FILE

INTERNAL DOCUMENT 252

I.O.S.

DETAILED STUDY FOR "SHIPS OF OPPORTUNITY" PROGRAMME TO COLLECT EXPENDABLE BATHYTHERMOGRAPH OBSERVATIONS IN THE NORTH ATLANTIC

Internal Document 252

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DETAILED STUDY FOR "SHIPS OF OPPORTUNITY" PROGRAMME TO COLLECT EXPENDABLE BATHYTHERMOGRAPH OBSERVATIONS IN THE NORTH ATLANTIC

MOD CONTRACT NO. NUW 62B/1941

FINAL REPORT 28.1.86

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Appendices

The Selection of Merchant Ships for transocean oceanographic observations

A.E. Fisher, W.J. Gould

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An investigation of how ship of opportunity lines can be selected has been undertaken at the Institute of Oceanographic Sciences in recent months. The study has been confined to the North and South Atlantic.

To obtain data relevant to an improved understanding of upper ocean thermal structure the prime lines of interest are trans-ocean passages. The problem therefore posed was how, without detailed knowledge of international trade patterns, information on shipping links between the continents on either side of the Atlantic could be obtained. Another objective was the selection of regular trade links/routes, to give repeated lines of observation preferably by the same vessel shuttling across the Atlantic.

The line of investigation taken, was to approach Lloyds Registry of Shipping in London. This revealed that within the computer database of the Shipping Information Services of Lloyds are details over 30,000 merchant vessels currently engaged in ocean-going world trade. (Further information contained within the Information Services - Fact file under the heading of Shipping Movement services (Appendix 1) indicated the services available to clients of the Information Services.) A visit was arranged to Lloyds Shipping Information Services at Sheepen Place, Colchester, Essex where our interests were explained to Mr Roland Ellen, the services Business Manager. A request was made to extract the following:-

a) Movements of Vessels which have called at or are bound for specific ports or geographic areas and b) Consecutive movements of vessels between

specific ports or geographic areas in order to pin point the ships of particular interest to the project. The subsequent task of locating the individual owners of the vessels could be readily obtained from Lloyd's Maritime Directory.

Accordingly the task of listing "Vessels completing Transatlantic passages on a regular basis (at least 4 passages during the year) for the year 1984", was placed with Lloyds SIS. The information requested was as follows.

1) Name of the vessel
2) Number of crossings made during the year 1984
3) Ports of sailing
4) Arrival points
5) Name of owners
6) Type of vessel. Principal dimensions, tonnage, service speed and flag.

Note questions 5 and 6 can be answered by reference to Lloyds Maritime Directory.

The geographical areas of interest requested were

a) Sailings to and from Atlantic ports of Europe and Scandinavia (Murmansk - Gibraltar) for ports in Iceland, Greenland, Canada, USA, Caribbean and S. American ports,
b) Sailings to and from West African ports (Tangier - Capetown) for ports on the Eastern seaboard of North and South America including the Caribbean.

Lloyds were requested to exclude vessels of the Eastern Block Countries.

Lloyds SIS made a charge of 960 pounds sterling plus VAT and dispatch

costs. The request was completed within 15 working days of receipt of order.

The computerised print-out of information consisted of 1029 pages and a copy of Lloyds Directory was received. A preliminary study of this print-out shows that approximately 200 vessels regularly (more than 8 passages) completed transatlantic passages during the year. A plot of these tracks (fig. 1) reveals the routes regularly covered. From this rough plot it is possible to pin point tracks of particular interest.

Case Study

In order to assess the value of the information acquired from Lloyds S.I.S. a case study was made by attempting the selection of ships covering the N E Atlantic and Norwegian Sea areas. The objective was to identify a small number of ships that gave extensive geographical coverage of the selected areas. The following paragraphs summarise the information gleaned from the Lloyds S.I.S. on five Icelandic vessels which we have selected.

Selection of Ships of Opportunity for northern XBT lines (Norwegian Sea and N.E. Atlantic)

A selection has been made from the Lloyds Register data base. The selection criteria used are

(a) the ships should run throughout the year

(b) they should spend much of their time on passage legs over deep water.

(c) they should give coverage of oceanographically interesting areas.

Five ships have been identified as fulfilling these criteria.

(1) SELNES GRT 3645 DW 5699 Owners NESSKIP

Working predominantly between Iceland and ports along the Norwegian coast. Provides crossings of southern Norwegian Sea.

(2) SUDURLAND)
) GRT 2333 DW 2528 Owners NESSKIP
(3) VESTURLAND)

Both ships worked between a variety of Icelandic ports and ports in Norway, Svalbard (on one occasion) and on numerous occasions between Iceland and ports on the Iberian peninsula. (There may be occasions on which return trips from Iberia are made coastwise but passage times suggest that at least some voyages were made direct from Iceland to Iberia).

(4) RANGA GRT 1516 Dw 2873 Owners HAFSKIP

This Ro Ro vessel works year-round between Iceland (Reykjavik) and alternately Ipswich and Hamburg. It could provide very regular data along sections lying just south of the Iceland-Faroe ridge.

(5) SKAFTA GRT 1506 DW 2873 Owners HAFSKIP

Possibly sister ship of the RANGA working between Iceland and Danish ports. Presumably would follow the same track as RANGA over deep water areas.

All vessels are registered in Iceland are of medium size and have passage speeds of 10-12kts. RANGA and SKAFTA are part of the Icelandic VOF, SUDURLAND, VESTURLAND and SELNES make occasional meteorological observations.

Other possible vessels in the area are

(a) enhancement of the NIVI ITTUK line or the use of some of the many other vessels plying between Denmark and Greenland

(b) the selection of ships engaged in the summer coal trade between Svalbard and (mostly) Norwegian ports. These have not been selected by the present interrogation of the Lloyds data set.

Approximate tracks covered by the five ships selected above are shown in the the attached figures.

Scientific rationale

The ocean areas covered by these ship tracks are those in which upper ocean thermal structure varies markedly from place to place according to the combined influences of ocean circulation, bottom topography and meteorological forcing. They are also those which are involved in the in- and out-flows between the Atlantic ocean and the southern parts of the Norwegian Sea. Observations using XBT probes would enable spatial and temporal changes in thermal structure to be better understood. It is known that these changes occur on a range of time scales from a very few days (~4) to interannual variability (e.g. the 1970's anomaly which produced large changes in both salinity and temperature at positions in the N. Atlantic and Norwegian Sea). The energetic short period changes known to occur in the Faroe-Shetland channel and across the Iceland-Faroe front will not be adequately resolved by observations of the type proposed here but irregular sampling would enable a statistical picture of variability to be produced. The longer period changes will be better sampled (provided the observational program is carried out for sufficient time).

