PRINCIPLE CHARACTERISTICS

Vessel Name:	Commodore	Official Number:	1278588
Call Sign:	WDJ8167	MMSI Number	368013770
Mobile Phone		Vessel VHF Ch.	13
Flag:	USA	Port of Registry:	Atlantic Highlands, NJ
Year Built:	2018	Location:	Franklin, LA
Vessel Type:	Passenger	Passengers:	599
LOA:	45m	Breadth:	12m
Hull Type:	Aluminum	Draft:	6 ft.
GRT:	99	Gross ITC:	726
Propulsion:	Diesel	Brake Horsepower:	7500hp
Waterjets:	4 Kamewa S4-63	Generators:	John Deer 150Kw
Fuel Capacity:	4000 Gals	Fuel Consumption:	
Sewage Capacity:	700 Gals	Fresh H_2O Cap.:	500 Gal

Safety Management Certification	American Bureau of Shipping
Insurance Underwriter:	Marsh Marine
Passenger Seating	Tier 1: 243 Tier 2: 265 Tier 2 Exterior: 42 Tier 3: 130

CREW SIZE:			
Captain	1	Licensed Mate/ Sr. Deckhand	1
Engineer/Deckhand	1	Deckhand	3

1.0 General Description of the Vessel

1.0.1. Brief Description of Vessel

The vessel is designed as a twin-hulled, high-speed catamaran, of welded aluminum construction, for operation as a passenger ferry on short domestic commuter services. It has the capacity to carry passengers and crew. The twin hulls are designed for speed and stability. The vessel is capable of loading/unloading passengers at amidships doors port and starboard, and over the bow via a hydraulically operated heated (winter/icy conditions) bow passenger ramp.

1.0.2. Construction

Bridging structures providing a load-carrying platform connects the hulls. Each catamaran hull is divided into six watertight compartments and contains two propulsion engines, two water jets, one electrical generator, one fuel tank and auxiliary systems. The self-contained passenger superstructure is of welded aluminum. There are three passenger accommodation decks. The main Tier 1 passenger cabin is the main seating deck with seats for 243 passengers.

Access to the cabin from outside is through sliding doors amidships port and starboard. Tier 2 has seating for 265 passengers inside and 42 outside. Tier 2 is accessed via internal stairs forward in Tier 1 or either through internal stairs located immediately aft of the amidships passenger boarding doors port and starboard, or via external transverse aft stairs. Tier 3 is accessed via external longitudinal stairs from Tier 2 outside aft.

1.0.3. Propulsion

Engine rooms port and starboard are accessed via access doors located immediately aft of the amidships passenger boarding area port and starboard. Two MTU 12V4000 M64 main engines are installed in each engine room, each provide propulsion developing 1398 kW at 1800 rpm. The engine units are connected via Reintjes WVS730 gearboxes to KAMEWA 63S4 water jets.

2.0 Vessel Systems

2.0.1 Engine Systems

Two MTU 12V4000 M64 engines are mounted in each of the two engine rooms (two per hull). Power transmission is to a rigidly mounted Reintjes WVS730 horizontally offset / reduction gearbox though a Centa flexible torsional coupling.

The main engine exhaust is dry and discharges though the exhaust stacks located at the 3rd deck aft. The system is fitted with muffler. Hot sections of piping are insulated with approved high temperature fiberglass blankets.

Features:

- Four cycle design for quiet and fuel-efficient operation.
- Replaceable wet cylinder liners.
- Gallery cooled pistons.
- Engine mounted heat exchangers.
- Marine grade air filters with air inlet restriction.
- Water cooled exhaust manifold for reduced engine room temperatures
- Coolant block heaters.
- Engine room LCD display panel.
- Primary / Secondary fuel filter.
- Air intake system.
- Electronic governor.
- 24-volt starter.
- Exhaust bellows.
- Bridge console display.
- Monitoring system.

Each gearbox is supplied with:

- Rigid mounts.
- Oil cooler.
- PTO's for water jet hydraulics.
- Electric shift solenoid.
- Pressure and temperature senders.
- Torsional coupling.

