" JEAN-CHARCOT "
A MULTI-PURPOSE RESEARCH VESSEL

I. — INTRODUCTION

Like many other maritime nations France, during the years following the 2nd World War, has felt that the study and exploitation of the oceans is a most pressing necessity. For this, and until recently, France has only had available a small number of ships — most of them highly specialised in character — under the control of certain organizations such as the Naval Hydrographic Office, the Fisheries Office, etc., and replying to the special needs of these organizations.

In order to coordinate the activities and the research programmes of these various institutes or laboratories the French Government in 1961 created a Committee attached to La Délégation Générale à la Recherche Scientifique et Technique (D G R S T) which was given the name of Comité d'Exploitation des Océans (COMEXO).

From the outset this Committee showed that it was anxious to have a sea-going vessel constructed, capable of carrying out long expeditions and with accommodation for a large team of scientists. COMEXO, itself composed of members drawn from many different disciplines, was anxious to make the new ship truly multi-purpose, able to undertake either basic or applied research anywhere in the world ocean.

It was thus that the construction of this new ship was decided upon. The vessel belongs to the D G R S T, First Minister's Department, and is managed by the Ministry of Posts and Telecommunications who also superintended its construction.

The ship can be put at the disposal of any organization or interested laboratory, whatever its speciality or its size.

II. — CONSTRUCTION AND SPECIAL FEATURES

Constructed by a consortium of dockyards (Ateliers et Chantiers Navals du Havre, et Forges et Chantiers de la Méditerranée) the vessel was laun-

ched on 19 January 1965. It was ready for service in December of that year.

To make the ship easy to manoeuvre and to allow it to remain motionless with respect to the bottom with any heading when occupying oceanographic stations two auxiliary propellers have been fitted in transversal tunnels, one situated near the stem and the other near the stern.

The four propellers are controlled directly from the bridge.

The propulsion units are in two separate compartments, the power plant forward, the electric motors aft, so as to reserve the centre of the vessel which is less affected by rough seas for the laboratories.

The amount of roll has been noticeably reduced by the installation of a stabilizing ballast of 33 tons of fuel.

The ship is of course equipped with the most up-to-date navigational, radio positioning, detection and sounding instruments.

The office and accommodation space is air-conditioned. The hull is reinforced in the regular manner to allow ice navigation.

The ship has a complement of 34 and can accommodate 29 scientists, the total thus amounting to 63.

Oceanographic Equipment

Particular attention has been paid to developing anchoring and dragging techniques in deep water and to the means of handling heavy objects at sea.

Two hydraulic pressure stations supply energy to the many cranes and winches. Forward, an anchor winch can take 18 000 m of steel or nylon cable, the drag winch aft holding 34 000 m.

The ship is arranged for stern trawling and the trawl ramp is served by a fishing winch taking 6 000 m of drag rope.

Electric winches for hydrologic and bathymetric work complete this equipment.

Finally, in the stern there are two hydraulic cranes of 3 and 12 tons allowing such a heavy object as a " diving saucer " to be lowered and raised.

Several other special arrangements should be pointed out. To port, an open well-cleared bridge permits the handling of 30-m long bottom cores which are subsequently stored in refrigerated space. Water samplings for analysis are taken on the starboard side, and arrangements have been made so that no discharge of polluted water is made from this side of the ship.

An observation chamber with portholes has been fitted in the stem bulb.

The usual lifeboats have given place to launches that are in fact oceanographic tenders, whilst a platform is used as a helicopter landing ground.

