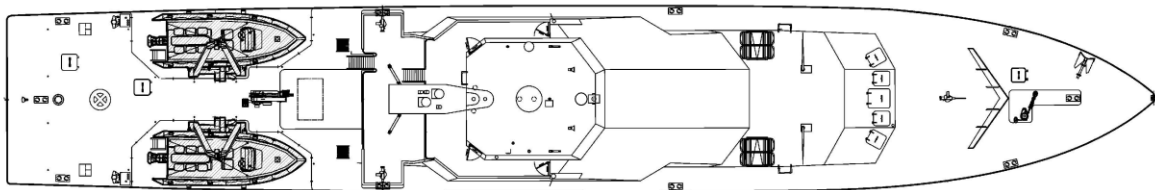
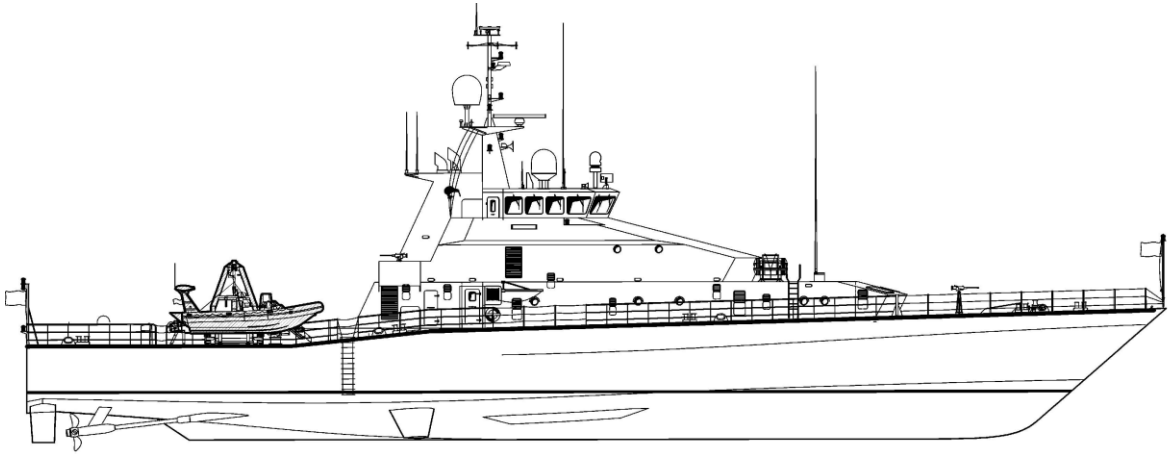
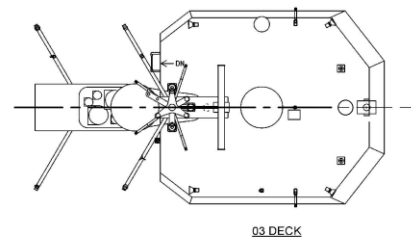
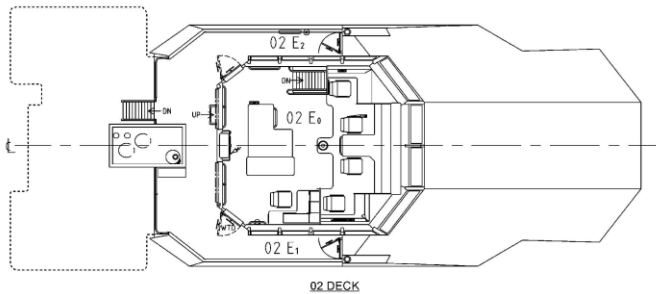
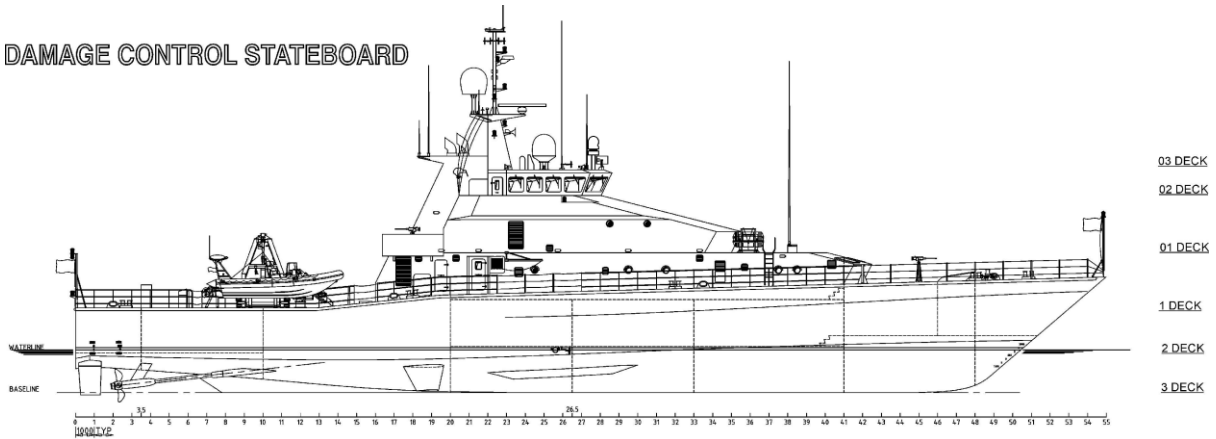




