The JOURNAL of NAVIGATION

01	L. 28, NO. 2	APRIL	1975
	The Tercentenary of the D. H. SADLER	Royal Observatory at Greenwich	121
	The Dover Strait Information Service R. K. EMDEN		129
	A Modern Collision Avoidance Display Technique R. F. RIGGS		
	Some Hazards to Subman	rine Navigation	156
	Lights for Landfall J. F. Drijfhout van Ho	off and Ir. J. C. Sirks	168
	The Loss of Morning Clou K. A. Coles	d	193
	Hong Kong Harbour as a D. J. MALONE	a Typhoon Haven	202
	Newton—A Man of His G. C. Dyer	Times	209
	The Velocity Field: A No. T. M. B. WRIGHT	ew Concept in Navigation	218
	Education and the Sea P. K. M'PHERSON		232
	Navigation in Offshore P R. D. Pike	owerboat Racing	240
		FORUM	
	Encounter Patterns betwee P. R. J. RAWLINSON	en Ships	243
	Record		244
	Review		248

THE ROYAL INSTITUTE OF NAVIGATION AT THE ROYAL GEOGRAPHICAL SOCIETY 1 KENSINGTON GORE LONDON SW 7

JOHN MURRAY (PUBLISHERS) LTD., 50 ALBEMARLE STREET, LONDON WI

THE ROYAL INSTITUTE OF NAVIGATION

Patron
H.R.H. THE PRINCE PHILIP DUKE OF EDINBURGH, K.G., K.T., O.M.

OFFICERS AND COUNCIL 1974-75

President G. E. Beck

Vice-Presidents F. A. Haworth Dr. K. C. Maclure

Honorary Treasurer
Lieut-Cmdr. R. B. Richardson, R.N. (Ret.)

Chairman of the Technical Committee
Captain R. Maybourn

Chairman of the Membership and Fellowship Committee
Captain C. H. Cotter

Other Members of Council

Captain B. J. Calvert
Lieut-Cmdr. A. G. Dyer, R.N.
A. H. Jessell
Captain A. C. Manson
Mrs. Mary Pera

Group Captain H. L. Sheppard F. S. Stringer Captain P. A. Thompson Captain R. J. Turner Lieut-Cmdr. D. W. Waters, R.N.

Director M. W. Richey, M.B.E.

The Journal of Navigation

THE Journal is published quarterly by the Institute and is edited by M. W. RICHEY. It contains original papers contributing to the science of navigation, including those presented at meetings of the Institute together with the ensuing discussion. In addition the Journal includes a record of current navigational work, reviews of important books, and other matters of concern to those interested in navigation. The views expressed in the Journal are not necessarily those of the Institute, or of any organization or department to which the authors may belong. Crown Copyright may be reserved.

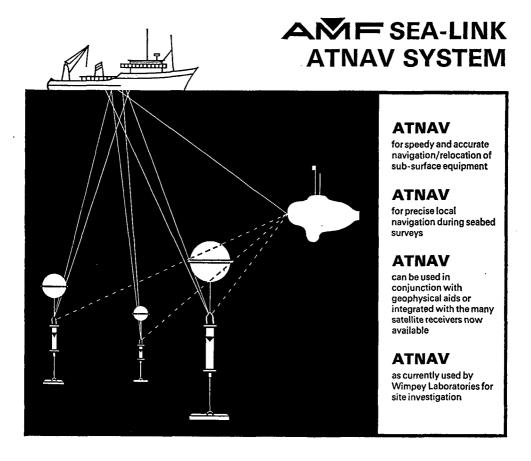
The Journal is issued free to all members of the Institute. It is sold to the public at two pounds per copy or, by subscription, at eight pounds thirty-five per annum (post free) and may be obtained through all booksellers and John Murray (Publishers) Ltd., 50 Albemarle Street, London W1. Back numbers dated two years prior to the current volume may be obtained from William Dawson & Sons, Ltd., (Back Issues Department), Cannon House, Folkestone, Kent.

Enquiries for advertising space should be addressed to the Institute offices.

The postal address of the Institute is The Royal Institute of Navigation, at The Royal Geographical Society, 1 Kensington Gore, London SW7. (Telephone: 01-589 5021).

Volumes of the Journal can be bound for two pounds. The parts should be sent to William Clowes & Sons Ltd., 15 Cavendish Square, London, WIM oHT.

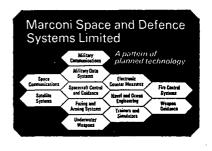
Key to exploration



ATNAV is obtainable from Marconi Space and Defence Systems Limited, specialists in underwater systems, and sole UK Distributors and European Servicing Agents for AMF Sea-Link Equipment.