The major cost of the exercise will be in the provision of XBT probes and these costs will almost certainly constrain the overall scope of the

exercise. Given that some ships will be instrumented with XBT equipment it is worthwhile to consider whether, for minimal additional cost, other observations can be made which will enhance the scientific value of the overall project. Measurements which come to mind are 1) Sea surface salinities from samples taken from engine room intakes 2) Sea surface temperatures (which are needed to verify XBT surface values) 3) Currents from ships navigation.

1) and 2) These are certainly worth pursuing on at least some of the vessels chosen. They would give immediate warning of salinity anomaly events and would greatly enhance the interpretation of the XBT data.

3) Accurate navigation is of importance in the plotting and interpretation of the XBT observations from areas in which spatial variability is large and rapid. It is most unlikely that the chosen vessels will have navigational aids other than Decca or LORAN C. Decca relies on the Officer of the Watch to convert coordinates to lat and long and experience shows that small scale charts are often used which further degrades the navigational data. Modern LORAN C sets have direct conversion to lat and long and might provide the best navaid for vessels working the northernmost lines.

Consideration should perhaps be given to the installation of Transit Sat Nav sets to some of these vessels. When interfaced to the ship's log these would provide some data on surface currents which would further enhance the XBT and SST and SSS data.

Project continuation

Informal contact was made with the Icelandic shipping companies concerned via Dr S A Malmberg of the Icelandic Fisheries Institute in Reykjavik. He confirmed that the lines were likely to be continued for the

foreseeable future and that there would be no strong objection from the shipping companies to their vessels undertaking this work. The approaches were made verbally and thus did not obtain any firm undertaking from the shipping lines. Since the vessels were part of the Icelandic V.O.F. an approach was also made to the Icelandic Meteorological Service and a satisfactory reply obtained (copies of the letters are attached).

No formal approaches have been made to the shipping lines since it now appears that neither probes nor recorders are likely to be available for the continuation of this project. It was thought inadvisable to make contact with the shipping lines until there was a sufficiently high probability of the project being able to continue.

The Canadians already run an XBT line between Halifax N.S. and Reykjavik and the attached letter from Dr F Dobson summarises their experience. It suggests that the extension to include other Icelandic ships and companies might be successful.

APPENDIX 1.

LLOYD'S
Shipping Information Services©
Lloyd's Register of Shipping–Lloyd's of London Press Ltd.
4 Lloyds Avenue. London EC3N 3ED England. Telephone: 01-709 9166 Extension: 459 or 660 Telex: 888379
Answer back code: LR LON G

SHIPPING MOVEMENTS SERVICES

Comprehensive, up-to-date and accurate information is the key to correct decision making. This is especially true of today's shipping industry with its increasingly fierce competition and the growth in international maritime legislation.

Lloyd's Shipping Information Services (LSIS) represents a joining together of the information resources of two of the world's leading shipping authorities, Lloyd's Register of Shipping and Lloyd's of London Press Ltd. The result is a combined source of shipping intelligence unmatched by any other organisation, or organisations, available today.

This sheet describes some of the shipping movement services provided by Lloyd's Shipping Information Services.

VOLUME AND RANGE OF INFORMATION STORED

The computer system details over 30,000 merchant vessels currently engaged in ocean going world trade.
The system is updated almost 6000 times each day, seven days a week, of which over 4000 entries represent fresh movement information.
In a single year over 1½ million movements are recorded by the system, and voyage histories are available from the computer back to January 1, 1976.
In addition to movements of vessels, information is maintained on:

- Previous names of the vessel
- Flag
- Classification society
- Vessel type
- Gross, net and deadweight tonnage
- Indication of owner or manager

The Lloyd's Register Identity number is also assigned to vessels,which allows the movement data to be supplemented with information from other LSIS files.

SERVICES AVAILABLE

Services are available on a regular basis at periods to suit the client or they can be provided on an *ad hoc* basis.

SELECTION CRITERIA

Information is selected according to criteria defined by the client. Selections currently available include one or a combination of:

- Movements of a list of specific vessels
- Movements of vessels of a particular flag
- Movements of vessels within specified tonnage ranges
- Movements over a given period
- Updates of fresh information
- Movements of vessels by vessel type
- Movements of vessels which have called at or are bound for specific ports or geographic areas
- Consecutive movements of vessels between specific ports or geographic areas.

OUTPUT MEDIA

The selected data can be output in the form of computer readable magnetic tape, cassettes. floppy disks and diskettes to enable clients to perform their own analysis. With regular updates of fresh data, clients can maintain their own database of ships' movements for enquiry or analysis.
Alternatively, selected data can be output in a variety of printed reports.

REPORT OPTIONS

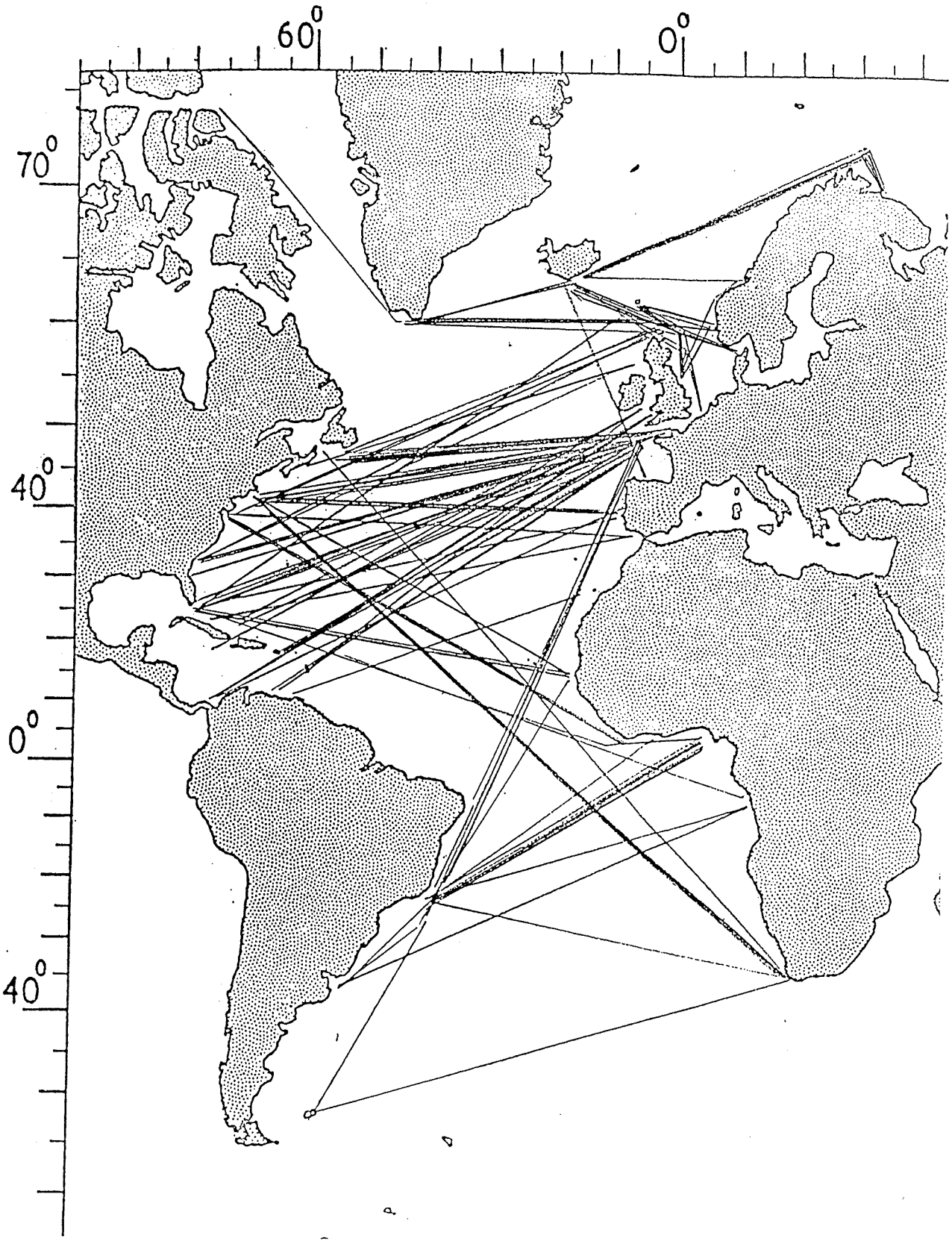
There are two basic formats of report available. These are a statistical summary type report and a vessel name detail type of report.
The summary type report shows totals of movements or totals of vessels, broken down by size and flag or year of build, within vessel type, within specified areas or ports, for specified time periods.
The vessel level detail type of report shows each vessel's name and particulars together with the ports' names and the dates of the recorded movements. Such reports can be arranged by port or as complete or selected itineraries by vessel name. Within these two basic sequences, the data can be sorted on the vessel characteristics shown.

