# AUSTRALIAN OCEANOGRAPHIC FRIGATES

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In 1959 two *River* class anti-submarine frigates, H.M.A. Ships *Diamantina* and *Gascoyne,* were released from the reserve fleet and converted for oceanographic research. Their primary role for the Navy is the training of recruit seamen and much of this is done while the ships are engaged on oceanographic cruises. Both ships are 301 feet in length (overall) and of 2 100 tons loaded displacement; details of dimensions and equipment are tabulated in the volume of Research Vessel Data compiled by the Food and Agriculture Organization of the United Nations for the Research Vessel Forum held in Tokyo in September 1961.

The outline and general arrangements of H.M.A.S. *Gascoyne* (fig. 1) show the main scientific research facilities of the ships; the plan of *Diamantina* is similar to that of *Gascoyne.* After conversion, the upper deck equipment comprised two electric bathythermograph winches near the stern, a three-drum steam winch, and an electric oceanographic winch of 10 000 metres wire capacity commanding a *Discovery-type* davit adjacent to the laboratory. Some modification to the deck equipment as originally fitted has been necessary following experience in early cruises.

Biological sampling from the starboard bathythermograph winch proved hazardous in heavy weather. When the ship in loaded condition adopted her normal station position, hove-to, stern-to-wind, seas swept along the upper deck. The biological winch was therefore moved to a position abreast the mainmast on the starboard side of the fo'c'sle deck and fitted with a footbrake for more positive control in sampling operations. In 1961, this winch was moved to its present position to take advantage of the bow flare counteracting the high freeboard, and a more suitable radial davit was provided. Sea-water seepage into the controller casing of the 25 h.p. oceanographic winch seriously affected its operation. Removal from the vulnerable upper deck position to a site above the laboratory reduced electrical maintenance time, and by providing the driver with a direct view of the meter block reduced station time and increased efficiency. The original davit was replaced with one of the bipod type stepped on the upper deck, with the accumulator and manual retraction unit above the projection of the fo'c'sle deck to the ship's side. The wire lead from the winch to the meter block at the davit head is well clear of the sampling operator in the chains on the deck below. Figure 2 shows the oceanographic winch, davit, and the handling position.

