The JOURNAL of THE INSTITUTE OF NAVIGATION

OL.	24, NO. I JANUARY	1971
N	vigation, Traffic and the Community	1
	PRESIDENTIAL ADDRESS BY A. STRATTON	
Λ	arine Traffic Engineering	24
	S. TOYODA AND Y. FUJII	•
T	e Master in Changing Times	35
	F. J. BUZEK AND A. WEPSTER	
A	Fully Automatic Marine Radar Data Plotter	43
	J. C. HERTHER AND J. S. COOLBAUGH	
Λ	ammoth Vessels and Coriolis Force	50
	J. C. Anneveld	
T	e Turn Criterion and the Collision Rules	56
	J. GARCÍA-FRÍAS	
P	actical Manœuvres to Avoid Collision at Sea	60
	K. D. Jones	,
E	unetto Latini and the Compass W. E. May	67
7		
	e Costs and Benefits of Air Navigation and Control Systems]. B. Heath	71
Е	ght in Poor Visibility	86
•	1. D. Proctor	00
Λ	eteorology and All-weather Operations	16
-	E. Chambers	<i>J</i> .
A	ea Navigation and the Associated Display Methods	105
	K. E. KARWATH	
	FORUM	
	The Measurement of Range and Velocity of Approach during the Berthing of Tankers	121
	R. N. B. GATEHOUSE	121
	Rhumb-line Failings	123
	J. S. McKenzie	
	Application of Omega to Aircraft Navigation and Traffic Control E. R. SWANSON	125
n	views	129
-	110110	7

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

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

THE INSTITUTE OF NAVIGATION

Patron

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

OFFICERS AND COUNCIL 1970-71

President

Rear Admiral G. S. Ritchie, C.B., D.S.C.

Vice-Presidents

G. E. Beck

Group Captain D. F. H. Grocott, C.B.E., A.F.C., R.A.F.

Honorary Treasurer F. A. Haworth

Chairman of the Technical Committee H. E. Smith

Chairman of the Membership and Fellowship Committee Captain V. A. M. Hunt, C.B.E.

Other Members of Council

J. H. Beattie W. J. Charnley Captain C. H. Cotter Captain R. Hart, C.B.E.,

D.S.O., D.S.C*., R.N. (ret.)

S. S. D. Jones

Captain F. L. Main Captain R. Maybourn

P. G. Reich R. B. Richardson R. Whalley

Executive Secretary: M. W. Richey, M.B.E.

The Journal of the Institute 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 thirty shillings per copy or, by subscription, at one hundred and twenty-five shillings 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 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 thirty shillings. The parts should be sent to William Clowes & Sons Ltd., Dorland House, 14 & 16 Lower Regent Street, London SW.1.

The Institute of Navigation

Addendum to the List of Members Dated 1970

ALPHABETICAL LIST OF FELLOWS

The date refers to election into Membership

- ADAMS, D. E., DOCTOR, Melbreak, Hazel Road, Ash Green, Aldershot, Hants. 1947
- 1948 ALABASTER, R. C., CAPT., D.S.O., D.F.C., Sumac, Pilgrims Way, Guildford,
- 1948 ANDERSON, E. W., WING CMDR., O.B.E., D.F.C., A.F.C., Coachmans Cottage, Tatchley Lane, Prestbury, Cheltenham, Glos.
- Andrew, J., CAPT., M.B.E., R.D., R.N.R., Impala, 17 Whitemoor Road, 1947 Rhinefield Gardens, Brockenhurst, Hants.
- ATHERTON, N., Kingswood Cottage, 37 Epsom Lane South, Tadworth, Surrey. 1956
- ATKINSON, R. D'E., DOCTOR, Department of Astronomy, Indiana University, 1947 Bloomington, Indiana 47401, U.S.A.
 ATTWOOLL, V. W., 44 Tillingbourne Road, Shalford, nr. Guildford, Surrey.
- 1966
- BAILLIE, W., CAPT., M.V.O., Managing Director, B.E.A. Airtours Ltd., Airtours 1949 House, Gatwick Airport-London, Horley, Surrey.
- BANKS, L. F., WING CMDR., D.F.C., R.A.F. (RET.), 148 Corringway, London, 1947 W 5.
- BARTON, E. L. T., WING CMDR., C.B.E., Djakarta House, 26 Pine Walk, Carshalton, Surrey.
- BEATTIE, J. H., Willow House, Blundell Lane, Stoke D'Abernon, Cobham, 1957 Surrey. BECK, G. E., Braemar, 10 Lake Avenue, Billericay, Essex.
- 1957
- BINI, M., ADMIRAL, 202 Avenue Roosevelt, Brussels 1050, Belgium. 1959
- 1947 BLAKE, D. A., Dormers, 4 Little Austins Road, Farnham, Surrey.
- Bower, D., AIR COMMODORE, O.B.E., A.F.C., R.A.F., 126 Orion Way, North-1949 wood, Middlesex.
- BRACE, J. R., CAPT., School of Navigation, Dept. of Technical Education, 1954 Ultimo, Sydney, N.S.W., Australia.

 BRANCH, W. J. V., WING CMDR., O.B.E., Sundial, Paget, Bermuda.

 BROUGHTON, W. O., The Bollans, Ashley Road, Farnborough, Hants.