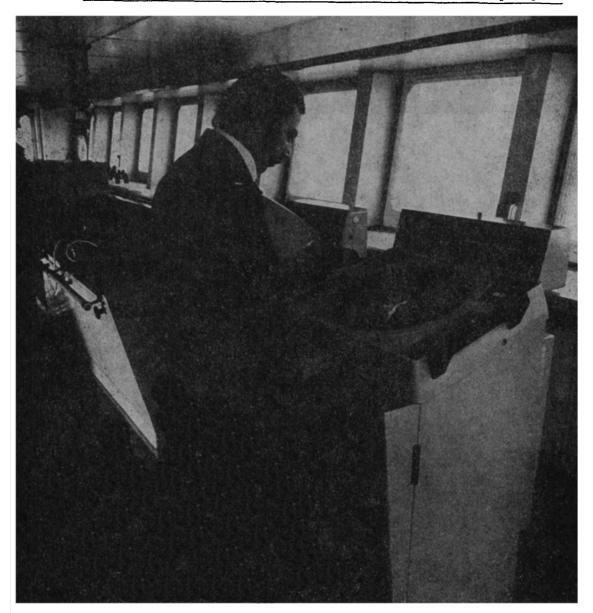
For further details contact Jim Wylie (Ext 239)

Marconi Space and Defence Systems Limited Naval and Ocean Engineering Division Chobham Road, Frimley, Camberley, Surrey. Telephone: Camberley (0276) 63311 Telex: 85289 Telegrams: Spadef, Camberley.



A GEC-Marconi Electronics Company

LTD/S23A



CAS

The professional Collision Avoidance System.
The heart of the Sperry Integrated Navigation System.



EUROPEAN HEADQUARTERS BRACKNELL BERKSHIRE ENGLAND RG12 1QL TELEPHONE: BRACKNELL 0344 3222 TELEX No. 847044

SEAPORTS

By Captain L. G. TAYLOR Extra Master, M.N., F.C.I.T., A.M.B.I.M.

£4.20

(per post £4.43; overseas £4.38)

In the field of transportation much change and development has taken place in recent years, and this is likely to be the pattern within the fore-seeable future. To both the student of this field, and personnel developing their careers within it, opportunity to consider the ramifications involved is both salutary and desirable.

Particularly is this the case with Seaports, both in the U.K. and abroad, where change is becoming remarkably traumatic, and within Shipping Companies whose sea-going personnel require wider liaison and involvement with ports procedures than was so hitherto.

To this end the book covers The Seaport as a Transport Mode; Characteristics of Seaports; Organisation and Management, including the Training of Staff; Services provided by Associations and supporting bodies; Marketing Services and Procedures; the Planning of Seaports and a List of documentary References.

THE ATLANTIC OCEAN

By CHARLES H. COTTER

£3.75

Per Post £3.971

The author of this new book has attempted to draw together, and to present in small compass, elements of geography, history, economics and politics, which make the Atlantic Ocean not only a fascinating area of wide interest, but also a region of considerable importance in the modern world.

The book is addressed primarily to the general reader: but, as it provides an overall view of the physical and human aspects of the Atlantic Region, it is hoped that it will appeal to a wide variety of students whose interests embrace a study of the oceans in any of its many facets.

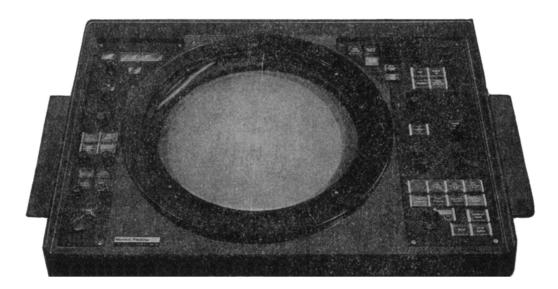
The author, who is well-known through his published work on a range of maritime subjects, is hopeful that his new book will reach, in particular, the hands of nautical men who seek to understand the environment within which they practise their noble profession, and who may desire to expand their interest beyond the boundaries which limit their professional requirements.

BROWN, SON & FERGUSON, LTD. 52 DARNLEY STREET, GLASGOW, G41 2SG





INFALLIBILITY



PREDICTOR II-the most advanced marine radar in the world

Radar plotting is as easy as pressing a button. 'Predictor' radar tracks and plots every target on the screen continuously, automatically and with infallible accuracy. True or relative tracks are presented as 4 plots equally spaced in time, up-dated every 10 seconds.

