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DEPARTMENT OF DEFENCE (NAVY OFFICE)

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REPORT

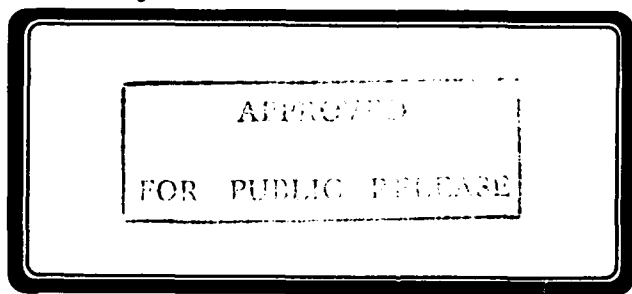
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HYDROGRAPHIC SERVICE

ROYAL AUSTRALIAN NAVY

for the year ended 30th June 1989



Issue Number 25

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REPORT

by the

Hydrographer, Royal Australian Navy

Commodore J. S. Compton, AM, R.A.N.

for the year ended

30th June, 1989

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Vice Admiral M W Hudson AC RAN
Chief of Naval Staff

Sir,

I have the honour to submit the Annual Report of the Hydrographic Service of the Royal Australian Navy. The report briefly describes the activities of the Service covering the period 1 July 1988 to 30 June 1989.

The objective of the Hydrographic Service is first to provide the maritime data base, products and services to meet the ADF requirements for geographic and environmental information so that maritime forces may be deployed and operated to the optimum at strategic, tactical and national task levels of activity. Secondly the objective is to exercise your role as the National Hydrographic Authority in providing surveys, charting and related services in support of the safe, economic and expeditious movement of the nation's maritime trade.

Progress in meeting these objectives has been satisfactory with some short comings. On the positive side highlights include:

- * completion of the organisational framework changes necessary for the future management of the Service which were set in train in 1987;
- * commissioning and proving the capability of HMAS PALUMA as the lead ship in the class of four new inshore survey ships;
- * endorsement by the Defence Operational Concepts and Capabilities Committee of a major policy paper on future direction and capabilities for hydrography in the ADF;
- * the near completion of a complementary policy paper on oceanography and meteorology;
- * contract award to the consortium led by BHP(E) for the production and introduction into service of the Australian designed Laser Airborne Depth Sounding system (LADS);
- * near completion of the installation of the Australian designed digital Hydrographic Data Logging and Processing Systems (HYDLAPS) in all hydrographic ships and boats;

Areas of concern which have increasing impact on achievement are being addressed, the more significant of these include:

- * inadequate accommodation in the headquarters in Sydney;
- * progress with the Oceanographic Data Base System (HYDROCOMP);
- * uncertainties generated by the rapid pace of change and reforms underway throughout the defence force and its departments.

I have the honour to be

Sir

Your obedient Servant

J S COMPTON
Commodore RAN
HYDROGRAPHER RAN

SECTION 1
HYDROGRAPHIC SURVEY

SURVEY OPERATIONS

General

The Marine Science Force of the Royal Australian Navy consists of HMAS MORESBY based at HMAS STIRLING south of Fremantle, HMAS FLINDERS based in Cairns, HMAS COOK based in Sydney and HMAS PALUMA, the first of a new class of Survey Motor Launch, currently undergoing acceptance trials in Adelaide. In addition, a small held unit which undertakes special survey tasks is based at the Hydrographic Office in North Sydney.

During the year HMA Ships BETANO and BRUNEL ceased their Interim Survey Ship role and reverted to General Service duties. HMAS PALUMA and her sister ships MERMAID, SHEPPARTON and BENALLA will replace this capability during the next year based from Cairns.

Details of the activities of individual units are given below.

Survey areas are shown in Figures 1-9.

Ship and Unit Reports

HMAS MORESBY

MORESBY has had a highly successful year with a diverse programme ranging from surveys in the warm pleasant climate of northwest Australia to work in the Bass Strait and South Australian waters where the weather ranged from moderate to appalling and always unpredictable. It was a productive year with work on three major Hydrographic Instructions: HI 124 Barrow Island to Thevenard Island, HI 130 Bass Strait and HI 140 Mary Ann Point to Margaret Cove. Additionally, three Supplementary Hydrographic Instructions were undertaken and completed. While in the vicinity of Barrow Island numerous sightings of Humpback whales were reported.

In addition to her survey work MORESBY visited Broome, Dampier, Geraldton, Sydney, Hobart, Bell Bay, Adelaide and Esperance. During MORESBY's visit to Sydney she represented the RAN Hydrographic Service at the Bicentennial Naval Salute. This was MORESBY's first visit to Sydney in fourteen years and to mark the occasion a mess dinner for past Commanding Officers was held onboard.

The highlight of MORESBY's year was undoubtedly the celebrations for her 25th birthday on 6 March 1989. This was not only a significant day for MORESBY, it was a notable milestone in the history of hydrographic surveying in Australia.

MORESBY has done more to advance our knowledge of home waters and has steamed more miles than any other ship currently commissioned in the RAN. The celebrations included a Families Day and an official reception.

Throughout the year preparations have been made for the installation of the Hydrographic Data Logging and Processing System (HYDLAPS). This technologically advanced system will make MORESBY one of the most modern survey ships working in Australian waters, and will improve data management with increased efficiency, accuracy and output. The system will be compatible with the Hydrographic Information System (HIS) in the Hydrographic Office and similar systems being fitted to HMAS FLINDERS and the Survey Motor Launches. Work on the installation began on 23 March and all fitting out and trials will be completed early in 1989/90.

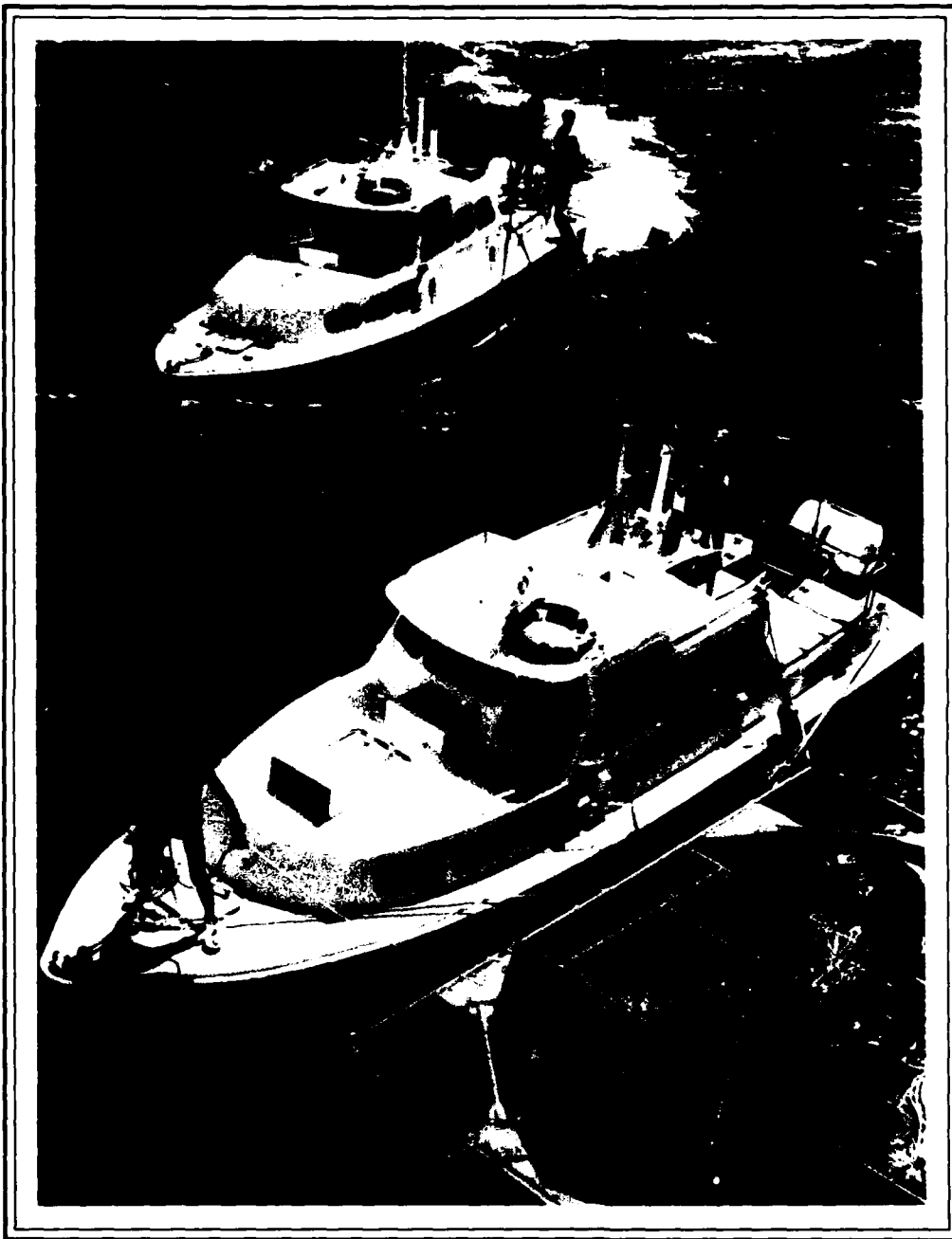
HMAS FLINDERS

HMAS FLINDERS has had an active and satisfying year, attesting to the adaptability and enthusiasm of the ship's staff. At the commencement of the year, FLINDERS was conducting a three month survey of the coastal waters of Papua New Guinea between Madang and Wewak.

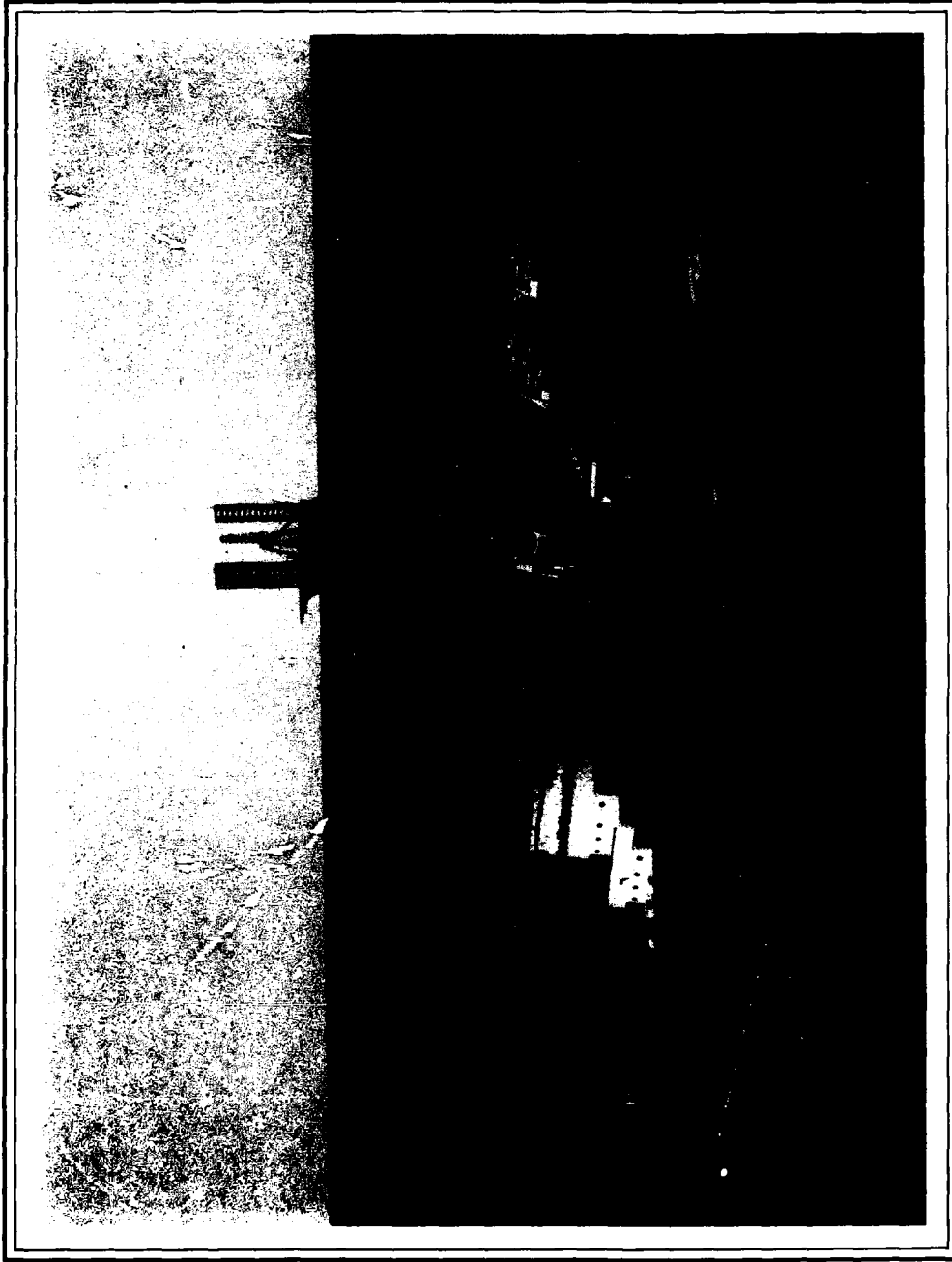
In the course of the operation, the ship spent time in company with HMA Ships BETANO and BRUNEL, crossed into the Northern Hemisphere for the first time in fifteen years and diverted to Honiara for the Solomon Islands 10th Anniversary Celebration. The PNG Hydrographer embarked in FLINDERS for the final section of the survey between Cape Croisilles and Madang; the ship returned to Cairns in August for a much needed AMP. Five weeks later, FLINDERS sailed for survey operations in the Great North East Channel in the Torres Strait, to search for an alternate route to Vigilant Channel. Before hydrographic work commenced, however, a welcome detour was made to Thursday Island for the rededication ceremony of the monument to Lieutenant James Cook RN at Possession Island. FLINDERS was tasked to assist the Thursday Island Historical Society by providing transportation and as a venue for the ceremony's reception. Another notable aspect of the ship's involvement was to provide advice for anchorages in Endeavour Strait for HM Ships ARK ROYAL and EDINBURGH.

FLINDERS departed for the next survey, Approaches to Daru, following a further short maintenance period. The survey proved to be an intense seventeen day operation with the ship and SMB sounding continuously in tandem. A tidal curve for the inshore area was compiled for datum determination. Plagued by mechanical failures and problems with hydrographic equipment, the survey was eventually successfully finalised and FLINDERS returned to Cairns for the Christmas period.

The new year saw FLINDERS completing an AMP and returning to the survey grounds of the Great North East Channel. The major survey was supplemented by fixing the position of a deep water wharf at Cape Flattery and by the presence of three representatives of the Ocean Sciences Institute (OSI) involved in Tertiary Institute Research Agreement work. The OSI tasks, conducted in conjunction with the hydrographic survey, involved checking sand wave mechanics, sea bed sedimentation and water characteristics throughout Torres Strait. Unfortunately the primary survey



SURVEY MOTOR BOATS PREPARE TO POSITION REPLENISHMENT CATAMARAN, JULY 1988



HMAS MORESBY OFF BARROW ISLAND AREA, AUGUST 1988

assignment was curtailed by a range of mechanical defects and FLINDERS returned to Cairns early in March to precipitate the planned four month refit and HYDLAPS installation programme.

HMAS BETANO

HMAS BETANO participated in operation Beachcomber during July 1988. Notably, this beach intelligence operation included participation in the demolition of a World War II mine at Rodda Reef on 17 July. A survey of an alternate, deeper draught route to the east of Heath Reef in the Coral Sea followed from 22 August to 11 September. Early completion of this survey allowed BETANO to support Explosive Ordnance Disposal Operations at John Brewer Reef prior to returning to Cairns for reversion to general service.

BETANO's role as an Interim Survey Ship officially ceased on 3 October 1988. During this phase the ship steamed 49,533 nautical miles and participated in eleven major surveys.

HMAS BRUNEI

HMAS BRUNEI, in company with HMAS FLINDERS, continued the survey of the coastal shipping route from Madang to Wewak, PNG, during July 1988. On completion of the survey BRUNEI returned to Cairns on 7 August. This marked the end of her employment in hydrographic surveying. During BRUNEI's Interim Survey Ship phase she steamed 46,655 nautical miles and participated in nine major surveys.

HMAS PALUMA

HMAS PALUMA was launched on 3 February 1989 at Eglo Engineering, Port Adelaide. On 27 February the ship was named by Mrs Jocelyn West, wife of RADMB L West, and shortly after was commissioned into the RAN at HMAS ENCOUNTER wharf. Because commissioning preceded delivery the vessel remained in Eglo's hands to complete outstanding work. The exceptions to this were for the passage back down the river and subsequent builder's sea trials when PALUMA's ship's company manned her. PALUMA was also 'borrowed' from the builders over 21 - 23 April for the period of the Marine Grand Prix. Port Adelaide was visited and the ship served as the official platform for the duration of the event.

PALUMA was finally delivered to the Commonwealth on 1 May. During the week storing and RANTAU Harbour Acceptance Trials were conducted. The following week a fleet sea safety check and RANTAU Sea Acceptance Trials (SATS) were completed. HYDLAPS setting to work then commenced, followed by SATS and a work-up survey in the Gulf of St. Vincent.

In the six weeks running since commissioning PALUMA has been found to be an ideal sounding platform and to have excellent sea keeping qualities. Particularly pleasing was her ability to hold the bottom to 5000m at 10 knots in fresh conditions well south of Kangaroo Island. Prior to proceeding to Cairns in September the ship will be docked to resiliently mount her main propulsion machinery in order to achieve internal noise reduction.

Hydrographic Office Detached Survey Unit (HODSU)

During the year the Hydrographic Office Detached Survey Unit has been employed on two main survey projects. A seven strong Naval Survey Team was embarked in the Department of Transport vessel, MV CAPE PILLAR, from 27 June to 25 October 1988 to conduct a 1:250 000 survey of the eastern section of Vanuatu's EEZ. This survey was a continuation of the South West Pacific Deep Water Bathymetric Programme jointly sponsored by the Defence Co-operation Programme (DCP) and the Australian International Development Aid Bureau (AIDAB).

A five man survey team was deployed to the Antarctic from 14 January to 7 April 1989 to carry out a boat survey of the approaches to and anchorage at Davis, the Australian Antarctic Base on the eastern side of Prydz Bay. This was HODSU's second season in the Antarctic continuing a programme to update the charts of the Australian Antarctic Bases. This year's survey operations were curtailed by the formation of sea ice, resulting in the Survey Motor Boat having to be left at Davis over winter.