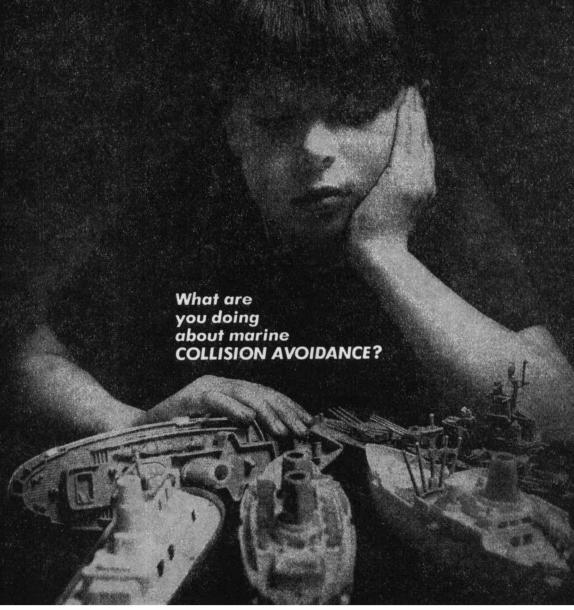
 BUNTING, M. C., GROUP CAPT., M.B.E., R.A.F., IMS P & P Division, NATO,
- 1947
- 1962
- 1951 Brussels, B.F.P.O. 49
- BURGER, W., CAPT., 67 St. Fagans Rise, Fairwater, Cardiff. 1952
- BUTLER-BOWDON, M. E., CAPT., O.B.E., R.N., Dapsland, Mayfield, Sussex. 1947
- CANE, A. P. W., Mead End House, Painswick, Glos. 1947
- CARR, F. G. G., C.B.E., 10 Park Gate, Blackheath, London, SE.3. 1947
- CHADWICK, R. H., Longridge, 2 Marlingdene Close, Hampton, Middlesex. 1948
- CHARNLEY, W. J., Kirkstone, Brackendale Road, Camberley, Surrey. 1960
- CHICHESTER, SIR FRANCIS, K.B.E., 9 St. James's Place, London, SW.1. 1947
- CHILTON, SIR EDWARD, AIR MARSHAL, K.B.E., C.B., 11 Charles House, 1947 Phyllis Court, Henley-on-Thames, Oxon.
- CLARE, D., GROUP CAPT., D.F.C., 18 Walgrove Gardens, White Waltham, 1947 Berks.
- 1960 CLEGG, J. E., Sheoak Road, Stirling, South Australia.
- CLISSOLD, P. C. H., CMDR., R.D., R.N.R. (RET.), Derry, Holly Hill Lane, 1949 Sarisbury Green, Hants.
- CLOUGH-SMITH, J. H., CAPT., The Villa, Uppleby, Easingwold, York. 1947

- 1948 COLBECK, W. R., CAPT., R.N.R. (RET.), Toorak, Wethersfield Road, Noctorum, Birkenhead, Cheshire.
- COLLINS, K. St. B., REAR-ADMIRAL, C.B., O.B.E., D.S.C., The Old Parsonage, 1953 Bentley (Hants.), nr. Farnham, Surrey.
- COTTER, C. H., CAPT., Middle Ground, Mill Road, Lisvane, Cardiff. 1947
- CROSSLEY, A. F., 15 Priest Avenue, Wokingham, Berks. 1959
- 1952 DEACON, G. E. R., DOCTOR, C.B.E., F.R.S., National Institute of Oceanography, Wormley, Godalming, Surrey.
- DICKIE, E. J., O.B.E., Pear Tree Cottage, Rayne, nr. Braintree, Essex. 1949
- DICKSON, A. F., CAPT., Shell International Marine, Shell Centre, London, 1963 SE. I.
- 1962 ELWERTOWSKI, H. J., Greytiles, 109A Slough Road, Datchet, Bucks.
- 1947 Evans, C., Sweep's Dyke, 57 Grosvenor Road, Staines, Middlesex.
- FARNDELL, C. T., 1400 Pine Avenue West, Apt. 804, Montreal 109, P.Q., 1960
- FEARNSIDE, K., The Paddocks, Birchley Road, Battledown, Cheltenham, Glos. 1959 FENNESSY, E., GROUP CAPT., C.B.E., Northbrook, Littleford Lane, Shamley 1947
- Green, nr. Guildford, Surrey. 1947
- 1947
- FLYNN, A. P. J., Shenstone, 9 Friars Road, Friars Cliff, Christchurch, Hants. Fox, W. A. W., 29 West Hill, London, SW. 18.
 FRANKCOM, C. E. N., CMDR., R.N.R., Primrose, 45 Mtarfa Road, Mtarfa, 1948 Malta, G.C.
- FRASER, D. O., British Aircraft Corporation, G.W. Division, Filton, Bristol. 1947
- FREER, T. St. B., CAPT., Flat 2, 1 Parkside Avenue, Wimbledon Common, 1948 London, SW.19.
- FREIESLEBEN, H. C., DOCTOR, 2 Hamburg 22, Ekhofstrasse 12, Germany. 1963
- GARCÍA-FRÍAS, J., REAR-ADMIRAL, Avenida del Generalisimo, 104, Madrid, 16, 1965 Spain.
- GARDNER, A. C., School of Navigation, Technical College, Bell Street, 1949 Dundee, Angus.
- GATEHOUSE, R. N. B., MAJOR, 5 Captain's Row, Lymington, Hants. 1957
- GENTY, R. L. J., COMMANDANT, 6 Rue Jules Simon, Paris XV, France. 1948
- GETHING, R. T., AIR CMDRE., C.B., O.B.E., A.F.C., Garden Hill, Kangaroo 1949 Ground, Victoria 3097, Australia.
- GREENAWAY, K. R., BRIGADIER-GENERAL, R.C.A.F., 472 Wellesley Avenue, 1953 Ottawa 13, Ontario, Canada.
- GRIFFITHS, W. E. B., C.B.E., 46 Oaken Grove, Maidenhead, Berks. 1947
- GROCOTT, D. F. H., GROUP CAPT., C.B.E., A.F.C., R.A.F., 48 Lees Gardens, 1949 Maidenhead, Berks.
- HAMILTON, B., GROUP CAPT., c/o Midland Bank Ltd., Kingsbridge, Devon. 1947
- HAMILTON, W., CAPT., c/o Harwood, Trevelyan, St. Teath, Bodmin, Corn-1947
- HANSFORD, R. F., Fir Mead, 40 Lower Road, Fetcham, Leatherhead, Surrey.
- HART, R., CAPT., C.B.E., D.S.O., D.S.C*, R.N. (RET.), Three Firs, Bramshott 1966 Chase, Hindhead, Surrey.
- HATFIELD, H. R., CMDR., R.N., Lych House, Clarendon Road, Sevenoaks, 1949
- HERRICK, Samuel, DOCTOR, 4731 Boelter Hall, University of California, Los 1947 Angeles, Calif. 90024, U.S.A.
- HEWSON, Sir Bushby, 77 Eyre Court, St. John's Wood, London, NW.8. HILDER, B., CAPT., 183 Edinburgh Road, Castle Grag, Sydney, Australia. 1947
- 1947
- HILL, L. C., CAPT., O.B.E., D.S.C., R.D., F.R.I.C.S., 17 Beryl Road, Noctorum, 1962 Birkenhead.
- HILLIER, A., O.B.E., J.P., Cranmore, Little Forest Road, Bournemouth, Hants.
- HONICK, K. R., The Laurels, Jubilee Road, Mytchett, Aldershot, Hants. 1961

