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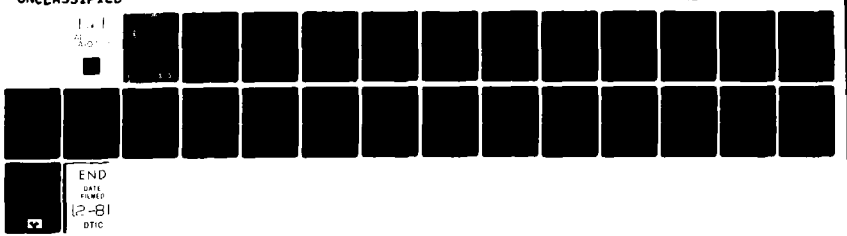

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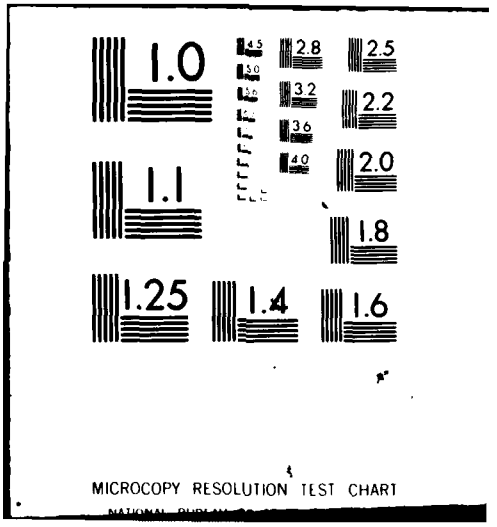
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AUSTRALIAN OCEANOGRAPHIC DATA CENTRE

BULLETIN 15.

Commonwealth of Australia

JUL 1981

HYDROGRAPHIC OFFICE, R.A.N.

161 WALKER STREET,

NORTH SYDNEY N.S.W. 2060

AODC BULLETIN NO.15

July 1981

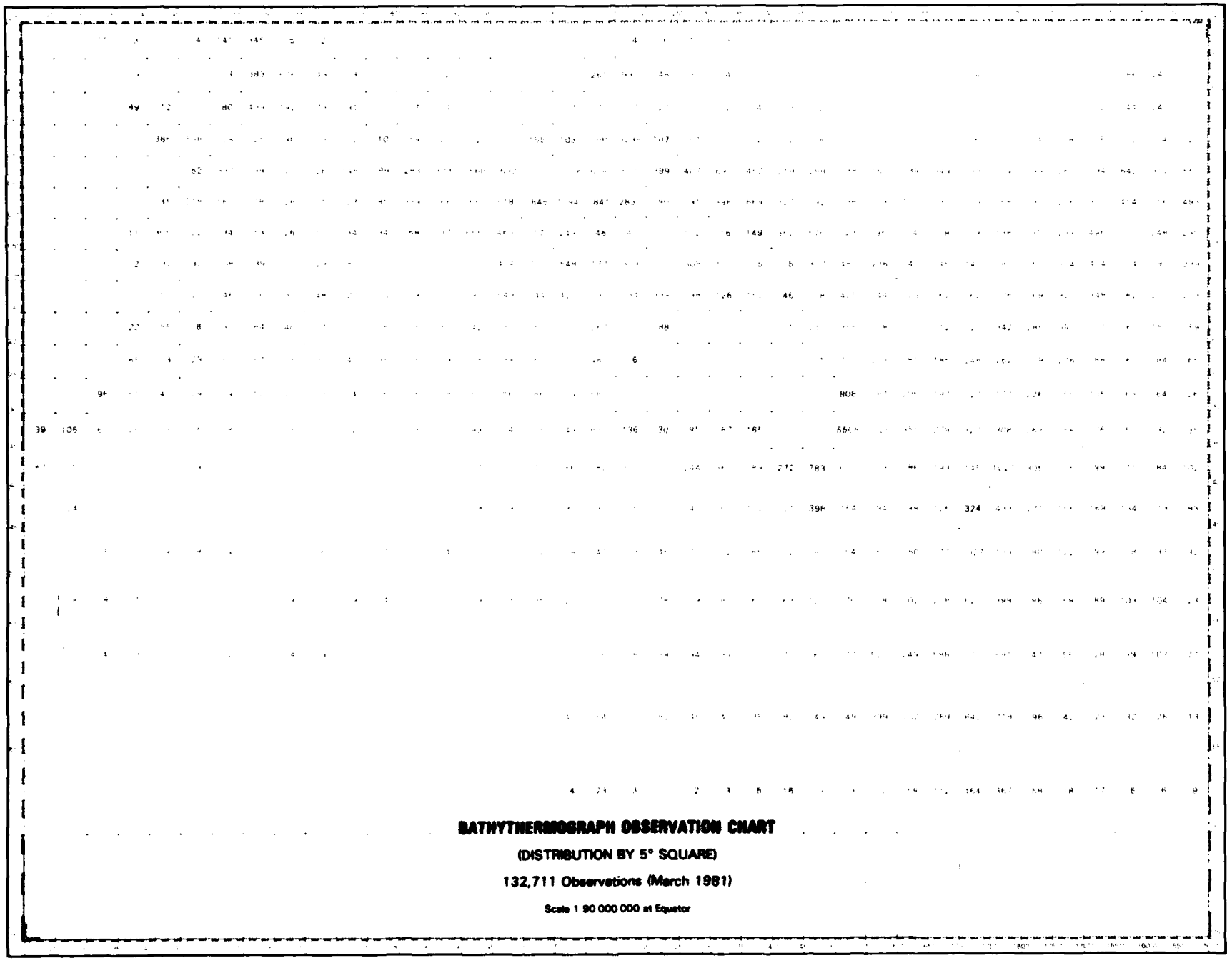
CONTENTS :

BATHYTHERMAL DATA BANK

AODC Bulletin No.14 (July 1980) outlined the rapid expansion of the bathythermal data bank. In April, 1980 this data file had increased to 80,221 observations. Recent acquisition from national and international sources have been combined resulting in a continuation of this growth. As of the 1st March, 1981 the AODC holds 132,771 observations in a working data base. This figure is expected to reach approximately 175,000 observations by 1982 as additional data is obtained from national sources and a tape recently obtained from World Data Center 'A' containing 45,000 Mechanical Bathythermograph observations is checked and included in the file.

This increase in data is most satisfactory and has resulted in a data coverage that provides a representative picture of the thermal structure of many of the areas surrounding Australia. The present coverage, although sparse in some areas, is a vast improvement on the data holdings of recent years. It is also encouraging to see more Australian organisations making their data available to the AODC and so contributing to the development of the national bathythermal data bank.

The AODC, utilising the Hydrographer's AUTOCHART facility, has produced a chart showing AODC's area of interest and the number of bathythermal observations held. This chart should enable agencies requesting data to gain an indication of what is held for their area of study. It should be noted that this chart is composed of both MBT and XBT observations and the distribution of data through time is not necessarily evenly spread. Research cruises generally do not occur on a regular basis and so observations may be biased towards certain years and certain times of the year.



BATHYTHERMOGRAPH OBSERVATION CHART

(DISTRIBUTION BY 5° SQUARE)

132,711 Observations (March 1981)

Scale 1 90 000 000 at Equator

REQUESTS FOR INFORMATION

Requests for information and data have come from an increasing number of civilian organisations, both nationally and internationally. The majority of requests have been for bathythermal data which has been provided by utilising the existing computerised data bank and its suite of analytical and retrieval programmes. Some requests, however, have arisen concerning data not held by the AODC. These have been re-directed to the appropriate body either within Australia or overseas. The AODC has made use of the exchange agreements that exist with other oceanographic data centres within the Intergovernmental Oceanographic Commission network and the National Oceanic and Atmospheric Administration information services. Enquiries for Australian data have also arisen from the Report of Observations/Samples Collected by Oceanographic Programmes (ROSCOP) forms that were forwarded to World Data Center 'A' (Oceanography) during the past few months.

Requests have included:

1.	Macquarie University	geological information, details obtained from USA, NZ and Australia
2.	University of Melbourne	bathythermal data for Bass Strait
3.	CSIRO, Division of Fisheries	bathythermal data for Coral Sea, Tasman Sea plus other Australian areas
4.	Department of Science and the Environment, (Antarctic Division)	bathythermal data for the Southern Oceans
5.	Department for the Environment (Adelaide)	bathymetric information for St. Vincents Gulf
6.	Department of Primary Industry Resource Management (Fisheries)	catalogue of biological data for South East Asia, obtained from World Data Center 'A'
7.	CSIRO, Division of Atmospheric Physics	bathythermal data for Bass Strait
8.	Flinders University	bathythermal data for the Australian Bight.

The AODC has continued to supply Defence with data as required.

REPORT OF OBSERVATIONS/SAMPLES COLLECTED BY OCEANOGRAPHIC PROGRAMMES (ROSCOP)

The AODC has been supplying ROSCOP forms to various Australian organisations over the past 12 months. Forms from eleven research cruises have been completed and returned to the AODC. Copies of these are sent to World Data Center 'A' (Oceanography) in Washington for inclusion in the world wide data referral system.

