

R.V. *SARSIA*

A BRIEF DESCRIPTION OF THE MARINE BIOLOGICAL ASSOCIATION'S NEW RESEARCH VESSEL

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The Plymouth Laboratory

(With Plates I-IV and Text-figs. 1-5)

From 1922 until the outbreak of the 1939-45 war, the Association's Laboratory at Plymouth was well served by the research vessel *Salpa*—a converted Lowestoft steam drifter having an overall length of about 95 ft. In 1939 *Salpa* was taken over by the Admiralty for naval duties and was not put back into service by the Association on her release after hostilities ended. Her place was taken by a 90 ft. motor fishing vessel on charter from the Admiralty and named *Sabella*. This vessel was only partially converted for research work and was handed back to her owners when *Sarsia* came into service at the end of 1953.

In consultation with the Laboratory staff, *Sarsia* was designed by Messrs Graham and Woolnough, Liverpool, and built by Messrs Philip and Son, Ltd., Dartmouth, to Lloyds 100 A1 classification 'Motor Trawler'. Much thought went into the planning of a ship that would be able to cope successfully and economically both with short trips to near-by grounds to collect and bring back living animals and with extended cruises to more distant and deeper waters. To meet the former requirements the vessel must not be too large and unhandy for inshore dredging and trawling; for the deeper work it was essential that she be large enough to stand up to heavy weather and provide a comfortable 'platform' in all reasonable conditions.

It early became obvious that the restriction on size ruled out steam—in spite of its many virtues—as a medium of propulsion. The cost of maintaining banked up fires at night while the vessel is employed in daily collecting was also a consideration. In spite of its various shortcomings, diesel propulsion was finally decided upon.

GENERAL PLAN OF THE SHIP

Hull. The hull is of riveted steel construction. Principal dimensions are:

Length overall 128 ft.	Tonnage gross 319
Breadth moulded 28 ft.	Tonnage net 95
Depth moulded 13 ft.	Designed speed 10 knots
Mean load draft 9 ft. 6 in.	

The general appearance of the vessel is clearly shown in Plate I. She has a soft-nosed raked stem and a cruiser stern. The main deck is continuous fore and aft carrying a forecastle forward and a large steel deck-house, the after part of which provides a spacious boat deck. At the forward end are the wheel-house, chart-room and master's accommodation. The wheel-house is raised 3 ft. above the level of the boat deck to provide a good view forward over the fore-castle head.

Forecastle. An electric windlass is fitted on the fore-castle deck. This supplies power for working the two bower anchors (about 7 cwt. each) and 105 fm. of $1\frac{1}{16}$ in. chain cable—60 fm. on the starboard anchor and 45 fm. on the port one. This cable is stowed in a locker below the main deck. In the fore-castle are situated the paint locker, lamp-room, scientific store and main hydrographic winch which is completely enclosed. When this winch is in use a door in the fore-castle bulkhead is opened and gives the winch operator a clear view of the hydrographic davit. The scientific store¹ is fitted with shelves for stowage of collecting jars, rails for hanging up small collecting nets, and has ample deck space for storing dredges, Agassiz trawls, and similar deck gear. It also contains a work bench and vice. A large opening gives access to the store from the main deck. This opening is fitted with pound boards which may be used completely to close the opening or to make a 'water step' of any desired height.

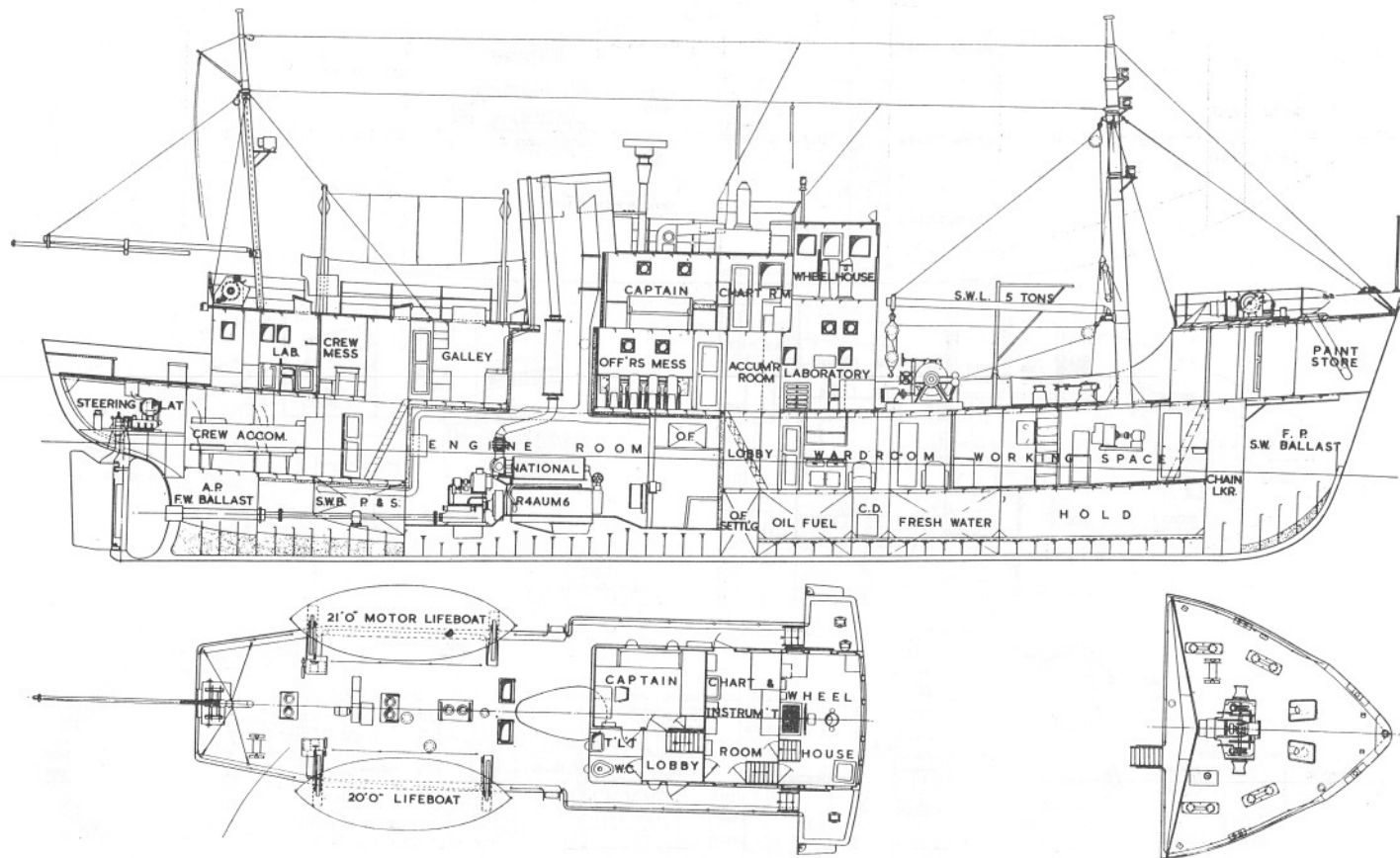
Main deck. The space between fore-castle and deck-house is mostly occupied by trawl fitments. The winch is normally sited, immediately forward of the deck-house. It is fitted with three drums, the centre and starboard one each carrying 500 fm. of $2\frac{1}{2}$ in. wire, while the port drum carries 1800 fm. of $1\frac{3}{8}$ in. wire. The trawling fair-leads are so arranged that any wire from the winch can be led to either gallows or to the main derrick on the foremast. Two of the fair-leads are fitted with mechanisms for recording length of wire out in both fathoms and metres—one for the after trawl warp and one for the long small general-purpose wire on the port drum. On the port side of the foredeck a 'Discovery' type hydrographic davit is fitted, and a small hatch with a steel cover provides access to the deck below. The foremast is stepped on this deck and carries a derrick tested to 5 tons safe working load.

