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# The Marine Observer

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Meteorology*



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# THE MARINE OBSERVER

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DIVISION OF THE METEOROLOGICAL OFFICE

VOL. XLVII

No. 257

JULY 1977

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*Letters to the Editor, and books for review, should be sent to the Editor, 'The Marine Observer',  
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## EXCELLENT AWARDS 1976

The method of selecting the annual Excellent Awards follows the same pattern as that started in 1975, that is, we are continuing to make awards to individuals rather than to particular ships, so that, in certain cases, Masters and Principal Observing Officers have been nominated whilst the Radio Officer has not qualified, whereas, in other ships, the reverse has been the case. This also means that more than one Master or Officer may qualify from the same ship on different voyages.

As usual consideration has been made during the assessment to the type of vessel, trade on which engaged, number of Observing Officers involved and in the case of Radio Officers, whether the ship has a high- or low-powered transmitter and the availability of shore stations to receive the messages.

The 1976 list of Masters and Officers who have qualified for the awards is shown on pages 95 to 99 and it gives us great pleasure in congratulating those whose names appear. It is with genuine regret that we offer our commiserations to the many others who have achieved an excellent assessment without quite reaching award standard. A short list of six ships which have the distinction of being at the head of the list due to the outstanding character of their records is as follows:

1. m.v. *Wild Auk* (Peninsular and Oriental Steam Navigation Company), Captain L. E. Quigley.
2. s.s. *Esso Caledonia* (Esso Petroleum Company Limited), Captain J. W. H. Aalen.
3. s.s. *Benattow* (Ben Line Limited), Captain R. E. Cowie.
4. m.v. *Mayfield* (Shaw Savill & Albion Company Limited), Captain J. S. Street.
5. s.s. *Cardigan Bay* (Ocean Transport & Trading Limited), Captain C. S. Mackinnon.
6. s.s. *Encounter Bay* (Container Fleets Limited), Captain K. E. Howard.

m.v. *Mayfield* and s.s. *Encounter Bay* merit our special congratulations, both appear for the second time on our short list—no small feat to achieve this out of a Voluntary Observing Fleet of about 560 ships.

Photographs of the first three ships appear opposite page 108.

Distant water trawlers, always prominent in these lists, have excelled themselves this year, no less than 13 vessels have gained awards.

The awards to Trawler Skippers and Radio Officers who make non-instrumental observations, together with the awards to MARID ships, vessels employed on short sea trades which take sea temperatures only, though wind and weather are also reported from the North Sea, are shown on pages 99 to 100. Their contribution to the Meteorological Office is also of considerable value.

The recipients of the awards will be notified by post and requested to provide an address to which the award may be sent. Any Master or Officer seeing his name in this list, or in any other list published by his company, before hearing individually from us, is requested to write and claim his award giving us a forwarding address.

The initial award is normally *The University Atlas* followed as a second award by *Cassell's English Dictionary*. The book selected this year as the third award is *The Wayfarer's Guide to Beautiful Britain*. The Atlas still appears to be very popular with the Dictionary a close second. When an Officer's name comes up for the third time he receives the book of the year which has been selected by the Marine Division of the Meteorological Office. If any first or second award Officer does not require either an Atlas or a Dictionary, we would be pleased if he would let us know; we would hope to be able to send to him the chosen book as an alternative.

J.D.B.



# EXCELLENT AWARDS (Year ended 31 December 1976)

CAPTAIN		COMPANY		CAPTAIN		COMPANY	
J. W. H. Aalen	..	Esso Petroleum Co. Ltd.	..	E. H. Gregson	..	Furness Withy & Co. Ltd.	..
A. G. Allison, D.S.M.	..	Union-Castle Mail S.S. Ltd.	..	D. V. Harradine, R.D.	..	P. & O. S.N. Co.	..
A. Atkinson	..	Hellyer Bros. Ltd.	..	S. Hay	..	Clan Line Steamers Ltd.	..
A. Ball	..	T. Hamling & Co. Ltd.	..	A. S. Haynes	..	Bank Line Ltd.	..
I. Y. Batley	..	P. & O. S.N. Co.	..	D. R. Hayward	..	Ocean Transport & Trading Ltd.	..
P. St Q. Beadon	..	Union-Castle Mail S.S. Ltd.	..	S. T. S. Household	..	P. & O. S.N. Co.	..
J. H. Beavan	..	Clan Line Steamers Ltd.	..	K. E. Howard	..	Container Fleets Ltd.	..
W. E. Bellamy	..	Ocean Transport & Trading Ltd.	..	L. E. Howell	..	Container Fleets Ltd.	..
J. Bentley	..	Ocean Transport & Trading Ltd.	..	W. G. Hunt	..	F. T. Everard & Sons Ltd.	..
J. Berry	..	British United Trawlers Ltd.	..	J. H. Hutson	..	Container Fleets Ltd.	..
F. G. Bevis	..	P. & O. S.N. Co.	..	J. Illingworth	..	Manchester Liners Ltd.	..
W. Boden	..	British United Trawlers Ltd.	..	D. D. Jamieson	..	Ellerman Lines Ltd.	..
W. D. B. Boler	..	Esso Petroleum Co. Ltd.	..	E. J. Johnson	..	T. Hamling & Co. Ltd.	..
R. Blackburn	..	F. T. Everard & Sons Ltd.	..	P. R. Kent	..	Clan Line Steamers Ltd.	..
W. W. Brown	..	London & Overseas Freighters Ltd.	..	J. B. Kerr	..	Christian Salvesen (Shipping) Ltd.	..
R. Brownbill	..	Blue Star Line Ltd.	..	J. N. Kerr, M.B.E.	..	British United Trawlers Ltd.	..
J. B. Caley	..	Clan Line Steamers Ltd.	..	F. G. King	..	Clan Line Steamers Ltd.	..
J. D. Cannon	..	Newington Trawlers Ltd.	..	S. J. Lawrence	..	British Antarctic Survey	..
E. E. Chapman	..	Port Line Ltd.	..	P. Lay	..	P. & O. S.N. Co.	..
M. J. Charlesworth	..	P. & O. S.N. Co.	..	K. Lehepuu	..	Manchester Liners Ltd.	..
P. J. Clark	..	Container Fleets Ltd.	..	T. A. M. Lincoln	..	P. & O. S.N. Co.	..
M. J. Cole	..	British Antarctic Survey	..	R. C. Lister	..	P. & O. S.N. Co.	..
I. S. M. Condie	..	Shaw Savill & Albion Co. Ltd.	..	R. W. Lumsden	..	Shell Tankers (U.K.) Ltd.	..
N. F. Wray-Cook	..	Clan Line Steamers Ltd.	..	C. S. Mackinnon	..	Ocean Transport & Trading Ltd.	..
J. Cosker	..	P. & O. S.N. Co.	..	I. C. Mackintosh	..	Blue Star Line Ltd.	..
R. E. Cowie	..	Ben Line Steamers Ltd.	..	A. R. Macintyre	..	Clan Line Steamers Ltd.	..
A. G. Cruickshank	..	Clan Line Steamers Ltd.	..	D. T. MacLachlan	..	Ocean Transport & Trading Ltd.	..
P. D. Cullen	..	Manchester Liners Ltd.	..	J. A. MacLeod	..	Ellerman Lines Ltd.	..
C. N. L. Davies	..	Sugar Line Ltd.	..	E. W. McCoid	..	British United Trawlers Ltd.	..
H. Davies	..	Ocean Transport & Trading Ltd.	..	H. H. McIntosh	..	Ben Line Steamers Ltd.	..
E. G. Dixon	..	P. & O. S.N. Co.	..	T. C. Mathews	..	P. & O. S.N. Co.	..
P. Donaghue	..	British United Trawlers Ltd.	..	G. Milburn	..	Panoean Shipping & Terminals Ltd.	..
K. N. Dootson	..	Lyle Shipping Co. Ltd.	..	R. Moore	..	Ocean Transport & Trading Ltd.	..
T. Doyle	..	T. Hamling & Co. Ltd.	..	P. K. Murchison	..	Shaw Savill & Albion Co. Ltd.	..
C. R. Elliott	..	British Antarctic Survey	..	J. W. Murray	..	Burmes Marks Ltd.	..
D. A. Graham	..	Ocean Transport & Trading Ltd.	..	B. A. Nelson	..	Manchester Liners Ltd.	..

# Excellent Awards (contd.)

CAPTAIN	COMPANY	CAPTAIN	COMPANY
A. Osler ..	Hudson Bros. Trawlers Ltd.	W. H. Selkirk ..	Stag Line Ltd.
A. J. Palmer ..	Ocean Transport & Trading Ltd.	W. M. Shirreff ..	Sugar Line Ltd.
D. Patrickson ..	Sugar Line Ltd.	R. M. Simpson ..	Ocean Transport & Trading Ltd.
E. M. S. Phelps ..	British Antarctic Survey	J. R. Sokalski ..	P. & O. S.N. Co.
J. M. Phillips ..	Esso Petroleum Co. Ltd.	A. B. Stalker ..	P. & O. S.N. Co.
P. M. Pitcairn ..	P. & O. S.N. Co.	J. G. Street ..	Shaw Savill & Albion Co. Ltd.
H. Powdrill ..	J. Marr & Son Ltd.	A. Walker ..	Hudson Bros. Trawlers Ltd.
L. E. Quigley ..	P. & O. S.N. Co.	R. Weston ..	B.P. Tanker Co. Ltd.
P. N. V. Rewell ..	Clan Line Steamers Ltd.	P. L. Whitehouse ..	F. T. Everard & Sons Ltd.
J. R. Richmond ..	Shaw Savill & Albion Co. Ltd.	D. Whiting ..	British United Trawlers Ltd.
D. Y. Roberts ..	Department of Trade	B. Wilcock ..	Buries Marks Ltd.
M. Robinson ..	P. & O. S.N. Co.	R. J. Williams ..	Shell Tankers (U.K.) Ltd.
A. A. Rundie ..	Ocean Transport & Trading Ltd.	J. C. Wilson ..	B.P. Tanker Co. Ltd.
J. R. Scott ..	B.P. Tanker Co. Ltd.	E. R. Wooldridge ..	Newington Trawlers Ltd.

PRINCIPAL OBSERVING OFFICER	COMPANY	PRINCIPAL OBSERVING OFFICER	COMPANY
I. Aitchison ..	Ben Line Steamers Ltd.	R. D. Lorraine ..	Container Fleets Ltd.
D. R. Alexander ..	Ocean Transport & Trading Ltd.	A. MacIntyre ..	F. T. Everard & Sons Ltd.
W. A. Anderson ..	Lyle Shipping Co. Ltd.	R. M. Maclure ..	Ocean Transport & Trading Ltd.
D. J. Austen ..	P. & O. S.N. Co.	A. R. McCulloch ..	Clan Line Steamers Ltd.
D. H. Ayris ..	P. & O. S.N. Co.	J. S. McKechnie ..	Shaw Savill & Albion Co. Ltd.
C. Baker ..	Clan Line Steamers Ltd.	R. J. McLarty ..	P. & O. S.N. Co.
T. P. Barrett ..	T. Hamling & Co. Ltd.	D. S. McWilliam ..	Clan Line Steamers Ltd.
P. R. D. Brewer ..	Ocean Transport & Trading Ltd.	P. A. S. Markland ..	Shell Tankers (U.K.) Ltd.
W. Broadbent ..	Ocean Transport & Trading Ltd.	L. Aye Maung ..	Ocean Transport & Trading Ltd.
C. D. Bull ..	Shell Tankers (U.K.) Ltd.	K. H. Milne ..	Esso Petroleum Co. Ltd.
G. Christmas ..	Newington Trawlers Ltd.	H. F. Monckton ..	British Antarctic Survey
C. J. A. Cladingbowl ..	Ben Line Steamers Ltd.	P. M. Moore ..	Blue Star Line Ltd.
I. Clark ..	P. & O. S.N. Co.	D. W. Morrison ..	Ocean Transport & Trading Ltd.

G. Cook ..	..	Ocean Transport & Trading Ltd.	M. R. Nelms ..	B.P. Tanker Co. Ltd.
M. A. Cook ..	..	P. & O. S.N. Co.	D. Normandale ..	Manchester Liners Ltd.
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C. M. Croome ..	..	Container Fleets Ltd.	K. W. O'Neill ..	Newington Trawlers Ltd.
J. G. W. Dixon ..	..	Ocean Transport & Trading Ltd.	H. G. Pask ..	T. Hamling & Co. Ltd.
N. J. Dodson ..	..	Clan Line Steamers Ltd.	G. W. Patrick ..	British United Trawlers Ltd.
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D. C. Fickling ..	..	P. & O. S.N. Co.	P. G. Powell ..	Clan Line Steamers Ltd.
L. J. Fletcher ..	..	P. & O. S.N. Co.	J. A. Pretswell ..	Christian Salvesen (Shipping) Ltd.
R. N. Franklin ..	..	Sugar Line Ltd.	D. A. Reid ..	Union-Castle Mail S.S. Co. Ltd.
A. Frost ..	..	Port Line Ltd.	N. R. G. Robinson ..	P. & O. S.N. Co.
A. Fulcher ..	..	British United Trawlers Ltd.	M. J. Rudd ..	Shaw Savill & Albion Co. Ltd.
D. W. Gilzean ..	..	Shaw Savill & Albion Co. Ltd.	C. M. Schiller ..	B.P. Tanker Co. Ltd.
T. G. C. Guan ..	..	Ocean Transport & Trading Ltd.	R. E. Shore ..	Sugar Line Ltd.
T. Gwynne ..	..	Ellerman Lines Ltd.	P. J. Sizer ..	Container Fleets Ltd.
M. O. Gyles ..	..	Buries Marks Ltd.	N. B. H. Skinner ..	F. T. Everard & Sons Ltd.
J. B. Harbord ..	..	Clan Line Steamers Ltd.	G. J. Smith ..	London & Overseas Freighters Ltd.
W. F. Harris ..	..	P. & O. S.N. Co.	R. Spall ..	British United Trawlers Ltd.
G. S. Hart ..	..	Blue Star Line Ltd.	K. C. Stone ..	T. Hamling & Co. Ltd.
J. R. D. Hart ..	..	Clan Line Steamers Ltd.	G. W. Taylor ..	British United Trawlers Ltd.
M. V. Hobbs ..	..	Ocean Transport & Trading Ltd.	H. C. L. Taylor ..	British United Trawlers Ltd.
B. Hollywood ..	..	F. T. Everard & Sons Ltd.	H. C. Thorburn ..	Ellerman Lines Ltd.
T. Horrocks ..	..	British United Trawlers Ltd.	C. J. Tilly ..	P. & O. S.N. Co.
S. T. Houldsworth ..	..	Ocean Transport & Trading Ltd.	M. A. J. Underwood ..	P. & O. S.N. Co.
M. J. Howarth ..	..	Container Fleets Ltd.	D. R. K. Vickers ..	P. & O. S.N. Co.
R. M. Hughes ..	..	P. & O. S.N. Co.	R. L. Walker ..	B.P. Tanker Co. Ltd.
G. D. S. Jex ..	..	P. & O. S.N. Co.	W. G. C. Wallace ..	Ocean Transport & Trading Ltd.
G. P. Jones ..	..	Shaw Savill & Albion Co. Ltd.	I. M. Ward ..	Clan Line Steamers Ltd.
R. Jones ..	..	Shaw Savill & Albion Co. Ltd.	J. Wells ..	British United Trawlers Ltd.
A. E. Joss ..	..	Manchester Liners Ltd.	K. A. J. White ..	Clan Line Steamers Ltd.
R. R. N. Laing ..	..	Hudson Bros. Trawlers Ltd.	M. J. Williams ..	Panoecean Shipping & Terminals Ltd.
E. A. Lamb ..	..	Stag Line Ltd.	A. K. Woodward ..	B.P. Tanker Co. Ltd.
R. J. Lewis ..	..	Clan Line Steamers Ltd.	K. Worthington ..	Container Fleets Ltd.
G. G. Lightbown ..	..	British Antarctic Survey	P. Wright ..	Ocean Transport & Trading Ltd.
R. P. Lonsdale ..	..	P. & O. S.N. Co.	A. A. Yunus ..	Ocean Transport & Trading Ltd.



# Excellent Awards (*contd.*)

RADIO OFFICER		COMPANY		RADIO OFFICER		COMPANY	
B. J. F. Adkin	..	..	P. & O. S.N. Co.	R. R. N. Laing	..	Marconi International Marine Co. Ltd.	..
C. Adkin	..	..	P. & O. S.N. Co.	W. Latus	..	Cayzer Irvine & Co. Ltd.	..
P. Arkley	..	..	P. & O. S.N. Co.	E. F. Law	..	P. & O. S.N. Co.	..
T. P. Barrett	..	..	T. Hamling & Co. Ltd.	D. Leeson	..	Marconi International Marine Co. Ltd.	..
R. P. Bate	..	..	Container Fleets Ltd.	D. A. C. Macrae	..	International Marine Radio Co. Ltd.	..
W. B. Bell	..	..	B.P. Tanker Co. Ltd.	T. McCarthy	..	Marconi International Marine Co. Ltd.	..
P. A. Braxton	..	..	Marconi International Marine Co. Ltd.	N. M. McKinven	..	Clan Line Steamers Ltd.	..
J. Breen	..	..	Marconi International Marine Co. Ltd.	E. Marks	..	P. & O. S.N. Co.	..
J. J. Briggs	..	..	P. & O. S.N. Co.	T. J. Martel	..	Clan Line Steamers Ltd.	..
H. E. Brookfield	..	..	Marconi International Marine Co. Ltd.	D. Matthews	..	T. Hamling & Co. Ltd.	..
D. L. Byne	..	..	P. & O. S.N. Co.	R. A. Maxfield	..	Clan Line Steamers Ltd.	..
R. Caine	..	..	Clan Line Steamers Ltd.	R. P. Murt	..	P. & O. S.N. Co.	..
J. A. Chalkley	..	..	Clan Line Steamers Ltd.	H. M. O'Gorman	..	British Antarctic Survey	..
H. Cherry	..	..	Marconi International Marine Co. Ltd.	K. W. O'Neill	..	Newington Trawlers Ltd.	..
G. Christmas	..	..	Marconi International Marine Co. Ltd.	B. Oldroyd	..	Ocean Transport & Trading Ltd.	..
R. F. Collins	..	..	International Marine Radio Co. Ltd.	J. H. G. Pask	..	T. Hamling & Co. Ltd.	..
J. Coop	..	..	P. & O. S.N. Co.	F. Paterson	..	Marconi International Marine Co. Ltd.	..
P. Cooper	..	..	Container Fleets Ltd.	J. K. Paterson	..	Clan Line Steamers Ltd.	..
J. A. Crampin	..	..	P. & O. S.N. Co.	S. M. Pilling	..	P. & O. S.N. Co. Ltd.	..
P. P. Cuffe	..	..	Shell Tankers (U.K.) Ltd.	M. Pitcher	..	J. & J. Denholm Ltd.	..
R. J. Deakin	..	..	P. & O. S.N. Co.	R. P. Pollock	..	Panoean Shipping & Terminals Ltd.	..
M. Donaldson	..	..	Marconi International Marine Co. Ltd.	G. D. Pople	..	Redifon Telecommunication Ltd.	..
M. G. Dunkley	..	..	B.P. Tanker Co. Ltd.	R. V. Price	..	Marconi International Marine Co. Ltd.	..
R. C. Elkins	..	..	Marconi International Marine Co. Ltd.	S. G. Price	..	Marconi International Marine Co. Ltd.	..
E. J. Emmett	..	..	Ocean Transport & Trading Ltd.	R. Prole	..	International Marine Radio Co. Ltd.	..
N. Fenton	..	..	Shell Tankers (U.K.) Ltd.	R. Routh	..	Silver Line Ltd.	..
G. A. Ferrand	..	..	Marconi International Marine Co. Ltd.	M. V. Savoury	..	Sir Wm. Reardon Smith & Sons Ltd.	..
A. Fulcher	..	..	British United Trawlers Ltd.	L. M. C. Sells	..	Ocean Transport & Trading Ltd.	..
C. Gamwell	..	..	P. & O. S.N. Co.	W. F. Shepherd	..	P. & O. S.N. Co.	..
J. Gilhooly	..	..	Marconi International Marine Co. Ltd.	J. Simpson	..	P. & O. S.N. Co.	..
R. E. M. Greaves	..	..	International Telephone & Telegraph Corporation	T. J. Slattery	..	Marconi International Marine Co. Ltd.	..
D. Griffith	..	..	Ocean Transport & Trading Ltd.	R. Smith	..	Marconi International Marine Co. Ltd.	..
J. E. Harding	..	..	Bibby Line Ltd.	R. Spall	..	British United Trawlers Ltd.	..

C. J. Hawkrige	..	Marconi International Marine Co. Ltd.	J. L. Spanner	..	P. & O. S.N. Co.
R. G. Heath	..	P. & O. S.N. Co.	M. Stokes	..	International Marine Radio Co. Ltd.
P. C. Heredge	..	Cayzer Irvine & Co. Ltd.	K. C. Stone	..	T. Hamling & Co. Ltd.
A. P. Hilder	..	B.P. Tanker Co. Ltd.	G. W. Taylor	..	Marconi International Marine Co. Ltd.
D. W. Hiron	..	P. & O. S.N. Co.	H. C. L. Taylor	..	J. Marr & Sons Ltd.
A. E. Holman	..	Ocean Transport & Trading Ltd.	C. K. Thornallay	..	Container Fleets Ltd.
R. Holmes	..	Associated Container Transportation Ltd.	A. Titley	..	Container Fleets Ltd.
G. Hough	..	Redifon Telecommunications Ltd.	R. W. Wade	..	British Antarctic Survey
S. Hudson	..	International Marine Radio Co. Ltd.	A. R. Watt	..	P. & O. S.N. Co.
C. E. Hughes	..	Container Fleets Ltd.	P. M. Weldon	..	Ocean Transport & Trading Ltd.
O. Ismail	..	Marconi International Marine Co. Ltd.	J. Wells	..	British United Trawlers Ltd.
D. Jackson	..	Panoecean Shipping & Terminals Ltd.	M. G. Welsh	..	P. & O. S.N. Co.
T. S. G. Jarra	..	B.P. Tanker Co. Ltd.	A. K. Wilkins	..	Redifon Telecommunications Ltd.
M. H. Joniec	..	Container Fleets Ltd.	R. M. Willcocks	..	P. & O. S.N. Co.
E. I. Kelly	..	Clan Line Steamers Ltd.	D. Williams	..	Redifon Telecommunications Ltd
J. Kelly	..	Marconi International Marine Co. Ltd.	R. A. Wilson	..	Union-Castle Mail S.S. Co. Ltd.
R. K. Kristiansen	..	P. & O. S.N. Co.	D. W. Woodhall	..	Marconi International Marine Co. Ltd.

## 'MARID' SHIPS †

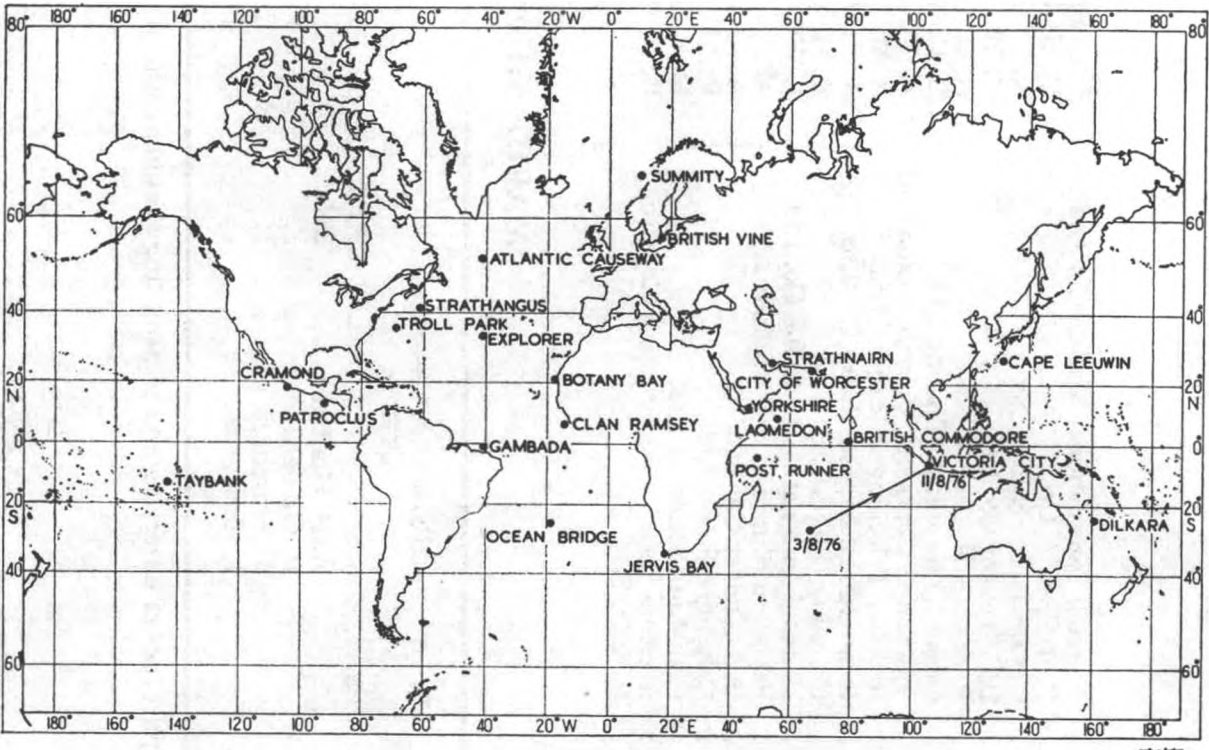
CAPTAIN	PRINCIPAL OBSERVING OFFICER	RADIO OFFICER	OWNER/MANAGER
C. M. Hart/P. H. Phillips	..	..	A. R. C. Marine Ltd.
P. Mattocks	..	..	Esso Petroleum Co. Ltd.
W. Lowndes	..	..	Esso Petroleum Co. Ltd.
P. G. Lynch	..	..	P. & O. Ferries

† Vessels recruited for the purposes of observing and transmitting sea temperatures together with non-instrumental observations when in the North Sea.

Excellent Awards (contd.)

TRAWLERS (non-instrumental)

SKIPPER	RADIO OPERATOR				TRAWLER OWNERS
J. W. E. Boyle ..					Boyd Line Ltd.
F. Drewery ..					British United Trawlers Ltd.
P. W. Garner ..					Boyd Line Ltd.
W. E. Harris ..					Northern Trawlers Ltd.
G. Kent ..					Boyd Line Ltd.
J. R. Nelson ..					T. Hamling & Co. Ltd.
D. Paterson ..					Hudson Bros. Trawlers Ltd.
T. W. Pembroke ..					British United Trawlers Ltd.
W. Waddingham ..					British United Trawlers Ltd.
	B. H. Colley .. ..	..	..	..	British United Trawlers Ltd.
	C. Hodder .. ..	..	..	..	British United Trawlers Ltd.
	M. E. Morrow .. ..	..	..	..	T. Hamling & Co. Ltd.
	H. G. Pougher .. ..	..	..	..	Northern Trawlers Ltd.
	A. Spence .. ..	..	..	..	Boyd Line Ltd.
	A. S. Warman .. ..	..	..	..	British United Trawlers Ltd.
	E. Willey .. ..	..	..	..	Hudson Bros. Trawlers Ltd.
	N. H. Willis .. ..	..	..	..	Boyd Line Ltd.



Position of ships whose reports appear in *The Marine Observers' Log*





## July, August, September

*The Marine Observers' Log* is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor.

Observing officers are reminded that preserved samples of discoloured water, luminescent water, etc. considerably enhance the value of such an observation. Port Meteorological Officers in the UK will supply bottles, preservative and instructions on request.

### TYPHOON FRAN

#### North Pacific Ocean

m.v. *Cape Leeuwin*. Captain M. Murray. Chinhae (S. Korea) to Albany. Observers, the Master and ship's company.

8-10 September 1976. During this period typhoon Fran was encountered and the following are selected extracts from the logbook:

GMT

8th

1500: Wind E'N, force 5. Barometer reading 998.7 mb. Moderate/rough sea with heavy SSE'ly swell.

1630: Speed reduced to avoid pounding. Course 160°T.

1900: Wind E'N, force 8. Barometer reading 994.4 mb. Sea rough with heavy confused SSE'ly swell. Heavy rain showers. Visibility 5 n.mile.

2100: Wind E'ly, force 8. Barometer reading 993.2 mb. Sea rough with heavy confused SE'ly swell. Heavy rain showers.

2300: Wind E'ly, force 8. Barometer reading 993.2 mb. Sea rough with heavy SE'ly swell. Heavy showers.

9th

0000: Wind E's, force 9. Barometer reading 990.9 mb. Very rough sea with heavy SE'ly swell. Heavy rain affecting visibility.

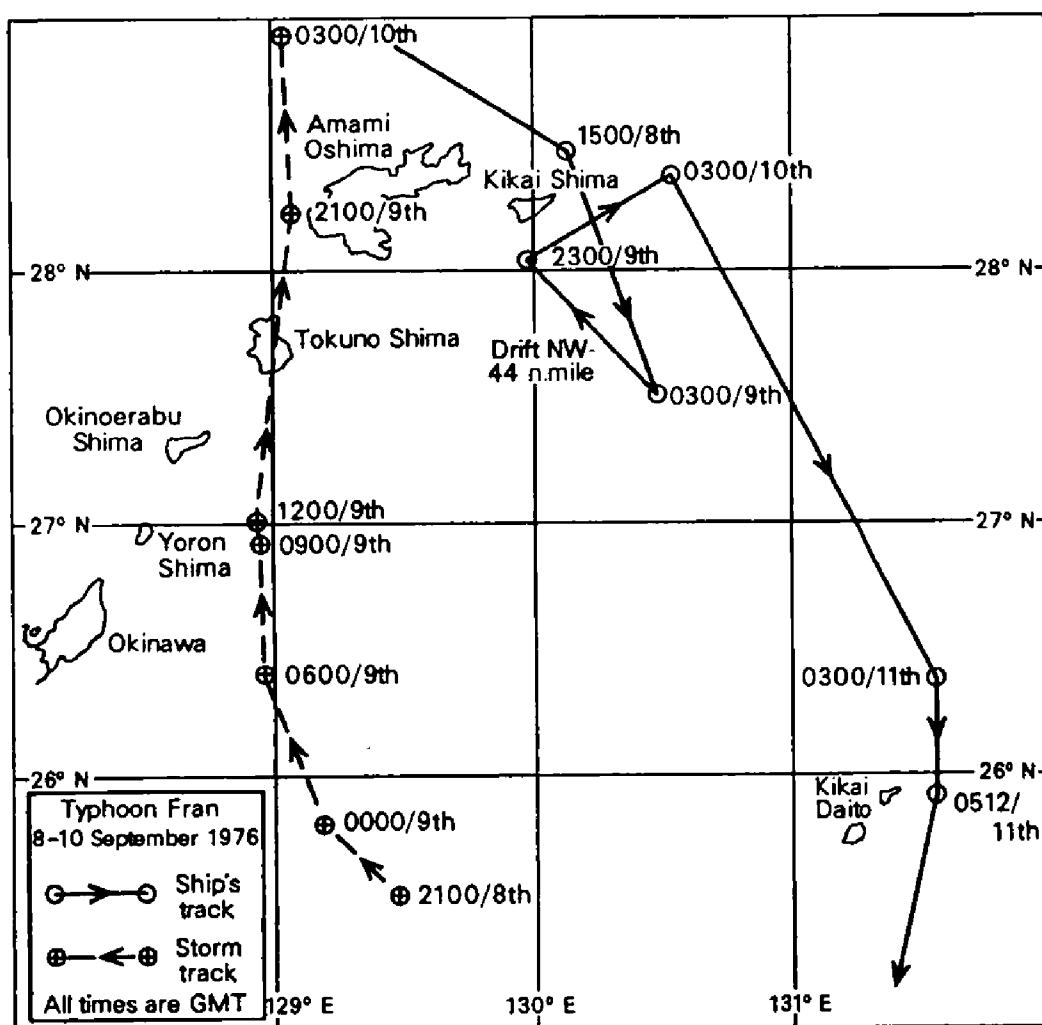
0300: Wind E's, force 10. Barometer reading 989.0 mb. Very rough sea with very heavy SE'ly swell. Heavy rain showers.

0500: Wind ESE, force 11. Barometer reading 985.5 mb. Exceptionally rough sea with very heavy SE'ly swell, sea white with driving spray. Torrential rain and spray affecting visibility.

0700: Wind SE'ly, force 11-12. Barometer reading 982.3 mb. Vessel hove to in extremely rough sea and very heavy SE'ly swell. Visibility seriously affected by torrential rain and driving spray.

0900: Wind SE'E, force 12. Barometer reading 982.5 mb. Exceptionally high seas with very heavy swell, torrential rain showers and driving spray.

- 1100: Wind SE'ly, force 12. Barometer reading 981.2 mb. Extremely rough sea with very heavy swell. Visibility 0.5 n.mile. Torrential rain and driving spray. Vessel hove to.
- 1300: Wind SE'E, force 12. Barometer reading 979.6 mb. Overcast with continuous heavy rain and driving spray. Sea completely white. Visibility less than 0.5 n.mile. Vessel hove to.
- 1500: Wind SE'E, force 12. Exceptionally high seas and very heavy swell. Torrential rain and driving spray affecting visibility.
- 1900: Wind SE'ly, force 12. Barometer reading 968.7 mb. Exceptionally high seas with long steep SE'ly swell. Vessel shipping spray over main deck and hatches. Overcast with heavy rain and driving spray. Vessel hove to.
- 2215: Kikai Shima Island sighted on radar, vessel had been set north-westwards 44 n.mile. Full ahead, alter course to 090°T to clear the island. Barometer reading 967.4 mb. Exceptionally high seas and very heavy swell. Visibility 50 metres. Wind veered to S'ly, force 12.
- 10th
- 0100: Vessel beginning to draw away from Kikai Shima Island, course 072°T. Very high seas, very heavy swell. Barometer reading 965.5 mb. Wind S'ly, force 11-12. Visibility 50 metres.
- 0300: Alter course to 155°T.
- 0600: Wind moderating to force 10. Visibility improving to 2 n.mile. Barometer reading 983.0 mb. Overcast with periods of heavy rain.
- 1400: Wind veering to SSW.
- 1700: Wind SSW moderating, force 7. Barometer reading 996.6 mb.
- Position of ship at 1800 on the 8th: 27° 36'N, 130° 24'E.
- Position of ship at 1800 on the 10th: 27° 54'N, 130° 45'E.



*Note.* Typhoon Fran was one of the most severe storms to strike Japan for more than a decade. First detected SE of Guam on the 3rd, Fran moved steadily NW, attaining typhoon strength on the 6th and reaching maximum intensity early on the 8th when maximum winds were estimated at 135 knots. Slowly weakening, Fran recurved north on the 9th (see accompanying chart) and crossed Kyushu into the Sea of Japan on the 12th. It was not until the 15th that the storm turned east into the Pacific and filled.

Fran did considerable damage in the Ryukyus and throughout Japan. More than 110 people were killed and the following is an extract from the *Mariners Weather Log*:

'Five-day totals of 60 inches of rain, more than Tokyo's average annual rainfall, fell over areas of western and central Japan. Hardest hit was Kochi City, where rivers flooded after 50 inches of rain. Throughout Japan floods swept away 221 bridges and caused 3577 landslides. Fran was also held accountable for the 138 vessels that were either sunk or damaged.'

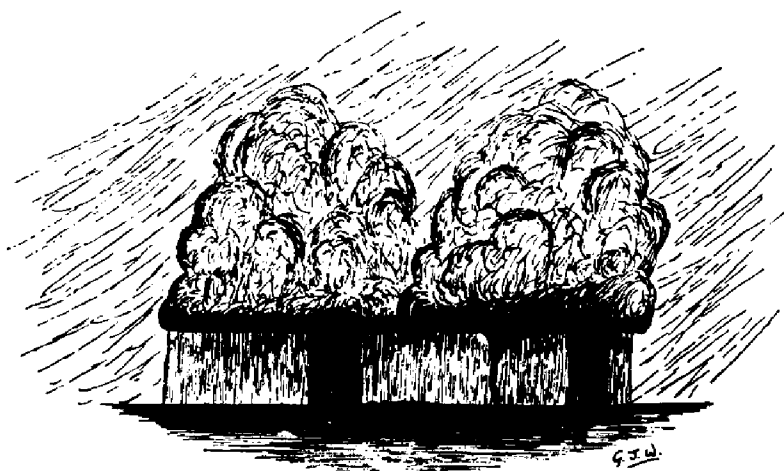
The *Cape Leeuwin* encountered the typhoon soon after it reached maximum intensity. For more than 24 hours the vessel was in the dangerous quadrant and the above report clearly illustrates the severity of conditions that may be experienced in such a position.

