

# BERTRAM 700

## OWNER'S MANUAL



This manual has been created by Studio ti in compliance with UNI EN ISO 10240:2004, for **BERTRAM**.  
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RINA S.p.A. (Registro Italiano Navale) assigned the classification of Your BERTRAM yacht with Certificate, following its supervision of hull lamination, reinforcement structures, propulsion and auxiliary power generating machinery, onboard systems.

### NOTICE

*The EC Certificate of product check stating that this pleasure boat has been approved in accordance with the 94/25/EC Directive, amended by the 2003/44/EC Directive, and that it conforms to the safety requirements applicable, is not included inside of the current Owner's manual, but it will be delivered separately by BERTRAM and will have to be stored with this manual.*

### Specifications

Manufacturer Name **BERTRAM**

Hull No. **9**

Number of People Capacity **max. 18**

Propulsion type: engine (#2)

Maximum Rated Engine Power **2217 mhp/1630 kW**

### Dimensions

- Length overall with fore pulpit	<b>74 ft 2 in - 22.6 m</b>
- Length hull (standard ISO 8666)	<b>70 ft 4 in - 21.45 m</b>
- Length waterline, yacht fully laden	<b>62 ft 6 in - 19.06 m</b>
- Fore rail extension pulpit	<b>3 ft 9 in - 1.15 m</b>
- Maximum Beam	<b>18 ft 8 in - 5.70 m</b>
- Depth under propellers (yacht fully laden)	<b>6 ft - 1.82 m**</b>
- Height maximum above waterline	<b>19 ft 6 in - 5.93 m**</b>
- Cockpit surface	<b>270 sq ft - 15.6 m<sup>2</sup></b>

### Displacements

- Displacement, unladen	<b>95681 lb - 43.4 ton</b>
- Displacement fully laden	<b>119500 lbs - 54,2 ton</b>

### Tank capacities

- Standard fuel tank capacity	<b>2008 US gals - 7600 lt *</b>
- Water tank capacity	<b>350 US gals - 1323 lt *</b>
- Black water tank capacity	<b>160 US gals - 606 lt *</b>

\* The usable volume of tanks will vary according to the trim and load.

\*\* With fuel and water tanks full, 6 persons onboard and 1200 lbs (545 kg) of equipment.

## BERTRAM YACHT, INC. LIMITED WARRANTY (U.S.A.)

**The limited warranty.** Bertram Yacht, Inc. (Bertram) warrants, subject to the limitations herein, to the first retail purchaser of this yacht (first owner) provided the First Owner completes, signs and returns the Bertram Warranty Registration Card to Bertram at the address below by certified mail, return receipt requested, within (10) days of the First Owner's purchase of the yacht, and any properly registered subsequent owners, that it will repair or replace defects in (a) items manufactured by Bertram for one (1) year and (b) the yacht's hull and its fiberglass structural components for five (5) years. These warranties run from the date of Delivery. "Delivery" means the date of the actual delivery of the yacht to the First Owner. Unless prohibited by applicable state law, an action hereunder shall be barred unless it is commenced within (1) year from the date the cause of action accrues, regardless of the time remaining in the applicable period above.

**Bertram's Obligation.** Bertram's obligation is limited to repairing or replacing, at its option, any covered items found to be defective at a facility designated by Bertram. Repaired or replaced items shall be warranted as provided herein for the remainder of the applicable warranty period. Defective parts or components that are replaced shall thereupon become the property of Bertram.

**Procedures.** Notice of defects occurring under this Limited Warranty must be given to Bertram within a reasonable time, not to exceed thirty (30) days after discovery, or the time such defect should reasonably have been discovered, in writing, at the address below, by certified mail, return receipt requested. All notices must include the owner's name, address, phone number, the hull number, the nature of the defect, the date it was discovered, the date of purchase, and the name and address of the party from whom the yacht was purchased. A copy must also be sent to the dealer from whom the yacht must be purchased.

The owner must thereafter provide all information necessary to allow Bertram to verify compliance with these requirements. The dealer must obtain Bertram's written approval before repairing the yacht and must follow all applicable Bertram procedures. As to items not covered by this Limited Warranty, the owner may contact the appropriate manufacturer representative, to which the dealer will direct the owner on request.

**Future Improvements.** Bertram reserves the right to improve its design or materials without any obligation, or incorporate any changes into any previously manufactured yachts.

**Exclusions.** This Limited Warranty is **NOT** applicable to:

- a. Damage to a yacht part or component, caused by any alteration, modification, or repair, or which has been removed from the yacht, unless specifically authorized in writing by Bertram.
- b. Paints; varnishes; gelcoats; anti-fouling products; chrome plated, anodized, aluminum, or other plated finishes; the color fastness of materials or finishes; external wood paneling, siding, and trimming; stainless steel, fabrics and canvas - all of which are subject to the effects of different climates and use (including cracking and crazing); osmosis blistering if the original gelcoat surface has been altered in any way - including repair, application of any coating other than marine antifouling bottom paint, improper surface preparation for paint, or excessive sanding or sandblasting.
- c. Engines, engine parts, controls, accessories, air conditioning systems, transmissions, electronics (including the installation thereof unless installed by Bertram), batteries, appliances, propellers, generators, and any equipment not manufactured by Bertram. Some of these items are warranted by their manufacturers as stated in the applicable warranties as supplied by their manufacturers. The owner shall look exclusively to these manufacturers for any and all such warranty claims.
- d. Yachts which have been used for or subjected to: commercial or charter service; careless operation, grounding, collision, hurricane conditions or other extreme forces of nature; military or paramilitary operations; racing, towing, improper storage, service or maintenance; negligent operation; lack of maintenance; improper use; use in violation of instructions provided by Bertram; or use in violation of Federal, State, or other governmental laws, regulations, or rules.

- e. Any published or announced catalog speeds; fuel consumption; weight; draft and performance characteristics; since these are estimated or obtained from test runs.
- f. Electrolysis, galvanic or crevice corrosion, or any deterioration of underwater items or items requiring repairs or replacement as a result of lack of maintenance or improper use.
- g. Any damage or failure that occurs from either increasing the horsepower of the original engines installed by Bertram.
- h. Compliance with the laws, regulations, or rules of any governmental or regulatory body or agency other than the U.S.A.
- i. Direct, incidental, or consequential damages, costs or expenses, including but not limited to, loss of time, inconvenience, rental charges, travel expenses, loss of use, dockage fees, towing and storage charges, and the costs of transportation to the repair facility designated by Bertram, incurred as a result of any defects, or as a result of any steps the owner must take to become entitled to repair or replacement, and injury or damage to persons or property resulting from information provided by the dealer if erroneous or not approved in advance and in writing by Bertram. SOME STATES DO NOT ALLOW THE EXCLUSION OF LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES SO SUCH LIMITATION MAY NOT APPLY TO YOU.

**DISCLAIMER; LIMITATION OF DURATION OF IMPLIED WARRANTIES.** EXCEPT FOR THE REPAIR OR REPLACEMENT BY BERTRAM OF ITEMS COVERED BY THE LIMITED WARRANTY, BERTRAM MAKES NO OTHER WARRANTIES EXCEPT FOR THE IMPLIED WARRANTIES THAT CANNOT BE DISCLAIMED, ALL OF WHICH ARE LIMITED IN DURATION TO THE APPLICABLE PERIOD PROVIDED IN THE LIMITED WARRANTY. SOME STATES DO NOT ALLOW TIME LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THIS LIMITATION MAY NOT APPLY TO YOU.

**Modifications, Subsequent Owners.** This limited warranty may only be modified in writing by an authorized Bertram officer. No dealer or other party may modify the Limited Warranty. Subsequent owners to the First Owner may register to qualify for the benefits of this Limited Warranty by following the procedures specified after contacting Bertram at the address and phone set forth below.

**Venue.** To the extent permitted by law, venue for any dispute shall lie in Miami-Dade County, Florida, unless an alternative venue is elected by Bertram.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

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**NOTES:**

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**NOTES:**

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## INTRODUCTION

### *INTRODUCTION*

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### *HOW TO USE THIS MANUAL*

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### *DESCRIPTION OF THE YACHT*

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### *GETTING UNDERWAY*

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### *INSTRUMENTATION & EQUIPMENT*

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### *HELM STATION*

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### *ON DECK*

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### *PROPULSION SYSTEMS*

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### *HYDRAULIC SYSTEMS*

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### *ELECTRICAL SYSTEM*

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### *INTERIOR DETAILS*

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### *SAFETY DEVICES & EQUIPMENT*

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### *YACHT LIFTING & ONSHORE HANDING*

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### *MAINTENANCE*

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### *TROUBLESHOOTING*

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## 1.1 WELCOME

Before taking the helm, you should have a working knowledge of the operational characteristics of your yacht, sufficient marine experience to take charge of its operation, and the skill to navigate the waters in which you intend to cruise. You must become familiar with the yacht's systems and their operation. Your personal safety and that of your guests, as well as that of your yacht, are your responsibility.

No single book can cover all the aspects of pleasure boating and seamanship, but your BERTRAM Owner's Manual is a key resource for learning about your yacht and its equipment, and for acquiring an understanding of its operational characteristics and maintenance requirements.

Additional information pertaining to the equipment installed on your boat is provided by the manufacturers of the equipment and is located in the owner's information case, which was placed aboard before delivery. It is very important that you study these manuals and understand the operation of all of the systems.

By providing you with the information you need to maintain the yacht and to operate it safely, the manual will enhance your enjoyment of your yacht. It contains details about the yacht and its systems and equipment, as well as information about practical use and maintenance. To become acquainted with your yacht before going to sea for the first time, we recommend that you read this manual carefully and consult it frequently in the future.



### WARNING

*This manual presents basic guidelines, but it cannot describe every possible risk you may encounter. You are strongly urged to:*

- regularly review safety requirements;*
- maintain your yacht and its onboard systems regularly;*
- have your yacht inspected at least (bi-annually) by authorized BERTRAM personnel.*



### WARNING

*Please, keep this manual carefully in a safe, dry and easily accessible place for an easy consultation. When you decide to change yacht, deliver this manual to the new owner in its integrity.*



### WARNING

*Do not attempt to operate your yacht until you are thoroughly familiar with the contents of this manual and all of your yacht's onboard systems.*

**NOTICE**

*This manual is not intended to replace years of boating experience or the excellent classes on boating safety offered by the United States Coast Guard Auxiliary and the United States Power Squadron. We have included material that covers some of the aspects of safe boating, but we urge you to attend a safe boating course and stay current on navigation and safe boating practices.*

This manual contains the following chapters:

- INTRODUCTION
- HOW TO USE THIS MANUAL
- DESCRIPTION OF THE YACHT
- GETTING UNDERWAY
- INSTRUMENTATION & EQUIPMENT
- HELM STATION
- ON DECK
- PROPULSION SYSTEMS
- HYDRAULIC SYSTEMS
- ELECTRICAL SYSTEM
- INTERIOR DETAILS
- SAFETY DEVICES & EQUIPMENT
- YACHT LIFTING & ONSHORE HANDING
- MAINTENANCE
- TROUBLESHOOTING

## 1.2 CUSTOMER SUPPORT

BERTRAM  
3663 N.W. 21st Street  
Miami, Florida 33142  
(305) 633-8011  
Fax (305) 635-1388  
www.bertram.com

To ensure a readily available supply of spare parts and the capability to provide prompt and reliable service, BERTRAM selects all your yacht's original equipment and accessories among the most reliable marine supply sources available.

The equipment is covered under specific warranties provided by the individual manufacturers.

Any repair to be performed under warranty must be carried out solely by BERTRAM authorized personnel, to avoid compromising the provisions of the warranty, as well as to ensure the quality of the workmanship and to prevent further damage.

The BERTRAM Service network is happy to provide any information regarding issues not addressed by the manuals. Yacht owners, captains, and crew members may contact dealers, sales offices, service centers, or BERTRAM directly.

**WARNING**

*Sanctions are provided if the yacht is not supplied with the "Owner's Manual".*

**WARNING**

*In case you lose or damage the manual, BERTRAM will always be able to supply you with a new copy.*

**WARNING**

*For all legal aspects related to the yacht warranty, refer only to the Purchase Proposal and to the Limited Warranty, which specify all warranty clauses applicable to the purchased product.*

**WARNING**

*BERTRAM declines all responsibilities for the installation and operation of electrical, electronic and mechanical equipment improperly installed by third parties in a fashion not authorized by the yacht's builder.*

**WARNING**

*Any modification or change to the yacht's original design or specifications must not be done without first consulting BERTRAM for approval, in order to avoid compromising the yacht's safety and the provisions of the warranty.*

**CAUTION**

*BERTRAM declines all responsibilities if third parties tampered with equipment installed by the yacht's builder. Such tampering or unauthorized installations will void the warranty, and even cause damages to the yacht and the people on board.*

**WARNING**

*BERTRAM declines all responsibilities for damages due to improper preservation and poor maintenance.*

**WARNING**

*The maintenance operations described in the manual are simple, but should be performed by authorized and qualified technical staff only, according to the standard procedures delivered by the devices manufacturers and in compliance with national and international regulations. We suggest to contact BERTRAM Customer Support.*

**CAUTION**

*Equipment and accessories: The engine, the windlass, the ventilators and other accessories are guaranteed by their manufacturers who will support you directly by means of their structures. If necessary, BERTRAM Customer Support Service will deal with your requests in order to obtain fast services and the respect of the applicable rules. At purchasing, the owner should mail the Warranty Registration Card to activate the Limited Warranty. BERTRAM is not responsible for warranty coverage if the owner fails to mail in the Warranty Registration Card.*

### 1.3 HULL IDENTIFICATION

BERTRAM has focused on building high quality yachts for the international yachting market since 1961. Safety is a high priority, and all BERTRAM yachts undergo certification to the requirements of the applicable registries to obtain a Classification Certificate.

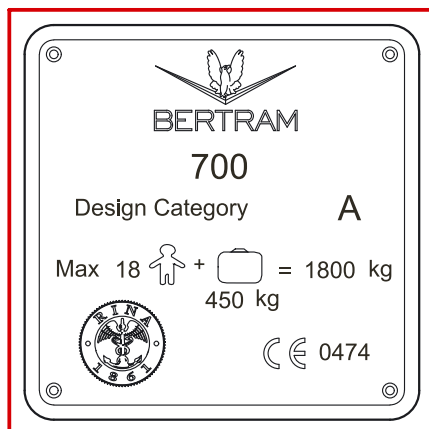
RINA S.p.A. (Registro Italiano Navale) assigned the classification of Your BERTRAM yacht with Certificate, following its supervision of hull lamination, reinforcement structures, propulsion and auxiliary power generating machinery, onboard systems.

You will find the hull identification numbers affixed to your yacht in two places.

One is integral to the hull laminate, and the other is engraved on the transom. The hull identification number is matched to that which appears on the Classification Certificate.

**WARNING**

*Always keep the plates readable. If deteriorated or altered, request new plates from BERTRAM.*



US-BERW2009I112



[illegible]

This image shows a blank sheet of white paper with horizontal ruling lines, resembling notebook paper. The page is divided into two equal vertical sections by a central vertical crease or fold line. Each section contains ten horizontal blue lines, evenly spaced from top to bottom. The lines are thin and light blue, providing a guide for writing without being distracting. The overall appearance is clean and minimalist, typical of standard lined paper used in schools or offices.





2



HOW TO USE THIS MANUAL

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*TROUBLESHOOTING*

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### 2.1 READ THIS MANUAL CAREFULLY

We recommend that you read the individual manufacturer's engine and equipment manuals provided with the yacht to gain a deeper understanding of the yacht and its systems.

This Yacht comes with the BERTRAM Limited Warranty, which describes the terms and conditions under which defects in your yacht will be repaired. Familiarize yourself with the warranty and follow instructions regarding proper operation and maintenance. Lack of attention to instructions can void the warranty.

Before operating equipment associated with your yacht, particularly the engine, read the manufacturer's manual concerning the equipment to be used.

## 2.2 STAY ALERT

Throughout this manual, we present critical information, messages, requirements, and safety alerts in a label format to draw your special attention to the information offered.

These messages begin with a signal word, e.g., “danger”, “warning”, etc. as follows. The signal word is the indicator of the level of the hazard being addressed in the message. See the following for hazard signal word definitions.



### **DANGER**

*Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. The use of this hazard signal word is limited to the most extreme conditions.*



### **WARNING**

*Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.*



### **CAUTION**

*Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or property damage. This signal word may also be used to alert against unsafe practices.*



### **ENVIRONMENT NOTICE**

*Draws the attention to risks associated with toxic substances and environmental pollution.*

### **NOTICE**

*Draws the attention to important information and reminders.*

### **MAINTENANCE**

*Shows the time necessary for the maintenance to be carried out on the different devices on board.*

### 2.3 SPECIAL SAFETY WARNINGS

#### Fire risk:

It indicates a fire risk.



**DANGER**

*The cause of the fire is described here.*

#### Electrocution risk:

It indicates an electrocution risk.



**DANGER**

*The cause of the electrocution is described here.*

#### Burn risk:

It indicates a burn risk.



**DANGER**

*The cause of the burn is described here.*

#### Forbidden areas:

It forbids the access, the transit or the stop in a dangerous area.



**DANGER**

*The forbidden area is described here: it is forbidden to access dangerous areas or to approach moving mechanical parts.*



## 2.4 KNOW YOUR RESPONSIBILITIES AS A YACHT OWNER/OPERATOR

If your Bertram is to be operated in the waters regulated by the United States Coast Guard, there are certain requirements that must be met. These requirements are discussed in the Coast Guard Publication Federal Requirements for Recreational Boats.

As a yacht owner, you are responsible for being informed about a variety of laws (state and Federal, in the U.S.) and regulations that apply to the navigation, operation and equipping of your yacht.

In the United States, the Federal government, through the U.S. Coast Guard, specifies the requirements for PFD's (personal flotation devices, a.k.a., "life jackets") and other required safety equipment that must be carried aboard recreational yachts.

PFD's and the other safety equipment must be approved by the Coast Guard and/or other safety standards organizations. If approved, there will be a label indicating this on the equipment. States may impose additional requirements. Know the regulations for your areas of operation.

The yacht's owner and/or operator, is responsible for knowing the navigation and safety rules and good seamanship practices. Take the time to learn the Nautical Rules of the Navigation (COLREGS) that are found in the Coast Guard publication Navigation Rules - International and Inland. CG-169 that is required to be carried on all yachts over 39.4 feet (12 m) in length. Study navigation techniques and the safe practices for operating Your yacht and its equipment.

You are also the key person ensuring the safety of your passengers, crew, and the yacht. Please take time to study the chapter on SAFETY in this manual for important information about safety procedures.

Every yacht owner and operator must be knowledgeable about the yacht and its systems. Because you are responsible for the operation of your yacht, we provide you with information on those topics. For each system on board, we have provided a detailed description, including schematics where appropriate, as well as information on maintenance and troubleshooting.

There is a variety of instructional books, courses and videos available to help you improve your knowledge of the Rules of the Navigation, navigation, yacht operation, the operation of marine electronics, maintenance, etc. Consult the resources listed in the appendix.

### NOTICE

*United States Coast Guard Regulations state that it is the responsibility of the vessel owner to be certain that all required equipment is onboard and in proper working order.*

*Bertram has supplied you with a copy of Navigation Rules, International – Inland.*

*Regardless of how much experience you have, it is important to refresh your memory by studying the Navigation Rules on a regular basis.*

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3



DESCRIPTION OF THE YACHT

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#### 3.1 MAIN DIMENSIONS AND WEIGHT DATA



– Length overall with fore pulpit	<b>74 ft 2 in - 22.6 m</b>
– Length hull (standard ISO 8666)	<b>70 ft 4 in - 21.45 m</b>
– Length waterline, yacht fully laden	<b>62 ft 6 in - 19.06 m</b>
– Fore rail extension pulpit	<b>3 ft 9 in - 1.15 m</b>
– Maximum Beam	<b>18 ft 8 in - 5.70 m</b>
– Depth under propellers (yacht fully laden)	<b>6 ft - 1.82 m</b>
– Height maximum above waterline	<b>19 ft 6 in - 5.93 m</b>
– Cockpit surface	<b>270 sq ft - 15.6 m<sup>2</sup></b>
– Displacement, unladen	<b>95681 lb - 43.4 ton</b>
– Displacement fully laden	<b>119500 lbs - 54.2 ton</b>

## 3.2 MAIN TECHNICAL DATA

### Main Propulsion Engines

Model	MTU 16 V 2000 M92
Power	2217 mhp/1630 kW at 2450 rpm
Fuel consumption per engine at rated power	414.4 l/h (109.5 gal)

### Fuel tank capacity

2008 US gallons

### Water tank capacity

350 US gallons

### Black water (sewage) tank capacity

160 US gallons

### Electrical power

AC Volts:	230
DC Volts:	24
Hz:	50
kW:	23+23

### Batteries

Eight batteries for engines

Eight batteries for users

Two batteries for generators

### Bilge pumps

One bilge pump in the helm gear compartment

Two bilge pumps in the engineroom

One pump forward stateroom area



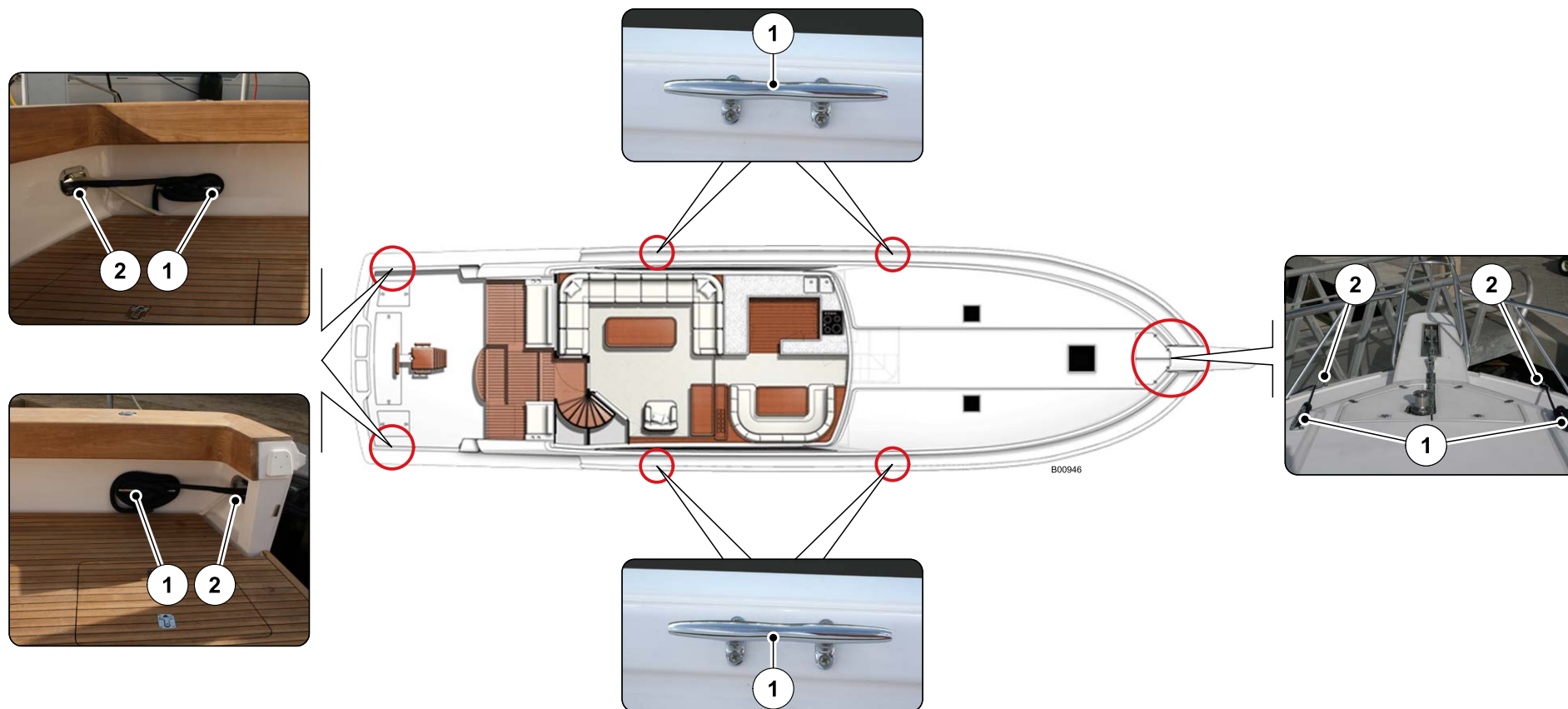
### WARNING

*BERTRAM Yachts are designed to obtain a correct transversal trim with full optional equipment, and with spare propellers and shafts.*

*If the yacht is not equipped with full optional, spare propellers and shafts, some weights might have been installed to correct the transversal trim.*

*The above-mentioned weights can be removed or displaced as soon as the yacht is provided with new equipment.*

#### 3.3 MOORING EQUIPMENT



- 1. Cleats
- 2. Chocks

### 3.4 WARNING AND SAFETY LABELS

The warning and safety labels applied as decals on the yacht are used to point out special features, systems or operational risks.

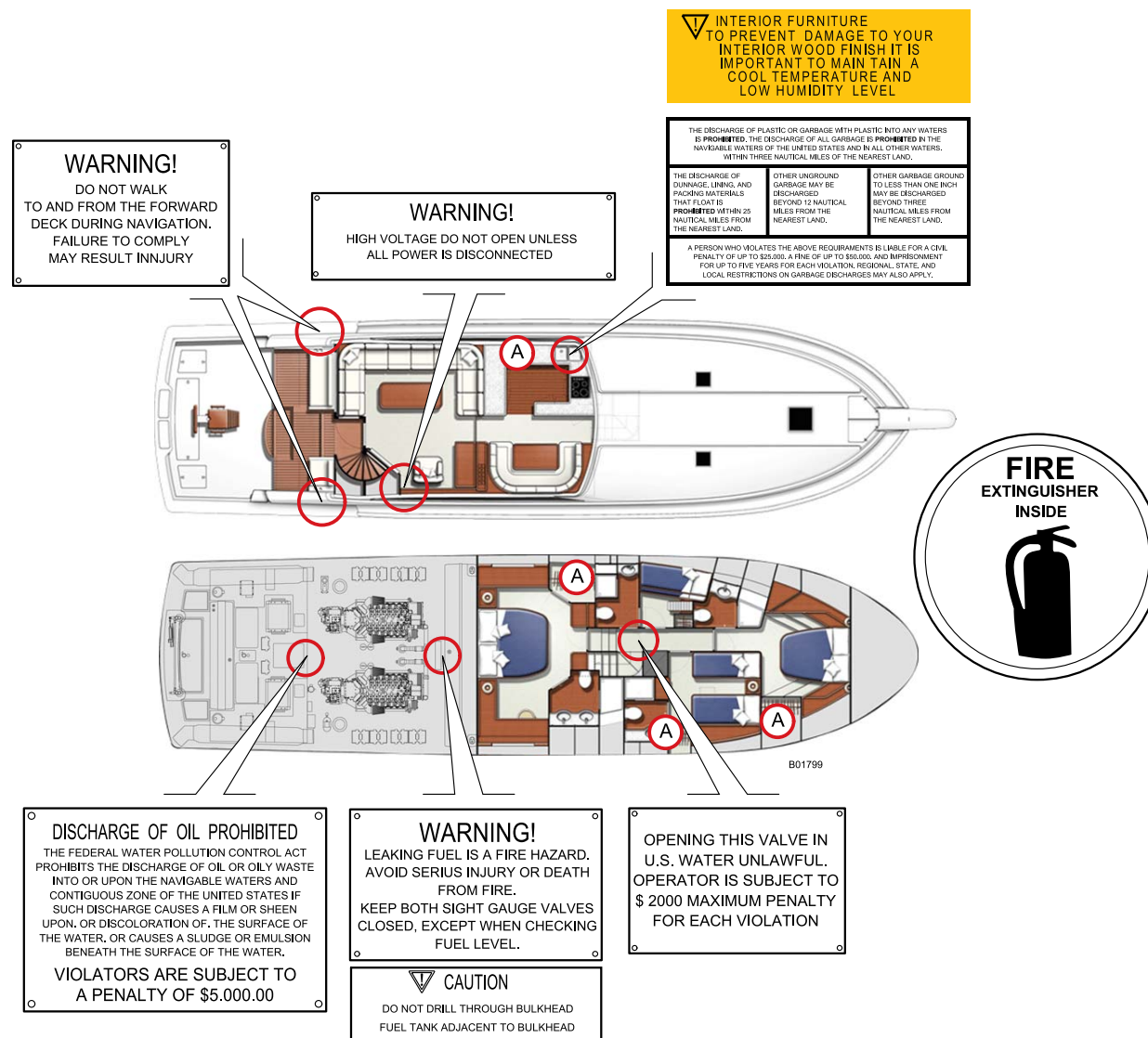
The labels identify the level of the hazard by the signal word, e.g., danger, warning or caution, followed by a notice of the nature of the hazard, followed by the consequences that can result if the instructions to avoid the hazard are ignored and, finally, instructions on how to avoid the hazard.

Before working with or on an area of the yacht or equipment bearing such a warning or safety label, be sure that you have read the safety warning and that you understand the nature of the hazard and that you act in accordance with the instructions to avoid illness, injury, death, or property damage.

Keep all the labels clean and legible. Replace them if they are lost or damaged.

The extinguisher plate (A) is located near each fire extinguisher.

This section shows the locations of the warning notice labels with their application points.



NOTES:






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GETTING UNDERWAY

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### 4.1 YOUR KEYS

The yacht is delivered with original keys to all the yacht's locks. Each original is supplied with copies. Each key has a code number printed on it. The other locks on the yacht are universal. The same key opens all the locks. The universal key opens a door even if it is locked from inside. Specific task keys are described as follows. The engine keys are provided with different colored BERTRAM floating key holders. Two (2) copies are included for each engine. Keys for the sliding door at the salon entry (3 copies)  
Keys for staterooms access (3 copies)

#### NOTICE

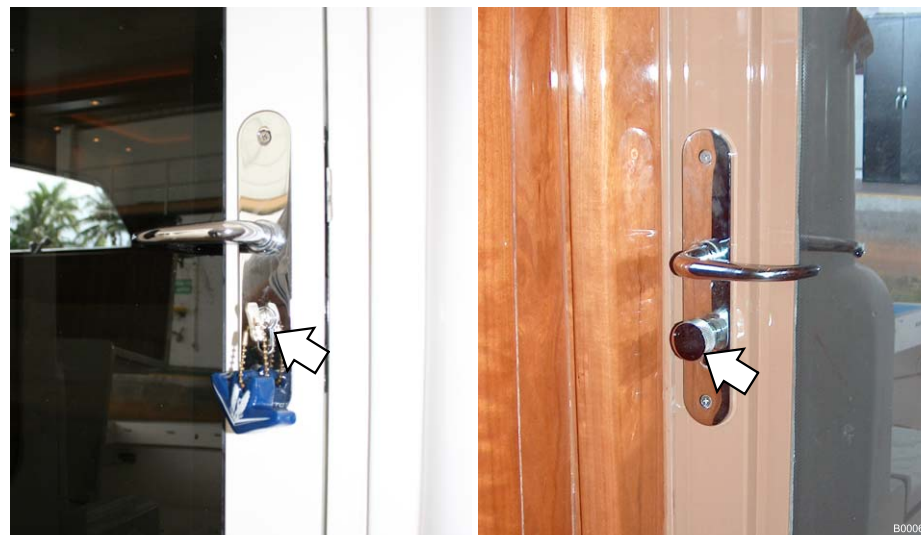
*The yacht's helmsman should have a complete set of keys in his/her possession at all times so that he/she can operate every lock on the yacht. Another complete set of keys should be stored in a readily accessible location on the yacht to be available at all times.*

Contact BERTRAM for guidance on deteriorated or altered locks.