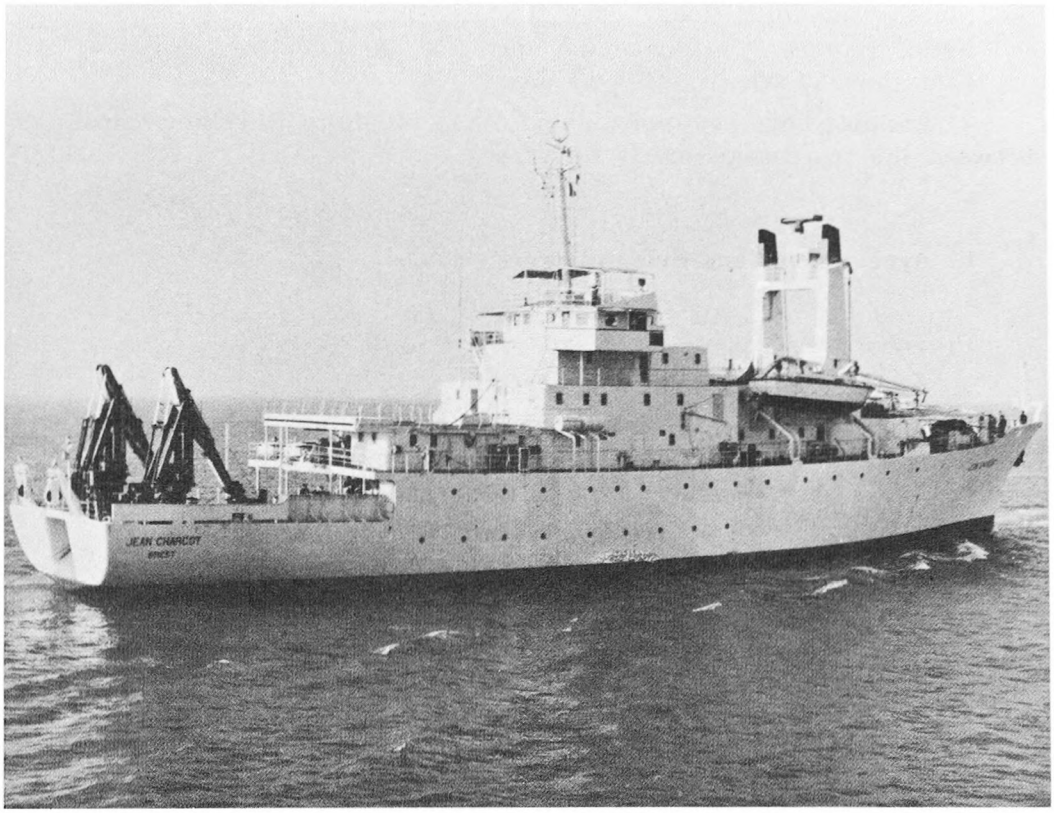


FIG. 1

Laboratories

Each laboratory has been designed to be used for a well-defined type of research : biological, chemical, physical, hydrological, geological and geophysical. An electronic workshop, a photographic laboratory and a drawing office are distributed over the six decks and cover a space of 400 m^2 for around 50 work stations.

III. — GENERAL DESCRIPTION

a) Principal Specifications

Length overall	244.2 ft (74.50 m)
Length, B.P.	210 ft (64 m)
Beam, moulded	46.3 ft (14.10 m)
Mean Load draught	16.8 ft (5.02 m)
Deadweight tonnage	630 tons (approx.)
Deep displacement	2200 tons (approx.)
Stability modulus (light)	1.3 ft (0.395 m)

Stability modulus (load)	3.8 ft (1.156 m)
Fresh water	205 tons
Endurance at sea	60 days.

The main bridge is supplemented by an auxiliary wheelhouse installed between the two funnel-masts forward.

b) **Appointments and living quarters**

Provided for 63 persons :

11	officers
23	crew
29	oceanographers

c) **Propulsion**

1. The principal propulsion equipment is Diesel-Electric and includes :

3 generators each made up of :

— 1 MAN Diesel Engine developing 1120 h.p. under tropical conditions;

— 1 Jeumont double D.C. dynamo for propulsion, each of 307 kW, total power 614 kW;

— 1 Jeumont alternator of 375 KVA, 400 volts triphase current, 50 Hz;

2 Jeumont electric motors of 1150 h.p. each, 210 r.p.m. (total propulsion power 2300 h.p.);

2 shafts and 2 fixed-blade propellers;

2 rudders.

In order to reduce hull vibration (absorption of frequencies above 8 Hz) the generators are mounted on rubber.

2. Two electrically-controlled Schottel thrusters each of 300 h.p. made up of two screws arranged in tunnels perpendicular to the ship's axis, one a quarter ship-length from the bow, and the other aft between the propeller-shafts. These transversal propellers should counteract the drift in a 25-30 knot wind.

