1. Control panels

Operation of the vessel is supported by two physical control panels:

- the domestic panel provides instrumentation and control of all house functions and enables/disables...
- the helm panel which provides instrumentation and control of the ship's navigation and technical installations.

In addition, a number of virtual interfaces and controls are implemented by the ship's Signal K server are made available on the vessel's LAN.

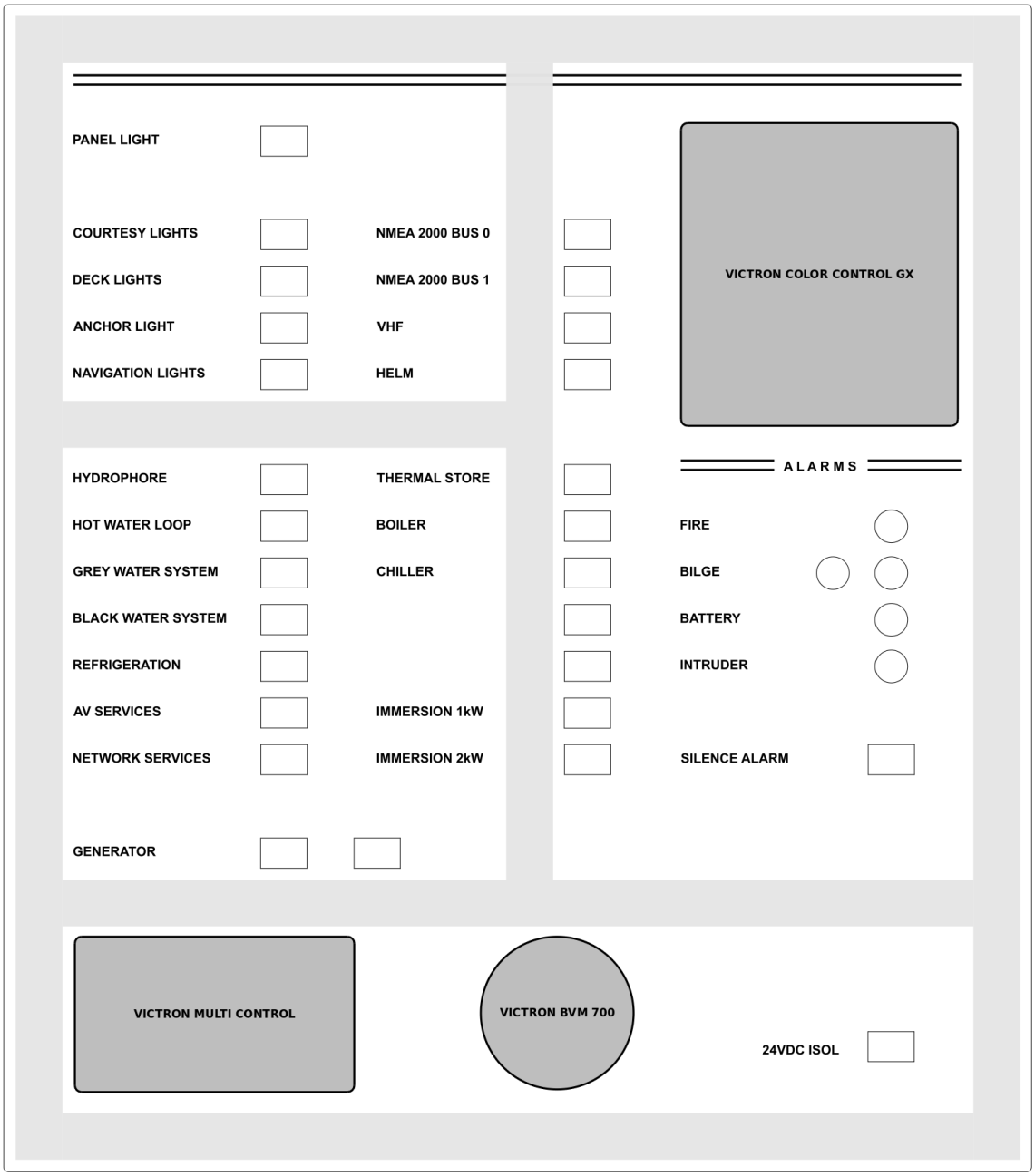
1.1. Physical control panels

1.1.1. Domestic panel

See ??? for an electrical schematic.

