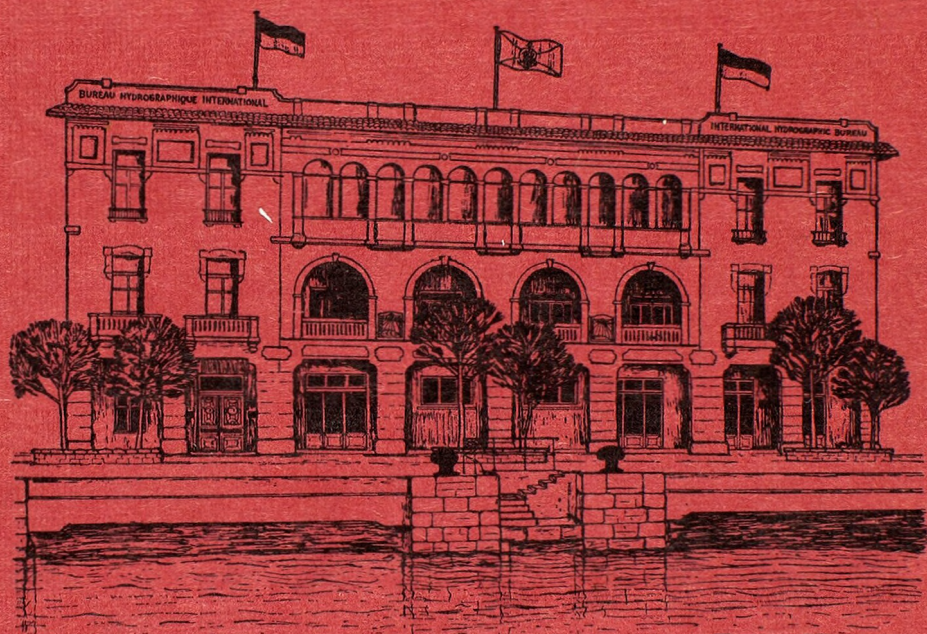


THE
INTERNATIONAL
HYDROGRAPHIC
REVIEW



**INTERNATIONAL HYDROGRAPHIC BUREAU
MONACO**

Vol. LIV No. 2

NO. 101 OF THE SERIES

JULY 1977

Recently published by the International Hydrographic Organization

INDEX 1971-1976
TO THE
INTERNATIONAL HYDROGRAPHIC REVIEW

Subject and Author Index sections
Published December 1976 in English and French versions.

Price : 5 francs.

XXXXXXXXXXXXXXXXXXXX

The 1977 Edition of the
YEARBOOK
of the
INTERNATIONAL HYDROGRAPHIC ORGANIZATION

containing particulars about Hydrographic Services throughout the world,
together with details about the scope of their work.
This invaluable reference work also features particulars about the participation
of the forty-six maritime nations whose Governments are Members of the
International Hydrographic Organization.

Price : 40 francs.

XXXXXXXXXXXXXXXXXXXX

S.P. 39 (see overleaf) : important new section on
HI-FIX/6
published December 1976.

English & French versions.

Section can be bought separately; Price : 15 francs.

XXXXXXXXXXXXXXXXXXXX

LIST OF IHO PUBLICATIONS

1977 edition

English & French versions. Free.

XXXXXXXXXXXXXXXXXXXX

INFORMATION CONCERNING RECENT BATHYMETRIC DATA

List No. 6, bilingual, with data on 71 cruises.

Published Nov. 1976, 53 pp. Price : 5 francs.

MICROFILMS

of all issues of the
INTERNATIONAL HYDROGRAPHIC REVIEW

can be ordered through Xerox University Microfilms at either 300 North
Zeeb Road, ANN ARBOR, Michigan 48106, U.S.A., or St. Johns Road,
Tylers Green, PENN, Bucks, England, to whom all enquiries for this
service should be addressed.

Xerographic copies of out-of-print issues of the complete Review, as well
as of individual articles can also be supplied.

Some Special Publications of the
INTERNATIONAL HYDROGRAPHIC ORGANIZATION :

HYDROGRAPHIC DICTIONARY

(THIRD EDITION)

Special Publication No. 32

A dictionary containing definitions of over 5600 current technical terms. In its bilingual version has full definitions in both English and French.

The indexed lists of equivalent terms in Italian and Spanish will be available later as Supplements to SP 32.

Price : 70 francs (English/French)
45 francs (English only)



RADIO AIDS

TO MARITIME NAVIGATION AND HYDROGRAPHY

(S.P. 39 - 2nd Edition, 1965 - reprinted 1969)

The principles of radioelectronic systems and instruments used in navigation and hydrographic surveying are outlined, and a general description is given of a number of these systems.

The following subjects are treated :

1. The spectrum and propagation of electromagnetic waves.
2. Equipment for use in marine navigation : Radio direction-finding, Loran, Decca, Consol, Radar, and Omega.
3. Equipment for use in hydrographic surveying : Decca, Raydist, Lorac, Rana, Hi-Fix, Hydrodist, Sea-Fix, Toran, **Hi-Fix/6 (1976)**.
4. Computation and plotting of hyperbolic lattices : the methods used by various Hydrographic Offices (Denmark, France, U.S.A., Sweden, Netherlands, United Kingdom).
5. Equipment for use in geodetic surveying : General aspects and use of radio positioning systems, Aga geodimeter, Tellurometer, Electrotape.

The work is published in loose-leaf form and contains approximately 550 pages with about 270 figures.

Price : 85 francs.

THE INTERNATIONAL HYDROGRAPHIC ORGANIZATION

an intergovernmental organization
also publishes the

INTERNATIONAL HYDROGRAPHIC BULLETIN

A monthly journal, published by the International Hydrographic Bureau for the benefit of the world hydrographic community, in a bi-lingual edition (English and French), 21 × 30 cm in size, with an average of 30 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 and progress in standardization of charts.

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

SECTION III — Listings 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.

“From the Chartroom” : notes on charts and nautical documents recently added to our world-wide collection.

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 60 French Francs) or per copy (6.00 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 \$ at current exchange rates, as appropriate. Packing and postage or shipping expenses will be added to invoices.

A discount of 25 % on list prices is allowed to booksellers. A 30 % reduction is granted to government offices, naval and merchant marine officers and practising hydrographic surveyors of IHO Member States ordering direct from the Bureau.

Payments may be made to the International Hydrographic Bureau by international money order or by cheque.

