1991-92

DEPARTMENT OF DEFENCE (NAVY OFFICE)

REPORT

of the

HYDROGRAPHIC SERVICE

ROYAL AUSTRALIAN NAVY

for the year ended 30th June 1992

Issue Number 28

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REPORT

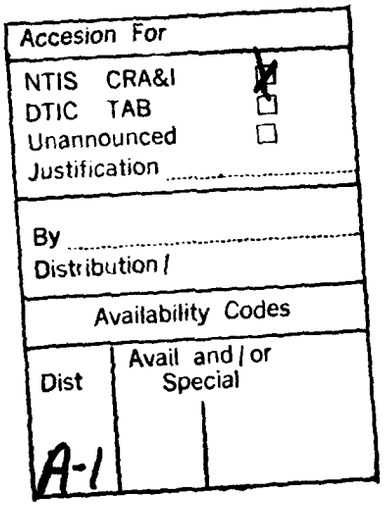
by the

Hydrographer, Royal Australian Navy

Commodore J W Leech RAN

for the year ended

30 June 1992



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Vice Admiral I.D.G. MacDougall, AO 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 1991 to 30 June 1992.

Notable new initiatives which were commenced during the year include:

* ECDIS development;

* discussions about civil funding;

* development of commercial support proposals;

* signing of a commercial licence for reproduction of charts in an electronic medium;

* absorption of remaining British Admiralty Charts in the Australian area into the Australian series.

Regrettably three objectives were not achieved during the year due to lack of resources. These were:

* the planned expansion of civil manpower;

* development of commercial activities;

* efforts to re-establish the Oceanographic Data Gathering Program.

I have the honour to be

Sir,

Your obedient Servant

J W LEECH
Commodore RAN
HYDROGRAPHER RAN

GEOGRAPHIC AND ENVIRONMENTAL SUPPORT

Manager: HYDROGRAPHER RAN

Component 215000

The RAN Hydrographic Service is the Commonwealth agency responsible for the publication of nautical charts and other information required for the safe navigation of ships in Australian Waters. The Service also provides oceanographic and meteorological information and services to support operations of the RAN. The work of the Hydrographic Service was commenced by the Royal Navy in 1795, and was taken over by the Commonwealth of Australia in 1920.

The rationale for the Hydrographic Service has four themes:

* Legislation requires ships to carry charts, and government to provide information, to protect life and property at sea.

* Economic activity is supported by this service, principally the safety and efficiency of shipping, but also development and management of resources within the 200-mile Exclusive Economic Zone.

* Environmental protection is underwritten by prevention of shipwrecks and subsequent oil pollution.

* Military operations require comprehensive knowledge of navigational dangers and a good knowledge of the marine environment.

The Hydrographic Service RAN, has three prime objectives. The first is to provide the ADF with the geographic and environmental database, products and services to enable maritime forces to be deployed and operated to the optimum at strategic, tactical and national task levels of activity. Secondly, the Service exercises the CNS role of National Hydrographic Authority in support of the safe, economic and expeditious movement of the nation's maritime trade. Thirdly, it manages the national databases for bathymetry and physical oceanography.

The core elements of the program are national and defence hydrography, together with the defence operational applications of oceanography and marine meteorology described collectively as the Geographic and Environmental Support Component 215000 of the Navy's Maritime Operations sub-program 210000.

The component program was implemented through the five sub-components of:

* Hydrographic Survey —215010
* Oceanographic Survey —215020
* Navigation Services —215030
* Environmental Services —215040
* Development and Corporate Services —215050

This year's report is arranged to accord with this program structure.

HYDROGRAPHIC SURVEY

Manager: Director Hydrographic Operations

Sub-Component 215010

Role

This sub-component is responsible for the acquisition and assessment of hydrographic data from field activities of the Marine Science Force and from other agencies.

Activities

Hydrographic Office Operations and Plans

Hydrographic Ships and Survey Units

RAN Hydrographic School

Objectives

Achievement of 10,000 square nautical miles of survey per annum in the 50–500 metre depth band, and 4,000 square nautical miles of survey per annum in the 0–50 metre depth band.

To gather data from external sources.

Performance Indicators

The rate of effort stated in the objectives is set to achieve a full survey of priority areas in the next 20 years. The priority areas are to the north of Australia and off PNG. The sub-component is therefore evaluated in terms of square nautical miles of survey to specification per annum.

HYDROGRAPHIC SURVEY

The objective of this sub-component is to carry out hydrographic surveys in accordance with the five year survey program Hydroscheme. The Hydrographic Office in North Sydney manages the planning and tasking of these surveys. Surveys during the year have been carried out off Esperance (WA), off Arnhem Land, off the north and south coasts of Papua New Guinea, off Townsville (Qld), in the Coral Sea, within the Great North East Channel, and in Antarctic waters.

The assets of this sub-component are the field units of the Royal Australian Navy's Marine Science Force, together with a planning and tasking office in Sydney. Detailed reports of these units appear below. Other programs with which the sub-component has significant interaction are the Training Program and the Defence Co-operation Program. Relevant aspects of these programs are included in this report.

SURVEY OPERATIONS

HMAS MORESBY

During the latter part of 1991, HMAS MORESBY was undergoing a major refit at Fremantle. Following sea trials and a work-up period, the ship returned to operational status in December 1991.

MORESBY deployed to south-western Australia in mid-January 1992, to complete the surveys of the coastal shipping route between Albany and Esperance. During this season, the ship also visited South Australia to establish a detached boat party in support of Laser Airborne Depth Sounder (LADS) trials and to be present for the official launch of the LADS system in Adelaide. The aims of the primary survey task were largely met and hydrographic data to modern standards is now available over the entire coastal route from Albany to Esperance.

Following a maintenance period at HMAS STIRLING in April/May, the ship proceeded north to continue surveys in Arnhem Land, and in June was conducting operations to the west of the Wessel Islands. In late June, HMA Ships MERMAID and PALUMA joined MORESBY to carry out sounding further inshore. A detached boat party conducted the first modern survey of Cadell Strait on the south side of Elcho Island.

HMAS FLINDERS

The last 12 months have been productive for FLINDERS, which completed two major surveys and is currently nearing completion of a third. The ship steamed a total of more than 29,500 nautical miles through the Coral, Bismarck and Solomon Seas in a period of 169 days away from her home port. Of that distance, more than 10,500 nm were sounded, equating to a total area surveyed of 5,124 square nautical miles.

The first survey in the Coral Sea was aimed at obtaining hydrographic and oceanographic data of the poorly charted waters between Palm Passage and the Willis Islets. The new deep water shipping route, when completed, will provide substantial time and cost savings to large merchant vessels using the coal and sugar loading facilities at Abbot Point and Lucinda.

With all preparations completed, FLINDERS set sail once again on 3 February, this time for the tropical waters of Papua New Guinea. In this survey, the ship operated in the vicinity of the Milne Bay area where she continued the work started during the previous deployment to the area in late 1990. The ship trialled a new Differential Global Positioning System which enabled the ship to calculate its horizontal position with accuracies of the order of metres. Also employed for the first time on FLINDERS were new telemetric tide gauges and current meters.

The ship sailed for another Coral Sea deployment in May to continue work started by FLINDERS in 1990. To date, FLINDERS has sounded and sonar swept the single line of a proposed tanker route which lies east of the Great Barrier Reef; a distance of about 1200 nautical miles. Extending from Sandy Cape in the south to Bramble Cay in the Great North East Channel, the route is intended to provide an alternative passage for tanker traffic away from the environmentally fragile area of the Great Barrier Reef Inner Route.

HMA Ships MERMAID and PALUMA

MERMAID and PALUMA have completed a busy 12 month period. At the start of the year, the ships were completing a survey of the area north of Melville Island and Snake Bay (HI 165) to enable the safe conduct of Exercise KANGAROO 92. Also, MERMAID was involved in operational evaluation of satellite telemetry tide gauges and current meters in the waters around Melville and Bathurst Islands. After 17 weeks away from their base port, the ships returned to Cairns for maintenance in early August.

Early in September, the ships commenced work in the Torres Strait, surveying a route which would enable ships to bypass the Vigilant Channel and join the Great North East Channel. The ships worked in the area until December when they returned to Cairns for the Christmas period.

The survey in the Capricorn Group (HI 173-North West Island) commenced in February. This survey was hampered by bad weather and heavy seas due to the effects of passing cyclones in the Coral Sea. The course of tropical cyclone *Fran* passed directly over the survey area requiring the ships to shelter in a creek adjacent to Port Alma. The North West Island survey continued until early May.

The ships maintenance period continued through to mid-June. During this period, a differential GPS system was fitted into the ships to enable operational evaluation during the survey of Castlereagh Bay (HI 179) in Arnhem Land. At the end of the period, both ships were operating on the survey grounds in Castlereagh Bay in company with HMAS MORESBY.

HMA Ships SHEPPARTON and BENALLA

SHEPPARTON and BENALLA started in extended assisted maintenance period in Cairns after completing duties supporting the LADS program in South Australia. With the maintenance package complete, the subsequent trials and sea readiness evaluations were conducted until mid-August. Both ships were ready to resume operational duties by 23 August.

HI 168, the survey of East Cape to Hummock Island, Papua New Guinea, commenced in September. The waters adjacent to the eastern shores of Nuakata Island and surrounding reefs were surveyed before concentrating sounding activities around East Cape and the western approaches to Raven Channel. The original HMA Ships SHEPPARTON and BENALLA conducted survey operations in this area during 1943–44. The ships returned to Cairns in early

December for the Christmas break.

SHEPPARTON and BENALLA departed Cairns on 13 January for survey HI 172, Halifax Bay, near Townsville. This survey encompassed the waters from Magnetic Island to Lucinda. The ships operated in the Halifax Bay region surrounding Rattlesnake, Herald and Acheron Islands. HMAS BENALLA grounded on Lorne Reef, west of Rattlesnake Island, on 6 February and suffered minor damage.

The ships returned to Halifax Bay following an Assisted Maintenance Period, but moved operations to the Lucinda area and continued sounding the waters between Orpheus and Fantome Islands and the mainland coast until the end of June 1992.

Hydrographic Office Detached Survey Unit (HODSU)

HODSU returned from Operation Beachcomber 91 in July 1991. During October, HODSU conducted two check surveys in Sydney Harbour, and attended the Antarctic Station and Field Training course. In late November, a second HODSU detachment completed a check survey of Hanns Inlet, Victoria.

HODSU deployed to Mawson Station, Antarctica in MV ICEBIRD in January 1992, conducting supplementary survey work at Davis Station en route. The unit returned to Australia in late March, embarked in MV AURORA AUSTRALIS via Heard Island, Davis and Casey Stations. The Antarctic HODSU team demobilised in April 1992.

Through June 1992, HODSU prepared for the deployment in July to Operation Beachcomber 1992.

SURVEY PLANS

The RAN surveying and charting plan, Hydroscheme, is developed through consultation with Department of Defence, maritime authorities and maritime commercial interests. The Hydroscheme is usually revised annually and promulgates the plan for the subsequent five years. The Operations element of the Hydrographic Office directs the survey units on Hydroscheme tasks.

Surveys Planned: July 1992 to June 1993

* Stevens Island to Howard Island, NT (scale 1:50,000/1:25,000): HMAS MORESBY, May to July and September to November 1992. A survey of coastal waters off the north-west coast of Arnhem Land. (Area 1 on figure 12)

* Coral Sea, QLD (scale 1:100,000): HMAS FLINDERS, June and July 1992. A survey of south-west Willis Islet Bank and the deep water approaches to Palm passage. (Area 2 on figure 12)

* Castlereagh Bay, NT (scale 1:50,000): HMA Ships MERMAID and PALUMA, July to September 1992. A survey of coastal waters off the north-west coast of Arnhem Land. (Area 3 on figure 12)

* Halifax Bay, Qld (scale 1:50,000/1:25,000): HMA Ships SHEPPARTON and BENALLA , May to August and September to December 1992. A survey of coastal waters close to the north of Townsville, and various survey activities in support of a LADS survey off Townsville during October 1992. (Area 4 on figure 12)

* Saumarez Reefs, Qld (scale 1:100,000): HMAS FLINDERS, September to November 1992. A survey in the Coral Sea surrounding Saumarez Reefs. (Area 5 on figure 12)

* Great North East Channel (scale 1:25,000): HMA Ships SHEPPARTON and BENALLA, February to May 1993. A continuation of surveys to provide an alternative route to Vigilant Channel. (Area 6 on figure 12)

* Gulf of Papua, PNG (scale 1:50,000): HMAS FLINDERS, January to March 1993. A survey of coastal waters off the Aird and Purari River Deltas. (Area 7 on figure 12)

* Joseph Bonaparte Archipelago, WA (oceanographic task): HMAS MORESBY, April to July 1993. An oceanographic task and boat camp survey off the Joseph Bonaparte Archipelago. (Area 8 on figure 12)

* LADS support, QLD (scale 1:10,000/1:25,000): HMA Ships MERMAID and PALUMA, January to April 1993. A variety of survey activities in support of LADS survey off Townsville. (Area 9 on figure 12)

* LADS support, QLD (scale 1:10,000/1: 25,000): HMA Ships MERMAID and PALUMA, May to July 1993. A variety of survey activities in support of LADS survey, vicinity of Raine Island. (Area 10 on figure 12)

* Macquarie Island, Antarctica (scale 1:25,000): Hydrographic Office Detached Survey Unit, January to March 1993. A survey of the approaches to Macquarie Island. (Area 11 on figure 12)

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 supply of hydrographic survey datum adjustments to the Hydrographic Office cartographic section and preparation of tidal information for survey operations remain the most time consuming tasks of the Tidal Section.

The 1993 edition of the ANTT has been compiled, and will include tidal height predictions for 80 standard ports and one entry for predicted tidal streams. These predictions were produced by the National Tidal Facility at the Flinders University of South Australia (streams and 78 ports), and Department of Marine and Harbours, WA, (2 ports). The ANTT includes a comprehensive listing of constituents (up to 21) for both primary and secondary ports and revised tidal level and time difference tables. This information is constantly updated as new tidal data becomes available and is supplied to the IHO.

The Hydrographic Service has recently been equipped with digital, seabed mounted tide gauges and current meters which replaced the ageing analogue gauges. The new equipment includes a satellite telecommunication system which transmits tidal data to the ships and the Hydrographic Office. Data from these new gauges will help to update the information

contained in the ANTT and to produce the Australian Tidal Stream Atlas.

Development of a computerised tidal database is well advanced and has been installed on a work station within the Tidal Section. This database will facilitate all aspects of the Section's work and that of the cartographic section which will have access to datum adjustment information within the tidal database.

Mean sea level measurement continues to be an important issue for Australia and the Pacific region, especially for research associated with the Greenhouse Effect. The Tidal Officer is a member of a Working Group of the Permanent Committee on Tides and Mean Sea Level and is closely involved in establishing a network of high accuracy tide gauges dedicated to mean sea level measurement. The Tidal Section cooperates closely with the National Tidal Facility at the Flinders University in Adelaide in all aspects of tidal theory and practice.

The Tidal Officer represented the Hydrographer at the inaugural meeting of the International Hydrographic Organisation Working Group on Standards for the Release of Tidal Data to Commercial Organisations. The Tidal Section maintains close links with its overseas counterparts, especially in UK, USA and Germany.

RAN TRAINING PROGRAM

Hydrographic School

During the year, three courses have been conducted at the RAN Hydrographic School. Two Australian, two Malaysian and one New Zealand officer completed the officer's Hydrographic Surveyor Fourth Class (H4) course; five RAN personnel completed the Advanced Survey Recorder course; and a further five completed the basic Survey Recorder course.

The school now has two HYDLAPS systems which provides a dedicated processing system in the classroom as well as a dedicated system in the Survey Motor Boat, which enables simultaneous data collection and processing when large numbers of trainees are borne, and also serves as a spare unit in case of defects. More emphasis is now being placed on computing generally, and eight laptop computers have been acquired to support training.

All courses are now being run within the RAN Training System, a systematic methodology of analysis, design, implementation and support of the training process. This has focused the training more sharply on the tasks that trainees will perform in the field. The H4 course has also been re-accredited by the International Federation of Surveyors / International Hydrographic Organisation (FIG/IHO) for another 10 years, and it has been agreed as a matter of policy that the development of the syllabus will retain this accreditation.

The school now has three Survey Motor Boats with the Antarctic boat, SMB 3411, on extended loan from HODSU. The new S4 tide gauge and current meter, and COMPNET, a new geodetic adjustment and optimisation software package, have been received. Training modules are currently being developed for these capabilities.

DEFENCE CO-OPERATION PROGRAM

Under the auspices of the Defence Co-operation Program (DCP), Hydrographic Advisers have been seconded to the governments of the Solomon ıslands and Vanuatu. Both advisers are Chief Petty Officer Survey Recorders. The Solomon Islands Hydrographic Unit was established in 1980 and the Vanuatu Hydrographic Unit in 1987.

ASSESSMENT AGAINST PERFORMANCE INDICATORS

The total area surveyed by the Marine Science Force for the financial year 91/92 was 9800 square miles. Almost all of this was in the priority areas of northern Australia and Papua New Guinea.

This achievement figure was affected by major defects to HMA Ships MORESBY and FLINDERS during the period and the involvement of the SML's in very large scale surveys in support of the LADS trials.

OCEANOGRAPHIC DATA ACQUISITION

Manager: Director Oceanography and Meteorology

Sub-Component 215020

Role

This sub-component is responsible for planning, tasking and maintaining professional standards of oceanographic data collection carried out by assigned units of the Marine Science Force and from other agencies.

Activities

Oceanographic Survey Plans

Maritime Environmental Data Acquisition and Quality Control

Oceanographic Survey Operations

Objectives

To collect and acquire a set of environmental data in Australia's area of direct military interest. In particular, to collect and acquire data about Australia's northern maritime approach by the year 2000.

Performance Indicators

This sub-component is evaluated by the number of completely surveyed squares in terms of the 13 environmental parameters, per one degree square, at least four times per annum.

OCEANOGRAPHIC DATA ACQUISITION

In the absence of a dedicated Oceanographic Survey ship, and until the Oceanographic and Hydrographic ships come into service, this sub-component has been extremely limited in the amount of actual oceanographic survey work being carried out. Rather, the emphasis has been on the enhancement of the ability of present RAN units to collect oceanographic data, the planning of future limited oceanographic surveys using HMAS MORESBY, and the management of the Maritime Environmental Data Base (MEDB).

OCEANOGRAPHIC SURVEY PLANS

Until the proposed Oceanographic and Hydrographic ships become available in the late 1990s, it is planned to continue to use HMAS MORESBY for limited data gathering over a three month period each year for the next five years. Additionally, this survey work will provide important training for personnel prior to the introduction of the Oceanographic and Hydrographic ships into service.

OCEANOGRAPHIC SURVEY

The replacement of the now obsolete analog Mk2 Expendable Bathythermograph System with the digital Mk12 Expendable Probe System (MEP 657) in selected Major Fleet Units is almost complete. This upgraded system enhances the oceanographic data gathering capability of the ships, because it is designed not only to record the ocean's thermal profile, but also the speed of sound and conductivity as a function of depth. The digital format of the recorded data allows it to be more easily assimilated into the Marine Environmental Data Base (MEDB).

A second MEP has been submitted to acquire a similar expendable bathythermograph system for HMA Ships TOBRUK, SUCCESS, WESTRALIA and PROTECTOR; the Fremantle Class Patrol Boats; and the Survey Motor Launches. When installed, the expanded oceanographic data gathering capability will provide a modest increase in the ADF's knowledge of the strategically important waters to Australia's north.

MARITIME ENVIRONMENTAL DATA ACQUISITION AND QUALITY CONTROL

Bathythermal Data

The MK12 Digital Bathythermal Recorder was introduced into service during 1991–92 and has resulted in the return of 598 digital observations. These returns were validated by a combination of manual and automated processes. Detailed specifications for the enhancement of the MK12 have been developed by the Australian Oceanographic Data Centre (AODC) to customise the recording system. These enhancements will encompass an onboard quality control suite which will improve the accuracy of predictions made from real time bathythermal data and ultimately result in a higher quality of data entering the Marine Environmental Database.

The Centre continued to receive analogue Expendable Bathythermograph (XBT) observations from routine fleet deployments. There were 2,402 observations received and a total of 2,557 forwarded to the US National Oceanographic Data Centre (US NODC) for electronic digitisation.