The domestic panel, located in the lower companionway, is the ship's primary control panel bringing together all of the ship's 'house management' functions and providing controls for enabling and disabling most of vessel's systems. For most controls to actually do anything NMEA BUS 0 must be enabled.

Figure 1. Domestic panel layout



1.1.1.1. Instruments and control panels

The domestic panel incorporates three sub-panels concerned primarily with the ship's electrical power systems.[1]

Refer to the manufacturer's user manuals for information on the operation of these devices.

1.1.1.2. Indicator and switch controls

1.1.1.2.1. Indicators

All indicators on the domestic panel reflect the state of helm alarm system channels.

[1]The Color Control GX is also able to display tank level information.

FIRE

Illuminates to indicate that a fire alarm signal is active. Consult the fire alarm panel to determine the source of the alarm.

BILGE

The left-hand indicator Illuminates when the engine room bilge pump is running. The right-hand indicator illuminates when the main compartment bilge pump is running.

BATTERY

Illuminates when the battery management system reports low voltage on the domestic battery bank.

INTRUDER

Illuminates when the intruder alarm is triggered. Consult the intruder alarm panel to determine the source of the alarm.

1.1.1.2.2. Switch controls

PANEL LIGHT (OFF-ON)

Operates the domestic panel back-lighting. The back-lighting can be dimmed at the helm.

COURTESY LIGHTS (OFF-ON)

Operates the side-deck courtesy lights.

DECK LIGHTS (OFF-ON)

Operates the fore-deck work lights.

ANCHOR LIGHT (OFF-ON)

Operates the anchor light.

NAVIGATION LIGHTS (OFF-ON)

Operates the port-side, starboard-side, stern and steaming lights.

HYDROPHORE (OFF-ON)

Operates the pressurised water system.

HOT WATER LOOP (OFF-ON)

Enables the hot-water loop. The hot-water loop is operated by an intelligent pump and once enabled will take some time to learn the domestic hot-water usage pattern.

GREY WATER SYSTEM (OFF-ON)

(unused)

BLACK WATER SYSTEM (OFF-ON)

(unused)

REFRIGERATION (OFF-ON)

Operates the refrigerator and freezer.

AV SERVICES (OFF-ON)

Operates the satellite receiver and DLNA file server.

NETWORK SERVICES (OFF-ON)

Operates the network switch, file server and mapping system.

GENERATOR (2 SWITCHES (OFF-ON))

These controls are only active if the generator control panel is in AUTO mode. In which case:

The left-hand switch starts the generator. The right-hand switch transfers generator control to the Victron Color Control GX battery management system so that a low-voltage alarm will automatically start the generator.

NMEA 2000 BUS 0 (OFF-ON)

Operates the NMEA 2000 BUS 0 power supply. BUS 0 is the ship's 'domestic bus' and must be on for the operation of most domestic controls, instrumentation and services.

NMEA 2000 BUS 1 (OFF-ON)

Operates the NMEA 2000 BUS 1 power supply. BUS 1 is the ship's 'navigation bus' and must be on for the operation of most navigation controls, instrumentation and services.

VHF (OFF-ON)

Enables the ship's VHF services which include the main VHF and AIS transceivers.

HELM (OFF-ON)

Enables the ship's helm panel. Most helm controls will only operate if this switch is ON.

THERMAL STORE (OFF-ON)

Enables the ship's domestic hot water system.

BOILER (OFF-ON)

Enables the ship's diesel boiler. Note that the boiler will only operate if channel 1 (space heating) or channel 2 (hot water) of the galley timer control are ON.

CHILLER (OFF-ON)

Enables the ship's chiller system. Note that the chiller will only operate if the galley chiller control panel is set appropriately.

IMMERSION 1KW (OFF-ON)

Operates the thermal stores upper immersion heater.