## WATERSPOUTS

### North Atlantic Ocean

m.v. *Troll Park*. Captain J. B. Morris. Bremen to Savannah, Georgia. Observer, Mr G. J. Watt, 2nd Officer.

10 August 1976. At 1930 GMT a waterspout was observed bearing 350°T at a distance of four n.mile, see sketch. Owing to distance the mode of formation, direction of rotation and diameter could not be ascertained.



The waterspout was visible for about 10 minutes, after which it became engulfed in the heavy rain shower falling from the cumulonimbus cloud. The base of the cloud was estimated to be 1000–2000 feet, towering, but with no anvil.

Position of ship: 35° 20'N, 68° 55'W.

### Baltic Sea

m.v. *British Vine*. Captain J. C. Wilson, Gothenburg to Umea (Sweden). Observers, Mr J. Swanson, 3rd Officer and members of the ship's company.

4 August 1976. At 0324 GMT a waterspout was observed extending downwards from a dense cumulonimbus cloud in a direction of 060°T and at a distance of 20 n.mile, as determined by radar, from the vessel. A sextant was used to determine the vertical extent of the formation and the heights were calculated.

The initial measurement showed the funnel to be 400 feet high. It continued to develop and when it had reached the horizon it was found to be 1400 feet high. A short distance above the horizon the funnel was observed to bend and drop vertically.

At 0330 the 'pipe' from the bend downwards became less solid and appeared much as distant-falling rain would appear.



By 0333 the 'pipe' had disappeared completely and by 0335 the funnel had begun to dissipate.

A watch was kept for any further developments and at 0346 we were rewarded when a second waterspout was observed. This time the funnel was much thinner. It developed from a cumulonimbus cloud in a direction of  $110^{\circ}\text{T}$  and at a distance of 18 n.mile from the vessel. When the funnel was fully extended and the 'pipe', as before, was observed to drop vertically to the horizon, measurements were taken and the height of the funnel was found to be 950 feet and the 'pipe' 350 feet.

At 0353 the 'pipe' had disappeared in exactly the same manner as the previous one had done and by 0355 the funnel also had dissipated.

Weather conditions at the time were as follows: 6 oktas towering cumulus and cumulonimbus, wind NW, force 3-4, sea slight to moderate, dry bulb  $14.0^{\circ}\text{C}$ , wet bulb  $11.7$ , barometric pressure  $1006.2$  mb.

Position of ship:  $56^{\circ} 35'\text{N}$ ,  $17^{\circ} 15'\text{E}$ .

## ST ELMO'S FIRE

### North Pacific Ocean

m.v. *Cramond*. Captain O. Henderson. Tocopilla (Chile) to Manzanillo (Mexico). Observers, Mr J. W. Hepburn, 2nd Officer, Cadet T. J. F. Gallacher and Mr J. A. Reilly, Radio Officer.

17 September 1976. At 0800 GMT heavy rain with thunder and lightning close to the ship began. By 0815 the rain had ceased but the thunder and lightning continued.

At 0820, while out on the bridge wing, Mr Hepburn put his arm over the starboard dodger and witnessed a small luminous spark extending from a finger-tip. The Master, Cadet Gallacher and Mr Reilly then came out onto the bridge wing and the same phenomenon was experienced by all three. Eventually it was observed that strong luminous sparks were extending from all five fingers of Cadet Gallacher at the same time. When the fingers were damp no sparks occurred.

No luminous brush was to be seen extending from the extremities of the mast and yards.

Position of ship:  $18^{\circ} 20'\text{N}$ ,  $103^{\circ} 49'\text{W}$ .

Note. m.v. *Cramond* is a Canadian Selected Ship.

## ATTACK ON WHALE

### Norwegian Sea

m.v. *Summit*. Captain W. G. Hunt. Harlingen to Archangel. Observers, the Master and Mr A. MacIntyre, Chief Officer.

21 August 1976. At 1400 GMT a large whale, which shortly before had been observed blowing on the port bow, appeared suddenly about one nautical mile off the starboard beam; it was in a near vertical position with the tail half of the body out of the water. Close alongside the whale was the very tall black dorsal fin of a large fish, the fish appeared to be holding the whale's head under water whilst another large black fish appeared to be attacking the whale. During the whole time the whale was bringing its tail down violently onto the water, presumably in an effort to free itself from whatever was holding it down.

A few minutes before the incident one of the large black fish had broken surface on the starboard bow travelling at speed in the direction of the whale. It was possible to get only a momentary glimpse of it. White markings were observed but it was not possible to determine whether they appeared on the top or underside, they were thought to be on the top, forward of the dorsal fin. During conversation with a Norwegian fjord pilot on a subsequent voyage, he said he thought we might have observed a killer whale.

On a previous voyage in the same area, a very large black dorsal fin, at least 2-2½ metres high, had suddenly appeared close alongside the ship and just as suddenly disappeared.

Position of ship: 66° 42'N, 10° 17'E.

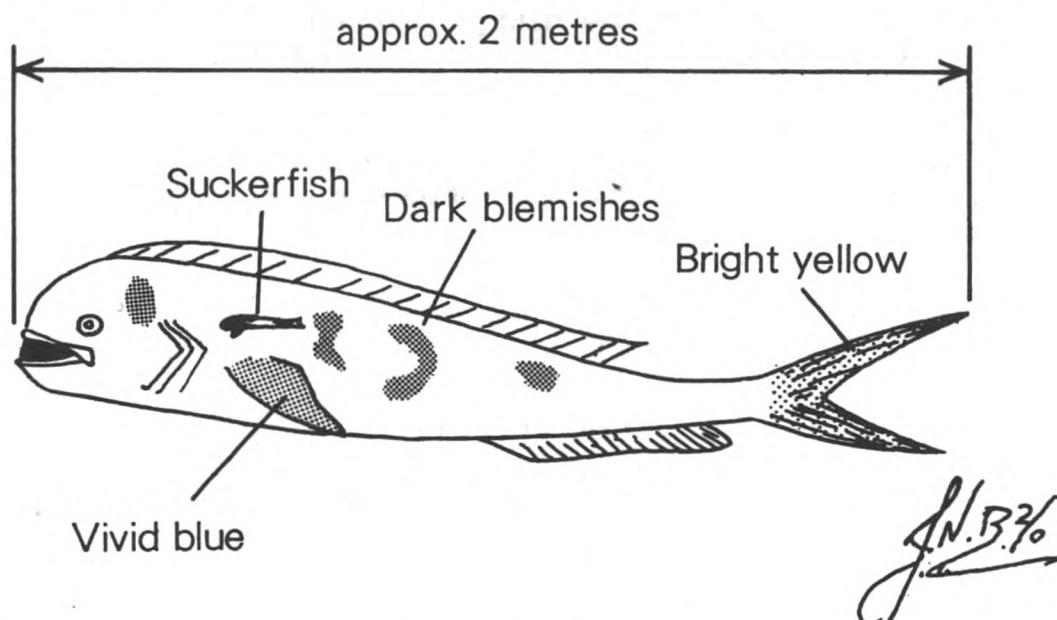
## FISH

### South Atlantic Ocean

m.v. *Gambada*. Captain R. J. Turney. Buenos Aires to La Salina. Observer, Mr J. N. Balkwill, 2nd Officer.

20 September 1976. At 1730 GMT whilst the vessel was stopped for a few hours and drifting with the South Equatorial current, four or five fish about two metres in length were observed swimming up and down the ship's side to leeward.

The fish were bluish-green in colour, the pectoral fins were a particularly vivid electric-blue and the tail fins were bright yellow, see sketch. It was observed that



a sucker fish had attached itself to the back of one of the fish just above the left pectoral fin.

The wind was SE, force 4 and the sea temperature 26.2°C.

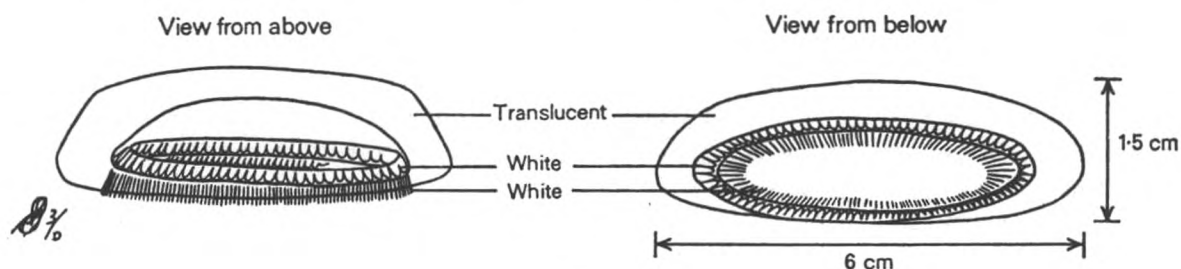
Position of ship: 01° 11'S, 40° 18'W.

## MARINE LIFE

### Arabian Sea

m.v. *City of Worcester*. Captain E. Finch. At anchor at Karachi Roads. Observer, Mr M. K. Ashok Menon, 2nd Officer.

5 September 1976. Whilst engaged in recreational fishing, the 2nd Officer found the creature, see sketches, in his net. It was thought to be a jellyfish.



In appearance its body was almost transparent but tinged with white. On the underside were white striped rings from which white hair-like appendages appeared. It was visibly disturbed by both light and heat.

Position of ship:  $24^{\circ} 18'N$ ,  $66^{\circ} 18'E$ .

## BIRDS

### North Atlantic Ocean

s.s. *Botany Bay*. Captain R. A. Wilson. Fremantle to Genoa. Observers, the Master, Mr J. Pym, 3rd Officer and Mr F. Holvast.

17 September 1976. At 1200 GMT a bird (see photograph opposite page 109) was found on board. Upon inspection it was found that the right wing was slightly elevated and although the bird was able to spread and flap its wings, it was unable to fly. It was tame and seemed quite contented.

The bird appeared to be a member of the pigeon family. The colour of the plumage on the head, shoulders and chest was a light purplish brown, it was white from the chest down to the underside of the tail feathers, the wings were black with fawn, white and russet-coloured tips, the beak was black and the feet red. The feet were made up of four claws, three in front and one at the rear.

The bird was 25 cm long, wing span 47 cm and beak  $1\frac{1}{2}$  cm.

On the same day there were about 20 more of the same species which stayed with us until we reached Gibraltar.

Position of ship:  $20^{\circ} 51'N$ ,  $17^{\circ} 36'W$ .

Note. Captain G. S. Tuck, Chairman of the Royal Naval Birdwatching Society, comments: 'This is the turtle dove, *Streptopelia turtur*.'

### Indian Ocean

m.v. *British Commodore*. Captain J. Pinkney. Kwinana (W. Australia) to the Persian Gulf. Observers, Mr A. J. Lange, 2nd Officer and Cadet J. Cawsey.

23 September 1976. During the evening a bird was found and taken to the wheelhouse. It seemed quite tame and remained quiet whilst a photograph was taken (see photograph opposite page 109).

The bird was 35 cm long, wing span 75 cm, beak 4 cm. The beak was pure black with an elongated aperture about half way along it. The feet were webbed. The only striking feature was a thin semi-circle of pure white on the lower lid of each eye.

After the photographic session and after refusing refreshment, the bird was taken outside to a section of clear deck from which it soon disappeared.

Position of ship:  $1^{\circ} 35'N$ ,  $79^{\circ} 54'E$ .

Note. Captain G. S. Tuck comments:

'This is the Immature Brown-winged or Bridled Tern, *Sterna anaethetus*.'

### Persian Gulf

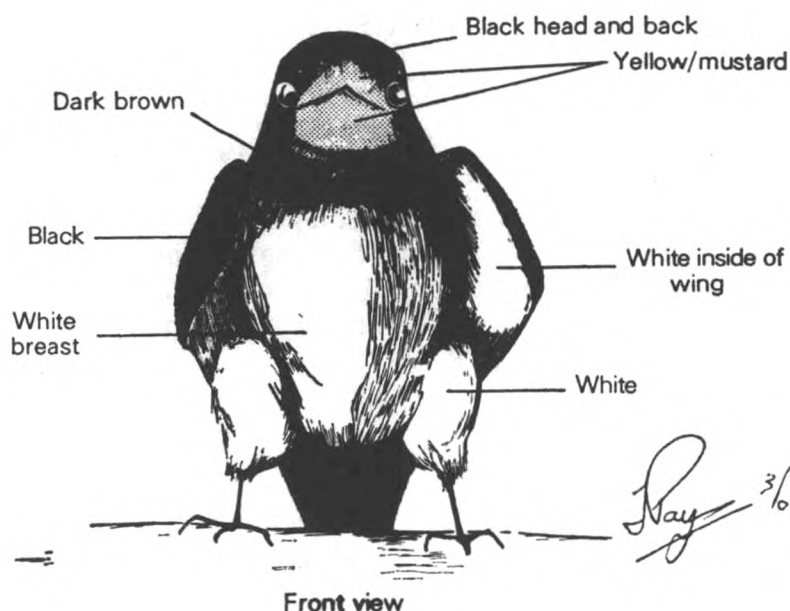
m.v. *Strathnairn*. Captain M. Robinson. At anchor off Jazireh-ye Qeys. Observers, Mr J. Payne, 3rd Officer and most of the ship's company.

8 August 1976. Throughout the morning a small swallow-like bird, see sketch, was observed flying around the ship, landing occasionally to rest for short periods. It was observed that the bird flew with legs down.

Just after midday the bird flew through the open wheel-house door and landed on a ledge above the chart table where it remained, obviously in an exhausted condition. Advantage was taken of its statue-like pose to make sketches.

The bird seemed abnormally thin, the outline of its breast-bone was clearly visible.





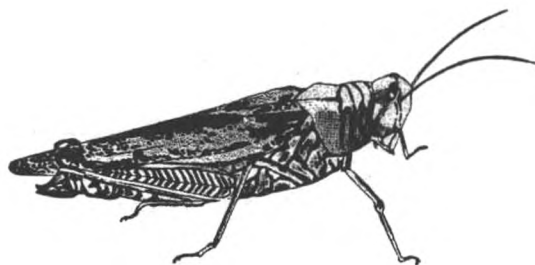
It refused food and just stood in the plate of water put before it.  
During the evening it was found to have 'passed on'.  
Position of ship:  $26^{\circ} 30' N$ ,  $54^{\circ} 00' E$ .

## GRASSHOPPER

### Western North Atlantic

m.v. *Strathangus*. Captain D. T. Hughes. New York to Cartagena. Observers, Mr R. Bloomfield, 3rd Officer, Mr R. Craik, 3rd Engineer and Mr N. Thorogood, 4th Engineer.

26 August 1976. At 1740 GMT an insect, assumed to be a grasshopper, see sketch, was observed flying about in the lee of the Officers' deck. It was caught by the 4th Engineer and upon examination was found to be 3.5 cm in length. It was assumed to have been on board since departure New York.



The insect was passed on to the wife of the 2nd Engineer who made the sketch and then set it free.

Position of ship:  $41^{\circ} 00' N$ ,  $61^{\circ} 15' W$ .

*Note.* Dr D. R. Ragge, Department of Entomology, British Museum (Natural History), comments:

'The insect caught on m.v. *Strathangus* and well illustrated by the 2nd Engineer's wife, was probably *Melanoplus differentialis*, a common North American grasshopper.'

## LOCUSTS

### Gulf of Aden

m.v. *Yorkshire*. Captain J. W. Jewell. Philadelphia to Persian Gulf. Observers, the Master and Mr M. S. Brocklesby, 3rd Officer.

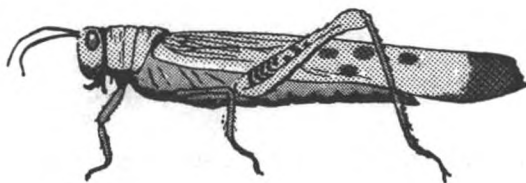
24 July 1976. At 1320 GMT a locust was found on the bridge wing. It was captured and kept alive for as long as possible. Unfortunately upon catching it one of its 'jumping' legs was broken off. It was pink in colour and there were black bands on the legs. The length of the specimen was about 9 centimetres.

Position of ship: 12° 45'N, 45° 40'E.

### South African Waters

s.s. *Jervis Bay*. Captain K. E. Howard. Rotterdam to Fremantle. Observers, the Master, Mr A. J. Ball, 2nd Officer, Mr N. J. Shearman, 3rd Officer and Cadet C. Urwin.

2 July 1976. At midday, whilst the vessel was carrying out its mail call in Table Bay (Cape Town), approximately five n. mile off the land, a locust, see sketch, was sighted by the Master on the deck of the bridge wing. It was captured for identification purposes by the Cadet.



The locust was a yellowish brown in colour with lighter yellow colouring on the first and second pairs of appendages. The wings and third pair of appendages had larger darker brown spots. The hind or third pair of appendages had a row of barbs on the lower after parts. The eyes were large and brown.

The statistics were as follows: head one cm in length, antennae two cm, thorax 2.3 cm with a hood extending from the rear of the head for one cm, abdomen 3.8 cm, it consisted of eight segments and a smaller protrusion at the end, wings 6.5 cm, first appendages 1.8 cm, second appendages 2 cm and rear appendages 6.4 cm.

It cannot be certain that the locust came on board in Table Bay, it could have arrived at any time during the voyage from Rotterdam. No other locusts were sighted.

Position of ship at 1200 GMT: 34° 30'S, 18° 24'E.

*Note.* Mrs Elizabeth Paton, Desert Locust Information Section of the Centre for Overseas Pest Research, comments:

'Our taxonomists have identified the locusts as far as is possible from the descriptions provided, but suggest that the addition of a fore- or hind-wing would be most helpful when it is not possible to preserve and send an entire specimen.'

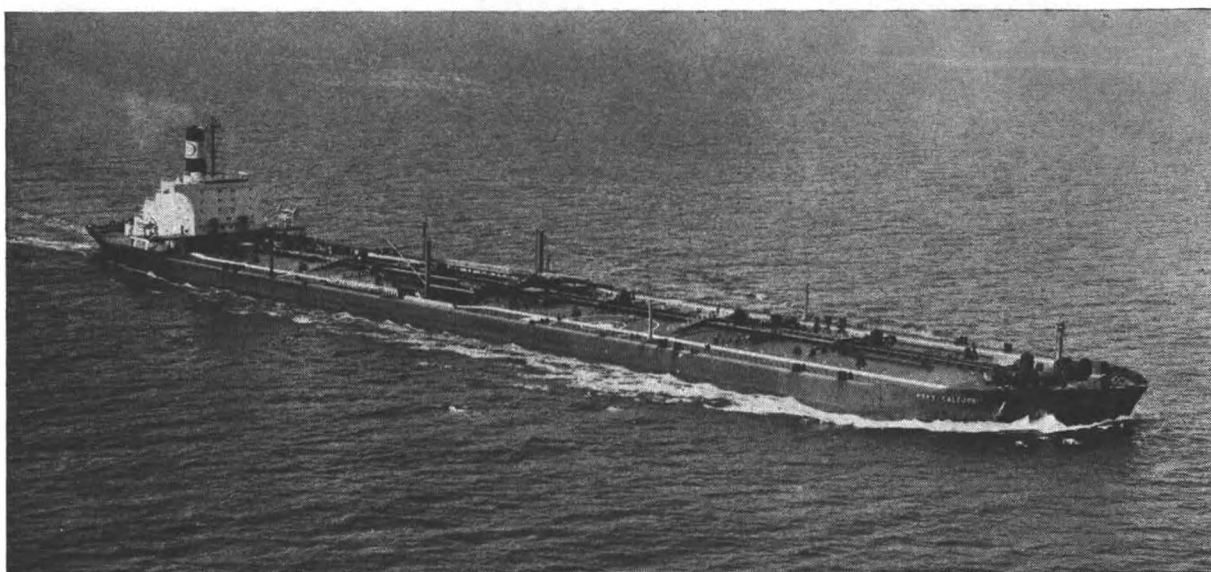
'The locust on board the *Yorkshire* was probably *Anacridium melanorhodon arabafum* (Dirsh 1953), a tree locust.'

'Identification of the locust on board the *Jervis Bay* is more difficult, especially since the location of the ship when the locust came on board is not known. However, it is probably either *Anacridium incisum* (Rehm 1942) or *Schistocerca americana flaviventris* (Burmeister 1938).'

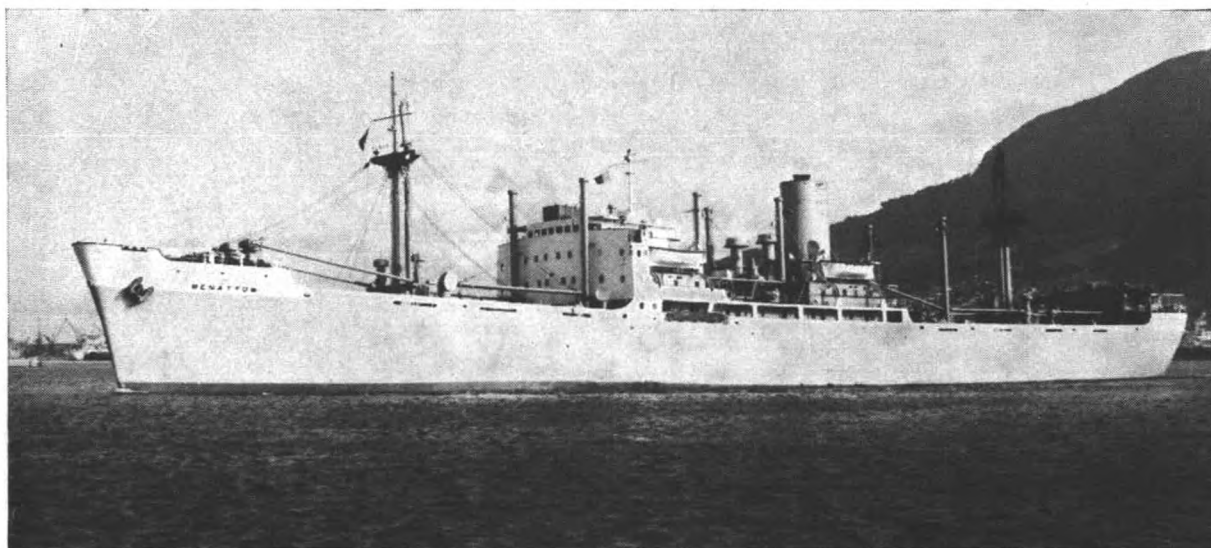
Mrs Paton expresses her thanks to those who submitted the observations and adds that the Centre is always most grateful for locust reports.



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*Wild Auk* (Peninsular and Oriental Steam Navigation Company), Captain L. E. Quigley



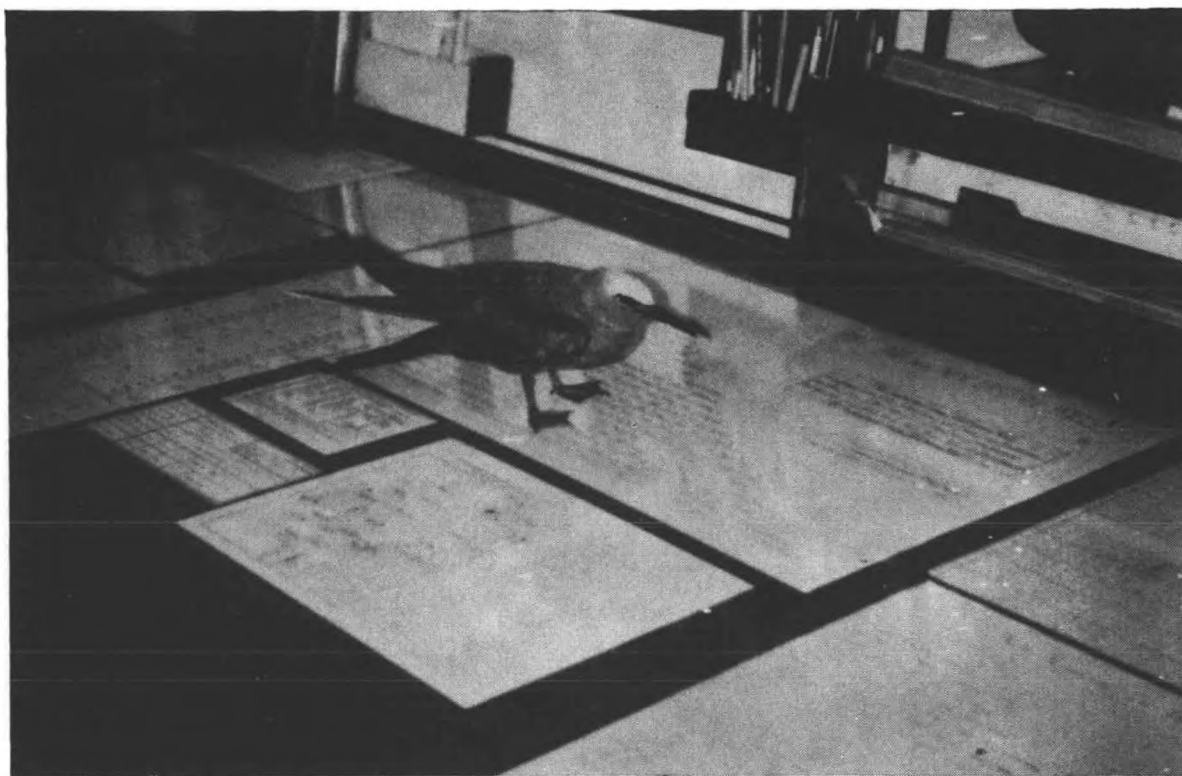
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*Benattow* (Ben Line Limited), Captain R. E. Cowie

THE THREE SHIPS WHICH GAINED THE HIGHEST MARKINGS FOR THEIR  
METEOROLOGICAL LOGBOOKS DURING THE YEAR 1976 (see page 94)

(*Opposite page 109*)



Immature Brown-winged or Bridled Tern (*see page 106*)



Turtle Dove (*see page 106*)

## BIOLUMINESCENCE

### North Atlantic Ocean

m.v. *Clan Ramsay*, Captain S. Hay. Cardiff to Cape Town. Observers, Mr P. J. M. Hickmott, 4th Officer and Mr M. Thomas, A.B.

14 July 1976. At 2110 GMT very bright lime-coloured glows and flashes of bioluminescence were observed; they were brightest in the vessel's bow waves and increased in intensity when the light beam of an Aldis lamp was played on them. At intervals of six to eight seconds lines of bioluminescence about one metre wide and of unknown lengths were also observed; they ran in a NE/SW direction and were thought to be caused by the swell. By 2145 the bioluminescence had decreased to sporadic low-intensity flashes.

At 2110 the sky was overcast, dry bulb 25.0°C, wet bulb 21.5, wind SW'ly, force 3, barometer reading 1015.5 mb. By 2145 the cloud had broken to become five oktas of cumulus and stratocumulus.

Position of ship at 1800: 06° 12'N, 14° 06'W.

*Note.* Dr P. J. Herring of the Institute of Oceanographic Sciences, comments:

'These were probably dinoflagellates. The lines of luminescence are a common feature of dinoflagellate blooms.'

### South Atlantic Ocean

m.v. *Ocean Bridge*. Captain G. V. Underhill. Tubarao to Japan. Observer, Mr G. S. Nixon, 3rd Officer.

23 September 1976. For about an hour before the 0000 GMT observation was made, flashes of light were seen in water disturbed by the vessel, they were light green in colour. The intensity of the flashes was not increased when a light was switched on. The flashes occurred at intervals, there were about 30 flashes over a period of five minutes, nothing for about ten minutes and then another series. The flashes were of low intensity—each one giving off about as much light as a candle flame for a period of less than half a second. Sea temperature 24.0°C, sky clear.

Position of ship at 0000 GMT: 25° 18'S, 18° 36'W.

*Note.* Dr P. J. Herring comments:

'These flashes obviously emanated from a larger organism, probably a jellyfish or pyrosoma.'

### South Pacific Ocean

m.v. *Taybank*. Captain R. J. Bridger. Balboa to Papeete. Observer, Mr S. G. Wride, 3rd Officer.

26 August 1976. At 0600 GMT the vessel entered an area of strong bioluminescence. Small bright spots about 5 cm in diameter and larger less-bright areas approximately 30–40 cm in diameter were sighted at frequent intervals in the disturbed water about the vessel. The smaller spots were white and the larger areas pale blue in colour. No effect was observed when the Aldis lamp and the radar were switched on. The phenomenon was visible up to distances of 100 metres from the ship's side.

As the vessel entered a rain shower the brilliance of the phenomenon was further increased.

Position of ship: 13° 20'S, 143° 13'W.

### Arabian Sea

m.v. *Laomedon*. Captain D. Howe. Port Suez to Singapore. Observer, Mr W. R. C. Butler, 2nd Officer.

22 July 1976. At 2200 GMT the vessel entered an area of bioluminescence and as far as could be seen the sea became a brilliant white. In contrast to the whiteness, the bow wave and broken water appeared black. The whiteness of the surface was



quite discomforting to the eyes. The phenomenon, which ended abruptly at moon-rise, lasted for 45 minutes.

Weather conditions at the time were as follows: barometer reading 1010.8 mb, steady, dry bulb 24.1°C, wet bulb 23.2, sea temperature 22.1, wind S, force 5-6.

A sample of sea water was taken at the time of the observation and forwarded subsequently to the Institute of Oceanographic Sciences for analysis.

Position of ship: 09° 18'N, 55° 30'E.

*Note.* Dr P. J. Herring comments:

'This observation refers to the "white water" phenomenon. Luminous bacteria have been suggested as a cause for this but it remains a puzzle. A curious and unexplained feature of this phenomena is that 85 per cent of the reports come from the Arabian Sea area and the majority of these refer to the July-August period. It is at this time that considerable upwelling occurs in this region under the influence of the south-west monsoon, and intense growth of plankton takes place in the surface waters. The description from this report indicates that luminescence was restricted to the extreme surface of the sea.'

### Indian Ocean

m.v. *Post Runner*. Captain R. Crump. Karachi to Durban. Observers, the Master and ship's company.

30 July 1976. At 1800 GMT the vessel passed through an area of exceptional bioluminescence. The sea was completely milky white and no wave forms could be distinguished despite a force 3 wind. There were few clouds.

Position of ship: 04° 45'S, 48° 56'E.

*Note.* Dr P. J. Herring comments:

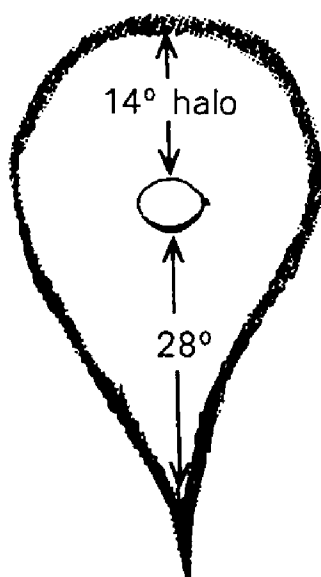
'This is a good description of a classical "milky sea" situation. As so often with this phenomenon there is an apparent flattening of the sea, this is probably illusory and the waves are simply not distinguishable.'

### UNUSUAL LUNAR HALO

#### North Pacific Ocean

m.v. *Patroclus*. Captain S. B. Gilliat. Los Angeles to Balboa. Observer, Mr M. R. Selvarajah, 3rd Officer and Mr L. Chung Fong, Quartermaster.

15 September 1976. At 0730 GMT an unusually shaped lunar halo was observed to the NNE. The moon, at its gibbous phase, had a 14° halo which projected outwards to a point about 28° from the centre. The appearance was that of a very large tear drop, see sketch.



HRS.

The phenomenon lasted for about 20 minutes after which time the elongation gradually diminished until a perfect  $14^\circ$  halo was achieved. This was visible until 0830.

The altitude of the moon was  $32^\circ 30'$ .

During the time this phenomenon was observed, numerous flashes of lightning were seen to the SE. By 0930 the sky had become completely overcast and a severe rain squall with frequent lightning flashes was experienced, no thunder was heard. By 1000 the squall had passed.

Weather conditions at 0730 were as follows: dry bulb  $28.9^\circ\text{C}$ , wet bulb  $26.2$ , sea temp.  $29.0$ . Wind NNW, force 3, pressure  $1009.2$  mb. A thin layer of cirrostratus cloud was observed at the time of the halo.

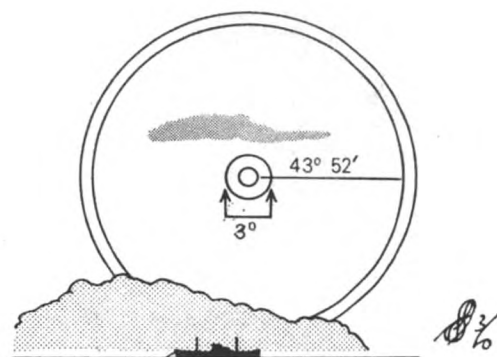
Position of ship at 0730:  $13^\circ 07'\text{N}$ ,  $93^\circ 15'\text{W}$ .

## LUNAR HALO AND AUREOLE

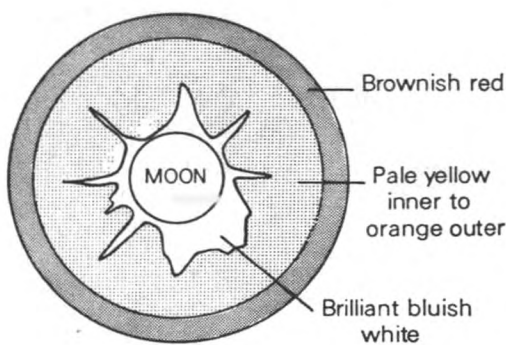
### Arabian Sea

m.v. *City of Worcester*. Captain E. R. Finch. At anchor off Karachi. Observer, Mr M. S. Shakespeare, 3rd Officer.

6 September 1976. During the period 1500 to 1900 GMT a faint halo was observed which, when measured, was found to have a radius of  $21^\circ 56'$ ; at the time the moon was obscured by cloud.



Halo and aureole at 1600 GMT



Enlargement of aureole

When the cloud had cleared the face of the moon it was observed that the  $22^\circ$  halo had disappeared and was replaced by another of radius  $43^\circ 52'$ . An aureole, diameter approximately  $3^\circ$ , was also observed at this time, see sketch.

Position of ship:  $24^\circ 53'\text{N}$ ,  $67^\circ 00'\text{E}$ .

## METEORS

### North Atlantic Ocean

m.v. *Explorer*. Captain C. D. Riley, Liverpool to Kingston (Jamaica). Observer, Mr K. I. Milton, 3rd Officer.

10 August 1976. During the evening watch a number of meteors were observed. At approximately 2235 GMT one meteor was observed for about one second, its direction of travel was about  $200-250^\circ\text{T}$ . It left behind a clear smoke-like trail which was visible for 5-8 minutes afterwards. About one hour later a second meteor was observed, this time for 2-3 seconds, heading in the same direction as the first. This left a similar trail visible for 2-3 minutes afterwards. Later a third meteor was observed for about one second, this also was heading in the same direction. It left a fibrous trail clearly visible for 2-3 minutes afterwards.

Position of ship at 2335:  $34^\circ 40'\text{N}$ ,  $40^\circ 50'\text{W}$ .

## SUNSPOT

### Indian Ocean

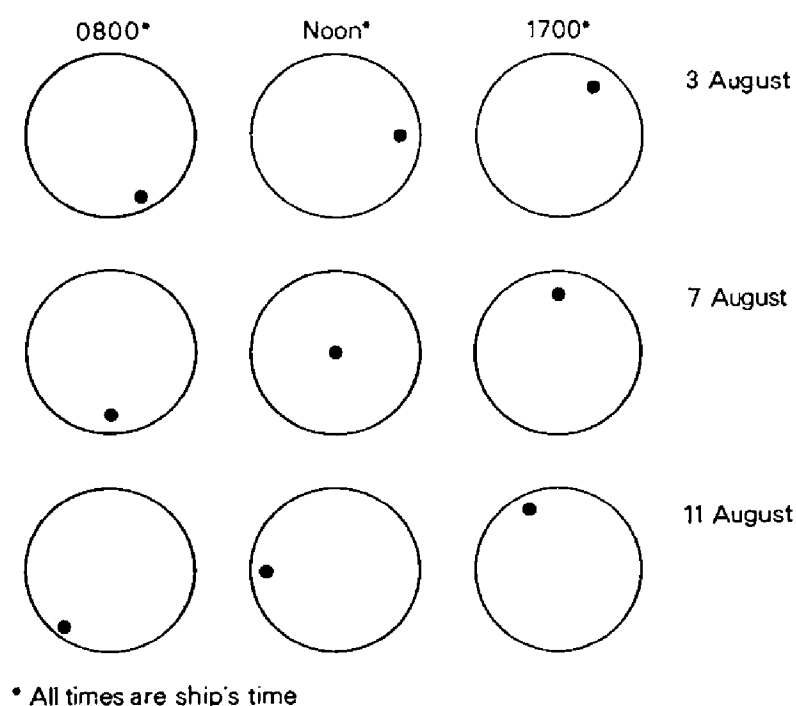
m.v. *Victoria City*. Captain K. B. Whitting. Buenos Aires to Singapore. Observers, Mr J. Stanbury, 2nd Officer and Mr C. Swindells, 3rd Officer.

