

14<sup>th</sup> CHRIS Meeting, Shanghai, China, 15-17 August 2002**PRO 13 - COMPILATION SCALES FOR SUPPORT OF ELECTRONIC CHART DATABASES**

Submitted by: United States of America (WORK PROGRAMME 3)

References:

1. IHO Publication M-3, Resolutions of the International Hydrographic Organization, Chapter B – Charts
2. IHO Publication M-4, Chart Specifications of the IHO, Section 200
3. IHO Publication S-57, Appendix B.1 – ENC Product Specification, Annex A

**PROPOSAL****The Conference is requested:**

That the IHO adopt standard compilation scales to support the zoom in and out feature of electronic chart systems and to eventually provide for seamless databases supportive of digital GIS applications. **A new paragraph for IHO Resolutions, Chapter B – Charts is proposed as follows:**

**B1.18 Standard Compilation Scales for Electronic Chart Databases**

1.- To support the capability of electronic chart systems to display data at a range of scales, both over and under scale, and to provide for a transition to seamless levels of data to support digital Geographic Information System applications, it is recommended that Hydrographic Offices compile data to standard scales. Through the use of SCAMIN and possibly SCAMAX\* attribution, compilation can be at a large scale and features may be turned off or on automatically as the user makes the transition through various scales. For features such as the shoreline, a family of generalized shorelines at different scales would be used for display over a band of scales on either side of the compilation scale. The recommended digital compilation scales are as follows:

<u>SCALES</u>	<u>TYPICAL USES</u>
1: 1,000	Berthing, harbor maneuvering and large-scale inland charts.
1: 10,000	Harbor, large-scale approach and inland charts.
1: 100,000	Small-scale approach and coastal charts.
1: 250,000	GEBCO plotting sheets, topo-bathymetric charts and military graphics.
1: 1,000,000	General coverage and International Bathymetric Charts.
1: 10,000,000	GEBCO and small-scale overview charts.

**EXPLANATORY NOTE**

To support paper chart navigation, nations have compiled charts at a wide variety of scales. Digitization of the existing paper chart coverage at multiple scales does not provide the seamless database needed for modern digital cartography. Continuous contours are needed for electronic chart

navigation warning systems and GIS displays, not digitization of paper charts with discontinuous contours. Further, it is impossible for national cartographers to compile digital charts to the almost infinite range of scales that may be displayed by the operator of an electronic chart system or digital Geographic Information System. To respond to the need for seamless databases, commercial firms sometimes recompile national Hydrographic Office data to support users, but these data are not the official data required by some users. Before national Hydrographic Offices individually begin to adopt specific scales, which would not support regional and global seamless databases, IHO should provide guidance in its Resolutions as to recommended compilation scales to support electronic chart databases. In this way, over time a global seamless database can evolve.

As a general “rule of thumb”, a user can function over or under scale by a factor of about 4X after which the data becomes either broken line segments or begins to over-plot and consolidate line graphics into an unacceptable display. In the USA, the largest paper chart insets are currently at 1:2,500 scale, but docking charts are already beginning to be used at 1:500 scale. Thus, 1:1,000 scale has been selected to support the larger-scale products envisioned for the future. In rationalizing the proposed digital compilation scales, the U.S. has avoided the existing concept of specific scales for Harbor, Approach, Coastal and General charts since these are defined differently by many Member States in relation to their paper chart products. For electronic data, the recommended scales were selected with a bias to larger scales such that they will support generalization from the digital chart database into the various scales needed for paper chart production. That is, it is envisioned that a large-scale compilation such as 1:1,000 could be used in support of products to 1:4,000 or 1:5,000, i.e., 4X to 5X, and the 1:10,000 scale might be used to support a 1: 5,000 scale product, i.e., ½X. Using ½X could possibly involve use of SCAMAX, but perhaps only SCAMIN is required.

The recommended scales have been selected in accord with IHO Publication M-4, Section 211, SCALE, which specifies natural scales, i.e., multiples of 1,000 or 2,500, should be used for all charts. The number of scales also have been selected to cover the range of navigational purposes specified in IHO Publication S-57, i.e., Overview, General, Coastal, Approach, Harbor, and Berthing.

It is to be noted that these are recommended scales and Member States may transition to these scales over time as resources allow. A Resolution is needed to provide guidance for international development of seamless digital databases.