In recent months ROSCOP forms have been supplied to the Department of Science and the Environment, Antarctic Division for their 1981 Southern Ocean research cruises and the Australian Institute of Marine Science (AIMS) have requested and been provided with a booklet of forms.

ROSCOP is an extremely useful mechanism used to determine the type and location of data collected during marine research cruises. It provides the AODC with a detailed inventory and allows a rapid response to requests for data not held by AODC. For example as a result of sending ROSCOP forms to World Data Centre 'A', an American mapping organisation has requested bathymetric information collected during a specific cruise. ROSCOP provided information as to the location of the required data and the request was forwarded to the appropriate agency.

The continued development of this data referral system can only progress with the assistance and co-operation of Australian marine research organisations. Although it may appear that ROSCOP is yet another form to be completed, it is a valuable system with many practical applications. In the future, when ROSCOP gains greater acceptance, it is intended to computerise the inventory in order to provide a rapid cross referencing capability.

Any organisation wishing to become involved in this scheme can obtain ROSCOP forms directly from the AODC.

INTEGRATED GLOBAL OCEAN STATION SYSTEM (IGOSS)

IGOSS is a world wide ocean services programme, the purpose of which is to promote, develop and co-ordinate the international machinery necessary for the timely global acquisition and exchange of ocean data as well as the dissemination of oceanographic products and services to a wide range of user groups. Although it is necessary for wider participation to develop the extensive data base required for improved products, the foundations have been laid and the basic systems are in place. The development of a wider range of ocean services for the vast and varied marine activities throughout the world will constitute the main thrust of IGOSS development during the 1980's.

IGOSS is composed of 6 major operational elements:

1. Observing system
2. Data Processing and Services System
3. Telecommunications
4. Marine Pollution Monitoring
5. Training and Assistance
6. Data Archival and Exchange

These operational elements work together to provide the greatest utility from the available resources and to enable the system to function effectively. Each element is being continually reviewed both in isolation and in context with the other elements. This refining and updating, necessary to cater for technological advances and to overcome developmental problems, has resulted in an effective system for monitoring the worlds oceans. IGOSS has many similarities to the World Meteorological Organisations (WMO) World Weather Watch (WWW) and consequently the programmes are organised so that common facilities can be used as much as possible for observations, data processing and telecommunications.

Australian participation in IGOSS has been increasing over the last few years and a wider number of organisations are becoming aware of the developing capabilities of this valuable system. The AODC Bulletin No.14 (July 1980) outlined the proposal to implement the real time transmission of Royal Australian Navy (RAN) bathythermograph observations into the IGOSS network. Approval has recently been given by Navy and since 1st January, 1981 RAN observations have been forwarded to IGOSS. Vessels at sea send signals to Naval Communications Centres who will pass the data to the Bureau of Meteorology via telex link. The bathythermal information is fed directly into the Bureau's computer via the automated message switching system and then passed into the world network as regular bulletins on the Global Telecommunications System (GTS).

In recent years Australian communications with IGOSS have been somewhat fragmented occasionally resulting in differing views being sent to each of the sponsoring agencies (World Meteorological Organisation, Intergovermental Oceanographic Commission). Steps have been taken over the past few months to remedy this situation by providing an Australian focal point. This has resulted in the Director of the AODC, Captain M. Calder Hydrographer, RAN being proposed as the National Representative and this will provide a more acceptable mechanism for dealing with IGOSS matters. The AODC will circulate relevant material to interested organisations for suggestions and contributions. The resulting report is forwarded to the Chairman of the National Advisory Committee on International Aspects of Oceanography (NACIAO) as the IOC contact and the Director of the Bureau of Meteorology as the WMO contact for comments. Once a single reply has been agreed to, the document will be sent to both IOC and WMO secretariats. The first report to be sent to IGOSS using this mechanism was the 1978-1980 Australian IGOSS National Report.

INTEGRATED GLOBAL OCEAN STATION SYSTEM
AUSTRALIAN NATIONAL REPORT

Australian participation in IGOSS has increased during the past two years with four agencies making important contributions. The progression towards a more organized approach to IGOSS by Australian marine science organizations is ensuring a developing interest in the system and resulting in greater involvement. Australian IGOSS activities during the next two years will be directed towards IGOSS products (Bureau of Meteorology and Royal Australian Navy Research Laboratories) and IGOSS Observing System with the instigation of 'real−time' bathythermal observations from Australian vessels.

AUSTRALIAN OCEANOGRAPHIC DATA CENTRE (AODC)

1. Data Archiving

   During the past two years the AODC has been involved with the expansion and consolidation of the bathythermal data bank and the suite of retrieval, display and analytical programmes.

   The data bank has risen from 12,000 observations in July 1979 to 123,346 observations as of July 1st, 1980. A further 45,000 observations are awaiting reformatting before being added to the main data bank. This rapid increase in data holdings has primarily resulted from international and national exchange, the main contributors being the American National Oceanographic Data Centre, the Royal Navy Hydrographer and various national agencies including CSIRO, Division of Fisheries and Oceanography (Data Distribution Chart Appendix 1). The AODC is in the process of digitising all analogue XBT traces held by marine science organisations within Australia as well as the 2500 observations collected annually by the Royal Australian Navy. Since the provision of an in-house digitising system (July 1979) the AODC staff have processed 3500 XBT traces. All digitised traces are capable of being reproduced in analogue form within the accuracy limits specified in paragraph 5.5.5, Guidelines for recording and documentation of data of the IOC Manuals and Guides No.9 (Manual on International Oceanographic Data Exchange, Fourth Edition, 1976).

2. Data Products

   A variety of data outputs have been developed to fulfil specific user needs. These include listings, graphical plots and simple statistical analysis providing information on mean temperatures, standard deviations and depth of the mixed layer. The AODC is capable of supplying data and information on both hardcopy and magnetic tape. To date, 'real-time' IGOSS products are not yet available from the AODC.

3. Data Exchange

   Due to the rapid expansion of data holdings the AODC has been concentrating on developing the system and reformatting data obtained from foreign sources. A variety of problems have been encountered while up-dating and so international exchange of newly acquired data has been withheld until all problems can be overcome.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION (CSIRO), DIVISION OF FISHERIES AND OCEANOGRAPHY

The Division maintains a Merchant Ship Programme, a coastal station observation system and obtains data from their own research vessels.

R.V. SPRIGHTLY carried out oceanographic observations over 180 days during the year in the waters off the east coast of Australia and at the equator. R.V. COURAGEOUS and the vessel which replaced her, R.V. SOELA undertook surface observations from the North West Shelf to Sydney. Some dozen satellite tracked buoys were released, mainly off the coast of NSW. A cruise was undertaken on HMAS DIAMANTINA to the equator at 92°E in conjunction with FGGE.

1. CSIRO Open Ocean Monitoring Program

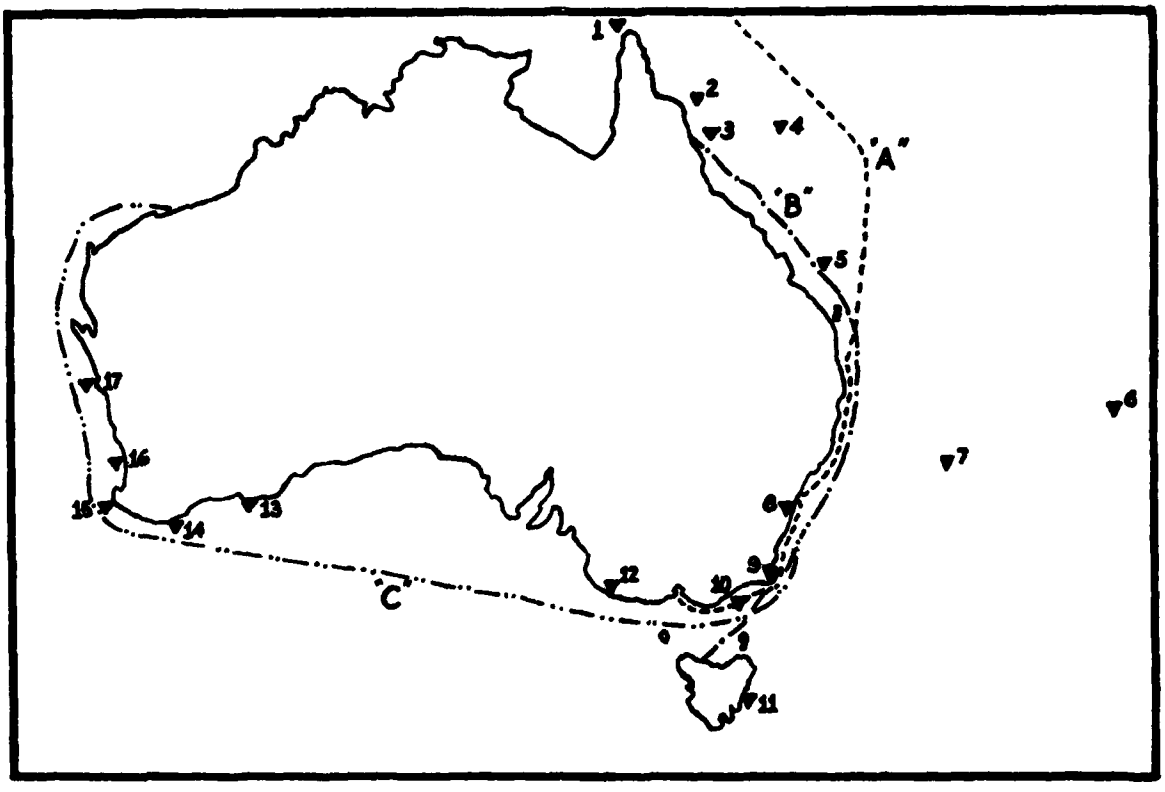
Coastal Station	Frequency	Depths	Measurements	Since
Booby Island	2 wk *	0,9	T,S,O.N,Si	June 1977
Lizard Island	2 wk	0,10,25	T,S,O.N,Si	Aug 1974
Low Isles	2 wk	0,10	T,S,O,N,Si	June 1977
Willis Island	1 wk	0	T,S	1976
Heron Island	2 wk	0,10,20,30,40,50	T,S,O.N,Si	Dec 1976
Norfolk Island	2 wk	0,10,20,30,40,50	T,S,O,N,Si	Dec 1977
Lord Howe Island	2 wk	0,10,20,30,40,50	T,S,O,N,Si	Apr 1976
Port Hacking (50m)	1 wk	0,10,20,30,40,50	T,S,O,N,Si,P	1939
Port Hacking (100 m)	1 wk	0,10,20,30,40,50 60,70,80,100	T,S,O,N,Si,P	1953
Eden	2 wk	0,10,20,35,50,75	T,S,O,N,Si	July 1974 **
Esso Kingfish	2 wk *	0,10,20,30,40,50	T,S,O,N,Si	Aug 1978
Maria Island	3 wk	0,10,20,30,40,50	T,S,O,N,Si	1944 ***
Port Macdonnell	4 wk	0,10,20,30,40,50	T,S,O,N,Si	May 1973
Esperance	2 wk *	0,10,20,30,40,50	T,S,O,N,Si	Dec 1979
Albany	2 wk	0,10,20,30,40,50	T,S,O,N,Si	Nov 1977
Augusta	2 wk	0,10,20,30,40,50	T,S,O,N,Si	Nov 1978
Rottnest Island	2 wk	0,10,20,30,40,50	T,S,O,N,Si	1970 **
Geraldton	2 wk	0,10,20,30,40	T,S,O,N,Si	Dec 1978

