chart corrector. In such circumstances one of two methods of approach can be chosen by the National Hydrographic Authority. Firstly, the material could be incorporated into a new edition of the chart or, secondly, it could be promulgated as a chartlet (block or patch) to be affixed physically to the current edition of the chart.

1.11 Such chartlets bear an individual Notice number, have their limits chosen carefully with respect to fitting points, and are chosen to be of the minimum size necessary to encompass the new material properly. They are perforce expensive to produce, require special printing and collating techniques and, by virtue of being distributed together with all other notices, have a large degree of redundancy.

1.12 In addition to chart correcting notices, mariners are advised of Temporary or Preliminary matters affecting their charts by a series of printed 'T&P' Notices. These notices are designed to be of short term duration, typically under two years. An updating list of effective T&P Notices may be printed monthly and incorporated in totality in Annual Notices. The mariner is advised to mark on his chart the existence of such a notice and to keep readily available a corrected file of all notices in force.

1.13 Local harbor authorities may issue Notice to Mariners in a local series. These changes should be noted by the mariner who is using the area and maintained on file. Such information does not constitute a permanent change to a particular chart until such time as it is promulgated by the National Authority with responsibility for that chart.

1.14 The criteria for updating the Electronic Chart will be the same as that explicit above which governs the updating of the paper chart. Only the procedures will change. The updating service must take full advantage of the capabilities of digital data transfer modes and of digital data manipulation to ensure a fully adequate and safe ECDIS.

2. RADIO NAVIGATIONAL WARNINGS

2.1 Radio Navigational Warnings provide early warning of navigational hazards.

2.2 Such warnings are normally transient and of short duration or speak of matters not relevant to the chart, such as an unwieldy tow, and thereby do not warrant chart correcting action. Those that do contain information of such importance as to warrant notice action, i.e. a newly sunken wreck in shallow waters, will remain in force and be broadcast until consequential chart correction action (i.e., issuance and distribution of a Notice to Mariners) can be taken. This may mean an individual warning message will remain in force for up to 6 weeks. The mariner is expected to take note of these warnings and review them when he is approaching their geographic area of application.

2.3 The IMO/IHO World Wide Navigational Warning Service (WWNWS) exists to:

.1 collect, exchange and collate navigational safety information;

.2 broadcast messages in a way that can be received and understood by all mariners; and

.3 control the huge amount of raw information so that the mariner is not overloaded.

2.4 To achieve this, 3 types of Radio Navigational Warnings have been established, each designed to serve the needs of the mariner in a particular location by exploiting the characteristics of the radio networks he will be using. They are:

(a) The NAVAREA Warnings Service which broadcasts warnings concerning routeing and passage along major shipping lanes to ships on the high seas by radio telegraphy at HF worldwide. In some NAVAREAs duplicate broadcasts by HF radio teletype or at MF, or by SafetyNET EGC, are available as well. Sixteen designated area coordinators manage such broadcasts.

(b) The second level of warnings, and perhaps the most prolific, are Coastal warnings. These are often the most important warnings, and have traditionally been broadcast using voice communications at both MF and VHF. These warnings give short term notice of generally transient hazards, such as lights temporarily extinguished, of interest only in the vicinity of the transmitter. Currently, a number of coastal warnings are also broadcast as NAVAREA warnings. With the implementation under GMDSS of mandatory carriage of a NAVTEX receiver by convention ships in August 1993, however, in areas of NAVTEX coverage only coastal warnings of major importance, such as those which might cause a mariner to amend his planned track substantially, are also disseminated by transmission as a NAVAREA warning.

(c) The final, lower level of radio warning is the Local warning. It may be issued by Port Authorities and sometimes by local Coast Guards, for broadcast usually on VHF voice and only in the national language.

3. THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)

3.1 The radio navigational warning is the first of the three basic information categories to achieve a measure of international coordination and standardization. The total package of Maritime Safety Information (MSI) requires the addition of meteorological broadcasts and search and rescue information, and also includes Notice to Mariners.

3.2 GMDSS has been developed by IMO (with IHO, WMO, INMARSAT and others) to upgrade existing worldwide distress and safety communications by the mid-1990's.

The main purpose of GMDSS is to support distress notification and search and rescue operations. GMDSS also provides for urgency and safety communications and for the dissemination of maritime safety information including Notice to Mariners, and navigational and meteorological warnings. GMDSS will merge and unify the existing land based MSI dissemination systems with an upgraded INMARSAT service.

