

4 ALBERT EMBANKMENT,
LONDON SE1 7SR

Telephone: 071-735 7611
Telegrams: INTERMAR-LONDON SE1
Telex: 23588
Telefax: 071-587 3210



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COMMENTS, EVALUATIONS AND PROPOSALS TO THE PROVISIONAL
PERFORMANCE STANDARDS ON ECDIS

1 At its sixtieth session (6 to 10 April 1992), the Maritime Safety Committee approved comments, evaluations and proposals to the provisional performance standards on Electronic Chart Display and Information Systems (ECDIS), as recommended by the Sub-Committee on Safety of Navigation (NAV), which, at its thirty-sixth session (23 to 27 September 1991), agreed that the Provisional Performance Standards (PPSs), circulated by MSC/Circ.515, should remain unchanged until adequate sea trials and development experience allowed their revision into final performance standards. The IMO/IHO Harmonization Group on ECDIS (HGE) and the NAV Sub-Committee believe that the comments and proposals received on the PPSs, and the HGE evaluations related to them, represent information of value to the development of ECDIS which should be brought to the attention of interested parties.

2 The annex to this circular contains a copy of the PPS annotated with those proposals, comments and questions received by the HGE up to and including the Sub-Committee's thirty-seventh session, together with any HGE response to them. It will be noted that comments and proposals from different sources in some cases conflict and that, in many cases, the HGE either believes that not enough experience has been gained to take a position on a particular suggested change or has rejected any change to an existing provision of the PPSs. All suggested amendments to the PPSs have been included regardless of their status. The comments and proposals follow the PPSs provisions to which they refer and appear on the left-hand side of the page. Any pertinent remarks by HGE appear directly to the right of the entry to which they pertain.

3 This circular is issued to keep Member Governments and interested parties informed and to assist in the further assessment of the PPSs. The annotated PPSs will be kept up to date by the HGE and will be reissued periodically until final performance standards are approved.

ANNEX

NOTES ON THE PROVISIONAL PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY SYSTEMS (ECDIS)

1. Introduction

The ECDIS is evolving as a completely new type of navigational system and appears to have potential to improve the safety of navigation. ECDIS requires extensive development before it can achieve this potential and be considered as equivalent to the paper chart. The provisional performance standards and associated notes which have been approved by the Maritime Safety Committee are intended to assist in this development.

2. Reliability and availability

The safety of navigation should not be adversely effected in the case of failure of an ECDIS. Adequate back-up provision are required. Possibilities include, for example, "Get you home" chart, hard copy from the ENC or additional back-up equipment.

Comments, questions and proposals

PROPOSED NEW NOTE

COMMENT BY IHO-HGE 11

"3. Additional details to the Standards may be obtained as a result of the work of other international organizations, in particular the IHO, which through its Committee on ECDIS has developed the following publications: -

- .1 Special Publication 52 (May 1990) Provisional Specifications for Chart Content and Display of ECDIS.
- .2 SP52 Appendix 1 (June 1990) Report of the IHO (COE) Working Group on Updating the Electronic chart.
- .3 SP52 Appendix 2 (February 1991) Provisional Presentation Standards for ECDIS.
- .4 SP52 Appendix 3 (July 1991) Glossary of ECDIS - Related Terms.
- .5 SP57 (Sept 1991) IHO Transfer Standard for Digital (Hydrographic) Data."

3. Operating controls and procedures

It is desirable that operating controls and procedures should be standardized. Manufacturers are invited to give this aspect consideration at an early stage.

4. **Data media**

Hydrographic offices and manufacturers should endeavour to agree on the data media to be used world-wide to supply ENC and update data.

5. **Number of displays**

Ships operating within limited trading areas may not require two displays for safe navigation. However, a second display may be used for management/operational tasks, in addition to navigation.

Comments, questions and proposals

IMO/SO/ON or HGE answers and evaluations

COMMENT BY NETHERLAND (HGE 10/3/3)

Number of displays

To be resolved.

For monitoring and route planning only one display was available; for information a separate alpha numeric display was available. Independent execution of routeplanning-mode and navigation-mode is essential for safe navigation, especially in coastal waters and dense traffic areas where looking ahead is necessary. Two displays would be the best solution also in view of redundancy.

6. **Standard display**

Section 3 of the standards refers to a standard display which should be available when the ECDIS is first switched on, and subsequently by a single action by the operator. This is considered as a set of information that will be the basis for navigation under most conditions. The navigator who is ultimately responsible for selecting those items of information which are necessary to facilitate safe navigation, may add to or subtract from this standard display either to provide additional chart features that may be needed, or to simplify the display and avoid clutter which may sometimes occur.

7. **Minimum display**

During the development of ECDIS it will be necessary for IMO to consider which items if the 'standard display' (section 3 of the standards) will be required to be displayed permanently (the 'minimum display') to ensure safe navigation.

8. **Specifications for symbols and colours**

Section 6 of the standards requires IMO and IHO symbols and colours to be utilized. A defined set of symbols and colours is being developed.

PROPOSED NEW NOTES:

Comments, questions and proposals

PROPOSED ADDITION BY CANADA (HGE16/3/2)

Note 9 - Display Base

A display base, to be permanently retained on the display, is set as a precaution against careless or reckless reduction of the standard display. It consists of items of information that are considered essential in all areas of the world, under all circumstances, and at all times. The list should be reviewed once extensive experience in a wide range of operational conditions has been accumulated.

Note 10 - Future Development

Since ECDIS is at a very early stage of development, these standards should remain open and flexible over many years to allow the system to adjust under the stimulus of operational use, in the context of the overall bridge information system, and with due emphasis on maintaining chart equivalence. The standards should be kept free of restrictions and detailed specifications except where these are essential to ensure safety of navigation. Proposed new capabilities should be judged by whether they enhance the ability of ECDIS to contribute to the safety of navigation.

IMO/SO-ON or IMO/HQ-HGE answers and evaluation

It is considered that this note duplicates in substance the contents of note 7. The term display base should replace the term minimum display.

This note is not required. It is covered by para. 2 of cover note to MSC/Circ. 515.

PROVISIONAL PERFORMANCE STANDARDS FOR ELECTRONIC CHART DISPLAY SYSTEMS (ECDIS)

1. INTRODUCTION

- 1.1 The primary function of the ECDIS is for safe navigation. The ECDIS should enable the navigator to execute in a convenient and timely manner all navigational routines which are currently done on the paper chart.
- 1.2 The ECDIS should display accurate and up-to-date chart information necessary for safe navigation and should be designed to reduce the navigational workload. The ultimate objective is to produce a system that can be accepted as a legal equivalent to the charts required by regulation V/20 of SOLAS 1974.

Comments, questions and proposals:

IMO/SO/ or IMO/IHO-HGE answers and evaluation:

IEC QUESTION/COMMENT (MSC/Circ. 562)

IMO/SO/ EXPLANATION

1. The words "accurate and up-to-date" in paragraph 1.2 and "accuracy" in paragraph 7.3 should be defined.

1. The ECDIS processing shall not degrade the accuracy of the database (ENC). "Up to date" means it contains the latest changes promulgated by Notice to Mariners just as would an up-to-date paper chart.

COMMENTS BY NORWAY (HGE 10/3/4)

We propose to move the last sentence of paragraph 1.2 to paragraph 1.3. In order to increase the safety of navigation, we propose that a requirement for calculating and displaying the ship's position along a preplanned route is added to paragraph 1.2, as follows:

- "1.2 The ECDIS should display accurate and up-to date chart information necessary for safe navigation and should be designed to reduce the navigational workload. Furthermore the ECDIS should display the ship's position."

