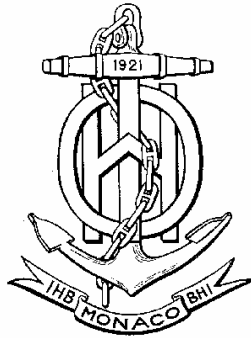


INTERNATIONAL HYDROGRAPHIC ORGANIZATION

CSMWG18-04.3A



International Hydrographic Organization (IHO) Test Data Sets (TDS) for Electronic  
Chart Display and Information Systems (ECDIS) Instruction Manual

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Introduction

### 1.1 Purpose

The International Hydrographic Organization (IHO) Test Data Sets (TDS) for Electronic Chart and Display Information System (ECDIS) has been produced to fulfill the requirement for a data set necessary to accomplish all ECDIS testing requirements (IEC 2008. 61174 Annex F, p. 53).

The TDS is IHO Publication S-64.

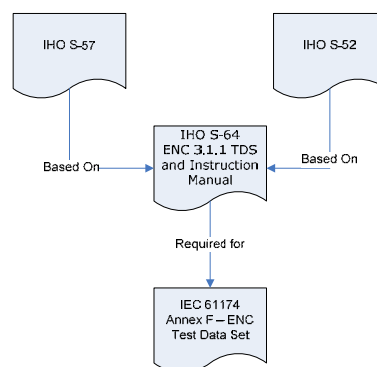
This guide, the TDS Instruction Manual (TIM), provides supporting documentation about the organization, understanding, and use of the TDS.

### 1.2 Key Documents, Organizations, and Relationships

The development and application of the TDS involves several organizations and related specifications (see Figure 1). In simplest terms, the TDS was produced by the IHO to allow for the complete testing ECDIS equipment (hardware and software) vis-à-vis the ECDIS Performance Standard. The ECDIS Performance Standard is specified by the International Maritime Organization (IMO) in MSC.232(82), and methods for testing this standard are the responsibility of the International Electrotechnical Commission (IEC) which publishes these requirements in document IEC 61174.

For the current versions of any of these documents or standards, consult each organizations' website.

Figure 1 The TDS and its Relatives



### 1.3 Structure of Document

This document contains four sections. The first is the introduction. The second outlines the organization of the TDS folders and files. The third section briefly discusses the current edition of S-57 ENC with respect to the TDS. Section 4 and 5 are currently and intentionally empty. Section 6 relates the various components of the TDS to the testing methods and results sections in IEC 61174 Section 6. Annotation is added in certain cases to promote clarity.

## 2.0 Organization of the TDS

The TDS will contain a folder/directory for each section of the IEC 61174. Each folder will contain a .doc file with information extracted from the TIM. Depending on the test requirement, the folder may also contain an ENC\_ROOT directory which will contain the files of the exchange set (CATALOG.031, .000, plus any updates or other optional/related files, e.g. .TIFF, .txt). The ENC\_ROOT directory will also contain a readme.txt file, which may have additional information regarding the content or usage of the files.

The location (or path) of ENC exchange set and/or ENC cell will be indicated using bold italic notation, e.g. ***6.4.1 Power Up\ENC\_ROOT\gb4x0000.000***

To conform to the directory structure as defined in S-57 Appendix B.1 Section 5.4.3, the ENC\_ROOT directory should be located in the media's root directory. This should be viewed as a requirement, however, in practical terms, many systems can "browse" and load files from almost any location. Consult with the equipment manufacturer for further information.

Figure 2 The Structure of TDS

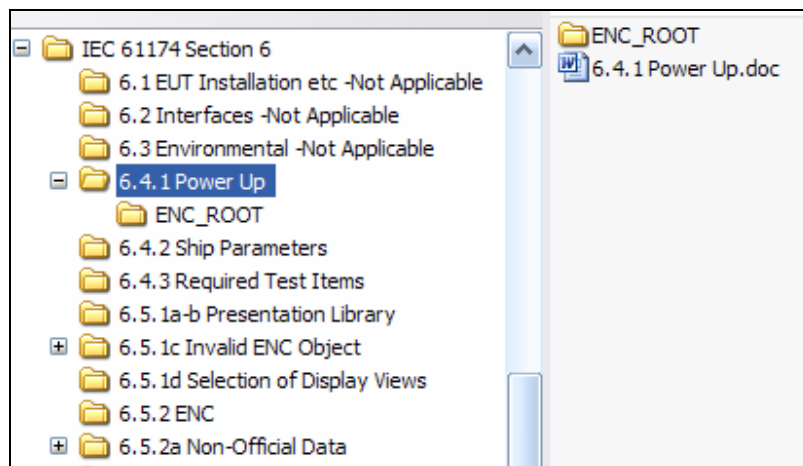
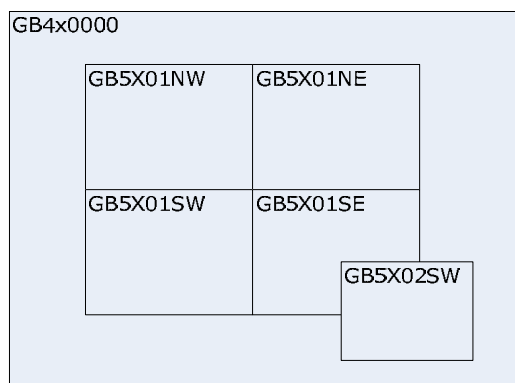


Figure 3 TDS Cell Coverage



### 3.0 A Word on the Current S-57 ENC Edition

The current S-57 ENC Edition is 3.1.1 All ENCs are compliant with this edition.

The difference between Edition 3.1 and 3.1.1 was the addition of three new object classes (features), two new attributes, and two new attribute values. ***These changes do not impact the IEC 61174 test procedures or test results.***

The new object classes are:

ASLXIS - Archipelagic Sea Lane Axis

ARCSLN - Archipelagic Sea Lane

NEWOBJ – New Object (a generic object class that is not yet S-57 Edition 3.1.1 compatible).

The new attributes are:

CLSDEF – Class Definition: Specifies the defining characteristics of a new object. To be used with NEWOBJ only.

CLSNAM – Class Name: Specifies the descriptive name of a new object feature object class. To be used with NEWOBJ only.

The new attribute values are:

CATREA 27-<Environmentally Sensitive Sea Area (ESSA)>; and,

CATREA 28-<Particularly Sensitive Sea Area (PSSA)>

Examples of the above features can be found in:

***6.8.5.1 S-57 Edition 3.1.1\ENC\_ROOT***

Particulars of the features and attributes, and attribute values added specifically for Edition 3.1.1 are documented in Section 6.8.5.1 of this document, and the 3.1.1 ReadMe.txt file also found in the aforementioned directory.

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The following two section of the TIM are intentional left blank to allow the section numbering in this document to correspond directly to IEC 61174 Section 6.

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4.0 Intentionally no content.

5.0 Intentionally no content.

### 6.0 The Use of the TDS in ECDIS Testing

Each of the following numbered subsections of the TIM corresponds directly to the equivalent-numbered subsections in IEC 61174 Section 6, “Methods of Testing and Required Test Results”. Direct quotations from IEC 61174 are annotated with *non-bold italic font*.

The TIM will provide guidance as to which ENC cells, updates, or other files (if applicable) can be used, as well as any additional information that may assist in the testing. It is designed to compliment IEC 61174 and should not be viewed as a substitute. IEC 61174 is the essential and required testing document, while the TIM is to be used as a helpful companion.

In the following sections, the term “Not Applicable” (NA) is used where no specific data from the TDS is required for the test.

## 6.1 EUT Installation, Technical Documentation, and Test Requirements

The Test Data Set (TDS) is not required to carry out the test(s) outlined in this Section of IEC 61174.

## 6.2 Interfaces

The Test Data Set (TDS) is not required to carry out the test(s) outlined in this Section of IEC 61174.

### 6.3 Environmental

The Test Data Set (TDS) is not required to carry out the test(s) outlined in this Section of IEC 61174.



## 6.4 Preparation

### 6.4.1 Power Up

Load files:

**6.4.1 Power Up\ENC\_ROOT\gb4x0000.000**; and,

**6.4.1 Power Up\ENC\_ROOT\gb5x01nw.000**

It is suggested that an initial ship position of 32 29.668S, 060 55.864E with a heading of 234.0 degrees. This will place ship at the jetty in Micklefirth.

From IEC 61174 Section 6.4.1:

*The installed EUT shall be powered up in accordance with the manufacturer's recommended procedures. Any self-testing shall be completed using simulated inputs. Signal generators shall be activated in a coherent manner to represent a stationary ship at the position selected. All the necessary selections to configure the equipment for the test environment shall be undertaken in accordance with the manufacturer's recommendations and settings.*

#### 6.4.2 Initial Ship Parameters

This section is not directly applicable to the TDS, however, the initial ship parameters must be entered in the EUT as prescribed in Section 6.4.2

From IEC 61174 Section 6.4.2:

*The following parameters shall be entered into the EUT for a simulated test:*

*Ship's length 300 m*

*Ship's beam 30 m*

*Ship's draught 7 m*

*Conning position*

*Aft of ship's center 100 m*

*On centre line*

*Navigation receiver antenna*

*Forward of conning position 5 m*

*Starboard of centre line 10 m*

*Secondary navigation receiver antenna (if provided to meet the requirements of 4.10 (232/A11.4.7))*

*Forward of conning position 5 m*

*Starboard of centre line 10 m*

*Radar antenna:*

*Forward of conning position 7 m*

*On centre line*

*The navigation receiver antenna offset shall be varied and it shall be confirmed that the position on the EUT changes accordingly.*

#### 6.4.3 Required Test Items.

In this section, the IEC lists the files and documentation required to complete the test procedure. There is no TDS data required for this specific section and this commentary is provided for additional information.