#### NOTICE

*Very general and limited information for first startup and initial operation of your yacht is included in this manual. For specific directions about the use of the individual systems and equipment, consult the manuals provided by the individual equipment manufacturers or contact the BERTRAM Customer Support.*

Before operating the yacht, you must understand the operation of all controls, instruments, and warning systems. Read the chapters **AT THE HELM & INSTRUMENTATION AND EQUIPMENT**.



## 4.2 PREPARING TO GET UNDERWAY

### 4.2.1 Preliminary checklist

Accurate and careful preliminary checks are fundamental for a safe outing. Before leaving harbor, perform the following procedures. Details for some of the procedures in this list are found elsewhere in this manual. Check the INDEX.

- Gather information on weather forecasts and warnings.
- Consult the pilot's book for the condition of waters in your area of operation.
- Consult the navigation charts, in particular the distances, routes, dangerous sea bottoms, shallow waters, and other hazards.
- Consider the cruise duration.
- Calculate the quantity of fuel required. Check the fuel onboard.
- Check the helm station panel bilge water indicators that signal the presence of possible water in the bilge.
- If the indicators are lit, switch ON the bilge pump.
- If the pumps do not run, the batteries should be changed.
- If the pumps run, but do not discharge any water, the float switches may be jammed or defective.
- If the pumps run, but do not discharge any water, the suction line may be clogged.
- Check if seawater filters of both engines intake seacocks, of generators cooling system and of A/C system, are clean. If the filter elements are dirty, CLOSE the thru-hull fitting by moving the valve lever perpendicularly to the thru-hull fitting body. Remove and clean the filter baskets, reassemble the filters and then OPEN the thru-hull valves.

#### NOTICE

*After reopening the intake seacock, check if seawater filter shows leaks.*



#### WARNING

*Storeroom stowage can alter yacht balance, especially transversal trim. Try to arrange load equally and securely, in order to avoid sudden displacements.*

- Check the engines and generators belt tension. Adjust as needed. Check the engine oil, gearbox oil, and generator oil levels. Replenish as indicated. V-drive oil inlet is via the dipstick opening.
- Check the propulsion engines and generators cooling water level. Replenish as indicated as per manufacturer's manual.
- Check that the diesel fuel filter/water separator elements are clean. Drain any water in the filters by operating the drain valve.
- Check hydraulic oil levels of gangway, trim tabs and helm system power units. Replenish as indicated.
- Check the levels in fuel and fresh water tanks.
- Check that all items (provisions, navigation charts, yacht documents, flares, first aid kit, basic tool kit, etc.) required for a safe and comfortable voyage are onboard.

- Ensure that the individual and collective personal safety and rescue equipment is available and in good condition.
- Check that all loose materials are properly fixed.
- Check that the loads are distributed evenly and the yacht floats on its lines without excessive list and in proper fore-and-aft trim.
- Check that all portlights and hatches are properly closed and secured.



### CAUTION

*Equipment, stores and supplies loaded onboard may alter the yacht's attitude afloat, affecting the trim and list. Distribute loads evenly so the yacht floats on its lines. Secure all loose items, to avoid sudden, dangerous load movement.*



### WARNING

*Open hatches can be hazards when the yacht is underway. To avoid injury or death to persons onboard and/or water penetration when the yacht is underway, ensure that all deck hatches, portlights, engineroom hatches, etc. are secured in the closed position before getting underway.*



### CAUTION

*Before starting the engines disconnect the battery charger.*

### NOTICE

*BERTRAM furnishes the equipment required by the international regulations.*

*The owner is responsible for providing any equipment or safety devices required by national regulations in force for the waters in which the yacht is underway.*

### 4.2.2 Safety Equipment Check

- Ensure that the life raft is easily accessible and properly stowed, and that its attachment lines and safety lines are in good condition, properly coiled and showing no wear and tear.
- Ensure that the throwable PFD's, e.g., ring buoy, horseshoe buoy, Lifesling® are in their correct locations on deck and that the safety line is in good condition.
- Check fire extinguisher charge levels. The extinguisher is charged when the pressure gauge indicator is in the green sector.
- Ensure that individual PFD's (lifejackets) meet the criteria for use in the waters of operation and are approved by the authorities. Check that they are in good condition, that the inflating device (if any) is operational, and that the PFD's are readily accessible in the proper location.

See **General Safety Considerations** that follow in this chapter.

#### **NOTICE**

*Check the safety equipment prior to leaving harbor, ensuring that all items required are in good condition. Record the locations of all such equipment and be familiar with its proper use.*

*The designated helmsman must ensure that all passengers are properly informed of safety equipment locations and of equipment proper use (fire extinguishers, life raft, throwable PFD's, personal PFD's, etc.).*

### 4.3 GENERAL SAFETY CONSIDERATIONS

**Do not deploy emergency signals (visual or radio) unless there is a need for emergency service.**

**Every person aboard the yacht must**

- know the storage location of the PFD's (life jackets)
- know the location of their personal PFD
- know the location of the throwable PFD's (e.g. ring buoy, horseshoe buoy Lifesling)
- know the location of the life raft
- know how to properly put on and wear a PFD
- know how to release the personal PFD's for use
- know how to launch a PFD
- know how to launch the life raft
- be aware of the risks posed by a fire
- know what to do in case of fire
- know the location of and be trained in the use of the fixed firefighting systems and the portable, hand-held fire extinguishers.

People can fall off the yacht at any time.

Do not hesitate to require that persons wear PFD's (life jackets). PFD's may be worn in any weather, underway, at the shore, or at anchor.

- Non-swimmers and children should wear a PFD at all times.
- People working on deck should wear a PFD.
- PFD's should be worn on deck when underway in cold waters (water temperatures below 20 °C/68 °F).
- In any emergency, passengers should put on their PFD's immediately.

Inflatable PFD's (USCG Approved Type V) are comfortable to wear, and some types will inflate automatically if the wearer falls overboard. These PFD's are mandatory safety devices to have for yourself and your guests. Make sure that all PFD's are approved by the appropriate national or international regulatory agencies.

Read the **SAFETY** chapter in this manual.

### 4.3.1 Final pre-departure checklist

- Check rudder operation by putting the rudder hard over to port and starboard, and then back to the center.
- Check trim tabs operation. Operate both trim tabs. When not in use, trim tabs should be kept in the UP position.
- Check navigation lights and horn operation.
- Check anchor windlass and chain stopper operation.
- Check VHF radiotelephone operation.
- Check yacht documents and navigation charts.
- Check proper closing of portlights and hatches and that all loose items are secured on main deck and belowdeck.
- Check operation of bilge pumps and related indicators.
- Make sure that the engineroom ventilation system is operating.
- Check that no flammable or other hazardous materials are stowed in the engineroom.
- Check that seawater intake valves for engine and generators cooling and for air-conditioning system are open.
- Check that the engine and generator fuel systems' valves are open.
- Switch on engine and user batteries.
- Switch on all 24 V circuits from the switch panel board. Check the proper operation of each system and then switch off the systems not to be used.
- Check the battery charge level (Volts) on the switch panel board. Recharge the battery if indicated.
- Start the generator if you are to use it. Allow the generator to warm up before adding electrical loads to it from the switch panel board.
- Disconnect the shore connections for fresh water and electric power, cable and telephone.
- Check the fixed firefighting systems and the portable (hand-held) fire extinguishers.
- Check fuel system for no leaks or fumes.

## 4.4 STARTING THE ENGINES

Refer to the **AT THE HELM** and **INSTRUMENTATION AND EQUIPMENT** chapters for the location of all engine controls and gauges.

### NOTICE

*Before starting the engine, check fuel level, coolant level and engine oil level. If necessary, refill with fuel, coolant and oil.*

Before starting the engines, carry out the necessary daily maintenance. Check the engineroom. This check may avoid further remarkable repairs. For further information refer to the Use and Instruction Manual delivered by the engine Manufacturer.

- In order to ensure a longer engine life, carry out a complete inspection before starting. Check for the following faults: oil leaks, coolant leaks, dirt build-ups. Remove dirt build-ups and repair if necessary.
- Check if cooling system hoses are cracked or show loose clamps.
- Check if alternator drive belts are cracked, broken or damaged.
- Check for the presence of loose wire connections, or worn out wires.
- Check the fuel quantity. Drain water from relevant separator. Open the fuel supply valve.



### WARNING

*Open all valves in the refuelling line, before starting the engine, to avoid high fuel pressure. This pressure may cause damages to the fuel housing or other damages.*



### Setting into operation

Before setting a new or overhauled engine into operation read carefully the "MTU technical publication". It is recommended that new or overhauled engines should not be operated at an higher load than 75% during the first few hours of operation; initial run-in should be at variable speeds. After this initial run-in, the engine should be brought up to full output gradually.



#### WARNING

*Use only approved fuels (see brochure "Fuels, Lubricants MTU"); otherwise the manufacturer's warranty will become null and void and the engines can get seriously damaged.*

### Daily start-up

Before daily start-up, check the fuel level, the coolant level and the engine oil level. If the oil and coolant levels are too low, top them up by means of the expansion tanks, paying attention not to exceed the maximum level mark.



#### WARNING

*Engines must always be started with gearboxes at idle run and throttle levers set at minimum speed.*



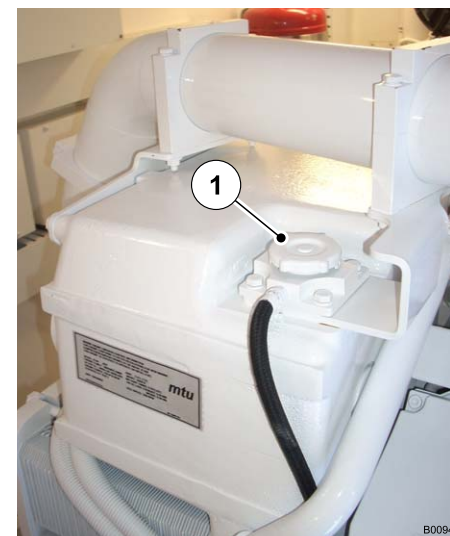
#### DANGER

*Before starting an engine, make sure that nobody stays within the dangerous area of the engineroom.*

### Cooling liquid

Fill the cooling system of the engine with a mixture of fresh drink water and antifreeze agent on ethylene glycol basis or anti-corrosion agent. For this purpose see "MTU liquids and lubricants specifications handbook".

- Pour in coolant slowly in the expansion tank through proper fill fitting (1).
- For coolant filling quantity, see "Technical data" on the handbooks delivered by MTU.



### Engine oil



#### WARNING

*Do not refill oil over the notch MAX of the dipstick. Overfilling may damage the engine!*

Pour lubricating oil into engine by means of proper fill fitting (2). For the refilling quantity see "Technical Data" on the handbooks delivered by MTU.



### Engine intake seacocks

Open the sea water valves inside of the engine heat exchangers.



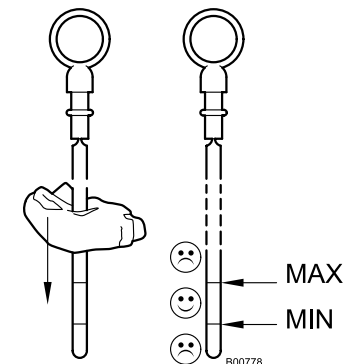
Ensure utmost cleanliness when handling fuels, lubricants and coolants.



### WARNING

*Do not refill oil over the notch MAX of the dipstick. Overfilling may damage the engine!*

Oil  
?

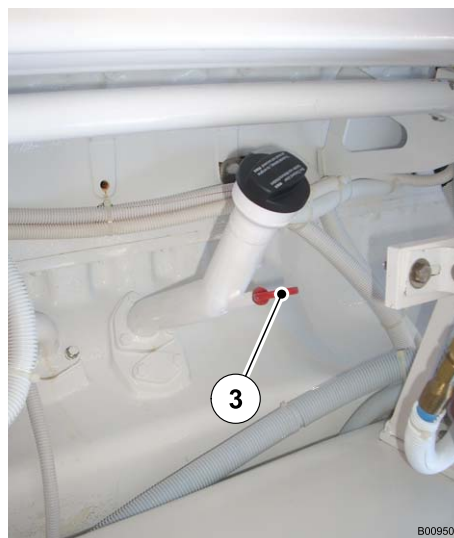


### Oil level check

Check engine oil level only approximately 20 minutes after the engine has been switched off.

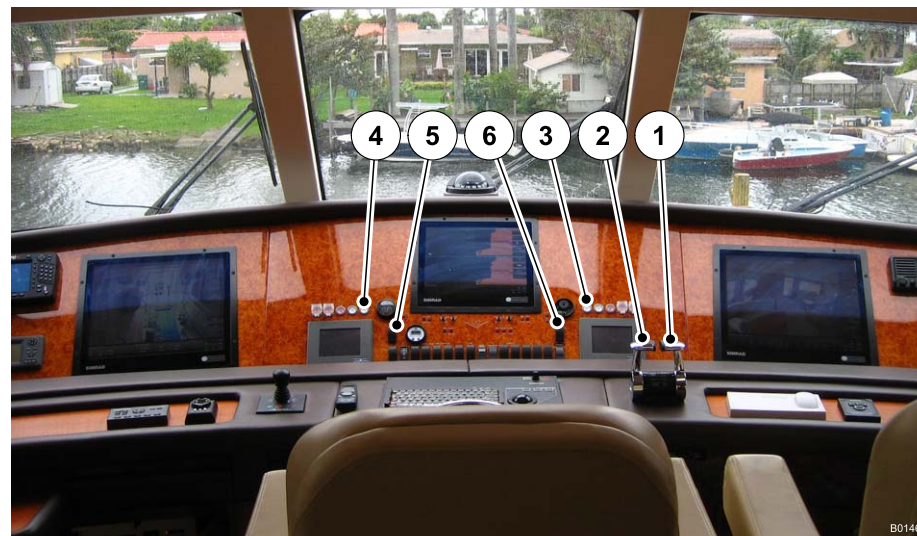
- Pull out dipstick (3) for oil level check.
- Wipe it with a clean, dry and lintfree cloth.
- Place it back up to detent.
- Pull out dipstick again.

The oil level should be between the two notches in the dipstick and must never drop below the lower notch. Top up oil as necessary.



After performing the final pre-departure checklist, **start the engines one at a time.**

- Set control heads (1) and (2) to central idle position.
- Press “STBD ENGINE” button (6) to enable start-up of the starboard engine.
- Press starboard engine “START” button (3).
- Verify that the oil pressure sets on normal value within 10 seconds.
- Verify the correct cooling water circulation.
- After starting the first engine and, only after checking that it operates correctly, start also the second engine.
- Start the port engine as described for the starboard one.
- Press “PORT ENGINE” button (5) to enable start-up of the port engine.
- Press port engine “START” button (4).
- Warm the engine up for about 2-3 minutes at 1000 rpm max.
- Check the alternators charge.
- Actuate the bow thruster by means of relevant control panel located in the helm station.



### Control heads operation

- Bring both control heads (1), (2) to “NEUTRAL” position (vertical individual levers).
- Press the button on the panel of control heads according to the mode and head you intend to actuate.
  - EASIDOCK
  - AUTOTROLL
  - ONE LEVER
  - WARM UP





### **WARNING**

*If you have to use the battery parallel connection to start-up the propulsion engines, we suggest to disconnect the electronic devices to avoid current rushes or drops.*



### **WARNING**

*Should a “circuit breaker switch” trip, do not try repeatedly to reset it but check the relevant electric system condition.*



### **WARNING**

*We suggest avoiding slow running for periods longer than 5 minutes. The low idle run implies major wear of the engine mechanical parts and is the most harmful of the poisonous exhausts.*

### 4.4.1 Control & drive

Despite the efficiency and the high performances of the motor-yacht, and in particular the sensitivity of the surface transmission, which allow an immediate reaction to the maneuver operation, the use of this yacht requires a careful and responsible behavior.

In the passage between displacement and gliding navigation there is a critical phase to be carried out as shortly as possible, as it is marked by high consumptions and more vibrations; it also causes a very deep wake. The minimum gliding speed is influenced by the displacement, the distribution of the weights onboard, the position of the trim tabs and the conditions of the sea. The excellent choice and quality of the engines allows to keep high speeds for a long time with no consequences.

Yet an excellent compromise among transfer speed, comfort and consumptions is obtainable with about 150/200 rpm less than the maximum allowable revolutions.

Do not keep the thrust engines at idle run for a long period of time; this to prevent them from getting "dirty" or overheated.

Avoid harsh accelerations or decelerations to avoid excessive stresses for the engine turbines.

When the yacht reaches the cruising speed, the engine check instruments should set to constant values.

If the instruments show contrasting or abnormal indications during continuous run, check for failures of the systems or of the equipment and contact MTU customer support.



#### **WARNING**

*Even if the automatic pilot controls the route, supervise navigation anyway.*



#### **WARNING**

*During navigation, the back glass wall should normally be kept closed, to prevent any exhaust gas and water splash from penetrating the deck compartments, under special wind strength and direction. This precaution will also improve the comfort and silence inside of yacht's compartments.*



#### **WARNING**

*Adjust the speed of the yacht and the trim tabs position according to the conditions of the sea and the prevalent direction of the waves; in this way the structure of the yacht is not submitted to useless stresses and the passengers can enjoy more comfort during navigation.*



#### **DANGER**

*It is absolutely forbidden to perform reverse run with one of the two engines stopped. This operation is allowed only in case of life danger for the persons onboard and for the safety of the yacht itself, however when the engine is running it should not run higher than 1000 rpm.*

### 4.4.2 Checks after start of thrust engines

- Check that water drains from low run exhaust hose and in case it doesn't, slightly accelerate with engine at idle run for a few seconds.
- Otherwise stop engines, troubleshoot the problem or call for MTU customer support.
- Run the engines slightly higher than slow run until they have reached the operation temperature.
- Check that there is no abnormal noise or excessive smoke.
- Otherwise stop engines and call for MTU Service Centre.
- Check the efficiency of the onboard instrumentation.
- Plug out the shore cords if connected.
- Remove moorings and check for loose mooring ropes or floating objects hindering the propellers movement.



#### **DANGER**

*Make sure that no crew stands in front of gas exhausts and near the mooring ropes.*



## 4.5 STOPPING THE ENGINES

### 4.5.1 Procedure

Do not stop the engines immediately after a high power operation, but let them run idle (for approx. 5 minutes) to balance the temperature differences.

#### From the helm stations

- Set levers (1) and (2) to central idle position of gearbox.
- Press STOP push-buttons (3) and (6).
- Press “STBD ENGINE” push-buttons (5) and “PORT ENGINE” (4) to stop the engines.
- Disconnect the circuit breakers enabling the engine start buttons.



#### DANGER

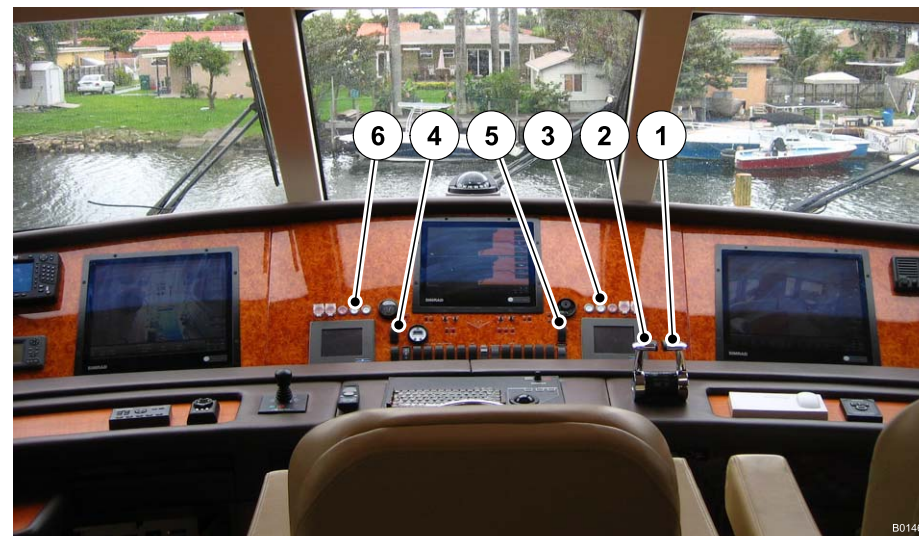
*Make sure that the engines cannot be started by non authorized personnel.*



#### WARNING

*With engines stopped carry out following:*

- cut out not-in-use electrical equipment and check the general condition of the electrical panel and the indication of voltmeters and ammeters;
- check for the condition of the bilge pump switches and their regular operation;
- check for possible leaks from the shaft seals;
- rinse the yacht with fresh water;
- connect electrical power supply from shore;
- keep air ventilators in the engineroom running for about 30 minutes for ventilation and air cooling.



## 4.6 NAVIGATION WITH ONLY ONE ENGINE

The yacht is driven by two powerful propulsion systems, designed to operate together and at the same time.

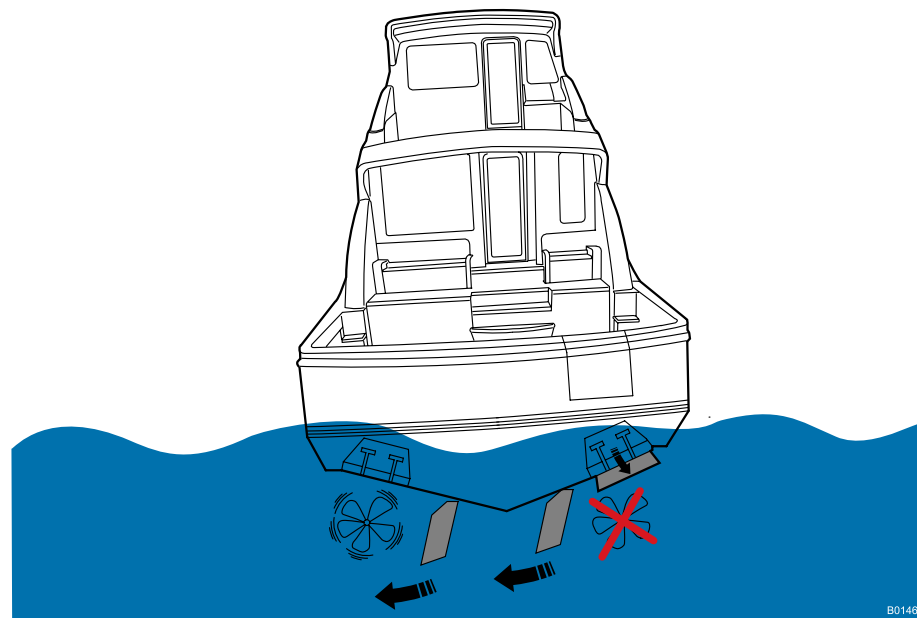
In case of failure of one of the propulsion systems, you may navigate with only one engine.

Therefore we suggest you to:

- shut off the failed propulsion engine;
- set the position of the helm in the opposite direction of the failed propulsion system; in case the helm cannot contrast the asymmetric push of the operating system, lower the trim tab on the side of the failed system, or reduce the speed;
- head to the nearest landing at a reduced speed;
- keep the yacht speed for the best maneuverability.

In case one engine stops due to a failure and the gearbox is set to neutral position, keep constantly an eye during navigation, on the gearbox oil temperature of the faulty system.

The propeller shaft is kept rotating thanks to the water flow through the propeller; in this way also some parts of the gearbox are kept rotating. Should the temperature increase excessively over 80 °C/176 °F, lock the propeller shaft by engaging the gearbox: in this way the resistance will be higher but, with gearbox jammed, the oil will not overheat.



### CAUTION

*The yacht has been designed to navigate thrust by two engines; please remember that, in case of emergency, it is possible to navigate with a single engine, but for a very short time.*



### DANGER

*It is absolutely forbidden to perform reverse run with one of the two engines stopped. This operation is allowed only in case of life danger for the persons onboard and for the safety of the yacht itself, however when the engine is running it should not run higher than 1000 rpm.*



## 4.7 MOORING & DOCKING



### WARNING

*Before the mooring or unmooring maneuver, ensure that engines, gearboxes, rudders and bow thruster (if installed) are in working order. During such maneuvers, the helmsman should prevent any unpleasant noise, and/or wake. Before starting maneuvers, make sure that doors, hatches, etc. are closed.*



### CAUTION

*Before starting the maneuver, make sure that people on board, especially children, do not obstruct operations or that they stay in suitable places.*

The yacht is equipped with very powerful engines, with high performance rudders and with a very efficient thruster.

The bow thruster should be used at very low speed for maneuvering, without making headway; at higher speeds, engine control levers should be in off-set use.

The ability to exploit such qualities depends on the “familiarity” the helmsman has with his yacht. Practice is the only way to acquire confidence, and finally you will be able to safely perform mooring and unmooring maneuvers even in very difficult or crowded areas.

A basic rule to keep in mind is to maneuver the yacht at low speed, in order to have enough time to react and for evaluating the situation; then, in case of accidental contact with other vessels, you will not cause any serious damage.

### 4.7.1 Before leaving the shore

Do not cast off mooring lines or weigh anchor if swimmers or other vessels are nearby.

- Ease the mooring lines and check that everything is ready for casting off lines, all lines are clear; nothing on the yacht is entangled with another yacht or the shore structure.
- Check the proper operation of all navigation instruments: VHF radio, compass, radar, plotter, horn, etc.
- Unplug the shore service connection cables of TV/Telephone, shore power electric supply, water supply, and cablemaster if connected.
- Plan maneuvers ahead of time.
- If there is more than one way to approach a berth or depart the shore, use the most conservative maneuver.

### 4.7.2 Departing from the shore

- When you are ready to depart the shore, remove mooring lines. Check for mooring lines overboard or objects that may become entangled in the propellers. Do not engage the engine gears until you are certain nothing can become caught in the propellers.
- Have a crew member ready with fenders to protect the yacht in the event of wind or sea conditions that overcome your ability to control the yacht.

If the yacht is moored aft to the shore (Mediterranean- mooring style with the anchor off the foredeck and the aftdeck tied to the shore):

- release the aft lines,
- haul in the anchor rope until you are sufficiently clear of the mooring area

If the yacht is side-moored,

- release the aft lines,
- haul in the shoreside foreline while pushing the aftdeck away from the shore and back away from the shore.

Another way to do this maneuver is to set up a spring line on which to drive the yacht forward (toward) the shore in such a way as to force the aftdeck outwards, and then back away from the shore. This is a highly recommended technique to master for close-quarters yacht handling.



### WARNING

*Mooring operations on a large yacht can be hazardous to personnel. To avoid serious personal injury or death, use only the appropriate equipment, e.g., fenders, boathook, to push the yacht away from a fixed or floating structure. Never permit any person onboard to attempt pushing the yacht away from a fixed structure or another vessel by using arms or legs.*

### 4.7.3 Before entering the harbor, be sure you

- check that bilges and gray/black water tanks are empty.
- check that the mooring lines are ready and coiled to run free.
- check that the mooring berth and the berthing route are free from incoming, departing or other moored vessels
- switch on all equipment necessary for entering the harbor from the switch panel board (anchor windlass, aft mooring windlasses, bow thruster, etc.).
- switch off all equipment not required for harbor operation.
- raise the trim tabs.
- stop in uncongested waters and check the operation of reverse gear.
- check the operation of the horn.
- have the yacht's boathook and fenders ready.
- check the operation of the searchlight and have a working flashlight ready on deck when mooring at night.
- check that mooring lines and fenders are positioned correctly.
- make sure that persons onboard not involved with the mooring operations do not interfere with the activity and, if participating, they are properly instructed and competent to perform as directed.

If the yacht is to be moored aft to the shore (Mediterranean mooring style), have the anchor ready to deploy. Prepare the aft lines. When the anchor is set, haul in the aft lines and adjust the anchor rode until the yacht is close to the shore.

If the yacht is to be side moored, haul on fore and aft lines until yacht is close and parallel to the shore. Adjust the fenders for best protection of the yacht's hull.

#### 4.7.4 When the yacht is safely secured to the shore

- Stop the engines.
- check that all lamps on the synoptic panel are switched off and remove the ignition keys.
- turn OFF all unnecessary electrical equipment and check all switch positions on the electric panels.
- check the readings on the voltmeters and ammeters.
- connect the shore power supply, and any other shore connections, such as shore water supply.
- start the battery charger when connected to shore power or when the generator is operating.
- check the position of the bilge pump switches and confirm the operation of the pumps.
- check that the bilges are dry.
- check for possible leaks from the shaft seals (stuffing boxes).
- raise the trim tabs to the fully UP position.
- wash the yacht with fresh water.

#### 4.7.5 Before leaving the yacht, be sure you

- Check that the below deck lights are OFF.
- check that the navigation lights, searchlights and other external lights are OFF.
- check that the switches for all unnecessary equipment (plotter, radio, anchor windlass, etc.) are OFF.
- check that all necessary equipment switches are ON (automatic bilge pumps, battery charger, etc.).
- check that the shore power cable is properly connected, has enough slack and will not fall into the water.
- turn OFF the battery switch.
- check that all deck equipment is stowed correctly.

- check that no flammable liquid bottles and containers are open or loose.
- check that there is no debris that can clog the deck scuppers and prevent proper water drainage.
- check that the gangway is in the right position and properly secured.
- check that the yacht is moored in a manner to protect it under all normally expected wind and sea conditions. Check that the mooring lines keep the yacht well clear of other vessels and that the fenders are properly positioned and secured in place.
- check the belowdeck compartment closures.
- check that all compartments, portlights, skylights and bilges are secured and watertight.

#### 4.7.6 Leaving the yacht unattended

If the yacht is left unattended,

- CLOSE the seawater intakes and the other thru-hull fittings below the waterline.  
Ensure that the bilge pump discharge is open.
- check the electrical panels and switch OFF all unnecessary equipment.
- switch OFF the pressurization systems of water.
- check that all compartments, portlights, skylights and bilges are secured and watertight.
- check that the yacht is securely moored.
- press the button OFF to disconnect the battery charger, located in the engine room.