- 1.3 The ECDIS should have at least the same reliability and availability of presentation as the paper chart.

Comments, questions and proposals:

IMO/SO/ or IMO/IHO-HGE answers and evaluation:

COMMENTS BY NORWAY (HGE 10/3/4)

1.3

The ECDIS should have at least the same reliability and availability of presentation as the paper chart. The ultimate objective is to produce a system that can be accepted as a legal equivalent to the charts required by regulation V/20 of SOLAS 1974.

COMMENTS BY NORWAY (HGE 10/3/4) and at HGE 11

Para 1.1-1.3 should be amended to read as follows:

HGE agreed.

1.1

ECDIS is a system for displaying all hydrographic information relevant for safe navigation; for the planning of sailing routes, and capable of plotting the ships position.

1.2

The primary functions of ECDIS is to contribute to safer navigation, and to reduce the navigational workload compared to using paper charts.

1.3

ECDIS should be capable of displaying accurate chart information necessary for safe and efficient navigation. The equipment should facilitate simple and reliable updating of chart information. The ECDIS should enable the navigator to execute in a convenient and timely manner all navigational routines currently done on paper charts. The chart information displayed by the ECDIS should have at least the same reliability and availability as paper charts. One of the objectives of ECDIS is to ultimately be accepted as a legal system for providing chart information to ships, as required by the SOLAS Convention.

- 1.4 In addition to the General Requirements for Electronic Navigational Aids contained in IMO resolution A.574(14), ECDIS should comply with the following minimum performance standards.

2. DEFINITIONS

- 2.1 Definitions of terms used in this performance standard are given in appendix 1.

Comments, questions and proposals:

COMMENT BY IHO

Reference should also be given to SP52, Appendix 3 Glossary of ECDIS.

3. DISPLAY OF ENC DATA

Comments, questions and proposals:

COMMENTS BY NORWAY (HGE 10/3/4)

The word "data" is suggested replaced by "information". "Information" may be a more suitable word for what is being presented to the navigator.

NOTE BY A. KERR (HGE 10/3/1)

Throughout the PPS the word "data" has been used whereas "information" would be more appropriate.

IMO/SO/N or IMO/IHO-HGE answers and evaluation:

Whilst this change is in general desirable, each occurrence must be examined on a case by case basis.

- 3.1 The electronic chart display equipment (ECDIE) should be capable of displaying all the data in the electronic navigational chart (ENC).

Comments, questions and proposals:

IMO/SO/ or IMO/IHO-HGE answers and evaluation:

COMMENTS BY NORWAY (HGE 10/3/4)

- 3.1 The electronic chart equipment (ECDIE) should be capable of displaying all the information in the electronic navigational chart (ENC).
- 3.2 When first switched on, and subsequently by a single operator action, the ECDIS should present the following standard display (default display), as appropriate to the chart scale:
- .1 coastline
 - .2 drying line
 - .3 indication of isolated dangers
 - .4 own ship's safety depth contour, to be selected out of the depth contours provided for in the ENC
 - .5 indication of fixed and floating aids to navigation
 - .6 boundaries of fairways, channels, etc.
 - .7 routing systems
 - .8 visual and radar conspicuous features
 - .9 prohibited and restricted areas
 - .10 indication of cautionary notes
 - .11 scale bar
 - .12 chart scale boundaries
 - .13 indication of units of depths and heights.

Comments, questions and proposals:

IMO/SO/ or IMO/IHO-HGE answers and evaluation:

COMMENTS BY NETHERLANDS (HGE 10/3/3)

- 3.2 Standard display

The required 13 items of the standard display seems to be necessary and sufficient.

IEC QUESTION/COMMENT (MSC/Circ. 562)

IMO/SO/ EXPLANATION

Location names should be included in paragraph 3.2.

The suggestion is noted and will be resolved on the conclusion of further sea trials.

PROPOSED ALTERNATIVE (MSC/Circ. 515/Add 1)

Standard display

On turning on the ECDIS, the following should be displayed:

- .1 confirmation that ECDIS display is up to date of last correction;
- .2 coastline;
- .3 names of principal landmarks, harbours, etc.;
- .4 isolated dangers including bridges, overhead cables, etc.;
- .5 water depth contours appropriate to scale of chart, including drying line;
- .6 characteristics of fixed and floating aids to navigation;
- .7 channel boundaries;
- .8 routing systems;
- .9 prohibited and restricted areas, including foul ground;

- .10 anchorage areas;
- .11 indication of cautionary notes;
- .12 scale bar;
- .13 leading lights; and
- .14 visual and radar conspicuous features.

PROPOSAL BY NORWAY (HGE 10/3/4)

- 3.2 Within the limitations specified in paragraphs 3.3 - 3.10 the ECDIS should enable the navigator to decide which types of information are to be displayed during route planning and route monitoring. In this respect, the information in the ENC is to be subdivided into the following groups:
- The reference to paragraphs 3.3-3.10 is to the suggested Norway replacement text.
1. Display Base information consisting of the following information.
- Display base - see note 7 and proposed new note 9.
- Coastline
 - Own ship's safety contour, to be selected out of the depth contours provided for in the ENC
 - Indication of isolated underwater dangers, of depth less than the safety contour, which lie within the safe water defined by the safety contour
 - Indication of isolated dangers which lie within the limits of the safety contour such as bridges, overhead wires, etc., and including buoys and beacons, whether or not these are being used as an aid to navigation
 - Traffic routing systems
 - Indication of scale and range, such as a scale bar
2. Standard (Default) Display Information consisting of the following information:
- Display Base
 - Drying line
 - Indication of fixed and floating aids to navigation
 - Boundaries of fairways, channels, etc.
 - Ferry routes
 - Visual and radar conspicuous areas
 - Prohibited areas
 - Restricted areas and cautions
 - Chart scale boundaries
 - Indication of units of depths and heights
- Ferry routes - defer decision.
3. Supplementary Information consisting of at least the following information:
- Spot soundings
 - Details of isolated dangers
 - Details of aids to navigation
 - Contents of cautionary notes
 - ENC edition date
 - Geodetic datum
 - Magnetic variation
- Magnetic variation - this category of information exists if all ENC content is included in the minimum and standard display. There is no advantage in adding it to the existing list. A new wording of 3.3 is suggested.

The Display Base should consist only of features that will be needed on the display in all geographic areas, under all circumstances and at all times:

- 3.3 The information included in the Display Base, as defined in paragraph 3.2.1 should always be displayed on the ECDIS; i.e. it should be impossible for the navigator to remove any item of the display base from the display.

The following is based on the wording of paragraph 3.2 in Circ. 515:

- 3.4 When first switched on, and subsequently by a single operator action, the ECDIS should present the Standard (Default) display, as defined in paragraph 3.2.2.

HGE - comment:

Do not agree that "as appropriate to the chart scale" should be deleted. The displayed content will be scale dependant.

PROPOSED ALTERNATIVE (NAV 36/4/3)

1. Amend PROPOSED ALTERNATIVE (MSC/Circ. 515/Add 1) to PROPOSED CONTENTS.

1. Minimum display

"Minimum" term not being used in future (HGE 11).