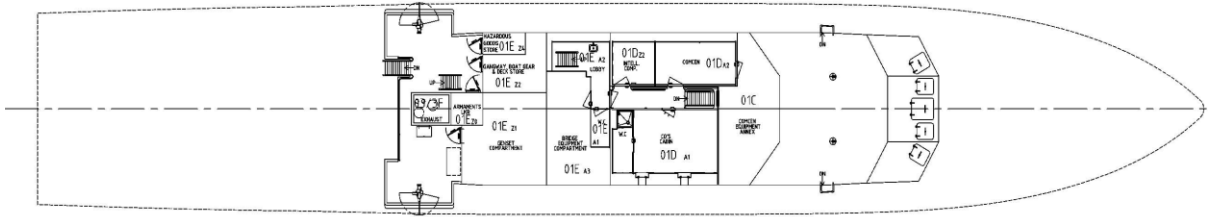
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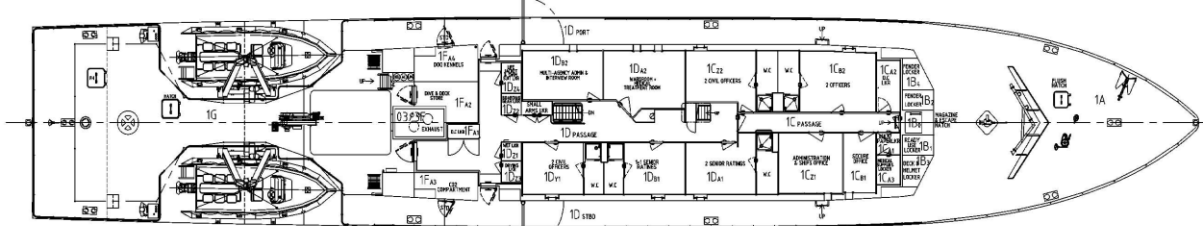
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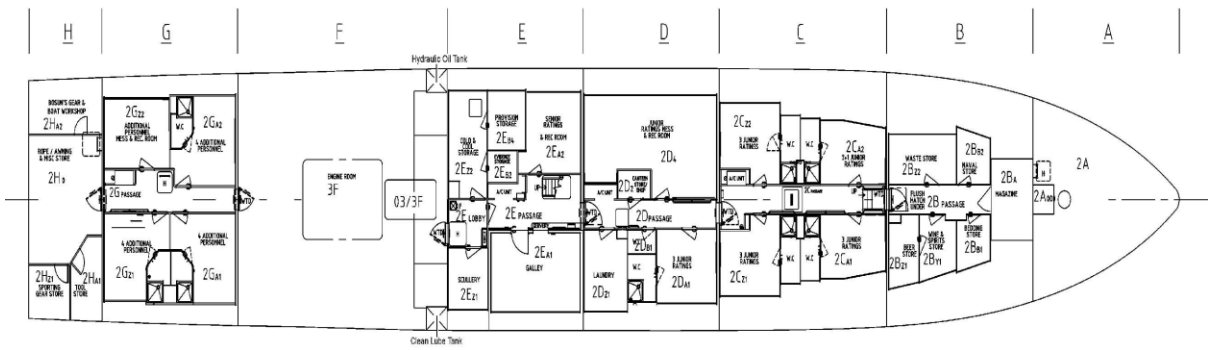
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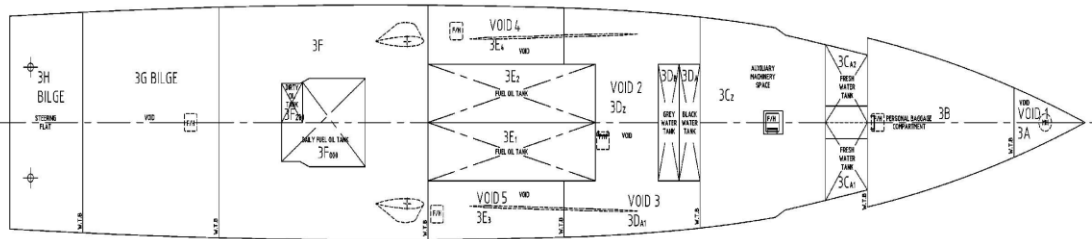
1 DECK



2 DECK



3 DECK



PROJ0101

PROJ0102

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## INTRODUCTION

The Patrol boats are Lake-class In-shore Patrol Vessels (IPV). Twin-screw ships, they are capable of a maximum continuous speed of 25 knots and a range of 3000 nautical miles at 12 knots, in full load condition. Refer above for general arrangement and detailed compartment views. The ship's intended role includes, but is not limited to, multi-agency activities encompassing maritime surveillance and response tasks.

### Compartment Identification

Ship's compartments and upper deck areas have been assigned compartment identification markings. For compartment location refer to Compartment Location and Numbering drawings above. Deck and section identification has been developed using the following convention:

- a. the main, or upper deck is designated '1',
- b. decks below the main deck are designated '2', and '3' in descending order; 'inner bottom' is the term given to the area containing all storage tanks below 3 Deck,
- c. decks above the main deck which are part of the superstructure are designated '01', '02', and '03' in ascending order, and
- d. the ship is divided into watertight sections by athwartships watertight bulkheads at appropriate, and practical, frame spacing. The watertight sections are designated, alphabetically, from 'A' to 'H', fwd to aft.