IMMERSION 2KW (OFF-ON)

Operates the thermal stores lower immersion heater.

SILENCE ALARM (OFF-(CANCEL))

Cancels the audible component of the helm alarm system annunciator. The visual component of the alarm annunciator will continue to operate until the alarm condition is cleared.

24VDC ISOL (OFF-(OPERATE))

Operates the change-over solenoid on the DC system non-essential services master switch.

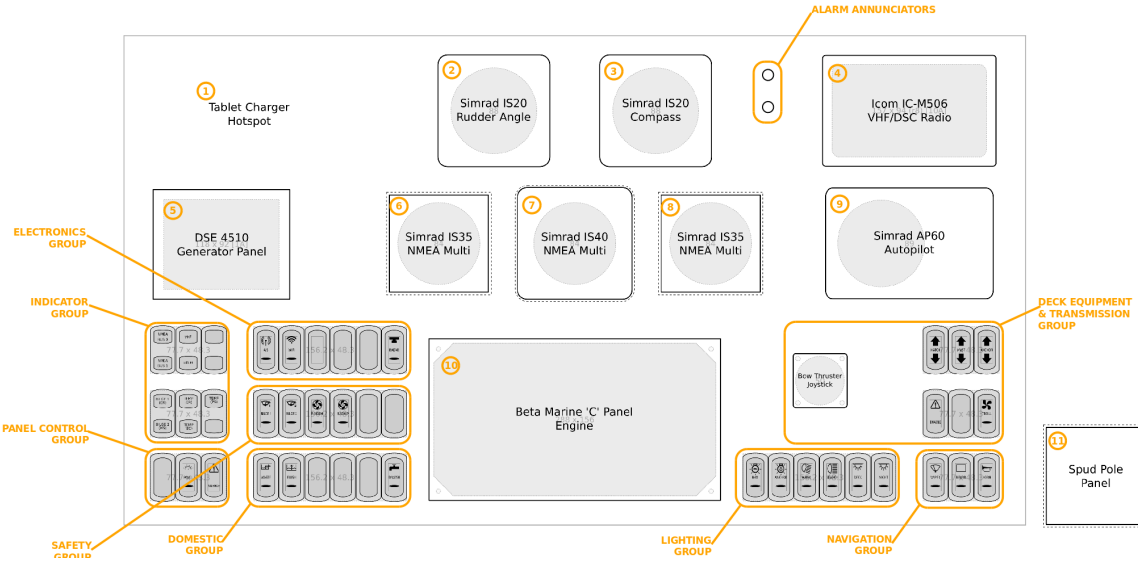
1.1.2. Helm panel

The helm panel (see Figure 2, “Helm panel”) brings together important controls and instrumentation mainly concerned with navigation of the vessel.

The helm panel is incrementally enabled by four domestic panel controls **HELM**, **NMEA BUS 0**[2], **NMEA BUS 1** and **VHF**[3]which must all be switched ON for the helm panel to be fully functional.

Non-navigation and safety features (including a multi-channel alarm system which alerts a range of critical operating conditions) of the helm panel are available at all times irrespective of the state of domestic panel controls.

Figure 2. Helm panel



1.1.2.1. Helm alarm system

The alarm system has ten input channels. A signal on any channel will trigger an audible and visual signals at the alarm annunciator; the audible component of an alarm can be cancelled by operating the SILENCE control (the visual alarm component will remain active until the fault or safety condition which triggered the alarm is removed).

Channel	Name	Meaning
1	Engine compartment bilge emergency level	Either the bilge pump is switched off or inundation is beyond the capacity of the bilge pump.
2	Main compartment bilge emergency level	Either the bilge pump is switched off or inundation is beyond the capacity of the bilge pump.
3	Engine compartment bilge pump operating	The bilge pump has been started either by the float switch or by manual operation of the helm control.
4	Main compartment bilge pump failure	The bilge pump has been started either by the float switch or by manual operation of the helm control.
5	Waste discharge pump operating	The waste discharge pump has been started either automatically or by manual operation of the helm control.
6	Domestic battery bank low	The battery controller at the domestic panel has signalled a low-voltage alarm for the domestic battery bank. This alarm signal may be accompanied by an automatic generator start.

