

GROUP TRAINING COURSE IN NAUTICAL CHARTING CONDUCTED BY THE HYDROGRAPHIC DEPARTMENT OF JAPAN

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INTRODUCTION

The Hydrographic Department of Japan conducted for the first time in its history a group training course in nautical charting from November 1987 for three months. This was a result of the Department's extended efforts to comply with the requests by those hydrographic offices of developing countries wishing to establish or expand their cartographic activities.

In commencing this group training, some ideas have materialized to provide a new approach to the technical transfer in nautical charting.

The course is to be conducted every other year by the Hydrographic Department of Japan under the auspices of the Japan International Cooperation Agency (JICA), as part of the technical cooperation programme of the Government of Japan.

BACKGROUND

Since 1972, the Hydrographic Department of Japan has been conducting two group training courses on the JICA basis, i.e. in hydrographic survey and in physical oceanographic survey for hydrographic personnel of developing countries. In the meantime, the desirability of conducting another group training in cartographic work to produce nautical charts has been strongly felt by developing countries. The Hydrographic Department of Japan has also been keenly aware of the necessity of establishing such a course for marine cartographers of those countries, since nautical charting, or publication of charts, is another essential task of a hydrographic service.

The Hydrographic Department was unable to start the training earlier as it had to wait until the completion of chart specifications, including chart symbols and abbreviations for the international charting scheme within IHO. At the XIIth

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I.H. Conference in 1982, the 'Chart Specifications of the IHO' for use on all nautical charts, both national and international, were adopted. This gave an impetus to the Hydrographic Department to open the planned group training course in nautical charting for its colleague offices of developing countries.

After lengthy deliberations and negotiations with governmental agencies concerned, i.e. the Ministry of Transport and the Ministry of Foreign Affairs, as well as JICA, which is responsible for implementation of group training courses under the Government's technical cooperation programme, it was finally decided that the proposed training course would be conducted at the Hydrographic Department every other year alternately with the existing training course in physical oceanography, the period, number of participants and budgetary arrangements being the same in both courses. Thus, the Hydrographic Department started to prepare for the course early in 1986, with the target of commencing the course in 1987 fiscal.

The International Cooperation Office of the Department was in charge of organizing the course syllabi and programme, in consultation with the lectures selected from among the technical personnel in charge of nautical charting and associated professional sectors in the Hydrographic Department.

JICA

Before introducing the group training course to the reader, it is considered necessary to give a brief explanation of the Japan International Cooperation Agency, JICA. The Government of Japan, convinced of the importance of human resources development, established JICA in 1974 as its sole agency for the integration and implementation of Japan's technical cooperation with developing countries, with the aim of expanding and increasing the effectiveness of Japan's development cooperation as well as responding to increasingly diversified requests from developing countries for technical cooperation, particularly in the area of human resources.

JICA conducts such activities as training programmes, expert dispatch programmes, equipment supply programmes, dispatch of Japan Overseas Cooperation Volunteers and development survey programmes, with extensive cooperation from Japan's governmental organs, local government bodies, universities and private enterprises in Japan.

JICA's training programme has been regarded as one of its core activities ever since the Agency's establishment. Under the training programme, which comprises both group training courses and individual training, JICA today accepts more than 4,600 overseas participants every year for training in Japan.

Around 250 group training courses are offered every year to developing countries to meet their needs in the area of human resource development. The group training courses at the Hydrographic Department are all conducted on the JICA basis.

OBJECTIVE OF THE TRAINING

The purpose of the course is to provide participants with :

- (1) modern theory of nautical charting based on the format established by the International Hydrographic Organization, and
- (2) knowledge and technique in drawing nautical charts, including special charts for preservation of the marine environment and utilization of the ocean.

In addition, the participants will be trained to become familiar with computer mapping technology, as nowadays information science is developing remarkably and so is the need for the computers in the field of cartography.

The participants will be given lectures, practical training, observation tours and other exposure to acquire extensive theoretical knowledge on nautical charting.