Notes

*	Intermittent
**	Previous data available
***	Some years not sampled before 1973
T	Temperature
S	Salinity
O	Dissolved oxygen
N	Nitrate
Si	Silicate
P	Inorganic phosphate

Ship	Route	Samples per month	Since
Papuan Chief	New Guinea to	160	Jan 1979
Coral Chief	Melbourne	160	Jan 1979
Melbourne Trader	Cairns to	40	Jan 1979
Bass Trader	Burnie	40	Jan 1979
Iron Sirius	Port Hedland to	200	Jan 1979 **
Iron Endevour	Port Kembla	200	Jan 1979 **

Note: Samples are salinity only, temperatures are recorded continuously along the ship's route.



CSIRO Open Ocean Monitoring Program

Coastal Stations

1	Booby Island
2	Lizard Island
3	Low Isles
4	Willis Island
5	Heron Island
6	Norfolk Island
7	Lord Howe Island
8	Port Hacking
9	Eden
10	Esso Kingfish oil platform
11	Maria Island
12	Port Macdonnell
13	Esperance
14	Albany
15	Augusta
16	Rottnest Island
17	Geraldton

Ships of Opportunity

A	Papuan Chief
	Coral Chief
B	Melbourne Trader
	Bass Trader
C	Iron Sirius
	Iron Endevour

(as at 14 July 1980)

BUREAU OF METEOROLOGY

The Bureau of Meteorology undertakes a number of IGOSS activities. These are carried out as part of the commitment to the World Weather Watch (WWW) of the World Meteorological Organisation (WMO), mainly through the Melbourne World Meteorological Centre (WMC) and to meet the Bureau's responsibilities under the Meteorology Act.

1. Observing Systems

   In adddition to routine meteorological observations, including ship reports (requiring the services of Port Meteorological Agents at three ports), the Australian network was augmented by observations from the Australian National Drifting Buoy program of some 50 buoys, returning surface pressure and sea surface temperature at least twice daily. (As at 3 October seven Australian buoys were still operating, six of them having a life expectancy of between one and nine months, the seventh, which was redeployed after recovery, has a life expectancy of eighteen months.)

2. Data Processing and Services System

   As part of its normal tasks, the Bureau prepares monthly and seasonal sea surface temperatures anomaly charts for use in long range weather forecasting; in addition storm warnings at sea are disseminated when necessary, as are ice edge analyses during Antarctic voyages undertaken during the Southern Hemisphere summer.

3. Telecommunication Arrangements

   The Bureau passes bathythermal messages to the Global Telecommunications System (GTS) and over the past two years have onforwarded a number of messages to the AODC.

4. Data Archival and Exchange

   The Bureau archives, on a routine basis, surface observations from ships. This has been done for a number of years and has amounted to about half a million messages on the Bureau's automated data storage system.

ROYAL AUSTRALIAN NAVY RESEARCH LABORATORIES (RANRL)

1. Data Collection

RANRL participated in the oceanographic programme of the Global Weather Experiment during Special Observing Period II. Data obtained were forwarded, via the AODC, to the Responsible National Oceanographic Data Centre, Washington USA. (non operational). Measurements were taken between the North West Australian coast and Indonesia in late April to early May 1979 and at 92°E, between 5°N and 3°S from 11th to 16th May 1979.

XBT traces obtained during research cruises are forwarded to the AODC for digitisation and archiving.

2. Data Products

Current development, in association with RAN meteorological/oceanographic officers, of an ocean analysis and forecasting scheme for the Tasman/Coral Sea area. This scheme uses sea-surface temperature reports from merchant ships, tracks of satellite monitored drifting buoys, ships sets from a small number of merchant ships on coastal routes, XBTs from the RAN and research cruises, and infra-red imagery from the Japanese geo-stationary satellite. Products which could be disseminated are weekly sea-surface temperature charts, and maps showing mixed layer depth together with the warm core eddies and the position of the East Australian Current.

FUTURE AUSTRALIAN INVOLVEMENT IN IGOSS

The Royal Australian Navy (RAN), Australian Oceanographic Data Centre (AODC) and the Bureau of Meteorology are currently discussing the feasibility of transmitting RAN bathythermal observations into the IGOSS network via GTS. The Bureau has provided two possible avenues of input to the automated message switching system and the Navy is currently considering the implications of becoming involved in this program. Should this be instigated approximately 2,500 observations will be available annually from the Southern, South Pacific and Indian Oceans. The coverage will depend on RAN deployment policy but will provide a valuable contribution to these data sparse areas.

REAL-TIME OCEAN-ANALYSIS OFF THE N.S.W. COAST

by
P.J. MULHEARN

RAN RESEARCH LABORATORY
P.O. BOX 706, DARLINGHURST 2010

INTRODUCTION

In the latter half of 1979 and since May 1980, scientists at the RAN Research Laboratory and Naval Meteorological-Oceanographic Officers at the RAN Air Station, Nowra, have been working on an ocean-analysis scheme. Its aims to routinely obtain up-to-date information on the positions of fronts and eddies off the N.S.W. coast, and to broadcast this information, to the fleet and other interested parties, in the form of regular bulletins. For the RAN, this information would be used for designating areas of good and bad acoustic propagation and regions with strong currents. It is intended to commence issuing monthly bulletins to the fleet in the near future.

OCEANOGRAPHIC BACKGROUND

Figure 1 illustrates the main oceanographic features off the NSW coast in late November 1980. It is fairly typical of the situation in this area. the contours are lines of constant temperature at 250m depth. this has been shown to be a good indicator of the oceanographic features. there are two warm-core eddies – Leo and Maria, and the East Australian current can be seen leaving the coast at 32°S and turning eastwards to form the Tasman Front. current flow anticlockwise around areas of warmer water, being strongest where the isotherms are closest together. Eddies are typically of order 150 Km in iDiameter and the currents around them can reach 4 knots. Eddies once formed persist for months. Eddy Leo was first observed in May 1980 and Eddy Maria was first observed in July 1980. Both were still in existence in December 1980. Neither had moved very far within those months, however eddies have been observed to move as fast as 50 Km/week.

Fronts are areas where temperatures change rapdily in the horizontal and these can be seen around the two eddies. Fronts are also where temperatures change rapdily in the horizontal and these can be seen around the two eddies. Fronts are also areas of strong currents, shallow surface mixed layers and hence poor acoustic propagation. Mixed layers in the middle of eddies are particularly deep in winter (350m in Eddy Leo) and so eddy centres are regions of good acoustic propagation. In summer the surface layers are heated up and mixed layer depth is fairly uniform except near fronts.

The Tasman Front is the boundary between Coral Sea and Tasman Sea water. It meanders in large loops across towards New Zealand. When one of these meanders grows and pinches off a new eddy is formed. This pinching-off process can occur in a couple of weeks.

