Marine National Facility

Investigator

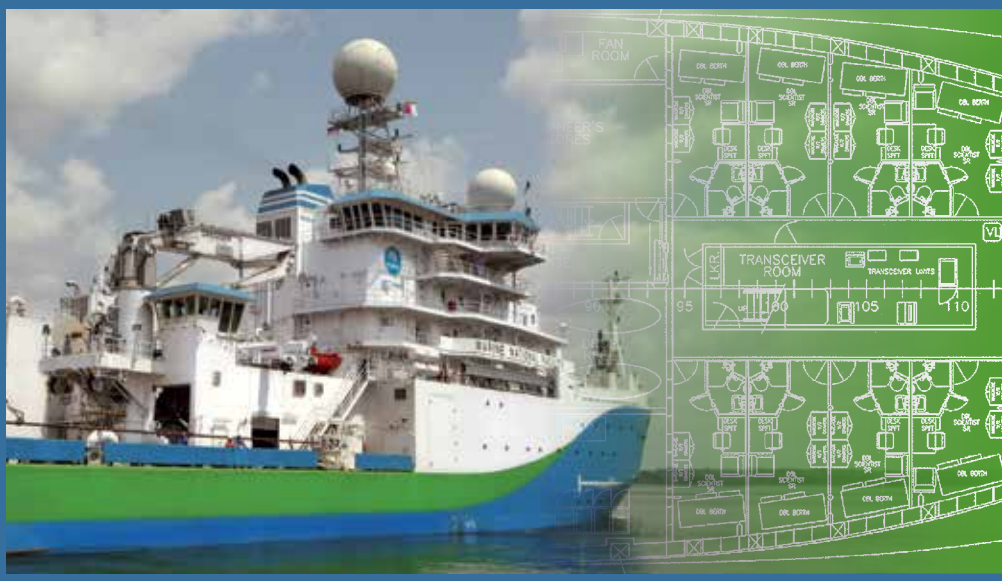
As much as possible, RV *Investigator* must be all things to all Australian marine scientists, as Australia has only one blue-water research vessel. The vessel will support atmospheric, oceanographic, biological and geoscience research.

This diverse and complex approach to marine and atmospheric science is on the leading edge of ocean research.

The ship has been specifically designed to an international maritime classification called DNV-Silent-R. Achieving this classification puts *Investigator* in the realms of being one of the quietest vessels in the world. Radiated ship noise interferes with acoustic signals, and by building a quiet ship, we will be able to maximise the performance of the equipment to be used to monitor the marine ecosystem, and map the seafloor and sea bed.

Investigator's hull shape was designed using computer-based fluid dynamics to ensure any bubbles formed by the hull moving through the water (bubble sweep-down) do not interfere with the acoustic equipment. To help achieve this, the hull was designed without either a bulbous-shaped bow or tunnel bow thrusters. Instead, *Investigator* has a soft nose stem and retractable azimuth bow thruster.

Australia's oceans are estimated to contribute $42 billion annually to our economy, increasing to over $100 billion in ten years. The ship is technically impressive and will open up avenues of discovery both within and across scientific disciplines. With an enviable suite of equipment, the ship will dramatically improve the national marine knowledge, putting Australia at the forefront of ocean research globally.



- Length – 93.9 metres
- Beam – 18.5 metres
- Draft – 6.2 metres
- Height from the waterline to the top of the ship – 37 metres
- Number of internal storeys – ten
- Number of single and double cabins – 43
- Number of scientists and support staff onboard – 40
- Number of crew – 20 including trainees
- Three diesel engines
- Two electric propulsion motors
- One retractable bow thruster capable of rotating 360 degrees
- Dynamic positioning system
- A range of 10,000 nautical miles at a cruising speed of 12 knots

Investigator generates around nine megawatts of power. The average Australian home uses about 18 kilowatt-hours per day, which means *Investigator* could power a small suburb or a country town!

Equipment capability

A-frame on the stern

Investigator is equipped with a 20 t A-Frame for deploying moorings. It has a height of 9.4 m, a width of 5.3 m, and is capable of swinging 170°.

Circulating clean seawater

Clean seawater constantly supplied to laboratories.

Container laboratories

HAZMAT locker
A specialised container for the bulk storage of toxic, corrosive and flammable chemicals. Substances that can be stored include concentrated acids (e.g. sulphuric acid, formaldehyde, formalin, ethanol and acetone.

Laboratory Clean Container
Specialised container for conducting trace metal work. It can be used for chemical and biological oceanography, atmospheric science and geosciences.

Radiation Laboratory
A specialised container for using of low level radioisotopes.

CTD storage container
Specialised clean container for the storage of the trace metal CTD rosette.

