

## THE HISTORY OF PUBLICATION SYMBOLS AND ABBREVIATIONS USED ON CHARTS

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### SUMMARY

History of nautical cartography can be traced on the basis of recent editions of the publication “Symbols and Abbreviations Used on Charts”. This paper examines editions of that publication covering the area of Eastern coast of the Adriatic Sea, from its first issue in 1929 published on one sheet, until these days. Every new edition includes more and more symbols and abbreviations, and its contents are consistent with worldwide trends in nautical cartography. In this way, nautical charts like no other thematic charts have been standardized all over the world. Such standardization has been achieved as a result of recommendations of the International Hydrographic Organization, to enable easier reading and interpreting of any nautical chart. The paper also refers to the IHO Symbols and Abbreviations for the production of electronic navigational charts and INT charts.

Keywords: Map content, Map design, Visual analytics

### 1. BACKGROUND AND OBJECTIVES

Nautical charts are produced so as to render their usage relatively simple, since their true purpose is manifested in the most serious circumstances of danger to human life and cargo. Nautical charts display less features per area unit, using a smaller number of colours. This is partly due to the fact that on the sea surface there are few features, and the features on land are shown just for orientation. It should be emphasized that in the representation of the seabed topography abundance of soundings burdens the chart content and distracts attention in the decision making.

The features on nautical charts are primarily intended for the safety of navigation. By the end of the last century they acquired another task – to safeguard the marine environment. These tasks were entrusted to the hydrographic service. The features represented on charts are mainly uniform among all chart producers, relying on the recommendations and key of the International Hydrographic Organization (IHO). Each national hydrographic service takes account of the specific characteristics of its area, following the IHO recommendations, which results in the specific manner of representing the features on charts.

In 1859, the Austro-Hungarian navy started the first hydrographic survey in Eastern Adriatic, and a year later, in 1860, established the Hydrographische Anstalt in Trieste, which in 1862 moved from Trieste to Pula (Croatia) changing its name into the Hydrographische Amt (Grakalić, 1962). During a century-and-a-half long hydrographic service in the Adriatic, the Hydrographic Institute published a large number of nautical charts and publications, having developed its specific style in the production of paper charts, adapted to the specific characteristics of an archipelagic area and its long tradition of the chart production, which has been maintained in its electronic editions (Duplančić Leder, 2006). The tradition and specific characteristics of the chart production are manifested in the publication containing symbols and abbreviations used on charts.

This paper aims to present a historical account of the nautical cartography in Eastern Adriatic, through the development of publication “Symbols and Abbreviations Used on Charts”, published by the Hydrographic Institute. The paper also provides a comparison of national progress in the nautical cartography with the selected maritime countries, using the method of expert assessment of the quality and number of symbols and abbreviations shown on charts.

### 2. APPROACH AND METHODS

In the last century and a half, throughout the tumultuous history, the Hydrographic Institute have always followed trends in the world hydrography and nautical cartography. Year after year, the key to nautical charts was enriched with new content and colours. Following that publication since its first editions, which coincide with the foundation of the International Hydrographic Organization in Monaco aiming to unify and standardize the cartographic activity and nautical charts as its products, one can trace the progress of the hydrographic activity.

For this paper, all available national and international editions of the cartographic keys to nautical charts were examined and compared. National keys were subjected to the statistical analysis, and changes to the symbols of some characteristic features on charts were presented.



The key to symbols and abbreviations on charts also served as the basis for the IHO publication “Glossary of Cartographic Terms and Manual of Symbols and Abbreviations Used on the Latest Navigational Charts of the Various Countries - Special Publication No. 22 - Glossaire des termes cartographiques et manuel des signes Conventionnels et abreviations employes sur les plus recentes cartes marines des divers pays - Publication spéciale N.º 22“. Its first edition from 1936, and the second and third editions from 1951 were printed by the International Hydrographic Bureau (IHB) in a 32x41 cm format. This publication was developed by arrangement between the member states encouraged by the need to obtain uniformity of symbols and abbreviations on charts. The content was divided into sections marked by letters from A to V. Each page was divided into 26 columns: 2 columns with the symbol number, the symbol term or abbreviation in official languages of the IHO (English and French), the column with symbols and abbreviations adopted by the IHO resolution, and 22 columns with the symbols of the member states arranged in alphabetical order (Argentina, Brazil, Chile, China, Denmark, Germany, Greece, Spain, France, Great Britain, Italy, Yugoslavia, the Netherlands, Japan, Norway, Poland, Portugal, USSR, Sweden, Thailand, USA, Uruguay). It is evident that at this early stage of chart production, the symbols were rather uniform. Each country has a specific style of representing its maritime area, but the symbols used on charts are so uniform that they can be read by different users (IHB, 1951).