Figure 2 is a bathythermal cross-section, approximately parallel to the coast, through Eddies Leo and Maria and the Tasman Front in September 1980. Note the large variation in mixed-layer depth (MLD) between the inside and the outside of eddies and the sharp fronts at their edges.

Figure 3 shows one of several bathythermal cross-sections obtained by RAN ships in 1980, in the course of other duties, on straight tracks through the area of interest. (It was taken by HMAS Yarra en-route to the New Hebrides in July for the independence celebrations). The Tasman Front shows clearly near 30°S.

DATA REQUIREMENTS AND SOURCES

To routinely have up-to-date data on oceanographic features one needs a regular supply of data which is sufficiently accurate, which is spaced with sufficient density to distinguish eddies and fronts, and which can be transmitted rapidly to a central analysis centre. The data acquisition, transmission and analysis must happen rapidly enough for the final product – chart of eddy and front locations and/or areas of good and bad propation – to reach the user well before it is out of date. Most of our effort has been, and still is, concerned with obtaining an adequate supply of data on a regular basis.

Figure 4 shows our data sources. Those at the top are the main ones. GMS 1 is a Japanese satellite and low-resolution cloud pictures from it are seen on T.V. weather forecasts every night. There is also a high-resolution mode which provides infra-red images, from which sea-surface temperature (SST) pattern can be obtained. Merchant ships radio in meteorological observations every 6 hours and near the coast there are enough of these to be useful. It is hoped in the near future to get additional sea-surface temperatures from the American Tiros-N satellite. These 3 sources are, or will, be obtained via the Bureau of Meteorology in Melbourne. Bathythermal data are obtained from RAN ships using expendable bathythermographs (XBT's). It is hoped soon to supplement XBT's with regular surveys using air-expendable bathythermographs (AXBT's) dropped from RAAF aircraft to fill in areas not frequented by ships. Other sources of data which are either available less regularly or in small quantity are shown at the bottom of Figure 4. The high resolution Tiros-N images are ideal for our purposes but are only available in small quantities and a month or more after acquisition by the satellite. They are useful for verification of past analyses.

Figure 5 shows the XBT and AXBT coverage for November 1980. X's are XBT's, A's are AXBT's. The east-west line of X's are hourly XBT's which we requested from HMAS Brisbane on her way back from New Zealand. The line of 4 AXBT's parallel to the coast were dropped by an Orion in the course of other duties. The line of AXBT's off to the S.E. were taken during an exercise as were those XBT's between Sydney and Jervis Bay. These together with GMS 1 images allowed us to produce the analysis of ocean features shown in Figure 6. Acoustic propagation was good within eddies. It was very poor at their edges and at the Tasman Front, where currents were also strong.

THE FUTURE

Commencing soon monthly bulletins will be issued containing information such as that in Figure 6. The analyses, possible at present, provide an overall picture of the positions of fronts and eddies off the New South Wales coast. Greater precision in describing frontal locations should result after the advent of regular AXBT surveys and access to more satellite information.

SOME IMPORTANT PAPERS

Andrews, J.C., Lawrence, M.W.L. and Nilsson, C.S. (1980). Observations of the Tasman Front. J. Phys. Oceanogr. Nov.

Andrews, J.C., and Scully-Power, P.D. (1976). The Structure of an East Australian Current anticyclonic eddy. J. Phys. Oceanogr. 6,756-765.

Boland, F.M., and Hamon, B.V. (1970). The East Australian Current, 1965-1968. Deep-Sea Res. 17-794.

Boland, F.M. (1979) A time series of expendable bathythermograph (XBT) sections across the East Australian Current. Aust. J. Mar Freshwater Res. 30, 33-313.

Godfrey, J.S., Creswell, S.R., Golding, T.J., Pearce, A.F. and Boyd, R. (1980). The Separation of the East Australian Current. J. Phys. Oceanogr. 10, pp 430-440.

Hamon, B.V. (1965). The East Australian Current, 1960-1964. Deep Sea Res. 12, 899-921.

Lawrence, M.W. (1979). The Prospect of Ocean Current Forecasting on the East Australian Coast. Australian Symposium on Ship Technology – The Impact of 200 Mile Economic Zones Nov. 1979 pp 191-198.

Nilsson, C.S., and Creswell, G.R. "The Formation and Evolution of East Australian Current Eddies" Progress in Oceanography, 1981.

Nilsson, C.S., Andrews, J.C., and Scully-Power, P.D. (1977). Observations of eddy formation off East Australia. J. Phys. Oceanogr. 7, 659-669.

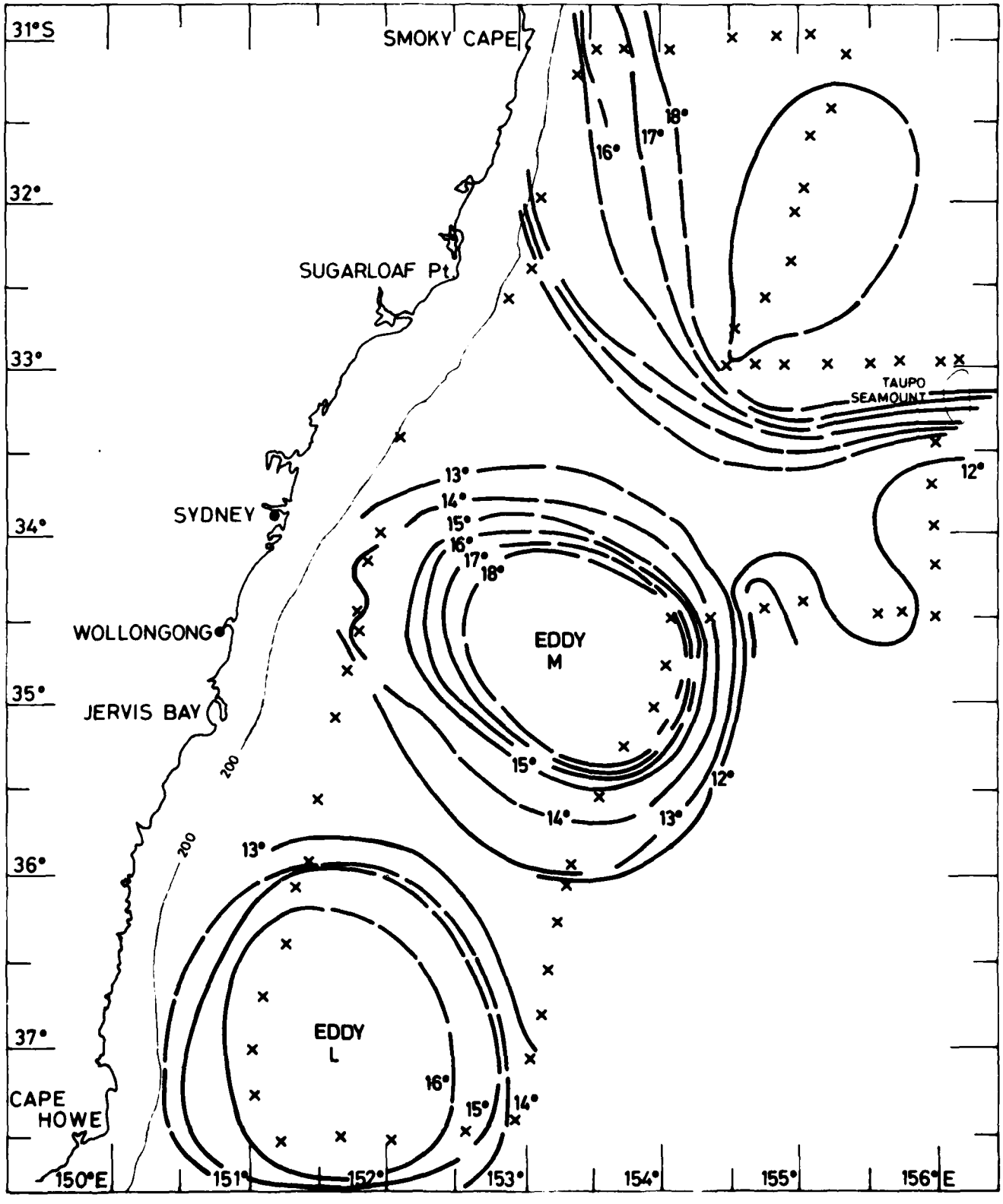


FIGURE 1 Contours of temperature at 250m depth for 24-30 November, 1980.