Compartments are:

03F Exhaust  
03E Bridge Roof  
02E0 Bridge  
02E2 Port Bridge Wing  
02E1 Stbd Bridge Wing  
01C Comcen Equipment Annex  
01DA2 Comcen  
01DA1 CO's Cabin  
01DZ2 Intel Compartment  
01EA2 Lobby  
01EA1 Heads  
01EA3 Bridge Equipment Compartment  
01EZ2 Gangway Boat Gear and Deck Store  
01EZ4 Hazardous Goods Store  
01EZ1 Genset Compartment  
01EZ0 Armaments Locker  
1B4 Fender Locker  
1B2 Fender Locker  
1B0 Escape Hatch  
1B1 Ready Use Locker  
1B3 Deck and Helmet Locker  
1CA2 Fwd DC Locker  
1CA1 Bulk Paper Locker  
1CA3 Medical Supplies Locker  
1CB2 Officers Cabin  
1CB1 Secure Office

1CZ1 Administration and Ship's Office  
1CZ2 Civil Officers Cabin  
1DA1 Senior Sailors Cabin  
1DA2 Wardroom and Medical Treatment Room  
1DB1 Senior Sailors Cabin  
1DB2 Multi-agency Admin and Interview Room  
1DY1 Civil Officers Cabin  
1DZ4 Life Jacket and Swimsuit Locker  
1DZ2 Boarding Gear Locker  
1DZ1 Wet Locker  
1DZ3 Drying Locker  
1FA1 Aft DC Locker  
1FA2 Dive and Deck Store  
1FA4 Dog Kennels  
1FA3 CO2 Compartment  
1G Seaboat Davits  
2A Rope Store  
2BA Magazine  
2BB2 Naval Store  
2BB1 Bedding Store  
2BZ2 Waste Store  
2BY1 Wine and Spirits Store  
2BZ1 Beer Store  
2CA2 Junior Sailors Cabin (2+1)  
22CA1 Junior Sailors Cabin (3)  
2CZ2 Junior Sailors Cabin (3)  
2CZ1 Junior Sailors Cabin (3)  
2D Passage  
2D2 Canteen  
2D4 Junior Sailors Mess and Recreation  
2DA1 Junior Sailors Cabin (3)  
2DB1 Heads  
2DZ1 Laundry  
2E Passage  
2EA2 Senior Sailors Mess and Recreation  
2EA1 Galley  
2EB4 Provision Store  
2EB2 Evidence Storage  
2EZ2 Cold and Cool Storage  
2EZ1 Scullery  
2G Passage  
2GA2 Additional Personnel Cabin (4)  
2GA1 Additional Personnel Cabin (4)  
2GZ2 Additional Personnel Mess and Recreation  
2GZ1 Additional Personnel Cabin (4)  
2H0 Steering Gear Compartment  
2HA1 Tool Store  
2HZ1 Sporting Gear Store  
2HA2 Bosun's Gear and Boat Workshop  
3A Void 1

3B Personnel Baggage  
3CA2 Fresh Water Tank  
3CA1 Fresh Water Tank  
3CZ Auxiliary Machinery Space  
3DA Black Water Tank  
3DB Grey Water Tank  
3DA1 Void 3  
3DZ Void 2  
3E2 Fuel Oil Tank  
3E1 Fuel Oil Tank  
3E4 Void 4  
3E3 Void 5  
3F Engine Room  
3F000 Daily Fuel Oil Tank  
3G Void  
3H Bilge  
3F200 Dirty Oil Tank

## **SHIP'S DESIGN CHARACTERISTICS**

### **Principal Characteristics**

#### **General**

Length overall 55 m  
Length waterline 50.6 m  
Beam moulded 9 m  
Draft moulded 2.43 m  
Draft max (propellers) 2.9 m  
Height (keel to top of mast) 20 m

#### **Propulsion**

Main engines (port and stbd) MAN - Paxman 12VP185  
Power rating 2500 kW at 1907 rpm  
Engine revolution range 600 to 1905  
Gearbox ZF 7640NR  
Gearbox reduction 4.238 : 1

#### **Shafting**

Shafts GRP-coated C45E (N)  
Couplings Vulkan Rato R212W  
Stern tube and bearings Wartsila, water-lubricated NF22  
Stern tube (gland) seals mechanical type with inflatable maintenance ring  
Shaft locking gear positive engagement, infinite positioning

#### **Propellers**

Type Wartsila, high-skew, controllable-pitch (CPP)  
Diameter 1.8 m  
Number of blades (each) 4  
Revolutions 142 to 450 rpm  
Coupling type keyed, hydraulically removed

## **Steering**

Rudder spade type (one per main shaft)  
Actuation hydraulic cylinders (two per rudder)  
Control bridge, autopilot or emergency hand pump (local)  
Rudder angle / port to stbd, time 35 - 0 - 35 degrees / 11 seconds

## **Surface Sensors**

Navigation radar system with display X-band, FAR-2127  
Other government agency (OGA) infrastructure pedestal and below deck connectivity  
Sound reception system VS-111  
Global positioning system and clock GP-90, Furuno RD-30  
Primary compass GPS, SC-110  
Pelorus repeater BRC-250  
Magnetic compass MR 165-C  
Autopilot Navipilot NT-91G-Mk2  
Electronic chart display and information system IMO-based ECDIS software  
Automatic identification system Furuno FA-150  
Closed circuit television system Bosch Divar DVR6E1162  
Sound reception system VSS Sound Reception System

## **Underwater Sensors**

Depth sounder Furuno FE700  
Speed log/environmental data acquisition sys T-P248 data display unit  
Oceanographic data acquisition unit Mk21, LM3A launcher, XBT expendable probes

## **Communications**

Internal communications, telephone MITEL, ICP-3200  
Internal comm, damage control intercom Stentofon VMA-120/SP-5H/T  
Broadcast and alarm SPA-1000  
Cellular communications Ericsson F221m  
Satellite communications NERA Saturn Bm Mk2 INMARSAT-B/ELS  
Safety communications, VHF transceiver Sailor RT2048  
Sea boat radio ICOM - IC-M801E  
Computer server HP Proliant DL 380, 6 x 70 GB drive  
Workstations Compaq 510, 19" LCD display  
Voice data recorder Marris REC2000

## **General**

The ship has a displacement of 390 tonnes with an overall length of 55 metres and beam of 9 metres. This ship has an unrefuelled range of 3000 nautical miles when fully loaded at the speed of 12 knots, with 20% burnable fuel remaining in reserve. The ship's endurance is 28 days with a complement of 36 personnel. The ship does not have an ice class. The hull is a deep-vee, single-chined semi-displacement monohull and is longitudinally framed. Seven watertight bulkheads, each with watertight door(s) divides the ship into eight watertight compartments. The hull is built from Grade A-36 steel, while the superstructure is made from marine-grade aluminium.