TYPES OF SERVICE CURRENTLY PROVIDED TO SUBSCRIBERS

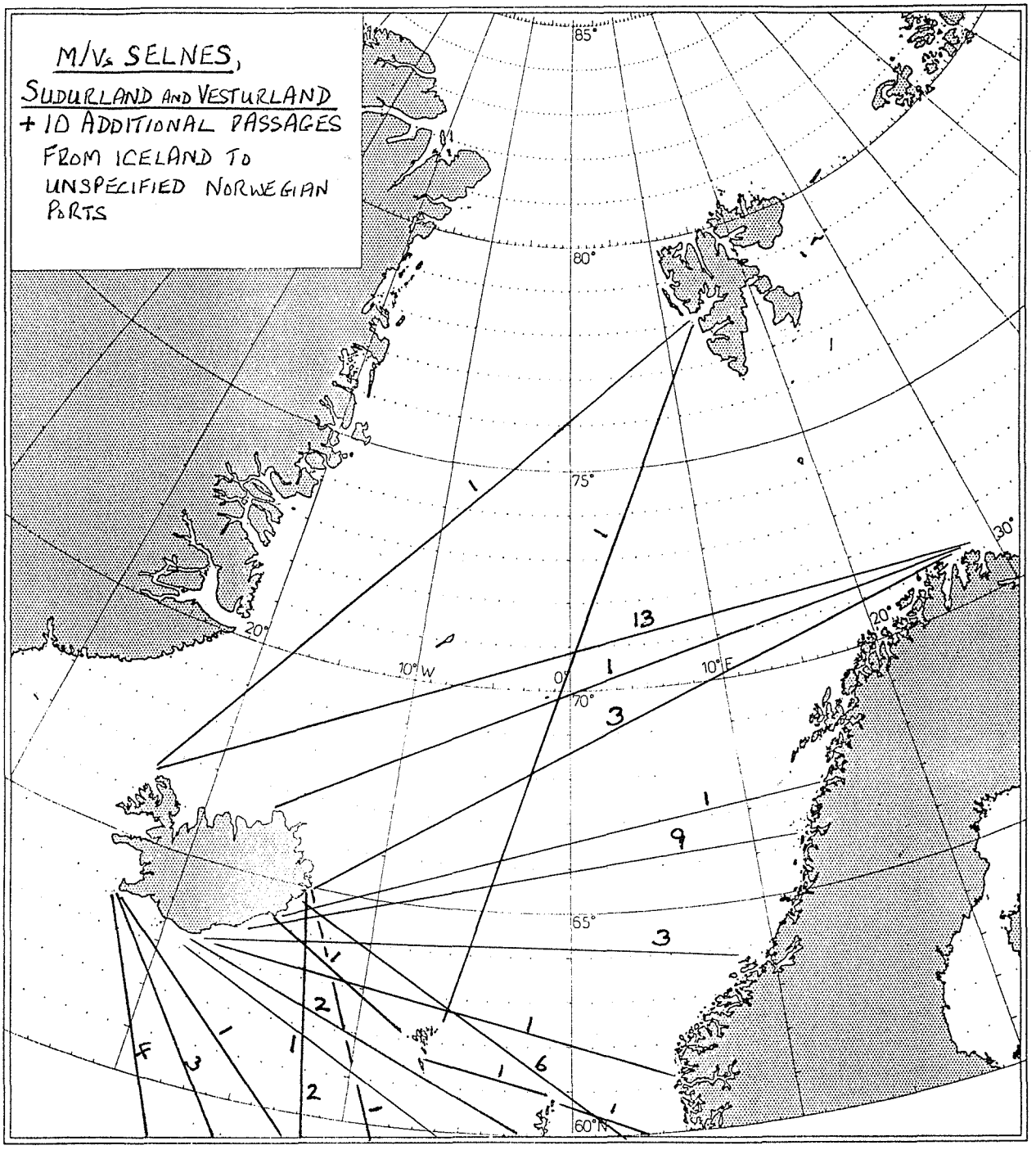
Monthly magnetic tapes of all fresh tanker movements.
Monthly printout of tanker movements and deadweight tonnage shipped from oil exporting areas.
Weekly details of vessels bound for a certain area.
Annual vessel histories of dry cargo vessels of certain flags.
Movements of vessels in a particular area.
Quarterly reports of gas tanker movements.
Statistical summaries showing the distribution of ships by geographic area, vessel type, flag and size.