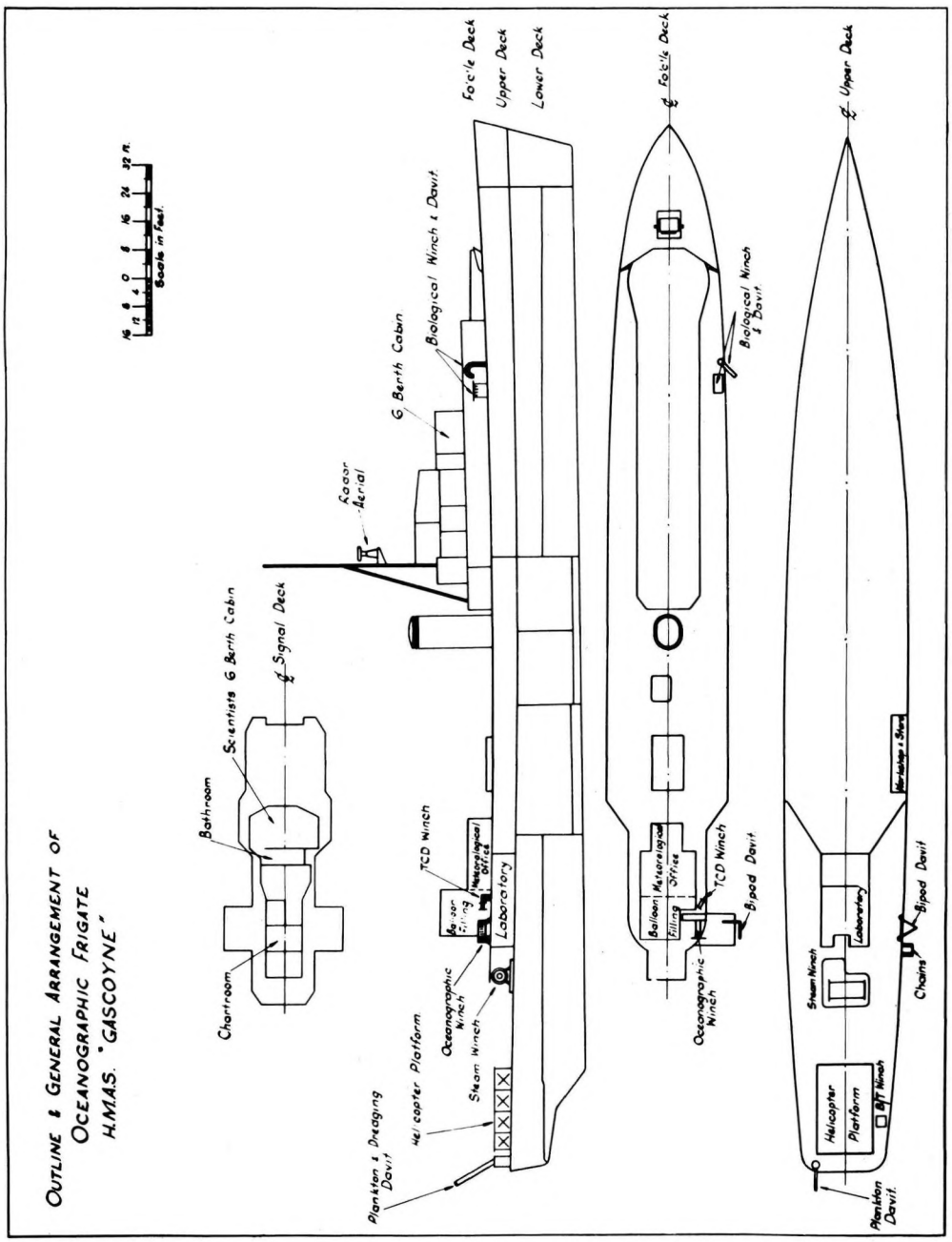


FIG. 1. — General arrangements of H.M.A.S. *Gascoyne*.

FIG. 2. — Oceanographic winch, davit, and the handling position.

A 2¼ h.p. electric winch stowing 1 300 metres of single-cored armoured cable on a demountable drum, and fitted with slip-ring contacts is sited forward of the oceanographic winch in *Gascoyne* for handling the temperature-chlorinity-depth recorder. This instrument is also lowered overside from the chains, the wire leading through a separate meter block, fitted with electrical contacts, at the davit head.

Initially there was no davit for towing plankton nets over the stern. A meter block rigged on a stay from a centre-line stanchion to the stern guard rail proved unsuccessful. In 1960 a self supporting davit with a rotating fixed-attitude jib was mounted in *Gascoyne* for plankton tows and benthos grabbing and dredging. *Diamantina* is to be fitted with a similar davit to replace one of the radial type now used for plankton tows, and in both ships an accumulator will be fitted between the steam winch and the davit in the way of the wire leads. The self supporting davit and Hayward standard grab are shown in figure 3.

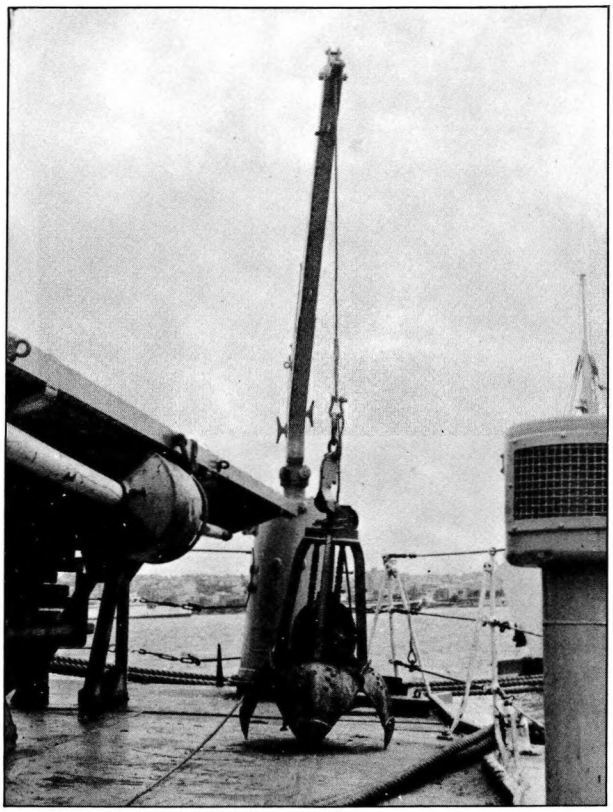

FIG. 3. — Self supporting davit and Hayward standard grab.