3. Bridge-controlled propellers.

4. Maximum speed : 15 knots with 3 diesels;
cruising speed : 12 knots with 2 diesels;
economics cruising speed : 10 knots;
range : 10 000 n.m. at 10 knots (42 days of continuous steaming);
fuel : approx. 270 tons (excluding anti-roll ballast).

d) **Electrical Equipment**

1. General arrangement :

— 3 alternators supplying a total of 1125 KVA in triphase A.C. current 400 V, 50 Hz;

— 1 auxiliary unit of 250 KVA;
— 1 emergency unit of 100 KVA.

The following currents are available on the electric boards :

— 380 V triphase 50 Hz;
— 220 V triphase 50 Hz;
— 220 V monophase 50 Hz;
— 220 V monophase 50 Hz regulated to within ± 1 %;
— 115 V monophase 60 Hz regulated to within ± 1 %;
— 24 V d.c.

2. Detailed arrangement :

— Boomer or Arcer type geophysical equipment fed by special plugs of 380 V 120 KVA in the general laboratory and the geophysical laboratory;

— possibility of occupying a "silent station" with the ship and motors stopped to avoid all vibration, the different kinds of electric current required for measuring equipment, light, radio communication, etc. being supplied by batteries of 1 250 A.H. which can feed a set of 5 transformers. Such a " silent station " can last 4 hours.

e) Navigational, sounding, detection and meteorological equipment

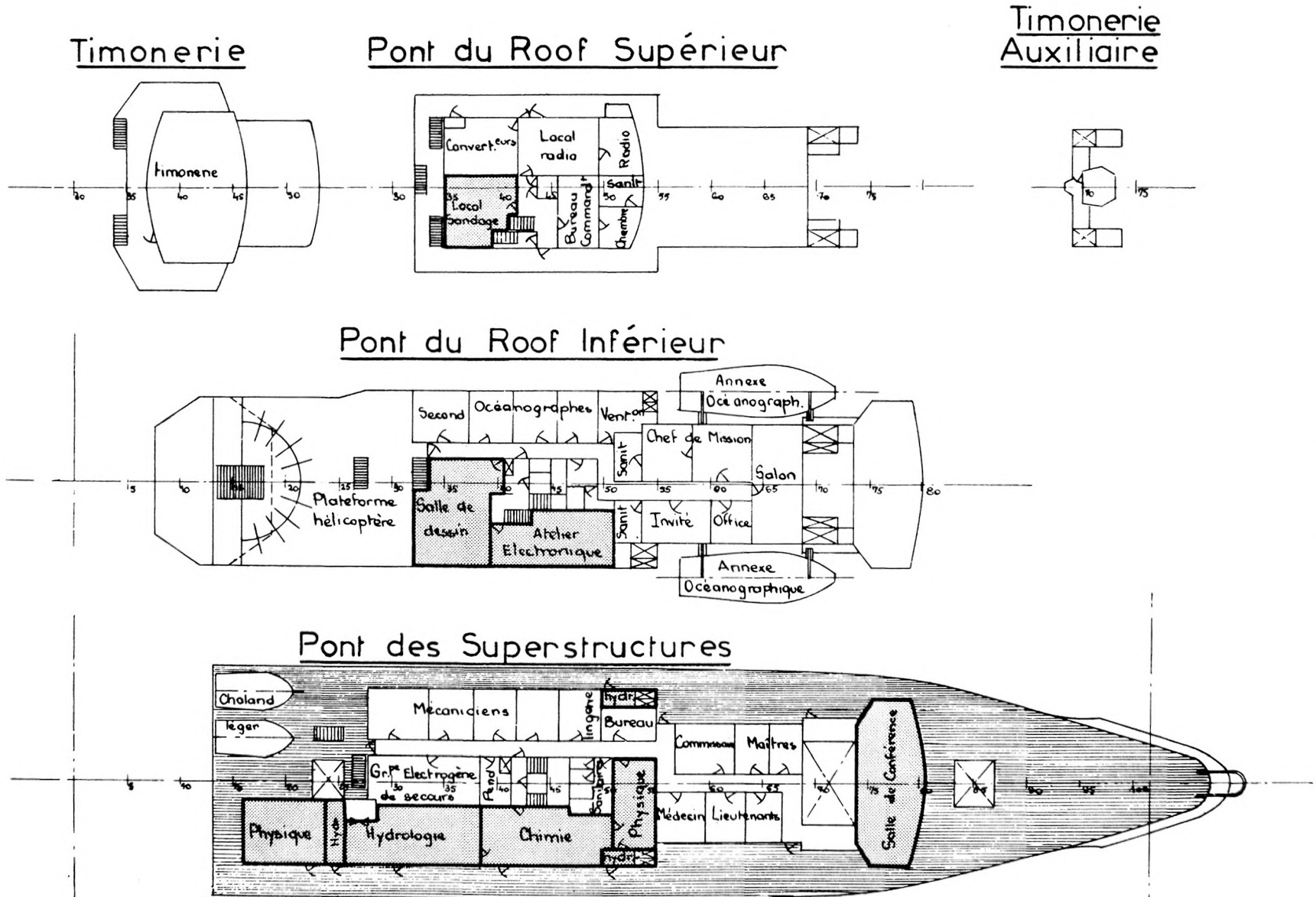
— Arma-Brown AOIP gyrocompass;
— Brown AOIP autopilot;
— Decca TMS 2 400 (10 cm) true motion radar;
— Plath visual radio direction finder;
— Decca radionavigator;
— Loran A/C;
— Elac/Enif sounder (12 kc/s);
— Edo-sonar sounder (12 and 34 kc/s) with Alden PGR 419 recorder;
— Simrad SK 2 A fishery asdic (range 1 500 m, frequency 30 kc/s);
— Sal log;
— plotting table (scales of 6, 12 and 60 n.m.) (*);
— speed and direction anemometer, and standard meteorological equipment;
— the usual W/T, R/T, as well as VHF and Walkie-Talkie communications.