DELIVERY

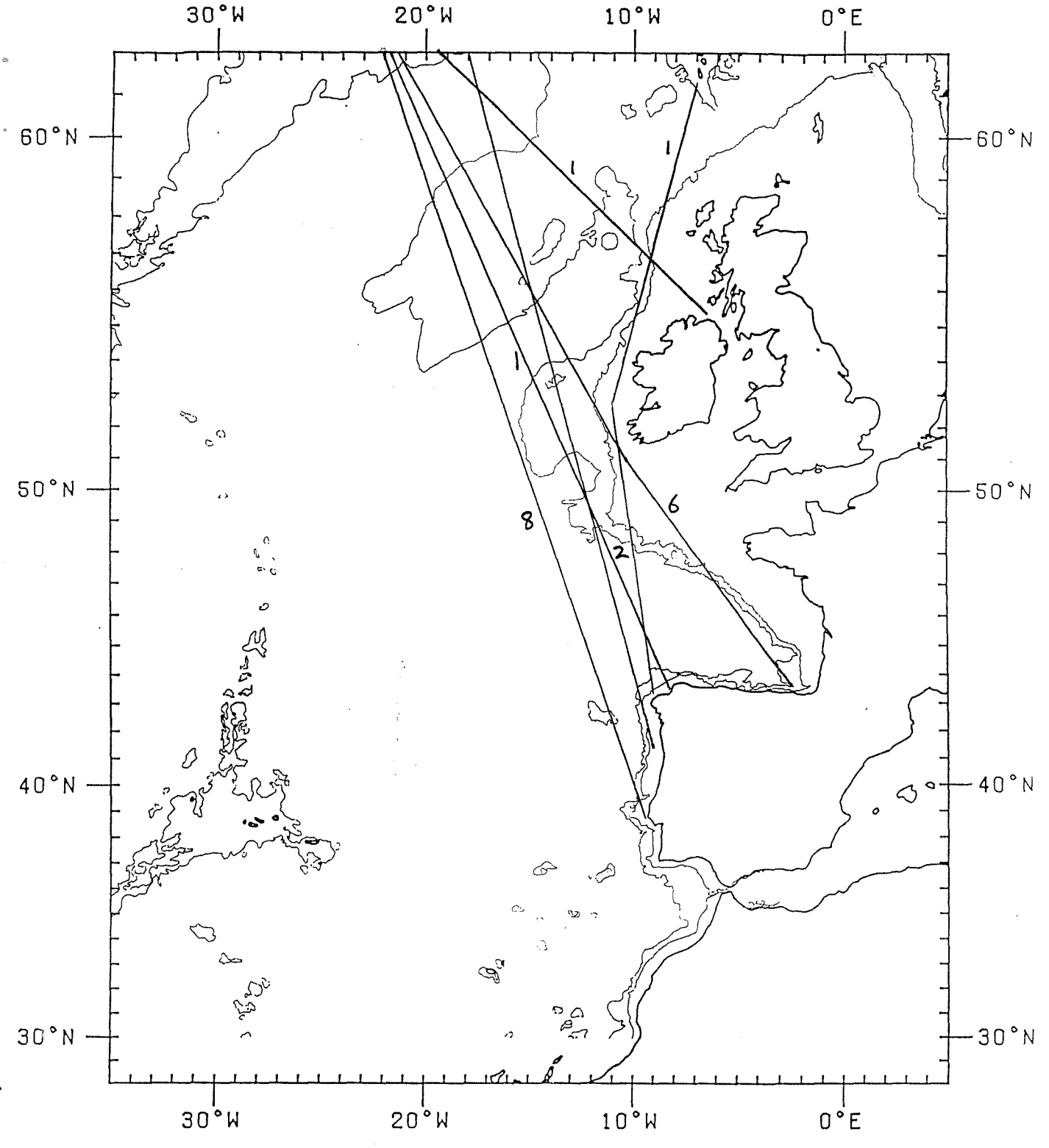
Information will normally be despatched within seven days of confirmation of order, dependent upon the complexity of the enquiry.



SUMMARY OF ATLANTIC SHIPPING ROUTES FROM LLOYDS SIS



NUMBER OF NORWEGIAN SEA PASSAGES DURING 1984



NE ATLANTIC PASSAGES IN 1984 M/Vs SELNES, SUÐURLAND, VESTURLAND

(V 1) SELNES

[GR= 3645] IC [UVN=00051355] [NESSKIP]
[DW= 5699] 75 [LRN=07341685] [ ]

NORWAY	AR	[ ]	--*--	[3]	[1]	FROM	GRUNDARTANGI 28/DEC
NORWAY	SD	[ ]	--*--	[3]	[1]	FOR	GRUNDARTANGI 8/JAN
NORWAY	AR	[ ]	--*--	[3]	[1]	FROM	GRUNDARTANGI 9/JAN
NORWAY	SD	[ ]	--*--	[3]	[1]	FOR	GRUNDARTANGI 21/JAN
MO I RANA	AR	[ ]	27-JAN-84	[330]	[1]	FROM	GRUNDARTANGI 23/JAN
MO I RANA	SD	[ ]	28-JAN-84	[330]	[1]	FOR	GRUNDARTANGI 31/JAN
LEIRPOLLEN	AR	[ ]	--*--	[176]	[1]	FROM	GRUNDARTANGI 1/FEB
LEIRPOLLEN	SD	[ ]	--*--	[176]	[1]	FOR	GRUNDARTANGI 12/FEB
LEIRPOLLEN	AR	[ ]	--*--	[176]	[1]	FROM	GRUNDARTANGI 13/FEB
LEIRPOLLEN	SD	[ ]	--*--	[176]	[1]	FOR	GRUNDARTANGI 2/MAR
MO I RANA	AR	[ ]	7-MAR-84	[330]	[1]	FROM	GRUNDARTANGI 3/MAR
MO I RANA	SD	[ ]	8-MAR-84	[330]	[1]	FOR	GRUNDARTANGI 11/MAR
THAMSHAMN	AR	[ ]	19-MAR-84	[530]	[1]	FROM	REYKJAVIK 12/MAR
THAMSHAMN	SD	[ ]	--*--	[530]	[1]	FOR	REYKJAVIK 31/MAR
ROTTERDAM	AR	[ ]	8-APR-84	[670]	[2]	FROM	REYKJAVIK 4/APR
ANTWERP	SD	[ ]	26-APR-84	[1170]	[2]	FOR	GRUNDARTANGI 9/MAY
LEIRPOLLEN	AR	[ ]	--*--	[176]	[1]	FROM	GRUNDARTANGI 10/MAY
LEIRPOLLEN	SD	[ ]	--*--	[176]	[1]	FOR	GRUNDARTANGI 19/MAY
LEIRPOLLEN	AR	[ ]	--*--	[176]	[1]	FROM	GRUNDARTANGI 20/MAY
LEIRPOLLEN	SD	[ ]	--*--	[176]	[1]	FOR	GRUNDARTANGI 29/MAY
KIRKENES	AR	[ ]	--*--	[150]	[1]	FROM	GRUNDARTANGI 30/MAY
KIRKENES	SD	[ ]	--*--	[150]	[1]	FOR	GRUNDARTANGI 8/JUN
KIRKENES	AR	[ ]	--*--	[150]	[1]	FROM	GRUNDARTANGI 9/JUN
KIRKENES	SD	[ ]	--*--	[150]	[1]	FOR	GRUNDARTANGI 19/JUN
MO I RANA	AR	[ ]	23-JUN-84	[330]	[1]	FROM	GRUNDARTANGI 20/JUN
MO I RANA	SD	[ ]	26-JUN-84	[330]	[1]	FOR	REYKJAVIK 29/JUN
BODO	AR	[ ]	17-JLY-84	[300]	[1]	FROM	REYKJAVIK 29/JUN
LEIRPOLLEN	SD	[ ]	--*--	[176]	[1]	FOR	GRUNDARTANGI 5/AUG
UDDEVALLA	AR	[ ]	13-AUG-84	[1460]	[1]	FROM	GRUNDARTANGI 7/AUG
UDDEVALLA	SD	[ ]	13-AUG-84	[1460]	[1]	FOR	GRUNDARTANGI 17/AUG
ROTTERDAM	AR	[ ]	23-AUG-84	[670]	[2]	FROM	THORLAKSHOFN 19/AUG
MO I RANA	SD	[ ]	27-AUG-84	[330]	[1]	FOR	REYKJAVIK 31/AUG
THAMSHAMN	AR	[ ]	10-SEP-84	[530]	[1]	FROM	REYKJAVIK 1/SEP
LEIRPOLLEN	SD	[ ]	--*--	[176]	[1]	FOR	GRUNDARTANGI 18/SEP
NORWAY	AR	[ ]	--*--	[3]	[1]	FROM	REYKJAVIK 20/SEP
NORWAY	SD	[ ]	--*--	[3]	[1]	FOR	REYKJAVIK 30/SEP
AAHEIM	AR	[ ]	--*--	[600]	[1]	FROM	REYKJAVIK 1/OCT
MOSJOEN	SD	[ ]	15-NOV-84	[350]	[1]	FOR	GRUNDARTANGI 22/NOV
ROTTERDAM	AR	[ ]	28-NOV-84	[670]	[2]	FROM	THORLAKSHOFN 24/NOV
EMDEN	SD	[ ]	5-DEC-84	[270]	[2]	FOR	REYKJAVIK 16/DEC
NORWAY	AR	[ ]	--*--	[3]	[1]	FROM	GRUNDARTANGI 20/DEC
NORWAY	SD	[ ]	--*--	[3]	[1]	FOR	REYKJAVIK 2/JAN