The deck on the starboard side of the main deck-house is kept clear for trawl handling. On the port side are two fixed tanks with hinged lids and provided with a continuous supply of salt water. Portable tanks are similarly supplied with running sea water from a supply pipe fitted along the bulwarks.

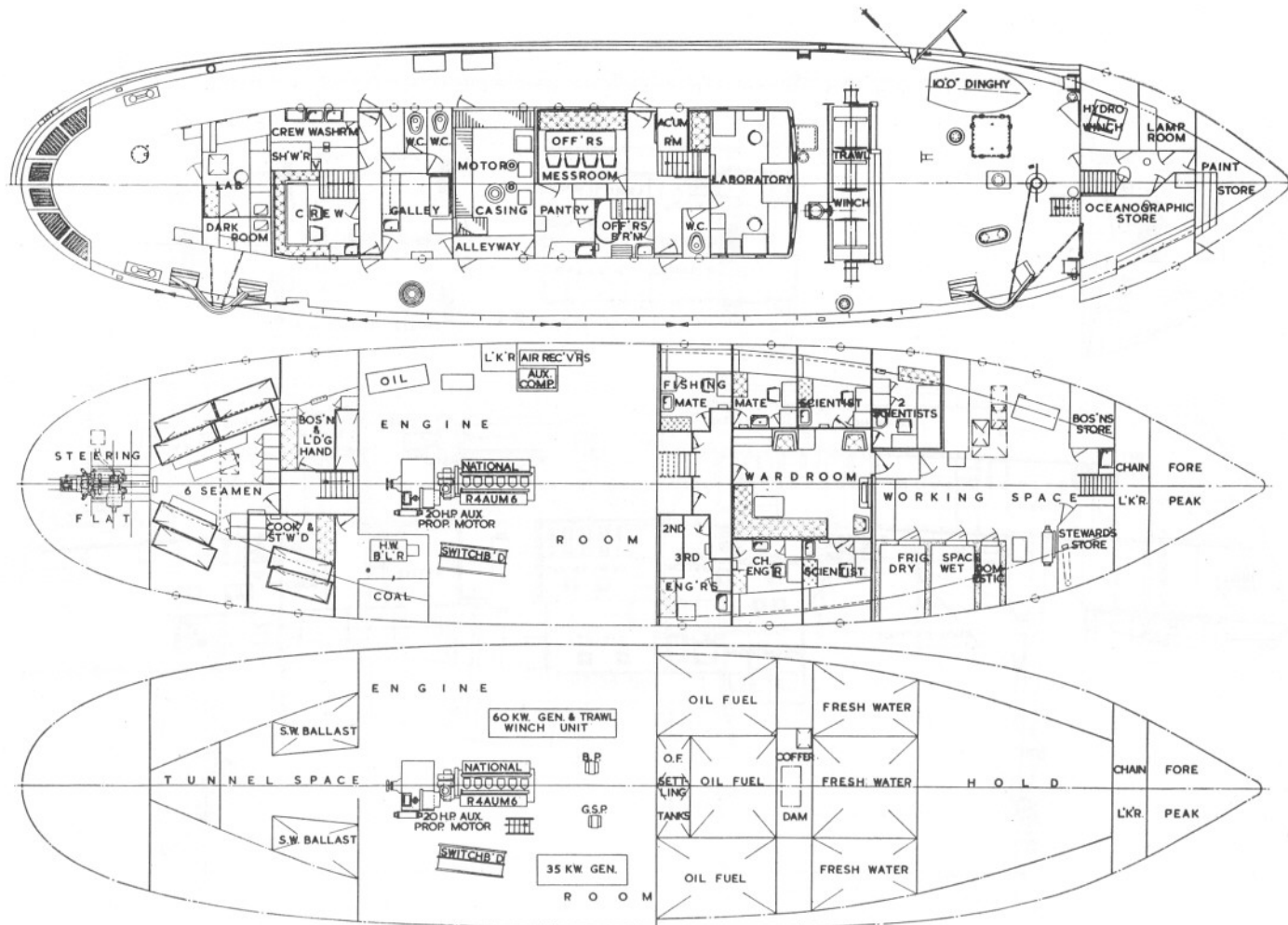
For a distance of 18 ft., between the after end of the deck-housing and the stern, the deck is clear, providing a most useful working space when gear is being used over the stern or quarter.

Main Deck-house. This structure, 60 ft. long and 15 ft. wide, extends from immediately abaft the trawl winch to within 18 ft. of the stern. The main laboratory (mainly hydrographic) is located in the forward end. From this laboratory a door opens aft into a passage-way which extends across the house

¹ Incorrectly named 'oceanographic store' in the builders' drawing in text-fig. 2.



Text-fig. 1. Profile section and general arrangement plan of bridge, boat deck and forecastle deck.



Text-fig. 2. General arrangement plans of main deck, lower deck and hold space.

to doors opening on to the main deck (port and starboard). From this passageway direct access is obtained to the officers' and scientists' messroom, bathroom and W.C.; and to ladders leading up to the wheel-house and down to the deck below.