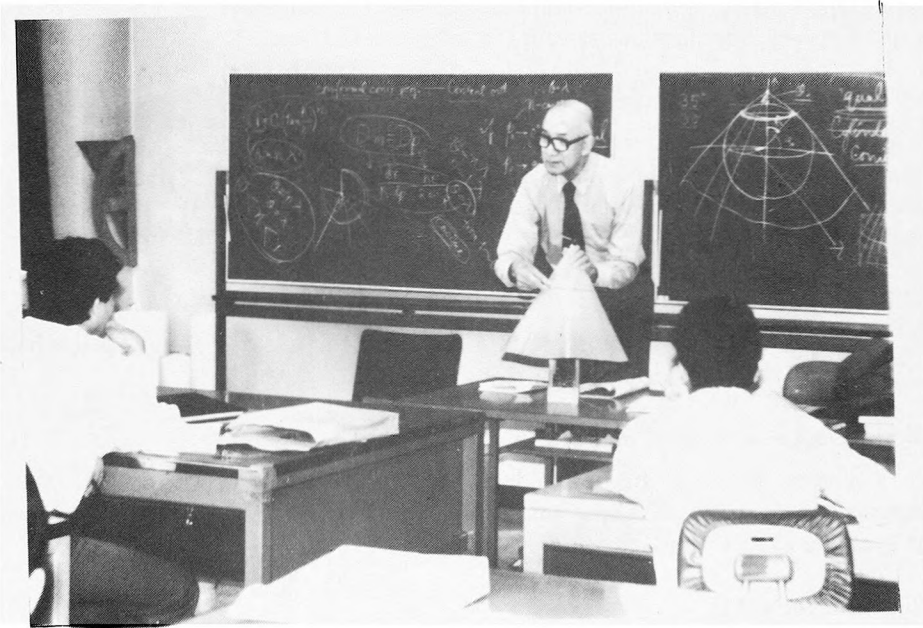


FIG. 1. — Lecture on map projection.

At the end of the training period, the participants are expected to be able to:

- (1) process and evaluate data on marine survey on natural and social information;
- (2) prepare an execution plan to publish nautical charts and other information maps;
- (3) compile nautical charts and other documents concerned;

- (4) use various charting instruments properly; and
- (5) exchange information on nautical charts.

In summary, the primary objective of the course was not merely to train chart draftsmen but to train those technical persons who should become staff members of national hydrographic offices to take charge of the technical control of nautical chart preparation.

LEVEL OF THE TRAINING

To attain the above-mentioned objective, the substantial level of syllabi was set at such a level that participants may be provided with practical knowledge as mentioned below:

(1) Cartography in general

The cartographer's common sense based on the essence of contemporary cartographic work, with more emphasis on the general aspect of nautical charts, such as history, specific character, usage, future trends, etc.

(2) Usage of nautical charts

The usage of nautical charts in relation to actual navigation of a vessel, together with knowledge on other nautical publications such as Sailing Directions, Lists of Lights and Notices to Mariners that are to supplement the information on charts.

(3) Collection and evaluation of data and information to be charted

Capability to make appropriate judgment on nautical charting on the basis of collected data and information currently available in Japan.

(4) Technique in nautical charting

Technique at the beginner's level for nautical charting through the actual experiences in compilation, drawing and reproduction of a nautical chart as well as updating of such chart.

(5) Mapping CAD

Familiarization with personal computers to acquire knowledge on modern techniques in computer assisted cartography which is expected to become more active and practical in the future.

SYLLABI AND PROGRAMME

Taking into consideration the purpose and level of the training as aforementioned, it was finally decided that the subjects to be taught or practised and hours to be allocated should be as follows:

Lectures (124 hours)**(1) General aspects of nautical charts (4 hours)**

General aspects of nautical charts, i.e. the specific character of a nautical chart as a topical map, kinds of charts, projections employed, usage of charts, etc., as well as the future trend in nautical charting, will be explained.

(2) Outline of nautical publications and their relationship with navigation (6 hours)

Explanation will be given on the outline of nautical publications, such as *Sailing Directions*, *Lists of Lights*, *Notice to Mariners*, etc., which are, together with nautical charts, indispensable for safe navigation of a vessel.

(3) General aspect of hydrographic survey (8 hours)

Explanation will be given on the process of hydrographic surveys to produce fair charts which are the fundamental data for preparation of nautical charts. How to evaluate the data on fair charts will also be taught.

(4) Construction of nautical charts (18 hours)

Lectures will be given on:

- Map projection, including principles, specific characters and drawing methods of various map projections;
- Classification of nautical charts according to their usage;
- Elements constituting a nautical chart, such as chart size, scale, geographical names, compass roses, topographic and bathymetric information and others.

(5) Cartographic Generalization (2 hours)

Explanation will be given on the outline of a technique for representing various kinds of information on a chart, such as simplification and symbolization of information for compilation and drawing of a chart, taking into account the chart scale.

(6) Chart symbols and abbreviations (2 hours)

Explanation will be given, with actual examples, on the general idea of arrangement and symbolization of information to be charted, so that the chart symbols and abbreviations may be fully understood.

(7) Artistic effects of a chart (4 hours)

General idea will be explained on how to design, colour and harmonize various kinds of charted information so as to enhance the legibility and artistic effects of a chart.