During the period 3–11 August 1976 a small speck was observed on the sun's surface whilst sextant altitudes were being taken. It was assumed that the speck must be a sunspot of great magnitude since it was so easily observed through a relatively low-magnification telescope.

During the sun's passage the spot was observed to move (over a period of several hours) from a position at approximately 5 o'clock at 0800 ship's time to a position at 3 o'clock at noon ship's time, and to a position at 1 o'clock at 1700 ship's time, see diagrams.

Position of ship at 1200 GMT 3 August:  $27^{\circ} 06'S$ ,  $66^{\circ} 12'E$ .

Position of ship at 1200 GMT 11 August:  $06^{\circ} 06'S$ ,  $105^{\circ} 36'E$ .



*Note.* The following is an extract from the *Marine Observer's Handbook*:

'It is very dangerous to the sight to look at the sun either with or without optical aid without using smoked or deeply-tinted glass to reduce the light. This applies even when the sun is in partial eclipse. The only exception is when the sunlight is greatly weakened by passage through fairly thick fog, especially when the sun is at low altitude.

'The number and size of sunspots varies in different years. Over a period of years solar activity, of which the occurrence of large sunspots is one manifestation, rises to a maximum and subsequently falls to a minimum. The time between successive maxima varies considerably but averages about 11 years. For several years around the time of maximum activity, spots are frequently large enough to be seen without optical aid; sometimes two or more are so visible at the same time. Around the time of minimum activity, spots are either very small or completely absent. The life of an individual spot may be anything from a few days to several weeks.

'Owing to the sun's rotation on its axis, a spot previously formed, and coming into view at the sun's eastern limb, will appear to cross the disc in about 14 days, if it lasts so long. Apparent changes of position of the spots on the sun's disc take place during the day, but are merely due to the observer's changing angle of view. The imaginary line forming the horizontal diameter of the sun at noon appears to be tilted upwards between sunrise and noon and downward between noon and sunset, the most extreme tilting occurring at sunrise and sunset.'

## UNIDENTIFIED FLYING OBJECT

### Coral Sea

m.v. *Dilkara*. Captain W. S. Coutts. Brisbane to Noumea. Observers, Mr S. W. Hayward, 3rd Officer and Mr F. Ullisala.

12 August 1976. At 1530 GMT a fast-moving object was observed in the sky moving horizontally (steady altitude of about  $15^\circ$ ) from  $30^\circ$  on the port bow to  $50^\circ$  on the starboard bow. The object was below cloud level (cumulus 1000–1900 feet) and consisted of a reddish glowing body with a dark orange tail. It was visible for approximately 2 or 3 seconds and had an apparent speed comparable to that of a low-flying jet aircraft. No noise was heard.

Weather conditions were as follows: wind SW, force 4, air pressure 1017 mb, air temperature  $18^\circ\text{C}$  and sea temperature 22. The ship was steering a course of  $071^\circ\text{T}$ , speed 19 knots.

Position of ship:  $24^\circ 18'\text{S}$ ,  $160^\circ 17'\text{E}$ .

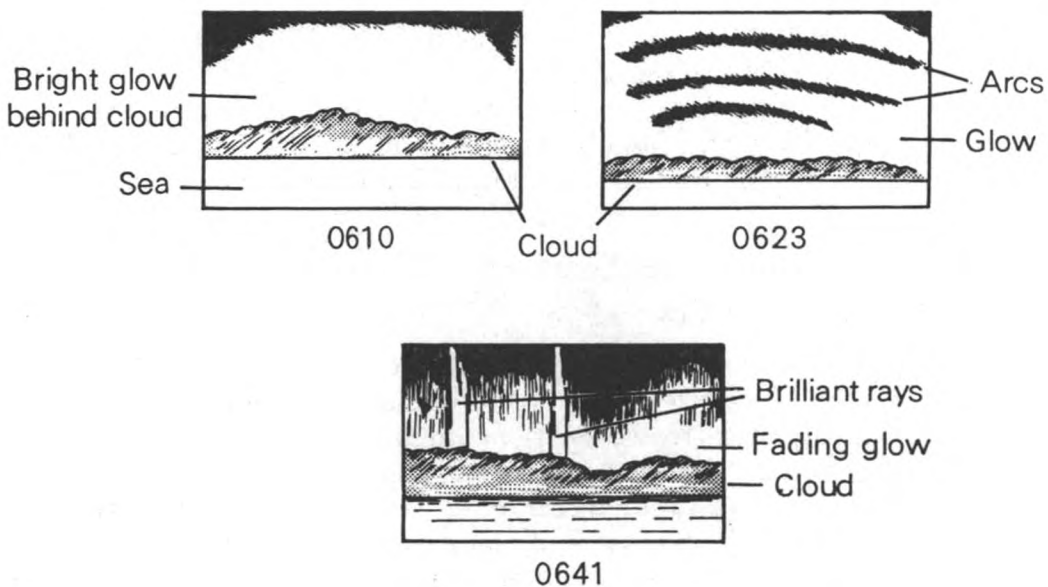
Note. m.v. *Dilkara* is a Canadian Selected Ship.

## AURORA

### North Atlantic Ocean

s.s. *Atlantic Causeway*. Captain A. Bull. New York to Gothenburg. Observers, Mr P. Pettitt and Mr J. K. Brocklehurst, 2nd Officers.

20 September 1976. At 0610 GMT an auroral display, see sketches, was observed as a glow lighting up the whole of the northern horizon; it increased gradually in intensity. At 0623 the glow was accompanied by a number of bright homogeneous arcs travelling rapidly every 1 to  $1\frac{1}{2}$  seconds from the northern horizon to the observer's zenith then disappearing.



At 0641 brilliant vertical rays looking very much like searchlight beams were observed. At first just a single brilliant ray was seen, then several more until a curtain effect was achieved.

After 0648 the display began to diminish in intensity and by 0700, when the eastern horizon was quite light with the approach of dawn, the display had ceased completely.

This ship has sailed the North Atlantic for several years and this auroral display was one of the most active yet observed.

Position of ship at 0600:  $52^\circ 42'\text{N}$ ,  $41^\circ 24'\text{W}$ .

# SEASAT-A and NIMBUS-G Potential Applications to Marine Meteorology and Oceanography

By J. W. SHERMAN AND A. A. LOOMIS

Paper presented at the World Meteorological Organization Technical Conference on the Applications of Marine Meteorology to the High Seas and Coastal Zone Development, November 1976. Reproduced by kind permission of World Meteorological Organization.

## Introduction

The application of space technology to the marine sciences and oceanic needs has been steadily evolving during the last decade until at present there is routine information being prepared from satellite-acquired data. The next major advance for the ocean community will occur in 1978 when space instruments specifically designed for oceanic data acquisition will be flown on the SEASAT-A and NIMBUS-G satellites.

The mission of SEASAT-A is orientated towards research on the dynamics of ocean surface conditions and features. This research will allow the demonstration of capability to improve the analysis and prediction of marine weather and further define the earth's geoid. The mission of NIMBUS-G is multi-discipline orientated. Data related to atmospheric pollution and sciences will be collected in addition to its oceanic observational capability. Both satellites are research platforms; the National Aeronautics and Space Administration (NASA) is responsible for their development, launch and operations.

Because of the importance of these two satellites to the mission of the National Oceanic and Atmospheric Administration (NOAA), a co-operative program is being developed between these two United States Federal Agencies and others, in particular for the SEASAT-A system. Complementing SEASAT-A and NIMBUS-G activities is the TIROS-N satellite system, also scheduled for a 1978 launch. The results of the experiments conducted during the 1978-79 period will guide the future NOAA plans for operational environmental satellites in the mid-1980s to extend and improve marine meteorology information on the high seas and coastal region.

## Sensor and orbit characteristics

The SEASAT-A orbit will be a non-sun-synchronous 800-km altitude orbit with an inclination of  $108^\circ$ . As such it will not have the usual polar coverage of many earth-observational satellites. However, the companion satellite, NIMBUS-G, will have polar coverage ( $99.28^\circ$  inclination) with its 955-km altitude sun-synchronous orbit. Both satellites carry an identical microwave radiometer instrument, the Scanning Multi-channel Microwave Radiometer (SMMR), to provide for a direct extension of certain types of environmental data and to increase temporal coverage of these data.

The inclination of SEASAT-A is the result of a trade-off in achieving maximum latitude coverage with minimum longitudinal errors in the measurement of the earth's geoid. To further increase the polar coverage would increase the east-west component of geoidal error to an unacceptable value. The orbit selected provides an 18.5-km equatorial ground-track separation every 152 days for both ascending and descending orbits to satisfy the spatial requirements for geoid measurements. Equatorial ground-track separation for both satellites for successive ascending orbits exceeds 2700 km. However, the orbit of NIMBUS-G repeats every 5.7175 days as compared to the 152 days of SEASAT-A. The orbit characteristics when



merged with the sensor swath widths determines the nature of the repeat coverage of each satellite.

Six different oceanic measuring instruments will be on SEASAT-A and NIMBUS-G. Four are microwave instruments of which three are active—active in that they transmit a signal that is reflected and returned to the instrument for detection. Two instruments use available energy in the visible and infra-red region, but in a manner quite dissimilar to one another. To summarize, the SEASAT-A sensor complement includes a radar altimeter, a SEASAT-A Scatterometer System (SASS), a Synthetic Aperture Radar (SAR), a Visible and Infra-Red Radiometer (VIR) and the SMMR noted earlier. The laser retro-reflector and beacon systems used for precise orbit determination will not be discussed. The two oceanic sensors on NIMBUS-G are the SMMR and the Coastal Zone Colour Scanner (CZCS). All sensors have a direct heritage from other earth-orbiting satellites except for SAR.

The manner of instrument selection and specification for SEASAT-A and NIMBUS-G has been somewhat different and will not be discussed. It is important that marine requirements have been addressed by NASA and translated to sensor specifications and parameters.

A short pulse (3 nanoseconds) radar altimeter operating at 13.5 GHz frequency was the first instrument selected for SEASAT-A. Because the sensor looks only at nadir (its swath width is between 1.8 and 12 km, depending on sea state), the orbit of SEASAT-A has been tailored to support the geodesy requirements of the altimeter. The precision of the altimeter measurement is expected to be 10 cm over seas with a significant wave height from calm to about 20 m. Precise spacecraft tracking is needed for geodesy, currents and storm surge analyses. Processing of the altimeter pulse will yield an estimate of significant wave height to  $\pm 0.5$  m or 10 per cent whichever is larger over seas from calm to 20 m.

The SASS is an active microwave instrument which illuminates the sea surface with four fan-shaped beams (two 500 km wide on each side of the SEASAT-A orbit). The amount of energy returned provides an estimate of surface wind stress magnitude and direction. The transmitted frequency is 14.6 GHz and the returned energy is shifted slightly due to doppler effects. In fact, the doppler shift aids in establishing a spatial resolution of 50 km over a region from 230 km to 730 km on either side of the spacecraft. Surface winds are to be determined to  $\pm 2$  m/s\* or 10 per cent in magnitude and  $\pm 20^\circ$  in direction. With less precision the SASS can measure winds out to 960 km from the spacecraft. The range of winds to be measured is from 3 to 25 m/s.

The L-band (1.275 GHz) SAR will look to the starboard side of SEASAT centred  $20^\circ$  off nadir with a swath width of 100 km. The length of track is determined by the receive station view duration with 4000 km being the maximum. A spatial resolution of 25 m needed for wave analyses will generate a very high data rate so that on board recording will not be used. Thus, data only within view of Rosman (North Carolina), Goldstone (California) and Fairbanks (Alaska) will be collected. A possible mobile facility may be developed but plans are not firm. Waves and wave spectra to oceanic wavelength of 50 m or greater can be measured with SAR along with sea ice features, possible iceberg detection, wave-land interfaces and penetration to the surface through major storms such as hurricanes.

The SEASAT-A instrument designed for basic feature identification such as clouds, major water masses etc. is the VIR. This instrument is a modified Scanning Radiometer used at present on the NOAA series of operational satellites. It will

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\* 1 knot = 0.5 metres per second (m/s)

have a spatial resolution of about 9 km and is not intended to advance the state-of-the-art of technology. Instead, VIR imagery collected over about a 1000-km swath width symmetrical about the ground-track will allow rapid identification of features within the microwave complement of data from SEASAT-A and a quick-look comparison to other satellite data.

Both satellites will carry the SMMR sensor operating at frequencies of 6.6, 10.7, 18, 21 and 37 GHz. The spatial resolution ranges from about 100 km at 6.6 GHz to 22 km at 37 GHz. The three primary classes of data obtained from SMMR are sea-surface temperature (SST), sea ice mapping and surface winds. Liquid water and vapour water are potentially measureable as well and will be used to correct pathlength measurements for the altimeter and attenuation corrections for SASS. SST is to be measured to  $\pm 2^\circ$  K, an important first step considering the need to determine SST under cloud conditions. The magnitude of the surface winds will be measured to  $\pm 2$  m/s or 10 per cent from 7 m/s to about 40 to 50 m/s. The SEASAT SMMR will scan the starboard side of the spacecraft with a constant  $42^\circ$  angle from nadir. The scan angle is from  $0^\circ$  to  $50^\circ$  resulting in a swath width of about 600 km. The NIMBUS-G SMMR will also scan at a constant  $42^\circ$  angle from nadir but will look forward and scan  $\pm 25^\circ$  with respect to the ground-track. The resulting swath width is about 725 km. The  $42^\circ$  angle from nadir for both SMMR systems gives a constant  $45^\circ$  angle of incidence at the surface due to the earth's curvature. The SEASAT SMMR coverage was chosen for maximum overlap with SASS.

The summary characteristics of the microwave sensors on SEASAT-A and NIMBUS-G are given in Table 1. Data from all these sensors will be recorded on board and telemetered to one of the previously noted receive stations. The exception is the data from SAR which can only be transmitted directly. Hence, global coverage is from three of the four microwave instruments.

The quantitative measurement of ocean colour will be available in four high spectral resolution channels of the six-channel CZCS on NIMBUS-G. The two remaining channels provide data on surface features, one for SST and the other for land-sea interface definition and ocean surface anomalies. The channels are: 0.443, 0.520, 0.550, 0.670, 0.750 and 11.5 micrometers. The surface resolution is approximately 825 metres and the total swath width exceeds 1500 km. The scanner

Table 1. SEASAT-A and NIMBUS-G microwave sensor characteristics

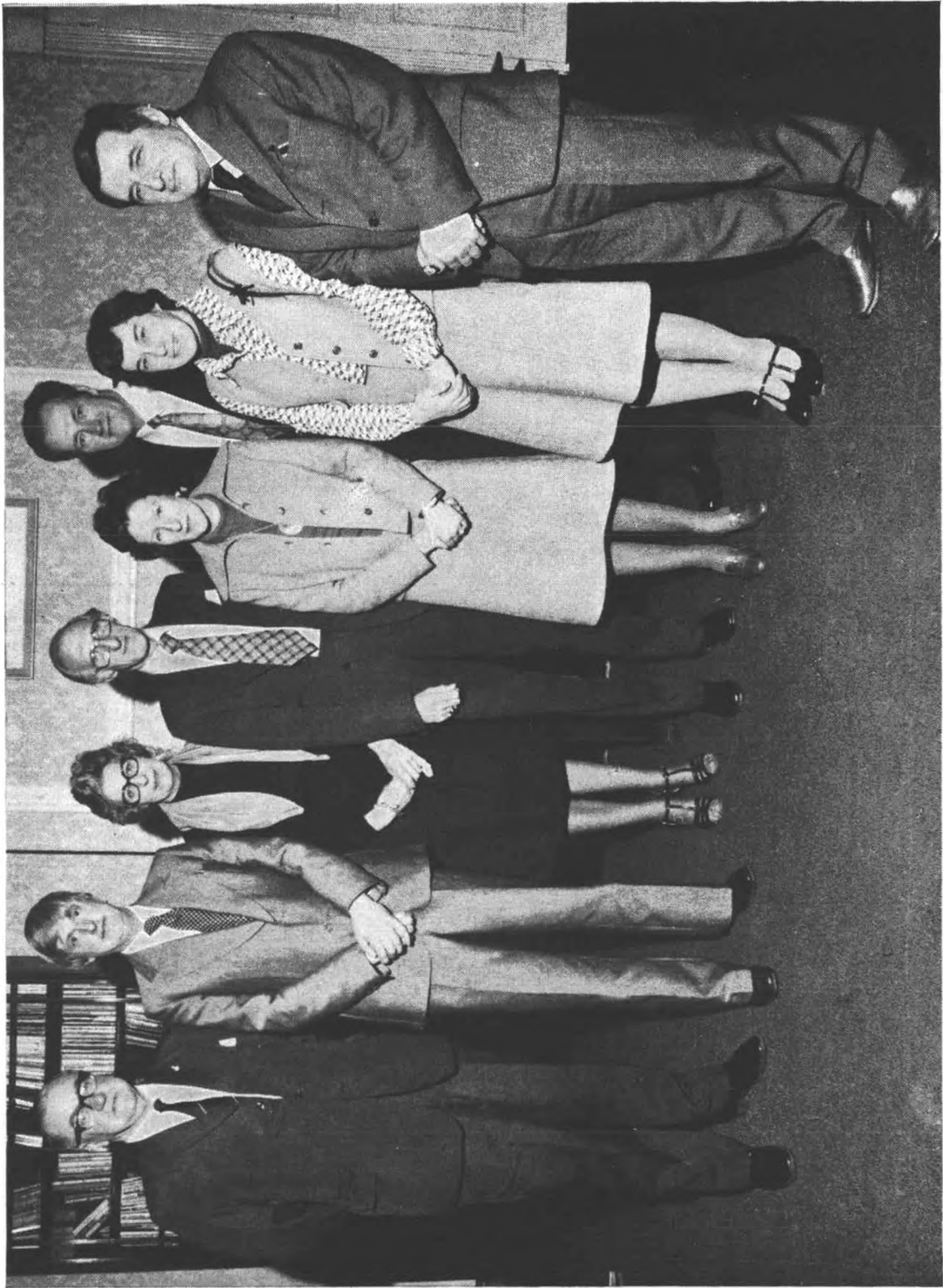
SENSOR	ALTIMETER	MICROWAVE SCATTEROMETER (SASS)	SYNTHETIC APERTURE RADAR (SAR)	MICROWAVE RADIOMETER (SMMR)
Sensing objective	Global ocean topography	Global wind speed and direction	Wavelength spectra	Global all- weather temperature Global wind amplitude
	Global wave height		Local high resolution images	Global atmospheric path corrections
Freq/Wave length	13.5 GHz	14.6 GHz	1.275 GHz	6.6, 10.69, 18, 21, 37 GHz 1.275 GHz
Antenna	1 m Parabola	4-2.7 m Stick arrays	11 x 2.2 m phased array	0.8 m Offset parabola
Power	125 W Average	165 W Average	200-250 W Average	50 W
Data rate Heritage	8 kb/s SKYLAB/ GEOS-C	2 kb/s SKYLAB	15-24 Mb/s APOLLO 17	4 kb/s NIMBUS-5,6



The refurbished O.W.S. *Admiral FitzRoy* (see page 127)



Renaming ceremony of O.W.S. *Admiral FitzRoy* at Greenock, 14 March 1977; left to right: Mr J. Wallace (British Sailors' Society Chaplain), Provost J. Walsh, Dr B. J. Mason, Mrs J. Walsh, Captain P. Robertson (Master of *Admiral FitzRoy*), Captain J. Morgan (Shore Captain, O.W.S. Base).



Presentation of Barographs at Bracknell on 11 January 1977; left to right: Captain J. L. Downie, Captain and Mrs J. M. Rushworth, Mr G. A. Corby, Captain and Mrs W. A. Murison, Captain and Mrs P. Lay (see page 129)

mirror can be tilted forward or backward by plus or minus 20° with respect to nadir about the spacecraft pitch axis in 2° increments. This aids in avoiding sun glitter.

The CZCS is currently scheduled for up to 16 minutes of time per orbit. With 13.8 orbits per day, more than 200 minutes of CZCS data and imagery will be available daily; this is more than  $12 \times 10^7$  km<sup>2</sup> per day. The CZCS data will be read-out at the three SEASAT-A stations cited previously and at Madrid, Orroal and Santiago\* and the data processed at the NASA Goddard Space Flight Centre (GSFC).

### Special data features

The SEASAT-A instrument ensemble will provide 95 per cent global coverage in 36 hours for surface winds, temperature and waves; NIMBUS-G is comparable. The environmental data will be uniformly spaced globally and not concentrated along the coast or major shipping lanes. The spatial resolutions associated with each instrument in the above description are viewed in a different manner when coupled with the swath width and orbital velocity to define an equivalence with regard to *in situ* data. These equivalences are noted in Table 2 and represent near-instantaneous spatial averages rather than point source data temporally averaged. The significant increase in data availability illustrates the importance of both the satellite technique and maintaining and improving the ship collection methods. Rigorous calibration of the satellite requires the surface program while the surface program is extended spatially by the satellite.

Special modifications to current weather modelling techniques will eventually have to be made if systems such as SEASAT-A and NIMBUS-G are to become operational. A key difference is that satellites collect continuously rather than at specific times during the day as with the ship program. Model grids may require changes. Because of these important differences, NASA, the Navy and NOAA tentatively anticipate using the SEASAT-A data in a near-real-time mode for operational demonstration/assessment in addition to the more conventional research methods. After the proper calibration and verification of data in the general research program, data will then be read-out on each Fairbanks, Alaska pass and relayed for high-speed processing from electrical engineering units to geophysical units. Data in this aspect of demonstration will be in addition to, and will not interfere with, the data flow used strictly for research which can use more vigorous processing. General data availability will be discussed in a subsequent section.

Table 2. Equivalent *in situ* SEASAT-A data reports per day

PARAMETER	REAL-TIME	NON-REAL-TIME
Winds		
vector-SASS	115 000	192 000
magnitude-SMMR* ( $\approx$ every 50 km)	106 000	177 000
Waves		
H <sub>1/2</sub> -altimeter (every 6.7 km)	36 000	60 000
SST		
temperature-SMMR*	46 000	77 000

\*The SMMR data shown is approximately doubled if the data from NIMBUS-G and SEASAT-A are combined.

\* A 12-metre diameter receive antenna is required for CZCS.

**Applications to marine meteorology and oceanography**

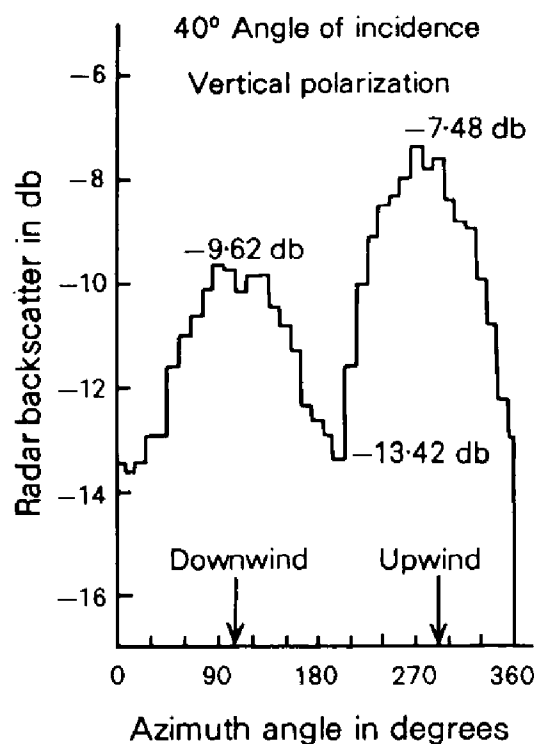
This section will give an overview of the marine applications of SEASAT-A and NIMBUS-G and will illustrate, by example, the importance of these satellites to the ocean community. With regard to SEASAT-A a major distinction will be made between those experiments designed solely for research and those which will be demonstration activities. The latter requires the former with the distinction being that the demonstration program is conducted jointly with the on-going operational program.

The overview of activities is summarized in Table 3 for SEASAT-A and Table 4 for NIMBUS-G. The examples related to environmental monitoring will be given first and include surface wind and chlorophyll-a experiments. The geodesy experiments require corrections for certain environmental variables so that there is a coupling between environmental measurements and geoid determination by satellite. This activity is discussed last.

*Surface winds*

The current operational satellites have demonstrated the importance of global weather data in particular for major storm tracking and warning. The addition of the surface windfield data to the existing multi-layer weather models provides a strong incentive to take the SEASAT-A SMMR and SASS instruments beyond the research phase to demonstration evaluation. SASS will be used as the example. At the heart of the SASS research activity is the determination of the relationship between the backscattered energy and the surface wind/stress conditions.

Figure 1 is a typical backscatter relationship for a specific set of environmental conditions. However, since the basic measurement is a measurement of the roughness caused by capillary waves (which are wind dependent), other environmental variables influence the return. These include the sea and air temperature and the nature of the sea in terms of swell or gravity waves. The longer period waves are known to introduce second order effects but they also contain information on the fetch and duration of the winds. Thus, a wide spectrum of environmental variables will be contained in the research experiments.



**Figure 1. Radar backscatter as a function of azimuth angle for a 13 m/s wind speed**



Table 3. Marine applications of SEASAT-A and NIMBUS-G microwave data

<i>Research</i>	
Coastal Region and Lakes	Open Ocean
Shallow water waves	Surface winds/stress
Internal waves	Wave spectra
Circulation processes	Surface temperature
Storm surge and setup	Currents
Near shore winds	Atmospheric water/ vapour
Shoals	Tides
Oil spills	
Lake ice	
Geodesy	Polar (Sea ice)
Geoid	Dynamics
Precise ephemeris	Mapping
	Statistics
<i>Demonstration</i>	
Meteorology	Oceanology
Data validation	Wave forecasting
Global models	Sea ice chart improvement
Boundary layer winds	NH wave model application
Living Marine Resources	Geodesy
Wind/plankton studies	Geoid comparisons
SST/fisheries	Oceanic tides/sea level
Surface layer transport	

Table 4. NIMBUS-G CZCS radiance measurement applications

<i>Water Mass Dynamics</i>	<i>Bio-Optical State</i>
Processes	Chlorophyll concentration
Discrimination	Primary productivity
Identification	Temperature/chlorophyll relationships
Classification	Insolation
Parameters	<i>Environmental Quality</i>
Suspended particulates (Turbidity)	Natural
Temperature	Water clarity
Surface roughness	El Niño
Circulation	Red tides
Transport	Man-made
Surface currents	Pollution
Upwelling	Detection
<i>Ecosystem</i>	Tracking
Carbon fixation	Photosynthesis
CO <sub>2</sub> capture/release	Degradation
Energy balance relationships	
	<i>Bathymetry</i>
	Not generally applicable
<i>Living Marine Resources</i>	
Year class potential	
Larvae transport	
Temperature	
Food	
Model evaluation	
Efficiency of operations	

The nature of the return response depends on wind direction as shown in Figure 1 and establishes the  $20^\circ$  directional measurement of wind vector. Since the returned energy does depend on angle, observation of the sea from at least two angles is required for the vector measurement. Hence, SASS observes the sea from two angles  $90^\circ$  apart. Even with this orthogonal measurement, there will be a  $180^\circ$  ambiguity in the measurement which will be removed by analysis of the pressure field from other sources. It is evident that SASS complements, augments and extends present capabilities, it does not replace them.

The demonstration program will utilize the surface wind data as calibrated and verified in the research experiments initially for preparation of wind analyses. When these winds systematically match and refine the surface gradients (such as pressure), the SEASAT-A SASS data may be used in the numerical models. The 'may be' is not an expression of doubt but one of how best to establish the interface, the criteria to use in judging the effects of SASS data on the model and whether to use the data in a real-time mode with the models or off-line.

The surface wind experiments have a cord of commonality throughout the SEASAT-A experiments. The surface winds and temperature as measured with SMMR, the significant wave height as measured with the altimeter and wave spectra (or wave slope spectra) as determined by SAR form a network of inter-coupled environment variables that will be analysed to more completely understand air-sea dynamics.

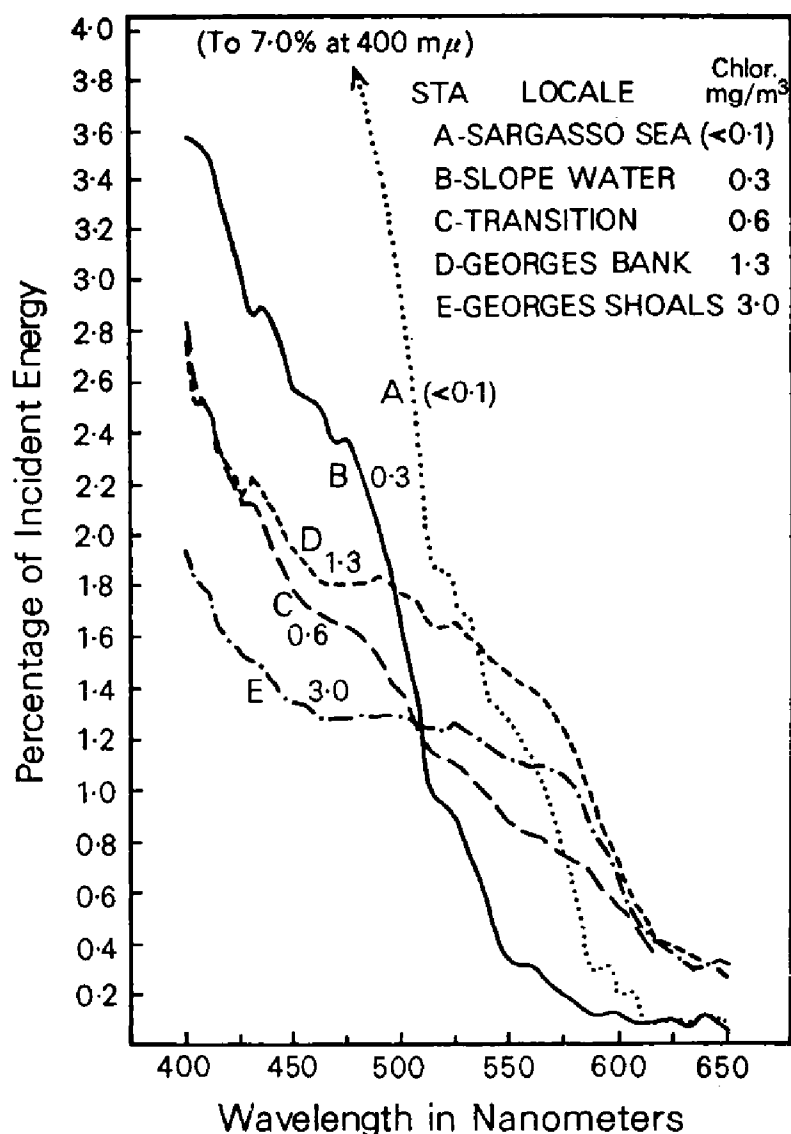
### *Chlorophyll*

A fundamental marine process which is equal in magnitude to that of terrestrial activity is photosynthesis, responsible for all carbon fixation. Chlorophyll (and the sun) is the agency for the creation of glucose and is the first element of the food chain in the ocean. Ocean chlorophyll maps at present exist based on a data base of forty or more years—the dynamics of chlorophyll are essentially unknown, and on synoptic scales the effects of environmental factors on chlorophyll production have not been studied, due primarily to limited data acquisition techniques.

The several types of chlorophyll are dominated by chlorophyll-a, approximately 90 per cent of chlorophyll in the sea is the a-type. Due to water attenuation, photosynthesis in the sea uses the absorption properties of chlorophyll-a primarily in the blue portion of the visible spectrum—not the red. This absorption effect is shown in Figure 2 as a function of wavelength with chlorophyll concentration as a parameter. The amount of energy upwelled decreases in the blue as the chlorophyll concentration increases. The signal that reaches space is small compared to that from other sources, in particular the atmosphere. However, it appears that chlorophyll-a can be measured to within a factor of two over the interval from  $0.1$  to  $10 \text{ mg/m}^3$ .

The signal from the ocean itself which reaches space comes primarily from the first 'optical depth' of the near-surface water, i.e. about 90 per cent. The optical depth is defined as the depth to which the energy is attenuated to 0.37 of its value at the surface. Most importantly, recent analyses have shown that there is an 0.95 correlation between the chlorophyll concentration in the first optical depth to the concentration in the euphotic region (the euphotic depth is the depth to which the light is attenuated to 0.01 of its surface value or 4.61 optical depths). Hence, there will be a strong relationship between the NIMBUS-G CZCS signal and the total chlorophyll in the water column. This aspect is important for both satellite measurements as well as the development of high-speed surface data acquisition techniques. Either technique will not measure the vertical distribution of chlorophyll—only the average concentration in the vertical column—a very important first step in understanding chlorophyll dynamics on synoptic scales.

The chlorophyll activities will focus on the limitations and constraints of remotely measuring chlorophyll. Atmospheric, surface and suspended sediments will be the



**Figure 2. Percentage of upwelled energy to incident energy as a function of wavelength with chlorophyll concentration as a parameter**

main competing signals. These other signals will be of value, if quantified, to other marine users, but must be corrected for chlorophyll assessment.

Other relationships of the environment and chlorophyll will be evaluated. Sea-surface temperature and upwelling, basic circulation relationships, insolation, productivity and man-made activities will be important in the chlorophyll studies and their relationship to other studies. However, it is emphasized that the NIMBUS-G CZCS is a research tool—not an operational system. Hence, long-term effects cannot be studied, only the feasibility of using space systems to conduct such studies.

### *Geodesy*

The SEASAT-A altimeter will measure the distance between the sea surface and the satellite to an expected precision of about 10 cm. Altitude information at this level of precision is expected to allow mapping of the static sea level geoid and the dynamic ocean topographic features superimposed upon that geoidal surface. Such features include the dynamic topography associated with geostrophic ocean circulation, tides, wind set-up, storm surges and barometric pressure effects. The geoid itself will have to be computed by extraction of these disturbing phenomena

once those phenomena are understood fully, and will have to be computed after the orbital distance from the centre of mass of the earth has been determined as precisely as possible. Although the orbit may never be calculated to the level of precision of the altimeter, the unmodeled uncertainties in the orbit probably will not have the same time and space distribution as either the real geoidal undulations or the dynamic factors creating ocean surface topography. Analyses of these problems are at present incomplete but show promise that the dynamic features will be elucidated beyond present understanding.

### **Data availability**

The current plans for SEASAT-A and NIMBUS-G marine data archiving and distribution are to use the NOAA Environmental Data Service (EDS). Data with approximately a 10- to 12-day delay from time of acquisition may be obtained from EDS beginning in or about September 1978. The exact time will be approximately three months after launch during which period the complete process required to convert the sensor electrical units to geophysical units will be evaluated.

A special comment on the availability of SAR data is appropriate. Current plans are to collect data from 400 orbits during the first year of SEASAT-A operations. Of these orbits, 260 will be optically processed to imagery and 26 digitally processed. Thus, while the other sensor data will be widely available to the marine community, SAR data will be quite limited both from the acquisition as well as processing viewpoints.

### **Summary and acknowledgements**

The SEASAT-A and NIMBUS-G satellites will provide a unique opportunity to the oceanic community to improve the present understanding of air-sea interactions and to evaluate those instruments with the largest potential for operational satellite use. This paper has been prepared as an overview, drawing on numerous NASA and academic community studies and analyses.

# The WMO Technical Conference on the Application of Marine Meteorology to the High Seas and Coastal Zone Development

By N. E. RIDER D.Sc.