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

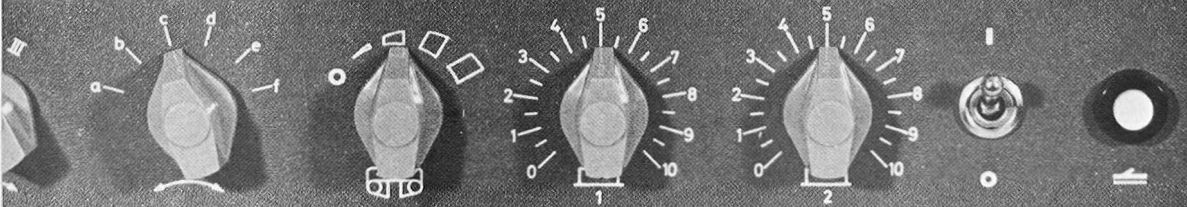
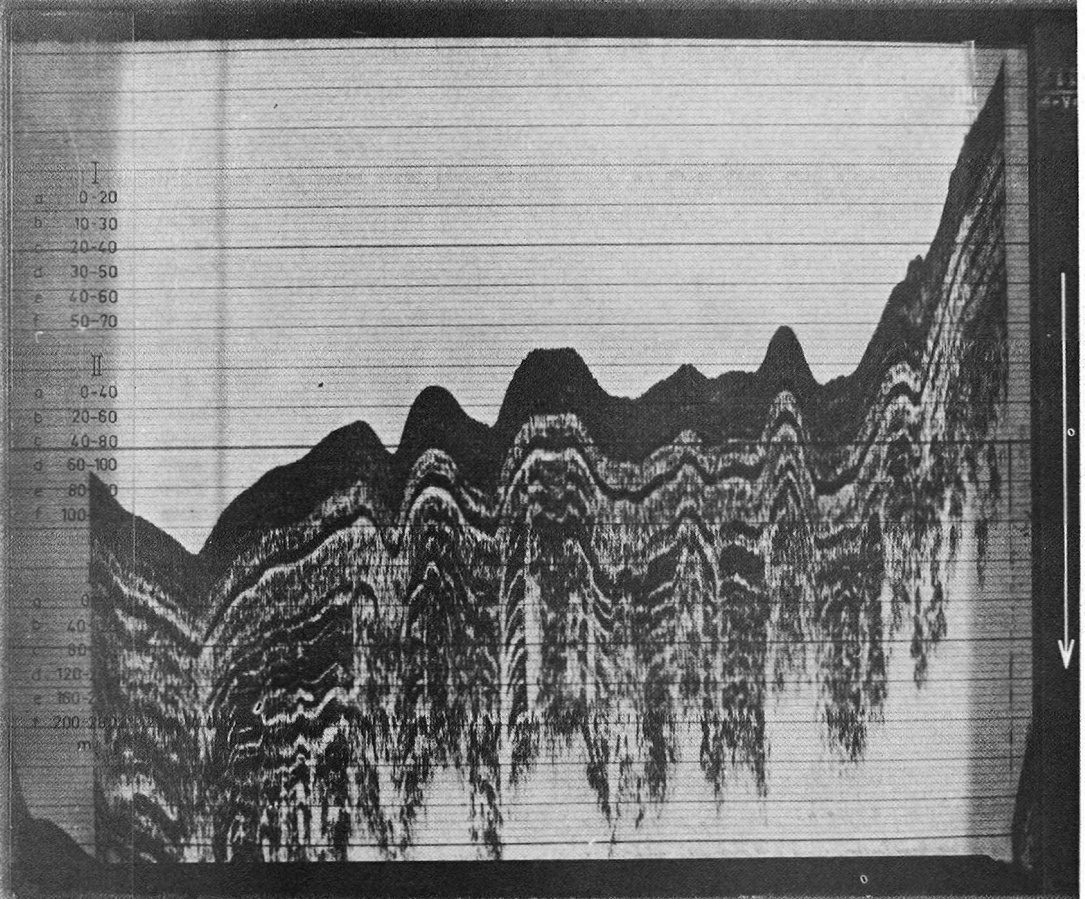
Orders can be sent either to a bookseller or direct to :

International Hydrographic Bureau, Avenue Président J.F. Kennedy,
MC MONTE-CARLO, Principality of Monaco.

Teleph. : 50.65.87 — Teleg : BURHYDINT, Monaco

Telex : (France) 469870 (MCS CARLO), ATTN INHORG

ATLAS-DESO 10



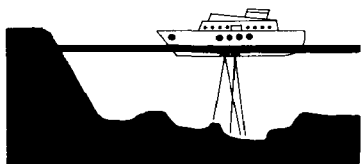
KRUPP

ATLAS-ELEKTRONIK

The dual channel survey echosounder

Simultaneous sounding with two frequencies, that's possible now with the new survey sounder of ATLAS-ELEKTRONIK: ATLAS-DESO 10.

There are four frequencies: 30 □, 33 □, 100 □, 210 □ kHz, one or two together. The choice is yours. A high and a low frequency: 30 and 210 kHz for instance. The reason for this: High frequencies penetrate through any water. Even through strongly aerated propeller wash. The bottom recordings remain clear and free of unwanted interruptions. And what counts still more: high frequencies are strongly reflected by soft bottom such as mud, most dangerous in river and waterway channels.



Low frequencies on the other hand are reflected by solid bottom: sand, rock, pebbles. With simultaneous radiation of a high and a low frequency both are recorded. Easily to be distinguished: mud and solid bottom. In two colours: grey and black. Depending on the adjusted intensity. Information you should make use of. For better observation means better decisions. ATLAS-DESO 10 – that's safety wherever you need it.

Technical data

Power input: max. 60 W

Starting current: 10 A

Operational voltage:

24 V = + 20% - 15%

Transmitter frequencies:

30 kHz

33 kHz

100 kHz

210 kHz

} one alone or
two simultaneously

Accuracy of measurement

in the 20 m range: abt. \pm 5 cm

in the 40 m range: abt. \pm 10 cm

in the 80 m range: abt. \pm 20 cm

Voltage fluctuations from - 15% to + 20% do not affect the measured result

Sounding rate

at a water sound velocity of

C = 1500 m/sec

in the 20 m range:

10 soundings/sec.

in the 40 m range:

5 soundings/sec.

in the 80 m range:

2,5 soundings/sec.