And before you alter course or speed, 'Predictor' will work out the new triangle of velocities for every target and plot the *impending* situation—before you alter.

Marconi Marine radar

The Marconi International Marine Co. Ltd.

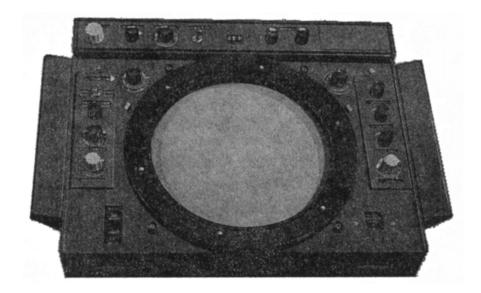
Chelmsford Essex England
Tel (0245) 61701 Telex 99228 • A GEC-Marconi Electronics Company





NAVIGATION RADAR SOUND AND TV

DEPENDABILITY



RADIOLOCATOR-radar designed throughout for simplicity and reliability

Conventional . . . yes, but the best of its kind. 'Radiolocator' gives you really dependable, workaday radar at the right price. Solid-state circuitry. Only two thermionic devices—a long-life magnetron and choice of 12-inch or 16-inch CRT. All normal marine radar facilities, plus true bearing indication, are standard; and options include True Motion, compass stabilisation, reflection plotter, dual displays, and full or partial interswitching of dual installations.

Marconi Marine radar

The Marconi International Marine Co. Ltd.

Chelmsford Essex England
Tel (0245) 61701 Telex 99228 • A GEC-Marconi Electronics Company



INTERNATIONAL HYDROGRAPHIC BUREAU

Avenue Président J. F. Kennedy, Monte-Carlo, Monaco

publishes

twice a year, in January and July, an English and a French edition of

THE INTERNATIONAL HYDROGRAPHIC REVIEW

This publication contains articles of topical interest on hydrography, oceanography and related ocean technology and sciences.

Approx. 160 pages, 18×27 cm; numerous illustrations.

Annual subscription: 100 French Francs, plus postage.

Original articles for publication are welcome.

The Bureau also publishes monthly

THE INTERNATIONAL HYDROGRAPHIC BULLETIN

which contains topical news and reports the work of the world hydrographic community. Charts and publications issued by Hydrographic Offices are listed each month.

A bi-lingual publication—English and French

Approx. 30 pages, 21 × 30 cm

Yearly subscription: 60 French Francs Individual issue: 6 French Francs

A 30% reduction is granted to research institutions, government offices, naval or merchant marine officers and to practising hydrographic surveyors of the IHO's Member States who send their orders direct to the Bureau.

The list of International Hydrographic Bureau publications, and the conditions of sale, will be supplied free on request.

Telegraph: BURHYDINT MONACO Telex: 46 870 MCS CARLO (Attn: INHORG)

'NAVIGATION (U.S.A.)'

Navigation, the quarterly Journal of the American Institute of Navigation, is available to Members of this Institute at a reduced subscription of £2 a year. Volume 21, No. 4 (Winter 1974-5), contains the following papers.

PRELIMINARY RESULTS FROM SKYLAB EXPERIMENT Too2, MANUAL NAVIGATION S. W. Powers

A FLEXIBLE, LOW-COST APPROACH TO DIFFERENTIAL OMEGA $D.\ A.\ Zomick$

MULTIPLE TARGET TRACKING AND TARGET ATTITUDE DETERMINATION WITH A SCANNING LASER RADAR T. Flom and D. Coombes

CONCEPTS FOR FUTURE VESSEL TRAFFIC SYSTEMS A. J. Cote, Jr.

OPTIMAL ESTIMATION OF A MULTI-STAR FIX C. De Wit

LATERALLY DISPLACED ISLS ANTENNA FOR TACTICAL RADAR $N.\ Marchand\ and\ D.\ Riva$

IN-ORBIT PERFORMANCE OF THE OAO INERTIAL REFERENCE UNIT R. A. Harris

SIMPLIFIED DETERMINATION OF THE ELLIPSE OF UNCERTAINTY G. P. Clark

SURVEILLANCE VELOCITY MEASUREMENTS WITH LEAST MAXIMUM ERROR J. M. Holt and R. H. Hamilton

THE EFFECTS OF GRAVITATIONAL UNCERTAINTIES ON THE ERRORS OF INERTIAL NAVIGATION SYSTEMS
R. R. Hildebrant, K. R. Britting and S. J. Madden, Jr.