[2]Only required for access to tank level data
[3]Required for operation of the main VHF radio

Channel	Name	Meaning
7	Fire alarm active	The fire alarm system has been triggered.
8	Intruder alarm active	The intruder alarm system has been triggered.
9	(unused)	
10	(unused)	

1.1.2.2. Instruments and control panels

The ship's helm panel is the primary location for navigation instrumentation and control and incorporates switches, indicators (both described below) and the following discrete instruments and control panels.

Ref	Instrument	Type	Domestic panel control dependency	Data connections	Default configuration
1	Tablet induction charger		None		
2	Multi display	Simrad IS40	HELM, NMEA BUS 1, NMEA BUS 0 (optional)	NMEA 2000	Depth/log/ temperature
3	Multi display	Simrad IS40	HELM, NMEA BUS 1, NMEA BUS 0 (optional)	NMEA 2000	Compass
4	VHF transceiver	Icom M506	When VHF enabled	NMEA 2000	
5	Generator control	DSE 4510	Always	Ethernet	
6	Multi display	Simrad IS35	HELM, NMEA BUS 1, NMEA BUS 0 (optional)	NMEA 2000	Tank levels
7	Multi display	Simrad IS40	HELM, NMEA BUS 1, NMEA BUS 0 (optional)	NMEA 2000	Rudder
8	Multi display	Simrad IS35	HELM, NMEA BUS 1, NMEA BUS 0 (optional)	NMEA 2000	Autopilot auxiliary
9	Autopilot control	Simrad AP60	HELM, NMEA BUS 1, NMEA BUS 0 (optional)	NMEA 2000	
10	Engine control	Beta Marine 'C'	Always	(none)	
11	Spud control		Always	(none)	

Refer to the manufacturer's user manuals for information on the operation of these devices.

1.1.2.3. Indicator and switch controls

The helm panel indicators and switches are water resistant, multi-function, industrial devices rated for 24VDC operation at up to 30A. Background and function illumination is by LED.

Some of the panel switches handle operating currents (for example the windscreen-wiper switch), but the majority switch a signal in the mA range sufficient to operate an NMEA 2000 switch bank interface or, occasionally, a remote relay.

1.1.2.3.1. Indicators

Carling VP series, two-segment, LED indicators are used throughout.

NMEA0 / NMEA1

The upper indicator segment illuminates when NMEA BUS 0 is powered.

The lower indicator segment illuminates when NMEA BUS 1 is powered.

The ship's NMEA buses are switched at the domestic panel and for navigational use of the helm use both indicator segments should be lit.

VHF / HELM

The upper indicator segment illuminates when VHF systems are enabled (this includes the ship's primary maritime VHF transceiver and the vessel's AIS transponder).

The lower indicator segment illuminates when the helm panel is enabled.

The ship's VHF systems and the helm panel are switched at the domestic panel and for navigational use of the helm both indicator segments should be lit.

BILGE 1 (ER) / BILGE 2 (MS)

The upper indicator segment illuminates when either the engine compartment bilge system is disabled or the engine room bilge pump is running.

The lower indicator segment illuminates when either the main compartment bilge system is disabled or the main compartment bilge pump is running.

TEMP (ER) / TEMP (BC)

The upper indicator segment illuminates when the engine compartment temperature exceeds 30C.

The lower indicator segment illuminates when the battery compartment temperature exceeds 30C.

WASTE PUMP / (not used)

The upper indicator segment illuminates when the waste discharge pump is running.

1.1.2.3.2. Switches

Carling L series switches are used throughout.

The switches used in the helm panel are either two-state (single-throw) or three-state (double throw). Two state switches adopt the European convention that the 'up' position is the 'off' state and the other position signals some type of 'on'-ness. Three position switches adopt the 'up is off' convention where possible, but there are a number of situations where this principle cannot apply.