## **Control and Monitoring**

The ship is controlled primarily from the bridge, compartment 02E, which is accessible from port or stbd weather-tight doors or internally from 01 Deck. For optimum operational control and rapid response, the bridge is divided into sections that group appropriate controls and information panels. Major items of equipment are listed in the following paragraphs while smaller items such as General Power Outlets (GPO) and lighting have been omitted. The bridge comprises the following major equipment:

a. Helm. Helm duties are executed from the port inboard fwd chair. The associated propulsion and steering duties which are normally controlled from the helm include controls for main engine (shaft) revolutions, propeller pitch, steering joysticks and change-over switch, autopilot, navigation lights, and emergency conning phone. Displays include Closed Circuit Television (CCTV) monitor, steering repeater and echo sounder. The radar screen is also visible from the helm.

b. Officer of the Watch Desk. The Officer of the Watch (OOW) desk is fwd of the stbd inboard fwd chair. Associated equipment includes keyboards and Visual Display Units (VDU) for the radar, Electronic Chart Display and Information System (ECDIS), man aloft radar control switch, check fire switch and telephone. A Remote Alarm and Interrogation Display (RAID) unit for the Integrated Platform Management System (IPMS) is also positioned next to the OOW's chair while the Pelorus is located amidships, aft of the helm and OOW chairs.

c. IPMS. (Engineer's Chair). The IPMS is positioned port side fwd and comprises two PC monitors, two trackballs for IPMS cursor manipulation, and a keyboard for system software maintenance. On the port outboard side are the Damage Control panel, fire and alarm indicator panel and voice terminal. The IPMS is also accessible from the Quartermaster's laptop data-cable socket in the Shore Connection Box, which is located on the ships superstructure outside and to stbd of the Dive & Deck Store (1FA2) doorway. This facility is primarily used when the ship is alongside to allow ships systems and alarms to be monitored by way of a laptop computer by gangway personnel. The same control and monitoring that is available from the bridge IPMS panels is provided to the laptop, and is subject to the same access/login requirements.

d. CO's Chair. The Commanding Officer's (CO) chair and console is positioned stbd outboard fwd and houses a binocular box. A voice terminal and two deck lighting switch panels are positioned on the stbd outer side of the chair.

e. Radio Operators Chair. Located aft of the CO's chair, the radio operator's console houses the Global Maritime Distress and Safety System (GMDSS) console which includes the VHF transceiver, MF/HF transceiver, Sat-C transceiver, Voice Data Recorder (VDR) interface, Digital Selective Calling (DSC) control, PC keyboard, PABX telephone, VDU and printer. Two mounts are included for the emergency radios. The man aloft keyswitch is also included.

f. Centre Console. The console positioned amidships aft on the bridge, provides a location for the chart table, the fire and safety plan, the type-1 portable radio, and the compass control display. Lockers below provide storage for wet weather gear, small arms and the night signal unit.



## **Propulsion and Steering System.**

An introduction to major propulsion components is as follows:

a. Main Engines. Propulsion is provided by two Main Engines (ME) coupled to the main shafts through reduction gearboxes. Each ME is a turbocharged, MAN - Paxman 12VP185, 12-cylinder, V-configuration diesel, delivering 2500 kW at 1907 rpm. ME direction of rotation is clockwise when facing aft, looking towards the free end (non-drive end).

b. Gearboxes. Power from the ME is delivered to the propeller shafts through two ZF 7640NR reduction gearboxes. Each gearbox is equipped with a flexible coupling to accept drive from its main engine. The stbd gearbox also changes the output shaft's direction of rotation.

c. Shafting. The propeller shafts are made by Wartsila and are each approximately 12 metres long. Each shaft is coated with glass-reinforced plastic for protection and is solid-coupled to its Controllable Pitch Propeller (CPP). At the propeller end, each shaft is supported by a P-bracket (shaft bracket) which is attached vertically to the underside of the hull and internally to structural members. P-brackets are fitted with water-lubricated shaft bearings.

d. Propellers. Each shaft is fitted with a Wartsilla 4-blade, 1.8 m diameter CPP. The maximum revolutions are 450 rpm, the ship's maximum speed is approximately 25 knots and propeller rotation (ahead) is outwards over the top.

## **Steering**

Two rudders are fitted to the ship. Each rudder is equipped with an individual set of steering gear powered from an independent hydraulic power unit and both are arranged to operate in synchronisation under automatic control from the bridge. Steering gear actuation is by double-ended tiller-arm with two double-acting hydraulic cylinders acting on each tiller. Rudders are capable of independent operation, however, manual intervention is necessary to segregate the systems for independent mode of operation. A hand-operated, emergency pump/directional control unit is fitted to each system to provide individual steering control of each rudder.