Laboratories were fitted out at the after end of the upper deck superstructure and in a smaller space on the same deck. In 1960, the main laboratory was extended forward to include the engineers' workshop and divided into two sections with internal access through the forward section

and direct access to the upper deck through the after one. The starboard laboratory was converted to a workshop and store. After several cruises the after section of the laboratory was set aside for the use of the physicists and chemists (these use the winches adjacent to the external door) and the forward section for biologists. Both sections are air conditioned and supplied with sea-water, fresh water, power, and gas. Vacuum and compressed air are available in the forward laboratory. The power supply is regulated by an A.C. controller situated on the deck below.

Because it is usual on oceanographic cruises to carry scientists engaged in at least five different projects, which vary in emphasis from cruise to cruise, it was decided to divide the 378 square feet of space allocated for analysis and examination of material. Bulkheads, some of them portable, were fitted to separate the different sections. These are particularly necessary as microscope cabinets for the examination of zooplankton and phytoplankton. When the cabinets are not in use the bulkheads can be removed and the bench space used for other purposes. Details of the laboratory arrangements are shown in figure 4.

In *Diamantina* an illuminated table for plotting data is fitted in a space abaft the chart room. A meteorological laboratory and radio-sonde balloon filling station is sited on the after end of the fo'c'sle deck in *Gascoyne* and similar facilities are being provided in *Diamantina*.

At the forward end of the signal deck a six berth cabin with toilet and shower facilities provides accommodation for scientists. A stretcher is used if an additional scientist is aboard. The scientists' mess with the officers in the wardroom and avail themselves of the ship's laundry and canteen facilities.

Sampling and observations for hydrology, physics, zooplankton, phytoplankton, primary production, and biochemistry are undertaken on most cruises, and for benthos and meteorological physics on some. Emphasis on particular studies depends on the area of the cruise and the availability of the relevant scientific personnel.

Stations are planned in relation to the studies contemplated and are designated as Reference, Position, Time, Periodic, and Drift Stations.

*Reference Stations* are occupied on every cruise in precise geographical positions to monitor physical and biological conditions in the area and to provide a chemical datum for the cruise.

*Position Stations* are those especially selected for the cruise in question.

*Time Stations* are occupied at a stated local mean time.

*Periodic Stations* (formerly called Intermediate) are occupied at approximately four hour intervals between Position Stations.

*Drift Stations* are occupied, for example, to determine *in situ* values of primary production; they range in duration from six hours to two days, during which time samples are suspended from buoys released by the ship.

Two Position Stations are occupied daily on most cruises in the sixteen to eighteen day period between ports. This number may be varied for special studies but has been found to give the best results for area coverage. It permits sixteen hours steaming per day, allowing four hours for each station with the stations spaced at intervals of 100 miles.