(Deputy Director, Observational Services-Meteorological Office)

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The World Meteorological Organization (WMO) Technical Conference on the Application of Marine Meteorology to the High Seas and Coastal Zone Development (TECMAR), held from 22 to 26 November 1976 at the WMO headquarters in Geneva, was attended by 77 participants from 25 countries, as well as by representatives from the United Nations, the International Association of Lighthouse Authorities (IALA), the International Chamber of Shipping (ICS), the Inter-Governmental Maritime Consultative Organization (IMCO), the Intergovernmental Oceanographic Commission (IOC) and the International Telecommunication Union (ITU). The conference was organized by a planning committee led by Mr M. W. Mull of the American national Weather Service on behalf of the Commission for Marine Meteorology (CMM). In their addresses at the opening of the proceedings, both the Secretary-General of WMO, Dr D. A. Davies, and the president of CMM, Mr J. M. Dury, stressed the need for such a Conference at this point in time when the nations of the world were actively engaged or becoming engaged in the many activities involved with the marine environment beyond those of a more traditional nature such as fishing and transport. The need for adequate meteorological and climatological services covering the high seas and coastal zones had never been more pressing and over the next decade demands were certain to increase.

The Conference itself was divided into three main sections. These were 'Support to high seas activities', 'Support to coastal zone activities' and 'Marine meteorological services at ports'. A total of 51 papers were presented and, as there were no simultaneous sessions, participants were able to attend all the presentations and discussions. Throughout the Conference interpretation in four of the official languages of WMO was provided and the success of the proceedings owed much to the skill of the interpreters.

In writing a short account of the Conference it is obviously impossible to comment on more than a few of the contributions although an attempt will be made to make mention of all the subjects discussed. The small selection chosen for comment must necessarily depend on the interests (and perhaps the prejudices) of this author and the reader should bear this in mind. Indeed, it is unlikely that any two authors would make the same selection. The planning committee probably faced a similar problem in choosing and restricting the number of contributions to provide a program that could be covered in the period allotted, while at the same time allowing reasonable time for discussion.

## Support to high seas activities

The session on support to high seas activities was chaired by Dr H. O. Mertins (Federal Republic of Germany). The first contribution was a provocative paper prepared by Mr L. K. McGlening (Canada) in which he called for less duplication of traditional marine forecast responsibilities, a revision of the content of forecasts in line with recent technological advances and requirements, less pre-occupation with old problems, the streamlining of current observational practices and more uses of facsimile in the acquisition of data by the user. Like all good advocates he

over-stated his thesis and recognized this in his conclusion. Mr F. Masson then summarized, on behalf of IMCO, a valuable paper in which the requirement for meteorological services in support of marine safety was set out in relation to existing international conventions together with those which are likely to be needed in fulfilment of conventions and codes of practice currently under discussion. In this latter category, he cited support for search and rescue operations, abatement of oil spills, the avoidance of ice accretion on fishing vessels and the operation of off-shore drilling units. An important suggestion was that world-wide navigational warning areas which were the subject of current planning might, with advantage to mariners, be adopted as forecast areas and that forecasts and warnings of all types should be issued on the same communication frequencies. In the discussion which followed, IMCO was assured of the enthusiastic support of WMO in the formulation of the meteorological content of the conventions and codes of practice which were under active development.

A group of papers then followed which dealt with the history, development, current organization and practice of the marine meteorological services and the contribution of seafarers to the successful operation of these services. Some authors suggested ways in which improvements might be introduced and a paper by Mr K. P. Vasiliev (USSR) contained a proposed list of symbols which might form the basis of an internationally agreed system designed to aid the user in the interpretation of all types of analyses and forecast charts.

The next three papers dealt with ship routeing matters. The paper by Mr C. G. Korevaar (Netherlands) contained an extensive analysis of the benefits, in terms of time saving experience, on a number of routes between western European ports and certain North American and Caribbean destinations. This survey covered about 2500 voyages during the period 1969 to 1974 and the results were divided into summer and winter seasons. Within this writer's limited knowledge this paper is thought to contain the best analysis yet published of the results of the application of ship routeing on the North Atlantic. This discussion on the benefits of ship routeing was rather lengthy and not very informative. Some thought it profitable while others expressed considerable doubt. In the end no consensus of opinion emerged.

A paper by Mr S. N. Dwivedi (India) dealt with Indian experience in support of oil spill clean-up operations in coastal waters. An interesting paper by Messrs J. H. Johnson and G. R. Seckel (USA) described the use of marine meteorological observations in fishing research and management. They cited several examples which included the recent climatic shift that had had a drastic effect on salmon in Alaskan waters, the effect of surface meteorological conditions on Atlantic menhaden, the influence of up-welling (or the lack of it) on both the Pacific mackerel fishing off the Californian coast and on the Pacific anchovy catch off the coast of South America. Mr F. S. Terziev (USSR) described the role and organization of hydrometeorological services provided by teams of meteorologists and oceanographers that sail with these high seas fishing fleets of the USSR.

After a paper by Mr A. Wood (IOC) on the developing contribution of oceanographic services to marine activities, two important papers on the role of satellites were presented by authors from the USA (these included Messrs F. E. Knickern, A. E. Strong, B. J. Thompson, J. W. Sherman and A. A. Loomis). The first gave many details of the way in which satellites in current operational use were contributing to oceanographic studies together with the means by which the meteorological satellites that are planned to become operational in the next few years would enhance this contribution. The second paper dealt with the data expectation from SEASAT-A and NIMBUS-G (to be launched in 1978). These satellites will carry instruments specifically designed for oceanographic purposes. The prospects are exciting.

The session continued with papers on the forecasting and climatology of marine fog (Mr R. J. Renard, USA), marine data management (Mr L. Hoffman, Federal



Republic of Germany), marine climatology (Mr R. G. Quayle, USA) and the forecasting of waves in low latitudes (Mr R. S. Srivastava, India). The first and longest section of the Conference was concluded by two papers on the important subject of navigation in sea ice and dealt specifically with conditions and practices in Baltic and Canadian waters.

### **Support to coastal zone activities**

The chairman for the second section of the conference, which was concerned with support to coastal zone activities, was Mr T. Thompson (Sweden) who read the first paper entitled 'Services for coastal zone activities—where are we heading?' He made the relevant point that the coastal zone must be considered to include the land area adjacent to the coast which is influenced by the presence of water as well as the water area itself. In support of this point he mentioned the many activities such as flood prediction and engineering developments along the coasts which must have regard to the adjacent sea conditions which in turn are highly dependent on atmospheric conditions. His paper was largely a review of the whole range of coastal activities and the services which are needed. The following paper by Mr E. Chacko (UN) dealt with the total benefit of meteorological services. The author highlighted the needs of the developing countries and the importance which is attached to the application of such services and on-going research by the various UN and associated agencies. Mr M. H. Glantz (USA), a social scientist, outlined the possible implications for society of the establishment of successful forecasting services and used, as an illustration, results which could follow from the establishment of coastal upwelling forecasts. He presented the case for broad in-depth studies.

In a significant paper entitled 'Environmental data in off-shore engineering' by Mr O. A. Olsen (Norway), attention was drawn to the urgent need for instrumental observations in coastal waters and off-shore locations, together with the pertinent analysis of such observations for engineering design and construction. Data are vital for the prediction of environmental loads on structures and their behaviour *in situ*. The paper contained a formidable list of data requirements, often for long time periods and their fulfilment by the meteorologist and oceanographer will be no easy task. Mr L. Haland (Norway) then described the services which the Norwegian Meteorological Institute was providing in response to the demands of the North Sea oil industry. He gave details of a numerical wave model which has been developed so that requests for forecasts and hindcasts of the likely drift of oil spill could be answered. The research program also included the development of a model to compute wave data from historical weather maps. A further project, based on the wave model and historical weather maps, used the state of sea observations data from lighthouses and weather ships. These data were transformed to adequate wave data which were in turn extrapolated to other areas of the continental shelf.

Two papers from India discussed, respectively, the swell régime in the Arabian Sea and climatic conditions and human comfort in the coastal zones of the Indian sub-continent. A contribution by Messrs D. B. Enfield and D. Zopf (USA) described a semi-automatic method of wave prediction which is in operational use on the Oregon and Washington coasts and employs a novel seismometer system to verify the predictions. In the same vein a paper by several Danish authors outlined the basis of the surge warning system in operation in their country. They illustrated its application by reference to the North Sea surges of January 1976.

Data-buoy networks and developments were the subject of three papers. These dealt with present efforts in France, Canada and the USA in the deployment and testing of buoys of many types and were largely descriptive in content. One was left with the impression that, although a good deal has been learnt and there have been successes over the past decade, such projects are expensive and assured success is not yet within reach. The requirements for the First GARP\* Global Experiment

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\* Global Atmospheric Research Program

in regard to drifting buoys were referred to in the subsequent discussions. A paper by Mr T. C. Bone (USA) on drift computations for search and rescue operations concluded the section on support to coastal zone activities. This described a method, based on surface current and wind analysis, which predicts the drift of an object. It must be recognized that in practical application the method may not always give good results since knowledge of the position of an object at a given time after release will depend on, for example, the generally unknown accuracy of the reported or assumed release co-ordinates, the generally unknown drift characteristics of the object in response to its unknown loading and hence unknown relative response to wind and current.

### **Marine meteorological services at ports**

Mr W. D. Moens of the Netherlands chaired the final section on the marine meteorological services at the ports. This section attracted a smaller number of contributions than either of the earlier ones. The first two papers by Messrs A. de Wilde and J. M. Dury (Belgium) presented the kind of meteorological information and forecasts that a harbour master needs in the performance of his duties. The authors gave an account of the ways in which these and other services are provided at the port of Antwerp.

Four papers were then delivered on the role of, and the attributes necessary in, Port Meteorological Officers (PMO's). These came from the United Kingdom, Hong Kong, Australia and New Zealand. All contributors were in broad agreement on the role that the PMO is required to play, but there were differences of opinion on whether those chosen to occupy such positions should be more experienced as meteorologists or as merchant marine officers. The paper from Mr J. A. Hunter (New Zealand) gave a view, which the author was at pains to make clear was a personal one, on the way that the PMO should conduct his duties. The chairman listed the desirable characteristics which should be found in a PMO and a rather pointless discussion on the theme of master mariner versus meteorologist ensued. Mrs E. A. Moskaleva (USSR) reported on the hydrometeorological services provided at ports in her country and described how they are organized. A paper by Mr G. Grunewald (Federal Republic of Germany) dealt with the important matter of damage to cargo during storage and transport.

### **Conclusions**

Looking at the Conference as a whole a commendable amount of information was exchanged, but it is to be regretted that the attendance by users was very limited. Discussions might well have been more productive if those having a need for marine meteorological services had been present to describe present shortcomings and omissions. If similar conferences are held in the future one would hope that naval architects, civil engineers, oil-rig operators, insurance underwriters, power-generator engineers and operators of all types of ships would attend in numbers equal to those of the meteorologists and oceanographers.

Fortunately the papers presented were published prior to the start of the Conference (Papers presented at The WMO Technical Conference on the Application of Marine Meteorology to the High Seas and Coastal Zone Development. WMO—No. 454).

The staff of the Secretariat are to be commended on the availability of this publication which was a major asset, and similar conferences in the future should whenever possible follow this formula. It was noticeable that the most fruitful discussions generally followed those presentations which were designed to set the already valuable material in perspective while strict verbal repetitions of the papers themselves were less successful. Contributors to future conferences of this type would do well to bear this in mind.

## RECOMMISSIONING OF THE OWS *Weather Adviser* UNDER A NEW NAME

Prior to the termination of the North Atlantic Ocean Station (NAOS) Joint Financing Agreement which operated under the auspices of the International Civil Aviation Organization it was agreed that a number of European States, being members of the World Meteorological Organization (WMO), would endeavour to bring into effect a new WMO/NAOS Joint Financing Agreement, under which the United Kingdom's operational responsibilities would be reduced to one ocean station requiring the services of only two ships. Due to financial restraints it was not possible to replace the currently employed 'Castle' class frigates with purpose-built ships. However, a reduction in commitments from four to two ships provided the opportunity to temporarily withdraw the *Weather Adviser* and *Weather Monitor* from service, put them through major refits whilst the *Weather Reporter* and *Weather Surveyor* continued in operation, and then return the refurbished ships to service with a new but still limited lease of life.

The re-equipping of the ships under refit was essential so the opportunity was taken to introduce labour-saving equipment and reduce the total ship's complement, thereby providing space on board for improvements to be made to the accommodation. The completed ship now has a less warship-like appearance though the hull lines still remain a conspicuous feature. The search radar with its large dish scanner has been removed and upper wind finding data is now obtained by utilizing an electronic navigational aid system. The balloon shelter has been raised one deck to eliminate the need for meteorological staff to work waist-deep in water when launching balloons under extreme weather conditions. The old wheelhouse and chart room have been replaced with a modern fully-equipped bridge structure and a completely new galley has been fitted. All radio equipment has been renewed. The boilers have been automated and are now remotely controlled from the engine room, thus enabling a reduction in the number of engine room ratings. With the crew reduction it has now been possible to accommodate all ratings, with the exception of two boys, in single berth cabins.

The *Weather Adviser* completed refit in Manchester Dry Docks on 4 March and after sea trials returned to her home port of Greenock. The extent of the changes made to the ship were such that it was decided a change of name might be appropriate. On 14 March Dr B. J. Mason C.B., F.R.S., Director-General of the Meteorological Office, and guests to the renaming and commissioning ceremony were kindly invited by Provost J. Walsh J.P., to a small reception at the Greenock Municipal Buildings where Dr Mason signed the visitors' book. The party then proceeded to the ship berthed in Great Harbour alongside her 33-year-old sister, *Weather Surveyor*, which she replaces. In his welcoming address to the renaming ceremony Dr Mason explained how we found ourselves in the situation of having to refurbish ships now 33 years old and commented that our weather ships may not be the largest nor perhaps the best but they form an essential part of our observing network which is necessary to the Meteorological Office if it is to provide weather forecasts for shipping, the North Sea industries, many other weather-sensitive industries and the general public. The ships not only contribute to UK data requirements but also to other northern hemisphere countries. He continued by describing briefly the remarkable history of Admiral FitzRoy, after whom the ship is being named, and invited Mrs J. Walsh, the wife of the Provost of Greenock, to name the ship. Mrs Walsh referred to her family ties with the sea and the close association of the ocean weather ships with Greenock before wishing the ship every success under her new name and named the ship Ocean Weather Ship *Admiral FitzRoy*. Photographs of O.W.S. *Admiral FitzRoy* and the renaming ceremony appear opposite page 116.

The *Admiral FitzRoy* sailed from Greenock for Ocean Station 'Lima' on her first voyage under her new name on 20 March 1977. We join Mrs Walsh in wishing the ship every success.

G.A.W.

## WAVE PHENOMENON IN THE NORTH SEA

The following is an extract from a letter sent to us by Captain P. Whitehouse, Master of m.v. *Supremity*.

'As a Selected Ship on a regular trade across the northern North Sea, I have, over the last few years, observed what appears to be abnormal wave and swell formation in one particular area and under certain weather conditions.

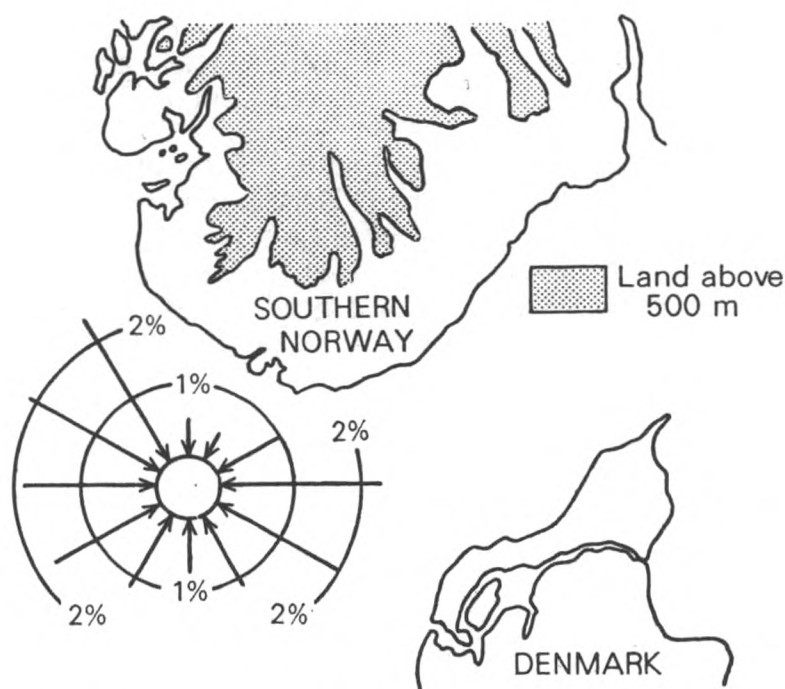
'The area is approximately that bounded by latitude  $57^{\circ}$  to  $58^{\circ}$ N and longitude  $5^{\circ}$  to  $7^{\circ}$ E. The conditions which give rise to the phenomenon are always the same—a SE'y gale from a depression to the west with a front moving E-NE across the North Sea.

'The wind, which may be between force 6 and 9 is, in the first place, not unusual, neither are the weather conditions—very low cloud, visibility 1-2 n. mile, falling pressure and moderate to heavy seas. However, about three hours before the passage of the front, at which time heavy rain is experienced and after which there is a lifting of the gloom from W-SW, the sea becomes very much disturbed with wave and swell heights out of all proportion to the fetch and strength of the wind. It was described by a member of the ship's company as being "like a pan of boiling water."

'Wave heights, which may before have been 5-7 metres, become anything up to 15-17 metres. The regular pattern becomes irregular, the sea coming from up to 90 degrees from the wind direction and it becomes impossible to differentiate between sea and swell. After the passage of the front conditions return to normal.

'As it may be seen from the area indicated, this is not particularly shallow water for the North Sea and it is well away from the Fisher Banks. On two occasions under these conditions considerable damage has been done to the vessel and on several occasions there has been minor damage—due mainly to the fact that it has not been possible to find a suitable heading upon which to heave to.'

*Note.* This very interesting phenomenon is likely to be related to the retardation of eastward moving fronts which commonly occurs as they approach the mountain block of southern Norway, and to the distortion of the wind field that takes place at the same time. Such features are notable during the winter when the blocking effect due to orography is reinforced by a tendency for high pressure to be persistent over the cold land mass of Scandinavia. As the approaching front slows down, the frontal trough is sharpened and the shift of the wind is accentuated; winds near the coast become locally enhanced in a direction parallel to the coast. The extent to which strong winds blow parallel to the coast over the area mentioned by Captain Whitehouse ( $57^{\circ}$ - $58^{\circ}$ N,  $5^{\circ}$ - $7^{\circ}$ E) is shown in the accompanying sketch.



**Rose showing frequency of winds Beaufort force 7 or stronger, southwest of Norway during the winter half-year (October to March)**

A chaotic state of sea is to be expected if the shift of strong winds at the passage of the front is especially pronounced. Such a phenomenon has been described in the *Norway Pilot II B* (page 30) as occurring in the seas just west of Norway:

'During gale force winds, the shift of wind from some southerly or south-westerly direction to a north-westerly or northerly direction is liable to raise a very heavy cross sea.'

However, a particularly interesting aspect of Captain Whitehouse's report is the statement that the dangerously chaotic state of sea starts about three hours before the passage of a front with its shift of wind. This suggests the arrival of a cross swell from a westerly direction ahead of the front itself. It seems feasible that such a swell, raised by winds well to the west, would overtake the retarded front.

The precise mechanism and area of risk can only be established by close study of individual cases. Consequently there is a need for information of any dangerously chaotic seas encountered off southern Norway. It may be impracticable under the conditions prevailing to make any very detailed observations, but even the bare facts of date, time and position of such encounters will be useful. Further details in the form of a 'Freak Wave Report' (*The Marine Observer*, January 1977, pp. 32-35) would be especially helpful.

## **PRESENTATION OF BAROGRAPHS**

The presentation of these Special Long-Service Awards to members of the Voluntary Observing Fleet was introduced in 1948 by the then Director-General of the Meteorological Office, Sir Nelson K. Johnson, K.C.B. Four of these awards are made annually to officers who have been selected in recognition of the quantity and quality of their meteorological observations over a number of years, thus rendering considerable service to the Meteorological Office.

On 11 January 1977, for the first time, the awards were presented at the Meteorological Office College at Shinfield Park near Reading. Also for the first time since 1956, all four recipients were able to be present at the same time. Perhaps now because of longer leave entitlement, we may succeed more often in the future in obtaining the presence of all four award winners at the one time.

As announced in the April edition of this publication the four qualifying Masters for the year ending December 1975 were: Captain P. Lay of P. & O. Lines, Captain J. M. Rushworth of Manchester Liners, Captain J. L. Downie, Shipping & Coal Co. and Captain W. A. Murison of Shaw Savill Line. It was also our pleasure to welcome the wives of Captains' Lay, Rushworth and Murison together with two

representatives of P. & O., Captain P. E. Maiden, Marine Manager and Captain K. Mayhew, Fleet Controller; Mr L. Tuppen, M.B.E., M.R.I.N., F.I.C.S., M.N.I., Managing Director of Shipping & Coal Co. and Captain M. McLennan, Marine Superintendent of Shaw Savill Line.

On this memorable occasion the presentation of the inscribed barographs was performed by Mr G. A. Corby, Director of Services of the Meteorological Office. Mr Corby, after expressing appreciation for the many years of outstanding voluntary work carried out by the recipients, emphasized the continuing necessity for ships' observations and stated that despite meteorological satellites and data buoys, surface observations from ships would continue to be of fundamental importance for many years ahead.

The Masters were invited to scrutinize the first meteorological logbooks they had compiled; this, no doubt evoked memories of former less-harrassing times, and old ship-mates, perhaps temporarily forgotten. A photograph taken at the presentation is shown opposite page 117.

The guests were then entertained to luncheon by Mr Corby and senior officers of the Meteorological Office, after which the party was transported to the Meteorological Office Headquarters at Bracknell where they were conducted through the Central Forecasting Office, Telecommunications Centre and the Computer Laboratory.

J.D.B.

## **ICE CONDITIONS IN AREAS ADJACENT TO THE NORTH ATLANTIC OCEAN FROM JANUARY TO MARCH 1977**

The charts on pages 132 to 134 display the actual and normal ice edges (4/10 cover), sea-surface and air temperatures and surface-pressure anomalies (departures from the mean) so that the abnormality of any month may be readily observed. (The wind anomaly bears the same relationship to lines of equal pressure anomaly as wind does to isobars. Buys Ballot's law can therefore be applied to determine the direction of the wind anomaly.) Southern and eastern iceberg limits will be displayed during the iceberg season (roughly February to July). In any month when sightings have been abnormally frequent (or infrequent) this will be discussed briefly in the text.

The periods used for the normals are as follows. Ice: 1966-73 (Meteorological Office). Surface pressure: 1951-70 (Meteorological Office). Air temperature: 1951-60 (U.S. Department of Commerce, 1965). Sea-surface temperature: area north of 68°N, 1854-1914 and 1920-50 (Meteorological Office, 1966), area south of 68°N, 1854-1958 (U.S. Navy, 1967).

### **JANUARY**

The striking anomaly for cold weather over most of eastern Canada during December moved south to the north-east United States during January and in Canada persisted only in the south-east; north-east Canada and the Davis Strait had temperatures well above the normal for January. The excessive cold gave rapid freezing of the Great Lakes with an almost complete cover of ice by the end of the month when normally only a fringe of coastal ice would have developed. The spread of ice was ahead of normal in the Gulf of St Lawrence. Thin ice developed along the coast of Maine causing hazards to navigation and reports of sea ice were received as far south as Chesapeake Bay. On the other hand, ice in the Davis Strait remained less extensive than normal and the ice edge off Labrador lay near the usual position at the end of January despite earlier excesses.

Anomalies elsewhere were less pronounced though a tendency for southerly winds over the Barents Sea gave a significant recession of the ice edge to the east of Spitzbergen but resulted in more extensive ice than usual near the coast of northern Russia.

### **FEBRUARY**

Anomalies of wind and temperature near the ice edge were less pronounced than in January—especially the temperature anomalies over North America. The development of ice ahead of normal persisted in the Great Lakes, the Gulf of St Lawrence and near Newfoundland. Deficits of ice persisted in the Davis Strait. Lower-than-normal temperatures in the Greenland and Barents Seas lead to an increase of ice in this sector.

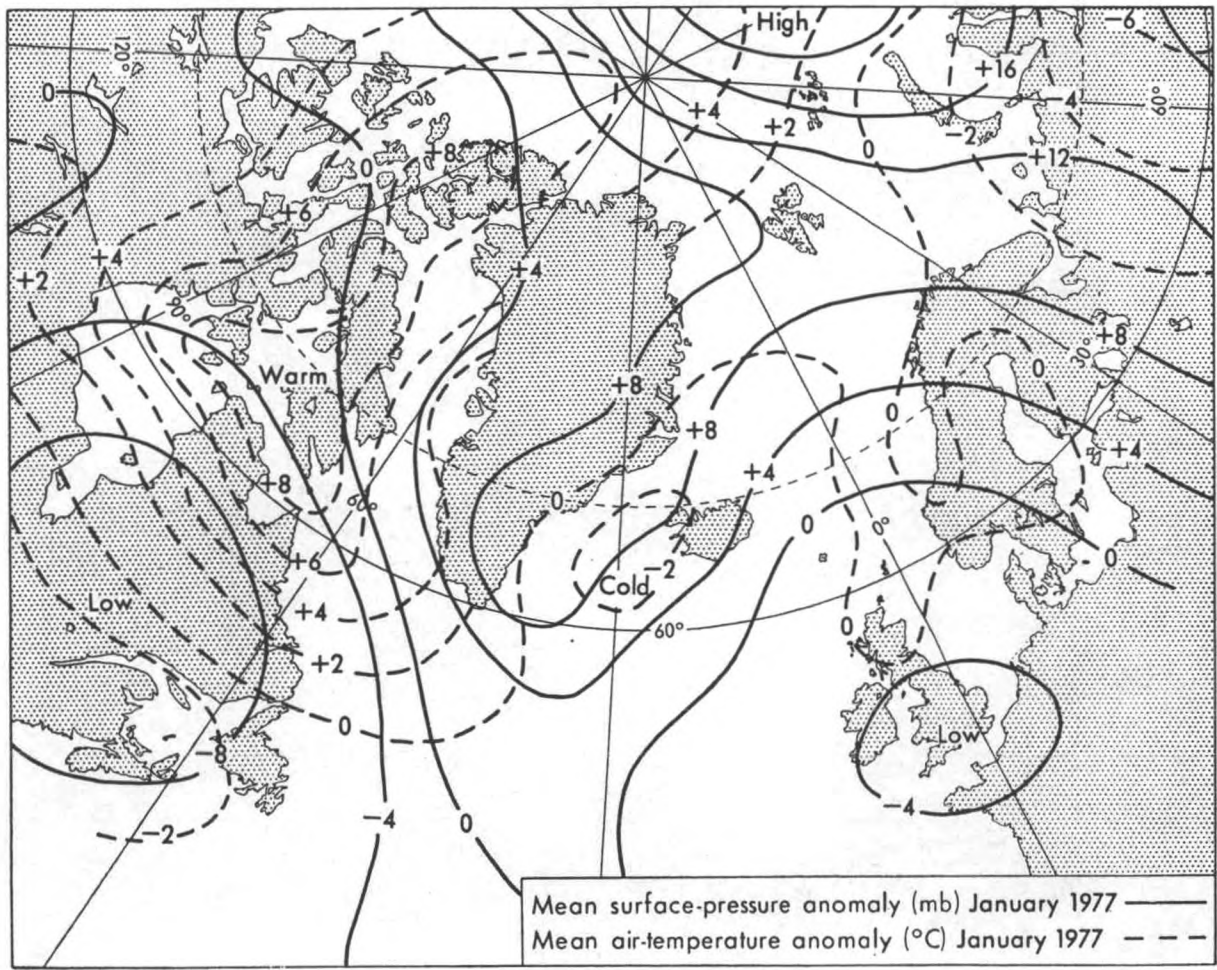
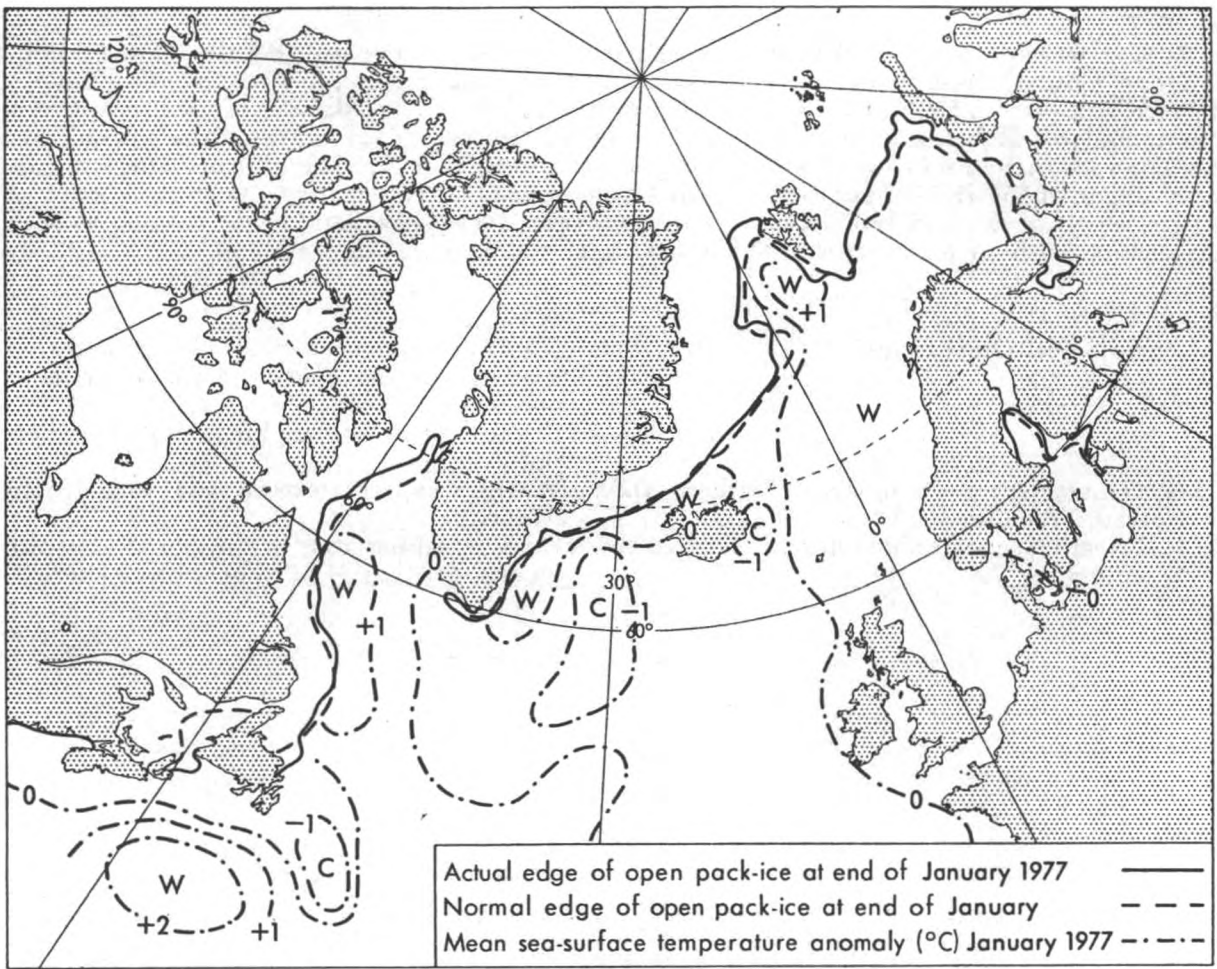
MARCH

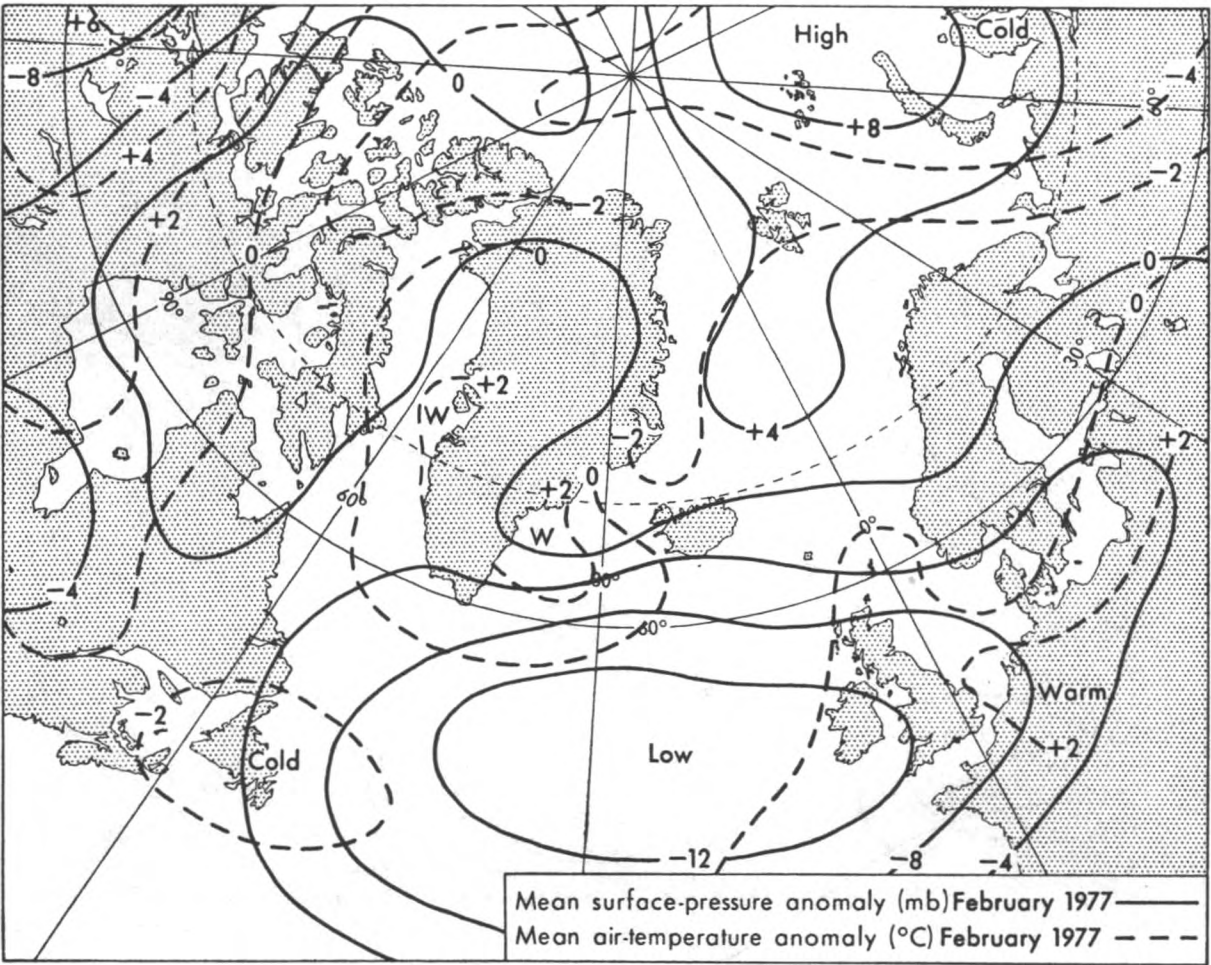
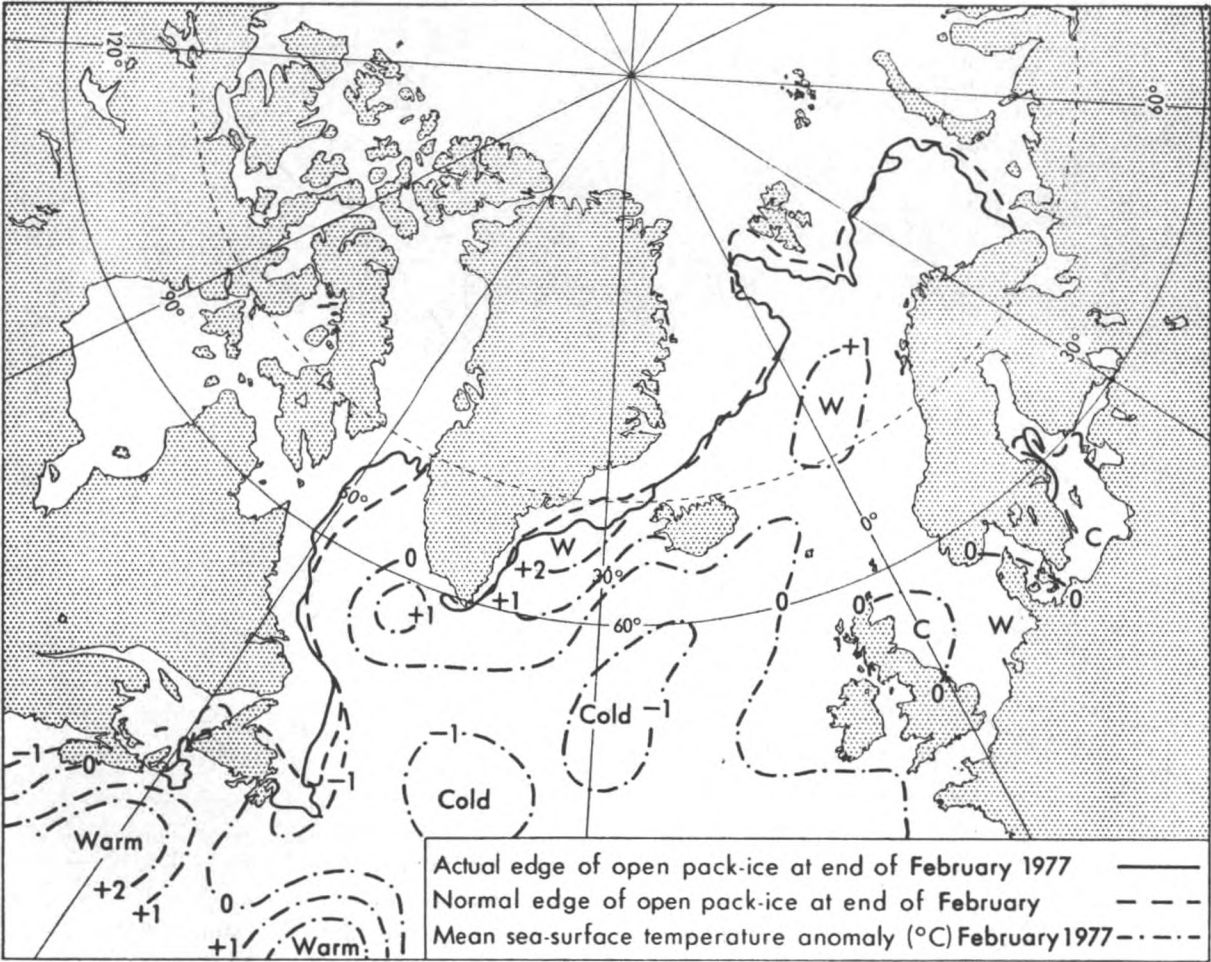
It was warmer than usual over eastern parts of North America and the Davis Strait. Melting reduced the extent of ice in the Great Lakes to near normal by the end of the month but ice was slow to clear in the Gulf of St Lawrence. There were deficits of ice in the Davis Strait and off Labrador. South-east of Greenland the seas were warmer than usual and breaking ice drifted southward with the current to round Cap Farvel and proceed westwards as a tongue of 'Storis'—ahead of the normal time of year for this feature. There was a deficit of ice north of Iceland but excesses were general in the Greenland and Barents Seas in association with air temperatures which were a good deal lower than normal.

