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NEW SURVEY VESSELS FOR THE PORTUGUESE NAVY

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INTRODUCTION

The Portuguese Hydrographic Institute has recently commissioned two new survey vessels built in the Navy Shipyards. NRP *Andromeda* was delivered in July 1987 and NRP *Auriga* in March 1988.

FIG. 1. — Survey Vessel *Andromeda*.

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The design of these survey vessels was the result of a close co-operation between the Hydrographic Institute and the Naval Architecture Department of the Navy. They were designed to meet some specific objectives and sea conditions. One important point to stress in their design was that they were to provide an opportunity for the State research organizations and universities to allow their use for field work during certain periods of the year. They were designed in 1982 and their construction started in 1984 after some improvements in the original drawings to get a more complete and wide variety of uses.

The construction is inexpensive with a very good cost/efficiency ratio and has proved to have very good results after one year of intensive field work. They have a high flexibility in coastal and port hydrographic surveys and also for side scan sonar, sub-bottom and continuous seismic reflection profiling. They have also proved to be very manœuvrable for the deployment and recovery of current meters and wave rider buoys. They have been used along the Portuguese coast, and in the Azores and the Archipelago of Madeira.

DESIGN AND TASKS

These survey vessels were designed to carry out a broad spectrum of work, ranging from hydrographic surveys to oceanographic observations (physical, geological and geophysical).

To perform these tasks, some specific requirements were included in their design:

a. Low speed operation with good steering.
b. Very low noise levels of ship and propeller.
c. Large deck areas for equipment deployment and recovery.
d. Good and versatile hoisting devices including an 'A' frame for handling oceanographic equipment.
e. Several types of winches for handling special electric cables with slip rings for a CTD probe and side scan sonar use.
f. Heavy duty winches and capstans for handling bottom samplers and corers.
g. Ability to operate in estuaries and coastal waters with light to moderate sea conditions.

The main tasks which they were required to perform were:

a. Coastal and oceanic hydrographic surveys to 2000 m depth.
b. Deployment and recovering of oceanographic instruments at sea, including current meters, wave rider buoys and bottom tide gauges.
c. Sampling with CTD probe and water sampler for gathering physical-chemical data.
d. Bottom sediment sampling and coring.
e. Side scan sonar, sub-bottom and continuous seismic reflection profiling for geomorphological studies.

f. Subsurface inspection for a broad type of uses, mainly running a Remote Operated Vehicle (ROV) with sampling arm, TV and photographic capabilities.

LAYOUT

The vessels are of a completely welded hull and superstructure and have been insulated with special care in order to limit noise and minimize vibrations.

Main characteristics

Length overall	31.5 m
Beam	7.74 m
Draft	2.8 m
Gross tonnage	190 t
Displacement	245 t
Maximum speed	12.5 knots
Endurance	maximum cruise length of 8 days
Range	1980 nautical miles at 10 knots

Ships crew

Officers: 2
Crew: 11 (2 petty-officers and 9 ratings)

6 scientists and technicians can also be accommodated.