Normal Starting Procedure (above 0°C)

- Place the marine gear in neutral
- Activate the start switch

- Pre-lube pump will run for (90 seconds) before the engine starts
- Engine oil pressure MUST be indicated on the gauge within 15 seconds after starting. If oil pressure is NOT registered in this time, shut off the engine immediately to avoid engine damage.
- Allow the engine to run at 500 - 1000 RPM for 4 - 5 minutes before engaging the load.
- During the next 10 - 15 minutes, or until the water temperature reaches 71- 74°C, operate at approximately 75% of governed RPM.
- Engine oil temperatures should normally read between 75°C and 94°C at full load. Any sudden increase on oil temperature not caused by load increase is a warning of possible mechanical failure and must be investigated immediately.

2.0.2 Propulsion Reduction Gears

The vessel is fitted with four Reintjes WVS730 reduction Gear boxes.

2.0.3 Propulsion System (Water Jets)

Water jet propulsion differs from conventional propeller systems. Maneuvering thrust is obtained by moving a reversing bucket and the steering nozzle of the jet unit. In this way thrust vectors can be obtained in all directions.

Water enters through the inlet duct. The bottom plate of the inlet duct is positioned flat against the hull of the boat. At low speeds, most of the water is sucked in, while at higher speed most of the water is pressed in. The pump is said to be operating at heavy or light load. Inside the inlet duct the speed of the water is reduced, causing the pressure to increase. There is a further increase in pressure by the impeller until the guide vanes in the guide vane chamber eliminate the rotation of the water flow. This maintains the energy generated by the rotation. The flow of water then accelerates via the guide vane chamber and out in to the air. It is the difference between the ingoing and outgoing speeds which generates thrust.

The ahead/astern movement of the vessel is controlled with the reversing bucket. This is infinitely variable between these three positions to obtain the speed and control needed for different maneuvers.

Main Components of the Water jet

- Reversing Bucket
- Steering Nozzle
- Guide Vane Chamber
- Impeller
- Steering Rod
- Impeller Housing
- Reversing Rod
- Inlet Duct
- Steering Cylinder
- Reversing Cylinder
- Inspection Hatch
- Anode Hatch
- Transom Flange
- Shaft Seal

1. Full ahead position: when driving full ahead, the reversing bucket is in its upper position - completely raised. The jet is now unaffected by the reversing bucket and thereby the maximum ahead thrust is achieved.
2. Zero thrust position: at the zero thrust position the reversing bucket deflects the major part of the jet in a forward / downward direction, while the remaining part of the jet passes unaffected. The forces are equal, and the vessel is neither moving ahead nor astern. Zero thrust is obtained when the reversing bucket is lowered about 70%.
3. Full astern position: at full astern position the reversing bucket fully deflects the jet in a forward / downward direction.

Function of the steering nozzle

The steering nozzles control sideways movement of the vessel.

There are three main positions with infinite variables in-between.

1. Full steering lock starboard: full steering lock starboard means that the steering nozzle is turned 30° to starboard side. Due to the deflection of the jet, a side force is generated which turns the boat to starboard.

2. Steering nozzle straight: when the steering nozzle is straight the jet is unaffected, which means that the vessel will move straight

ahead, or astern, depending on the position of the reversing bucket.

3. Full steering lock port: full steering lock to port side means that the jet is deflected to port and the generated side force turns the vessel to port.

The Control System

The KAMEWA CanMan Touch control system is a microprocessor-based remote-control system. This is used to control the steering nozzle and the reversing bucket of each water jet unit. The RPM of the main engines are also controlled by the KAMEWA control system.

The steering nozzle controls the port / starboard direction of flow from the water jet. The reversing bucket controls the ahead / astern direction and the engine speed controls the power of the water jet.

Maneuvering is performed from one of the three control stations (Central, port / starboard bridge wings) equipped with the necessary control device (thrust control levers, steering tiller, Joystick, and the control panel).