f) Winches and handling gear

1. Cranes :

— 1 hydraulic crane, Ateliers et Chantiers du Havre, 8/12 tons, range 26.3 ft (8 m);
— 1 hydraulic crane, Ateliers et Chantiers du Havre, 2/3 tons, range 26.3 ft (8 m).

(*) To be installed during 1966.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timonerie
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Salon
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These cranes serve the aft hold and are also used for lowering and taking in all apparatus.

2. Winches :

— 1 Renou-Dardel/Delatte-Levivier deep-sea anchor winch, load at rest 12 tons, lifting 8 tons.

This winch has a 3-drum winder able to take :
6 000 m of 13.5 mm steel cable,
2 × 6 000 m of 20 mm nylon cable.

— 1 Renou-Dardel/Delatte-Levivier hydraulic deep-sea trawling winch, load 12 tons at rest, lifting 8 tons.

This winch has a 4-drum roller able to take :
12 000 m of 14.8/10 mm conical cable,
12 000 m of 12 mm nylon cable,
2 × 5 000 m of 12 mm nylon or steel cable.

Other combinations of cable are possible. The trawling winch aft is provided with an oil and air shock absorber.

The hydraulic power plants serving the winches and cranes can work at a maximum pressure of 350 bars

— 1 hydraulic fishing and trawling winch, load 8.4 tons at rest, lifting 6 tons; 2 drums, each taking 3 000 m of 13.5 mm cable.

— 2 electric hydrological winches, 10 h.p., port and starboard, large size Mécabolier type, with interchangeable drums each taking 5 000 m of 4.5 mm steel cable, maximum load 500 kg.

— 1 hydrological winch, to starboard, 20 h.p., same type as above, taking 6 000 m of 5.5 mm steel cable, maximum load 1 000 kg.

— 2 bathymetric electric winches, 3 h.p., taking 750 m of 3.2 mm, stainless steel cable, maximum load 150 kg.

This equipment is placed as follows :

— cranes : on the quarter deck of the upper deck, on either side of the trawling ramp, the 8/12 ton crane to port, the 2/3 ton to starboard;

— anchor winch : on the upper deck, hawse pipe on the spar deck forward;

— trawl winch : on the main deck, hawse pipe on the upper deck aft;

— hydrological and bathymetric winches : on the spar deck.

g) Laboratories, work space and workshops

Distributed over 6 decks. All have fresh water, sea water and compressed air, and the various kinds of electric current. They are air-conditioned.

1. Under the main deck, towards the stern, situated where they are least affected by pitch and roll :

The geophysical laboratory (67 m²), will take a gravimeter; has a dark room, the so-called "optical room ".