3.3 IMO initiated a study of satellite communications systems in 1972 which led to the formation of the International Maritime (now «Mobile») Satellite Organization (INMARSAT) in 1979. The INMARSAT system consists of four geostationary satellites covering the Atlantic, Indian and Pacific Oceans, giving comprehensive coverage worldwide with the exclusion only of the Polar Regions. Satellites link with terrestrial telecommunications stations known as Coast Earth Stations (CES) located around the world. The INMARSAT shipboard installation is known as a Ship Earth Station (SES) and the most prevalent existing equipment is designated INMARSAT-A. INMARSAT-A supports voice telephone and data telex services, teleprinters, video display units, fax machines and data transmission equipment. To use INMARSAT-A the vessel must be fitted with a gyro stabilized one meter diameter dish antenna. However, slower and cheaper INMARSAT SES equipment has recently become available. It supports, amongst other things, data transmission for telex at a 600 bit/sec rate using a small omnidirectional antenna. Class II, the most common configuration, and Class III INMARSAT-C receivers support Enhanced Group Call (EGC), a global automated service capable of addressing commercial messages (FleetNET) or MSI (SafetyNET) to groups of ships or all vessels in both fixed and variable geographic areas. CES which are specially equipped to handle messages in the EGC system are designated Network Coordinating Stations (NCS).

3.4 Under the GMDSS, the present day NAVAREA radiotelegraphy service will be ineffective and is being replaced by a satellite broadcast service using INMARSAT's Enhanced Group Call (EGC) SafetyNET facilities. NAVAREA warnings traffic volume will be greatly reduced by the worldwide implementation of NAVTEX Broadcast Services (see para. 3.6 below).

3.5 CCIR has found that correction information to ships at sea may be communicated by INMARSAT-A or-C(EGC), or by VHF. (See CCIR Recommendation 826.)

3.6 The NAVTEX Service, now nearly fully established worldwide, broadcasts warnings in the area up to at least 200 miles offshore on a time share basis at 518 kHz to a dedicated receiver on board ship. Because most warnings pertain to coastal areas and the NAVTEX transmissions are frequent, many warnings which were required to be promulgated through the NAVAREA service are now being broadcast only by NAVTEX.

3.7 It is again emphasized that the text of the Notice to Mariners and Radio Warnings is written to be clear, concise and unambiguous to the mariner reading the text. However, utilization of the correction information by ECDIS makes different demands on its structure; therefore messages prepared for the automated update of the SENC or its display will be entirely different.

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ANNEX C - ESTIMATE OF DATA VOLUME

1. A rough estimation of the data volume for automatically updating the SENC has been carried out based on an evaluation of the Notice to Mariners (NtM) by Germany's Hydrographic Authority, the Bundesamt für Seeschiffahrt und Hydrographie (BSH), with the objective of estimating the data volume to be transmitted by slow satellite broadcast (INMARSAT C-EGC) of only that information which is considered necessary for safe navigation.

2. BSH evaluation of NtM

(a) The BSH evaluation rested on the following assumptions:

.1 only the needs of the larger vessels (Draft ≥ 5m) have been considered (approximately 70% of the total NtM chart correction information published applies)*;

.2 if any corrections affected other objects contained in the charts (e.g. light sectors), these have been taken into account as additional (indirect) corrections, if they were deemed necessary for safe navigation; (this accounts for an additional 10% corrections);

.3 corrections were taken into account only once regardless of the number of charts affected, because of the anticipated efficiency in scheming the ENC.

(b) The evaluation was carried out by mariners of the BSH who are in charge of publishing the German NtM.

(c) The evaluation covered only the BSH sea area 20 (European North Ocean including North Sea), shown in Fig. C-1, an area, however, which is known to be heavily affected by chart updates. Twenty weeks of consecutive NtM were processed for this area. The area was considered representative of the nine such areas which encompass the oceans of the world.

(d) The investigation resulted in a table containing the frequency of insertions, deletions and additions for 18 distinct types of chart information, involving 1127 corrections affecting 1255 geographical positions (see Table C-1). For items requiring attributes, the average number of those attributes has been determined. Line features (such as depth lines, cables, etc.) were estimated to contain 10 positions on average.