- 1948 Hughes, G. R., CAPT., M.B.E., 30 Powisland Drive, Crownhill, Plymouth, Devon.
- 1947 Hunt, V. A. M., CAPT., C.B.E., Chief Inspector of Accidents, Board of Trade, Shell Mex House, Strand, London, WC.2.
- 1950 ILLINGWORTH, J. H., CAPT., R.N., 36 North Street, Emsworth, Hants.
- 1960 IRVING, Sir Edmund, REAR-ADMIRAL, K.B.E., C.B., Camer Green, Meopham, Gravesend, Kent.
- 1947 JESSELL, A. H., British Embassy, 3100 Massachusetts Avenue, Washington, D.C., 20008, U.S.A.
- 1952 KARWATH, K. E., DOCTOR, Deutsche Lufthansa A.G., 6 Frankfurt a.M. Flughafen, Germany.
- 1947 KEELING, H., c/o A.Ť.C.E.U., Bournemouth (Hurn) Airport, Christchurch, Hants.
- 1951 KENDALL, E. C., 6176 Price Street, North Burnaby, B.C., Canada.
- 1966 KING, G. A. B., 34 Cedar Drive, Hatch End, Pinner, Middlesex.
- 1949 KLINKERT, J., CAPT., Vinland, Bridle Close, Grayshott, Hindhead, Surrey.
- 1949 LE PAGE, L. S., 15 Syke Cluan, Richings Park, Iver, Bucks.
- 1962 LEWIS, D. H., DOCTOR, Dept. of Pacific History, Australian National University, P.O. Box 4, Canberra, Australia.
- 1952 LIPMAN, D. D., D.F.C., 2 Allée Des Pins, 92 Sceaux, France.
- 1948 LORAINE, A. C., CAPT., M.V.O., 173 Mortlake Road, Kew, Richmond, Surrey.
- 1956 LOWRY, C. C., CAPT., R.N. (RET.), Buckleigh House, Westward Ho, North Devon.
- 1948 LUARD, W. B., CMDR., O.B.E., R.N. (RET.), Trelour, Mawnan Smith, nr. Falmouth, Cornwall.
- 1966 MACCHIAVELLI, A., CAPT., Istituto Idrografico della Marina, Passo Osservatorio 4, Genoa, Italy.
- 1954 MACKAY, I. S. S., CAPT., R.N., Crofters, Itchenor Gate, Chichester, Sussex.
- 1947 McKinlay, W. H., 36 Frogston Terrace, Edinburgh 10.
- MCKINLEY, D. C., AIR VICE-MARSHAL, C.B., C.B.E., D.F.C., A.F.C., Sundial Cottage, Fawley, Hants.
- 1948 MACLURE, K. C., COLONEL, A.F.C., R.C.A.F., 3290 Woodburn Avenue, Victoria, B.C., Canada.
- 1947 MACMILLAN, D. H. T., CMDR., R.N.R. (RET.), 32 Queen's Terrace, Southampton, Hants.
- 1960 MAIN, F. L., CAPT., 2 Coronation Drive, Great Crosby, Liverpool 23.
- 1947 MAY, W. E., CMDR., R.N., 58 South Audley Street, London, W.I.
- MICHELL, R. B., LT. CMDR., D.S.C., R.N., Leith House, Amberley, Arundel, Sussex.
- 1948 MITCHELL, J. L., AIR CMDRE., M.V.O., D.F.C., A.F.C., R.A.F., 56 Linton Street, London, N.1.
- MOLINE, A. J., c/o Qantas Airways Ltd., Box 489 G.P.O., Sydney, N.S.W., Australia.
- 1959 Mudie, C. C., Bywater Lodge, Pierside, Lymington, Hants, SO4 8SB.
- 1947 Nunn, J. L., Wing CMDR., D.F.C., 13 Garners Close, Chalfont St. Peter, Gerrards Cross, Bucks.
- 1948 NYDELL, S. I., REKTOR, Rosengatan 5B, Gothenburg S-413 10 Sweden.
- 1947 OLIVER, R., CAPT., 59 Pampisford Road, Purley, Surrey.
- 1947 ORMONROYD, F., CAPT., D.F.M., I Dearne Close, Stanmore, Middlesex.
- 1947 OSBORNE, C. B., CMDRE., R.D., R.N.R., (RET.), Pine Lodge, Kyrchil Lane, Colehill, Wimborne, Dorset.
- 1962 OUDET, L., COMMANDANT, 4 Rue Perrault, Paris 1, France.