**WARNING**

*Overboard outlets and drainpipes should be checked regularly, in order to ensure good drainage. The electric system should be checked regularly, in order to prevent fire risks on board.*

**CAUTION**

*When preparing to get underway, ensure that no persons are near the engine exhaust discharges. Ensure that only the line handlers are on deck when casting off shore lines.*

**CAUTION**

*Do not run the engines at idle longer than necessary. Excessive idling time can damage the engines and pollute the environment.*

**NOTICE**

*Excessive cranking of propulsion engines can damage the starters. Do not run the engine starter for more than 10 seconds. Allow the starter to cool for about one minute before attempting to start the engine again.*

**CAUTION**

*Hot and moving parts in the engine space are hazardous to personnel. To avoid serious injury or death from contact with hot and/or moving parts when working inside engine space, wear appropriate safety attire, including but not limited to safety glasses and gloves. Be extremely cautious when near hot and moving parts. Wear hearing protection if the engines are running.*

**CAUTION**

*Never deactivate the battery disconnectors with the engines running or you may damage the engine alternators.*

**NOTICE**

*Use the engine/users battery parallel switch only if absolutely necessary, to provide additional battery power for starting the engines. To prevent damage, turn off all electrical equipment prior to operating the battery parallel system. Disconnect it as soon as possible.*

**NOTICE**

*If a circuit breaker trips, check the related circuit for any short circuits or overload before switching ON again.*



**CAUTION**

*Starting the engines in gear or at a higher-than-idle speed can cause sudden motion of the yacht. To avoid serious injury or death to persons onboard, always ensure that the gears are in neutral and the throttles at idle before starting the engines.*



**CAUTION**

*Open hatches can be hazards when the yacht is underway. To avoid injury or death to persons onboard and/or flooding when the yacht is underway, ensure that all deck hatches, portlights, engineroom hatches, etc. are secured in the CLOSED position before getting underway.*

## 4.8 OPERATING THE YACHT UNDERWAY

**NOTICE**

*Persons operating your ship must never be under the influence of alcohol or drugs. The yacht's pilot should be experienced in the use of all instruments and controls, and know the handling characteristics of the yacht at all speeds and sea conditions.*

*You should be certain that persons intending to operate your yacht are completely knowledgeable about its proper operation. If you are not certain about an individual's qualifications or competence, the person must be supervised by a qualified operator.*

The yacht is very efficient and is equipped with very responsive rudders; nevertheless, because of its size and performance capability, only persons experienced, competent, responsible, prudent and with necessary qualifications should operate the yacht.

The yacht is steered by using the drive wheel from the helm station. The drive wheel operates the rudders via a hydraulic system. The drive gear operation is independent from the engine operation. Never leave the drive wheel unattended when the yacht is underway.

Keep in mind that the rudder effect is proportional to the propeller rpm and the yacht's speed, especially when moving forward. As a consequence, rudder efficiency is high at high rpm and speed. On the contrary, when the engines are idling and the yacht's speed is low, the yacht's reaction to the tiller angle is almost negligible.

If necessary, or when in restricted waters, you can steer the yacht with the engines by varying and/or reversing the engine speeds and alternating power from port and starboard engines.

At low rpm's, operating on a single engine, alternating port and starboard engines and using the "back and fill" method for turning the yacht is the recommended practice. Learn and practice the skills for handling the yacht at low speed and engine rpm.

When the yacht's speed increases, the transition of the hull from displacement mode to planing mode is a critical phase. The transition to the planing mode should be done as quickly as practical to achieve fuel efficiency and provide a comfortable motion.

The minimum planing speed depends on yacht's displacement, the load distribution; trim tab position and sea conditions.

Adjust speed and trim tab positions according to the sea conditions and the loading of the yacht to ensure a comfortable yacht motion and avoid stresses to the yacht structure from the affects of sea conditions.

**NOTICE**

*At high speed, the use of the autopilot is dangerous and not recommended. Anyway, pay always attention when underway and use of the above mentioned device.*

The high quality engines allow running the yacht safely at cruising speed for extended periods of time.

### 4.8.1 Operating in shallow water



#### **WARNING**

***COLLISION HAZARD** - Use extra caution in shallow water or where underwater/floating objects may be present. Hitting an object at high speed or at a severe angle can seriously injure people and damage the yacht.*

#### **NOTICE**

*The best compromise in speed, to accommodate comfort and minimize fuel consumption, is to operate the engines at 150/200 rpm under the maximum rated rpm (also known as WOT [wide open throttle]).*

#### **NOTICE**

*When underway, keep the aft tilting window closed to prevent engine exhaust fumes and splash water from entering the interior. Because the closure is not watertight, do not aim water directly onto the window when washing down the yacht.*

Observing the following guidelines will improve comfort, minimize noise inside the yacht, avoid damage and assist in the proper operation of the yacht.

- Do not run the engines at idle longer than necessary.
- Avoid sudden accelerations and decelerations, which create stress on engine turbochargers.
- Run at idle for a few minutes before shutting down the engines to allow a gradual cool-down.
- Once the yacht is at cruising speed, the engine instrumentation readings should remain steady. However, if, during normal operating conditions, the engine gauges show abnormal or contradicting values, investigate for possible systems and/or equipment problems or failures.
- Monitor the control panel gauges and system condition alerts frequently.
- Check the switch panelboards to see if any circuit breakers have tripped due to an electrical system fault.
- Once in open waters and well clear of other vessels, increase the engine rpm gradually, until the desired speed is reached. Adjust the trim tab positions for the best performance. For information on trim tab adjustment, refer to “Trim Tabs” in the AT THE HELM chapter.
- Adjust the speed to accommodate sea conditions.

- Check the engine exhausts. In particular,
  - very black smoke generally means dirty filters or unburned fuel due to improper calibration of injection pumps or injectors.
  - very white smoke may mean presence of water in the fuel.
  - bluish smoke may mean abnormal oil combustion.
- In case of abnormal vibration, reduce speed and run at slow rpm until the cause of the vibration is determined. If the vibration is severe, take the engines out of gear. It may be necessary to check the propeller condition. It may also be necessary to have a specialist check the propeller shaft alignment.
- Perform a visual inspection of the bilges periodically.

Be aware of the fuel supply in relation to the distance you plan to cover.

### **NOTICE**

*While the yacht is underway all persons onboard must be seated in designated seating areas in order to avoid injury from falls from sudden yacht motion in active wake areas or in the event of sudden changes in yacht speed or during maneuvering. No one should be seated on the spoiler or forward decks when the yacht is underway.*



## 4.9 PRECAUTIONS WHILE UNDERWAY

- Maintain a safe speed for the sea conditions, visibility, and when near other yachts.
- Observe speed limits in the harbor and other confined waters.
- Follow all navigation rules applicable to the waters in which you are operating.
- During navigation do not unlock the anchor chain stopper because you can seriously damage the yacht foredeck.
- Provide laminated plastic reference cards for the Rules of Navigation and have them available for quick reference at each helm station.
- Consult charts for information on locations of reefs, rocks, shoals, or other hazards to make sure that the yacht is not at risk of grounding or collision with fixed or floating structures.
- Frequently check that your route ahead and around the yacht is unobstructed (no yachts or objects in the expected route or approaching your yacht).
- Frequently confirm the yacht's position as you cruise, using all available aids, such as charts, visual observations and bearings, depth soundings, GPS, radar, etc.
- If the yacht is controlled by the autopilot, be especially careful to keep a good visual watch. The autopilot cannot see.
- Before night navigation, make sure that navigation lights and searchlight are operational. Ensure that the correct navigation lights are turned on for operation at night. Do not have the anchor light on while the yacht is underway.
- Use navigation lights in all conditions of reduced visibility, such as fog and rain and at all times between sunset and sunrise.

### NOTICE

*When underway at night, visual sharpness is crucial for a safe passage. To avoid collisions, reduce speed at night to compensate for limitations of visibility. Avoid switching on inner lights that may affect the helm person's night vision.*

- Know the characteristics of the sea bottom prior to anchoring. Keep well clear of other anchored yachts.
- During anchoring, pay special attention to avoiding rotating parts of the windlass and take precautions when handling the anchor chain as it comes off the windlass. Caution is needed to avoid injury to hands and fingers. Also, take care to avoid entangling feet and legs in the anchor rode.
- While the yacht is underway, all persons onboard must be seated in designated seating areas in order to avoid injury from falls from yacht motion in the rough seas and wake areas, in the event of sudden changes in yacht speed or during maneuvering. No one should be seated on the spoiler or forward decks when the yacht is underway.

**CAUTION**

*Persons entering the engineroom when the yacht is underway should be aware of the hazards of the yacht's motion and their potential exposure to high ambient temperatures, hot equipment components and operating machinery within the engineroom.*

*Prior to entering the engineroom, set the yacht on the most comfortable heading for sea and wind conditions. Persons in the engineroom should maintain communication with the helmsman.*

**WARNING**

*To avoid serious illness, injury or death from engineroom hazards, avoid contact with hot and/or moving parts when working within the space, wear appropriate safety attire, including, but not limited to, safety glasses and gloves. Be extremely cautious when near hot and moving parts. Wear hearing protection if the engine is running.*

**DANGER**

*It is absolutely forbidden to perform reverse run with one of the two engines stopped. This operation is allowed only in case of life danger for the persons onboard and for the safety of the yacht itself, however when the engine is running it should not run higher than 1000 rpm.*

## 4.10 NAVIGATION IN BAD WEATHER CONDITIONS

It is the yacht captain's responsibility to ensure the safe conduct of the yacht. The yacht's captain must consider the sea state and weather conditions (at present and as forecast) in determining whether it is safe to navigate.

In consideration of these conditions, it may be necessary to reduce speed, change the heading or seek shelter to protect the yacht from damage and to keep all persons onboard safe.



### CAUTION

*BERTRAM declines any responsibility for the improper use of the yacht, in relation to the wave height conditions.*



### CAUTION

*Before setting off, it is necessary to be aware of the sea and weather conditions you will find along the transfer route and in the area you want to reach.*

### 4.10.1 Weather

Learn to understand weather patterns and signs of change. Bad weather and sea conditions can cause an uncomfortable and unsafe situation. Here are a few basic weather-related rules:

- check the forecast and sea conditions before leaving and while underway;
- a sudden change in wind direction or speed or an increase in wave height indicates deteriorating weather;
- if a storm approaches, immediately seek a safe harbor;
- if a storm hits, head the foredeck of your yacht into the wind;
- if you encounter fog, determine your position, set a safe course, slow down and alert other boats of your presence with a sound signal.

#### **ACCIDENT REPORT:**

The U.S. Coast Guard and state agencies require a report to be filed by the helmsman of a boat involved in an accident involving loss of life, disappearance, injury requiring treatment beyond first aid, loss of boat or property damage exceeding \$500. Contact the state boating agency where the accident occurs for a copy of the state's accident report form. In the absence of a state enforcement agency, contact the U.S. Coast Guard office nearest the accident site. Other countries have other reporting requirements. Consult your nation's boating law enforcement agency.

#### **HOTLINES:**

The U.S. Coast Guard offers many pamphlets on safety and other information not covered in this Manual. Contact your local Coast Guard unit or call the toll-free U.S. Coast Guard hotline at: 1-800-368-5647.

**NOTE THAT THIS NUMBER IS NOT INTENDED FOR BOATING EMERGENCIES.**

## 4.11 ANCHORING

To know the anchor windlass operation (if installed) read the chapter **Anchor Windlass** in the section **ON DECK**.

Your choice of anchor depends on the size and type of your yacht and the weather and anchoring conditions you generally expect to encounter. When selecting anchors for your yacht, bigger is better and there's safety in numbers. No anchor can be all things to all bottoms so have aboard at least two anchors of different designs to handle varying conditions.

- Check that on battery disconnect panel the engines battery disconnect is ON;
- turn the switchboard “windlass” breaker on, on the main electric panel;
- when the windlass hand-held remote control is not used, disconnect it and stow it away, in order to prevent contacts oxidation;
- before operating the windlass, check that the wildcat clutch is properly engaged and remove the chain stopper;
- let the yacht move backward slowly; if necessary, use the engines;
- deploy the anchor until just below the waterline, and hold;
- deploy the anchor until reaching the sea bottom;
- once the anchor is engaged, leave the chain stopper on.



### CAUTION

*Operate the anchor windlass with the engines running, in order to provide the high voltage required and reduce the stress by slowly moving the yacht toward the anchor without passing the chain.*

### 4.11.1 Setting the anchor

**For a secure set, follow these basic guidelines**

- Choose the spot to ride the anchor carefully, considering the shelter it offers, the proximity of other boats, and whether it's a good-holding bottom. Remember that boats of different sizes may swing to a different amount of anchor rode (scope) than your yacht, so give other boats as wide a berth as possible.
- Determine the scope (length) of anchor rode needed for the water depth and type of rode. (See **DETERMINING SCOPE** in this section). If the anchor rode is line (rope), you should have the predetermined amount of line ready on deck. If the rode is chain, you will have to watch the markings on the chain, as the chain is let out, to know how much chain has been deployed.
- Approach the spot where you plan to drop the anchor. Move slowly and put the yacht in slow/idle reverse when you're over the desired location. As the yacht begins to move slowly at the aftdeck, lower the anchor to the bottom, gradually paying out the rode to almost the full amount of scope that you have predetermined.
- Secure the chain on the windlass, or, if the rode is line, around a cleat. This will make the anchor “bite”. Take the engines **OUT OF GEAR** (put engine controls in **NEUTRAL**). Let out the anchor rode to the proper scope and secure the end of the line around the mooring cleats at the foredeck. If a chain rode is used, lock the chain with the chain stopper. Don't let the windlass carry the load of anchor chain or line.

- Confirm that the anchor is set well. One of the methods of doing this is to choose two stationary objects on shore that are abeam of the yacht and that line up to form a range. When the objects are in line with each other (looking at them from the same position on your yacht, for example the main helm position) your anchor is probably set.
- Visually check your position periodically in relation to the shore objects. Any change in the way they line up means your anchor may be dragging and you'd better try again. **Always check anchor ranges/bearings if the wind increases or the yacht swings in another direction.** Learn how to use the radar and GPS to assist checking your anchored position. Read the manuals supplied with the equipment for this information.

### 4.11.2 Determining scope

The amount of anchor rode (scope) to pay out depends on:

- the type of rode you're using;
- the weather (now and in the future);
- the bottom conditions (mud, sand, weed, grass, gravel, etc.);
- the range of the tide.

A chart of the anchorage will show the type of bottom and the tide range in the area. Avoid trying to anchor on rocky bottoms. The anchor may not be able to hold or it may get caught under a rock.

The key is to keep the angle of pull on the anchor as close to horizontal as possible. Heavy weather or difficult anchoring conditions demand more scope. Always keep in mind the extent of the arc or circle in which you'll swing in relation to other yachts in the anchorage.

In an area with a substantial tide range, you should consider the tide range in determining scope; at high tide you may not have enough rode out for the proper scope.

Rode: the rode is the line connecting the anchor to the yacht.

Rode length = (Foredeck Height + Water Depth) x Scope.

Scope: the scope is technically defined as the ratio of the rode length to the vertical distance from the foredeck to the sea floor.

Scope = Rode Length / (Foredeck Height + Water Depth)

Minimum scope is 5:1 for calm conditions; norm is 7:1; severe conditions may require 10:1.

### 4.11.3 Retrieving the anchor

To avoid overstressing the electric windlass, break out your anchor by powering up to it slowly, taking in the chain or rope as you go. When the foredeck is over the anchor, the windlass should be able to lift it vertically. If the anchor is still stuck, stop the windlass and snub the rode around the cleat/bitt or windlass (if chain). Then power the yacht forward slowly over the anchor until it breaks free. When the anchor is free, remove the rode from the cleat/bitt and try the windlass again. You know the anchor is free when the windlass is able to pull the rode and raise the anchor. Be careful not to damage your yacht's hull during this operation or ride over the anchor and foul the yacht's propellers with the rode. Do everything slowly and gently.

A muddy or weedy bottom condition may leave the anchor and chain very dirty. Use the seawater washdown provided on deck to clean the ground tackle while retrieving it.

Read **ANCHORING PRECAUTIONS** on the next paragraph.

#### 4.11.4 Anchoring precautions

**WARNING**

*The last ring of the anchor chain is fastened by a polyester rope, fixed to the anchor peak. In case you must leave the mooring suddenly or you cannot refloat the anchor, you can cut the rope.*

**CAUTION**

*Danger: when the windlass is operating, be extremely cautious of rotating parts; keep your feet, hands and the remote control cable at safe distance.*

**WARNING**

*Anchoring operations involve working with heavy equipment such as anchors and chains. These operations can pose hazards to personal safety. To avoid serious injury or death from improper handling or accidents, ensure that persons working with the windlass, anchors and chains and ropes are careful to keep a good footing on deck and that everyone is wearing shoes. Make certain that the anchor load is secured after unlocking the anchor prior to deploying it, and that the windlass wildcat tension is correctly adjusted. Persons involved with anchoring operations must take care to protect hands and fingers from the windlass gears and to avoid feet or legs being caught.*

**WARNING**

*The entire anchoring area must be free, in case of sudden variations of wind and/or current direction, especially in case of night anchoring. At night, before dropping the anchor, check that the white anchor light works. Before dropping the anchor, check the nautical charts: anchoring is prohibited in certain areas; in coral covered sea bottom, anchoring is unsafe and harmful to the environment; on rocky sea bottom, the anchor may get fouled or lost. Anchor the yacht with the engines running, both for safety reasons and to guarantee electrical power to the windlass. Check the anchoring point frequently.*

*The distance from obstacles or from other yachts must be greater than the length of the chain deployed (all round). At anchoring, leave the windlass electrical power on. Do not reverse the windlass rotation suddenly.*

**NOTICE**

*Before using the anchor, remove the chain stopper, check that the wildcat clutch is engaged properly and momentarily activate the anchor windlass from the helm station to check that it will operate when needed.*

### 4.12 FUELING THE YACHT

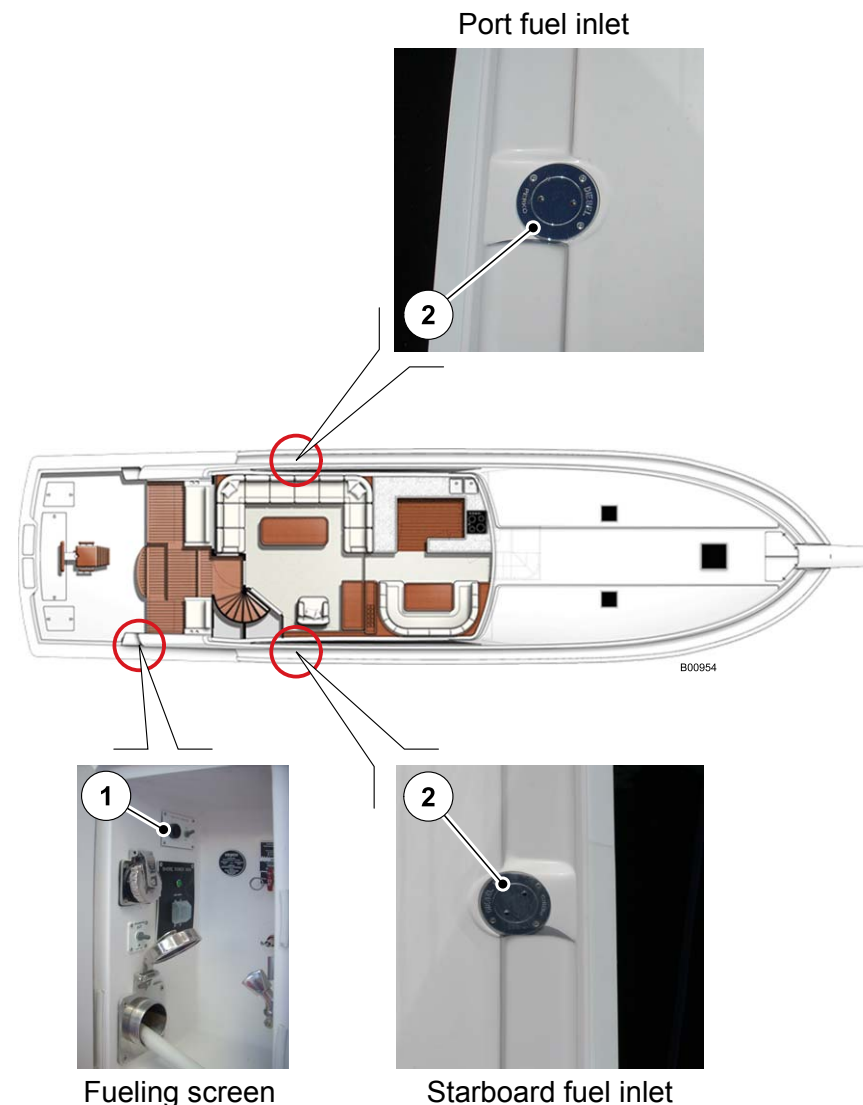
- Check that the yacht is securely moored and shut down all engines, including the generators.
- Extinguish any open flames and do not smoke when handling fuel or oils.
- The fuel tank (2) fill fittings are located on the fuel tank on both walk-arounds.



#### **WARNING**

*During refueling, open both fuel fill fittings and check the level by means of the fuel sight tube, located in the engineroom. To monitor the fuel level, open the valves placed on the tube top.*

- During refueling, verify the correct operation of the electric level indicator.
- Remove the fuel tank fill fitting cap; check that the fuel dispensing nozzle fits. Place the filling nozzle as far as possible into the filling pipe, through the rubber anti-splash sleeve on the flow cut-off. Fill the tank. Hold the nozzle steady while pumping. Never leave the filling operation unattended.
- Fuel is toxic to the environment. Prevent any spilling of fuel. Have absorbent materials within reach and promptly clean up any spills.
- Do not overfill the tank. Overfilling the tank will result in illegal, polluting fuel spillage from the tank vent. To avoid the tank overfilling, the stern cockpit is equipped with a panel (1) carrying a switch and a buzzer. At switch activation, the buzzer starts sounding when the tank is nearly full. By setting the switch to OFF, the buzzer stops.





- Reinstall the fuel tank fill cap carefully to ensure a tight seal that will keep out rainwater and spray.
- Do not dispose of fuel, oil or other petroleum products into the environment. Use only approved shoreside disposal facilities.
- If you are in doubt about the fuel quality at the fueling facility, see the engine manual for the specifications for diesel fuel quality.
- Check for the correct operation of the visual level indicator at least once a month.

During filling, the fuel flow produces foam that may cause a fuel overflow, giving the appearance of a full tank. Therefore, it is good to wait for a few minutes and then fill, in order to be sure the tank has been filled correctly. The special geometric shape of the tank allows also the decantation of the impurities or of water contained in the fuel.

#### NOTICE

*Follow the engine manufacturer's recommendation on fuel type. Diesel engines require very clean fuel. Keep filters clean.*

#### WARNING

##### EXPLOSION/FIRE HAZARD

- *Store flammable material in a safety-approved container. Never store flammable material in a non-vented space.*
- *Check bilge and engineroom for fumes.*
- *Keep ventilation system free of obstructions. Never modify the ventilation system.*
- *Inspect fuel system regularly for leaks.*

#### WARNING

*We suggest refueling upon return to the harbor, in order to allow fuel to cool down without condensating. Drain the tank, every 2 or 3 refuelings. Before refueling, wash the teak (if installed) with fresh water, in order to prevent the formation of fuel stains.*

#### DANGER

*Do not smoke during refueling.  
During refueling, do not leave the yacht unattended.  
During refueling, do not leave the engines running.*

#### ENVIRONMENT

*Dispose of fuel carefully: it is highly polluting.*



### **WARNING**

#### **EXPLOSION/FIRE/POLLUTION HAZARD**

*Fuel system connections that are too loose or too tight can leak, resulting in fuel loss, environmental pollution and explosion/fire hazard.*



### **WARNING**

*Carbon Monoxide Hazard - Ensure engine exhaust system is working properly. Carbon monoxide poison is extremely toxic.*

- *Exhaust system removes gases created by the engine and vents them aft.*
- *Inspect entire system for tightness on a frequent basis. Leaks may permit carbon monoxide exposure.*

### **Before & During Fueling - Checklist**

- fire extinguisher - close at hand
- mooring - yacht tied securely to fueling pier
- crew - at least one knowledgeable person present
- passengers - unnecessary people off boat
- engines - stopped
- electrical equipment - power off
- windows, doors, hatches - closed
- smoking material - extinguished
- trim - fuel weight distributed equally if more than one tank

### **After Fueling - Checklist**

- windows, doors, hatches - open
- fuel tank - secure fuel tank fill fitting cap
- spills - wipe spillage

## 4.13 PREVENTIVE MAINTENANCE

The yacht is fitted with sophisticated equipment and a number of systems that require periodic inspections and maintenance in order to operate safely and reliably. One of the factors that can cause failures is the intermittent use of the yacht and its equipment. Experience shows that the regular use of equipment helps maintain the utility and function of all machinery and equipment. Your yacht and its systems will thrive on regular use.

Daily checks and periodic routine and preventive maintenance are important for maintaining the efficiency and effectiveness of your yacht's equipment. Failure to perform these routine periodic maintenance schedules can result in the deterioration of the equipment's performance and lead to premature failures. Neglecting maintenance can lead to unexpected problems and unsafe conditions that will reduce your enjoyment of your yacht.

### NOTICE

*General information about ordinary maintenance tasks and maintenance scheduling is provided in this manual. For further information, refer to the specific equipment manufacturer's manuals.*

The maintenance schedule is based on time or running hour intervals, rather than a specific calendar. For example, if a maintenance task is scheduled every 100 hours or 3 months; such task must be repeated at 200 hours or after 6 months, at 300 hours or after 9 months and so on.

In case of a long inactivity period, e.g., winter, it is advisable to decommission the yacht. See the **Long-Term Lay-up** section in the **MAINTENANCE** chapter of this manual.

### 4.14 COLD WEATHER MAINTENANCE CAUTIONS

Periodically check that all equipment and machinery containing water is protected with the correct proportion of non-toxic antifreeze. If the outside temperature goes below 0 °C/32 °F, all fresh and seawater systems are at risk of freezing. Piping and hoses may rupture from freezing and this could lead to sinking the yacht.

Systems subject to risk of freezing include also the freshwater and saltwater cooling systems for engines and generators, the watermaker system, the freshwater system (cold and hot water piping, pumps and tanks), the screen washing system, toilet and waste systems (piping, pumps and black water tanks), air-conditioning pumps and piping, all seawater pumps and piping, icemakers and refrigerators, etc.

For more information on the maintenance and service needs of your yacht and its equipment, see the sections in this manual that reference the specific components, machinery and equipment manufacturer's manuals for information about special attention during freezing weather.

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5



## INSTRUMENTATION & EQUIPMENT

*INTRODUCTION*

---

*HOW TO USE THIS MANUAL*

---

*DESCRIPTION OF THE YACHT*

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*GETTING UNDERWAY*

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***INSTRUMENTATION & EQUIPMENT***

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*HELM STATION*

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*ON DECK*

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*PROPULSION SYSTEMS*

---

*HYDRAULIC SYSTEMS*

---

*ELECTRICAL SYSTEM*

---

*INTERIOR DETAILS*

---

***SAFETY DEVICES & EQUIPMENT***

---

*YACHT LIFTING & ONSHORE HANDING*

---

*MAINTENANCE*

---

*TROUBLESHOOTING*

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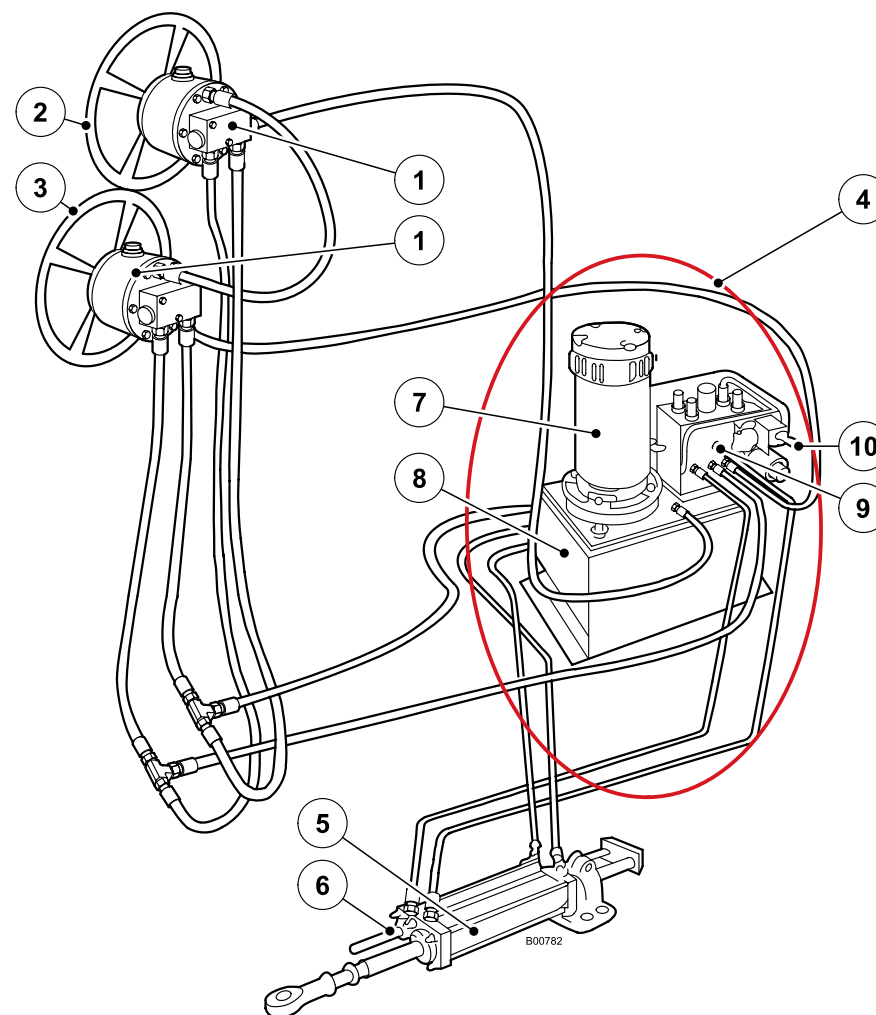
## 5.1 HELM SYSTEM

### 5.1.1 Description

The hydraulic power-steered helm system has been provided to make driving easier when underway, and to improve the safety and reliability of the system.

It consists essentially of an electric pump (1), of a double cylinder set and of a compact power unit (3). The two cylinders “tandem” have their rods stiffly connected for synchronized operation. The larger cylinder (4) controls the drive. The smaller cylinder (5) reacts to manual maneuvers and those of the autopilot. The drive is controlled by the drive wheel on the main helm station (2).

1. Drive wheel pump
2. Main helm station drive wheel
3. Second helm station drive wheel
4. Helm system power unit
5. Large hydraulic cylinder
6. Small hydraulic cylinder (power-steering)
7. Electric motor with oil pump
8. Tank
9. Control valve block
10. Solenoid valve block





### 5.1.2 Components of the system

#### Helm gear assy

The helm gear assy is installed in the helm gear compartment, it is accessible through the aft cockpit and consists of an hydraulic cylinder (1) and a power-steering one (2). These cylinders actuate the rudder arm (3) stiffly connected to the other one (4) by means of a coupling bar (5) allowing their simultaneous motion.