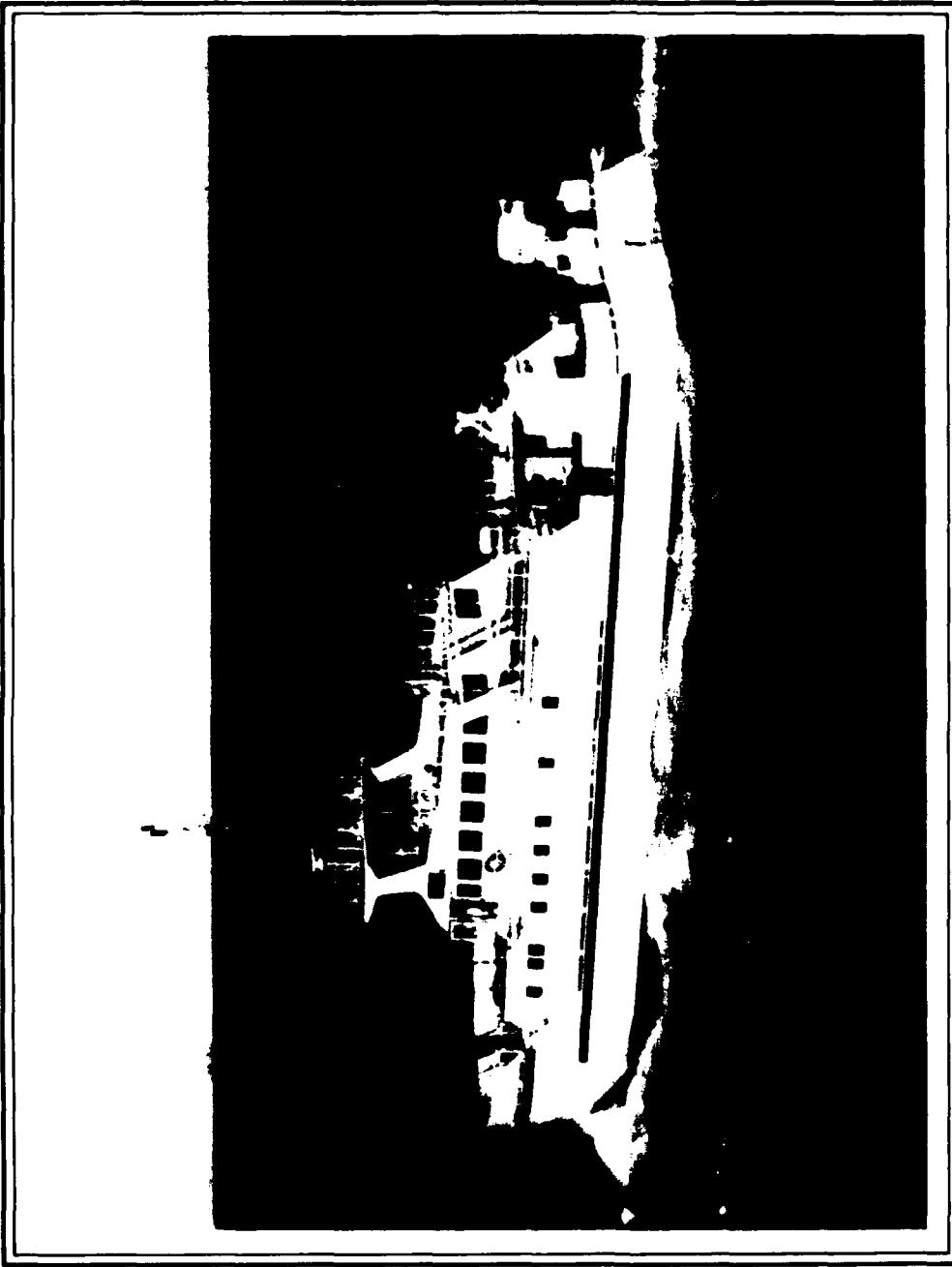
At year's end the HODSU team was once again embarked in CAPE PILLAR, having sailed from Sydney on 30 May to continue work in the South West Pacific, this time working in Solomon Islands waters.

Operational Facilities Section

In July 1988 the bathymetric unit of National Mapping was transferred to the control of the Hydrographer. During the past year the unit has continued their National Bathymetric Mapping Programme, a programme of 1:250 000 scale surveys of the continental shelf.

The CAPE PILLAR was chartered for 135 days and surveys were undertaken in the vicinity of Kangaroo Island, Bass Strait, the Gulf of Carpentaria and the Coral Sea. During a 112 day period similar surveys were conducted in the Great Barrier Reef region in the RSMV FEBRINA. Together, these surveys have permitted the completion of twelve map areas and part-completion of a further six.

Following the next charter of FEBRINA in the latter half of 1989 sea surveying activities will cease, and any outstanding areas will be incorporated into Hydroscheme for completion in the normal course of hydrographic operations.



HMAS PALUMA UNDERGOING SEA TRIALS

HMAS CAIRNS Hydrographic Support Unit

The Hydrographic Support Unit at HMAS CAIRNS provides assistance to HMAS FLINDERS and the smaller hydrographic survey vessels. Assistance provided includes equipment maintenance and support, and the preparation, compilation and rendering of survey data.

Recently, progress has been made on preparations for home porting of the four Survey Motor Launches (SML) expected in the latter half of 1989 and early 1990. This has included the acquisition of layapart stores, the arrangement of shore power supplies, and dredging inside the Naval wharf area to provide increased berthing and manoeuvring area.

Defence Co-operation Programme

Under the auspices of the Defence Co-operation Programme, RAN Hydrographic Advisers have been seconded to the Hydrographic Units of the Solomon Islands and Vanuatu. Both advisers are Chief Petty Officer Survey Records.

RAN Adviser to Solomon Islands Hydrographic Unit

During the period the unit has conducted three surveys and published one chart. The first was a 1:2 500 survey of the selected mooring site for the relocation of the petroleum and LPG depot at Ranadi. This was followed by a 1:10 000 survey from Ranadi to Pt. Cruz early in 1989, as a continuation of the 1:10 000 series along the Guadalcanal north coast.

In May the unit was deployed to Moli Island in Choiseul to conduct a survey to establish the feasibility of constructing a wharf for loading timber, as well as manoeuvring ships in the passage between Moli Island and Choiseul. This survey was carried out at a scale of 1:5 000.

The chart SI 12 Florida Islands, scale 1:75 000, was completed and printed to International Standards and is now on sale through the 'B' Class Chart Agency operated in the Solomon Islands.

A five year Hydroscheme was implemented late in 1988 and support for hydrographic surveying in the Solomon Islands is gaining momentum as more people are becoming aware of the unit's capabilities.

The provision of a survey vessel (15 metre motor sailer) and associated equipment by the Defence Co-operation Programme (DCP) is eagerly awaited and indications are that delivery will take place early in 1990. This will enhance the unit's capabilities quite dramatically and points to a bright future.

RAN Adviser to Vanuatu Hydrographic Unit

In addition to surveying equipment supplied under the *Vanuatu Defence Co-operation Inshore Hydrographic Project*, a survey motor yacht has been provided to enable the Vanuatu Hydrographic Unit to undertake coastal and harbour surveys. The vessel, S.M.Y. SPIA LAEN is a 15 metre motor ketch fitted with conventional ocean navigational equipment and can support a crew of eight for sailing and surveying tasks. For surveying the vessel is fitted with an Elac 4721 echosounder and a DDMU 592 Trisponder position fixing system.

SURVEY PLANS

The RAN surveying and charting plan is published in a five year programme called Hydroscheme. The programme is developed in conjunction with other areas of the Department of Defence, maritime authorities, and maritime commercial interests through the Department of Transport and Communications. The programme is revised annually.

Although Hydroscheme 89, the plan for 1989-1993, was published in December 1988, a shift in accounting arrangements has led to an intention to publish future Hydroschemes in June of each year. Hydroscheme 90/91 will be published in June 1990.

Surveys Planned — July 1989 to June 1990

- HI 146** **Eastern Solomon Is. EEZ;** (Scale 1:250 000) Hydrographic Office Detached Survey Unit. May to September 1989. Joint DCP/AIDAB sponsored Bathymetric survey of the Solomon Islands' EEZ. HODSU embarked in the Australian Department of Transport vessel MV CAPE PILLAR
- HI 135** **Arnhem Land East — Cape Wessel to Elcho Island;** (Scale 1:25 000 / 1:50 000). HMAS MORESBY. July to October 1989 and April to November 1990. Survey of the Wessel Islands and westward to Arnhem Land coastal waters.
- HI 132** **Great North East Channel;** (Scale 1:25 000 / 1:50 000). HMAS FLINDERS. September to November 1989. Continuation of early 1989 survey to identify a deeper draught alternative to the present Great North East Channel in the eastern approaches to Torres Strait.
- HI 133** **Woodlark Island West, PNG;** (Scale 1:50 000). HMAS FLINDERS. May to August 1990. Survey of the passage between Egum Atoll and Woodlark Island.
- HI 120** **Approaches to Davis, Antarctica;** (Scale 1:10 000 / 1:25 000). Hydrographic Office Detached Survey Unit. January to March 1990. Continuation of survey operations in the approaches to Davis.
- HI 145** **South West Coast, WA;** (Scale 1:50 000). HMAS MORESBY. February to March 1990. Continuation of survey operations on the continental shelf of south-western WA.
- HI 148** **Holmes to Lihou Reefs, Coral Sea;** (Scale 1:50 000). HMAS FLINDERS. January to April 1990. Survey of commercial shipping routes north and east of Flinders and Lihou Reefs. Qld.
- HI 149** **Cairns North, QLD;** (Scale 1:25 000 / 1:50 000). HMAS PALUMA. November 1989 - May 1990; HMAS MERMAID. March to May 1990. Surveys of the Inner Great Barrier Reef.

SURVEY EQUIPMENT

The Hydrographic Service has an ongoing programme for the replacement of old equipment and the introduction of new capabilities. Equipment currently in service includes:

Hydrographic Equipment

Echo Sounders	Krupp Atlas Deso 20 ELAC 4721 Raytheon DE 719 AN/UQN 4
Sonars	Simrad Searchlight Sonar Skipper S113 Searchlight Sonar EG & G DCS3 Side Scan Sonar 259 Mk 3&4 ELAC LAZ 72 Side Scan Sonar
Electronic Positioning	Cubic Western ARGO DM 54 Motorola Miniranger MRS 3 Motorola Falcon IV Magnavox 1105
Tidal	Bristol Elliott Tide Gauges ONO Current Meters
Boats	10m aluminium Survey Motor Boats (MORESBY-3, FLINDERS-1, School-1, HODSU-1) 10m timber Survey Motor Boat (School-1)
Data Logging and Processing	HYDLAPS Qubit Trac IV/Chart IV with HP Draftmaster Drum Plotter (HODSU) Qubit Trac V/Chart V (SMLs, MORESBY, FLINDERS)

Land Survey Equipment

Principal Land Surveying Equipment includes:

Theodolites	Wild T2
Levels	Wild/Nikon/Fuji Automatic levels
EDM	Tellurometer MRA 7 Sokkisha Red L2 Wild Distomat
Geoceiver	Magnavox 1502

NEW EQUIPMENT PROJECTS

Survey Motor Launches

In November 1987 a contract was signed with Eglo Engineering of Adelaide, South Australia, for the construction of four catamaran hulled vessels based upon the Prince class Ro-Ro passenger ferries. The first vessel, HMAS PALUMBA, was commissioned on 27 February 1989. The remaining vessels are expected to commission as follows:

MERMAID	4 December 1989
SHEPPARTON	11 January 1990
BENALLA	20 March 1990

The principal features of the vessels are:

Length	36.7 metres OA (34.9 WL)
Beam	13.7 metres
Draught	1.9 metres
Speed	12 knots
Endurance	14 days
Propulsion	Twin Detroit GM192TA Diesels
Crew	12

The crew of 12 includes two surveying officers, four seamen/survey recorders, four engineers/technicians, a radio operator and a cook. In order to provide the required level of technical expertise the ships will operate in pairs and members of crew will be interchangeable. For example, one vessel of a pair will have a senior mechanical engineer, while the other will have a senior electrical engineer. This pooling of expertise is important for operations in very remote localities.

The four ships will be based in Cairns. They will mainly operate on the north coast of Australia from Exmouth to Darwin, across to Torres Strait and down the east coast as far as Brisbane. They will also conduct surveys in Papua New Guinea waters, and will be able to work in co-operative programmes in other areas of the South West Pacific as the need arises.

The vessels have been named after ships employed in surveying on the Australian coast in earlier times.

Hydrographic Data Logging And Processing System (HYDLAPS)

A contract awarded to Qubit Pty Ltd of Fremantle, WA, in January 1988 has come to fruition with the installation of HYDLAPS systems in HMA Ships PALUMA, MORESBY and FLINDERS.

Installation and trials in MORESBY and PALUMA occurred in the first half of 1989. Completion of trials of FLINDERS' system is expected in the latter half of the year, along with installation of systems in the Hydrographic Office and Hydrographic School. Systems will be installed in the remaining SMLs during fitting out.

Laser Airborne Depth Sounder (LADS)

The LADS System was developed from experimental work on lasers at the DSTO Laboratories Salisbury SA through the mid 1970's and early 1980's. When fitted in an F27 aircraft, LADS will measure water depths in the range 0-50m. Raw depth data will be analysed in the field utilising a special to type computer system to enable digital data to be forwarded to the Hydrographic Office.

Following the evaluation of four tenders, BHP Engineering Pty Ltd was awarded a contract to produce and trial an operational system. The \$40.4M contract was signed in May 1989. Flight trials are expected to commence in February 1991 with LADS programmed to enter Naval service in June 1992. The majority of production will occur in SA. Trials will take place in SA, WA and QLD.

Major subcontractors to BHP(E) include Vision Systems Ltd (Data Acquisition System), British Aerospace Australia (Ground Analysis System), Fairey Australasia (Laser System), East West Airlines (Aircraft supply, modifications and operations) and Honeywell Australia (Ground Support Equipment). Navy will lease the aircraft, but retains the option to purchase at any time. Once operational all logistic support for LADS will be provided by a contractor with Navy retaining operational control and providing the system operators.

Offshore Hydrographic Ships

The project to acquire a class of 65 metre ocean capable survey ships is under active development. It is proposed to introduce the vessels into service in the period 1993 to 1996 as replacements for HMAS MORESBY and HMAS FLINDERS.

Minor Projects

Further specialist hydrographic equipment fitted during the period included doppler logs and Simrad sonar colour recording consoles in MORESBY and FLINDERS.

A number of other projects are in various stages of development, including:

- Survey Motor Boat Replacement
- Tide Gauges and Current Meters Replacement
- Remotely Operated Vehicles
- GPS Navstar
- HP 85 Replacement
- MRS III Replacement
- Sidescan Sonar Replacement

SECTION 2
NAUTICAL CHARTING

CHART PRODUCTION AND MAINTENANCE

Continuation of the National Charting Programme has in many ways been influenced by the arrangement to change vertical datum of large scale port charts and coastal navigation series charts from Indian Spring Low Water (ISLW) to Lowest Astronomical Tide (LAT). There are now sixty Australian metric charts published indicating soundings reduced to the lowest predictable tide. This endeavour now provides compatible datum between these charts and tidal datum relative to the National Tide Tables.

With the gradual increase in the size of vessels it has become necessary to plan new charts throughout waters considered critical to navigation. One such area, Prince of Wales Channel, Torres Strait, consists of a new series of charts appropriately designed in area coverage and scale, to accommodate navigation of long haul bulk carriers in comparative safety. Six large scale charts were completed in the later part of 1988, servicing a high priority requirement for coverage of an area extremely important to Australia's maritime trade.

As there is a legal liability imposed on the incorporation of navigation data presented for use both nationally and internationally, reviews of new maritime information for chart inclusion are conducted regularly. In an endeavour to maintain and improve published large scale port charts and include significantly complex new surveys, it has been necessary to rescheme charts for certain individual ports. Additional charting has been identified for those ports with heavy maritime traffic. These charts now provide authorities with a medium for future development planning, associated with traffic control, berthing and anchorage requirements. This exercise has been implemented for the ports of Dampier, Port Hedland, Gladstone, Albany, Newcastle, Brisbane and, more recently, Townsville.

In November of last year a major charting project was implemented to include the National Bathymetric survey of the Timor Sea on nine charts at a scale of 1:300 000. This vast area from the Australian coastline to Timor, Indonesia, covers approximately 173 000 square nautical miles of ocean. These charts provide navigation guidance through the extensive area of Sahul Banks and improve hydrographic details of international shipping routes across the north of Australia.

Project Kimberley Coast (Western Australia) was also implemented in the later part of 1988. This charting task includes nine coastal navigation charts at a scale of 1:150 000, from Fog Bay (12° 50'S) to King Sound (17° 20'S) covering coastal waters not previously charted at this scale. Digital enhancement of modern topographic mapping throughout this region provides navigational assistance although many areas remain inadequately surveyed.

The current published chart coverage of Australia is 413 out of a planned 718. Of the published charts 369 are Australian and 44 British Admiralty. Australian charts represent 170 in imperial units and 199 in metric units; 92 in metric format have been digitally produced. The 44 BA charts are included in the planned total but require metrication when absorbed into the Australian national series. Chart statistics are summarised in Appendix 2.

The volume of hydrographic and marine charting information received at the Hydrographic Office during 1988/89 once again exceeded the manpower resources required to effectively process it all. There were 400 survey documents rendered affecting 150 charts and 106 topographic maps affecting 63 charts. The majority of charts affected are not included in current chart programmes.

To process significant navigational information, the contents of which exceeds promulgation by Notice to Mariners services, small chartlets (block corrections) have been prepared. Throughout the period thirty charts have been updated by this approach, being equivalent to two charts in terms of preparation time and the amount of information involved.

A long term chart production programme to 1992 has been developed in order to better reflect the RAN Hydroscheme programme. International charting requirements in Papua New Guinea and the immediate South Pacific region as well as continuation of Australia's coastal navigation series.

The annual short run chart reprint programme has been reviewed and adjusted by increasing the volume of copies printed in each run, thus eliminating repeated reprinting of a number of charts. Maintenance of chart stocks to include outstanding Notice to Mariners corrections has been achieved using screen printing techniques. An updated semi-automatic screen printer installed in early 1988 became fully operational during this period. There has been a noticeable reduction in hand correction of selected chart stocks, and in the number of charts subjected to reprinting annually. Figures for screen printing and chart reprinting are summarised in Appendix 2.

Problems of meeting chart user demands have increased as a result of increases in hydrographic surveys and port development projects. Management of increasing maritime geographic information and processing into digital format has placed a continuous demand upon manpower resources. The number of technically skilled compiling and processing staff fell below the desired level during the year, making charting goals difficult to achieve within planned time frames.

CHART DISTRIBUTION AND SALES

The Chart Distribution Centre has had some changes in the 1988/89 financial year including a revised pricing policy, a staff structure review, a pilot advertising programme and an increase in the number of agents.

The total revenue from sales has exceeded the \$1M mark for the first time as Appendix 4 will show. This achievement can be attributed to the increased price as well as increased turnover. The new pricing policy requires the department to recover full costs of the distribution process.

The staff structure review was in line with Commonwealth Government policy for flatter and more efficient structure. The principles of industrial democracy have been embraced by this change.

In an attempt to foster the use of Hydrographic Service charts and also safety at sea the Distribution Centre ran a series of advertisements in two magazines directed to power boat and yacht owners. The effect of this exercise on sales has not yet been determined but it has served the purpose of showing what can be done and more publicity activities are

being considered for the future.

The chart agency network is still servicing the mariner well. An inspection of the agents between Sydney and Melbourne has proved to be very encouraging and illustrates the dedication that some retailers have when dealing with this vital service. There are now 100 agents in Australia and overseas.

INFORMATION SERVICES

The Hydrographic Office Records and Library section provides a specialised service covering hydrographic and oceanographic activities within Australian states and territories, and overseas.

During the year 1988-89 survey sheets were received from the RAN Survey Units and from other sources listed in Appendix 3.

TIDAL AND NAVIGATION SERVICES

Tidal Section

The Section's work includes production of Australian National Tide Tables (ANTT), and support for cartographic work, survey operations, and special projects.

The 1990 edition of ANTT has been compiled and will include tidal height predictions for 76 standard ports and one entry for predicted tidal streams. These predictions were produced by Flinders Institute for Atmospheric and Marine Sciences (FIAMS) (streams and 59 ports), Department of Marine and Harbours WA (4 ports), Hydrographer of the Navy (UK) (3 ports), Proudman Oceanographic Laboratory (Bidston, UK) (1 port), Associated Surveys International (1 port) and the RAN Hydrographic Office (8 ports).

The Australian Government Publishing Service continues to be the commercial marketing authority for the ANTT.

The supply of hydrographic survey datum adjustments to the cartographic section of the Office remains the most time consuming task of the Tidal Section, especially when large scale exercises like Kangaroo 89 require large numbers of new or updated charts. Development of the tidal data base is progressing. It will facilitate all aspects of the Section's work and that of the cartographic section which will have access to the datum adjustment part of the data base.

As the RAN now surveys areas for which there are little or no tidal data, the importance of accurate tide measurements cannot be exaggerated. The Tidal Section has advised on technical requirements for the digital, bottom mounted tide gauges and tidal stream meters which are to replace the now ageing analogue gauges. At the same time, the Section investigated and thoroughly tested some inexpensive capacitance type tide gauges which have been found to be very accurate.

As all new equipment is to be digital including the tidal components of the HYDLAPS and LADS systems a suite of reformating programmes has been prepared to facilitate future data transfers, analyses and predictions.

The issue of Mean Sea Level measurement is of particular importance to Australia and the Pacific region, especially in the context of the Greenhouse effect. In June, the Tidal Officer attended an inaugural meeting of the Group of Experts on GLOSS (Global Sea Level Observing System) at Bidston, UK, which examined the problems associated with sea level data acquisition and management. The Tidal Section has been fully manned since December when an Assistant Tidal Officer was appointed.

Notices to Mariners

The section has continued to receive a steady flow of data resulting in 747 Notices being issued during the year.