## **Sensors**

Introductory information on navigation and surveillance sensors is covered in the following paragraphs.

a. Radar. The X-band radar is used as the navigation radar and with its automatic tracking capability, it can also be used for surface surveillance. The radar provides high-definition digital video which is displayed on a high-resolution monitor. The radar is used with Automatic Radar Plotting Aid (ARPA) functions for anti-collision, navigation and naval functions.

b. Other Government Agency Infrastructure. Communication detection infrastructure for Other Government Agencies (OGA) has been provided in the form of a multi-purpose pedestal on the bridge top for connection of antenna of various configurations. Six low-loss RF feeders, a Cat 5e cable and switchable DC power supply (+12, +24,

+48 V DC) are routed from the pedestal to the Communications Desk on the Bridge where OGAs can set up their BDE.

c. Sound Reception System. The Sound Reception System (SRS) is an acoustic electronic navigation aid that enables bridge personnel to hear sounds (such as fog horns) from other ships while inside the enclosed bridge space. Weatherproof microphones mounted externally to the bridge send signals to the SRS amplifier. A loudspeaker in the SRS console at the radio operator's desk broadcasts the sounds, while two of four indicator lamps illuminate to the quadrant from which the sound is being emitted.

d. Radio Navigation Aids. The Automatic Identification System (AIS) enables navigation and ship's data to be exchanged between this ship, and other ships and coastal stations set up for vessel traffic control. The AIS provides fast information regarding risk of collision by calculating Closest Point of Approach (CPA) and Time to Closest Point of Approach (TCPA) from position information transmitted by target vessels.

e. Compass Subsystem and Autopilot. The primary compass is a Global Positioning System (GPS) compass that provides primary data to the ship's navigation systems. A magnetic compass, located on the bridge roof in front of the mast, provides fluxgate heading data to a display located above the helm. Data supplied by the magnetic compass is independent of the primary compass. Two compass repeaters provide ship's bearing from the primary compass. One repeater is located in the helmsman's console and the other, which is located in the steering gear compartment, is used for emergency steering. A Pelorus repeater compass, located on the bridge centreline, provides the means to take bearings, relative to the ship's heading using an azimuth ring. The autopilot provides a means of controlling the ship's course using a combination of inputs from the Electronic Chart Display and Information System (ECDIS) or the compass, as well as preset limits for rudder trim, rate of turn and yaw control.

f. Underwater Surveillance. Underwater surveillance is conducted by a depth sounder, which displays data of below-keel conditions including history, logbook, Depth Below Ship (DBS) Own Ship Position (OSP) and navigation.

g. Closed Circuit Television. The Closed Circuit Television System (CCTV) provides surveillance of the engine room and the generator compartment. CCTV images are fed to a Digital Video Recorder (DVR).

h. Ancillary Navigation Systems and Equipment. The ancillary navigation systems and equipment details are as follows:

(1) Global Positioning System and Clock. The GPS is an accurate, stand-alone, electronic, position fixing system that uses satellite data to provide the ship's position and speed, as well as the time. The receiver can store such data as past ship positions, event marks, way points and routes.

(2) Ship Speed. Ship speed is measured by the extendable/retractable log probe. Data collected is processed by a dedicated encoder and is displayed on the bridge in knots.

(3) Oceanographic Data Acquisition System. The Oceanographic Data Acquisition System (ODAS) uses expendable probes to measure ocean parameters from the

surface to specified depths, depending on the probe type used. The probe transmits data while descending, via a trailing wire trace to a launcher connected to the processor module. Data received at the processor are then acquired by a computer loaded with the dedicated software, where data, trends and results can be recorded and printed. Refer to Section 5, Chapter 2 - Surveillance and Navigation Systems.

(4) Electronic Chart Display and Information System. The Electronic Chart Display and Information System (ECDIS) is a computerised navigation tool that displays electronic charts, navigational information and the ship's position in real time on a virtual display. It provides bridge personnel with the ship's position, relative to a planned route and navigational hazards. It allows the navigator to plot a course, and using course information and sensor data, direct the autopilot.

(5) Voice Recorder. The Voice Recorder (VR) is fitted to comply with Safety of Life at Sea (SOLAS) requirements. It continuously records voice communications on the bridge and radio communications from the communications and damage control communications systems for up to seven days of voice data on a hard drive. The stored data can be downloaded and analysed for investigation purposes, training and simulation, as required.

### **Roll Stabilisation**

A stabilising system is fitted to reduce the sea-induced rolling motion of the ship when underway. This provides increased ship stability for helicopter transfer (VERTREP), and increased crew comfort. The anti-heeling stabiliser comprises two non-retractable hydroplanes (fins) one port side and one stbd side between frames 18 and 19. Interconnected by an oil hydraulics system, the hydroplanes counteract the natural rolling motion of the ship by applying an equal and opposite righting moment. Control panels on the bridge and in the engine room, provide control, monitoring and alarms for the system. The operational status of the system together with warnings for alarm conditions are sent to the ship's Integrated Platform Management System (IPMS).

### **Ship Support Systems**

Systems fitted to the ship include:

- a. climate control system
- b. refrigeration
- c. seawater, including firemain and sprinkler systems, bilge pumping, sanitary supply and equipment cooling
- d. fresh water, including fresh water generating plant
- e. compressed air systems including working air system and breathing air
- f. fuel oil
- g. lubricating oil, and
- h. environmental pollution control, including garbage collection and disposal, sewage, sanitary and drainage systems.

## **ELECTRICAL SYSTEM**

### **Power Generation**

The primary power supply of 440 V, 3-phase, 60 Hz is generated by the ship's electrical plant comprising No.1 (port) and No.2 (stbd) diesel generators in the Engine Room (ER) and another on Deck 1 (No.3 genset). The power generation network is capable of ensuring maximum continuity of electrical supplies and a high degree of ship survivability. Any two gensets are capable of meeting the ship's maximum

demand, with the third acting as a stand-by unit. Power generation is controlled by the Power Management System (PMS) and status is indicated on the IPMS Power

No.1 and No.2 genset are identical and are located in the ER, one aft of each main engine. They are turbocharged, 4-stroke diesels and are each fitted with one electric starter, which take its power from a respective 24 VDC battery bank in the ER. Each genset diesel engine uses a secondary cooling system, where a mechanically-driven (off-engine) Cooling Water (CW) pump draws seawater from the 600 mm sea inlet manifolds at frame 19 and pumps it through the engine-mounted, fresh water/ coolant heat exchanger. Fuel to both ER gensets is drawn from a common Fuel Oil (FO) header tank, the level of which is maintained by No.1 or No.2 FO transfer pump which draws from the daily FO tank.