The control system also offers alarm handling and a control of the marine gear clutch.

2.0.4 Operation

Before Starting

Check the following before starting the engine and engaging the gear:

- Check that there is no oil or water leakage.
- Check the oil level in the hydraulic and oil lubrication pack.
- Check that the power supply to the control system is switched on.
- Check that no system warnings or no "Disconnected" alarms are indicated in the control panel.
- Before starting the engines, make sure that you follow the engine start-up procedures.

Starting

- Set the thrust levers in zero position.
- Check that the steering tiller is in the center position.
- Check that the gear is in neutral position.
- Check operation of steering and reversing bucket rams.
- Check follow-up of bucket and steering indicators.
- Start the engines.
- Maneuver the steering nozzle to both port and starboard, and the reversing bucket to ahead and astern, and check that the control of the water jet unit is working correctly.

NOTE: When engaging the gear, pay special attention to abnormal vibrations. If there is abnormal vibrations, the reason for this MUST be investigated and remedied otherwise the impeller and impeller housing will be damaged.

Stopping

- Set the steering tiller to center position and the thrust levers to zero position.
- Disengage the gear.
- Set the thrust lever to the "neutral" position.
- Stop the engine.
- Check that there is no oil or water leakage.
- Switch off the power supply to the control system.

Maneuvering from the control station

Maneuvering is performed from the control stations equipped with the two thrust control levers, steering tiller, and Joystick and control panel.

Thrust is controlled for each water jet unit by moving the corresponding lever handles ahead / astern. The thrust obtained corresponds to the direction and magnitude of the lever movement.

When the thrust lever is in "Zero" position the reversing bucket will be set to a position giving equal ahead and astern thrust, resulting in zero thrust.

Maneuvering Sideways

For maneuvering sideways to starboard, set the starboard thrust lever in astern position, and then maneuver the port thrust lever ahead to a position where the ahead thrust is balancing the astern thrust from the starboard water jet unit, keeping the vessel in place.

For maneuvering sideways to port, set the port thrust lever in astern position, and the starboard thrust lever in the ahead "balanced" position.

If more sideways force is required, increase the thrust lever position towards astern which then also requires an increase of the thrust lever set to ahead resulting in more side force.

While keeping the vessel in place by maneuvering the thrust lever, also keep the course of the vessel by maneuvering the steering tiller. The bow of the vessel will turn the same way as the steering tiller is moved, independent of going ahead or astern or maneuvering to port or starboard.

Rotation

Set the thrust levers to "zero" position. Move the steering tiller and the bow of the vessel will turn the same way as the steering tiller is moved. If more rotation force is required, increase the RPM, using the thrust levers.

Braking

Braking is very different from braking with a propeller vessel. Using the reversing bucket, which can be maneuvered from full ahead to full astern in 5 seconds, it is possible to apply astern thrust at the beginning of the braking sequence while the boat is still travelling ahead. This will give a shorter braking distance, but also very high braking force that has to be considered in order to avoid injury and / or material damage. Emergency braking should therefore only be used when necessary.

Emergency Braking

1. Set the lever to full astern.
2. Maintain full astern position until the vessel has slowed down (almost stopped).
3. Gradually decrease the thrust so that zero thrust is ordered when the vessel has stopped.

While braking, the steering characteristics of the vessel are changed and the boat becomes much more sensitive to steering tiller movements. Therefore, it is not recommended to steer the vessel except for keeping the course.

Slowing Down and Stopping

1. Gradually decrease the RPM until the vessel has slowed down.
2. When the vessel has reached low speed, set the levers in zero thrust position.
3. If required, apply a little astern thrust until the vessel comes to a complete stop.

Maneuvering by Joystick

The joystick function simplifies maneuvering by offering a single lever control, combining the commands to all water jets. Turning the lever-knob can also rotate the vessel.