Statistics for the 1988-89 period are as follows (1987-88 Period in brackets):

Notices to Mariners Issued	747 (694)
Block Corrections for Charts	36 (41)
Notes, Cautions for Charts	57 (52)
Hydrographic Notes from HMA Ships	93 (94)
Hydrographic Notes from other sources	52 (92)

Vessels rendering 5 or more Hydrographic Notes during the year were:

HMAS CANBERRA	6
MV CAPE PILLAR	18
HMAS FLINDERS	5
HMAS TOBRUK	5
HMAS WOLLONGONG	18
STS YOUNG ENDEAVOUR	8

Sailing Directions

The Sailing Directions Officer, Mr G.H. McIntosh, retired in early January 1989 and his replacement, Captain J.J. Doyle, AM, RANEM, was appointed in May.

The work of the section was again mainly directed towards nomenclature matters. As 1988 was the Bicentenary Year, an increase in interest in the origin of Australian maritime names was apparent. Liaison with state nomenclature authorities has continued.

SYSTEMS SUPPORT

AUTOCHART computer assisted graphics system

The age and vulnerability of the Autochart system, installed in 1979, has been addressed during the year. In an effort to prolong its effective life, a programme to acquire replacement equipment and parts from other Commonwealth departments has begun. These items have been refurbished and incorporated as unit spares to minimise downtime. The software base has been stabilised and development will be restricted because of hardware limitations and the projected lifespan of the system, however software has been developed to allow Autochart users to obtain verification plots, in a fraction of the time required previously, using the Precision Image electrostatic plotter attached to the HIS.

Two systems changes are planned for the near future. The acquisition of three Tektronix 4115B terminals will double the current graphics capabilities, while plans to reconfigure the system will improve resource utilization and subsystem independence.

It is expected that a replacement system will be installed within two years and the existing system decommissioned within three years. It is intended to install a system in the Canberra office to facilitate the integration of the recently acquired Operational Facilities Section.

Hydrographic Information System (HIS)

The first phase of the HIS project is nearing completion with outstanding software currently being implemented and tested. This will mark the completion of HIS project definition, development and installation. Testing is expected to be completed in early July, 1989.

Work in progress on the HIS includes development and installation of the Chart Management Database, data input of existing digital sounding data, installation of a tide station database, initial entry of existing manuscript indexes and the testing of the Survey Management Database scheme. The impact of the system on management of information will not be felt immediately but rather will coincide with the growth of the database.

The next phase of the HIS project will commence upon completion of current acceptance tests and will include upgrading of the existing system to include additional functionality identified as necessary to efficiently process and manage the very large volumes of data currently held, as well as future digital information. Another HIS system will be purchased and installed in the Canberra Office, where bathymetric data will be entered into the system and a chart production facility added to provide enhanced system functionality.

Software development will include upgrades to system software for increased end-user functionality, spheroid transformation programme suites for survey and chart data, enhancements to two and three dimensional surface modelling, satellite image handling, sounding selection algorithms and improved database functionality, in particular database rollback and recovery.

Hardware development will include high and low level browse terminal capabilities using advanced workstations to improve ease of use over that provided by the current MicroVax stations, and investigation of new technology, in particular, document scanners, satellite imagery analysis systems and optical disks for storage and backup of high volume sounding data.

SECTION 3
OCEANOGRAPHIC SURVEY
AND
ENVIRONMENTAL SERVICES

OCEANOGRAPHIC SURVEY

General

The Hydrographer is responsible for the development of Oceanography and Meteorology in the RAN. The principal centres of activity are the Oceanographic ship HMAS COOK, the Science and Oceanography section housed in the Hydrographic Office in North Sydney (incorporating the Australian Oceanographic Data Centre), and the Naval Weather Centre at the Naval Air Station Nowra.

HMAS COOK

This year has been a mixture of frustrations, busy periods at sea, and an endless summer in tropical waters interrupted by visits to Sydney for emergency dockings.

COOK completed her refit with both Hydrology winches unserviceable. Despite an availability period after trials and workup, the modifications to the H winches were unsuccessful. Without this capability the ship's oceanographic programme has been significantly changed. One success story from the refit was upgrading of SNBESS to Sea Beam status, and this system has worked well since being set to work. However, other enhanced capabilities, although available, have yet to be installed. These are: a new CTD probe and Rosette sampler; a 3.5Khz sub-bottom profiler; and a doppler log.

The civilian software contractor COMPUCAT has made significant progress in resolving many of the software problems which have plagued the installed Data Logger System (DLS). Acceptance into Naval service trials were conducted in April/May 1989 which demonstrated that within the limitations of the antiquated HP 1000 computers, the DLS was capable of recording and processing data from installed equipment. Some enhancements have been made to the DLS by the addition of PCs for digital expendable bathythermographs (XBT's), and a scientists' PC to allow onboard processing of data.

With MSD 8-88 cancelled due to unavailability of H winches, in late 1988 COOK conducted a brief hydrographic survey from Palm Passage to Flinders Reefs. This survey was curtailed when the ship was diverted to join a search for a missing aircraft in the Coral Sea.

Research Operations

MSD 1-89. This research cruise for Maritime Systems Division of the Weapons System Research Laboratory (WSRL) was conducted in two phases:

An extensive bathythermal survey in the waters south of the Louisiade Archipelago, and ambient sea noise measurements.

Shallow water surveys in Torres Strait and Inner Great Barrier Reef waters to measure turbidity, transparency, suspended matter, temperature and salinity, and bottom sediment sampling. Ambient sea noise measurements were also made.

Museum Cruise. In late April 1989 a short cruise was conducted for the Australian Museum to sample bathypelagic species in water depths between 500 and 2500 metres. Nine trawls were conducted at varying depths and in one trawl an Australian record for deep trawling was set at 3300 metres.

Sea Beam Validation. A short cruise was conducted off the NSW coast to validate the improvements to Sea Beam and to further develop the post-processing software for the Ocean Science Institute of Sydney University.

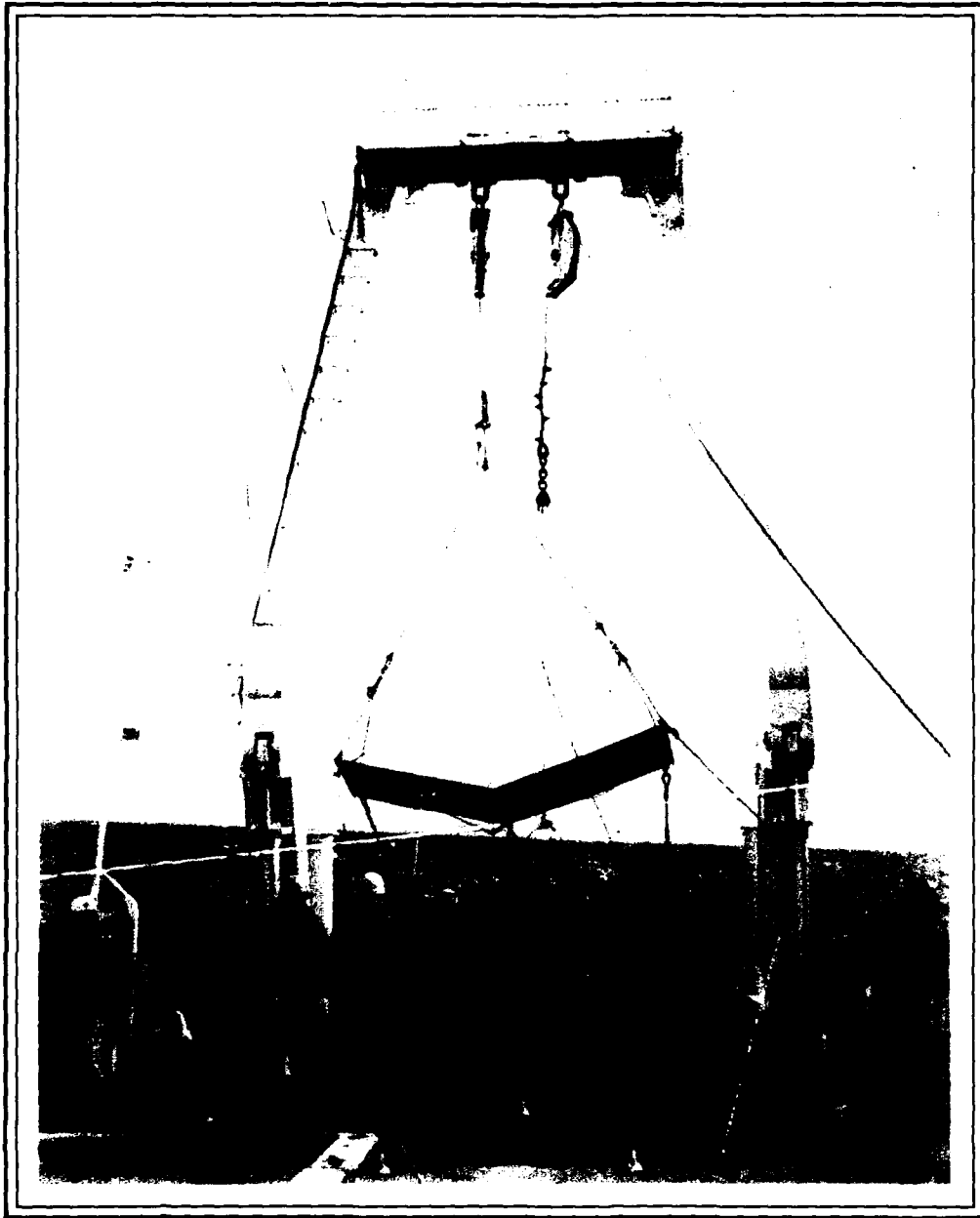
MSD 15-89. This was a geo-acoustic survey in the Coral and Solomon Seas conducted for WSRL. The objectives were altered due to the nonavailability of the 3.5Khz sub bottom profiler; nevertheless, data was gathered using sonobuoys and SUS charges combined with cores.

The end of 1988-89 has been marked with the installation of a Geological Long Range Inclined Asdic (GLORIA) deep ocean survey system. COOK will be conducting two surveys with this equipment; the first will be on behalf of James Cook University in the Coral Sea adjacent to the Great Barrier Reef, and the second cruise will be conducted for the Committee for Co-ordination of Joint Prospecting in the South Pacific (CCOP/SOPAC) in the EEZs of Vanuatu, Fiji and Western Samoa.

Other Events

In October 1988, COOK once again was host to royalty when the Duke and Duchess of York embarked for the Bicentennial Naval Salute. Two unscheduled dockings were made in January and April 1989 for repairs to the port controllable pitch propeller, and also damage to the fibreglass sheathing of the Sea Beam hydrophone dome. At the end of 1988-89, damage to the Sea Beam dome has again been noted which will require a further unscheduled docking in the near future.

Despite the long periods spent in maintenance, COOK has achieved 93 days at sea and steamed 14645 miles.



DEEP SEA TRAWL ABOUT TO BE STREAMED
HMAS COOK, APRIL 1989



SPECIMENS RECOVERED BY DEEP SEA TRAWL
HMAS COOK, APRIL 1989

ENVIRONMENTAL SERVICES

AUSTRALIAN OCEANOGRAPHIC DATA CENTRE (AODC)

Within the Hydrographic Service the AODC is responsible for the acquisition, quality control and archiving of oceanographic data, and the dissemination of information to the Australian Defence Force and the civilian community.

Bathothermal Data

The AODC received 911 XBT profiles from RAN ships. Of these, 100 were received from Fleet survey units, those from MORESBY and COOK having been rendered in digital format. During the year approximately 1800 analogue and digitally recorded profiles were forwarded to the U.S. National Oceanographic Data Centre (NODC) for electronic quality control and processing. This information has now been returned on magnetic tape and will be merged with existing data.

Over the past year, Navy, via the AODC, has continued to assist the CSIRO in administering the "Ships of Opportunity" Program. Approximately 400 T7 type XBT probes have been delivered to three merchant ships, the NIMOS, ANRO ASIA and ANRO AUSTRALIA, which regularly berth in Sydney. These "Ships of Opportunity" provide the primary database for a research program known as the Tropical Ocean Global Atmosphere Programme (TOGA), which seeks to establish the scientific basis of global climate prediction. Through process studies to identify the physics of ocean temperature change, scientists will be able to use ocean temperature as a predictor of rainfall anomalies, either as direct input to statistical models or in the initialisation of general circulation models.

Services

In 1988 the AODC began to produce a 'stand alone' Regional Environmental Brief for waters of military interest to Australia in conjunction with the Applied Oceanography Centre (AOC) of the Australian Joint Maritime Warfare Centre (AJMWC). Unfortunately, due to continued understaffing and higher priority tasks little progress has been made towards completion of this brief.

Three seasonally dependant Environmental Briefs were supplied for Naval and RAAF deployments. Each brief provided information extracted from historical data holdings. Oceanographic and meteorological factors affecting maritime operations were analysed for specific areas and presented in both written and diagrammatic form.

The AODC received numerous requests for information during the period. Requests have ranged from provision of winter sea surface temperatures to complex statistical analyses of temperatures in various water masses off the east coast of Australia. Some of the more substantial requests were:

NSW Fisheries Dept.	Statistics on deep sea temperatures off the east coast for use in prawn research.
Prime Minister's Dept	Provision of mean sea surface temperatures to the north of Australia in connection with Southern Oscillation Research.

Ad-hoc reports were also prepared for various defence organisations including contractors for the New Submarine Project.

The AODC has also distributed a number of oceanographic products including the East Australian Current (EAC) charts, the Integrated Global Ocean Services System (IGOSS) Sea Level Programme (ISLP-PAC) reports, and Computed Global Ocean Sea Surface Temperature (GOSSTCOMP) charts.

Training

Underwater Control specialists from HMAS WATSON and various Fleet units visited the AODC for familiarisation courses during 88/89. These courses include an orientation segment and stressed the importance of oceanographic data to civilian and defence organisations. Courses on operation of XBT's and the maintenance of associated equipment were also conducted.

International Activities

The AODC has continued its involvement with the Intergovernmental Oceanographic Commission (IOC) as the National Co-ordinator for the International Oceanographic Data and Information Exchange (IODE) programme and as the National Representative of the IGOSS.

Integrated Global Ocean Services System (IGOSS)

In November 1988 accreditation was sought from the IOC and the World Meteorological Organisation (WMO) for an Australian Specialised Oceanographic Centre (SOC).

This Centre has been developed as a combined project between the AODC and the Bureau of Meteorology. At present the SOC is undertaking a limited number of functions, being constrained by a lack of resources, but these will develop as capabilities improve and AODC's HYDROCOMP computer system is acquired. Since February 1989 the SOC has acquired and quality controlled monthly ocean temperature data sets and the first products, consisting of data distribution charts, have been compiled, however lack of suitable graphics facilities has prevented production and distribution.

A Global Temperature/Salinity Pilot Project (GTSP) was approved by IGOSS in November 1988. The project has been initiated to improve and standardise Temperature and Salinity (T-S) data management through a co-operative effort. As much of the available T-S data as practical will be acquired from both real-time and delayed-mode data sources, quality controlled and made available in a timely fashion to the user community. The AODC will participate by co-ordinating and forwarding data from both national sources and other countries in the region. The CSIRO is expected to provide assistance to the project through their involvement in other global research programmes.

International Oceanographic Data and Information Exchange (IODE)

As the national focal point for IODE sponsored programs, the AODC is responsible for the exchange of Australian sourced data with the World Data Centre for Oceanography. This year due to resource constraints, no data has been forwarded to the Responsible National Oceanographic Data Centre for the West Pacific region (RNODC-WESTPAC).

International Meetings

In November 1988 the Head, Science and Oceanography attended the Fifth Session of the Joint Intergovernmental Oceanographic Commission (IOC) and World Meteorological Organisation (WMO) Working Committee for IGOSS as leader of the Australian delegation. The meeting was held at the UNESCO headquarters in Paris and discussed the inter-sessional activities of IGOSS and provided tasks for future development.

The proposal to establish the Australian Specialised Oceanographic Centre was endorsed by the Committee and Australian involvement in a Global Temperature/Salinity Pilot Project (GTSP) was also discussed. Mention was also made of Australia's wish to establish a Southern Ocean Sea Level Monitoring Project.

In January 1989 the Head, Science and Oceanography was sponsored by UNESCO to attend an ad-hoc consultative meeting to discuss the development of the GTSP. This major project is being developed by the AODC, the Canadian Marine Environmental Data Service (MEDS) and the US NODC, with the co-operation of a number of scientific organisations, including Scripps Institute of Oceanography. This project will provide the platform for future data management, quality control and data exchange procedures. Australia will gain considerable benefits from involvement in this project.

Facilities

The HYDROCOMP computer project has suffered a number of delays but will be underway in early FY 1989/90 with the signing of the contract for \$1.8M. A significant factor has been the desire to obtain a system that will integrate with HIS and future ADP acquisitions. The system will have at its core a geographic information system similar to HIS but with significant modifications to the data structures to cater for management of oceanographic data. Further software developments will allow for specific oceanographic analysis and reporting functions.

The project will require a considerable involvement from the AODC staff and during the development phase the AODC will be unable to meet a number of its obligations due to the higher priority of HYDROCOMP activities. Once HYDROCOMP is operational the AODC will be able to provide an improved level of support to both Defence and the civilian marine science community. The involvement in international programmes will also be considerably enhanced.

NAVAL WEATHER CENTRE, RAN AIR STATION NOWRA

General

Due in large part to the Bicentennial activities and related maritime exercises conducted in the latter part of 1988, but also through increases in demand from the RAAF, the output of the Naval Weather Centre (NWC) increased by 22 per cent in the reporting period. This increase in demand has placed a strain on manpower resources which is expected to be partially overcome by the imminent introduction of a major meteorological computer system (NAVMET).

Two GLEX officers and one Instructor Officer, were the first RAN personnel to complete the Bureau of Meteorology's (BOM) Graduate Diploma in Meteorology at the end of 1988. One of the Seaman officers is to be posted to a bridge watchkeeping/METOC billet in an FFG at the end of this year, thus re-establishing the role of the METOC officer at sea.

Meteorological Forecasts

As a result of the increase in demand for forecasts during the period, the NWC is considering ways of rationalising its output, without sacrificing quality. A survey to provide the NWC with a more accurate picture of user needs, is being conducted.

An upgraded Electromagnetic Atmospheric Refraction forecast, based on the USN-produced Integrated Refractive Effects Prediction System (IREPS), providing surface to surface, surface to air, and air to air information, has been included on Sydney/Jervis Bay area and Western Australian Exercise Area maritime forecasts.

Oceanography

The analysis of the Western Tasman Sea has continued, with the distribution list for products continuing to grow. The CSIRO Division of Oceanography in Hobart became a new source for satellite sensed sea surface temperatures for the latter half of the period. With the advent of the Man Computer Interactive Data Acquisition System (MCIDAS — see below) an even more reliable source of data will become available. Although MCIDAS will provide enough data to enable an analysis of the South Eastern Indian Ocean including the Leeuwin Current, manpower constraints may preclude this in the short term.

Drifting current buoys deployed in the Western Tasman Sea by 817 Squadron have provided valuable data for the oceanographic analysis of the area.

The ICL DRS300 computer installed in the NWC in 1987 has been linked to the Hydrographic Office by data line. This will permit access to the FACT 10B acoustic model. Demand for Acoustic Sensor Ranging and Prediction (AUSRAP) forecasts has remained constant during the period with peaks occurring during exercises associated with the Bicentennial activities.

Computing Support

During the next few months two major computer systems will be installed in the Naval Weather Centre (NWC). These are designed to:

- expand significantly the NWC's data base;
- provide easy and immediate access to that data base;
- provide compatibility with, and access to, the BOM's digital data communications network; and
- reduce the repetitive and labour intensive tasks associated with the activities of NWC personnel.

The first system to be installed in the NWC will be the Australian Region MCIDAS computer system, consisting of an IBM Personal Computer. This system will be used as an interactive terminal connected by a dedicated data line to a main frame computer housed in the BOM head office in Melbourne.

This terminal will allow NWC forecasters access to a huge source of data. This will include the full range of weather and sea surface temperature satellite imagery for the Australian region, all land and maritime observations in the Australian Meteorological (AUSMET) area, and many computer based forecasting tools including prognoses at various levels in the atmosphere. It will also allow any combination of the products to be displayed on a high definition colour monitor. For example, a satellite image can be overlaid with a surface chart for comparison purposes. In the near future, an updated operating system will allow these products to be available in hard copy. MCIDAS will provide the forecaster, in close to real time, with a much wider range of information, both raw observations and processed data, than is presently the case.

The second system, expected to be installed in late July 1989, is the BOM designed Automated Regional Operational System (AROS). This system will reduce the repetitive and labour intensive tasks associated with the activities of forecasters and observers, and provide the NWC with a large data base for easy and immediate access by meteorological personnel.