The messroom, comfortably fitted and provided with the usual appointments, connects directly with a steward's pantry containing a domestic refrigerator, hot cupboard and other usual fittings.

Abaft the messroom and pantry is the engine-room casing, along the starboard side of which an alleyway extends aft to the galley. Its cooking range is of the old-fashioned coal-fired type. Despite objections to carrying coal as an additional fuel, this type of range is welcomed by all as providing the only warm and comfortable spot on board when all the ship's machinery is 'dead', and no shore electrical supply is available.

An athwartships alleyway abaft the galley gives access to the deck, port and starboard. On the port side, forward of this alleyway and opening off it, are crew's toilets and an oilskin locker. Abaft the alleyway, also on the port side, is the crew's wash-place—containing two ordinary hand basins, a trough, and a shower—and a drying room. From the centre of the alleyway a ladder leads down to the crew's sleeping quarters. Abaft the alleyway, on the starboard side—i.e. directly opposite the galley—is the crew's messroom.

In the after end of the deck-housing with a door opening aft, is a second small laboratory—mainly biological—part of which is partitioned off to form a fully fitted dark-room. Abaft this laboratory a small section of the open deck is sheltered by an extension overhead of the boat deck and a corresponding continuation of the casing on each side.

Bridge Arrangements. These arrangements are rather unusual and contribute greatly to easy working. The wheel-house, being raised 3 ft. above the level of the chart-room, provides easy access to the flying bridge which is sited directly above the chart-room. The flying bridge carries the standard compass, radar scanner, ventilating fans and gravity tanks. A wood screen around the fore-end provides adequate shelter.

The wheel-house (Pl. IIIA), in addition to basic fittings, contains a Decca Radar Unit Type 12, a Marconi 'Graphette' echo-sounder, a Walkers 'Trident' electric log recorder, a telephone, an electric rudder indicator, and an engine-revolution indicator. The port forward window is fitted with a Kent's clear-view screen. Sliding doors, port and starboard, give access to open bridge wings which are carried on sponsons. An engine-room telegraph is fitted on both wings and a revolution telegraph on the port wing. A portable searchlight can be mounted and worked on either wing.

From the starboard side of the wheel-house a few steps lead down into the chart-room (Pl. IIIB). Across the forward end of this space is a chart table and a long writing table with drawers and cupboards under. The forward bulkhead carries two Kelvin and Hughes echo-sounders—one Type MS 26B

(0-720 ft. or fm.) and one MS 26E (0-2250 fm.). A Decca Navigator decometer unit is fitted to the bulkhead just above the table level. In the cupboards under the table converter units for the echo-sounders and radio-telephone are housed.

On the after bulkhead, the Decca Navigator receiver panel, Redifon radio-telephone and Decca radar receiver panel are fitted. A door opening aft on the starboard side leads into a lobby giving access to the Master's quarters. From this lobby a ladder leads down to the main deck.

Boat Deck. The funnel is oval (Pl. II B) in cross-section and merges into the after part of the Master's accommodation. Aft the funnel there is, on the starboard side, a 20 ft. standard life-boat and on the port side a 21 ft. motor life-boat fitted with an 8 h.p. Stewart Turner petrol engine. Near the after end of the boat deck the mainmast is stepped. This carries a light derrick which has a sliding boom fitted along its underside. This boom can be slid outboard to obtain up to 8 ft. clearance for light gear worked over the ship's stern or quarter. Aft the mainmast is a small two-drum hydrographic winch, one drum carrying 500 m of 4 mm (diam.) wire and the other carrying 300 m of 7 mm (diam.) wire.

Lower Deck. Aft the chain locker on this deck is a large compartment used as a general workroom and store. On the starboard side it contains three cold rooms—one for domestic use and the two others for scientific purposes. There is also a work bench. The after bulkhead, port side, carries a battery of racks for storage of collecting boxes of special design (see p. 396). A small hatch in the port side of this deck opens into the hold space below.

From the working compartment a door leads aft into a comfortably furnished 'wardroom'. Three scientists' cabins open off the wardroom—two single-berth cabins and one double-berth cabin, all with fitted basins supplied with hot and cold running water. Aft the wardroom is a lobby giving access to three single-berth cabins for ship's officers (mate, fishing mate and chief engineer) and one two-berth cabin shared by engineers II and III. From this lobby, too, a ladder leads up to the deck above, emerging into the alleyway aft the main laboratory.

Crew's Quarters. The space aft the engine-room is taken up by the crew's sleeping accommodation. This consists of a double-berth cabin for the cook and steward on the starboard side; a similar cabin for the bosun and leading hand on the port side, and a large central six-berth cabin in the after end of the ship.

The crew numbers sixteen—master, mate, fishing mate, chief engineer and two other engineers, bosun, leading hand, cook, steward and six seamen.

MACHINERY

Main engine. The main propulsion unit consists of a vertical 4-stroke cycle, single acting diesel engine (National R4 AUM 6) of 290 b.h.p. coupled through S.L.M. reverse-reduction gearing to a propeller having anti-clockwise rotation,

viewed from aft to forward. Maximum engine revolutions are 486 per minute. Two lubricating oil pumps, one salt-water and one freshwater pump are incorporated in the main engine. The S.L.M. oil-operated marine gearing (Modern Wheel Drive, Ltd., type M2 WR, size 4) has a gear-ratio of 3.02-1. The blower is of Napier Turbo make, Type T.S. 100. The intermediate shaft runs in a self-lubricated plummer block and the stern tube has U.S. packing glands at the inboard and outboard ends. The propeller is of manganese-bronze, 4-bladed, left hand, of 7.75 ft. diam., and of 7.05 ft. mean pitch.

Fuel consumption at 125 shaft-r.p.m., giving an average (economical) speed of $8\frac{1}{2}$ knots, is 1 ton in 24 h; the steaming range is 22 days, or just over 4000 miles.

Aspinal low-pressure indicators and alarms are fitted for lubricating-oil and cooling-water systems. A 'wrong way' alarm is also provided which operates if the propeller is moved contrary to telegraph orders.

All overboard discharges from engine-room and bilges are at the starboard side as far aft as practicable. By this arrangement the risk of contaminating water samples by ship wastes is reduced to a minimum, all water samples being collected over the port side in a forward position.

Auxiliary Propulsion. The slow speeds necessary in much scientific work cannot be provided by the main engine which has a lower limit of 3-4 knots. After much consideration of various possibilities, a separate low-speed drive was provided quite independent of the main engine. A 20 h.p. variable speed electric motor is geared to the propeller shaft through the main gear-box and so arranged that it cannot be engaged nor remain engaged except when the main engine is disengaged from the reverse-reduction gear. This arrangement works very well in calm weather, but a stronger electric motor would have given greatly improved performance in less favourable conditions.