This display must always show:

- .1 coastline;
- .2 isolated dangers including bridges, overhead cables, etc.;
- .3 own ship's safety contour to be selected from ENC sounding;
- .4 indication of fixed and floating aids to navigation;
- .5 routing systems;
- .6 prohibited and restricted areas, including foul grounds;
- .7 indication of cautionary notes;
- .8 scale bar; and
- .9 leading lights.

2. **PROPOSED CONTENTS BY NORWAY (HGE 10/3/4)**

- .1 coastline
- .2 own ship's safety contour to be selected out of the depth contours provided for in the ENC
- .3 indication of isolated underwater dangers, of depth less than safety contour, which lie within the safe water defined by the safety contour
- .4 indication of isolated dangers which lie within the limits of the safety contour such as bridges, overhead wires, etc., and including buoys and beacons, whether or not these are being used as an aid to navigation
- .5 traffic routing systems
- .6 indication of scale and range, such as a scale bar

It is premature to agree on the contents of the minimum display. It is noted that when describing the proposed contents, different nations have used different terminology. The terminology used in MSC Circ 515 should be adapted wherever possible.

NOTE BY CANADA (HGE 10/3/2)

2. Standard display

- 2.1 From a suggestion by the watch keeper on the SEATRANS ship Nornewa Express, and from experience of ferries in Halifax harbour, it is proposed that ferry routes be added to the Standard Display in section 3.2 of the Provisional Performance Standards.

- "7 "Ferry routes"
("Routing systems" becomes number 8, and so on.)

Ferry routes - defer decision

2.2 Apart from this small addition, Canada believes it is important to reduce the Standard Display to what is proved by experience to be essential, in order to:

- 1.) avoid a cluttered display;
- 2.) permit quick re-drawing of the standard display by the single action control specified in section 3.2.

In particular:

- a.) alphanumeric characters must be large to be legible, and this means that if they cause clutter, they should be avoided if possible or switched on/off when required.
- b.) additional contours cause clutter and use much drawing time. Human factors specialists advise against the use of many depth shades.

3. Minimum Display: "Display Base"

3.1 Note 7 of the annex to MSC/Circ. 515 states:

Display base - see note 7 and proposed new note 9.

"During the development of ECDIS it will be necessary for IMO to consider which items of the standard display (section 3 of the standards) will be required to be displayed permanently (the minimum display) to ensure safe navigation."

3.2 Canada considers that the features required for a safe minimum display will vary too much, depending on circumstances, for it to be possible to define a single minimum display list. A long list would, in some circumstances, cause clutter that would be just as dangerous to navigation as lack of information, while a short list would not always provide enough chart information.

In either case, the mariner would be given false security by the definition that he was seeing the "minimum display to ensure safe navigation". To avoid this, the term "Display Base" is proposed.

3.3 Canada, therefore, proposes that the Provisional Performance Standards specify a "Display Base", which should be displayed permanently, with the implication that further information would normally be needed to complete the chart. This "Display Base" should consist only of features that will be needed on the display in all geographic areas, under all circumstances, and at all times.

3.4 Present experience indicates that the "Display Base" should consist of:

- .1 The own-ship safety contour.
- .2 Indication of isolated underwater hazards, of depth less than the safety contour, which lie within the safe water defined by the safety contour.
- 3 Indication of isolated dangers which lie within the limits of the safety contour such as bridges, overhead wires, etc..., and including buoys and beacons, whether or not these are being used as an aid to navigation.
- .4 Traffic routing systems.

- .5 Clear indication of scale and range, such as a scale bar or other appropriate solution. (Included because tests have shown that mariners tend to underestimate the closeness of hazards shown on ECDIS.)
- .6 Warning that geographic datum of the chart information differs significantly from the datum of the positioning system in use (if applicable.)
- .7 Planned route.
- .8 Own-ship symbol and past track.

Future experience may require changes to this list.

3.5 The following features of the Standard Display are not included, for the reasons given (numbers refer to paragraph 3.2):

- .1 Coastline: This will not always be needed in all areas and under all circumstances.
- .2 Drying line: Seldom needed.
- .5 Indication of fixed and floating aids to navigation: Under some circumstances, such as 10m radio positioning verified by radar, these aids would not always be required. (However, buoys and beacons close to the planned route are a hazard to navigation, and so are included.)
- .6 Boundaries of fairways, channels: Once the planned route has been chosen, these would not be needed at all times.
- .8 Visual and radar conspicuous features: Visual features are not needed at all times (they are not needed in fog, for example.)
- .9 Prohibited and restricted areas and cautions: At the mariner's discretion these can, of course, be included, or a notation made on the planned route.
- .12 Chart scale boundaries: At the mariner's discretion these can be included, or a notation can be made on the planned route when to change scale. (See also comment on a "Display Planning Package" below.)
- .13 Indication of depth and height units: At the mariner's discretion; probably included only when units differ from the normal.

3.6 It must be stressed that the ECDIS user has to strike a careful balance between too little and too much information, and that either of these can reduce safety of navigation. The Display Base is intended to guard against reckless or careless reduction of chart information below the base level.

It is of prime importance that manufacturers develop a well designed and effective man-machine interface to enable mariners to add and remove chart information quickly, easily, and without confusion.

It may be useful in future ECDIS design to provide a "Display Planning Package", which would allow the mariner to pre-select chart scale, chart features to be shown, etc., during route planning, and have this pre-planned display layout presented automatically when the ship reached that area. However, this should be an addition to effective-real-time control, not a substitute for it.

3.7 The following wording is proposed as a new section in the Provisional Performance Standards:

3.3 The following must be permanently retained on the ECDIS display, as a display base which should be added to as required to meet operational needs:

- .1 Own ship's safety depth contour, to be selected out of the depth contours provided for in the ENC.
- .2 Indication of isolated underwater dangers, of depth less than the safe water defined by the safety contour.
- .3 Indication of isolated dangers within the limits of the own ship's safety contour, including bridges, etc..., and buoys and beacons even when these are not being used as an aid to navigation.
- .4 Traffic routing systems.
- .5 Indication of scale and range, such as scale bar.
- .6 Warning that the geographic datum of the chart differs from the positioning system in use (if applicable).
- .7 Planned route.
- .8 Own ship's symbol and past track.

In adding to the display base, the navigator should keep a balance between too little information (omitting important chart features) and too much chart information (causing confusing clutter.)"

(The remainder of section 3.3 should be re-numbered)

COMMENTS BY UK ON CANADA'S COMMENTS (HGE 10/3/5)

Para 3.5.1. The shore line is an underwater hazard and should be given the same priority as an isolated underwater hazard (3.4.2). It is also needed for radar overlay.

COMMENTS BY NORWAY (HGE 10/3/4)

We suggest that the ENC-information is divided into different groups. We support the introduction of a Display Base proposed in the note made by the government of Canada. However, items 3.3.6, 3.3.7 and 3.3.8 in the Canadian note (geographic datum warning, planned route as well as own ship's symbol and past track) are in our proposal (5.2.3, 5.2.1 and 5.2.4). The coastline is included in the display base. The ferry routes are included under the Standard (Default) information in accordance with the Canadian note. The magnetic variation is added to the supplementary information, because this is an essential information in the paper charts which also will be needed with an ECDIS when using a magnetic compass.

COMMENTS BY UK (HGE 10/3/5)

The idea of a "Display Base" shows merit and is worthy of discussion. It should not replace the existing idea of a minimum display without the idea being further demonstrated.