1. Push-button "Joystick On/Off'
2. Indication lamp "Joystick in Command"
3. Indication lamp "Joystick failure"

The joystick is activated by means of pressing the "Joy Stick Request Button". The gray indication on the display indicate when the joystick is in "command". Red indication dots indicate joystick failure, which means that there is a failure of the joystick control electronics or that one (or more) of the water jet units are not available for the joystick control, due to "jet-failure", "clutch out" or "engine stopped."

Fore and Aft (ahead and astern) Movements

Along ship movements are obtained by moving the lever ahead / astern (direction 00 or 180°). The thrust generated is dependent on the magnitude of the lever movement. For smaller lever movements the system will work only with the position of the reversing buckets, but if more thrust is ordered also the engine speed will be raised.

Transverse Movements

To move the vessel in the starboard direction, the handle is moved towards starboard (direction 900). The thrust generated is dependent on the Magnitude of the lever movement. In order to

achieve the desired thrust, starboard water jet unit is turned inwards and reversed, while the port unit is kept at zero angle, or given a small angle. The thrust of the port water jet unit is balanced to the starboard water jet unit in order to give along ship thrust, and the water jet unit angles are selected to give zero turning moment.

Rotation

Clockwise Rotation

For pure rotation (no transverse or along ship movements ordered), the nozzles are turned maximum 30. For a clockwise turn, the starboard water jet unit is given thrust in the ahead direction and the port water jet unit in the astern direction. The magnitude of the thrusts are controlled with the turning knob and balanced in order to achieve zero Along ship thrust. For a counter clockwise turn, the thrust directions are reversed.

Transferring Stations

If the vessel is equipped with more than one control station, it is possible to switch the control between stations.

At the control station to which the control is being transferred, push the "Station Request" button. This control station is now in command and the "STATION IN COMMAND" indication is lit at this station. This station alone has control over the thrust commands and most functions found on the control panels. The station may have command over other systems (for instance tunnel thrusters) that follow the same manoeuvre responsibility as the waterjet control system. The alarm indications however will always work at all stations.

Clutch Control

Normal clutch in/out can be operated from any station in command with the throttles in neutral.

1. **Engage the clutch**

1.1 From the main screen you press on Harbor Panel.
1.2 When the harbor panel screen opens clutch in when available will be lit green and clutch out will be gray for each jet icon.

1.3 Press on the clutch in icon for each jet, they will be grey after you do so. They are now clutched in. (And the clutch out will be green)

The clutch control function gives "clutch in" and "clutch out" orders to the clutch via closing contacts. As long as no engine clutches are engaged on the shaft. No engine force is transferred to the water jet.

Clutch reverse: Button to change direction of the impeller. To activate the reverse button, the engine must run at idle rpm, and the clutch must have been clutched out, if applicable.

1.4 Set the control lever in zero position
1.5 In the primary control panel push on any image of the jet and all 4 controls will pop up.
1.6 Press and hold reverse clutch on the jet you want to flush. (you will not be able to increase the rpms on the jet you are flushing.)

Note: It is a good practice to clutch out the jet directly next to the jet that has debris in it, so if debris comes out of the one jet it doesn't go in the next one.

Alarm Handling and Fault Detection

The control system offers supervision of analogue input / output signals, checks the steering and reversing gear for the remaining control error, and also performs continuous self-testing. The remote control indicates an alarm handling system based on "fail to safe" principle. If a failure is detected the indication lamp "disconnected". Simultaneously when the control failure is detected, the faulty water jet unit is automatically taken to a fail-safe mode. The steering nozzle and reversing bucket is blocked in actual position by electronically disconnecting the hydraulic control valve(s) and the engine RPM is set to idle.

When the failure no longer exists, the indication lamp "reconnect enable" (2) is lit and the system can be reconnected by pushing the button "reconnect" (4). When the button is pushed, the system will return to normal operation.

Using the Back-up System

As a complement to the main system there is also a back-up system to be used if there is a failure in the main control system. The back-up system is electrically separated from the main system and has its own power supply. The back-up system is of "non follow up" type and controls the reversing bucket and the steering nozzle by direct activation of the hydraulic control valve. Also main engine RPM clutch "IN" and "OUT" can be controlled by the back-up system. If back-up control is included a back-up panel is added on one control station, normally the main control station.