No.3 genset is located in the genset compartment, 01EZ1. It is a self-contained, turbocharged, 4-stroke, diesel- driven unit and is provided especially for damage control use when the main gensets are inoperable, such as during a fire in the engine room. Its cooling water system is of the fresh water/coolant type and is heat-exchanged by an engine-driven fan and air/water radiator. FO is gravity fed from a header tank located within the same compartment (01EZ1) and is maintained by No.1 or No.2 FO transfer pump, which draws from the daily FO tank.

Nos. 1 and 2 genset engine	MAN D 0836 LE 311
Nos. 1 and 2 genset power	140 kW / 175 kVA
Nos. 1 and 2 genset alternator	Leroy Somer LSAM 44.2 L12 C6/4
No. 3 genset engine	MAN D 0824 LE 201
No. 3 genset power	103 kW / 129 kVA
No. 3 genset alternator	Leroy Somer LSAM 44.2 S7

### **Power Distribution**

The ship's power distribution network is a 3-phase system with insulated neutral conductor. Power is distributed throughout the ship to a series of distribution boards from main switchboards, MSB-1 and MSB-2. Power is provided as follows:

- a. 440 V - 60 Hz, 3-phase for heavy machinery including pumps, steering and Controllable Pitch Propeller (CPP) hydraulics, stabiliser hydraulics, compressors, machinery, some fans, water heaters and sewage,
- b. 230 V - 60 Hz for galley equipment, some ER equipment, comcen and bridge equipment room, mess deck refrigerators, laundry equipment and small power appliance General Power Outlets (GPO),
- c. 115 V - 60 Hz for small items of machinery including window wipers, some fans, battery chargers, some fire dampers, Damage Control (DC) station, navcomms, lighting, firemain electrically-operated valves, 24 VDC battery chargers, and
- d. 24 VDC for control panels, emergency lights, DC equipment, fire alarm panel, some fire dampers, safety and emergency appliances, gas detectors, horn, navigation lights and equipment, autopilot, compass, Public Address (PA) broadcast and alarms, and solenoid valves. The 24 VDC system is supplied power from battery banks, which are

constantly maintained by dedicated battery chargers, supplied from the 115 V - 60 Hz system.

A load shedding system is installed to prevent any genset from being overloaded before another is available for loading and ensures the continued availability of power to vital services within the ship.

To provide for redundancy, No.3 genset supplies equipment that is considered necessary to maintain reduced ship's headway, following an incident such as a serious fire or flooding damage in the ER. Equipment that is supplied power from No.3 genset includes the emergency fire pump, the stbd ER supply fan, the stbd steering hydraulic power pack, both Controllable Pitch Propeller (CPP) hydraulic power units, bridge and comcen air conditioning units and the diving air compressor.

### **Shore and External Supplies**

Facilities are provided for connection to a shore power supply and to supply/receive from another vessel alongside. Provision is made for connection to 440 V, 60 Hz or 415 V, 50 Hz, which is conditioned by the on-board converter to 415 V, 60 Hz. Both supplies pass through a phase rotation switch for phase correction. Three-phase power supply to the main switchboard is automatically synchronised during change-over.

### **Lighting Systems**

The ship's lighting comprises the following three separate systems:

a. General Lighting. General lighting and red lighting is powered from the 115 V, 60 Hz supply and comprises all ship's illumination lighting. The system comprises both fluorescent and incandescent light fittings and provides for general lighting and darken ship operations. Darken ship lighting activates changeover to red lighting for night vision.

b. Emergency Lighting. The emergency lighting system is powered by 24 VDC from battery banks F and G, which are located in the battery box on 01 Deck, aft of the genset bulkhead. In the event of failure of the main power supply, power is supplied via distribution boards to lights in essential areas, corridors and stairways.

c. Navigation Lighting. Navigation lighting is powered from the ship's 24 VDC supply and from a back-up battery that ensures continuity of supply in the event of failure of the 115 V, 60 Hz supply, from where the 24 VDC system takes its normal supply.

### **Batteries**

Batteries and battery chargers are used throughout the ship for 24 VDC supply to various pieces of equipment as listed under Power Distribution. Each battery set is kept in a fully-charged state by a dedicated automatic battery charger supplied from the 115 V, 60 Hz supply.

There are seven battery banks in total, identified as A, B, C, D, E, F and G:

- A engine room, port side, frame 15 port main engine starter and control panel
- B engine room, stbd aft, frame 10 stbd main engine starter and control panel
- C engine room, port side, frame 14 port genset, No.1 starter and control panel
- D engine room, stbd aft, frame 10 stbd genset, No.2 starter and control panel

- E genset compartment, 01EZ1, aft bulkhead No.3 genset starter and control panel
- F external to genset compartment, aft bulkhead DC-1, 24 VDC distribution board
- G external to genset compartment, aft bulkhead DC-2, 24 VDC distribution board, for dist to DC-21 and DC-22
- H external to genset compartment, aft bulkhead GMDSS safety radio

Battery banks A and B are fitted with an emergency paralleling switch, and battery banks C and D are fitted with an emergency paralleling switch, which are used to cross-connect both main engines or both gensets when required. Cross connection between main engines and gensets is not provided.