COMMENTS BY A. KERR (HGE 10/3/3)

3.2.11 The scale bar was included although it would have been better placed vertically on the side and less use made of numbers on the scale e.g. use shaded and clear stripes alternately. It is really questionable how useful a scale bar is considering that distance can be measured so conveniently with the cursor.

COMMENTS BY NETHERLANDS (NAV 37/5/5)

The 13 items of the standard display (in the text also the minimum display) are fully satisfactory; to prevent confusion we propose to use only the word "standard display" and to delete the word "default display" in paragraph 3.2:

3.2 When first switched on, and subsequently by a single operator action, the ECDIS should present the following standard display, as appropriate to the chart scale: etc.

3.3 On demand ECDIS should display any other information contained in the ENC, including:

- spot soundings
- details of isolated dangers
- details of aids to navigation
- contents of cautionary notes
- ENC edition date
- geodetic datum

Comments, questions and proposals:

PROPOSED ALTERNATIVE (NAV 36/4/3)

Enhanced standard display

Enhanced standard display should contain necessary supplementary information that may be selected by the operator, which should include but not be restricted to:

- .1 currents and tidal streams including ocean currents;
- .2 compass rose, variation and note on local magnetic anomaly;
- .3 latitude and longitude grid;
- .4 spot soundings;
- .5 details of aids to navigation;
- .6 content of cautionary notes;
- .7 geodetic datum;
- .8 land topography;
- .9 names of selected landmarks, and geographical features;
- .10 details of vessel traffic services (VTS, anchorages;
- .11 berthing, mooring and pilotage facilities.

PROPOSED BY NORWAY (HGE 10/3/4)

The following paragraph is suggested to replace the wording of paragraph 3.3 in Circ. 315:

3.6 On demand, it should be possible for the navigator to display selectively any item of the Supplementary Information, as defined in paragraph 3.2.3 of Norway's suggested new text following PPS para 3.2.

COMMENTS BY UK (HGE 10/3/5)

"Radar Conspicuous" features were noted on charts in the days when radar was unreliable and the users relatively unskilled in its interpretation. This is no longer the case and the navigator is usually able to see from the chart whether a feature could be expected to be conspicuous visually or by radar. There is justification for removing this from the display base.

- 3.4 It should be possible to delete from the display any items of ENC content. A warning should always appear when any of the standard display items are absent.

Comments, questions and proposals:

IMO/SO/ or IMO/THO-HGE answers and evaluation:

PROPOSAL BY NORWAY (HGE 10/3/4)

The following paragraph is suggested to replace paragraph 3.4 in Circ. 515:

- "3.5 It should be possible for the navigator to remove selectively from the display any items of the Standard (Default) display which are not included in the Display Base. A warning should appear whenever any item of the Standard (Default) Information is not displayed."
- a) The contents of the display base have not been agreed.
- b) The wording of the existing 3.4 is misleading. It is not the intention that the mariner should be able to delete individual items, e.g. a single dangerous rock, only categories of items, e.g. all dangerous rocks. Amended wording is required.
- 3.5 The addition or subtraction of information should be possible with a minimum of operator controls and actions.
- 3.6 It should be possible to verify that the ENC data have been loaded into the system and are being displayed without corruption.

Comments, questions and proposals:

IMO/SO/ or IMO/THO-HGE answers and evaluation:

PROPOSAL BY NORWAY (HGE 10/3/4)

In the following paragraph the wording "and are being displayed without corruption" is suggested removed from paragraph 3.6. in Circ. 515:

- 3.8 It should be possible to verify that the ENC Information has been loaded into the system.
- Not agreed. The proposal was made because no technical means has yet been identified of verifying that displayed data has not been corrupted. Whilst accepting that such a technical solution may be difficult to achieve, the original wording should be retained as the requirement is still valid.

PROPOSED BY HGE 11

It should be possible for the user and regulator to verify that the ENC information available from the ECDIS has not been altered in any way that affects safety of navigation.

- 3.7 On the display the ENC data should always be clearly distinguished from all other data.

Comments, questions and proposals:

IMO/SO/ or IMO/THO-HGE answers and evaluation:

PROPOSAL BY NORWAY (HGE 10/3/4)

- 3.9 On the display all other information should always be clearly distinguished from the ENC information.
- "Information" replaces "data" - see comments on PPS para. 3.
- 3.8 The ENC content and its display should be internationally standardized.

4. SCALE

Comments, questions and proposals:

IMO/SO/N or IMO/HO-HGE answers and evaluation:

PROPOSAL BY NORWAY (HGE 10/3/4)

We suggest that a division should be made between a change of scale by use of chart information in different scales and a change of scale by use of zooming functions.

Agreed by HGE.

- 4.1 ENC's will be provided at specified scales. If the data are displayed at other scales (underscale or overscale), a warning should be provided.

Comments, questions and proposals:

IMO/SO/N or IMO/HO-HGE answers and evaluation:

PROPOSAL BY NORWAY (HGE 10/3/4)

The following paragraph covers the contents of paragraph 4.1 in Circ. 515, but is limited to a change of scale by use of zooming functions:

- 4.2 If scale of the display is not in accordance with the scale of the ENC (due to zooming functions), a warning (overscale/underscale) should be provided.

- 4.2 The same size of symbols, figures and letters should be used for all specified scales.

Comments, questions and proposals:

IMO/SO/N or IMO/HO-HGE answers and evaluation:

PROPOSAL BY NORWAY (HGE 10/3/4)

The following paragraph is proposed to replace paragraph 4.2 in Circ. 515. The own ship symbol should be an exception, because a true scale symbol of own ship is of great navigational importance. However, in small scales, there should be a lower limit for the size of own ship's symbol:

- 4.3 With the exception of the own ship symbol, the same size of symbols, figures and letters should be used for all specified scales. Own ship should be displayed in true scale, but the symbol length should never be less than [3 mm]. Whenever own ship is not shown to scale, this should be clearly indicated.

4-6 mm instead of 3 mm, minimum.

- 4.3 A display of the sailing area at a different scale, if it exists, should be generated immediately.

Comments, questions and proposals:

IMO/SO/N or IMO/HO-HGE answers and evaluation:

IEC QUESTION/COMMENT (NAV 36/4/2)

IMO/SO/N EXPLANATION

1. In paragraphs 4.3 and 10.1, the maximum acceptable time has to be specified.
2. Clarification is needed of what is meant in paragraph 4.3 by "the sailing area at a different scale".

1. The time will depend on the outcome of sea trials.
2. It is believed that the correct interpretation of 4.3 is that the equipment will automatically generate all the scales available in the ENC depending on the known position. They will be available for display at the option of the user.

PROPOSAL BY NORWAY (HGE 10/3/4)

The following paragraph covers information in different scales. Reference is made to paragraph 4.3 in Circ. 515, and we suggest that the paragraph should be removed because the navigator should decide whether the chart in a different scale should be generated or not:

4.1 If the area of the ship's position is covered by ENC's in different scales, the ECDIS should inform the navigator about the existence of other scales and enable him to choose the appropriate scale.

"display" replace "ships position"

... appropriate scale, and generate nearest large and nearest smaller scale for immediate display.

HGE agrees with the proposal, but wants the above addition.

5. ROUTE PLANNING AND MONITORING AND DOCUMENTATION

5.1 Route planning

It should be possible to carry out route planning independently of route monitoring in a simple and reliable manner. For route monitoring the selected route should appear automatically whenever the display covers that area.