[V 3] SUDURLAND

[GR= 2333] IC [UVN=00053500] [NESSKIP]
[DW= 2528] 72 [LRN=07208110] [ ]

BILBAO	AR	[ ]	4-JAN-84	[310]	[3]	FROM	KEFLAVIK 29/DEC
LISBON	SD	[ ]	13-JAN-84	[550]	[3]	FOR	REYKJAVIK 20/JAN
RUNCORN	AR	[ ]	25-JAN-84	[1540]	[0]	FROM	REYKJAVIK 22/JAN
STENUNGSUND	SD	[ ]	7-FEB-84	[1480]	[1]	FOR	BREIDDALSVIK 11/FEB
BILBAO	AR	[ ]	29-FEB-84	[310]	[3]	FROM	HAFNARFJORD 23/FEB
LISBON	SD	[ ]	13-MAR-84	[550]	[3]	FOR	VESTMANN ISLANDS 19/MAR
BILBAO	AR	[ ]	10-APR-84	[310]	[3]	FROM	VESTMANN ISLANDS 5/APR
FLEKKEFJORD	SD	[ ]	16-APR-84	[930]	[1]	FOR	SEYDISFJORD 27/APR
AVEIRO	AR	[ ]	24-MAY-84	[530]	[3]	FROM	SEYDISFJORD -/-
DOVER STRAIT	PD E	[ ]	4-JUN-84	[345]	[0]	FOR	SEYDISFJORD 10/JUN
SZCZECIN	AR	[ ]	19-JUN-84	[3460]	[1]	FROM	ESKIFJORD 15/JUN
HELSINGBORG	SD	[ ]	--A--	[1890]	[1]	FOR	REYKJAVIK 11/JLY
AVEIRO	AR	[ ]	1-AUG-84	[530]	[3]	FROM	VESTMANN ISLANDS 26/JLY
LISBON	SD	[ ]	16-AUG-84	[550]	[3]	FOR	REYKJAVIK 22/AUG
FLEKKEFJORD	AR	[ ]	3-SEP-84	[930]	[1]	FROM	REYKJAVIK 31/AUG
HAUGESUND	SD	[ ]	5-SEP-84	[830]	[1]	FOR	GRINDAVIK 9/SEP
FECAMP	AR	[ ]	24-SEP-84	[1740]	[2]	FROM	STODHVAMFJORD 20/SEP
VIANA DO CASTELO	SD	[ ]	9-OCT-84	[500]	[3]	FOR	ESKIFJORD 23/OCT
FLEKKEFJORD	AR	[ ]	--A--	[930]	[1]	FROM	ESKIFJORD 24/OCT
HAUGESUND	SD	[ ]	1-NOV-84	[830]	[1]	FOR	VESTMANN ISLANDS 4/NOV
SHARPNESS	AR	[ ]	19-NOV-84	[1040]	[0]	FROM	SIGLUFJORD 14/NOV

[V 6] VESTURLAND

[GR= 2333] IC [UVN=00053501] [NESSKIP]
[DW=] 72 [LRN=07128370] [ ]

MURMANSK	AR	[ ]	--A--	[140]	[1]	FROM	FASKRUDSFJORD 3/MAR
MURMANSK	SD	[ ]	--A--	[140]	[1]	FOR	BREIDDALSVIK 18/MAR
MOSJOEN	AR	[ ]	--A--	[350]	[1]	FROM	AKUREYRI 24/MAR
MOSJOEN	SD	[ ]	--A--	[350]	[1]	FOR	GRUNDARTANGI 18/APR
LISBON	AR	[ ]	10-MAY-84	[550]	[3]	FROM	GRUNDARFJORD 4/MAY
VIVERO	SD	[ ]	--A--	[420]	[3]	FOR	GRUNDARTANGI 24/MAY
BILBAO	AR	[ ]	11-JUN-84	[310]	[3]	FROM	GRINDAVIK 6/JUN
AVEIRO	SD	[ ]	20-JUN-84	[530]	[3]	FOR	REYKJAVIK 26/JUN
LISBON	AR	[ ]	12-JLY-84	[550]	[3]	FROM	REYKJAVIK 5/JLY
CORUNNA	SD	[ ]	31-JLY-84	[450]	[3]	FOR	THORSHAVN 6/AUG
ADVENT BAY	AR	[ ]	--A--	[30]	[1]	FROM	THORSHAVN 7/AUG
ADVENT BAY	SD	[ ]	--A--	[30]	[1]	FOR	GRUNDARTANGI 16/AUG
BILBAO	AR	[ ]	4-SEP-84	[310]	[3]	FROM	GRUNDARTANGI -/-
CORUNNA	SD	[ ]	16-SEP-84	[450]	[3]	FOR	REYKJAVIK 22/SEP
TRONDHEIM	AR	[ ]	3-OCT-84	[520]	[1]	FROM	REYKJAVIK 25/SEP
PORSGRUNN	SD	[CLD]	2-NOV-84	[1080]	[1]	FOR	HORNAFJORD 6/NOV
BILBAO	AR	[ ]	20-NOV-84	[310]	[3]	FROM	VESTMANN ISLANDS 15/NOV
AALESUND	SD	[ ]	11-DEC-84	[580]	[1]	FOR	REYKJAVIK 14/DEC
MURMANSK	AR	[ ]	--A--	[140]	[1]	FROM	REYKJAVIK 24/DEC
MURMANSK	SD	[ ]	--A--	[140]	[1]	FOR	VOPNAFJORD 5/JAN

INSTITUTE OF OCEANOGRAPHIC SCIENCES

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Brook Road,
Wormley,
Godalming,
Surrey, GU8 5UB

Our Ref. WJG/jmj

Your Ref.

