TOWARDS AN INTERNATIONAL CHART

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1. Nautical charts are, and can be considered to remain, an indispensable requisite for the purpose of safe navigation. Without reliable and up-to-date charts, no merchant service of any size would have developed. Safety of ships, cargoes, passengers and crews depends directly on the existence of such charts which inform the navigator of the presence of invisible, submerged dangers and show them charted in their correct positions. At the same time the nautical chart contains the information needed by the navigator to fix his own position on the chart with the instruments at his disposal, such as compass, sextant, log, etc. Hereby the good navigator will be able to avoid the dangers that lurk below the water-level and escape the eye, thus directing his vessel along the safest and shortest possible route from its point of departure to its destination.

2. Apart from military requirements, it is this safety aspect, the main element of a good nautical chart, that induced maritime nations to take organised action in the field of hydrographic surveying at the end of the 18th and the beginning of the 19th century. In the navy departments of these nations, hydrographic offices were established and charged with the responsibility of charting the seas, and of placing the results at the disposal of their mariners in a form suitable for navigation. Charting, like charity, begins at home and, consequently, home waters, entrances of harbours and navigable rivers were among the first areas to be charted. Today the coasts, and the belt of water adjacent to the coast, of the great majority of maritime nations have been surveyed and charted more or less adequately. Hydrographic surveying being considered the prerogative of a sovereign nation, no such surveys normally were carried out within the territorial waters of another nation, unless by special request or by bilateral agreement.

3. On the other hand the 19th century was the era of colonial possessions, which is the reason why the seas around young and developing nations, that have become independent since then, are fairly well charted even when these nations do not yet have at their disposal the services of a fully developed hydrographic office.

4. Therefore, the picture that presents itself consists of series of nautical charts on a reasonably large scale of the home waters of the older maritime nations, based on national surveys and compilation and charting activities. These charts are normally published in the national language and generally their juncture with the chart coverage of the adjacent coastal state is poor, i.e. showing either a gap or too much overlapping. In some of the developing countries, the original charts published by former rulers are still valid or at least not yet replaced by more modern charts.

5. However, marine transport does not stop at the fringe of national chart coverage and essentially needs reliable charts of all navigable seas and rivers. Moreover, the large maritime nations were in need of such a world coverage for purely military reasons as well. Seapower, having influenced the history of maritime nations to a very great extent, also had a major impact on surveying and charting activities as seapower could only be exerted by sending naval units, squadrons or fleets all over the world, which was only possible through the existence of reliable charts and a fleet to send.

6. All this has led to the fact that today there are four countries, the U.K., the U.S.A., France and the U.S.S.R., that have established and keep up to date a world coverage of nautical charts. These four sets of charts, each counting between four and five thousand different nautical charts, are not at all identical. Apart from the four national areas that were charted, these countries also had different spheres of military or economic interest, which changed with the growth or decline of these interests. Now, an important question is on what this world coverage is based, as it is clear that these four countries have not surveyed the whole world.

7. Each of the four countries named has, of course, surveyed and charted its own territorial waters and adjacent sea areas and those around its former colonies or possessions, as well as some ocean areas outside any national jurisdiction. However, the charts published by other countries — necessary to build up a world coverage — had to be copied. They could not, however, be copied facsimile as normally the publication of charts is under the reservation of copyright for the Crown or the national Government. This means that all charts of foreign ports, territorial waters and adjacent sea areas had to be redrawn or, before the war, re-engraved. The only advantages of this extremely cumbersome work were the possibility of choosing a different spheroid, a different projection, a different scale and presentation so as to establish a more comprehensive coverage.

8. When we add up all existing large-scale charts of territorial waters, adjacent sea areas, and harbour and river entrances, their total number far exceeds the four to five thousand charts of which the different world coverages consist. This means that the countries maintaining a world coverage of nautical charts have had to generalise the different foreign charts by publishing smaller scales, thus omitting less important detail. This generalisation was born of sheer necessity as it is considered impossible, and in certain cases unnecessary, to maintain a set of some ten to twelve thousand charts.

9. Essentially it is possible for a mariner to use foreign charts also, as it has been one of the principal aims of the International Hydrographic Bureau to internationalise and standardise nautical charts published by its Member States. As long as symbols are internationally agreed upon — which for some symbols was, and still is, rather difficult — the use of such symbols materially adds to the understanding of a foreign chart. Unfortunately, however, abbreviations on charts are national abbreviations (with a few exceptions) and therefore may add to the confusion, which can also arise from the use of different units of measurement. Moreover, the majority of nautical charts, of whatever nationality, still contain a number of warnings, cautions or descriptions in the national language. Finally, it is one thing to use a foreign chart, it is quite something else to keep that chart corrected and up to date by reading and applying the foreign Notices to Mariners, especially those that are published in the foreign language only.