Recording paper

Width: 230 mm

Recording width: 200 mm

Length: 16 m

Paper speed

independent of the adjusted range

1.25 cm/min

2.5 cm/min

5.0 cm/min

10.0 cm/min

Water sound velocity

adjustable over full range

indicator ranges at choice

I. 1360 - 1480 m/sec

II. 1420 - 1540 m/sec (standard)

III. 1480 - 1600 m/sec

Measuring ranges

Group A: 0-280 m

subdivided in 3 basic

measuring ranges

20 / 40 / 80 m and 15

phased measuring

ranges in 20/40/80m

stages

Group B: 0-1400 m

subdivided in 3 basic

measuring ranges

100 / 200 / 400 m and

15 phased measuring

ranges in 100 / 200 /

400 m stages

Group C: 0-700 ft

subdivided similar to

Group A

Group D: 0-3500 ft

subdivided similar to

Group B

ATLAS-DESO 10 is fully transistorized and thus immediately ready for operation. The only thing to be done is to switch it on. Select range and paper speed (one out of four - 1.25/2.5/5.0 and 10.0 cm/min), and adjust gain and illumination as required.

Everything else is automatic. ATLAS-DESO - an apparatus for work. In every respect. Thus for instance the folding window can be opened during operation to make entries on the paper. The recording table is vibration-free. Window and casing have magnetic locks. The recorder also can be delivered with sliding window.

Each apparatus has a marker key for ordinary position and time markings on the recording paper. Further keys for hand and foot remote-control can be supplied and connected by means of plugs.

For reliability and accuracy choose the double effect of two-frequency sounding for your new survey sounder ATLAS-DESO 10.

For special information write to



KRUPP

KRUPP ATLAS-ELEKTRONIK

D 2800 Bremen 44

P.O. Box 44 8545

Phone (0421) 45831

Telex 0244890

MORE SOUNDING MILES PER WEEK WITH HYDROTRAC™

A bewildering choice of positioning systems is available today, offering a wide range of attractive operational features. Every system is a compromise however, since additional features are gained at the expense of complexity, and the intending purchaser should consider whether the trade-offs which the manufacturer has made on his behalf are those which he would have chosen for himself.

In the Hydrocarta Corporation we believe that there are some features that are paramount, and our Hydrotrac system is designed to incorporate them. Equally we believe that a purchaser is entitled to know what these features are; in an advertisement or a brochure they make dull reading, but to the man in the field with a job to be done they make the difference between success and failure.

- **Reliability.** A proven MTBF of 8000 hours per chain, measured over a 2½ year period, for four Hydrotrac chains in the Gulf of Mexico.
- **Ease of Maintenance.** Every unit is designed for field maintenance; every sale includes training, circuit diagrams and complete documentation; every component is available from an electronic supply house.
- **Repeatability.** The receivers are self-referencing and the standard deviation of the system - with propagation variations excluded - is better than .01 lane. This is achieved without mathematical smoothing so that the receiver reacts instantaneously to the movement of the vessel.
- **Retention of Lane Count through Electrical Storms.** In her first cruise with Hydrotrac, the U.S. National Ocean Survey Vessel Mount Mitchell recently surveyed 1800 miles in 7 days. No lanes were lost despite electrical storms, twenty four hour operation and distances of up to 110 miles from the shore stations. On tying back there was an error of .03 lanes on each pattern. On her next cruise she surveyed 2400 miles in 12 days, again without loss of a lane and with closing errors of .00 and .05.
- **Ease of Receiver Operation.** In the Set mode the frequency may be dialed in, the lanes set, and the appropriate systematic error correction applied, by easy front panel controls. In the Operate mode each of these controls is disabled, but the operator may freeze the display for easy reading, or, if lanes should slip, he may toggle them back one lane at a time.
- **Availability of the hyperbolic mode.** The ease of drawing range circles should not blind the user to the merits of the hyperbolic mode:
 - * the geometric accuracy is often greater along a concave coastline or where off-shore islands exist.
 - * no transmissions are required from the vessel, so there is no RF interference with sensitive equipment and small boats do not need large antennas.
 - * in Range Range mode the diurnal variations in the velocity of propagation, due to changes in the refractive index, cause significant systematic errors at extended ranges - the error is always less, and normally considerably less, in hyperbolic mode because of the differential readings:
 - * the possibility of using a monitor station (not available in Range Range) allows such propagation variations to be measured and corrected.
 - * if more than one ship is working the cost is lower.

Sometimes of course Range Range is preferable; with Hydrotrac you have the choice.

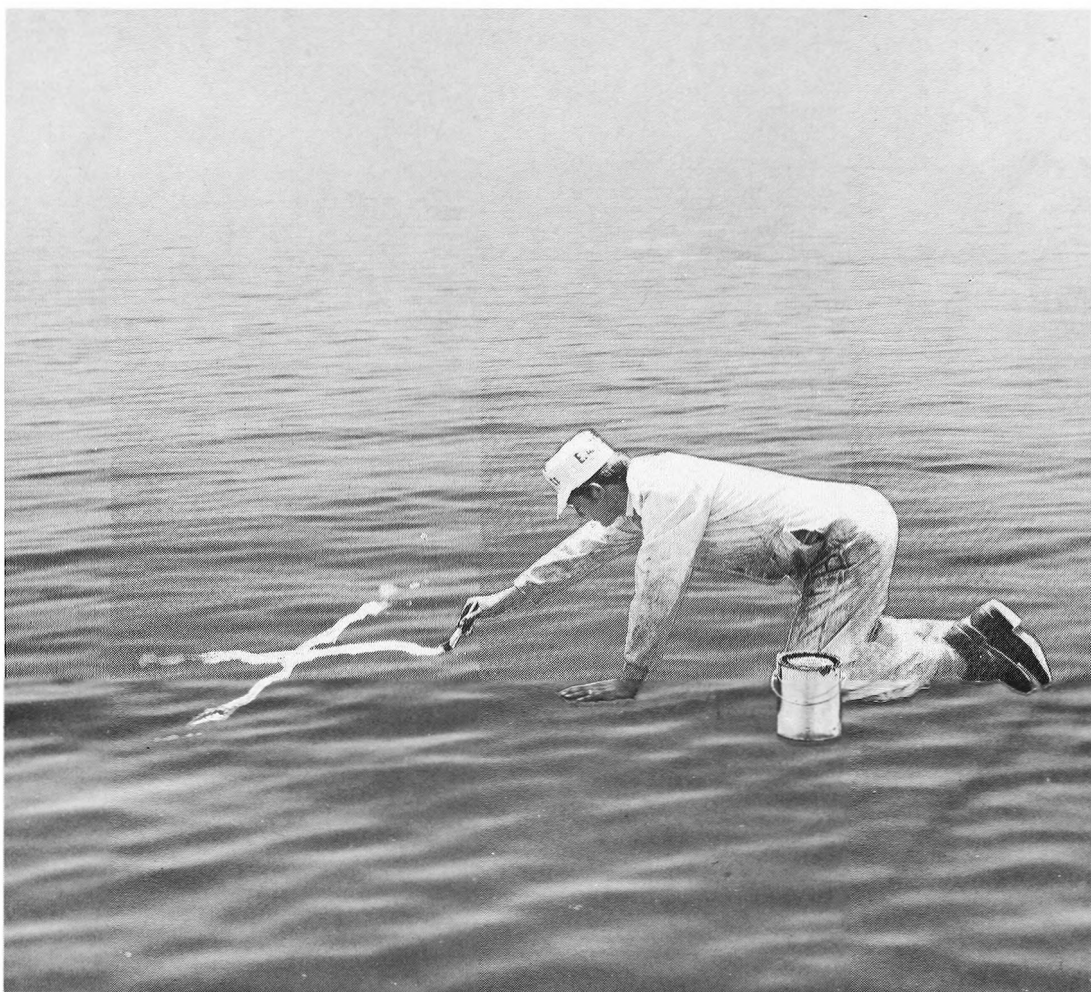
- **Availability at Extended Ranges.** Inflated claims are sometimes made; the informed user knows that, within a given frequency band, successful long range operation depends on transmitter power output, the duration of each signal pulse, if intermittent, and the receiver's capacity to reject spurious signals. The respective figures for Hydrotrac are 150 watts PEP (maximum), 300 msec per second and a receiver bandwidth of 100 Hz at 3 dB points.

