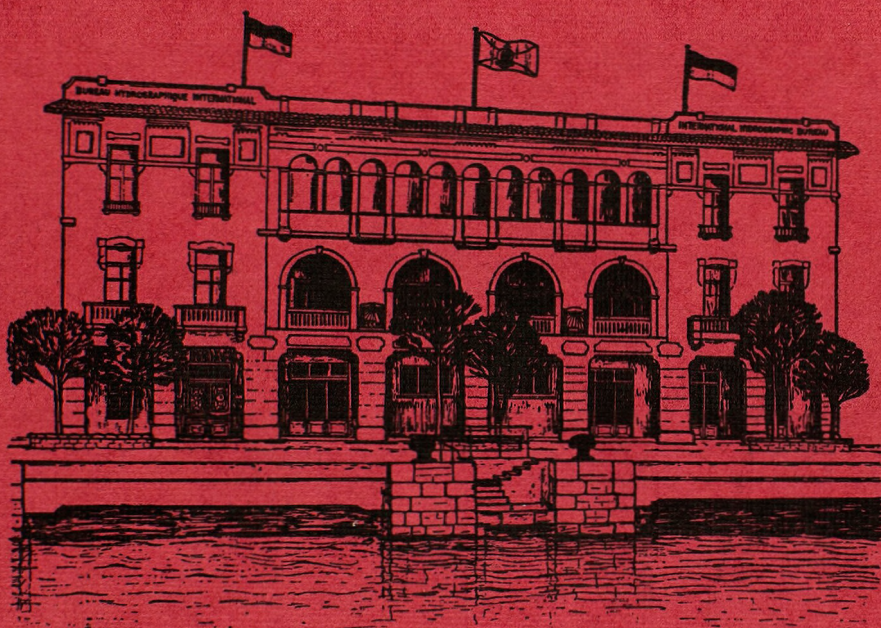


THE INTERNATIONAL HYDROGRAPHIC REVIEW



INTERNATIONAL HYDROGRAPHIC BUREAU
MONACO

Vol. LXV No. 1

No. 122 OF THE SERIES

JANUARY 1988

Recently published by the International Hydrographic Bureau:

PP-06	Report of Proceedings of the XIIIth International Hydrographic Conference, May 1987 (English)	75.00 FF
MP-005	Standards of Competence for Hydrographic Surveyors. Part 1 (English, French, Spanish), 5th Edition, August 1987	15.00 FF
SP-44	IHO Standards for Hydrographic Surveys Classification Criteria for Deep Ocean Soundings Procedures for Elimination of Doubtful Data 3rd Edition, November 1987 (English/French)	50.00 FF
MP-008	List of Sheets of 'Chart Symbols and Abbreviations' published by Various Maritime Countries, 6th Edition, November 1987 (English/French)	15.00 FF
BP-0004	Information Concerning Recent Bathymetric Data — List No. 17, December 1987 (English/French)	25.00 FF

The following are soon to be released by the International Hydrographic Bureau:

PP-06	Compte rendu des séances de la XIII^e Conférence H.I., mai 1987 (français)	75.00 FF
PP-05	IHO Yearbook 1988 — particulars and addresses of Hydrographic Services throughout the world (English/French)	60.00 FF

The following publications are in the process of preparation:

MP-004	Chart Specifications of the IHO (in 6 sections)	Price to be announced
SP 32	Hydrographic Dictionary, 4th Edition	—
SP 47	Training and Technical Assistance in Hydrography, 2nd Edition	—
SP 50	Tidal Constituent Data Bank	—

A COMPLETE LIST OF ALL IHB PUBLICATIONS FOR 1988
CAN BE OBTAINED BY WRITING TO THE

INTERNATIONAL HYDROGRAPHIC BUREAU

BP 445

7 avenue Président J.F. Kennedy

MC 98011 MONACO CEDEX

The following bathymetric charts are available from the
International Hydrographic Bureau:

General Bathymetric Chart of the Oceans (GEBCO), 5th Edition (1:10M), series of 18 sheets	
Price per sheet	35.00 FF
Carte générale bathymétrique des océans (GEBCO), 5^e édition (1/10M), série de 18 feuilles	
Prix unitaire	35,00 FF

N.B. — All IHB prices are subject to periodic review.