Comments, questions and proposals:

IEC QUESTION/COMMENT (MSC/Circ. 562)

1. With reference to paragraphs 5.1 and 10.2 the number of displays should be clarified.

Will it be accepted to comply with the requirements for:

- .1 navigation and route monitoring; and
- .2 look ahead, route planning and supplementary navigation tasks by means of a window on one display provided only?

IMO/SO/ or IMO/IMO-HGE answers and evaluation:

IMO/SO/ EXPLANATION

1. This can only be answered satisfactorily after sea trials.

PROPOSAL BY NORWAY (HGE 10/3/4)

5.1 Route planning

The following paragraph is identical with the first part of paragraph 5.1 of Circ 515. The second part of 5.1 is suggested moved to part 5.2, Route monitoring (paragraph 5.2.1 in our proposal):

"5.1.1 It should be possible to carry out route planning independent of route monitoring in a simple and reliable manner."

5.1.2 and 5.1.3 are suggested added to part 5.1 in order to ensure user-friendly route planning:

5.1.2 It should be possible to position the waypoints directly and indirectly in the display chart. Examples of direct positioning are use of: -

- rollerball
- screen pen
- touch screen

Examples of indirect positioning are:

- Keyboard input with geographic coordinates
- Keyboard input of bearing and distance from another waypoint, cursor point, user-defined point or from a point given by geographic coordinates

5.1.3 It should be possible to adjust a planned route by:

- Adding waypoints into a route
- Deleting waypoints from a route
- Changing the position of a waypoint
- Changing the order of the waypoint in the route (including inversion of the route)

The following paragraph is added in order to enable exact planning of the track in the turns:

5.1.4 It should be possible to enter a turn radius for each waypoint. (If no turn radius is entered, a default turn radius value should be used.)"

The following paragraph is suggested as a minimum requirement for items to be displayed in the planning mode:

5.1.5 In the route planning mode the ECDIS should display the route with at least the waypoint, the planned track between the waypoints including the turning arc with the numerical value of the turn radius."

The following paragraph is suggested added as a means for the prevention of hazardous route planning.

5.1.6 It should not be possible to plan a route across the boundaries for own ship's safety contour."

The following paragraph should enable the navigator to preset the off-track limits in relation to sailing area.

5.1.7 It should be possible for the navigator to specify limits for off-track alarm."

PROPOSAL BY NETHERLAND (NAV 37/5/5)

For the safety of navigation we suggest to include an "off-track" alarm in paragraph 5.1:

5.1 It should be possible to carry out route planning independently of route monitoring in a simple and reliable manner. For route monitoring the selected route and waypoints should appear automatically whenever the display covers that area. It should be possible for the navigator to specify limits for off-track visual and/or audible alarm.

Too detailed for the standard.

"... route by, for example:"

These inclusions are relevant.

5.1.4 It should be possible to plan a route with either straight lines or curved lines.

5.1.5 should be deleted

A warning is required if the navigator plans a route cross... delete "It should not be possible to plan"

5.1.7 "... navigator to specify a limit of deviation from the planned route before an off-track alarm will sound." delete "limits for off-track alarm."

Supported by HGE.

5.2 Route monitoring

5.2.1 Own ship's position should be displayed on the screen continuously in the case of route monitoring.

Comments, questions and proposals:

IMO/SO/ or IMO/TRO-HGE answers and evaluation:

PROPOSAL BY NETHERLAND (NAV 37/19/5)

5.2 Route monitoring

In order to display own ship's position continuously, it is proposed to adjust the wording of para. 5.2.1 as follows:

HGE 11 agreed.

5.2.1 The ECDIS should be able to display the ship's position continuously by means of the following 3 methods:

- .1 manual input of course and speed;
- .2 input from speed measurement and course information systems;
- .3 input from position-fixing systems/integrated systems.

L INTRODUCTION

The displaying of the ship's position is essential for the use of ECDIS and when the electronic positioning system fails, the system should continue with dead reckoning, therefore we propose to include this in paragraph 1.2:

1.2 The ECDIS should display accurate and up-to-date chart information necessary for safe navigation and should be designed to reduce the navigational workload. Furthermore the ECDIS should calculate and display the planned ship's position along a preplanned route.

The ultimate objective is to produce a system that can be accepted as a legal equivalent to the charts required by regulation V/20 of SOLAS 1974.

Relevant comment to para. 5.2.1.

COMMENTS BY HGE 10

Add to existing 5.2.1:

It should be possible to display a sea area that does not have the ship on the display (e.g. for look ahead, route planning). The automatic route monitoring functions (e.g. updating ships position, detecting and warning of prohibited areas) should be continued, and it should be possible to return to the display of the ships position immediately by single action control.

- 5.2.2 It should be possible to position and subsequently adjust the symbol for own ship's position manually.

PROPOSAL BY CANADA (HGE 10/3/2)

- 4.1 During the November 1990 SEATRANS operational test of ECDIS when much of the passage was in confined waters, the ship's positioning system frequently switched between 30m GPS' and much lower accuracy Decca without warning. This dramatically demonstrated the necessity of having an immediately obvious warning when the positioning accuracy deteriorates sharply. Blinking the ship's symbol is one possible solution.

The following addition to Section 5.2, Route Monitoring, is proposed:

"5.2.2 Immediate warning of significant deterioration in positioning accuracy should be given, by appropriate and prominent means."

Agreed by HGE.

(The succeeding paragraphs should be re-numbered)

- 4.2 It is unclear to some readers of the Provisional Performance Standard whether existing paragraph 5.2.2 refers to the ship's geographic position or to her position relative to the edge of the display. Does it specify a manual position error correction, or manual re-framing?

Based on the assumption that ECDIS will always have a continuous position input, even if it is no better than dead reckoning, the following re-wording is suggested:

"5.2.2 It should be possible to adjust the ship's geographic position manually, in order to correct a positioning system error. This manual adjustment should be noted alpha-numerically on the screen and should be maintained until altered by the navigator."

Agreed by HGE.

COMMENTS BY A. KERR (HGE 10/3/1)

The need for CANADA 5.2.2 seems questionable and as GPS seems almost certain to be integral part of ECDIS one wonders at its need. It could be done on the DISC - ECDIS system.

COMMENTS ON HGE 10/3/1 BY UK (HGE 10/3/5)

New para 5.2.2 We agree that warning of deterioration in positional accuracy is important, but see last point of para 3.3 of HGE 10/3/1.

PROPOSAL BY NORWAY (HGE 10/3/4)

A complete new chapter 5.2 is recommended, as follows:

5.2 Route monitoring

5.2.1 For route monitoring the selected route should appear automatically whenever the display covers that area."

The route should be displayed exactly as planned. The indication of the course line in degrees should be displayed as information for the navigator:

5.2.2 In route monitoring mode the ECDIS should display the selected route, with the planned track between the waypoints including the turning arc and a three digit number along the course line identifying the true course. The ECDIS should also display the rate-of-turn value required to stay in the track based on the preset turn radius and the actual speed.

delete - "including the turning arc"; delete - "The ECDIS should ... actual speed".

The following paragraph should enable the navigator to choose the routes to be displayed:

5.2.3 At the navigator's discretion, the ECDIS should be capable of displaying other routes in addition to the selected route. The selected route should be clearly distinguishable from the other routes. During the voyage, it should be possible for the navigator to change the selected sailing route.