Marine Environmental Database (MEDB)

No addi ·nal digital data was added to the MEDB, because the effort was focused on the transition from the previous system to HydroComp. Table 1 outlines the major data types and quantities currently held for waters of interest (30°N – 70°S; 150°W – 20°E), which are on-line and accessible.

Table 1: Major AODC Digital Data Holdings

Data Source	Data Type	Format	Number of Observations
US NODC	MBT	UBT	192,800
US NODC	XBT	UBT	156,130
RAN(AODC)	XBT	XBT	10,200
US NODC	XBT	CSIRO	1,790
US NODC	SBT	UBT	108,550
US NODC	SD	NANSEN	78,500
US NODC	CTD/STD	CTD	3,300
CSIRO	CTD	CSIRO	4,360

A detailed data acquisition plan has been formulated to acquire existing national and international data held by private and government organisations. Implementation of this plan, which has a direct bearing on the successful outcome of program objectives, is not possible given current resources. This management plan is presently being supplanted by ad hoc acquisitions which is the only mechanism allowable under present budgetary constraints. This situation is unfortunate given that the cost of acquiring the vast quantities of existing data is only a small fraction of that which is required to collect the observations at sea.

Format standards for a number of the MEDB data types have been finalised and work continues on database development.

HydroComp Computer System

Prototyping on the HydroComp system was finished at the beginning of the reporting period and system development, based on these models, is also complete. The AODC has taken delivery of several major system components on a trial basis to assist with familiarisation and acceptance testing. Hardware and third party software is in place and it is expected that fully integrated systems testing will occur in the next few months with the delivery of GeoVision's customised product. Despite being marginally behind schedule, mainly due to fine tuning of requirements, it is anticipated that the system will be world class and may offer export opportunities for Australia.

Development of the quality control software component of the system is being undertaken in house. Inadequate access to resources continues to hamper progress.

The AODC has become a user of the Australian Academic Research Network (AARNet) which provides a high speed digital link to a number of universities and government agencies including the CSIRO Division of Oceanography and the Bureau of Meteorology. AARNet also enables AODC to connect with a large number of international organisations via INTERNET. This capability has already been used to transmit and receive data electronically. This is a great advance over the traditional exchange methods using magnetic tapes.

International Activities

IGOSS

The Australian Oceanographic Data Centre (AODC) continues to cooperate with the Bureau of Meteorology in the operation of the Specialised Oceanographic Centre. The data quality control and management system has been ported to the HydroComp system but no improvements or additions have been made to the capabilities. While additional outputs have been planned, resources have not been available for implementation.

WOCE

Recent discussions between the joint members, i.e. the CSIRO, AODC and the Bureau of Meteorology Research Centre (BMRC), concerning the Australian World Ocean Circulation Experiment (WOCE) Data Assembly Centre (DAC), have more clearly identified the responsibilities of participants. The CSIRO's Ocean Observing Network has undertaken to train an AODC officer in the methods of scientific quality control and to oversee the scientific component of the DAC's operations. The BMRC has provided the CSIRO with a suite of statistical and mapping programs which will be integrated with the quality control software.

An officer from the AODC has already completed a two week preliminary training session at the CSIRO Marine Laboratories in April 1992. The extended training is due to begin in November 1992 for a period of six weeks. The experience gained from this exchange agreement will put AODC in a position to undertake scientific quality control of WOCE thermal data under CSIRO supervision. The AODC will also have data management responsibilities for the Indian Ocean WOCE data set.

GTSPP

The Head, Science and Oceanography, was invited by the World Meteorological Organisation to present a paper on the Global Temperature and Salinity Pilot Project to the first Ocean Climate Data Workshop held at NASA's Goddard Space Flight Center in Maryland in February, 1992. This workshop examined the requirements for oceanographic data for global climate research programs including WOCE. It resulted in a fruitful dialogue between data managers and scientists.

Australia's participation in GTSPP has been limited by resources during this year. However, the introduction of an AARNet connection will enable AODC to more quickly acquire data coming from this project.

ASSESSMENT AGAINST PERFORMANCE INDICATORS

This sub-component is evaluated in the following manner:

* for systematic survey: in terms of square nautical miles achieved, and quantities of individual parameters acquired, to specification per annum; and

* for data acquisition: in terms of quantities of individual parameters acquired to specification per annum.

The lack of an effective oceanographic data collection program has precluded progress in systematic oceanographic survey activities. Ad hoc data collection continues to be undertaken by RAN ships. Data acquisition and exchange via national and international sources is shown in Table 1.

NAVIGATION SERVICES

Manager: Director Hydrographic Operations

Sub-Component 215030

Role

The production of marine navigation information, and the delivery of customer services and products related to safety of navigation at sea.

Activities

Nautical Charting

Navigational Services

Information Services

Chart Distribution

Objectives

To provide timely delivery of services and products to the ADF and maritime community.

To produce sufficient products and services to a standard that will meet Australia's needs for safe navigation in the Australian and Papua New Guinea waters.

Performance Indicators

The extent to which the products and services are supplied to satisfy the ADF and maritime community's navigation needs.

The extent to which products and services cover the navigable waters around Australia and Papua New Guinea, in a timely and accurate manner.

NAUTICAL CHARTING

The following task objectives have been accomplished during the period:

* Charts identified in the National Charting Programme have all been completed within the schedule (19 have been published whilst the remaining 14 are in advanced stages of production).

* Production requirement rate of two charts per annum per person has not been achieved in terms of published charts (the rate is 1.3), but the production rate achieved including unpublished near-completed charts is 2.1.

* Production of 11 charts (new editions) which include updated magnetic variation isogonals was achieved.

* Modification of 26 British Admiralty charts to be taken into the Australian series was achieved (30 charts were actually published).

* 25 block chartlets were published and distributed through Notices to Mariners.

* Chart repromat (reproduction medium) was updated and is includes all Notices to Mariners correction issues for the period.

* Maintenance of the chart reprinting schedule, by arrangement with Army Survey Regiment, Bendigo.

The following development initiatives were accomplished:

* Chart repromat has been duplicated and stored in another locality, for security.

* Nautical Charting Element future manpower review document completed.

* Nautical Charting Instructions document completed.

* Nautical Charting Investigation of Source Material document completed.

* Format and design of digital workstations.

* Manual of charting practices and procedures, in progress.

* Project charting scheme implemented.

Chart Production and Revision

Thirteen new charts and six new edition charts from the National Charting Program were published during the reporting year. These charts vary considerably in scale and geographical area, and meet specific individual maritime requirements. They include three charts of Papua New Guinea, three of Antarctica, seven coastal navigation charts of Australia and five large scale Australian port charts.

The acceptance of Lowest Astronomical Tide (LAT) as the vertical datum for all large and medium scale charting products, has created an enormous task in relation to conversion practices involving new edition charts. All original source documents showing depths of less than 50m need to be reexamined by the cartographer. Creating a new edition involves the same production effort as producing a new chart. Seven charts are in advanced stages of manual production and a further five new charts are nearing digital completion.

Chart Maintenance and Printing

The need to maintain and revise Australia's growing number of published charts (now 363) is imposing increasing demands on staff resources. Chart reprinting in 1991-92 increased to 302 charts from 278 charts (1990-91). This involved the maintenance group in opaquing and spotting procedures to 525 negatives, necessary to process new printing plates. Screen printing was used in lieu of hand correction to chart stock. The screen printing service was applied to 212 charts, embracing 974 corrections and affecting 74,470 chart copies. To support this service, the maintenance group prepared 222 screen printing correction overlays. Information from Notices to Mariners (493 notices including 25 block chartlets) was cartographically incorporated into the master repromat of 302 charts.

Since the days of Captain James Cook's voyages of discovery and the ensuing years to the mid-1950s, the British Admiralty was responsible for producing nautical charts of the coastal waters of Australia. During this period, approximately 300 charts were compiled and published. To support this endeavour, the RAN Hydrographic Service began publishing its own charts in 1941, and as each equivalent scale chart to the British Admiralty series was produced, the superseded version was withdrawn. Not all of the British Admiralty produced charts have been replaced by Australian versions, and in 1977, a scheme was introduced to progressively take into the Australian chart series a number of British Admiralty charts each year, to be known as modified reproductions. In July 1991, there were 35 British Admiralty charts still in circulation within the Australian area of charting responsibility. A major project to convert these charts to Australian format was effected by the RAN Hydrographic Office in July 1991. The task progressed on schedule and has almost concluded. 31 of the identified charts have been completed whilst the remaining four will be included in the Australian chart series in late 1992. This final step brings British Admiralty charting influence in Australia's territorial and adjacent waters to an historic and nostalgic end.

Following publication of the United Kingdom Hydrographic Office world standard magnetic variation charts for the epoch commencing 1990, eleven Australian published charts were identified for new edition action to include updated isogonals and magnetic variation values. The opportunity was also taken to include other amendments outstanding to individual charts.

Upgrading of the Nautical Charting Element's automated drafting facility (Autochart), to an 'A' Series Platform using HP990 processor with Altek serial interface back-lit digitising tables and dual screen interactive graphics capability, has been introduced to progressively phase out the 1979 installed 'E' Series Platform using the HP1000 processor. Precise definition for a complete replacement production system cannot be determined until the development of ECDIS is resolved and commercial vendors are capable of producing systems to support the requirements of future charting production methods.

Staffing and Training

On the job cartographic training (manual/digital compilation and system operations) for a number of new staff members over the past two years is showing results through increased chart product production figures. This method of training, not available through TAFE related courses, is considered the most effective training to enhance personal charting experience and marine cartographic knowledge.

Six technical officers are currently studying for the Survey Drafting Associate Diploma. One officer has undertaken a university entrance course and a senior technical officer is undertaking a Bachelor of Applied Science, full-time studies. One senior technical officer completed a TQM Facilitator Course. A computer word processing course was completed by two chart compiling officers. Two technical officers from the chart production section experienced sea familiarisation with the RAN HYDLAPS surveying system.

NAVIGATION SERVICES

Notices to Mariners

The Notices to Mariners section is responsible for issuing weekly booklets of chart corrections, to enable chart users to keep their charts up to date. About 1,700 Notices to Mariners booklets are dispatched each week. The section has continued to receive a steady flow of data, resulting in 748 Notices being issued during the year.

Statistics for the 1991–92 period are as follows:

	1991–92	1990–91
Notices to Mariners issued	748	699
Block corrections for charts	25	38
Notes for charts	78	21
Reproduction of BA blocks	5	1
Reproduction of BA notes	7	3
Reproduction of NZ blocks	0	1
Reproduction of NZ notes	10	13
Hydrographic notes from HMA Ships	71	79
Hydrographic notes from other sources	33	45

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

HMAS MORESBY	13
HMAS TORRENS	12
HMAS FLINDERS	5
HMAS GAWLER	5
SV TUDOR ROSE II	5

Sailing Directions

The Sailing Directions sub-section is responsible for gathering and editing material to be compiled in a series of volumes of sailing directions, covering the Area of Australian Charting Responsibility; advising on matters pertaining to maritime boundaries; and dealing with maritime nomenclature.

The proposed coverage of Australia-produced sailing directions remains as reported in the *1989–90 Annual Report*. Because of other priorities, little progress was made during the year with the volume of sailing directions covering the Northern Territory.

Draft sailing directions text has been provided for all Hydrographic Instructions issued to the units of the Marine Science Force for field additions and field editing. All Returns of Survey received have been examined during the quality control procedure with particular reference to Sailing Directions.

The United Kingdom Hydrographer is finalising new editions of *Australia Pilots*, volumes I, II, III and IV. It was necessary to employ a contractor for a three week period to respond to the large number of requests for, and verification of, data required for this task.

The compilation of a glossary of geographic, hydrographic, maritime and cartographic terms used in Australian hydrographic publications and charts has progressed on an opportunity basis.

Maritime Boundaries

The insertion of the territorial sea of Australia straight baselines on the 1:300,000 chart series continued. The depiction of the outer limit of the Australian Fishing Zone on small scale charts in the Coral Sea was amended to accord with the bilateral treaties with Papua New Guinea, the Solomon Islands and France.

The sixteen areas of Naval Waters in New South Wales were re-gazetted with new limits during the year. A description of a proposed revision of the limits of Naval Waters adjacent to Garden Island, Western Australia, was prepared for gazettal.

The sub-section responded to a large number of requests from authorities and the public concerning the recognised limits of oceans and seas adjacent to Australia.

Maritime Nomenclature

All new charts and new editions have had nomenclature researched and verified. A number of new geographic names within State territorial limits, resulting from survey operations, were proposed to the relevant authorities for adoption. The help and assistance of the State and Territory Nomenclature and Geographic Names Boards has been greatly appreciated; however, difficulties continue with names in Papua New Guinea as no nomenclature authority is active for that area.

The program to rationalise the nomenclature in use in the Torres Strait area continues. The Queensland authorities have supplied a list of names from the Queensland Place Names Data Base, and estimate that two years dedicated field work is required to complete the rationalisation.

The sub-section continues to respond to queries from authorities and the public relating to the origin and historical significance of the names of various coastal and maritime features. The results of research undertaken to satisfy these queries is being incorporated into a database.

The bathymetric Offshore Resource Map Series (ORMS), a joint project of the Bureau of Mineral resources, Bureau of Rural Resources and the RAN Hydrographic Service, continues to require nomenclature verification of the map compilations. Five sheets, out of a total of 32 sheets, have been progressed. New name proposals for 26 features, covering ORMS Sheets Ceduna and Hartog, have been forwarded to IHO for international recognition and adoption into the IHO/IOC Special Publication BP0008.

In conjunction with the ORMS project, an Australian gazetteer of Undersea Feature Names in the general Indo-Pacific region is being compiled.

INFORMATION SERVICES

The Hydrographic Office Information Services Element manages both hydrographic data and general library resources. Its major task is to support surveying, charting and oceanographic activities in the Australian charting area. The section holds hydrographic surveys of RAN and civilian origin, geodetic information, satellite imagery and aerial photography, and supports these with specialist library resources.

Requests for the supply of original RAN survey data has been noticeably increasing over the past few years. Data from other sources is not released to third parties. Fishermen, engineers, authors and others are continually seeking source data to supplement the existing charted information. This has resulted in an increased load on existing resources. Data is supplied on a user pays or data exchange basis.

CHART DISTRIBUTION

Revenue from chart sales has again exceeded the one million dollar mark; however, there remains a downwards trend in the quantity of charts sold.

The chart agency network has been expanded with new agents being appointed in India, Korea and the USA.

To equalise the price of a chart throughout Australia, a freight free despatch system was introduced in August 1991. Agents' stock orders are despatched by a freight method of Hydrographic Office choice to coincide with the agents' specified delivery requirements.

To improve the degree and quality of information available to agents and mariners, the Chart Agents Newsletter has been re-introduced. The Newsletter provides information on topics of concern to both the agent and the Hydrographic Service as well as a forecasted production schedule of new charts and new editions over a three to four month period.

The Distribution Centre continues to deal with requests for permission to reproduce published data in books and magazines. Several requests have been granted in the interests of public safety.

OPERATIONAL FACILITY CANBERRA

The Operational Facility, located in Canberra, comprised the assets transferred in 1988 from the Bathymetric Mapping Programme, Division of National Mapping, to the Hydrographic Charting Program, Department of Defence. The Program Evaluation conducted by the Inspector General Division during 1990-91 recommended that the facility be relocated to Sydney. The agreement to the compulsory transfer of staff positions was obtained in June 1991 and the facility was progressively wound down during 1991–92. Staff were redeployed and assets have been transferred to the Sydney Office.

ASSESSMENT AGAINST PERFORMANCE INDICATORS

In the order of priorities, the timely supply of products and services represents satisfactory performance to meet the ADF and maritime communities needs. Appendixes 3 and 9 give detail of products produced, sold and issued. Overall there has been an increase in turnover, despite a price increase, reflecting strong demand for the products.

The sub-component produced 13 new charts, 21 new editions and 8 new charts/diagrams for RAN use. In addition, 175 charts were reprinted with additional information incorporated. The coverage of Australian and Papua New Guinea waters has increased by this effort. This represents a sound improvement in chart coverage during the year and compensates for the apparently low level of production in the previous year. Appendix 4 details the chart scheme statistics.

ENVIRONMENTAL SERVICES

Manager: Director Oceanography and Meteorology

Sub-Component 215040

Role

This sub-component is responsible for maintaining standard Meteorological and Oceanographic (METOC) products and services in support of maritime operations.

Activities

Australian Oceanographic Data Centre

Naval Weather and Oceanographic Centre

Objectives

The provision of maritime environmental products and services to support the ADF's maritime environmental needs and to meet national and international obligations.

Performance Indicators

The sub-component is evaluated by the degree that METOC products satisfy user requirements, including timely delivery.

ENVIRONMENTAL SERVICES

The two elements of this sub-component, the Australian Oceanographic Data Centre (AODC) and the Naval Weather and Oceanography Centre (NWOC), provide maritime environmental products and services in support of ADF maritime operations, as well as to meet national and international responsibilities.

During the past year, the Tactical Environmental Support System (TESS) has entered operational service in Major Fleet Units. Housed in the Mk12 expendable probe system hardware, TESS has been designed to provide tactical advice to the Command on existing and predicted ionospheric, atmospheric and acoustic conditions. TESS has been developed jointly by the NWOC, the Defence Science and Technology Organisation (DSTO), and the AODC.

AUSTRALIAN OCEANOGRAPHIC DATA CENTRE

The AODC is responsible for providing environmental support to the RAN, through the supply of oceanographic data and analysis products. Environmental information is continuously acquired, validated, managed and added to the Navy's Marine Environmental Database. As Australia's national oceanographic data archive, the Centre is also responsible for acquiring and disseminating environmental data to the civilian marine science community and the general public as well as meeting Australia's international obligations in data management and exchange. In performing this role, the AODC participates in a number of national and international scientific and oceanographic data management and exchange programs which, among other things, contributes significantly to world climate research. Information obtained via these programs is used to support both defence and civilian activities.

Overview

In the past 12 months, the AODC has dedicated a large percentage of its resources to activities related to the development, testing and acceptance of the HydroComp system, a GIS based oceanographic data management and analysis system. The production of environmental briefs in support of fleet deployments has been another major activity.

Staff numbers have remained constant despite an increase in the level of activity associated with the Centre's objectives under Program Management and Budgeting (PM&B). Monthly activity reports, incorporating manpower and resource statistics, have been introduced to optimise resource allocation. Development of the AODC Business Plan has further served to streamline AODC activities in line with PM&B principles.

This reporting period has seen a consolidation of AODC activities with significant emphasis having been placed on the improvement of the quality of AODC services and products.

Staff Development

Both professional and technical staff within the AODC have been encouraged to improve their level of expertise, skills and qualifications. Qualified and experienced personnel are necessary for the maintenance of the Centre's credibility within the national and international scientific community and to keep pace with rapid advancements in data management technology. The section's Technical Officer (3) was awarded a one year Undergraduate Defence Scholarship at the beginning of 1992 and a number of other officers are undertaking postgraduate studies at the Masters and Graduate Diploma level.

Products and Services

The demand for AODC products continued to rise, particularly environmental briefs for fleet deployments. Table 2 details these products.

Table 2: Environmental Briefs Supplied to Fleet

Title	Requestor	Area Covered	Time Period
Fincastle	92WG	39°–41°N, 154°–156°E	October 1991
Lungfish	Maritime Command	26°–27°S, 153°–155°E	November–December 1991
Kangaroo '92	Maritime Command	5°–15°S, 126°–138°E	March 1992
Coral Sea	Maritime Command	32°–37°S, coast and 155°E	April–May 1992
RIMPAC	Maritime Command	25°–34°N, 130°W	June–July 1992
LADS	LADS Project Office	17°–19°S, 146°–148°E	April 1992
Christie	Maritime Command	30°–31°S, 154°–156°E	May 1991
Starfish	Maritime Command		September 1992
South-east Asian Deployment	HMAS Brisbane	Waters of military interest	August–December 1991

As a result of the production of these documents, it was not possible to allocate any further resources to the compilation of Regional Environmental Briefs. Their status remains unchanged from the last reporting period.