#### NOTICE

*Do not remove the safety guards on the rudder coupling system.*

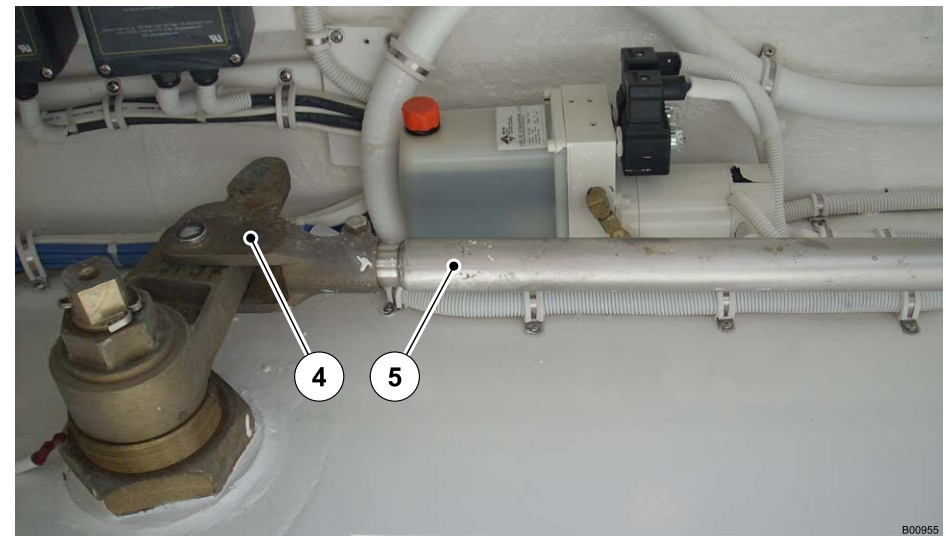
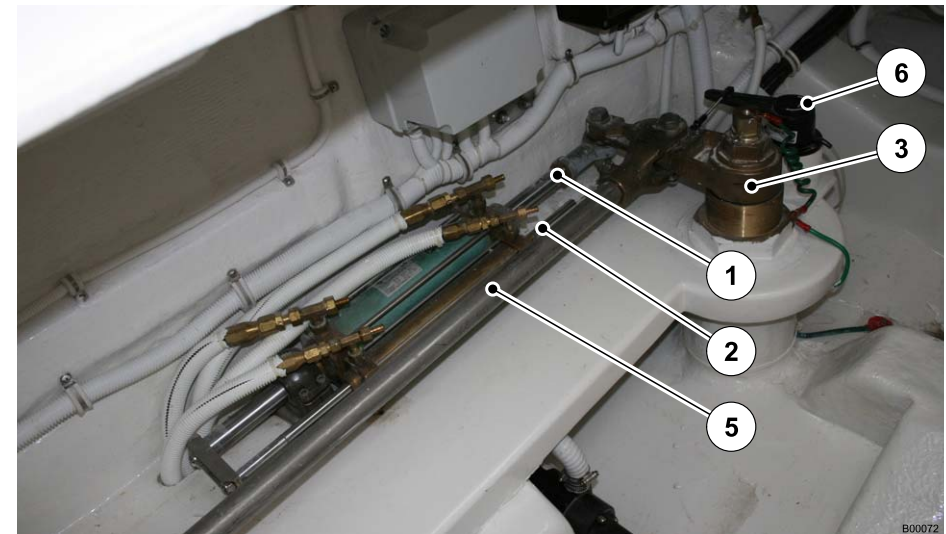
Near to the port rudder arm is installed the autopilot sensor (6) that allows assisted navigation by means of the autopilot.

#### Electro-hydraulic power unit

The helm system power unit is located in the engine room.

#### Autopilot compass

The transducer of the autopilot compass, is located in the bilge under the dunnages of the passageway.



**WARNING**

*If the yacht foredeck is facing a sudden obstacle, this can be avoided by turning with force the drive wheel. This operation allows to drive the yacht only until the drive wheel is firmly held. As soon as the drive wheel is released, the autopilot resumes immediately the yacht's course. If the obstacle is not too close, the best thing is to set the device in stand-by, so as to take over control of the yacht definitively. Once the hindrance has been bypassed, the device can be switched on again by resetting the course.*

**NOTICE**

*At high speed, the use of the autopilot is dangerous and not recommended. Anyway, pay always attention when underway and use of the above mentioned device.*

**WARNING****CONTROL HAZARD**

*Inspect and service the driving system regularly. An improperly serviced driving system may get damaged, causing the sudden loss of control, resulting in personal injury and property damage.*

- Follow instructions in owner's information packet for hydraulic driving system operation, for filling and bleeding procedures, for alternative means of operation, for service procedures, troubleshooting, fluid specifications, systems plans and replacement parts list.*
- Follow instructions in owner's information packet for mechanic driving system inspection and lubrication.*
- In a hydraulic system, the drive wheel movement pump hydraulic fluid into the lines until they reach a cylinder which transfers the movement to the rudder, aft drive; a tank holds the exceeding fluid; a valve protects against overexposure.*
- The operator must inspect the driving system frequently for a smooth, free and full range operation.*

### 5.1.3 Operation

The helm system operates in MANUAL, POWER STEERING, AUTO-PILOT mode, and the operations to switch over from one condition to another are extremely simplified.

#### Manual mode

In manual mode, the power unit motor is shut off and by turning the drive wheel you act directly on the power-steering cylinder; up to 10 complete turns of the drive wheel are needed for this operation, which is not extremely difficult.

#### Automatic mode

The automatic mode includes two sub-cases: power-assisted drive and autopilot drive. In both cases the motor of the power unit must be running. If the **autopilot is not connected**, the oil under pressure, activated by the pump of the drive wheel, moves the power-steering cylinder, that actuates the output devices of the power unit for helm cylinder actuation; up to 4 complete drive wheel turns are needed to move the wheel from end to end.

Once the **autopilot is connected**, it moves the power-steering cylinder with the same reactions described above.

#### Safety features

This system allows the manual navigation with all cases of predictable faults except for oil leaks. In case of power unit motor electric fault, of power unit pump mechanic fault and of control valve block fault, the manual mode is not disabled.

On the control valve block is installed an emergency red knob, connected to the control valve block and ensuring the manual operation of the helm system; at engine start the knob raises and the power-steering actuates, as soon as the engine shuts off, the knob lowers.

The low position of the knob corresponds to manual operation, should the knob remain arisen for whatever reason, so press it down manually.

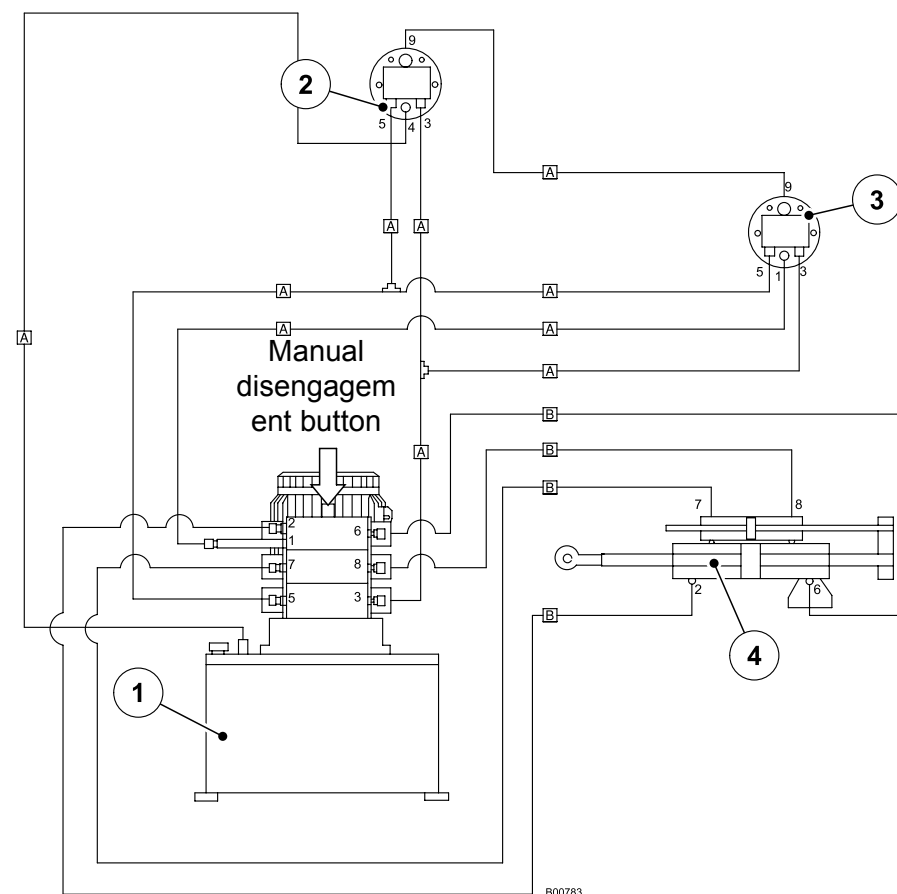


## 5.2 ELECTRO-HYDRAULIC HELM SYSTEM

### Helm system plan

The helm system can be controlled from the helm stations on the enclosed bridge and consists of following devices.

1. Hydraulic power unit with tank
1. Main helm station driving pump
2. Second helm station driving pump
3. Hydraulic cylinders



### 5.3 RUDDERS STROKE (TRAVEL) CHECK

- Turn on the helm system electrical power and activate the hydraulic power unit.
- Bring the rudders to the center. Observe the tiller angle indicator.
- Turn the drive wheel all the way to one side, counting the number of turns to the end of the stroke (travel). Observe the angle between the rudders and the centerline (keel line) of the yacht as shown on the tiller angle indicator.
- Turn the drive wheel all the way to the other side, counting the turns to the end of the stroke (travel). Observe the angle indicated on the tiller angle indicator.
- The number of wheel turns must be about the same in both directions. The angle between rudders and keel line should also be equal on each side.
- When the check is completed, bring the rudders to the center.

**CAUTION**

*In case of a remarkable imprecision or failure when checking the rudder stroke, contact the BERTRAM Customer Support.*

**CAUTION**

*The hydraulic power unit to operate must be electrically powered by the circuit breaker located on the main electric panel.*

## 5.4 DRIVING SYSTEM MAINTENANCE

### Filling

Cleanliness is important when handling hydraulic oil. Prevent contaminants from getting into the oil.

Fill the driving system at the hydraulic power unit tank. Remove the cap and fill tank to the higher level using the type of hydraulic fluid shown in the manufacturer's manual. Switch ON the driving system pump motor for a few minutes to fill the pipelines, then switch OFF the pump. After filling or adding hydraulic fluid, the system must be purged of air (bled).

To prevent hydraulic fluid from leaking into the bilge during air venting, use a  $\varnothing$  8 mm hose long enough to connect the air vents you are working on to the hydraulic power unit tank. If the components are too far apart, use shorter hoses into collecting containers, which can later be drained back into the hydraulic power unit tank.

### NOTICE

*After carrying out one or two complete purging cycles, switch OFF the pump motor and wait for about two hours before repeating. If air is trapped in the hydraulic fluid in the tank, you must wait for 24 hours. If the drive wheel is turned too quickly, the oil may foam. In that case, wait for 24 hours before bleeding the system.*

### Air vent (purging)

- Switch ON the pump motor.
- OPEN the two vent valves (1) and (2).
- Turn the drive wheel on the pump slowly, so that the cylinder rod can move in the direction shown by the arrow.
- Stop turning as soon as the hydraulic fluid drains from the vent valves (1) and (2) and is free of air (no bubbles).
- CLOSE the vent valves. Do not turn the drive wheel in the opposite direction.
- OPEN the vent valves (3) and (4).
- Now turn slowly the drive wheel in the opposite direction.
- Stop turning as soon as the hydraulic fluid drains from the vent valves (3) and (4) and is free of air (no bubbles).
- CLOSE the vent valves. Repeat the operation at least once, opening and closing the vent valves under pressure until no more air comes out.

## BERTRAM 700

Some days after the system filling, check the oil level frequently. If necessary, add more fluid.

As trapped air is released from the oil, the hydraulic fluid level may drop.

The presence of air in the driving pump is indicated by a bubbling sound at the purge points when the drive wheel is turned.



In case of emergency due to a failure of the hydraulic control unit or driving system, the hydraulic control unit can be cut-off and the rudders can be driven manually and directly.

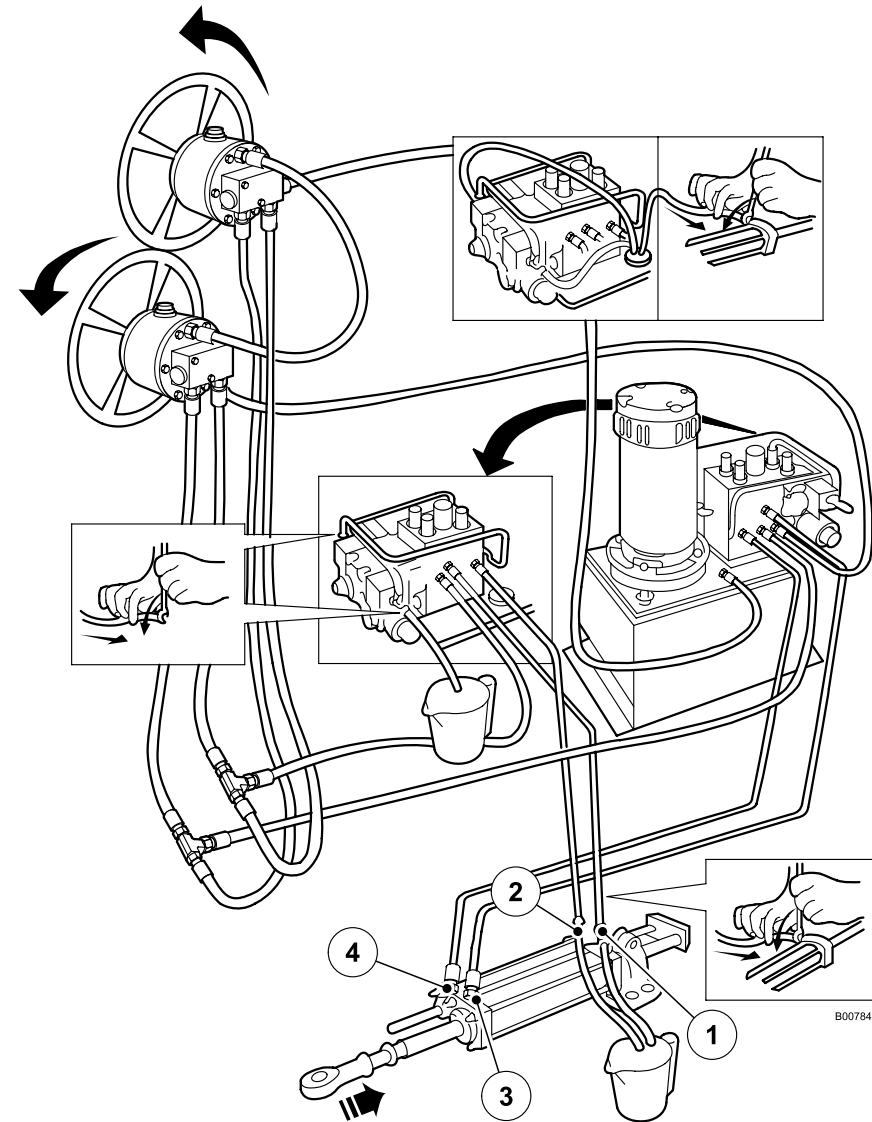
The valve (5) installed on the block of valves of the rudder power unit, sets in contact the delivery of the hydraulic circuit with the return.

By handling on this valve you can cut off the valves block and move the rudders freely.

**DANGER**

*These operations have to be performed only in emergency case and with the help of the crew.*

*As navigation without hydraulic drive is very dangerous, it is of utmost importance to keep a moderate speed and a careful steering until you reach the harbor or a rescue squad arrives.*





### Hydraulic oil level check

Check the oil in the hydraulic power unit tank and the helm system tank at weekly intervals. If additional pumps have been installed, also check the level of the tank pump located in the highest position.

### Hydraulic oil change

Change the hydraulic oil when suggested by the equipment manufacturer.



#### ENVIRONMENT NOTICE

*Hydraulic oil is toxic. Dispose of old oil and oily waste materials only in an approved toxic materials disposal facility.*

### Item

Electro-hydraulic helm system

### Maintenance

System plan

Check of the rudders stroke (at least once a month, anyway before navigation)

Filling

Bleeding

Oil level check

Oil change

### Notes and precautions

Top up, when necessary, the tank of the gear case with suitable oil.

Should frequent oil topping up be necessary, check all fittings and tubes to see if there is a leak.



## 5.5 TRIM TABS

### 5.5.1 Trim tabs operation

The yacht is equipped with hydraulic trim tabs, that can be controlled from the helm station. Each trim tab is driven by two hydraulic pistons. They allow you to adjust both fore-and-aft and athwartship trim of the yacht during cruising. They also affect the minimum planning speed.

The circuit is extremely simple. The electric signal coming from the control switches in the helm station, reaches the electric pump, located in the helm gear compartment.

### 5.5.2 Trim tabs general information

It is important to become sensitive to the use of the trim tabs. With practice, you will learn how their position affects the performance of the yacht and makes a difference in your comfort.

When you lower the trim tabs, you lower the bow toward the water. When you raise them, you raise the bow. Adjusting the trim tabs is done primarily to adjust the fore-and-aft and/or athwartships trim of the yacht.

### 5.5.3 Trim tabs basics

When the yacht is underway, adjust the tab positions to the angle that gives the best performance and comfort.

- When the loads aboard the yacht (fuel, supplies, passengers, etc.) are evenly distributed and the yacht sits level on its lines, you will use the trim tabs in a “normal” manner.

- When weight aboard the yacht is unevenly distributed, you may have to adjust the trim tabs individually to compensate for the uneven weight distribution.
- The optimum trim tab position, in calm sea conditions, provides maximum speed with minimum friction, because the trim tabs counteract the natural tendencies of the yacht as it moves through the water. You will learn the best positions for the tabs through experience.
- With average speed, pay close attention to the trim tabs.
- RAISE the trim tabs when going astern.
- At the end of cruising, or when you stop the yacht, push UP both selectors and wait for about 30 seconds to raise the trim tabs and retract the cylinder rods.

#### NOTICE

*The trim tabs are used to improve both passenger comfort and the yacht's performance.*

#### NOTICE

*RAISE the trim tabs when going astern to avoid damage to the tabs.*



#### WARNING

*The trim tabs, like the rudder, can result in sudden direction changes, if actuated too fast. It is therefore necessary to test how they respond very carefully and in open sea.*



### CAUTION

*Pay particular attention when using the trim tabs during fishing operations.*



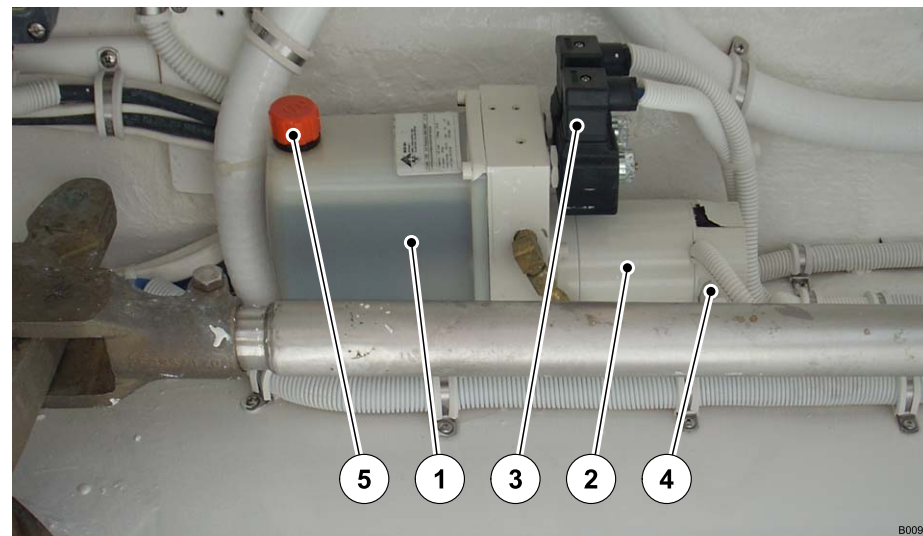
### WARNING

*A good practice when navigating is that of making sure that all passengers are sitting down, before carrying out any maneuver when operating the trim tabs, particularly when navigating at high speed.*

#### 5.5.4 Trim tabs oil level check

Prior to navigation, check the oil level visually.

1. Tank
2. Electric motor
3. Solenoid valves
4. Oil draining cap
5. Oil filling cap



#### 5.5.5 Trim tab oil change

Remove oil filling cap. Drain the oil by removing the drain cap. Screw in drain cap and proceed with oil filling through the open filler cap. Replace and tighten the fill cap when done.

### 5.5.6 Hydraulic Cylinder

To prevent the cylinder rods from acquiring barnacles that may damage the gaskets, keep the trim tabs control button on UP when not using the trim tabs. Periodically check the scraping ring on the rods for cracks and oil leaks.



#### Item

Trim tab system

#### Maintenance

Check oil level before navigation

Oil change

Hydraulic cylinders

#### Notes and precautions

Top up, when necessary, the tank of the gear case with suitable oil.

Should frequent oil topping up be necessary, check all fittings and tubes to find and remove the leak.



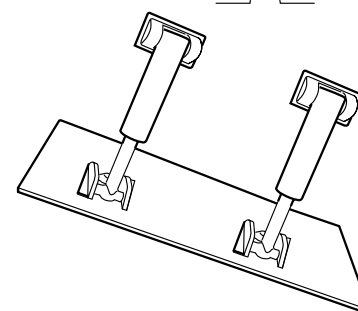
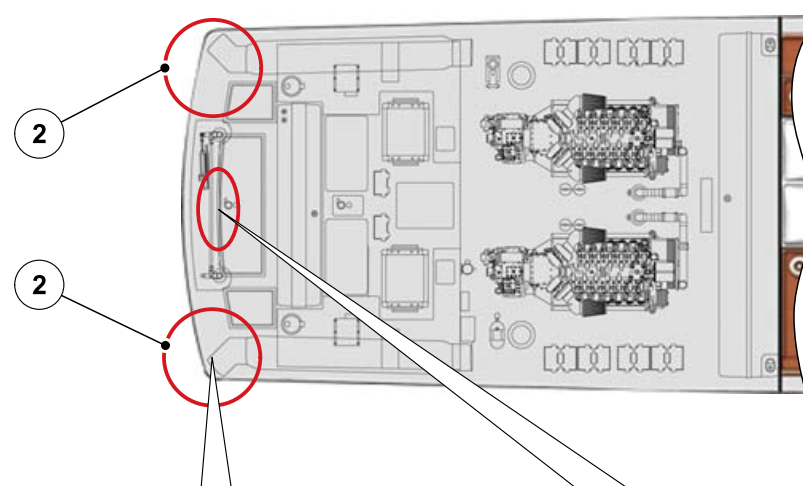
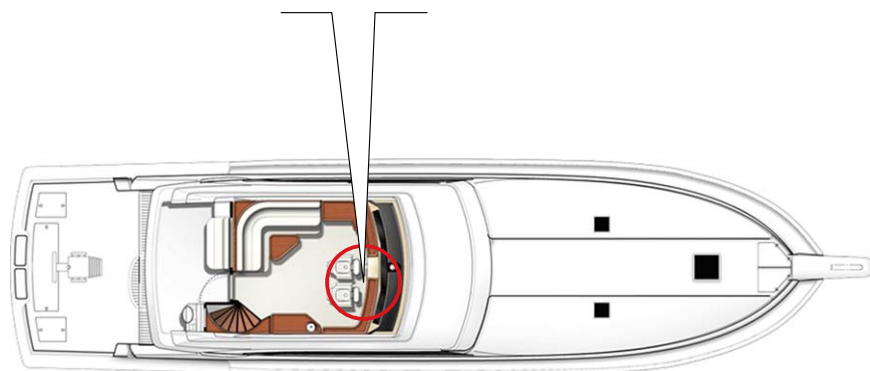
#### ENVIRONMENT

*Collect and dispose of waste oil according to safe environmental practices. Use an approved toxic material disposal facility.*

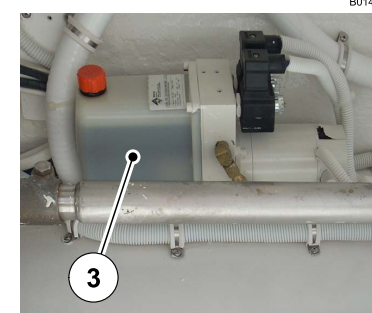
#### NOTICE

*Clean the cylinders periodically to remove possible spots of corrosion that can impair their efficiency. To reduce the risk of corrosion, retract the cylinder rods each time you leave or moor the yacht, and when the yacht is on land.*

Trim tabs controls in the helm station



Trim tabs



Trim stabilizer control unit

1. Trim tabs controls in the helm station
2. Trim tabs
3. Trim tab power unit

## 5.6 BOW THRUSTER

The bow thruster is operated by an electric motor and is activated from the helm station.

The bow thruster system has a dedicated oil tank.

A joystick operates the bow thruster controls that direct the lateral movement of the bow during docking and close-quarters maneuvering. The joystick movement corresponds to the desired direction of the bow.

For detailed information refer to Manufacturer's manual.



### WARNING

*For the continuous operation of the bow thruster, refer to the handbook delivered by the manufacturer.*

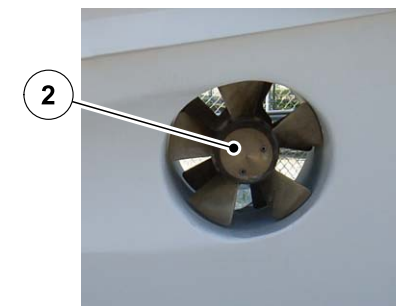
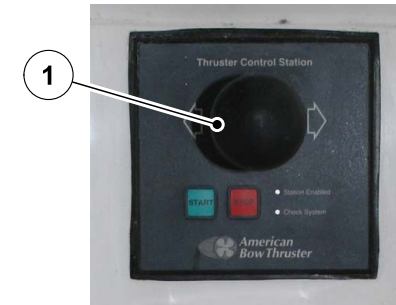


### DANGER

*When the bow thruster is not used, always disconnect the control unit.*

1. Joystick and power switch
2. Bow thruster

Bow thruster control from helm stations



Bow thruster



### CAUTION

*Remember to disconnect power supply to the system when maneuvers are ended or during normal navigation.*



### DANGER

*Always stop the bow thruster before undertaking inspection or maintenance tasks by disconnecting the switches and possibly also the battery terminals.*

## 5.7 ANTI ROLLING GYRO (OPTIONAL)

An innovative system consisting of an anti rolling gyro has been installed to reduce the irritating effect of the rolling due to the waves; this system is able to generate a rotation equal and opposite to the waves motion. The ARGs system combines a sensible reduction of the rolling both with yacht idle and in navigation, with low energy consumption, and does not involve the life quality onboard leaving performance unchanged. Thanks to these very important features the device can remain active overnight to maintain the best comfort on board, by damping nearly completely the irritating rolling.

The ARGs operation principle is based on a well known physical principle: a gyro tends to maintain its own vertical rotation axis parallel to gravitational acceleration.

When its position changes due to external reason, like the rolling generated by waves, it reacts with a rotation on a perpendicular axis against its own axis of rotation and against the listing cause.

With AR, this generated movement (rolling) is softened by the presence of a damper, calibrated expressly in compliance with the specifications of each yacht.

The system consists of two power units and of two anti rolling gyros placed in the generators' room.

For further information on their use and maintenance see the manufacturer manuals.



### WARNING

*The ARG is not watertight. If submerged by seawater it could get damaged.*



### WARNING

*Have the PERIODIC ARG INSPECTION carried out by specialized personnel every two years. Contact the CUSTOMER SERVICE for further information.*



### DANGER

*During operation the ARG components roll freely inside of their housing; therefore to open this housing would cause injuries or even death. In case of a fault, if it is necessary to open the housing for checking, have this operation performed by a skilled technician.*



### CAUTION

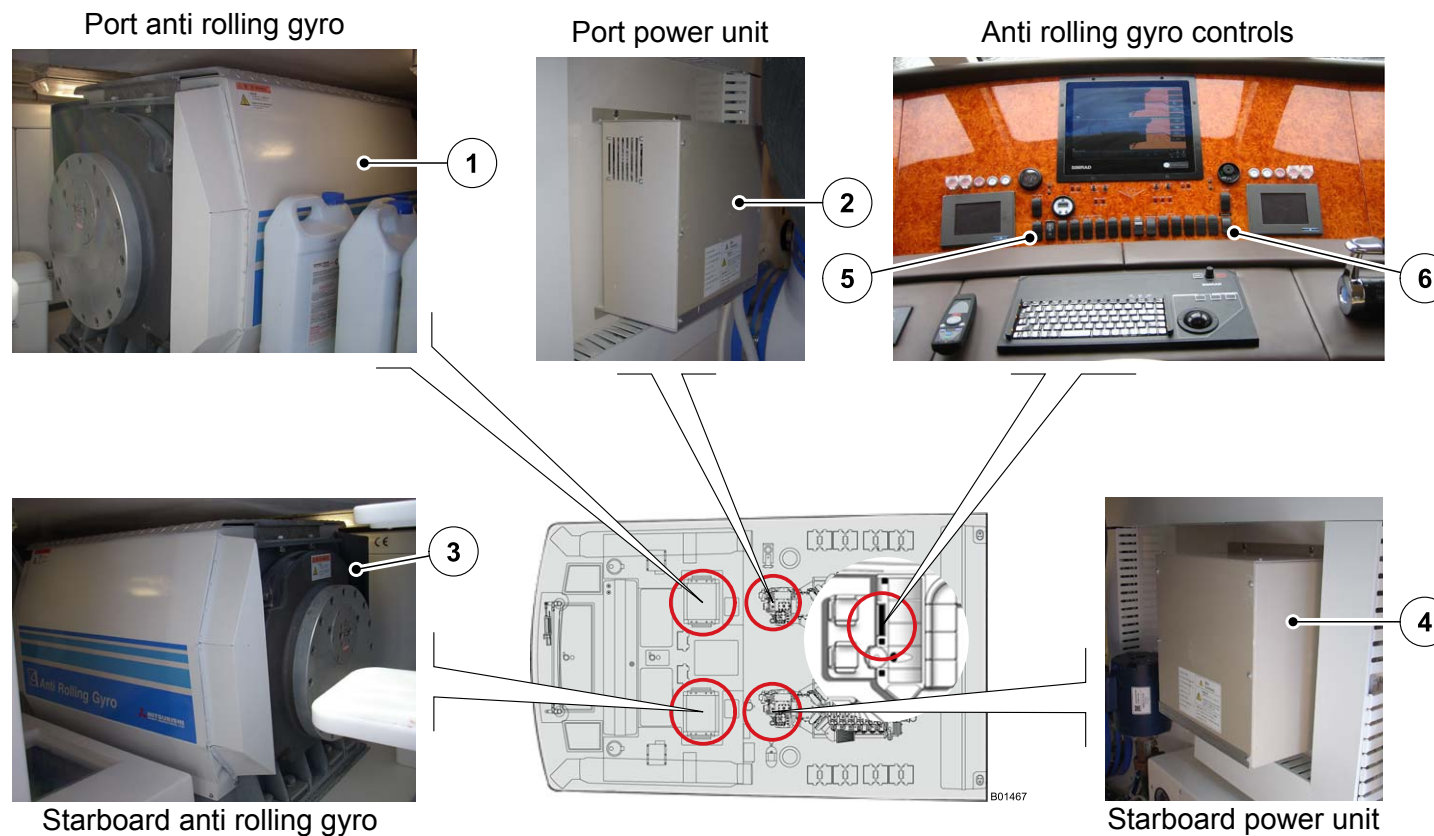
*During operation the ARG, the dampers and the housing overheat. Therefore, to avoid burns, do not touch the ARG during operation.*



### DANGER

*The ARG housing is not solid. Do not lay objects on the ARG or sit on it.*





1. Port anti rolling gyro
2. Power unit for port anti rolling gyro
3. Starboard anti rolling gyro
4. Power unit of starboard anti rolling gyro
5. Helm station anti rolling gyro controls



**NOTES:**

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6



HELM STATION

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*YACHT LIFTING & ONSHORE HANDLING*

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*MAINTENANCE*

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*TROUBLESHOOTING*

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### 6.1 HELM STATION

Your yacht is equipped with a main and a second helm stations, they are located on the enclosed bridge and includes several controls, instruments and navigation devices.