THE INSTITUTE'S PROFESSIONAL FILE

THE INSTITUTE'S PROFESSIONAL FORUM

INDEX TO VOLUME 21

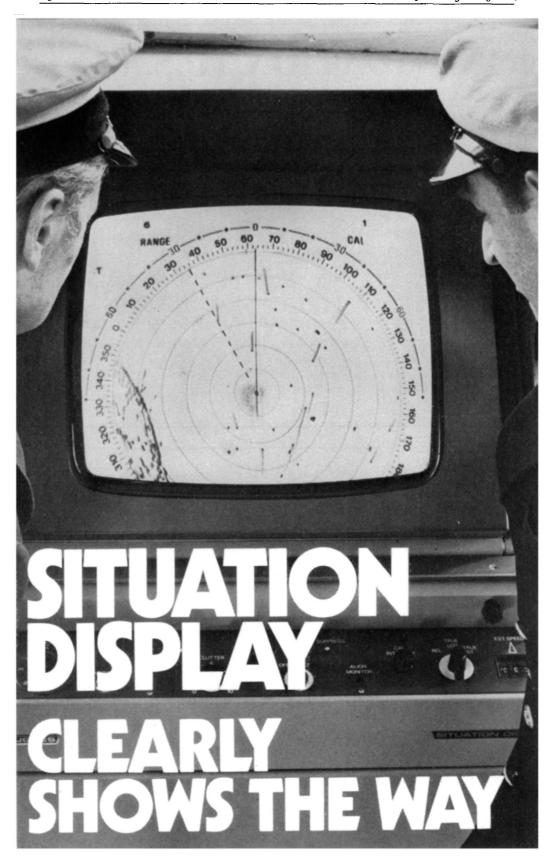
'NAVIGATION'

NAVIGATION (Paris), the quarterly Journal of the French Institute of Navigation, is available to Members of the Institute at the preferential subscription rate of £7.00 per annum. The January 1975 issue contains the following papers.

- I page de voeux—
- II. LES NOUVEAUTÉS TECHNIQUES—
 - 1. Recherche du Nord par Gyro pendule par J. M. VAUCHY
 - 2. Le système Sylédis par G. NARD
 - 3. Les espérances de l'OMEGA aéroporté en navigation de zone par S. JACQUELIN
- III. LA CHRONIQUE DU NAVIGANT-
 - 1. Le point à la mer par deux observations simultanées par P. HUGON
 - 2. Le système de navigation utilisé dans le projet "FAMOUS" par A. FARCY & J. JARRY
 - 3. Navigation et élections par P. H.
- IV. CHRONIQUE DE NAVIGATION SPATIALE—
 - 1. L'exploration de la planète Mars par des sondes spatiales par E. GIBOIN
- V. LE COLLOQUE DE L'I.F.N. SUR LA NAVIGATION DE ZONE-
- VI. INFORMATIONS-
 - 1. Le deuxième symposium OMEGA de l'I.O.N. des Etats-Unis
 - 2. Océanexpo-1974-BORDEAUX 1-4 Octobre 1974
 - 3. Le symposium de l'A.F.C.E.T. (MONTE-CARLO 16-21 Septembre 1974)
- VII. TRIBUNE LIBRE-

Lettre de Mr. Ivan DOWNER, Commandant du S/S ''LATIRUS'' de la SHELL TANKERS Ltd

- VIII. CHRONIQUE DES LIVRES ET REVUES-
- IX. TABLE QUINQUENNALE DES MATIERES-



The days of visor squinting, tired eye radar interpretation and complicated plotting are over. All the visual information for safe navigation can be seen at a glance on the Kelvin Hughes Situation Display.

This unique and advanced electronic equipment is bringing 'clear vision' to the bridges of over 100 vessels, and is already clearly showing the way through the congested waters of the world for British Rail, Esso, Ocean Transport, P&O, Royal Norwegian Navy, Shell and many others. Situation Display is being installed both independently without a second display and in fully interswitched systems with conventional radar in 3cm and 10cm.

Situation Display presents a big bright picture which simulates a clear view from the bridge; 'ship's head-up' but compass stabilised. Moving targets and own ship leave clear tracks so that the 'sure eye' of the navigator can instantly assess the positions, aspects, courses and approximate speeds of all ships in the selected range.

Nothing is left to the imagination – visibility is always good in the weatherless world of the Situation Display.

Please send now for literature.

Kelvin Hughes Equipment & Systems

New North Road, Hainault, Ilford, Essex, England IG6 2UR Telephone 01-500 1020 Telex 896401







Morning Cloud in the Solent. An article on the foundering of this famous yacht appears at p. 193 (Photo, Chris Wood, Daily Express)