** In the event ships of all drafts were to be served, the total data volume would increase to 143% of the total noted for only the larger vessels.*

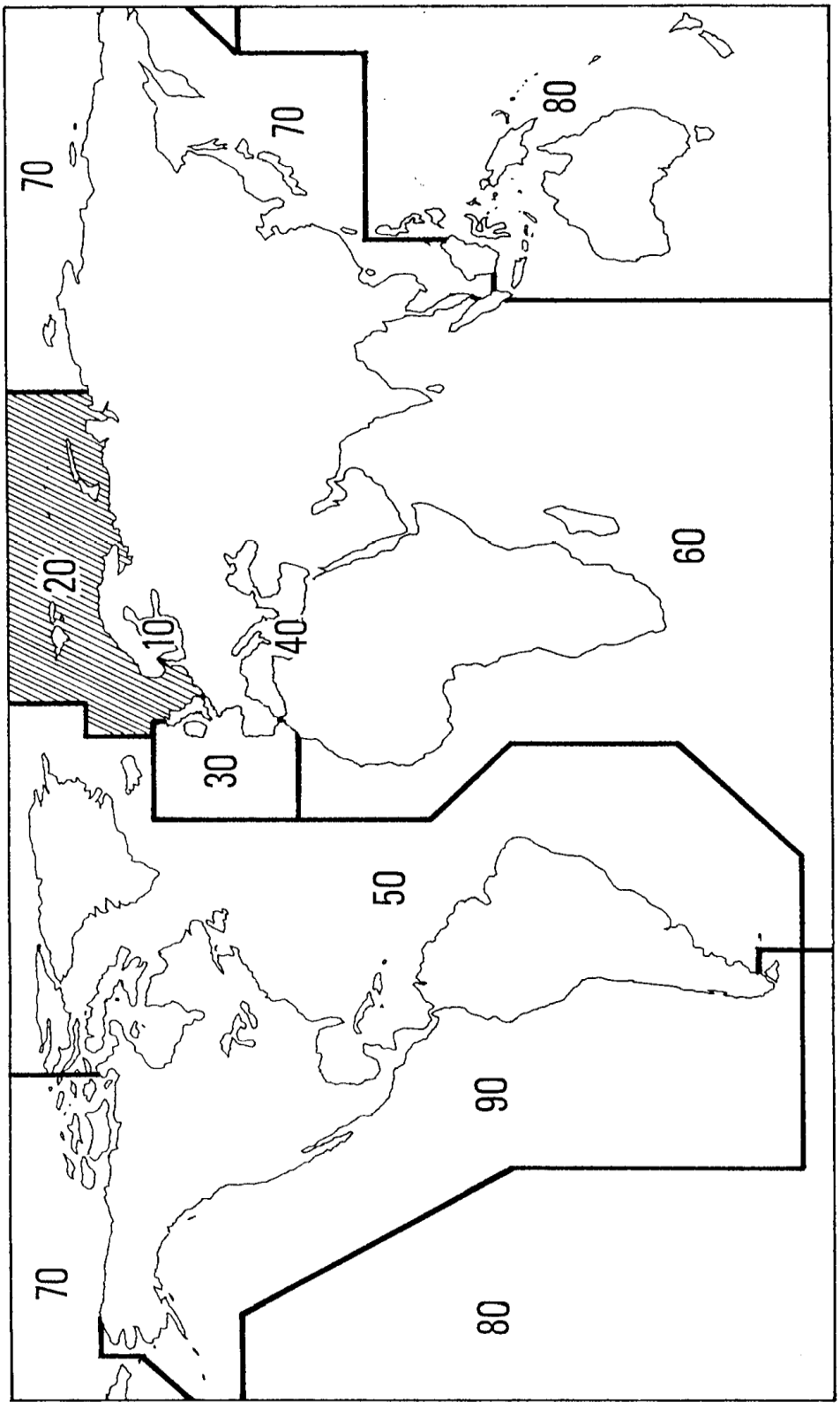

Fig. C-1 - Area of BSH Traffic Volume Study

Table C-1 - Notice to Mariners Correction instructions

Insert	Delete	Add	Subject of correction
11	4		boundaries; cables, moles
22	22	3	remarks (20 characters)
78			lights with full annotation (6 attributes)
17	16		light abbreviation
3	3		range
85	71		sectors
		1	light buoys with full annotation (5 attributes)
	66		light without annotation
10	75		light buoys without annotation
87			buoys with full annotation (3 attributes)
37	162		buoys without annotation
5	1		platforms
2	5		depth isolines
25	79		spot soundings without septh lines
6			with depth lines
100			depth with depth lines + attributes (obstructions)
13	6		wrecks and foul ground
7	9		other symbols

3. Data Volume

In order to estimate an upper bound, including the potential impact of accompanying text, the overhead factor has been set as ten times the basic information. The resulting figure for worldwide coverage is approximately 135,000 bytes (135 kbytes) to be transmitted weekly for automatic updating. Setting, for transmission purposes, 1 byte equal to 10 bits, the data volume may be estimated at 1,350 kbit per week. Repetitive transmissions in order to ensure error-free receipt are not considered.