#### **NOTICE**

*Very general and limited information for first startup and initial operation of your yacht is included in this manual. For specific directions about the use of the individual systems and equipment, consult the manuals provided by the individual equipment manufacturers or contact the BERTRAM Customer Support.*

## 6.2 MAIN HELM STATION

To understand the control devices installed in the main helm station, refer to following main sections:

- A. Upper helm station console
- B. Lower helm station console
- C. Magnetic compass



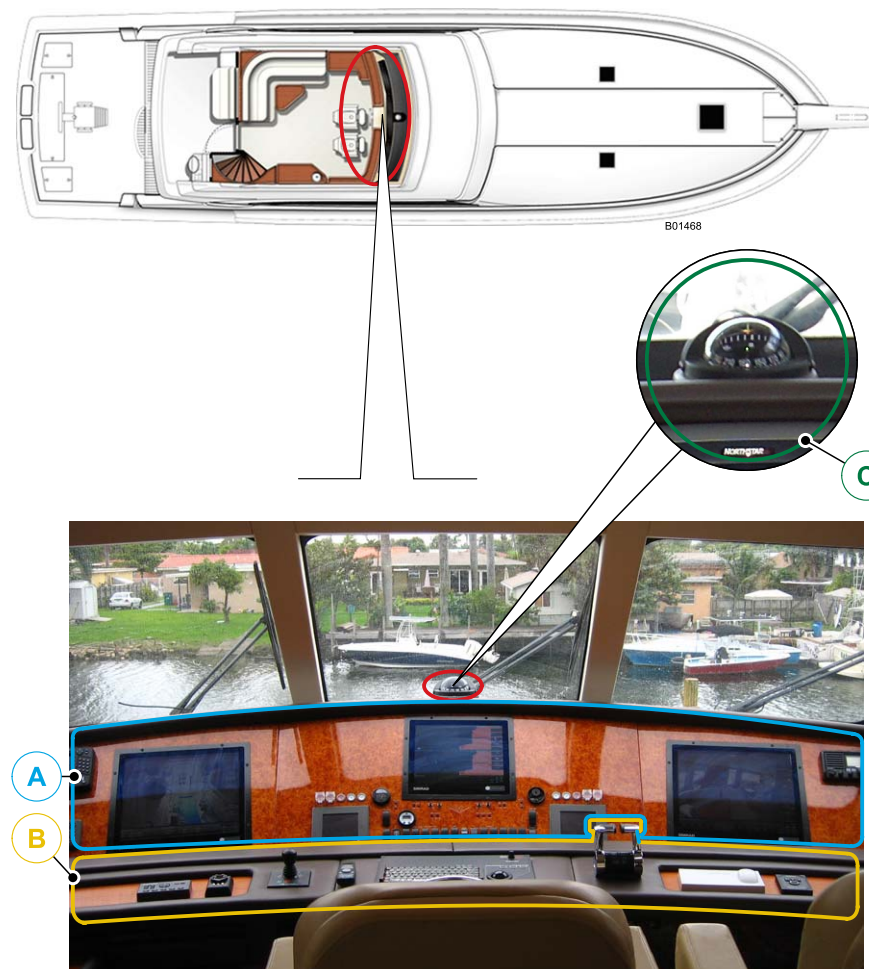
### CAUTION

*It is a good rule to keep the screens clean by washing them with wet and clean rags, avoid using chemical or abrasive products.*



### CAUTION

*During the yacht cleaning and washing take care not to throw water on the electrical components.*



### 6.2.1 SECTION A - Upper helm station console

#### 1. Radar/Chartplotter/Depth Sounder

Enables to display on the screen in a clear and quick way what is happening around the yacht, so as to facilitate navigation.

#### 2. Multifunctional screen

This screen allows to display the information received from GPS, chartplotter, radar or various water temperature sensors, wind data, etc.

#### 3.5.7. Multifunctional screen (optional)

This screen allows to display data and information received by the interfaced instruments like radar/chartplotter/depth sounder/sonar/TVCC.

#### 4. Port engine control panel

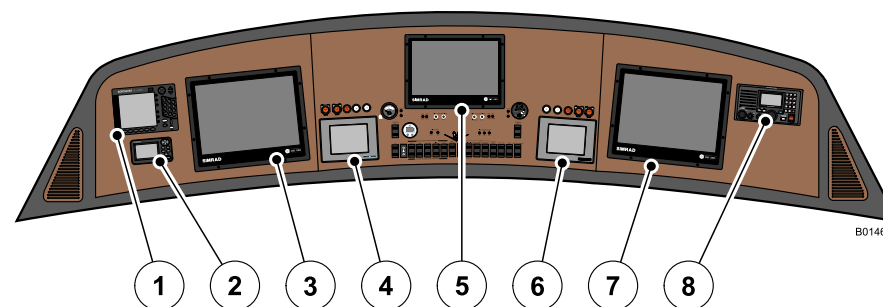
This panel allows to monitor all operating data of the port engine.

#### 6. Starboard engine control panel

This panel allows to monitor all operating data of the starboard engine.

#### 8. VHF-DSC Radiotelephone

This device allows to communicate with other vessels and ships. It is possible to carry out long distance connections with shore stations for emergency calls and to get in touch with the research and rescue teams. This instrument allows to carry out calls in DSC mode (Digital Selective Call).



**9. Port engine priority stop (OVERRIDE)**

If the engines are out of control, and an high quantity of alarms trips on, a special button (OVERRIDE) allows to clear all alarms and to let the engines run for a short time. This function is only intended as last resort to maintain maneuverability in hazardous situations. Therefore when you find yourself in such a situation, head to the nearest landing and inform immediately MTU customer support.

**10. Port engine emergency stop**

This button allows and indicates the emergency stop of the port engine.

**11. Port engine Combi signal acknowledgement**

This Combi signal indicates the presence of a fault on the port engine. It switches off only when the alarm cause has been removed. If pressed once, it will clear the signal buzzer, if pressed twice, it will acknowledge the fault. According to its activation if the signal light: FLASHES - the unrecognized fault waits to be processed.

IS ON - the recognized fault waits to be processed (the cause is still active).

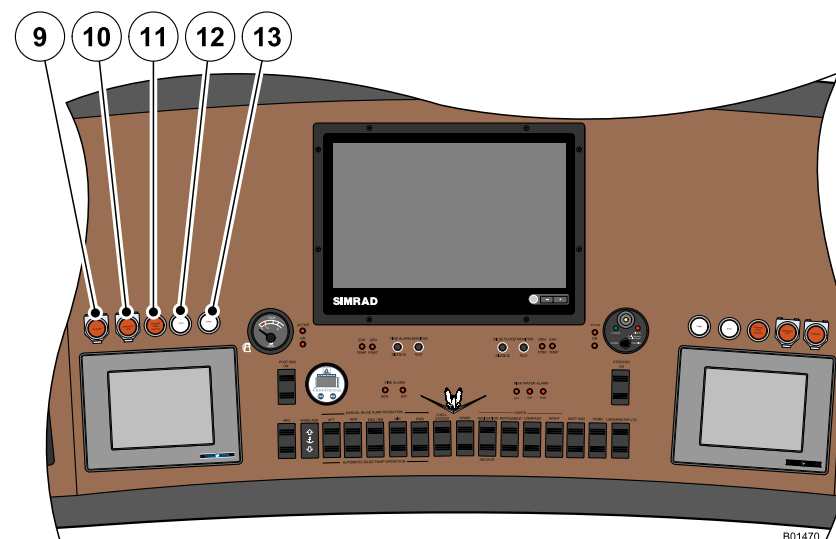
IS OFF - no fault is waiting to be processed.

**12. Port engine stop button**

This button allows and indicates the port engine stop.

**13. Port engine start button**

This button allows and indicates the port engine start.



**14. Starboard engine start**

This button enables and indicates the start of starboard engine.

**15. Starboard engine stop button**

This button allows and indicates the stop of starboard engine.

**16. Starboard engine Combi signal acknowledgement**

This Combi signal indicates the presence of a fault on the starboard engine. It switches off only when the alarm cause has been removed. If pressed once, it will clear the signal buzzer, if pressed twice, it will acknowledge the fault. According to its activation if the signal light: FLASHES - the unrecognized fault waits to be processed.

IS ON - the recognized fault waits to be processed (the cause is still active).

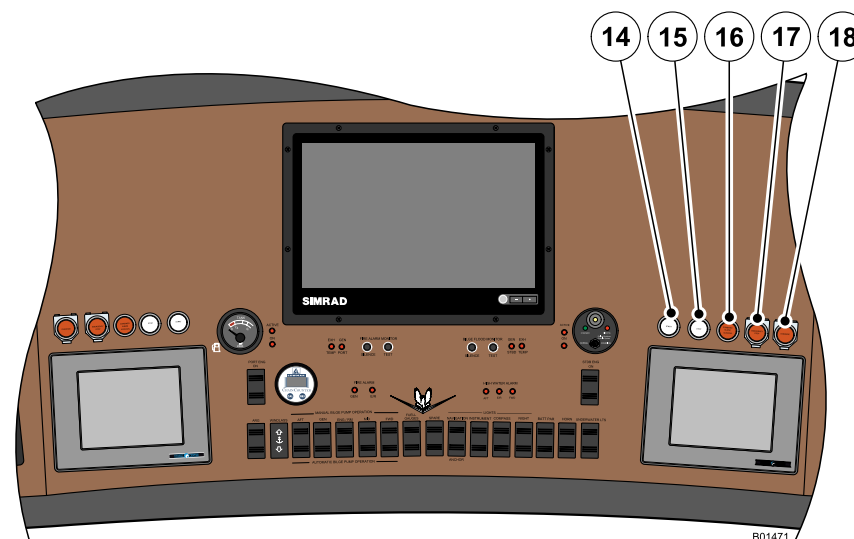
IS OFF - no fault is waiting to be processed.

**17. Starboard engine emergency stop**

This button allows and indicates the emergency stop of the starboard engine.

**18. Starboard engine priority stop (OVERRIDE)**

If the engines are out of control, and an high quantity of alarms trips on, a special button (OVERRIDE) allows to clear all alarms and to let the engines run for a short time. This function is only intended as last resort to maintain maneuverability in hazardous situations. Therefore when you find yourself in such a situation, head to the nearest landing and inform immediately MTU customer support.





**19. Fuel level gauge**

This gauge shows the fuel level in the tank.

**20. Port engine ON/OFF switch**

This button allows to stop or to start the port engine.

**21. Available**

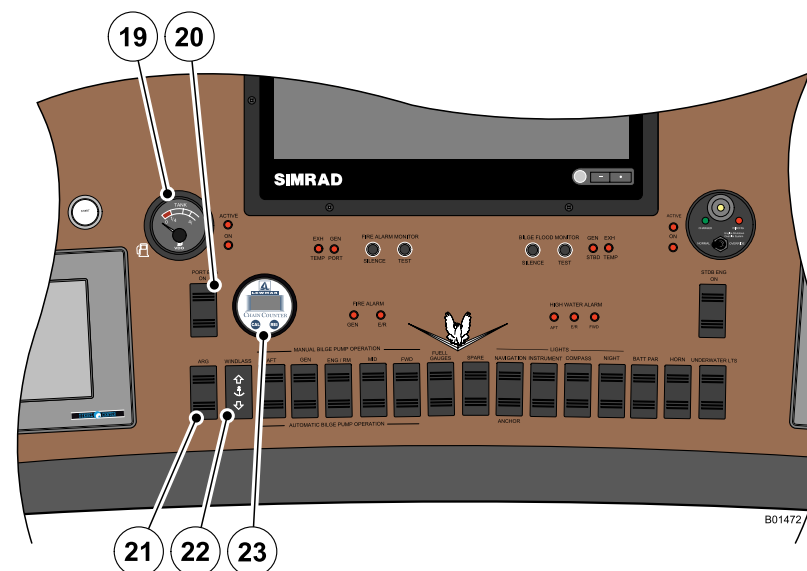
Switch available for auxiliary systems.

**22. Anchor windlass control**

This switch enables the activation of the anchor windlass from the helm station.

**23. Digital chain counter (optional)**

This device activates the anchor windlass and displays at the same time the length of the chain deployed, by means of a graphic display at liquid crystals.



**24. Port engine exhaust signal light**

This light indicates high temperature inside of port engine exhaust ducts.

**25. Port generator light**

This light indicates that the port generator is running.

**26. Squelch button for firefighting alarm signal**

This switch allows to disconnect the fire hazard signal buzzer.

**27. Test button to signal a fire**

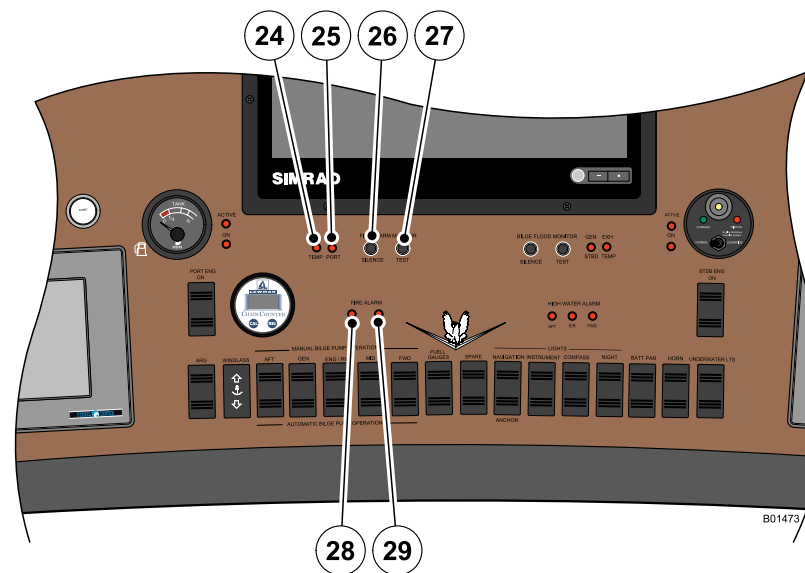
The test button is used to verify the correct operation of each signal light of the panel. When using the test button, all LEDs must be ON and the buzzer must sound to confirm the correct operation of the firefighting system. When releasing the button all LEDs must go out and the buzzer must clear off.

**28. Generator room bilge flood signal light**

This light indicates the flood of the bilge in the generator room.

**29. Engineroom bilge flood signal light**

This light indicates the flood of the bilge in the engineroom.



**30. Squelch button of bilge flood signal**

This switch allows to disconnect the bilge flood signal.

**31. Test button to bilge flood signal**

The test button is used to verify the correct operation of each signal light of the panel. When using the test button, all LEDs must be ON and buzzer must sound to indicate the correct operation of the bilge signal system. When releasing the button all LEDs must go out and the buzzer must clear off.

**32. Starboard generator light**

This light indicates that the starboard generator is running.

**33. Starboard engine exhaust signal light**

This light indicates high temperature inside of starboard engine exhaust ducts.

**34. Aft bilge flood signal light**

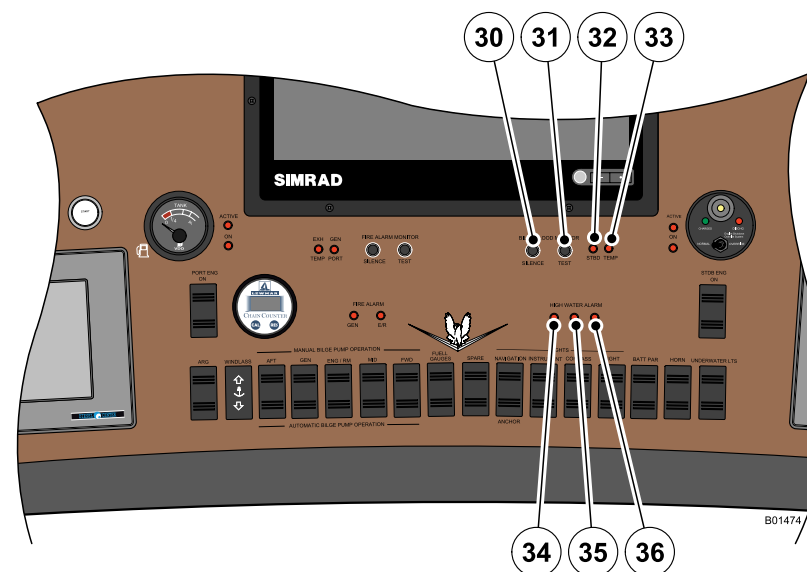
This light indicates the flood of the aft bilge.

**35. Mid yacht bilge flood signal light**

This light indicates the activation of the mid yacht flood signal.

**36. Fore bilge flood signal lamp**

This lamp indicates the flood of the fore bilge.



**37. Aft bilge pump switch**

This switch allows the manual activation of the aft bilge pump. If the light is on, this means that the pump is operating.

**38. Generator room bilge pump switch**

This switch allows the manual activation of the bilge pump in the generator room. If the light is on, this means that the pump is operating.

**39. Engineroom bilge pump switch**

This switch allows the manual activation of the bilge pump in the engineroom. If the light is on, this means that the pump is operating.

**40. Amidship bilge pump switch**

This switch allows the manual activation of the amidship pump. If the light is on, this means that the pump is operating.

**41. Fore bilge pump switch**

This switch allows the manual activation of the fore bilge pump. If the light is on, this means that the pump is operating.

**42. Fuel level switch**

Allows the activation of the analog fuel level gauge.

**43. Available**

Switch available for auxiliary systems.

**44. Anchor riding and navigation switch**

This switch turns on the anchor riding or the navigation lights.

**45. Instruments backlight switch**

This switch turns on the instruments backlighting.

**46. Switch for magnetic compass backlighting**

Allows the backlighting of magnetic compass.

**47. Night light switch**

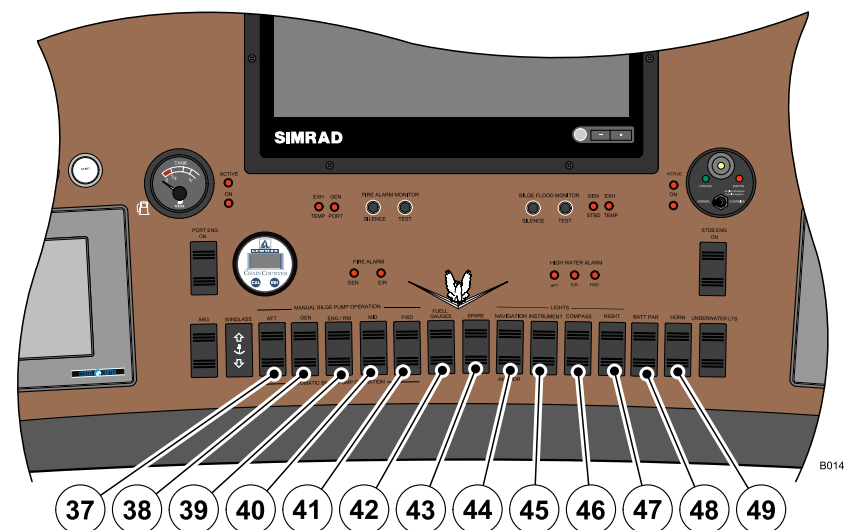
This switch allows the activation of the instrument lights.

**48. Parallel switch**

This switch allows parallel connection of the user/engine batteries to supply additional power for starting the engines. This happens only if the batteries are not sufficiently charged.

**49. Horn switch**

This switch allows the activation of the horn.



**50. Firefighting signal panel**

Displays the warning lights connected to the firefighting system in the engineroom and includes the NORM/OVERRIDE switch.

**51. Starboard engine ON/OFF switch**

This switch allows to start or to stop the starboard engine.

**52. Underwater lights switch**

This switch allows the activation of the underwater lights.



### 6.2.2 SECTION B - Lower helm station console

#### 1. Sonar power unit (optional)

Allows to monitor the sonar screen.

#### 2. Trim tabs control panel

This panel carries the switches for trim tabs activation.

#### 3. Swinging searchlight control panel (optional)

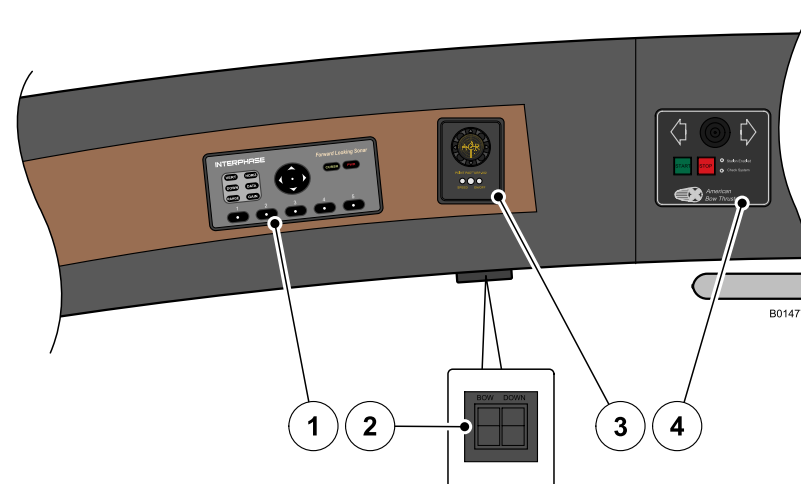
This panel allows to maneuver the motorized searchlight in front of the enclosed bridge windshield.

The panel carries following buttons:

- ON/OFF: button switching on/off the motorized searchlight (LED lights up);
- SPEED: allows to vary the searchlight rotation speed (high or low);
- STARBOARD & PORT ARROWS: they allow to turn the searchlight in both direction;
- UP & DOWN ARROWS: they allow to raise or to lower the searchlight.

#### 4. Bow thruster control panel

This contains the controls for the bow thruster.



# **5. Multifunctional screen power unit (optional)**

This power unit allows to monitor the multifunctional screen.

# **6. Drive wheel**

By turning the drive wheel you actuate an hydraulic pump that operates the piston located in the helm gear compartment, this in turn is connected to the rudder and allows to drive the yacht.

# **7. Heads block (levers)**

This block drives, by means of electric signals, the revolutions of the propulsion engines and the gearbox speeds.

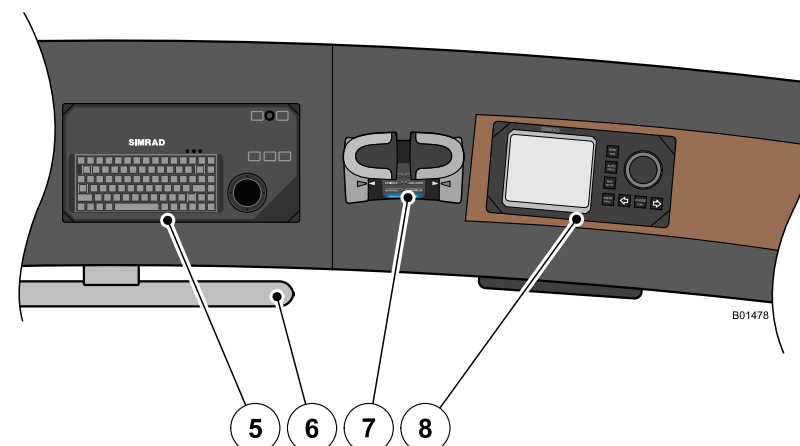
# **8. Autopilot**

The autopilot functions are controlled by the simple pressure of the keys. Each mode key is identified with the primary function indicated in large text and the secondary function in smaller text. For more information, consult the Manufacturer's manual.



## **WARNING**

*If the yacht foredeck is facing a sudden obstacle, this can be avoided by turning with force the drive wheel. This operation allows to drive the yacht only until the drive wheel is firmly held. As soon as the drive wheel is released, the autopilot resumes immediately the yacht's course. If the obstacle is not too close, the best thing is to set the device in stand-by, so as to take over control of the yacht definitively. Once the hindrance has been bypassed, the device can be switched on again by resetting the course.*

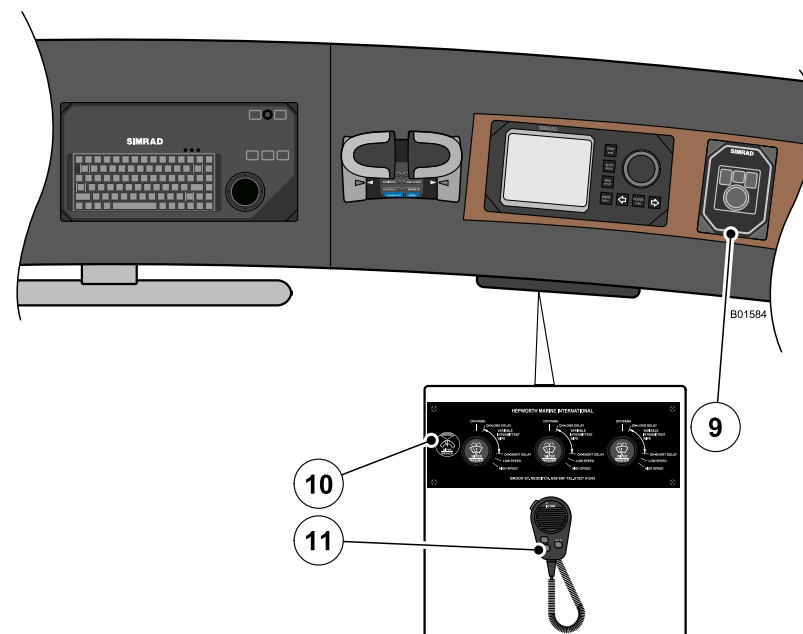


**9. Trackball for multifunctional screen (optional)****10. Screen wiper control panel**

The panel carries several buttons for the screen wiper control. Each button allows to activate and to adjust the screen wiper speed and to control the screen washer pump.

**11. VHF-DSC microphone**

VHF microphone with remote control function on channels and output power.





### 6.2.3 SECTION D - Magnetic compass

A magnetic compass installed on the console of a yacht is unavoidably close to the magnetic fields produced by the electric and electronic systems on board. This condition is called “variation”. You must have an expert technician to adjust the variation of the compass and to provide a detailed deviation schedule. This process is called “compass compensation” or “compass adjustment”.

To eliminate the compass errors due to its position, carry out the compensation after the yacht launch or when the compass is replaced. Never approach steel, iron, or other ferrous metals to the compass (e.g. tools, keys, batteries, etc.). Ferrous metals near the compass will affect its readings, making it unreliable. Keep the area around the compass clear of unnecessary items.

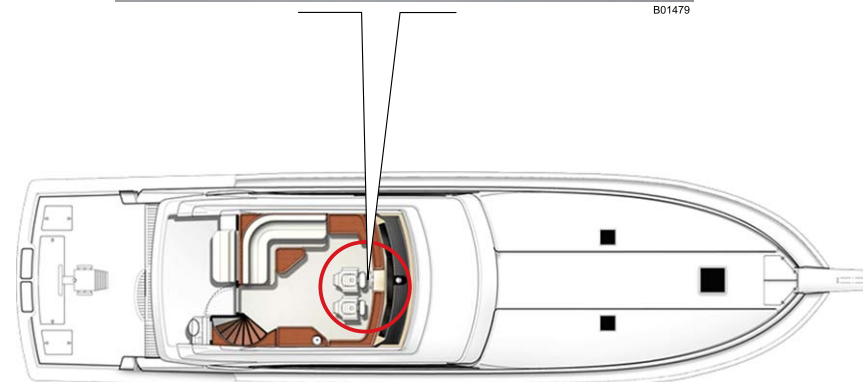
#### NOTICE

*The compass delivered with the yacht is not compensated for variation or deviation. Any electrical or metallic items located near the compass may influence the accuracy of the compass. The compass compensation is the yacht owner's responsibility. It should also be performed after any installation of any additional electronic equipment or after a prolonged period of mooring or storage ashore. Compensation should be performed only by an authorized and qualified compass adjuster.*

*Since a compass seldom can be corrected to zero deviation on all headings, the technician who compensates your compass should give you a deviation card showing the correction to be applied in navigational calculations. Keep this card at the helm station at all times.*



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### Compass compensation

Read carefully the manual delivered by the manufacturer.

#### NOTICE

*Never unscrew for any reason screws and filling caps (1). The only screws that may be turned are the adjusting screws (2) by means of the non-magnetic screwdriver provided. When the adjuster's screw slot (2) is horizontal, the compensation is neutral. When the slot is vertical, the compensation is at its maximum. This operation must be carried out only by a trained compass adjuster.*

#### NOTICE

*Verify the operation and the deviations at least once a month. If necessary, have a new compensation of the compass turns carried out.*

Objects in the immediate vicinity influence every compass. Deviation is the angular difference between the reading your compass provides as installed and the reading it would provide if the objects were not there.

Deviation is expressed in degrees East or West of true North. It varies with the heading of your vessel, because as your vessel turns, the position of the objects that affect the compass change relative to magnetic North.

You must record deviation of the compass on a compass deviation card and place it near the compass. You must record the deviation for each individual compass that you use, because the position of each compass relative to the materials around it determines the deviation.



Your compass is fitted with a set of compensation, or adjustment, screws to minimize these errors. It is seldom possible to compensate for all compass deviation errors, since this type of error varies as the heading of your vessel varies. However, the error should remain the same for any given heading, as long as no changes are made to instruments and electronic fixtures near the instrument panel.

There is a vertical mark on the compass called a “lubber line”. This line was oriented when your compass was installed, so an imaginary line drawn from the compass pivot point to the lubber line will be parallel to the longitudinal axis of your vessel. Thus, your vessel’s course is the compass card reading below the lubber line.

### 6.3 SECOND HELM STATION

#### 1. Port engine revolution counter

Indicates the revolutions number of the port engine.

#### 2. Port engine Combi signal acknowledgement

This Combi signal indicates the presence of a fault on the port engine. It switches off only when the alarm cause has been removed. If pressed once, it will clear the signal buzzer, if pressed twice, it will acknowledge the fault. According to its activation, if the signal light: FLASHES - the unrecognized fault waits to be processed.

IS ON - the recognized fault waits to be processed (the cause is still active).

IS OFF - no fault is waiting to be processed.

#### 3. Port engine emergency stop

This button allows and indicates the emergency stop of the port engine.

#### 4. Port engine priority stop (OVERRIDE)

If the engines are out of control, and an high quantity of alarms trips on, a special button (OVERRIDE) allows to clear all alarms and to let the engines run for a short time.