(8) How to produce a nautical chart (18 hours)

Practical knowledge on the process of chart production will be taught,

namely from publication planning to the preparation work (compilation, drawing, proof-reading, etc.) and finally to the reproduction work (plate-making and printing).



FIG. 2. — Practice on copying source materials using electrophotographic copier.

(9) Updating of nautical charts (6 hours)

Explanation will be given on the work on Notices to Mariners for updating nautical charts and disseminating necessary information quickly to navigators, including the knowledge and technique about corrections to charts and production of correction blocks to be attached to weekly Notices to Mariners.

(10) Geodesy (12 hours)

Basic knowledge will be taught on the mathematical aspect of geodesy required for cartographers which is indispensable for producing charts and should be continuously studied in the future. Satellite geodesy technique will also be introduced.

(11) Introduction to computers (14 hours)

Lectures will be given on the general idea of computers, giving basic knowledge on hardware and software, including outline of computer assisted drawing technique.

(12) Mapping CAD (16 hours)

For comprehension of computer assisted cartographic systems as the most advanced cartographic technique, such matters as hardware/software for digitiza-

tion, methods for digitizing various data, digitized data base, and knowledge and technique of data control will be taught in the light of actual systems.



FIG. 3. — Practice on mapping CAD.

(13) General aspect of navigation (10 hours)

In producing nautical charts, it is necessary for cartographers to understand the standpoint of navigators as users of nautical charts. By giving participants the general knowledge about navigation, they will comprehend what kinds of information are required on charts by the navigator.

(14) Special study (2 hours)

Lectures on specific subjects will be given upon request by lecturers or participants.

(15) Country report (2 hours)

Each participant will report on the existing status and future trend of the nautical charting activity in his country, thus participants, lecturers and persons concerned can exchange useful information.

Practice and observation tours (60 hours and 11 days, respectively)

(1) Compilation planning (12 hours)

Preparation of a planning sheet (layout of the chart to be produced, giving

cartographic directions) and a planning note (specifications of the chart to be produced, such as the title, scale and number of the chart, source materials adopted, etc.) and confirmation of geographical names, will be made.

(2) Compilation (12 hours)

Based on the planning sheet and planning note prepared and other source materials, preparation of a compilation sheet will be made by drawing and colouring of topographic and bathymetric information.

(3) Drawing (12 hours)

The border of the chart will be prepared, and scribing of coastlines and depth contours will be made on the film base on which the compilation sheet is printed. Then, a positive film will be produced, on which details of topographic, bathymetric and other information will be drawn with various types of drawing pens, and phototypeset figures, letters and symbols are pasted, thus to complete a chart original.

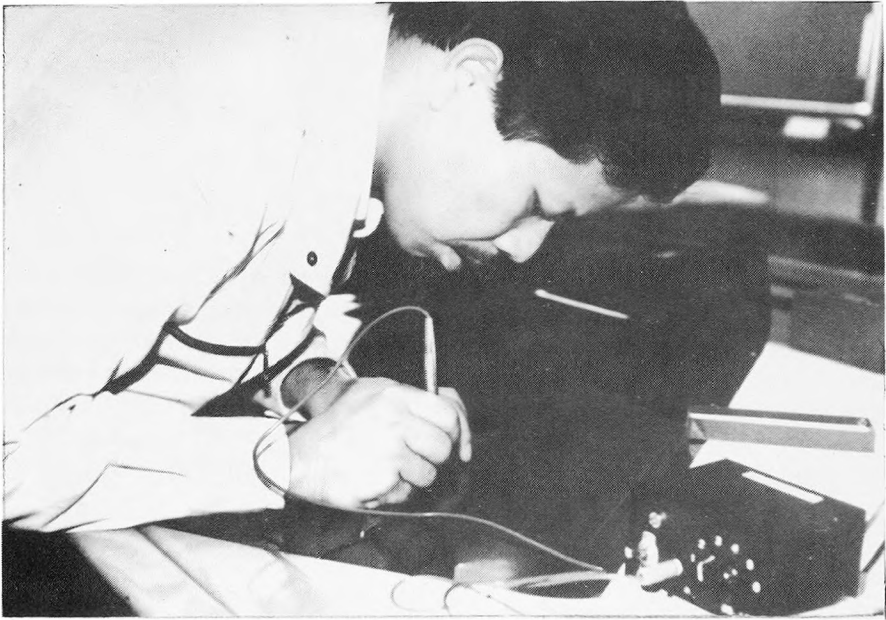


FIG. 4. — Practice on scribing.