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Annex B to EUWG letter 03/2010

Questionnaire

Question		Yes	No
1	Do you know other IHO, IMO or IEC documents which cover item of S-52 Appendix 1 (e.g. describing RENC) or which refer to it? *If you know another document, please indicate which paragraphs of appendix 1 are concerned.*		
	Comments:		
2	Do you have some other comments about Annex A?		
	Comments:		
3	Do you agree that, currently, the peculiarity of S-52 Appendix 1 is the service delivery/distribution process?		
	Comments:		
4	Do you agree that the description of the service delivery/distribution process should be developed in S-65?		
	Comments:		

5	What are our views on the content of such a description? *Please, use the outline below to introduce our elements.*		
6	Do you agree that, very schematically, the new S-52 Appendix 1 could be referenced with the S-65 (new edition with ENC service delivery included) and composed of elements relating to ECDIS to minimise the impact on IMO and IEC publications?		
	Comments:		
7	Do you agree view of the EUWG chairman reported to the WWNWS ? *Ref: WWNWS2/3/5/1A & 4A* Report on e-Navigation and GMDSS Review *(§ 3).*		
	Comments:		

Question 5

Outline for service delivery/distribution process

to be supplemented

Producer

Requirements for ENC data (ENC and ER) productions (Integrated Updates)
Other official information (Non-Integrated Updates e.g. RNW, elements for Readme files issued by RENC, …)
Quality Assurance – Checks of ENC data – S-58 - S-65 (ENC consistency) – Methods and tools – Release of the ENC data

Producer – RENC interface

Data transfer HO to RENC - Data integrity
Tools

RENC/data management

Quality Assurance – Checks of ENC data – S-58 - S-65 (ENC consistency) – Methods and tools – Release of the ENC data
Support RENC provides members (tools,…)
Data Management - Data integrity
Meta data (catalogue, readme file, list of ENC data in force…)

RENC/distribution (RENC and its distributors) - Services to end-user

Data transfer RENC to distributors
Data integrity
S-63 application
SENC
Quality Assurance
Media: hard media, telecommunication, schedule, …
Promotion of ENC usage

End-user/ECDIS

See S-52 appendix 1, §3.4 et 3.5

Other comments:

Name of the EUWG member:
Organisation:
Date:

IEC 61174 Edition 3 references to S-52 Appendix 1

3.1.16
ENC test data set
Standardized data set supplied on behalf of the IHO that is necessary to accomplish IEC testing requirements for ECDIS. This data set is encoded according to the S-57 ENC product specification and contains update information based on **S-52, appendix 1**. The specific requirements are listed in Annex E

5.10.1 General
Test requirements are addressed to individual update sets or cumulative updates (collection of sequential individual update sets). A third alternative update method is the "compilation update" set, which contains all current changes from the edition date of the ENC, and does not involve or rely on any previously issued update. It shall be possible to carry out updating operations in all ECDIS modes, for example route planning, route monitoring, etc.

The detailed method of updating is described in the ENC product specification in S-57. If, in the following clauses, there are conflicts between the requirements of **S-52, appendix 1** and the ENC product specification, the requirements of the latter shall be used.

5.10.1.1 Integration of updates
(See 6.8.15.2)
(**S-52, appendix 1**/3.4.1(c)) Updates shall be clearly distinguishable on the display. Once accepted, integrated updates shall be indistinguishable from ENC data. Non-integrated updates (for example those entered manually) shall be distinguishable as described in S-52, appendix 2/2.3.4. (S-52/4(a)) Official HO updates shall be distinguished from local ones.

5.10.1.2 Recall for display
(See 6.8.15.2, 6.8.16)
(**S-52, appendix 1**/3.4.1(e)) It shall be possible on demand to review a previously installed update.

5.10.1.3 Log file
(See 6.8.15.3)
(**S-52, appendix 1**/3.4.1(h)) ECDIS shall keep a record of updates, including time of application and identification parameters described in **S-52, appendix 1**/3.2(i), through a log file. The log file shall contain, for each update applied to or rejected by the SENC, the following information:
.1 date and time of application/rejection;
.2 complete and unique identification number of update as described in the S-57 product specification;
.3 any anomalies encountered during application;
.4 type of application: manual/automatic.
An example of "anomalies" could be error messages or load warnings.

5.10.1.4 Update applied out of sequence

(See 6.8.15.1)
(**S-52, appendix 1**/3.4.1(i)) The ECDIS shall warn the user when an update is out of sequence, terminate the update and restore the SENC as it was before application of the ENC update file.