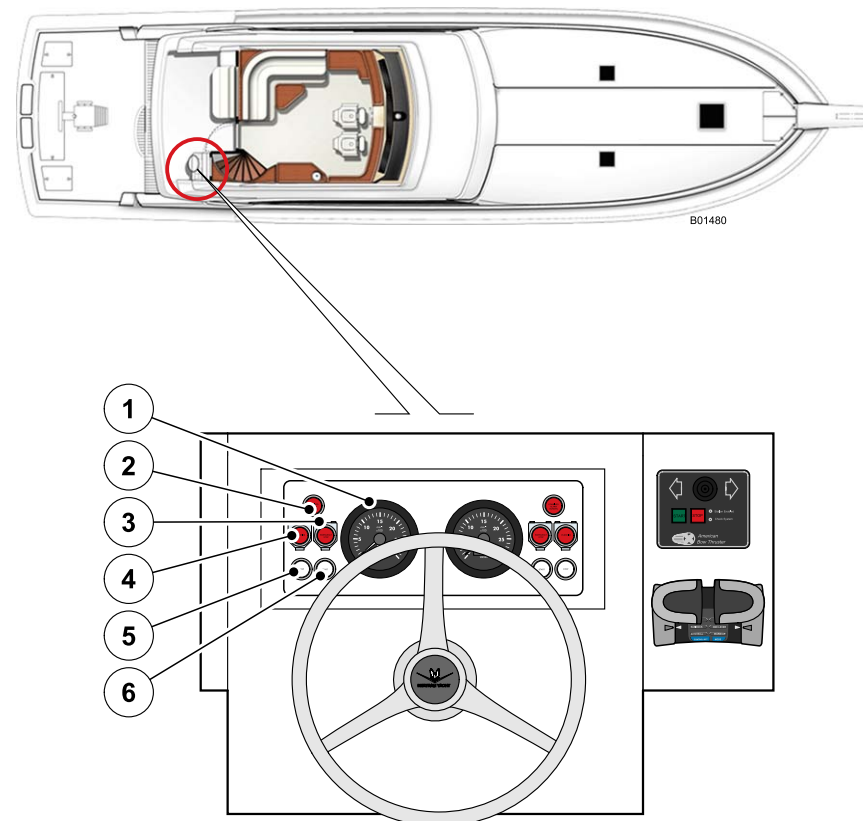
This function is only intended as last resort to maintain maneuverability in hazardous situations. Therefore when you find yourself in such a situation, head to the nearest landing and inform immediately MTU customer support.

#### 5. Port engine stop button

This button allows and indicates the port engine stop.

#### 6. Port engine start button

This button allows and indicates the port engine start.



### 7. Starboard engine revolution counter

Indicates the revolutions number of the starboard engine.

### 8. Starboard engine Combi signal acknowledgement

This Combi signal indicates the presence of a fault on the starboard engine. It switches off only when the alarm cause has been removed. If pressed once, it will clear the signal buzzer, if pressed twice, it will acknowledge the fault. According to its activation, if the signal light: FLASHES - the unrecognized fault waits to be processed.

IS ON - the recognized fault waits to be processed (the cause is still active).

IS OFF - no fault is waiting to be processed.

### 9. Starboard engine emergency stop

This button allows and indicates the emergency stop of the starboard engine.

### 10. Starboard engine priority stop (OVERRIDE)

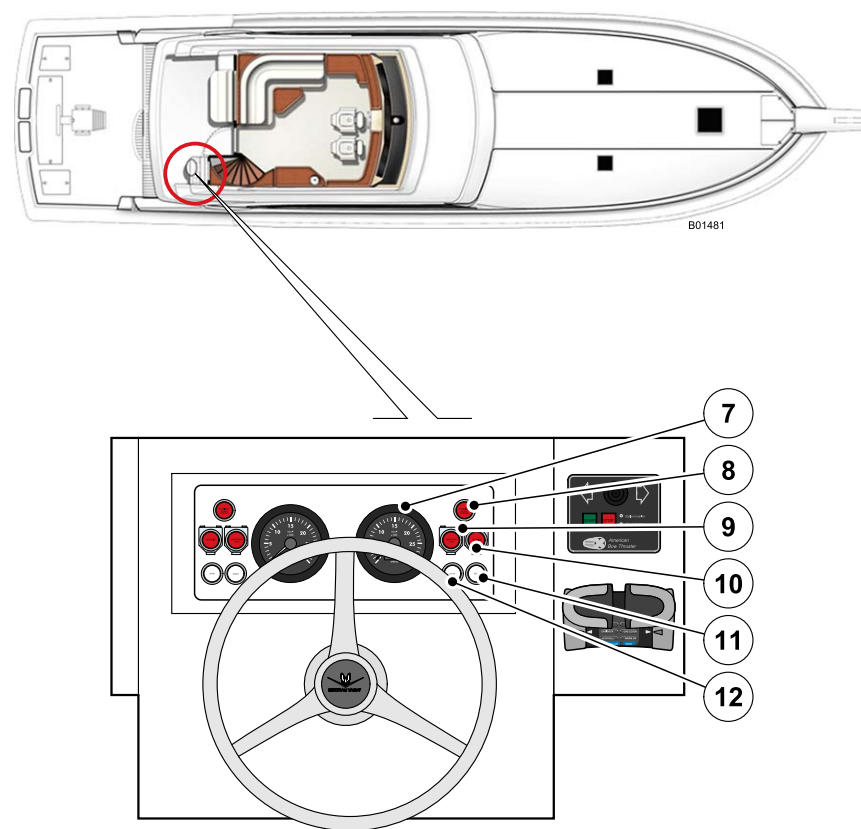
If the engines are out of control, and an high quantity of alarms trips on, a special button (OVERRIDE) allows to clear all alarms and to let the engines run for a short time. This function is only intended as last resort to maintain maneuverability in hazardous situations. Therefore when you find yourself in such a situation, head to the nearest landing and inform immediately MTU customer support.

### 11. Starboard engine stop button

This button allows and indicates the stop of starboard engine.

### 12. Starboard engine start

This button enables and indicates the start of starboard engine.



**13. Bow thruster control panel**

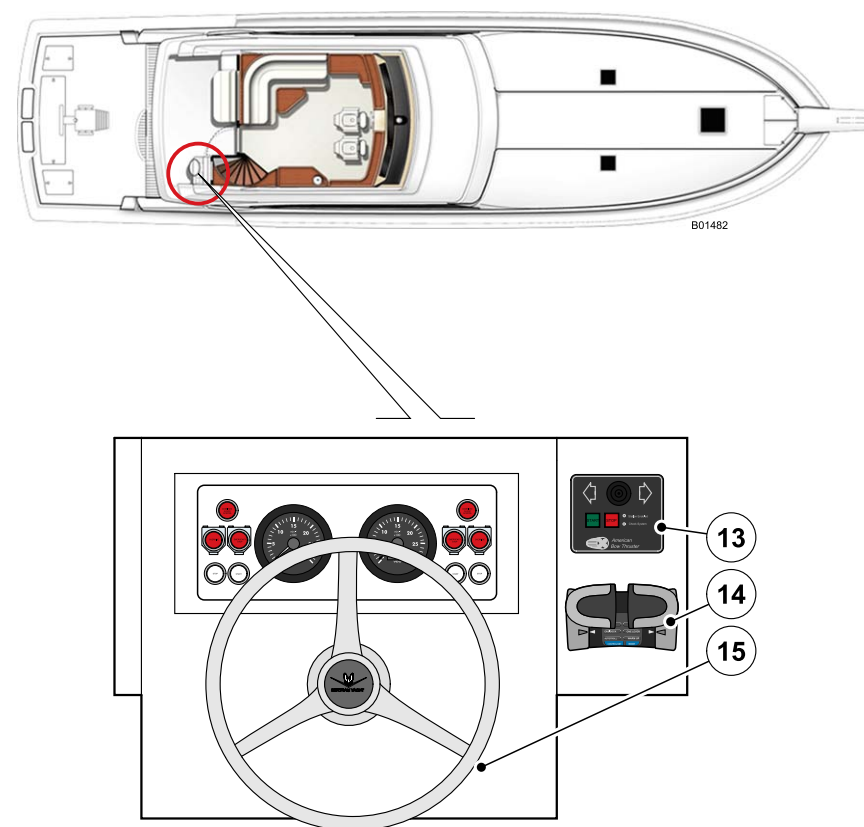
This contains the controls for the bow thruster.

**14. Head block**

This block monitors, by means of electric signals, the revolutions of the propulsion engines and the speeds of the gearboxes.

**15. Drive wheel**

By turning the drive wheel you actuate an hydraulic pump that operates the piston located in the helm gear compartment, this in turn is connected to the rudder and allows to drive the yacht.



## 6.4 HEADS BLOCK

The heads block is a system designed to control through electric signal the revolutions of the engines and the gearbox speeds. The system may consist of a single block carrying the heads and the selector switches or of two separate heads, each one installed at the side of the drive wheel, and of a separate panel.

In both cases the heads can be moved to three detents:

1. **Neutral:** in this position, the gearbox clutch is disengaged and the propulsion engines turn at idle speed;
2. **Ahead/astern:** in this position the gearbox clutch is engaged to “ahead” or “astern” and the engines turn at idle speed;
3. **Maximum revs:** indicates the maximum speed detent for ahead and astern gear.

The system between the positions (2) and (3) changes the engine revolutions continuously.

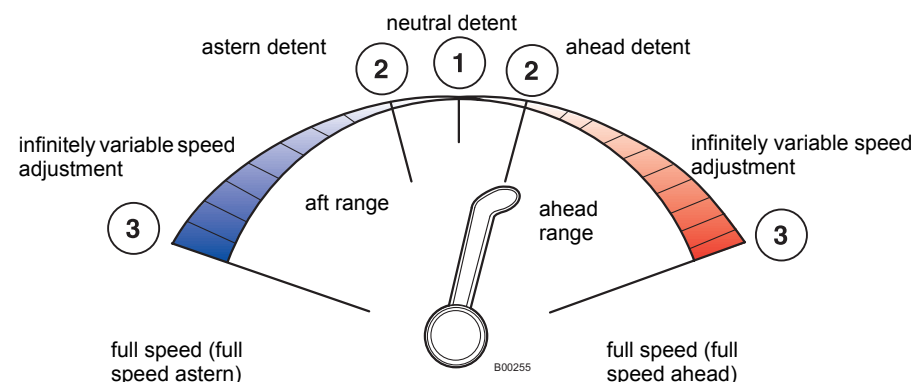
The operation principle is different for the two modes: standard and trolling.



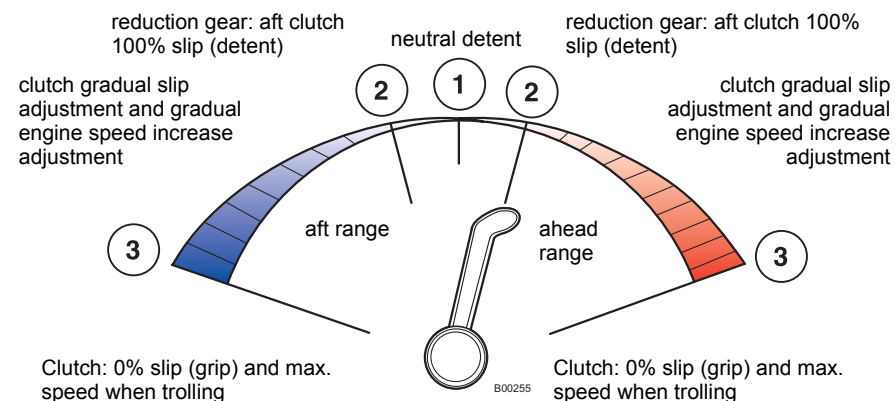
### WARNING

*In “trolling” mode (optional) the function of the heads block changes according to the standard mode.*

Standard mode plan



Trolling mode plan (optional)





### Steps for taking over the control

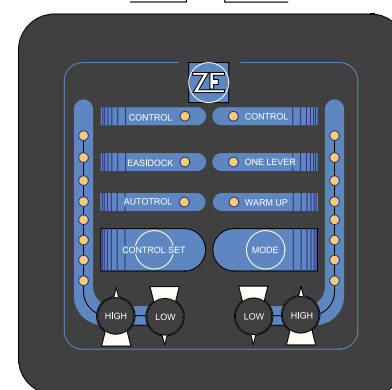
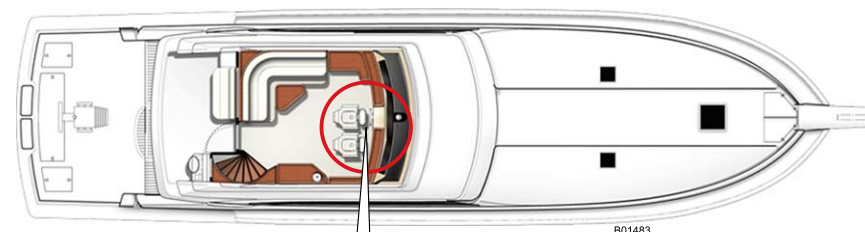
- Set the control heads to the central idle position. The station cannot take over the control with heads in different positions. The acoustic start sequence is released.
- Press **CONTROL/SET**. The **CONTROL** LEDs light up green steadily, to indicate that the station has taken over the control and that the operator is engaging the idle control.



### CAUTION

*The next shifting of the control head will engage the gear.*

- Start the engine while engaging the idle control. If the control heads are not set to idle, the start interlock switch will prevent the engines from starting.
- Shift the heads to ahead and astern detent. The transmission starts operating and the **CONTROL** LEDs lights up red steadily, to indicate that the station has taken over the control and that the operator is engaging either the ahead or the astern gear. For more information see the Manufacturer's manual.



**Advanced control modes**

SmarCommand is equipped with several advanced control modes:

- **EASIDOCK**: mode giving the answer for a safe action of the gearbox and ensuring a maneuverability easy and accurate during the mooring in confined space.
- **AUTOTROLL**: mode keeping the propeller rpm constant, when a complete range of shaft speed controls is available.
- **WARM UP**: mode increasing the engine rpm when the transmission is stalling on idle.
- **ONE LEVER**: mode allowing to activate several propellers with full gear change and acceleration control by means of a one lever control.

**High and low buttons** allow you to control the shaft rotation (engine RPM) through the use of SmartCommand Trolling System.

In the Cruise Mode, the up and down push buttons allow to move to at least five percent of Trottle Command. By pressing the buttons (high or low), the command can be incremented or decremented up to twenty (20) percent.

The Autotroll Mode allows for slipping the clutches to go between 30 and 70 percent of idle speed. It allows fine-tune movement of the yacht by pressing the panel HIGH or LOW buttons.



## 6.5 ENGINE ALARM DEVICES

The engine monitoring alarms alert the yacht operator that important engine operating values are outside the permitted tolerance range.

The engine operating parameters shown on the display are monitored. If gearbox parameters are to be monitored, this depends whether the corresponding sensors have been fitted in the gearbox.

For a more detailed description refer to the specific handbook.

### **NOTICE**

*To protect the engine, power is automatically reduced in the case of certain main alarms.*

### 6.5.1 Engine control panel

This panel allows the visualization of the engine's data and to monitor it. The engine and gear data visualization is carried out graphically on a display with digital indication of the values obtained. The led as the visualization listing all incoming alarms with detailed information, indicate the alarms status.

For a more detailed description refer to the specific handbook.

## 6.6 INSTRUMENTATION

### 6.6.1 VHF-DSC Radiotelephone

Operate the radiotelephone according to the following instructions:

- Power the device through the switch located on the 12 V users electric panel of enclosed bridge.
- Push POWER switch to switch on and off the radiotelephone.
- Set the audio and squelch levels by means of knobs VOL and SQL.
- Select channels with knob CHANNEL.
- To transmit, use the microphone by holding key **PTT** pushed.

The handset display shows always the information concerning the channel selection, the operation mode and the output power.

The **HI/LO** key, allows to select the output power (high -25 W, low -1 W).

The **16-9** key, selects the help and safety channel; it is used to establish an initial contact with another station and for emergency calls.

This key also allows to memorize the call channels more frequently used in order to recall them quickly.

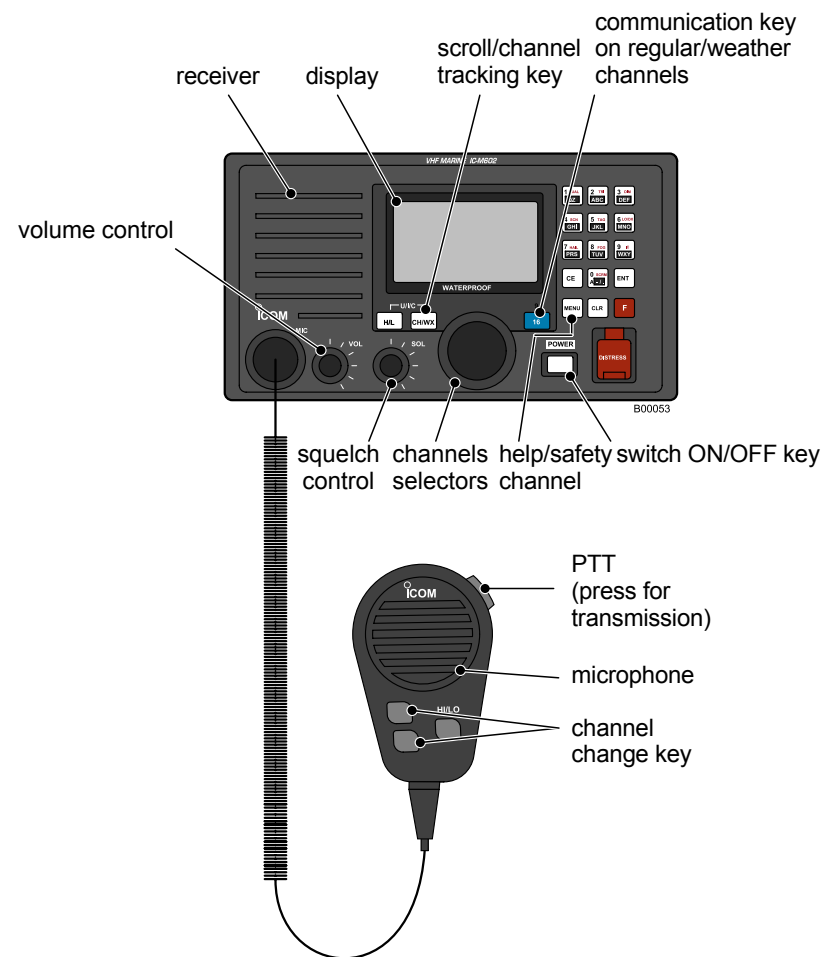
The **DISTRESS** key, if pressed for 5 seconds, transmits the rescue calls.

- **Urgency - “PAN-PAN, PAN-PAN, PAN-PAN”**

(pronounced PAHNPAHN). Used when a person or vessel is in some jeopardy less than indicated by a Mayday call.

The **DSC/ENT** key selects the DSC menu for Digital Selective Calls.

For the activation of transceiver's particular functions, see the specific manual delivered by the Manufacturer.



#### Manual distress call

- select the rescue channel with key 16 (156.800 MHz) or through SSB radio frequency 2182 KHz
- press PTT pushbutton on the handset
- transmit with a calm voice the following message, loud and clear:

#### **MAYDAY - MAYDAY - MAYDAY**

**THIS IS** (repeat the yacht name THREE TIMES)

**MAYDAY THIS IS** (repeat the yacht name)

**AT POSITION** (specify the position)

**FAILURE** (specify the distress causes)

- release the PTT pushbutton
- wait for the reply for a few seconds; if you do not receive any reply, repeat the message at regular intervals, until receiving a reply

For further information refer to the specific manual of use.



#### **CAUTION**

*For channel selection or special function instructions, please refer to the radiotelephone manufacturer manual.*



#### **WARNING**

*Perform DSC-call only in case of a real danger. Otherwise, sending a DSC-call is considered a law infringement.*



#### **CAUTION**

*The DSC (Digital Selective Calling) system is a protocol applied all over the world that uses channel 70 (156.525 MHz) to send and receive digital messages. The communications take place between VHF radios equipped with DSC system and are programmed for emergency calls, individual or collective. The users of VHF DSC radio can contact other ships equipped with DSC system, avoiding unnecessary radio traffic and improving the communications from ship to ship.*

### 6.6.2 Radar/Chartplotter/Fishfinder

The display can show four different types of color screens.

Chartplotter, radar, sounder and video can be visualized inside of small windows or overlapped on the multifunctional display with a simple press of a key. By means of SPLIT key you can subdivide the screen or modify the selected windows.

You can select which and how many screens to use and what functions to combine on each display.

For a more detailed description refer to the specific handbook.



#### **DANGER**

*Radiations danger.*

*The radar antenna emits radiations, which can damage the human body, especially the eyes. When the radar is operating, never look straight at the transmission antenna at a distance lower than 40 in.*

*During the radar operation it is necessary to keep out of the antenna transmission flow; therefore steer the yacht exclusively from the inner helm station. Close the radar if not expressly necessary to navigation.*



#### **CAUTION**

*Pay the outmost attention during navigation, because in proximity of the yacht a shadow cone is formed, which is not covered from the radar waves.*



### 6.6.3 Radar/Chartplotter

The radar/videoplotter belongs to the new integrated Navnet system, which taking advantage of the Ethernet technology, links the radar, the plotter and the depth sounder, creating a true and real network on board. The system also uses a communicating protocol (TCP/IP) by means of a LAN Ethernet.

This latter is a local net granting the management of data and various instruments, interlocked for navigation, in a correct and quick way.

The radar system operates mainly by means of the controls installed on the power unit. The controls are the same as the whole NAVNET system, thus enabling different configurations.

For a more detailed description refer to the specific handbook.

### 6.6.4 Autopilot

This unit includes a LCD display to visualize the information.

The dedicated keys and the intuitive menus are completed by a simple basic graphic presentation, which facilitates the best performance of your instrument. It can be used as a single or additional controller.

It offers a variety of functions included in the system; the compass rate (mini gyro); the user control and reaction; the direct interface with a wind sensor.

The information plans are easily accessible with a single press on the correspondent key mode.

The autopilot sensor is located in the bilge under the passageway of the stateroom area.

For a more detailed description refer to the specific handbook.



#### **WARNING**

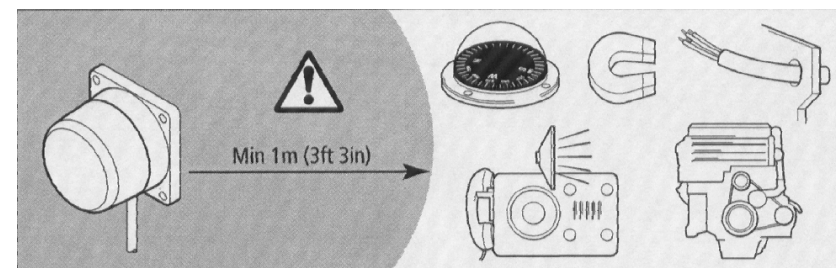
*Never place electric and/or magnetic sources of any kind closer than 1 meter from the autopilot compass (particularly in presence of loudspeakers, transceivers, tool boxes, etc.) which could jeopardize the operation and reliability of the autopilot.*



#### **DANGER**

*The autopilot has been designed to offer the maximum accuracy and reliability. The autopilot's performance can be influenced by many factors. For this reason we recommend its use only as a help to navigation.*

*A careful and continuous monitoring must always be kept under the best navigation and sea conditions.*



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**WARNING**

*If the yacht foredeck is facing a sudden obstacle, this can be avoided by turning with force the drive wheel. This operation allows to drive the yacht only until the drive wheel is firmly held. As soon as the drive wheel is released, the autopilot resumes immediately the yacht's course. If the obstacle is not too close, the best thing is to set the device in stand-by, so as to take over control of the yacht definitively. Once the hindrance has been bypassed, the device can be switched on again by resetting the course.*

**6.6.5 Multifunctional screen**

This multifunctional screen allows to select the information received from GPS, videoplotter, radar and depth sounder or from different sensors of water temperature, wind data, etc.

Five display modes are available, including speedometer, highway and text. The text mode gives up to four informations at the same time between the data available. The display layout can be customized according to requirements.

For a more detailed description refer to the specific handbook.

[illegible]

**NOTES:**

This image shows a blank sheet of white paper with horizontal ruling lines, resembling notebook paper. The page is divided into two equal vertical sections by a central vertical crease. Each section contains ten horizontal lines, creating a total of twenty rows for writing. The lines are evenly spaced and extend across the width of each half of the page.







ON DECK

7

*INTRODUCTION*

---

*HOW TO USE THIS MANUAL*

---

*DESCRIPTION OF THE YACHT*

---

*GETTING UNDERWAY*

---

*INSTRUMENTATION & EQUIPMENT*

---

*HELM STATION*

---

***ON DECK***

---

*PROPULSION SYSTEMS*

---

*HYDRAULIC SYSTEMS*

---

*ELECTRICAL SYSTEM*

---

*INTERIOR DETAILS*

---

*SAFETY DEVICES & EQUIPMENT*

---

*YACHT LIFTING & ONSHORE HANDLING*

---

*MAINTENANCE*

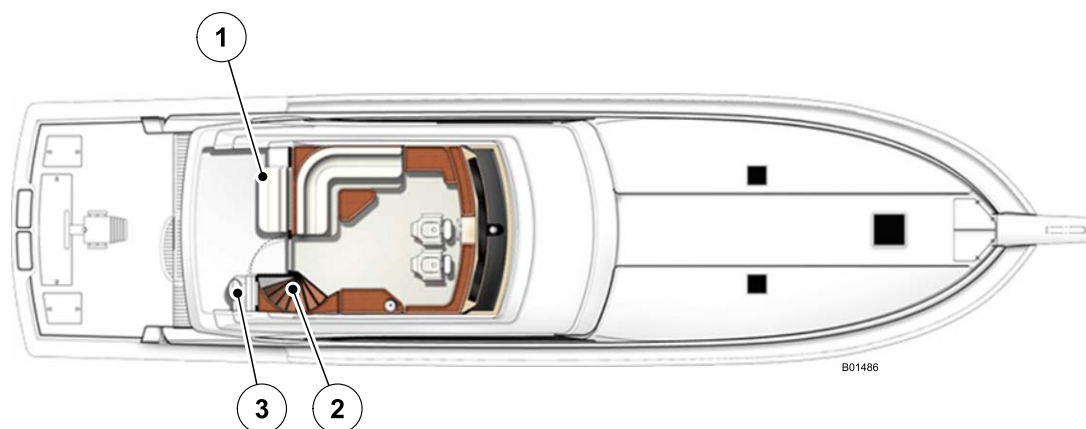
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*TROUBLESHOOTING*

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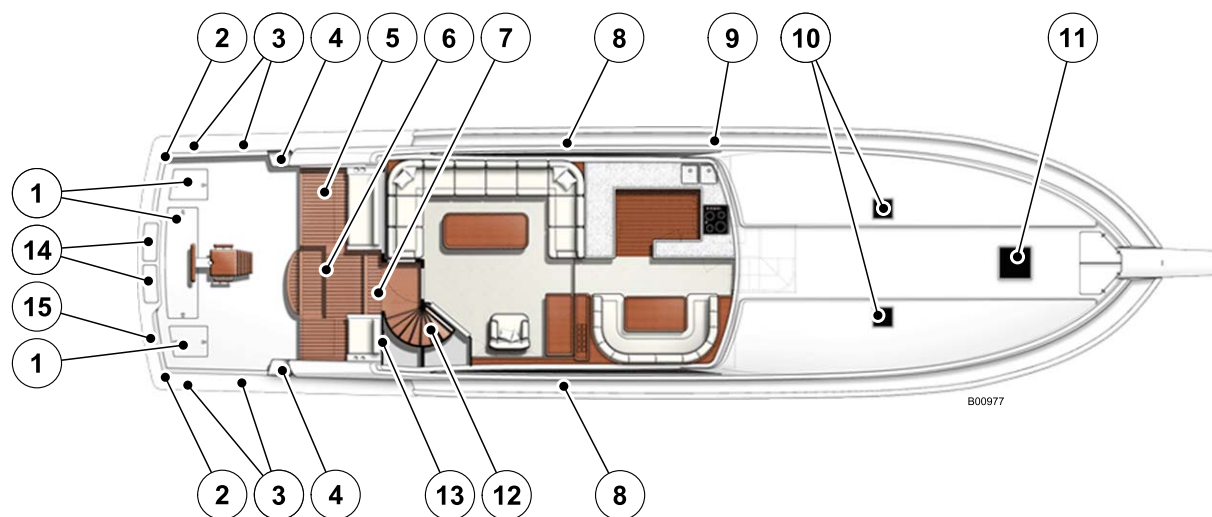
## 7.1 ENCLOSED BRIDGE - EXTERIOR

1. Settee
2. Access door
3. Second helm station



## 7.2 MAIN DECK - EXTERIOR

1. Removable containers for caught fish
2. Aft moorings, chocks and cleats
3. Rods holder, boat hook and gaff storage under gunnel
4. User peaks
  - shore electric power outlets
  - dockside water inlets
  - firefighting system controls
  - cockpit washdown faucets
  - switches
5. Tanks
6. Engineroom access door
7. Salon access steps
8. Fuel fill fittings
9. WASTE black water drain fitting
10. Staterooms skylights
11. Anchor locker with washdown faucet
  - anchor windlass (available only with optional pulpit)
12. Enclosed bridge access stair
13. Lit rod compartment
14. Transom fish box
15. Transom door and gate



**CAUTION**

*Never use alcohol or acetone to clean Plexiglas; this may cause the treated part to get cracks inside.*

**WARNING**

*When the yacht is underway it is unadvisable to move, a listing of the yacht could affect a passenger's movement, causing his accidental fall or his impact against a piece of furniture.*

**CAUTION**

*To prevent circumstances that could lead to property damage, injury or death from the improper use of the helm and its controls, the yacht's owner/operator must ensure that inexperienced or unauthorized persons are never permitted to be at the helm station.*

### 7.2.1 Navigation Lights

The yacht is delivered to you with a complete set of navigation lights. These lights fully comply with the requirements of the International Regulations for Preventing Collisions At Sea (72 COLREGS). All vessels may use the 72 COLREGS as the controlling document when in international waters. In U.S. navigable waters, reference must be made to the Great Lakes and Western River Rules.

The 72 COLREGS require that the navigation lights shall be switched on if your vessel is being operated between sunset and sunrise, or in times of reduced visibility. For this kind of yacht, the required navigation lights consists of a red (port) and green (starboard) sidelight, a white masthead light, and a white stern light; or if you are not docked or anchored in a recognized anchorage, a white masthead light.

**CAUTION**

*All of the navigation lights furnished with your vessel meet the current 72 COLREGS requirements. However, it is the legal responsibility of the vessel's owner to ensure that in the event of modifications to the vessel superstructure, the required areas of visibility for each of these lights are not obscured.*

**CAUTION**

*Your transom door must be kept closed while underway at night to avoid obscuring the stern light. This door should remain closed at all times when underway to minimize the possibility of someone falling overboard.*

**WARNING**

*Check the bulb operation before setting up for navigation to avoid any inconvenient by night use.*

**WARNING**

*Replace the bulbs with the same visual fields.*

### 7.3 ANCHOR

The anchor locker is located at foredeck and is equipped with hatches. Inside of the locker is located the anchor with relevant chain and recovery line.

**WARNING**

*Always maneuver the anchor with the utmost care, to avoid to damage the vessel and the people onboard.*

The locker houses inside also a faucet for the anchor and relevant chain washdown.



## 7.4 ANCHOR WINDLASS

The on board anchor windlass allows to face each anchoring condition, even the most critical one with a certain margin of safety.

The anchor windlass is used to weigh and lower the anchor. It may also be used as warping windlass for pulling a line.