From IEC 61174 Section 6.4.3:

*For the purpose of these tests the following items shall be used:*

- IHO ECDIS presentation library contained in S-52, appendix 2 including an ECDIS chart 1 and colour differentiation diagrams. If the manufacturer provides his own presentation library, Chart 1 has to be adapted accordingly;*
- IHO S-57 test data sets for IEC 61174 which includes ENC data, both encrypted and unencrypted, and its updates, together with the associated instruction manual. The contents of these test data sets are described in Annex F.*
- SENC test data sets, if supported from each SENC distributor. The test data set contents are described in Annex F.*

The first item in the list, the IHO ECDIS presentation library (from S-52, appendix 2) including an ECDIS chart 1 and colour differentiation diagrams must be acquired and installed on the equipment under test (EUT) by the manufacturer, prior to the beginning of the tests.

The second item, the IHO TDS is provided herein, with the exception of the encrypted data. A second TDS for data encrypted using the IHO Encryption Scheme will be available from the IHO ([www.iho.shom.fr](http://www.iho.shom.fr)) as part of Special Publication 63 (S-63).

This document is to be considered the “Instruction Manual”.

The third item on the list, SENC test data set, if supported, must be provided by the manufacturer.

## 6.5 Initial Data Sets

### 6.5.1a-b Presentation Library

Load ENC files from:

**6.4.1 Power Up\ENC\_ROOT**

From IEC 61174 Section 6.5.1a-b:

*a) Check that the edition number of the presentation library can be displayed. Observe the chart display and check that the buoy symbols are as defined in the presentation library.*

*b) Check that ECDIS chart 1, contained in the presentation library, can be displayed.*

*Select*

*three symbols and check that these symbols can be interrogated by cursor and that the associated text explanation contained in the symbol library of the presentation library is displayed.*

As indicated in 6.4.3, the IHO ECDIS presentation library (from S-52, appendix 2) including an ECDIS chart 1 must be acquired and installed on the equipment under test (EUT) by the manufacturer, prior to the beginning of the tests.

For 6.5.1b, the ECDIS chart 1 will be loaded from the Presentation Library media.

### 6.5.1c Invalid ENC object

Load file:

**6.5.1c Invalid ENC Object\ENC\_ROOT\GB5X01NE.000**

From IEC 61174 Section 6.5.1c:

*c) Load an ENC containing an object not valid for ENC purpose, i.e. an object, attribute and attribute value not recognized by the presentation library. Check that the symbol magenta “?” occurs at the indicated position on the test chart when the standard display is selected.*

The purpose of this test is to ensure that the system utilizes the magenta “?” symbol when it encounters an object whose display instructions are not in the presentation library.

This file is a copy of GB5X01NE.000 from the 6.4.1 Power Up\ENC\_ROOT directory and has been modified so that it contains 3 objects for which an object, an attribute, and an attribute value are not recognized by the presentation library. The 3 modifications are described below:

- i. INVALID OBJECT  
The object CGUSTA (OBJL 29) at:  
32 30.924S, 60 58.719E  
has been changed to OBJL 999.
- ii. INVALID ATTRIBUTE  
The attribute BOYSHP (ATTL 4) for object BOYSPP (OBJL 19) at:  
32 31.740S, 60 59.155E  
has been changed to ATTL 777.
- iii. INVALID ATTRIBUTE VALUE  
The attribute value for BOYSHP (ATTL 4) for object BOYLAT (OBJL 17) at:  
32 31.665S, 60 58.243E  
has been changed to 555.

#### 6.5.1d Selection of Display Views

Load any ENC from:

***6.4.1 Power Up\ENC\_ROOT***

From IEC 61174 Section 6.5.1d:

*d) Check that the EUT provides the capability to select for display either the simplified chart symbols for buoys and beacons, special areas, etc., or the corresponding paper chart symbols.*

The EUT must have the ability to select either the simplified or the paper chart view (display) of chart symbols.

This is a test of the ECDIS functionality and is not to the data content of the TDS.

## 6.5.2 ENC

Load one of the ENCs from:

### **6.4.1 Power Up\ENC\_ROOT**

From IEC 61174 Section 6.5.2:

*Check that the edition number and date of the ENC included in the IHO test data set for IEC 61174 is displayed in the chart library.*

*Load an additional ENC cell and ensure that the chart coverage has changed and that the chart library is updated.*

*Remove an ENC cell and ensure that the chart coverage has changed and that the chart library is updated.*

Ensure that the edition and data information displayed by the EUT for the selected chart is identical to:

ENC	Edition (EDTN)	Update Number (UPDN)	Update Application Date (UADT)	Issue Date (ISDT)
gb4x0000.000	1	0	20010409	20010409
gb5x01ne.000	1	0	20010406	20010406
gb5x01nw.000	1	0	20010406	20010406
gb5x01se.000	1	0	20010406	20010406
gb5x01sw.000	1	0	20010408	20010408
gb5x02se.000	1	0	20010407	20010407

Add and remove charts as described in IEC 61174 6.5.2 and verify that the chart coverage has changed and the chart library has been updated.

## 6.5.2a Non-Official Data

Load the file:

**6.5.2a Non-Official Data\ENC\_ROOT\GB5X01NE.000**

From IEC 61174 Section 6.5.2a:

*a) Load a data cell whose source identification indicates that the data is non-official (by the inclusion of a producer code, which indicates a source other than the official producers listed in the Annex A to S-57 appendix A). Check that when the area of this cell is displayed, the boundary of the area, or the edge of the display if the boundary is offscreen, is marked using the appropriate symbology as defined in the presentation library. The warning “No official data available. Refer to paper chart” shall appear.*

This ENC has been modified in the following manner to make it “non-official”:

- the producer code has been changed from GB to 1B
- the agency code (AGEN) has been modified from 540 to 65535 as specified in S-57 clauses 4.3.1 and 2.1.

When this chart is loaded, check that when the area of this cell is displayed, the boundary of the area, or the edge of the display if the boundary is offscreen, is marked using the appropriate symbology as defined in the presentation library. The warning “No official data available. Refer to paper chart” shall appear.



#### 6.5.2b Area of No Data

Load the file:

***6.4.1 Power Up\ENC\_ROOT\gb4x0000.000***

From IEC 61174 Section 6.5.2b:

*b) Select a display area for part of which no ENC data is loaded and check that the “no data” area symbolization defined in the presentation library is displayed in the appropriate area.*

This cell contains an area of no data surrounding the entire data area. Select this area and check that the “no data” area symbolization defined in the presentation library is displayed in the appropriate area.

### 6.5.3 Encrypted ENC

Not applicable. IHO will provide a separate TDS under S-63 Data Protection Scheme, for testing.

## 6.6 Accuracy

For this test, load the files from:

**6.4.1 Power Up\ENC\_ROOT**

The following documents will also be required:

**6.6 Accuracy\6.6 Accuracy –Geodesic.doc**

**6.6 Accuracy\6.6 Accuracy –Rhumb Lines.doc**

From IEC 61174 Section 6.6:

*The test shall verify:*

*– the accuracy of EUT calculations consistent with SENC;*

*– the measurement accuracy consistent with display resolution.*

*a) Perform the measurements provided for in the IHO test data set and confirm that they meet the required accuracy. Check that the system can perform the following calculations:*

*– transformation between a local datum and WGS-84, and between WGS-84 and a local datum;*

*– true distance and azimuth between two geographical positions;*

*– geographical position from known position and distance/azimuth;*

*– rhumb line and great circle.*

*b) Calculate and display both a rhumb line and a great circle line according to test scenario 1 of Annex J and verify that no visible distortion exists between these lines and the data.*

*This test shall be carried out using the scale supported by the data, i.e. not over-scaled.*

### 6.6a

-Transformation between a local datum and WGS-84:

This test is considered “not applicable” to the TDS because all ENC’s have to be on WGS84 datum. It is assumed that this test is to confirm that a positioning signal input on a different datum can be transformed to WGS84 and not an ENC.

-True distance and azimuth between two geographical positions:

True distances and azimuths between a selection of geographical positions on the Micklefirth cells are contained in the file **6.6 Accuracy –Geodesic.doc**.

-Geographical position from known position and distance/azimuth:

It is assumed that true distance / bearing is used here. These can be calculated from the above by using the first point, the forward bearing and the distance to obtain the second point.

-Projection calculations e.g. true distance, rhumb line, convergence and great circle:

True distance and great circle are given above. Rhumb line distances / bearings are given in the file **6.6 Accuracy –Rhumb Lines.doc** for the same set of points as were used for geodesics above. An example of convergence is provided below for ENC data displayed by an ECDIS on a Transverse Mercator projection using the UTM grid specified below:

Projection: Transverse Mercator

Grid: UTM Zone 41 (Southern Hemisphere)  
False Easting: 500,000.0  
False Northing: 10,000,000.0  
Latitude of Origin: 0 0 0.0 N  
Longitude of Origin: 63 0 0.0 E

Convergence: 1.144667 degrees at: 32 33.14S, 60 52.4E

6.6b The files **6.6 Accuracy –Geodesic.doc** and **6.6 Accuracy –Rhumb Lines.doc** contain a set of points which fall along a series of long geodesics and rhumb lines. These can be used to test if the ECDIS draws geodesics and rhumb lines correctly (i.e. does the line drawn by the ECDIS pass through, or sufficiently close to, the identified points). In addition to the long lines, a 'geodesic circle' is provided. This is a set of points defining a line of constant distance from the centre and should allow the accuracy of large range circles to be checked.

Geodesics and Rhumb lines in the Northern Hemisphere, Southern Hemisphere and Crossing the Equator are provided.

To test the ability of an ECDIS to draw such lines across the Greenwich Meridian or the 180 degree meridian etc the longitude of each point can be changed by the same amount. The 'shape' of a geodesic or rhumb line is not affected by longitude (it is however affected by latitude so latitudes must not be altered).

Rhumb lines will be plotted as straight lines on a Mercator projection. However, on other projections they will plot as curves of various forms.

## 6.7 Visual Requirements

### 6.7.1 Symbols

The ECDIS Chart 1, which comes with the presentation library (IHO S-52 Appendix 2) can be used for this series of test, and specifically, must be used for 6.7.1e.