AROS will enable the NWC to continue to provide environmental support to defence units operating in the AUSMET areas with a more efficient and effective use of existing manpower. The equipment to be installed in NWC includes two Tandem 640 CLX non stop mini computers, 11 VDU's, four printers and two CALCOMP 1076C plotters, plus additional peripheral communications and interface hardware. The BOM is providing the software to operate the system and an AROS implementation team to set the system to work.

The NWC AROS will be capable of:

- automated communication of NAS NOWRA synoptic observations to the BOM;
- automatic plotting of serological diagrams and meteorological synoptic charts;
- on line access to the BOM data base;
- on line access to the Aeronautical Fixed Telecommunications Network which provides the NWC with meteorological reports from airfields throughout Australia;
- direct input, in due course, of shipping forecasts into the RAN tactical network and DISCON; and
- forecaster access to more sophisticated algorithms.

SECTION 4
PERSONNEL AND TRAINING

PERSONNEL

ORGANISATIONAL CHANGES

The Hydrographic Office Establishment Review was completed and approved in November 1988, and as a result the civilian staff establishment was increased to 103 positions. The principal features of the re-organisation were:

- The establishment of an Operations Facilities Section in Canberra, formed from the Bathymetric Survey Group, previously a division of National Mapping.

- The transfer of Hydrographic Service corporate planning activities to the new Co-ordination and Development Section, headed by Mr Ken Burrows as Director.

- The reclassification of a number of positions to provide a more contemporary mix of technical, professional and management skills to provide for present and future branch requirements.

An organisational diagram and list of key personnel is shown at Appendix 6.

NUMBERS EMPLOYED

The establishment for civilian employees within the Hydrographic Office was 103 on 30 June 1989. 87 positions were filled and 17 restaffing applications were being processed. The average staffing level for the year was 83.

The number of uniformed personnel has not varied greatly during the year however the manning of the four new SML's has placed a strain on personnel resources.

Details of uniformed and civilian staffing levels are shown in Appendix 5.

TRAINING

RAN Hydrographic School, HMAS PENGUIN

The RAN Hydrographic School conducted a full programme of officer and sailor training during 1988/9. As well as Australian students, representatives from Malaysia, New Zealand, the Solomon Islands and Thailand attended. Notably, the RAN's first female Survey Recorder was amongst the successful trainees. Additionally, a female officer is currently under instruction at the School. As well as the major career courses, a variety of training was given to a number of non-hydrographic organisations, including other RAN specialisations and students from the University of New South Wales.

Training documentation for the Basic Survey Recorder Course has been completed and the course length reduced from twelve weeks to ten. A Task Book has been developed to provide consistent on-the-job training for Survey Recorders up to the rank of Leading Seaman. Further development of the Officers' H4 Course has proceeded, albeit slowly due to staff shortages. Significant changes have been made to practical training exercises and assessment procedures.

Training has been supported by two Survey Motor Boats, a dedicated four wheel drive vehicle and a suite of surveying instruments including echo sounders, side scan sonar, EPF systems together with geodetic instruments and geociever equipment. Classrooms have recently been refurbished and afford a more pleasant working environment than hitherto. It is anticipated that an additional classroom will be made available shortly to cater for further increases in training anticipated over the next year.

RAN School of Meteorology

At the end of 1987 RAN METOC officer training was repatriated from the Royal Navy to the Bureau of Meteorology (BOM). The RAN School of Meteorology (RANSOM) assumed the function of training METOC officers in both military Oceanography and Meteorology. This course, of three months duration, is conducted following the year long BOM course. The RANSOM also provides basic and advanced training for RAN Meteorology Sailors.

The throughput for the 12 months to 30 June 1989 has been one Military METOC course, one Basic Meteorological Observers' course, one Advanced Meteorological Observers' course, six Upper Air Meteorology Qualifying courses and six Vaisala Marwin Upper Air Meteorology conversion courses.

The School has also conducted a variety of specialist courses for the Army Parachute Training School, as well as the RAN Long Navigation course, the Small Ship's Flight Commanders course, EXAC Phase One and FOSLEX course. Other specialists within the RAN have also made use of the School's expertise for courses of less than one week duration. These include the Basic Aircrew category and Petty Officer Aircrew qualifying course as well as Electronic Warfare System training for HS748 Flight operators.

Additional commitments carried out by RANSOM during the period were:

- Cyclone comparison studies between Darwin and Cairns for DOA (N), as part of a submission for the building of additional facilities at HMAS CAIRNS; and

- liaison and operations advice for the introduction into service of Vaisala Marwin Systems by the Royal Australian Artillery.



SURVEY INSTRUCTION, RAN HYDROGRAPHIC SCHOOL

Oceanographic Training

The Officer in Charge of the RAN's Applied Oceanography Centre (AOC) is primarily responsible for the planning and provision of all oceanographic training. The AOC is located within the Australian Joint Maritime Warfare Centre (AJMWC) at NAS NOWRA and provides oceanographic training for:

- UC category sailors (General Service and Submariners at both basic and advanced level);
- Principal Warfare Officer, Submariner and EXAC officers' courses;
- Fleet Air Arm (HS 817 SQN and HS 816 SQN);
- Fleet (Pre-Workup and Continuation Training);
- METOC officers under training; and
- 92 Wing RAAF (via the AJAAC sponsored Advanced Acoustics Course and visits to RAAF Base Edinburgh).

To meet this demand the conduct of oceanographic training is split evenly between the Sydney area and NAS NOWRA. All Sydney area establishment oceanographic training has previously been conducted in NAS NOWRA by OIC AOC. With the disestablishment of the PWO Course METOC billet in June 1989 the responsibility for Sydney area oceanographic (and meteorological) training will transfer to the newly created Staff Officer Environmental Prediction billet in the Maritime Command Centre.

Cartographic Branch Training

Staff have been encouraged to avail themselves of the opportunity to undertake part-time studies at educational institutions and to attend Departmental Development instruction classes. Courses in cartographic and related subjects are being undertaken by four officers at Certificate level, while two officers are studying for Degrees and one for an Associate Diploma.

It is becoming increasingly difficult to employ qualified and experienced drafting officers and in-house training has increased accordingly. In-house training is continuous for inexperienced and newly employed drafting officers in basic manual and digital chart compilation procedures, general chart maintenance and production techniques.

General nautical cartographic training was provided to two students from the Solomon Islands Hydrographic Unit, under the sponsorship of the Defence Co-operation Programme. Certificates of competence were issued to both students.

Visits by Naval Officers attending navigation courses (various levels) at HMAS WATSON were made to the Hydrographic Office. Senior drafting personnel gave lectures and guided tours on the activities and production of the Cartographic Branch.

Several staff attended familiarisation visits to RAN Establishments.

SECTION 5
CO-ORDINATION AND DEVELOPMENT

CO-ORDINATION AND DEVELOPMENT

General

The Co-ordination and Development section was formed in April 1988 as a result of the re-organisation of the Hydrographic Service which followed the review of Commonwealth mapping and charting activities. It has the following sub-sections:

- Administration Services
- ADP and Computing Services
- Planning and Resources
- Liaison and Secretarial Services
- Programme Budgeting

BRANCH DEVELOPMENT

The section provides a focus for Branch development, dealt with previously on an ad-hoc basis. Current activities include:

- Information Management Study
- Hydrographic Service Capabilities Study
- ADP Strategic Plan
- Introduction of Programme Budgeting.

LIAISON AND VISITS

The Hydrographic Service has been heavily involved in various National and International forums. Activities have included:

- International Hydrographic Organisation
- Committee on Standards for Digital Data Exchange
- Committee on the Electronic Chart
- Area Lima co-ordinator
- Chart Standardization Committee.
- Australian Association of Port and Marine Authorities.
- Permanent Committee on Tides and Mean Sea Level (PCTMSL).
- Australia-wide chart datum.
- Global Sea Level Observing System (GLOSS).
- IOC and WMO committee for Integrated Global Ocean Services System (IGOSS).

Other committees and conferences in which the Service has been involved include:

- Australian Surveying Industry Advisory Committee.
- Institution of Surveyors, Australia.
- Australian Institute of Cartographers.
- Australian Institute of Navigation.
- Hydrographic Society (Australasian Branch).
- Intergovernmental Advisory Committee on Surveying and Mapping.

The Hydrographic Office has continued to receive working visits from a wide spectrum of people including national and international government officials, military officers, members of the scientific community, commercial maritime and resource industry representatives, and the general public.

APPENDICES

APPENDIX 1

SURVEYS UNDERTAKEN JULY 1988 — JUNE 1989

Ship/Unit	Commanding Officer	Areas
HMAS MORESBY	CMDR R.J. Willis RAN	Thevenard I to Barrow I Ledge Point to Seabird Bass Strait Mary Ann Point to Margaret Cove
HMAS COOK	CMDR B.D. Hunt RAN	Palm Passage to Flinders Reefs
HMAS FLINDERS	CMDR G.J. Geraghty RAN LCDR J.W. Paterson RAN (from 3 October 1988)	Madang to Wewak Great North East Channel Approaches to Daru Approaches to Cairns
HMAS BRUNEI	LCDR M.J. Sinclair RAN	Madang to Wewak
HMAS BETANO	LCDR R.R. Nairn RAN	Madang to Wewak Claremont Isles to Heath Reef
HMAS PALUMA	LCDR M.J. Sinclair RAN (from 27 February 1989)	Gulf of St. Vincent
HODSU	LCDR R.J. Ball RN CMDR G.J. Bond RANEM (29 May — 3 July 1989)	Vanuatu Deep Water Survey Approaches to Davis, Antarctica Solomon Islands Deep Water Survey

APPENDIX 2

CHART PRODUCTION AND MAINTENANCE

New Chart Production	<u>1986/87</u>	<u>1987/88</u>	<u>1988/89</u>
New Charts Published	5	11	17
New Editions Published	14	12	8
New Charts/Diagrams for RAN use	6	23	18
Miscellaneous Charts	1	1	1

Chart Maintenance

Modified facsimiles of BA charts	1	0	2
Notice to Mariners block corrections	32	41	36
Revisions by reprinting	164	180	197
Revisions by screen printing	—	36	140
Miscellaneous Graphics	75	77	64

Chart Printing

New charts	5	11	17
New editions	14	12	8
Revised charts	164	180	197
Reprinted charts	206	165	153
Facsimile reproductions	0	0	1
Modified reproductions	1	0	2
Charts for Fleet purposes	4	4	4
Miscellaneous charts	1	0	19

Chart printing by RA Survey Regiment Bendigo, Victoria -- 402 charts. 268,752 copies.

CHART SCHEME STATISTICS 30-6-89

Category/Scale	Published Imperial	Published Metric	Total Published	Total Planned
1:150 000 Aus. PNG	29	56	85	199
1:300 000 Aus. PNG	42	18	60	101
1:1 000 000 Aus, PNG, Antarctica	5	3	8	34
1:500 000 and smaller Aus, PNG, Antarctica	2	1	3	9
Large scale 1:5 000 to 1:100 000				
Aus	21	89	110	189
PNG	27	2	29	40
Antarctica	3	1	4	4
Territories & Reefs	3	2	4	19
International Charts				
1:1 500 000	0	1	1	20
1:3 500 000	0	6	6	6
1:10 000 000	0	1	1	1
Recreational Charts				
PC (Pleasure Craft) series	2	5	7	12
Y (Yachting) series	1	3	4	4
RAN Fleet series	19	9	28	40
Diagrams	17	8	20	40
Totals:	170	199	369	718

The United Kingdom Hydrographic Department continues to maintain 47 of their originally published charts in the Australian area of charting responsibility. These charts are included in the planned totals above under their respective series.

DESCRIPTIONS OF NEW CHARTS PUBLISHED

Aus 257 Townsville Harbour and Ross River Entrance (published 3-9-88)

A large scale chart at scale 1:7500 to replace Townsville Harbour plan previously published on chart Aus 256. South-east of the main harbour is the Ross River Channel and access to small craft and commercial fishing craft moorings opposite Ross Island and the South Townsville region. This chart now provides greater scope to accommodate changes due to future harbour development and planning.

Aus 57 Dampier Archipelago (published 22-8-88)

Following the withdrawal of chart Aus 58 originally published in 1969, it became necessary to support two new large scale charts of Port Dampier (Aus 58 of 1988 and Aus 59 of 1987) with an additional chart at a suitable scale, 1:75 000, to feature the islands and waters throughout the extent of the Dampier Archipelago. This chart provides access to Port Dampier from the western approach, Mermaid Strait, and also provides coverage of Nickol Bay for future development and surveys.

Aus 334 Ledge Point to Cape Naturaliste (published 30-9-88)

This metric unit chart, 1:300 000 scale, replaces former chart Aus 334 of imperial units, same scale published 1970. The new chart provides ocean transit from the deeper waters of the Indian Ocean, beyond the continental shelf, to the larger scale navigation chart series occupying the southern Western Australia coastal region. Included are RAN surveys completed between 1976 and 1982.

Aus 289 Gannet and Varzin Passages (published 30-9-88)

RAN surveys to the north of Varzin Shoal revealed a broader and deeper expanse of water to approach Prince of Wales Channel than the regular access through Gannet Passage north of Booby Island. This large scale chart 1:25 000 has been published in advance of established navigation aids to mark safe shipping routes through Varzin Passage.

Aus 292 Adolphus Channel to Prince of Wales Channel
(published 30-9-88)

Replaces chart Aus 292 previously published 1970. Geographical limits have been considerably adjusted to provide continuous navigation from Adolphus Channel to Prince of Wales Channel and to adjoin planned chart coverage of the main shipping routes through Torres Strait at scale 1:75 000. Sounding datum has been adjusted to Lowest Astronomical Tide in accordance with Torres Strait charting policy.

Aus 294 Endeavour Strait
(published 28-11-88)

Another Torres Strait large scale chart in the 1:75 000 scale series. It adjoins Aus 292 (see above) and replaces former British Admiralty charts 3783 and 3782 published in 1953. The chart includes a plan, 1:20 000 scale, of the approaches to Red Island Point.

Aus 256 Cleveland Bay and Approaches
(published 16-1-89)

This chart was produced following the publication of Aus 257 in September 1988 (see previous). It replaces Aus 256 published in 1974. Geographical limits have been amended to include Rattlesnake and Herald Islands occupying the western approach to Magnetic Island.

Aus 335 Cape Naturaliste to Point D'Entrecasteaux
(published 7-12-88)

Modernization in metric format of chart Aus 335, at scale 1:300 000, published in 1971. Its limits provide navigation coverage between Bunbury in the north, south around Cape Naturaliste and Cape Leeuwin to the Southern Ocean. Included are extensive RAN surveys between 1975 and 1978.

Aus 314 Sahul Banks
(published 12-6-89)

A chart in the 1:300 000 scale national series to replace Aus 314 of imperial unit measurement, published in 1966. This chart has been reproduced to include data from the national Bathymetric Survey programme and to include a plan of Ashmore Reef Anchorage, 1:37 500, based on RAN 1987 surveys.

Aus 725 Port Keats to Victoria River
(published 15-5-89)

A coastal navigation chart at scale 1:150 000. Charted information affords navigable passages through the eastern waters of Joseph Bonaparte Gulf to the delta of the Victoria River, and in the north, entry to Port Keats. The chart includes extensive RAN surveys of 1979-85.

Aus 727 Rocky Islet to Eclipse Islands
(published 9-6-89)

A coastal navigation chart of the 1:150 000 scale national series. Covering the western side of Joseph Bonaparte Gulf, it provides access to Napier Broome Bay and Vansittart Bay not previously charted at this scale. Includes RAN surveys of 1971-87. Coastline is derived from modern topographic mapping.

Aus 729 Cape Voltaire to Lamarack Island
(published 30-6-89)

A coastal navigation chart of the 1:150 000 scale national series. This chart portrays the northern islands of the Bonaparte Archipelago and entry to Montague Sound and includes RAN surveys conducted between 1944-48 and 1986-87 as well as data from the national Bathymetric programme. Coastal and offshore islands have been fixed by modern topographic mapping.

Aus 730 Lamarack Island to Degerando Island
(published 1-6-89)

A 1:150 000 scale coastal navigation chart, adjoins Aus 729 (see above). The chart includes the southern portion of the Bonaparte Archipelago between York Sound and Camden Sound and portrays the waters of St. George Basin and the entrance to Prince Regent River. Coastline and offshore island features are based on modern topographic mapping.

Aus 701 Vrilya Point to Duyfken Point
(published 30-6-89)

A coastal navigation chart of the 1:150 000 scale national series. The charted area portrays navigable coastal waters from Vrilya Point to Port Musgrave and south to the port of Weipa. Areas of significant navigational importance were surveyed by the RAN between 1976-83.

Aus 310 Cape Van Diemen to Masela
(published 30-6-89)

A 1:300 000 scale chart to replace that published in 1967 in imperial measurements. The new chart includes data from the national Bathymetric Survey programme, and soundings from the international GEBCO series ocean sounding sheets.

Aus 312 Dillon Shoal to Timor
(published 30-6-89)

A chart in the 1:300 000 scale national series which provides access to the northeastern area of Sahul Banks and further north to Timor. The chart includes data from the national Bathymetric Survey programme and the international GEBCO series ocean sounding sheets.

Aus 315 Darwin to Penguin Shoal, Western Sheet
(published 30-6-89)

A 1:300 000 scale chart to replace that published in 1966 in imperial measurements. The chart provides coverage of preferred routes for international shipping from the Timor Sea to the Indian Ocean, and includes data from the national Bathymetric Survey programme.

DESCRIPTIONS OF NEW EDITION CHARTS

Aus 253 Plans on the East Coast of Australia
(printed 3-10-88)

This chart was revised to include an additional plan of Shute Harbour at 1:15 000, and to include a survey of Gloucester Passage by Dept. of Harbours and Marine of 1984.

Aus 296 Goods Island to Proudfoot Shoal
(printed 30-11-88)

General revision and vertical datum change to Lowest Astronomical Tide in accordance with Torres Strait charting policy. Includes RAN surveys of 1987 and 1988.

Aus 728 Eclipse Islands to Cape Voltaire
(printed 3-12-88)

Revised to include extensive RAN surveys of 1986-87 of Holothuria Banks and the Institut Islands area. Coastline and adjoining features have been updated from modern topographic mapping. The chart also includes survey data from the national Bathymetric Survey programme.

Aus 4 Approaches to Weipa
(printed 22-3-89)

A general revision which included hydrographic information from 1988 surveys conducted by the Department of Harbours and Marine.

Aus 726 Approaches to Cambridge Gulf
(printed 29-4-89)

Revised to include RAN surveys of 1975-80 throughout the eastern area of the chart. Vertical datum has been adjusted to Lowest Astronomical Tide.

CHARTS IN PRODUCTION (30th June 89)

NC -- New Chart
NE -- New Edition

Chart No.	Category	Title	Scale	State/Locality
Aus 732	NC	Hall Point to Sunday Islands	1:150 000	WA
Aus 733	NC	Buccaneer Archipelago and King Sound	1:150 000	WA
Aus 316	NC	Charles Point to Pelican Islet	1:300 000	NT
Aus 319	NC	Penguin Shoal to Browse Island	1:300 000	Indian Ocean
Aus 311	NC	Timor Sea (Eastern Sheet)	1:300 000	Timor Sea
Aus 312	NC	Timor Sea (Central Sheet)	1:300 000	Timor Sea
Aus 318	NC	Pelican Island to Penguin Shoal	1:300 000	NT
Aus 320	NC	Browse Island to Adele Island	1:300 000	WA
Aus 323	NC	Adele Island to Lacepede Island	1:300 000	WA
Aus 301	NC	Booby Island to Archer River	1:300 000	QLD
Aus 309	NC	Darwin to Penguin Shoal (Eastern Sheet)	1:300 000	NT

To commence August 1989 -- a number of the charts listed below have previously been manually compiled or partially digitised but were temporarily suspended owing to urgent priority requirements of the above listed charts.