Requests for the supply of data have also come from a broad spectrum of the community, including a number of consultants. The AODC has introduced cost recovery procedures to recoup monies incurred in the provision of data to consultants. Funds generated from cost recovery have amounted to $3,152. Some of the major data requests which have been satisfied include:

NAUTRONIX Ltd	Engineering Consultants
Petroconsultants Australasia Pty Ltd	Consultants
Advance Ship Design	Consultants
RNZ Navy	Data supply for sonar predictions
DSTO	Sound velocity profiles
CSIRO	Southern Ocean data SE Indian Ocean data
RN Hydrographic Office	Indian Ocean data
SA Fisheries	Transparency data

To facilitate the collection of environmental data by fleet units, particularly survey vessels, the AODC has produced an instructional manual for the collection of water clarity, bioluminescence and bottom samples. This booklet, issued in March 1992, is designed to be used in conjunction with pre-formatted log sheets. Also released in March was AODC Bulletin No. 18.

Consultancy

Malaysian Visit

In January 1992, as part of a joint Malaysian Australian Defence Project (MAJDP), two officers were dispatched to Kuala Lumpur to provide advice on the establishment of a national environmental centre within the Hydrographic section of the Royal Malaysian Navy, which would be responsible for oceanographic survey, archival of data and the production of operationally useful meteorological and oceanographic products.

The Royal Malaysian Navy responded to this visit by sending their own delegation of three officers to Australia in June for a period of approximately four weeks. The purpose of the visit by the Malaysian delegation was to:

* prepare concepts for an operational paper for the creation of a Maritime Environmental Services Centre (MESC) within the Hydrographic section of the RMN; and

* undertake a study tour of Australian Naval facilities and private organisations, ultimately directed at acquiring an oceanographic research ship.

The Malaysian delegation visited a number of ship yards throughout Australia, including NQEA (builders of 'RV Franklin'), AMECON (builders of FFG 05 and 06, and the ANZAC frigate), and visits to view the research vessels 'Aurora Australis' and 'Southern Surveyor'.

The delegation were also involved in discussions with the CSIRO's Oceanography and Fisheries Division in Hobart, officers from the P&O Polar, and the OHS Project Directorate, and spent time viewing operations at NWOC and AODC.

International Activities

IGOSS

AODC continues to issue products from the Specialised Oceanographic Centre, including ocean thermal observations which are distributed monthly and the statistics of data received and disseminated from national communications centres.

NAVAL WEATHER AND OCEANOGRAPHY CENTRE

General

The Naval Weather and Oceanography Centre (NWOC) comprises three separate sections:

* the Meteorological (and Oceanographic) Office;
* the Applied Oceanography Centre; and
* the RAN School of Meteorology.

Objective

NWOC's objective is to provide timely, accurate and operationally useful METOC products and training which assist the ADF maritime community to operate safely and to tactically exploit the above and below-water environments.

New Equipment

The Digital Facsimile (DIFACS) service, sourced from the Bureau of Meteorology (BOM), was commissioned in late 1991. It provides the NWOC with a range of environmental support information and products, including meteorological satellite imagery and prognostic synoptic charts. It is anticipated that, through the DIFACS link in financial year 1992–93, the NWOC will gain access to the Australia-wide coastal weather radar network.

Navy Quality Management (NQM)

The NWOC, as a lodger unit within HMAS ALBATROSS, has benefited from its participation in the Establishment's NQM training programs and activities. Through the application of the processes pf PM&B, the NWOC Business Plan was prepared with due regard to the requirements of the various clients. In addition, resource management has been improved: the available financial flexibility has allowed the organisation to respond quickly to unforseen requirements for environmental services.

Communications

The planned introduction of a high speed data link between the BOM and the NWOC, funded by the Defence DISCON Project, was postponed due to an unexpected short-term equipment incompatibility between the two organisations' communications equipment. The link is expected to be upgraded in November 1992.

The implementation of an in-house Defence Integrated Secure Communication Network (DISCON) terminal was postponed due to financial considerations. It is anticipated that the facility will become available in late 1992, which will facilitate the prompt transmission of environmental information to Fleet Units.

Manpower

A fourth forecaster billet was approved in March. This has allowed for greater flexibility in the management of human resources, in particular during periods of continuous increased output and on-the-job training of forecasters. In addition, junior forecasters have more access to ad hoc training opportunities for professional development.

Meteorological support was provided to Exercise Kangaroo 92 (K92) through the detachment to RAAF Curtin of a Leading Seaman Meteorology (LSM) for a period of five weeks. The LSM was supported from the NWOC, by telephone and telephone facsimile, with meteorological data and products.

Environmental Output

The routine output from the Centre has shown a marginal increase compared to last year, with the exception of the reduced demand for sonar range predictions. This reflects the satisfactory commissioning of TESS in Fleet Units and shore establishments.

Throughout the year, in addition to the previously mentioned services for K92, environmental support was provided to 92 Wing RAAF and TAMEX exercises, and the units of various allied navies for TASMANEX, LUNGFISH and CORAL SEA exercises. Supplementary data support for TESS has seen an increase in the demand for raw environmental data. In particular, this data is required as input to the anomalous atmospheric propagation prediction modules.

Applied Oceanography Centre (AOC)

Initial development of the RAN TESS version 1.0 was completed during the reporting period and, together with the Mk12 digital XBT system, installed into HMA Ships BRISBANE, HOBART, ADELAIDE, CANBERRA, MELBOURNE, SWAN and DERWENT, and into the Anti-Submarine Warfare (ASW) facility HMAS WATSON. Stand-alone TESS (without Mk12) was installed in HMAS ORION; Helicopter Squadron HS 816; Maritime Headquarters; the Australian Oceanographic Data Centre; RAAF 92 Wing; Australian Joint Acoustic Analysis Centre; RAN Tactical Electronic Warfare Support Section; and Central Studies Branch, Canberra. HMA Ships DARWIN, TORRENS, SYDNEY and PERTH and the ADF Warfare Centre, Williamtown, will have the system installed in the early 1992–93 financial year. System manager and operator manuals for each of the TESS/Mk12 software modules were written and provided to the users, together with training courses, as part of the installation process.

The cooperative venture between the AOC and the BOM to process satellite imagery for sea surface temperatures (SSTs) has been completed. It is now fully operational and has replaced the imagery previously obtained under contract from the CSIRO Division of Oceanography, Hobart. This provides for an expanded coverage of SST over the Australian region, at no cost and in real time. The product has also been exported overseas by the BOM, and is in widespread use throughout its Regional Forecasting Centres.

The AOC has provided specialist meteorological and oceanographic advice to a number of Defence working groups and projects during the year. These include SEAHAWK FLIR/ESM, the Fast Time Acoustic Analysis System (FTASS) in AJAAC, Infra-red and Electromagnetic propagation modelling studies conducted in DSTO, the Navy/Air Force ASW Working Group and Central Studies Branch.

The training commitments of the Officer-in-Charge of the AOC increased in the period with courses conducted in oceanography, sonar range prediction, TESS and the tactical exploitation of the environment. The training was provided in Basic and Advanced UCSM, PWO Phase I and Phase II, Advanced RP, Advanced Acoustic Analysis, SEAHAWK Operators, Military METOC and EW Operators courses.

Oceanography

Early in the year, demand for Sonar Range Prediction forecasts (AUSRAPS) continued at a high level until the operational benefits of TESS were realised.

The three-dimensional oceanographic analysis of the South-west Tasman has continued. The process has benefited from the collaborative project with the BOM, resulting in the development of sea-surface temperature contouring software. The associated products continue to be available to users at sea through the BOM radio transmission schedule broadcast.

Analysis of the South-west Indian Ocean's Leeuwin Current commenced in November 1991. This SST analysis is also very much dependent upon the MCIDAS sourced sea-surface temperature data, which has the contouring software applied to it. Access to sea-surface temperature data from this area, other than that sourced through satellite sensors, continues to be extremely limited.

RAN School of Meteorology (RANSOM)

Now in its 43rd year of operation, the RAN School of Meteorology has a staff of one Training Officer (Lieutenant), one Chief Petty Officer and two Petty Officers. The School's primary role is to provide the basic training for RAN Meteorological Observers and to conduct the courses necessary for all advanced meteorology category training. These courses, together with the Military Meteorology and Oceanography Courses (MILMETOC) which provides the military aspects of meteorology and oceanography for graduates of the Bureau of Meteorology's (BOM) Forecasters Course, represent the key training activities of RANSOM. Courses this year included one MILMETOC, two Basic Observers, one Advanced Met, and four Upper Air Windfinding/Radiosonde.

A variety of specialist training was also provided by the School, in the form of courses conducted for the Army Parachute Training School, RAN Long Navigation course, Small Ship's Flight Commanders course, SEAAC Phase Three and FOSAC courses, plus the meteorology component of Aircrew category and Aircrew Petty Officer qualifying courses.

The Foreign Officers Seaman Application Course of 1992 comprised 14 trainees from:

Papua Guinea	6
Cook Islands	1
Solomon Islands	2
Western Samoa	1
Tonga	2
Marshall Islands	2

The training development of the Basic Meteorology Course continues. While Syllabus 'A' for the Military METOC Course was approved by COMTRAIN, the entire initial training process for METOC officers is under review. The Duty Task Inventory for the redevelopment of the Advanced Meteorology course is near completion.

ASSESSMENT AGAINST PERFORMANCE INDICATORS

This sub-component is evaluated by the:

* percentage of METOC products provided to those requested;
* percentage of METOC products delivered on time; and
* the degree that METOC products satisfy user requirements, in relation to accuracy and operational relevance.

Very good results were achieved in the timely delivery of most METOC products. The exception was in the production of Environmental Briefs, demand for which outstripped available resources. Recognised standards of accuracy were met and the operational relevance of METOC products was monitored by an MHQ steering committee set up for this task.

DEVELOPMENT AND CORPORATE SERVICES

Manager: Director Co-ordination and Development

Sub-Component 215050

Role

This sub-component is responsible for the Branch wide aspects of planning, resourcing and coordination of hydrographic, oceanographic and meteorological operations. It is responsible for servicing and promoting the national activities of the Branch.

Activities

Hydrographic Development

Branch Development

National and International Affairs

Corporate Services

Objectives

To supply the long-term planning and coordination of resources for tasks necessary to meet strategic guidance and national responsibilities.

To promote the Hydrographer's national and international role in hydrography and physical oceanography.

To provide development and investigation services to meet specific program requirements with minimum disruption to operational areas.

Performance Indicators

The sub-component is evaluated by the following factors:

The ability to meet international commitments affecting the national role of providing maritime geographic and environmental information.

The degree to which essential planning and project tasks can be performed without impinging on resources available to the operating areas.

The ability to provide management information on resource utilisation and control.

HYDROGRAPHIC DEVELOPMENT

Although the Hydrographic Development section is responsible for Service policy, personnel and project initiatives, three activities have overshadowed what has otherwise been steady progress.

* The OHS Statement of User Requirement was refined and published. It clearly details the hydrographic data collection philosophy and process. The document is now incorporated within the OHS request for tender, to be released in August 1992.

* The Commercial Support Program (CSP) gained momentum rapidly, requiring a comprehensive evaluation of the cost of in-house activities compared to commercial charges for the same activity.

* Functional, financial and personnel reviews have been carried out throughout the year in order to evaluate the three proposed sites for the Office's relocation.

BRANCH DEVELOPMENT

Two important themes have defined the Branch Development activity this year. The first is development of the Electronic Chart Display Information System (ECDIS). Regrettably, most of the regular and frequent vessel strandings that occur world-wide are caused by human errors in navigation. ECDIS has the potential to significantly reduce the incidence of error through the integration of a digital chart base and satellite navigation to provide an accurate real time display of ships' position and track, relative to the unseen dangers on the seabed. ECDIS development, therefore, is a high priority for the Hydrographic Office. The second important theme is the development of digital databases to support data acquisition and provision of services. These databases are considered to be a fundamental requirement in the transition from a paper chart product to a multiplicity of user orientated services of the future. A special problem of these databases is the speedy processing of ultra-large data sets.

In December 1991, the International Hydrographic Conference (IHO) committees on ECDIS (COE) and the Exchange of Digital Data (CEDD) met in Sydney. This was the first time that so many of the world's leading experts in hydrographic charting had met in Australia. During this meeting, it was quite apparent that much of the development work and continuing discussion was taking place amongst nations in the northern hemisphere, and that Australia simply was not appearing to take an active development role. The Hydrographer made a commitment to ECDIS by providing funding to develop a database for the testing of ECDIS capabilities.

The selected area for the development of a database was Sydney Harbour, and the main objectives of the development are:

* to determine the viability of using the Hydrographic Branch's automated charting and GIS facilities to capture data and develop a database compliant with the IHO SP57 Part A, Object Catalogue;

* to exchange/receive a IHO SP57 DX90 data file to/from other IHO member states involved in testing the viability of the IHO transfer standard; and

* to provide a database to an ECDIS manufacturer for shipborne demonstrations to interested parties.

Objective (i) has been completed and the Hydrographic Branch has demonstrated that its systems are suitable to undertake ECDIS ENC database development, albeit at a standard that still has many fundamental shortcomings. Experience with constructing the database has indicated that SP57 Parts A (Object Catalogue) and C (Digitising Conventions) are, in Australia's opinion, far from satisfactory. Several RAN system enhancements have been identified and the development clearly demonstrated that the GIS world still has a considerable learning curve when it comes to managing complex hydrographic data. Objective (ii) has not been undertaken yet. The Sydney Harbour data set is being provided to the Woods Hole Oceanographic Institution for evaluation during the American ECDIS Test Bed. Further exchange of data files is expected to take place during the next year and Australia is working to produce a 'scientific' evaluation and reporting methodology as part of the exchange process. Objective (iii) will be considered during the next 12 months.

In the early part of 1992, senior staff visited several overseas organisations to evaluate the level of ECDIS development and the management of hydrographic data. During their time overseas, they attended the US Hydrographic Conference and the ECDIS Conference. Organisations visited included the IHO Data Centre for Digital Bathymetry; Offshore Systems Limited in Canada, which is one of the leading ECDIS manufacturers in North America; National Ocean Service of NOAA; Intergraph Corporation, which is developing the ECDIS system for the US ECDIS Test Bed Project; and SUSAN Ship Simulator Facility in Germany which developed the SP57 Part A Object Catalogue, has also developed an ECDIS database and system and at the time, had just completed ECDIS sea trials on a ferry between Harwich in the UK, and Hamburg. HIS Project Officers also spent a week in Canada participating in a workshop discussing the theoretical aspects of the SP57 Data Model and its development.

The Chart Information System

In mid-1991 a project team of three commenced development work on the Chart Information System (CIS). The CIS is a management information system designed to provide up-to-date information on charts held in the Office, and related information.

The first stage in the project was to implement the CIS into the Chart Maintenance Section (SCS) of the Office, to allow for the entry of information on published charts, Notices to Mariners and stock. It will enable the SCS to better manage the chart restock process and repromat updates from Notices to Mariners.

The software for this stage has been written and the database is currently being populated, prior to acceptance tests being carried out.

In the future, the CIS will be integrated into most areas of the Office, allowing staff to access up-to-date information on the Office's most important product charts.

NATIONAL AND INTERNATIONAL AFFAIRS

National Affairs

During the year, Commodore J.W. Leech (Hydrographer RAN) chaired the annual meetings of various national committees in which the RAN Hydrographic Office plays an important role. The Permanent Committee on Tides and Mean Sea Level (PCTMSL) met in Hobart on 8 August 1991, and the Association of Australian Ports and Marine Authorities (AAPMA) Hydrographic Surveyors Meeting was held in Adelaide on 31 March to 1 April 1992. Secretariat support for both meetings was provided by the Office.

The Office participated in the work of the Steering Committee for the National Tidal Facility (NTF), which is chaired by CDRE Leech, and Mr J. Randhawa (Manager, National & International Affairs) acts as Secretary. CDRE Leech is also involved in the review of the NTF carried out by Flinders University, South Australia, which commenced in early 1992. The report is expected to be out in September 1992.

Other national committees in which the Office continued to be involved include:

* the Inter-Governmental Advisory Committee on Surveying and Mapping
* the Maritime Service Advisory Committee, Navigation Safety
* the Co-ordinating Committee for Commonwealth Marine Science Agencies
* the Commonwealth Spatial Data Committee

The issue of the national accreditation of hydrographic surveyors gained momentum during 1991-92, and is currently receiving favourable consideration by the Institution of Surveyors, Australia.

International Affairs

Mr K. G. Burrows represented Australia at the Seminar on World Electronic Chart Data Base held at Monaco on 1-4 October 1991. The seminar examined the proposal by Norway for a World Centre for Electronic Chart Data, and was attended by representatives from eighteen member states of the International Hydrographic Organisation (IHO).

Following this, Mr Burrows attended the Meeting to Discuss Hydrographic Cooperation in Antarctica at Bonn, Germany, on 9-10 October 1992. The need for better charts of Antarctica has been highlighted recently by a number of strandings resulting in significant pollution of the environment.

On 18-27 November 1991, the Hydrographer attended the Integrated Global Ocean Services System (IGOSS) Meeting in Geneva, where he was elected Vice-Chairman of this Joint IOC/WMO (Intergovernmental Oceanographic Commission/World Meteorological Organisation) Committee for the next four year term. On his return journey, he took the opportunity to visit the hydrographers of Singapore and Malaysia to discuss hydrographic matters of mutual interest.

The Hydrographic Office hosted the Third Joint Meeting of the IHO Committee on Electronic Chart Display Information System (COE) and Committee on Exchange of Digital Data (CEDD), which was held at HMAS PENGUIN, Sydney, on 3-6 December 1991. Member states

represented at the meeting were Australia, Canada, China, Germany, Finland, France, Japan, Netherlands, New Zealand, Norway, Republic of Korea, UK and the USA. It reviewed the progress and plans of the various Working Groups, and the relationship of COE and CEDD to external bodies such as the IMO/IHO Harmonising Group on ECDIS, the CIRM (Comité International Radio Maritime) and the IEC (International Electrotechnical Commission).

Messrs K. Burrows, R. Furness and I. W. Halls (Hydrographic Information System Project Officer) attended the US Hydrographic Conference in early 1992 and participated in ECDIS '92, the first of a planned annual series of such conferences intended to bring the maritime industry together to focus on ECDIS development. The team also visited the National Ocean Service of NOAA and the Woods Hole Oceanographic Institution.

Commodore Leech, accompanied by Mr Burrows (Director, Coordination and Development) and Captain R.J. Willis (Director, Hydrographic Operations) attended the XIVth International Hydrographic Conference (IHO) at Monaco, 4-15 May 1992. The Australian delegates participated in the conference deliberations and the working group sessions. After the conference, Commodore Leech visited Taunton and discussed charting matters with the UK Hydrographer.

As Chair of the International Cartographic Association (ICA) Working Group on Marine Cartography, Mr Furness (Manager, Branch Development) attended the IHO Conference as ICA's observer.

COMPUTER SERVICES

Most of the computing effort goes into development tasks, so computer services is covered in other sections dealing with Branch Development activity.

CORPORATE SERVICES

Considerable workload has been undertaken in this area throughout the year, particularly with the introduction of Program Management & Budgeting. Major activity has occurred in the following areas.

Accommodation

Wollongong, which was selected as the long-term site for the Hydrographic Office, will be the single facility for housing all shore based Maritime Geographic and Environmental Support activities. The implementation of plans already developed for this accommodation will begin in the 1992-93 financial year.

Program Management and Budgeting (PM&B)

The Branch has had a successful year under Program Management and Budgeting. Revenue was 'grossed up' to allocations, which meant that, to some extent, the money that was recovered from the sale of Hydrographic Products was used within the program. There was an overall increase in allocation, and this was effectively and efficiently used to maintain the current levels of activity; provide development in the management of information including

electronic data processing and ECDIS activity; provide development in environmental support activities; and provide enhancement of the ageing Autochart facility.

The financial database and resource management system (RMF) has been refined over the year to provide more relevant management reports, and continues to be a valuable tool used to complement DEFMIS reporting to evaluate the effectiveness and efficiency of program outcomes.

Staffing

The Branch human resource plan was formulated, but putting it into effect was limited by allocated funds. The bathymetric program will conclude at the end of the 1991-92 financial year and it is expected that there will be positions transferred from Canberra to Sydney

Commercialisation

The preparation of a marketing plan has not progressed far, due to lack of resources. The Branch has reached its first agreement with a company to scan its series of charts into a navigation system that registers a GPS plot of the vessel's position and overlays it on the scanned chart image. Navigation and Information Systems Australia Pty Ltd have developed this system in the OCEANVISION product that was scheduled to go onto the market during July 1992. Other commercial ventures are pending including a 'Waterways Atlas of NSW'.