The following paragraph is suggested to replace paragraph 5.2.1 in Circ. 515. Dead reckoning based on course and speed input is assumed provided in order to display own ship's position continuously:

5.2.4 Based on dead reckoning with input from speed measurement and course information systems, own ship's position should be displayed continuously.

5.2.4 and 5.2.5 should be deleted - use existing 5.2.1.

The following paragraph is added in order to enable connection with equipment which can contribute to increasing safety of navigation:

5.2.5 The ECDIS should enable connection with position-fixing systems.

The following paragraph says that the own ship symbol should be displayed at the position given by the selected position-fixing system (this may also be the position calculated by dead reckoning):

5.2.6 If position fixing systems are connected to the ECDIS, the ship's position should be displayed continuously based on the selected system (dead reckoning included). On demand, it should be possible to display the position given by other positioning systems.

delete "(dead reckoning included)"

Support is given to the suggested Canadian re-wording of paragraph 5.2.2 in Circ. 515. The condition about the connection with ECDIS has been added, because a positioning system is no assumption for an ECDIS:

5.2.7 If a position-fixing system is in use, it should be possible to adjust the ship's geographic position manually, in order to correct a positioning system error. This manual adjustment should be noted alpha-numerically on the screen, and should be maintained until altered by the navigator."

The following paragraph should cover item 3.3.6 in the Canadian note:

"5.2.8 The geographic datum of the position-fixing system(s) connected to ECDIS should be automatically adjusted to conform with the datum of the displayed chart."

The following paragraph should ensure information about the source and quality of the positional input.

"5.2.9 When the ECDIS equipment is receiving positional input from electronic position-fixing equipment, a warning should be given whenever the positional accuracy deteriorates substantially, and whenever the input changes from one system to another."

The paragraphs 5.2.10 and 5.2.11 are suggested added in order to increase the safety of navigation:

"5.2.10 The ECDIS should be able to detect and give a warning if own ship will cross the boundaries of the safety contour within a specified time set by the navigator.

5.2.11 When limits for off-track alarm have been specified for the selected route, an alarm should be given whenever these limits are exceeded.

5.2.11 When limits for deviation from planned route have been specified for the selected route, an alarm should be given whenever this deviation is exceeded.

5.2.12 The ECDIS should be able to display:

- .1 time-labels along the ship's track manually on demand and automatically at intervals selected between 1 and 120 minutes;
- .2 the past track information for at least 8 hours on demand; and
- .3 points, free movable electronic bearing lines, variable and fixed range markers and other symbols required for navigation purposes as specified in appendix 2.

HGE note: This is the same as existing FPS para. 5.2.3.

5.2.13 It should be possible to enter, display and read on demand the geographical co-ordinates of any position."

HGE note: This is the same as existing FPS para. 5.2.4.

The contents of the following paragraph should enable the navigator to execute navigational routines which are currently done on the paper charts:

"5.2.14 The ECDIS should be capable of calculating the distance and bearing between any two points in the chart, chosen by the navigator in a simple manner."

The ECDIS should not only detect, but also give a warning if the ship's position is within an area for which special conditions exist. The term special conditions should be clarified.

5.2.15 The ECDIS should be able to detect and give a warning if the ship's position is within a geographical area for which special conditions exist.

5.2.3 The ECDIS should be able to display:

- .1 time-labels along the ship's track manually on demand and automatically at intervals selected between 1 and 120 minutes;
- .2 the past track data for at least 8 hours on demand; and
- .3 points, free movable electronic bearing lines, variable and fixed range markers and other symbols required for navigation purposes as specified in paragraph 6.2.

5.2.4 It should be possible to enter, display and read on demand the geographical coordinates of any position.

5.2.5 The ECDIS should be able to detect if the ship's position is within a geographical area for which special conditions exist.

Comments, questions and proposals:

IEC QUESTION/COMMENT (NAV 36/4/2)

1. Paragraph 5.2.5 implies that the navigation system is a part of ECDIS. Clarification is needed.

IMO/SO/ON or IMO/IHO-HGE answers and evaluation:

IMO/SO/ON EXPLANATION

1. As defined by IMO (see FPS Appendix 1, paragraph 4) ECDIS is capable of being connected to a position-fixing system.

5.3 Documentation

It should be possible to store, protect and reproduce those minimum elements of the display required to reconstruct the past navigation in utilizing the ECDIS during the previous eight hours.

Comments, questions and proposals:

IEC QUESTION/COMMENT (NAV 36/4/3)

The "minimum elements" in paragraph 5.3 should be clarified in regard to size and content of information.

PROPOSAL BY NORWAY (HGE 10/3/4)

IMO/SO/ON or IMO/IHO-HGE answers and evaluation:

IMO/SO/ON EXPLANATION

The minimum elements for documentation will emerge after sea trials.

In the following paragraph we have removed the word "protect" for the first sentence and specified an in our opinion reasonable level of protection in the second sentence:

"It should be possible to store and reproduce those minimum elements of the display required to reconstruct the past navigation in utilizing the ECDIS during the previous eight hours. It should be impossible for a navigator to manipulate the stored information."

Replace manipulate with alter.

Agreed by HGE.

6. **SYMBOLS AND COLOURS**

- 6.1 Only IHO approved symbols and colours should be used to represent ENC information.
- 6.2 All symbols and colours other than those mentioned in 6.1 should be approved by the IMO (see appendix 2).

7. ACCURACY

- 7.1 Lines used for the purpose of navigation should be displayed with an angular error not greater than plus or minus 0.50° .
- 7.2 Ranges should be displayed with an error not exceeding 1.5 % of the semi- diagonal length or 70 m, whichever is greater.
- 7.3 The ECDIS should be capable of meeting the accuracy requirements of the IHO with respect to ENC data.

Comments, questions and proposals:

IEC QUESTION/COMMENT (NAV 36/4/2)

1. The meaning of "capable of meeting the accuracy requirements of the IHO" in paragraph 7.3 is not understood.

PROPOSAL BY NORWAY (EGE 10/3/4)

A complete new chapter 7.

The current requirements of paragraph 7, refer to errors in the display of the equipment. However, moderate display errors/distortions are not serious, assuming that calculations performed by the equipment will not be related to possible display errors:

- 7.1 All calculations performed by the ECDIS equipment should be based on the actual ENC information so as not to be affected by possible distortions in the equipment
- 7.2 The means provided for obtaining bearing should enable the bearing to be measured with an accuracy of $\pm 0,5^\circ$ or better.
- 7.3 The means provided for obtaining range should enable the range to be measured within an accuracy of one tenth of the chart scale in use (e.g. in a 1:50 000 scale chart, the accuracy should be within 5000 cm = 50 m).
- 7.4 The ECDIS should be capable of meeting the accuracy requirements of the IHO with respect to ENC information.

IMO/SO/ or IMO/IHO-EGE answers and explanations:

IMO/SO/ EXPLANATION

1. The ECDIS processing shall not degrade the database (ENC).

- 7.1 All calculations performed by the ECDIS equipment should be consistent with ENC accuracy.

8. DISPLAY OF OTHER INFORMATION

- 8.1 If radar information or other temporary navigational information is added to the chart display it should not degrade the ENC information display and it should be clearly distinguishable from the ENC data.

Comments, questions and proposals:

IMO/SO/ON or IMO/IHO-HGE answers and evaluation:

PROPOSED BY MANY:

Change ENC-data to ENC information.

See comment on existing PPS 3.