REFERENCES

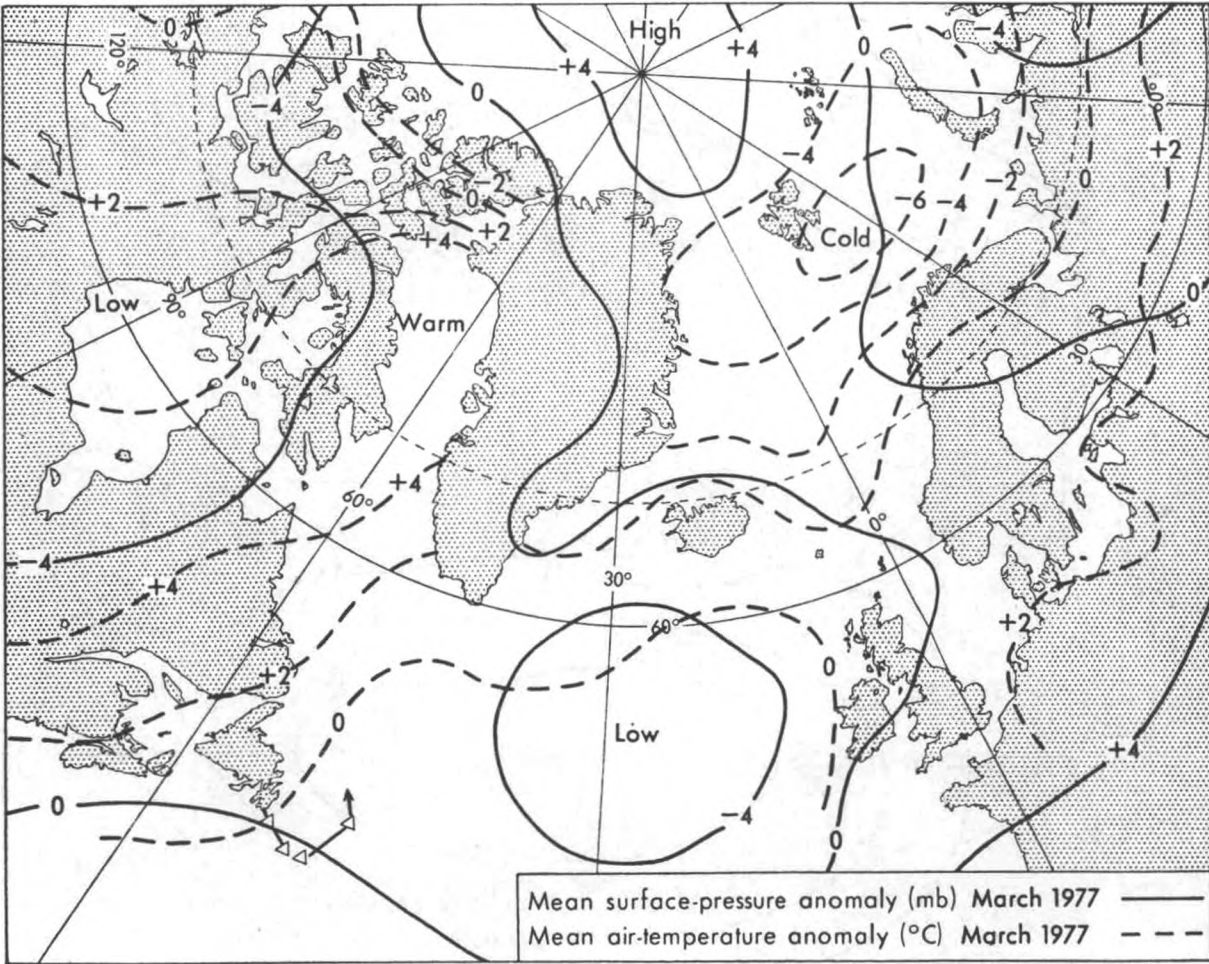
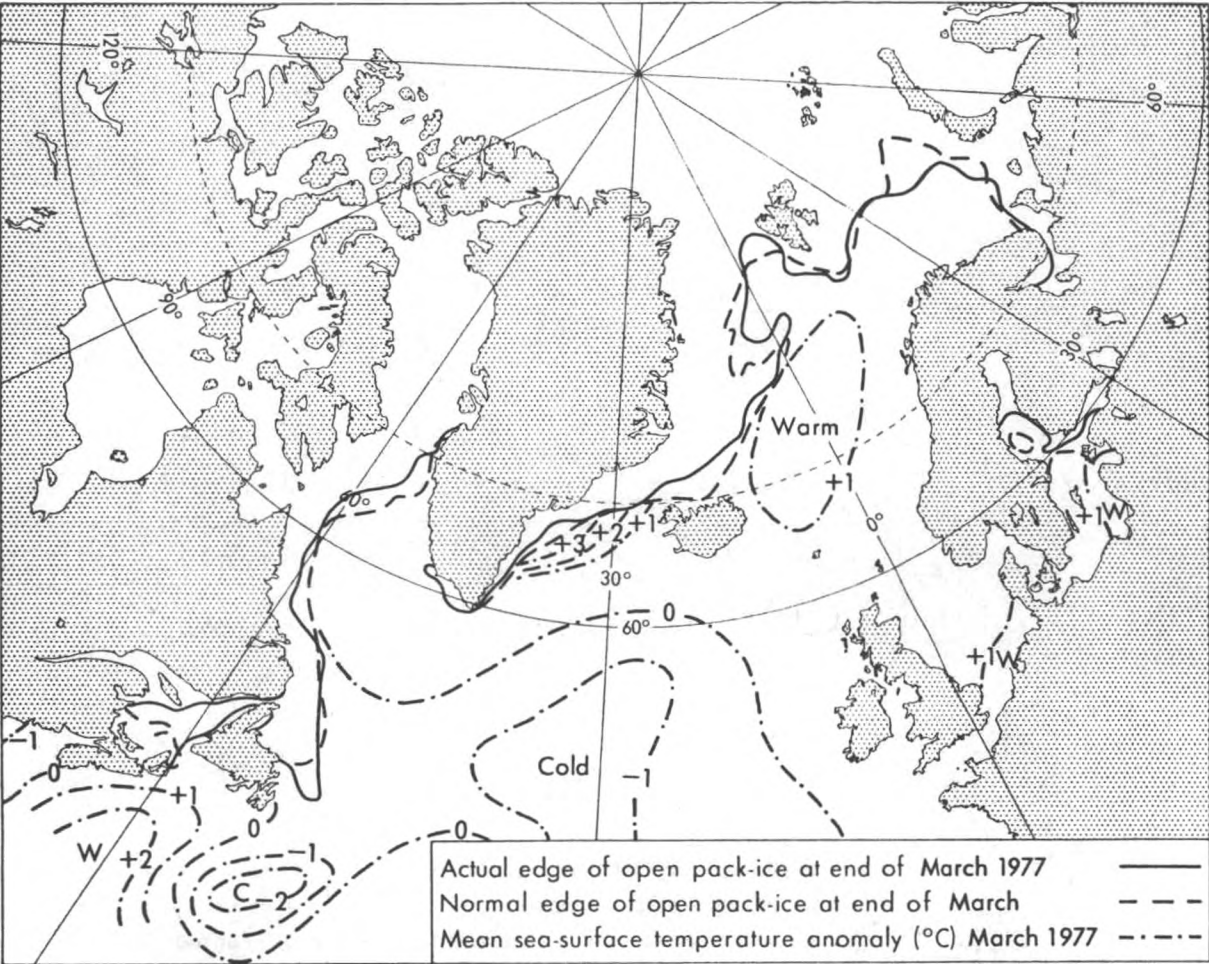
Meteorological Office, London	1966	Monthly meteorological charts and sea surface current charts of the Greenland and Barents Seas.
	—	Sea ice normals (unpublished) and various publications.
U.S. Department of Commerce Weather Bureau, Washington, D.C.	1965	World weather records, 1951–60. North America.
U.S. Naval Oceanographic Office, Washington, D.C.	1967	Oceanographic atlas of the North Atlantic Ocean, Section II: Physical properties.











# Baltic Ice Summary: January-March 1977

No ice was reported at the following stations during the period: Göteborg, Visby, Emden, Lübeck, Bremerhaven, Kiel, Flensburg, Stettin, Gdansk, Stralsund, Rostock, Aarhus, Copenhagen, Oslo, Kristiansandfjord

STATION	JANUARY					FEBRUARY					MARCH							
	LENGTH OF SEASON		ICE DAYS		NAVIGATION CONDITIONS	ACCUMULATED DEGREE DAYS	LENGTH OF SEASON		ICE DAYS		NAVIGATION CONDITIONS	ACCUMULATED DEGREE DAYS	LENGTH OF SEASON		ICE DAYS		NAVIGATION CONDITIONS	ACCUMULATED DEGREE DAYS
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Leningrad	1	31	31	6	25	0	31	0	474	1	28	28	0	28	0	28	0	722
Riga	1	27	23	4	0	12	0	0	242	1	28	26	10	5	12	7	0	365
Pärnu	1	31	31	31	0	0	0	31	—	1	28	28	28	0	0	0	28	—
Viborg	1	31	31	30	0	0	27	4	—	1	28	28	28	0	0	0	28	—
Klaipėda	1	29	17	0	10	11	0	0	—	4	19	14	0	5	10	0	1	—
Ventspils	1	27	25	3	0	15	0	0	—	4	28	21	1	4	17	0	1	—
Tallin	11	31	18	0	14	15	1	0	—	1	28	28	28	0	0	28	0	602
Helsinki	1	31	31	16	15	20	11	0	351	1	28	28	28	0	0	28	0	299
Mariehamn	0	0	0	0	0	0	0	0	146	13	28	16	2	0	12	0	0	564
Turku	1	31	31	8	12	25	6	0	323	1	28	28	28	0	0	28	0	635
Mantyluoto	1	31	10	0	0	2	0	0	—	11	28	18	16	0	17	1	0	—
Vaasa	1	31	31	31	0	0	31	0	375	1	28	28	28	0	0	28	0	—
Oulu	1	31	31	31	0	0	31	0	—	1	28	28	28	0	0	28	0	—
Rovaniemi	1	31	31	0	31	0	31	0	—	1	28	28	28	0	0	28	0	1061
Luleå	1	31	31	31	0	0	29	2	694	1	28	28	28	0	0	28	0	—
Bredskär	1	31	30	0	3	11	15	0	—	1	27	27	5	1	10	17	0	—
Sundsvall	1	31	31	3	0	31	0	0	—	1	28	28	28	0	24	4	0	296
Stockholm	1	31	31	31	0	31	0	0	157	1	28	28	28	0	28	0	0	140
Kalmar	1	31	30	0	26	30	0	0	87	1	28	28	0	0	28	0	0	—
Skellefteå	1	31	31	31	0	0	31	0	—	1	28	28	22	6	0	28	0	—
Hamburg	2	6	5	0	0	0	0	0	—	0	0	0	0	0	0	0	0	—

## CODE

- A First day ice reported.
- B Last day ice reported.
- C No. of days when ice was reported.
- D No. of days continuous land-fast ice.
- E No. of days of pack ice.
- F No. of days dangerous to navigation, but assistance not required.
- G No. of days assistance required.
- H No. of days closed to navigation.
- I Accumulated degree-days of air temperature (°C) where known.\*

\* These figures give a rough measure of the first probability of the formation of sea ice, and later the progress of the growth and its thickness. They are derived from daily averages of temperature (00 + 06 + 12 + 18 GMT) and are the sum of the number of the degrees Celsius below zero experienced each day during the period of sustained frost.

## Book Reviews

*Victory at Sea*, by Lieutenant-Commander P. K. Kemp, F.R.HIST.S., F.S.A., R.N. (Rtd). 220 mm × 140 mm, pp. 383, *illus.* White Lion Publishers Ltd, 138 Park Lane, London W1Y 3DD, 2nd edition, 1976. Price: £5.50.

At the end of World War II the Admiralty had intended to bring out a single volume work, based on official records, describing the Naval side of the War. It had been hoped to have such a book available by 1948 but, for a variety of reasons, the project never materialized. However, it was revived in 1956 and Lt Comm. Kemp, the Admiralty archivist and head of the Historical Section, was offered the job. The book has full Admiralty approval and naturally the author, with his background, has been able to make full use of official reports and documents, both British and German.

That more than 30 years after the events recorded in it the book could come into a second edition, is a measure, not only of the author's competence to write it, but also of public interest in a period which, in the reviewer's humble opinion, all too many think should be forgotten.

The author has given the reader in this one volume of 14 chapters a complete world-wide picture of the war at sea—the bitter fighting to put convoys through the Mediterranean, the long and desperate struggle in the North Atlantic and in Arctic waters, operations against the *Bismarck* and other heavy German ships, the great carrier-borne air battles in the Pacific and the final allied landings in Italy, Normandy, Burma, Malaya and Japan are all there, related with impartiality lest one should be thought to be of greater importance than another. Herein lies the quality of the historian.

There are flashes of brilliance in his choice of words too. Your reviewer was particularly impressed by his ending to Chapter I (The Drift into War) for which he has used the signal which the Admiralty made to 'All ships and Establishments at Home and Abroad' within a few hours of the declaration of war. It read simply 'Winston is back', and to those concerned it did indeed seem to mark the end of a somewhat sorry 20 years of British history.

Most who served at sea between 1939 and 1945 will, almost inevitably, have served in only a few areas; the writer knows of one seaman, who after several Australian voyages, remained in the same ship for the whole duration and was indeed still in her in 1952! To such it must sometimes have seemed that there were no other convoys, no other battles and no other seas—for them this book may be a revelation. To the growing number of seamen who were not around until after 1945 it will be a record of bravery, diligence and devotion to duty worth remembering.

It is worthy of a place on the shelves of either, even if it is used only as a reference book to settle some dog-watch argument.

L.B.P.

*Famous Ships of World War II*, by Chris Ellis. 200 mm × 140 mm, pp. 210, *illus.* Blandford Press, Link House, West Street, Poole, Dorset BH15 1LL, 1976. Price: £2.95.

World War II saw the birth of many new types of warships as well as the demise of several older and well-trying types.

To attempt to document adequately the vast number of types which were engaged in a global struggle lasting almost six years would seem a daunting task; within the compass of a book this size, especially when 50 of the pages must be used for illustrations, it is well-nigh impossible.

The author has made a good job of the material he has used, in particular the illustrations, apparently by a team of four artists led by John W. Wood, are first class. The criticism is that he does too much in some places and not enough in others. For instance, we are shown on three pages a drawing of each type of 'Liberty' ship. The structural differences between these three types were not great and a line or two of text might have been used to point them out. The art pages thus released could have been used to illustrate, say, an auxiliary aircraft carrier, a midget submarine, a C.A.M. (Catapult Armed Merchantman) ship or one of the great number of assault ships and craft. These were all new types and all certainly deserve a place among the 'famous'.

What constitutes a 'famous' ship must ever be a matter of opinion; however, one cannot but wonder why submarines are pictorially represented by two German, two Russian, two French and one Japanese craft whilst there is no mention of either a British or an American submarine.

The glossary also is disappointing. Listed under the heading 'Battles', for instance, we are given brief summaries of the battles of the Coral Sea, Java Sea, Marianas, Midway, River Plate and the Solomons, but no mention of Matapan or Taranto nor yet of the longest and most bitter battle of them all—the Battle of the Atlantic. Although Greenock and Halifax are described as major convoy assembly and dispersal points, Freetown, Lock Ewe and many another have no place. One wonders if this sort of information deserves a place in this volume anyway when so much which would help to justify its title has been left out.

Rather a disappointing book and, even at today's prices, rather too expensive.

L.B.P.

*Soviet Merchant Ships*, by Jeffrey Curtis and Ambrose Greenway. 260 mm × 185 mm, pp. 204 including 267 photographs. Kenneth Mason Publications Ltd, 13-14 Homewell, Havant, Hampshire. Price: £6.00.

A concise recognition manual which gives basic details of Soviet merchant ships, fish-factory ships and research vessels of over 1000 deadweight tons.

The book contains a large number of photographs depicting a representative of each type or class of vessel. The captions to the photographs contain information which includes the builders, dates of delivery, tonnage, main dimensions, engines and other known details. Much of this information has been drawn from Lloyd's publications.

Since 1969, when the first edition of this book was published, some 2000 new Soviet vessels have been built. Entry of these new vessels into service has, no doubt, enabled many of the older, uneconomic vessels to be withdrawn and scrapped. There is, however, little information available on this and it must be assumed that the continued existence of some of the older ships is suspect.

The Soviet fleet is state-owned but managed by 15 individual companies. No attempt has been made to indicate these in this publication but the port of registry and, sometimes, the ship's name itself may give a lead to the company responsible. Soviet ships generally operate on a world-wide trade basis and a trading pattern therefore does not indicate a particular company.

The book is in a loose-leaf form contained within a spiral binding thereby allowing supplementary information to be inserted. An application form in the book can be completed to receive this further information as and when it becomes available.

This latest edition should prove a valuable and informative reference book for those requiring information about Soviet shipping.

C.R.D.

## Personalities

OBITUARY.—We regret to have to record the death of CAPTAIN G. E. HARRIS of P. & O. General Cargo Division at his home in Chichester on 15 January 1977 after a long illness.

George Harris, who was 46, did his pre-sea training in H.M.S. *Worcester* before joining P. & O. Lines as a cadet in April 1948.

He was promoted to Chief Officer in 1958 and subsequently served as Staff Captain of the *Orsova*. He later joined Strick Line before that company's amalgamation with P. & O. and was promoted to Master in P. & O. General Cargo Division in October 1974. His last command was the *Strathappin* in 1976.

We received the first meteorological logbook bearing Captain Harris' name in 1950 from the *Palana*. Since then he had sent us a further 18 logbooks.

We extend our sincere condolences to his widow and family.

RETIREMENT.—CAPTAIN J. IVOR JONES D.S.O., D.S.C., R.D. retired on 1 March after serving 45 years at sea.

John Ivor Jones first went to sea in 1932 as an apprentice to Kaye Son and Company in the s.s. *Margot*. After obtaining his 2nd Mate's Certificate in 1936, he spent a year with Blue Star Line in the *Trojan Star* before transferring to T. and J. Harrison Limited with whom he remained until 1939.

Between 1939 and 1946 he served in the Royal Naval Reserve and was in command of corvettes, frigates and destroyers. Whilst commanding H.M.S. *Hyacinth* he captured an Italian submarine and was involved in the Malta Convoys. During his war service he was awarded the D.S.O., the D.S.C. and was twice mentioned in dispatches.

Whilst in command of H.M.S. *Byard* in April 1945, and during a re-fit period, he obtained his Master's Certificate; this being the first opportunity he had of taking the examination.

At the cessation of hostilities he re-joined Harrison Line and in 1952 was promoted to Master in command of the *Explorer*. From 1955 to 1956 he served in the Board of Trade as a Surveyor and then joined Booth Line with whom he remained for the next two years.

Captain Ivor Jones joined Lamport and Holt Line in 1958 and continued with that company until his recent retirement. His last command was the *Ronsard*.

According to our records, Captain Ivor Jones sent us his first meteorological logbook from the *Tribesman* in 1948. Since then we have received a further 25 logbooks bearing his name. He received an Excellent Award in 1972.

We wish him a long, healthy and happy retirement in his home in North Wales.

RETIREMENT.—CAPTAIN R. W. LUMSDEN retired last December after completing almost 36 years service at sea.

Robert Lumsden was indentured as apprentice to Anglo-Saxon Petroleum Company in January 1941. During his first voyage, in m.v. *Spondilus*, the ship came under attack in February 1942.

From July 1950 to August 1951, he was seconded to H.M.S. *Conway*, the Cadet Training Ship in the Menai Straits, as 2nd Officer, where he had responsibility for the training and welfare of 40 cadets.

He was promoted to Master in 1957 and appointed to command of s.s. *Armilla*. He succeeded Captain Davison as Commodore of Shell Tankers (U.K.) Limited Fleet in September 1973.

Captain Lumsden was in command of s.s. *Mytilus*, 207 000 tons deadweight, in March 1974 when that vessel became the first VLCC to transit the Magellan Strait.

In October 1974 he took command of s.s. *Opalia*, Shell's Cadet Training Ship,



and continued to be involved in that project up to the time of his retirement.

Our records show that Captain Lumsden sent us his first meteorological logbook from the *Latia* in 1948. Since then we have received a further 21 logbooks bearing his name, 10 of which have been classed as Excellent. He received Excellent Awards in 1976 and 1977.

We wish him a long, healthy and happy retirement.

RETIREMENT.—CAPTAIN T. B. SCOTT retired recently due to ill-health from the position of Harbour-Master at Ardrossan. Thomas Scott received his pre-sea training at the Royal Technical College, Glasgow from 1934 to 1935 and then joined the Monarch Steamship Company as a cadet. He remained with that Company until 1946 at which time he was serving as Chief Officer.

During the war he was torpedoed twice in one day off the coast of Greenland and when hostilities ceased, whilst serving with Anchor Line as Troop Officer, he was involved in returning Italian prisoners of war to their homes, some of whom had been away from Italy since the Abyssinian war of 1935.

In 1950 he transferred to Donaldson Line and, for a time, served in passenger/cargo liners on the North Atlantic route. During the latter part of his sea-going career he was Chief Officer of the *Captain Cook*, then sailing under charter to the New Zealand Government, carrying in all, 27 000 emigrants to that country.

Captain Scott was appointed Harbour-Master of Ardrossan in 1962. During the course of his career at sea he had developed an interest in ornithology and meteorology and had been a member of the Royal Naval Birdwatching Society for some years. He retained these interests in his shore appointment and became Warden of the Bird Sanctuary on Horse Island; also Ardrossan Harbour Master's office became a land weather reporting station for the Meteorological Office.

According to our records, Captain Scott sent us his first meteorological logbook in 1952 from the *Delilian* although he himself states that he was involved in weather reporting as early as 1938 whilst he was serving in *Celtic Monarch*. In all, we have received 19 logbooks bearing his name of which 16 were classed as Excellent. He received Excellent Awards in 1955 and 1956.

We wish him a speedy recovery in health and a long, happy retirement.

# Fleet Lists

GREAT BRITAIN (Information dated 18.3.77)

The following is a list of British ships which have been equipped with instruments and which voluntarily co-operate with the Marine Division of the Meteorological Office. The names of the Masters, Observing Officers and Senior Radio Officers are given as ascertained from the last written returns received. The date of receipt of the last return received is given in the second column; an asterisk indicates a new recruitment who has not yet sent in a logbook.

All returns received from observing ships will be acknowledged, direct to the ship, by the Marine Superintendent of the Meteorological Office.

The Port Meteorological Officers will make personal calls on the Masters and Observing Officers as opportunity offers, or on notification from the ship at any time when their services are desired.

Excellent Awards are made at the end of each calendar year. The names of the Masters, Principal Observing Officers and Senior Radio Officers gaining these awards are published each July in *The Marine Observer*.

It is requested that prior notification of changes of service, probable periods of lay-up, transfer of Master or other circumstances which may prevent the continuance of voluntary meteorological service at sea, may be made to a Port Meteorological Officer or to the Marine Superintendent of the Meteorological Office at Bracknell.

Masters and Officers are invited to point out any errors or omissions which may occur in the list.

## Selected Ships

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Acavus</i>	11.5.76	R. M. Codd	J. B. Smith, D. J. Hall	G. A. Sutherland	Shell Tankers (U.K.) Ltd.
<i>Act 1</i>	21.12.76	C. P. Leighton	T. Orrell, A. R. P. Geels, C. Jackson	D. Owen	Associated Container Transportation Ltd.
<i>Act 2</i>	15.2.77	L. J. Brown	D. R. Moody, G. J. H. Peaston, P. R. Forcett		Associated Container Transportation Ltd.
<i>Act 6</i>	24.12.76	V. A. Hunt	S. A. Trundle, M. J. Lewis-Williams, J. A. Osocroft	A. P. Handley	Associated Container Transportation Ltd.
<i>Adventurer</i>	29.11.76	C. D. Wilde	M. E. Stoddart, J. Blakely, B. Roberts	D. Daly	T. & J. Harrison Ltd.
<i>Afric Star</i>	6.12.76	J. Calabrese	I. H. Venables, J. Mockett, P. Tann	B. W. J. Peters	Blue Star Line Ltd.
<i>Agamemnon</i>	9.8.76	M. P. Stone	W. T. Stainer, E. J. Watterson	P. Barratt	Ocean Transport & Trading Ltd.
<i>Aiana</i>	*	P. D. Guerrier	R. J. Kingsnorth, P. D. Orman, J. Beck	C. R. Orpen	Trinder Anderson & Co. Ltd.
<i>Al Rumaithiah</i>	*	B. Hird	R. J. Yellan, B. R. Denley, I. H. Clark, A. Hughes, R. L. Hall, R. Allen		Kuwait Shipping Co. (S.A.K.)
<i>Al Shamiah</i>	*	J. S. Smith	M. C. Thorburn, B. R. Denley, K. Campbell	T. Miller	Kuwait Shipping Co. (S.A.K.)
<i>Albright Explorer</i>	22.11.76	M. Rossiter	M. P. Foster, W. McLeod-Campbell	W. D. Wood	James Fisher & Sons Ltd.
<i>Albright Pioneer</i>	31.12.76	J. Wood	D. A. Maclean	P. Dempsey	James Fisher & Sons Ltd.
<i>Alert</i>	2.12.75	J. M. S. Lowe	W. Ellis	W. Holmes	Post Office
<i>Alinda</i>	1.3.77	G. M. Sutherland	S. Taylor, G. L. Henke, D. Invararity	S. S. Samant	Shell Tankers (U.K.) Ltd.
<i>Almeda Star</i>	31.12.76	F. P. McGuckin	G. S. Hart, J. C. Harris, R. A. Orford	J. H. Macfarland	Blue Star Line Ltd.
<i>Almeria Star</i>	*	N. D. T. Johnson	K. Lumby, A. J. Brown, H. Owen		Blue Star Line Ltd.
<i>Amatric</i>	16.9.76	R. J. Bland	R. Turner, D. Stuart-Taylor, J. Spurgeon	T. Chambers	Shaw Savill & Albion Co. Ltd.
<i>Amara</i>	5.6.75	G. C. Maconville	E. Southworth, G. Akehurst, M. Geddes	A. Macrae	Shell Tankers (U.K.) Ltd.
<i>Amastra</i>	30.11.76	D. Mackillop	E. A. Barrimond, J. S. Gee, C. J. Furness		Blue Star Line Ltd.
<i>Amoria</i>	12.1.77	J. Aitkinson	M. J. Downes, A. Woodward, S. J. Henry	C. Jones	Shell Tankers (U.K.) Ltd.
<i>Anadara</i>	25.6.76	P. I. Parrott	P. Derbyshire, C. S. Case, J. R. Foxwell	B. Mullally	Shell Tankers (U.K.) Ltd.
<i>Anchises</i>	10.3.77	M. Sheridan	M. V. Hobbs, L. J. Drummond, G. Wood	R. D. Cause	Ocean Transport & Trading Ltd.
<i>Anco Empress</i>	*	E. Grant	A. Parry, H. Lafferty, D. March	A. Wilkins	Panoecean-Anco Ltd.
<i>Anco Stane</i>	*	K. Lewis	T. W. Edmunds, M. Ward, M. Wood, P. Morrissey	M. Finn	Panoecean-Anco Ltd.