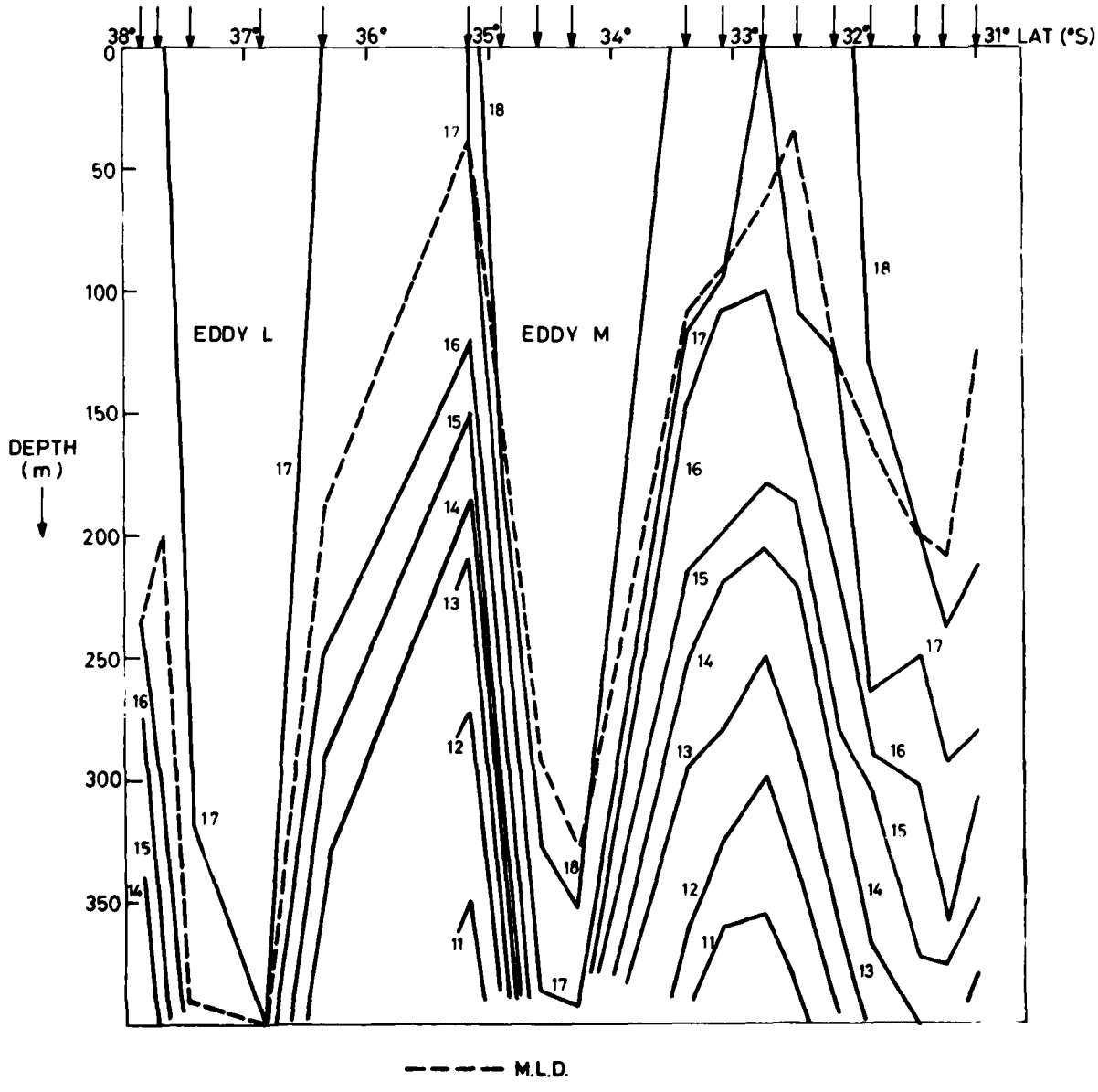


FIGURE 2 XBT section from 37°52'S., 151°31'E., to 31°S., 153°30'E., for 17-19 September, 1980.

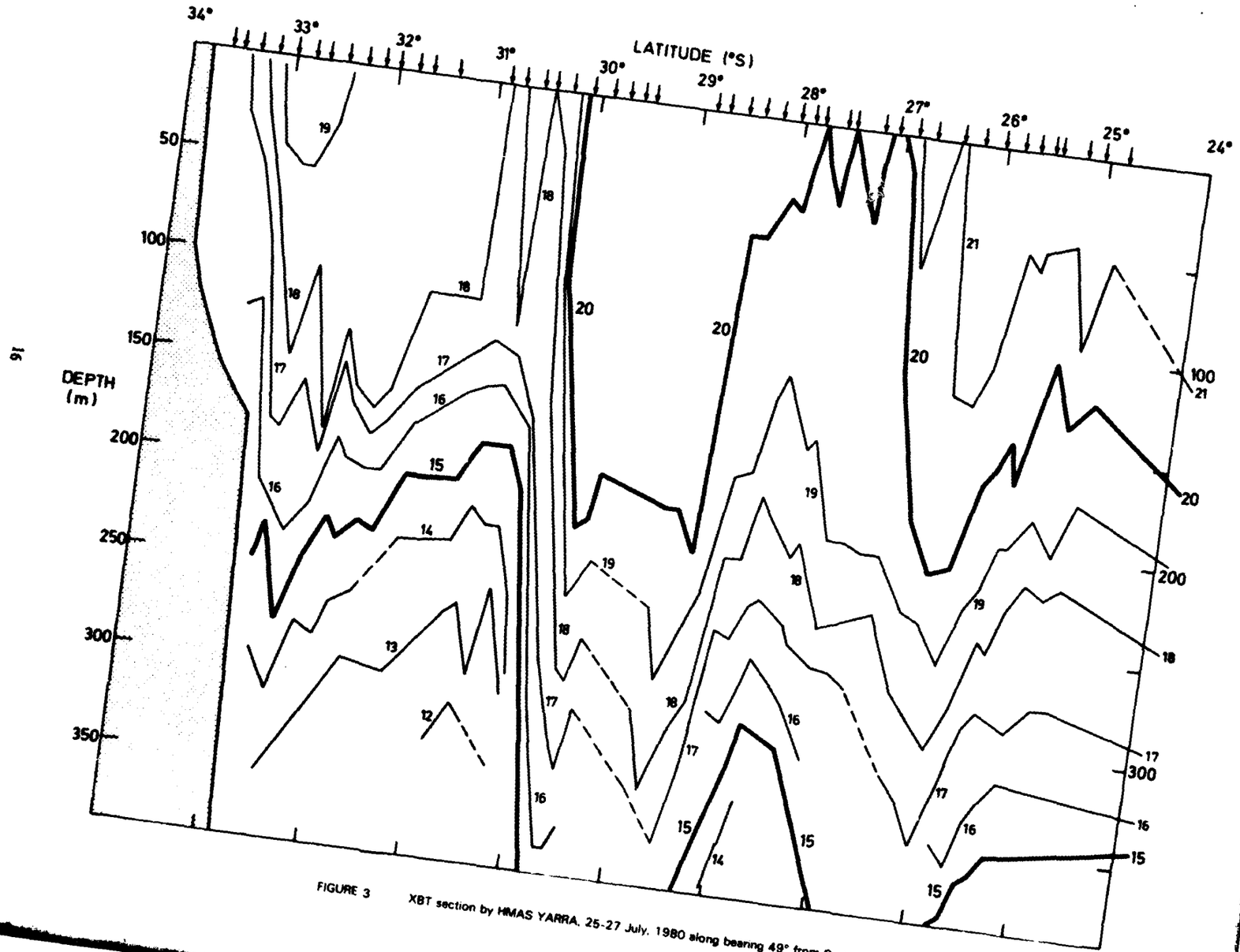


FIGURE 3 XBT section by HMAS YARRA, 25-27 July, 1980 along bearing 49° from Sydney