Chart No.	Category	Title	Scale	State/Locality
Aus 602	NC	Approaches to Davis	1:25 000	Antarctica
Aus 832	NE	Cape Flattery to Barrow Point	1:150 000	QLD
Aus 835	NE	Cape Weymouth to Cairncross Islets	1:150 000	QLD
Aus 333	NC	Geraldton to Ledge Point	1:300 000	WA
Aus 828	NE	Palm Isles to Brook Islands	1:150 000	QLD
Aus 119	NE	Western Approaches to Esperance	1:75 000	WA
Aus 112	NE	Approaches to Fremantle	1:37 500	WA
Aus 763	NC	Cape Le Grande to Cape Pasley	1:150 000	WA
Aus 236	NE	Moreton Bay	1:75 000	QLD
Aus 249	NE	Hay Point to Penrith Island	1:75 000	QLD
Aus 200	NE	Port Jackson	1:20 000	NSW
Aus 235	NE	Approaches to Moreton Bay	1:75 000	QLD
Aus 248	NC	Port Clinton	1:25 000	QLD
Aus 343	NC	Whidbey Isles to Cape Couedic	1:300 000	SA
Aus 762	NC	Rocky Islands to Cape Le Grande	1:150 000	WA
Aus 260	NC	Broad Sound Channel and Shoalwater Bay	1:75 000	QLD
Aus 388	NC	Karkar Island to Kairiru Island	1:300 000	PNG
Aus 839	NE	Cairncross Islets to Arden Island	1:150 000	OLD
Aus 384	NC	Cape Vogel to Cape Nelson	1:300 000	?
Aus 500	NC	Bramble Cay to Fly River	1:150 000	PNG
Aus 4634	NC	Mackay to Port Moresby	1:1 500 000	QLD/PNG
Aus 156	NE	Western Port The Entrance	1:37 500	VIC
Aus 149	NC	Western Port	1:75 000	VIC
Aus 152	NC	Hanns Inlet	1:7 500	VIC

APPENDIX 3

HYDROGRAPHIC INFORMATION RECEIVED DURING THE YEAR

Hydrographic Information Received from RAN Sources

HMAS MORESBY	HI 130	Bass Strait
	HI 138	Ledge Pt to Seabird Entrance Shoals to Tamar River
HMAS FLINDERS	HI 126	GEBCO - Coral Sea, Bismark Sea PNG, Solomon I
	HI 129	Wewak to Madang PNG Vigia Investigations
	HI 132	Great North East Channel
	HI 134	Eastern Approaches to Daru
	HI 144	Cape Flattery Wharf
	S.O.P.	Cairns to Bramble Cay
	GEBCO	N.E. Coast of Australia, PNG, Solomon I
	—	Possession I Anchorage Investigation
HMAS BETANO	HI 121	Claremont Isles to Heath Reef Part II
	HI 129	Vigia Investigations
HMAS BRUNEI	HI 129	Bogia, Roil, Kinim Sketch Surveys Vigia Investigations
HMAS GEELONG		Shell Harbour Survey
HMAS COOK	HI 139	Palm Passage to Flinders Reefs
	GEBCO	Sydney to Honiara
HODSU (MV CAPE PILLAR)	HI 128	Vanuatu Bathymetric Survey
	S.O.P.	Brisbane to Vanuatu
HODSU	HI 120	Approaches to Davis Anchorage
	S.O.P.	Heard I
HMAS CESSNOCK		Charles Point to Pelican Islet
HMAS BENDIGO		Cape Voltaire to Adele I

Hydrographic Information Received from Non-Service Sources

Source	General Locality	Title or Location of Survey
NEW SOUTH WALES		
MSB	Iluka Lord Howe I Newcastle	Clarence River North Passage Mooring Area and Jetty Dyke Berths No. 5 & 6 Hunter River - Morpeth to Green Rocks Hunter River -- North Arm Hunter River -- Tomago Newcastle Harbour Steelworks Channel The Carrington Basin The Horseshoe Trial Bay Wharf Road Soldiers Point Darling Harbour No 4 & 5 Darling Harbour Darling Harbour (South) Goat I to Harbour Bridge Johnston Bay and White Bay Area Map of Main Wharfage, Port of Sydney Pyrmont Berths Woolloomooloo Bay (South) Woolloomooloo Bay
Port Const'n & Repair Group	Port Stephens Sydney	Boolambayte Lake -- Korsman Landing Bungwahl, Corrigan's Bay Myall Lake
PWD	Eden Shell Hbr. Ulladulla Yamba	Eden Breakwater Extension Eden Harbour Proposed Boat Harbour Site Ulladulla Harbour Mini-Port Yamba Boat Harbour
Sydney Harbour Tunnel Company	Sydney	General arrangement -- Structure of Immersed Tube
Waterboard	Sydney	North Head, Malabar and Bondi Sub-Ocean Outfalls

QUEENSLAND

AUSLIC	Great Barrier Reef	Bait Reef Bowden Reef Bushy/Redbill Reef Cockburn Reefs Denham Passage Little Black Reef Middle Banks Pompey Reef Queue (and Wreck) Reef Quoin Island Ribbon Reef and Adjacent Reefs Sandpiper Reef Sir Charles Hardy Island Tern Reef
Cairns Harbour Board	Cairns	Trinity Channel
Cairns Port Authority	Cairns	Port of Cairns Wharfs Trinity Channel Trinity Entrance Channel
Department of Harbours and Marine	Brisbane Bowen	Wynnum Creek Boat Harbour Marine Boat Harbour Entrance Harbour — Wharf No.1 & 2 North Entrance Channel Wharf and South Entrance Channel
	Gladstone	Auckland Pt Wharves Barney Pt Wharf Clinton Pt Wharf Marine Siltation Seaway and Approaches Wharf Area River Entrance Kangaroo i to Tabby-Tabby I Port Alma Approaches to Thursday I — Correction to light characteristics
	Gold Coast Mourilyan Mooloolaba Moreton Bay Rockhampton Torres Strait	Cora Bank En.bley River Fairway to Port Limit Gonbung Shoal Upstream of Evans Landing Wharf
	Weipa	
Army Survey Corps	Townshend I.	Townshend Island Coastline Plot
Gladstone Port Authority	Gladstone	Calliope River Mouth Calliope River to Auckland Creek Clinton Wharf Extension Gladstone Port Development Marina Development
GBRMPA	GBR	Green Arlington Transection
Mackay Port Authority	Mackay	Mackay Harbour
Mapping and Hydrographic Survey	G. Coast Whitsunday Passage	Coomera River Channel Hamilton I Submarine Powerline
Brisbane Port Authority	Brisbane	Moreton Bay Outer Bar. Pelican Banks
Surveyor General	Thursday I	Approaches to Thursday I — Nomenclature correction
Townsville Harbour Board	Townsville	Ross River

SOUTH AUSTRALIA

Department of Marine and Harbours	Adelaide	Hallet Cove, Christies Beach O'Sullivan Beach Boat Ramp Site Pt Hundred, Noarlunga Port Adelaide and Approaches Corrections and Amendments Crude Oil Berth American River — Soundings Ballast Head Wharf — Soundings South End — Soundings
	Port Stanvac	
	Kangaroo I	
	Rivoli Bay	
	Kangaroo I	
D. Fitzhenry and Partners Harbourworks, Clough	Port Bonython	C.S.R. Ballast Head Wharf Story Point Liquids Terminal

TASMANIA

Burnie Port Authority	Burnie	Burnie Cargo Berth Burnie Harbour General Cargo Berth McGaw Berth Reconstruction Southern Ro-Ro Berth Tanker Berth Structure
Smith Shipping	Tasman Peninsula	Fortescue Bay

VICTORIA

Melbourne Port Authority	Corner Inlet	Entrance to Lewis Channel Port Albert Channel Port Welshpool Jetty and Boat Harbour Port Welshpool — Lewis Channel Pier to Jetty Lakes Entrance Cunningham Arm — Approaches to Fuel Jetty Cunningham Arm Lake Wellington Avon River Entrance Latrobe River Entrance Approaches to Marine Terminal Hobsons Bay — Approaches to Webb Dock Inner Entrance Part of Nepean Bank Port Melbourne Channel South Channel West Channel
	Gippsland Lakes	
	Port Phillip	
	Western Port	East Arm — Freeman Pt Flinders Jetty Hastings Jetty North Arm — Crib Pt North Arm — Lysaghts Pt. Approaches and Berthing North Arm — Stony Pt Jetty North Arm — Watson Inlet Phillip I — Approaches to Rhyll Jetty Vicinity of Cowes Jetty Vicinity of Newhave Jetty Port of Portland

WESTERN AUSTRALIA

Australian Survey Office
BHP Engineering

Browse I
Timor Sea

Browse I Lighthouse
Ammaroo Site Survey
Asterias Site Survey
Eclipse 2 Site Survey
Cassini/Challis Field-
Restricted Anchorage Area
Challis 2, 3, 4 and 5 Site Surveys
Jabiru Field -- Restricted Anchorage Area
Jabiru 1A, 5 Site Surveys
Montara Site Survey
Oliver Site Survey
Rainier Site Survey
Santo Site Survey
Skua Field -- Restricted Anchorage Area
Wittecarra Site Survey
10 KM Enclulsion Zones

Marine and Harbours

Bunbury

Harbour Approaches Channel Soundings
Harbour and Channel Survey
Rock Area Investigation
Siltation West of Breakwater
Spoil Area Soundings
Coastal Soundings
Soundings
Harbour Survey
Norcape Lodge, Town Beach
Bluff Leads Investigation
Foreshore and anchorage
Approaches to Denham
Denham Fishing & Recreation Facilities

Busselton
Cambridge Gulf
Esperance
Exmouth Gulf
Geraldton
Ledge Pt
Shark Bay

OVERSEAS

Indonesia
Holland

Indonesia
Indonesia

Selaru
Nusa Tenggara
Zuidkust Timor

France

Coral Sea
Tasman Sea
South Pacific

Fishing Zones
Fishing Zones
Coral, Solomon and adjacent seas

New Zealand
Solomon I

South Pacific
Solomon I

Tuvalu, Funafuti
Ranadi Beach, East Honiara

ANTARCTIC REGION

NATMAP

Vestfold Hills

PUBLISHED CHARTS

BMR

Australasia

Magnetic Variation Charts

BOATING CHARTS

Deparument of
Marine and Harbors
Department of
Marine and Harbours

SA
WA

Port Vincent
Semaphore to Marino
Quinns Rocks

TOPOGRAPHIC MAPS

AUSLIG	18
Joint Operation Graphic	17
RASC	248
SUNMAP	1
TASMAP	19
M&H WA	38
DAS WA	13

BATHYMETRIC MAPS

AUSLIG

Ashmore Reef
Burnabbie
Echo Shoals
Heywood Shoals
Lynher Bank
Maitland
Pemberton
Scott South
Seringapatam
Timor Trough
Wilson Promontory
Shark Bay

BATHYMETRIC MANUSCRIPT

AUSLIG

Reports of Survey

Gove
Blue Mud Bay
Port Langdon
Roper River
Cape Beatrice
Mount Young
Pellew
Robinson River
Ruthland Plains
Mornington
Cape Van Diemen
Port Clinton
Mackay
Great Barrier Reef No. 2-1981
Continental Shelf No. 1-1988

SATELLITE IMAGERY

AUSLIG

WA
QLD

NT
PNG

Admiralty Gulf
Ayr
Bowen
Bundaberg
Capricorn Group
Daintree
Innisfail East
Lizard Island
Mackay
Palm Island
Percy Isie
Percy Isie North
Proserpine
Swain Reefs
Darwin
Melville Island
Goshen Strait
Milne Bay

APPENDIX 4

DISTRIBUTION AND SUPPLIES

Sales and distribution of charts and associated publications

		<u>1986/87</u>	<u>1987/88</u>	<u>1988/89</u>	<u>%</u>
Australian	issued	27123	29166	32208	21
	sold	124680	116360	118526	79
British	issued	6035	14527	17234	
	sold	14658	9779	6204	
New Zealand	issued	264	1458	1514	
	sold	918	720	208	
Canadian	issued	30	16	44	
	sold	70	68	69	
Total		173778	172094	176007	

Value of charts and associated publications sold (excluding sales tax)

	<u>1986/87</u>	<u>1987/88</u>	<u>1988/89</u>
	\$	\$	\$
Australian	706,589	706,030	889,188
British	104,301	104,328	96,484
New Zealand	1,846	3,131	2,575
Canadian	455	442	455
Total	813,191	813,931	988,703

Revenue

	\$
Net Sales as per Sales Summary	988,703
Plus sales Tax	71,192
Plus Freight & Sundries	8,873
Total	1,068,731

Retail Chart Prices (includes sales tax)

	<u>1986/87</u>	<u>1987/88</u>	<u>1988/89</u>
	\$	\$	\$
Australian	10.60	11.10	14.38
British	22.47	27.82	23.09
New Zealand	12.23	13.81	13.81
Canadian	7.26	7.26	7.26

APPENDIX 5

UNIFORMED AND CIVILIAN STAFFING LEVELS

Uniformed

Hydrographic Survey Specialists

The numbers of PNF hydrographic specialists in the Hydrographic Service on 30 June 1989 were as follows (1988 figures in brackets):

Rank	Billets	Manning
Commodore	1	1 (1)
Captain	1	1 (1)
Commander	3	3 (4)
Lieutenant Commander	9	13 (8)
Lieutenant	16	13 (20)
Sub Lieutenant	0	0 (2)
WOSR	1	1 (1)
CPOSR	6	6 (6)
POSR	12	12 (8)
LSSR	20	16 (18)
ABSR/SMNSR	42	36 (37)
Totals	111	102 (96)

The number of Reserves on active service were:

Commander	1
Lieutenant Commander	1
Lieutenant	1

Meteorological and Oceanographic Specialists

The numbers of Meteorological and Oceanographic (METOC) specialists on 30 June 1989 were as follows (1988 figures in brackets):

Rank	Billets	Manning
Commander	2	5 (4)
Lieutenant Commander	6	6 (6)
Lieutenant	4	5 (7)
Sub Lieutenant	0	0 (1)
WOM	1	1 (1)
CPOM	2	2 (3)
POM	5	6 (6)
LSM	12	16 (13)
ABM	30	24 (22)
SMNM	0	0 (10)
Totals	62	65 (73)

Civilian

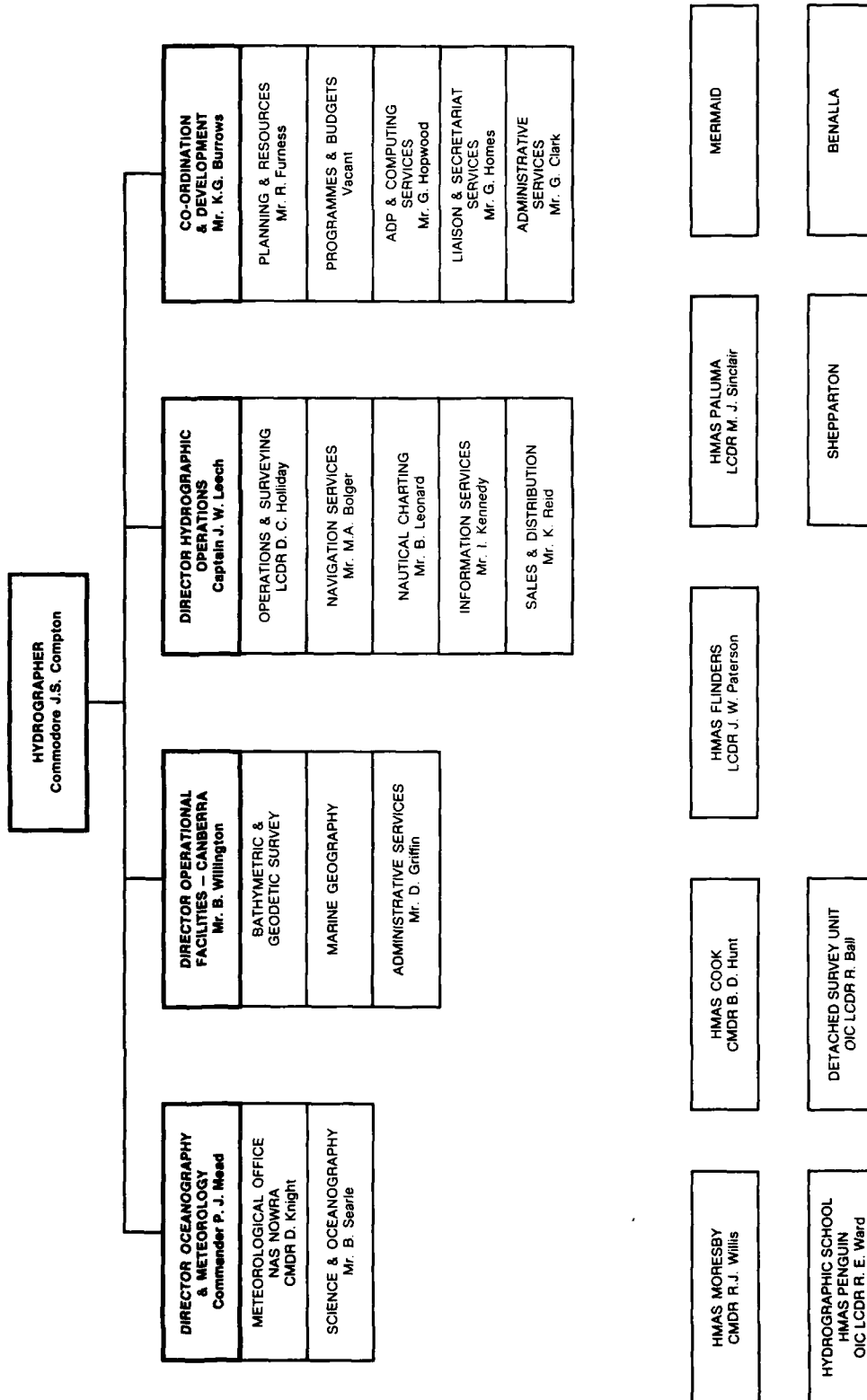
The following civilian personnel were employed in the Hydrographic Service on 30 June 1989:

	Establishment	Average Staffing Level	Manning (30/6/89)
Co-ordination and Development	7	7	6
Cartographic	44	28	35
Cartographic Trainee	2	2	2
System Support	12	8	8
Survey Branch	6	6	6
Science Branch	6	6	6
Information Services	16	16	15
Administration	8	8	7
Naval Defence Act	2	2	2
Operational Facilities (Canberra)	39	35	31
Totals	142	118	118

APPENDIX 6

HYDROGRAPHIC SERVICE KEY PERSONNEL DIRECTORY

Canberra		STD:062
Hydrographer, RAN	Commodore J S Compton AM RAN	527 451
Staff Officer Hydrography	Lieutenant Commander R W Quarrill RAN	525 177
Director Oceanography and Meteorology	Commander P J Mead RAN	526 615
Oceanographic Staff Officer	Lieutenant Commander C A Low RAN	(02)9254 873
Director Operational Facilities	Mr B Willin	525 169
Administrative Services Officer	Mr D Griffin	526 592
Nowra		STD:044
Commander Naval Weather Centre	Commander D J Knight RAN	211 268
Sydney — Operations		STD:02
Director Hydrographic Operations	Captain J W Leech RAN	9254 801
Head Operations and Surveying	Lieutenant Commander D C Holliday RAN	9254 804
Staff Officer Operations	Lieutenant C K Ellis RAN	9254 817
Quality Control Officer	Lieutenant Commander B J Kafes RAN	9254 808
OIC Detached Survey Unit	Lieutenant Commander R Ball RN	9254 894
Tidal Officer	Mr B Pillich	9254 872
Survey Equipment Officer	Warrant Officer K D Slade	9254 812
Head Science and Oceanography	Mr B J Searle	9254 870
Head Navigation Services	Lieutenant Commander M A Bolger RANEM	9254 850
Sailing Directions Officer	Captain J J Doyle RANEM	9254 850
Head Nautical Charting	Mr B C Leonard	9254 830
Supervisor System Support	Mr B Rowland	9254 854
Supervisor Chart Maintenance	Mr G Milby	9254 820
Manager Information Services	Mr I Kennedy	9254 853
Manager Chart Distribution	Mr K Reid	9254 880
Sydney — Co-ordination and Development		STD:02
Director Co-ordination and Development	Mr K G Burrows	9254 803
Staff Officer Systems	Lieutenant Commander L J Gee RAN	9254 802
Head Planning and Resources	Mr R A Furness	9254 844
Staff Officer Planning	Lieutenant M E Prince RAN	9254 813
Head Computing Services	Mr G Hopwood	9254 871
Administrative Services Officer	Mr G Clark	9254 809



HYDROGRAPHIC SERVICE RAN — KEY ADDRESSES

Addresses as at 30 June 1989.