The following is also applicable:

- a. Main Engine Starting. Main engines are electric start with no alternative starting system. Local control panels, the IPMS and engine warning systems also require 24 VDC to operate. The port main engine takes its power from the port side battery bank in the engine room and the stbd main engine takes its power from the stbd battery bank.
- b. Genset Starting. Numbers 1 and 2 gensets are 24 VDC electric start with no alternative starting system. No.3 genset is 24 VDC electric start and fitted with a manual, hydraulic starter.

## **MAJOR SHIPBOARD ARRANGEMENTS**

### **Complement**

The core ship's company complement is 20. Crew accommodation is provided in the form of one, two and three-person cabins for officers, senior sailors and junior sailors, as well as wardroom and combined mess/recreation areas, respectively. En-suite shower/toilets or adjacent personal washing facilities are provided for the crew while the CO is provided with dedicated day/ night cabin and en-suite wash and toilet facilities. There is also accommodation for 12 additional personnel in three, four person cabins fitted with ensuite facilities in 2G. The crew is made up as follows:

- a. the commanding officer,
- b. two officers,
- c. three non-commissioned officers, and
- d. 14 junior ratings.

### **Structural Closures and Tanks**

There are removable deck plates located throughout the ship, which are unbolted and lifted clear for the removal of large pieces of machinery that would otherwise not be possible.

### **Doors**

All external doors are classed as weatherproof. Weatherproof doors, hatches, and watertight bulkhead doors are fitted with a rubber gasket to ensure their watertightness. Internal doors are fitted for the purposes of privacy and ventilation air

balance only, and are therefore not fitted with gaskets. All WT openings are to be shut during pilotage, hours of darkness, during high-sea conditions and high-speed transits/pursuits. Four doors, which are often left in the open position, are fitted with electric releases that enable them to be remotely closed when an alarm is activated in that particular loop. These doors, all on 2 Deck are for the canteen, galley, scullery and the cool store.

### **Tanks**

Tanks are incorporated throughout the ship to hold fresh water, fuel oil, lubricants, and black and grey water. Each tank is fitted with a mechanical contents gauge and/or a sounding tube and others are fitted with high and/or low level electronic sensors that provide a signal for alarm purposes. Vents on the upper deck direct fumes and vapours to the atmosphere for personnel safety and the elimination of combustible mixtures.

### **Voids and Confined Spaces**

Voids are sealed (with hatch or manhole cover) unventilated compartments, which are not filled with liquids such as fuel or water, but can be used for stowage purposes.

### **Underwater Valves and Fittings**

Underwater valves and fittings are those which are either hull components or equipment attached to the hull, and are particularly important because servicing or maintenance of these items can generally be carried out when the ship is drydocked. Damage to or failure of these items during service creates considerable operational restrictions.

### **Masts and Superstructure**

The ship has one main mast, with its supporting superstructure between frames 22 and 23. It is fitted with spars and platforms to support navigation, communications and weather sensor equipment. A fwd jackstaff and aft ensign staff are fitted to fly their respective flags.

### **Firefighting**

Fires can be fought in the ship using the following:

- a. The Engine Room (ER) or genset compartment by the CO<sub>2</sub> drenching systems or with fire hoses connected to firemain hydrants, and/or hand-held extinguishers.
- b. There is a stand-alone CO<sub>2</sub> system in the galley that releases its gas charge from trunking above the deep fat fryer as well as a deep fat fryer Nobel K-5 system, which releases a wet chemical agent through a single nozzle that blankets the deep fat fryer to smother the fire.
- c. The bridge equipment compartment, lobby and bridge are protected by a Novec 1230 Fire Suppression System, which provides a structural fire protection boundary between these areas.

A main and/or emergency fire pump supplies seawater to the firemain and each is supplied electrical power from different switchboards.

### **Fire Detection**

Smoke, heat and gas sensors are fitted throughout the ship to provide the detection of fire, hot spots and the existence of abnormal gasses. These incidents are indicated on the fire and alarm indicator Panel and on the Fire Suppression mimic, which is displayed on the IPMS panels, located on the bridge, port side. An audible alarm also provides a simultaneous alert.

### **Tiedown Points**

Tiedown points in the form of load-bearing eyebolts are provided at suitable locations for stores handling, shipboard removal, repair and replacement machinery and other items. When not in use, the eyebolts are unscrewed and tie-down plugs are inserted in their place.

### **Anchors and Anchor Handling**

The ship is fitted with a bow anchor and chain that drops at the port side on 1 Deck. The Super High Holding Power Anchor is capable of holding the ship on a firm sand bottom in line with Classification Society Rules. Two anchors are carried on board, one in use attached to the anchor chain and a spare, which is secured to the foredeck. Anchoring equipment comprises anchor, anchor chain, swivel piece at anchor end of chain, chain stopper/roller tensioner, cable stops, and anchor and cable lashings, as required.

The anchor is deployed and recovered using an electrically-driven anchor-windlass/capstan combination, which is controlled locally by deadman-type, covered footswitch or pendant control with six metres of cable. The anchor-windlass winch head (gypsy) can be positively secured with a direct-acting, handwheel-operated band brake.

### **Docking and Towing**

The berthing facilities are sufficiently adequate in location, size and number to provide the capability of berthing to a pier, with spring and breast head and stern lines. The facilities also allow the ship to be secured to a buoy using the anchor chain. The combination anchor-windlass/capstan on the focsle and the capstan on the quarterdeck are provided to assist in berthing and towing. The anchor-windlass/capstan is capable of handling mooring lines through the fwd fairleads on the port and stbd sides, and handling towing gear through the fwd fairlead. The aft capstan can assist in handling towing gear aft through the aft fairlead. Bollards, four each on the port and stbd sides on 1 Deck, provide for berthing the ship, as well as the alongside mooring of sea boats, lighters and bunker boats. Fender tie-down points are fitted to handrail stanchions on 01 Deck in eight places.