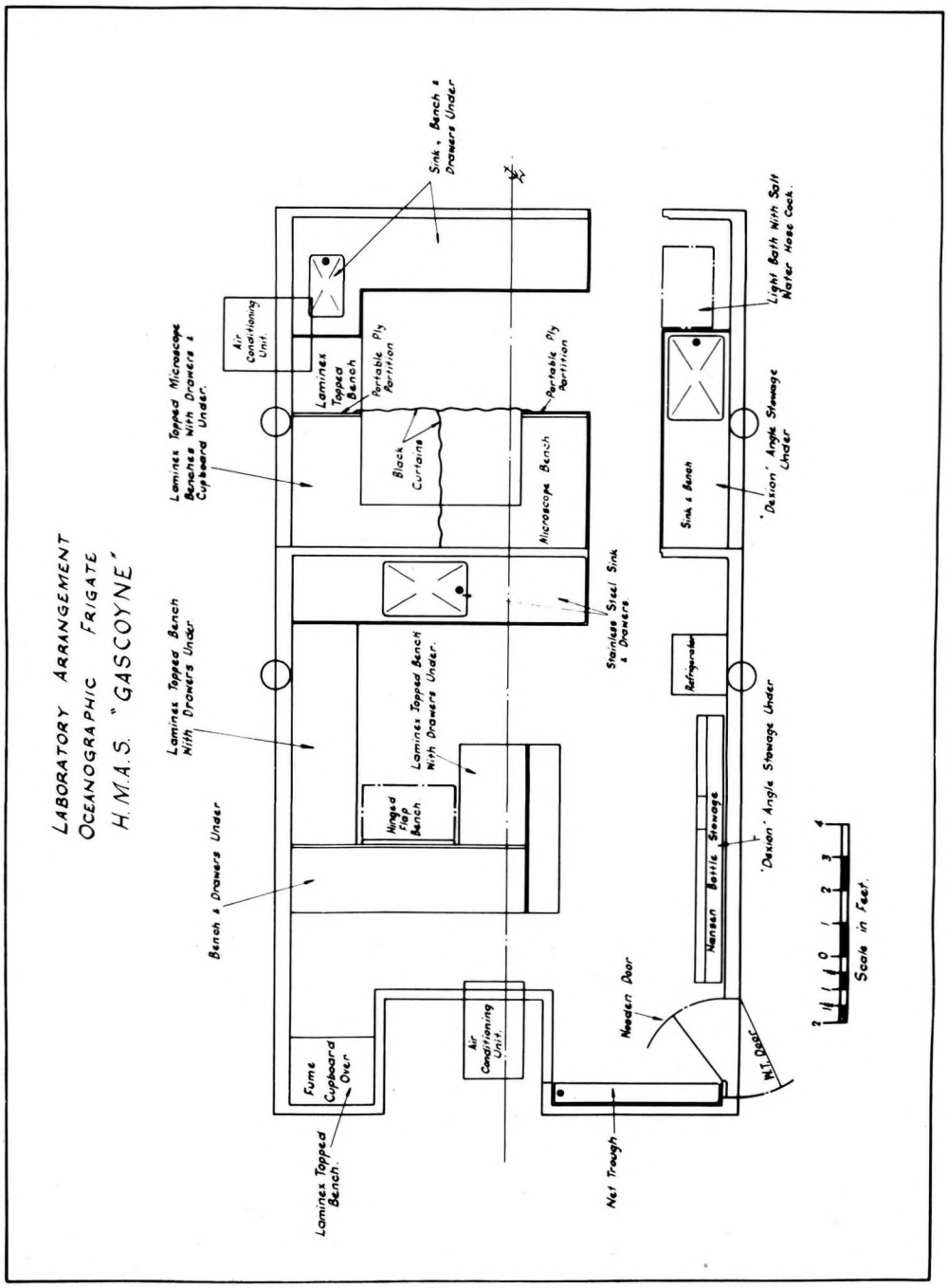


FIG. 4. — Details of the laboratory arrangements.

Nansen bottle sampling from the oceanographic winch and sampling from the biological winch are done simultaneously after the bathythermograph cast. Three Nansen bottle casts may be necessary to cover the range of depths to the bottom. Transparency measurements follow in sequence. Plankton tows with Clarke-Bumpus nets are carried out from the steam winch as the ship gets underway. The bridge is kept informed by telephone for manœuvering purposes of the progress of the sampling and of the wire angle.

Temperatures from reversing thermometers are read from the first cast, and samples are drawn from Nansen bottles held in outside racks while the second cast is overside. The bottles from the final cast are racked inside for reading temperatures and drawing samples while underway. Recorders in the after section of the laboratory give information from the G.E.K. electrodes, the temperature-chlorinity-depth unit, and other electronic equipment. Analyses are carried out while steaming between stations.

Preliminary cruise plans are drawn up for the approval of the Commonwealth Naval Board after the year's cruises are announced. Final cruise plans are issued immediately before the cruise, keeping within the speed, range, and endurance limits laid down. The frigates each spend about twenty weeks per year at sea on oceanographical cruises, the remainder of the time is at the disposal of the Hydrographer, R.A.N., for survey. Between 1959 and 1961 a total of 70 weeks was spent on oceanographical cruises and 95 000 miles steamed. Figures 5 and 6 show the cruise tracks of both ships in this two year period.