Alternatively, the files from 6.4.1 can be used for checking symbols (with the exception of 6.7.1e):

#### **6.4.1 Power Up\ENC\_ROOT**

From IEC 61174 Section 6.7.1:

*Verify compliance in accordance with IMO resolution MSC.191(79) for chart display (See 6.1, Annex K). The following checks are included:*

- a) Check that the chart symbols conform to the IHO presentation library.*
- b) Display simplified chart symbols. Check that the simplified symbols conform to the IHO presentation library.*
- c) Perform zoom-in and zoom-out operations in each mode and check that the symbols do not decrease in size below that shown in the IHO presentation library.*
- d) Check that it is possible to display own ship in true scale or as a symbol.*
- e) Display "Buoys and Beacons (Q)" part of the ECDIS Chart 1 (cell name AA5C1Q00). Check that the height of the CHKSYM01 symbol is not less than 5 mm.*
- f) Check that the number of pixels (lines) which comprise the vertical extent of the symbol CHKSYM01 is not less than 16.*
- g) Using a sample of text contained in the chart, for example manual updates, mariners notes, ENC text or pick reports, check that the height of upper-case characters is not less than 3,5 mm.*
- h) Check that the navigational elements conform to Annex E.*

This is a test of the ECDIS functionality and it is not directly related to the specific data content of the TDS.

## 6.7.2 Units and Legend

Load one or more ENC's from:

### **6.4.1 Power Up\ENC\_ROOT**

From IEC 61174 6.7.2:

*a) Verify compliance in accordance with IMO resolution MSC.191(79) requirements for standard units and abbreviations (See 6.1 and Annex K)*

*b) Check that the following elements are available in the display of general information:*

*.1 units for depth;*

*.2 units for height;*

*.3 scale of display;*

*.4 data quality indicator;*

*.5 sounding/vertical datum;*

*.6 horizontal datum;*

*.7 the value of the safety depth;*

*.8 the value of the safety contour;*

*.9 magnetic variation;*

*.10 date and number of last update affecting the chart cells currently in use;*

*.11 edition number and date of issue of the ENC;*

*.12 chart projection.*

This is a test of the ECDIS functionality and it is not directly related to the specific data content of the TDS.

### 6.7.3 Colour Table

This section is not applicable to the TDS.

#### 6.7.4 Resolution

It is suggested that one or more ENC's from:

**6.4.1 Power Up\ENC\_ROOT**

be used as a backdrop to for this check for resolution.

From IEC 61174 Section 6.7.4:

*Verify compliance in accordance with IMO resolution MSC.191(79). (See 6.1 and Annex K)*

IEC 61174 Annex K contains the list of requirements of, "...any displays associated with the navigational systems and equipment for which individual Performance Standards have been adopted by the IMO".

This is a test of the ECDIS functionality and it is not directly related to the specific data content of the TDS.



### 6.7.5 Display Characteristics

It is suggested that one or more ENC's from:

**6.4.1 Power Up\ENC\_ROOT**

be used as a backdrop to for this check for the display characteristics.

From IEC 61174 Section 6.7.5:

*Verify compliance in accordance with IMO resolution MSC.191(79). (See 6.1 and Annex K)*

*Check that a mariner's information panel on the same screen as the route-monitoring display uses only the "user interface" colours defined in the presentation library or clearly visible colours which do not detract from the chart display in any of the mandatory colour tables and can be accepted as equivalent to the "user interface" colours.*

IEC 61174 Annex K contains the list of requirements of, "...any displays associated with the navigational systems and equipment for which individual Performance Standards have been adopted by the IMO".

This is a test of the ECDIS functionality and it is not directly related to the specific data content of the TDS.

## 6.8 Functional Requirements

This paragraph is for information only.

From IEC 61174 6.8:

*The following tests [in Section 6.8] shall be performed both in route planning and route-monitoring mode. The initial latitude/longitude position shall be that provided in the instruction manual for the IHO test data set. For all tests, confirm that there is no degradation in information content.*

### 6.8.1 Standard Display

For the following functional requirements testing, load files from:

#### **6.4.1 Power Up\ENC\_ROOT**

Set an initial ship position of 32 29.668S, 060 55.864E

From IEC 61174 Section 6.8.1:

*Verify compliance in accordance with IMO resolution MSC.191(79). (See 6.1 and Annex K)*

*Ensure that the initial latitude/longitude position is entered and a chart is displayed.*

*Refer to the operator's manual supplied with the equipment and change the settings of the operator menus or manual controls provided. Turn off EUT and then turn EUT back on. Confirm that the manually selected settings are the same as they were before the EUT was turned off.*

Once the charts and initial position are set, the EUT is turned off, then back on. The test is to ensure that the chart and the user-entered settings are maintained between shut down and start up.

This is a test of the ECDIS functionality and it is not directly related to the specific data content of the TDS.

## 6.8.2 Display Base

For this test load the files from:

### **6.4.1 Power Up\ENC\_ROOT**

In addition, the following file (graphical representation), which is delivered with S-52 Appendix 2, is also required:

### **6.8.2 Display Base\S57ed3\_1\_1 S52ed3\_4 PLOT 1.pdf**

From IEC 61174 Section 6.8.2

*Verify compliance in accordance with IMO resolution MSC.191(79). (See 6.1 and Annex K)*

*Select standard display. Add selectable information. Remove all selectable information. Check that the EUT display is the same as the graphical representation of the display base for the IHO test data set for IEC 61174. Verify that the standard display can be restored by a single operator action. Confirm that the display mode is indicated.*

*Confirm by observation that means are provided to indicate which selectable information categories are enabled for display and which are not.*

This test (and 6.8.3) is designed to evaluate the EUT interface and capabilities for selecting and de-selecting optional display views.

For this test, all selectable information is to be removed from the display and the result is to be visually compared to the screen captures in the .PDF file. The screen captures are generally of each quadrant of the chart coverage area.

For best comparisons, the EUT should also use the following settings:

Scale 1:20 000

Shallow depth: 2m

Safety contour 5 m

Deep contour 10 m

Safety depth 4 m

### 6.8.3 All Other Information

For this test load the files from:

**6.4.1 Power Up\ENC\_ROOT**

In addition, the following file (graphical representation), which is delivered with S-52 Appendix 2, is also required:

**6.8.3 All Other Information\S57ed3\_1\_1 S52ed3\_4 PLOT 2.pdf**

**6.8.3 All Other Information \S57ed3\_1\_1 S52ed3\_4 PLOT 3.pdf**

**6.8.3 All Other Information \S57ed3\_1\_1 S52ed3\_4 PLOT 4.pdf**

From IEC 61174 Section 6.8.3:

*Verify compliance in accordance with IMO resolution MSC.191(79). (See 6.1 and Annex K)*

*Select standard display. Add all other SENC information and check that the EUT display is the same as the graphical representation of the complete IHO test data set for IEC 61174. Confirm that the display mode is indicated.*

Repeat the process used in 6.8.2 to evaluate the display of all other information vis-à-vis the graphical representations provided by S-52 Appendix 2 (ensure the settings, scale, safety contour etc, match those indicated on the plots):

-Standard display & Additional information available

**6.8.3 All Other Information\S57ed3\_1\_1 S52ed3\_4 PLOT 2.pdf**

-Standard (no chart data coverage, no buoys and beacons) & Other display (no text, no additional information available, no information about chart data)

**6.8.3 All Other Information \S57ed3\_1\_1 S52ed3\_4 PLOT 3.pdf**

-Standard & Other display (no text, no additional information available)

**6.8.3 All Other Information \S57ed3\_1\_1 S52ed3\_4 PLOT 4.pdf**

Compared to **6.4.1 Power Up\ENC\_ROOT\gb4x0000.000**

## 6.8.4 Display Priorities

Load files from:

### **6.4.1 Power Up\ENC\_ROOT**

IEC 61174 Section 5.2 provides the guidelines for display priorities:

*Layers are required to establish the priority of data on the display. The general rule for the*

*priority between different categories of information is given below: (S-52/5.3(a)) (See 6.8.3, 6.8.4.)*

- .1 ECDIS visual alarms/indications (for example caution, overscale);*
- .2 HO-data: points/lines and areas plus official updates;*
- .3 Notices to mariners, manual input and radio navigational warnings;*
- .4 HO-caution (ENC cautions);*
- .5 HO-colour-fill area data;*
- .6 HO's on demand data;*
- .7 radar information;*
- .8 mariners data: points/lines and areas;*
- .9 manufacturer's data: points/lines and areas;*
- .10 mariners colour-fill area data.*

NOTE 1 *This list is not intended to indicate a drawing sequence, but to specify that the information content of category  $n + 1$  must not obscure the information content of category  $n$  or any higher category (i.e.  $n - 1$ , etc.). (S-52/5.3(b)(1).) (See S-52, appendix 2/2.3.2 a)*

NOTE 2 *Category .7 shall have a radar off switch to facilitate its removal. In order to meet the requirements of 4.6.3.4 to adjust ship's position, the ECDIS may incorporate the capability of changing the radar priority of the presentation library. Operation of this feature shall be clearly indicated. (S-52/5.3(b)(2).) (See S-52, appendix 2/2.3.2 b) (See 6.8.13)*

The following plots may also be useful references for evaluating drawing priorities:

**6.8.4 DisplayPriorities \S57ed3\_1\_1 S52ed3\_4 PLOT 5.pdf**

**6.8.4 DisplayPriorities \S57ed3\_1\_1 S52ed3\_4 PLOT 6.pdf**

The above tests relate to the functionality of the ECDIS, and do not directly involve the data contained in the TDS.

## 6.8.5 Additional Display Functions

It is suggested that ENC:

### **6.4.1 Power Up\ENC\_ROOT\gb4x0000.000**

be used as a backdrop to for the checks of the additional display functions.