DATA ACQUISITION SYSTEM

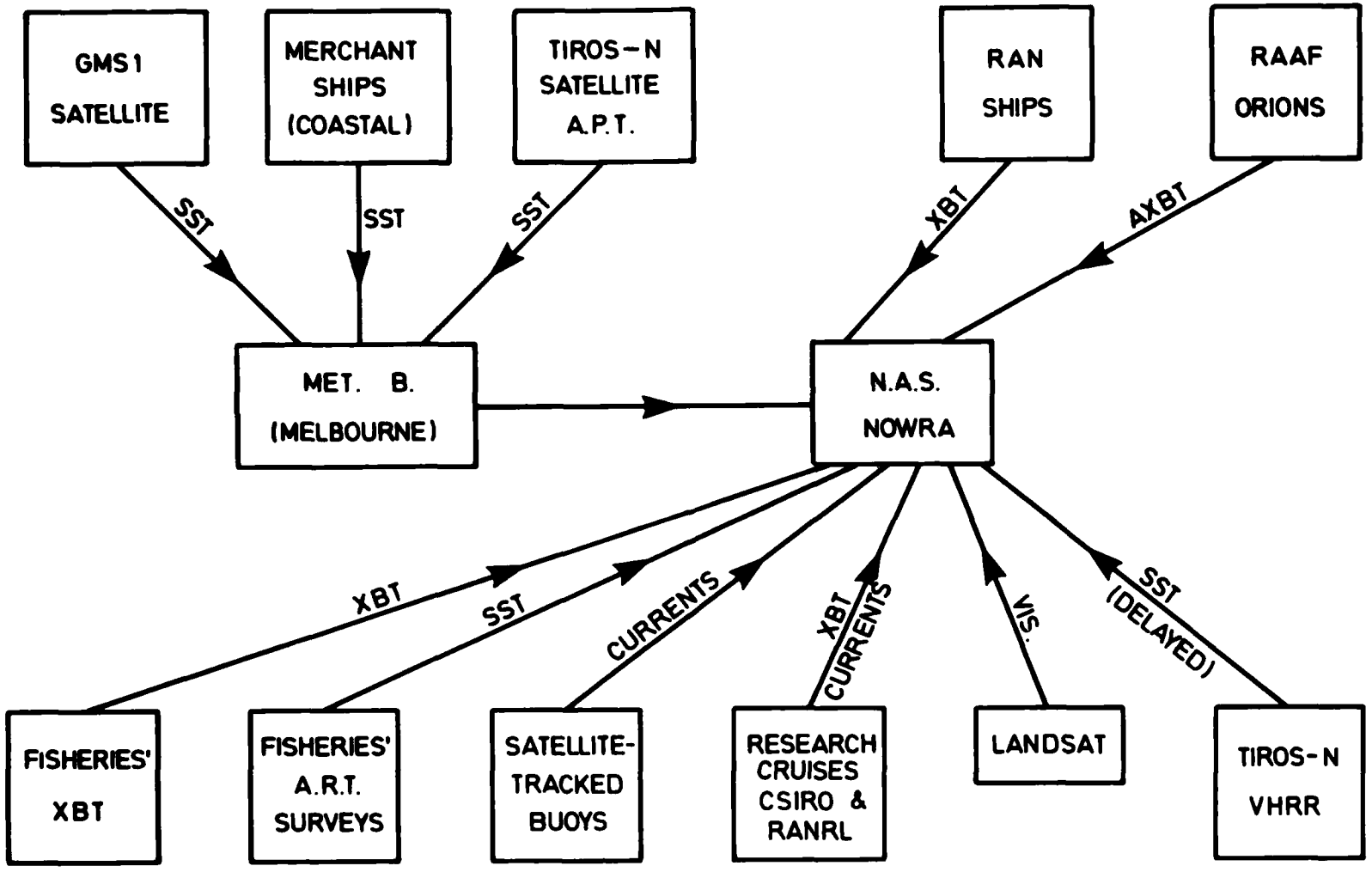


FIGURE 4 Data Acquisition System.

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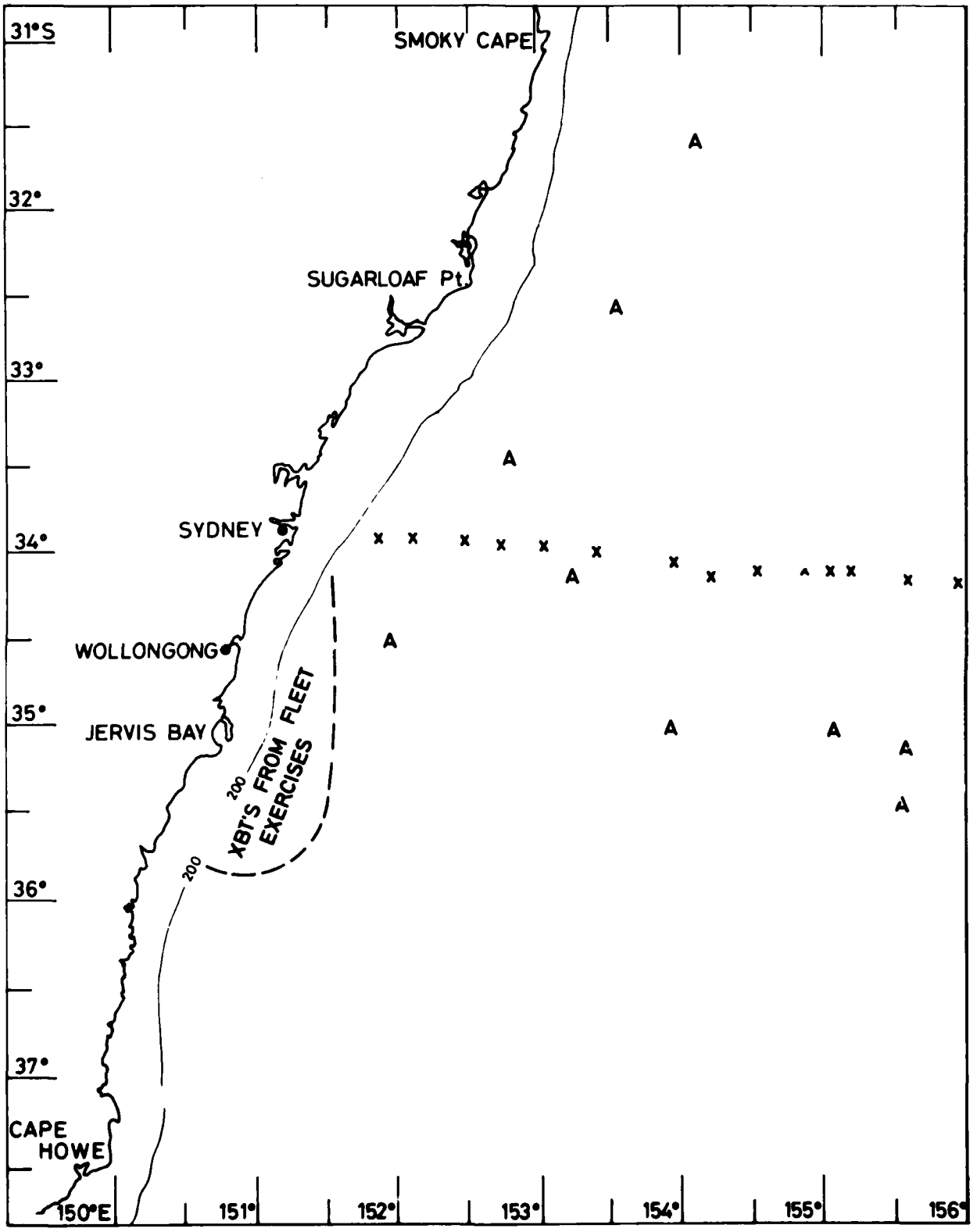


FIGURE 5 XBT and AXBT distribution for November, 1980.

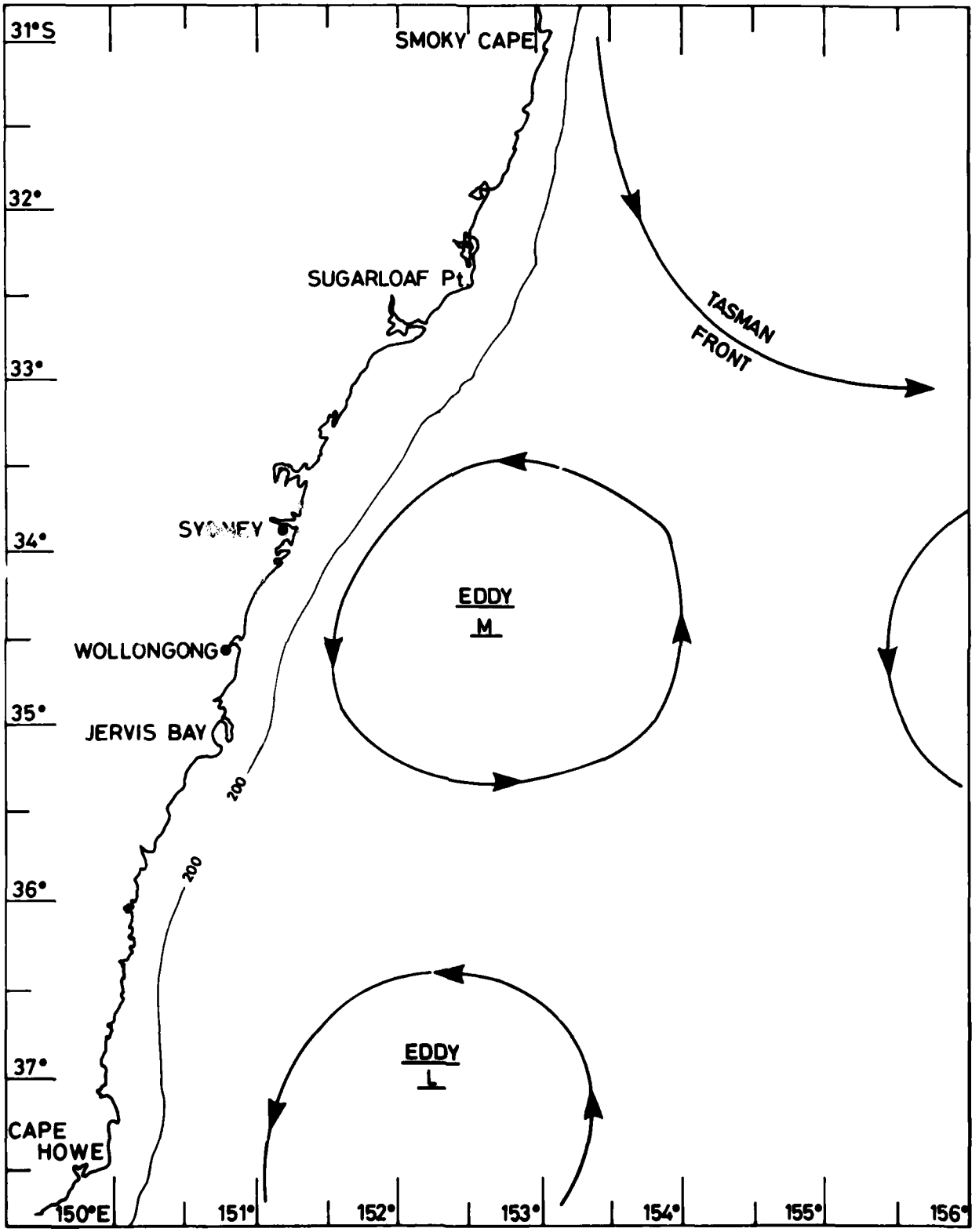


FIGURE 6 Ocean analysis for early November, 1980.