SYDNEY

RAN Hydrographic Office
161 Walker Street
NORTH SYDNEY NSW 2059

P.O. Box 1332
NORTH SYDNEY NSW 2060

Switch: (02)925-4800

Telex: AUSHYD AA 72669

Fax: (02)925-4835

Signal: HYDRO SYD

Canberra

Office of the Hydrographer, RAN
Unit 3Gc
Cameron Offices
Cnr Cameron Ave & Edmonds Place
BELCONNEN ACT 2616
Phone: (062)527-451
Fax: (062)531-693
Signal: HYDRO RAN

Operations Facilities Section
Unit 3Gc
Cameron Offices
Cnr Cameron Ave & Edmonds Place
BELCONNEN ACT 2616
Phone: (062)525-169
Fax: (062)531-683

FIELD UNITS

Naval Weather Centre
Naval Air Station
NOWRA NSW 2540
Phone: (044)21-1269

HMAS MORESBY
C/- HMAS STIRLING
P.O. Box 228
ROCKINGHAM WA 6168
Phone: (09)527-0470

HMAS FLINDERS
C/- HMAS CAIRNS
Draper Street
CAIRNS QLD 4870
Phone: (070)50-3311

HMAS COOK
C/- Warships
SYDNEY NSW 2890
Phone: (02)359-9111

RAN Hydrographic School
HMAS PENGUIN
C/- Naval Post Office
BALMORAL NSW 2890
Phone: (02)960-0264