- **Ability to work through Skywave.** Skywave reflection of 2 MHz signals is an inevitable, if unfortunate, fact of life. No system in this frequency band can eliminate it; the best that can be attempted is to mitigate its effects. In Hydrotrac the maximum rate of pattern movement is preset to correspond to the maximum speed of the vessel. If signal cancellation occurs, lanes cannot be lost in an uncontrolled manner; with careful operation, work can continue in marginal conditions.

European Representatives: Gardline Surveys of Riverside Road, Gorleston, Norfolk, N R 31 6 PK, England.

9730 Town Park Drive, Houston, Texas 77036
(713) 771-1263

THE HYDROCARTA CORPORATION



How do you mark the spot at sea?

Accurate position measurement is our business. Our modern Raydist DR-S system can "mark the spot" within a few feet for your off-shore work hundreds of miles seaward.

To get continuous, repeatable data we use shore stations—just two of them. We made our shore station electronic packages 100 percent solid state for highest reliability, light weight (only 27 pounds) and low power (just 2 amps at 24 volts DC). It takes about two hours to put a station into operation, making Raydist by far the most portable radio-location system available for use beyond line-of-sight.

Do you have unusual or demanding requirements? Raydist has enough built-in flexibility to handle just about anything you can come up with, such as four-party range-range operation, unlimited-user passive operation, and enough output flexibility to handle our wide selection of control and display accessories, or to interface directly with your computer or digital tape recorder. We can even provide our unique HALOP alternate coordinate geometry by means of an inexpensive attachment.

To find out more about Raydist DR-S and the complete line of Raydist accessories, call or write:



TELEDYNE HASTINGS-RAYDIST

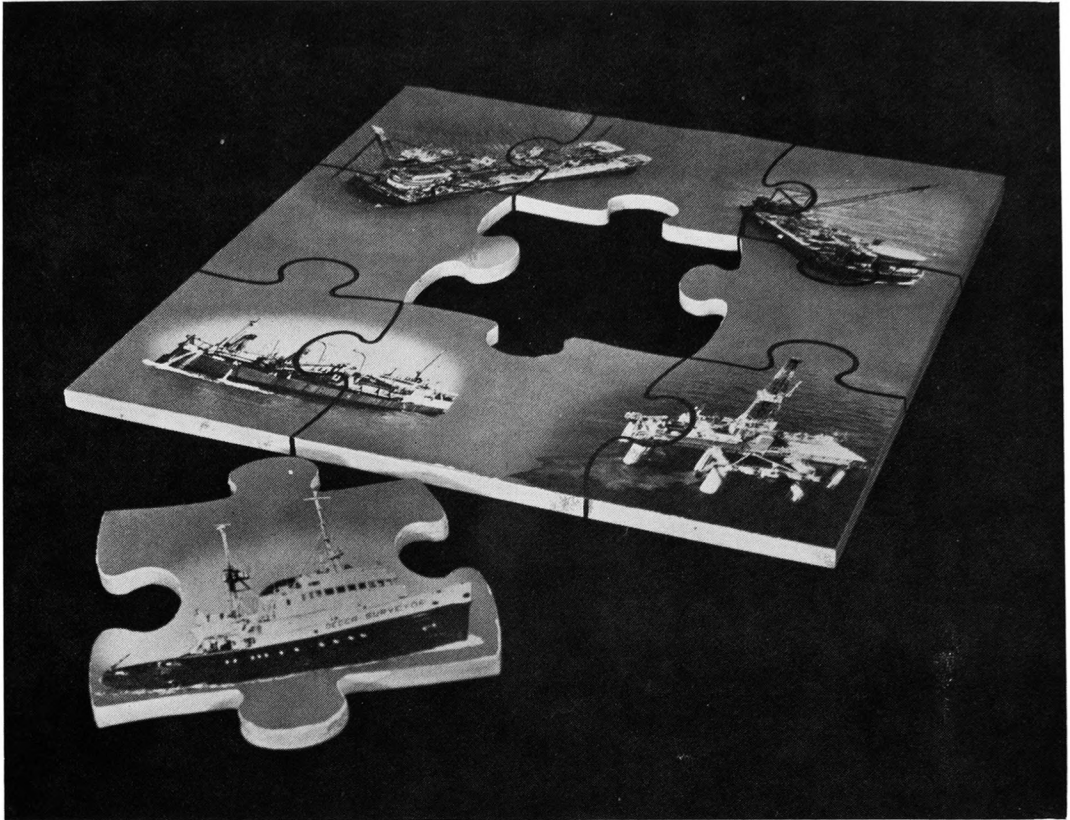
P. O. Box 1275

Hampton, Virginia 23361, U.S.A.