A DROP IN THE OCEAN

Each watch you drop into the sea
Something they call an XBT
A device quite like a mortar bomb
With wire nine hundred metres long.

It's made of plastic and coloured black
And once it's launched, does not come back
It drops from the tube on a copper line
And disappears into the brine.

Though looking like a fishing lure
It's made to measure temperature
The ship doesn't even need to stop
Just to let you make a drop.

As it sinks into the water
It draws a trace on your recorder
Enabling us to have a peep
At what goes on down in the deep.

This information helps us find
Layers that subs may lurk behind
And also helps to let us know
Places where the fish will go.

If we're to use this hard earned data
Complete the log sheet now, not later
Fill in neatly all the gen
And finally check it once again.

Now for the signal, it must go
To Nas Nowra, RANRL and Hydro
And if "unclas" you should always tell
The men at Meteo Melbourne as well.

When you return or two months later
The time has come, pass on the data
Send traces and log sheets to the AODC
Addressed Hydro RAN in North Sydney.

All Naval ships on every station
Help collect this information
And all results are sent ashore
For us to use in peace and war.

Hydro will be greatly thrilled
When his data bank is filled
So though the job is bloody cold
Each trace is worth its weight in gold.

I hope we've shown that Bathy dips
May one day help to save your ships
And though each drop seems quite a trial
The end result makes all worthwhile.

Remember too that you men at sea
Are welcome to visit the AODC
We look forward to meeting all of you
Who help us in this job we do.

ELECTRONIC DATA PROCESSING ASPECTS OF THE FISHERIES INFORMATION SYSTEM

Department of Primary Industry
Resource Management Section (Fisheries)

The Fisheries Information System (FIS) consists of all the data gathered from foreign fishing vessels in the Australian Fishing Zone (AFZ). There are two main sources of input, these are radio reports and log books.

As well as these sources, information also arises from shipboard observations, pre and post fishing inspections, licence application forms and other minor inputs.

It was necessary to organize all of this data in a form where it could rapidly be retrieved by the Commonwealth, the States and other interested bodies (e.g. CSIRO). After consultation with the Division of Computing Research of CSIRO it was decided that the data should be held on three separate databases each of which serves a different purpose but is nevertheless interconnected with the others. The flow chart (Attachment A) depects the overall system and how each of the databases is dependent upon at least one of the others.

The radio report database holds the position and catch reports. This information goes to the Australian Coastal Surveillance Centre via coastal radio and is updated weekly. The catch and position information are stored on the database and are used to keep a short term overview of the fishery particularly with regard to quota limits.

The logbook database holds all the data from the logbooks. These vary in complexity depending upon the fishery concerned and the number of parameters considered. The books are designed to try and gather as much information as the fisherman would normally use in the course of operations. For example, bottom type, water temperature, position, depth, length of operation and a description of gear would be common to most logbooks. As well as this catch information is required and is usually broken down into species and then grades within species. It is hoped that this data will be applicable to analysis of multi−species fisheries both in terms of the species found and, by using grade information, extrapolations can be made regarding populations and the effects of fishery pressure.

The boat history database holds information on vessel parameters, inspection data, observer comments, gear information, violation of regulation and summaries of data collected through the logbook and radio reporting sub−systems. This will allow a boat or a fishing master or a company or country's performance to be considered over a period of time and in a concise way. This should provide valuable historical data to allow comparisons of fishing methods, boat performance and so on.

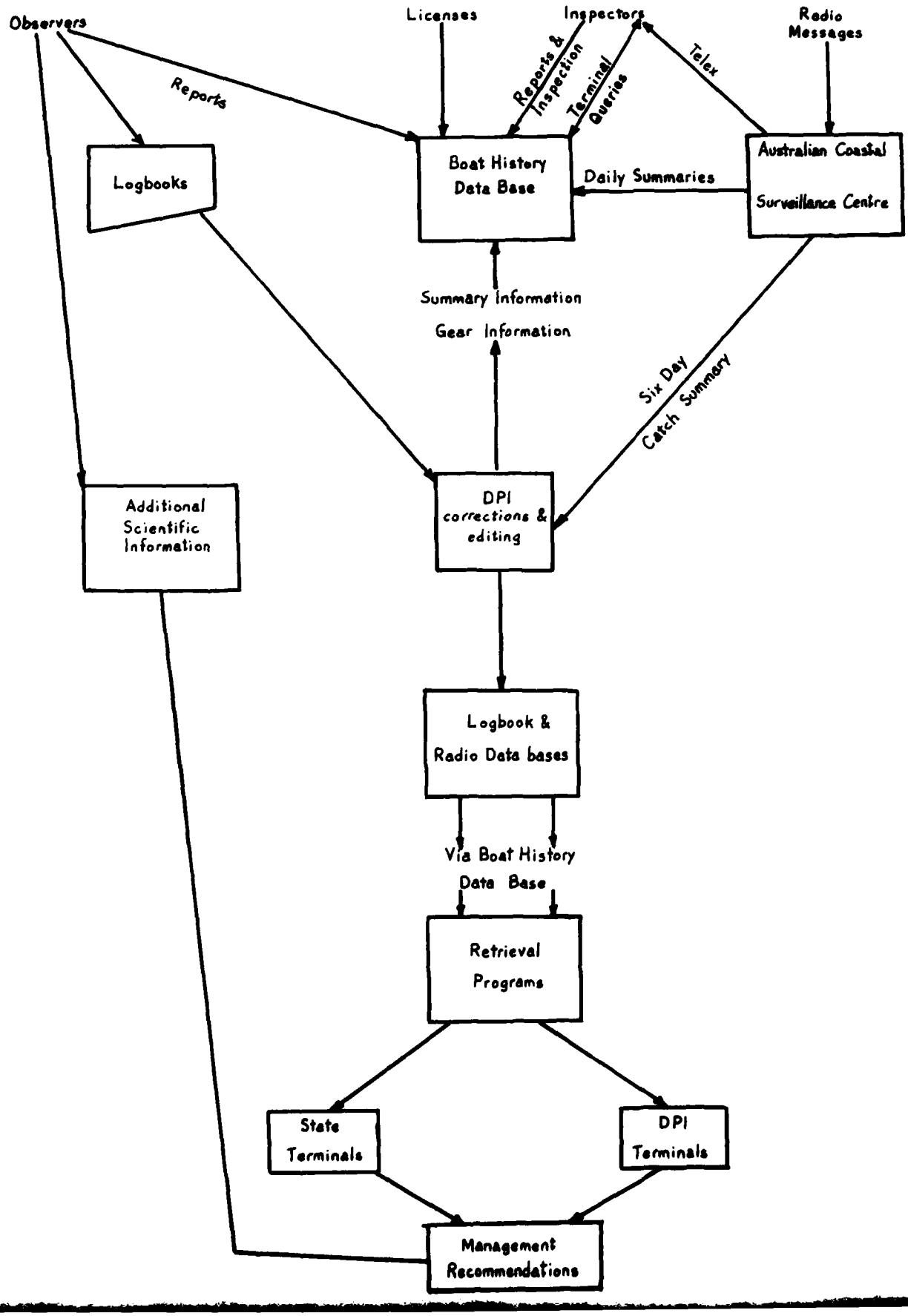
Because of the large quantity of the data (approximately 200 million characters per year) and the fact that different types of fishery, and, therefore, different types of input are used within each database, the data is stored in random access in a CSIRONET system called FORDATA.

A sophisticated FORDATA schema has been designed to maximise efficiencies in storage and retrieval, the major costs of database usage.

Retrievals are made on the basis of keys such as area, fishing method, nationality, species, etc and consequently the same programs can be applied to data from different fisheries and from varying inputs. Programs have been developed so that catch and effort for various keys (e.g. vessel name, nationality etc) can be inserted on maps of any area within the zone. The scale of map can be varied to suit the user's purpose. Other standardized outputs in a tabular form are also available. For more specific purposes the data can be retrieved and used with either a suitable package (e.g. SPSS or the NCDC table generator) or with a tailored package.

It was decided that the data should be held on the CSIRO Cyber 76 computer for a number of reasons. Among these reasons was the availability of a wide range of packages suitable for presenting the data and the software support provided by the Division of Computing research. However, the primary reason was the existence of CISRONET which allows data to be accessed through modes in many places throughout Australia (see Attachment B). This facility has made it possible for the State fisher authorities to access the data for their own needs and for the radio report data, which is the nearest to "real time" information available on the system, to be distributed in a timely manner and at a reasonable cost.

Fig. 1 Fisheries Information System



THE LASER AIRBORNE DEPTH SOUNDER AND CHARTING IN AUSTRALIA

by Mr. K.G. Burrows, Chief Cartographer

September, 1980

During 1979 the Hydrographic Office RAN introduced automated charting with the acquisition of the Autochart System. This initial acquisition was the first phase of a total project which will provide a specialised sea resources data bank. The system will provide management control over all hydrographic information for defence and maritime interests.