ILLUSTRATIONS

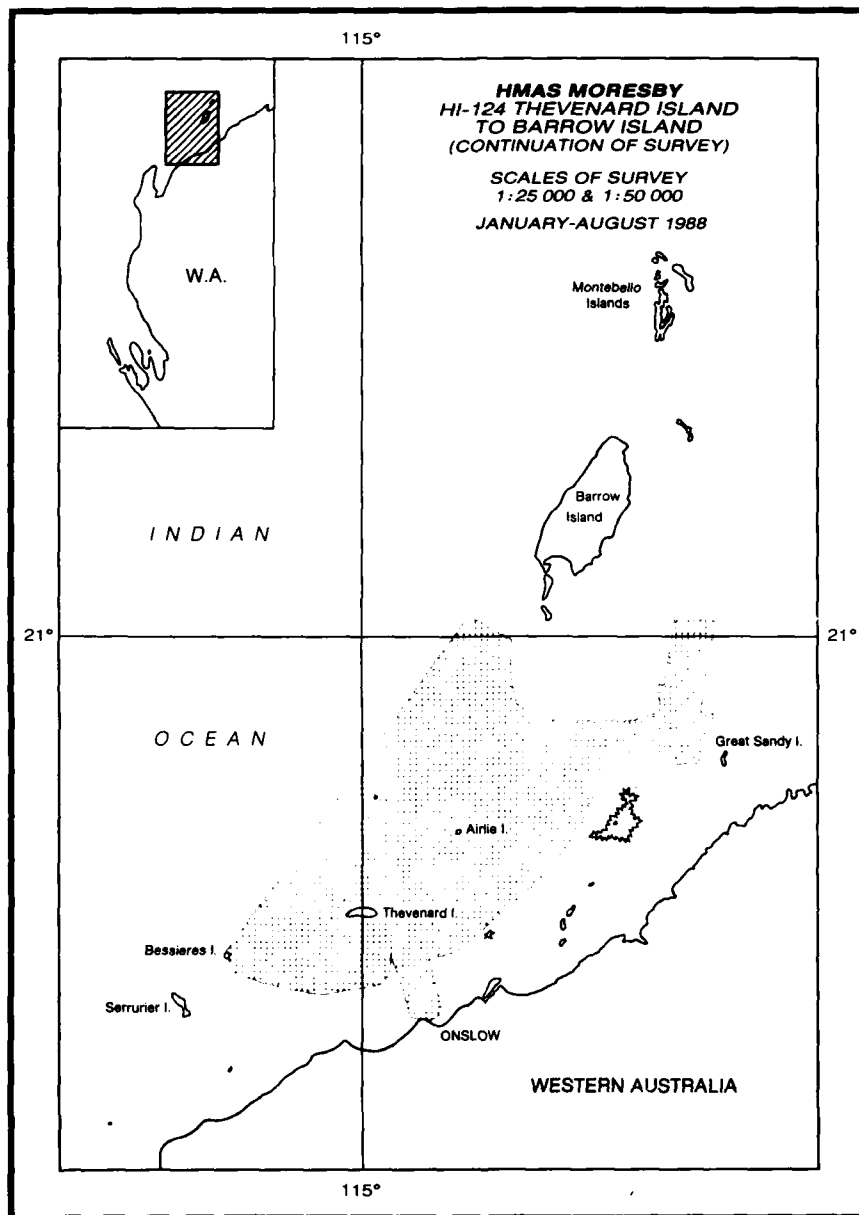


FIG.1

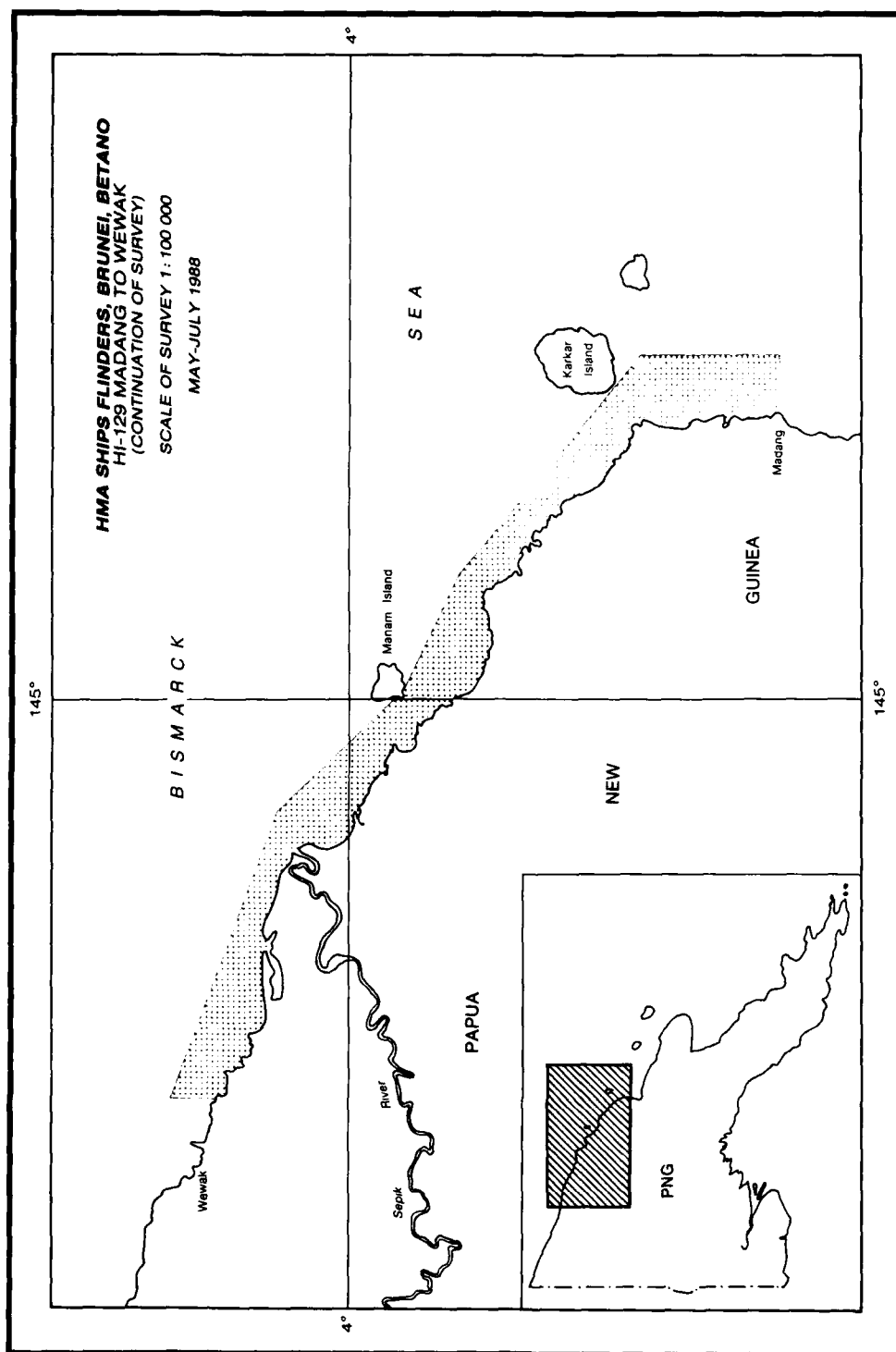


FIG.2

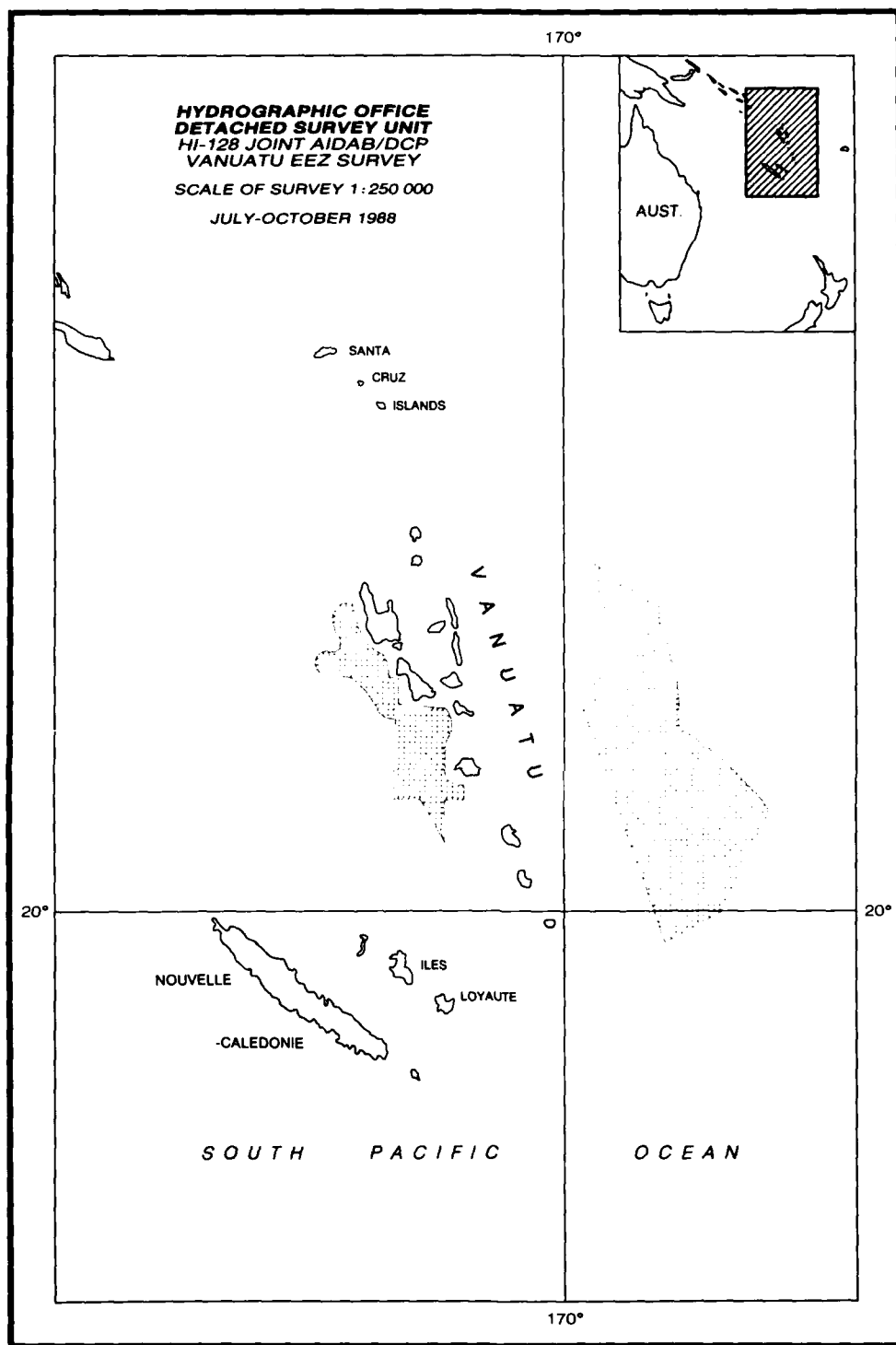


FIG.3

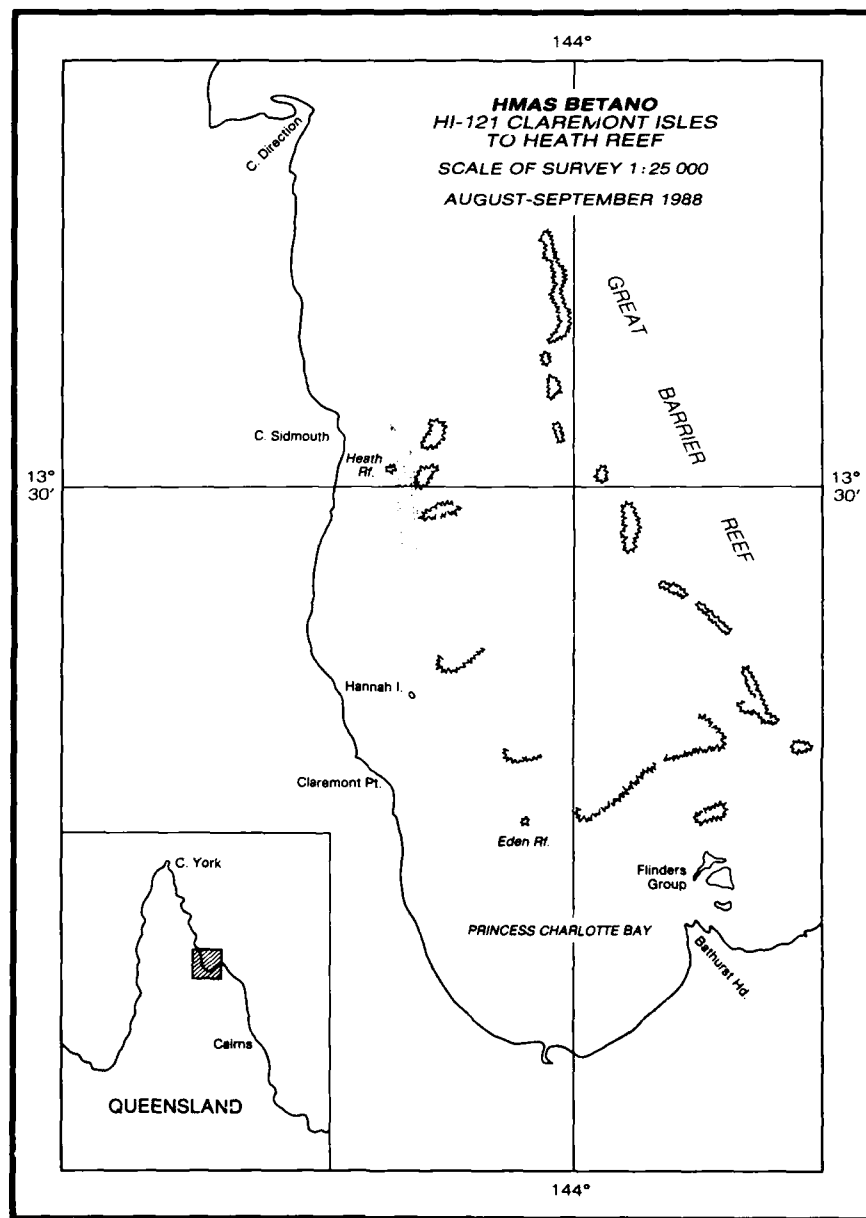


FIG.4

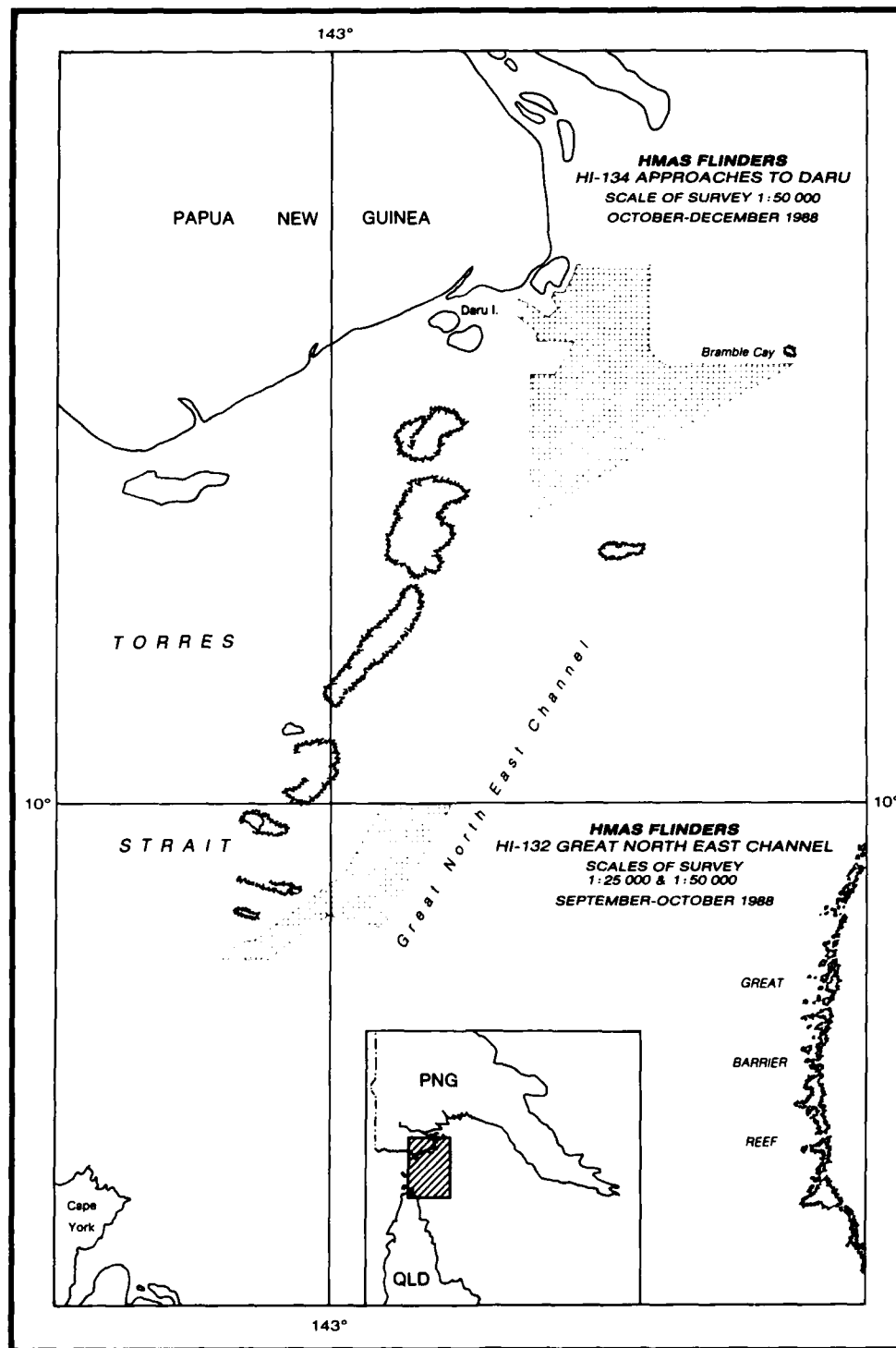


FIG.5

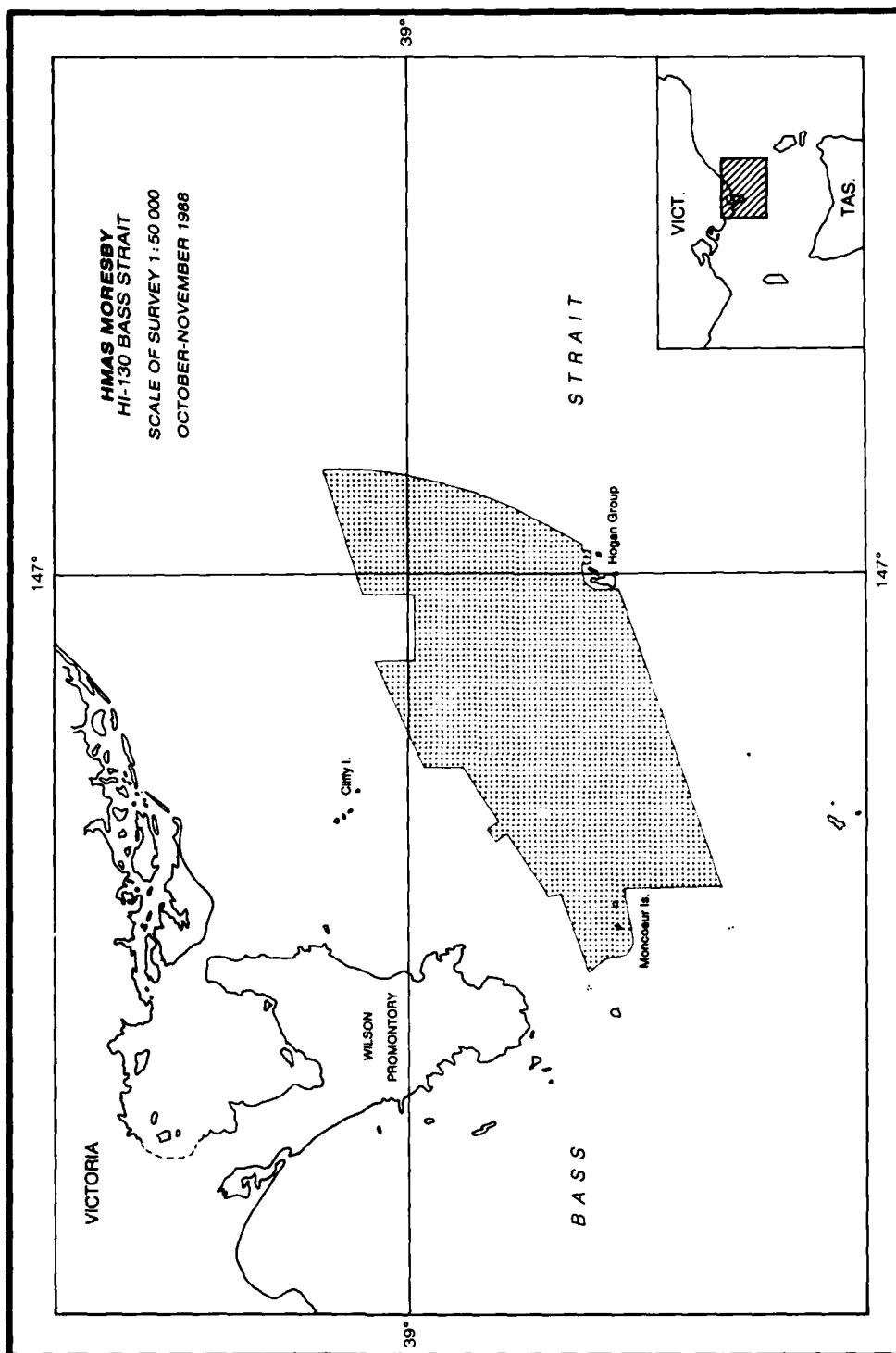


FIG. 6

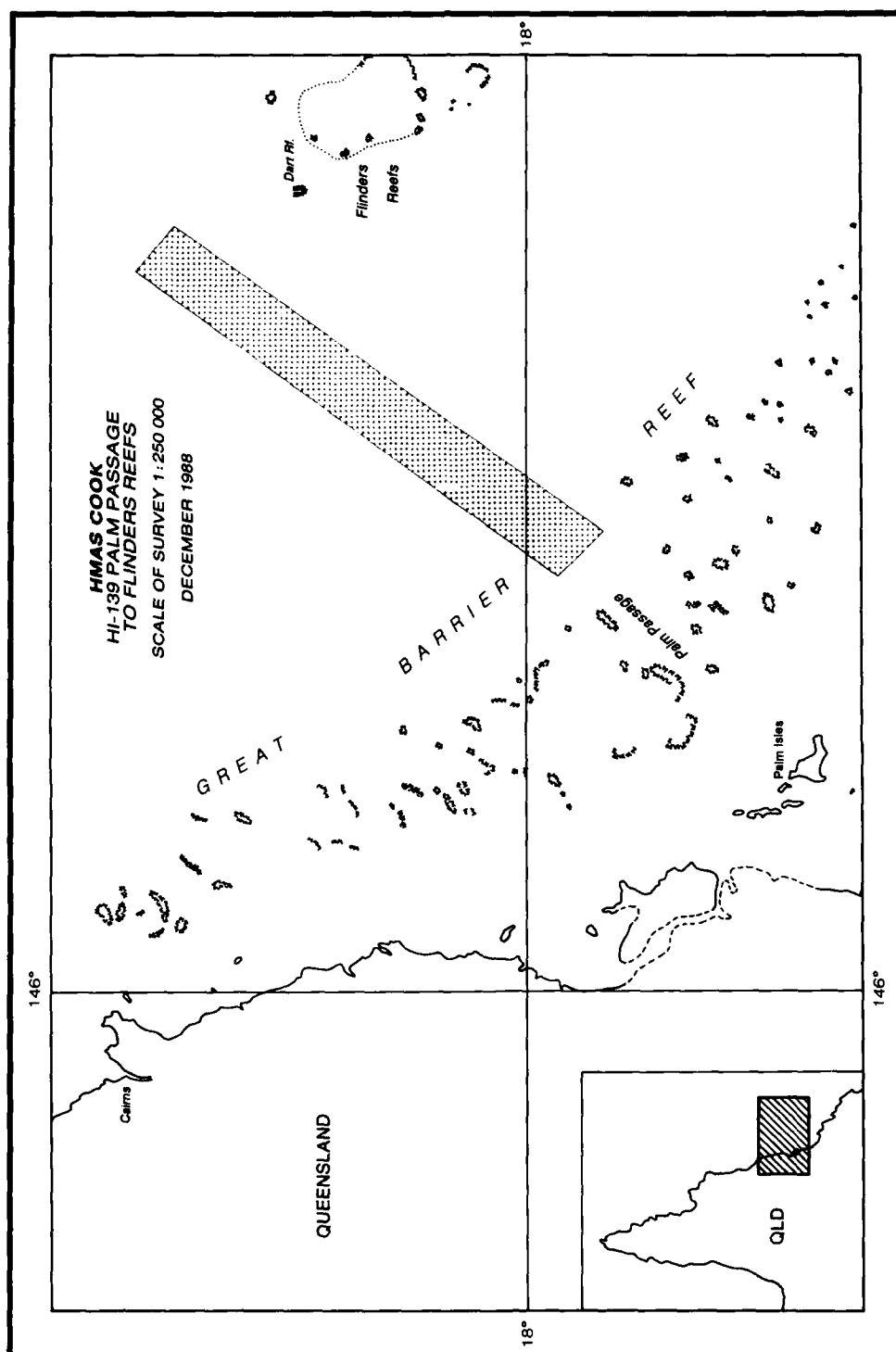


FIG.7

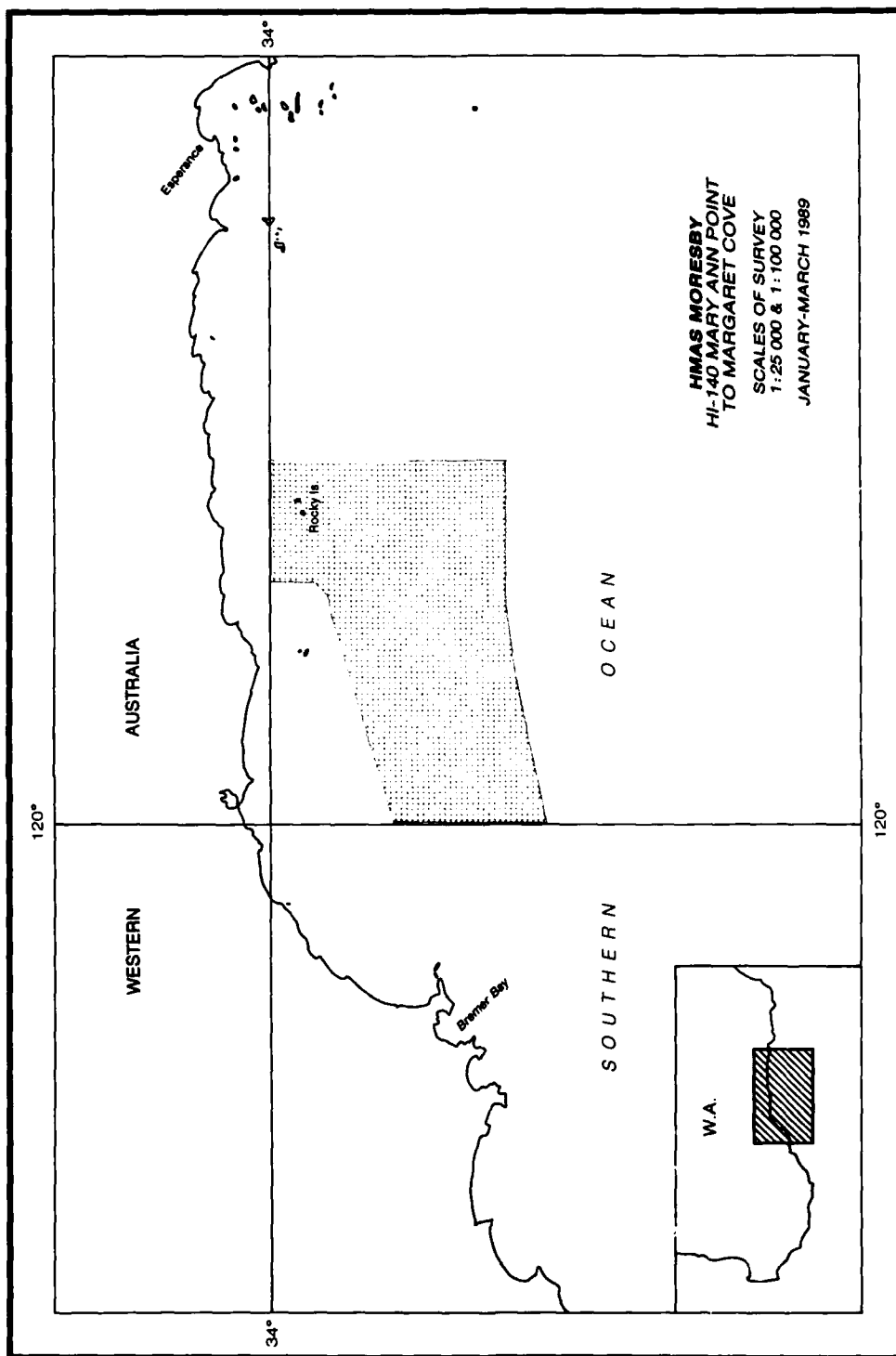


FIG.8

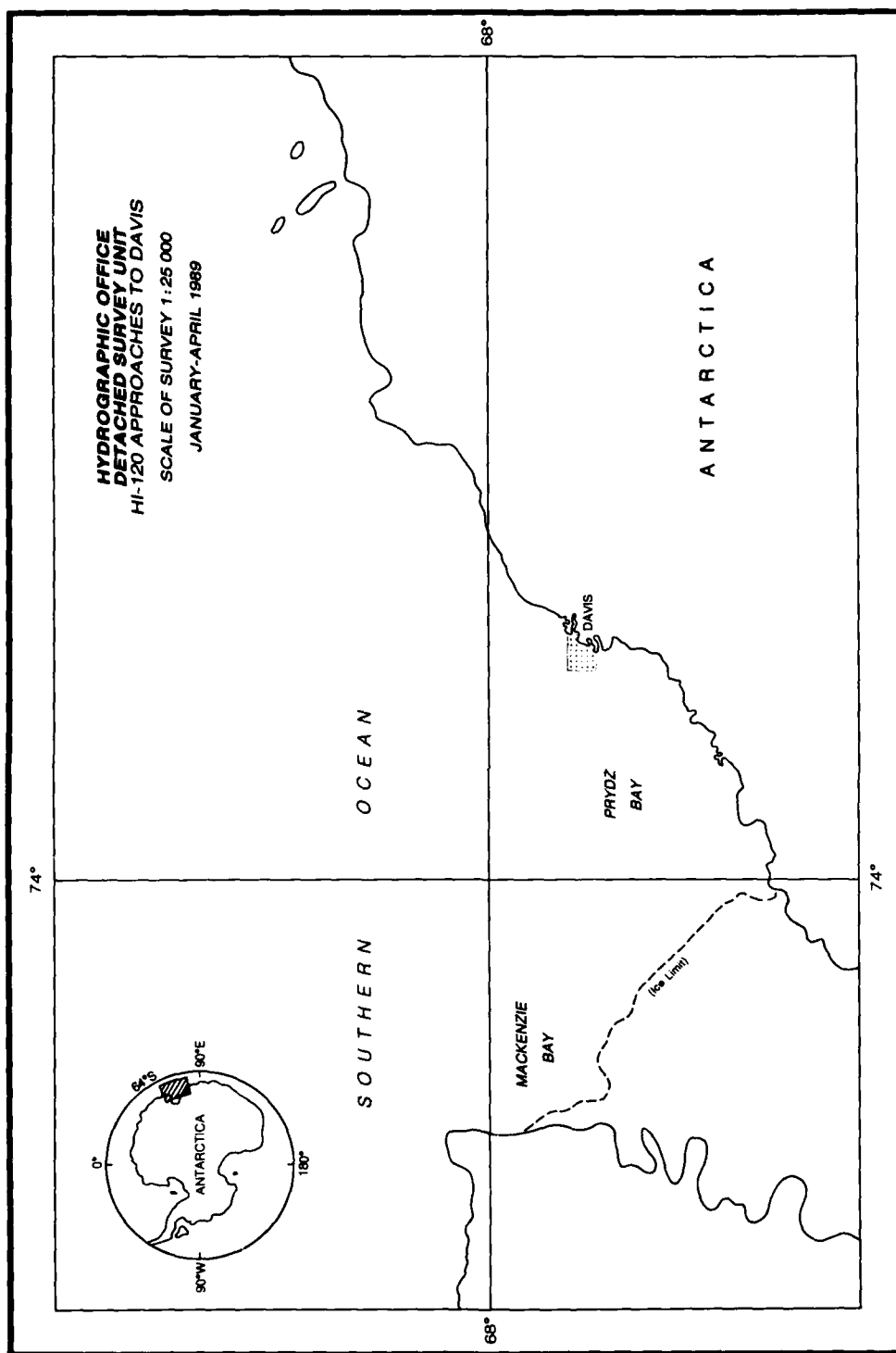


FIG.9

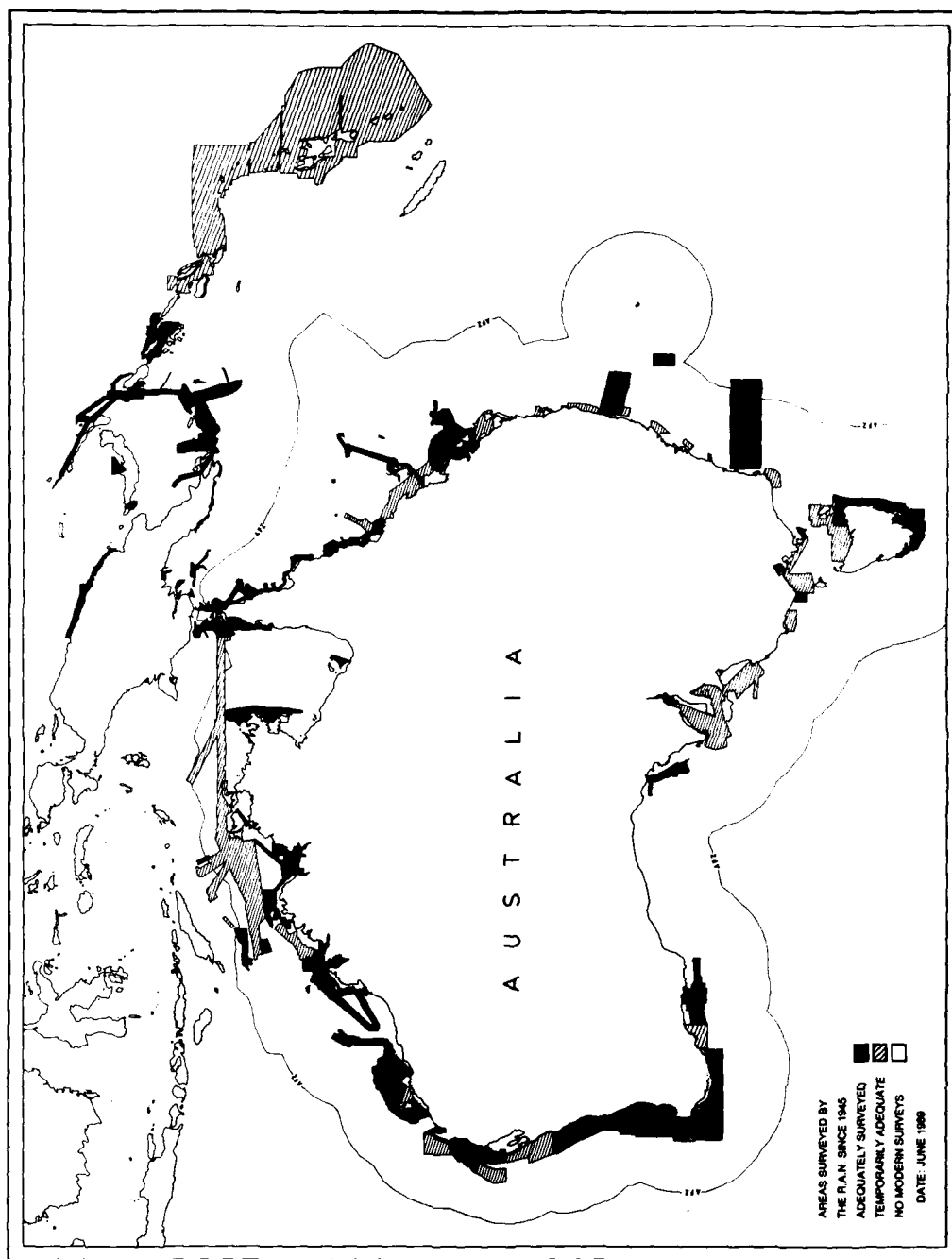


FIG.10

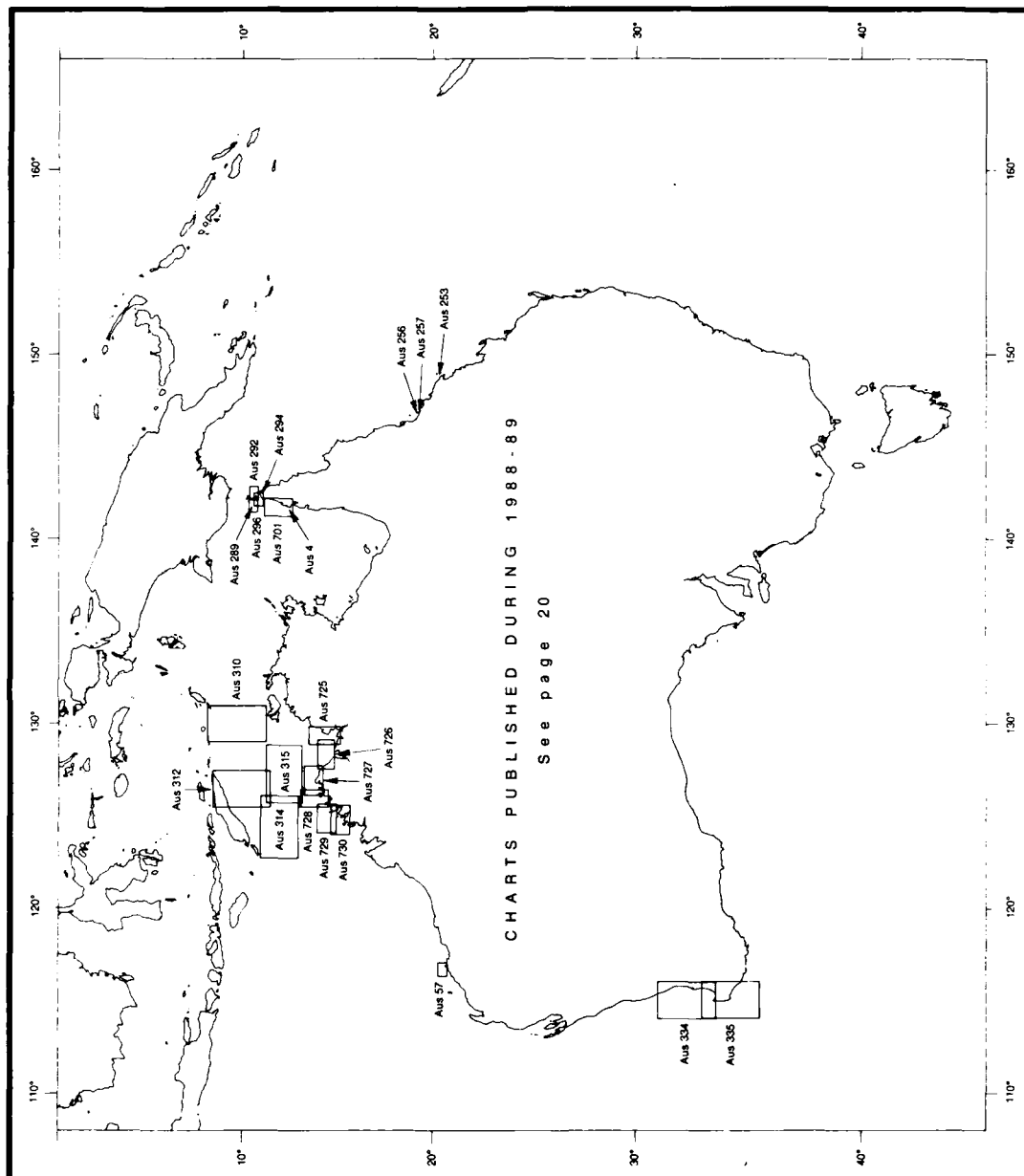