Telephone: (703) 723-6531

TWX: (710) 822 0085

CABLE ADDRESS: "HASTRAY", Hampton, Virginia



We're great at putting everything in its proper place- precisely.

Because positioning is our business. And because we've been doing it for a long time now. For over 30 years, we have been steadily developing and improving electronic positioning aids.

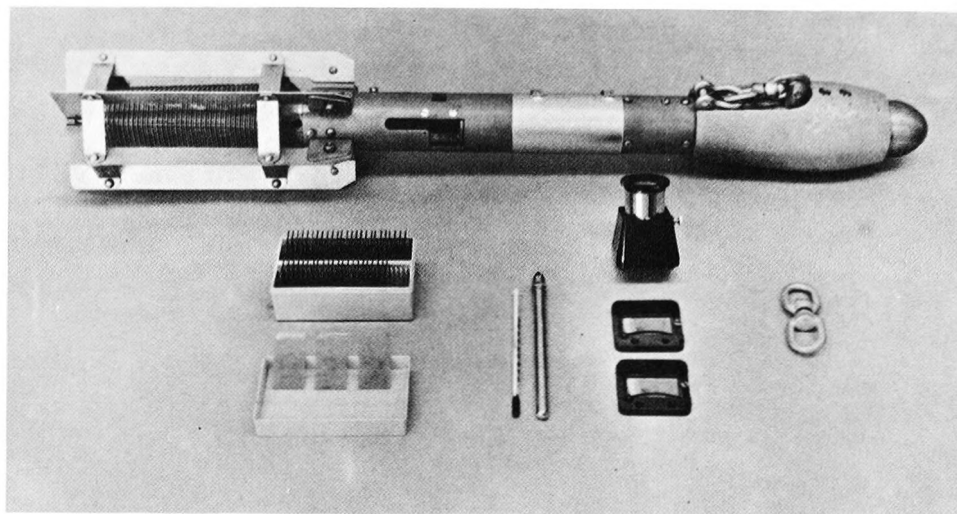
Today, as the Decca Survey Group of companies, we are strategically stationed to provide a comprehensive survey service anywhere on demand. Precisely positioning rigs and platforms in the search for oil and minerals offshore. Undertaking the vital survey work associated with dredging and port and harbour maintenance and

development. And surveying the routes for pipes and cables in the seas and oceans of the world.

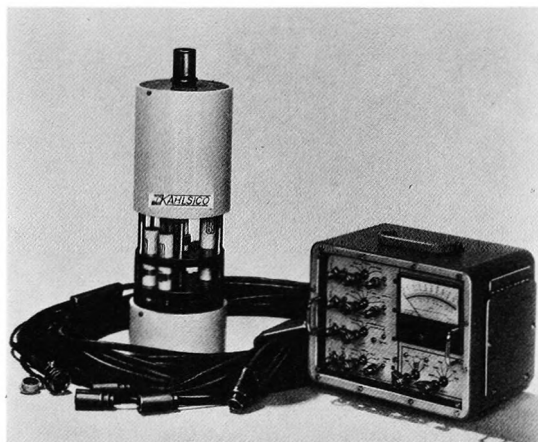
We have the most experienced personnel. The most comprehensively fitted vessels. And the most advanced electronic equipment — including acoustic and satellite positioning aids.

Whenever you need precise positioning services, you need us. The Decca Survey Group. In positioning, we're *precisely* the people who matter.

ds DECCA SURVEY GROUP
anytime anywhere



KAHLSICO BATHYTHERMOGRAPH (BT) is an efficient and reliable device which graphically records on a gold-plated glass slide both temperature and depth measurements as the BT is towed through the water at speeds up to 15 knots. It may be used to depths of 270 meters (900 ft). As illustrated, the equipment comes complete with all accessories, including a calibrated grid, viewer and thermometer, all packed in a special, compartmented storage case.



HYDROLAB SYSTEM, a modern and reliable in-situ measuring and monitoring system consisting of a control unit, cable and underwater sonde with sensors to measure various parameters including Temperature, Depth, Conductivity, Dissolved Oxygen, pH, Redox, Specific Ion, etc. Accessory recorders and data loggers are available.



REMOTE CURRENT METER, uses a special Savonius rotor and coupled compass to provide accurate measurements of water speed and direction. Special design features make this the most reliable unit available. Accessory recorders and data loggers can be provided as well as temperature and depth measuring systems.

Consult us with regard to your needs for other instruments such as Fog Alarm Systems for platforms or coastlines, Tide Gauges, Current Meters, Corers, Dredges, etc.



P. O. Box 947, EL CAJON, California 92022, U. S. A.
Telex : 697906 Telephone : (714) 444-2158

Our Instruments Are In World-wide Use
HYDROLOGY - OCEANOGRAPHY - METEOROLOGY

we're helping hydrographers read between the lines

*in Argentina, Australia, Canada, Finland,
France, Iceland, India, Italy, Japan, Korea,
Kuwait, Malaysia, Netherlands, Portugal,
Spain, United Kingdom, U.S.A.*

EG&G developed the first commercial Side Scan Sonar in the late 1960's. Since then this unique underwater scanning system has become an essential tool of hydrographers and ocean engineers around the world.