From IEC 61174 Section 6.8.5:

*Verify compliance in accordance with IMO resolution MSC.191(79). (See 6.1 and Annex K)*

*Check that the additional manufacturer and mariner entered information can be displayed on demand.*

*a) Verify that the navigator's notes can be displayed.*

*b) Select three different mariner entered objects, check that these may be positioned at userdefined locations on the display. Similarly check that 10 lines, 25 text characters and two areas can be drawn at user defined locations. Check that all information added by the mariner is distinguishable. Check that one of the areas can be filled, as described in S-52, appendix 2/2.3.1b. Check that all of these objects can be added to the SENC. Recall them from the SENC and check that they may be deleted.*

*c) If the manufacturer displays information, check that the presentation of the information conforms with the following:*

*.1 the caution (!) or information (i) symbol is used to call up a note on the alphanumeric display by cursor picking;*

*.2 simple lines, or areas without colour fill, are set up for cursor picking to give an explanatory note in the alphanumeric display. Colour fill shall not be used;*

*.3 manufacturer information is distinguishable as described in S-52, appendix 2/2.3.1c), and does not overwrite i.e. degrade HO chart information.*

*d) It shall not be possible to adjust depth information by changes in tidal height.*

*e) If non-ENC data is mixed with ENC, then it shall be distinguishable as described in S-52, appendix 2/2.3.1c. If the non-ENC data is clearly separated from the ENC data, it may be symbolized in the same way as ENC data, provided that a prominent warning of "non-ENC data" is displayed, and the area of non-ENC data is marked as defined in S-52, appendix 2, 8.5.2 of Annex A. (See 6.5.2(a))*

The above tests relate to the functionality of the ECDIS, and do not directly involve the data contained in the TDS.

### 6.8.5z S-57 Edition 3.1.1

\*\*\*NOTE: This section is not related to the IEC 61174 document.\*\*\*

The presentation of an ENC encoded to S-57 Edition 3.1.1 in this document is for informative purposes only. These changes do not impact the IEC 61174 test procedures or test results.

Load files from:

***6.8.5z S-57 Edition 3.1.1\ENC\_ROOT***

The difference between Edition 3.1 and 3.1.1 was the addition of three new object classes (features), two new attributes, and two new attribute values. The specific contents of this directory are listed below.

The S-57 Edition 3.1.1 base file is:  
GB5X01SW.000 (EDTN 3, UPDN 0, UADT 20071121, ISDT 20071121)

The new S-57 Edition 3.1.1 (from January, 2007) objects and attributes added to it as follows:

- new ASLXIS objects (connecting 32-31.926S, 60-58.000E; 32-31.310S, 60-56.953E; 32-30.000S, 60-57.166E)

NATION = GB

INFORM = Archipelagic Sea Lane Axis

SCAMIN = 89999

- new ARCSLN objects (surrounding the above ASLXIS object)

NATION = GB

INFORM = Archipelagic Sea Lane

SCAMIN = 89999

- new C\_AGGR object (aggregation of the above ASLXIS and ARCSLN objects)

OBJNAM = Jussland Archipelagic Sea Lane System

- new RESARE object (approximate location 32-30.803S, 60-56.494E )

CATREA = 27-<Environmentally Sensitive Sea Area (ESSA)>

INFORM = Environmentally Sensitive Sea Area (ESSA)

SCAMIN = 119999

- new RESARE object (approximate location 32-30.485S, 60-57.408E)

CATREA = 28-<Particularly Sensitive Sea Area (PSSA)>

INFORM = Particularly Sensitive Sea Area (PSSA)

SCAMIN = 119999

- new NEWOBJ (P) objects (location 32-32.700S 60-56.083E and 32-32.700S 60-56.250E)

CLSDEF = Specifies the defining characteristics of a new object.



- CLSNAM = Specifies the descriptive name of a new object feature object class.  
 INFORM = Describes the feature for ECDIS systems that are not yet S-57 Edition  
 3.1.1 compatible.  
 SYMINS = "SY(CHINFO06)"
- new NEWOBJ (L) objects (connecting 32-32.700S 60-56.083E and 32-32.700S 60-56.250E)  
 CLSDEF = Specifies the defining characteristics of a new object.  
 CLSNAM = Specifies the descriptive name of a new object feature object class.  
 INFORM = Describes the feature for ECDIS systems that are not yet S-57 Edition  
 3.1.1 compatible.  
 SYMINS = "LC(FERYRT01)"
- new NEWOBJ (A) objects (surrounding the above NEWOBJ objects at 32-32.700S 60-56.083E and 32-32.700S 60-56.250E)  
 CLSDEF = Specifies the defining characteristics of a new object.  
 CLSNAM = Specifies the descriptive name of a new object feature object class.  
 INFORM = Describes the feature for ECDIS systems that are not yet S-57 Edition  
 3.1.1 compatible.  
 SYMINS = "AC(RESBL,2);LS(DASH,2,CHBLK)"
- new NEWOBJ (P) objects (location 32-32.700S 60-56.683E and 32-32.700 S 60-56.833E)  
 CLSDEF = Specifies the defining characteristics of a new object.  
 CLSNAM = Specifies the descriptive name of a new object feature object class.  
 INFORM = Describes the feature for ECDIS systems that are not yet S-57 Edition  
 3.1.1 compatible.
- new NEWOBJ (L) objects (connecting 32-32.700S 60-56.683E and 32-32.700S 60-56.833E)  
 CLSDEF = Specifies the defining characteristics of a new object.  
 CLSNAM = Specifies the descriptive name of a new object feature object class.  
 INFORM = Describes the feature for ECDIS systems that are not yet S-57 Edition  
 3.1.1 compatible.
- new NEWOBJ (A) objects (surrounding the above NEWOBJ objects at 32-32.700S 60-56.683E and 32-32.700S 60-56.833E)  
 CLSDEF = Specifies the defining characteristics of a new object.  
 CLSNAM = Specifies the descriptive name of a new object feature object class.  
 INFORM = Describes the feature for ECDIS systems that are not yet S-57 Edition  
 3.1.1 compatible.

This directory also contains two incorrect updates as follows:  
 - update .001 changes SYMINS from "SY(CHINFO06)" to "SY(CGUSTA02)" for NEWOBJ at 32-32.700S 60-56.083E - this new SYMINS has a valid syntax but it is

unlikely to be approved by CSMWG/TSMAD as it includes a symbol for a CG station unlikely to be used for anything else.

- update .002 changes SYMINS from "SY(CHINFO06)" to "SY(BNNSTK02);TE('bn %s','OBJMAM',2,1,2,'15110',-1,-1;CHBLK,21)" for NEWOBJ at 32-32.700S 60-56.250E - this new SYMINS has an invalid syntax which should be detected upon loading.

**Important Note:**

The above description of updates .001 and .002 outlines the end result of applying them to the base cell. The actual implementation consists of deleting and, subsequently, adding likewise object(s) with the new values of SYMINS attributes. For that reason the update messages/logs will indicate additions, deletions and geometry changes accordingly.

The first update can be used as a test for valid S-52 syntax, but not approved by CSMWG/TSMAD SYMINS attribute string. The second update can be used as a test for an invalid S-52 syntax of SYMINS attribute string.

Additionally this edition of GB5X01SW had SCAMIN attributes populated based on IC-ENC SCAMIN Proposal as well as all existing DEPARE (L) objects removed.

## 6.8.6 Scale and navigation purpose

### 6.8.6a

Load files from:

***6.4.1 Power Up\ENC\_ROOT***

From IEC 61174 Section 6.8.6a:

*a) Display information at a larger scale than that in the ENC (overscale) by zooming in, and ensure that an indication is provided.*

The harbour usage band cells (GB5\*\*\*\*\*.000) have a compilation scale of 1:25,000 and the approach usage cell (GB4x0000.000) has a compilation scale of 1:52,000. Once the display has been zoomed in beyond the compilation scale of the harbour charts, the overscale indication should appear.

6.8.6b

Load files:

**6.4.1 Power Up\ENC\_ROOT\gb4x0000.000;** and,

**6.4.1 Power Up\ENC\_ROOT\gb5x01nw.000**

It is suggested that an initial ship position of 32 29.668S, 060 55.864E with a heading of 234.0 degrees. This will place ship at the jetty in Micklefirth.

From IEC 61174 Section 6.8.6b:

*b) Select the less detailed navigation purpose cell which includes own ship's position, covered by the more detailed navigational purpose cell in the ENC and ensure that an indication is provided.*

In this case, the ECDIS should provide an indication that a chart of better (larger) scale is available.

#### 6.8.6c

Load file:

**6.4.1 Power Up\ENC\_ROOT\gb4x0000.000**

See also:

**6.4.1 Power Up\ENC\_ROOT\readme.txt**

From IEC 61174 Section 6.8.6c:

*c) Select an area where different compilation scales appear on the display. Verify that a boundary line between different scales is indicated. Check if areas which are overscaled are identified as specified in S-52, appendix 2.*

The approach cell has a compilation scale (CSCL) of 52000. The approach cell also has an area at a different compilation scale (M\_CSCL). This area is at a scale of 45000 and lies to the north west of the cell. The area on the sea is bounded by the north border and a line between:

32 19.77S, 61 01.20E and

32 21.58S, 60 56.13E.

The area continues over the land as a thin strip. The larger scale area is that part of the cell covered by Furania rather than Jussland. Check the area to ensure that the specified indication is provided by the ECDIS.

6.8.6d

Load files from:

***6.4.1 Power Up\ENC\_ROOT***

From IEC 61174 Section 6.8.6c:

*d) Verify that if the display cannot be completely covered with data for the detailed navigational purpose, the remaining part of the display will be covered by the data for the more general navigational purpose.*

The approach chart has a geographical coverage that encompasses and is larger than the coverage of the harbour charts. The eastern limit of the harbour chart is at 60 59.836E. This boundary should be visible if the display is centred at:

32 30.000S 60 59.836E

6.8.6e-f

Load one or more ENC files from:

**6.4.1 Power Up\ENC\_ROOT**

From IEC 61174 Section 6.8.6e-f:

- e) A graphical index of the scale boundaries shall be shown on demand.*
- f) Verify the ability to use intermediate display scales changeable by appropriate steps for example by increments of chart scale values and by increments of displayed range values in nautical miles.*

The above tests relate to the functionality of the ECDIS, and do not directly involve the data contained in the TDS.