10. All this has led to the use by most mariners of the world coverage of one of the four originating nations, as soon as the mariner enters a sea area not charted by his own nation. The loss of detail that has thereby to be accepted is unavoidable owing to the lack of practical alternatives.

11. Apart from the four nations maintaining a world coverage, there are some nations, such as West Germany, Japan and Italy, that publish charts covering part of the world. West Germany covers parts of the Atlantic and Indian Oceans; Japan, parts of the Pacific and Indian Oceans; and Italy, part of the Mediterranean. Many other maritime nations chart their own coasts and adjacent sea areas as well as a small number of other areas already charted by another nation.

12. The present situation, in which four nations maintain a world coverage of nautical charts, and at least three nations have published a partial world coverage, whereas several nations are charting — apart from their own off-lying sea area — regions of particular interest to them, gives rise to the following comments and remarks.

12.1. The present situation is a logical consequence of historical developments, national laws and international relations and co-operation, coupled with navigation needs and cartographic technology.

12.2. Notwithstanding the excellent work done by the International Hydrographic Bureau and its co-operating Member States to arrive at a more uniform and standardised system of charting, the present situation is far from satisfactory.

12.3. Charts belonging to a world set and depicting areas that are not surveyed and charted by the country issuing the world set, but by the country that is, or feels itself, responsible for that particular area, lag behind in recent information — and sometimes by several years — as the hydrographic office maintaining the world set is faced with the sheer impossibility of issuing new editions or large corrections of all its charts with the same frequency, as the originator does. This is particularly distressing in areas where the alluvial sea-bed is continuously subject to appreciable changes. Manpower and printing facilities are the main limiting factors.

12.4. These same limitations also apply to the generalisation that had to be carried out when publishing the world set and which resulted in generally less detailed and smaller-scale information for the mariner.

12.5. It is a conservative estimate that the major hydrographic offices, since the 19th century, have spent several hundreds of man-centuries in non-facsimile copying each other's charts, with the poor result that all world and regional coverages of charts that are used nowadays by the mariners of the world are less detailed and less up to date than the national chart coverages on which they are based.

12.6. It must be stressed that the above remarks are not at all intended as criticism but only as statements of fact. The inherent problems are too well known to the author for him to criticise, but rather must he express his admiration for what has been accomplished in this field, notwithstanding extreme difficulties.

13. To prove that very many man-years have been wasted on non-facsimile copying, the following three tables list the different charts that exist of some sea areas. As no Russian catalogue was available, no Russian charts are listed but it can safely be assumed that for every sea area mentioned a Russian chart will exist as well.

TABLE 1

Medium to large-scale charts and plans of which the original is exclusively based on the survey, compilation and charting activities of one national hydrographic office only, and of which non-facsimile copies have been prepared by other hydrographic offices

Chart			
Issued by Hydrographic Office of :	Number	Scale	Remarks
CAPE FINISTERRE – Plan			
Spain	9271	1/15000	Original chart
British Admiralty	3764	1/41000	
West Germany	617	1/42000	
CAPE FINISTERRE – Approaches			
Spain	927	1/50000	Original chart
British Admiralty	1752	1/200000	
West Germany	616	1/250000	
France	3007	1/272100	
US Navy	4407	1/200700	
TOKYO – Plan			
Japan	1065	1/11000	Original chart
British Admiralty	3110	1/25000	
France	5137	1/35000	
US Navy	5469	1/10500	

TOKYO – Bay			
Japan	1061	1/52000	Original chart
British Admiralty	3548	1/50000	
US Navy	5468	1/51650	
TOKYO – Entrance of Bay			
Japan	90	1/100000	Original chart
British Admiralty	3360	1/200000	
West Germany	554	1/3000000	No larger scale issued
France	4507	1/107900	
US Navy	5467	1/51790	
COPENHAGEN – Plan			
Denmark	134	1/12500	Original chart
British Admiralty	3194	1/12600	
West Germany	289	1/12500	
France	6322	1/15000	
East Germany	1601	1/12500	
US Navy	4918	1/12500	
COPENHAGEN – Roadstead			
Denmark	133	1/40000	Original chart
British Admiralty	790	1/40000	
France	6324	1/40000	
COPENHAGEN – Approaches			
Denmark	131	1/70000	Original chart
British Admiralty	2594	1/60000	
West Germany	328	1/60000	
France	4667	1/132500	
East Germany	1700	1/60000	
Sweden	922	1/60000	
US Navy	4920	1/62200	
SPLIT – Plan			
Yugoslavia	207	1/10000	Original chart
British Admiralty	1561	1/10000	
France	3621	?	Various scales
Greece	1561	?	Various scales
Italy	530	1/15000	
SPLIT – Approaches			
Yugoslavia	207	1/80000	Original chart
British Admiralty	2712	1/100000	
West Germany	602	1/300000	
France	3539	1/173300	
Greece	2712	1/144000	
Italy	530	1/80000	