The following Information Papers are available free from the
International Hydrographic Bureau:

- No. 1 — **The International Hydrographic Organization** (September 1987)
- No. 2 — **The FIG/IHO International Advisory Board on Standards of Competence for Hydrographic Surveyors** (November 1987)
- No. 3 — **IHO Special Publication No. 39: Precise Positioning Systems for Hydrographic Surveying** (Series 1977) (December 1982)
- No. 4 — **IHO Tidal Constituent Bank** (February 1986)
- No. 5 — **The IHB's Views on Proposals for a World Chart Series** (November 1987)
- No. 6 — **Technical Assistance** (November 1987)
- No. 8 — **GEBCO** (July 1987)
- No. 9 — **The INT Chart Concept** (March 1985)

**This publication is
available in microform
from University
Microfilms
International.**



Please send information about these titles:

Name _____

Company/Institution _____

Address _____

City _____

State _____ Zip _____

Phone () _____

Call toll-free 800-521-3044. In Michigan,
Alaska and Hawaii call collect 313-761-4700. Or
mail inquiry to: University Microfilms International,
300 North Zeeb Road, Ann Arbor, MI 48106.

THE INTERNATIONAL HYDROGRAPHIC ORGANIZATION
an intergovernmental organization
also publishes the

INTERNATIONAL HYDROGRAPHIC BULLETIN

(PP-03)

A monthly journal published by the International Hydrographic Bureau for the benefit of the world hydrographic community, in a bilingual edition (English and French), 21 x 30 cm in size, with an average of 45 pages per issue, and comprising :

SECTION I — News from Hydrographic Offices; Appointments of Hydrographers; New Membership of the IHO; Reports on various international commissions and committees; Training programmes in hydrographic surveying; Recent developments in hydrographic instrumentation; Operational assessments of equipment; Work being undertaken by the Bureau; Work on the General Bathymetric Chart of the Oceans and the International Set of Charts. Also covered are development and research in the field of hydrography, descriptions of new survey vessels, progress in standardization of charts and «From the Chartroom»: notes on charts and nautical documents.

SECTION II — Reports on hydrographic surveys carried out, or planned for the future, by various countries.

SECTION III — Listing of new charts and new editions published by Member States, with their reference number, title, limits, scale and date of publication. Charts and new editions in preparation are also listed.

Status catalogue of International Charts in the International Set of Charts, with their International reference number, title, limits, scale, date of publication, and the names of the producer and any printer nations.

Publication and new editions of Sailing Directions, Lists of Lights, Tide and Current Tables, Radio Signals, Radio Aids to Navigation, Chart Catalogues.

SECTION IV — Lists of selected recent publications and articles concerning hydrography and allied disciplines.

Reviews of some recent publications of particular interest to hydrographers.

The **International Hydrographic Bulletin** is distributed free to the Hydrographic Office of governments belonging to the International Hydrographic Organization.

It is also available for sale to the public on yearly subscription (price 140 French Francs) or per copy (14.50 French Francs) plus postage.

Conditions of sale of International Hydrographic Bureau Publications

Prices are quoted in French Francs. IHB invoices will be expressed in French Francs or in US dollars at current exchange rates, as appropriate. Packing and postage or shipping expenses will be added to invoices. Payments may be made to the International Hydrographic Bureau by bank transfer or by cheque.

No credit can be allowed on unwanted publications unless returned immediately.

Orders can be sent either to a bookseller or direct to :

International Hydrographic Bureau, B.P. 445, 7, avenue Président J.F.-Kennedy
MC 98011 MONACO CEDEX, Principality of Monaco.
Teleph.: 93.50.65.87 — Teleg.: BURHYDINT, Monaco
Telex : (France) 479164 MC INHORG

The JOURNAL of NAVIGATION

Editor: Professor J. F. Kemp, Royal Institute of Navigation, London

The **Journal of Navigation** publishes authoritative papers on every aspect of navigation—air, land, sea and space—and papers of every type—scientific, historical and narrative. It also features book reviews and keeps a 'record' of current navigational work.

Some important articles appearing in the Journal of Navigation . . .