- 1960 OULTON, W. E., AIR VICE-MARSHAL, C.B., C.B.E., D.S.O., D.F.C., Denefield, Overstream, Rickmansworth, Herts.
- PARKER, J. B., Oak Tree Cottage, Padworth Common, nr. Reading, Berks. 1947
- PARMITER, G. V., CMDR., R.N. (RET.), Winfrith, Main Road, Kerikeri, Bay 1947 of Islands, New Zealand.
- PEARSON, W. A., CAPT., J.P., 310 Cotham Road, Kew, Melbourne, Victoria, 1948 Australia.
- PEDERSEN, E. S., Sandhamnsgatan 19, Stockholm NO, Sweden. 1949
- 1954
- Pera, M., Signora, Via Cassia 1041, Rome, Italy. Pike, E. W., Lynwood, Lynden Grove, Ashley Park, Walton-on-Thames, 1947 Surrey.
- POLHEMUS, W. L., MAJOR, U.S.A.F., P.O. Box 1011, Burlington, VT 05401, 1961 U.S.A.
- 1959 POWELL, C., 295 Richmond Road, Kingston-upon-Thames, Surrey.
- PRITCHARD, H. C., October House, Jackson's Lane, Great Chesterford, Essex. 1947
- 1966 REICH, P. G., Pendennis, College Ride, Bagshot, Surrey.
- RICHARDSON, F. C., GROUP CAPT., C.B.E., 14 Maxwell Road, Northwood, 1948 Middlesex.
- RICHARDSON, R. B., Fenn Wood, Shorne, nr. Gravesend, Kent. 1967
- RITCHIE, G. S., REAR-ADMIRAL, C.B., D.S.C. F.R.I.C.S., Sharpe House, West Road, Wiveliscombe, Taunton, Somerset. 1952
- ROBINSON, W. P., M.B.E., 2 Orchard Gate, Sandhurst, Camberley, Surrey. 1964
- SADLER, D. H., O.B.E., 8 Collington Rise, Bexhill-on-Sea, Sussex. 1947
- 1961 SAMESHIMA, N., DOCTOR, 4212-3, Nakahara, Seyamachi, Totsuka-ku, Yokohama, Japan. SATOW, P. G., D.S.C., Copt Howe, Great Langdale, Ambleside, Westmorland.
- 1947
- Scott, W. A., 42 Dalehurst Road, Bexhill-on-Sea, Sussex. 1947
- SMITH, H. E., Innisfree, Christchurch Road, Virginia Water, Surrey. 1955 1960
- STRATTON, A., 39 Salisbury Road, Farnborough, Hants. STRINGER, F. S., Beverley Fair, 21 Revelstoke Avenue, Farnborough, Hants. 1964
- TOPLEY, H., CAPT., 3 Lindsay Park, Lindsay Road, Poole, Dorset, BH13 6 AU. 1948
- TREWEEK, K. H., 28 Dunstall Road, Wimbledon Common, London, SW.20. 1966
- TROW, G. H., 40 Val du Prince, Crainhem, Brussels, Belgium. 1947
- Tyrrell, A. J. R., CAPT., 23 Great Oaks, Raleigh Road, Hutton, Essex. 1947
- 1966 VAN HOOFF, J. F. DRIJFHOUT, REAR-ADMIRAL, D.S.O., R.N.I.N., Klein Persijnlaan 25, Wassenaar, Holland.
- VIELLE, E. E., GROUP CAPT., O.B.E., c/o Glyn Mills & Co., Kirkland House, 1949 Whitehall, London, SW 1.
- VIVIAN, J., D.S.O., D.F.C., Fairwinds, Bull Lane, Gerrards Cross, Bucks. 1947
- WAKEFORD, G. W., CAPT., O.B.E., University of Southampton, School of 1947 Navigation, Warsash, Southampton.
- WARD, E. V., CAPT., M.B.E., Lavender Cottage, Corfe Lodge Road, Broad-1959 stone, Dorset.
- WATERS, D. W., LT. CMDR., R.N., Jolyons, Bury, nr. Pulborough, Sussex. 1954
- WATSON-WATT, Sir Robert, C.B., F.R.S., 7 Crescent Place, London, SW.3. 1947
- WATTS, O. M., CAPT., F.R.A.S., A.R.I.N.A., 49 Albemarle Street, London, W.I. 1947
- 1956
- WEEKES, M. W. M., CAPT., Fig Tree House, Queenborough, Kent. WEPSTER, A., CAPT., Van Ballegooysingel 22, Rotterdam 13, The Netherlands. 1967
- WHALLEY, R., Ingarsby, Brackendale Road, Camberley, Surrey. 1956
- WHITELEY, E. A., GROUP CAPT., C.B.E., D.F.C., R.A.F., (RET.), 529 Lonsdale 1948 Street, Melbourne, Victoria, Australia.
- WILCOCKSON, A. S., CAPT., O.B.E., Downside, 70 Croham Manor Road, 1947 South Croydon, Surrey.
- WILLIAMS, J. E. D., Willow House, Quarry Woods, Marlow, Bucks. 1948
- 1948 WYLIE, F. J., CAPT., O.B.E., R.N. (RET.), 3 Fishermans Bank, Mudeford, Hants.