From Table 1, it follows that the average number of charts issued for the sea areas mentioned amounts to 5.7 if we assume that for every area also a Russian version exists. It is not impossible that this figure of 5.7 will be slightly higher as only 15 up-to-date catalogues were used, whereas the International Hydrographic Bureau has 42 members.

TABLE 2

Medium to small-scale charts showing coasts of more than one nation and therefore not based on the survey, compilation and charting activities of one national hydrographic office only. Every chart mentioned in this table is based on information received from at least two hydrographic offices. Consequently, it is no longer possible to indicate the original chart

Chart			
Issued by Hydrographic Office of :	Number	Scale	Remarks
SOUTHERN PART NORTH SEA, NORTHERN ENTRANCE TO CHANNEL			
British Admiralty	1406	1/243000	
West Germany	53	1/400000	
France	3402	1/314500	
East Germany	53	1/300000	53 East and 53 West
Netherlands	1035	1/375000	
Denmark	91	1/1200000	
Sweden	2	1/1000000	
US Navy	4841	1/746460	
ENTRANCE OF THE GULF OF FINLAND			
British Admiralty	2241	1/196000	
West Germany	164	1/200000	
Finland	902	1/200000	
France	3658	1/217800	
East Germany	140	1/200000	
Sweden	61	1/200000	
US Navy	4987	1/202000	
SOUTHERN APPROACHES TO RED SEA AND GULF OF ADEN			
British Admiralty	6	1/750000	
West Germany	325	1/1000000	
France	2115	1/725700	
Italy	803	1/1000000	
Japan	3196	1/712000	
US Navy	2816	1/711850	

Table 2 shows us that the average number of charts, including a Russian version, issued with respect to the three sea areas mentioned is 8.0. This indicates a disquietingly high number of repetitive chart productions all depicting the same area and based on the same original surveys that are

sometimes a century old. More or less the same picture presents itself when looking at the ocean sailing charts.

TABLE 3

Small-scale charts, on a scale smaller than 1/5 000 000, called ocean sailing charts, that are normally based on the survey, compilation and charting activities of many hydrographic offices.

Chart			
Issued by Hydrographic Office of :	Number	Scale	Remarks
SAILING CHART INDIAN OCEAN			
British Admiralty	748A	1/8220000	Southern part
British Admiralty	748B	1/8220000	Northern part
West Germany	397	1/12000000	
France	4360	1/13825000	
Japan	3198	1/8220000	Southern part
Japan	3199	1/8220000	Northern part
Spain	1000	1/18000000	Sheet III
US Navy	5445	1/7233858	Northern part
US Navy	5446	1/7599700	Southern part
SAILING CHART SOUTHERN ATLANTIC OCEAN			
Brazil	3001	1/10000000	
British Admiralty	2203	1/12900000	
West Germany	384	1/12000000	
France	5280	1/11695000	
Spain	140A	1/8232000	
US Navy	0958	1/5174000	S.W. part

From Table 3 it can be learned that, assuming that a Russian version of these sailing charts also exists, an average of 7.0 different charts of the same area are published, having been compiled and charted — and kept up-to-date ever since — in seven different hydrographic offices.

14. A solution of at least part of this problem can be found by the adoption of the concept of "translated facsimile reproduction". If again we look at the large-scale charts first, this concept constitutes the reciprocal rights of two nations to print each other's charts in facsimile after having replaced all texts or abbreviations in the original language by their translations. The translated facsimile chart hereby becomes a normal national chart of the copying nation with a number consistent with the copying nation's system of numbering and quoted in this nation's Notices to Mariners.

15. This "translated facsimile reproduction" concept has many advantages over non-facsimile copying, a number of which will be given below :

15.1. The concept remains valid whether or not both nations (the originating and the copying nation) exercise their rights to facsimile

printing, or when only part of the other nation's large-scale coverage is used for translated facsimile reproduction.

15.2. Preparation of a translated facsimile reproduction sheet takes only a comparatively short time when the original sheet is forwarded by the originating nation. Every new edition or large correction can be followed by the same type of renewal of the translated facsimile chart in a matter of weeks.