12th November 1985

Mr H Sigtryggsson
Director State Meteorological Service
Bustadavegi 9
105 Reykjavik
Iceland

Dear Mr Sigtryggsson

I wish to investigate the possibility of setting up a scheme to collect sub-surface temperature data from merchant vessels in the area of the southern Norwegian Sea using expendable bathythermograph (XBT) probes. By using information from the Lloyds Shipping Register we have identified Icelandic vessels as being likely to provide the geographical coverage which would give most information on the distribution of water masses in the area and aid our objective of looking at long term changes in sub-surface structure.

Three ships in particular stand out (from their voyages in 1984) these are owned by NESSKIP and are the SELNES, SUDURLAND, and VESTURLAND. We are also interested in two ships owned by HAFSKIP (RANGA and SKAFTA) which make regular passages between Reykjavik and the north of Scotland.

Since I believe that some of these vessels make meteorological observations I felt it proper that I should obtain the reaction of your organisation before I contact the shipping lines. We would hope to obtain up to four temperature profiles per day and would also like to investigate the possibility of transmitting some of the data in the form of BATHY messages which could be entered in the GTS. All of this work would of course be dependent on the cooperation of the ships' owners, masters and officers. I have mentioned the proposed scheme to Dr S A Malmberg of the Marine Research Institute in Reykjavik and he is most interested in the possibility of obtaining this data.

The enclosed figure shows the number of passages made in 1984 by the NESSKIP ships. I look forward to hearing your reactions to this plan and any advice you may give me in respect of the best means of approaching the shipping lines concerned.

Yours sincerely

W J Gould, Dr.

b.c.c. Capt. Mackie, Marine Supt. Meto 17, Met Office, Bracknell
Dr S A Malmberg, Marine Research Institute, Reykjavik
Lt. Cdr. T McAndrew MOD, Old War Office Building, London.

VEÐURSTOFA ÍSLANDS

THE ICELANDIC METEOROLOGICAL OFFICE

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Brook Road, Wormley,
Godalming,
Surrey, GU8 5UB.

Address Bústaðavegur 9
105 Reykjavík, Iceland
Telephone (91) 86000
Telegrams METEO REYKJAVÍK

Our ref. 395/85/HS/BHÓ Your ref. WJG/jmj Date 26.22.1985

Dear dr. Gould,

I have received your letter of 12th November 1985 concerning XBT observations from certain Icelandic ships, which also make meteorological observations.

I have no objections to the arrangements you propose, with the understanding that these operational activities are entirely separate from the meteorological observations.

I wish to point out that the Icelandic Meteorological Office operates the terminal for the GTS in Iceland. We would be willing to accept BATHY and TESAC messages conforming with the WMO/GTS specifications and for ward them to RTH Bracknell.

I also wish to inform you that the future of the company HAFSKIP is quite uncertain at the moment, and their ships Rangá and Skaftá may be taken over by another company, or sold.

Yours sincerely,

Hlynur Sigtryggson.

Fisheries and Oceans
Pêches et Océans

Ocean Science and Surveys Atlantic
Sciences et levés océaniques Atlantique

December 13, 1985

Telex 01931552

Your file Votre référence

Our file Notre référence
1165-J45-1

Mr. E.A. Fisher
Institute of Oceanographic Sciences
Wormley, Godalming, Surrey
England GU8 5UB

Dear Arthur:

Your 22 October letter regarding my Halifax-Reykjavik line has just surfaced in my pile. I am, at present, working with the Iceland Steamship Co. Ltd. (Hf. Eimskipafelag Islands) of Reykjavik (P.O. Box 220, 121 Reykjavik); my gear is on board MV Bakkafoss, Master Thor Elisson, which travels a triangular route: Reykjavik-Rotterdam-Norfolk-New Jersey-Halifax (not every time) and home. She returns about once every five weeks; she drops 16 T-7 probes on her Cape Race-Reykjavik section in March, June, September and December; I am using a Sippican Mark 9 XBT system.

My approach was to initially talk informally with the Master and obtain his approval for what I had in mind. I then wrote the Company, got no response for six months, wrote again, and at the same time telephoned their agent in New York and got a positive response within two weeks; I attach a copy of the reply. As you can see, they are being very helpful and do not require any direct reward (I am being as nice to them as I can during their visits to Halifax.) Captain Elisson is already familiar with the use of XBT's and has been very helpful in training his officers in our methods. (It is he who packages the HP.85 cassettes and mails them to us from Reykjavik.)

I can see no reason, if you can gain Captain Elisson's and the Company's approval, why you should not use my XBT system on Bakkafoss on one of her other legs, as long as you supply your own probes and ensure that there are no misunderstandings about whose data is sent where and whose probes are to be used on which leg of the trip. I think you will find the Company to be very cooperative once you have made the initial contact. They understand our reasons for wanting such data.

I last saw you at IOS during Jasin and came to respect your abilities greatly then; I hope I can help you a bit now.

With Season's Greetings,

Fred Dobson

Fred Dobson
Ocean Circulation Division

Enclosure
FWD/vlw

Canada

HF. EIMSKIPAFÉLAG ÍSLANDS
THE ICELAND STEAMSHIP COMPANY LTD.
P.O. BOX 220 - 121 REYKJAVIK - ICELAND - TELEPHONE 27100 - TELEX 2022 IS

TRU/HJ/KO/33.

Reykjavík, Marz 22nd, 1985.

Dr. Fred Dobson
Ocean Circulation Division
Atlantic Oceanographic Laboratory
Bedford Institute of Oceanography
P.O.Box 1006
Dartmouth, N.S. B2Y 4A2.

Dear Dr. Dobson,

Thank you for your letter of March 8th. We are pleased that we can be of assistance in this program and hope that your research will be fruitful. Sorry to say, we do not know any oceanographer but would be more than happy to mail the data tapes and log sheets ourselves directly from Reykjavík to your office if you feel that acceptable.

Sincerely,

Hjörleifur Jakobsson.
Manager North America Services.

cc:. PM New York.