The ships cooperate with the Hydrographer, Royal Australian Navy, by plotting soundings taken continuously during the cruise, and meteorological observations are made and recorded. Information obtained on the cruises provides general background data for fisheries programmes. Some cruises are specifically designed for extensive and intensive coverage of areas of major fisheries' interest and complement observations made by fisheries research vessels.

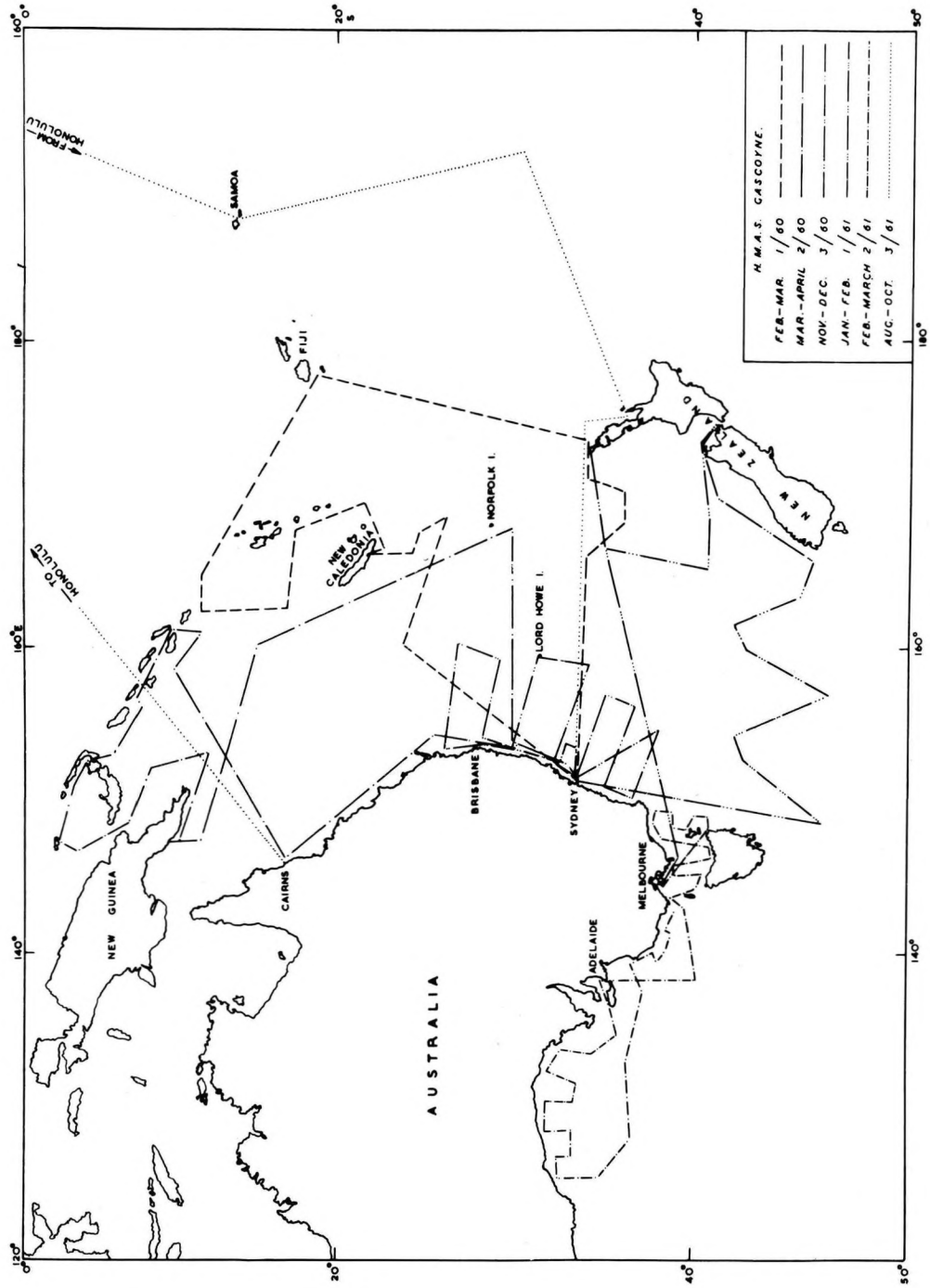


FIG. 5. — Cruise tracks of H.M.A.S. *Gascoyne* between 1959 and 1961.