Indication Touch Panel

1. Indication of reversing bucket position
2. Dimmer switch
3. Indication of steering nozzle position

The indication system continuously indicates (on each control station) the actual steering nozzle and reversing bucket positions. The positions are shown with digitally. The indicators show the position of the reversing bucket and shows the position of the steering nozzle.

As long as the main control system is in operation the indication is used more or less only to see that the water jet units are responding. However if maneuvering the water jet unit with the back-up system, which is of "non follow up" type, the indication is necessary in order to see the positions of the steering nozzle and the reversing bucket.

The alarm panel is installed at the main control station.

Alarm Panel

The alarm panel is installed on one control station, normally the main control station, one panel per water jet (2) The panel is illuminated and of water protected design.

MAIN CONTROL SYSTEM FAILURE
BACK-UP & INDICATION FAILURE

1. Push-button "Test"
2. Push-button "Reset"

CONTROL FAILURE
BACK-UP FAILURE

JOYSTICK FAILURE
EARTH FAULT
LOW HYDRAULIC PRESSURE
HIGH TEMPATURE
LOW OIL LEVEL
LOW OIL FLOW
LOW L/O PRESSURE
DC OK SYSTEM A
DC OK SYSTEM B

An alarm will remain even if the fault is eliminated, until reset is made. If the failure still remains (when reset is pushed) the alarm light will go over to steady light. The steady light will remain as long as the fault remains.

Functional test

The alarm panel is equipped with the push-button "TEST"
Upon activation of this all alarm inputs are activated. The alarms will illuminate. The alarm test is reset by means of the push-button "RESET".

Operation in Shallow Water

Avoid driving at high engine speed in shallow waters especially when reversing since the jet of water will move up sand etc. from the bottom, therefore sand and stones can be sucked through the water jet unit. This may cause wear to the impeller and guide vane chamber.

Do not accelerate heavily in shallow waters. Stones and sand etc. may be sucked into the water jet unit and cause wear to the impeller and the guide vane chamber.

Drive at idling speed until deeper water is reached. If a foreign object is sucked into the inlet duct temporarily disengage the water jet unit to remove the object. See 2.2.2.21 for instruction on removing an obstruction in the water jet unit.

Run Aground Checklist

Warning!

Remove the start key and shut off the power using the main switch to make it impossible to start the engine.

Checklist:

- Check that there are no water leaks.
- Check if there are any scrap, stones, seaweed etc. in the water jet unit by opening the inspection hatch. If necessary the anode hatch may be opened too.

Warning!

Never open the inspection hatch or the anode hatch before checking that the water level is lower than the hatch openings. The vessel may sink if water can enter through the opening. Never leave an opened hatch unattended.

Inspection hatch

When starting the engine again:

- Engage the gear and check that there are no abnormal vibrations in the shaft and hull.
- Move the steering nozzle from side to side between the limit positions. Check for abnormal noises from the steering gear.
- Move the reversing bucket up and down. Check for abnormal noises.

Operating through Flotsam and Seaweed

Scrap, twigs, seaweed etc. will not usually block or damage the water jet unit. However, avoid operating over such objects because they affect the performance of the water jet unit.

It is usually possible to notice when the water jet unit is blocked because:

- engine speed increases,
- the speed of the boat decreases,
- Abnormal sounds and vibrations can be heard from the water jet unit.

Caution!

If fishing nets or lines are sucked into the water jet unit, the water jet unit must be disengaged as quickly as possible to avoid damage to the impeller and impeller housing!

Removing an obstruction on the water jet unit

If a blockage of the water jet unit occurs:

1. Reduce the engine speed to idling speed or disengage it. The blockage may clear when the boat goes forward and water flows through the water jet unit. If this is not successful:

2. The blocked water jet unit, which must be disengaged and the bucket placed in the ahead position. Reverse the vessel backing into the seas to push the water through the clogged jet to dislodge debris.