### **Boats and Handling**

The ship is outfitted with two seaboats of the rigid-hull, inflatable type, located on 1 Deck, centred at frame 10. They use dedicated davits for launch and recovery. The seaboats are designed as a fast rescue boat. In that capacity, they are used as a crash boat during helicopter flying operations and for general rescue duties. They also serves as a general purpose boat for personnel and stores transfer and for other seamanship evolutions as required.

The seaboats are launched and recovered by davits that are fitted with local control consoles, aft of the unit, for winching and luffing functions. To launch the seaboat, the



davit winch lifts it clear of the cradle and then luffs down until the boat is afloat. Recovery is carried out in reverse order.

### **Stores Handling Crane**

**WARNING : THE CRANE IS NOT TO BE USED FOR THE MOVEMENT OF PERSONNEL.**

**WARNING : THE CRANE SHALL NOT BE DEPLOYED OR OPERATED IN HARBOUR IF THE FOLLOWING CONDITIONS ARE EXCEEDED:**

- a. BEAUFORT 2,
- b. SEA STATE 1,
- c. SEA CONDITIONS: SMALL WAVELETS, SHORT PRONOUNCED CRESTS WITH A GLOSSY APPEARANCE BUT DO NOT BREAK,
- d. WIND SPEED: NOT EXCEEDING 20 M/S,
- e. WAVE HEIGHT: 0.6,
- f. HEEL ANGLE: NOT TO EXCEED 5°, AND
- g. TRIM ANGLE: NOT TO EXCEED 2°.

A collapsible, extendable-boom, stores handling crane is located amidships at frame 12 for the manipulation of loads from ship to shore and vice-versa. The crane is hydraulically powered from the seaboat davits power unit and is operated from its local control panel via directional control valves or by remote pendant control for improved operator visibility. The crane has a lifting capacity of 520 kg at a 7 metre outreach and is equipped with automatic limiting and fail-safe devices to facilitate safe operation. Three fixed 250 kg safety working load (SWL) padeyes are provided at passage 1F to hoist stores inboard using an electric chain hoist.

### **Davits**

Davits are load-handling devices provided to raise and lower various loads. Davits are provided as follows:

a. Seaboat Davits. Each davit assembly incorporates a boat cradle and emergency operation system that allows safe launching of the boat when the ship is without electrical power, as well as a hydraulic hand pump on the hydraulic power unit for their recovery. Davits are arranged such that seaboats can be launched or recovered when the ship has a vessel in tow.

b. Portable Davit. A free-slewing, 125 kg SWL, portable davit can operate from either of these three locations, frame 42 on the port or stbd gunwhale or from the stbd-fwd inboard corner of 01 Deck superstructure. The lower part of its vertical member is inserted into a tubular mount and is able to swing through 360-degrees, providing a centre-of-lift with 1.35 metres of clearance from the ship's side, making it suitable for Man Overboard (MOB) recovery. It is fitted with a 250 kg SWL electric chain hoist with pendant control and a slewing lanyard. When not in use, the portable davit is stowed and clamped behind the breakwater on 1 Deck at frame 46.

c. Man Overboard Davit. See Safety Equipment paragraph below.

## **Replenishment**

The ship is equipped for light line transfer and Vertical Replenishment (VERTREP) at sea. Light line transfer can be exercised between two ships using hand hauling lines and VERTREP can be exercised from the air using helicopters. Replenishment capabilities are summarised as follows:

- a. VERTREP - is conducted by helicopter to deliver or collect solid cargo, to or from the ship while underway, and meets helicopter transfer requirements. VERTREP can be employed to the top of Sea State 5 conditions.
- b. Replenishment at Sea (RAS) - delivery or receipt of cargo, stores/provisions and/or ammunition, which is required to be transferred from one ship to another.

## **Safety Equipment**

- a. Two quick-release lifebuoys (rings) with Man Overboard Markers (MOM) attached are located on 02 Deck port and stbd at frame 24. Lifebuoys with lights are located on 1 Deck port side at frames 22 and 38 and one stbd at frame 22. Lifebuoys with lines are located on 1 Deck port and stbd side at frame 14 and another at frame 00. The MOM are day/night type, producing both smoke and light.
- b. A man over board (MOB) is recovered from the water by the SOW using either davit that swings outboard from its bulkhead stowed position from the port and stbd side on 1 Deck at frame 23. The davit is secured in its outboard position by a brace and clevis pin. The SOW's line is passed through a ratchet pulley at the inboard end and a plain pulley at the davit head. When the MOB is positioned under the davit, the person is secured in a helicopter recovery strop attached to the davit line, and is pulled aboard by ship's crew. The following equipment is provided for MOB recovery:
  - (1). port and stbd davit that, when rigged, can be freely observed from the port or stbd bridge wing,
  - (2) two recovery reels - one in each MOB locker next to the recovery davit,
  - (3) 90 m long swimmer's line of 10 mm plaited polyethylene (on recovery reel), and
  - (4) two helicopter recovery strops (Nowra) complete with 50 m length of 16 mm polyethylene recovery line.
- c. Jacobs ladders rigged at frames 15 and/or 25 on the port and stbd sides, provide another means for boarding the ship from the water.
- d. Four 25-person liferafts are located on 01 Deck at frame 35, two on the port side and two on the stbd. Each can be manually or hydrostatically released.

## **Entertainment**

The entertainment systems provide video and radio entertainment in the various recreational areas, wardroom and CO's cabin. Satellite TV, FM and shortwave radio reception is facilitated by receivers and associated antennas on 03 Deck. Digital and video media players provide for a variety of video and audio formats. TV and radio outlets are fitted in accommodation spaces.