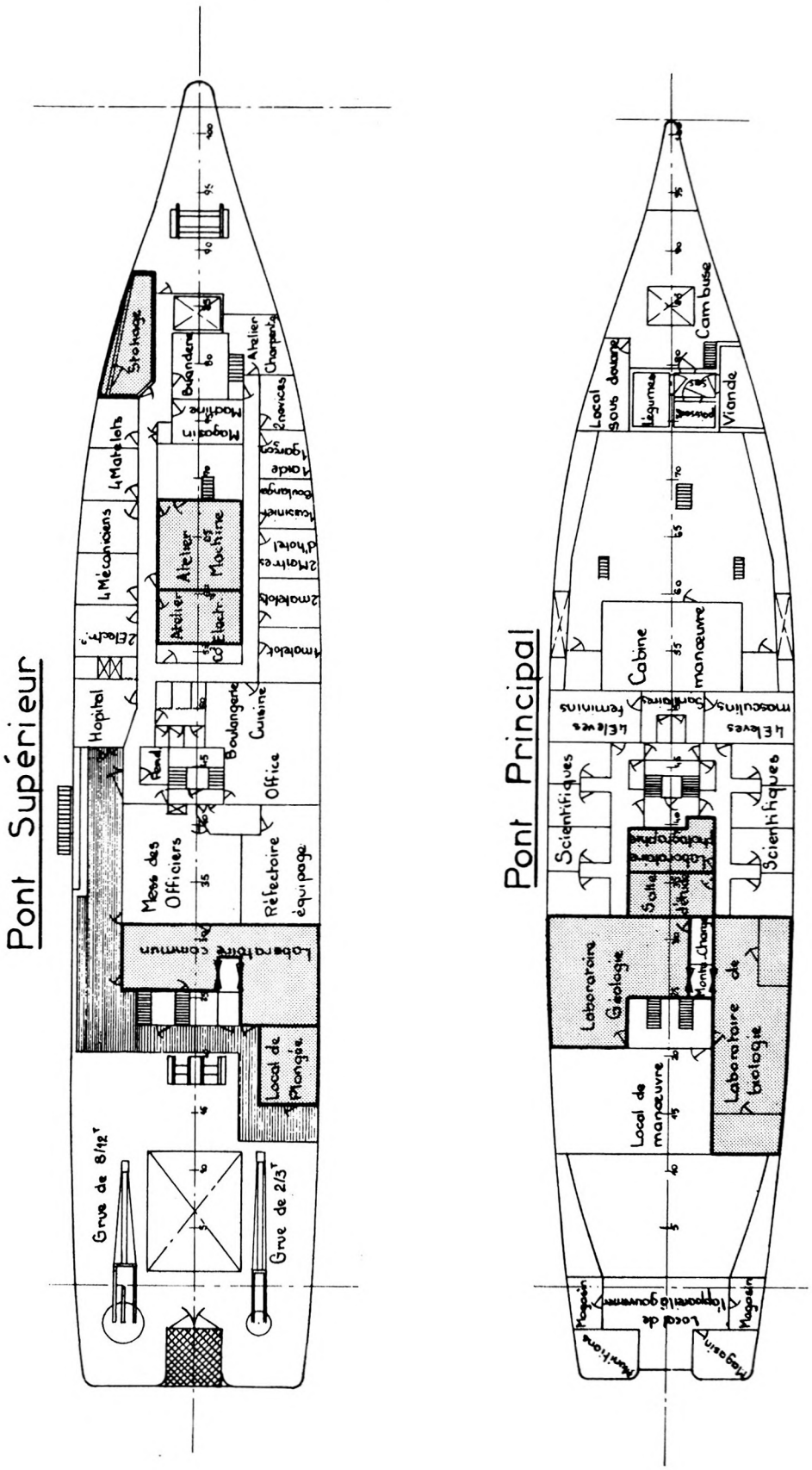
Pont Supérieur
Stokage
Boulangerie
Atelier Charpente
Magasin
Machine
2 novices
4 Matelots
4 Garçons
4 Cuisiniers
4 Mécaniciens
Atelier Machine
Atelier Electricité
2 Maîtres d'hôtel
2 Matelots
2 Electr.
1 Matelot
Hôpital
Boulangerie Cuisine
Office
Réfectoire équipage
Mess des Officiers
Laboratoire commun
Local de Plongée
Grue de 8/12 T
Grue de 2/3 T
Pont Principal
Local sous douane
Légumes
Cambuse
Viande
Cabine manœuvre
4 Elèves mousses
4 Elèves Timoniers
4 Elèves Mécaniciens
Scientifiques
Laboratoire Photographie
Salle de dessin
Scientifiques
Laboratoire Géologie
Monte charge
Laboratoire de Biologie
Local de manœuvre
Local de l'appareillage gouverne
Magasin
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FIG. 3

