

NEW ARGENTINE OCEANOGRAPHIC VESSEL — “ PUERTO DESEADO ”

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A.R.A. Puerto Deseado

A.R.A. *Puerto Deseado*, the new Argentine oceanographic vessel, was built for the Argentine National Scientific and Technical Research (CONICET) at the modernized Astilleros Argentinos Rio de la Plata S.A. dockyards, and was completed at the beginning of 1979. Her structural characteristics, installations and equipment make her one of the most complete and advanced vessels for oceanographic and meteorological research afloat.

Incorporated into the Argentine Navy as an auxiliary vessel for scientific research, she will carry out oceanographic campaigns approved by a joint Technical Commission of the Navy and CONICET and programmed by the Navy Hydrographic Service and national research institutes, either jointly or separately.

The vessel, with a displacement of 2,400 tons and fitted with the most recent equipment, is able to operate anywhere in the world ocean. Normally her area of operations will be the South Atlantic Ocean, both upon and outside the continental shelf, and including polar waters with up to four tenths coverage of young ice, for which purpose her hull has been adequately ice-strengthened.

Particulars of her hull design and principal characteristics are:

Overall length	76.80 m
Moulded beam	13.20 m
Design draught	4.50 m
Maximum continuous speed	15 knots
Range	12,000 miles
Classification	A.B.S. Class B for ice
Main engines: 2 × 1,350 HP	1,000 rpm
Main generators: 4 × 320 KVA, 3 × 380/220	50 cycles
Crew	63
Scientists and technicians	20

Special features

One of the ship's main characteristics is her highly automated equipment. An oceanographic and meteorological data acquisition and proces-



FIG. 1. — The Argentine Oceanographic Vessel *Puerto Deseado*.

sing system, based upon four Hewlett-Packard computers with a central memory sustained by magnetic disc operates in real time and enables the vessel to return to port after having finished the campaign with all physical, chemical and meteorological data already processed and plotted.

The ship is designed to accomplish research and associated functions in different scientific fields, examining the conditions in the atmosphere, the surface and the depths of the sea, and the sea floor and its substratum, and measuring the gravitational and geomagnetic fields. She is being equipped so as to be able to:

- obtain fixes at sea with maximum accuracy;
- carry out meteorological surface and upper-air observations, and obtain meteorological data by reception of satellite pictures;
- collect water samples and carry out bathythermograph measurements;
- carry out current, wave, and sound propagation measurements, as well as those of suspended particles of material;
- conduct chemical analysis, and that of primary productivity of

- sea water, collect surface and bottom plankton, and conduct marine bacteriological studies;
- carry out precise bathymetric measurements, collect samples from the sea floor surface and core the sea bed, conduct seismic prospecting and heat-transfer-measurements of the sea floor;
 - study the physical properties of sea water, and make glaciological observations;
 - measure the Earth's gravity field intensity and the variation of its magnetic field.

For this type of work, the location of laboratories, manœuvring decks, navigation areas and other compartments is of great importance. The main laboratories are on the main deck; they have direct and rapid access from this deck to the sea, making it easier to handle the samples collected and affording protection from wind, sea and spray. This ensures maximum space availability for laboratories and auxiliary rooms for scientific research in the area where effect of pitching is the least. Accommodation for other important on-board facilities, such as data processing and navigation equipment as well as living quarters and various service areas, have been so arranged as to achieve functional efficiency with minimum interference. Maximum attention has been paid to reducing noise and vibration. Air conditioning equipment has been installed to optimize environment conditions for laboratories, cabinet deck, living premises and other areas. One result has been the achievement of adequate personal comfort levels for working and resting purposes.

Main and auxiliary engines

The two main engines operate variable pitch propellers through reduction gears and a transmission shaft, enabling fine variations in speed control and sensitive response handling. A soundproof and air-conditioned control room has been provided, where the remote controls for the main engines and the electric generators are installed.

Furthermore, for better ship control under differing operating conditions, propeller control consoles are installed on the bridge wings, in the crow's nest and on the upper deck aft. These operate through the main control console in the wheelhouse.

To improve manœuvrability a bow thruster with a 2,500 kg thrust is provided; this can also be operated from all control stations. Using the bow thruster, main propellers and the rudder, the ship is able to turn around in about its own length.

The power station is completely automated in order to ensure adequate power generation under any conditions of load, operation or equipment failure.

Operation

The steering equipment is located on the bridge (which includes the wheelhouse, the radio room, the navigation room and the two bridge

wings). Excellent visibility is provided for manœuvring, for both navigational and scientific purposes. The oceanographic equipment located on the bridge is so arranged as to avoid interference. During navigation through ice the ship can be governed from the crow's nest.

The equipment installed is the most modern, ranging from the satellite navigation equipment and doppler sonar and doppler log to the latest in internal and external communications equipment.