3. If step 2 above was not successful, the next step is to open the inspection hatch. Before the inspection hatch is opened:

   a) Switch off the engines.

      Remove the start key and shut off the power using the main switch to make it impossible to start the engine!

   b) Check that the water level is not above the inspection hatch. If the water level is too high, weight can be added to the bow so that the stern rises sufficiently for the inspection hatch to be opened.

      Never open the inspection hatch or the anode hatch without first checking that the water level is lower than the hatch openings. The vessel may sink if water can enter the vessel through the opening. Never leave an opened hatch unattended.

   c) If the above steps have not removed the blockage, let a diver remove the scrap from the inlet duct or contact a Kamewa workshop.

Operating in Heavy Seas

When operating in heavy seas note that engine speed may vary as the impeller sucks in air. When the impeller sucks in air, drive and maneuvering force are reduced. Engine speed should be reduced until engine speed and drive force are stable.

Emergency Operation

Operation in the event of Electrical Failure

If an electrical failure in the main control system should occur and cannot be repaired, the vessel can be operated by the back-up system to the nearest harbor for service.

Manual control of the hydraulic control valves

If the back-up system is operable, the hydraulic control valves can be operated manually.

To steer the boat:

1. To turn the vessel to port, activate the lever on the right side of the control valve V10.

2. To turn to starboard, activate the lever on the left side of the control valve V10.

To slow down or speed up:

1. To slow down or to brake the vessel, activate the lever on the left side of the control valve Vii.
2. To speed up the vessel, activate the lever on the right side of the control valve Vii.

Operating in the event of a hydraulic fault

If there is no hydraulic oil available due to leakage or some other reason that water jet is not operable. Use the other engines to maneuver vessel to the nearest harbor for service.

Reversing Bucket Uncontrollable

If the reversing bucket is uncontrollable but the vessel is still steerable, you may operate the vessel to the nearest harbor with the reversing bucket tied up.

The bucket is tied up as follows:

1. Remove the screws retaining the reversing rods in the reversing bucket. When tied up it should be in ahead position and should not obstruct the jet of water.

2. Operate the vessel at reduced speed to the nearest harbor. Use the throttle lever to increase / reduce thrust.

3. Use the reversing buckets that are in working order to slow down the vessel. Remember that the braking capacity is reduced.

Steering Control Loss

Emergency Steps:

1. If any of the water jet units are in working order, disconnect the faulty water jet unit(s) in the control panel (if not already disconnected). Operate the vessel with the other water jet(s) unit to the nearest harbor. Let a Kamewa workshop investigate and repair the fault.

2. If all water jet units are not operable, call for assistance and tow the vessel to the nearest harbor. Let a Kamewa workshop investigate and repair the fault.

   a) Push-button "Joystick On/Off'
   b) Indication lamp "Joystick in cmd"
   c) Indication lamp "Joystick failure"

   The lamp indicates joystick failure, which means that there is a failure of the joystick control electronics or that one or more jets are not available for joystick control, due to "jet failure", "clutch out" or "engine stopped".

3.0 Auxiliary Systems

3.0.1 Fuel System

The vessel is fitted with 2 x 2000 US gallon fuel tanks, one per hull. The filling of each tank is through a 2" cam lock cap above the main deck. Each tank has a 2" vent lead fitted with a vent / ball check and Scully whistle. Filling and venting pipes are made of aluminum. A valve with plug is fitted at the bottom of each tank for sludge removal.

Fuel tank suctions are fitted near the bottom of each tank. Shut-off valves are also fitted on the tanks, the valves being fitted with manual remote actuators enabling them to be shut off from the main deck in the event of fire. Fuel return connections are fitted at the tops of the tanks. Each tank is fitted with a Petro meter-type fuel sounding device located in the adjacent electrical room.

The fuel supply and return flexible connections to all engines are made with USCG-approved wire braided hose. Fuel supply and return for all engines is made of stainless steel pipe. The main engines fuel supplies have water separating Racor primary filters and secondary on engine and off engine particle fuel filters provided by MTU.