2. On the main deck.

To port :

— *The geological laboratory* (45 m², 6 work stations), with benches, suction-bucket, drying cabinet, refrigerator, photographic bench for bottom cores. An inclined tube allow cores to be taken into this laboratory direct from the upper deck without complicated handling.

To starboard :

— *The biological laboratory* (52 m², 15 work stations), with benches, suction-bucket, drying cabinet, refrigerator, centrifugal machine, autoclave and sterilizer. This laboratory is divided into three parts. The first, in the centre, is devoted to day-to-day biological work. Aft, an air-filtered insulated room for microbiological work. To starboard, forward, a " damp " room kept at a temperature of + 5° to + 10° C, for conserving living organisms in their usual temperature conditions.

Towards the centre of the ship :

— *A photographic laboratory* (12 m²), fully equipped.

3. On the upper deck, port side, towards the prow :

The cold rooms for storage (30 m³), comprising a room refrigerated to + 5° C (for 6-m bottom cores); a smaller room (approximately 5 m long) refrigerated to — 5° to — 10° C; a compartment (approximately 1 m × 1 m) refrigerated to — 20° C.

Towards the stern :

— *The common laboratory* (47 m², 3 work stations), with benches. This room opens to port on a cleared working deck for handling 30-m cores and for receiving trawls and various fish. This laboratory is in two parts : to port, a "damp" portion, with aquariums; to starboard, a "dry" zone which will shelter a certain number of instruments and repeaters.

To starboard, aft of the common laboratory :

— *A diving station* (15 m²), equipped with a recompression tank; two 196-bar Junkers compressors placed in the stern propulsion equipment compartment make the recharging of air bottles possible.

4. On the spar deck :

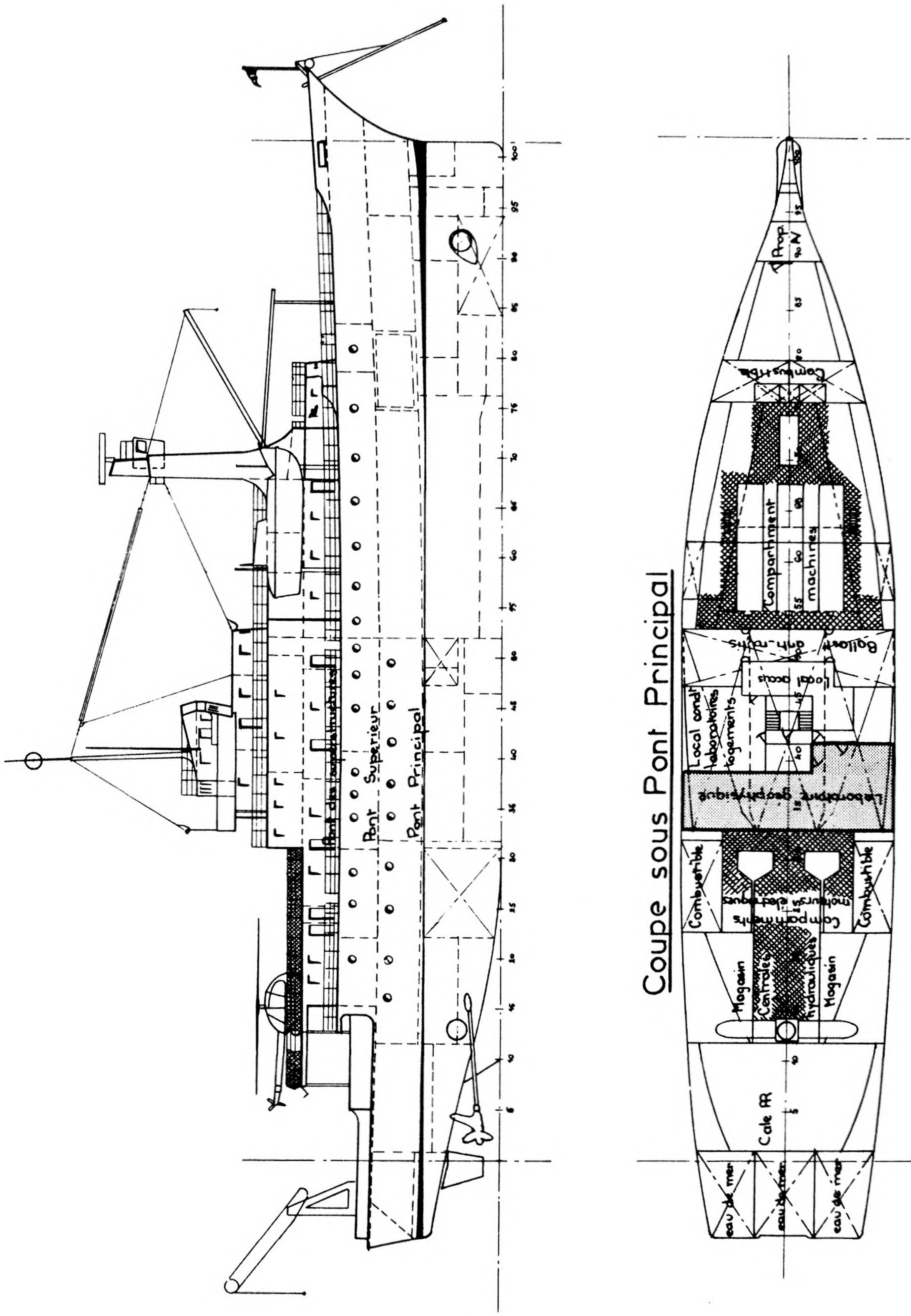
— *The physics laboratories* (forward 23 m², 2 work stations; aft 17 m², 4 work stations), with benches and racks.