Special equipment

The ship is fitted with the following installations and equipment :

- complete oceanographic wet laboratory;
- chemical laboratory which in addition to the conventional equipment is fitted with a solar radiation meter, non-toxic bottles, incubation bath, bacteriological sampling apparatus, salinometers, spectrophotometers, automatic titrator and a manual microtitrator, a multiple filtration equipment, vacuum pumps, a liquid scintillation system, absorption spectrophotometers, and automatic gas chromatograph. The samples obtained are stored in a cold storage room specially designed for this purpose;

- biological and bacteriological laboratories in which are installed, besides the plankton nets, a sterilizing apparatus and two culture heaters. A cold storage room conserves the samples;

- the electronic instruments room is fitted with a conductivity, temperature, depth and oxygen content profiler (CTD/O), a seismic profiling equipment, seismic refraction and reflection recording instruments with four and twelve channels respectively, based on a Texas Instruments computer, EDO sounders, nuclear precession magnetometer, Askania GSS 3 gravimeter, data collecting and recording equipments;

- the weather station which, in addition to the usual instruments, has a computer that controls the ship's automatic radiosounding system, as required by the WMO for vessels participating in the GARP programme. A satellite image receiver is also fitted. In close proximity there is an inflating room for radiosounder balloons;

- the geological laboratory has extractors for bottom samples together with gravity and pneumatic extractors (Vibracore). The bottom samples are stored in a specially designed cold storage room.

The vessel also has an electronics and communications repair shop and storeroom, a hold for instruments, a draughting room, and a photographic laboratory.

Winches

The ship's seven winches for handling instruments and oceanographic equipment were supplied by the German firm Willy Baensch:

- 1 coring winch with a 10,000 m cable;
- 2 oceanographic winches for serial observations at oceanographic stations, each with 10,000 m of cable, and adapted for CTD/O observations;
- 2 bathythermographic winches each with 600 m of cable;

— 2 winches—one for towing the magnetometer, and the other for the hydrophone streamer and other instruments.

In addition an electro-hydraulic 10-ton crane is installed, with wave compensation, to handle heavy equipment such as the motor launch and a future "minisubmarine" for undersea research and exploration.

To obtain the required platform stabilization, a passive system of roll damping tanks has been installed, allowing considerable reduction of roll angle and also increasing the roll period. This system has the advantage of not requiring that the ship be underway to fulfill its function.

Data acquisition and processing

This system incorporates the latest technology and a high degree of automation in order to acquire, store, select, tabulate and plot information relating to navigation, geophysics, oceanography and meteorology obtained by the ship's equipment.

The system has four sub-systems: Navigation; Data Acquisition, Underway; Data Acquisition, Station; and Data Processing. All these sub-systems are interlinked in order to supply a flow of primary or pre-processed data to the Data Processing sub-system. Here the data are re-processed and the output registered in the form of tables and graphs immediately useful for continuous control of measured values and the variations of the different parameters of navigation, geophysics, oceanography and meteorology.



FIG. 2. — Computer room — CTD/O subsystem.

The Data Processing sub-system consists of a Hewlett-Packard computer with a 32 K memory, TRC units, magnetic and paper tapes, teletypes, printers and plotters; a similar 32 K memory computer is used for the Data Acquisition, Underway. The other two sub-systems each utilize a dedicated 16 K Hewlett-Packard computer.

The Navigation sub-system (Magnavox-Hewlett-Packard), with a doppler sonar and a doppler log, input speed and bearing data, combines this information with data received from a satellite navigation receiver and continuously computes the ship's position at sea, plotting the route followed on the chart.

The Data Acquisition, Underway sub-system obtains geophysical, oceanographic and meteorological data while the ship is en route. For this purpose it registers the data obtained from the gravimeter, the magnetometer, the bathymetric system and the automatic meteorological station. When the ship is on station, the Data Acquisition, Station sub-system operates; it collects and registers data obtained with expendable bathythermographs (XBT) and the CTD/O profiler. Both these sub-systems apply the necessary corrections to the data collected and put them through to the Data Processing sub-system for their final processing.

The ship also has a marine seismic system for collecting and recording data regarding sea bed structure, using pulses generated in the water by an air-gun; the reflected echoes are picked up by the streamed hydrophones; refraction signals can also be received through sonobuoys and receivers.