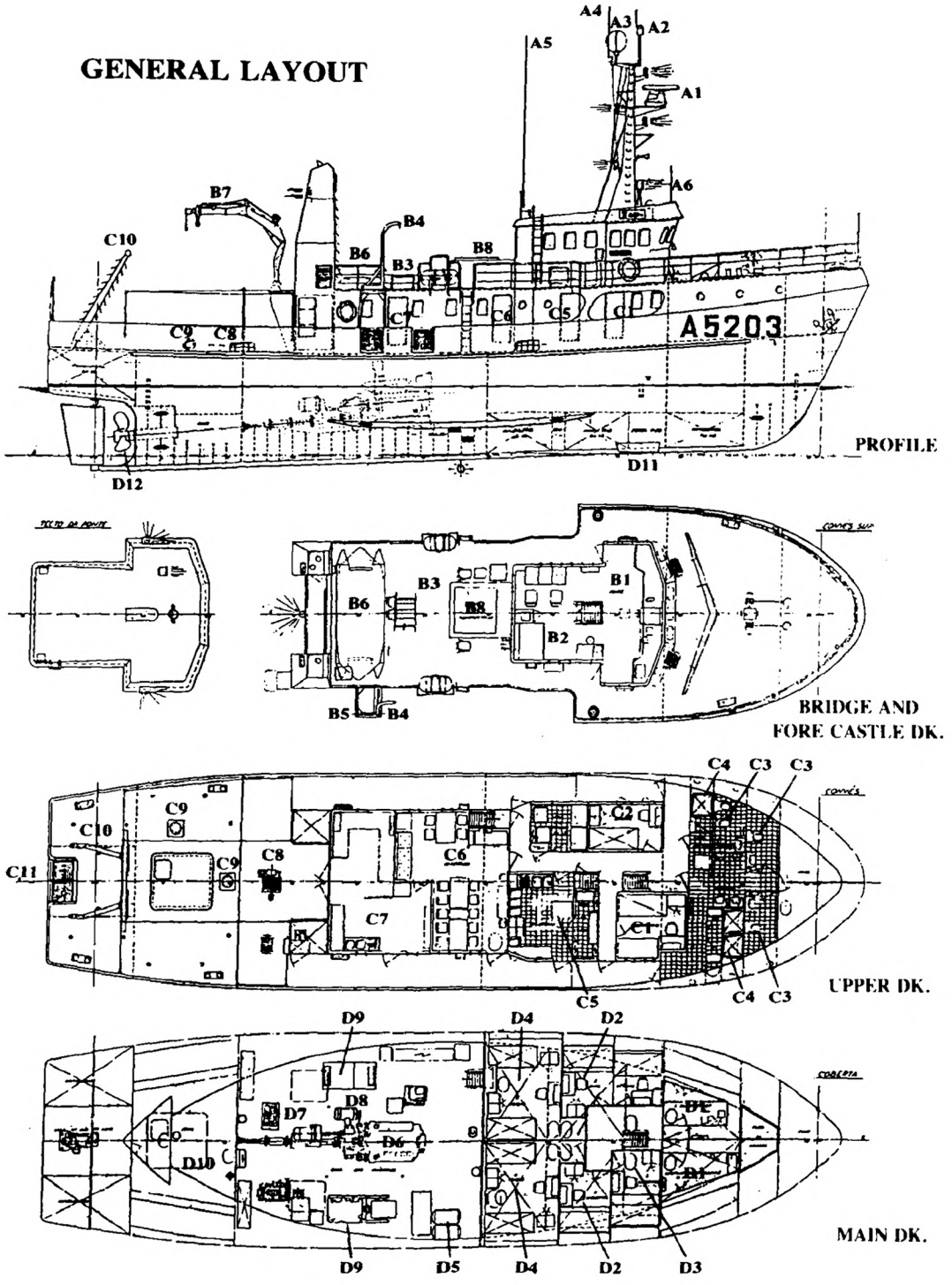
Engines and propulsion

Propulsion is provided by a diesel engine MTU 12V 398 TC 82 with a 1030 HP capacity at 1500 RPM, 12 cylinder, clutch coupled to the propeller shaft.

Propulsion is attained by a controllable pitch SCHAFFRAN propeller.

There is also an auxiliary drive for very low speed operation with an electric engine BAUER D84 17E/80 delivering 60 HP coupled to the propeller shaft. This drive can be powered by an auxiliary diesel alternator, independently from the main engine.

The main engine room has a special type of fire extinguishing device, HALON 1301, with complete flooding.


GENERAL LAYOUT
A4
A3
A2
A5
A1
A6
B7
B4
C10
B6
B3
B8
C9
C8
C7
C6
C5
A5203
D12
D11
PROFILE
B3
B1
B6
B8
B2
B5
B4
BRIDGE AND
FORE CASTLE DK.
C4
C3
C3
C9
C10
C2
C11
C9
C8
C6
C7
C1
C5
C4
C3
UPPER DK.
D9
D4
D2
D8
D7
D6
D10
D9
D5
D4
D2
D3
MAIN DK.

SURVEY VESSELS '*ANDROMEDA*' AND '*AURIGA*' GENERAL LAYOUT

PROFILE

A 1 — **Radar**
A 2 — **Trisponder unit and aerial**
A 3 — **Radiogoniometer aerial**
A 4 — **VHF/FM aerial**
A 5 — **MF/HF aerial**
A 6 — **OMEGA aerial**

BRIDGE AND FORECASTLE DECK

B 1 — **Wheelhouse**
B 2 — **Scientific room**
B 3 — **Oceanographic winch**
B 4 — **Crane**
B 5 — **Working platform**
B 6 — **Searider work boats**
B 7 — **Hydraulic telescopic crane**
B 8 — **Air conditioning unit**

UPPER DECK

C 1 — **Captain's cabin**
C 2 — **Officers' cabin**
C 3 — **Toilets**
C 4 — **Showers**
C 5 — **Kitchen**
C 6 — **Mess**
C 7 — **Scientific laboratory**
C 8 — **Side scan sonar winch**
C 9 — **Capstan**
C 10 — **'A' Frame**
C 11 — **Equipment's slope and platform**

MAIN DECK

D 1 — **Workshop**
D 2 — **Scientist's cabin**
D 3 — **Petty officers' cabin**
D 4 — **Ratings' cabin**
D 5 — **Hydraulic winch power pack**
D 6 — **Main diesel propulsion motor**
D 7 — **Electric propulsion motor**
D 8 — **Main diesel alternator**
D 9 — **Diesel alternators**
D 10 — **Storage**
D 11 — **Transducer's room**
D 12 — **Controllable pitch propellor**

FIG. 3. — Layout description.

Power supplies

The mains are supplied by an AVK type DKB 42/60-4TS 380/220 V, 60 KVA, 3 phase, at 50 Hz, driven by the propulsion engine.

This is complemented by a FAPRIL B1125 1T15 380/220 V, 120 KVA, 3 phase, at 50 Hz for heavy loading when necessary, including the auxiliary electric propulsion.

Fully independent from the mains, a G & M POWER PLANT, 40MDP-4-57R 380/220 V, power regulated, 37 KVA, 3 phase, at 50 Hz, is available for scientific equipment handling and use when berthing.