Printed in Great Britain by William Clowes and Sons Ltd., London, Beccles and Colchester



DIGIPLOT (a marine radar aid for automatic anti-collision navigation) does something about it. Digiplot processes signals from conventional radar (either x or s band) and presents it with computed information on a separate screen to give at-a-glance situation appreciation . . □ Warns of threatening targets. □ Plots and displays up to 40 targets using track-ahead method. □ Instantaneously updates information on clear, flicker-free screen. □ Gives instant digital reading of range, bearing, course, speed, CPA and time-to-CPA for any selected target. □ Instant switching permits viewing situation in true or relative plot modes in head up or North up orientation. □ Trial maneuver capability permits viewing proposed maneuver consequences in speeded up time.

DIRECT INQUIRIES TO:

IOTRON CORPORATION 7 ALFRED CIRCLE BEDFORD, MASSACHUSETTS U.S.A.

CABLE: IOTRON BOSTON



APPLYING AEROSPACE TECHNOLOGY OF THE '60s' TO

ttps://digg/101017/5037253300CQLLISION PREVENTION IN THE '70s

USEFUL BOOKS ON NAVIGATION

AND SHIPPING LAW

NICHOLLS'S SEAMANSHIP AND NAUTICAL KNOWLEDGE

By CHARLES H. BROWN, F.R.S.G.S., Extra Master

55/- (£2.75)

Per post 59/6 (£2.97½)

Supplement 4/- (20p)

Per post 4/6 (22½p)

BASIC SEAMANSHIP (FOR BEGINNERS AT SEA)

By COMMANDER PETER CLISSOLD, R.N.R. (Rtd.)

21/- (£1.05)

Per post 22/2 (£1.11)

Supplement 4/-(20p)

Per post 4/6 (22½p)

RADAR OBSERVER'S HANDBOOK

By WILLIAM BURGER, M.Sc. (Wales), Extra Master

42/- (£2.10)

Per post 43/6 (£2.17 $\frac{1}{2}$)

BUSINESS AND LAW FOR THE SHIPMASTER

By CAPTAIN F. N. HOPKINS, M.I.N., Extra Master

90/- (£4.50)

Per post 94/6 (£4.72 $\frac{1}{2}$)

Supplement 5/- (25p)

Per post 5/6 (27p)

MERCHANT SHIPPING ACTS

Revised by CAPTAIN W. V. J. CLARKE, D.S.C.

60/- (£3.00)

Per post 63/- (£3.15)

SHIPBROKERS AND THE LAW

By E. J. EDWARD, LL.B. (Lond.)

30/- (£1.50)

Per post 31/4 (£1.56 $\frac{1}{2}$)

LAW AND PRACTICE OF SEA TRANSPORT

By CAPTAIN L. F. H. STANTON, A.M.Inst.T.

63/- (£3.15)

Per post 66/- (£3.30)

Catalogue "N", giving further titles and details, free on request.

BROWN, SON & FERGUSON, LTD.,

52 DARNLEY STREET, GLASGOW, S.1.



of confidence

Confidently, we invite you to see the brightest, clearest radar display. The Kelvin Hughes Series 19.

Ask us to show you its ten range scales, from [mile to 64 miles. Its improved clutter suppression. Its 3 cm X band or 10 cm S band operation on 9 or 12 displays—with a range discrimination better than 10 yards (9 metres).

For the price, there's nothing to match it.