— *The hydrology laboratory* (27 m², 6 work stations) and 3 hydrological stations (6 m² in all) situated at the level of the hydrological winches, allowing bottles and equipment to be handled sheltered from the weather.

— *The chemistry laboratory* (23 m², 2 work stations). Has a propane gas supply, a demineralised water supply and outlet pipes protected against corrosives.

5. On the lower part of the deckhouse :

— *A drawing office* (30 m², 8 work stations. For briefings and other uses, with drawing tables, duplicating apparatus, etc.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Pont Superieur
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Compartiment machines
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Laboratoire geophysique
Combustible
Compartiments moteurs electriques
Combustible
Magasin
Centrales hydrauliques
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Prop. AV

— *An electronic workshop* (21 m², 4 work stations). Equipped with many measuring instruments, racks, benches, etc.

6. On the upper part of the deckhouse :

— *A sounding room* (15 m²). For the Edo echo-sounder, the PGR 419, the track-plotter table, and the meteo recorders.

To recapitulate, the *Jean-Charcot* possesses :

8 laboratories, properly speaking, distributed over 6 decks;

5 work areas (excluding storerooms and hydrological stations) totalling 400 m² of which 300 m² is for the laboratories alone; and about 50 work stations, to which must be added a reading room and a conference room. Finally, there are workshops for the engineers, the electricians and the carpenters.

h) Boats and helicopter

1. Boats.

— The usual life-boats have been replaced by two 9.50 m launches, each equipped with 2 Couach 60 h.p. motors with a 48-hr endurance at sea. These launches are in fact also oceanographic launches and have radio communication.

— 2 light barges with outboard motors serve as harbour craft.

2. Helicopter.

— A helicopter landing area, with the possibility of refuelling with Kerosene, has been provided.

i) Special arrangements

— The ship has been designed so that all the polluted water outlets are on the port side. Therefore it is on the starboard side in unpolluted waters that all the surface sampling is made.

— The port side, at the outer working deck (Upper deck) is sufficiently clear to allow the handling of 30-m cores. In this space certain sorting and sieving operations are carried out. (The sifter and debris tables are removable).

— In the stem bulb a sub-marine observation chamber with 5 portholes has been provided.

— A free-board margin corresponding to an augmentation in weight of 300 tons is provided, to allow for subsequent modifications and additions.