The chain to which the anchor is linked, glides inside of the yacht through the chain guide and reaches the anchor windlass, it then turns around the wildcat and glides into the chain pit. Each anchor windlass is equipped with a control to handle the chain in both directions and with manual brake to lock the chain position during the moorings.

**1. Lever connecting bushing**

It allows the lever connection.

**2. Capstan**

It allows to pull a line.

**3. Wildcat**

It allows to retrieve and to deploy the anchor.

**4. Safety hook**

It allows to lock the anchor chain.



**WARNING**

*The anchoring area is a circle with the center at the anchoring point and a radius equal to the chain length plus the yacht length.*

*The entire anchoring area must be free, in case of sudden variations of wind and/or current direction, especially in case of night anchoring.*

*At night, before dropping the anchor, check that the white anchor light works.*

*Before dropping the anchor, check the nautical charts: anchoring is prohibited in certain areas; in algae covered sea bottom, anchoring is unsafe and harmful to the environment; on rocky sea bottom, the anchor may get fouled or lost.*

*Anchor the yacht with the engines running, both for safety reasons and to guarantee electrical power to the windlass.*

*Check the anchoring point frequently.*

*The distance from obstacles or from other yachts must be greater than the length of the chain deployed (all round).*

*At anchoring, leave the windlass electrical power on.*

*Do not reverse the windlass rotation suddenly.*

**WARNING**

*The anchor chain is fastened to the yacht by means of a line and a hook system. If it is not possible to remove the anchor from the sea bed this system will make it possible to resume navigation.*

**Anchoring operation**

- check that on the battery disconnecter panel the engines batteries breaker is on;
- turn on the switchboard windlass breaker on 24 V enclosed bridge user panel;
- before operating the windlass with the electric control, check that the wildcat clutch is properly engaged;
- let the yacht move backward slowly; if necessary, use the engines;
- deploy the anchor until just below the waterline, and hold;
- deploy the anchor until reaching the sea bottom;
- once the anchor is engaged, leave stopper and brake on.

**CAUTION**

*Operate the anchor windlass with the engines running, because of the high electric absorption and to reduce the effort by slowly moving the yacht toward the anchor.*

**NOTICE**

*To use the anchor, remove the stopper from the chain. Attach the stopper to the chain when the anchor is set (if using a chain rode). Attach the stopper to the chain after the anchor is on deck.*



### 7.4.1 Anchor windlass activation controls

The anchor windlass is located at foredeck; it can either be activated by the switch located on the helm station console, by the foot buttons or by the digital chain counter (optional).

#### 1. Anchor windlass control on the enclosed bridge

This button allows to operate the anchor windlass from the enclosed bridge.

#### 2. Foot buttons

They allow retrieving or deploying the anchor chain.

#### 3. Digital chain counter (optional)

This device activates the anchor windlass and displays at the same time the length of the chain deployed, by means of a graphic display at liquid crystals.



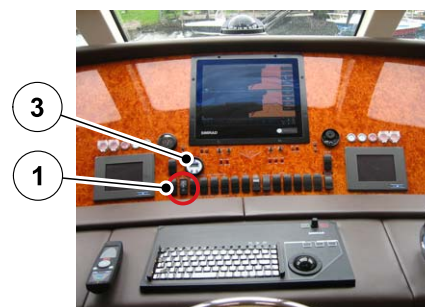
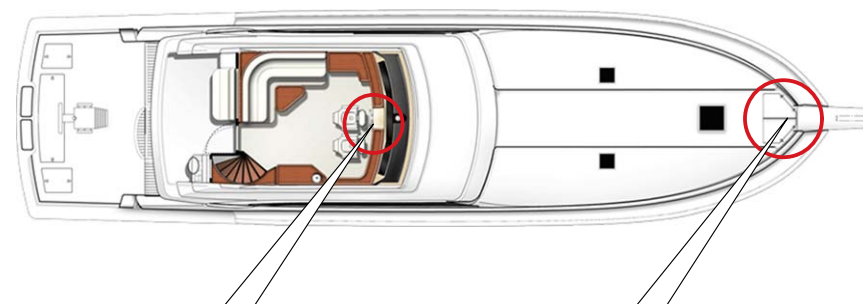
#### WARNING

*If you are to use the anchor, remove the wildcat lock and the safety cable.*

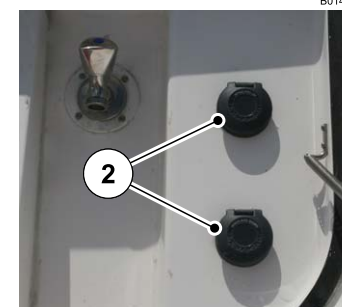


#### WARNING

*Do not approach your body or objects to gliding chains, to lines or wildcats. Make sure that the electric motor is not supplied when the anchor windlass is operated manually (even when the lever to release the clutch is moved), as persons in possession of the anchor windlass remote control may accidentally activate it.*



Helm station windlass controls



Foot buttons

### Use of the clutch

The wildcat is connected with the main shaft by means of the clutch. The clutch releases (disengages) through the lever that, once inserted in the barrel, will have to turn counterclockwise. When rotating clockwise, the clutch will be applied (engaged).

### Anchor retrieval

Start the yacht engines. Make sure the clutch is engaged and pull the lever. Press the relative control button and start retrieving the anchor. If the anchor windlass stops without any reason, the anchor might be stuck and therefore the anchor windlass protections will activate, due to the effect of the effort. In this case, if after several attempts the anchor windlass remains stuck, we suggest to maneuver the yacht, to refloat the anchor.

Check the raise of the last meters/feet in order to avoid bow damage.

### Anchor deploying

Deploy the anchor by means of electric controls or manually. To carry out this operation manually, open the clutch and leave the wildcat free to rotate on its shaft.

Let the chain fall into the water. Turn the lever clockwise to slow down the anchor fall.

For the electric anchor deploying, press the relative control button. In this case the deploying is perfectly controllable and the unrolling of the chain or of the line is regular.

Once anchored, lock the chain with the proper cable.

The anchor and the chain may cause damages to the yacht hull if the anchor windlass is not operated carefully.

We suggest to carry out the operation by means of the remote control located near the anchor windlass; this will allow to check the lifting and lowering speed of the chain and the entry and exit of the anchor shaft into the anchor roller. Namely during those operations, an excessive gliding

of the chain or a wrong entry or exit of the anchor shaft from the anchor roller may cause damages to the yacht foredeck.

**Pay utmost attention: do not approach too much to the moving parts to avoid dangers and injuries to the people.**



#### WARNING

*Lock the chain with proper wildcat locking before setting up navigation.*



#### WARNING

*Do not activate the anchor windlass electrically with the lever engaged in the barrel or in the wildcat cover.*



#### DANGER

*Do not approach to moving parts to avoid dangers and injuries to people.*



#### DANGER

*Danger: when the windlass is operating, be extremely cautious of rotating parts; keep your feet, hands and the remote control cable at safe distance.*

**NOTICE**

*Lock the chain with the stopper before cruising.*

Deploy and retrieve the anchor always by using the electrical control, after engaging wildcat and capstan.

This latter can be disengaged, both for casting the anchor off in case of need and for operating the capstan as a warping windlass. This is simply performed by undoing the clutch located on the barrel, by means of the lever.

**Anchor retrieving**

To retrieve the anchor, perform the same operations previously described above, in reverse order.

In windy or strong current conditions, start the engines and keep the foredeck towards the anchor position to avoid the breakage of the hawse. Once the anchor is retrieved, fasten the chain stopper, before resuming navigation.

## 7.5 WINDLASS CLEANING AND SERVICE

Item	Maintenance	Notes and precautions
Gearmotor	Check and cleaning (before any navigation)  Check and topping up	Sailing the chain, after an anchor mooring in muddy or seaweed seabed, we suggest to wash the chain using the provided system. The outer part of the windlass demands frequent washes with fresh water because very much exposed to sea salt during navigation, especially with choppy sea. It is a good rule, before any season begin, to carry out service by disassembling the wildcat and the drum, to remove oxidation from the rubbing and gliding points and to restore correctly the lubrication grease in the points requiring it.

### 7.5.1 Gearmotor

Frequent rinsing of the windlass with freshwater from a hose will help prevent corrosion.

Routinely remove the layer of salt that forms on the outer surfaces of the windlass. Corrosion may occur that could jeopardize its operation or safety. Wash with fresh water and flush all the surfaces clean, taking special care to remove salt trapped in inaccessible areas.

#### NOTICE

*Before carrying out any maintenance operation on the anchor windlass, turn off the electric power connected to it and carefully remove the chain from the wildcat. The accidental application of power to the windlass could injure the person servicing the equipment. Secure the chain with the chain stopper and remove the chain from the wildcat.*

Routinely disassemble the exposed parts of the windlass, clean and check all parts, removing any corrosion. Grease the threads of the shaft with salt-resistant grease. If the windlass has not been used for a period of time, turn the motor slowly for several minutes in both directions. If the motor turns with difficulty, clean or replace the motor brushes. Routinely lift the windlass from the deck to remove salt deposits that form at the base.

If oil leaks from the windlass, it will be necessary to disassemble the gear to replace the seals. A complete kit of spare parts is available from the windlass manufacturer.

Periodically check the condition of the electric motor terminals and the control box. Remove any corrosion and coat terminals with corrosion inhibitor.

**NOTES:**

[illegible]

[illegible]



8



## PROPULSION SYSTEMS

*INTRODUCTION*

---

*HOW TO USE THIS MANUAL*

---

*DESCRIPTION OF THE YACHT*

---

*GETTING UNDERWAY*

---

*INSTRUMENTATION & EQUIPMENT*

---

*HELM STATION*

---

*ON DECK*

---

***PROPULSION SYSTEMS***

---

*HYDRAULIC SYSTEMS*

---

*ELECTRICAL SYSTEM*

---

*INTERIOR DETAILS*

---

*SAFETY DEVICES & EQUIPMENT*

---

*YACHT LIFTING & ONSHORE HANDING*

---

*MAINTENANCE*

---

*TROUBLESHOOTING*

---

## 8.1 ENGINE ROOM ACCESS

The access to the engineroom is possible through a hatchway located port of the aft cockpit, close to the salon access door.



### **DANGER**

*You are not allowed to enter the engineroom when underway.*

The engineroom, accessible through a ladder, is illuminated by several fixed overhead lights supplied by the switches (1) located at engineroom entry.

If you have to carry out extra maintenance to the engines, it is possible to gain access to the engineroom also from the salon, by lifting the dunnages of the salon floor.



### **DANGER**

*In the engineroom, thermal engines create highly radiated areas which keep temperature high for a long time. Protect yourself and wait until they are cool before entering the engineroom.*



### **CAUTION**

*The maintenance and adjustment operations have to be carried out only by expert and authorized personnel equipped with proper tools. BERTRAM declines all responsibility for proposed corrective action carried out by unskilled personnel not properly equipped.*



### **WARNING**

*Do not stow in the engineroom any material that can freely move due to the navigation lists.*



### **CAUTION**

*The engines maintenance is a special operation that has to be carried out by specialized personnel. Contact BERTRAM Customer Support to receive suitable help.*



## 8.2 PROPULSION SYSTEMS

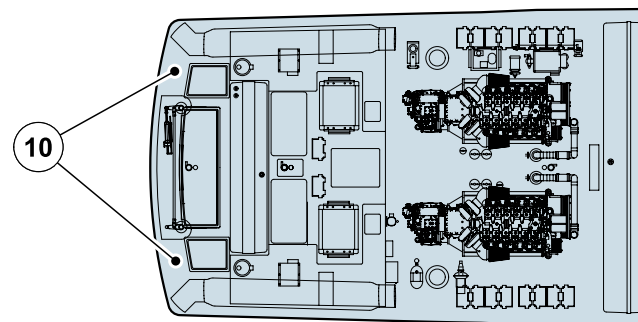
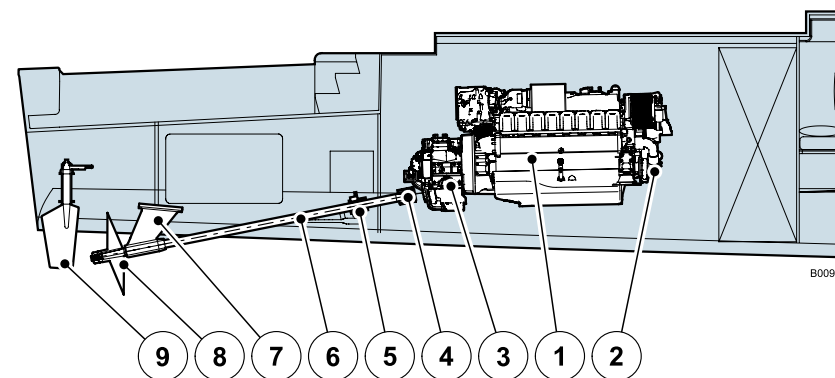
The propulsion system consists of two equal units. Each one includes the following:

1. Engine "MTU", 16V 2000 M92
2. Flexible struts for engine
3. Gearbox ZF3060 A
4. Flange coupling
5. Shaft seal
6. Propeller shaft in stainless steel "Aquamet" 17;  
diameter 3.5 in/90 mm; length 154 in/3910 mm
7. Propeller shaft support with neoprene bearing
8. Propeller
9. Rudder
10. Trim tabs



### **DANGER**

*It is absolutely forbidden to perform reverse run with one of the two engines stopped. This operation is allowed only in case of life danger for the persons onboard and for the safety of the yacht itself, however when the engine is running it should not run higher than 1000 rpm.*



### 8.3 ENGINES

They have the following specifications:

– Model		16V 2000 M92
– Make		MTU
– Cylinders No.		16
– V-pattern		90°
– Effective output	kW/mhp	1630/2217
– Fuel consumption per engine at rated power	gal/h (l/h)	109.5 (414.4)
– Rated speed	rev/min	2450
– Dry weight	lb (kg)	8840 (4010)

For any problem concerning the use or the maintenance of the engines, refer to the fixture manuals or directly to the MTU Customer Service.

**WARNING**

*We suggest you to read the MTU operating instruction manual carefully and in detail.*

## 8.4 ENGINE CONTROL PANEL

We advise to use this system only in emergency cases. The controls installed on the panel allow to carry out all procedures for yacht navigation in “Local” mode. The engine can be started or stopped by means of selector. The engine operation status and the error information are visualized on the display.



### WARNING

*If the yacht is driven by means of local station, three persons have to attend to this operation: the first person drives the yacht, the second must stay at the engineroom hatch and transfer the information to the third person driving the local panel.*

#### 1. ON/START/STOP selector

This switch enables to start or to stop the engine. When set to ON, the engine is ready to run.

#### 2. Signal lamp

Lights up when the engine is ready to run.

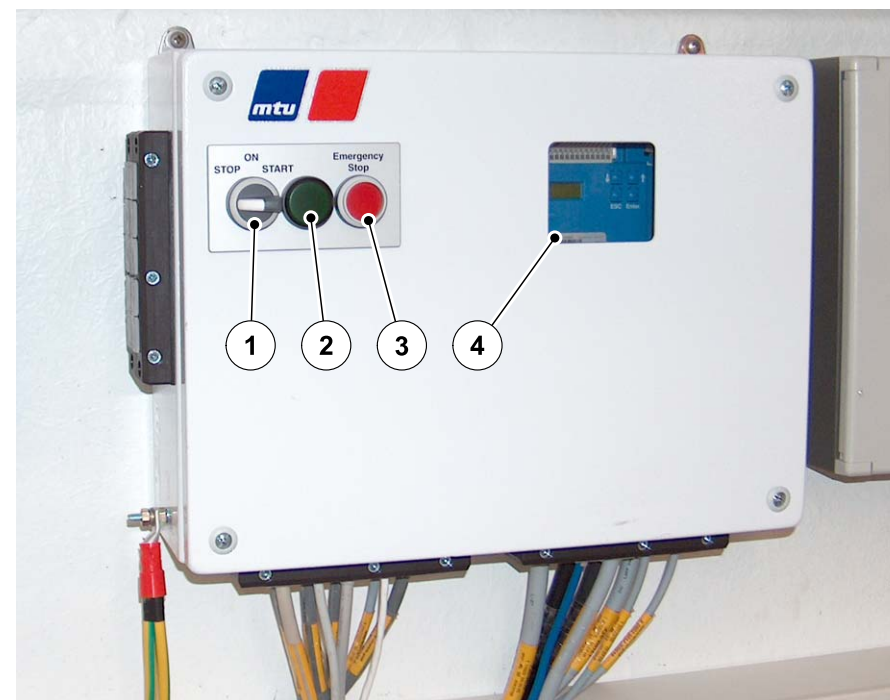
#### 3. EMERGENCY STOP button

Enables the engine stop in case of emergency.

#### 4. Display

Displays the operational status of the engine.

For further information, refer to manufacturer manual.



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## 8.5 PROPELLERS

The propellers have been designed in order to result lightly “unloaded” with new yacht, hull clean and without displacement overloads: in this way the engines will develop all their power in average normal operating conditions, with hulls and propellers not perfectly clean and some overloads on board.

Periodically check (at least once every six months) that the propellers are not too “dirty”, as this leads to a fast performance decrease and to a vibration increase.



### **WARNING**

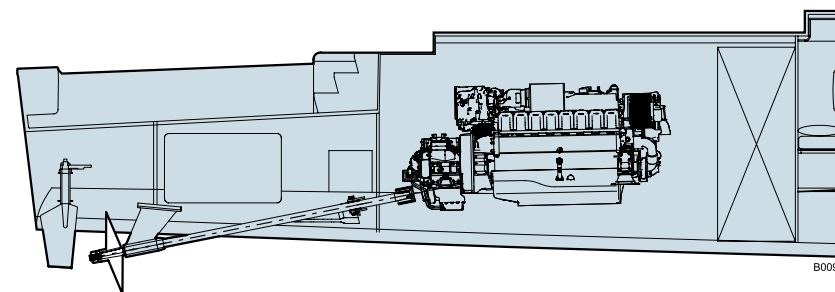
*Dirty propellers can lead to cavitation.*

*The propellers check must be carried out according to the yacht stationary waters.*

In case of impact with the depth or submerged/semi-submerged bodies, check propellers and shafts immediately; in case of considerable vibrations, reduce the revolutions to the minimum and steer toward the harbor for repair, as a vibration increase might damage the propelling devices and the yacht structure.

If items such as a fishing tower, tender, davit, or anything else that changes the displacement or trim of the vessel are added to your boat, it may be necessary to adjust the propeller specifications. Bertram Yacht is not responsible for any changes that may become necessary. Please contact a propeller specialist for recommendations based on the modifications that were made. Keep in mind that anything that adds weight to your boat, or affects its aerodynamics or hydrodynamics, will affect its performance.

See **Maintenance** in this chapter.





**CAUTION**

*An increase in vibration that develops while the engines are in gear could damage the propulsion system and the yacht structure. To reduce the chance of damage, decrease the engine rpm to the slowest speed that allows drive control and proceed slowly to the nearest harbor for repair.*

*If the vibration is very severe, you may have to stop the yacht as soon as possible, anchor, and call for professional assistance.*



**WARNING**

*BERTRAM Yachts are designed to obtain a correct transversal trim with full optional equipment, and with spare propellers and shafts.*

*If the yacht is not equipped with full optional, spare propellers and shafts, some weights might have been installed to correct the transversal trim.*

*The above mentioned weights can be removed or displaced as soon as the yacht is provided with a new equipment.*



**WARNING**

*To reduce the risk of serious injury or death, do not enter the water from your vessel, or board your vessel from the water, while the engines are running.*

## 8.5.1 Propellers service

Item	Maintenance	Notes and precautions
Propellers	Periodical checks	<p>The propellers check must be carried out according to the stationary waters. Checking and eventual cleaning may be carried out with the yacht in a dry shore or with the help of a diver.</p> <p>Check that the propeller paddles do not show notches or breaks, scales or barnacles, which may have a negative influence on the yacht output while sailing.</p> <p>If you find traces of corrosion you must check the condition of the anodes and for heavy irregularities, replace the propeller.</p>
	Assembly/disassembly	<p>The propellers, the starboard and port one, are not interchangeable between them and with others, as they have been projected according to specific features of Your yacht.</p> <p>Replace only with genuine spare parts supplied by BERTRAM Customer Support.</p>

### 8.5.2 Periodic checks on propellers

**DANGER**

*While carrying out cleaning and checks with the yacht in water: disconnect the engines and generators start.*

It is advisable to carry out this operation with yacht in a dry shore because maintenance is in this way eased. Check that the propeller paddles do not show notches or breaks, scales or barnacles, which may have a negative influence on the yacht output while sailing. If you find traces of corrosion you must check the condition of the anodes and with heavy irregularities replace the propeller.

**WARNING**

*Ensure that the engines cannot be started before you carry out any propeller or shaft cleaning or checks with the yacht in the water. Remove the keys from the ignition. If an engine is started when a diver is underwater, serious injury or death could result.*

**NOTICE**

*Propellers are not interchangeable with each other. Each yacht model has its own propellers. Check to ensure that replacement propellers meet the specifications of your yacht. Do not replace the propellers of your yacht with others of unknown or doubtful origin. Contact the BERTRAM Customer Support for more details.*

## 8.6 PROPELLER SHAFT, STUFFING BOX CASE AND SHAFT SUPPORT

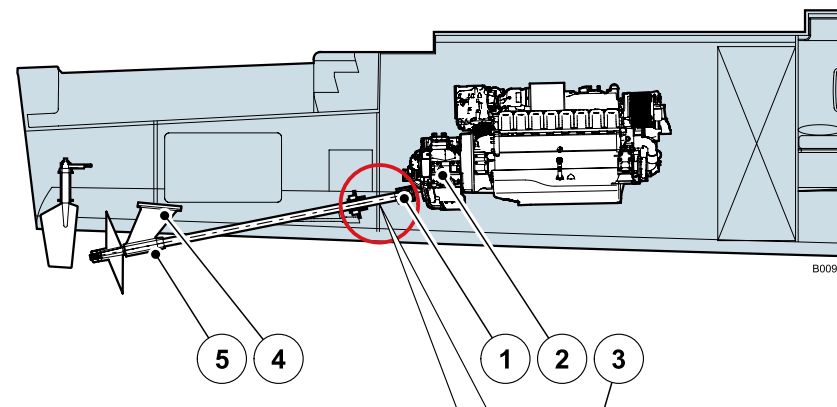
The propeller shaft is fastened to the gearbox by means of a flange coupling (1) and is aligned on the three points represented by the gearbox (2), a water-lubricated propeller shaft seal (3) and a shaft support (4). The propeller shaft seal includes a fixed piece fastened to the hull and a movable piece, which is adjustable. This latter is pushed against the fixed piece, so as to compress the seal inside of the case. It is very important that the seal is compressed evenly, because if it doesn't, irregular pressure may occur on the seat housing and this could impair the life and performance of the seal. The outer shaft support includes a neoprene bushing (5), which uses the seawater as a lubricant. Check it every season, as it might get worn quickly during navigation, especially in sandy waters. The bushing wear causes a vibration increase. When the yacht is on a sandbank, a good technician can easily evaluate, by moving the shaft, if the wear demands the replacement of the bushing.



### WARNING

*Remember to check the shaft seal clamps after a period of inactivity of the yacht before turning the shafts again, otherwise you might damage them.*

1. Flange coupling
2. Gearbox
3. Shaft seal
4. Shaft support
5. Neoprene bushing



Propeller shaft seal



### 8.6.1 Shafts line, stuffing box seal and shafts supports bushings maintenance

Item	Maintenance	Notes and precautions
Shaft lines	Periodical checks  Assembly/disassembly	It is essential to keep the propellers shafts always clean; the formation of barnacles or the presence of cloths or plastic bags lead to propulsion power reduction, to propellers cavitation with consequent surface damage, and to vibrations causing damages to the stuffing box seals and to the bushings of the shaft supports. Checking and eventual cleaning may be carried out with the yacht in a dry shore or with the help of a diver.
Bushings of shaft supports	Checks & maintenance  Shaft support bearing replacement	The Neoprene bushing of the shaft support, when sailing in waters with sandy suspensions, may wear rapidly. The bushing wear causes a vibration increase. With the yacht in a dry shore a good technician can evaluate easily, by moving the shaft, if the wear is so bad to require the bushing replacement.
Propeller shaft seal	Checks & maintenance	The shaft seals prevent water from leaking around the shaft and into the boat. The seals installed in your BERTRAM are of the dripless type and do not require adjustment as in a traditional stuffing box. Special nitrile lip seals endure a watertight fit around the shaft. A constant supply of water is necessary for cooling and lubricating the shaft and seal. This water supply is provided by hose connections from the seals to the engine heat exchanger discharge. Water must be supplied to the seals anytime the shafts are rotating. A lack of cooling water may cause distortion of the seal resulting in leakage around the shaft.

#### NOTICE

*Proper alignment of the shaft is very important for the life of the seals.*



#### CAUTION

*The seal should never operate without cooling water, so as not to impair its lifetime.*

### 8.7 GEARBOX (TRANSMISSION)

The main functions of a marine gearbox are the following:

- couple the engine with the propeller shaft and reduce the number of the propeller revolutions;
- to reverse the propeller direction;
- stop the propeller shaft motion (idle).

Read the gearbox operating instruction manual carefully and in detail.



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### 8.7.1 Gearbox service

Item	Maintenance	Notes and precautions
Gearbox	Oil level check	For correct procedures about maintenance and check, refer to the manual provided by the Manufacturer.
	Oil change	Refer to gearbox plate, to determine the oil type and viscosity grade recommended by the manufacturer.
	Suction filter check	Remove the suction filter cap uphill the sump, positioned near the gearbox connection/propeller shaft area. Remove filter and gasket. Carry out check according to the time intervals suggested by the manufacturer.
	Oil filter replacement	Have the expected maintenance carried out at correct time intervals and by authorized and qualified personnel only, to keep the gearboxes perfectly efficient.

### 8.7.2 Gearbox check

#### Oil level check

Carry out oil level check after the engine has stopped.

The right oil level is set between upper and lower notch of dipstick.

After first filling or repair or oil filter cleaning, run the gearbox for the time suggested by the Manufacturer.

Later on you have to carry out the oil level check again after the engine has stopped.



#### WARNING

*Before checking the oil level, check that the oil temperature of the gearbox is as per normal operation specifications.*



#### ENVIRONMENT

*Recover waste oil, according to the laws in force relevant to special waste disposal.*



#### DANGER

*Service the gearbox only if engine and propeller are stopped and the circuit breaker switch is OFF. Before starting the gearbox, carry out the filling and the consequent check of the oil level. The use of the gearbox with a low quantity of oil, may damage the gears. An excess of oil might cause leaks to the seals and to the vent and increase remarkably the operation temperature.*

## 8.8 FUEL AND LUBRICATION SYSTEMS

Among the many routine maintenance tasks required for the engines, the following are the most common.

- Replace the oil filters and the fuel filters.
- Replace the elements on the water/fuel separator prefilters.
- Check the oil level of engines and generators.

See the engine instruction manual.

### NOTICE

*The engine data cards are very important when repairs are necessary. Keep them together and store them with your warranty in a secure, readily available location.*

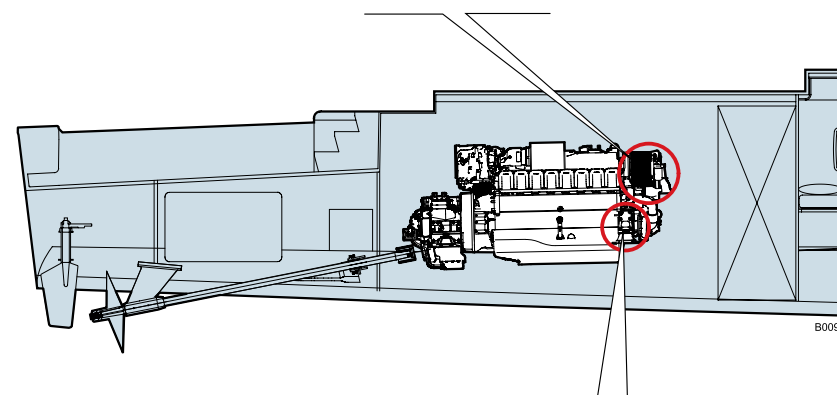
### NOTICE

*Read the engine operating instruction manual carefully.*

Fuel twin filters



Oil twin filters



Flexible strut

## 8.9 PROPULSION ENGINES MAINTENANCE

Item	Maintenance	Notes and precautions
Lubrication system	Replacement of the oil separator filter	Replace the separator filter, according to the time intervals suggested by the Manufacturer.
	Diaphragm check and replacement	Check if the diaphragm is damaged; in this case replace it.
	Oil level check	Check the oil level by means of the special dipstick; make sure the level is included in the allowable range (MIN - MAX). Do not start engines if oil level is not within reference notches, as indicated by the Manufacturer's Manual.
	Oil and oil filter replacement	Replace engines oil according to time intervals and oil type suggested by the Manufacturer.
Fuel System	Replacement of fuel filter	Replace fuel filter according to the time intervals suggested by the Manufacturer.
	Air cleaner replacement	Replace air filter within the intervals indicated by the Manufacturer.
	Check and replacement of air filter clogging indicator	Check the gauge; if its reset is not easy, replace with a new one. Replace the gauge within the intervals indicated by the Manufacturer.
Cooling system	Coolant check	Make sure the coolant is in the tank (lever sensor, reference plate, built-in eyelet).
	Cooling system filling	For coolant features refer to the User's Manual of the Manufacturer.
	Cooling system drain	Drain the cooling liquid only with cool engine following the procedure suggested by the Manufacturer.

For more information, consult the Manufacturer's manual.