5.10.2.1 Keying and symbology
(See 6.8.16)
(**S-52, appendix 1**/3.4.3(a)) The ECDIS shall enable manual entry of updates for non-integrated presentation on the display. A capacity shall exist to enable the mariner to:
.1 enter the update as described in S-52, appendix 2;

5.10.2.2 Indications and alarms
(See 6.8.16)
(**S-52, appendix 1**/3.4.3(b)) The ECDIS shall be capable of sensing indications and alarms related to non-integrated (manual) updates, just as it does for integrated ENC updates.

5.10.2.3 Presentation
(See 6.8.16)
(**S-52, appendix 1**/3.4.3) Manual updates shall be displayed as described in S-52, appendix 2/2.3.4.
(**S-52, appendix 1**/3.4.3(e)) It shall be possible to remove from the display any manual update. The removed update shall be retained in the ECDIS for future review until the commencement of the next voyage, but will not be otherwise displayed. Manual updates need to be retained only until a new edition of the cell is incorporated. For the purpose of retaining the removed updates in the ECDIS for future review, the commencement of the next voyage is defined as a period of three months.

5.10.3 Semi-automatic update
(See 6.8.15.1)
(**S-52, appendix 1**/3.4.2(a(ii))) The ECDIS shall be capable of receiving updates in standard IHO S-57 format by CDROM and from any other interface or data storage media that are provided with the ECDIS for that purpose.

5.10.4 Reception of updates
(See 6.8.14, 6.8.15.1)
(**S-52, appendix 1**/3.4.2(b(ii))) The identification of the issuing authority of the update shall be checked for conformance with the corresponding identifier of the ENC. If any errors are detected from the receiving device, the reception procedure shall be terminated and the ENC update flagged invalid in the record of updates. The user shall be informed of the corruption. The ECDIS shall employ the error detection scheme defined by IHO for ENC data. The ECDIS shall reject corrupted files and provide a warning of this action.

5.10.5 Sequence check
(See 6.8.15.3)
(**S-52, appendix 1**/3.4.2(c)) The following sequence number checks shall be performed at the time of application, for sequential and cumulative updates:
.1 file extension of the ENC update;
.2 number of the ENC update;

.3 sequence number of the individual records in the ENC update.
Refer to the S-57 product specification for details on how these sequence numbers are encoded in the ENC update.

5.10.6 Consistency check
(See 6.8.15.1)
(**S-52, appendix 1**/3.4.2(d)) The mariner shall be warned of any previous ENC updates which have not been successfully applied.

5.10.7 Geographic applicability
(See 6.8.15.2)
(**S-52, appendix 1**/3.4.2(e)) Updates not relating to a cell within a set of ENCs in the ECDIS may be discarded.

5.10.8 Summary report
(See 6.8.15.3)
(**S-52, appendix 1**/3.4.2(f)) A summary report for each of the issuing authority's official update files shall be given after completion of receipt containing at least:
.1 identification of issuing authority;
.2 update numbers of the update files;
.3 cell identifiers of cells affected;
.4 edition number and date of cell involved;
.5 number of updates in the affected cells.

5.10.9 Review of ENC updates
(See 6.8.15.2)
(**S-52, appendix 1**/3.4.2(g)) It shall be possible for the mariner to review the updates applied through displaying the SENC contents with the updates highlighted.

5.10.10 Modification of updates
(See 6.8.15.2)
(**S-52, appendix 1**/3.4.2(h)) Rejection or amendment of an update by the mariner shall be achieved by the manual update method. The questionable update shall be noted as an anomaly in the log file. (**See S-52, appendix 1**/3.4.1(h).)

E.3 Data subset B – Automatic updating
E.3.1 Update data: contents
The data set shall include:
a) multiple individual updates, certain of which shall affect topology;
b) an update with an invalid producing agency identifier;
c) an update referring to a superseded edition of a cell;
d) an update which comes into effect at a future date;
e) data which falls outside the area of data subset A;
f) an example of corrupted data;
g) a separate text document containing the required contents of the summary report and an application report described in 3.4.2(f) of **appendix 1 of S-52**;
h) an example of a cell-cancellation update.
E.3.2 Update data: sequence

The data set shall include a sequence of update, for example 1, 2, 3, 4 and 5, where 3 and 4 are logically linked but two versions of 3 are provided, one which makes 4 invalid, the other being compatible with 4.

E.4 Data subset C – Manual updating

E.4.1 Update data: contents

A text document shall contain information for manual updating.

E.4.2 Update data: alarms and warnings

The text shall include reference to part of the contents of data subset C, including items which trigger alarms and warnings.

G.2 RCDS definitions

(3.6) Further information on RCDS definitions may be found in **S-32, appendix 1**.