'Safety of Modern Shipping and Requirements in Hydrographic Surveying and Nautical Charting' by *J.-N. Pasquay, Service Hydrographique et Oceanographique de la Marine Francaise.*

'Characterizing Height-keeping Error Distribution Based on Indirect Observation' by *Sakae Nagaoka, Electronic Navigation Research Institute, Tokyo.*

'The Navigation of Navigation Satellites' by *V. Ashkenazi and T. Moore, University of Nottingham.*

'The Use of Computer Modelling in Planning Marine Aids to Navigation' by *N. Ward, Trinity House, London.*

Military Flight Checking of Navigation and Landing Aids by *M. A. Radforth, RAF.*

Search Area Determination and Search Unit Deployment by *John Astbury, HM Coastguard Headquarters.*

Volume 40 (1987), UK: £43, N. America: US\$100, Elsewhere: £54 Single Issues, UK £16, N. America US\$36, Elsewhere £20

ISSN 0020-3009, published three times per year.

ORDER FORM Please complete and return (with remittance enclosed) to **Journals Subscription Department, Oxford University Press, Walton Street, Oxford OX2 6DP UK.**

Enter my subscription to Volume 40 of the **Journal of Navigation**

Please send a free sample copy

I enclose my remittance of

Please make cheques payable to Oxford University Press.

Name (*please print*)

Address

I wish to pay by Access/Visa/American Express/Diners (delete as appropriate)

My card number is

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Expiry date Signature

If address registered with credit card differs from that given above, please give details.

OXFORD JOURNALS

Journals Subscription Department, OUP, Walton Street, Oxford OX2 6DP, UK

Determine your precise position

PULSTRAC™ System Configured for GPS Integration

Pulstrac

The first precise positioning system to be passive, self-calibrating and self-initializing. This navigation system is accurate to within 2 meters dynamically.

Trisponder Systems

Precision microwave, line-of-sight radio location and guidance equipment composed of up to 8 transponders and a digital distance measuring unit. They offer flexible modes of operation: range/range, range/bearing and XY position.

UHF Trisponder Systems Worldwide Service

Over-the-horizon system that utilizes the latest in solid state technology. The UHF system utilizes spread spectrum techniques for maximum range and optimum signal to noise ratio.

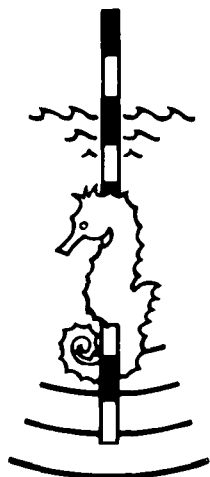
Del Norte now offers a **TWO-YEAR** warranty. Representation and factory authorized service are available worldwide. For more information on the full Del Norte product line, write or call.

Del Norte Trisponder® and Pulstrac™ positioning and navigation systems provide unsurpassed accuracy and reliability.



DEL NORTE Technology, Inc.

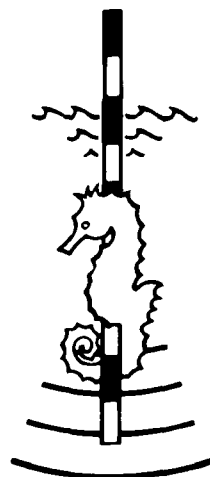
1100 Pamela Drive, P.O. Box 696
Eules, Texas USA 76039
Texas: 817 267-3541 US: 1-800 433-7505
Telex: 26 2449 DEL NORTE EULESS
FAX: 817 354-5762



15-17 NOVEMBER 1988

HYDRO 88

AMSTERDAM
RAI Congress Centre



**Sixth Biennial International Symposium of
The Hydrographic Society presenting the
latest developments in the hydrographic
profession supported by an exhibition
of equipment and services.**

Organised by
The Hydrographic Society
NETHERLANDS BRANCH

Co-sponsored by
The International Federation of Surveyors - FIG
The International Hydrographic Bureau
Lloyd's List



The Hydrographic Society

NORTH EAST LONDON POLYTECHNIC · LONGBRIDGE ROAD · DAGENHAM
ESSEX RM8 2AS · ENGLAND · TELEPHONE: 01-597 1946 · TELEX: 665080