The notation used in this section to describe a two position switch is (*upState-downState*) and a three position switch (*upState-midState-downState*). If a switch position is momentary (i.e. the switch must be held in position by finger pressure), then this position is indicated in parentheses: for example (*upState*-(*downState*)).

1.1.2.3.2.1. Deck equipment & transmission group

These controls are concerned with heavy equipment under hydraulic operation and with change of transmission mode of operation.

For safety reasons, the **ENABLE** control must be switched on before other controls in this group will operate.

All of the controls in this group with the exception of the bow-thruster joystick are available on a hand-held deck remote control.

ANCHOR ((UP)-STOP-(DOWN))

Raises and lowers the anchor. The anchor must be released and the winch engaged before operating this control.

ENABLE (OFF-ENABLE)

In the ON position the other controls in this group together with the bow-thruster joystick are enabled.

HATCH ((OPEN)-STOP-(CLOSE))

Opens and closes the fore-deck hatch. The hatch must be unlocked before operating this control.

MAST ((UP)-STOP-(DOWN))

Raises and lowers the mast. The mast guys must be released before operating this control.

TROLL (OFF-ON)

In the ON position the transmission is switched to trolling mode, restricting the propeller revolutions for slow speed maneuvering.

1.1.2.3.2.2. Domestic group

These controls are concerned with operation of some domestic systems.

D.WASH (OFF-ON)

In the ON position the aft deck-wash raw-water pump is enabled.

FLUSH (OFF-ON)

In the ON position the sewage holding tank will be automatically flushed with raw water when waste discharge completes.

WASTE (OFF-AUTO-ON)

In the AUTO position the sewage holding tank will be automatically discharged when it reaches the alert capacity set in the ship's Signal K system. If this mode is selected then the holding tank discharge valve and sea-cock must be left open.

In the ON position the sewage discharge pump will operate. Before selecting this mode, the holding tank discharge valve and sea-cock must be open.

1.1.2.3.2.3. Electronics group

These controls operate auxiliary electronic equipment supporting navigation.

AIS (OFF-RECV-TRANSMIT)

In the RECV position the ship's AIS transceiver will receive data from other stations, but will not broadcast this ship's position.

In the TRANSMIT position the transceiver will both receive and transmit AIS data.

RADAR (OFF-ON)

In the ON position the ship's radar is powered up.

WIFI (OFF-ON)

In the ON position the ship's external WiFi gateway is powered up. The gateway provides a high-gain antenna for accessing external WiFi hot-spots and a local wireless hub which supports, amongst other things, VoIP communication for deck crew.

1.1.2.3.2.4. Lighting group

These controls are concerned with operation of lights associated with navigation.

NAV (OFF-ON)

In the ON position the ship's navigation lights (steaming light, stern light, port and starboard lights) are illuminated.

ANCHOR (OFF-ON)

In the ON position the ship's anchor light is illuminated.

WORK (OFF-ON)

In the ON position the ship's work lights (covering the fore-deck) are illuminated.

SEARCH (OFF-ON)

In the ON position the ship's searchlight connection socket is powered.

DECK (OFF-ON)

In the ON position the ship's courtesy lights are illuminated.


NIGHT (OFF-ON)

In the ON position the ship's red wheelhouse night lighting is illuminated.

1.1.2.3.2.5. Navigation group


WIPER (OFF-ON-(MODE))

In the ON position the windscreen wiper(s) operate. The operating speed and the screen wash are selected by the MODE position. Refer to the windscreen wiper controller manual for more information.


BOARD (OFF-ON)

In the ON position the ship's blue board is displayed (moved to its vertical position); in the OFF position the board is restored to its horizontal parking position.


HORN (OFF-(ON))

In the ON position the ship's horn sounds for the duration the switch is operated.

1.1.2.3.2.6. Panel control group

These controls are concerned with modifying the operation of the helm panel itself.


PANEL ((UP)-OFF-(DOWN)

In the UP position panel background illumination is increased; in the DOWN position panel illumination is decreased.


SILENCE (OFF-(SILENCE))

The SILENCE position cancels the audible component of any active alarm conditions. Note that the alarm indicator lamp will remain illuminated until the cause of the alarm condition is cleared and that any new alarm conditions will cause the audible alarm to sound again).