The last from the series of IHO cartographic keys was produced on the initiative of the Chart Standardization and Paper Chart Working Group (CSPCWG). Their objective was to standardize the cartographic representation on charts, through proposals for uniformity of symbols and representation of the content on charts. At the beginning of the nineties of the last century, the IHO CSPCWG tried to place new products on the market, like electronic navigational charts and INT paper charts (chart series 1:250 000 to cover all the navigation areas). New products had to be uniform in appearance. The INT paper chart series was modelled on the series of publications INT 1 - Symbols, Abbreviations and Terms used on Charts (6th Edition; Deutsches Hydrographisches Institut, Hamburg, 2008), INT 2 - Borders, Graduations, Grids and Linear Scales (4th Edition; Dienst der Hydrografie, 2007), and INT 3 - Use of Symbols and Abbreviations (4th Edition; United Kingdom Hydrographic Office – UKHO, 2005), whereas electronic navigational charts were produced according to S-57 Standard, Appendix B.1, Annex D - INT 1 to S-57/52 (IHO, 2000).

### **3. RESULTS**

#### **3.1. Comparison of cartographic keys**

A comparison between early editions of the Yugoslav publication “Symbols and Abbreviations“ and other national publications leads to the conclusion that the HIJRM publication is much richer in content (eg. USA Chart No. 1, 1957). If we compare the last Croatian Hydrographic Institute (HHI) edition with the keys by other hydrographic offices with a long tradition of chart production (US Navy Hydrographic Office, 1996; Statens Kartverk SJØ, 2006; SHOM, 2006; BSH, 2008; NNHO, 2008; UKHO, 2008;), it is evident that the HHI edition contains a slightly smaller number of symbols, but in terms of quality it is as good as any key of other countries. A smaller number of symbols is due to the fact “big hydrographic offices” cover the whole world with their charts (USA, UK), while “smaller hydrographic offices” chart only their territorial waters and the surrounding area. The HHI has been authorised by the IHO for charting the Adriatic Sea and the Ionian Sea. Since some features do not even exist in the Adriatic (ice, mangrove, sand dunes, etc.), there is no need for including them in the key.

#### **3.2. How the national cartographic key changed**

Every new edition of the cartographic key improves on the quality and quantity of the features represented on nautical charts. Every new edition contains more and more features (Figure 2 a), symbols (Figure 2 b), and abbreviations (Figure 2 c). It should be emphasized that the key includes not only the symbols used on currently produced charts, but also the symbols formerly used, and those used by neighbouring countries. More specifically, mariners often use nautical charts published by different hydrographic offices, or dating from different periods.

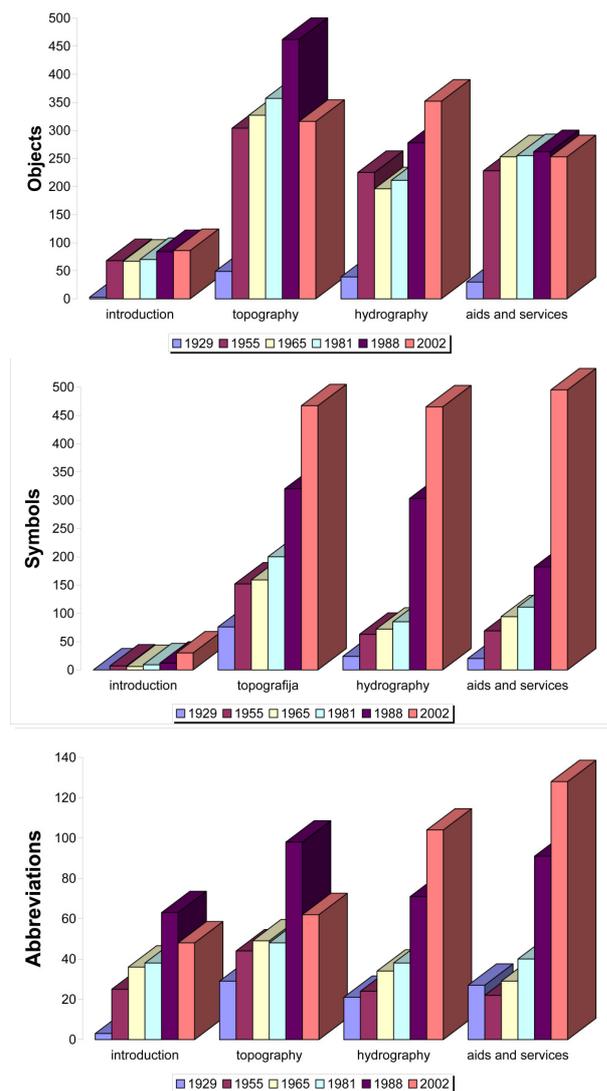


Figure 2. – Feature number (a), symbol number (b) and abbreviation number in all the four chapters of past editions of the cartographic key (c)

In the course of time, some symbols and abbreviations significantly changed, some remained equal or very similar to their earlier version, while some of them completely changed. Consequently, in the first edition of the key (HJRM 1955) full stops were omitted after all abbreviations, because on the sea they could be mistaken for rocks. Besides an increasing number of symbols and abbreviations, every new edition renders more and more colours to represent these symbols. Table 1 shows the selected symbols that usually appear on nautical charts, which have changed considerably through the past six editions of the cartographic key.