All these facilities are bridge controlled, which allows a significant crew reduction.

WORKING AREAS AND HANDLING EQUIPMENT

The main characteristics are:

a. A wide bridge to provide space for navigation, positioning and hydrographic equipment, for simultaneous surveying and safety of navigation purposes.
b. A 10 square metres wet laboratory with remote sensors for course, ships' log and echo sounder.
c. A wide working area of 30 square metres in the aft area.
d. A place in the aft area for mounting a laboratory in a container with ground surface of 3 m × 2 m.
e. An 'A' frame aft to handle equipment up to a 2.5 ton load.
f. An aft ramp to allow handling for deployment and recovery of oceanographic equipments.
g. Two capstans in the aft area with maximum loads of 2.5 and 5 tons.
h. A telescopic hydraulic crane with a maximum load of 3.4 tons.
i. An hydraulic variable speed oceanographic winch with two drums, one with slip rings for electro-mechanical cable, uniconductor, 1500 m long for CTD probe and water sampler and another general purpose one for handling sediment samplers and corers, 1500 m long also.
j. An electric variable speed winch for the side scan sonar equipped with slip rings and 600 m of electric armoured cable.
k. Two Searider inflatable work boats.

COMMUNICATION EQUIPMENT

a. Two CH 25 MF/HF transceivers
b. One DEBEG 7617 VHF/FM transceiver

NAVIGATION EQUIPMENT

a. DECCA 914 A radar
b. SERCEL M6 Omega receiver
c. TRIMBLE 4000 AX Navstar satellite receiver
d. ANSCHUTZ model STANDARD 4P gyrocompass
e. ANSCHUTZ COMPILOT 7 autopilot
f. Type LHS SAGEM log
g. GV6M (G. VIEIRA, LDA) magnetic compass
h. TAYO Model TD-C 328 MATS radiogoniometer
i. Model 95.000.00 THIES anemometer
j. NAGRAFAX weather facsimile receiver
k. ATLAS DESO 25 and ATLAS DESO 20 echo sounders with dual frequency operation.

FIG. 4. — Interior showing the bridge and navigation equipment.

HYDROGRAPHIC EQUIPMENT

The survey vessels are equipped with a hydrographic automatic data acquisition system and use the following equipment:

a. ATLAS DESO 25 echo sounder with dual frequency 15/210 kHz

b. ATLAS DESO 20 echo sounder with dual frequency 33/210 kHz
c. DESOSCRIPT digital unit
d. TRISPONDER receiver DDMU 540/542
e. TRISPONDER, master unit and four remote stations
f. TRISPONDER data printer
g. Automatic hydrographic acquisition system

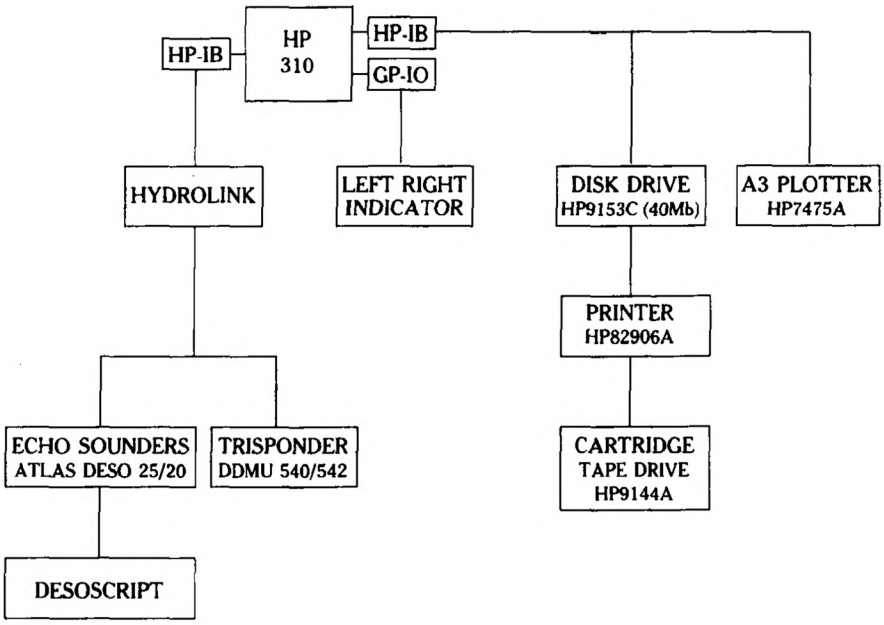


FIG. 5. — Layout of the automatic hydrographic acquisition system.

The automatic hydrographic acquisition system has a HP 310 computer system with 2 Mb RAM and DMA controller and RS 232 serial ports. It has an HP-IB interface to the HYDROLINK that controls both echo sounder and TRISPONDER receiver DDMU.

Another HP-IB bus allows the command of a HP 7475A plotter, a HP 9153C 40 Mb hard disk drive, a HP 82906A printer and a HP 9144A 1/4" cartridge tape drive.

A GP-IO interface allows the command of a left-right indicator for the helmsman.

The general layout of the system can be seen in Figure 5.