The Branch has been pro-active in preventing infringement of the Commonwealth's copyright in charts, whenever possible breaches become apparent.

ASSESSMENT AGAINST PERFORMANCE INDICATORS

This sub-component has met its commitments in representing Australia's interests in international forums on hydrography and has contributed significantly contributed to the initial development of ECDIS.

Branch essential planning and project tasks have been largely met from this sub-component's resources. The extent to which operational tasks have been affected was minimal and initiatives that affect future branch activities have been achieved.

A greater degree of management information on resource utilisation and control has been provided through this sub-component's effort. Provision of monthly reports giving summaries of the component's position to managers has been a developing process. Also, greater control with the utilisation of resources has been exercised branch wide and co-ordinated from this sub-component's effort.

APPENDIXES

APPENDIX 1

SURVEYS UNDERTAKEN JULY 1991 – JUNE 1992

Ship/Unit	Commanding Officer	Areas
HMAS MORESBY	CMDR LJ Gee RAN	HI 170 Groper Point to Margaret Cove
	CMDR MA Hudson RAN (from 15 January 1992)	HI 178 Stevens Island to Howard Island
HMAS FLINDERS	LCDR PA Spencer RAN	HI 167 Palm Passage to Willis Islets
	LCDR BJ Kafer RAN (from 22 May 1992)	HI 174 Nuakata I to Laseinie Islands
		HI 181 Flora Reef to Diane Bank
HMAS MERMAID	LCDR RW Quarrill RAN	HI 156 Dugong I to Stevens I Great
	LCDR JW Maschke RAN (from 29 May 1992)	NE Channel
		HI 173 North West Island
HMAS PALUMA	LCDR JW Maschke RAN	Surveys in company with MERMAID
	LEUT GP Paten RAN (from 16 June 1992)	
HMAS SHEPPARTON	LCDR AR Dennison RAN	HI 168 East Cape to Hummock Island
	LCDR CK Ellis RAN (from 1 May 1992)	HI 172 Halifax Bay
HMAS BENALLA	LEUT DB Errington RAN	Surveys in company with SHEPPARTON
	LEUT CJ Hardy RAN (from 27 October 1991)	
HODSU	LEUT KD Slade RAN	HI 169 Approaches to Mawson
		HI 171 Approaches to Davis
		Darling Harbour check survey

APPENDIX 2

SURVEY EQUIPMENT IN SERVICE

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 Magnavox 1102 Sercel NR 103 DGPS
Tidal	Bristol Elliott Tide Gauges ONO Current Meters Inter Ocean S4 Tide Gauges Inter Ocean S4 Current Meters
Boats	10m aluminum 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 V /Chart V/ChartV(M) Qubit Trac IV/Chart IV

Land Survey Equipment

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

APPENDIX 3

CHART PRODUCTION AND MAINTENANCE

	1988–89	1989–90	1990–91	1991–92
New Chart Production				
New charts published	17	12	7	13
New editions published	8	5	4	21
New charts/diagrams for RAN use	18	15	12	8
Miscellaneous charts	1	1	7	1
Chart Maintenance				
Modified reproductions of BA charts	3	0	0	30
Modified facsimiles of BA charts	2	0	0	1
Notice to Mariners block corrections	36	39	38	25
Revisions by reprinting	197	154	175	175
Revisions by screen printing	140	160	123	212
Miscellaneous graphics	64	27	56	26
Screen printing overlays prepared	140	160	123	222
Negatives processed for printing	n/a	n/a	502	525
Chart Printing				
New charts	17	12	7	13
New editions	8	5	4	21
Revised charts	197	154	175	175
Reprinted charts	153	96	103	127
Bathymetric charts	0	33	25	7
Facsimile reproductions	1	0	0	1
Modified reproductions	2	0	0	30
Charts for fleet purposes	4	2	12	8
Miscellaneous charts	19	1	7	1

Chart printing by RA Survey Regiment Bendigo, Victoria: 391 charts, 156,222 copies.

APPENDIX 4

CHART SCHEME STATISTICS 30 JUNE 92

Category/Scale	Published Imperial	Published Metric	Total Published	Total Planned
Small scale 1:150,000 to 1:1,000,000				
1:150,000 Aus, PNG	27	61	88	199
1:300,000 Aus, PNG	48	30	78	101
1:1,000,000 Aus, PNG, Antarctica	11	3	14	34
1:500,000 and smaller Aus, PNG, Antarctica	5	3	8	13
Large scale 1:5,000 to 1:100,000				
Aus	21	95	116	202
PNG	27	2	29	40
Antarctica	1	2	3	4
Territories & Reefs	4	4	8	16
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
Other Charts				
Recreational Charts PC (Pleasure Craft) series	2	5	7	12
Y (Yachting) series	1	3	4	4
RAN Fleet Series	19	13	32	40
Diagrams	17	4	21	40
TOTALS	**184**	**232**	**416**	**732**

APPENDIX 5

DESCRIPTION OF NEW CHARTS PUBLISHED

NEW CHARTS (digital editions)

Aus 763 —Cape Le Grand to Cape Pasley, 1:150,000
(published 4 Oct 91)

Western Australia, coastal navigation chart adjoining Aus 762 (published 28 Jun 91), replaces former British Admiralty chart 3189, 1:144,000 published in 1902. The new chart provides accurate positioning of the many islands and dangers that make up the Archipelago of the Recherche. Included are surveys conducted by the RAN of 1983, 1985 and 1986.

Aus 384—Cape Vogel to Cape Nelson, including Trobriand Islands, 1:300 000
(published 27 Sep 91)

Metric chart designed to replace former Australian chart of the same number, published 25 Aug 91 in imperial units. Situated on the NE coast of Papua New Guinea. Rectified satellite imagery has been used extensively over the charted area, identifying the dangers to navigation between the waters of the Trobriand Islands and D'Entrecasteaux Islands and the area of Star Reefs. The new product is inclusive of RAN surveys of Star Reefs Passage and approaches thereto from Ward Hunt Strait.

Aus 450—Cape Rouse to Sandefjord Bay, 1:500 000
(published 9 Nov 91)

The first chart published of a new metric series at scale 1:500,000, to provide ocean approaches (approx. 180 nm) to the Antarctic Continent. The southern area of this chart depicts the Amery Ice Shelf between MacRobertson Land and Princess Elizabeth Land. The sounding detail is from inadequate reconnaissance information as no detailed hydrographic survey has been conducted in the charted area.

Aus 732—Hall Point to Sunday Point, 1:150,000
(published 8 Nov 91)

Coastal navigation series, metric medium-scale chart, Western Australia (Buccaneer Archipelago). This chart was produced primarily, to adjust and position topographic detail, to include RAN hydrographic surveys of 1974 and 1977 not previously charted, and to replace imperial unit charts Aus 731 and British Admiralty 1206, published respectively in 1949 and 1954.

Aus 523—Nassau Bay to Finsch Harbour, 1:150,000
(published 31 Dec 91)

Metric coastal navigation chart displaying the waters of Huon Gulf, Papua New Guinea, and the approaches to the port of Lae. This product replaces chart Aus 574 (published 1956, imperial units) which has been withdrawn. The chart includes plans of Lae Harbour and Salamaua Harbour which were originally shown on British Admiralty chart 2054 as inset plans.

Aus 451—Sandefjord Bay to Cape Rundingen, 1:500,000
(published 3 Jan 92)

The second metric chart of the Australian Antarctic Territory in this scale series (see Aus 450 this report). Again as with Aus 450, the chart is based on inadequate data and reconnaissance hydrographic detail. The chart affords coverage of Prydz Bay and the ocean approach to Australia's Base, Davis.

Aus 21—Snake Bay, 1:37,500
(published 24 Jan 92)

A large-scale chart of the identified bay situated in the north-west corner of Melville Island, Northern Territory. The chart was published to include the RAN 1991 survey of the approach and inner waters of this inlet.

Aus 721—Port Essington to Snake Bay, 1:150,000
(published 24 Jan 92)

Metric chart, coastal navigation series, depicting the waters to the north and dividing Melville Island and Cobourg Penninsula (Northern Territory). The chart includes a RAN survey of 1991, approaches to Snake Bay.

Aus 733—Buccaneer Archipelago and Kind Sound, 1:150,000
(published 31 Dec 91)

Metric chart Western Australia coastal navigation series, published to replace Aus 733 of imperial units (published in 1965). The chart includes surveys conducted by the RAN, 1975 and 1977. Modern topographic detail has positioned accurately the many islands of the Buccaneer Archipelago.

Aus 61—Montebello Islands, 1:25,000
(published 22 May 92)

This is the first large-scale chart published of the Montebello Islands group, Western Australia. Hydrographic surveys by the RAN, were carried out between 1951 and 1966. A prohibited area limit (former nuclear weapon testing site) is identified on the chart.

Aus 152—Plans in Western Port (Victoria)
(published 19 Jun 92)

A group of plans reflecting berthing facilities, dredged areas and channels in the North Arm of Western Port including Hastings Bight 1:10,000; Rutherford Inlet 1:15,000; Crib Point 1:12,000 and Hans Inlet 1:7,500

Aus 604—Macquarie Island, 1:100,000
(published 19 Jun 92)

A large-scale chart depicting the approaches to Australia's sub-antarctic territory. The chart was designed to replace British Admiralty chart 1022, published in 1917. The new chart is generally based on bathymetric survey data and is indicated as being inadequately surveyed.

Aus 302—Archer River to Nassau River, 1:300,000
(published 19 Jun 92)

Situated on the Queensland Coast, Gulf of Carpentaria. Metric chart, designed to replace former Australian chart of the same number, published 1 Oct 68. The bulk of sounding information is derived from the national bathymetric survey program.

NEW EDITIONS OF CHARTS

Aus 250—Plans in Mackay and Bowen
(printed NE 26 Jul 91)

General revision to include port facility developments, graduation of harbour plans, inclusion of Notices to Mariners.

Aus 112—Approaches to Fremantle, 1:37,500
(printed NE 22 Jan 92)

Vertical datum adjusted from Port Datum to Lowest Astronomical Tide, including surveys by RAN, Port Authority, Public Works Dept., 1982–84. Chart size reduced from double fold to standard size.

Aus 835—Cape Weymouth to Cairncross Islets, 1:150,000
(printed NE 13 Mar 92)

General revision and adjustment of vertical datum to Lowest Astronomical Tide.

Aus 249—Hay Point to Penrith Island, 1:75,000
(printed NE 30 Jun 92)

General revision and inclusion of RAN, 1984 surveys and Queensland Port Authority surveys to 1990. Plan of Hay Point was reschemed to include the Tug Boat Harbour.

Aus 547—Lolobau Island to Willaumez Peninsula, 1:150,000
(printed NE 19 Jun 92)

Papua New Guinea chart; general update and to include later hydrographic survey detail adjoining the east coast between Commodore Bay and Lolobau Island. A plan of Bialla Harbour at scale 1:25,000 was included.

Aus 840—Arden Island to Bramble Cay, 1:150,000
(printed NE 26 Jun 92)

This Queensland coastal navigation series chart was revised to convert the hydrographic survey vertical datum to Lowest Astronomical Tide.

APPENDIX 6

CHARTS IN PRODUCTION (30 JUNE 92)

NC—New Chart
NE—New Edition

Chart No.	Category	Title	Scale	State/ Locality
Aus 235	NE	Approaches to Moreton Bay	1:75,000	Q
Aus 200	NE	Port Jackson	1:20,000	NSW
Aus 323	NC	Adele I to Lacepede I	1:300,000	WA
Aus 236	NE	Moreton Bay	1:75,000	Q
Aus 743	NC	Barrow I to Onslow	1:150,000	WA
Aus 742	NC	Rosemary I to Barrow I	1:150,000	WA
Aus 4621	NC	Mackay to Port Moresby	1:1,500,000	Q/PNG
Aus 156	NE	Western Port Entrance	1:37,500	V
Aus 502	NC	Cape Blackwood to Kerema Bay	1:150,000	PNG
Aus 15	NC	Plans in Wessel I Passages	–	NT
Aus 4622	NC	Choiseul I to Wewak	1:1 500,000	PNG
Aus 614	NC	Lihou Reef	1:150,000	Cor/Sea
Aus 615	NC	Plans in Coral Sea (Sheet 3)	–	Cor/Sea
Aus 149	NC	Western Port	1:75,000	V
Aus 621	NC	Port Moresby	1:37,500	PNG
Aus 163	NE	Port of Burnie	1:25,000	T
Aus 715	NE	Cape Arnhem to Cape Wessel	1:150,000	NT
Aus 601	NC	Approaches to Wilkes Station	1:50,000	Ant
Aus 514	NC	Woodlark Island	1:150,000	PNG

Aus 700	NE	Western Approaches to Torres Strait	1:150,000	Q
Aus 749	NC	Shark Bay (SW Sheet)	1:150,000	WA
Aus 747	NC	Shark Bay (N Sheet)	1:150,000	WA
Aus 748	NC	Shark Bay (SE Sheet)	1:150,000	WA
Aus 4727	NC	Esperance to Whidbey I	1: 1,500,000	WA/SA
Aus 809	NC	Port Jackson to Port Stephens	1:150,000	NSW
Aus 383	NC	Bonvouloir I to Woodlark I	1:300,000	PNG
Aus 14	NC	Milner Bay to Cape Shield	1:75,000	NT
Aus 337	NC	King George Sound to Rocky I	1:300,000	WA
Aus 722	NC	Beagle Gulf to Clarence Strait	1:150,000	NT
Aus 720	NC	Van Diemen Gulf	1:150,000	NT
Aus 207	NC	Approaches to Newcastle	1:25,000	NSW
Aus 27	NC	Approaches to Darwin	1:50,000	NT
Aus 28	NC	Plans in Port Darwin	–	NT
Aus 280	NC	Eden Reef to Magpie Reef	1:75,000	Q

APPENDIX 7

HYDROGRAPHIC INFORMATION RECEIVED DURING THE YEAR

Hydrographic Information received from RAN Sources

Ship	Instruction	Locality
HMAS FLINDERS	HI 159	Nuakata Island to Laseinie Islands, PNG
	HI 167	Palm Passage to Willis Islets, Coral Sea
HMAS MORESBY	HI 178	Gugari Rip, NT
	HI 157	Cape Wessel to Cape Stewart, NT
	HI 170	Groper Point to Margaret Cove, WA
HMAS MORESBY/ MERMAID/ PALUMA	HI 165	Melville Island, NT
HMAS SHEPPARTON	HI 168	Approaches to Port Moresby, PNG
	HI 168	Killerton Island, PNG
	HI 143	LADS Trial area, SA
	HI 168	Dreger Harbour , PNG
HMAS SHEPPARTON/ BENALLA	HI 157	Cape Wessel to Cape Stewart, NT
	HI 168	East Cape to Hummock Island, PNG
	HI 168	SE Approaches to Dreger Harbour, PNG
HMAS WATERHEN	–	Herald Island, QLD
HODSU	HI 161	Casey, AAT
	–	Darling Harbour, NSW
	–	Pyrmont Wharves, NSW
	HI 131	Hanns Inlet, VIC
	–	BEACHCOMBER 1991, NT

Hydrographic Information received from Non-Service Sources

Source	General Locality
NEW SOUTH WALES	
Maritime Services Board	Botany Bay
	Chowder Head to Georges Head
	Clarence River
	Double Bay
	Garden Island
	Fern Bay
	Middle Harbour
	Darling Harbour

	Neutral Bay
	Mortlake
	Fort Denison to Harbour Bridge
	Pyrmont
	Blackwattle Bay
	Sydney Cove
	Gore Cove
	Silverwater Bridge
	Sow and Pigs
	East Channel
NORTHERN TERRITORY	
Kleenheat Gas	Channel Island
Nabalco Pty Ltd	Gove
Wesfarmers-Kleenheat Gas	Channel Island
QUEENSLAND	
AUSLIG	Flinders Reef—Coral Sea
	Townsville
	John Brewer & Kelso Reefs
Cairns Port Authority	Port of Cairns
DOT-Marine & Harbours Division	Abbot Point
	Hay Point
	Arlington Reef
	Rosslyn Bay
	Wide Bay
	Cabbage Tree Creek
	Port Alma
	Cooktown
	Ellis Channel to Hovell Bar
	Ellis Channel
	Hovell Bar
	Karumba
	Gladstone Harbour
	Gold Coast Waterway
	Half Tide Tug Harbour
	Hay Point
	Bowen
	Manly Boat Harbour, Rosslyn Bay
	Mooloolah River
	Moreton Bay,
	Mooloolaba Harbour
	Mourilyan Harbour
	Quintell Beach,
	Rosslyn Bay,
	Gladstone
	Scarborough Boat Harbour

	Shelburn Bay, Karumba, Townsvillle Thursday Island, Weipa Townsville, Port Douglas Clump Point
Port of Brisbane Authority	Fisherman Island

SOUTH AUSTRALIA

BMR	Ceduna (Offshore Resource Map)
SA Department of Marine & Harbors	Edithburg Outer Harbour—Port Adelaide Port Riley to Shoalwater Point sub-cable

TASMANIA

Burnie Port Authority	Port of Burnie
Department of Main Roads	Currie Harbour Stanley Harbour
Marine Board of Hobart	Maria Island—Nature Reserve Ninepin Point—Nature Reserve Tinderbox—Nature Reserve Governor I.—Nature Reserve Port of Hobart
Port of Devonport Authority	Ulverstone

VICTORIA

ESSO Australia	Gippsland Basin
Port of Melbourne Authority	Corner Inlet Barwon River Lakes Entrance Port Welshpool Port Phillip Gippsland Lakes Warrnambool Harbour Mallacoota Inlet Port Fairy Corio Bay Western Port

WESTERN AUSTRALIA

BMR	Cuvier (Offshore Resource Map)

	Hartog (Offshore Resource Map) Perth (Offshore Resource Map)
Bunbury Port Authority	Port of Bunbury
Dampier Port Authorty	Offshore locality map
Department Marine & Harbours	Coral Bay Broome Shark Bay Carnarvon
Hadson	Varanus Island
West Australian Petroleum P/L	Ward Reef Ashburton Island
BHP Engineering	Griffin Field Jabiru Field

OVERSEAS

Papua New Guinea

Chevron Niugini P/L	Kutubu Petroleum Development Project
Dames & Moore	*Iagifu Survey Planning Study*
Department Lands, Surveys & Mines	Alotau
Department of Transport	Samarai
Gardline Surveys	Kutubu Petroleum Development Project

SOLOMON ISLANDS

Solomon Islands Hydro Unit	Basilisk Harbour Aveta Passage Ringdove Passage Utupua Island

ANTARCTIC

Antarctic Division	Prydz Bay
AUSLIG	Amanda Bay—Princess Elizabeth Land Casey Framnes Mountains—MacRobertson Land Heard Island, McDonald Island Kerguelen Plateau Prydz Bay

	Macquarie Island
	Mawson
	Davis
	Rauer Group—Princess Elizabeth Land
	Vestfold Hills to Princess Elizabeth Land
Russian Hydrographic Office	GEBCO sheets

BOATING CHARTS

SA Department of Marine & Harbors	Edithburg
	Port Victoria
WA Department of Harbours & Marine	Green Head
	Ocean Reef to Cape Peron

BATHYMETRIC MANUSCRIPTS

Hydrographic Office Canberra	Orford Bay

SATELLITE IMAGERY

ACRES/AUSLIG	Capricorn Group
	E of Marion Reef
	Frederick Reef
	N of Frederick Reef
	N of Saumarez Reefs
	S of Hood Point—PNG
	Sandy Cape to Frazer Island
	Saumarez Reefs
	Lihou Reefs
	SE of Ashmore Reefs
	W of Cato Island
	Barrow Island
	E of Daru Island

TOPOGRAPHIC MAPS

NSW Land Information Centre	3
RASC	64
TASMAP	5

APPENDIX 8

BUDGET

Expenditure

		$m
Hydrographic Survey		23.4
Navigation Services		3.5
Oceanographic Survey		0.1
Environmental Services		1.2
Co-ordination and Development		2.8
Centrally managed staff and property overheads		1.5
Hydrographic School		0.5
	TOTAL	**$33.0m**

Revenue

Chart Sales and other services		$1.1m
Department of Defence appropriation		$31.9m
	TOTAL	**$33.0m**