Fisheries and Oceans
Pêches et Océans

Ocean Science and Surveys Atlantic
Sciences et levés océaniques Atlantique

Telex 01931552

Your file Votre référence

Our file Notre référence

THE OCEAN CLIMATE IN THE NORTHERN NORTH ATLANTIC

by Dr. Fred W. Dobson, Research Scientist
Ocean Circulation Division
Bedford Institute of Oceanography
Canada Department of Fisheries and Oceans

With the active encouragement of the World Meteorological Organization, the Bedford Institute of Oceanography has begun a long-term study of the climate of the upper 1200 metres of the northern North Atlantic Ocean. Surface meteorological observations and profiles of ocean temperature, gathered by selected commercial ships making regular runs, will be combined with weather charts of the North Atlantic, in order to study the physics of changeability of the ocean climate, and the reasons for the changes. We also wish to study relationships with other climatic "events", such as the "El Niño" in the equatorial Pacific, changes in the location of the "Polar Front" (the boundary where warm, southern waters meet cold waters from the Labrador and Greenland Sea), and changes in the deep waters of the Atlantic Ocean.

Oceanographers have for many years been using meteorological and oceanographic data collected by merchant ships all over the North Atlantic: the widespread coverage these data provide allows us to "fill in the blanks" between our own oceanographic cruises and those of the weatherships.

The BIO programme is part of the World Climate Research Programme of the WMO; our specific goal is to determine the heat content of the North Atlantic ocean from the equator to its northern limits. Canada, West Germany, Portugal, and France are now recruiting ships in the North Atlantic, and the United States and England will soon become involved. The data will be processed and stored centrally, probably at the U. S. National Center for Atmospheric Research in Boulder, Colorado. All the processed and unprocessed data will be made available to all participants, who will each have regional studies to pursue. The overall heat content study will be a joint effort involving theoretical and experimental oceanographers and meteorologists from many countries.

The BIO part of the study will centre in the North Atlantic north of 45N, and will take five to ten years, starting in late 1984, to complete. It is hoped to find commercial vessels (or other ships making regular runs) which sail regularly on two routes in particular: between the east coast of North America and Iceland or Norway, and between South Europe/North Africa/the Azores and Labrador, Newfoundland or Greenland ports.

Each participating ship will be equipped with expendable temperature probes, a small launcher, a small box of processing electronics, and a HP-85 microcomputer

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Canada

(diagrams are attached). With these, a watchkeeping officer can obtain a complete 1200 m ocean temperature profile, and record it and accompanying meteorological observations on a cassette tape with the computer, in about 15 minutes. The ship's course and speed need never be altered. To obtain sufficient information to make climate scale measurements, a line of temperature profiles is needed five times per year, one profile every 175 km along the ship's route (in regions of high oceanic variability, such as off the Grand Banks, a spacing of 50 km might be asked for). When not being used for taking temperature profiles, the computer is available to the ship.

Since the programme is entirely voluntary, the system has been automated as much as possible, and is designed not to interfere with the regular duties of watchkeeping officers. Profiles need not be taken exactly on schedule; rather they can be a spare-time activity. If feasible, the meteorological data can be sent by radio or satellite link in WMO format to the Weather Services for use in weather prediction. A similar service (IGOSS) will accept the sea temperature profiles (BATHY messages).

Training of ships' officers in the use of the system, if required, will be provided by BIO. This can be done either while the ship is in port, or by having an individual from BIO sail with the ship for an initial trip. As quickly as we can, we will be producing manuals in the language used on board ship.

What is the payoff of such studies? For the scientist, understanding our high-latitude climate requires a better understanding of how the ocean stores and releases its heat over the course of the seasons, and from year to year. The oceanic temperature and meteorological data collected by the programme, when added to the existing small collection of high-latitude data, will provide an accurate record, extending over 10-20 years, of the oceanic heat content, its variability, and of the associated weather. Numerical models, similar to those now being used for predicting our weather, are now being developed for the purpose of predicting climate. This modelling work is also being sponsored by the WMO, as part of the World Climate Research Programme. Because the climate models work on longer time scales, they must include the storage and release of heat by the ocean in their calculations, and they will never work without good data against which to test their predictions.

For the general public, understanding and (eventually) predicting our climate would have enormous economic and social benefits. On a yearly time scale ice movement, the length of the ice-free season, the amount and type of cloudiness and precipitation, the length of the growing season, are all of crucial importance to the economies of high-latitude countries. In the medium term, we know that disturbances of the sea surface temperature in the equatorial Pacific ocean, such as the 1982-83 "El Niño", can cause major climatic effects at all latitudes, which last for more than twelve months after the onset of the equatorial disturbance. By studying the uptake and release of heat by the ocean at high latitudes, we can help to define the response of our high-latitude climate, and thus point the way towards predicting the effects of future El Niño events. In the longer-term, that is, ten years or more, we have observed the buildup of carbon dioxide in the world's atmosphere, which is known to prevent the escape of heat from the world's surface (the "greenhouse" effect). We expect soon to see a global increase in air temperature, which is predicted to be largest at high latitudes. What we do not know is, how quickly the excess carbon dioxide, or even the excess heat it produces, can be absorbed by the ocean. Until we do, we cannot attempt to make accurate estimates of what will happen if we continue to add carbon dioxide to the atmosphere at the present rate.

The Bedford Institute of Oceanography, although one of the finest laboratories in North America, could never hope to carry out its part in such a project unaided: the cost of keeping our ships at sea for such lengths of time, on a regular schedule, would be prohibitive. It is only through a co-operative programme that the work becomes feasible at all. And although it is true that the navies of the world gather such temperature profile information regularly, they do not go deep enough for our purposes, and are less than helpful about releasing their data to us. It is for these reasons that we are approaching, whenever possible, merchant ships on regular runs. We are counting on your help in these studies.