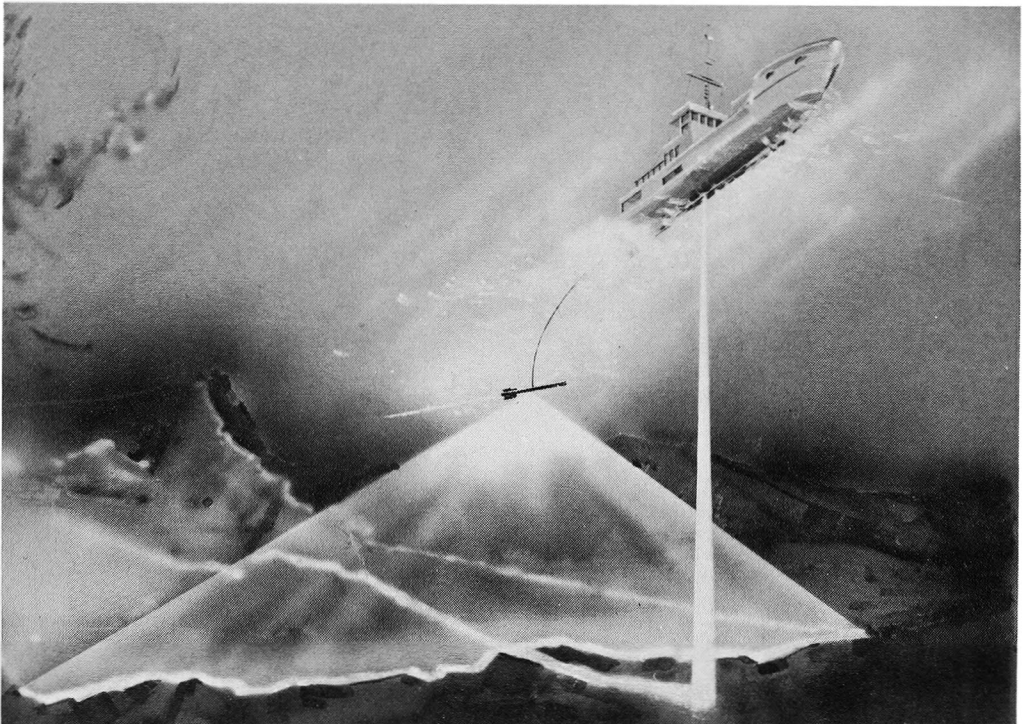
Hydrographers use it, typically, in conjunction with sounding equipment, to provide 100% coverage between survey lines, eliminating the chance of overlooked navigation hazards and permitting more detailed charting of bottom features. They also find it useful in survey planning, channel mapping, etc.

But the reliability, ease and flexibility of operation, and unsurpassed range and resolution of EG&G equipment have made it equally useful in dozens of other applications. Engineers, researchers and surveyors use it, often with EG&G's new "Deep Tow" system, for geological surveys, siting and pre-construction studies, cable and pipeline surveys, search and salvage operations and many other ocean floor investigations.

EG&G inventories side scan systems for immediate shipment. Our exclusive Tech-ALERT service ensures round-the-clock, world-wide availability of technical assistance and replacement parts. Send for new Side Scan catalog.



ENVIRONMENTAL EQUIPMENT DIVISION
151 Bear Hill Road
Waltham, Massachusetts 02154
(617) 890-3710 TELEX: 92-3429



EP210 Freescan digitiser

- Designed as a production tool.
Fast, easy to use, ergonomic.
- No mechanical moving parts.
- Unique digital readout on hand-held cursor allows verification of work without taking eyes away.
- High resolution and accuracy.



Other Ferranti ADE equipment:
EP211 Gantry Drawing Reader—

for applications like drawing
office automation and part
programming for machine tools.


Freedraft Interactive System—

fully integrated hardware/software
system using the Freescan
Digitiser. Allows on-line verification and
interactive editing.

No-one is as deeply involved in computer graphics
as Ferranti who bring to drawing readers higher cost
effectiveness than ever before.

Send for leaflets to
Ferranti Limited, Information Equipment Group (Sales),
Ferry Road, Edinburgh, Scotland, EH5 2XS.
Telephone: 031-332 2411

FERRANTI

IEG 16 



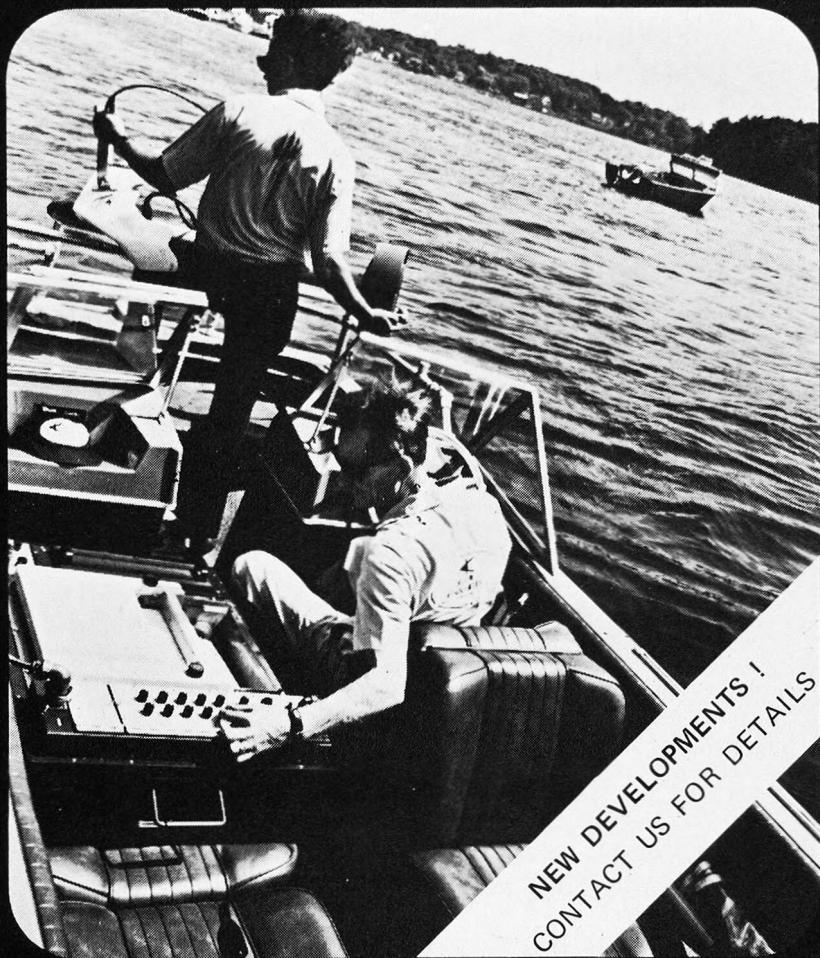
The **Journal of Navigation** is the periodical publication of the Royal Institute of Navigation. It contains authoritative papers on every aspect of navigation — air, sea and space — and papers of every type — scientific, historical and narrative. It also publishes reviews of important books on navigation and a record of current navigational work.

The **Journal** is completely international in character and a sizeable proportion of its contributions always come from abroad. Its circulation likewise is wholly international.