APPENDIX 9

DISTRIBUTION AND SUPPLIES

DISTRIBUTION OF CHARTS AND ASSOCIATED PUBLICATIONS

		87–88	88–89	89–90	90–91	91–92
Australian	issued	29,166	32,208	28,743	20,961	29,075
	sold	116,360	118,526	101,928	100,429	95,921
British	issued	14,527	17,234	17,421	17,493	16,144
	sold	9,779	6,204	6,456	6,260	5,327
New Zealand	issued	1,458	2,524	1,252	1,564	1,627
	sold	720	208	340	295	238
Canadian	issued	16	44	158	61	26
	sold	68	69	45	68	69
	Totals:	172,094	177,017	156,343	147,131	148,427

VALUE OF CHARTS AND ASSOCIATED PUBLICATIONS SOLD
(exclusive of sales tax)

	87–88	88–89	89–90	90–91	91–92
Australian	$706,030	$889,188	$861,029	$853,773	$947,075
British Admiralty	$104,328	$96,484	$103,482	$136,295	$116,857
New Zealand	$3,131	$2,575	$3,975	$3,424	$3,174
Canadian	$442	$455	$297	$449	$455
Totals:	$813,931	$988,702	$968,783	$993,941	$1,067,561

REVENUE SUMMARY

Net Sales as per Sales Summary	$1,067,561
Plus Sales Tax	$69,189
Plus Sundries	$43
TOTAL REVENUE	$1,136,793
Value of Stock Issued	$741,110

RETAIL CHART PRICES (includes sales tax)

	87–88	88–89	89–90	90–91	91–92
Australian	$11.10	$14.38	$14.38	$14.38	$16.55
British Admiralty	$27.82	$23.09	$28.93	$28.93	$35.24
New Zealand	$13.81	$13.81	$13.81	$13.81	$15.14
Canadian	$7.26	$7.26	$7.26	$7.26	$7.26

APPENDIX 10

STAFFING LEVELS

Hydrographic Survey Specialists

The numbers of PNF hydrographic specialists in the Hydrographic Service on 30 June 1992 were as follows (1991 figures in brackets):

Rank	Billets	Manning	
Commodore	1	1	(1)
Captain	1	1	(1)
Commander	4	4	(4)
Lieutenant Commander	12	11	(11)
Lieutenant	23	19	(19)
Sub-Lieutenant	0	2	(2)
WOSR	1	0	(1)
CPOSR	5	6	(5)
POSR	12	12	(11)
LSSR	26	16	(21)
ABSR/SMNSR	71	42	(41)
Totals:	*156*	*114*	*117*

Meteorological and Oceanographic Specialists

The numbers of meteorological and oceanographic (METOC) specialists on 30 June 1992 were as follows (1991 figures in brackets):

Rank	Billets	Manning	
Commander	2	6	(6)
Lieutenant Commander	6	7	(6)
Lieutenant	15	9	(4)
Sub-Lieutenant	0	1	(0)
WOM	1	1	(1)
CPOM	2	3	(3)
POM	5	6	(6)
LSM	15	15	(15)
ABM	24	25	(23)
SMNM	0	0	(2)
Totals:	70	73	(66)

Civilian

The following civilian personnel were employed in the Hydrographic Service on 30 June 1992:

	Establishment	Average Staffing Level	Manning 30/6/92
Hydrographic Survey	2		2
Oceanographic Survey			
Navigation Services	101		72
Environmental Services	8		7
Development & Corporate Services	32		24
Totals:	143	124	105

APPENDIX 11

HYDROGRAPHIC SERVICE KEY PERSONNEL

PERSONNEL		STD: 02
Hydrographer	Commodore J.W. Leech RAN	925 4251
Personal Assistant	Mrs H. Mullins	925 4221
Operations		
Director Hydrographic Operations	Captain R.J. Willis RAN	925 4801
Head Operations and Surveying	Commander G.J. Geraghty RAN	925 4804
Staff Officers Operations	Lieutenant D.J. Wyatt RN Lieutenant R.G. Shepherdson RAN	925 4807
Quality Control Officer	Lieutenant Commander D.B. Errington RAN	925 4808
OIC Detached Survey Unit	Lieutenant K.D. Slade RAN	925 4283
Tidal Officer	Mr B. Pillich	925 4872
Survey Equipment Officer	Chief Petty Officer G.L. Stuart	925 4812
Head Navigation Services	Mr M.A. Bolger	925 4850
Sailing Directions Officer	Captain J.J. Doyle AM RANEM	925 4851
Head Nautical Charting	Mr B.C. Leonard	925 4870
Supervisor Chart Editing	Mr M.G. Griffin	925 4874
Supervisor Cartographic Support	Mr R.E. Walker	925 4854
Supervisor Chart Production	Mr W.K. Wagstaff	925 4832
Manager Information Services	Mr I.P. Kennedy	925 4853
Manager Chart Distribution	Mr N.J. Gillin	925 4880

Co-ordination and Development		**STD: 02**
Director Co-ordination and Development	Mr K.G. Burrows	925 4201
Manager Corporate Services	Mr R.A. Furness	925 4203
Manager Branch Development	Mr I.W. Halls	925 4255
Manager Hydrographic Development	Commander R.E. Ward RAN	925 4220
Staff Officer Systems	Lieutenant Commander P.A. Spencer RAN	925 4231
Head Computing Services	Mr J. Herbert (Ag)	925 4260
Manager National and International Affairs	Mr J. Randhawa	925 4209
Manager Finance and Resources	Mr K. Reid	925 4205
Manager Administrative Services	Mr J. O'Brien	925 4218

Oceanography and Meteorology		
Director Oceanography and Meteorology	Commander D.J. Knight RAN	925 4232
Oceanographic Staff Officer	Lieutenant M.T. Evans RAN	925 4233
Head Science and Oceanography	Mr B.J. Searle	925 4230

Nowra		**STD:044**
Commander Naval Weather and Oceanographic Centre	Commander C.A. Low RAN	21 1268

Canberra		**STD: 06**
Hydrographic Projects Officer	Lieutenant Commander D.H. James RAN	253 2587

HYDROGRAPHIC SERVICE RAN—KEY ADDRESSES

SYDNEY

RAN Hydrographic Office
161 Walker Street
NORTH SYDNEY NSW 2060

PO Box 1332
NORTH SYDNEY NSW 2059

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SHEPPARTON, BENALLA
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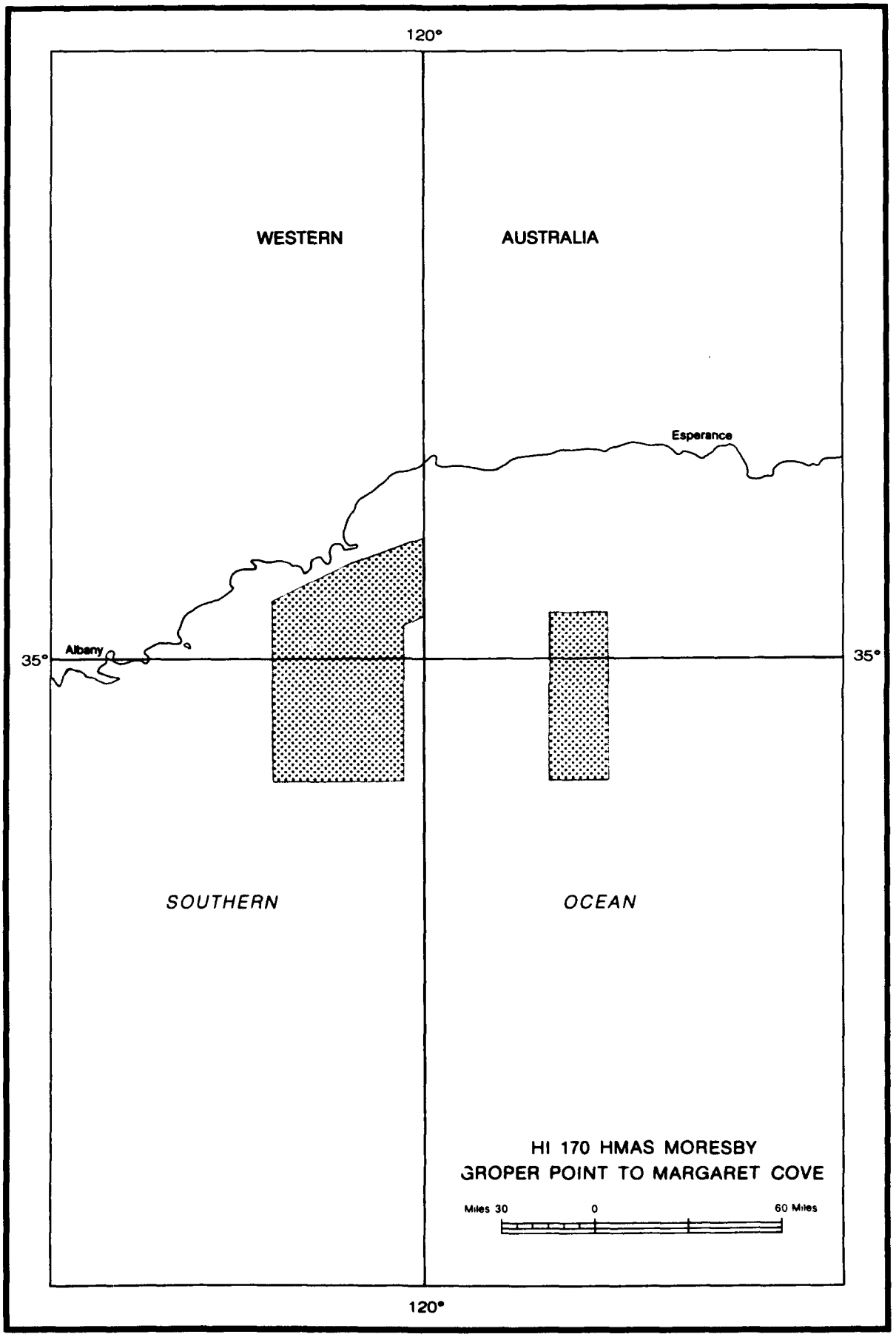

120°
WESTERN
AUSTRALIA
Esperance
Albany
35°
35°
SOUTHERN
OCEAN
HI 170 HMAS MORESBY
GROPER POINT TO MARGARET COVE
Miles 30
0
60 Miles
120°

FIG. 1

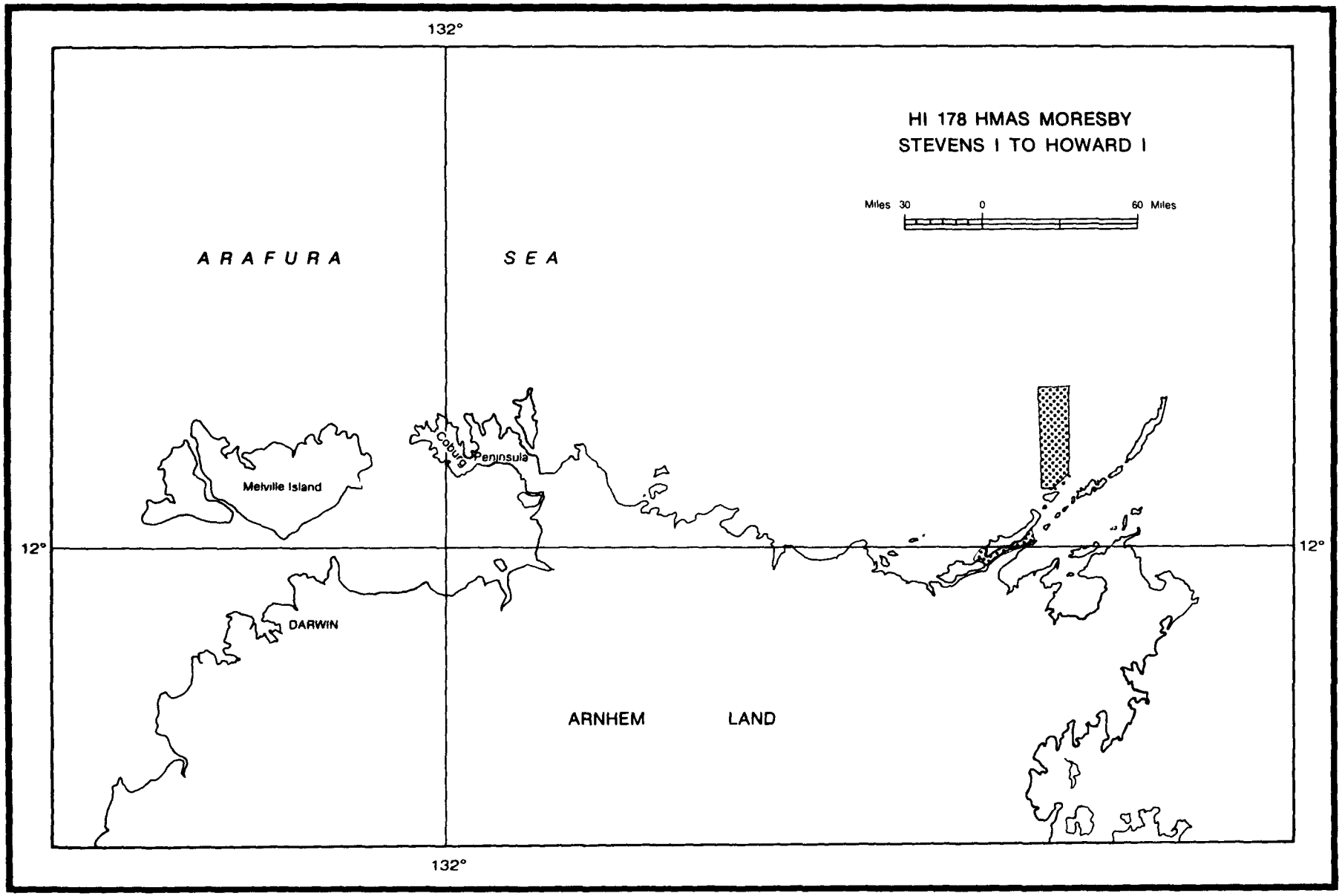

132°
HI 178 HMAS MORESBY
STEVENS I TO HOWARD I
Miles 30 0 60 Miles
ARAFURA SEA
Melville Island
Cobourg Peninsula
12°
12°
DARWIN
ARNHEM LAND
132°

FIG. 2

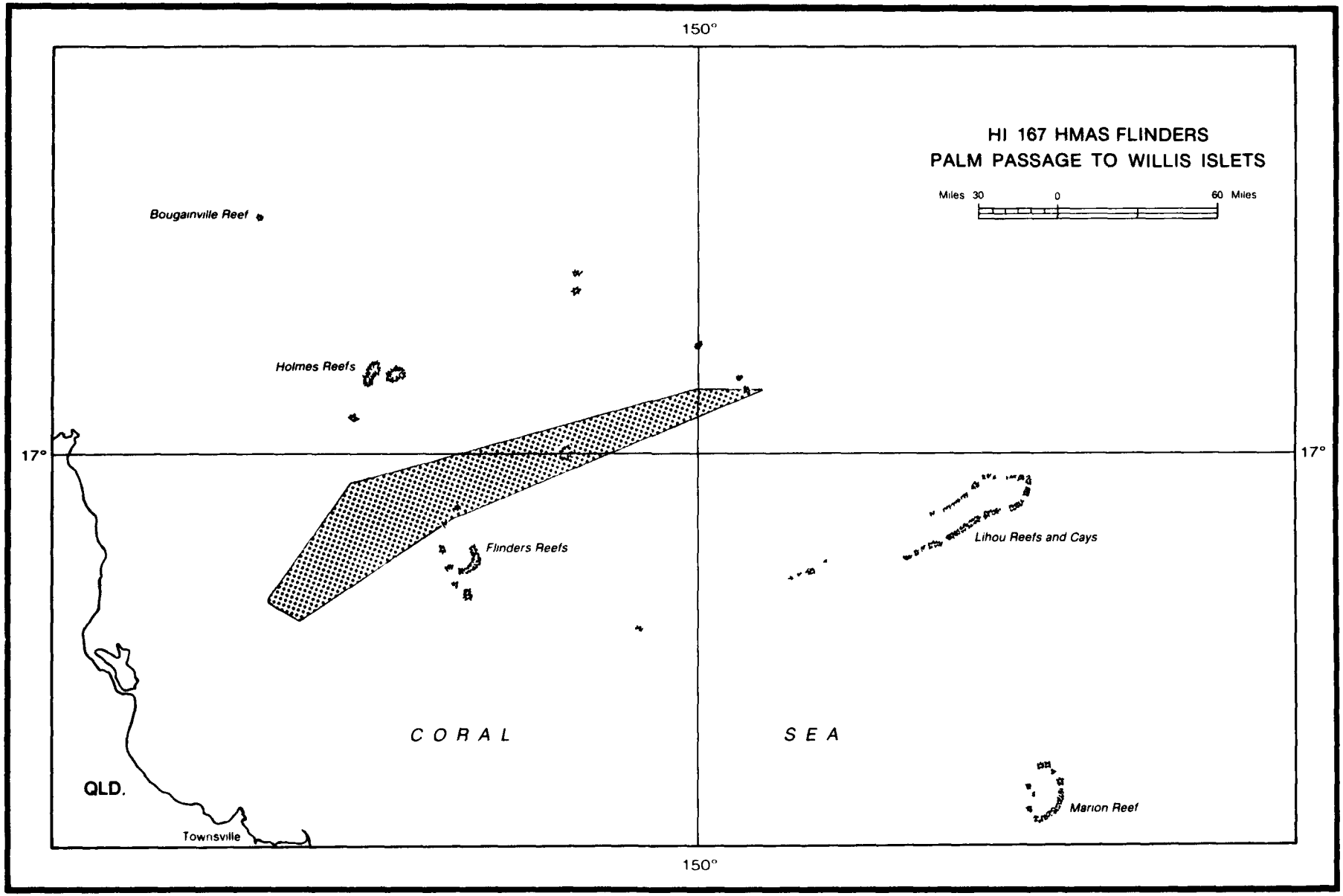

150°
HI 167 HMAS FLINDERS
PALM PASSAGE TO WILLIS ISLETS
Miles 30 0 60 Miles
Bougainville Reef
Holmes Reefs
17°
17°
Flinders Reefs
Lihou Reefs and Cays
CORAL
SEA
QLD.
Townsville
Marion Reef
150°

FIG. 3

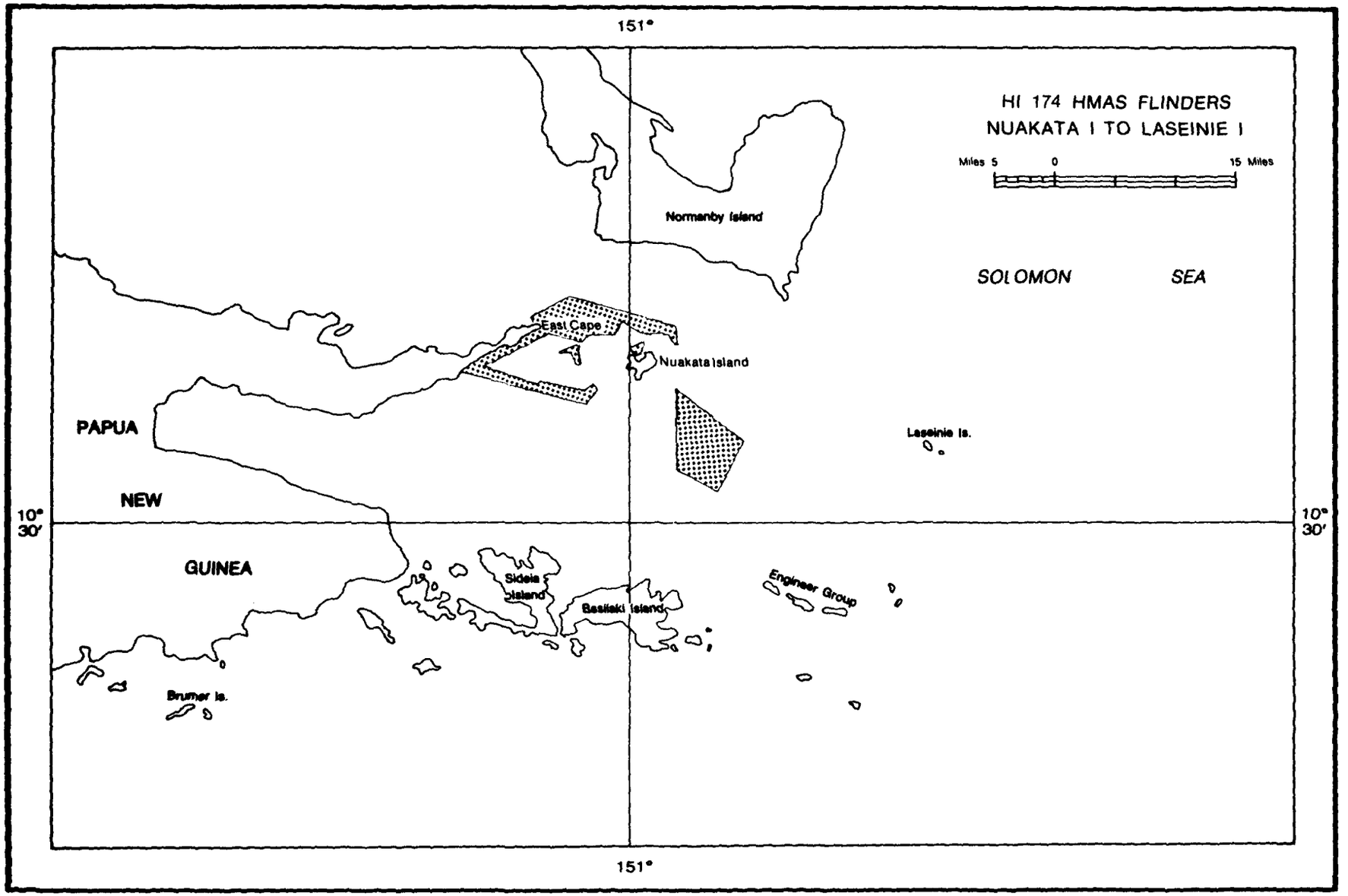

151°
HI 174 HMAS FLINDERS
NUAKATA I TO LASEINIE I
Miles 5 0 15 Miles
Normanby Island
SOLOMON SEA
East Cape
Nuakata Island
Laseinie Is.
PAPUA
NEW
GUINEA
10° 30'
Sideia Island
Basilaki Island
Engineer Group
Brumer Is.
151°