- 8.2 If radar video is added to the chart its scale and orientation should be adjusted automatically to the ENC information displayed. The origin of the radar image should be capable of manual adjustment.

Comments, questions and proposals:

IMO/SO/ON or IMO/IHO-HGE answers and evaluation:

COMMENTS BY NORWAY (HGE 10/3/4)

The meaning of the last sentence of the paragraph is unclear, and should be clarified by the committee.

PROPOSED BY HGE 11

Replace the last sentence with the following:

"It should be possible to adjust the position of the ship manually so that the radar image matches the chart information (See 5.2.2 above.) It should also be possible to adjust the position on the ship from which the radar originates, to compensate for effects such as offset between the radar and positioning system antennas."

- 8.3 It should be possible to remove all radar information in a single action.

9. DISPLAY MODE AND GENERATION OF THE NEIGHBOURING AREA

- 9.1 It should always be possible to display the ENC 'north-up'. In any other orientation the North direction should be indicated.
- 9.2 ECDIS should provide at least for true motion mode. If true motion mode is in use, reset and generation of the neighbouring area should take place automatically at a predetermined distance from the border of the display.
- 9.3 There should be a positive indication of the display mode in use.
- 9.4 The change of the chart area and the position of own ship on the screen should also be capable of being performed manually.

Comments, questions and proposals:

IMO/SO/ON or IMO/IHO-HGE answers and evaluation:

PROPOSAL BY NORWAY (HGE 10/3/4)

The re-wording of the last sentence of the paragraph is unclear, and should be clarified by the committee.

- 9.4 The change of the chart area and the position of own ship relative to the edge of the display should also be capable of being performed manually.

HGE is positive to the proposal.

10. DISPLAYS

10.1 The ECDIS should have the capacity to display information required for:

- .1 navigation and route monitoring;
- .2 look ahead, route planning and supplementary navigation tasks;

In changing from one function to the other on a display the change should be immediate.

Note: This may require one or two displays depending on the nature of the voyage.

Comments, questions and proposals:

IMO/SO/N or IMO/IHO-HGE actions and evaluations:

COMMENTS AND PROPOSAL BY NORWAY (HGE 10/3/4)

The current text could be interpreted to imply requirements for the equipment to display information additional to what has been required in previous paragraphs. In our view, this is not intended, and if it were intended, then the additional requirements would have to be specified in the Performance Standard. It is therefore proposed to amend the introductory sentence of 10.1 to read as follows: "The ECDIS should have the ability to display information as specified in previous paragraphs, for:"

In the current text of MSC/Circ. 515, there is a note regarding the number of displays required, but the text is rather unclear. As the text of para 10.1 itself is now worded, the minimum requirement seems to be that route monitoring and route planning are not required to be performed simultaneously. However, the first sentence of para 5.1 in the PPS could be interpreted to have the opposite meaning (i.e. if the two modes are totally independent, as required by para 5.1, they can be done at the same time). This matter should consequently be clarified. When making a decision, economic factors should also be taken into account, and it may have significant economic consequences if the requirements are worded in such a way that mandatory duplication of the display (and possibly also other parts of the ECDIS equipment) were to be required.

Taking into account that - from an operational consideration - it would be highly desirable to be able to perform both route monitoring and route planning at the same time, the following alternative may be considered further: Is it technically and operationally feasible to use a "split screen mode", i.e. when needed, to use one part of the screen (e.g. one third of the screen area; which should preferably be possible to move to any of the four corners of the screen) for route planning (i.e. in a different chart area)?

"10.1 The ECDIS should have the capacity to display information, as specified in previous paragraphs, for:

- .1 navigation and route monitoring;
- .2 look ahead, route planning and supplementary navigation tasks;

In changing to the route monitoring from any of the other functions, the display change should be immediate.

Note: This may require one or two displays depending on the nature of the voyage."

.... display information required in these Performance Standard, for:

- .1 navigation, route monitoring and look ahead.
- .2 delete "look ahead"

Delete "in changing.... immediate" and replace by:
"Activating the route monitoring function on the display should be immediate."

- 10.2 The effective size of the chart presentation on a display should be at least 350 mm x 270 mm.

Comments, questions and proposals:

IMO/SOLAS or IMO/IHO-HGE answers and evaluations:

PROPOSAL BY NETHERLAND (HGE 10/3/3)

- 10.2 The effective size of 350 mm x 270 mm should be the minimum size:

HGE 10 - leave the paragraph as it is.

- 10.3 The displays should be capable of meeting colour and resolution requirements of the IHO and IMO.

Comments, questions and proposals:

IMO/SOLAS or IMO/IHO-HGE answers and evaluations:

HGE 10 - proposal:

Reference should be given to IHO - SP52.

- 10.4 The method of presentation should ensure that the displayed data are clearly visible, in general, to more than one observer in the conditions of light normally experienced on the bridge of a ship by day and by night. Facilities to adjust the brightness should be provided.

11. PROVISION AND CORRECTION OF DATA

- 11.1 The contents of the ENC should be adequate and up to date for the intended voyage to comply with SOLAS, regulation V/20.

- 11.2 The ECDIS should be capable of accepting official automatic updates added to the ENC, communicated in standard IHO format. These updates should be automatically applied to the displayed information but, in accordance with 11.7, should be stored separately from, and should not overwrite, the ENC data.

Comments, questions and proposals:

IMO/SOLAS or IMO/IHO-HGE answers and evaluations:

PROPOSED BY MANY

Change "ENC data" in last line to "ENC information".

Use either "data" or "contents", not "information".

- 11.3 The ECDIS should also be capable of accepting updates entered manually with simple means for verification prior to the final acceptance of the data. These should be stored separately from the ENC and should on demand be distinguishable on the display from ENC data and their automatic correction and not affect their legibility.

Comments, questions and proposals:

IMO/SOLAS or IMO/IHO-HGE answers and evaluations:

PROPOSED BY MANY

In 4th line - change "data" to "information" and "their" to "its".

See comments on existing PPS 3.

- 11.4 The system should keep a record of updates added to the ENC, including time of application. In addition to an alphanumeric listing of these updates, it is necessary that the navigator be able to display updates both for verification and to ascertain the changes which have been made.
- 11.5 The format in which the ENC and updates to it are originated by HOs, and the data media, should be internationally standardized.

Comments, questions and proposals:

IMO/SO/ or IMO/IHO-HGE answers and evaluation:

PROPOSED BY MANY

In 2nd line - change "data" to "information".

See comments on existing PPS 3.

- 11.6 The ENC data to be used in ECDIS should be that originated by national hydrographic offices.

Comments, questions and proposals:

IMO/SO/ or IMO/IHO-HGE answers and evaluation:

PROPOSED BY MANY

1st line - change "data" to "information".

See comments on existing PPS 3.

- 11.7 It should not be possible to alter the contents of the ENC on board.

12. CONNECTIONS WITH OTHER EQUIPMENT

- 12.1 The ECDIS should not degrade the performance of any equipment providing sensor inputs. The connection of the ECDIS to any other equipment should not degrade the performance of that equipment.

13. PERFORMANCE TESTS AND WARNINGS

Comments, questions and proposals:

IMO/SO/ or IMO/IHO-HGE answers and evaluation:

PROPOSED BY HGE 10

Revise title to: "MALFUNCTION WARNINGS AND PERFORMANCE TESTS"

- 13.1 The ECDIS should provide suitable warnings of ECDIS malfunction to enable the observer to monitor the proper operation of the system.