Readers of the **Journal** comprise members of the Institute and other subscribers who are for the main part air and sea navigators, scientific workers of one kind and another concerned with navigation, and an increasing number of yachtsmen. It is widely circulated at sea, in government departments with navigational responsibilities, and in the shipping and aeronautical industries. The **Journal** costs £4.50 an issue (£14 a year plus postage) and is published (January, May & September) by :

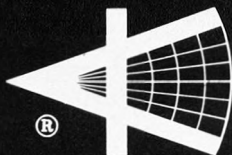
The Royal Institute of Navigation
at The Royal Geographical Society
1 Kensington Gore, London SW7 2AT

**A SIDE SCAN SONAR SYSTEM
IS AN IMPORTANT INVESTMENT—
YOU OUGHT TO HAVE THE BEST...**



HYDROSCAN

KLEIN SIDE SCAN SONAR



KLEIN ASSOCIATES, INC.
UNDERSEA SEARCH AND SURVEY

Route 111 • RFD 2 • Salem, New Hampshire 03079 U.S.A.
• (603) 893-6131

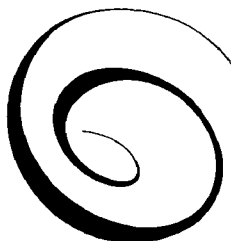
FRENCH INSTITUTE OF NAVIGATION

3, Avenue Octave-Gréard — 75 - PARIS (7^e)

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

NAVIGATION

which is issued quarterly



● **Membership.** — Applications should be addressed to the Secretary-General. Admission is decided by the Council. *Navigation* is despatched regularly to Members of the French Institute of Navigation.

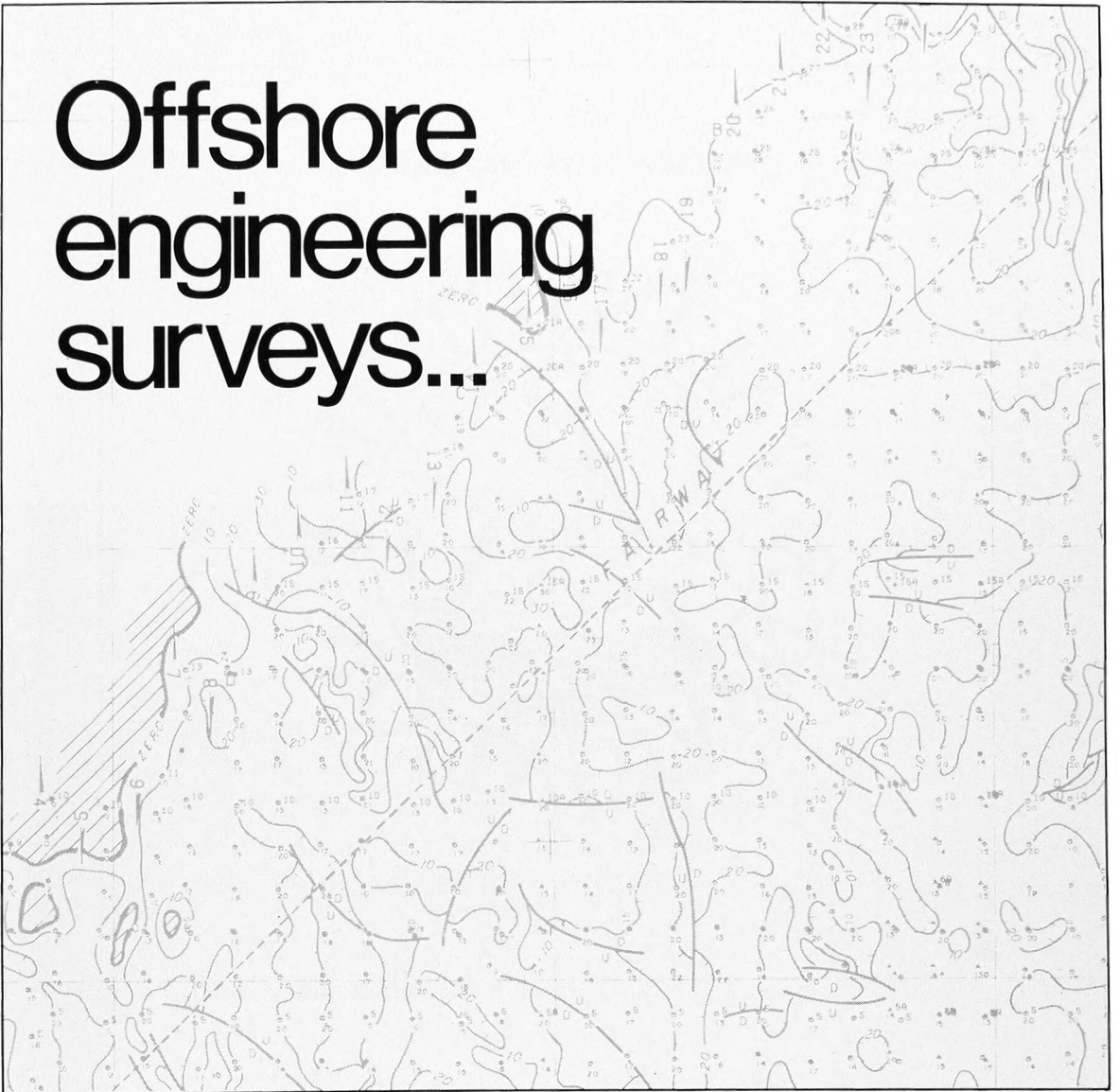
● **Annual Dues :**

- Active Members **75 F**
- Associate Members (resident abroad) ... **85 F**

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

Bank cheques payable in Paris in French francs are accepted.

Offshore engineering surveys...



Offshore Navigation, Inc., offers a complete survey package for offshore engineering studies. The system capabilities span the full range of requirements—from bathymetric surveys to bottom shear analysis to gas pocket and shallow fault identification to archaeological site investigation. A team of trained navigators, oceanographers, geophysicists and technicians, backed by ONI's superior record of field service to the offshore industry, insures the reliability of each survey. Call or write for a copy of Offshore Engineering Surveys.



OFFSHORE NAVIGATION, INC.
P. O. Box 23504
New Orleans, Louisiana 70183
Phone: (504) 733-6790
Cable "OFFNAV", Telex 058-381



DO YOU CATCH A BOAT TO WORK?

If you do you will be better informed as a member of the HYDROGRAPHIC SOCIETY and a reader of the HYDROGRAPHIC JOURNAL.

THE HYDROGRAPHIC SOCIETY

The Hydrographic Society was formed to further the interests of all those concerned with surveying at sea. Its membership is international and broadly based, in order to unite surveyor, equipment manufacturer and client. Over 40 Corporate Members and 500 surveyors, engineers, geologists and geophysicists from more than 30 countries now enjoy the benefits of membership.