FIG. 4

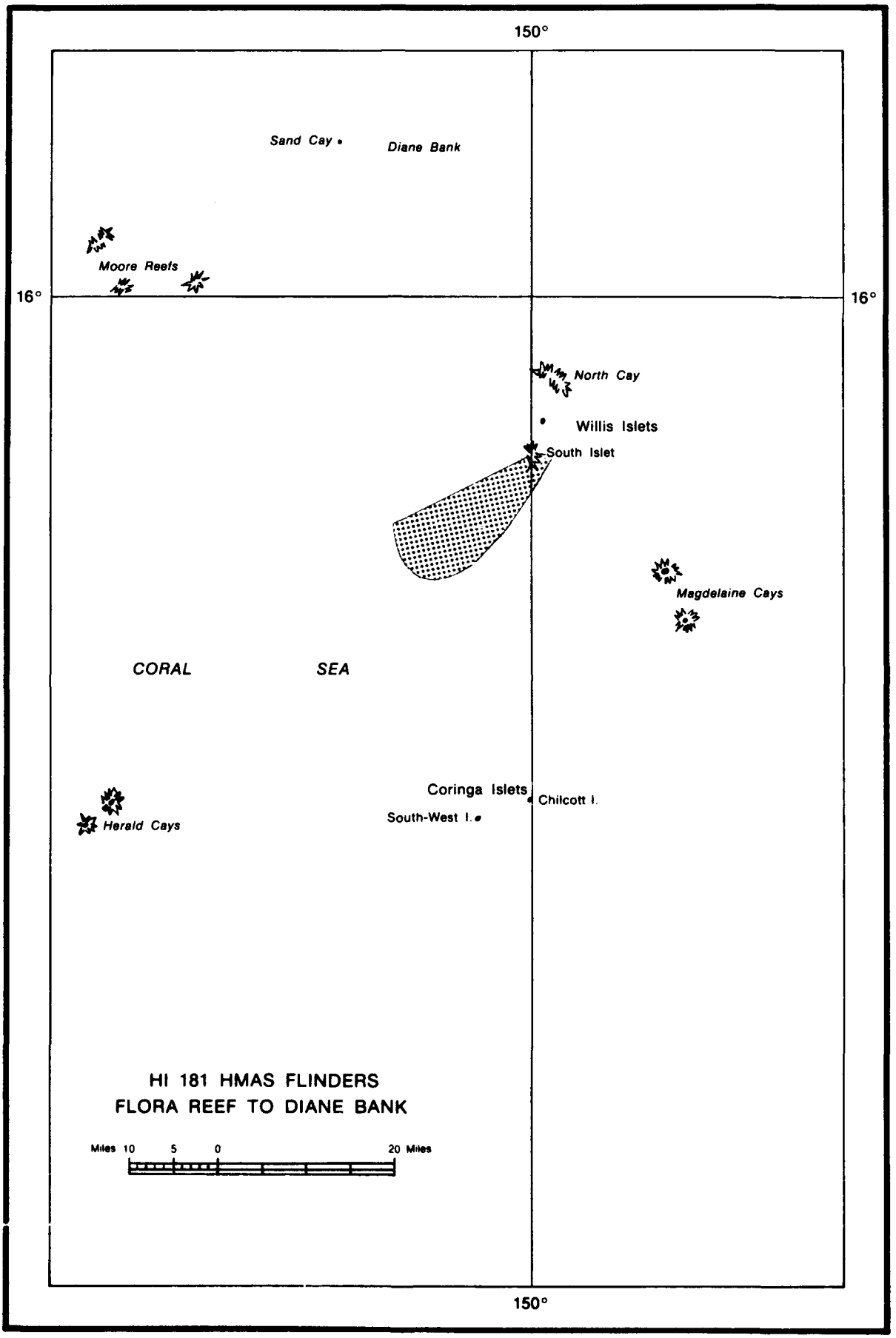

150°
Sand Cay
Diane Bank
Moore Reefs
16°
16°
North Cay
Willis Islets
South Islet
Magdelaine Cays
CORAL
SEA
Coringa Islets
Chilcott I.
South-West I.
Herald Cays
HI 181 HMAS FLINDERS
FLORA REEF TO DIANE BANK
Miles 10 5 0 20 Miles
150°

FIG. 5

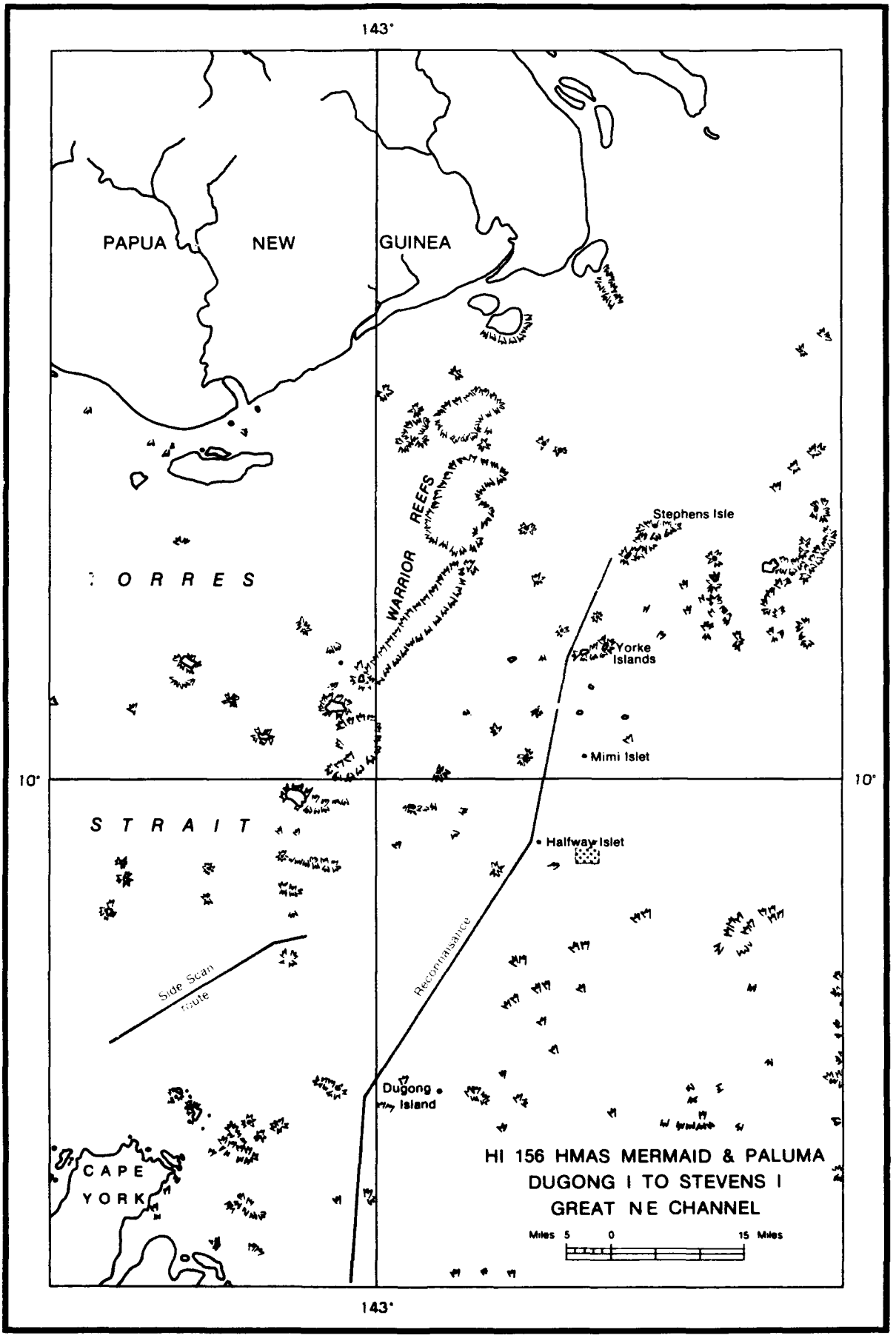

143°
PAPUA NEW GUINEA
TORRES STRAIT
WARRIOR REEFS
Stephens Isle
Yorke Islands
Mimi Islet
Halfway Islet
10°
10°
Side Scan Route
Reconnaissance
Dugong Island
CAPE YORK
HI 156 HMAS MERMAID & PALUMA
DUGONG I TO STEVENS I
GREAT NE CHANNEL
Miles 5 0 15 Miles
143°

FIG. 6

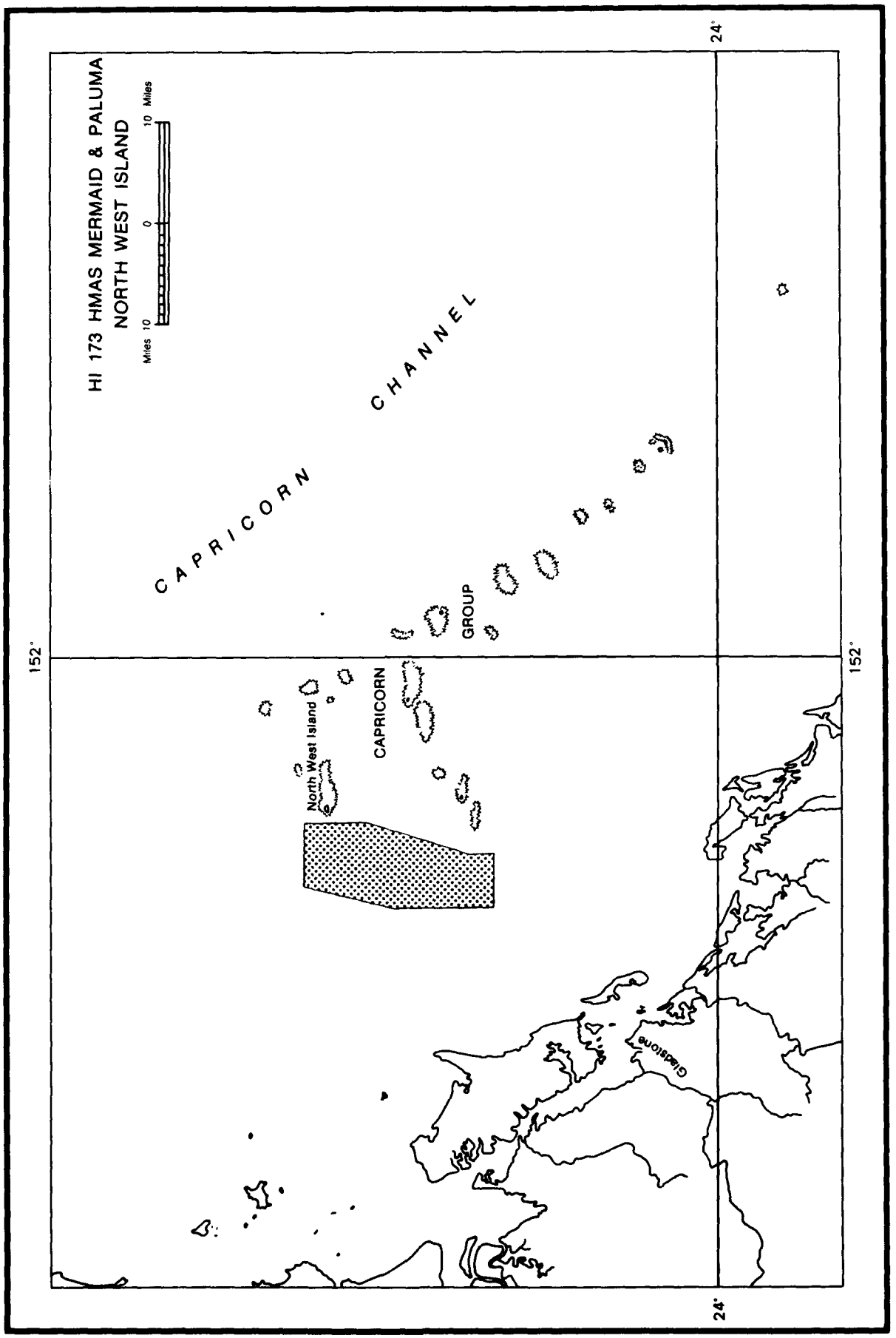

HI 173 HMAS MERMAID & PALUMA
NORTH WEST ISLAND
Miles 10 0 10 Miles
CAPRICORN CHANNEL
CAPRICORN GROUP
North West Island
Gladstone
24°
152°
152°
24°

FIG. 7

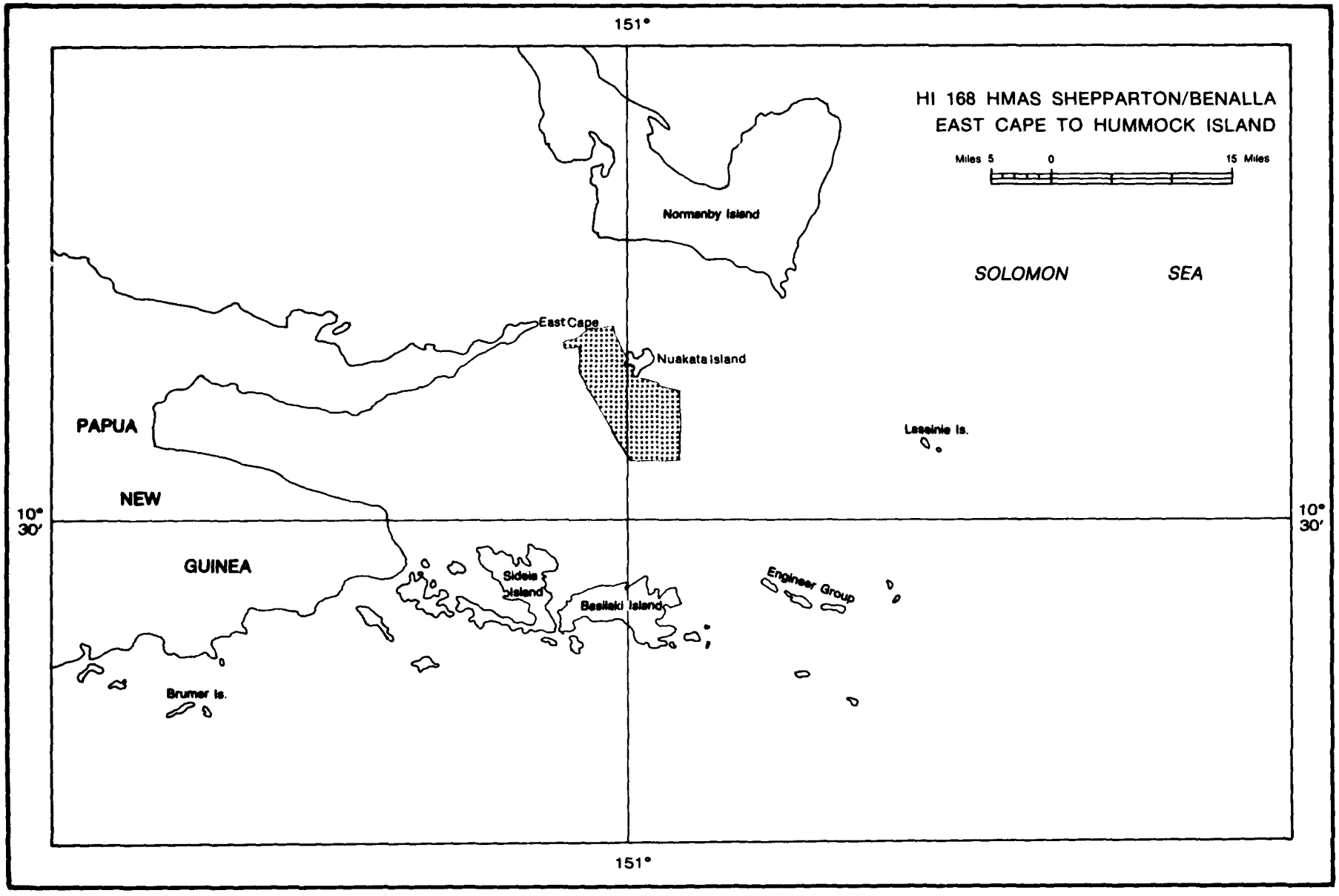

151°
HI 168 HMAS SHEPPARTON/BENALLA
EAST CAPE TO HUMMOCK ISLAND
Miles 5 0 15 Miles
Normanby Island
SOLOMON SEA
East Cape
Nuakata Island
PAPUA
NEW
GUINEA
Laseinie Is.
10° 30'
Sideia Island
Basilaki Island
Engineer Group
Brumer Is.
151°