Ask for a demonstration

To Kelvin Hugh	ics, New North Ro	ad, Hainault, life	rd, Essex, England.
Please call me to	arrange a demons	reation of your Se	ries 19 radar
A TERROO ELIM THE CO		11 31 11 11 11 11 11 11 11 11 11	ares readure

NAME POSTTION

ADDRESS

KELVIN HUGHES

A THIVISION OF SEMETHES INCLUDE SHIPS CHAIRS
https://doi.org/10/10/10/17/5037346330004772X Published online by Cambridge University Press

'NAVIGATION,

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 17, No. 3 (Fall 1970) contains the following

NAVIGATION NEAR THE MOON BY MEANS OF LUNAR-BASED BEACONS Thomas M. Carson

NAVIGATION DATA FROM MARINER MARS 1969 TV PICTURES
Thomas C. Duzbury

NAVIGATION SATELLITES FOR EARTH-ORBITAL AND LUNAR OPERATIONS Thomas P. Nosek

EARTH SATELLITE SYSTEMS FOR MARINE AND TRANSOCEANIC NAVIGATION AND TRAFFIC CONTROL
Capt. Alfred B. Fiore, USNR, and Dr. Paul Rosenberg

THE IMPACT OF HELICOPTER OPERATIONS ON AIR TRAFFIC CONTROL IN THE 1970'S Col. James G. McFadden, USA, AASC.

ANALYSIS OF A CAPACITY CONCEPT FOR RUNWAY AND FINAL-APPROACH PATH

AIRSPACE A. J. Goldman TIME-SYNCHRONIZED APPROACH CONTROL Ralph L. Erwin, Jr.

AVOIDING COLLISIONS IN A TIMELY MANNER Robert E. Perkinson

RESULTS OF THE ATA CAS FLIGHT TEST PROGRAM Martin J. Borrok and David C. Rider

NAVIGATION BY DEFINITION N. W. Emmott

DETERMINING A RADAR STATION'S CONTACT TIMES James M. Deike

CERTAIN bo/Z COMPUTATION POSSIBILITIES Alfred H. Kerrick

TRIANGULATION THEORY AND TECHNIQUES Cherokee C. Johnson

THE INSTITUTE'S PROFESSIONAL FILE

ROYAL GEOGRAPHICAL SOCIETY

John Bartholomew & Son Ltd., Cartographers of Edinburgh in co-operation with the Royal Geographical Society, London have reproduced the below detailed maps from the Blaeu Atlas Novus published in Amsterdam. Each map is printed on this specially selected antique paper and is presented rolled in an appropriately designed carrying tube. The maps are ideal for framing and the most appropriate style has been found to be the Hogarth black and gold frame which enhances the fine detail of the copper engraved line work and lettering. The paper size is 20" × 24" or 51 cm. × 61 cm.

British Isles Middlesex Norfolk Kent **Yorkshire** Lancashire **Warwickshire and Worcs.**

Available from

Publications Department, Royal Geographical Society, Kensington Gore, London, S.W.7.

Price

each including postage



At Potter's you will find everything for the navigator... instruments, aids, reference books, classics, technical papers, tables and over 60,000 charts corrected to

date. We have a huge

So call in at our navigation centre or let us know your needs.

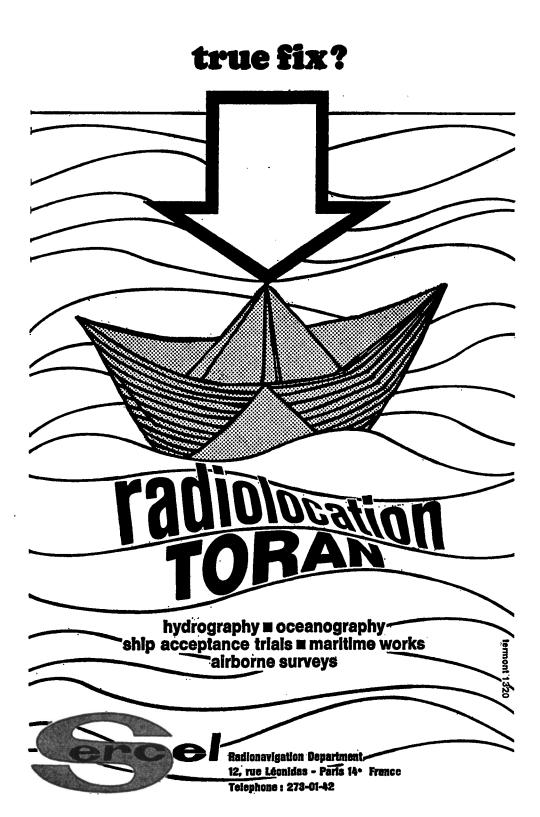
Publication lists sent upon request.



J. D. POTTER LIMITED

The Pure Navigators, Established 1830 145 Minories, London. EC3N INH Tel: 01-481 8795/6, 1369 Cables: Adcharts London EC3 Telex: 27946

POT 1207/2



'Electronic Chernikeeff'

The ideal Log for all Mercantile purposes—backed by almost 50 years actual experience in the design and manufacture of Impeller Logs.

Log makers to the British Admiralty and Overseas Navies for more than 40 years.

- I Accurate and dependable at all speeds down to 'bare steerage way'.
- 2 Suitable for Ship's Side or Bottom Mounting—no loss of accuracy.
- 3 The Retractable Log Tube can be supplied with remotely controlled 'raising and lowering' system.
- 4 Has outputs for True-Motion Radar, Data Logging, Decca ISIS-300.
- 5 Lower installation costs—simple maintenance.

MARCONI-MARINE world wide service is available to users.

Sole Makers .