Coring storage facility container
A container to store all of the long and short sediment core equipment

Cranes

Main working crane
The main working crane can lift 25 t at a reach of 12 m and five t at 20 m. It is located towards the rear of the ship.

Stores crane
Located on the forward deck and used to resupply the ship and is capable of lifting five t at ten m.

Utility crane
Two aft deck utility cranes, one on each side of the ship, used for relocating and deploying equipment.

Data processing Information Technology

The ship has an integrated computer network which:

- Provides typical office computing services to scientists, support staff and crew (e.g. email, file storage, backups etc)
- Connects to the ship's scientific instruments to provide instrument control, status monitoring and data recording
- Hosts data processing and visualisation systems
- Provides the backbone of the ship's telecommunication system
- Connects a network of video cameras used to monitor critical areas of the ship

There are approximately 1,000 network outlets around the ship to allow equipment to be connected to the computer network, with eight central servers (incorporating dual-redundancy), and 58 TB of central scientific storage. The network is built on a fibre optic backbone with a 10 Gbps core switch and 1Gbps edge switches.

Investigator has a 512kbps VSAT data link to shore for email, internet, voice, video, remote support services as well as enabling live science data transfer. It is also capable of live via satellite interviews to most television stations and studios globally.

Deck seawater supply

Constant supply of seawater to the back deck, container spaces, deck level 2 and the General Purpose Wet (Dirty) Laboratory.

Drop keels

Two drop keels that can be lowered or raised as needed.

- Camera – 360°
- EK60 with transducers working at 18kHz, 38kHz, 120kHz, 200kHz and 333kHz
- Water intake
- ADCP 75kHz + 150kHz
- Hydrophone

Dual axis doppler Log

Skipper DL850 located on the gondola 1.2 m below the hull, it measures the speed of the ship through the water.

Electronic balances

Heavy duty electronic balance, motion compensated 150 kg max. POLS S-210 onboard marine Scale or MAREL M2200 PL6050.

Light Duty motion compensated electronic balance. POLS S_182 (3 kg) or equivalent.

Medium Duty motion compensated electronic balance. POLS S_182 (20 kg) or equivalent.

Fume cupboards & Hazardous Materials lockers

The Hydrochemistry, General Purpose Clean and General Purpose Dirty, General Purpose Dry, and Preservation laboratories include fume cupboards and Hazmat Lockers for working with and storing hazardous materials.

Gondola

Underneath Investigator is a hydrodynamically designed housing called a gondola that contains sonar equipment.

Laboratory fresh water

Hot and cold freshwater supplied to all labs, and working decks.

Laminar flow cabinets

Provide a clean air environment for undertaking contamination sensitive analyses.

Milli-Q systems

Ultra-pure filter for water used in laboratories. Systems available in Hydrochemistry, Preservation Lab, Clean Wet Lab and Dry Lab but water available for use elsewhere.

12 KHz pingers

Pingers are typically attached to equipment that is deployed in the ocean, to determine the distance a piece of equipment is above the seafloor.

Portable capstan

A capstan is a device for winding in ropes and wires, which is used for the deployment and retrieval of equipment.

Stern gallows

Located either side of the A-Frame, they are used to deploy and retrieve nets and dredges.

Swaging system

Swaging system for re-terminating cables onboard.

12kHz transducer

This transducer is a transmitting and listening device used to talk to moorings and pingers to determine the distance a piece of scientific equipment is above the seafloor, or the location of a mooring in relation to the ship.

Winches x 11

Coring winch
In the winch room 8,400 m synthetic rope and a safe working load of 20 t. It can be deployed through the A-Frame or the corer boom.

CTD winches x 2
Both to 7,000 m, one can be redirected for deployment from the corer boom on the starboard side. These have conducting wires and can also be used for tow-yo operations.

Heavy duty general purpose towing
It is located in the winch room below the aft deck and is able to reel out 8,400 m of steel cable, with a safe working load limit of 11 t.

Hydrographic winch
Located in the winch room, it has 2,000 m synthetic rope and is used for light sediment grabs, light grabs and as a general purpose winch.

Net drum
Located above the back deck on the 02 level it is an open drum that can be used for the deployment and recovery of nets and to deploy and recover moorings.

Towed body winch
6,000 m of fibre optic and conducting wire for towing the TRIAXUS, EZ net and towed cameras. It can be deployed through the A-Frame or the corer boom and is located in the winch room.

Trawl winches x 2
Located underneath the gallows below the back deck, they are used for trawling and dredging with 8,400 m of steel cable.

Utility winches – working decks
Utility winches located underneath the net drum platform above the back deck.

Workboat

6.5 m x 2.2 m, and 1.05 m deep, fitted for general purpose science use. Located on the starboard side of the 02 level deck, it is able to be deployed using the main crane.

Working air systems

A compressed air system available in all laboratories.