#### 6.8.6g

Load files from:

##### ***6.4.1 Power Up\ENC\_ROOT***

From IEC 61174 Section 6.8.6g:

*g) Verify that the SCAMIN attribute removes clutter when changing to a smaller scale. Compare this with the graphical representation for SCAMIN attribute provided with the IHO test data set.*

The four harbour cells have SCAMIN set to 40000 for the soundings. The approach cell has SCAMIN set to 80000 for all soundings with the exception of two groups:

-within the 10m contour around Bow Reef centred about 32 34.6S, 60 58.5E; and the other,

-within the 10m contour around Pillar Shoal centred about 32 37.0S, 61 00.0E; which have SCAMIN set to 104000.

When the display scale is less than the SCAMIN values, the sounding objects should not be shown on the display. For example, at a display scale of 1:50,000, soundings should not be visible on the harbour cells. Conversely, when the display is set or zoomed to a scale greater than the SCAMIN values, the soundings should be displayed.

Note: Based on S-52, soundings only appear on the “Other” display (not “Display Base” or “Standard”) However, on some ECDIS, there is an optional setting that will turn the display of soundings on or off. In addition, some ECDIS have an optional setting to override the SCAMIN value and its effect. Ensure that all these options are disabled/turned off prior to this test.



6.8.6h-j

Load one or more ENC files from:

**6.4.1 Power Up\ENC\_ROOT**

From IEC 61174 Section 6.8.6h-j:

- h) Verify that a scale bar is provided as part of the display base at a scale of 1:80 000 or larger.*
- i) Verify that a latitude bar is provided as part of the display base at a scale smaller than 1:80 000.*
- j) Set a display scale larger than 1:80 000 (for example 1:25 000) or the equivalent radar range scale and check that the 1 mile scale bar is displayed between 2 mm and 4 mm from the left side of the chart display area. Set a display scale smaller than 1:80 000 or the equivalent radar range scale and check that the latitude scale is displayed between 2 mm and 4 mm from the left side of the chart display area.*

The above tests relate to the functionality of the ECDIS, and do not directly involve the data contained in the TDS.

## 6.8.6z IC-ENC SCAMIN

\*\*\*NOTE: This section is not related to the IEC 61174 document.\*\*\*

The presentation of an ENC encoded with the proposed IC-ENC SCAMIN method in this document is for informative purposes only. These changes do not impact the IEC 61174 test procedures or test results.

Load files from:

***6.8.6z IC-ENC SCAMIN\ENC\_ROOT***

For further information on this SCAMIN coding method, visit [www.iho.shom.fr](http://www.iho.shom.fr)

## 6.8.7 Mode and orientation

### 6.8.7a-c

Load one or more ENC files from:

**6.4.1 Power Up\ENC\_ROOT**

From IEC 61174 Section 6.8.7a-c:

- a) Check that the north arrow symbol is always displayed at the top left corner of the chart area, not overlapping the scale or latitude bar. If the EUT offers the capability to show other than north-up presentation, check that the symbol realigns to north.*
- b) Ensure that true motion is provided. Reset the display and check that the generation of the neighbouring area takes place automatically at a distance selected by the mariner.*
- c) Check that it is possible to change manually the chart area and the position of own ship relative to the edge of the display.*

The above tests relate to the functionality of the ECDIS, and do not directly involve the data contained in the TDS.

6.8.7d

Load file:

**6.4.1 Power Up\ENC\_ROOT\gb4x0000.000**

From IEC 61174 Section 6.8.7d:

*d) Where a ship centred display mode is provided, select a display scale such that the display shows only a portion of the chart which lies entirely within an area which is symbolized with a centred symbol (for example traffic lane). Check that over-writing between the ship symbol and the centred symbol does not occur or, the own ship symbol allows adequate visibility for the covered "centred" symbol.*

The traffic separation scheme on this chart may be used for testing. A position of 32 35.300S 61 06.232E will place the ship symbol within this scheme.

6.8.7e

Load file:

**6.4.1 Power Up\ENC\_ROOT\gb4x0000.000**

From IEC 61174 Section 6.8.7e:

*e) Position own ship in an area for which no ENC is available. Confirm by observation that a “No ENC available” indication is provided that includes guidance to refer to a paper chart or RCDS mode of operation.*

The is an area around the outside of the approach chart where there is no ENC data coverage (M\_COVR CATCOV=2 (no coverage available). Using the coordinates 32 24.53S 061 19.29E will place the ship symbol in this area.

Further east, e.g. 32 27.88S 061 20.66E will place the ship in an area where there is no ENCs. It is at this location that a “No ENC available” indication should be provided.

6.8.7f

Load one or more ENC files from:

***6.4.1 Power Up\ENC\_ROOT***

From IEC 61174 Section 6.8.7f:

*f) For each bearing-stabilised orientation other than 'north-up' that may be provided, confirm by analytical evaluation that for turning rates between 0 deg/s and 20 deg/s the displayed chart symbols and text do not re-orient more often than 2 times per second and remain legible.*

The above tests relate to the functionality of the ECDIS, and do not directly involve the data contained in the TDS.

## 6.8.8 Safety contour

### 6.8.8a

Load file:

***6.4.1 Power Up\ENC\_ROOT\gb4x0000.000***

From IEC 61174 Section 6.8.8a:

*a) Switch on. Do not select a safety contour. Check that the equipment defaults to a 30 m safety contour depth.*

Once the file is loaded, power-off, then power-on the EUT. Examine the chart gb4x0000.000: It contains a 30m contour and this contour should be presented as the safety contour (i.e. thick gray line as per S-52).

This is a test of the functionality of the ECDIS and is not directly related to the TDS content.

#### 6.8.8b

Load the ENC files from:

***6.4.1 Power Up\ENC\_ROOT***

From IEC 61174 Section 6.8.8b:

*b) Select a depth contour value not contained in the SENC but which falls between two existing depth contours. Verify that the EUT selects the next deeper contour in the SENC and clearly indicates the selected contour.*

Select a safety contour value of 15m. None of the ENCs (with the exception of gb5x01se.000) have a 15m contour. In these cases, the 20m contours should be highlighted as the safety contour.

Other values should also be investigated. The harbour charts (i.e. gb5\*\*\*\*\*.000) contain 0, 2, 5, 10, 20m contours, and the contour intervals on the approach chart (i.e. gb4x0000.000) are 0, 2, 5, 10, 20, 30, 50, 100, 200, 300, and 400m.



### 6.8.8c

Load the ENC files from:

**6.4.1 Power Up\ENC\_ROOT**

See also:

**6.8.8c Safety Contour \S57ed3\_1\_1 S52ed3\_4 PLOT 2.pdf**

**6.8.8c Safety Contour \S57ed3\_1\_1 S52ed3\_4 PLOT 4.pdf**

From IEC 61174 Section 6.8.8c:

*c) Compare safety contour display with appropriate graphical representation provided with the IHO test data set. Verify that safety contour is emphasized. Ensure that isolated dangers within the ship's safety contour are indicated.*

Set the ECDIS safety contour to 5m and visually compare the display to **S57ed3\_1\_1 S52ed3\_4 PLOT 2.pdf** which contains screen captures from a selection of the ENCs with the safety contour set to 5m. Similarly, set the safety contour value to 10m and compare to **S57ed3\_1\_1 S52ed3\_4 PLOT 4.pdf**. The screen captures in this file are of gb4x0000.000 and the safety contour is 10m

### 6.8.9 Safety depth

Load the ENC files from:

**6.4.1 Power Up\ENC\_ROOT**

See also:

**6.8.9 Safety Depth \S57ed3\_1\_1 S52ed3\_4 PLOT 3.pdf**

**6.8.9 Safety Depth \S57ed3\_1\_1 S52ed3\_4 PLOT 4.pdf**

From IEC 61174 Section 6.8.9:

*For the display of spot soundings, set initial safety depth to 10 m. Compare safety depth display with appropriate graphical representation provided with the IHO test data set. Verify that spot soundings less than the safety depth are emphasized. Repeat test for 7 m and for 12 m. These depths are chosen because they are not depth contours.*

Currently, the IHO plots only contain examples of safety depths set to 4m (e.g. **S57ed3\_1\_1 S52ed3\_4 PLOT 3.pdf**) and 7m (e.g. **S57ed3\_1\_1 S52ed3\_4 PLOT 4.pdf**). However, the functionality, that is, the emphasis on spot soundings less than the specified safety depth, must be similar, regardless of the safety depth selected.

## 6.8.10 Object information

### 6.8.10a

Load the ENC files from:

***6.4.1 Power Up\ENC\_ROOT***

From IEC 61174 Section 6.8.10a:

*a) Verify compliance in accordance with IMO resolution MSC.191(79). (See [61174] 6.1 and Annex K).*

The above tests relate to the functionality of the ECDIS, and do not directly involve the data contained in the TDS.

6.8.10b

Load the ENC files from:

**6.4.1 Power Up\ENC\_ROOT**

From IEC 61174 Section 6.8.10b:

*b) Select by cursor several locations with examples of the following area, line and point objects. (See Table 1.) Check that the information contained in the ENC may be displayed on demand for objects within the general footprint of the cursor, including attributes of symbols as well as “no-symbol” information; such as territorial waters and compilation scale.*

*Table 1 – Area, line and point objects*

<i>Area</i>	<i>Line</i>	<i>Point</i>
<i>Depth</i>	<i>Depth contour</i>	<i>Buoy</i>
<i>Restricted</i>	<i>Ferry route</i>	<i>Light</i>
<i>Sea</i>	<i>Recommended track</i>	<i>Wreck</i>

Using the loaded ENCs, the any of these features can be queried.

6.8.10c

Load the ENC files from:

**6.4.1 Power Up\ENC\_ROOT**

From IEC 61174 Section 6.8.10c:

*c) Check that text associated with chart objects is displayed only when selected and may be removed from the display. Confirm the displayed text uses common language terms, not hydrographic abbreviations*

The above tests relate to the functionality of the ECDIS, and do not directly involve the data contained in the TDS. However, for an example of the “common language” versus hydrographic abbreviations, select the buoy and light at 32 29.50S 061 00.46E. The text displayed upon query may contain the abbreviation (BOYSAW) of the object class, but must say, “Buoy, safe water”. Similarly, attributes and their values must be displayed in common language terms, e.g. “pillar” must be displayed for buoy shape (BOYSHP=4).