(4) Proof-reading and checking (2 hours)

Proof-reading and checking of the chart original prepared will be performed, and any correction, if found, is to be made.

(5) Preparation of correction block (12 hours)

Technique for preparation of a correction block and a guide to correction of original plate will be taught.

(6) *Reproduction and printing (10 hours)*

Original plates will be prepared from the chart original and the original of correction block, followed by plate-making of printing plates and printing of pulls for proof-reading.

(7) *Practice in navigation (2 days)*

On board the Survey Vessel *Shoyo* (2,000 tons), participants will experience actual navigation and understand how to use nautical charts as well as the significance of charted information.

(8) *Observation tour (9 days)*

Visits will be made to various governmental and private facilities related to navigation, charts and cartography to obtain wide knowledge on nautical and other marine charts.

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Lectures are to be given 4 hours a day, two hours in the morning and two hours in the afternoon, from Monday to Friday.

DURATION

The duration of the course was originally planned as four months and the syllabi were so selected and arranged as to be accommodated within this period. Unfortunately, however, the actual duration had to be reduced to three months due to unavoidable circumstances, which caused some inconvenience both on the lecturers' and the participants' side. Actually, the duration of the first group training course in nautical charting was fixed to be from 5 November 1987 to 14 February 1988. Such a situation will, however, be certainly remedied in the next course.

LECTURERS AND TEXT BOOKS

In parallel with the preparation of the syllabi and programme of the course, selection of lecturers was eagerly carried out by the International Cooperation Office in collaboration with the Divisions of the Hydrographic Department in charge of nautical charting, hydrographic surveying and nautical publications.

With one exception for the subject of map projection, all the lecturers selected were well-experienced technical officers of the Department, some of them having experiences in teaching at the Maritime Safety School and/or the group training course in hydrographic survey. The lecturer on map projection was an ex-official of the Hydrographic Department, also well-experienced in teaching this

subject both at the Maritime Safety School and the group training course in hydrographic survey.

Since the training is to be conducted in English or Japanese through English translations by a training coordinator, the lecturers were asked to prepare text books on their respective subjects. The text books in Japanese were sent at professionals for English translation. Thus, two volumes of English text books, each containing 300 pages, were prepared.

APPLICATION

About six months prior to the commencement of the course, a brochure entitled 'Information on Group Training Course in Nautical Charting, 1987-88' was printed by JICA and copies were distributed through diplomatic channels among ten selected developing countries having shown keen interest in sending applicants to this particular group training course.

As a result, there were fifteen applications from all these ten countries. Since it had been decided that eight participants should be accepted for the course — the same number of participants in the Physical Oceanographic Survey Course, selection had to be made, which was indeed a very difficult and unpleasant task, and finally eight applicants were selected. Unfortunately, however, one applicant selected could not visit Japan due to the political instability of his country. Thus, the first Nautical Charting Course started with seven participants from seven developing countries mostly located in Asia.

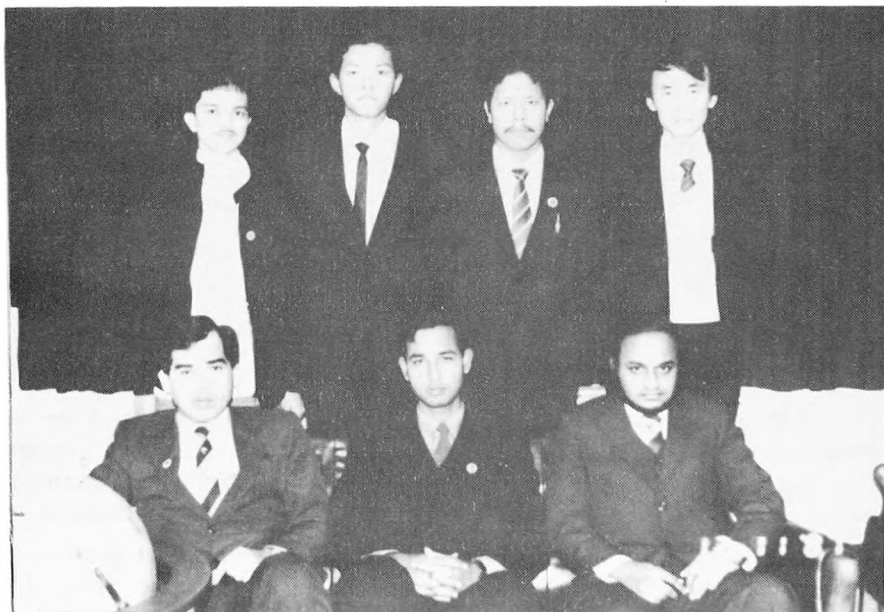


FIG. 5. — Participants of the Nautical Charting Course, 1987.