The Submerged Log Company (1962) Limited, 565/569 High Road, Chiswick, London, W.4, England

Telephone: CHISWICK 01-9946685/6 Telegrams: CHERLOG LONDON W.4

MAKE NAVIGATION SAFE BY AVOIDING FOULING YOUR PROPELLERS AND DAMAGING FISHERMEN'S LIVELIHOOD

Final Act Fisheries Policing Conference, London 1966/67, Annexe 4. Marking Nets, Lines, etc. with Flag or Radar Reflector Buoys by Day and Light Buoys by Night. Lights to be visible at least Two Miles.

- MARKING DRIFT GEAR, LIGHTS TWO METRES ABOVE
 THE BUOY WITH A POLE TWO METRES ABOVE
- WHITE LIGHTS VISIBILITY TWO MILES IN GOOD VISIBILITY
- AUTRONICA TRANSISTORISED ELECTRONIC BEACONS AND FISHING LIGHTS FOR MARKING ROCKS, COAST LINES, ETC.

REAR ADMIRAL A. L. P. MARK-WARDLAW, (Ret.)
LOSEBERRY ENTERPRISES,
LOSEBERRY, CLAYGATE, SURREY

THE INTERNATIONAL HYDROGRAPHIC BUREAU

Avenue Président J. F. Kennedy, MONACO

publishes

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

THE INTERNATIONAL HYDROGRAPHIC REVIEW

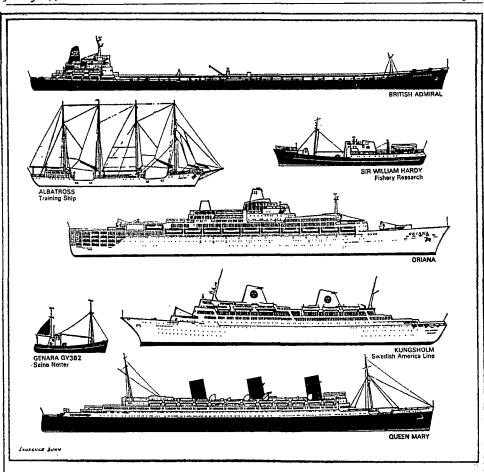
This publication contains articles of topical interest on hydrography, hydrographic surveying and related subjects.

Each number contains an average of 160 pages, 18×27 cm., and numerous illustrations.

Price per number 50/- or \$6 (U.S.), post free in Europe.

Orders should be sent direct to the Bureau's Headquarters in Monaco, but payments can be made to the Bureau's account at Barclays Bank Ltd., Chief Foreign Branch, 152-156 Upper Thames Street, London, E.C.3. Specify English or French edition when ordering.

A reduction of 25% on the price quoted is allowed to booksellers. A reduction of 30% is granted to naval or merchant marine officers of the Bureau's Member States, provided the order is sent direct to the Bureau.



A Growing Tradition...

Over 15,500 ships of all types and sizes, from the largest supertankers to small fishing vessels, today rely on Decca for accurate navigation and economical operation. Now more and

more ships will benefit even more widely as a result of the extensive new coverage now being set up in Australia, the Baltic, South Africa, Japan and the United States.

We are proud to be associated with the wide variety of famous, and not so famous, ships that have relied on the Decca Navigator since it was first introduced commercially over 20 years ago.



The Decca Navigator Company Limited 9 Albert Embankment London SE1

ACCESSON BOYL

SPERRY INTEGRATED SHIPS SYSTEMS The most comprehensive range of equipment ever offered RADAR LORAN SONAR STABIL-PILOTS/ STEERING COMPASSES ANCILLARIES INTEGRATED SHIP SYSTEMS BERTHING & NAVIGATION SONAR SPERRY AUTOMATIC LIST CONTROL GYROFIN ÁCTIVATED FIN SYSTEM 9 VERSIONS GYRO-HYDRAULIC 3 VERSIONS GYRO-ELECTRIC RUDDER ANGLE INDICATOR RE-TRANSMISSION SYSTEM ELECTRO MAGNETIC LOG FACIA PANEL (DUPLEX) FIRE CONTROL RADAR MK 19 MK 23 MK 27 TAPE TYPE REPEATER SR120 MK 37 MK 20 STEERING REPEATER COURSE RECORDER BEARING REPEATER TILLER STEERER TILLER PILOT 12in 10in LORAN A/C 7in 7in DUPLEX MK12 MK10 MK8 MK7 NAVAL APPLICATIONS LICATIONS ICATIONS NAVAL

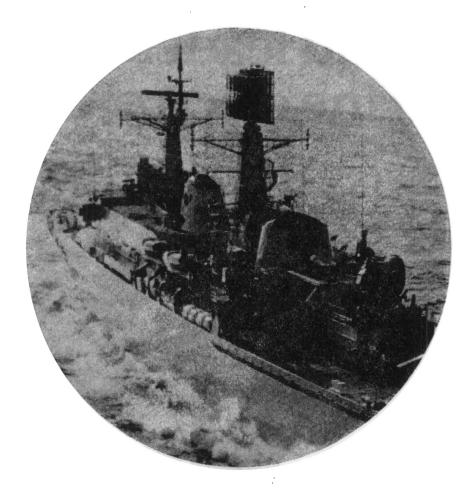


ecca world leaders in marine electronics



London SE1

Marconi complete naval communications



The Marconi comprehensive range of s.s.b/i.s.b naval communications equipment meets all present and foreseeable requirements for voice and automatic telegraphy.