6.8.10d

Load file:

**6.4.1 Power Up\ENC\_ROOT\gb4x0000.000**

From IEC 61174 Section 6.8.10d:

*d) Select an example of a note encoded using TXTDSC (text description). Check that the note is displayed within the light level of the current display and that it can be easily read, for example by displaying the note as it might appear on a paper chart.*

Select for query the caution area at approximately, 32 34.74S 061 08.92E. The attribute “Text Description” (TXTDSC) should have a value of GBIECTMP.TXT, which should link, to the actual file. The link should be “live” and display the contents of the GBIECTMP.TXT file when clicked upon.

The GBIECTMP.TXT file itself is located in same directory as the ENC file. That is:

**6.4.1 Power Up\ENC\_ROOT\**

The displaying of the note within the light levels of the current display, is a functionality of the ECDIS and is not related to the TDS.

6.8.10e

Load file:

**6.4.1 Power Up\ENC\_ROOT\gb4x0000.000**

From IEC 61174 Section 6.8.10e:

*e) Select an example of PICREP (picture representation). Check that it can be displayed in a manner that does not affect the user's night vision.*

Query the landmark (LDNMRK) object at 32 31.95S 60 54.34E. It is attributed with PICREP and a value of GBTESTPC.TIF. In addition a query in the area of 32 30.25S 60-54.64E should find an M\_NPUB object with a PICREP attribute value of GBX4000T.TIF. The GBTESTPC.TIF and GBX4000T.TIF files are located in same directory as the ENC file. That is:

**6.4.1 Power Up\ENC\_ROOT**

The displaying of the picture is a functionality of the ECDIS and is not related to the TDS.

6.8.10f

Load file:

**6.4.1 Power Up\ENC\_ROOT\gb5x01sw.000**

From IEC 61174 Section 6.8.10f:

*f) Select an example of TSPAD (tidal stream panel information) and TS\_PRH (tidal stream prediction by harmonic methods). Check that in both cases the data is displayed within the light level of the current display (Table 1) and that the data can be easily read and is logically presented, for example by displaying the data as it might appear on a paper chart.*

An example of a TS\_PAD object can be found at 32 31.45S 60 56.35E and an example of a TS\_PRH object can be found at 32 32.57S 060 57.69E.

The display of the data within the indicated light levels is a functionality of the ECDIS and is not related to the TDS.



### 6.8.10g-i

Load file:

**6.4.1 Power Up\ENC\_ROOT\gb5x01sw.000**

followed by the update files:

**6.8.10g-i Object Information\ENC\_ROOT\gb5x01sw.001**

**6.8.10g-i Object Information\ENC\_ROOT\gb5x01sw.002**

From IEC 61174 Section 6.8.10g-i:

*g) Select an example of an update or ENC object that comes into effect or becomes void at a future date using one of the attributes DATSTA / DATEND (date start / date end).*

*Check that:*

*– the user is able to obtain information about the date of implementation and contents of the update;*

*– the update is displayed during the time of the validity;*

*– the update is processed during route planning if it comes into effect during the dates specified for the voyage;*

*– the update is processed for route monitoring during the time of validity.*

*h) Select an example ENC object that repeatedly comes into effect during a date-interval period specified using the attributes PERSTA/PEREND (date start / date end). Check that:*

*– the user is able to obtain information about the object and date of implementation;*

*– the object is normally displayed only during its time of the validity;*

*– the object is processed during route planning if it comes into effect during the dates specified for the voyage;*

*– the object is processed for route monitoring during the time of validity.*

*i) Enable display of an example date-dependant ENC object outside its time of validity.*

*Check that:*

*– The example ENC object is correctly displayed;*

*– a persistent indication shall be provided to inform the mariner that the information displayed may be incorrect for the present date and time.*

Update 2 (gb5x01sw.002) inserts a prohibited area with a DATSTA of 20050220. The testing of the application of this object requires an adjustment of the system clock. The manufacturer must provide instructions for this operation.

Currently there are no examples of PERSTA/PEREND in the TDS.

#### 6.8.11 Navigation Related Functions

Load file:

***6.4.1 Power Up\ENC\_ROOT\gb4x0000.000***

Refer also to:

***6.8.11 Navigation and Related Functions\GEODESIC.TXT***

***6.8.11 Navigation and Related Functions\rHUMB.TXT***

From IEC 61174 Section 6.8.11:

*Verify that at least one EBL and VRM is available.*

*Verify compliance in accordance with IMO resolution MSC.191(79). (See [IEC 61174] 6.1 and Annex K)*

EBLs and VRMs can be checked for accuracy using the information in GEODESIC.TXT and RHUMB.TXT.

This section is a test of the functionality of the ECDIS and is not related to the TDS.

## 6.8.12 Position Integration

Load file:

**6.4.1 Power Up\ENC\_ROOT\gb4x0000.000**

From IEC 61174 Section 6.8.12:

- a) Remove the simulated position input and connect a continuous positioning system to the EUT and verify that the correct position is displayed.*
- b) With a second, independent positioning method ensure that the EUT displays any difference in reported positions.*
- c) Remove the positioning input to the EUT and ensure that an alarm is given.*
- d) Simulate a message from the positioning device that indicates an error condition, and observe that the alarm or indication is repeated by the EUT as an indication.*
- e) Select a different geodetic datum between the positioning system and the SENC, and ensure that an alarm is given.*
- f) Adjust the position manually. Observe that the amount of the correction is displayed on the screen and that the position changes accordingly. Recheck periodically to see that it remains unchanged.*
- g) Verify that the manufacturer's documentation includes guidance for implementing a common reference system (offsets).*

This section is a test of the functionality of the ECDIS and is not related to the TDS.

### 6.8.13 Radar and Plotting Information

Load file:

**6.4.1 Power Up\ENC\_ROOT\gb4x0000.000**

From IEC 61174 Section 6.8.13:

*Where the capability for displaying radar, radar tracks or AIS is provided, verify compliance in accordance with IMO resolution MSC.191(79). (See 6.1 and Annex K):*

*a) observe the display without radar overlay, switch on the radar overlay, the radar tracks and the AIS, as available, and ensure that the SENC information is not degraded, and is clearly distinguished;*

*b) observe the display without radar, then switch on the radar overlay, the radar tracks and the AIS, as available, and ensure that these match in scale, orientation, projection and accuracy, within the ranges defined in IEC 62388. Check that a change of scale of the radar, if it is a separate unit, does not affect the EUT/radar image in scale, orientation, projection and accuracy;*

*c) ensure that the displayed position of the ship may be adjusted manually;*

*d) note that the accumulated offset is clearly indicated;*

*e) ensure that the radar image, tracked target information, AIS information and other added navigational information may be removed by single operator action;*

*f) set EUT to accept and display transferred plotting targets and AIS information. Set the simulator to the equivalent of stabilized, north-up mode and to 12-mile range. Check that the target and AIS information is being accepted and displayed correctly;*

*g) vary the radar antenna offset and confirm that the position of radar overlay, radar tracks, AIS, as available, on the EUT changes accordingly.*

*For this test a radar target in a fixed position shall be simulated.*

This section is a test of the functionality of the ECDIS and is not related to the TDS.

## 6.8.14 Loading of Corrupted Data

### 6.8.14a

Load file:

***6.8.14a Loading Corrupt Data\ENC\_ROOT\gb5x01ne.000***

From IEC 61174 Section 6.8.14a:

*a) Load an example of corrupted ENC test data. Verify that EUT provides the appropriate warning.*

The data in the ENC is correct, but the CRC value stored in the CATALOG.031 file is inconsistent with the data. The EUT must generate a warning when loading this file is attempted.

6.8.14b-c

Load file:

**6.4.1 Power Up\ENC\_ROOT\gb5x01sw.000**

followed by the updates from:

**6.8.14b-c Loading of Corrupted Data\ENC\_ROOT\**

From IEC 61174 Section 6.8.14b-c:

- b) Load the IHO ENC test data set. Enter an example of a corrupted update. Verify that the reception procedure is terminated and the update record is flagged as invalid.*
- c) Verify that the user is informed of the corruption.*

Attempt to load the updates that are present in the same directory. The data in the second update, that is gb5x01sw.002, is correct, however, the CRC value is not consistent with the CRC value in the CATALOG.031.

The update process should stop, the update flagged as invalid, and the user provided with an appropriate message.

## 6.8.15 Automatic Updates

### 6.6.15.1 Receipt – Installation and Application of Updates

#### 6.8.15.1a

Copy the update files from the directory below to each type of removeable storage media provided this the ECDIS:

#### ***6.8.15.1a Receipt-Installation and Application of Updates\ENC\_ROOT\***

From IEC 61174 Section 6.8.15.1a:

*a) Verify that the system can receive updates via CDROM and from each type of removeable storage media or interface that is provided with the ECDIS for the purpose of receiving or updating ENC's.*

Copy these files to the appropriate directory for the application of the updates.

This section is a test of the functionality of the ECDIS and is not related to the TDS.

6.8.15.1b-c

Load the file from:

**6.4.1 Power Up\ENC\_ROOT\gb5x01sw.000**

followed by the update:

**6.8.15.1b-c Receipt-Installation and Application of Updates\ENC\_ROOT\gb5x01sw.001**

From IEC 61174 Section 6.8.15.1b-c:

*b) Apply the test update number 1 to the IHO ENC test data set.*

*c) Identify the issuing authority of the update. Check that this conforms to the corresponding identifier of the ENC.*

Apply update number 1, that is, gb5x01sw.001 . This valid update has been issued by the UKHO (producer agency code GB 540). The ECDIS should provide a means to display this information, on command.