Auxiliary Service Units. Two diesel-driven D.C. generators are installed—one 60 kW, 220 V driven by a National M4 A6 engine at 1000 r.p.m.; and one 35 kW, 220 V driven by a National M4 A3 engine at 850 r.p.m. Also driven off the M4 A6 engine is the V.S.G. power unit (V.S.G. type K, size 12) for operating the main (trawl) winch. This unit is activated through an S.L.M. clutch and reduction gear-box, ratio 1.54-1 (Modern Wheel Drive, size 1). A Reavall 11.5 cu.ft./min. 2-stage air compressor is driven off the M4 A3 engine. Aspinal alarms are fitted to both auxiliary diesels, as is also an 'Arkon' visual flow indicator for the freshwater systems. The main and auxiliary diesel engines all have freshwater circulation in a closed circuit with a common expansion tank. Heat exchangers are incorporated in the cooling systems.

Other auxiliary machinery in the engine-room comprises:

- (1) A Russell Newbury diesel (7.5 b.h.p., 850 r.p.m.) driving a Reavall air compressor, 11.5 cu.ft./min., 2-stage; pressure 350 lb. sq.in.
- (2) A Megator T 100 electrically driven general service pump.
- (3) A Megator T 100 electrically driven bilge pump.

- (4) Alfa Laval fuel and lubricating-oil centrifugal separators.
- (5) A Megator M. 8 electrically driven domestic freshwater pump.
- (6) A 3.45 single-phase, 50-cycle alternator. The alternator is controlled by an automatic carbon pile voltage regulator giving a stabilized voltage of 220 V. a.c. By hand regulation the unit can be made to provide any other voltage from 100 to 220, thus enabling continental and American types of a.c. mains apparatus to be used on board.
- (7) A motor-driven V.S.G. 'A' end-unit for the aft hydrographic winch (boat deck).

The main engines and all auxiliaries are mounted on resilient pads of dextrine to reduce vibration. All pipes leading from the engines are fitted with flexible pipe joints to prevent vibration transference from engines to pipes. The underside of the main deck over the engine-room, bulkheads and ship's sides are insulated against conduction of machinery noises to living quarters. Underneath the engine-room flooring, at the forward end, three echo-sounder oscillator tanks are fitted. Ventilation is provided by two Aerofoil dual duty fans situated in the funnel. One fan can be used for either supply or exhaust. Fuel oil is stored in three main bunker tanks having a total capacity of 30 tons.

Steering Gear. Brown's electro-hydraulic steering gear is fitted. The power unit in the steering flat consists of a motor-driven V.S.G. variable delivery pump (mark III, size I, type K). Normal telemotor control is provided from the bridge steering pedestal. The steering unit in the wheel-house remains operative even if the electric steering engine fails, a solenoid-operated valve in the oil system instituting automatic change-over to direct hydraulic control. If this also fails provision is made for emergency steering by hand control from the steering flat.

Windlass. The Reid electric windlass on the forecastle deck has a McClure motor of 11 b.h.p. at 800/1600 r.p.m.—half-hour rating.

Trawl Winch. The trawl winch is an Elliott and Garrood type VS 3-6 hydraulically operated three-drum model made to special order. The drive consists of one size 12, mark III V.S.G. 'A' end of 75 b.h.p. at 650 r.p.m. fitted with single acting auto-control; and one size 12, mark III V.S.G. 'B' end with speed 0-575 r.p.m. A total pull of $3\frac{1}{4}$ tons at an average hauling speed of 150 ft./min is provided.

Main Hydrographic Winch. This winch is hydraulically operated and incorporates type 'K' V.S.G. units, mark III, size III. The motor, V.S.G. 'A' end and starter are in the forward working compartment on the lower deck. The electric motor (by Laurence Scott) is of 25 h.p. at 720 r.p.m. The single drum carries 5000 m of 4 mm (diam.) wire. Average hauling speed is 200 m/min with a 300 lb. load. There is an automatic wire-spreader which can quickly and easily be disconnected if not required.

Aft Hydrographic Winch. This winch is also hydraulically operated and incorporates type 'K' V.S.G. units, mark III, size I. The motor, V.S.G. 'A' end

and starter are all in the engine-room. The electric motor (by Laurence Scott) is of 75 h.p. at 720 r.p.m. There are two drums, one carrying 500 m of 4 mm (diam.) wire and the other carrying 300 m of 7 mm (diam.) wire. Average hauling speed is 200 ft./min with a 600 lb. load.

Heating System. A non-pressure boiler fitted with an 'electromatic' fully automatic oil burner supplies hot running water to bathrooms, living quarters and galley, and also provides central heating throughout the ship. The heating system can be shut off when not required while the hot-water supply is still in use.

Lighting. The vessel is fitted throughout with electric light and power of 220 V d.c. A shore connexion is provided for the purpose of drawing upon shore supply when berthed at a quay with machinery stopped. A rotary converter is incorporated in the lay-out and a change-over switch isolates the necessary circuits from the ship's internal supply system.

Secondary (emergency) lighting is provided from a set of 12 accumulators (see p. 398) housed in a special battery room, as is also the necessary current for bells, the Marconi 'Graphette' echo-sounder and alternative power for the radio-telephone.