1.1.2.3.2.7. Safety group

These controls are concerned with operation of environmental safety systems.


BILGE 1 (OFF-AUTO-ON)

This control operates the engine compartment bilge system and should normally be left in the AUTO position. The bilge system is integrated into the ship's helm alarm system and operation of this control may trigger an alert.

In the AUTO position the engine compartment bilge pump will be operated by the system float switch.

In the ON position the engine compartment bilge pump will run continuously.

BILGE 2 (OFF-AUTO-ON)

This control operates the main compartment bilge system and should normally be left in the AUTO position. The bilge system is integrated into the ship's helm alarm system and operation of this control may trigger an alert.

In the AUTO position the main compartment bilge pump will be operated by the system float switch.

In the ON position the main compartment bilge pump will run continuously.

E.ROOM (OFF-AUTO-ON)

This control operates the engine room ventilation system and should normally be left in the AUTO position.

In the AUTO position the engine room ventilation system will operate when the engine room temperature exceeds the set point on the engine room thermostat.

In the ON position the engine room ventilation system will run continuously.

B.COMP (OFF-AUTO-ON)

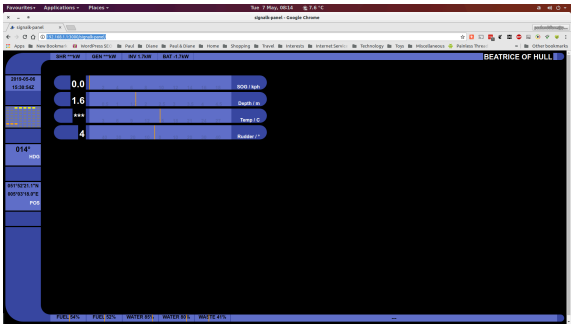
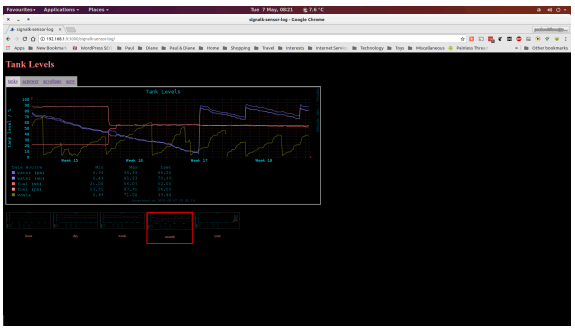
This control operates the battery compartment ventilation system and should normally be left in the AUTO position.

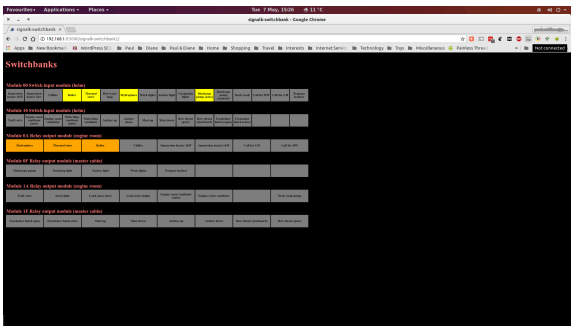
In the AUTO position the battery compartment ventilation system will operate when the battery compartment temperature exceeds the set point on the battery compartment thermostat.

In the ON position the battery compartment ventilation system will run continuously.

1.2. Logical control panels

A number of logical control panels are implemented as Signal K server plug-ins.

Signalk Panel (http://192.168.1.1:3000/signalk-panel/) is a simple integrated instrument panel displaying house and navigation data.	
Signalk Log Viewer (http://192.168.1.1:3000/signalk-log-viewer/) is a viewer for data logged by the `signalk-log-viewer` plug-in.	

Signalk Switchbank (http://192.168.1.1:3000/signalk-switchbank/) visualises the state of NMEA 2000 switch bank input and output channels defined by the `signalk-switchbank` plug-in.	
Freeboard-sk (http://192.168.1.1:3000/freebaord-sk/) chart plotter.