\* It is to be noted that the use of SCAMAX is currently prohibited by the ENC Product Specification, S-57, Appendix B.1, Annex A – Use of the Object Catalogue for ENC, paragraph 2.2.7.

### **IHB COMMENTS**

The IHB supports this proposal.

### **MEMBER STATES' COMMENTS**

#### **AUSTRALIA**

Australia opposes this proposal. Furthermore, it is Australia’s view that this proposal is technical in nature and should in any case be considered by the relevant IHO technical committee or working group and if necessary amending action achieved through Circular Letter or following a recommendation to the Conference as part of the relevant IHO Work Programme report.

Australia notes that the development of S-57 Edition 3.0 specifically went away from fixed scale ranges (this was the case with S-57 Version 2.0), to allow maximum flexibility in ENC production, relating various navigational purposes to intended usage (and not to scale ranges). This flexibility allows nations such as Australia to encode ENCs at various compilation scales, even within the one cell, depending on the underlying data available. In turn, this provides the mariner with the most

appropriate data to gain the most benefit from ECDIS; for example, increased contour intervals in depth critical areas such as channels and narrow passages.

In any case the proposal cites scales that are not necessarily in harmony with scale ranges used by most Member States for paper charts and bathymetric products. The proposal cites berthing, harbour manoeuvring and large-scale inland charts at a fixed scale 1:1000. Australia is well aware that some berthing charts will be required at scales of 1:500 or perhaps larger. Current S-57 arrangements allow for this.

A scale of 1:100 000 is nominated for approach and coastal charts. Where would a 1:300 000 series of coastal charts fit with this proposal? A scale of 1:250 000 is nominated for GEBCO charts, yet the IHO specification for GEBCO is a scale of 1:1million. These are obvious issues that must be addressed at a technical level if this proposal is to proceed.

In summary, it is Australia's view that PRO 13 is a retrograde step and in any case must be referred to the relevant IHO technical WG (TSMAD) for consideration prior to any decision being made.

### **BRAZIL**

Brazil agrees with the proposal submitted by USA.

### **CANADA**

Canada agrees with the overall intent of this proposal but feels it would be best handled as a technical issue to be reviewed through the appropriate committee (e.g. CHRIS).

### **CHILE**

Chile supports the proposal.

### **CROATIA**

Croatia supports this proposal.

### **FINLAND**

NOTE: Finland believes that the issues contained in some of the proposals do not need to be decided at the Conference. These are PROs 12, 13, 14 and 15. They would be processed more efficiently by an appropriate Technical Committee or by the IHB by Circular Letter.

Not supported.

The issue (i.e. the use of nominal and compilation scales and the use of SCAMIN and SCAMAX attributes) should be studied in more detail by e.g. the CHRIS Committee.

(See Note above).

### **FRANCE**

Not in favour.

There are several reasons, some of which are explained here below:

- a) The final aim of a nautical chart is safety of navigation. The current charts, whether they be in paper form or electronic, depend essentially on the choice of a scale which is adapted to the

navigational conditions of the charted area. The determination of the information and its density depend on the scale and it is essential to be able to use a large range of scales.

- b) There is no direct link between the necessity to compile charts at standard scales and the necessity to ensure a transition towards seamless data sets. When preparing ENC, the bathymetric contours or area limits are systematically closed to ensure that they define area objects.
- c) The use of the SCAMIN attribute, which triggers or not a display mechanism, cannot replace generalization operations, taking into account the context, which allow a chart to be produced at a given scale. Furthermore, implementing SCAMINs would imply a significant amount of cartographic compilation work (which could be subject to errors).
- d) It is not realistic to adopt a technical resolution which would not be in accordance with internationally adopted standards (IMO, IEC ...) as regards electronic charts.
- e) It is interesting to note that although the GEBCO is an international effort which is widely supported by many hydrographic services, including SHOM, it is not an objective in itself linked to the fundamental responsibilities of hydrographic services.

## **GREECE**

HNHS supports this proposal.

## **INDIA**

The proposal is supported by India.

## **ITALY**

Italy believes that highly technical questions such as these should not be submitted to the floor of general conferences but should rather be addressed by specific WG.