AUSTRALASIA

Australian Maritime College
PO Box 986
Launceston Tasmania 7250
Tel 063 260711
Tx AMU 58827

DENMARK

Soopmalingen
Esplanaden 19
DK 1263 Copenhagen K
Tel 1935155
Tx 22204 FRVSKA DK

NETHERLANDS

RWS - Der Noordzee
Postbus 5807
2280 HV Rijswijk ZH
Tel 070 949500
Tx 33782

UK

NELP
Longbridge Road
Dagenham Essex RM8 2AS
Tel 01-597 1946
Tx 665080

US

PO Box 732
Rockville
Maryland 20851
Tel 301 443 8232
Tx 248376 OBSW UR

Performance and Style



Hydrographic Research Systems
Integrated Navigation · Research-Echosounders · Data Processing



Hydrographic Survey Systems
Precision Equipment for Position and Depth Determination
Hydrographic Data Processing

 **KRUPP ATLAS ELEKTRONIK**
A Sound Decision

Krupp Atlas Elektronik GmbH · P.O. Box 44 85 45 · D-2800 Bremen 44 · FRG · Phone (421) 457-0
Telefax (421) 457-2900 · Telex 2 457 460 ka d

Lighthouse

JOURNAL OF THE CANADIAN HYDROGRAPHIC ASSOCIATION

A journal dedicated to promoting the free exchange of information within the hydrographic community and to advancing the technical and professional ability of hydrographers.

It includes a variety of articles and topical news on advances in hydrography and historical perspectives.

Published twice yearly, in April and November, and is free to Association members.

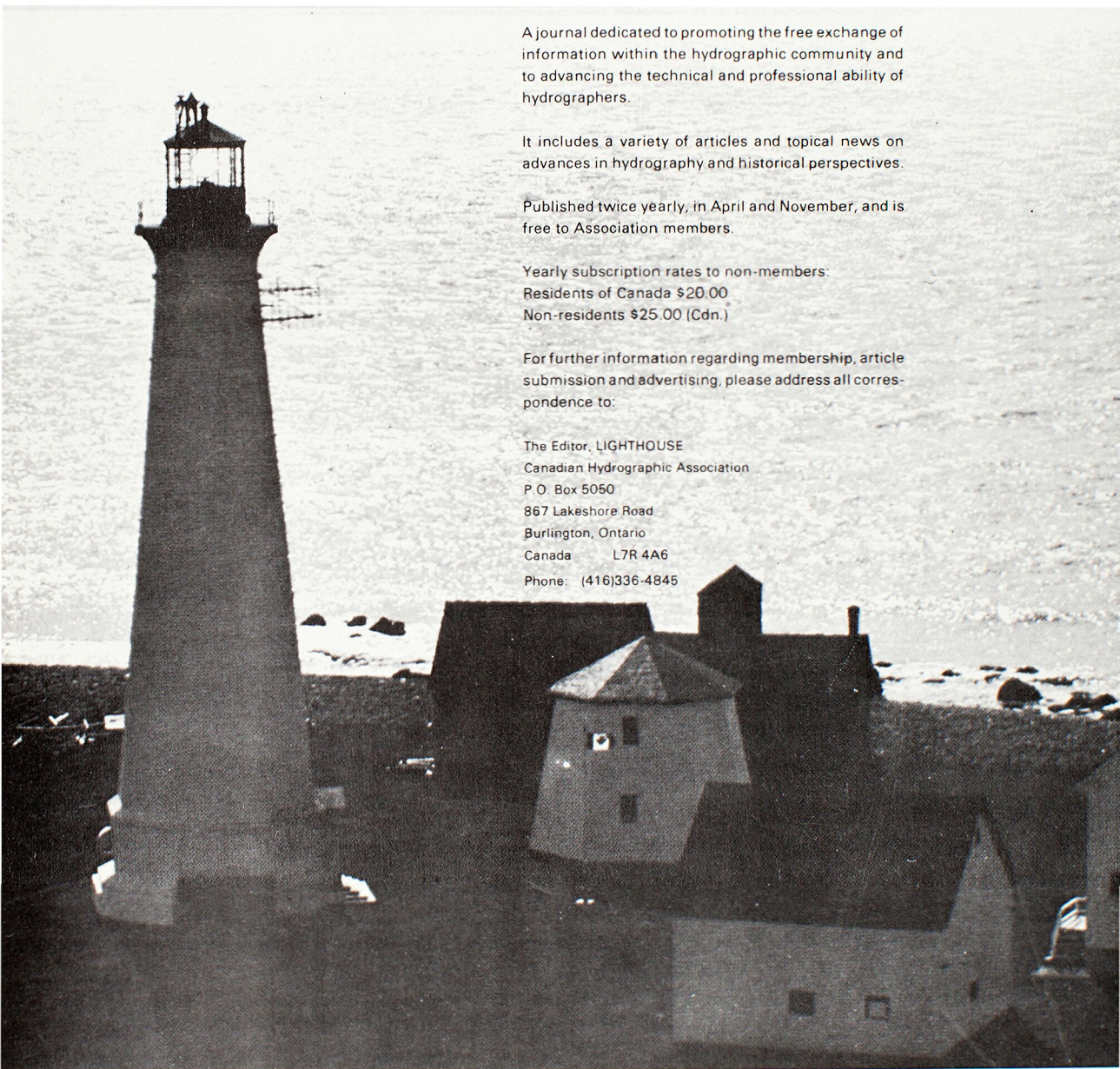
Yearly subscription rates to non-members:

