

THE JOURNAL OF NAVIGATION

Volume 31

1978

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL
EDITED BY M. W. RICHEY

THE ROYAL INSTITUTE OF NAVIGATION
AT THE ROYAL GEOGRAPHICAL SOCIETY
1 KENSINGTON GORE, LONDON SW7 2AT
SCOTTISH ACADEMIC PRESS LTD., 33 MONTGOMERY STREET, EDINBURGH EH7 5JX

THE ROYAL INSTITUTE OF NAVIGATION

PATRON

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

OFFICERS AND COUNCIL 1977-78

PRESIDENT

Sir Edward Fennessy, C.B.E.

VICE-PRESIDENTS

Captain R. Maybourn
S. Ratcliffe

HONORARY TREASURER

Mrs. Mary Pera

CHAIRMAN OF THE TECHNICAL COMMITTEE

Dr. J. F. Kemp

CHAIRMAN OF THE MEMBERSHIP AND FELLOWSHIP COMMITTEE

Rear Admiral D. W. Haslam, O.B.E.

Other Members of Council

Professor A. N. Black	Miss A. M. Ferrar
Captain B. J. Calvert	Captain K. D. Jones
Group Captain D. Clare, D.F.C., R.A.F.	Lieut.-Cmdr. P. Le Pla, R.N.
Captain G. Dudley	Captain A. M. MacLean
Captain R. K. N. Emden, D.S.C., R.N. (ret.)	J. W. McIvor

DIRECTOR

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

CONTENTS

THE PRESIDENTIAL ADDRESS: THE NAVIGATIONAL REQUIREMENTS FOR OCEAN CABLE LAYING. SIR EDWARD FENNESSY	1
EARLY DEAD RECKONING NAVIGATION. C. H. COTTER	20
TESTING A MODERN STRIKE AIRCRAFT NAVIGATION SYSTEM. J. B. V. COLLINS	29
AERONAUTICAL CHART SERVICING. W. A. ROSENKRANS	39
DEPTH SOUNDING FROM THE AIR BY LASER BEAM. J. E. CLEGG and M. F. PENNY	52
NAVIGATION IN THE ENGLISH CHANNEL AND THE SOUTHERN NORTH SEA. J. PATON	62
COLLISION AVOIDANCE BEHAVIOUR AND UNCERTAINTY. J. R. RIEK	82
SHIP PERFORMANCE IN ROUGH WEATHER. A. R. J. M. LLOYD	93
TRAFFIC MODELS FOR USE IN VESSEL TRAFFIC SYSTEMS. M. D. CILETTI	104
THE ESTIMATION OF LOSSES RESULTING FROM MARINE ACCIDENTS. Y. FUJII	117
DRIFT ANGLE AND ITS CONSEQUENCES IN SHIP MANŒUVRES. K. MEURS DYNAMIC SIMULATION: A TOOL IN RESEARCH ON HUMAN BEHAVIOUR IN NAVIGATION. A. LAZET and H. SCHUFFEL	133
ESTIMATING SPEED AND ANGLE OF IMPACT IN COLLISION CASES. T. D. HELLESØE	141
SINGLE-HANDED VOYAGES AND THE COLLISION REGULATIONS (Forum) L. R. FOSTER, H. G. HASLER, J. D. SLEIGHTHOLME, A. N. COCKCROFT and A. WEPSTER	149
A NEW NAVIGATION COMPUTER (Forum). M. W. RICHEY	157
ENGLISH CHANNEL TRAFFIC CONTROL (Forum). I. C. VENDRELL	161
TRAFFIC ROUTING AT SEA, 1857-1977. J. H. BEATTIE	167
TRAFFIC SEPARATION—WHAT NEXT? R. K. N. EMDEN	203
STATISTICS OF SHIP COLLISIONS. A. N. COCKCROFT	213
INCREASING THE SHIPPING CAPACITY OF THE SUEZ CANAL. J. D. GRIFFITHS and Mrs. E. M. HASSAN	219
'THE FIRST NAVIGATION OF TORRES STRAIT'. G. C. INGLETON	232
LUNAR METHODS FOR 'LONGITUDE WITHOUT TIME'. D. H. SADLER	244
SST FLIGHT PLANNING AND NAVIGATION: THE FIRST YEAR'S EXPERIENCE. T. C. R. GUEST	250
FULLY-AUTOMATED, PILOT-MONITORED AIR TRAFFIC CONTROL. R. L. FORD	259
NEW STUDIES IN COLLISION AVOIDANCE RADARS. J. A. BUTT, K. D. JONES, C. G. ROWSELL and F. J. WYLIE	268
THE DISTRIBUTION PATTERN OF OMEGA OBSERVATIONS. T. HIRAIWA	306
PROBLEMS OF NAVIGATION IN HIGH DENSITY TRAFFIC. P. LE PLA	310
CROSSING TRAFFIC SEPARATION SCHEMES (FORUM). K. GLAS and J. PATON	320
THE NEW BUOYAGE SYSTEM (Forum)	324
STRATEGIC OR TACTICAL AIR TRAFFIC CONTROL? S. RATCLIFFE	337
DEVELOPMENTS IN MARINE TRAFFIC OPERATIONS AND RESEARCH. A. WEPSTER	348
MARINE ENCOUNTER RATES. ELISABETH M. GOODWIN	357
A DECADE OF NAVIGATION IN THE ANTARCTIC. P. LE PLA and J. DRAPER	370
NUMERICAL MODELS OF TIDE AND SURGE PROPAGATION AS AN AID TO NAVIGATION. D. PRANDLE	378
THE RISK OF A SHIP ENCOUNTER LEADING TO A COLLISION. G. R. G. LEWISON	384