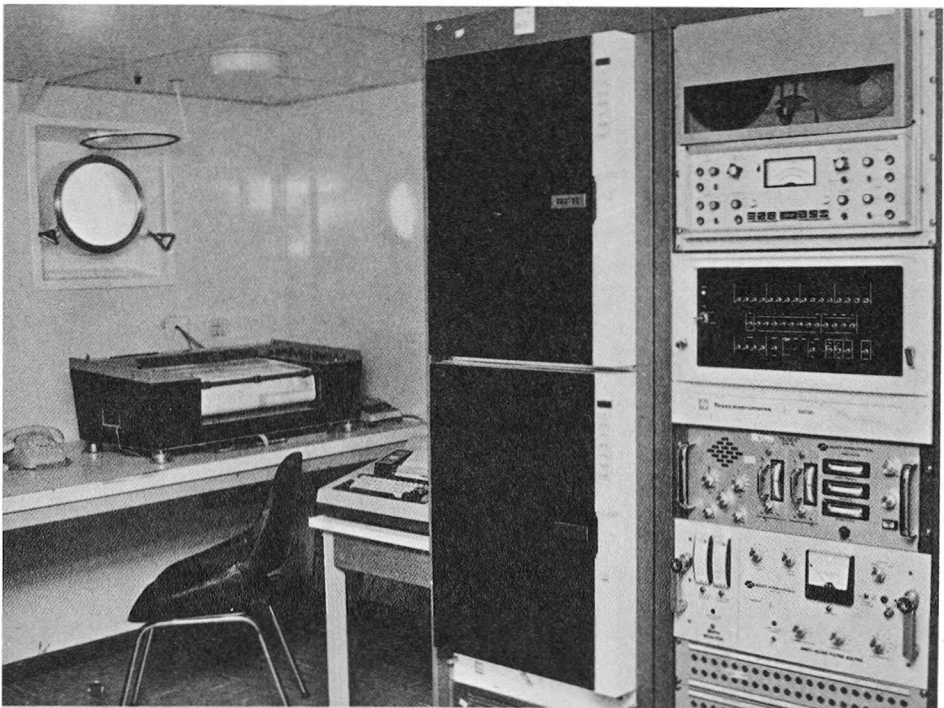


FIG. 3. — Marine seismic system.

Engineering for the integrated and scientific computation system, and the supply of the corresponding hardware, was carried out by Raytheon Service Company and Thyssen Steel of the United States. Valuable specialized advice was also received from Woods Hole Oceanographic Institution.

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Entry into service of A.R.A. *Puerto Deseado* brings to Argentina the capability for expanded and enhanced research, especially in the relatively neglected areas of the southern oceans. It brings to the world the promise of valuable new scientific data to further the struggle to understand the planet Earth.

HAZARDOUS NAVIGATION

Concerned (the Master) received order from the owner to sail through Magellan Strait. Concerned rightly took this choice to be the result of thorough preparation and extensive consideration by the owner. Apart from meteorological, geographical and economic aspects, reliability of the charts is a determining factor too in taking a decision of this kind.

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The Admiralty Court is of the opinion that, the stranding having occurred on a shallow patch which is well known, it cannot be concluded that the choice of route in itself should be called unjustified.

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An enquiry conducted by the Admiralty Court gave no evidence that the owner failed to consider properly all factors involved. Witness Mr. W.H.R. Lawrence and expert witness (Mr. R. van den Oever) — cartographer Hydrographic Office of the Netherlands) made statements in court pertaining to the reliability of the charts of Magellan Strait used for preparation of the passage and possible hazards thereof. The transit of Magellan Strait is not without hazards for very deep draught vessels as becomes evident from a report published by the U.S. Hydrographic Office on 8 February 1975, mentioning two shallow patches measuring 11 fathoms in the eastern entrance to Magellan Strait which the *Metula* passed by very closely.

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HAZARDOUS NAVIGATION

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The Admiralty Pilot tells that very accurate navigation is required especially in the area near the south-western exit of the First Narrows and that recommended tracks should be followed. That is to say, additional measures should be taken.

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When the pilots' new Chilian chart was brought to his attention concerned at first sight discovered on it a shallow patch not shown on his B. A. chart. Plotting the position of this patch on the latter chart by transferring latitude and longitude instead of bearing and distance from a navigational mark was a grave error. Had he not made this mistake he would have noticed that on the B. A. chart too this patch was located south of the recommended track indicated. He made this mistake a second time when he plotted the position of Punta Mendez on the B. A. chart again using latitude and longitude and plotted the direction 59-239 degrees from this position. When seeing the new Chilian chart for the first time and discovering the shallows and difference compared with his B. A. chart he had time and opportunity to contemplate anew the alteration of course with the aid of the new Chilian chart and correct his plan if desired. Moreover, he would have discovered that both charts showed that Punta Mendez should be bearing 59° or somewhat less but certainly no more than that, during alteration of course. The charts show little or no difference in method and moment of alteration of course.

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The Admiralty Court applauds attempts being made to establish a faster and more efficient exchange of information obtained from hydrographic surveys, on an international level. Whatever may come of the results of these attempts, utmost caution is required in the choice of route of a large and deep draught vessel.

Extracted from the Record of the Netherlands Admiralty Court verdict on the stranding of the VLCC *Metula* on 9 August 1974.