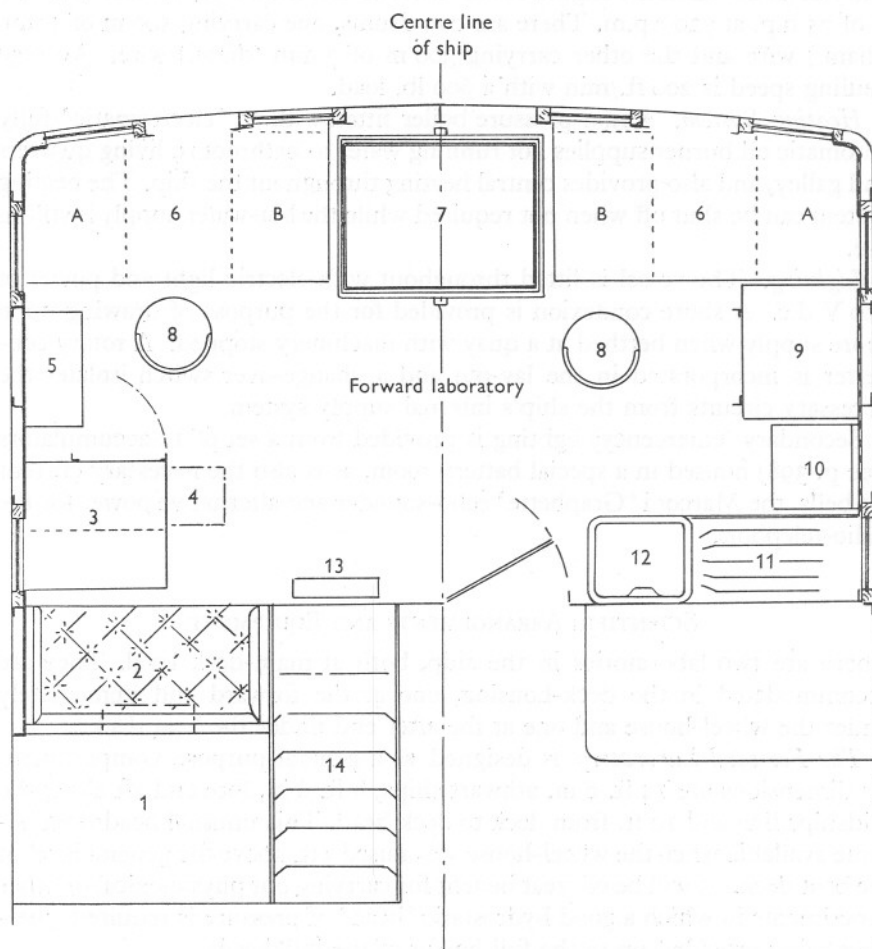
SCIENTIFIC ARRANGEMENTS AND EQUIPMENT

There are two laboratories in the ship, both at main-deck level. They are accommodated in the deck-housing, one at the forward end immediately under the wheel-house and one at the after end under the boat deck.

The Forward Laboratory is designed as a general-purpose compartment. Its dimensions are 14 ft. 6 in. athwart ships, 8 ft. 6 in. fore and aft along the midships line and 10 ft. from deck to deck head. This unusual headroom became available when the wheel-house was raised 3 ft. above the general level of the boat deck. It will be of great benefit for carrying out physiological or other experiments in which a good hydrostatic 'head' of pressure is required, shelving being provided up to the full height of the bulkheads.

In a central position against the forward bulkhead a 'Discovery' type gimbal table is fitted, having surface dimensions of 3 ft. 4 in. by 2 ft. 6 in. On either side of this table, teak-topped laboratory benches extend to the full width of the laboratory; each is 5 ft. 3 in. long and approximately 2 ft. 6 in. in mean width.

Under each bench, in addition to ordinary drawers and cupboards, is a removable drawer unit fitted with cast aluminium-alloy drawer runners. Into these runners standard collecting-boxes are placed which then are used as ordinary drawers until the jars or bottles they contain are all filled. The full box is then lifted right out of its runner and sent below for storage in the racks provided in the working compartment (see p. 392) and a similar box of empty vessels brought up to replace it. By this arrangement the laboratory floor is



Text-fig. 3. Plan of forward laboratory.

kept completely clear of collecting-boxes which normally are awkward to accommodate and to handle in the restricted space available.

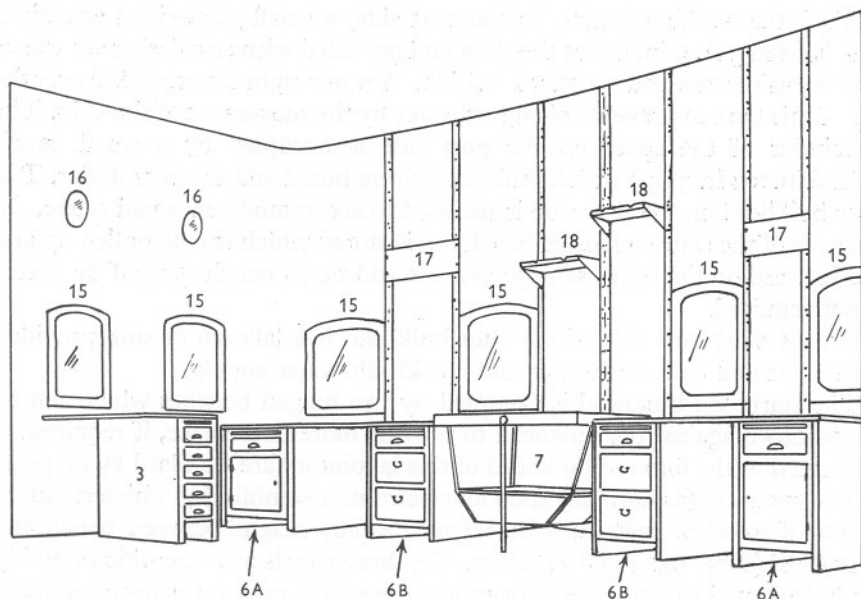
Four kinds of drawer units are provided which take different-sized boxes equipped with different collecting vessels.

Unit 'A' carries two boxes each holding 40 standard salinity bottles.

Unit 'B' takes two boxes each holding 6 full-sized breffits.


Unit 'C' takes two boxes each holding 15 half breffits.

Unit 'D' takes three boxes, one holding 15 half breffits, one holding 24 one-pound honey jars and one holding 28 half-pound honey jars.



Text-fig. 4. Perspective drawing of forward laboratory looking forward and to port.

Key to Text-figs. 3 and 4

1. Accumulator room.
2. Settee: terminal board over.
3. Bench with portable top: slide and drawers under.
4. Slide in pulled out position.
5. Aquarium tank with circulating sea water.
6. Laboratory bench with portable top: A, drawer and cupboards under; B, withdrawable drawer unit under. Knee-hole between A and B.
7. 'Discovery' type gimbal table.
8. Chairs.
9. } Hinged tables.
10. } Draining board.
11. Sink.
12. Radiator.
13. Stairs down.
14. Windows fitted with armoured glass and storm screens.
15. Circular scuttles (openable).
16. Standard panels mounted on 19 in. standard post-office-type racks. Other standard racks are shown thus  beside benches 3 and 9.
17. Special shelves mounted on the standard racks. Other specially fitted shelves shown in Pl. IV A. These can be moved or removed with the greatest of ease and others speedily fitted.

The spare space in each unit is taken up with a partitioned drawer and a pull-out writing board. Before the ship puts to sea the laboratory is provided with the drawer units appropriate to the type of work in hand. The spare units are stored in the working compartment near the racks holding the spare boxes.