15.3. Relatively very little additional time is required from cartographic officers to provide their hydrographic offices with a regional set of detailed and up-to-date large-scale charts in the national language.

15.4. At low cost every country wishing to do so can build up a regional set of charts in its national language, thereby avoiding the problems of bilingual versions and the inherent intricacies of abbreviations based on national languages.

16. The true international large-scale chart (i.e. the chart that shows the coast of one nation only and on a scale of approximately 1/200 000 or larger, therefore, is the sum of all national large-scale charts copied according to the concept of translated facsimile reproduction by any country wishing and having the right to do so.

17. Essentially this concept has only two limiting factors, i.e. the countries intending to copy each other's charts by facsimile should either both use the metric system or both the fathoms/feet units of measurement and both should use the same alphabet. These two factors can be seen as the only problem prohibiting, or at least impeding, the concept of translated facsimile reproduction being adopted world-wide.

18. A slightly more complicated picture presents itself when we consider the medium- to small-scale charts on which the coasts of two nations are shown. Here there are three possible types of charts :

18.1. Tne chart published by one of the nations whose coast is shown. This nation will use its original information to compile its own part of the chart and use copied information of the other nation whose coast is shown.

18.2 The chart published by the other nation whose coast is shown. Here the same procedure, but reversed, takes place; both charts are similar in many ways and generally do not even differ very much in scale.

18.3. The chart published by other nations whose coasts are not shown on it. As we saw in table 2, this third type of chart may exist in considerable numbers.

19. It should not be too difficult to decide on the international chart in this case. Essentially only one of the two nations of which the coast and coastal waters are shown should become responsible for the publication of the international version. All charts of the same area published by others should be printed under the translated facsimile reproduction system. This would only require agreement on a system of mutual exchange of hydrographic information between two nations and as such should not be impos-

sible, provided both nations use the same units of measurement, or are at least prepared to accept international charts based on units of measurement different from their own.

20. By far the most difficult part of the question is presented by the small-scale charts on which the coasts of many countries are shown. Here two distinct problems arise, one being the fact that the basic principles of ocean charting are apparently different in different hydrographic offices, the second that any agreement on exchange or the acceptance of an international chart will be subject to approval of more than two charting nations. Fortunately these small-scale charts are very few in number compared to the two other types of charts already mentioned.

21. A solution might be found here by accepting the ocean charts in the metric system that are now being prepared by the British Admiralty as the international charts for ocean coverage or, as an alternative the already existing French coverage in the metric system. Under the translated facsimile reproduction concept, any maritime nation willing and able to do so could use these charts as their national charts, the keeping up to date of which would be the responsibility of either the U.K. or France. This solution would avoid the formidable problem of recharting the oceans.

22. To conclude these thoughts on the international chart, it should be mentioned that facsimile reproduction already takes place between some hydrographic offices. But this does not always include translated facsimile and generally is only intended to fill gaps in national chart coverage. Systematic translated facsimile reproduction has been agreed upon between France and the Netherlands with the object on the French side of acquiring recently surveyed and up-to-date charts of the Netherlands coastal waters, harbours and harbour entrances without having to use a relatively great part of the available charting manpower, and on the Netherlands side to acquire modern charts of the French Channel coast for the Netherlands coastal trade, again with a minimum of charting labour involved.

23. It is my sincere conviction that this type of charting foreign coasts is the fastest, most detailed and most reliable way to serve one's shipping with the best there is at the lowest possible cost. There is no loss of information on account of necessary generalisation or human errors in copying. There are no problems in reading another nation's Notices to Mariners as should be done when using that nation's original charts. For the very numerous charts necessary to cover the seashores and coastal waters of the world, the translated facsimile reproduction system in my opinion is the answer to the problem of the international chart. Further perfection of the International Hydrographic Bureau's standardisation of symbols and perhaps international abbreviations can considerably lessen the amount of translating. This refers especially to the characteristics of lights.

24. For the medium-scale charts, the same system may be applied provided two or perhaps three nations have agreed as to whose chart will be accepted as the one to be used as the basis for the translated facsimile reproduction system. For the small and very small-scale charts providing ocean coverage the solution of translated facsimile may be more difficult,

but it only affects a small number of charts and for this reason alone a solution should be possible. A special working group of the International Hydrographic Bureau has been established to go deeper into this matter of small-scale charts with a view to presenting proposals to the Bureau on the concept of an international chart. As soon as a solution is found in this field the possibility will exist to arrive at an international chart on any scale.