Residents of Canada \$20.00

Non-residents \$25.00 (Cdn.)

For further information regarding membership, article submission and advertising, please address all correspondence to:

The Editor, LIGHTHOUSE
Canadian Hydrographic Association
P.O. Box 5050
867 Lakeshore Road
Burlington, Ontario
Canada L7R 4A6
Phone: (416)336-4845



FRENCH INSTITUTE OF NAVIGATION

3, Avenue Octave-Gréard — 75007 PARIS

**Publishes a Technical Review on
Maritime, Aerial and Spatial Navigation
entitled :**

NAVIGATION

which is issued quarterly
(January, April, July, October)



● **Registration.** — Applications for registration should be addressed to the Secretary-General. Membership of the French Institute of Navigation and dispatch of the review NAVIGATION are acquired for the full year from 1st January.

● **Annual Dues.** — 1988 :

— France 240 FF
— Abroad 290 FF

● **Payment.** — Preferably by bank transfer or postal payment to the Association's Postal Order Account : I.F.N. 1581-32 N Paris.

● Bank cheques only in French francs, payable in Paris; bank charges for the subscriber.

INTERNATIONAL HYDROGRAPHIC REVIEW

FOREWORD

The *International Hydrographic Review* is published twice a year (January and July) in separate English and French editions.

Original articles are welcomed on hydrography, oceanography, cartography, photogrammetry, geodesy, navigation and allied subjects, radio aids, automation, new instruments, equipment and hydrographic vessels, as well as on the history and organization of hydrographic offices.

The latest date for receipt of manuscripts is :

— 1 August for the January issue,

— 1 February for the July issue,

but earlier submission greatly facilitates the work of preparing translations.

Articles should be addressed to : The Directing Committee, International Hydrographic Bureau, B.P. 445, MC 98011 MONACO Cedex (Principality of Monaco).

Up to 50 reprints per article can be supplied free to the author(s). They must be ordered prior to publication, and may be in either language or a proportion in each. Further copies ordered are charged at cost price, plus postage.

The Directing Committee does not hold itself responsible for statements or opinions expressed by contributors to the Review.

Notes for contributors

Papers should be as concise as possible for maximum reader value, and an abstract of up to 150 words is desirable. Uncommon expressions or constructions should be avoided since a large proportion of readers are necessarily reading the Review in a language that is not their mother tongue.

Any permission needed to incorporate material published elsewhere is the responsibility of authors, and it will be assumed that such permission has been obtained.

Texts should be submitted in English or French (or both), though by special arrangement articles in Spanish, Italian or German could be accepted for translation in the Bureau.

Two copies of the article are required, typed in double spacing with adequate margins and on one side of the paper only. Authors should check manuscripts very carefully as no responsibility can be taken for errors of fact or presentation.

Bibliographic references should be listed at the end of the article in the standard Harvard form. Footnotes should be kept to a minimum, and metric measures used throughout.