FIG.11

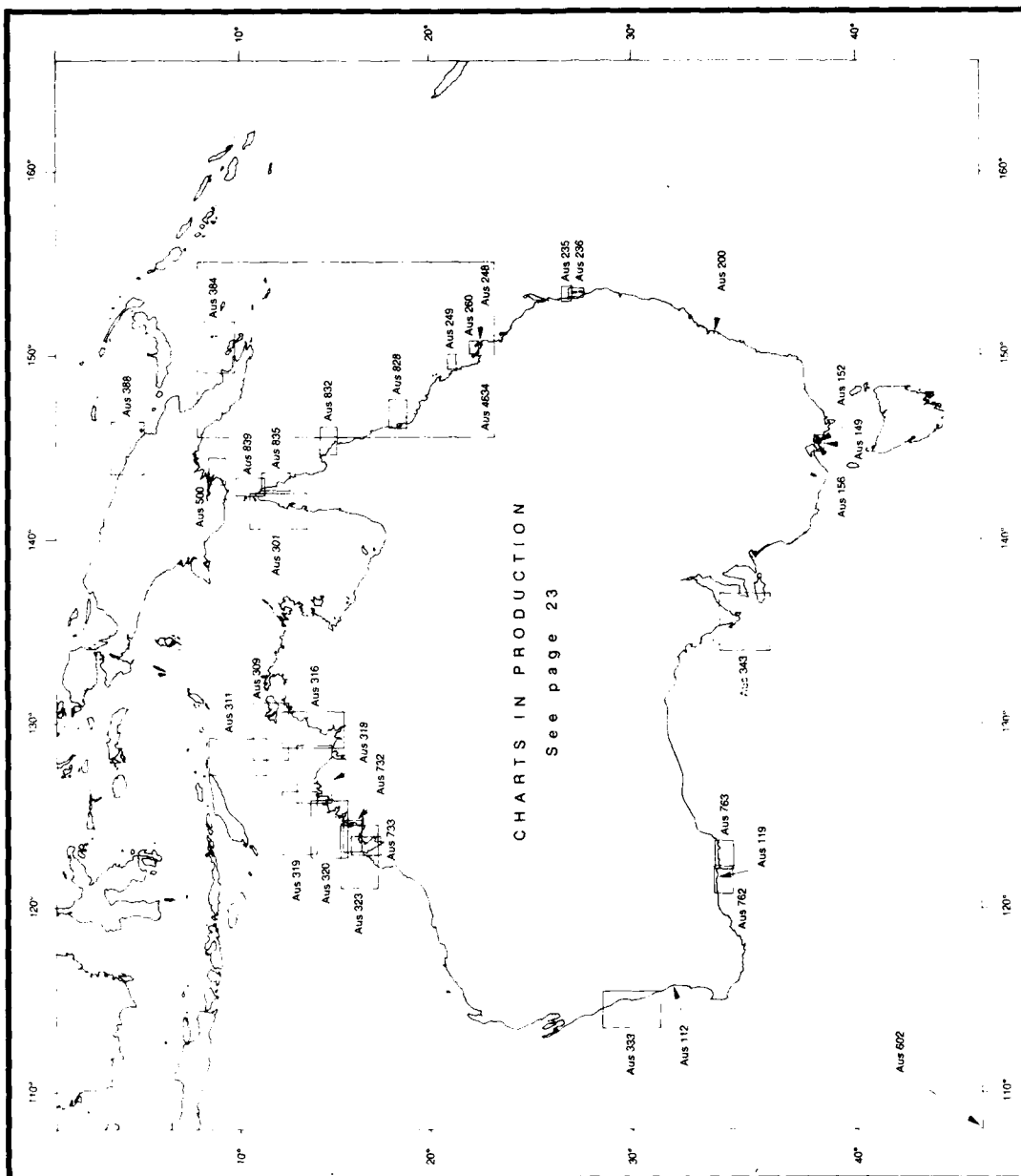


FIG.12

**NATIONAL BATHYMETRIC MAP SERIES 1:250 000
MAPPING PROGRAM**

	Printed before 1988		Compilation commenced
	Printed 1988-89		Surveyed 1988-89
	Compilation completed		Part surveyed 1988-89

FIG. 13 A

1:250 000 BATHYMETRIC
MAPPING PROGRAM

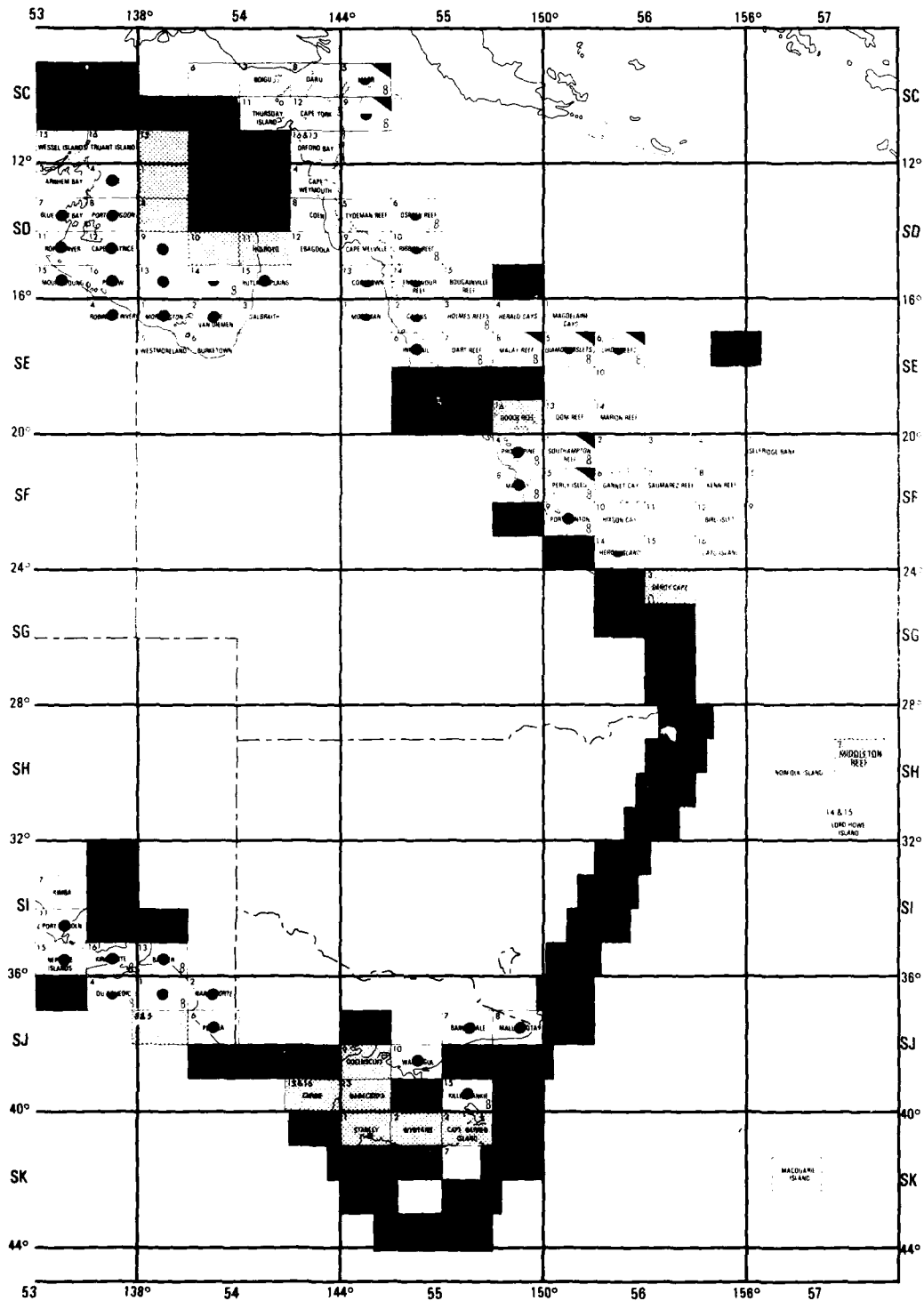


FIG. 13B

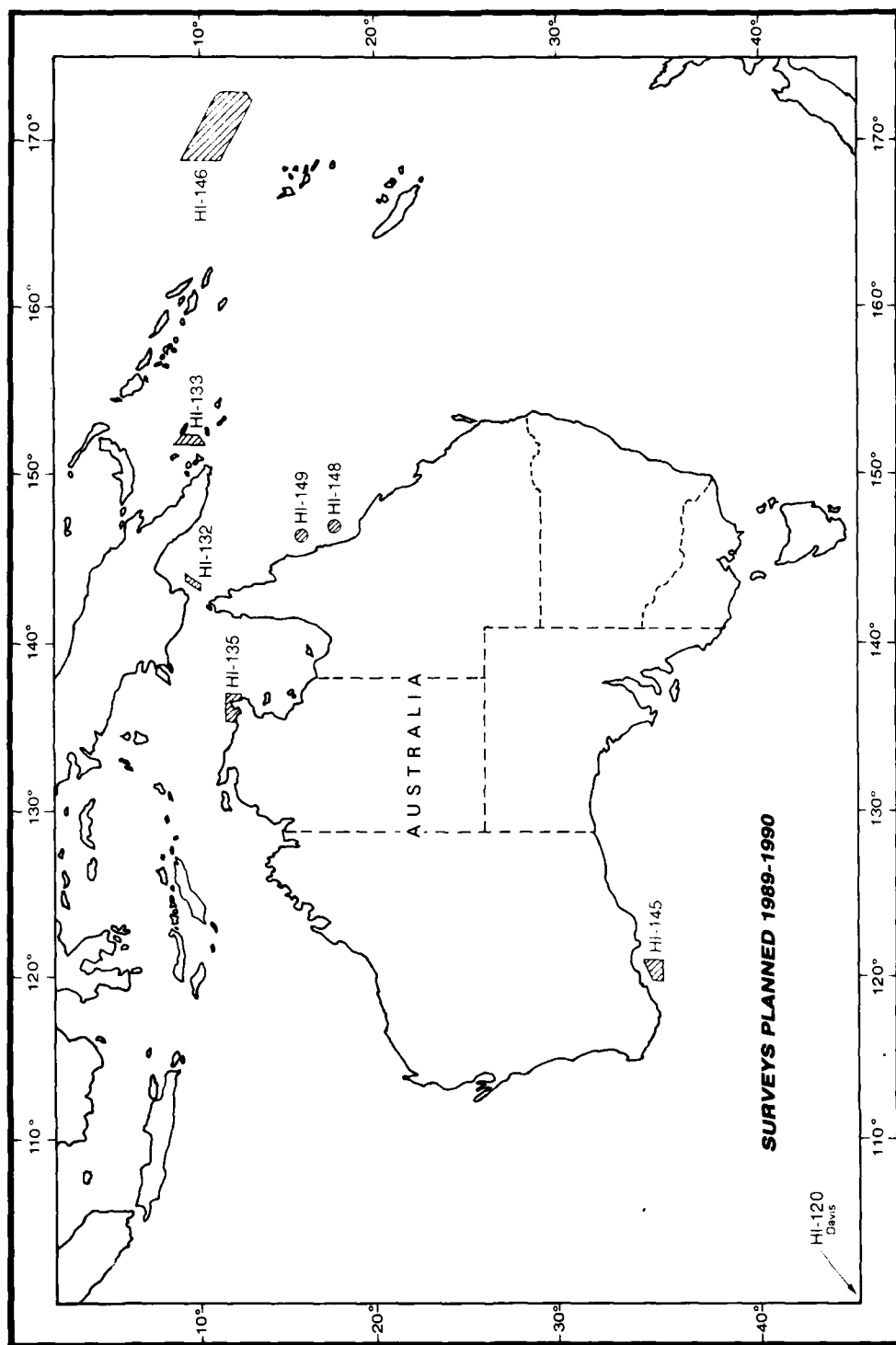


FIG. 1A

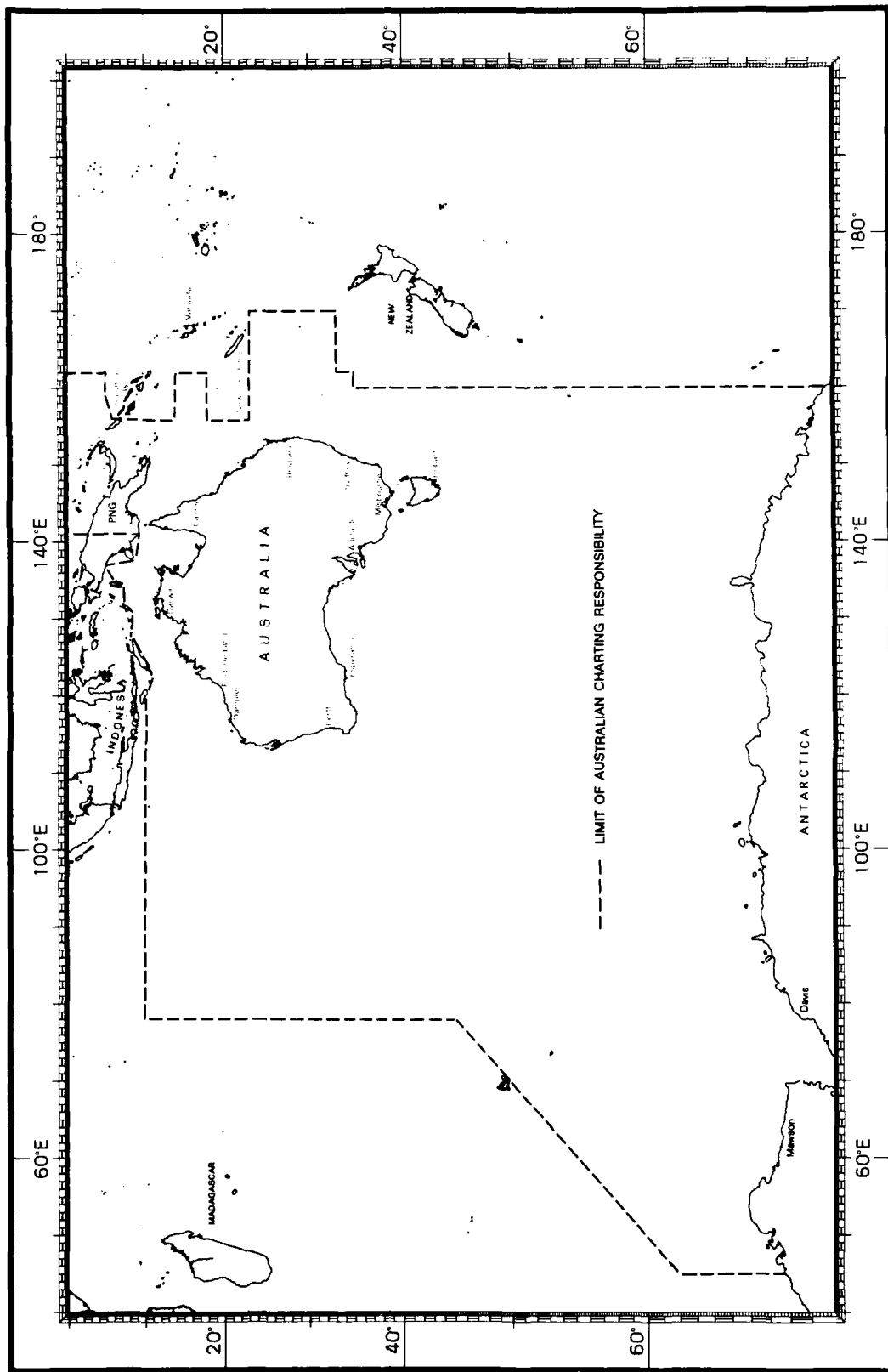


FIG.15

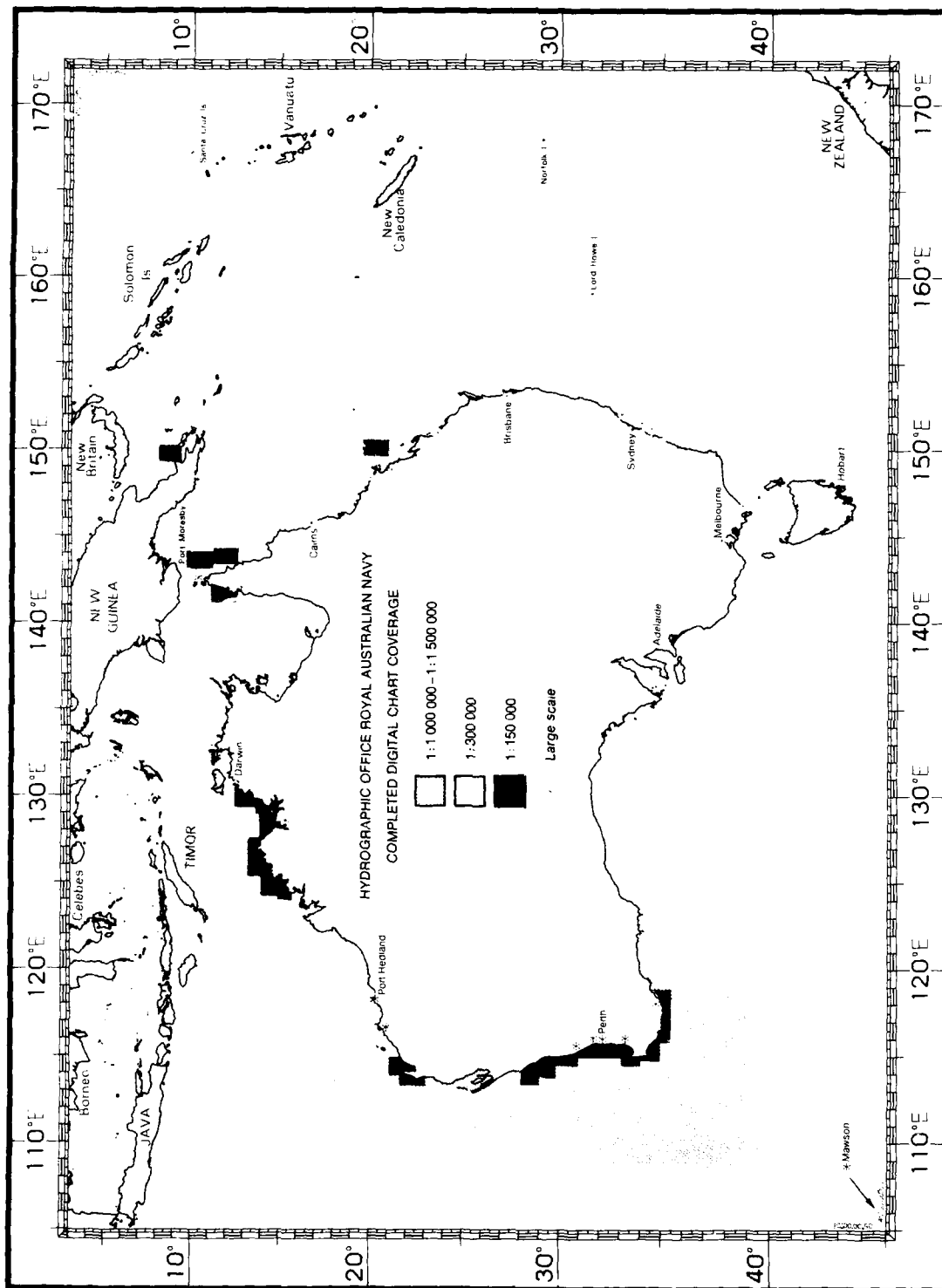


FIG. 16

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