The initial programme establishes the cartographic capacity and specialised operations necessary for chart production. Current system operation permits the semi-automated compilation of charting information into a chart data base and the fully automated output of reproduction material for printing. The management capacity in the data base provides:

(i) Time separation of detail to facilitate chart revision.

(ii) Data structuring to facilitate derivative charting and multi-product extraction.

(iii) Special management of selected areas of interest to support rapid revision and auxillary publications. e.g. A navigation light file automatically updates any chart and provides for the publication of a Light List.

Subsequent system development in applied cartography will enhance cartographic editing and product versitility.

The other arm of the Autochart project services the primary need for control over all hydrographic field information. The Hydrographic Data Base is being developed to control the accelerated increase in survey information arising from an increase usage of digital data acquisition systems. Specifically, it will be necessary to manage the flow of information generated by Laser Airborne Depth Sounder equipment.

Information arising from field operations will have been processed for signal comparison, position, tides, etc and consist of serial data in the form of x y z and classification. In order that a detailed area evaluation beyond the limits of individual or adjacent scans may be undertaken by a hydrographic surveyor, the serial information will be structured into area files on the Hydrographic Data Base. Facilities will then exist to support the surveyor in his evaluation and comparison with existing surveys, particularly in shoal or dangerous water.

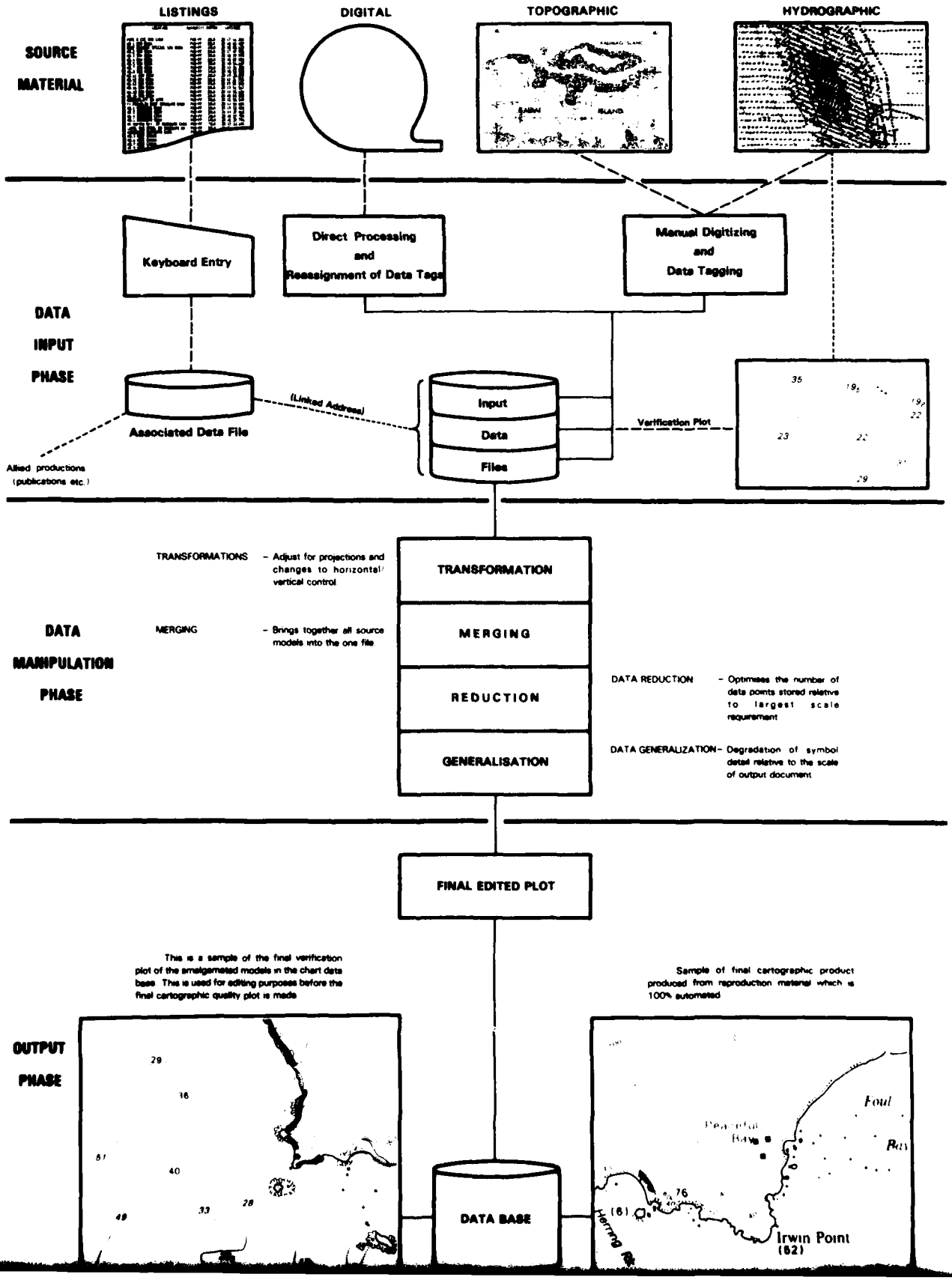
System processor capacity necessary to evaluate ultra high data volume, precludes detailed evaluation in the field. The software necessary to evaluate the field results, is essentially the same as that required for general hydrographic information management on the Hydrographic Data Base. Information arising from other digital field systems will also be incorporated into the base. A program exists to transfer existing source information held in the traditional manual form, into the Hydrographic Data Base, despite the current technological limitations in this field. However, the rate of field acquisition with the Laser Airborne Depth sounder may negate the necessity to incorporate much of the manually produced surveys.

The Hydrographic Data Base will provide the management capability over the continually growing volume and variety of field information. The manipulation of this basic information into the traditional navigation chart, and the growing demand for new and specialised cartographic products related to the sea will be a function of data base extraction and processing through the Autochart cartographic and publication facility.

Today this office does not simply produce charts, it manages the information on our sea environment and supplies an information service to the defence, scientific and maritime communities. Indeed, all organisations having a common interest in the sea and its resources will benefit from the expertise developed by the Hydrographer of the Royal Australian Navy.

HYDROGRAPHIC OFFICE
ROYAL AUSTRALIAN NAVY

CHART PRODUCTION ON THE AUTOCHART SYSTEM



CARTOGRAPHIC PRODUCTS FROM THE AUTOCHART SYSTEM

An objective of the Autochart system is 100% automation of graphic output. To achieve this objective the philosophy has been adopted that all symbology, linework, text and graticule required for charting will be software generated. Allowances can be made for automatic selection of detail for the final plot and for different cartographic output from the same data bank and file input.

DATA BASE

PLOT CONTROL SOFTWARE

FEATURE SELECTION FACILITIES

MASTER LIBRARY

FEATURE SELECTION

WINDOW INCLUDE

WINDOW EXCLUDE

This facility permits the selection of specific groups of data concepts within or outside of defined geographical areas. The Master Library contains stored listings of standardised groupings which permits identification for output requirements. The Feature Selection option permits operator overriding of Master Library references – thus permitting flexibility to meet variations in the cartographic requirement.

SYSTEM DIRECTORY FACILITY

FEATURE TABLE

ASSOCIATED DATA FILE

This facility controls the system address for entry into the Symbol Generation Facility directly through the Feature table or indirectly through the Associated Data File.

The Associated File provides the information for cartographic output as well as management requirements and other derived products such as publications etc. This facility also permits the software generation of a variety of thematic mapping.

SYMBOL GENERATION FACILITY

SYMBOL TABLE

MATRIX TABLE

Symbol Product No 1

No 2

No 3

No 4

No 5

etc

This facility writes all plotting instructions in relation to data position and according to final product type required through the Symbol Set facility. Thus a particular feature can be symbolised in many ways e.g. a lighthouse on a navigational chart is the conventional "star" symbol while the same feature when plotted for aircraft use may be a large dot.

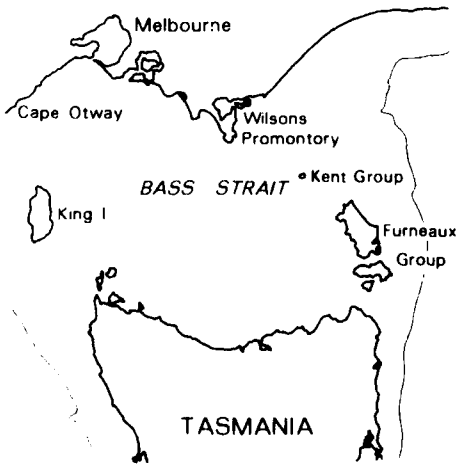
To facilitate 100% automation of symbology all symbols are software defined on a matrix basis which avoids the negative aspects of symbol aperture plotting. Simple round apertures are used to photo draw all software defined matrices permitting complete user flexibility in symbol definition. Autochart currently uses some 600 stored symbols including cartographic quality text.

A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r
s t u v w x y z

1 2 3 4 5 6 7 8 9 0

Sample of Matrix Generated Symbology



Sample Cartographic output requiring no manual intervention