6.8.15.1d

Load the file from:

**6.4.1 Power Up\ENC\_ROOT\gb5x01sw.000**

followed by the updates:

**6.8.15.1d Receipt-Installation and Application of Updates\ENC\_ROOT\gb5x01sw.001**

**6.8.15.1d Receipt-Installation and Application of Updates\ENC\_ROOT\gb5x01sw.002**

**6.8.15.1d Receipt-Installation and Application of Updates\ENC\_ROOT\gb5x01sw.003**

**6.8.15.1d Receipt-Installation and Application of Updates\ENC\_ROOT\gb5x01sw.004**

From IEC 61174 Section 6.8.15.1d:

*d) Attempt to load an improperly sequenced update; check that the update is rejected and that a warning is given to the user.*

The sequence of these updates has been artificially altered: updates 3 and 4 have been reversed. The updates should apply successfully until update 4 (which will attempt to modify an object that has already been deleted). The system should provide a message that this update has not been applied successfully.

6.8.15.1e

Load the files from:

**6.4.1 Power Up\ENC\_ROOT\gb5x01sw.000**

followed by the update:

**6.8.15.1e Receipt-Installation and Application of Updates\ENC\_ROOT\gb5x01sw.001**

From IEC 61174 Section 6.8.15.1e:

*e) Attempt to load an update related to a newer edition of ENC; check that the update is rejected and the user is informed that a newer edition is available.*

The base file, gb5x01sw.000 is Edition 1 of the ENC and the update that is being applied was generated from Edition 2 of the file. The update should not be applied successfully and the system should provide an indication (either on screen or in an error log) the reason the update was not applied, e.g. “Incorrect Edition Number 2 [of update]: expecting 1”.

6.8.15.1f

Load the files from:

**6.8.15.1f Receipt-Installation and Application of Updates \ENC\_ROOT\gb5x01sw.000**

followed by the update:

**6.8.15.1f Receipt-Installation and Application of Updates\ENC\_ROOT\gb5x01sw.001**

From IEC 61174 Section 6.8.15.1f:

*f) Attempt to load an update related to an older edition of ENC; check that the update is rejected and the user is informed that the update belongs to a previous edition.*

In this case the base file, gb5x01sw.000 is Edition 2 and the update that is trying to be applied was generated for Edition 1 of the chart. The update should not be applied successfully and the system should provide an indication (either on screen or in an error log) the reason the update was not applied, e.g., “Incorrect Edition Number 1 [of update]: expecting 2”

6.8.15.1g

Load file:

***6.4.1 Power Up\ENC\_ROOT\gb4x0000.000***

followed by:

***6.8.15.1g Receipt-Installation and Application of Updates\ENC\_ROOT\gbx4000.001***

From IEC 61174 Section 6.8.15.1g:

*g) Load a cell-cancellation update. Check that the cancelled cell is no longer available.*

Once the cell-cancellation update is loaded, the ENC should not be visible or available.

#### 6.8.15.1h

From IEC 61174 Section 6.8.15.1h:

*h) Verify in accordance with Annex L, that the ECDIS accepts encrypted ENC data.*

This test is not applicable to this TDS. A second TDS for data encrypted using the IHO Encryption Scheme will be available from the IHO ([www.iho.shom.fr](http://www.iho.shom.fr)) as part of Special Publication 63 (S-63).

6.8.15.1i-k

From IEC 61174 Section 6.8.15.1i-k:

*i) If the ECDIS supports SENC delivery (accepting a SENC resulting from conversion of ENC to SENC ashore, in accordance with IHO TR 3.11, IHO Miscellaneous Publication M-3), then each SENC distributor to be approved for use with the system under test shall supply a SENC version of the IHO ENC test data set. Each SENC distributor shall provide documentation of approvals from each the Hydrographic Offices that has approved SENC distribution of chart data for their waters, based on the same test data set. For each SENC test data set, verify compliance with 6.8.15(a) thru (g). (See 4.3 (232/A5.1b) and Annex F)*

*j) If the ECDIS supports SENC delivery, for each SENC distributor that is supported by the equipment under test, confirm by inspection of submitted documentation which Hydrographic Offices have certified approval to distribute. (See 4.3 (232/A5.1 b))*

*k) If the ECDIS supports SENC delivery, confirm by analytical evaluation that the ECDIS provides an update mechanism for delivered SENC's that is not inferior to the update mechanism of ENC's. (See 4.3 (232/A5.1 b))*

This test is not applicable to this TDS. If the EUT supports SENC delivery, the manufacturer must provide an SENC test data set.

6.8.15.2 Display – Show and Verify

6.8.15.2a

Load the file from:

**6.4.1 Power Up\ENC\_ROOT\gb5x01sw.000**

followed by the updates:

**6.8.15.2a Display – Show and Verify\ENC\_ROOT\gb5x01sw.001**

**6.8.15.2a Display – Show and Verify \ENC\_ROOT\gb5x01sw.002**

**6.8.15.2a Display – Show and Verify \ENC\_ROOT\gb5x01sw.003**

**6.8.15.2a Display – Show and Verify \ENC\_ROOT\gb5x01sw.004**

**6.8.15.2a Display – Show and Verify \ENC\_ROOT\gb5x01sw.005**

From IEC 61174 Section 6.8.15.2a:

*a) Ensure that the edition date/update number is displayed on request.*

At any time, the ECDIS should be able to provide the current edition and update number.

This section is a test of the functionality of the ECDIS and is not related to the TDS.

#### 6.8.15.2b-c

From IEC 61174 Section 6.8.15.2b-c:

*b) Ensure that the contents of the updates have been included in the SENC, by displaying the SENC contents and highlighting updates.*

*c) Ensure that updates not relating to an ENC cell within the SENC are discarded.*

Tests b and c are not applicable to this TDS. If the EUT supports SENC delivery, the manufacturer must provide an SENC test data set, including updates.



6.8.15.2d-e

Load the file from:

**6.4.1 Power Up\ENC\_ROOT\gb5x01sw.000**

followed by the update:

**6.8.15.2d-e Display – Show and Verify\ENC\_ROOT\gb5x01sw.001**

From IEC 61174 Section 6.8.15.2d:

*d) Ensure that official ENC updates can be distinguished from local updates.*

*e) Verify that, once accepted, integrated updates are indistinguishable from ENC data.*

Before the update is accepted, observe and note how this official update is displayed. Once it has been accepted, it should not appear different from the rest of the display.

For test d), manually create a chart update, similar to the official update. For example:

Insert a dangerous wreck near: 32 31.5S, 60 57.3E marked by East and West Cardinal buoys near: 32 31.5S, 60 57.46E and 32 31.5S, 60 57.16E, respectively.

Visually compare the display of these updates to the display of the official updates noted earlier. There should be an obvious difference and these updates should remain differentiated from the ENC data.

### 6.8.15.3 Records and Logs

Load the file from:

**6.4.1 Power Up\ENC\_ROOT\gb5x01sw.000**

followed by the updates:

**6.8.15.3 Records and Logs\ENC\_ROOT\gb5x01sw.001**

**6.8.15.3 Records and Logs \ENC\_ROOT\gb5x01sw.002**

**6.8.15.3 Records and Logs \ENC\_ROOT\gb5x01sw.003**

**6.8.15.3 Records and Logs \ENC\_ROOT\gb5x01sw.004**

**6.8.15.3 Records and Logs \ENC\_ROOT\gb5x01sw.005**

From IEC 61174 Section 6.8.15.3:

*Tests shall be applied in all EUT operating modes, i.e. route planning and route monitoring.*

*a) List on the display, and observe the contents of the record of updates, including the time of application to the SENC.*

*b) Verify that the log file contains the following information:*

*.1 date and time of application/rejection;*

*.2 complete and unique identification of update described in the S-57 product specification;*

*.3 any anomalies encountered during application;*

*.4 type of application: manual/automatic.*

*c) Verify that the summary report for the update set provides the following information:*

*.1 identification of issuing authority;*

*.2 update numbers of the update files;*

*.3 cell identifiers of cells affected;*

*.4 edition number and date of ENC cells involved;*

*.5 number of updates in the affected cells.*

The table below indicates the basic update information, if they the updates have been successfully applied:

Update	Edition # (EDTN)	Update # (UPDN)	Issue Date (ISDT)
gb5x01sw.001	1	1	20010509
gb5x01sw.002	1	2	20050101
gb5x01sw.003	1	3	20050908
gb5x01sw.004	1	4	20050922
gb5x01sw.005	1	5	20051006

The ability to display the information listed in 6.8.15.3a-c is a function of the ECDIS and is independent of the data loaded in the system.

## 6.8.16 Manual Updates

Load the file:

**6.4.1 Power Up\ENC\_ROOT\gb5x01sw.000**

From IEC 61174 Section 6.8.16:

- a) *Add a new point and restricted area features from the presentation library, locating them at selected positions.*
- b) *Delete an existing feature.*
- c) *Check to see that any update text information relevant to the new condition and to the source of the update entered by the mariner is recorded by the system. Verify that this update can be re-displayed on demand.*
- d) *Verify that EUT is capable of sensing indications and alarms related to the SENC data from manual updates.*
- e) *Verify that manual updates are distinguishable as described in S-52, appendix 2 /2.3.4.*
- f) *Verify that any manual updates removed from the display during the last 3 month period are retained and can be reviewed.*

Using the editing tools available with the EUT, make the following changes and include a short textual description of the action to test 6.8.16a-c:

- insert a dangerous wreck near: 32 31.5S, 60 57.3E marked by East and West Cardinal buoys near: 32 31.5S, 60 57.46E and 32 31.5S, 60 57.16E respectively;
- insert a prohibited entry area between Panther and Tinker Shoals timed to come into force at 20050220. A cautionary area in the same location is in force from date of issue to 20050220;
- extend western limits of the prohibited entry area and delete cautionary area; and,
- insert 15 metre sounding at 32 31.7S, 60 57.4E.

To test d), plot a course through the newly added prohibited area after the “come into force” date. The system should provide an indication and alarm that the vessel should not pass through this area. Similarly, if the extension of the prohibited area covers an existing route, an indication must be given.

The manual updates should remain identifiable as non-official updates (See (e) above).