FIG. 8

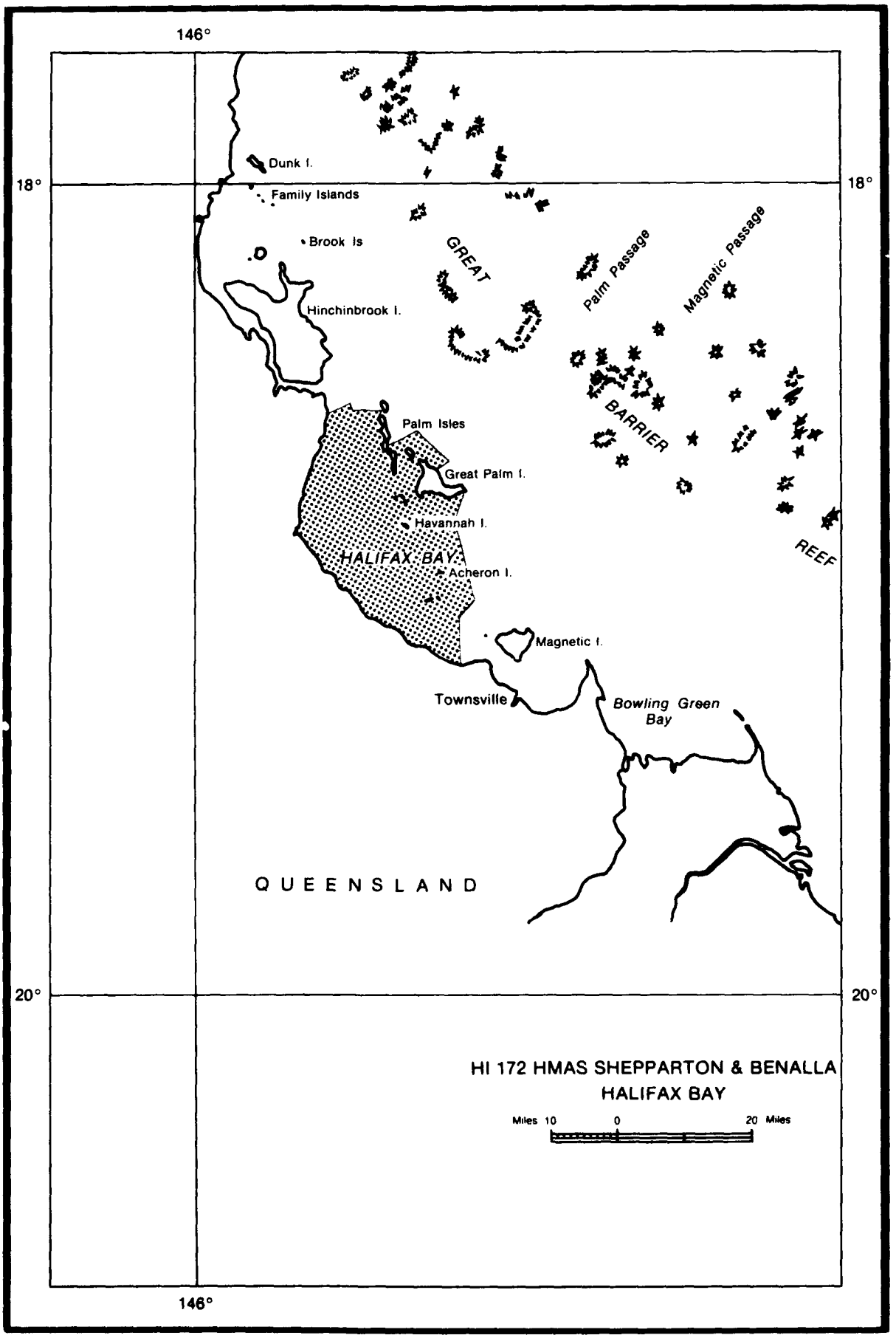

146°
18°
20°
Dunk I.
Family Islands
Brook Is
Hinchinbrook I.
GREAT
Palm Passage
Magnetic Passage
BARRIER
REEF
Palm Isles
Great Palm I.
Havannah I.
HALIFAX BAY
Acheron I.
Magnetic I.
Townsville
Bowling Green Bay
QUEENSLAND
HI 172 HMAS SHEPPARTON & BENALLA
HALIFAX BAY
Miles 10 0 20 Miles

FIG. 9

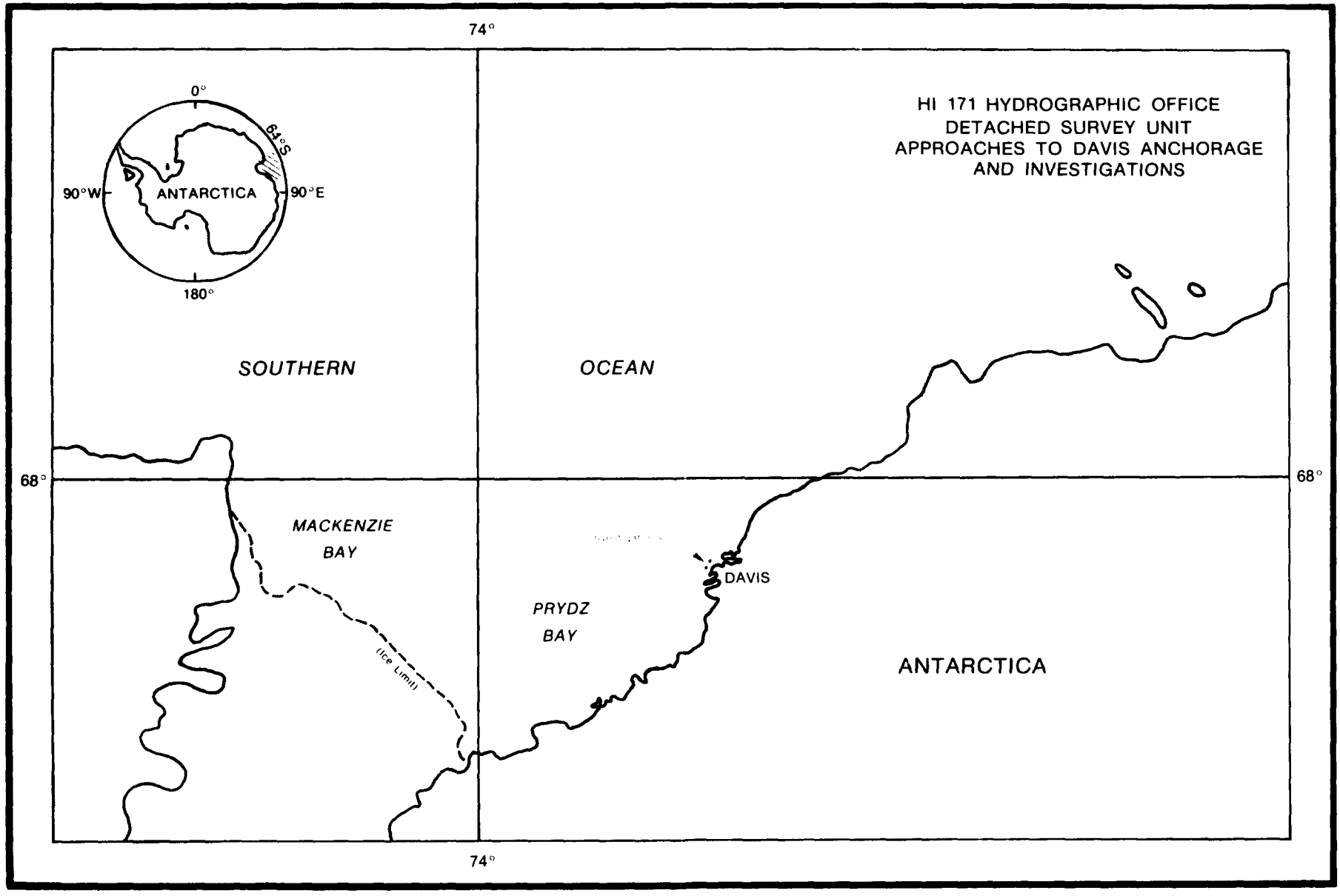

74°
0°
64°S
90°W
ANTARCTICA
90°E
180°
HI 171 HYDROGRAPHIC OFFICE
DETACHED SURVEY UNIT
APPROACHES TO DAVIS ANCHORAGE
AND INVESTIGATIONS
SOUTHERN
OCEAN
68°
68°
MACKENZIE
BAY
DAVIS
PRYDZ
BAY
(Ice Limit)
ANTARCTICA
74°

FIG. 10

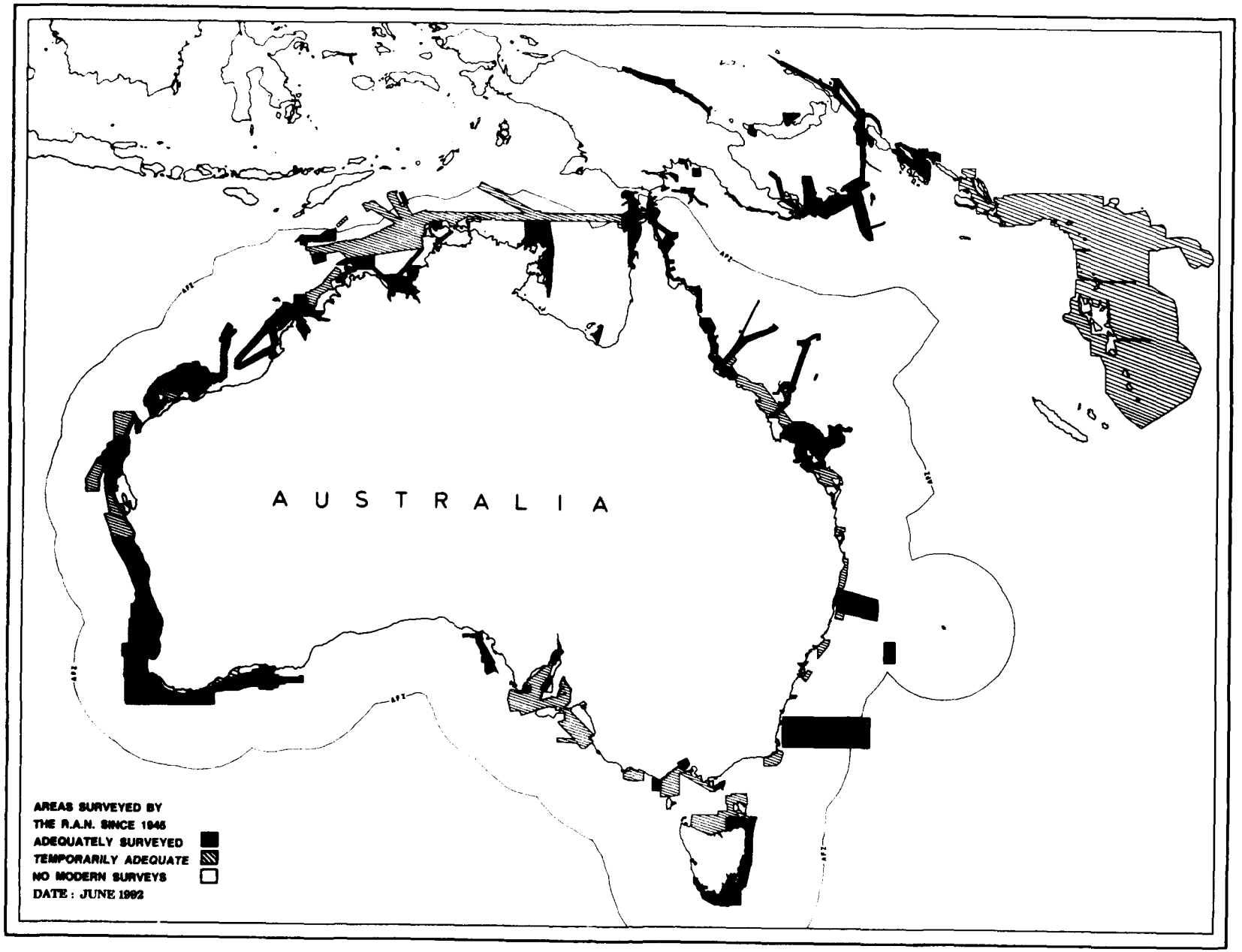

AUSTRALIA
AREAS SURVEYED BY
THE R.A.N. SINCE 1945
ADEQUATELY SURVEYED
TEMPORARILY ADEQUATE
NO MODERN SURVEYS
DATE : JUNE 1992

FIG. 11

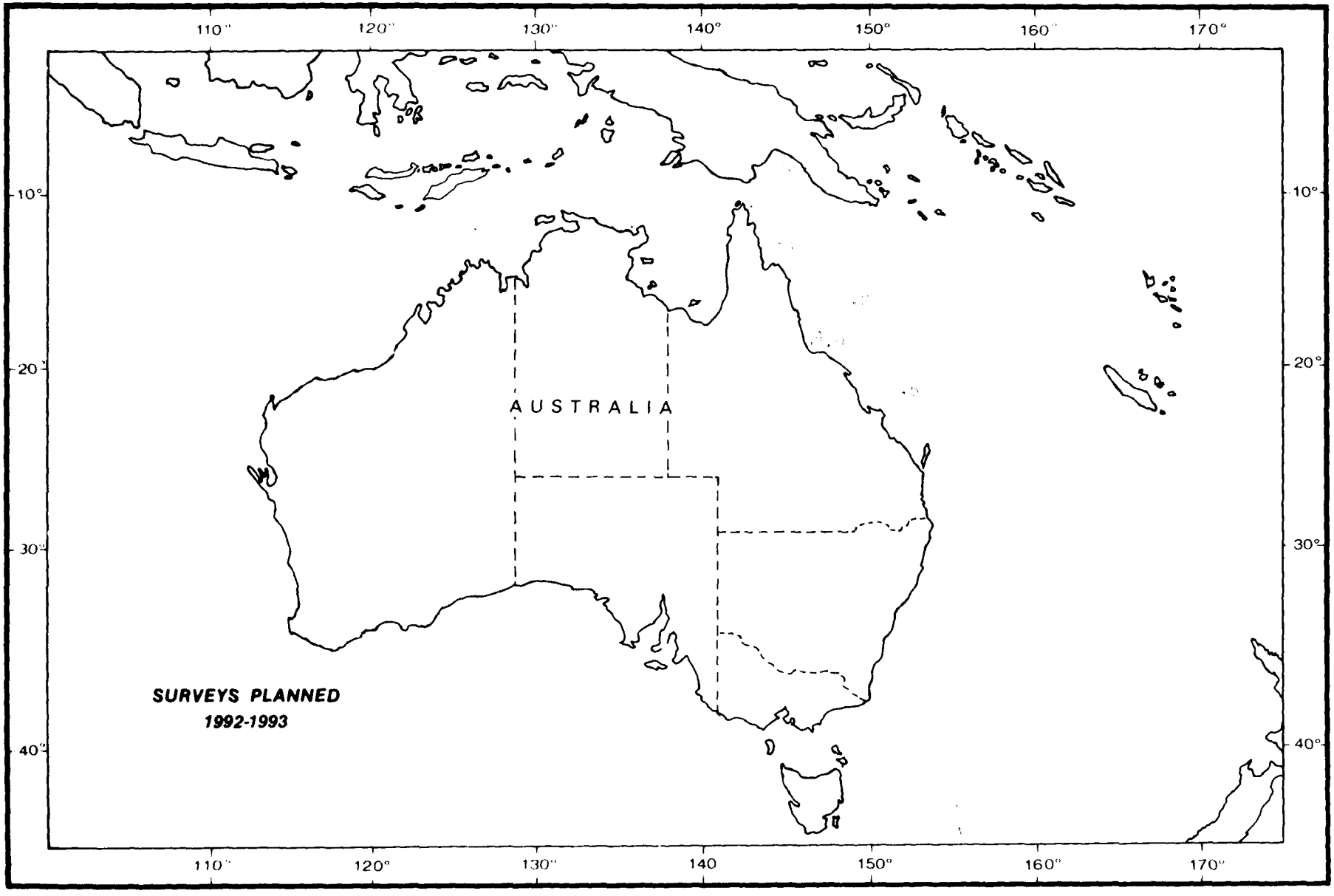

110°
120°
130°
140°
150°
160°
170°
10°
20°
30°
40°
AUSTRALIA
SURVEYS PLANNED
1992-1993

FIG. 12

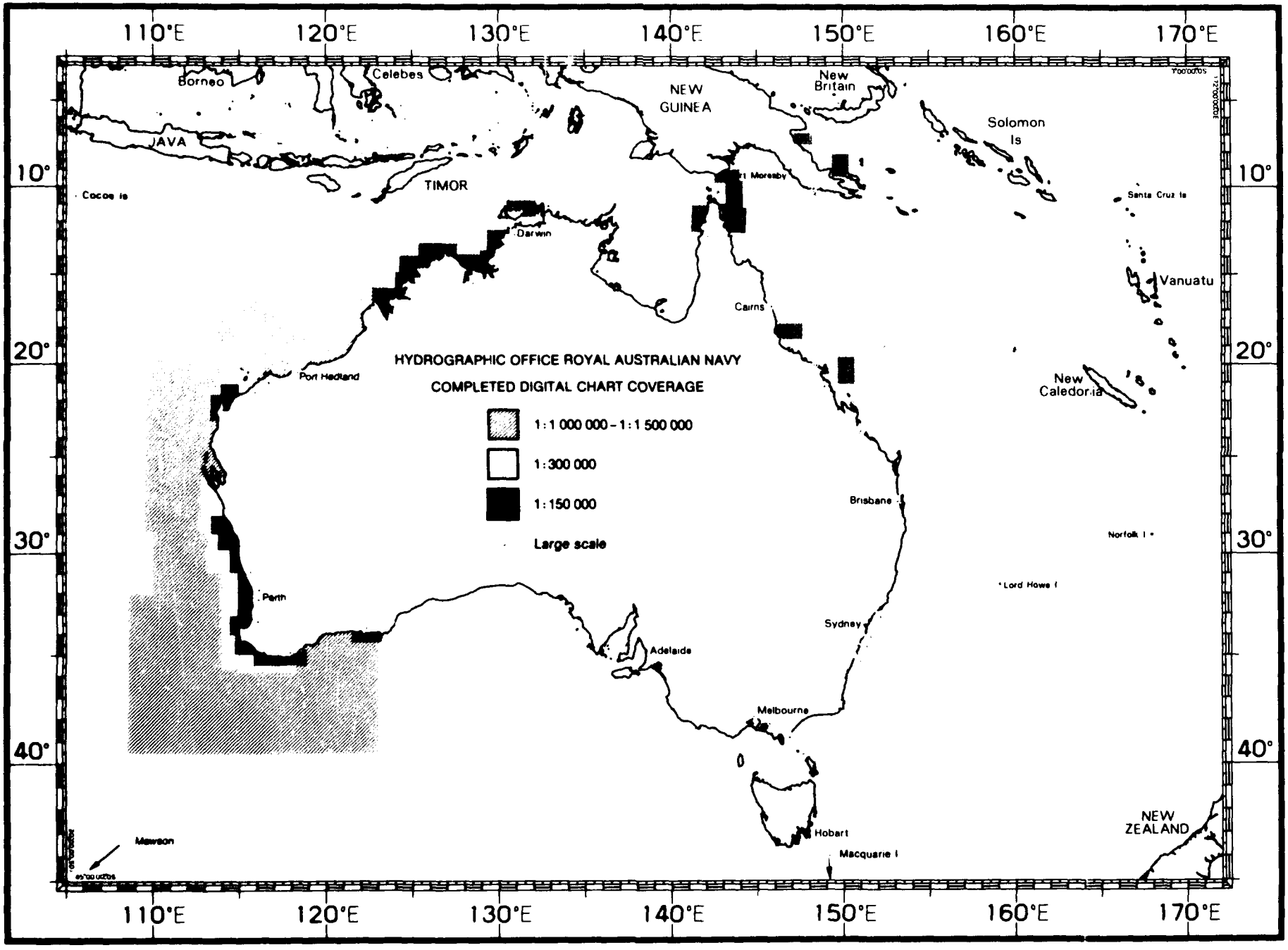
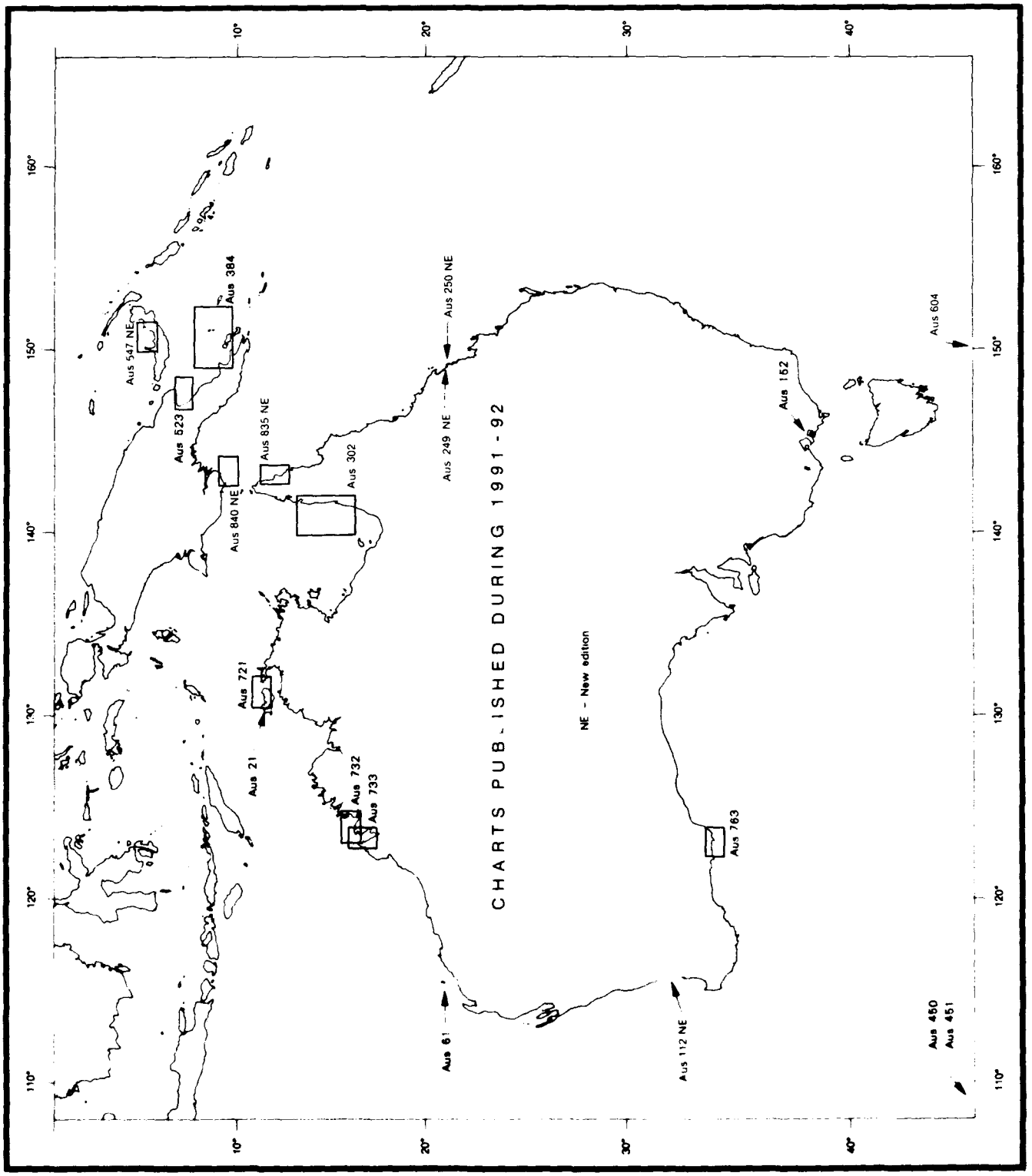