The Society offers a variety of services to members, including a Journal, Information Sheets at approximately two-monthly intervals, Special Publications, Symposia, lectures and an employment information service.

THE HYDROGRAPHIC JOURNAL

As the forum of the Hydrographic Society, the Journal provides a medium wherein the knowledge, experience and views of individuals, firms, and organisations engaged in the profession of surveying at sea can be published. It also records the activities and functions of the Society.

Two issues per annum, published Spring and Autumn.

The options are:-

Full Individual Membership — £2 joining fee and £7.50 p.a. (Journals and Information Sheets supplied free, by airmail).

Full Corporate Membership (for organisations) — £20 joining fee and £40 p.a.

Subscriber (non member) —
£5 p.a. plus postage (Journal)
£10 p.a. plus postage (Journal and information sheets)

For further information and membership applications write to:-

Hon. Secretary
The Hydrographic Society
Department of Land Surveying
North East London Polytechnic
LONDON E17 4JB

For Journal subscription write to:-

Subscription Secretary
67 Kingtree Avenue
Cottingham
North Humberside
HU16 4DR



The Canadian Hydrographers Association
publishers of

LIGHTHOUSE

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

LIGHTHOUSE is published twice yearly, in April and November;
yearly subscription rate is \$6.00 (Canadian)

Correspondence should be addressed to:

The Editor
LIGHTHOUSE
c/o The Canadian Hydrographers Association
P.O. Box 5050
867 Lakeshore Road
Burlington, Ontario
Canada
L7R 4A6

**THE
INTERNATIONAL HYDROGRAPHIC REVIEW**

FOREWORD

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

The Directing Committee and the Editor are not responsible for statements or opinions expressed by contributors to the Review.

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 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, Avenue Président J.F. Kennedy, MC MONTE-CARLO (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.

Notes for contributors

Texts should be submitted in English or French (or both) though by special arrangement Spanish, Italian or German could be accepted for translation by the Bureau. The 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) they hamper the production of a definitive translation in the Bureau;

b) a large proportion of readers are still necessarily reading the Review in a foreign language.

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

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 the Bureau takes no responsibility 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 sent ready for reproduction by the offset method and for reduction to 13 × 20 cm, the effective size of a Review page. Positive or negative transparencies (repromats) are preferred.

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.

Photographs should be black and white glossy prints and be limited to those necessary for an understanding of the text.

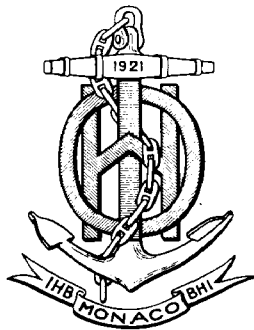
Printer's proofs are corrected in the Bureau and are not normally sent to authors.

M. R. HEALY
Editor

THE INTERNATIONAL HYDROGRAPHIC REVIEW

Vol. LIV

No 2



(No 101 OF THE SERIES)

PUBLISHED BY

THE

INTERNATIONAL HYDROGRAPHIC BUREAU

Avenue Président J. F. Kennedy, Monte-Carlo

MONACO

PRINCIPALITY



JULY 1977

IMPRIMERIE LOUIS-JEAN

GAP

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

MEMBERS OF THE IHO (*)

ARGENTINA	NETHERLANDS
AUSTRALIA	NEW ZEALAND
BRAZIL	NIGERIA
CANADA	NORWAY
CHILE	PAKISTAN
* COLOMBIA	PHILIPPINES
CUBA	POLAND
DENMARK	PORTUGAL
DOMINICAN REPUBLIC	REPUBLIC OF KOREA
ECUADOR	REPUBLIC OF SOUTH AFRICA
EGYPT, ARAB REPUBLIC OF	SINGAPORE
FINLAND	SPAIN
FRANCE	SWEDEN
GERMANY, FEDERAL REPUBLIC OF	SYRIAN ARAB REPUBLIC
GREECE	THAILAND
GUATEMALA	TURKEY
ICELAND	UNION OF SOVIET SOCIALIST REPUBLICS
INDIA	UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND
INDONESIA	UNITED STATES OF AMERICA
IRAN	VENEZUELA
ITALY	YUGOSLAVIA
JAPAN	ZAIRE
MALAYSIA	
MONACO	

(*) Countries marked with an asterisk have not yet completed action to become Parties to the Convention on the IHO.

INTERNATIONAL HYDROGRAPHIC BUREAU

DIRECTING COMMITTEE

President : Rear Admiral G.S. RITCHIE, C.B., D.S.C., F.R.I.C.S., Royal British Navy (Ret.).

Directors : Rear Admiral J.C. TISON, Jr., USNOAA (Ret.).
Rear Admiral D.C. KAPOOR, AVSM, Indian Navy (Ret.).

EDITOR

Lieut. Commander M.R. HEALY, F.I.L., M.N.I., A.C.I.S., Royal British Navy (Ret.).

Price 50.00 French Francs. For conditions of sale see *List of Publications and Prices.*

© Copyright, Monaco, 2nd quarter 1977.

TABLE OF CONTENTS

— Prince Albert, heir to the Prince of Monaco at the XIth International Hydrographic Conference	Frontispiece
— The new Netherlands hydrographic/oceanographic ship <i>Tydeman</i>	Frontispiece
— The General Bathymetric Chart of the Oceans; seventy-three years of international cooperation in small scale thematic mapping	9
(D. MONAHAN).	
— The role of the contract hydrographic surveyor (W.J.M. ROBERTS).	19
— The Kelvin-Hughes MS-48 echosounder and digitiser — Evaluation by the U.K. Hydrographic Department (C.S. GOBEY)	29
— The World Ocean Atlas — A new cartographic work devoted to the nature of the World Ocean (V.I. FALIEEV)	37
— An investigation of a sandwave field at the south western end of Sandettié Bank, Dover Strait (B.W BURTON)	45
— Surveying in the Gironde (M. CHAUMET-LAGRANGE)	61
— The storage, updating and presentation of navigational information (I.M.J. CLARKE)	87
— Bottom samples as taken by the hydrographer and the geologist (B.R. PELLETIER)	103
— Measuring the surface thermal structure of the sea off Brittany by ship and aircraft (C. DECHAMBENOY, J. LE FLOC'H, L. PONTIER, J. RAILLARD, F. SIROU)	125
— Fifty years ago	143