The generator engines are fitted with a Racor filter as the primary fuel filter, and John Deere filters as the secondary. Valves are installed before and after the fuel filters to facilitate filter changes.

3.0.2 Air Conditioning System

The vessel is fitted with an air-cooled air conditioning system with a capacity of 68 tons cooling for the interior cabins, consisting of Daiken VRV system 2 X 12 Ton 2 X 14 Ton 2 x 8 Ton 3-phase units, mounted on the 3rd deck aft of the wheelhouse. Two Daiken VRV Mini split systems with 8 tons is supplied for the cooling / heating of the bridge. A central control panel is located in the bridge with temperature regulators for each zone, with the controller sensing return air at each air mover. A vent fan is also fitted in each of the toilets.

3.0.3 Sewage System

The installed system meets the requirements of the USCG. Toilet flushing water is provided by a potable water system. This system is supplied with a 500 US gallon holding tank, pressure set, water heater providing hot and cold water to each toilet sink, and bar sink. One 700 US gallon aluminum holding tank is fitted in stbd hull to collect sewage, with the pump out connection located on the aft deck.

Head Hunter electric flush porcelain elongated toilets are fitted. Sinks and deck drains discharge overboard or into the sewage tank.

3.0.4 Bilge System

The vessel has a submersible bilge pump located in each compartment. The engine spaces contain 2 pumps per hull. The required two bilge pump redundancy is provided by the portable auxiliary bilge pump located in the port electrical closet on the main deck. The submersible pumps are controlled by the main electrical distribution panel located on the bridge.

A bilge alarm switch is fitted in each compartment required. A Power Panels alarm panel is installed on the bridge to indicate high water with a beeper and LED for each space with a switch.

3.0.5 Fresh Water System

The fresh water system is supplied with a 500 US gallon holding tank, pressure set, water heater providing hot and cold water to each toilet sink, and bar sink. The tank is mounted in the port jet room compartment located in the port hull of each vessel. The Main electrical breaker is located in the port engine room with a sub switch located at the pump next to the tank. The system also has an inline water filter which is to be serviced on a monthly basis.

3.0.6 Compressed Air System

A 2 hp electric driven air compressor is fitted, with adequate capacity to supply compressed air to the horn, and is supplied with the required receivers, piping, valves, regulators, and switches.

4.0 Electrical System

4.0.1 Main Generators

Two marine John Deere 6068T generator sets, each with a capacity of 150kW are installed in the engine rooms, providing AC 120/208 volt 60 cycle three-phase power to the vessel. A start / stop and

gauge panel are installed near the generator to display oil pressures, water temperature, charging voltage and engine hours. A system is provided to shut down the engine in the temperature or low oil pressure.

Each generator is supplied with:

- Dry exhaust
- Coolant heater
- 24-volt starter
- Engine vibration mounts
- Aluminum drip pan
- Lube oil filter
- Fuel filter
- Electronic governor
- Gauge panels at engines and monitoring in port electrical closet and bridge
- Start / Stop circuits at engines and transfer panel
- Low oil pressure shutdown
- High water temperature shutdown
- USCG-approved generator and fuel systems
- Belt guards
- Bridge panel with run light
- Automatic shutdown in the event of high coolant temp, Overspeed, low oil pressure, and low frequency

4.0.2 Power Distribution System

Distribution panels are located as follows:

- 1x port engine room.
- 2 x starboard engine room.
- 1 x bridge.
- 1 x starboard electrical closet.
- 3 x port electrical closet (1X HVAC)
- 1 x main switch board in Starboard electrical room

Metering for generators is provided in the form of voltmeters, ammeters and frequency meters as required by the USCG. A 100 AMP shore power receptacle is supplied.

A dedicated 24-volt ship's service system consisting of two gel cell, 12-volt batteries, supply running lights, wipers, horn and electronics. A ship's service distribution panel is installed in the wheelhouse. The system is charged from a 24-volt multi-bank battery charger. 12 volts is supplied to some electronics through a 24 to 12-volt step-