<i>Anco Templar</i>	15.3.77	A. K. Froggatt	J. Wainwright, J. Dipple	J. Wainwright, J. Dipple	D. McGovern	Panoean-Anco Ltd.
<i>Andalusia Star</i>	11.1.77	J. R. Howorth	T. C. Black, M. A. Fraser, K. M. Chester	T. C. Black, M. A. Fraser, K. M. Chester	J. Ramsay	Blue Star Line Ltd.
<i>Andria</i>						Cunard S.S. Co. Ltd.
<i>Amnity</i>	7.1.77	A. Booth	D. Mwakio, P. Clegg, B. Yelland	D. Mwakio, P. Clegg, B. Yelland	I. Armstrong	Cunard S.S. Co. Ltd.
<i>Armadale</i>	25.1.77	D. G. Munro	I. Clenson, R. Shrubhall	I. Clenson, R. Shrubhall	W. Alea	F. T. Everard & Sons Ltd.
<i>Arino</i>	11.8.76	F. J. Adams	S. J. Wynne, F. J. Marks	S. J. Wynne, F. J. Marks	I. Stephen	Trinder Anderson & Co. Ltd.
<i>Asiafreighter</i>	22.11.76	D. A. Dickinson	D. J. E. Morris, H. Goulden	D. J. E. Morris, H. Goulden	B. Smith	J. & J. Denholm Ltd.
<i>Asialiner</i>	19.1.76	N. A. Macdonald	W. Y. Chalmers, J. Mortimer, D. H. Thompson	W. Y. Chalmers, J. Mortimer, D. H. Thompson	W. E. Harrison	Manchester Liners Ltd.
<i>Asian Renown</i>	19.7.76	T. Turner	J. Morton, H. G. Holmes, J. Fowler	J. Morton, H. G. Holmes, J. Fowler	M. Adams	Shell Tankers (U.K.) Ltd.
<i>Asprella</i>	24.2.77	J. Illingworth	J. B. K. Tyson, A. Reid, J. B. Turnbull	J. B. K. Tyson, A. Reid, J. B. Turnbull	A. R. Taylor	Cunard-Brocklebank Ltd.
<i>Atlantic Causeway</i>	21.12.76	W. Irvine	A. J. McDougall, D. Inverarity	A. J. McDougall, D. Inverarity	W. A. Wade	Cunard-Brocklebank Ltd.
<i>Atlantic Conveyor</i>	17.12.76	A. Bull	R. O. Garner, J. R. Hibling, J. P. Collins	R. O. Garner, J. R. Hibling, J. P. Collins	D. P. Stoker	Blue Star Line Ltd.
<i>Auckland Star</i>	26.1.77	I. H. North	D. J. McKay, M. G. D. Shariff	D. J. McKay, M. G. D. Shariff	D. W. Humble	T. & J. Harrison Ltd.
<i>Author</i>	24.12.76	A. W. Kinghorn			D. W. Humble	Ocean Transport & Trading Ltd.
<i>Automedon</i>	2.8.76	T. A. Butler	D. J. Theobald, M. Sims	D. J. Theobald, M. Sims	S. White	Blue Star Line Ltd.
<i>Avetona Star</i>	22.11.76	R. M. Simpson	A. I. Middleton, R. Cawthorne, P. Holtby	A. I. Middleton, R. Cawthorne, P. Holtby	D. W. Hughes	Harrisons (Clyde) Ltd.
<i>Avon Forest</i>	11.10.76	D. M. McPhail	B. Ferguson, R. Berry, A. Menzies	B. Ferguson, R. Berry, A. Menzies	I. Snowden	Union-Castle Mail S.S. Co. Ltd.
<i>Balmoral Castle</i>	31.8.76	R. McDougall	K. T. Eunson, M. J. Hanschell, A. J. Gladman	K. T. Eunson, M. J. Hanschell, A. J. Gladman	D. W. Hughes	W. A. Souter & Co. Ltd.
<i>Bamburgh Castle</i>	7.1.77	T. L. Kirby	P. F. Curg	P. F. Curg	D. W. Hughes	Houlder Bros. & Co. Ltd.
<i>Banbury</i>	22.4.76	K. E. Greest	P. Goodman, D. Magin, I. Wright	P. Goodman, D. Magin, I. Wright	D. W. Humble	Scottish Ship Management Ltd.
<i>Baron Ardrossan</i>	19.8.76	A. Cameron	D. Cursiter, E. T. Moodie, A. G. F. Michie	D. Cursiter, E. T. Moodie, A. G. F. Michie	D. W. Humble	Scottish Ship Management Ltd.
<i>Baron Belhaven</i>	21.12.76	C. Maclean	C. Groundwater, P. Buckley	C. Groundwater, P. Buckley	D. W. Humble	Scottish Ship Management Ltd.
<i>Baron Inchcape</i>	12.10.76	G. Towers	R. G. Wiggins, T. Hallhead, G. Houston	R. G. Wiggins, T. Hallhead, G. Houston	D. W. Humble	Scottish Ship Management Ltd.
<i>Baron Napier</i>	5.8.75	M. Turton	D. Cursiter, D. White	D. Cursiter, D. White	D. W. Humble	Scottish Ship Management Ltd.
<i>Baron Renfrew</i>	1.6.76	J. M. Mackay	J. Curley, R. G. Wiggins, D. White	J. Curley, R. G. Wiggins, D. White	D. W. Humble	Bank Line Ltd.
<i>Beaverbank</i>	17.11.76	A. E. Newton	L. C. Pink, R. F. Morton, B. A. Gregory	L. C. Pink, R. F. Morton, B. A. Gregory	D. W. Humble	Ben Line Steamers Ltd.
<i>Bechbank</i>	12.12.75	H. Barber	M. Trimble, I. Faithfull, R. Brown	M. Trimble, I. Faithfull, R. Brown	D. W. Humble	Ben Line Steamers Ltd.
<i>Benabnanach</i>	22.12.76	A. S. Hamilton	G. W. Day, J. F. Atkinson, J. R. Mouat	G. W. Day, J. F. Atkinson, J. R. Mouat	D. W. Humble	Ben Line Steamers Ltd.
<i>Benalder</i>	25.1.77	A. Maclean	G. Byers, J. Fleming, A. S. Rankin	G. Byers, J. Fleming, A. S. Rankin	D. W. Humble	Ben Line Steamers Ltd.
<i>Benarly</i>	17.0.76	T. P. Barr	N. C. Reid, J. Campbell, R. Sutherland	N. C. Reid, J. Campbell, R. Sutherland	D. W. Humble	Ben Line Steamers Ltd.
<i>Benatow</i>	8.11.76	R. E. Cowie	C. J. A. Cladingbowl, A. J. M. Wilson, J. R. E. Paterson	C. J. A. Cladingbowl, A. J. M. Wilson, J. R. E. Paterson	D. W. Humble	Ben Line Steamers Ltd.
<i>Benavon</i>	4.2.77	J. R. Morrison	J. S. Phillips, D. A. Walker	J. S. Phillips, D. A. Walker	D. W. Humble	Ben Line Steamers Ltd.
<i>Benavuchan</i>	25.10.76	O. Tucker	S. A. Edmundson, J. A. Robinson, A. R. Christie	S. A. Edmundson, J. A. Robinson, A. R. Christie	D. W. Humble	Ben Line Steamers Ltd.
<i>Bendearg</i>	6.9.76	W. Spencer	D. C. Rone	D. C. Rone	D. W. Humble	Ben Line Steamers Ltd.
<i>Bendorian</i>	9.2.77	J. S. Schofield	L. B. Webster, J. H. Gibson	L. B. Webster, J. H. Gibson	D. W. Humble	Ben Line Steamers Ltd.
<i>Benefactor</i>	25.10.76	W. G. Jackson	A. Atkin, M. S. Brooks, T. C. Harrison	A. Atkin, M. S. Brooks, T. C. Harrison	D. W. Humble	Ben Line Steamers Ltd.
<i>Bengloe</i>	24.12.76	H. H. McIntosh	I. A. Marshall, A. H. Glen, G. L. Craigen	I. A. Marshall, A. H. Glen, G. L. Craigen	D. W. Humble	Ben Line Steamers Ltd.
<i>Benlawers</i>	28.1.77	J. R. Rodger	R. Campbell, J. E. Robertson, J. J. M. Beggs	R. Campbell, J. E. Robertson, J. J. M. Beggs	D. W. Humble	Ben Line Steamers Ltd.
<i>Benledi</i>	28.2.77	R. C. Thomas	A. J. Lynch, I. A. Hamilton, I. G. Morrison	A. J. Lynch, I. A. Hamilton, I. G. Morrison	D. W. Humble	Ben Line Steamers Ltd.
<i>Benlomond</i>	24.1.77	L. G. Powell	W. F. P. Cargill, C. V. Wyatt, J. D. Simpson	W. F. P. Cargill, C. V. Wyatt, J. D. Simpson	D. W. Humble	Ben Line Steamers Ltd.
<i>Benloyal</i>	17.11.76	G. Reid	M. T. Jamieson, I. M. Greig, T. C. L. Rowe	M. T. Jamieson, I. M. Greig, T. C. L. Rowe	D. W. Humble	Ben Line Steamers Ltd.
<i>Ben Ocean Lancer</i>		J. McLeod	A. Davidson, C. Kemp, A. McPheat	A. Davidson, C. Kemp, A. McPheat	D. W. Humble	Ben Line Steamers Ltd.
<i>Benstac</i>	31.12.75	T. P. Barr	R. S. Basford, J. R. E. Paterson, J. I. Brown	R. S. Basford, J. R. E. Paterson, J. I. Brown	D. W. Humble	Ben Line Steamers Ltd.
<i>Benuyvis</i>	10.9.76	W. C. Watson	E. R. Chalkins, D. A. Throw, G. H. Buckley	E. R. Chalkins, D. A. Throw, G. H. Buckley	D. W. Humble	Ben Line Steamers Ltd.
<i>Bhano</i>	14.2.77	D. E. Easay	A. Montearth, N. J. Wallace, M. P. Donnelly	A. Montearth, N. J. Wallace, M. P. Donnelly	D. W. Humble	Ben Line Steamers Ltd.
<i>Bhranbank</i>	6.7.76	A. J. Kiff	R. A. Berry, R. Oden	R. A. Berry, R. Oden	D. W. Humble	Ben Line Steamers Ltd.
<i>Blenheim</i>	14.1.77	D. Ede	J. J. Breen, M. C. Corner, P. A. Southworth	J. J. Breen, M. C. Corner, P. A. Southworth	D. W. Humble	Ben Line Steamers Ltd.
<i>Booker Vanguard</i>	4.6.76	R. E. Dunne	P. P. Rowland, P. G. Morris, G. J. Wood	P. P. Rowland, P. G. Morris, G. J. Wood	D. W. Humble	Ben Line Steamers Ltd.
<i>Booker Venture</i>	17.3.76	R. E. Dunne	C. H. James, P. J. Donnelly, H. M. Bates	C. H. James, P. J. Donnelly, H. M. Bates	D. W. Humble	Ben Line Steamers Ltd.
<i>Booker Viking</i>	11.11.76	R. E. Dunne	M. Callander, J. Rumsby	M. Callander, J. Rumsby	D. W. Humble	Ben Line Steamers Ltd.
<i>Border Castle</i>	12.9.72	C. L. Southcombe	R. W. Tate, M. B. Deerning, A. P. Brookes	R. W. Tate, M. B. Deerning, A. P. Brookes	D. W. Humble	Ben Line Steamers Ltd.
<i>Border Chieftain</i>	17.1.77	R. W. Blyth	J. P. Pym, C. J. Johnstone, J. C. Wise	J. P. Pym, C. J. Johnstone, J. C. Wise	D. W. Humble	Ben Line Steamers Ltd.
<i>Border Shepherd</i>	22.11.76	I. Smyth	H. F. Monckton, C. Evans, J. Tolson	H. F. Monckton, C. Evans, J. Tolson	D. W. Humble	Ben Line Steamers Ltd.
<i>Botany Bay</i>	28.2.77	R. A. Wilson			D. W. Humble	Ben Line Steamers Ltd.
<i>Bransfield</i>	21.5.76	M. J. Cole			D. W. Humble	Ben Line Steamers Ltd.

# Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Brasil Star</i> ..	8.3.77	E. G. Bee	B. E. Newbery, M. A. Barker, J. P. Spencer	G. Smith	Blue Star Line Ltd.
<i>Brithorn</i> ..	17.8.76	K. Fox	H. Nightingale, S. Chapman	I. Jenkins	S. William Coe & Co. Ltd.
<i>British Avon</i> ..	18.1.77	I. A. Potter	P. W. Wilson, I. Hodge, R. J. Kendall	M. Walsh	B.P. Tanker Co. Ltd.
<i>British Beech</i> ..	10.3.77	N. H. Roberts	K. B. MacInnes, M. J. Cafferty, A. D. Wilcock	P. J. Whiteley	B.P. Tanker Co. Ltd.
<i>British Centaur</i> ..	11.1.77	R. A. Jarrett	A. J. Lange, M. C. Roberts, K. C. Gardiner	D. C. MacPherson	B.P. Tanker Co. Ltd.
<i>British Commodore</i> ..	1.2.77	W. Callaghan	C. Mullett, A. Holmes, P. Hebdon	D. M. Gleeson	B.P. Tanker Co. Ltd.
<i>British Esk</i> ..	7.2.77	R. Payne	R. Bell, R. Anderson, R. Hendry	R. Hall	B.P. Tanker Co. Ltd.
<i>British Explorer</i> ..	*	E. Henderson	P. M. Fido, D. M. MacDonald	A. J. Bellamy	B.P. Tanker Co. Ltd.
<i>British Fern</i> ..	18.1.77	C. N. Burley	I. Sutherland, K. C. Smith	M. J. Jennings	B.P. Tanker Co. Ltd.
<i>British Forth</i> ..	28.6.76	D. N. Peck	D. Shield	S. W. Taylor	B.P. Tanker Co. Ltd.
<i>British Hazel</i> ..	11.11.76	T. Y. Richards	K. W. Bainbridge, C. B. McGill, J. Kinnear	D. Walker	B.P. Tanker Co. Ltd.
<i>British Holly</i> ..	12.1.77	J. C. Wilson	K. Miller	R. Jones	B.P. Tanker Co. Ltd.
<i>British Ivy</i> ..	12.8.76	R. Longhorn	A. G. Bagley, D. J. Ridgway, G. J. Vandenberg	P. Luck	B.P. Tanker Co. Ltd.
<i>British Kennet</i> ..	27.1.77	M. V. McCarthy	P. J. Gildes-Evans, D. W. Rice	D. Lawrence	B.P. Tanker Co. Ltd.
<i>British Liberty</i> ..	21.10.76	W. O. Burns	A. Burns, S. Ratt, B. J. Turnbull, G. Cleary	S. C. Barnes	B.P. Tanker Co. Ltd.
<i>British Loyalty</i> ..	*	D. R. Botting	K. Lorimer, P. Knox, B. Millar	R. Clemence	B.P. Tanker Co. Ltd.
<i>British Maple</i> ..	24.2.77	F. W. Lamb	F. B. Whamond, R. Banks, J. B. Greenhalgh	M. J. Jennings	B.P. Tanker Co. Ltd.
<i>British Poplar</i> ..	23.11.76	M. Searle	D. Thwaites, M. Aldred	P. F. Davies	B.P. Tanker Co. Ltd.
<i>British Spey</i> ..	4.3.77	W. Hare	C. Mitchell, J. A. Condie, T. J. Bailey	N. R. Huntley	B.P. Tanker Co. Ltd.
<i>British Tamar</i> ..	11.2.77	M. T. Gordon	D. Robinson, D. Thomas, P. W. Hillier	W. Bell	B.P. Tanker Co. Ltd.
<i>British Tay</i> ..	3.2.77	E. Coates	S. W. Thomson, N. C. Baker, J. M. Ronald	C. Martin	Blue Star Line Ltd.
<i>British Trent</i> ..	18.8.76	R. Weston	D. Jeffcock, B. J. Turnbull	R. C. J. Clay	Canadian Pacific Steamships Ltd.
<i>British Unity</i> ..	20.1.77	I. K. Miller	A. K. Woodward, A. N. H. Hamer, K. Hunter	H. C. Chan	Canadian Pacific Steamships Ltd.
<i>British Vine</i> ..	17.6.76	J. C. Wilson	P. C. Shone, S. W. Gium, G. Round	N. Maclean	Jardine Matheson & Co. Ltd.
<i>Buenos Aires Star</i> ..	19.1.77	R. Burns	V. Edwards, G. B. Ivens, J. R. Brooks	A. Cruden	Blue Star Line Ltd.
<i>C.P. Discoverer</i> ..	18.5.76	E. Metham	J. H. Turner, A. C. Matthews, I. MacGregor	D. Roche	Lyle Shipping Co. Ltd.
<i>C.P. Trader</i> ..	24.12.76	M. Allen	D. R. Morgan, I. Currie, R. J. Doodson	I. H. Kell	Lyle Shipping Co. Ltd.
<i>Carnumore</i> ..	11.1.77	C. Preston	J. A. Cameron, J. K. Coughlan, D. W. Tang	D. S. Anderson	Lyle Shipping Co. Ltd.
<i>California Star</i> ..	23.11.76	D. M. McPhail	N. B. Meek, J. Peake, J. F. Rowe	D. Wilson	Lyle Shipping Co. Ltd.
<i>Cameronia</i> ..	24.12.76	G. J. A. Seave	T. Orrell, C. E. Elms, C. A. F. Ledsam	A. Mackinnon	Lyle Shipping Co. Ltd.
<i>Canterbury Star</i> ..	1.7.76	J. E. Jennings	B. F. Dobson, P. C. Mackay, S. P. Barker	D. Poole	Ellerman Lines Ltd.
<i>Cape Horn</i> ..	4.11.76	W. Warden	J. R. Sharp, E. R. Williams, T. N. Farley	K. Bent	Ocean Transport & Trading Ltd.
<i>Cape Howe</i> ..	31.8.76	I. Tyrrell	S. J. Hall, A. Michie, J. Gillespie	K. F. Lancashire	G. Heyn & Sons Ltd.
<i>Cape Leuwini</i> ..	24.2.77	K. N. Dootson	W. Andersen, J. Patton, C. R. Williams	A. R. Bridger	Bank Line Ltd.
<i>Cape Ortel</i> ..	7.12.76	A. M. Fraser	D. I. Jones, N. G. Smith, C. Thomas	Council	Natural Environment Research
<i>Cape Rodney</i> ..	1.2.77	D. L. Innes	P. Devenish, M. J. O'Reilly, A. Maxwell	R. Rowell	W. A. Souter & Co. Ltd.
<i>Cape Sable</i> ..	24.12.76	P. B. Hall	D. N. Fenton, R. C. Bucknall, E. R. Williams		
<i>Cape York</i> ..	20.1.76	J. B. Kerr	J. M. MacIver, R. Beck, C. J. Lang		
<i>Carchester</i> ..	10.12.76	D. T. MacLachlan	C. D. Grahame, G. Warren		
<i>Cardigan Bay</i> ..	1.2.77	W. F. Joyce	J. Beattie, P. H. Capper, R. Copeland		
<i>Carinitha</i> ..	8.12.76	D. MacPhail	S. J. Rabbett, M. J. Ross-Walker, B. Stirling		
<i>Cast Beaver</i> ..	21.2.77	S. Mayl	J. H. Evans, J. D. Noden, J. S. Jones		
<i>Cedarbank</i> ..	6.12.76	R. Carr	J. Rawlins, N. Carter, I. Boulton		
<i>Challenger</i> ..	14.2.77				



# Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Cumbria</i> ..	31.1.77	P. J. E. Charman	P. Woolstenholmes, C. R. Jenkins, M. Caine	T. Holt	Hadley Shipping Co. Ltd.
<i>Cunard Calamanda</i> ..	16.3.77	D. Kissane	S. C. Parvin, W. J. Harwood, R. G. Tanner	P. A. Cosargue	Cunard S.S. Co. Ltd.
<i>Cunard Carrier</i> ..	21.2.77	C. J. Burtinshaw			Cunard S.S. Co. Ltd.
<i>Cuthbert</i> ..	*	N. F. Sharp			Booth S.S. Co. Ltd.
<i>Dalesman</i> ..	9.2.77	J. Maddison	E. Oddy, A. Joyce, A. Patterson	C. Currie	T. & J. Harrison Ltd.
<i>Dart America</i> ..	27.1.77	A. F. Ashton	R. H. Wyatt, J. G. B. Tyler, D. H. Makin	C. K. Valentine	Bibby Line Ltd.
<i>Dart Atlantic</i> ..	24.12.76	D. Hine	P. W. A. Kinkad, S. H. Gledhill	A. E. Fell	Bibby Line Ltd.
<i>Degema</i> ..	14.1.77	N. Richardson	R. F. Kirker, I. M. Hill, K. F. Vickery, V. N. Karkarey	B. C. Jones	Ocean Transport & Trading Ltd.
<i>Detdo</i> ..	10.12.76	A. J. Palmer	D. R. Alexander, S. T. Houldsworth, J. G. Currie	E. Chlichowin	Ocean Transport & Trading Ltd.
<i>Derventfield</i> ..	*	I. A. M. Haddow	J. Rayn, I. Jarwick, D. Sim	L. J. Anderson	Hunting & Son Ltd.
<i>Decado</i> ..	12.11.76	C. A. Borthwick	P. A. Foulds, J. A. Gover, A. W. Webber	G. A. Ferrand	Shaw Savill & Albion Co. Ltd.
<i>Discoverer</i> ..	24.8.76	H. Traynor	L. W. Burton, O. M. Owen, K. Inskip	R. V. Price	T. & J. Harrison Ltd.
<i>Discovery</i> ..	22.12.76	P. Maw	J. J. Moran, R. Coutts, D. A. Pye		Natural Environment Research Council
<i>Discovery Bay</i> ..	31.1.77	J. Cosker	P. Morter, D. Treacy, T. Ristee	P. Cook	Container Fleets Ltd.
<i>Donga</i> ..	16.5.73	W. E. Bowden	G. A. Bateman, S. T. Houldsworth	T. J. Smith	Ocean Transport & Trading Ltd.
<i>Donington</i> ..	22.2.77	M. Robinson		R. W. Browning	Stephenson Clark Ltd.
<i>Dover Castle</i> ..	1.11.76	N. F. Wray-Cook			Union-Castle Mail S.S. Co. Ltd.
<i>Drina</i> ..	22.2.77	M. Larrive	K. A. J. White	T. McGill	Shaw Savill & Albion Co. Ltd.
<i>Drupa</i> ..	28.10.76	C. S. Owston	K. B. Thorpe, E. T. Hawkins, R. Taylor	N. O'Docherty	Shell Tankers (U.K.) Ltd.
<i>Dumbaia</i> ..	23.11.76	I. D. Jackson	J. M. Rose, M. Kenny, C. S. Gwilliam	J. C. Gartland	Ocean Transport & Trading Ltd.
<i>Dunhua</i> ..	16.12.76	A. Clish	A. I. Morrison, A. Provan, J. P. Lawson	C. Branthwaite	Ocean Transport & Trading Ltd.
<i>Dunstanburgh Castle</i> ..	11.2.77	A. W. Richards	R. W. Hide, C. E. Howey, R. J. Smart	W. Krause	W. A. Souter & Co. Ltd.
<i>Eboni</i> ..	4.8.76	J. R. Rawding	J. P. Shaw, N. W. Handley, P. M. Doyle	D. F. Murray	Ocean Transport & Trading Ltd.
<i>Edinburgh Clipper</i> ..	10.3.77	B. A. Chapman	E. R. Chalkley, P. Woodcock, P. F. Noonan	D. E. S. Robson	Cunard S.S. Co. Ltd.
<i>Edward Forbes</i> ..			K. M. Thein, V. Kapoor		Natural Environment Research Council
<i>Egton</i> ..	23.7.76	W. T. Maltman	J. Fardoarson, T. Corner, J. Callan	M. Killian	Roland & Marwood S.S. Co. Ltd.
<i>Elmina Palm</i> ..	1.9.76	G. Morris	R. Trotter, S. Holloway, A. M. Muhsin	A. M. Worthington	Palm Line Ltd.
<i>Encounter Bay</i> ..	12.1.77	L. E. Howell	D. L. Haynes, B. Graham, P. Pritchard	C. E. Hughes	Container Fleets Ltd.
<i>Eravan</i> ..	24.2.76	J. N. Edwards	A. Whittle, M. A. Coletis, J. A. Hamilton	Tsang Che Chin	John Swire & Sons Ltd.
<i>Ernebank</i> ..	15.10.76	T. Smith	G. A. B. Ward, F. D. Harron, J. D. Lorking	R. T. Graham	Bank Line Ltd.
<i>Eso Caledonia</i> ..	20.1.77	J. W. Aalan	K. H. Milne, P. J. Chester, N. J. Sparrow	D. Lesson	Esso Petroleum Co. Ltd.
<i>Eso Cambria</i> ..	7.1.77	J. D. Grigor	P. J. Grounds, T. Jackson	C. J. D. Trapp	Esso Petroleum Co. Ltd.
<i>Eso Demetia</i> ..		J. R. Lewis	D. Bunker, R. Vane, G. Foxcroft	G. Smith	Esso Petroleum Co. Ltd.
<i>Eso Mercia</i> ..	31.1.77	B. Meyer		W. Hawkins	Esso Petroleum Co. Ltd.
<i>Eso Ulidia</i> ..	27.1.77	A. Washbourne	M. Corlett, N. D. Paine, C. A. McDowall	W. Adams	Esso Petroleum Co. Ltd.
<i>Eso Warwickshire</i> ..	2.3.77	W. D. Templeman	P. Grant, M. Hocking, T. J. F. Welch	N. B. H. Skinner	Esso Petroleum Co. Ltd.
<i>Ethel Everard</i> ..	31.12.76	R. Blackburn	N. B. H. Skinner, N. R. Wood	D. B. O'Donoghue	F. T. Everard & Sons Ltd.
<i>Eucadia</i> ..	28.11.74	T. R. Rowe	C. Walmsley, D. Marshall, J. Kuzynski	E. Collins	Walter Runciman & Co. Ltd.
<i>Eurofreighter</i> ..	22.12.76	N. A. Macdonald	C. W. Harvey, S. M. Ferguson, A. Patterson	J. & J. Denholm Ltd.	J. & J. Denholm Ltd.
<i>Euroliner</i> ..	3.8.76	W. R. Williamson	D. C. Ellison, M. S. Dixon, K. I. Milton	M. Webster	T. & J. Harrison Ltd.
<i>Explorer</i> ..	15.12.76	C. D. Riley	J. A. Main	D. J. O'Brien	Dept. of Agriculture & Fisheries for Scotland
<i>Explorer (F.R.S.)</i> ..	29.10.76	F. D. Orr			
<i>Farnella</i> ..	7.2.77	H. Powdrell	G. Christmas	P. Wilson	J. Marr & Son Ltd.
<i>Ferne</i> ..	7.3.77	W. Smith	A. C. Peace, B. G. Mavity, A. M. Verghese		P. & O. S.N. Co.



	12.12.74	C. Newson	P. G. I. Rodgers-Gray, J. Morrison, P. I. Roberts	S. H. Dobson	Mavrolean Bros. Ltd.
<i>Finnmore Meadow</i>		C. B. Davies	P. K. Leppington, R. J. Leanders, N. J. Goldsmith		Bank Line Ltd.
<i>Firbank</i>	14.12.76	P. Simpson	I. Ward, M. Macinnes, C. Notman	S. Flannigan	Bank Line Ltd.
<i>Fleethanks</i>	10.1.77	G. A. Gibbons	R. B. Gurney, O. P. Thomas, J. R. Wisden	S. Braithwaite	Container Fleets Ltd.
<i>Foreland</i>	14.3.77	J. L. Halcrow	R. S. Drew, R. W. Paul	N. Cuthbert	Shipping & Coal Co. Ltd.
<i>Forties Kiwi</i>	26.1.77	J. Hobbs	I. T. Anderson, R. Morton, F. Betts	B. Cameron	B.P. Tanker Co. Ltd.
<i>Fourah Bay</i>	25.2.77	C. E. Woodward	P. J. Barrett, K. D. Campbell, G. Ridout	R. A. Browne	Ocean Transport & Trading Ltd.
<i>Fremantle Star</i>	18.1.77	D. Gilmour	T. Turner, N. B. Meek, A. Redcliff	E. Connell	Blue Star Line Ltd.
<i>Fremont City</i>	24.12.76	J. Vaughan	T. A. Burley, R. S. McKay, J. Shirley	C. J. Berram	Sir Wm. Readon Smith & Sons Ltd.
<i>Frontier</i>	17.11.76	P. D. Cullen	D. Bancroft, F. P. Garbutt, W. A. Lowe	J. McKory	Manchester Liners Ltd.
<i>Gambada</i>	23.12.76	R. J. Turney	T. James, R. Grey, R. J. Pilley	A. Watson	P. & O. S.N. Co.
<i>Gandara</i>	*	B. D. Woolley	A. J. Lewis, A. C. Wilson, J. Harvey	G. R. Bailey	P. & O. S.N. Co.
<i>Gardline Locater</i>	*	H. Morrell	- Hill, -, Withers		Gardline Shipping Ltd.
<i>Garinda</i>	16.7.76	A. O. Copeland	P. Frewer, P. Swift, P. Thomas	P. Morgan	P. & O. S.N. Co.
<i>Gazara</i>	23.11.76	P. R. Malarky	K. Breedon, W. A. Boddington, A. Bourn	T. Howes	P. & O. S.N. Co.
<i>Geestcrest</i>	7.3.77	J. Milner	A. B. Ward, I. M. Grant, W. A. Boddington	D. Pugh	Geest Industries Ltd.
<i>Geestland</i>	6.12.76	M. Wilks	A. Bourn, D. Roberts, P. G. Gough	G. Selby	Geest Industries Ltd.
<i>Geeststar</i>	2.11.76	D. Boon	S. J. Wozniak, K. M. R. Skinner	S. Codling	Geest Industries Ltd.
<i>Geest-Tide</i>	24.1.77	O. Springett	G. Evans, J. W. Gorton, P. G. Deschamps	W. P. Cameron	Sir Wm. Readon Smith & Sons Ltd.
<i>Gela</i>	24.1.77	D. B. Jack	M. Vojtko, E. W. Wells, M. Wolf	D. A. Barry	International Ore Carriers Ltd.
<i>Gene Trefethen</i>	12.10.76	L. L. Stevens	N. B. Meek, A. Milligan, P. Milton	D. C. Millar	Blue Star Line Ltd.
<i>Gladstone Star</i>	7.3.77	J. G. King	P. Walley, B. N. Jones, N. M. U. Salmon	A. G. Thomson	Ocean Transport & Trading Ltd.
<i>Glenjalloch</i>	24.1.77	J. C. Liptrout	I. D. MacPherson, K. Gibson, D. R. Walker	N. H. Kinley	Ocean Transport & Trading Ltd.
<i>Glenlyon</i>	11.3.77	A. Mackenzie	I. D. Cardno, T. S. Main, P. R. D. Brewer	W. J. Walters	I. & J. Denholm Ltd.
<i>Glenogie</i>	26.1.77	W. J. S. Eynon	P. I. Webber, C. Mallett, R. I. Mackenzie	M. Hester	Union-Castle Mail S.S. Ltd.
<i>Glenpark</i>	23.12.76	F. Danks	R. G. Powell, A. J. Maxwell, G. M. Robertson	P. Boyle	British United Trawlers Ltd.
<i>Good Hope Castle</i>	31.12.76	A. G. Allison	R. Spall	R. Spall	P. & O. S.N. Co.
<i>Goth</i>	13.8.76	J. N. Kerr, M.B.E.	K. A. Stapleton, R. Karlsson	K. Green	Graig Shipping Co. Ltd.
<i>Grafton</i>		J. M. Christie	G. Watson-Wood, G. Reynolds, A. Humphreys	B. Fairhurst	Blue Star Line Ltd.
<i>Graigaur</i>	2.3.76	R. McDonald	G. Copping, M. Thompson, C. Notman	S. W. Pearson	Bank Line Ltd.
<i>Halifax Star</i>	31.12.75	D. M. Maclean	P. J. Donnelly, R. Dootson, A. D. Mackenzie	A. W. Irwin	Walter Runciman & Co. Ltd.
<i>Hazelbank</i>	3.3.77	J. A. Williamson	D. C. McDowell, R. Milton, P. Helsby	P. Stanway	Bibby Line Ltd.
<i>Hazelmoor</i>	8.3.76	A. Lightfoot	M. Carrigan, M. Tallentire, G. Barry	P. W. Curphey	Common Bros. Ltd.
<i>Herefordshire</i>	8.3.77	R. G. McKay	D. J. Smith, K. Inskip, J. R. Leslie	H. G. Sparkes	T. & J. Harrison Ltd.
<i>Hindistan</i>	13.9.76	I. Mitchell	G. J. Gillies, K. O'Brien, C. Craddock	C. Constantinov	Blue Star Line Ltd.
<i>Historian</i>	29.3.76	J. O. White	M. A. Youd, K. J. Bolden, R. Gibson	V. A. Notley	Kuwait Shipping Co. (S.A.K.)
<i>Hobart Star</i>	28.1.77	M. Morfin	D. H. Thackray, D. Petty, J. Barclay	J. C. O'Leary	Shaw Savill & Albion Co. Ltd.
<i>Ibn Rushd</i>	7.2.77	R. E. Marshall	P. R. Haynes, J. D. Allen, J. Stevens	S. Stephens	I. & J. Denholm Ltd.
<i>Icemic</i>	14.2.77	J. R. Richmond	G. F. Smith, R. Marshall, W. Rankin	M. P. Clarkson	Bank Line Ltd.
<i>Illyric</i>		C. P. W. White	H. MacDonald, M. K. McLeod	P. N. Draper	Shaw Savill & Albion Co. Ltd.
<i>Industria</i>	7.2.74	D. L. Young	P. Henderson, R. E. V. O'Donnell, V. F. R. Moorman	J. Donachie	Bank Line Ltd.
<i>Inverbank</i>	1.3.77	D. T. Mouldley	M. T. Hardy, G. Grime, J. Lewis	W. P. Guiry	Bank Line Ltd.
<i>Irisbank</i>	10.1.77	B. Gerstel	J. Cobban, D. Llewellyn, G. Tennant	J. J. Kennedy	P. & O. S.N. Co.
<i>Jamaica Producer</i>	21.12.76	M. C. Harper	A. C. Peace, K. W. Bennett, M. R. Gibbon	D. Smith	Container Fleets Ltd.
<i>Jedforest</i>	15.11.76	J. R. McMurry	M. T. James, J. C. Peterson, A. J. Ball	D. Flemington	British Antarctic Survey
<i>Jervis Bay</i>	11.3.77	M. J. Heron	C. G. Lightbown, A. C. Baker, J. Webb	R. Wade	Natural Environment Research Council
<i>John Biscoe</i>	26.4.76	E. M. S. Phelps	G. M. Long, A. R. Neil, J. T. Morse		Dept. of Agriculture & Fisheries for Scotland
<i>John Murray</i>	18.8.76	A. Justen	I. Pollock, A. Hunt, J. McLeod, J. McCutcheon	M. M. Garrett	Palm Line Ltd.
<i>Jura</i>	*	P. Burn	A. J. Radford, P. H. D. Coombs	H. C. L. Taylor	British United Trawlers Ltd.
<i>Kano Palm</i>	26.10.76	J. A. Crook	P. W. K. Mbiriri, R. A. Milne, D. M. Rae	D. J. Oakden	Cayzer Irvine & Co. Ltd.
<i>Kell</i>	27.7.76	E. W. McCoid	A. W. Huber, M. Tew, E. Sullivan	J. Davies	Whitco Marine Services Ltd.
<i>King Alfred</i>	31.1.77	M. N. Ure			
<i>King Edmund</i>	*	G. Adams			

# Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
King Egbert	25.2.77	J. R. Bell	M. J. W. Harding, D. R. Duffield, M. Dolding	P. Dyer	Whitco Marine Services Ltd.
King George	31.12.76	P. C. Byrne	S. F. Renfree, A. Fienley, J. F. Pink	J. Blackwell	Cayzer Irvine & Co. Ltd.
King James	*	A. T. Campbell	N. Bennett, T. Whittaker, P. McArthur	I. Pegg	Cayzer Irvine & Co. Ltd.
King Richard		I. W. Bennet	F. J. Bailey, J. Patience	D. M. Garbett	Cayzer Irvine & Co. Ltd.
King William	22.11.76	P. S. G. Eckford	J. W. Wilcock, B. J. Ross-Smith, D. J. Mercer	P. C. Heredge	Union-Castle Mail S.S. Co. Ltd.
Kinburnie Castle	8.12.76	M. Brackenbridge	J. R. D. Hart, R. Gebbie, L. C. Mitchell	T. Martel	Ocean Transport & Trading Ltd.
Kowloon Bay	14.2.77	J. Bold	M. R. Freeman, A. J. Leslie, M. J. Phillips	D. H. Storar	P. & O. S.N. Co.
L.N.G. Challenger	12.6.75	C. G. Hunt	T. W. Morey, T. James, A. J. Lewis	V. Oram	Buries Marks Ltd.
La Loma	7.1.77	J. W. Murray	M. G. Phipps, K. Dearlove, D. Clyens	I. Robson	Bibby Line Ltd.
Lancashire	11.8.76	A. R. Moore	R. F. Milton, A. Kachno, C. S. Gaukroger	J. Palethorpe	Harrison (Clyde) Ltd.
Laurentian Forest	2.12.76	A. Mitchell	P. Freebody-Adjei, P. W. March, A. W. Breach	J. H. Clark	Shaw Savill & Albion Co. Ltd.
Laurentic	7.6.76	W. Wheatley	M. D. Ardenne, M. G. Bullock	P. Braxton	R. S. Dalgliesh Ltd.
Letchworth	22.2.77	T. R. Smith	M. F. Cooper, A. Kominek, B. F. Shepherd	T. E. Fisher	James Fisher & Sons Ltd.
Leven Fisher	25.8.76	I. J. Groundwater	G. R. Calderbank	S. A. Richards	Shaw Savill & Albion Co. Ltd.
Lindfield	25.2.76	I. S. M. Condie	P. J. Green, J. B. Brown, J. N. Ramsay		T. & J. Harrison Ltd.
Linguis	9.11.76	T. Wilson	K. M. McDermott, L. C. Irvine, C. Wren	G. Quirke	Ocean Transport & Trading Ltd.
Liverpool Bay	14.2.77	W. A. Fitzgerald	A. Thomas, B. R. Noble	J. B. Carr	J. & J. Denholm Ltd.
Loch Lomond	15.3.77	J. F. T. Houghton	A. C. Smith, R. McLeod, S. Card	F. MacLachlainn	J. & J. Denholm Ltd.
Loch Maree	25.10.76	D. Dickon	G. A. Cole, A. Finiefs	J. M. A. O'Sullivan	London & Overseas Freighters Ltd.
London Cavalier	31.1.77	A. Smith	G. A. J. Boucher, M. C. Littiewood, J. A. Attwater	J. C. Trotter	London & Overseas Freighters Ltd.
London Fusilier	24.11.76	W. W. Brown		G. E. Shirt	Canadian Pacific (Bermuda) Ltd.
Lord Strathcona	24.11.76	W. Gardiner			Bank Line Ltd.
Lossibank	16.3.77	C. C. Creasey	E. R. Mainland, C. S. Latchford, G. S. Rolls	W. B. Jackson	Oregon S.S. Co. Ltd.
Lutetian	1.11.76	R. T. Mudd	S. Woodward, M. J. C. Court, D. F. Norman	K. P. Jackson	Houlder Bros. & Co. Ltd.
Lynton Grange	*	J. C. Clark	G. N. Smith, D. P. Lawford, J. Laverick	I. McKinley	Maersk (U.K.) Co. Ltd.
Maersk Cadet	18.8.76	J. Lundberg	G. W. Miller, G. Thompson, J. Anderson	C. Wicks	Maersk (U.K.) Co. Ltd.
Maersk Commander	26.1.76	D. A. M. O'Byrne	M. W. Brown, R. C. Winlo, B. J. Woodward	D. J. Saunders	Cunard-Brocklebank Ltd.
Mahout	13.10.76	I. Lyle	P. Bailey, T. N. Dudman, B. J. Argent	D. Beech	Cunard-Brocklebank Ltd.
Mahonda	*	W. H. C. Hicks	T. Judge, P. Pettitt, A. McCutcheon	C. Clarke	Cunard-Brocklebank Ltd.
Maihar	8.2.77	R. Blaiklock	B. Evans, D. G. Wilcockson, D. J. MacFaddin	D. Richie	P. & O. S.N. Co.
Makaria	15.10.76	R. C. Lister	W. F. Harris, S. Millard, D. W. Caney	A. Wood	P. & O. S.N. Co.
Manapouri	7.9.76	K. Lehepuu	P. Doyle, W. D. Porter, R. S. Holt	W. Stirling	Manchester Liners Ltd.
Manchester Challenge	6.4.76	P. M. Fielding	D. W. Milligan, D. Davies, M. Bateman	J. McDonald	Manchester Liners Ltd.
Manchester Concept	15.2.77	D. G. Thomas	A. J. Williams, J. L. Mitchell, D. Normandale	S. A. Lamb	Manchester Liners Ltd.
Manchester Concorde	25.10.76	B. A. Nelson	A. G. Roebeck, T. Mather, K. Cookson	M. D. A. Walsh	Manchester Liners Ltd.
Manchester Crusade	15.10.76	I. Baker	J. T. Snee, P. Thompson, B. Frost	S. A. Lamb	Manchester Liners Ltd.
Manchester Vigour	29.9.76	J. A. Nelson	R. G. Tanner	H. Holdridge	Cunard-Brocklebank Ltd.
Manipur	18.10.76	J. St. H. Webber	C. Smith, C. Medlicott, M. C. Heron	H. Cherry	Bank Line Ltd.
Marabank	22.6.76	H. Dillon	J. G. Ward, D. W. Lax, C. Latham		Cunard-Brocklebank Ltd.
Markhar	8.2.77	G. D. Symonds	A. Mackenzie, R. Doman, C. Lewis		P. & O. S.N. Co.
Matara	9.8.76	C. Taylor	G. C. Kelly, A. C. Brooking, S. A. Jose	S. L. Ludgate	Mobil Shipping Co. Ltd.
Matco Aoon	1.3.77	D. Anderson	J. S. McKechnie, A. Hooper, J. Farrell	I. R. Francis	Shaw Savill & Albion Co. Ltd.
Mayfield	6.7.76	R. Barton	D. E. McAuley, R. I. G. Calder, G. P. D. Coleridge	R. V. Price	Shaw Savill & Albion Co. Ltd.
Medic	2.3.77	W. W. Newport	A. R. Brinkworth, R. A. Wooding, J. R. Thomas	S. Murphy	Shaw Savill & Albion Co. Ltd.
Meganitic	16.9.76	M. E. Musson		R. Carrons	Shaw Savill & Albion Co. Ltd.