The complete range conforms to Royal Naval standards of resistance to shock, vibration and climatic conditions, and has been NATO codified by the British Defence Department. It is in wide use by the Royal Navy and in the modernization of ten other navies.

Marconi Communication Systems
Limited also has a complete range of
communications equipment available for
shore stations; shipborne, mobile and
static space communication earth
terminals; digital transmission, and
airborne communications.

In addition the Company is able to assist naval departments and shipbuilders with the planning, fitting, testing and tuning of complete ship communications installation.

Marconi Communication Systems Limited

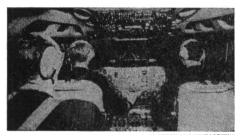
Radio Communications Division, Chelmsford, Essex

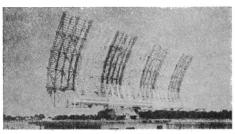
A GEC-Marconi Electronics Company

LTD/H88

GEC-Marconi Electronics

Europe's largest and most comprehensive capital electronics company







The Marconi Company Limited

The principal operating company of GEC-Marconi Electronics Limited.

Marconi Communication Systems Limited

Designers and suppliers of complete h.f. point-to-point, microwave and tropospheric scatter communication systems; fixed, mobile and portable radio telephones; complete space communication earth stations; message switching systems and digital and data transmission systems; mobile communication systems; complete sound and vision broadcasting systems; specialised components.



Marconi Radar Systems Limited

Designers and suppliers of complete ground radar systems for all air defence, air traffic control and shipborne defence applications. Product range includes every type of ground radar equipment and is the most comprehensive in the world. Fighting vehicle systems.

Marconi-Elliott Avionic Systems Limited

Airborne navigation, radar and communication systems. Electro-optical systems. Special purpose radars. Intruder detection systems. Neutron and X-ray devices. Aircraft tracking systems. Flight control, engine control, fuel management and flight instrumentation systems. Automatic test equipment.

Marconi Space and Defence Systems Limited

Research, development and production of advanced electronic equipments. Satellite communication. Spacecraft, satellite electronics and launch vehicle systems. Simulators and trainers. Military communications. Data processing for Field Army, Naval and other shipborne applications. Weapon guidance and fire control systems. Fighting vehicle, navigation and oceanography equipment. Microwave and electronic counter measure (ECM) systems. Underwater weapons.



E-A Space and Advanced Military Systems Limited (EASAMS)

Advanced project and system studies and management for defence, space and industry.

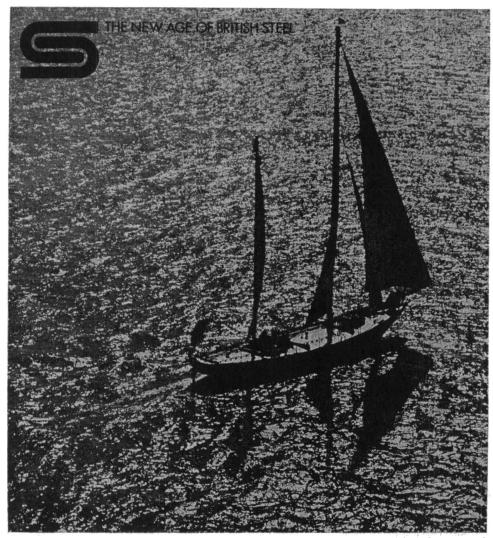
Marconi Instruments Limited

Designers and manufacturers of a wide range of electronic measuring instrumentation from d.c. to microwave frequencies. Signal generators, response analysers, counters, voltmeters, power meters, bridges and oscilloscopes. Programmable automatic test systems. TV image intensifiers.

GEC-Marconi Electronics Limited

Marconi House, Chelmsford, Essex, England

GM01



'British Steel' designed by Robert Clark. Built by Philip & Son, Dartmouth. Length 59 ft. Beam 12 ft. 10 ins. Draught 8 ft. Rig: Bermudan Ketch.

'British Steel'goes round the world

Over 50 per cent of the value of Britain's exports are steel or steel-containing goods. Last year BSC itself sold some £200 million worth of products to all parts of the world—a sizeable contribution to the nation's balance of payments—putting BSC among Britain's top four exporters.

To reach its destination British Steel travels by almost every known means, including road, rail, ship and, occasionally, air. And part of the giant Rio Niteroi Bridge in Brazil was recently floated into position across Guanabara Bay.

Now a new journey has begun as 'British Steel'—a specially designed steel yacht—sails round the world, with Chay Blyth (who rowed the Atlantic with John Ridgeway in 1966) at the helm, alone. He will be sailing from East to West—against the prevailing winds

and currents. This is the first time that a single-handed, non-stop round trip has been attempted 'uphill'.

Steel was Chay Blyth's own choice for his yacht. "Its unique combination of lightness and toughness makes it the best material for the job", he says. In addition to the hull, most of the boat's fixtures and fittings are steel. So is the rigging and much of the equipment which he will take with him.

'British Steel' sails round the world, close-hauled to windward. And the spirit and challenge of this unique adventure symbolise the new age of British Steel.

Copies of a wall chart (45" x 27") showing the projected route of 'British Steel' are available free. Write to the Information Officer, British Steel Corporation. Allow 14 days for delivery.

British Steel Corporation



The newly elected President, Rear-Admiral G. S. Ritchie, c.b., d.s.c., Hydrographer of the Navy.