Table 1. Illustration of the selected symbols from six editions of the cartographic key, which have changed considerably

SYMBOL	1929	1955	1965	1981	1988	2002
Foreshore						
Church						
Lighthouse						
Depth Contours	2 m ..... 5 m ..... 10 m .....					

Changes to the symbols describing the features on nautical charts followed the technology of chart production. Moreover, with every new edition of the cartographic key, the number of symbols and abbreviations increased, and the symbols were better defined, as a result of the technology of chart production. Recommendations of the IHO followed the technological development of marine navigation, being reflected in the manner of representing particular features on charts, consequently changing the appearance of the cartographic key and of the chart itself.

#### 4. CONCLUSION AND FUTURE PLANS

The Hydrographic Institute of Croatia and its predecessors have published five editions of the key to symbols and abbreviations used on nautical charts. Such publication, as well as classification of charts into series, is an essential prerequisite for the production of nautical charts.

The first edition of the cartographic key was issued in Dubrovnik in January 1929 by the Hydrographic Office of the Serbian, Croatian and Slovenian Navy, on one sheet. The last, fifth edition (bilingual Croatian/English) was published in Split in 2002 by the Hydrographic Institute of the Republic of Croatia, on 96 pages.

It can be concluded that the Hydrographic Institute of Croatia (and its predecessors) best followed the world progress in nautical cartography through its publication “Symbols and Abbreviations used on Charts”.

In the last two decades of the past century, nautical cartography has undergone the greatest change with the appearance of electronic navigational charts and INT charts. The latest products of the hydrographic offices are produced following the IHO cartographic keys, thus being standardized to the maximum extent all over the world.

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#### REFERENCES

- BSH, 2008. Karte 1 Zeichen Abkürzungen Begriffe in amtlich deutschen Seekarten – INT 1 Symbols Abbreviations Terms used on Charts, 6th Edition, Bundesamt für Seeschifffahrt und Hydrographie, Hamburg - Rostock, 104.
- Duplančić Leder, T., 2000. Electronic charts in nautical cartography, Master Thesis, Geodetic Faculty University of Zagreb, 132.
- Duplančić Leder, T. & Lapaine, M., 2006. A Proposal of ENC Cell Distribution of the Croatian Part of the Adriatic, Kartografija i Geoinformacije No. 6, Vol. 5, 56-67.
- Grakalić, M., 1962. Hydrographic Service on our coast, Hidrografski godišnjak 1961, 59–94.
- HHI, 2002. Znaci i kratice na hrvatskim pomorskim kartama (Karta 1) - Symbols and Abbreviations used on charts (INT 1), 5th Edition, Hydrographic Institute of the Republic of Croatia, Split.
- HI JRM, 1955. Symbols and Abbreviations on Nautical Charts Edited by HI JRM, 1st Edition, Hydrographic Institute of Yugoslav Navy, Split.
- HI JRM, 1965. Symbols and Abbreviations on Nautical Charts Edited by HI JRM, 2nd Edition, Hydrographic Institute of Yugoslav Navy, Split.
- HI JRM, 1981. Symbols and Abbreviations on Nautical Charts Edited by HI JRM, 3rd Edition, Hydrographic Institute of Yugoslav Navy, Split.

- HI JRM, 1988. Symbols and Abbreviations on Nautical Charts Edited by HI JRM, 4th Edition, Hydrographic Institute of Yugoslav Navy, Split
- HU MSHS, 1929. Key for Symbols and Abbreviations on Nautical Charts, Hydrographic Office of the Serbian, Croatian and Slovenian Navy, Dubrovnik.
- IHB, 1951. Glossary of Cartographic Terms and Manual of Symbols and Abbreviations Used on the Latest Navigational Charts of the Various Countries - Special Publication No. 22 – Glossaire des termes cartographiques et manuel des signes Conventionnels et abreviations employes sur les plus recentes cartes marines des divers pays – Publication spéciale N.º 22, 3rd Edition, November 1951, International Hydrographic Bureau, Monaco.
- IHO, 1987. International Chart Series - INT 1 - Symbols, Abbreviations and Terms used on Charts; Internationale Kartenserie - Karte 1 - Zeichen Abkürzungen Begriffe in Deutschen Seekarten, Deutsches Hydrographisches Institut, Hamburg.
- IHO, 1997. Colour & Symbol Specifications for ECDIS, IV Edition, International Hydrographic Organization, Monaco, 113.
- IHO, 2000. S-57 APPENDIX B.1, Annex D (INT 1 - ENC), Edition 1.0, November 2000, International Hydrographic Bureau, Monaco.
- Kozličić, M. & Duplančić Leder, T., 2003. Split – A Centre of the Adriatic Hydrography and Marine Cartography, Significant Anniversaries of Research of sea and submarine Area, Exhibition in the Gliptoteka of the Croatian Academy of Science and Arts in Zagreb, April 2003, Kartografija i geoinformacije, Vol. 2, No. 2., 162-176.