<i>Melita</i>	11.3.77	B. Blacklock	T. M. North, T. Kvi, S. Formstone	B. O'Donoghue	P. & O. S.N. Co.
<i>Menestheus</i>	10.1.77	G. D. Johnson	D. W. Morrison, T. M. Allister, P. G. Doering	R. McSorley	Ocean Transport & Trading Ltd.
<i>Merchant</i>	29.4.76	R. H. Jones	A. P. Caola, J. N. Brook, N. Rebeiro	D. W. Cross	T. & J. Harrison Ltd.
<i>Mercury</i>	10.1.77	G. T. Robinson	G. Bury, S. Clark, F. Hill	P. Money	Cable & Wireless Ltd.
<i>Miranda</i>	12.10.76	D. Y. Roberts	G. Saul, R. E. Vinall, M. Ruane	R. E. Vinall	Department of Trade
<i>Mobil Condor</i>	*	G. J. Robertson	M. H. McFarlane		Mobil Shipping Co. Ltd.
<i>Montreal Star</i>	4.2.76	M. J. MacNeil	A. Lunn, J. P. Rogers, D. Barnicoat	R. Harvey	Bank Line Ltd.
<i>Moraybank</i>	13.9.76	H. J. Allan	P. G. H. Stapleton, T. Michael, R. G. Blakey	M. G. Rayner	Container Fleets Ltd.
<i>Moray Bay</i>	12.1.77	J. H. Hurson	D. Wilson, D. G. Sinclair, J. Fee	D. Fraser	I. & J. Denholm Ltd.
<i>Muirfield</i>	3.2.77	H. Munro	J. A. Jackson, G. L. MacQueen, A. R. Pedder	P. Body	Bank Line Ltd.
<i>Nairnbank</i>	20.12.76	J. W. Greateorex	P. M. Anthony, R. S. Brown, R. Snape	J. N. Phipp	R. S. Dalghiesh Ltd.
<i>New Westminster City</i>	29.10.76	A. Matheson	L. Laidler	G. Thomas	Sir Wm. Reardon Smith & Sons Ltd.
<i>New Zealand Star</i>	9.11.76	T. W. D. John	N. Jerrum, K. Jones, S. P. Gorford		Blue Star Line Ltd.
<i>Nina Bowater</i>	16.2.77	W. A. Wilson	J. V. Daymond, T. Jones, J. Moxon		Cayzer Irvine & Co. Ltd.
<i>Nordic Commander</i>	26.10.76	C. Gowans	G. A. Dickens	B. H. Varrall	I. & J. Denholm Ltd.
<i>Nordic Talisman</i>	31.12.76	E. Warman	I. A. Souter, O. Murphy, A. Macpherson	J. Varley	Burles Marks Ltd.
<i>Norman Lady</i>	21.9.76	A. H. Smart	C. C. W. A. Eager, R. W. Orr	H. Bahn	Harrisons (Clyde) Ltd.
<i>Norse</i>	9.6.76	J. W. Murray	A. Ramsay	A. Ramsay	Harrisons (Clyde) Ltd.
<i>Norse Marshal</i>	18.2.76	R. Waller	N. Stark, H. Syed	J. B. Carter	Cardigan Shipping Co. Ltd.
<i>Norse Trader</i>	24.1.75	A. Barker	H. Churchill, J. W. Parkinson, A. C. Wilson	A. E. Campbell	T. & J. Harrison Ltd.
<i>Norse Viking</i>	2.10.74	E. Muir	R. Lorne, N. M. Cooper, I. McKidd	J. K. Dunham	R. S. Dalghiesh Ltd.
<i>Novelist</i>	25.1.77	T. F. Jones	D. C. Tinton, G. Walter, N. Bevan	K. Halliwell	Bibby Line Ltd.
<i>Oakworth</i>	11.3.77	R. Maxwell	J. A. Denton, D. Reynolds	N. Fenton	Shell Tankers (U.K.) Ltd.
<i>Ocean Bridge</i>	2.8.76	N. Storey	P. Jones, P. Anderson, J. Best	M. Morgan	Pacific S.N. Co. Ltd.
<i>Obelia</i>	10.1.77	G. V. Underhill	P. A. S. Markland, N. Dixon, S. Pullan	M. P. Elliot	Pacific S.N. Co. Ltd.
<i>Orbita</i>	6.12.76	R. W. Lumsden	M. P. Molloy, S. J. E. D'Arcy, P. M. Gregson	M. M. Sime	Ore Carriers Ltd.
<i>Orcoma</i>	15.3.77	R. K. C. Thomas	K. Thompson, T. F. Hill, P. Wilkins	M. Cottle	Sir Wm. Reardon Smith & Sons Ltd.
<i>Orduna</i>	13.10.76	G. E. Turner	A. Shaw, S. Szaroleta, D. Smith, G. Darling	G. J. MacCourt	Ore Carriers Ltd.
<i>Orenda</i>	18.1.77	R. T. Riley	P. J. Jones, P. G. Sayers	A. Rodskjaer	British United Trawlers Ltd.
<i>Orient City</i>	2.2.77	C. Bowyer	B. Herniman, G. Parker	G. Smith	Ocean Transport & Trading Ltd.
<i>Orotava</i>	2.3.77	B. Tyler	I. Cranson, M. Roberts, H. Beaton	W. J. Lloyd	Shell Tankers (U.K.) Ltd.
<i>Orsino</i>	26.10.76	R. Spenser	A. Rodskjaer	C. D. Dews	Ocean Transport & Trading Ltd.
<i>Ortega</i>	10.6.76	C. W. Allison	C. Ashton, G. Shurmin, E. Jones	D. G. Bentley	Ocean Transport & Trading Ltd.
<i>Osaka Bay</i>	19.1.77	M. Lees	J. W. Kemp, T. D. A. Murphy	T. Jones	Ocean Transport & Trading Ltd.
<i>Parula</i>	23.12.76	J. Legg	J. H. Adams, R. J. Payne, A. T. Henderson	Chan Kok Soo	Ocean Transport & Trading Ltd.
<i>Paratrocus</i>	26.10.76	S. B. Gilliant	R. M. Selvarajah, D. M. Illingworth	R. A. Knight	Ocean Transport & Trading Ltd.
<i>Pegu</i>	10.1.77	J. McGeche	A. H. Price	R. E. Stewart	T. & J. Harrison Ltd.
<i>Peixander</i>	18.11.76	G. A. Armstrong	R. W. W. Baldwin, K. W. Smith, M. C. Knight	C. A. G. Boone	Stag Line Ltd.
<i>Perseus</i>	19.8.76	A. M. Blackburn	B. I. Noor, A. C. G. Leach, P. T. K. Carling	O. B. H. Hussein	Ocean Transport & Trading Ltd.
<i>Phemius</i>	1.7.76	C. H. F. Hill	S. P. C. Saverimutto, P. Fielding	A. Cooper	P. & O. S.N. Co.
<i>Photia</i>	11.2.77	H. Traynor	E. L. Halloo, F. Bissett, G. Clint	J. Buchanan	T. & J. Harrison Ltd.
<i>Phrontis</i>	1.11.76	B. Rowlings	W. Thompson, J. Williams, C. Dobson	D. C. Short	Northern Lighthouse Board
<i>Piako</i>	18.11.76	W. P. Goldie	B. S. Dzulkipili, M. G. Fennel, R. S. Hopkins	D. J. Duggan	Sir Wm. Reardon Smith & Sons Ltd.
	1.3.77	R. G. Dando	N. S. Harvey, H. M. Munro, B. B. McLeod, M. Nicholson	I. S. Barlow	Port Line Ltd.
				J. D. Boardman	Port Line Ltd.
				R. Marshall	Port Line Ltd.
				D. Reilly	Port Line Ltd.
				M. Winn	Port Line Ltd.
				M. Jackson	Panocean-Anco Ltd.
<i>Plainsman</i>	13.2.76	R. Taylor	A. C. McMillan, M. Camm, J. Fletcher		
<i>Pole Star</i>	*	G. Reid	A. D. Welch, D. Hamilton, G. R. Forth		
<i>Port Alberni City</i>	26.1.77	B. A. Boyer	P. C. Roberts, D. W. Ellis, P. F. Mathews		
<i>Port Alfred</i>	21.10.76	D. Sinclair	R. J. Morgan, A. M. Staveley, M. Thwaite		
<i>Port Caroline</i>	28.6.76	G. Carling	P. Fowler, P. Carter, J. Corse		
<i>Port Chalmers</i>	10.1.77	J. R. dit-Leschery	R. L. Grenville, G. B. Robson, R. F. Fitch		
<i>Port Laureston</i>	14.9.76	T. G. S. Ward	A. Brindie, G. Rosie, P. Dornigan		
<i>Port New Plymouth</i>	11.3.77	J. G. Whyte	P. D. E. Baker, F. Beer, M. Jevons		
<i>Port Nicholson</i>	26.10.76	P. R. R. Ramsay	G. Whiffield, E. Green		
<i>Post Challenger</i>	*	P. Bennison	A. Stobbs, M. Mitchell, A. Good, W. Fernis		

**Selected Ships (contd.)**

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Post Champion</i> ..	18.11.76	J. P. Pickard	E. J. W. Litchfield, K. Mober, R. Wakeling	J. J. Downey ..	Panoean Anco Ltd.
<i>Post Charger</i> ..	25.2.77	G. Maciver	P. Kidman, M. McMahon, I. R. Ward	D. W. Hirona..	Panoean-Anco Ltd.
<i>Post Chaser</i> ..	25.2.77	N. Hayward	M. J. Benson, R. J. Lee, D. J. Williams	G. Palmer ..	Panoean-Anco Ltd.
<i>Post Endeavour</i> ..	4.3.77	G. L. Milburn	M. T. Knight, P. J. Russi	B. Godfrey ..	Panoean-Anco Ltd.
<i>Post Enterprise</i> ..	*	D. W. Owen	D. Bell, D. Betts, M. Ashby, T. Murphy	C. Anderson ..	Panoean-Anco Ltd.
<i>Prince Rupert City</i> ..	21.1.77	J. C. Morris	R. J. Murray, P. Singh, T. Bayley	E. E. Milburn	Ocean Transport & Trading Ltd.
<i>Prometheus</i> ..	5.5.76	R. K. Stuart	A. Abel, K. B. Whitting, K. T. O'Higgins	C. J. Burt ..	Sir Wm. Reardon Smith & Sons Ltd.
<i>Protesilaus</i> ..	26.1.77	E. L. Stubbings	W. S. Payne, I. S. Cairns, M. A. Basar	G. M. Gregory	Ocean Transport & Trading Ltd.
<i>Queen Elizabeth 2</i> ..	2.10.75	W. P. Goldie	W. B. Westwood, A. Leach, G. Begley	E. E. Milburn	Ocean Transport & Trading Ltd.
<i>Rachurn</i> ..	29.11.76	R. H. Arnott	M. Scanlan, P. Barber		Cunard S.S. Co. Ltd.
<i>Raphael</i> ..	26.10.76	J. K. Schofield	P. Richards, I. Maxwell, I. Moist		Blue Star Line Ltd.
<i>Recorder</i> ..	25.5.76	R. K. Bilton	R. C. Corfield, G. J. Rawding, A. Milligan	E. B. O'Keefe	Lampoport & Holt Line Ltd.
<i>Remuera</i> ..	3.3.77	K. E. Howard	N. Shearman, C. R. Short, C. D. Smith	R. P. Bate	Cable & Wireless Ltd.
<i>Rockhampton Star</i> ..	15.2.77	A. H. White	D. Leech, J. Meyrick	S. Ashbrook ..	P. & O. S.N. Co.
<i>Romney</i> ..	26.1.77	R. Bilton	F. J. Riley, A. J. Brown, R. Henderson	M. Blount ..	Blue Star Line Ltd.
<i>Ronsard</i> ..	3.2.77	J. J. Jones	D. M. Nicholson, D. J. Jones, D. G. Marsh	R. Prole ..	Lampoport & Holt Line Ltd.
<i>Ross Orion</i> ..	24.12.76	A. Walker	R. R. N. Laing	R. R. N. Laing	Hudson Bros. Trawlers Ltd.
<i>Rowanbank</i> ..	18.3.77	J. Campbell	A. Mountnath, S. E. Ford, V. L. Mitchell	M. A. Brennan	Bank Line Ltd.
<i>Rudby</i> ..	22.2.77	F. B. Pounder	P. F. Bayliss, W. Mutch, K. Hughes	E. Perkins ..	Sir R. Ropner & Co. Ltd.
<i>St. Benedict</i> ..	9.12.75	A. T. Blenkin	H. G. Pask	R. T. Murphy	T. Hamling & Co. Ltd.
<i>St. Jason</i> ..	31.1.77	A. Ball	A. W. Kitchen, J. G. Scott, G. Bryson	H. G. Pask ..	T. Hamling & Co. Ltd.
<i>Sanaria</i> ..	*	N. M. Johnson	T. A. Burley, R. E. Baker, W. D. Hasell	F. C. Brown ..	Cunard S.S. Co. Ltd.
<i>Sara Lupe</i> ..	7.5.76	A. B. Parkhouse..	J. M. Kennedy, M. J. Wilcock, R. P. Green	R. J. Preece ..	Sir Wm. Reardon Smith & Sons Ltd.
<i>Scholar</i> ..	18.11.76	M. Watson	A. Main, W. Henderson, W. Laws..	G. J. Quirke ..	T. & J. Harrison Ltd.
<i>Scotia</i> ..	12.9.74	P. S. Burn		J. MacIntyre ..	Dept. of Agriculture & Fisheries for Scotland
<i>Scottspark</i> ..	5.8.75	A. Johnston			J. & J. Denholm Ltd.
<i>Seythia</i> ..	*	C. R. Thomas	I. Browne	H. Grattan ..	Cunard S.S. Co. Ltd.
<i>Severn Bridge</i> ..	9.11.76	R. M. Paton	J. D. Hillier, D. W. Miller, D. C. Duff	J. D. Walsh ..	J. & J. Denholm Ltd.
<i>Shackleton</i> ..	24.12.76	G. Selby-Smith..	J. T. Morse, S. Mayl, K. J. Moore	D. Neave ..	Natural Environment Research Council
<i>Sheaf Tyne</i> ..	24.8.76	D. A. B. Walker	J. O. Grieg, R. W. Taylor, R. Cordon	R. Rowell ..	W. A. Souter & Co. Ltd.
<i>Sherbro</i> ..	12.1.77	J. M. Johnston	J. C. Innes, J. G. W. Dixon, O. J. Watson	T. F. Scott ..	Ocean Transport & Trading Ltd.
<i>Shirabank</i> ..	*	P. H. Thomas	J. Nippers, N. E. Maxwell, R. J. Nibb		Bank Line Ltd.
<i>Shonga</i> ..	16.2.77	R. Wild ..	T. Callan, M. J. Knight, A. H. D. Brown	J. J. Crotty ..	Ocean Transport & Trading Ltd.
<i>Sig Ragne</i> ..	21.9.76	B. S. McManus	J. A. R. Jackson, K. J. Cassidy, S. J. Mellodey		J. & J. Denholm Ltd.
<i>Silverdon</i> ..	14.9.76	C. Forth ..	B. Roberts, A. Peacock, P. N. W. Collings	R. A. Wilson ..	Silver Line Ltd.
<i>Silverford</i> ..	8.12.76	N. Tuddenham	S. A. Telford, A. M. Huntington, A. G. Tester	C. G. A. Turner	Silver Line Ltd.
<i>Silvermain</i> ..	8.6.76	I. Kennar	N. L. L. Sandes, M. W. Witkowski, P. A. Neville	J. B. Grant ..	Silver Line Ltd.
<i>Silvermain</i> ..	10.12.75	N. Tuddenham	D. Murray, N. C. I. Despon, J. C. Oxenham	K. Roberts ..	Silver Line Ltd.
<i>Sincerity</i> ..	1.10.74	H. Brown	I. Hay		F. T. Everard & Sons Ltd.
<i>Somerses</i> ..	1.10.74	B. A. Smith	P. J. Ewen, M. J. Fletcher	C. A. Partridge	P. & O. S.N. Co.
<i>Somerses</i> ..	26.10.76	E. R. Wooldridge	K. W. O'Neill	K. W. O'Neill	Newington Trawlers Ltd.
<i>Somerset Maugham</i> ..	29.11.76	C. D. Hedges	R. A. Chadney, J. E. Walker-Spicer	D. A. P. Galbraith	Union-Castle Mail S.S. Co. Ltd.
<i>Southampton Castle</i> ..	29.11.76	R. MacDonald			Blue Star Line Ltd.
<i>Southland Star</i> ..	1.9.76	J. E. Sherwood			Jebsens (U.K.) Ltd.
<i>Spraynes</i> ..	26.1.77		N. M. Davies, J. Edkins, R. J. Newling	W. Cole ..	

Star Blackford	1.2.77	J. J. Craig	G. Gwyther, D. W. Keighley, D. Mathias	V. G. Meriott	Blandford Shipping Co. Ltd.
Star Buford	22.11.76	M. F. Haley	A. P. Terris, B. D. Cock, W. Broadley	L. Moreton	Blandford Shipping Co. Ltd.
Stephano	22.2.77	K. J. Lyall		J. Aherne	I. & J. Denholm Ltd.
Stirling Bridge	25.2.77	N. MacIver	M. W. Shoolbraid, M. J. Wray, W. H. Ross	S. A. O'Grady	P. & O. S.N. Co.
Strathadzie	31.12.76	D. V. Harradine	K. K. Sood, C. R. Heard, R. N. Hocking	A. Archibald	P. & O. S.N. Co.
Strathard	28.10.76	T. Lincoln	D. R. Le Page, A. Pridoux, G. Pettingell	A. D. MacGillivray	P. & O. S.N. Co.
Strathathie	29.9.76	J. A. McCowan	J. A. Kent, D. Pierce, A. K. Brown	S. M. Pilling	P. & O. S.N. Co.
Strathbarn	4.11.76	I. H. B. Weston	M. C. Adams, L. D. Wood, R. Ley	E. C. Madders	P. & O. S.N. Co.
Strathbarn	24.12.76	D. T. Hughes	R. C. Bloomfield, R. Madden, N. R. Barnes	A. C. Catt	P. & O. S.N. Co.
Strathbarn	12.1.76	D. Calvert	D. B. Barnett, A. Adams, P. Costas	G. Hetherington	P. & O. S.N. Co.
Strathbarn	12.8.75	G. L. Andrews	P. J. Goadby, R. G. Tull, A. B. Parry		P. & O. S.N. Co.
Strathbarn	1.11.76	S. A. Turk	R. D. M. Hamilton, M. Bailey, D. Carpenter		P. & O. S.N. Co.
Strathbarn	1.9.75	P. W. Filcek	D. H. Ayris, D. J. Goodwin, G. L. Pettenger		P. & O. S.N. Co.
Strathbarn	22.4.76	M. J. Charlesworth	R. A. Critchlow, R. A. Gammie, J. S. W. Dyson		P. & O. S.N. Co.
Strathbarn	1.12.76	R. O. Cunningham	N. Alcazar, K. Buckle, D. Forster		P. & O. S.N. Co.
Strathbarn	20.7.76	M. H. Wilson	D. W. A. Cater, P. Davies, A. D. Hamilton		P. & O. S.N. Co.
Strathbarn	21.9.76	A. W. Jones	D. T. Simpson, A. R. Davidson, I. A. E. Cookson		P. & O. S.N. Co.
Strathbarn	22.2.77	R. D. Cookman	T. U. Owen, G. W. Bryson, D. P. Castellino		P. & O. S.N. Co.
Strathbarn	4.8.76	D. A. C. Windle	I. T. Blackley, S. M. Patel		P. & O. S.N. Co.
Strathbarn	16.12.75	G. C. Woolgar	M. Ross, S. N. Monks, S. Kocherla		P. & O. S.N. Co.
Strathbarn	21.12.76	L. J. Lennox	K. Milnes, M. C. J. Jewell, G. W. Weaver		P. & O. S.N. Co.
Strathbarn	*	H. E. Wrightson	R. D. M. Hamilton, B. S. Dean, D. J. Perry		P. & O. S.N. Co.
Strathbarn	*	T. E. Kelso	I. J. Shipley, R. McNeil, D. P. Ploughman		P. & O. S.N. Co.
Strathbarn	*	A. Jenkins	D. P. Williams, P. Vennell, D. Lepage		P. & O. S.N. Co.
Strathbarn	*	G. Dixon	R. Hocking, G. Combe, M. Pellett		P. & O. S.N. Co.
Strathbarn	29.10.76	A. Wood	S. M. Tankard, T. Dann, D. L. Lacey		P. & O. S.N. Co.
Strathbarn	25.8.76	A. J. Field	N. D. Graham, I. K. Hara, R. K. Blackley		P. & O. S.N. Co.
Strathbarn	3.9.76	D. J. Harrison	A. C. Lobo, P. Rutter, D. Turrall		P. & O. S.N. Co.
Strathbarn	22.6.76	I. S. Laidlaw	K. V. Jolly, S. B. Rahman, D. J. Pratt		P. & O. S.N. Co.
Strathbarn	24.12.76	M. Robinson	J. F. Payne, J. F. Farquharson, T. J. Fox		P. & O. S.N. Co.
Strathbarn	4.2.77	P. W. Price	J. C. Etheridge, B. J. Kirtley, R. Kapoor		P. & O. S.N. Co.
Strathbarn	15.2.77	M. J. Charlesworth	P. J. Ewen, R. A. Childs, R. Gammie		P. & O. S.N. Co.
Strathbarn	6.9.76	R. Ling	S. P. Jarvis, J. W. Bird		P. & O. S.N. Co.
Strathbarn	12.1.77	I. MacAllister	T. L. Leuty, C. Cadman, J. Appadorai		P. & O. S.N. Co.
Strathbarn	6.12.76	J. W. Cole	M. G. Smith, W. V. Venning, R. S. Likhari		P. & O. S.N. Co.
Strathbarn	15.3.77	J. J. Woodmass	P. Thompson, R. Smith, R. M. Thaku		P. & O. S.N. Co.
Strathbarn	24.11.76	A. Stewart	K. Duff, R. W. Ireland, R. Gavine		P. & O. S.N. Co.
Sugar Carrier	28.9.76	I. E. Leaver	T. J. O'Connell, R. E. Shore, E. Winsor		P. & O. S.N. Co.
Sugar Crystal	18.10.76	D. Patrickson	G. Dunkley, W. H. Walker, N. Howart		P. & O. S.N. Co.
Sugar Producer	25.1.77	C. N. L. Davies	G. E. Harvey, J. H. Clark, A. P. S. Lark		P. & O. S.N. Co.
Sugar Refiner	24.12.76	P. M. Shirreff	P. M. Crow, O. Stephenson, D. Buck		P. & O. S.N. Co.
Sugar Trader	16.2.77	W. M. Surcliffe	C. J. B. Leith, J. Ford, T. A. Smith		P. & O. S.N. Co.
Sugar Transporter	18.1.77	N. S. Lancaster	I. Baird, W. H. Walker, C. E. Houghton		P. & O. S.N. Co.
Summit	12.1.77	D. O. Davies	P. R. Mason, A. Macintyre, J. E. Thornton, P. J. Dominey		P. & O. S.N. Co.
Supremity	30.11.76	P. L. Whitehouse	T. H. Withers, B. Hollywood		P. & O. S.N. Co.
Swedish Wasa	28.8.74	C. Marchant	S. A. Hollingworth, J. Bashforth, B. H. Bailey		P. & O. S.N. Co.
Sydney Bridge	9.2.77	P. B. Robier	A. Thomson, R. Alford, A. Coles		P. & O. S.N. Co.
Tacoma City	6.9.76	R. Stuart	W. A. S. Williams, B. J. Roberts, G. A. Walter		P. & O. S.N. Co.
Tactician	20.1.77	B. Crook	R. Hurst, E. Curling, T. Dickson		P. & O. S.N. Co.
Tamworth	11.1.77	J. S. Wisden	W. G. C. Wallace, G. W. N. Evans, M. Bregazzi		P. & O. S.N. Co.
Tantalus	11.3.77	A. A. Rundle	J. Potter, K. N. Metcalfe, C. F. Campbell		P. & O. S.N. Co.
Taupo	1.12.76	C. M. Gibbs	D. G. Houghton, A. G. Stevenson, S. G. Wride		P. & O. S.N. Co.
Taybank	24.11.76	R. J. Bridger	D. R. K. Vickers, P. Grimes, G. L. Pettinger		P. & O. S.N. Co.
Tekoa	15.11.76	A. B. Stalker	A. H. Fronk, I. H. Blyth, T. N. Wilkinson		P. & O. S.N. Co.
Tentobank		B. F. C. Bennett			P. & O. S.N. Co.

Selected Ships (contd.)

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Texaco Brussels</i> ..	23.8.76	A. W. Reeves ..	A. D. Hogg, R. A. R. Baddaloo, A. Garner	C. J. M. Tait	Texaco Overseas Tankship (U.K.) Ltd.
<i>Texaco Gloucester</i> ..	27.1.76	P. Stead ..	A. Monteath, C. Rose, A. Day ..	S. Kavannagh	Texaco Overseas Tankship (U.K.) Ltd.
<i>Texaco Singapore</i> ..	9.7.68	R. G. A. Barnes ..	R. A. Russell, J. Campbell, R. R. Brooks ..	G. Cockburn ..	Texaco Overseas Tankship (U.K.) Ltd.
<i>Timaru Star</i> ..	1.10.75	G. Bowden ..	K. D. Campbell, K. J. Owen, R. W. Bristolow	B. Gallagher ..	Blue Star Line Ltd.
<i>Tokyo Bay</i> ..	25.2.77	G. I. Wright ..	J. G. Mackay, T. J. Shone, T. E. McLaren	D. C. C. Clarkson	Ocean Transport & Trading Ltd.
<i>Tongararo</i> ..	28.1.77	J. A. North ..	W. Darby ..	H. Harper ..	P. & O. S.N. Co.
<i>Tourmaline</i> ..	*	J. Metigue ..	P. S. Kumar, C. Bufton, M. Rowley ..	L. K. Livie ..	Wm. Robertson & Co. Ltd.
<i>Townsville Star</i> ..	26.10.76	P. W. Hutchinson ..	D. W. Brennan, G. M. Hunt, J. Brierley ..	B. Coward ..	Blue Star Line Ltd.
<i>Trader</i> ..	30.11.76	F. H. Curry ..	S. Groombridge, G. Williams, D. Owen ..	M. Tegan ..	T. & J. Harrison Ltd.
<i>Trent Wood</i> ..	8.2.77	H. D. Osthoff ..	G. J. Watt, P. Kilvington, N. C. Horner ..	B. Puzey ..	International Ore Carriers Ltd.
<i>Troll Park</i> ..	10.1.77	P. T. Boundy ..	G. P. Jones, M. R. Greenwood, S. D. Bell	M. Stokes ..	J. & J. Denholm Ltd.
<i>Tropic</i> ..	18.11.76	E. H. Gregson ..	L. G. Copeman, G. Ralph, D. Moorhouse	Miss B. Keating	Pacific S.N. Co. Ltd.
<i>Turakina</i> ..	15.2.77	F. S. Angus ..	R. S. Richardson, M. R. Fowler, R. J. Spread	H. F. Murphy	P. & O. S.N. Co.
<i>Uganda</i> ..	22.7.76	D. J. Scott-Masson ..	T. J. Sheffield, J. Bottwood, D. Wadley ..	I. M. McConnell	P. & O. S.N. Co.
<i>Ulsar Star</i> ..	8.3.77	J. C. Harris ..	M. J. Clarke, J. York, P. Lewis ..	E. Bromham ..	Blue Star Line Ltd.
<i>Vancouver City</i> ..	21.2.77	L. R. Staines ..	A. S. Ingram, D. R. Perry, C. I. Ryan ..	D. E. Brown ..	Sir Wm. Reardon Smith & Sons Ltd.
<i>Vancouver Forest</i> ..	2.9.76	B. Hill ..	F. O. Wahu, L. K. Jaffer, J. P. Martlew	P. M. Haalam	J. & J. Denholm Ltd.
<i>Vancouver Trader</i> ..	19.11.76	A. T. MacGregor ..	P. A. Hayes, I. Anderson, D. J. Macfaddin	C. Adkin ..	J. & J. Denholm Ltd.
<i>Vendee</i> ..	27.7.76	C. Prescott ..	L. Sutherland, T. Jones ..	I. C. Yates ..	P. & O. S.N. Co.
<i>Vickers Viking</i> ..	31.12.76	J. Johanson ..	W. J. Hutchings, G. W. Hargreaves, D. J. Smythe	W. Donaldson	James Fisher & Sons Ltd.
<i>Vickers Viscount</i> ..	20.11.76	A. Mellor ..	P. Le Tissier, P. G. Barrah ..	G. Smith	James Fisher & Sons Ltd.
<i>Vickers Voyager</i> ..	23.9.76	L. Edwards ..	P. B. Fewster, J. Morrison, I. Mathias ..	M. Anderson ..	James Fisher & Sons Ltd.
<i>Victore</i> ..	14.12.76	C. Newson ..	C. S. Windells, J. Starbury, R. V. Duncan	L. R. Campbell	Mavroleon Bros. Ltd.
<i>Victoria City</i> ..	8.2.77	K. B. Whitting ..	D. J. McIntosh, P. Breslin, A. Stoddart ..	S. Smith	Sir Wm. Reardon Smith & Sons Ltd.
<i>Vimeira</i> ..	26.1.77	H. Churchill ..	J. M. Shiner, P. I. Hillman ..	E. Griffiths ..	Harrisons (Clyde) Ltd.
<i>Voeges</i> ..	25.1.77	A. Sugden ..	A. P. Morkley, S. Gledhill, P. A. Brown ..	G. Simpson ..	P. & O. S.N. Co.
<i>Warwickshire</i> ..	*	D. R. Clayton ..	T. A. C. Baker, M. H. C. Lunn, H. G. Thomas ..	J. C. Byrne ..	Bibby Line Ltd.
<i>Welsh Endeavour</i> ..	31.12.76	B. Rayner ..	D. Eakin, H. Burgess, W. Lynn ..	G. Simpson ..	Welsh Ore Carriers Ltd.
<i>Westbury</i> ..	23.11.76	W. Backhouse ..	N. D. Graham, D. C. Winter, K. Byrne ..	A. P. Rhind	Houlder Bros. & Co. Ltd.
<i>Westmorland</i> ..	26.2.76	T. C. Mathews ..			P. & O. S.N. Co.
<i>Westra</i> ..		D. R. Corse ..			Dept. of Agriculture & Fisheries for Scotland
<i>Wild Auk</i> ..	18.1.77	A. Dorkins ..	M. A. J. Underwood, P. N. J. Cowdell, C. J. Price	D. Hayes	P. & O. S.N. Co.
<i>Wild Avocat</i> ..	29.9.76	M. A. Hill ..	R. M. Hughes, M. Harvey, W. Londresborough ..	L. Sutron	P. & O. S.N. Co.
<i>Wild Cormorant</i> ..	29.7.76	I. Y. Batley ..	D. H. Ayris, L. Heaketh, S. Formstone ..	L. J. Briggs	P. & O. S.N. Co.
<i>Wild Curlew</i> ..	11.6.76	F. T. Rowlands ..	G. D. S. Jex, W. D. Phumister, D. R. Lewis	R. I. F. Adkin	P. & O. S.N. Co.
<i>Wild Fulmar</i> ..	2.3.77	D. E. Moran ..	D. Carsey, J. G. Melrose, K. Thomas ..	T. M. Elson ..	P. & O. S.N. Co.
<i>Willowbank</i> ..	15.2.77	R. W. Gunn ..	E. Stewart, P. Lock ..	I. W. Andrew	Bank Line Ltd.
<i>Wiltshire</i> ..	19.11.76	M. J. Winter ..	S. R. Woodward, R. M. Young, P. Anderson	N. J. Clarke ..	Bibby Line Ltd.
<i>Wimpey Sealab</i> ..	22.2.77	D. Grant ..	A. Jackson, A. Pendleton, K. Jupp ..	J. Braddock	Wimpey Marine Ltd.
<i>Winchester Castle</i> ..	31.12.76	K. Morton ..	D. Hart, R. S. Grant, C. Baker, P. J. M. Hickmott	B. Whiteford ..	Union-Castle Mail S.S. Co. Ltd.
<i>Windsor Castle</i> ..	17.12.76	P. St. Q. Beadon ..	I. A. Ross, F. J. Mack, P. W. Brown, P. Hooper	F. H. Sharp ..	Union-Castle Mail S.S. Co. Ltd.
<i>Yonkshire</i> ..	11.2.77	H. E. Carlisle ..	S. A. McClure, R. T. Nield, F. A. Bayliss	G. F. Glover ..	Bibby Line Ltd.
<i>Zealandic</i> ..	3.3.77	B. A. Hills ..	C. Sharp, C. R. Darke, A. W. Jones	R. Draper ..	Shaw Savill & Albion Co. Ltd.