Illustrations, already numbered and titled, should be supplied ready for reproduction by the offset method and for reduction to 12.5 x 21 cm, the effective size of a Review page. Positive or negative transparencies (repromats) are preferred. Photographs should be black and white glossy prints and be limited to those necessary for an understanding of the text.

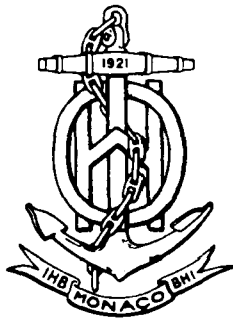
As the Review is a two-language publication a minimum of wording should be shown on the illustrations themselves, explanations being confined to the legend beneath.

Printer's proofs are corrected in the Bureau and are not normally sent to authors.

PP-01

THE INTERNATIONAL HYDROGRAPHIC REVIEW

Vol. LXV



No. 1

(No. 122 OF THE SERIES)

PUBLISHED AND PRINTED BY

THE

INTERNATIONAL HYDROGRAPHIC BUREAU

B.P. 445 — 7, avenue Président J.F. Kennedy

MC 98011 MONACO Cedex

PRINCIPALITY

JANUARY 1988

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

MEMBERS OF THE IHO

ARGENTINA	NEW ZEALAND
AUSTRALIA	NIGERIA
BELGIUM	NORWAY
BRAZIL	OMAN
CANADA	PAKISTAN
CHILE	PAPUA NEW GUINEA
CHINA	PERU
CUBA	PHILIPPINES
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	POLAND
DENMARK	PORTUGAL
DOMINICAN REPUBLIC	REPUBLIC OF KOREA
ECUADOR	REPUBLIC OF SOUTH AFRICA
EGYPT	SINGAPORE
FIJI	SPAIN
FINLAND	SRI LANKA
FRANCE	SURINAME
GERMAN DEMOCRATIC REPUBLIC	SWEDEN
GERMANY, FEDERAL REPUBLIC OF	SYRIAN ARAB REPUBLIC
GREECE	THAILAND
GUATEMALA	TRINIDAD AND TOBAGO
ICELAND	TURKEY
INDIA	UNION OF SOVIET SOCIALIST REPUBLICS
INDONESIA	UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND
IRAN	UNITED STATES OF AMERICA
ITALY	URUGUAY
JAPAN	VENEZUELA
MALAYSIA	YUGOSLAVIA
MONACO	ZAIRE
NETHERLANDS	

INTERNATIONAL HYDROGRAPHIC BUREAU

DIRECTING COMMITTEE

President : Rear Admiral Sir David W. HASLAM, KBE, CB, FRICS, Royal Navy (UK) (Retd.)

Directors : Rear Admiral A. CIVETTA, Italian Navy (Retd.)
Mr Adam J. KERR, MSc. (Canada)

Price 125.00 French Francs. For conditions of sale see *List of Publications 1988*.

TABLE OF CONTENTS

— Obituary — Commodore A.H. COOPER (G.S.R.)	7
— The present and future of the Chinese surveying and charting (LIU CHANG GUI)	11
— HMS ROEBUCK — The ship and her systems (U.K. HYDROGRAPHIC DEPARTMENT)	21
— Continental shelf survey project of Japan (T. SATO and S. OSHIMA)	41
— Contour processing and 3-D image processing of Sea Beam bathymetric data (A. ASADA)	65
— Marine safety information (R.E. HEARSEY)	81
— Information management in the modern hydrographic office — A challenge for the 21st century (K.G. BURROWS)	93
— A brief discussion on Zheng He's nautical charts and the presentation of the ancient-present contrast of Zheng He's nautical charts (ZHU JIANQIU)	107
— Computer assisted cartography in nautical charting — An appraisal (P. SATYANARAYANA and S. PRAKASH)	115
— Storm surge generation by winter cyclones at Alexandria, Egypt (A.A. HAMED and A.A. EL GINDY)	129
— Tidal analysis of long series (A.S. FRANCO and J. HARARI) ...	141
— Spurious long-period tides due to tide gauge errors (B.V. HAMON)	159
— A proposal for modesty (R.L. FISHER)	163
— 50 years ago	167