The requirements for applicants were as follows:

Applicants should:

- (1) be nominated by their government,
- (2) be presently employed at the national hydrographic office or other organizations which are engaged in carrying out hydrographic surveys for safe navigation of ships, nautical charting and oceanographic surveys for utilization of the ocean,
- (3) be not more than thirty-five (35) years of age,
- (4) have a sufficient command of spoken and written English,
- (5) be a graduate of a junior college or special school graduate or equivalent, and
- (6) be in good health, both physically and mentally, to undergo the training. Pregnancy is regarded as a disqualifying condition for participation in the training.

ALLOWANCES AND EXPENSES

The Government of Japan provided the following expenses in accordance with JICA rules and regulations:

- (1) return air-ticket (normal economy fare) between the international airport designated by JICA and Tokyo,
- (2) an allowance of ¥3,900 per day and other allowances for outfit, books and literature-transportation in addition to free accommodation and breakfast at JICA Training Centre,
- (3) medical charges for participants who may become ill after arrival in Japan, and
- (4) expenses for study tours.

FACILITIES

The group training was conducted in the seminar room on the 8th floor of the main office building of the Hydrographic Department in Tokyo. This seminar room has been used for the other group training courses for several years.

In starting the nautical charting course, it was felt necessary to change desks in the classroom to large size drawing desks for participants and lecturers, as this type desk, whose top plate frosted glass will be illuminated from underneath, would greatly help the practice in chart compilation and drawing work. Therefore, the former small size desks were entirely replaced by the drawing desks which were collected from various sections of the Hydrographic Department. These desks are also to be used for the other group training courses, i.e. hydrographic survey course and physical oceanographic survey course, since 'the greater serves for the lesser'.

Various kinds of drawing instruments and other teaching materials were newly procured, including drawing sets, rotating scribes, magnifying lenses and others which were considerably expensive. These instruments and materials cost about ¥700,000 per participant.

Practice of chart reproduction and printing was conducted at the printing factory of the Department.

In practising with the computer, a personal computer provided in the seminar room as well as similar computers borrowed from various sections of the Department were used.

FINDINGS

The group training was smoothly conducted as scheduled with the efforts of lecturers and other people concerned. All the seven participants enthusiastically followed the programme and successfully completed the course.

At the end of the training, various comments, suggestions and impressions on the training were obtained from both participants' and lecturers' sides, which are summarized as follows:

Participants' side

- (1) As a whole this training is especially useful to the participants from those hydrographic offices which are establishing or expanding their charting activities.
- (2) Due to shortage of time, practice on certain subjects could not be done sufficiently, such as drawing and reproduction. It is felt necessary that each participant brings back all the resulted products of his training. Accordingly, it is not advisable if the chart produced by himself is only half-made. Therefore, even if the size of the chart is small, it is better to have a complete product.
- (3) Sufficient time should be allocated to practice on the computer. In particular, the subject on 'Mapping CAD' was most interesting so that 4 or 5 hours should be given to the practice on Mapping CAD.
- (4) Selection of soundings on the source materials (smooth sheets) is a very important work so that more time should be allocated.

Lecturers' side

- (1) Due to shortage of time, sufficient lectures and practice could not be given, particularly on such subjects as 'planning', 'drawing' and 'reproduction'. Also, selection of soundings on the smooth sheet is a fundamental work so that sufficient time should be given. However, the text books prepared were so appropriate in contents that they helped lecturers considerably.

- (2) The lecture on 'Mapping CAD' gave only the technique and systems available in Japan, but in the future course it would be necessary to touch upon the most advanced technique and systems in other developed countries. It is also felt necessary that in the near future this course should include a subject on the world tendency of the development of electronic charts.
- (3) Due to difference in backgrounds of participants, especially in the experiences in nautical charting, certain difficulty was felt in giving lectures and practices. However, all the participants were very hard-working and keen to comprehend the modern technique of nautical charting, especially in computer assisted cartographic work.

CONCLUDING REMARKS

Despite the duration being rather limited, the curriculum as well as the programme of the group training were well organized, and the contents and level of teaching were generally appropriate — in some cases more than required thanks to the enthusiastic lecturers — for the technical personnel of developing countries who will work as the staff of their hydrographic offices in the future.

It is undeniable that the technology in nautical charting is advancing rapidly nowadays in parallel with other fields of hydrography, boosted, in particular, by the advancement in computer application. Under such circumstances, the curriculum of this group training course, being conducted every other year, should be reviewed constantly to keep pace with the development in the related science and technology.

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