Comments, questions and proposals:

IMO/SO/ or IMO/IHO-HGE answers and evaluation:

PROPOSED BY HGE 10

New 13.2

"The ECDIS should provide suitable performance testing capability to facilitate the maintenance of the system.

14. POWER SUPPLIES

- 14.1 The ECDIS should normally be powered from the ship's main source of electrical energy. In addition, it should be possible to operate the ECDIS and all equipment necessary for its normal functioning, from an alternative source of energy. Changing from one source of supply to another or any interruption up to 60 s duration of the supply of electrical energy should not require the equipment to be manually re-initialized and should not lose information stored in the memory.

15. BACK-UP ARRANGEMENTS

- 15.1 Adequate back-up arrangements should be provided to ensure safe navigation in case of ECDIS failure.

(No comparable standard.)

Comments, questions and proposals:

IEC QUESTION/COMMENT (NAV 36/4/2)

1. There is a need for clarifying the reliability and availability (MTBF and MTTR).

IMO/SO/ or IMO/IHO-HGE answer and evaluation:

IMO/SO/ EXPLANATION

At present it is envisaged that reliability and availability is covered by the requirement (PPS para. 15.1) to have back-up arrangements. It is not considered practical to specify Mean Time Between Failure (MTBF) and Mean Time to Repair (MTTR).

COMMENT BY NETHERLAND (HGE 10/3/3)

Reliability and availability (back up facility)

A colour copier was available which could copy within a few seconds the information from the ECDIS-screen into A3 or A4 format. The copies of the screen containing the planned route, could be used as "get you home charts".

APPENDIX 1

DEFINITIONS OF TERMS TO BE USED ONLY IN CONNECTION WITH ECDIS PERFORMANCE STANDARDS

1. **Electronic chart database (ECDB)**

An ECDB is a master database of chart information held in digital form by the national hydrographic authority.

Comments, questions and proposals:

PROPOSED BY IHO - SP52, Appendix 3

The master data base for Electronic Navigation Chart Data (ENCDB), held in digital form by the national hydrographic authority, containing chart information and other nautical and hydrographic information.

2. **Electronic navigational chart (ENC)**

An ENC is a subset of the ECDB, held on the vessel. It contains useful information for navigation coastlines, obstructions, beacons, etc.

Comments, questions and proposals:

PROPOSED BY IHO - SP52, Appendix 3

The data base, standardized as to content, structure and format, issued for use with ECDIS. The ENC is equivalent to New Editions of paper charts, and may contain additional supplementary nautical information additional to that contained in the paper chart (e.g. sailing directions). The ENC is a subset of the ENCDB developed from National Hydrographic Authorities, ENCDBs.

3. **Electronic chart display equipment (ECDIE)**

ECDIE is the display equipment which processes and indicates necessary information compiled in ENC and other information to assist in safe navigation.

Comments, questions and proposals:

PROPOSED BY IHO - SP52, Appendix 3

ECDIE is the IMO name for the Electronic Chart Display Equipment which, when supplied with ENC data, forms a system called ECDIS. Thus and ECDIE consists of display hardware and software and is the equipment produced by the manufacturer. Not until the ECDIE receives the ENC information can it function as an ECDIS.

4. **Electronic chart display system (ECDIS)**

An ECDIS is a system which displays hydrographic information which may be combined with information provided by electronic position-fixing systems, radar, etc., to assist in the safe navigation of a ship.

An ECDIS consists of the electronic navigational chart (ENC) as data file, and the electronic chart display equipment (ECDIE).

Comments, questions and proposals:

IMO/SO/ON or IMO/IHO-HGE answers and evaluations:

PROPOSAL BY CANADA (HGE 10/3/2)

From the start of their use by the IHO working group on ECDIS chart specifications in 1987, the initials "ECDIS" have been taken to stand for "Electronic Chart Display and Information System". The inclusion of "Information" makes the important point that ECDIS is more than an electronic mirror of the paper chart, and that it is in fact an information system. It is proposed that this full title be substituted for "Electronic Chart Display System" wherever this appears in the Provisional Performance Standards.

HGE 10 agrees with the proposal.

PROPOSAL BY NORWAY (HGE 10/3/3)

4 **Electronic chart display and information system (ECDIS)**

The suggested re-wording is based on the assumption that ECDIS should be able to do more than displaying hydrographic information:

An ECDIS is a system which displays hydrographic information and the ship's position along a route preplanned by the navigator.

PROPOSED BY IHO - SP52, Appendix 3

The navigation information system which is considered equivalent to the nautical paper chart, displaying selected information from the chart data base (see ENC, SENC) integrated with data from positional and, optionally other sensors. By displaying chart contents and optionally other chart related and navigational information. ECDIS assists the mariner in route planning and, with on-line position indication, in route monitoring. An ECDIS can only be recognized as equivalent to the chart required by Regulation V/20 of SOLAS if it satisfies the yet provisional IMO and IHO specifications.

APPENDIX 2

NON-ENC DISPLAY SYMBOLS

The following preliminary list of symbols has been identified as being used for navigational routines:

- .1 Own ship
- .2 Past track
- .3 Vector for heading and speed
- .4 Vector for course and speed made good
- .5 Range rings
- .6 Cursor mark
- .7 Waypoint
- .8 Event
- .9 Dead reckoning position (DR)
- .10 Estimate position (EP)
- .11 Position probability area (PPA)
- .12 Fix - visual
 astronomical
 radar
 electronic position-fixing system (EPFS)
- .13 Position lines
- .14 Transferred position lines
- .15 Planning track
- .16 Current vector
- .17 Dangers
- .18 Clearing lines
- .19 Distance to run
- .20 Planned position and time
- .21 Visual limits of lights
- .22 Position and time of 'Wheel over'

This list is not exhaustive nor does it imply that all ECDIS will contain all these symbols.

Comments, questions and proposals:

IEC QUESTION/COMMENT (NAV 36/4/2)

1. The list in appendix 2 should be completed and the minimum requirements of symbols included should be defined.

HGE 11

- .12 Fix - ...
 ...
 ... (EPFS)

IMO/SO/ or IMO/IHO-HGE answers and explanation:

IMO/SO/ EXPLANATION

1. Annex 5 of NAV 36/4, report of the SO/HGE dated 10 May 1990, which will be updated as a result of sea trials, defines the non-chart symbols which have been provisionally decided to date.

Change (EPFS) to (EPFS).

PROPOSAL BY CANADA (HGE 10/3/2)

The following additions and changes are proposed:

HGE 10 evaluated that "Electronic dividers" and "parallel index" did not call for a symbol, but it should be ensured that they were specified as functions.

"ANNEX 2

- .6 Electronic dividers
- .7 Parallel indexing lines

- .24 Position for Wheel over"
- .25 Navigator's general notes
- .26 Manual chart correction".

(Existing items .6 through .22 should be re-numbered.)

PROPOSAL BY NORWAY (HGE 10/3/4)

Support to the additions made by the Government of Canada (HGE 10/3/4)

General remarks by HGE 10:

- .20 Delete "and time"
- .22 Delete "and time"

Time seems not to be a symbol, but an annotation.

The title should be changed to read:

"NON - ENC DISPLAY INFORMATION"

PROPOSAL BY IHO AND CIRM (NAV 37/INF.3)

A revised set of symbols and colours is presented in this paper.

HGE recommends these colours and symbols to be tested.