DETERMINATION OF MARINERS' REACTION TIMES. R. G. CURTIS . . .	408
THE ADMIRALTY CHART—V. D. W. HASLAM, G. A. MAGEE, F. A. PIELOU, H. R. W. HALLIWELL and D. W. NEWSON . . .	418
ESCAPE TIME: THE CRUCIAL FACTOR IN COLLISION AVOIDANCE SITUATIONS AND SYSTEMS. F. J. WYLIE . . .	438
AN OUTLINE HISTORY OF MARINE PILOTAGE IN BRITAIN. H. M. HIGNETT	453
AUTOMATED CHARTING. W. A. A. HUDDY, G. E. MURT, L. A. HOLDER, J. VICKERS and R. F. HANSFORD . . .	465
AUTOMATIC LANDING SYSTEMS OR FOG-DISPERSAL DEVICES? D. V. WARREN, M. BERNARD and I. L. McGRATH . . .	479
ESTIMATING THE AVERAGE TAXI SPEED OF DEPARTING AIRCRAFT. S. NAGAOKO, P. T. MUTO and E. YOSHIOKA . . .	494
A STANDARD-TIME SUNDIAL (Forum). R. d'E. ATKINSON . . .	500
RECORD	162, 326, 501
REVIEWS	334, 506

MADE AND PRINTED IN GREAT BRITAIN BY WILLIAM CLOWES & SONS LIMITED
LONDON, BECCLES AND COLCHESTER

THE ROYAL INSTITUTE OF NAVIGATION

THE OBJECT of the Institute is to unite in one body those who are concerned with or who are interested in the science and art of navigation. Membership is not restricted to those who hold professional qualifications, but is open to others who wish to further the aims of the Institute.

By coordinating the knowledge and achievements of marine and air navigators, scientists and those associated with the development and production of navigational equipment, the work of the Institute is directed towards raising the standard of navigation. In the field of education it is the aim of the Institute to bring practical navigators into contact with teachers and research workers to increase a common appreciation of the issues involved. It is an object of the Institute to encourage research in equipment and methods; through its publications it gives a wide circulation to original work on navigation so that new developments and suggestions can be appreciated by those most directly concerned with them.

The activities of the Institute include the holding of monthly meetings to discuss specific problems, the publication of a Journal and of other works concerned with different aspects of navigation, and such other activities as the Council may deem necessary to promote knowledge in navigation and its associated sciences.

The Journal of Navigation is issued free to all Members and contains a full account of the Institute's proceedings. It prints the papers which are presented at meetings, together with their ensuing discussion, and other original papers contributing to the science of navigation. It also contains a record of current navigational work, reviews of important books, and general papers of interest to navigators and those with similar interests.

The work of the Institute is coordinated with that of similar societies abroad, whose proceedings are available to members.

Membership. There are five classes of membership of the Institute:

(1) HONORARY MEMBERS, who shall be distinguished persons upon whom the Council may see fit to confer an honorary distinction.

(2) FELLOWS, who shall be members, of at least three years' standing who, in the opinion of the Council, have made a contribution of value to navigation.

(3) MEMBERS, who shall be persons over twenty-one years of age who can satisfy the Council of their interest in navigation.

(4) STUDENT MEMBERS, who shall be persons under twenty-five years of age studying with a view to making navigation, or an allied interest, their career.

(5) CORPORATE MEMBERS, who shall be companies, universities, navigation schools, government departments and other organizations, here and abroad, who are directly or indirectly interested in the science of navigation. Corporate Members are entitled to send representatives to all Institute meetings and to receive six copies of the *Journal*, and other publications. They are encouraged to take an active part in the Institute's work. Application should be by letter addressed to the Director.

Subscriptions. Annual subscriptions to the Institute are payable in advance as follows:

Members and Fellows	£12.00
Student Members	£5.00
Corporate Members	£100.00

The Institute's financial year begins on 1 July. Members in any category who are elected after 1 January in any year are only due for one half of their subscription until 1 July, when the full subscription for the next year becomes due.