F. W. Dobson

July 16, 1984

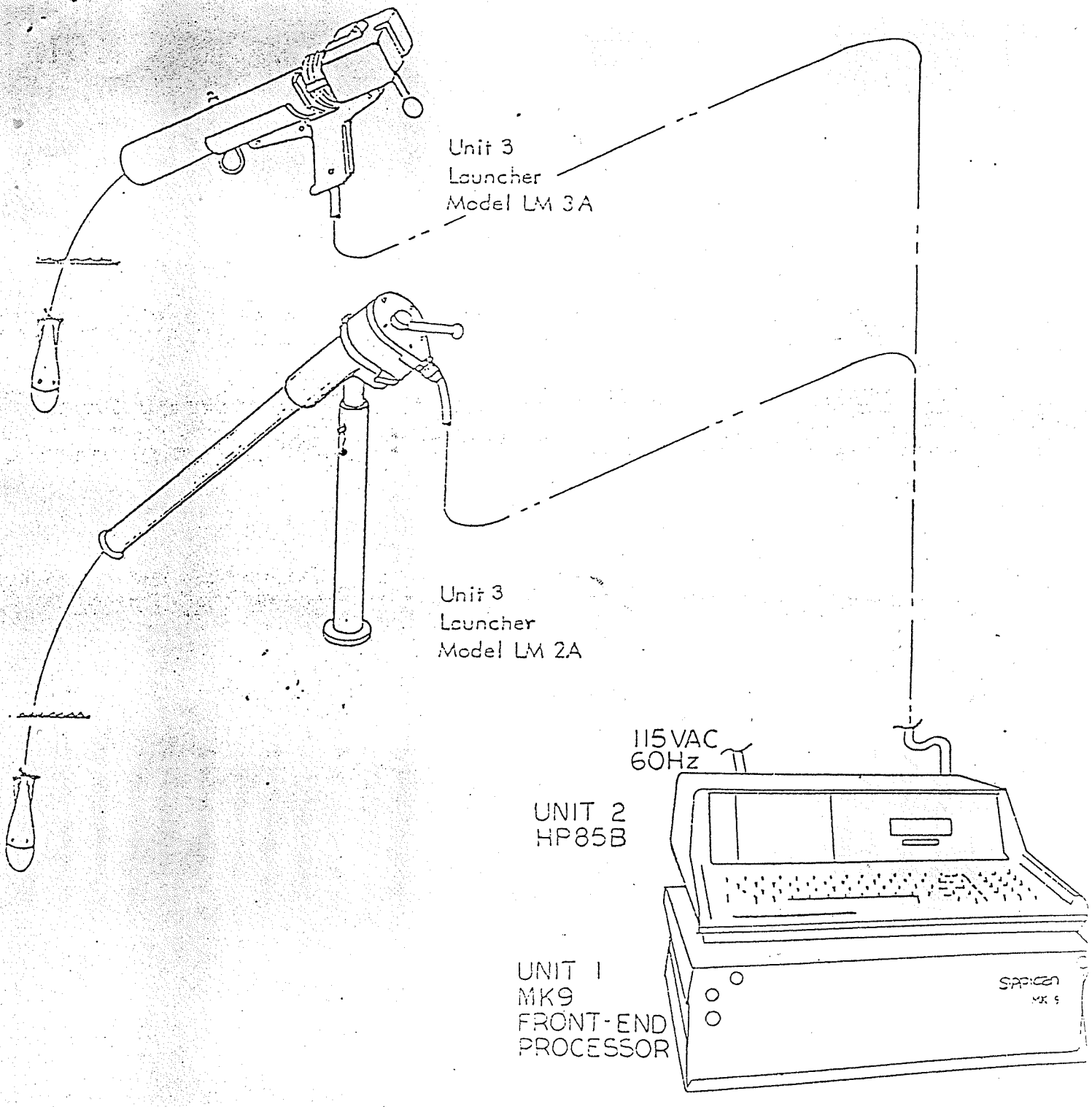
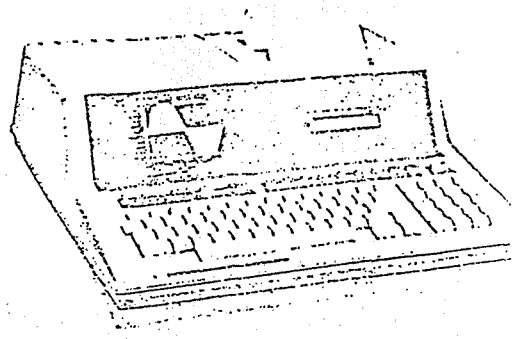


Figure 1-1(a) MK9 Surface-Launched Recorder-Processor System
Relationship of Units

Series 80
HP-85B Personal Computer

HEWLET PACKAR



If you need an instrument controller, then Hewlett-Packard's new HP-85B is for you. It's HP's low-cost computer for data acquisition, computer-aided testing, and technical analysis.

Designed with the needs of the technical professional in mind, the HP-85B integrates a keyboard and numeric keypad, CRT screen, thermal printer, and tape drive unit into one 20-pound package. So it's the answer wherever you need it.

To optimally serve your needs, features of the HP-85B Personal Computer include built-in Electronic Disc memory, an enhanced operating system, and integrated ROM's.

Electronic Disc

There are 64K bytes of memory built into the HP-85B. Of this, 32K bytes are directly addressable as user-available read/write memory. The other 32K bytes, called Electronic Disc memory, are indirectly addressable via built-in mass storage commands. The 32K bytes that are built in are dramatically expandable to 544K bytes by using any combination of 64K or 128K plug-in memory modules.

Conceptually, Electronic Disc acts as a high-speed disc drive. Because disc space is electronically, rather than mechanically accessed, execution speeds of software such as the Graphics Presentations Pac, General Statistics, and Regression Analysis are greatly increased. Once data or programs are stored on Electronic Disc, the speeds of data transfer or program loading and chaining are very fast. For example, Electronic Disc read and print speeds for data are up to 150 times faster than tape, and 15 times faster than flexible disc. Then, to save information stored on Electronic Disc, simply copy it onto a tape or flexible disc.

Enhanced Operating System

The HP-85B's ROM-based operating system is enhanced to increase performance by a built-in Mass Storage/Electronic Disc ROM set. Capabilities added include commands such as "GET" and "SAVE", which are designed to improve program transportability. Other commands let you address mass storage devices and the Electronic Disc.

Features	Benefits
• System Integration	*Saves space*—Includes keyboard, mass storag Electronic Disc, printer, and CRT for alpha and graphics needs, in one 20-lb package. This provides you with a total low-cost har ware solution for both technical analysis ar instrument control.
• Built-in Electronic Disc	*Saves time*—Provides high-speed mass stora performance.
	Adds flexibility—Gives you a second built-i mass storage medium.
• Built-in Mass Storage and Electronic Disc ROM Set	*Enhances the operating system*—Lets you us Electronic Disc memory, as well as flexible and 10M byte Winchester disc drives.
	Saves money—You don't need to purchase Series 80 ROM Drawer, Mass Storage RO or Electronic Disc ROM.
• Integrated Graphics Capability	*Makes graphics programming easier*—Graph commands are built right into the compute BASIC language.
• Four Expansion Ports	*Provide expandability*—Let you plug in a variety of expansion modules including me ory, ROM Drawer, modem, and interfaces Through the ports you can add additional printers, plotters, or mass storage units as w as hook up a wide variety of instrumentati
• Eight Built-in Softkeys	*Make it easy to write and understand programs*—Give you more control by letti you define subroutines within program execution.
• Hard-copy Printer	*Saves money and space*—No extra printer i needed for many applications.
	Gives you on-the-spot hard copies—Provid hard copy of reports, program listings, da and graphics.
• Optional Interfacing Systems	*Save money and free an expansion port for uses*—Provide a built-in I/O ROM as wel the interface you need.

Optional I/O ROM

There's even an I/O ROM built into HP-85B Interfacing Systems (Option 001 through 007). This ROM provid the commands necessary to access f tures of Series 80 interfaces, and be it's built in, frees an expansion slot other uses.