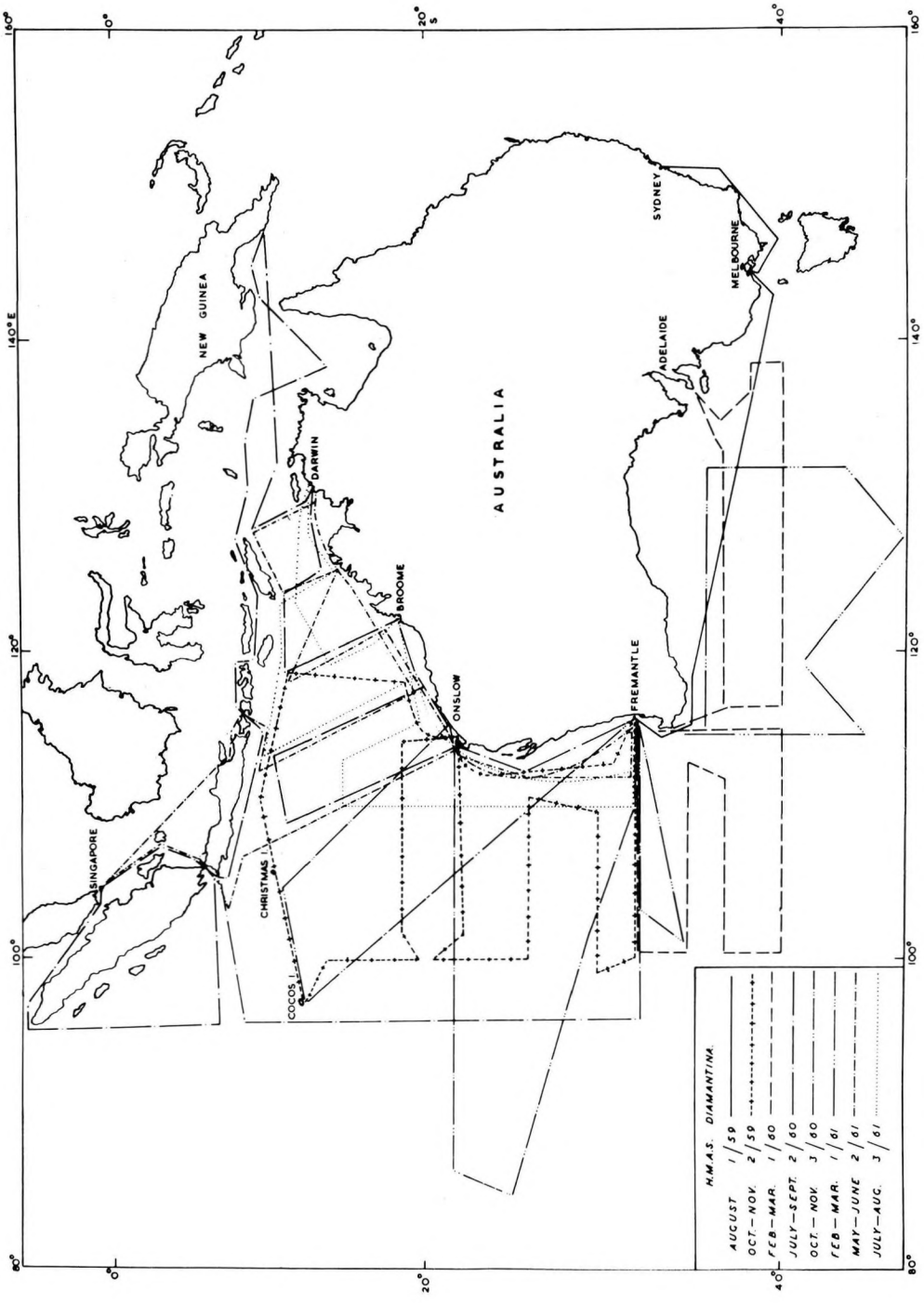


FIG. 6. — Cruise tracks of H.M.A.S. *Diamantina* between 1959 and 1961.