Supplementary Ships

NAME OF VESSEL	LAST RETURN RECEIVED	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>Apollo</i> ..	1.2.77	J. Earl ..	H. Bond, A. M. Jones		Bristol S.N. Co. Ltd.
<i>Baltic Jet</i> ..	8.11.76	J. Reid ..	I. Priestly, S. Williamson, T. Taylor		United Baltic Co. Ltd.
<i>Baltic Star</i> ..	3.9.76	M. De Lacy	D. Sinclair, J. Collings	R. Milner ..	United Baltic Co. Ltd.
<i>City of Ankara</i> ..	21.6.76	W. White	P. Warr, C. Hewitt, D. Cuthbertson		Ellerman Lines Ltd.
<i>Caroline Weston</i> ..		J. G. P. Van der Ham	P. King, W. Darby		Weston Shipping Ltd.
<i>City of Famagusta</i> ..	12.10.76	A. S. Matheson ..	C. M. Nicholls, R. Niven, P. Lawley	J. Kane ..	Ellerman Lines Ltd.
<i>Decca Surveyor</i> ..		T. Sheehan	H. Skelton		Oil Search Marine Management
<i>Echo</i> ..	15.2.77	W. R. Kays	I. R. Boulton, R. Smithson, K. Parkin		Bristol S.N. Co. Ltd.
<i>Eden Bridge</i> ..	19.10.76	P. Shawyer	J. M. Craig, D. J. Glenn	M. M. Kinsella	I. & I. Denholm Ltd.
<i>Esso Severn</i> ..		G. R. Rowe	C. Perry, P. Johnson, D. Campbell, C. Lynn	M. Fraser ..	Esso Petroleum Co. Ltd.
<i>Gardline Researcher</i> ..		J. W. Dunn	I. E. Thornton		Gardline Ltd.
<i>Gowanbank</i> ..		P. J. Elder	M. J. Perkins, J. Faulkner, A. M. Weale	S. Murphy ..	Bank Line Ltd.
<i>Hero</i> ..		J. O'Rourke	M. Wdowikowski, C. Johnston, P. Iveson	T. W. Lawson	Ellerman Lines Ltd.
<i>Ilorin Palm</i> ..	2.11.76	G. Davidson	A. I. Russell, A. D. Wright, R. T. Blomfield		Palm Line Ltd.
<i>Kurd</i> ..		C. Thresh	H. Bryant	H. Bryant	British United Trawlers Ltd.
<i>Lord Mount Stephen</i> ..		P. Davis ..	D. West-Watson, B. Alexander, G. Waterson	M. Corry ..	Canadian Pacific Steamships Ltd.
<i>Lord Nelson</i> ..	9.11.76	A. Atkinson	G. W. Taylor		Hellyer Bros. Ltd.
<i>Lord St. Vincent</i> ..	15.3.77	A. Osler ..	R. Wagner	M. Allison	British United Trawlers Ltd.
<i>Methane Princess</i> ..	30.9.76	W. A. Clark	A. P. Willmore, A. L. Wynn, P. Allen	J. O'Toole	Shell Tankers (U.K.) Ltd.
<i>Methane Progress</i> ..	18.10.76	G. Griffiths	N. A. D. Wilson	M. Ridehalgh	Shell Tankers (U.K.) Ltd.
<i>Mobil Energy</i> ..	23.7.73	R. D. Stevenson	L. M. Wright, M. Larkin	A. B. Crossland	Mobil Shipping Co. Ltd.
<i>Mobil Pegasus</i> ..	16.5.73	J. Millar ..	J. B. McGrath, G. Wrigley	R. J. Thompson	Mobil Shipping Co. Ltd.
<i>Northern Reward</i> ..	1.3.77	T. Pembroke	H. C. Pougher	H. C. Pougher	Northern Trawlers Ltd.
<i>Oil Hustler</i> ..		N. Brown	L. Elms		Ocean Inchcape Ltd.
<i>Oil Supplier</i> ..		C. Cunningham	G. J. S. Ives, M. Kirk		Ocean Inchcape Ltd.
<i>Princess Anne</i> ..	14.9.76	P. E. Choven	C. Sheen	B. Pherson ..	Boston Deep Sea Fisheries Ltd.
<i>Prins Oberon</i> ..		J. E. Johannsson	W. Axkull	R. Sewell ..	Lion Ferry A/B
<i>Roches</i> ..	23.12.76	M. Roberts	A. J. Malgarin, W. G. Ogle, D. A. Macleod		Jebsen (U.K.) Ltd.
<i>Ross Canaveral</i> ..	6.7.76	J. Berry ..	A. Fulcher		British United Trawlers Ltd.
<i>Ross Implacable</i> ..	12.10.76	W. Boden	D. Williams, T. Horricks	P. J. O'Connor	British United Trawlers Ltd.
<i>Roybank</i> ..	10.5.76	P. H. Thomas	M. J. Carman, J. V. Tyrrell, L. Tunnacliffe	T. Plant	Bank Line Ltd.
<i>St. Edmund</i> ..		A. Brading	I. Casswell	M. C. Powell ..	British Rail
<i>St. George</i> ..		W. Bramhill	R. Sopwith	D. Mathews ..	British Rail
<i>St. Giles</i> ..	8.6.76	P. Grayburn	D. Mathews		T. Hamling & Co. Ltd.
<i>St. Jasper</i> ..	25.1.77	E. J. Johnson	D. Mathews		T. Hamling & Co. Ltd.
<i>St. Jerome</i> ..	9.11.76	T. Doyle	T. P. Barrett		T. Hamling & Co. Ltd.
<i>Sir Winston Churchill</i> ..		C. Row ..	D. Groom		Sail Training Association
<i>Susan Miller</i> ..	31.1.77	G. W. Moss	T. J. Conway, F. Shuttleworth, B. Hall	D. J. MacInnes	St. Vincent Shipping Co. Ltd.
<i>Tor Belgia</i> ..		C. J. C. Harker	P. G. Granham, S. R. Dowler, A. Page	D. Chapman ..	Tor Line Ltd.
<i>Tor Gothia</i> ..		D. G. Watson	G. Pearson, A. Page, J. R. Watson	N. Watchorn ..	Tor Line Ltd.

## Trawlers

The following is a list of trawler skippers and radio operators who voluntarily observe and report those elements of the weather which do not entail the use of any meteorological instruments (irrespective of the vessel in which they sail).

SKIPPER	RADIO OPERATOR				OWNER/MANAGER
C. Hamling .. ..	E. J. Moffatt .. ..	..	..	..	Boyd Line Ltd.
A. Jagger .. ..	K. H. Massey .. ..	..	..	..	T. Hamling & Co. Ltd.
E. McCoid .. ..	A. S. Warman .. ..	..	..	..	British United Trawlers Ltd.
C. Walker .. ..	A. Spence .. ..	..	..	..	Boyd Line Ltd.

## Light-vessels

NAME OF VESSEL	MASTERS
<i>Dowsing</i> .. ..	A. S. Richards, F. Turner
<i>East Goodwin</i> .. ..	L. Mortimer, F. J. Shilling
<i>Falls</i> .. ..	A. H. Robinson, W. Semple
<i>Humber</i> .. ..	T. W. Grice, S. F. Goose
<i>Newarp</i> .. ..	G. A. Harris, L. R. Long
<i>Royal Sovereign</i> (Lt. Tower)	W. Fagg, M. O'Sullivan
<i>St. Gowan</i> .. ..	R. S. Woolnough, T. Goddard
<i>Seven Stones</i> .. ..	A. W. Allum, T. G. Northcott
<i>Shiptwash</i> .. ..	R. Cadman, W. F. Dalby
<i>Smith's Knoll</i> .. ..	F. Harrison, B. H. Holmes
<i>South Rock</i> .. ..	J. Roche, J. Scanhian
<i>Tongue</i> .. ..	H. W. Brasted, J. H. Wilson
<i>Varne</i> .. ..	F. Betts, H. Baldry

# **'Marid' Ships**

The following is a list of ships recruited for the observing and reporting of sea temperatures from coastal waters of Great Britain. Masters are requested to point out any errors or omissions in the list.

NAME OF VESSEL	MASTER	OWNER/MANAGER
<i>Anglezark</i> .. ..	R. Kirk .. ..	Effluent Services Ltd.
<i>Arco Scheldt</i> .. ..	R. A. Hatch .. ..	A. R. C. (Marine) Ltd.
<i>Arco Thames</i> .. ..	C. Hart .. ..	A. R. C. (Marine) Ltd.
<i>Arco Tyne</i> .. ..	L. Locke .. ..	A. R. C. (Marine) Ltd.
<i>Ashington</i> .. ..	A. M. Arkley .. ..	Stephenson Clarke Shipping Ltd.
<i>Avalon</i> .. ..	W. Bramhill .. ..	British Rail
<i>Bass Shore</i> .. ..	S. Sage .. ..	Offshore Marine Ltd.
<i>Brenda</i> .. ..	R. J. Dias .. ..	Dept. of Agriculture & Fisheries for Scotland
<i>Brian Boroime</i> .. ..	C. B. Powell .. ..	British Rail
<i>British Security</i> .. ..	I. McNaughton .. ..	B.P. Tanker Co. Ltd.
<i>Caesarea</i> .. ..	M. E. Bodiam .. ..	British Rail
<i>Caledonian Princess</i> .. ..	C. Barker .. ..	British Rail
<i>Castle Point</i> .. ..	M. Umilski .. ..	Hudson S.S. Co. Ltd.
<i>Clansman</i> .. ..	K. McPherson .. ..	David MacBrayne Ltd.
<i>Columba</i> .. ..	J. Grey .. ..	David MacBrayne Ltd.
<i>Cymbeline</i> .. ..	J. Potter .. ..	Houlder Bros. Ltd.
<i>Dolphin Point</i> .. ..	—, Waldrop .. ..	Ocean Transport & Trading Ltd.
<i>Doric Ferry</i> .. ..	R. Hockings .. ..	Atlantic S.N. Co. Ltd.
<i>Dragon</i> .. ..	I. H. Leggatt .. ..	Southern Ferries Ltd.
<i>Dunvegan Head</i> .. ..	L. Buchanan .. ..	Christian Salvesen (Shipping) Ltd.
<i>Earl Goodwin</i> .. ..	J. Macmillan .. ..	British Rail
<i>Esso Fawley</i> .. ..	F. W. Doghertry .. ..	Esso Petroleum Co. Ltd.
<i>Esso Mersey</i> .. ..	P. H. Mattocks .. ..	Esso Petroleum Co. Ltd.
<i>Esso Milford Haven</i> .. ..	W. Lowndes .. ..	Esso Petroleum Co. Ltd.
<i>Ferryhill II</i> .. ..	J. Imnes .. ..	Aberdeen Coal & Shipping Co. Ltd.
<i>Fingal</i> .. ..	F. Davidson .. ..	Northern Lighthouse Board
<i>Garrison Point</i> .. ..	H. M. Horsley .. ..	Hudson S.S. Co. Ltd.
<i>Hamble</i> .. ..	N. MacLeod .. ..	Shell-Mex B.P. Ltd.
<i>Hebrides</i> .. ..	J. Hodgson .. ..	David MacBrayne Ltd.
<i>Helmsdale</i> .. ..	A. F. Ross .. ..	Northern Trading Co. Ltd.
<i>Hilary Weston</i> .. ..	R. C. Chaplin .. ..	Western Shipping Ltd.
<i>Inganess Bay</i> .. ..	W. G. Dennison .. ..	Elwick Bay Shipping Co. Ltd.
<i>L. N. Odin</i> .. ..	D. Thompson .. ..	Land & Marine Engineering Ltd.
<i>Mariri Everard</i> .. ..	M. Parker .. ..	F. T. Everard & Sons Ltd.
<i>Mole Venture</i> .. ..	L. A. Clark .. ..	C. M. S. Shipping Co. Ltd.
<i>Moyle</i> .. ..	F. T. Black .. ..	Shamrock Shipping Co. Ltd.
<i>Navigator</i> .. ..	J. N. Cannock .. ..	Decca Navigator Co. Ltd.
<i>Oswestry Grange</i> .. ..	M. Mortimer .. ..	Hudson Bros. Ltd.
<i>Penelope Everard</i> .. ..	P. Mackay .. ..	F. T. Everard & Sons Ltd.
<i>Pharos</i> .. ..	M. Fraser .. ..	Northern Lighthouse Board
<i>Portelet</i> .. ..	J. D. McFail .. ..	Onesimus Dorey Ltd.
<i>Rhodri Mawr</i> .. ..	.. ..	British Rail
<i>Ringnes</i> .. ..	R. D. Fryzendorf .. ..	Jebsen (U.K.) Ltd.
<i>Rosemarkie</i> .. ..	S. R. Gurton .. ..	W. N. Lindsay & Co. Ltd.
<i>St. Clair</i> .. ..	D. C. Gray .. ..	North of Scotland Shipping Co. Ltd.
<i>Sarmia</i> .. ..	J. Davies .. ..	British Rail
<i>Somersetbrook</i> .. ..	D. Hill .. ..	Comben Longstaff & Co. Ltd.
<i>Suavity</i> .. ..	—, Anderson .. ..	F. T. Everard & Sons Ltd.
<i>Suffolk Shore</i> .. ..	R. Dawson .. ..	Offshore Marine Ltd.
<i>Sussexbrook</i> .. ..	J. MacCormack .. ..	Comben Longstaff & Co. Ltd.
<i>Ulster Queen</i> .. ..	W. E. Wildgeese .. ..	Belfast S.S. Co. Ltd.
<i>Wendy Weston</i> .. ..	W. Agnew .. ..	Weston Shipping Ltd.
<i>Whitegate</i> .. ..	K. Radford .. ..	Turnbull Scott Management Ltd.
<i>Whitehorn</i> .. ..	H. S. Culley .. ..	Sir William Coe & Co. Ltd.
<i>Wilmington</i> .. ..	E. Welsh .. ..	Stephenson Clark Shipping Ltd.

## BRITISH COMMONWEALTH

The following lists give the name of Selected and Supplementary Ships and the number of Auxiliary Ships where known (i.e. those which only report in 'sparse areas'), which voluntarily co-operate with meteorological services of the British Commonwealth.

Information for these lists is required by 31 March each year. Information for the January corrective lists is required by 30 September each year.

### AUSTRALIA (Information dated 1.1.77)

NAME OF VESSEL	OWNER/MANAGER
Selected Ships:	
<i>Advara</i> .. .. .	Southern Shipping Line
<i>Al Khaleej</i> .. .. .	Kuwait Shipping Co.
<i>Al Kuwait</i> .. .. .	Kuwait Shipping Co.
<i>Andros</i> .. .. .	Australia-West Pacific Line
<i>Arafura</i> .. .. .	Overseas Containers Australia Pty Ltd.
<i>Ariane</i> .. .. .	Overseas Containers Australia Pty Ltd.
<i>Asian Reward</i> .. .. .	Asia-Australia Express
<i>Australian Emblem</i> .. .. .	Australian National Line
<i>Australian Endeavour</i> .. .. .	Australian National Line
<i>Australian Enterprise</i> .. .. .	Australian National Line
<i>Australian Escort</i> .. .. .	Australian National Line
<i>Australian Explorer</i> .. .. .	Australian National Line
<i>Australian Exporter</i> .. .. .	Australian National Line
<i>Baron MacLay</i> .. .. .	Scottish Shipping Management Ltd.
<i>Baron Wemyss</i> .. .. .	Scottish Shipping Management Ltd.
<i>Bass Trader</i> .. .. .	Australian National Line
<i>Beroona</i> .. .. .	W.A. State Shipping Service
<i>Bogong</i> .. .. .	Associated Steamships Pty Ltd.
<i>Boogalla</i> .. .. .	W.A. State Shipping Service
<i>B.P. Endeavour</i> .. .. .	B.P. Tankers Pty Ltd.
<i>B.P. Enterprise</i> .. .. .	B.P. Tankers Pty Ltd.
<i>Cape Don</i> .. .. .	Department of Transport
<i>Cape Grafton</i> .. .. .	Scottish Shipping Management Ltd.
<i>Cape Hawke</i> .. .. .	British Phosphate Commission
<i>Cape Moreton</i> .. .. .	Department of Transport
<i>Cape Pillar</i> .. .. .	Department of Transport
<i>Centaur</i> .. .. .	Blue Funnel Line
<i>Clutha Capricorn</i> .. .. .	Clutha Development Pty Ltd.
<i>Clutha Oceanic</i> .. .. .	Clutha Development Pty Ltd.
<i>Clydebank</i> .. .. .	Bank Line Ltd.
<i>Corabank</i> .. .. .	Bank Line Ltd.
<i>Coral Chief</i> .. .. .	New Guinea Australia Line Pty Ltd.
<i>Darwin Trader</i> .. .. .	Australian National Line
<i>Doha</i> .. .. .	Patrick Agencies Pty Ltd.
<i>Dona Clausen</i> .. .. .	Clausen Shipping Co.
<i>Eigamotiya</i> .. .. .	Nauru Pacific Shipping Line
<i>Empress of Australia</i> .. .. .	Australian National Line
<i>Forresbank</i> .. .. .	Bank Line Ltd.
<i>Forthbank</i> .. .. .	Bank Line Ltd.
<i>Gjertrud Bakke</i> .. .. .	Knutsen Line
<i>Iberia</i> .. .. .	Wilmores Ltd.
<i>Iron Arnhem</i> .. .. .	Broken Hill Pty Co. Ltd.
<i>Iron Cavalier</i> .. .. .	Broken Hill Pty Co. Ltd.
<i>Iron Dampier</i> .. .. .	Broken Hill Pty Co. Ltd.
<i>Iron Endeavour</i> .. .. .	Broken Hill Pty Co. Ltd.
<i>Iron Flinders</i> .. .. .	Broken Hill Pty Co. Ltd.
<i>Iron Hunter</i> .. .. .	Broken Hill Pty Co. Ltd.
<i>Iron York</i> .. .. .	Broken Hill Pty Co. Ltd.
<i>Island Chief</i> .. .. .	New Guinea—Australia Line Ltd.
<i>Ivybank</i> .. .. .	Bank Line Ltd.
<i>Jeparit</i> .. .. .	Australian National Line
<i>John Burke</i> .. .. .	John Burke Pty Ltd.
<i>Kota Bali</i> .. .. .	Pacific International
<i>Kota Singapura</i> .. .. .	Pacific International
<i>Lake Macquarie</i> .. .. .	Australian National Line
<i>Lake Sorrel</i> .. .. .	Australian National Line
<i>Lalandia</i> .. .. .	Scan Austral East Asiatic Shipping Co.
<i>Larchbank</i> .. .. .	Bank Line Ltd.
<i>Linda Clausen</i> .. .. .	Clausen Shipping Co.
<i>Malaysia</i> .. .. .	Austasia Line Ltd.
<i>Malmos Monsoon</i> .. .. .	Australia West Pacific Line
<i>Marco Polo</i> .. .. .	P. & O. Australia Ltd.
<i>Meadowbank</i> .. .. .	Bank Line Ltd.
<i>Melbourne Trader</i> .. .. .	Australian National Line
<i>Mt Newman</i> .. .. .	Broken Hill Pty Co. Ltd.
<i>Myarra</i> .. .. .	Union Bulkships Pty Ltd.
<i>Neptune Fisher</i> .. .. .	James Fisher and Son
<i>New Guinea Chief</i> .. .. .	New Guinea-Australia Line Ltd.
<i>Nyanda</i> .. .. .	W.A. State Shipping Service
<i>Regional Endeavour</i> .. .. .	Drillships Ltd.
<i>Seaway Queen</i> .. .. .	Union Bulkships Pty Ltd.
<i>Sprucebank</i> .. .. .	Bank Line Ltd.
<i>Stirling Range</i> .. .. .	Wilmores Ltd.
<i>Strathmay</i> .. .. .	P. & O. Australia Ltd.

<i>Strathmeigle</i>	..	..	..	..	..	P. & O. Australia Ltd.
<i>Strathmore</i>	..	..	..	..	..	P. & O. Australia Ltd.
<i>Strathmuir</i>	..	..	..	..	..	P. & O. Australia Ltd.
<i>Surenes</i>	..	..	..	..	..	Jepsen Line
<i>Sydney Trader</i>	..	..	..	..	..	Australian National Line
<i>Tamara</i>	..	..	..	..	..	Southern Shipping Line
<i>Tarago</i>	..	..	..	..	..	Scan Austral East Asiatic Shipping Line
<i>Tombarra</i>	..	..	..	..	..	Scan Austral East Asiatic Shipping Line
<i>Townsville Trader</i>	..	..	..	..	..	Australian National Line
<i>Triadic</i>	..	..	..	..	..	British Phosphate Commission
<i>Tricolor</i>	..	..	..	..	..	Scan Austral East Asiatic Shipping Line
<i>Wambiri</i>	..	..	..	..	..	W.A. State Shipping Service
<i>Weirbank</i>	..	..	..	..	..	Bank Line Ltd.
<i>Weserdespatcher</i>	..	..	..	..	..	Nauru Pacific Shipping Line
<i>Yarra River</i>	..	..	..	..	..	Australian National Line

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# CANADA (Information dated 1.3.77)

NAME OF VESSEL	OWNER/MANAGER
<b>Selected Ships:</b>	
<i>Achatina</i> .. .. .	Shell Canada Ltd.
<i>Achilles</i> .. .. .	Ocean Transport & Trading Ltd.
<i>Alert</i> .. .. .	Government of Canada
<i>Allunga</i> .. .. .	Australian National Line
<i>Antenor</i> .. .. .	Ocean Fleets Ltd.
<i>Baffin</i> .. .. .	Government of Canada
<i>Bayfield</i> .. .. .	Government of Canada
<i>Bluenose</i> .. .. .	Canadian National Railway
<i>Camsell</i> .. .. .	Government of Canada
<i>Canberra</i> .. .. .	P. & O. Lines Ltd.
<i>Canmar Explorer</i> .. .. .	Canadian Marine Drilling Co.
<i>Canmar Explorer III</i> .. .. .	Canadian Marine Drilling Co.
<i>Cape Breton Highlander</i> .. .. .	Leitch Transportation Ltd.
<i>Cape Grenville</i> .. .. .	Anglo-Canadian Shipping Co.
<i>Cape Harrison</i> .. .. .	Government of Canada
<i>Cardiff City</i> .. .. .	Sir William Reardon-Smith & Sons Ltd.
<i>Chebucto</i> .. .. .	Government of Canada
<i>Cygnus</i> .. .. .	Government of Canada
<i>Dawson</i> .. .. .	Government of Canada
<i>D'Iberville</i> .. .. .	Government of Canada
<i>Dilkara</i> .. .. .	ACTA Pty Ltd.
<i>Dumurra</i> .. .. .	Ocean Transport & Trading Ltd.
<i>Fort Kamloops</i> .. .. .	Canadian Pacific Steamships Ltd.
<i>Frobisher Transport</i> .. .. .	Federal Commerce & Navigation Co. Ltd.
<i>G.B. Reed</i> .. .. .	Government of Canada
<i>Gulf Canada</i> .. .. .	Gulf Canada Ltd.
<i>Gulf Gatineau</i> .. .. .	Gulf Canada Ltd.
<i>H1060</i> .. .. .	Kent Lines Ltd.
<i>H1070</i> .. .. .	Kent Lines Ltd.
<i>H. R. MacMillan</i> .. .. .	Canadian Pacific Steamships Ltd.
<i>Harfleet</i> .. .. .	J. & C. Harrison Ltd.
<i>Harfleur</i> .. .. .	J. & C. Harrison Ltd.
<i>Hector</i> .. .. .	Ocean Fleets Ltd.
<i>Hudson</i> .. .. .	Government of Canada
<i>Irving Glen</i> .. .. .	Kent Lines Ltd.
<i>Island Princess</i> .. .. .	Princess Cruises
<i>Isia</i> .. .. .	Stag Lines Ltd.
<i>J. E. Bernier</i> .. .. .	Government of Canada
<i>J. V. Clyne</i> .. .. .	Canadian Pacific Steamships Ltd.
<i>John A. MacDonald</i> .. .. .	Government of Canada
<i>John Cabot</i> .. .. .	Government of Canada
<i>Labrador</i> .. .. .	Government of Canada
<i>Limnos</i> .. .. .	Government of Canada
<i>London Pride</i> .. .. .	London Shipowning Co. Ltd.
<i>Lord Selkirk II</i> .. .. .	Venture Manitoba Tours Ltd.
<i>Louis S. St. Laurent</i> .. .. .	Government of Canada
<i>Maxwell</i> .. .. .	Government of Canada
<i>Montcalm</i> .. .. .	Government of Canada
<i>N. B. McLean</i> .. .. .	Government of Canada
<i>Nordpol</i> .. .. .	Norden Steamship Co. Ltd.
<i>N. R. Crump</i> .. .. .	Canadian Pacific Ships Ltd.
<i>Nahidik</i> .. .. .	Government of Canada
<i>Namoo</i> .. .. .	Government of Canada
<i>Norman McLeod Rogers</i> .. .. .	Government of Canada
<i>Oriana</i> .. .. .	P. & O. Lines Ltd.
<i>Pacific Logger</i> .. .. .	Canadian Pacific Ships Ltd.
<i>Pacific Princess</i> .. .. .	P. & O. Lines Ltd.
<i>Pariseau</i> .. .. .	Government of Canada
<i>Petrel V</i> .. .. .	Government of Canada
<i>Phosphore Conveyor</i> .. .. .	Leitch Transportation Ltd.
<i>Princess of Acadia</i> .. .. .	Canadian Pacific Ships Ltd.
<i>Queen of Prince Rupert</i> .. .. .	British Columbia Ferries
<i>Sedco H</i> .. .. .	Southeastern Commonwealth Drilling Ltd.
<i>Silvercove</i> .. .. .	Silver Lines Ltd.
<i>Sir Humphrey Gilbert</i> .. .. .	Government of Canada
<i>Sir William Alexander</i> .. .. .	Government of Canada
<i>St. Lawrence Navigator</i> .. .. .	Leitch Transportation Ltd.
<i>St. Lawrence Prospector</i> .. .. .	Leitch Transportation Ltd.
<i>Star Boxford</i> .. .. .	Star Shipping Ltd.
<i>Sun Princess</i> .. .. .	P. & O. Lines Ltd.
<i>T. Akasaka</i> .. .. .	Canadian Pacific Steamships Ltd.
<i>Temple Inn</i> .. .. .	Scottish Ship Management
<i>Thomas Carleton</i> .. .. .	Government of Canada
<i>Thorshope</i> .. .. .	Thor Dahl Lines
<i>Thorsriver</i> .. .. .	Thor Dahl Lines
<i>Thorstrem</i> .. .. .	Thor Dahl Lines
<i>Thorswage</i> .. .. .	Thor Dahl Lines
<i>W. C. Van Horne</i> .. .. .	Canadian Pacific Steamships Ltd.
<i>Westocean</i> .. .. .	Jardine Matheson Ship Management
<i>Wild Flamingo</i> .. .. .	P. & O. Lines Ltd.

## Auxiliary Ships:

Canada has 82 ocean-going Auxiliary Ships and 72 Auxiliary Ships operating on the Great Lakes and Inland Waters.

# NEW ZEALAND (Information dated 1.3.77)

NAME OF VESSEL	OWNER/MANAGER
<b>Selected Ships:</b>	
<i>Act 3</i> .. .. .	Blue Star Port Line
<i>Act 4</i> .. .. .	Blue Star Port Line
<i>Act 5</i> .. .. .	Blue Star Port Line
<i>Aotea</i> .. .. .	Container Fleets (N.Z.) Ltd.
<i>Athel Viscount</i> .. .. .	Union Steam Ship Co. N.Z. Ltd.
<i>Blue Whale</i> .. .. .	Marine Offshore Construction
<i>Bulkness</i> .. .. .	Shipping Corporation of N.Z.
<i>Coastal Ranger</i> .. .. .	Shipping Corporation of N.Z.
<i>Coastal Trader</i> .. .. .	Shipping Corporation of N.Z.
<i>Erne</i> .. .. .	Union S.S. Co. Ltd.
<i>Holmdale</i> .. .. .	Union S.S. Co. Ltd.
<i>James Cook</i> .. .. .	N.Z. Government (Fisheries)
<i>John Wilson</i> .. .. .	Tarakohe Shipping Co. Ltd.
<i>Karepo</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Karetu</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Kotuku</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Kuaka</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>La Bonita</i> .. .. .	Reef Shipping Co. N.Z. Ltd.
<i>Ligar Bay</i> .. .. .	Tarakohe Shipping Co. Ltd.
<i>Lorena</i> .. .. .	Shipping Corporation of N.Z.
<i>Luhesand</i> .. .. .	Omega Shipping Co.
<i>Maheno</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Marama</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>N.Z. Aorangi</i> .. .. .	Shipping Corporation of N.Z.
<i>N.Z. Waitangi</i> .. .. .	Shipping Corporation of N.Z.
<i>Ngahere</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Ngakuta</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Ngapara</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Penrod 74</i> .. .. .	Hunt International Petroleum Co.
<i>Tangaroa</i> .. .. .	N.Z. Government (Oceanography)
<i>Titoki</i> .. .. .	Anchor Dormon Ltd.
<i>Toa Moana</i> .. .. .	Shipping Corporation of N.Z.
<i>Totara</i> .. .. .	Anchor Dormon Ltd.
<i>Tui Cakau</i> .. .. .	Pacific Line
<i>Union Auckland</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Union Australia</i> .. .. .	Maritime Carriers Ltd.
<i>Union Hobart</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Union Melbourne</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Union New Zealand</i> .. .. .	Maritime Carriers Ltd.
<i>Union Rotorua</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Union South Pacific</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Union Sydney</i> .. .. .	Union S.S. Co. N.Z. Ltd.
<i>Union Trans Tasman</i> .. .. .	Maritime Carriers Ltd.
<i>Valetta</i> .. .. .	British Phosphate Commission
<i>Westport</i> .. .. .	N.Z. Cement Holdings Ltd.
<b>Supplementary Ships:</b>	
<i>Arahanga</i> .. .. .	N.Z. Railways
<i>Aramoana</i> .. .. .	N.Z. Railways
<i>Arami</i> .. .. .	N.Z. Railways
<i>Aratika</i> .. .. .	N.Z. Railways

## Auxiliary Ships:

New Zealand also has a fleet of 17 Auxiliary Ships currently reporting.



# HONG KONG (Information dated 16.3.77)

NAME OF VESSEL	MASTER	OBSERVING OFFICERS	SENIOR RADIO OFFICER	OWNER/MANAGER
<i>American Main</i>	R. S. Manginsay	C. C. Espino, C. C. Valledor, N. B. Maquilling	R. M. Benoman	United States Lines
<i>American Ming</i>	E. J. Uyeke	A. N. Regapi, T. B. Dalaga III, R. T. Tumagan	M. P. Taniagra	United States Lines
<i>American Mist</i>	F. C. Carlos	E. D. Tayong, A. C. Forjes, L. A. Paulin	B. Suansing	United States Lines
<i>Cape St. Mary</i>	H. M. Chan	Y. S. Kwok, M. S. Ngau	Li Kim-hung	Agriculture & Fisheries Dept, H.K. Govt.
<i>Cardross</i>	Chai Kong Ping	Sung Yim Wing, Cheung Wan Wah, Cheung Yuen Tin	Lueng Ki On	Kian Hin Leong Enterprises Ltd.
<i>Carl Offerten</i>	R. H. W. Feldtmann	A. S. Larsen, F. Nissen, E. Roether	G. Brinkmann (Mrs.)	Jebson & Co. Ltd.
<i>Chengiu</i>	R. J. Shipp	P. D. Clarke, Li Yun Lung, W. G. Pierce	Mok Hon Ming	The China Navigation Co. Ltd.
<i>Coral Princess</i>	M. T. Anderson	D. W. Fellowes, M. R. Stanton, D. B. Cooper, B. W. Burton	Marr Zimmon	The China Navigation Co. Ltd.
<i>Eriskay</i>	A. J. Gregg	G. D. Rutherford, R. A. Lowe, Wong Kun Lun	Ho Tat Shing	The China Navigation Co. Ltd.
<i>Foh Kim</i>	S. Steele	Chan Kwong Yue, M. E. Sobhan, G. C. Pianta	Tsui Wai Leung	Hong Kong Borneo Shipping Co. Ltd.
<i>Haldis</i>	A. Sjoberg	T. Egeiland, A. Torjesen, S. Holland	Shui Man Wong	Thoresen & Co. Ltd.
<i>Hallvard</i>	N. Ø. Wilhelmssen	P. Tolgenabakk, H. Sato, A. Strand	Kwong Yin Lai	Thoresen & Co. Ltd.
<i>Hermida</i>	J. Rivrud	R. Nilsen, K. Spusoy, K. Øi	Kwong Fai Tsang	Thoresen & Co. Ltd.
<i>Hoi Kung</i>	A. Vespestad	K. Neheim, J. Kvithyll, J. Holme	E. Storeund	Karsten Larsen & Co. (H.K.) Ltd.
<i>Hupoh</i>	G. A. Drewery	A. D. Hotchkiss, Lo Sai Shing, M. A. M. Jennings, R. Noble	Li Yan Lam	The China Navigation Co. Ltd.
<i>Kwanguing</i>	B. Keeble	S. J. Barber, N. F. Drake, K. Ienraoi, P. Midgley	Fan Kwan Wah	The China Navigation Co. Ltd.
<i>Maersk Tempo</i>	I. G. Nielsen	E. Jensen, J. E. Østerballe, Carl Madsen	Rita Quist (Miss)	Maersk Line (H.K.) Ltd.
<i>Manoloverett</i>	Ariston D. Roxas	F. F. Tubojan, I. G. Daco, A. N. Marquez	E. G. Santos	Everett Steamship Corporation S/A
<i>Mui Kim</i>	I. Keates	A. G. Paul, Y. F. Vaz, L. Dordas	Chau Wing	Hong Kong Borneo Shipping Co. Ltd.
<i>Oriental Mariner</i>	F. G. Dagger	B. W. Yeung, Y. K. Ip	C. Y. Leung	Island Navigation Corporation Ltd.
<i>Pabloverett</i>	C. G. Villaneuva	E. G. Bejaraco Jr, D. C. Pinar, R. F. Zarate	A. Caminong	Everett Steamship Corporation S/A
<i>Poyang</i>	I. B. H. J. Aldiss	R. P. Fairbrother, H. W. Thomas, M. J. O. Pemberton	J. J. Stone	The China Navigation Co. Ltd.
<i>Sinkiang</i>	I. H. Gomersall	B. A. Cushing, A. D. Loynd, Yip Siu Keung	Ho Kwok Chan	The China Navigation Co. Ltd.
<i>Star Alcione</i>	Bror Carlsson	C. Magnusson, L. E. Borjesson, F. E. Bolling	R. Reslow	Everett Steamship Corporation S/A
<i>Star Aldebaran</i>	G. R. Henriksson	S. Waharrom, M. Bjorkman, K. Kereby	S. L. B. Davidsson	Everett Steamship Corporation S/A
<i>Star Altair</i>	B. Robertson	B. G. Lydig, B. I. Viksten, L. Svardendahl	L. Ra. Petersson	Everett Steamship Corporation S/A
<i>Star Antares</i>	J. Malmberg	K. H. Kristiansson, M. K. E. Hensel, B. A. Marklund	S. I. Adilfsson	Everett Steamship Corporation S/A
<i>Star Bellatrix</i>	B. G. Strandberg	C. J. Roberts, L. Hodgson, M. N. Smith, D. C. Fickling	T. B. Ruden	Everett Steamship Corporation S/A
<i>Strathcarrol</i>	B. S. C. Mordaunt	R. O. M. Wilson, D. J. Peck, S. M. Robinson, R. C. Bradbury	E. A. Rogers	Mackinnon Mackenzie Ltd.
<i>Strathcarron</i>	L. Seddon	S. P. Woo, W. K. Yip	T. C. Baldwin	Mackinnon Mackenzie Ltd.
<i>Taichungshan</i>	K. J. Ko	C. C. Wong, K. H. Cheng, K. Kumar	C. Tam	Shun Cheong S.N. Co. Ltd.
<i>Taihookshan</i>	T. W. Duncan	K. C. Cheng, M. S. Ip, W. M. Chung	C. Mu	Shun Cheong S.N. Co. Ltd.
<i>Tailungshan</i>	N. B. Manning	K. H. Wong, T. C. Yeung, Y. S. Ng	S. Chong	Shun Cheong S.N. Co. Ltd.
<i>Taipoonsok</i>	H. K. Fung	M. G. Vedpathak, R. J. Paes, M. S. Babu	Y. L. Chuk	Shun Cheong S.N. Co. Ltd.
<i>Tatra</i>	P. M. Abraham	J. Parakal, S. Palat, Myint Soe	V. Nunes	Barber Ship Management Ltd.
<i>Thoben</i>	W. G. Kaisare	L. G. Torres, J. C. Gelvero, F. P. Anchuello	S. A. Choksi	Barber Ship Management Ltd.
<i>Thomaseverett</i>	J. S. Vapor	G. R. Kellar, A. A. N. Rodrigues, J. Singh	P. B. Salvador	Everett Steamship Corporation S/A
<i>Towada</i>	I. M. Narang	M. S. Jacob, R. Manghnam, A. O. W. Lobo	S. S. Parkhi	Barber Ship Management Ltd.
<i>Toyo</i>	J. M. Furtado	K. D. Ketkar, M. J. Nazareth, T. M. Win	D. P. Santhanam	Barber Ship Management Ltd.
<i>Tulane</i>	J. L. Tucker		K. S. Doshi	Barber Ship Management Ltd.

# SINGAPORE (Information dated 15.3.77)

NAME OF VESSEL	MASTER	OBSERVING OFFICERS	RADIO OFFICER	OWNER/AGENT
<i>Golar Buatan</i>	F. P. Narareth	A. Rehman, W. A. Burton, R. K. Saidha	R. G. Braganza	Wallem Shipping (Singapore) (Pte.) Ltd.
<i>Golden City</i>	M. T. R. Turner	J. H. R. Pinontoan, R. Katiandagho, Ho Kee Quat	U. Aung Naing	Guan Guan Shipping (Pte.) Ltd.
<i>Golden Lion</i>	P. W. Seal	G. Yopie, Goh Kan Tiong	A. C. Lubis	Guan Guan Shipping (Pte.) Ltd.
<i>Golden Season</i>	S. E. Merchant	F. Sumampouw, Niaung Hla Min, Koko Win	Ng Ba Cho	Guan Guan Shipping (Pte.) Ltd.
<i>Keningau</i>	E. E. Fenwick	Gok Toh Sek	K. A. Menon	Straits Shipping (Pte.) Ltd.
<i>Kimanis</i>	R. C. Barker	Tan Kim Leong	Pang Ting Kwai	Straits Shipping (Pte.) Ltd.
<i>Kim Ann</i>	R. A. Frazer	A. Hafid Thahir, Abdul Mwin Lida, Foo Chek Neng	Gulam Nabi	Guan Guan Shipping (Pte.) Ltd.
<i>Kim Hock</i>	J. T. Walker	P. Parapat, D. Simarmata, D. A. H. H. Manwung	Muang Kyang	Guan Guan Shipping (Pte.) Ltd.
<i>Kunak</i>	G. Coupar	Lee Siu	Tan Chong Huan	Straits Shipping (Pte.) Ltd.
<i>Neptune Agate</i>	D. E. Blazey	J. A. Pereria, Wong Kim Seng, Mohd. Silaiman	Zainurain Mid Shah	Neptune Orient Lines (Pte.) Ltd.
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