Abaft the working bench, on the port side, a small glass-sided aquarium tank is fixed 3 ft. 9 in. above the deck and provided with circulating sea water. Its dimensions are 2 ft. \times 1 ft. \times 1 ft. high. A water-tight cover is fitted over the top of this tank to prevent spillage of water by the movement of the ship. The remainder of the space on the port side is occupied by a small bench (2 ft. 6 in. \times 2 ft. 3 in.) with a pull-out writing board and drawers under. The after bulkhead on the port side is recessed to accommodate a small settee. In the back of the settee a hidden bench top is stored which can be pulled up and slid forward on the settee arms to provide additional bench space if the settee is not required.

On the starboard side of the after bulkhead is a laboratory sink provided with a hot and cold freshwater and a cold salt-water supply.

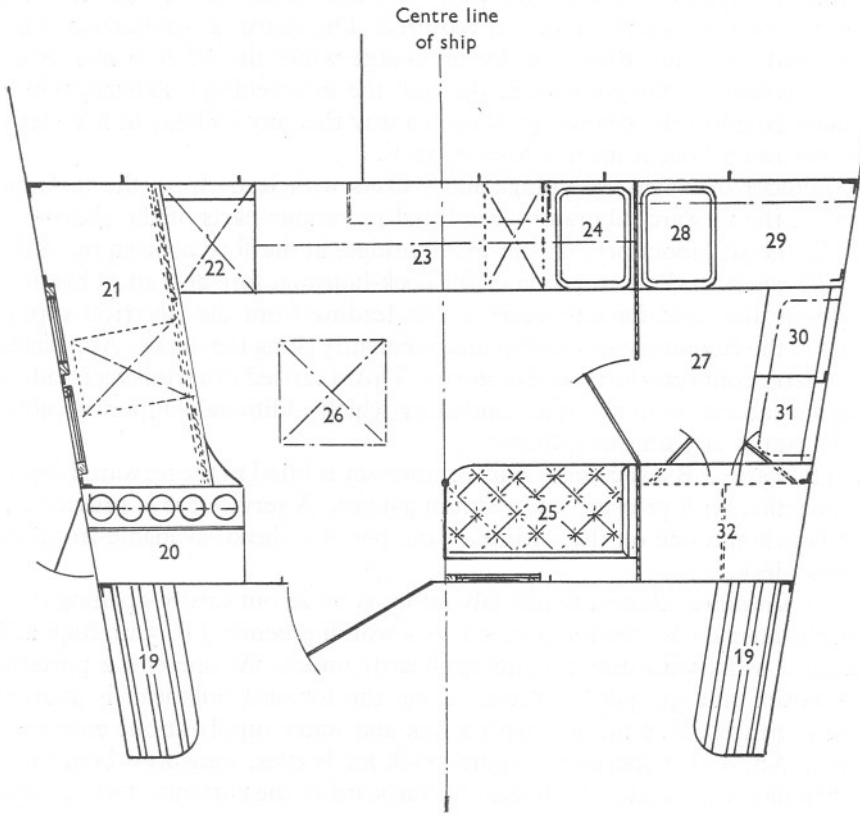
The starboard bulkhead is occupied by two hinged benches which can be folded down against the bulkhead to provide more floor space, if required.

Welded to the forward bulkhead of this laboratory are standard 19 in. post-office-type racks (as normally used for electronic assemblies) to which standard panels of wood or metal can be screwed at any height between bench and deck-head (Text-fig. 4 and Pl. IVB). On these panels any scientific assembly can be built up in a shore laboratory and screwed into position at any convenient place on the bulkhead racking and at any required height. To provide for apparatus assemblies that project on both sides of a panel, or which require access to both sides, other standard racks are provided extending from deck to deck-head, one on the port and one on the starboard side of the laboratory, in front of the side benches. These racks are so constructed that any scientific assembly erected on them can be swung outwards for easy access to any part of the assembly.

A number of panels have been made with special fitments to carry aspirator bottles, books and other standard apparatus (Pl. IVB). These can be accommodated in any position on the racking on the bulkhead, and can be moved to new positions at any time in a few minutes. Other special fittings can be erected on standard panels by any worker at any time, without visiting the ship, and with certainty of their being immediately accommodated on the standard racking on board whenever required.

Each working bench is provided with an additional (loose) whitewood top kept in position, when required, by a fiddle along the outer edge of the fixed top. These additional tops are provided so that any kind of apparatus of any shape or size can be screwed down upon them in any desired position without damage to the expensive permanent top underneath. The additional tops are cheap, expendable and easily renewed when unfit for further service. They can be stored away out of sight when not in use.

Abaft the main laboratory and abutting on its after bulkhead on the port side is a special 'accumulator room' carrying two banks of six accumulators, each bank producing 36 V and having a capacity of 100 amp/h. A selenium type



Text-fig. 5. Plan of aft laboratory and dark-room.

Key

19. Sparred seat.
20. Twine locker with access from outside deck; withdrawable unit under.
21. Bench, 3 ft. 3 in. high with drawers and cupboard under.
22. Bench, 2 ft. 6 in. high, hinged to bulkhead.
23. Laboratory bench, 2 ft. 6 in. high with shelf and bottle-racks over.
24. Sink.
25. Settee.
26. Escape hatch from crew's quarters (in floor).
27. Dark-room.
28. Dark-room sink.
29. Lead-covered bench: shelves over.
30. Hinged table: shelf over.
31. Hinged table.
32. Bench, 2 ft. 6 in. high with two equal cupboards under.