## **JAPAN**

Japan thinks that the concept of this proposal is supportable ideally. But it is impossible practically because a lot of HO's have already developed their ENCs and it costs too much money and time to re-compile ENCs already developed.

Because a large scale chart, especially, needs set of its scale and surveys based on its purpose, it is impossible to set a series of worldwide standard compilation scale.

## **NETHERLANDS**

The proposal is supported in principle. However, the choice of scales should be further studied or discussed within the CSC or other (working-) group, as these are not necessarily the best choice.

Essential question is: which is the maximal acceptable factor for scale reduction or enlargement. In the proposed list the scale-steps are not very consistent (vary between 2.5 and 10), leading to a maximal reduction or enlargement by  $\sqrt{10}$ , (= 3.16).

Tests should confirm that this value is acceptable.

Especially in the larger scale ranges it is guessed that more standard scales would be necessary.

## **NEW ZEALAND**

New Zealand supports the proposal in principle, but notes that it is technically complex to achieve. The concepts touch upon, but do not embrace, the need for seamless databases with integration between data captured at large and small scales. It may also involve automated generalization techniques which have yet to be adopted as routine charting or mapping procedures. The proposal can be advanced through consideration by a technical working group.

## **NORWAY**

Norway is of the opinion that other IHO bodies than the Conference should discuss this proposal (i.e. TSMAD, CSC, Circular Letter).

## **PERU**

Peru supports the proposal as a recommendation.

## **PORTUGAL**

Disagree. It is too specific and would lead to the complete reformulation of the IH-PT ENC folio.

## **SWEDEN**

Sweden does not support the proposal. The aim of the proposal is fully worth a support. However the proposal is reflecting thoughts of a separate database for specially compiled ENC's. Today HOs are struggling to make one single database for producing as well printed charts as ENC's to get rationalized and avoid making errors by maintaining at least two databases, but believes that the scale area 1:100 000 should be 1:50 000 to cover a wider spectrum of national standards. In many coastal areas covered by a lot of islands or archipelagos the most used scales of charts are between 1:50 000 and 1:70 000. Of course different HOs are using different ways in compiling the charts. For Sweden that means that the charts are compiled in double the scale but generalized for the scale at publication. This is the fact also with digital source material to get a better precision in navigational aids and information. With that in mind Sweden proposes the scale band 1:50 000 instead of 1:100 000, if the proposal would be accepted as, with the safety at sea in mind, it is better with a diminished chart scale compared with the original scale than an enlarged. Also Sweden in that case proposes the term coastal charts should be transferred to the scale band 1:250 000. The term "military graphics" should be deleted from the latter scale band as it must be individual for different military organizations.

## **TURKEY**

No not agree.

Turkey is determining the navigational purposes of ENC cells, based on the following range of scales and finalised 56 cells as of September 2001;

- Berthing, bigger than 1:2 000
- Harbour, between 1:2 000 and 1:20 000
- Approach, between 1:20 000 and 1:50 000
- Coastal, between 1:50 000 and 1:150 000
- General, between 1:150 000 and 1.500 000
- Overview, smaller than 1:500 000

In addition to that 2-3 of our charts are digitised according to original scales. Recompile of those charts with new scales will create many technical problems including new surveys which will cause HOs to lose valuable time in their efforts to finish the digitisation of their charts.

**UK**

The theory of this proposal is creditable but UK considers there are practical difficulties associated with its introduction. From the user's perspective there is a need for nations to produce consistent ENC's that can be knitted together into a coherent or seamless world-wide series. However, as the ENC product specification does not define the bands of navigational purpose by specific ranges of scale, different countries with the same compilation scales have chosen to place their data in different usage bands. At the very least a number of HOs would have to re-allocate their ENC's to different usage bands in order to achieve the objectives of this proposal. This would not be a simple process and some cells would end up without usage bands in which to put them.

Additionally, the proposal does not recognise that the majority of nations still compile ENCs from their paper chart series and are thereby tied to the variety of scales that this presents.

It is the opinion of the UKHO that the technical nature of this proposal does not render it appropriate for detailed discussion at an IH Conference. We therefore recommend that it be considered in more detail by the IHO CHRIS before it is progressed any further. Any proposed changes of this nature could then be more appropriately incorporated into M-4 Part B rather than issued as a TR.

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