Extended testing and/or manipulation of the system clock are required to test 61174 6.8.16f. It is the responsibility of the manufacturer to provide instructions for this process.

### 6.8.17 Self Tests of Major Functions

From IEC 61174 Section 6.8.17:

- a) Perform tests of the major functions which are supported by the EUT. Verify that the EUT provides appropriate display information and indications.*
- b) Simulate the following sensor malfunctions (including for radar if provided for):*
  - .1 interruption of sensor input (loss of signal);*
  - .2 invalid sensor information (status);*
  - .3 physical breakdown of sensor connection.*
- c) Verify that the system provides suitable alarms or indication of system malfunction arising from failures in accordance with IEC 60945.*

This section is a test of the functionality of the ECDIS and is not related to the TDS.

## 6.9 Operational Requirements

Load all the files from:

### **6.4.1 Power Up\ENC\_ROOT**

The tests below are of the functionality of the ECDIS and are not directly related to the TDS data.

From IEC 61174 Section 6.9:

#### *6.9.1 Ergonomic principles*

*a) The EUT shall comply with the ergonomic principles noted in 5.9, IEC 60945, and IMO resolution MSC.191(79) including guidelines of application of MSC/Circ.982. (See [61174] Annex K)*

*b) The acoustic alarm level must be capable of the maximum defined in IEC 60945 but may be adjustable below this limit.*

#### *6.9.2 Route planning*

*a) Confirm that means are provided for the user to enter a minimum distance limit for indication of the proximity of a planned route to the boundary of a prohibited area, an area with special conditions (Annex C), or point objects.*

*b) For the routes to be planned as described below, the following general guidelines apply:*

*.1 initially plan the route without specifying a safety contour. Ensure that the default value is 30 m or the next deeper contour;*

*.2 at least one leg shall enter an area where the specified safety contour is not available. Ensure that the safety contour defaults to the next deeper contour and an indication is provided to the mariner;*

*.3 at least one leg shall pass closer than the minimum distance limit to a safety contour. Ensure that an indication is provided;*

*.4 at least one leg shall pass closer than the minimum distance limit to the boundary of a prohibited area. Ensure that an indication is provided;*

*.5 at least one leg shall pass closer than the minimum distance limit to the boundary of a geographical area for which special conditions exist. Ensure that an indication is provided;*

*.6 at least one leg shall pass closer than the minimum distance limit to a point object, such as a fixed or floating aid to navigation or isolated danger. Ensure that an indication is provided;*

*.7 at least one leg shall cross the boundary of an area entered by the mariner which should generate an alarm or indication. Ensure that an indication is provided;*

*.8 at least one leg of the route shall be planned through an area of the ENC test data at a different scale;*

*.9 each leg shall be planned with an appropriate off-track limit (for example 100 m);*

*.10 course changes shall be made, both to starboard and port, between different legs of the route and shall vary from 5° up to 175°;*

*.11 the length of the legs shall vary from 0,5 nautical miles to at least 3 nautical miles with a total length of at least 25 nautical miles;*

*.12 planned speed shall vary between 5 knots and 15 knots;*

*.13 the planned route shall cross at least 3 cells of the ENC.*

- c) Observe that the displayed information for route planning, route monitoring and supplementary navigation tasks, such as pilotage or chart work is available.
- d) Plan a route which uses at least 10 waypoints:
  - .1 test that the route can be planned using both straight and curved segments;
  - .2 save the planned route.
- e) Retrieve the planned route and plan an alternative route as follows:
  - .1 add three waypoints using alphanumeric means and graphical means;
  - .2 delete three waypoints using alphanumeric means and graphical means;
  - .3 change position of two waypoints using alphanumeric means and graphical means ;
  - .4 change order of waypoints in the route;
  - .5 save the alternative route.
- f) Plan complex tracks using scenarios 2 and 3 as noted in Annex J and save the tracks. Check that track distances comply with those noted in Annex J and that no distortions are visible.

### 6.9.3 Route monitoring

- a) Confirm by observation that means are provided to enter a look-ahead range in units of time or distance and to enter a distance limit for proximity to dangers. Confirm by analytical evaluation of a test scenario, that an indication of the hazard condition and location are given whenever continuing the present course and speed over the length of the look-ahead range will cause own ship to approach closer than the distance limit to an aid to navigation or to a danger (for example obstruction, wreck, rock) shallower than the mariner's safety contour.
- b) For route monitoring, the following general guidelines apply:
  - .1 initialize the simulator at the starting position for the planned route;
  - .2 select standard display and select the route;
  - .3 the route shall be planned through an area covered by the IHO ENC test data set;
  - .4 carry out route monitoring using the selected routes and starting at the first waypoint of the route;
  - .5 at least one leg shall cross own ship's safety contour;
  - .6 at least one leg shall enter an area where the specified safety contour is not available;
  - .7 at least one leg shall cross an overscale area. Verify that this is indicated;
  - .8 at least one leg shall cross the boundary of an area entered by the mariner which should generate an alarm or indication. Ensure that an alarm or indication is provided.
- c) Operate the own ship position function, and observe that the display shows own ship's position.
- d) Shortly before the vessel enters an area for which an alarm will be released (safety contour and prohibited areas) perform the following actions:
  - .1 display a sea area ahead of ship's position and outside present display (look ahead);
  - .2 verify that the appropriate alarms/indications are provided;
  - .3 return to own ship's position by a single operator action and verify that this takes no more than 5 s.
- e) When the vessel enters the area where the specified safety contour is not available, ensure that the safety contour shown defaults to the next deeper contour.
- f) Verify that an alarm is released each time the vessel is going to cross the boundary of a prohibited area or safety contour, within the time specified by the mariner.

g) Select a scale smaller than the largest one available for the area. Simulate crossing over the safety contour. Check that an alarm is generated by EUT using data from the largest available scale.

h) Using the ENC test data set:

.1 simulate own ship's movement from an area of large-scale data into an adjoining area of small scale data. Ensure that each re-draw which occurs until the display is wholly within the small scale area is completed in less than 5 s. (The situation where official chart data is not available is outside the scope of this test);

.2 select the display of an area not currently displayed, at least 10 nautical miles from own ships position and which is covered by ENC data at a scale different from the one in use. Check that the old display is maintained from the start of the regeneration until the start of re-draw of the new display. An indication shall be given if the regeneration time is more than 5 s;

.3 simulate deviation from intended track and verify that the off-track alarm is released;

.4 verify that an alarm is released each time, within the time or distance specified, when a critical point has been reached by or is abeam of the ship;

.5 display the alternative route and ensure that it is clearly distinguishable from the selected route. Change to the alternative route and verify that this becomes the selected route;

.6 modify the selected route by adding a new waypoint;

.7 select an automatic time interval, within a range of 1 min to 120 min: simulate the vessel's movement, and verify that the time labels are displayed. Ensure that time labels may also be entered manually.

i) Reload the complex route of scenario 2 and start monitoring the route with the first waypoint. Confirm that all waypoint changes, bearings and distances are calculated and displayed correctly during route monitoring.

j) Reload the complex route of scenario 3 and start monitoring the route with the first waypoint. Confirm that all waypoint changes, bearings and distances are calculated and displayed correctly during route monitoring.

#### 6.9.4 Twelve-hour log

For recording purposes (see below) the data resolution shall be in accordance with 6.7.2.

a) For voyage recording, a separate test route plan shall be made. The route plan shall be designed as a loop. It shall be possible for the simulator to carry out this test automatically.

b) Continue to run the test for 12 h. During this period, attempts should be made to manually edit the log. This shall not be possible. At the end of the 12-h period, the EUT log shall then be analyzed according to the procedures in the operating manual and the results shall comply with the test carried out.

c) Ensure that the record for the previous 12 h including all the items defined in [61174] 4.10.5.13 and 4.10.6.1 is stored and available on demand. Check that chart data according to 4.10.6.1 and 4.10.6.2 is stored at least initially and for each data change.

#### 6.9.5 Voyage record

a) Verify that the EUT records the track for the entire voyage, with time marks at intervals not exceeding 4 h. Verify that the logging capacity for the voyage has a minimum capacity of three months. (See [61174] 6.9.7)

*b) Ensure that the record, for the previous 12 h, and the voyage track, once recorded, can be preserved.*

#### *6.9.6 Power supply*

*Interrupt the power supply for 45 s, and ensure that the equipment does not need to be re-initialized manually. Operator settings shall be checked that they have not changed.*

#### *6.9.7 LOP Position Fix*

*a) Manually enter bearing data for one LOP and distance data for a second LOP.*

*Confirm by observation that a means or method is provided to manually enter bearing and distance data for lines-of-position (LOP) and that this data is time-stamped when it is entered.*

*b) Confirm by observation that LOP data (range or bearing, time, source) can be presented both alphanumerically and graphically.*

*c) Confirm by analytical evaluation that an estimated position (EP) is provided based on two LOP's selected by the operator is provided.*

*d) Enter data for a third LOP, six minutes later. Confirm by analytical evaluation that a means or method is provided to transfer LOP's observed at different times to a common time defined by an operator, extrapolated forward or backward in time using present heading and speed.*

*e) Confirm by analytical evaluation that a position fix based on three or more LOP's selected by the operator is provided.*

*f) Confirm by observation that, when a position fix is accepted by the operator, the plotted position is indicated graphically on the display. Confirm by observation that position plots indicate the time, source of data used and the type of plot, in the case of estimated position or dead-reckoned position plot (DR or EP). (See [61174] annex E)*

*g) Confirm by inspection of recorded data that the position fix data and the associated LOP data (range or bearing, time, source, and any time transfer applied) were automatically recorded and can be reproduced from the data log. (See [61174] 6.9.4)*

*h) Verify that the graphic symbols for LOP bearing and LOP distance comply with Annex E.*

*i) Confirm by observation that the graphic symbols for position plots comply with [61174] Annex E.*

*j) Confirm by analytical evaluation that a means or method is provided to use the resulting position as a position update during dead reckoning operation.*

*k) Confirm by inspection that the operator's manual supplied with the equipment includes guidance on use of LOP's for calculation of position fixes.*