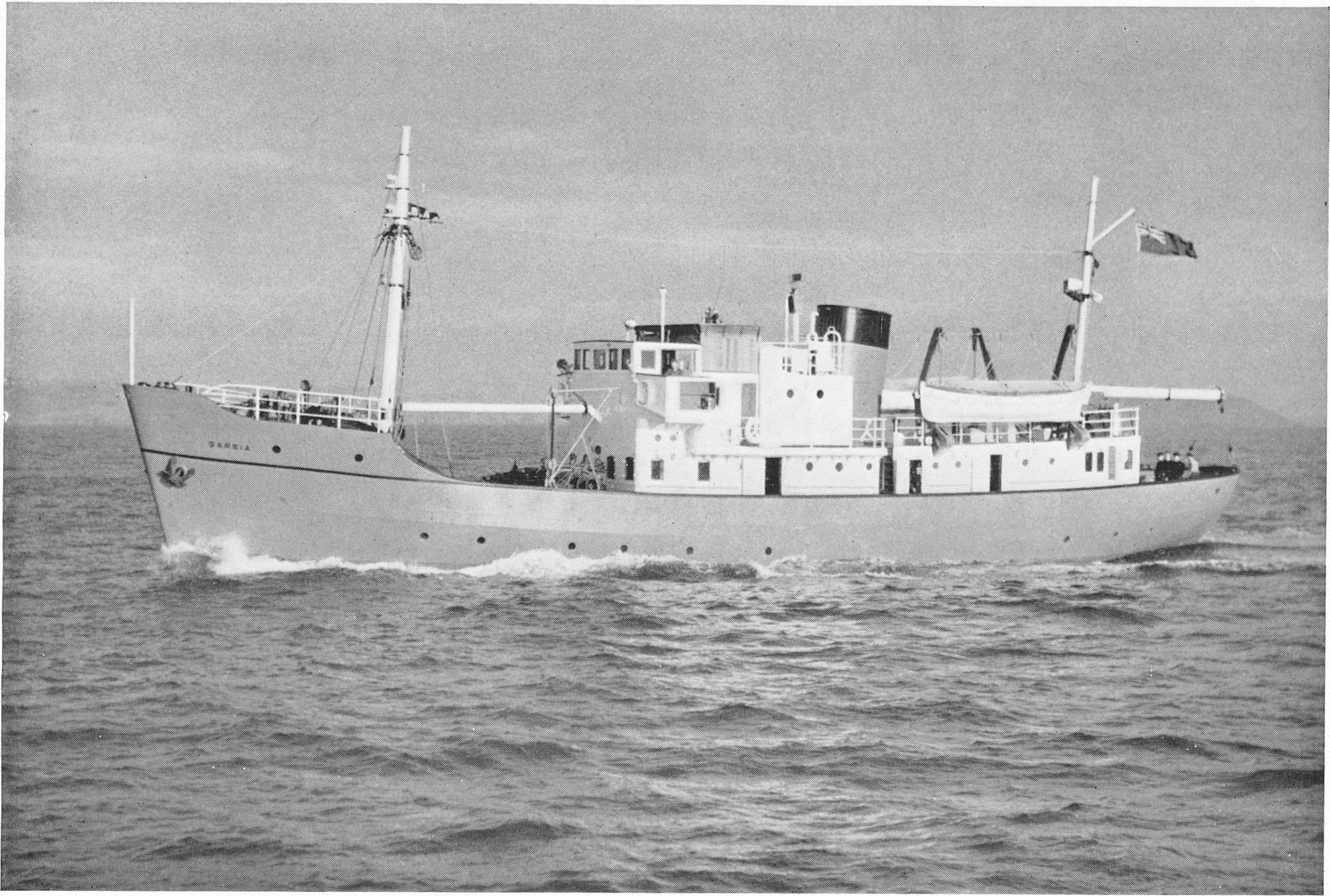
rectifier is employed for charging purposes, the rectifier being fed from the alternator or from shore supply, as required. The charging arrangements are so devised that one 'bank' can be on charge while the other is in service. The accumulators are connected, through the intervening bulkhead, with a terminal board in the laboratory in such a way that any voltage, in 2 V steps, may be drawn from it up to a total of 36 V.

A number of water-tight plugs and sockets with leads from the terminal board in the forward laboratory, are fitted in various parts of the ship—one each in the aft laboratory, on the flying bridge, in the forecastle store, in the working space, and on each side of the deck-housing, fore and aft. This does away with the need for temporary cables leading from the electrical supply points in the laboratory and strung inconveniently along the decks. A specially heavy cable connects the two laboratories. This is carried in a trunkway leading from one laboratory to the other, and along which additional temporary cables can be run at any time as required.

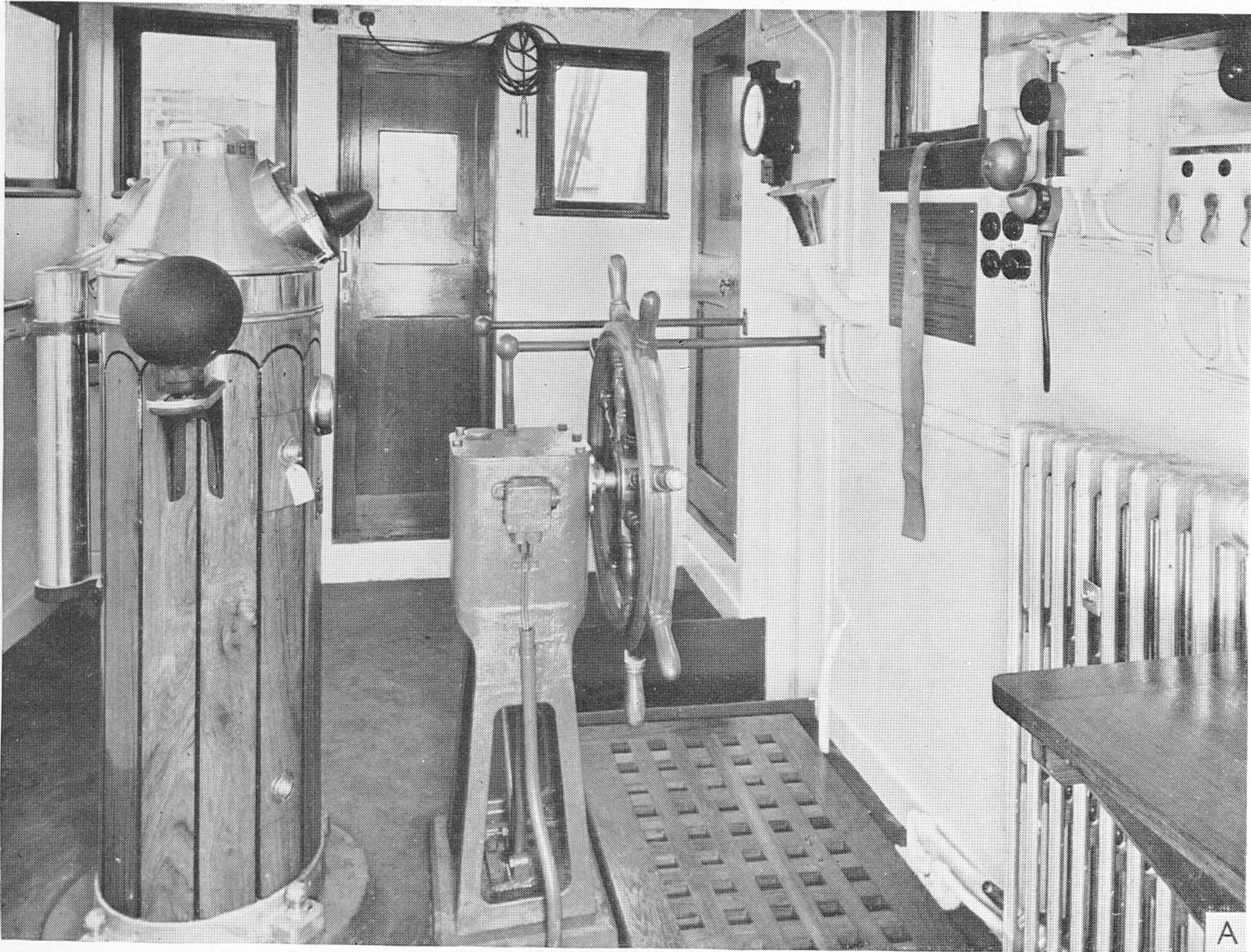
An Edwards RB 4 vacuum pump-compressor is fitted in the forward laboratory together with pressure and vacuum gauges. A service tap is provided at each bench and one on the outside of the port bulkhead, available from the external deck.