110°E
120°E
130°E
140°E
150°E
160°E
170°E
10°
20°
30°
40°
Borneo
Celebes
JAVA
TIMOR
NEW GUINEA
New Britain
Solomon Is
Cocos Is
Darwin
Port Moresby
Santa Cruz Is
Vanuatu
Cairns
New Caledonia
HYDROGRAPHIC OFFICE ROYAL AUSTRALIAN NAVY
COMPLETED DIGITAL CHART COVERAGE
1:1 000 000 - 1:1 500 000
1:300 000
1:150 000
Large scale
Port Hedland
Brisbane
Norfolk I.
Lord Howe I
Perth
Sydney
Adelaide
Melbourne
Hobart
Macquarie I
NEW ZEALAND
Mawson

FIG. 13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Aus 250 NE
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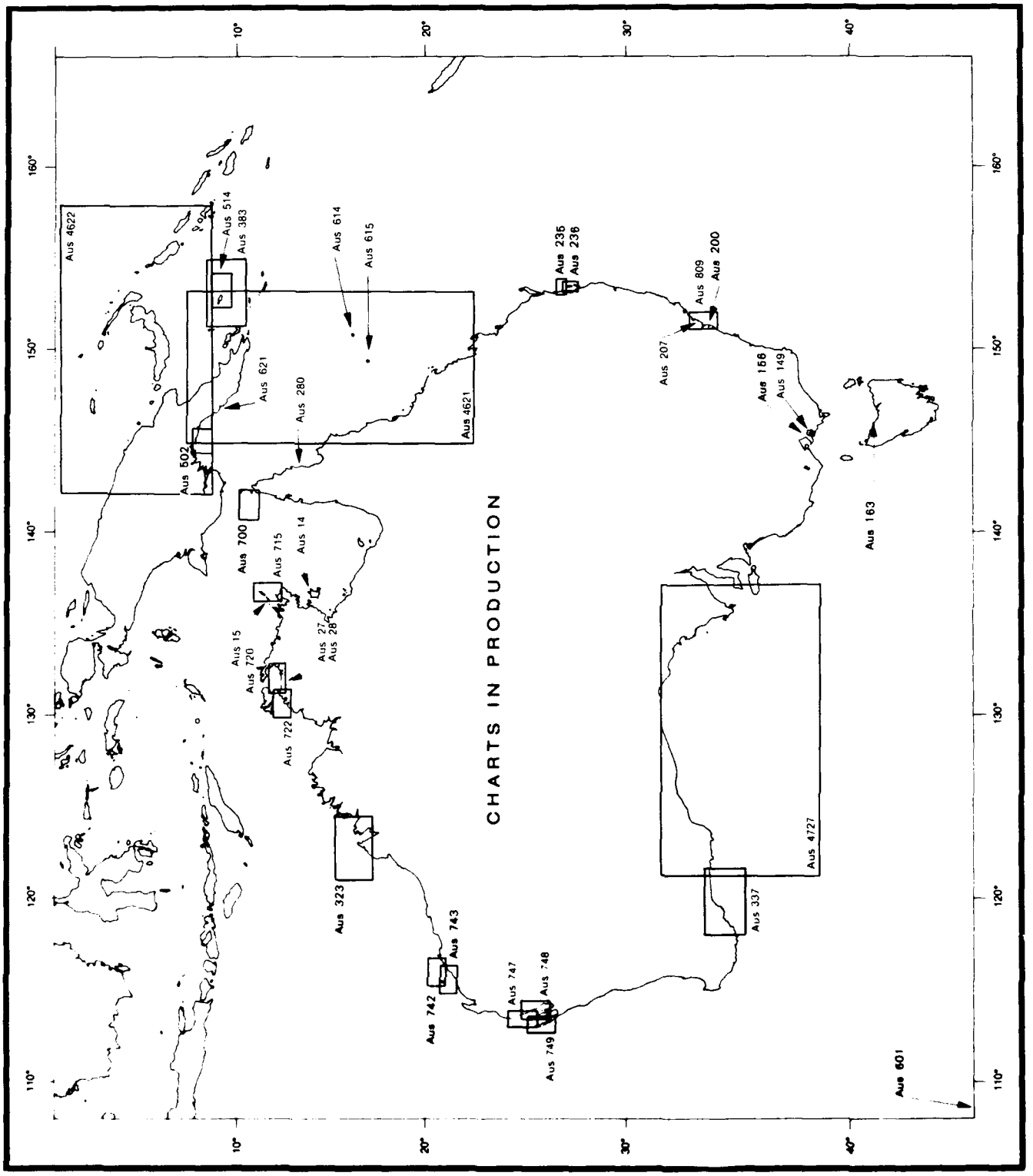
Aus 152
Aus 721
Aus 21
Aus 732
Aus 733
Aus 763
Aus 61
Aus 112 NE
Aus 450
Aus 451
10°
20°
30°
40°
110°
120°
130°
140°
150°
160°

FIG. 14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Aus 514
Aus 383
Aus 614
Aus 615
Aus 621
Aus 280
Aus 502
Aus 4621
Aus 235
Aus 236
Aus 809
Aus 200
Aus 207
Aus 158
Aus 149
Aus 163
Aus 700
Aus 715
Aus 14
Aus 15
Aus 720
Aus 27
Aus 28
Aus 722
Aus 323
Aus 743
Aus 742
Aus 747
Aus 748
Aus 749
Aus 4727
Aus 337
Aus 601
10°
20°
30°
40°
110°
120°
130°
140°
150°
160°

FIG. 15

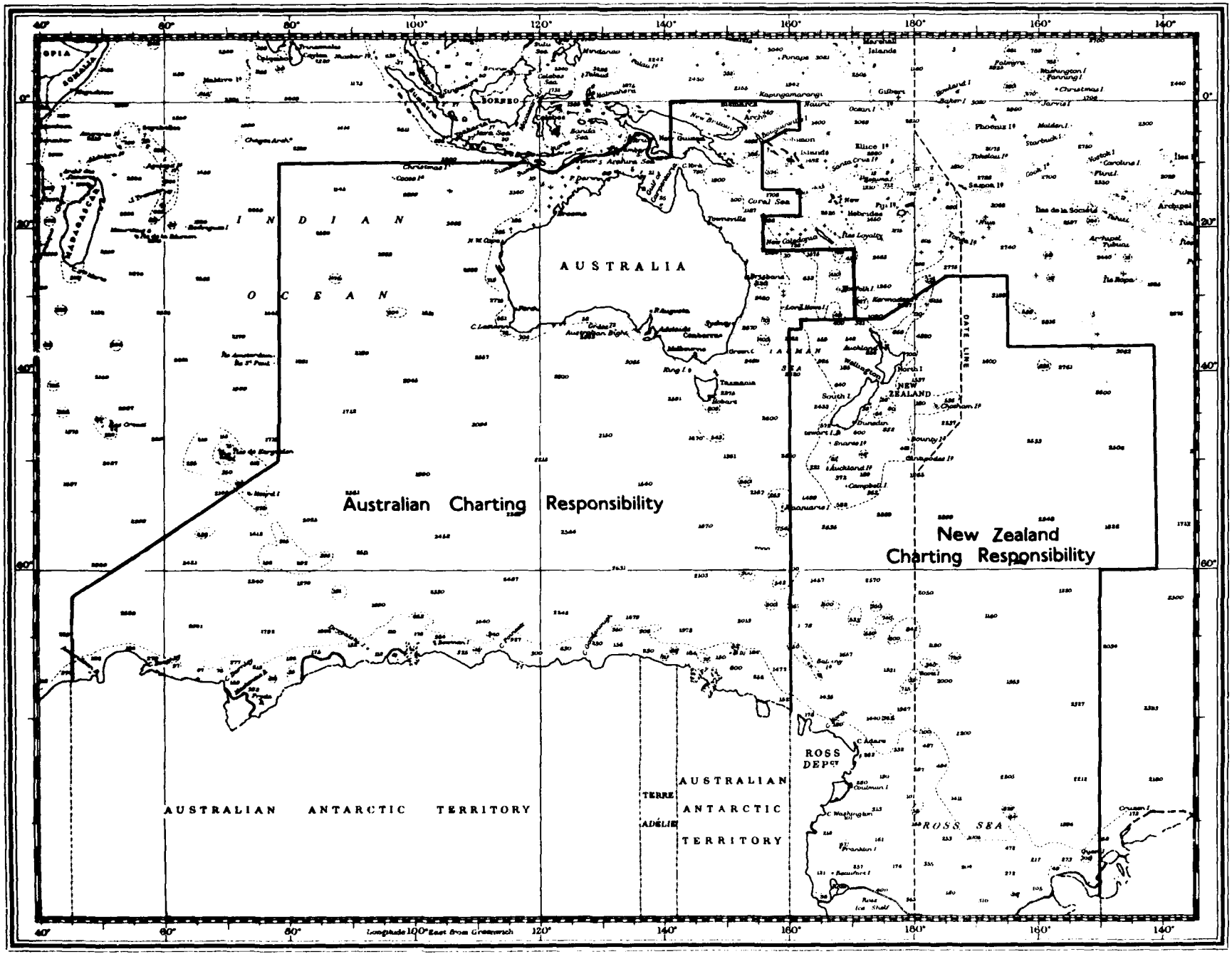
Australian Charting Responsibility
New Zealand Charting Responsibility
AUSTRALIA
INDIAN OCEAN
AUSTRALIAN ANTARCTIC TERRITORY
AUSTRALIAN ANTARCTIC TERRITORY
TERRE ADÉLIE
ROSS DEPCY
ROSS SEA
NEW ZEALAND
DATE LINE
Longitude 100° East from Greenwich

FIG. 16

1:250 000 BATHYMETRIC
MAPPING PROGRAM

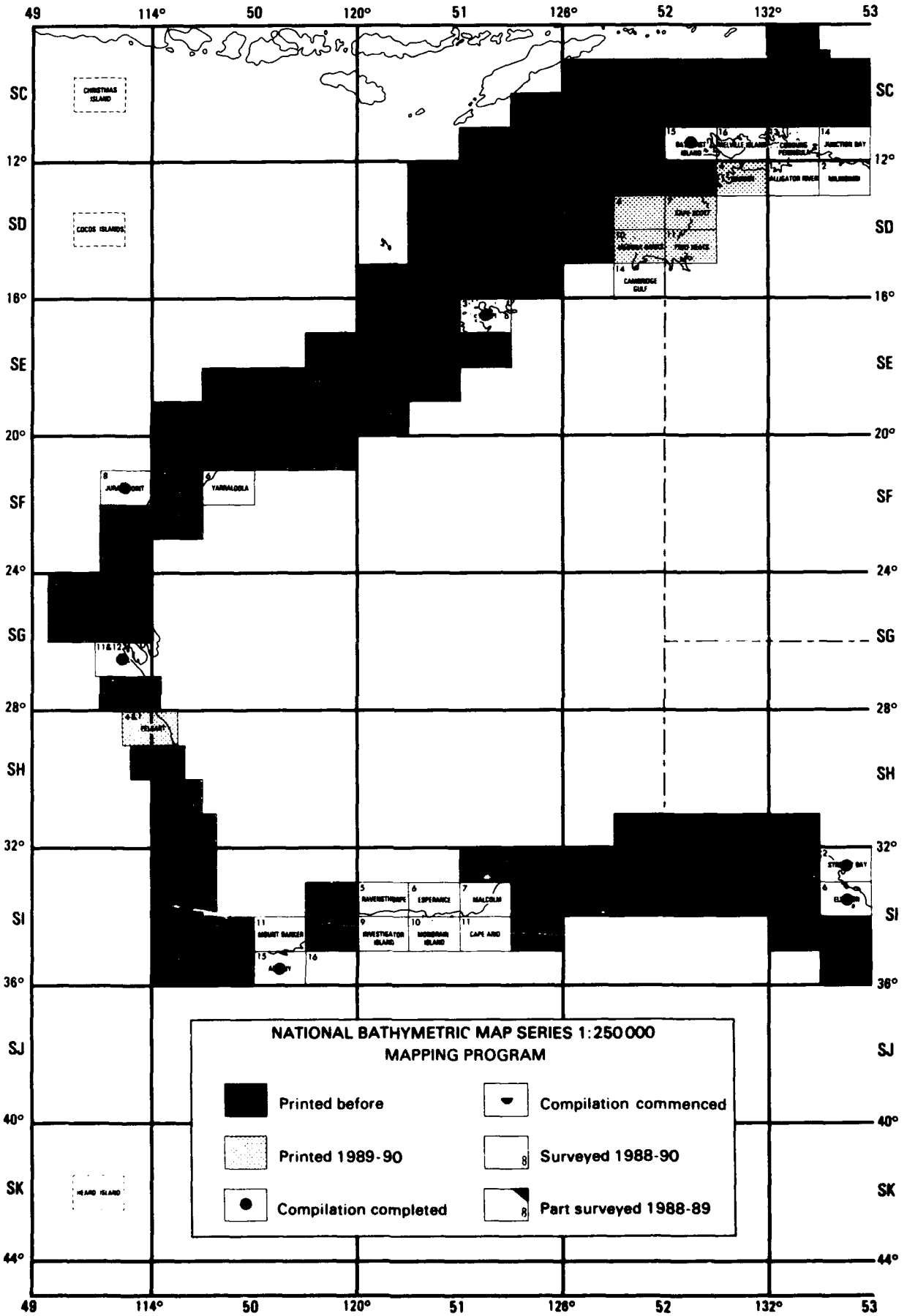

FIG. 17A

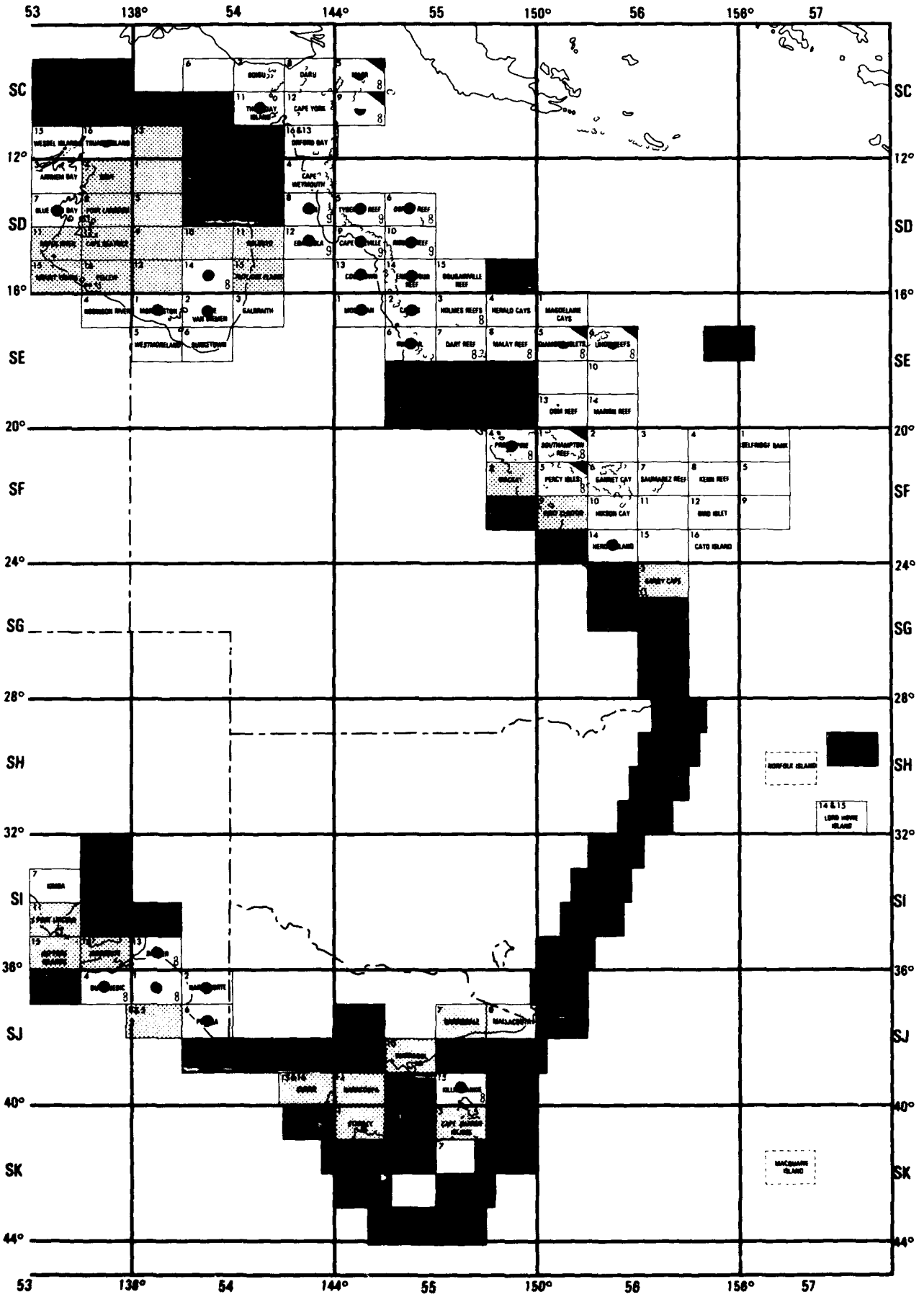
53
138°
54
144°
55
150°
56
156°
57
SC
SD
SE
SF
SG
SH
SI
SJ
SK
12°
16°
20°
24°
28°
32°
36°
40°
44°
DARU
CAPE YORK
CAPE WEYMOUTH
HERALD CAYS
MAGDELAINE CAYS
SOUTHAMPTON REEF
PERCY ISLET
GARRET CAY
KENN REEF
MISTAKE CAY
CATO ISLAND
GANNY CAPS
NORFOLK ISLAND
LORD HOWE ISLAND
MACQUARIE ISLAND

FIG. 17B

GLOSSARY

ANTT	Australian National Tide Tables
AODC	Australian Oceanographic Data Centre
ASW	Anti-Submarine Warfare
AUSRAPS	Australian Ship Reporting System
Autochart	Automated drafting facility
BOM	Bureau of Meteorology
CNS	Chief of Naval Staff
COMTRAIN	Command Training facility
DIFACS	Digital Facsimile (service)
DISCON	Defence Integrated Secure Communication Network
DSTO	Defence Science and Technology Organisation
IHO	International Hydrographic Organisation
LADS	Laser Airborne Depth Sounder
MEDB	Marine Environmental Data Base
METOC	Metereological and oceanographic (services, products etc.)
MILMETOC	Military Meteorology and Oceanography Courses
NWOC	Naval Weather and Oceanography Centre
OHS	Oceanographic/ Hydrographic Survey
PM&B	Program Management and Budgeting
HYDLAPS	Hydrographic Data Logging and Processing System
TESS	Tactical Environmental Support System

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Department of Marine and Harbours, Western Australia
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