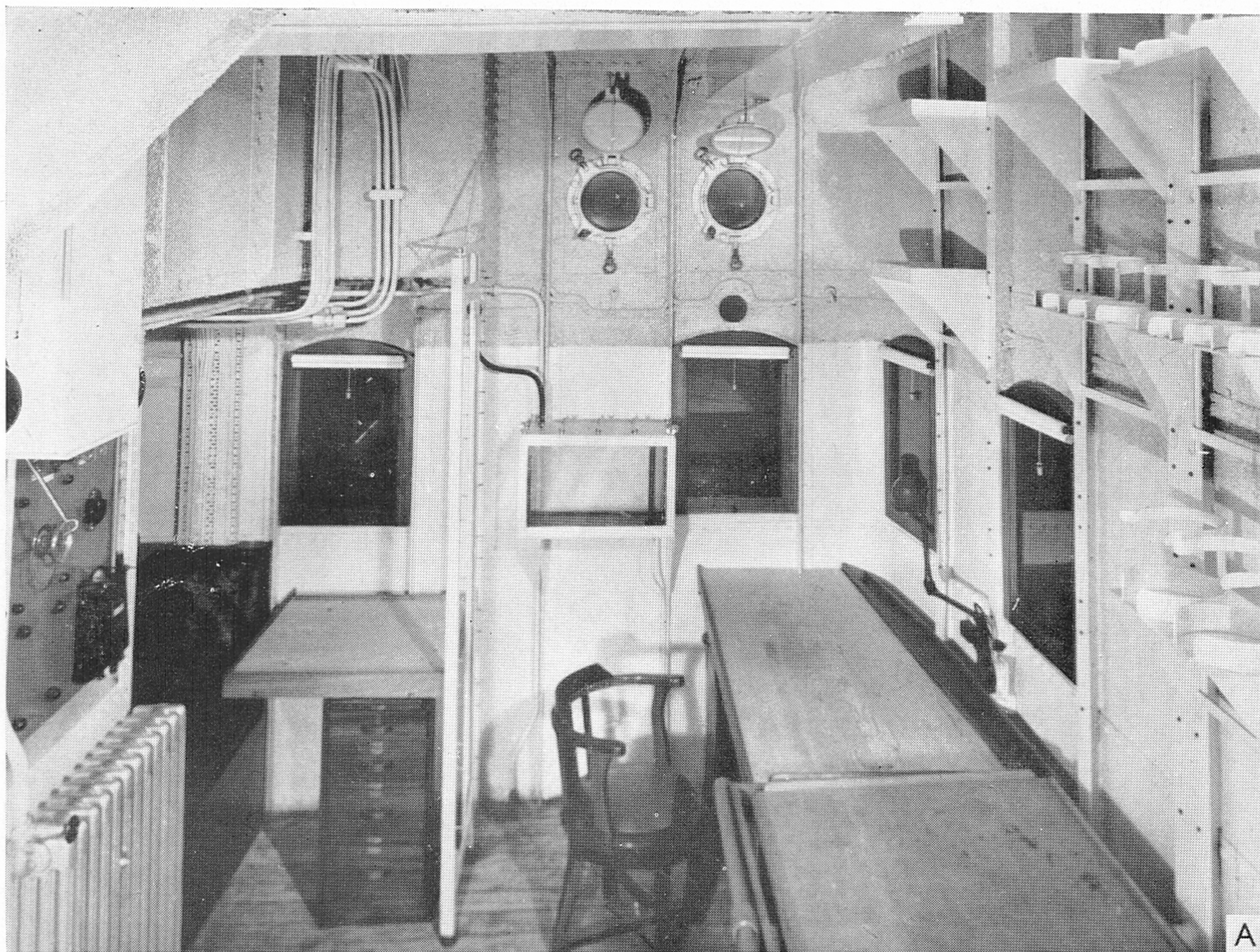
Aft Laboratory. Access to this laboratory is by an outwardly-opening door from the after deck. On the port side is a working bench 3 ft. 3 in. high and 2 ft. 3 in. wide, with drawers and cupboards under. At one end a portable box/drawer unit (p. 396) is fitted. Along the forward bulkhead is another working bench 2 ft. 6 in. high with a sink and water supply at one end (starboard). Above is a specially designed rack for bottles, measures, books and other items. On the after bulkhead, to starboard of the entrance door, a small settee is fitted with a disappearing bench top stowed in the back like that of the settee in the forward laboratory (p. 398). The after bulkhead on the port side of the doorway is occupied by a twine locker with a door opening into it through the deck-house casing from the external deck. In this locker stowage is also provided for winchesters of formalin, spirit and other chemicals required from time to time to be readily available on deck.

Dark-room. Cut off from the aft laboratory by a wood partition and light-proof door is a small dark-room with sink, hot and cold fresh water, benches, cupboards, safelights and all necessary fittings.









EXPLANATION OF PLATES

PLATE I

Research Vessel *Sarsia* on arrival off Plymouth from the builders' yard—5 November 1953.
Photo D. P. Wilson

PLATE II

- A. General view of flying bridge, foredeck and forecastle deck.
- B. General view of boat deck and after deck.

PLATE III

- A. Wheel-house looking to starboard.
- B. Chart-room, looking to port.

PLATE IV

- A. Forward laboratory looking to port. Gimbal table in right foreground. Benches shown with removable tops in position.
- B. Wardroom.

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