**WARNING**

*Use only approved fluids (see table "MTU Instruction Manuals") otherwise the Manufacturer's warranty will expire.*



**WARNING**

*Do not refill oil over the notch MAX of the dipstick. Overfilling may damage the engine!*



**DANGER**

*Hot oil can contain combustion residuals which are harmful to health. Risk of injury and scalding! Wear protective clothing, gloves and goggles/safety mask. Avoid contact with skin. Do not inhale oil vapor.*



**WARNING**

*No open flames, no electric sparks. Do not smoke. Avoid ignition sources. Risk of fires and explosions!*



**DANGER**

*Due to high temperature in engine room, oil or fuel leaks can evaporate and create a serious risk of fire break. Periodically check the integrity of Your installation.*



**DANGER**

*A wrong use, a wrong maintenance, tampering and replacement of pieces, can cause serious damages or mortal events, beyond damaging the equipment.*

*The interventions on the electrical and mechanical equipment must be carried out by qualified staff after having examined the Manual delivered by the Manufacturer.*



**WARNING**

*With BERTRAM it is absolutely necessary to view the various components documentation delivered by the Manufacturer; for any problem relevant to the use or maintenance, you can refer directly to the Service Centers, listed in the documentation delivered by the Manufacturer. Anyway, in case of need, some little interventions, can be carried out by the staff on board, after consulting the use manual.*



**ENVIRONMENT**

*Dispose of waste materials (engine oil, fuel, filters, etc.) by respecting the environment according to the laws in force.*

*Use only authorized disposal procedures, in case of doubts, contact the Port Authority.*

**DANGER**

*Any maintenance intervention on the engines is to be carried out with engines shut off, after they have sufficiently cooled down and preventing their switching on with the disconnection of the circuit breakers.*

**ENVIRONMENT**

*Handle used fuel filters as special waste.*

**ENVIRONMENT**

*Collect the coolant and dispose of it according to regulations in force.*

**WARNING**

*Filling of the cooling system only by cooled down engine.*

**DANGER**

*Compressed air at high pressure may create the risk of injuries. Do not direct compressed-air jets at persons. Wear protective goggles, safety masks and ear protectors.*

**DANGER**

*Coolant is hot and under pressure. Risk of injury and scalding! Let the engine cool down and wear protective clothing, gloves and goggles safety mask.*

**WARNING**

*Cold coolant in hot engine causes thermal stress; formation of cracks in the components. Fill/top up only into cold engine.*

**WARNING**

*If the oil level is not positioned between the two reference notches do not activate any device.*

**WARNING**

*Pressurized system: coolant is hot and could generate serious burns. To open the filling plug of cooling system, stop the engine first and wait until system components have cooled down. Unlock the plug slowly to release the pressure.*





**CAUTION**

*During normal engine operation the coolant expands when heated. The additional volume will be forced into the tank during engine operation. When the engine is shut down and cooled, the coolant flows-back to the engine.*



**CAUTION**

*Do not use transmission liquid, engine oil, diesel fuel or other lubes to lubricate the air filter element. If improper lubricant is used, the element could not operate correctly. Do not start the engine if the air filter element is dry. Without oil the filter element could fail.*



**CAUTION**

*The engine should not run without air filter. Do not run the engine if the air filter is damaged. Do not use elements with fins, gaskets or seals damaged. Dirt penetrating inside of the engine may cause premature wear or damage the components. The filter elements prevent the penetration of air particles through the air inlet.*



**CAUTION**

*Do not use compressed air, open flames or warm air to clean the air filter element. Excessive heat restricts the cotton fiber and compressed air can pierce the material. Let the element dry to the air.*



**CAUTION**

*Do not service air filter when engine is running: dirt may penetrate inside of engine.*



**CAUTION**

*Do not use gasoline, steam or lye-based dissolvers, detergents or solvents for the cleaning. Do not use compressed water or air to clean the air filter element. Anyone of these liquids or methods could damage the element.*

**CAUTION**

*If the engine is started when the oil level exceeds the reference "FULL", this can cause the immersion of the drive shaft in the oil. The air bubbles generated reduce the oil lubrication features and cause consequently a loss of power.*

**CAUTION**

*No dirt should penetrate into the fuel system. Clean the area around the component of the fuel system to be disassembled, accurately. Cover all disassembled components of the fuel system properly.*

**CAUTION**

*The oil filters are produced according to manufacturer's requirements. The use of a filter not recommended by manufacturer could damage the engine seriously as well as its bearings and drive shaft etc. This is because particles of slag penetrate inside of the engine lubrication system. Use oil filters exclusively recommended by the manufacturer.*

**CAUTION**

*Collect the fuel spilled into a suitable container. Clean fuel leaks immediately.*

**WARNING**

*The fuel spilled on hot surfaces or electric components may cause a fire. To avoid possible injuries, disconnect the starter switch when fuel filters or water/fuel separator elements are replaced. Clean fuel leaks immediately.*

## 8.10 FUEL SYSTEM

### Fuel Quality

Quality of fuel is crucial for efficient performance of the engines installed on your BERTRAM 700 yacht. Purchase fuel only from reliable high-volume filling stations. This will help ensure the quality of the fuel itself, as well as the probability that the fuel has not been stored for a long period inside the shore tank.

For fuels suitable to supply MTU engines, read the MTU manual.

If none the above types of fuel specified is available in some countries, follow the rules suggested in the engines manual.

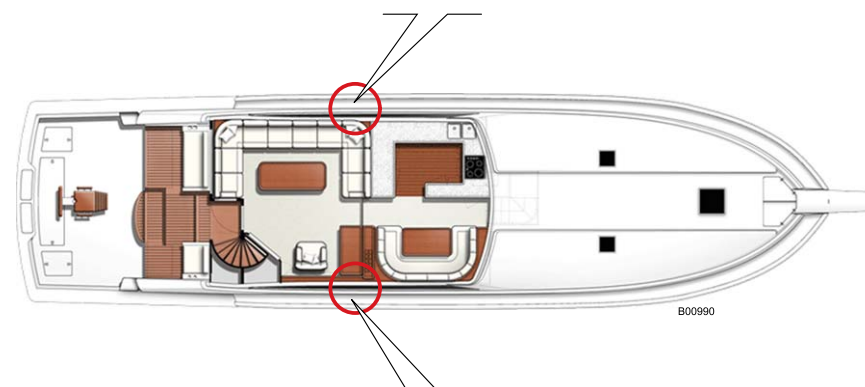
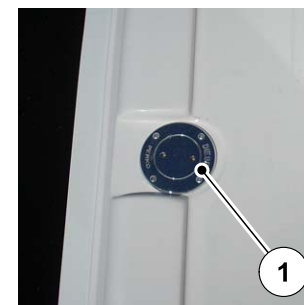


### CAUTION

*Stop all engines when refueling.*

#### 1. Refueling fill fitting

Port fill fitting



Starboard fill fitting

### 8.10.1 Fuel tank filling

The fuel tank is filled by means of two fill fittings positioned along the lateral corridors of the yacht, they are equipped with vent and flame-trap screen.



#### CAUTION

*If fuel containing water is drawn by the engines, the injection system may get damaged. To avoid this, drain water from the fuel tank and service the water & fuel separator filters regularly. Do not use additives to improve fuel flow properties in winter.*

During filling, the fuel flow produces foam that may cause a fuel overflow, giving the appearance of a full tank. To be sure the tank is filled completely; wait for the foam to dissipate before adding more fuel.

#### NOTICE

*Place the filling nozzle as far as possible into the filling pipe, through the rubber anti-splash sleeve on the flow cut-off. Use the nozzle to fill the tank.*



#### WARNING

*When refueling open both fill fittings of the yacht.*

In the aft cockpit starboard, inside of a proper peak is installed a buzzer indicating when the fuel tank is full. The buzzer actuates only if the switch placed aside of the same is set to "ON".  
To clear the buzzer, set the switch to "OFF".



#### ENVIRONMENT NOTICE

*Fuel is toxic to the environment. Prevent spillage by observing proper refueling procedures. As a precaution, always keep oil-absorbent materials within reach when fueling the yacht. Dispose of oily materials as toxic waste.*

An analog gauge on the console of helm station shows the fuel tank level. This control is connected to an electronic fuel level sending unit inside the tank.

The other level is visible by means of a visual check, installed directly on the tank and can be activated by a ball valve. Check it from time to time to determine the real fuel level inside the tank. Unless the valve is operated each time the level is checked, the level indicated refers to the last check.



#### WARNING

*Stop all engines when refueling.*

### 8.10.2 Fuel System


The fuel system allows for the supply to both the propellers' engines and to the generators. It consists of following:  
from refueling fill fittings, located along the lateral passageways, the fuel falls into the tank and, by means of cut-off valves on the suction, is sent to the engines and generators.

The engine and generator fuel suction can be remotely cut-off by means of two levers (to actuate only in emergency case), located at foredeck in the engineroom, close to the fuel tank.


Fuel is sucked directly from the tank and delivered to the manifold supplying the engines and generators. The fuel before reaching the users, is led through the water/fuel separator filters, to hold impurities and to separate possible water.



B00102


**CAUTION**

*The bilge of the engineroom must always be clean, in this way fuel leaks or bleedings or oil leaks from engines or generators, can easily be noticed. If this happens, stop the engines and let them cool down, then if possible repair the leak. Finally clean the bilge.*


**ENVIRONMENT**

*Handle and drain the water mixed with fuel and dispose of it according to the rules in force. Use only authorized disposal procedures; in case of doubt, refer to the Port Authorities.*

The fuel once flown through the separator pre-filters is still dirty, for this reason the engine is equipped with water separators, able to hold the remaining particles of dirt. When using fuel containing water, serious damages can impair the injection system.



B00992

**ENVIRONMENT**

*Every marina has toxic waste disposal dedicated areas. It is recommended to dispose polluting waste (such as used oil, fuel, oily liquids, batteries, etc.) according to the environment protecting laws. Prior to performing any job in the engineroom, disconnect the bilge pumps switches, in order to prevent that accidental fuel, lubricant or other liquid leakages pollute the surrounding waters.*

**DANGER**

*Due to high temperature in engineroom, oil or fuel leaks can evaporate and create a serious risk of fire break.*

**DANGER**

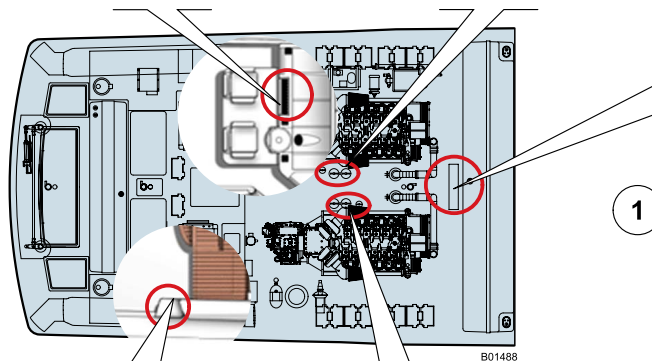
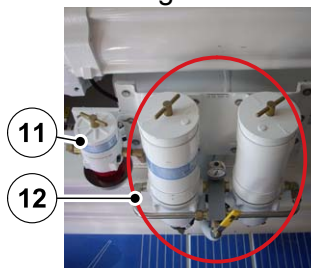
*Fuel leak can be the cause of fire. Periodically check the integrity of Your installation.*

1. Level gauge in the engineroom
2. Users manifold
3. Main fuel delivery valve
4. Port generator fuel delivery valve
5. Port engine fuel delivery valve
6. Fuel level delivery valve
7. Starboard engine fuel delivery valve
8. Starboard generator fuel delivery valve
9. Starboard generator "RACOR" separator filter
10. Starboard engine "RACOR" separator filters
11. Port generator "RACOR" separator filter
12. Port engine "RACOR" separator filters
13. Helm station level gauge
14. Full tank buzzer

Level gauge



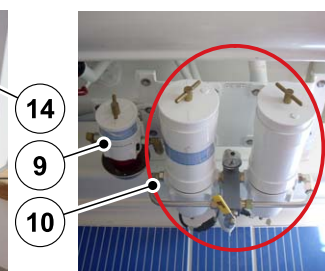
"RACOR" separator filters for port engine and generator



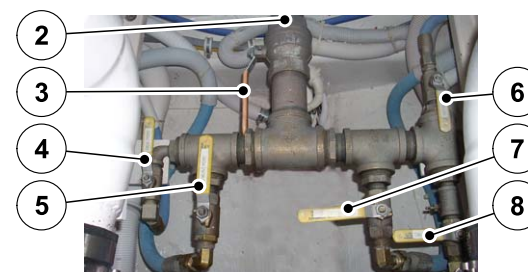
Level gauge



Buzzer



"RACOR" separator filters for starboard engine and generator



Users manifold



### 8.10.3 Water & fuel separator filters for the engines

#### Maintenance and check

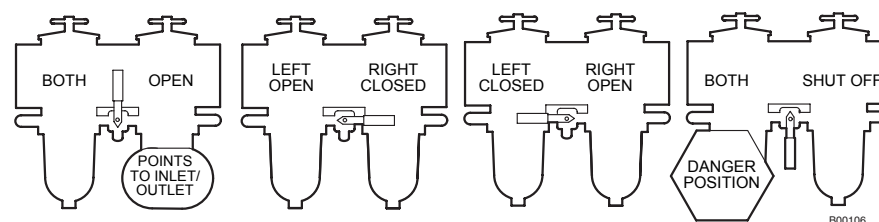
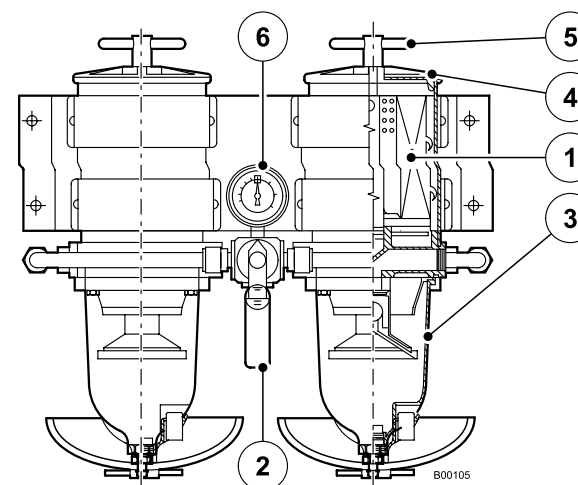
The frequency of water drainage or of filtering element (1) replacement is determined by fuel contamination level.

The selector valve (2) (or handle indicator) allows the operator to isolate one filter at a time, in order to carry out service even with engine running.

#### Water drainage from collecting tank

Check or drain the water collecting tank (3) daily. The collecting cup must be drained before polluting elements reach the engine.

- In order to eliminate the polluting elements place a big recovery tank there below.
- Remove the cover (4) and fill the device with clean fuel.
- Close the cover and tighten T-handle (5) firmly by hand.





## Replacement of the filtering element

Replace the element according to the intervals suggested by manufacturer or in case of power losses; a power loss indicates that the element is restricted.

As a rule, when the pressure gauge (6) shows 6-10 inches of mercury (inch Hg), it should be time for maintenance.

The current values varies in the different fuel systems. Also other extra elements, such as a full tank or excessively contaminated fuel may obstruct the filter.

- Close the valve.
- Remove the cover.
- Remove the element by holding the handle and pulling lightly forward with a twist movement.
- Fit the new filter (having the same filtering features of the replaced filter).
- Replace the cover seal with the seal pertaining to the new element. Apply a layer of clean fuel or engine oil on the seal before reinstallation, fit the new element with a slow twist movement downwards.
- Fill the device with clean fuel, then replace the cover. Tighten T-handle by hand and reopen by hand.
- Start the engine and check for leaks. If necessary, remedy with the engine off.

## Troubleshooting procedure

The main cause of a weak start or of a power loss is the result of an obstructed filter or an air loss in the fuel system. If the device does not start or does not hold the low idle, check first of all the cover and vent it, if it hadn't been properly closed. Then check all the pipe connections and make sure no fuel pipe is obstructed by contaminants. If the fuel tank is equipped with a built-in filter, check if it is obstructed. If the problem continues and the filtering element is new, contact your dealer.



### WARNING

*The separators have to be checked at regular intervals as suggested by manufacturer, so as not to impair the engines operation.*



### CAUTION

*If the engine must be running, select the filter which has to remain in-line and carry out maintenance on the filter not in-line. This operation is a good procedure also when the engine is off.*

### 8.10.4 Water & fuel separator filters for the generators

#### Water drainage from collecting tank

The frequency of water drainage or of filtering element (1) replacement is determined by fuel contamination level.

Check or drain the water collecting tank (2) daily.

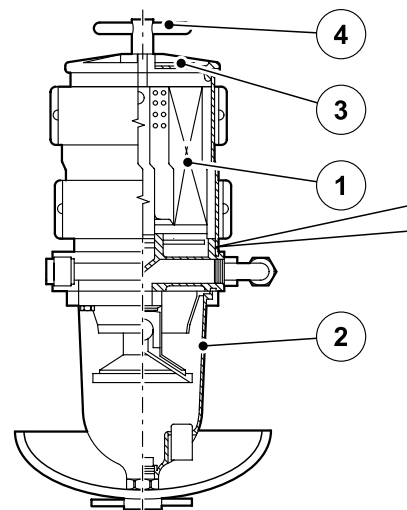
The collecting cup must be drained before polluting elements reach the engine.

- In order to eliminate the polluting elements place a big recovery tank there below.
- Remove the cover (3) and fill the device with clean fuel.
- Close the cover and tighten T-handle (4) firmly by hand.

#### Replacement of the filtering element

Replace the element according to the intervals suggested by manufacturer or in case of power losses; a power loss indicates that the element is restricted. Also other extra elements, such as a full tank or excessively contaminated fuel may obstruct the filter.

- Close the valve.
- Remove the cover.
- Remove the element by holding the handle and pulling lightly forward with a twist movement.
- Fit the new filter (having the same filtering features of the replaced filter).



B00994

- Replace the cover seal with the seal pertaining to the new element. Apply a layer of clean fuel or engine oil on the seal before reinstallation, fit the new element with a slow twist movement downwards.
- Fill the device with clean fuel, then replace the cover.
- Tighten T-handle by hand and reopen by hand.
- Start the engine and check for leaks. If necessary, remedy with the engine off.

### Troubleshooting procedure

The main cause of a weak start or of a power loss is the result of an obstructed filter or an air loss in the fuel system.

If the device does not start or does not hold the low idle, check first of all the cover and vent it, if it hadn't been properly closed. Then check all the pipe connections and make sure no fuel pipe is obstructed by contaminants. If the fuel tank is equipped with a built-in filter, check if it is obstructed. If the problem continues and the filtering element is new, contact your dealer.



#### **WARNING**

*The separators have to be checked at regular intervals as suggested by manufacturer, so as not to impair the engines operation.*

## 8.11 LUBE OIL SYSTEM

## 8.11.1 Oil filling/draining system from engines, generators and gearboxes

The system consists of a pump (1) duly connected to engines, gearboxes and generators, by which it is possible to perform filling/draining operation of lubricant directly from shore, without having to carry onboard clean oil and waste oil barrels.

The filling/draining outlet (2) is located in the aft cockpit starboard, inside a suitable locker.

For correct maintenance procedures, refer to the manufacturer manual.

## 3. Oil level gauge

Measures the quantity of oil filled/drained.

## 4. Oil quantity measuring/non-measuring lever

In the non measuring position, the gauge does not indicate the oil quantity, while in the measuring position it does.

## 5. Port users lever

It allows exclusive selection of port engine, generator and gearbox.

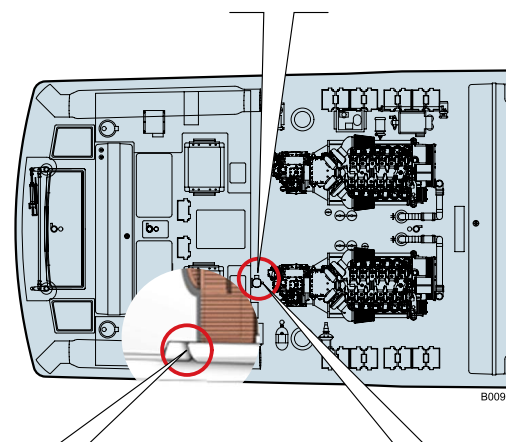
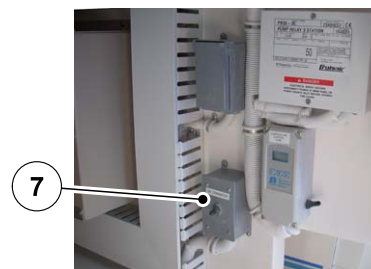
## 6. Lever for starboard users

It allows exclusive selection of starboard engine, generator and gearbox.

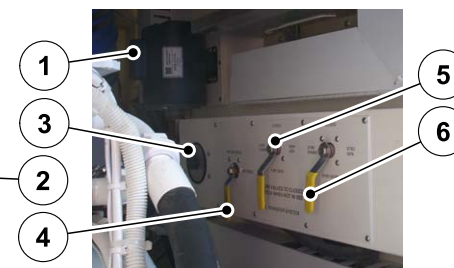
## 7. Oil pump circuit breaker

This switch allows to activate or deactivate the oil transfer pump.

Oil pump switch



Filling/draining outlet



User manifold for oil transfer pump



**CAUTION**

*Close the valves if not in use.*



**DANGER**

*Take care that oil does not hit the skin. During maintenance operation wear gloves and safety glasses. If you come in contact with lube oil wash the hit part immediately and accurately with water and soap.*



**DANGER**

*Any maintenance intervention on the engines is to be carried out with engines shut off, after they have sufficiently cooled down and preventing their switching on with the disconnection of the circuit breakers.*



**WARNING**

*Do not remove the tank **filling plug** when the engine is running, because the hydraulic installation under pressure may cause injuries. Before releasing pressure, stop the engine.*



**DANGER**

*The spilling of hydraulic oil **under pressure** may cause injuries: before disconnecting or connecting the hoses, stop the engine and operate the controls to release the residual pressure. Prevent the engines from starting when the pipes are disconnected.*



**DANGER**

*The use of the gearboxes and engines with a low quantity of oil, may damage them.*

*An excessive quantity of oil may cause seals and vents to leak and can remarkably increase the operation temperature.*



**DANGER**

*No open flames, no electric sparks. Do not smoke. Avoid ignition sources. Risk of fires and explosions!*

**WARNING**

*Make sure to drain the oil contained inside of the engine or gearbox completely, before performing new oil top-up.*

**CAUTION**

*For more information about the lubrication of engines and gearboxes, refer to use and maintenance manuals.*

**ENVIRONMENT**

*Never discharge old oil at sea, but dispose of it instead into proper containers. Respect rules in force concerning the disposal of special waste.*

**WARNING**

*Use only technical fuels approved by the manufacturer otherwise warranty will become null and void.*

**WARNING**

*If damaged, the **hydraulic hoses** may cause death, carry out appropriate periodical checks to verify the presence of:*

- *damaged fittings;*
- *wear of outer coatings as consequence of rubbing;*
- *swelling of outer coatings.*

**DANGER**

*Due to high temperature in engineroom, oil leaks can cause a serious risk of fire break. Periodically check the entirety of your system.*

**WARNING**

*Filling of the cooling system only by cooled down engine.*

**WARNING**

*Do not refill oil over the notch MAX of the dipstick. Overfilling may damage the engine!*



**DANGER**

*The oil is hot, risk of scalding! Do not touch the oil drain plug with bare hands. Engines oils are polluting liquids; treat them and handle them with care!*



**CAUTION**

*The Federal Water Pollution Control Act prohibits the discharge of any oily waste into, or upon, the navigable water and contiguous zone of the United States. If such discharge causes a film, or sheen upon, or a discoloration of the surface of the water, or causes a sludge or emulsion beneath the surface of the water, it is considered a violation of the regulation.*

## 8.12 ENGINE COOLING SYSTEM

### 8.12.1 Operation

The engines and generators are cooled by seawater that is circulated through the engines by internal pumps. After the suction, the water filtered is delivered to the engines, to the gearboxes and to the heat exchangers, and then discharged at sea.



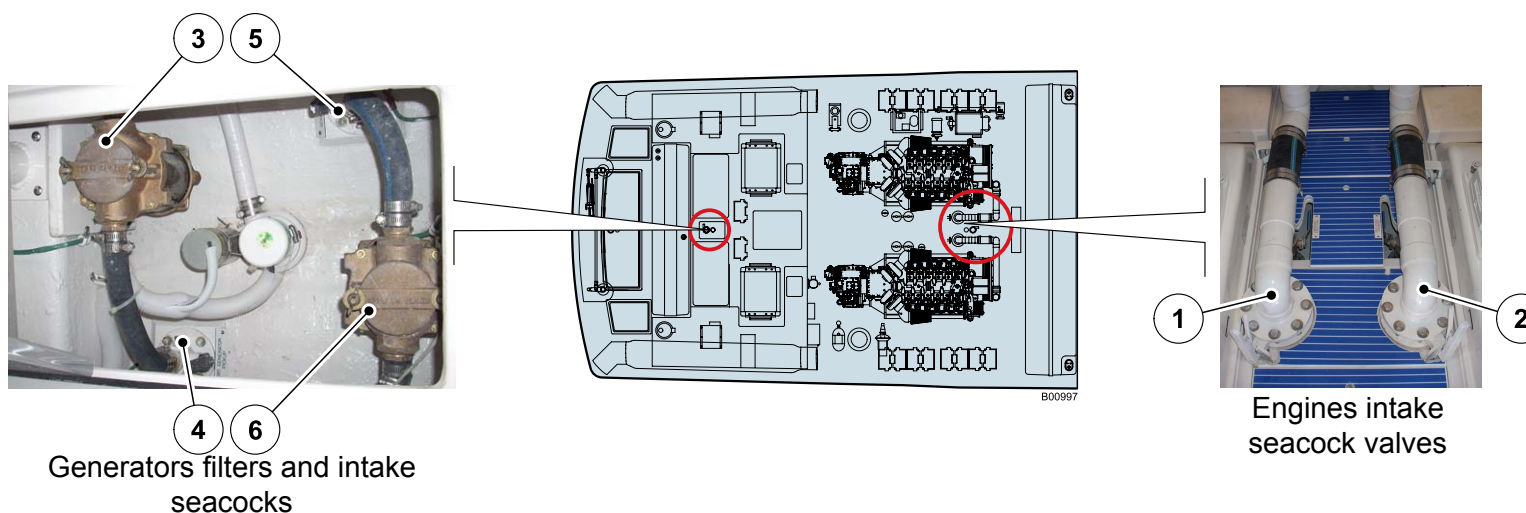
#### **WARNING**

*Before opening the intake seacock filter for cleaning, remember to close the hull cut-off valve.*

*If the yacht is left unattended, close as a precaution, all intake seacock cut-off valves; when they have to be used again, remember to re-open them.*







1. Port engine intake seacock valve
2. Starboard engine intake seacock valve
3. Port generator intake seacock filter

4. Port generator intake seacock valve
5. Starboard generator intake seacock valve
6. Starboard generator intake seacock filter

### 8.13 BILGE SUCTION OF THE ENGINES IN EMERGENCY

In engineroom is located the bilge emergency draining system, which operates with diverters, allowing to use the seawater pumps, driven by the propulsion engines, as draining pumps.

The diverters are valves, which in normal position ensure the seawater suction, through the intake seacock filters, for engine cooling. In case of emergency, handle on lever (1) of both valves, by setting the valves to emergency position: the pumps suction, driven by the engines, is then diverted directly to the bilge. The levers are equipped with a spring mechanism, because their operation must absolutely be wanted and not accidental.

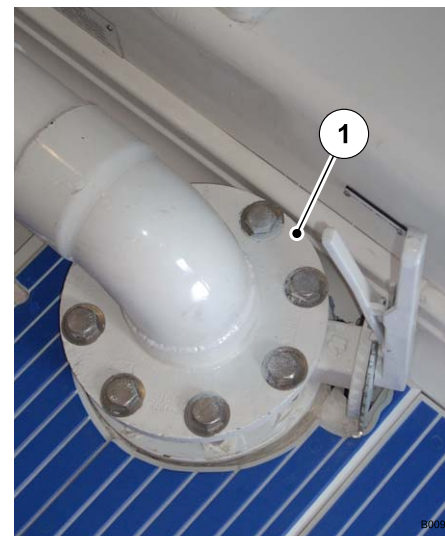
If it is necessary to use this draining system, check the bilge level continuously, because in case of complete draining, the engines cooling should not fail.

**WARNING**

*Be very careful when resetting the valves to the outboard suction position when the bilge is dry, in order not to compromise the engine parts.*

**WARNING**

*In case of emergency it is possible to pump the water from the bilge through the seawater pumps of each engine.*



## 8.14 EXHAUST SYSTEM

The engine exhaust system is equipped with a double chamber muffler (one on each engine). These mufflers allow to generate a very low counterpressure inside, so that the hazard of water flow-back to cylinders is reduced, otherwise the propulsion system could get seriously damaged.

The exhaust system is conceived so as to eject water and gas together. This reduces remarkably the combustion noise and the noise produced by the same engines.

Check the underwater exhaust terminal cleanliness conditions periodically.

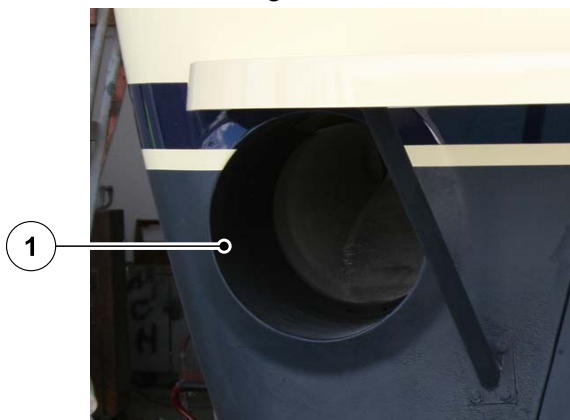


### CAUTION

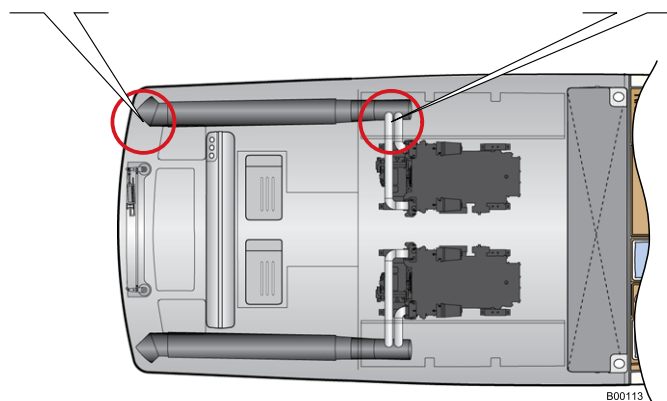
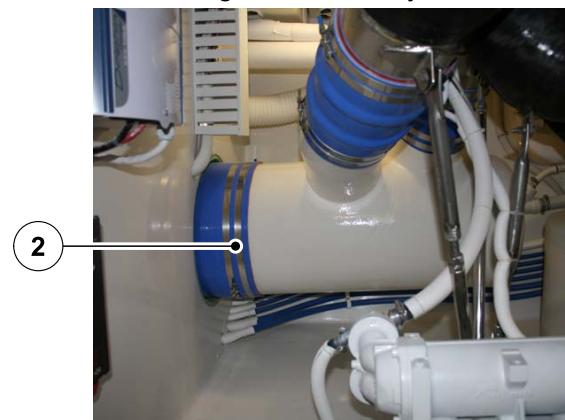
*When starting the engines, check that the exhaust discharges water; this means that the engines cooling system and exhaust cooling system work correctly. Accelerate if no water comes out.*

*If the problem carries on, refer to the BERTRAM Customer Support.*

Engine exhaust



Engine exhaust system



1. Engine exhaust
2. Engine exhaust system

### 8.14.1 Engine Exhaust System Inspection

For each engine, you should:

- check the components of the exhaust system (exhaust manifold, mixing elbow, exhaust line, hose clamps, muffler, struts, etc.) for cracks, breaks and corrosion.
- check the hoses for softness, cracks, leaks, or dents. Replace them as needed.
- check for corroded or broken metal parts. Replace them as needed.
- check for loose, corroded, or missing clamps.
- tighten or replace the hose clamps and/or hangers as needed.
- check that the exhaust outlet is unobstructed.
- visually inspect for exhaust leaks.
- check for carbon or soot residues in the exhaust components. These residues indicate exhaust leaks, which must be repaired.



#### CAUTION

*Carbon deposits, marine growth, and fouling may affect engine exhaust operation, causing performance degradation and engines damage. Exhaust outlet blockage, even if partial, may compromise proper engine operation.*

*Ensure that the exhaust outlets are free of deposits, growths, and fouling. Ensure that the parts of the check valves (flappers) move freely and without any obstruction.*

#### NOTICE

*A strong smell and a light smoke from exhaust insulation are normal at the first start.*

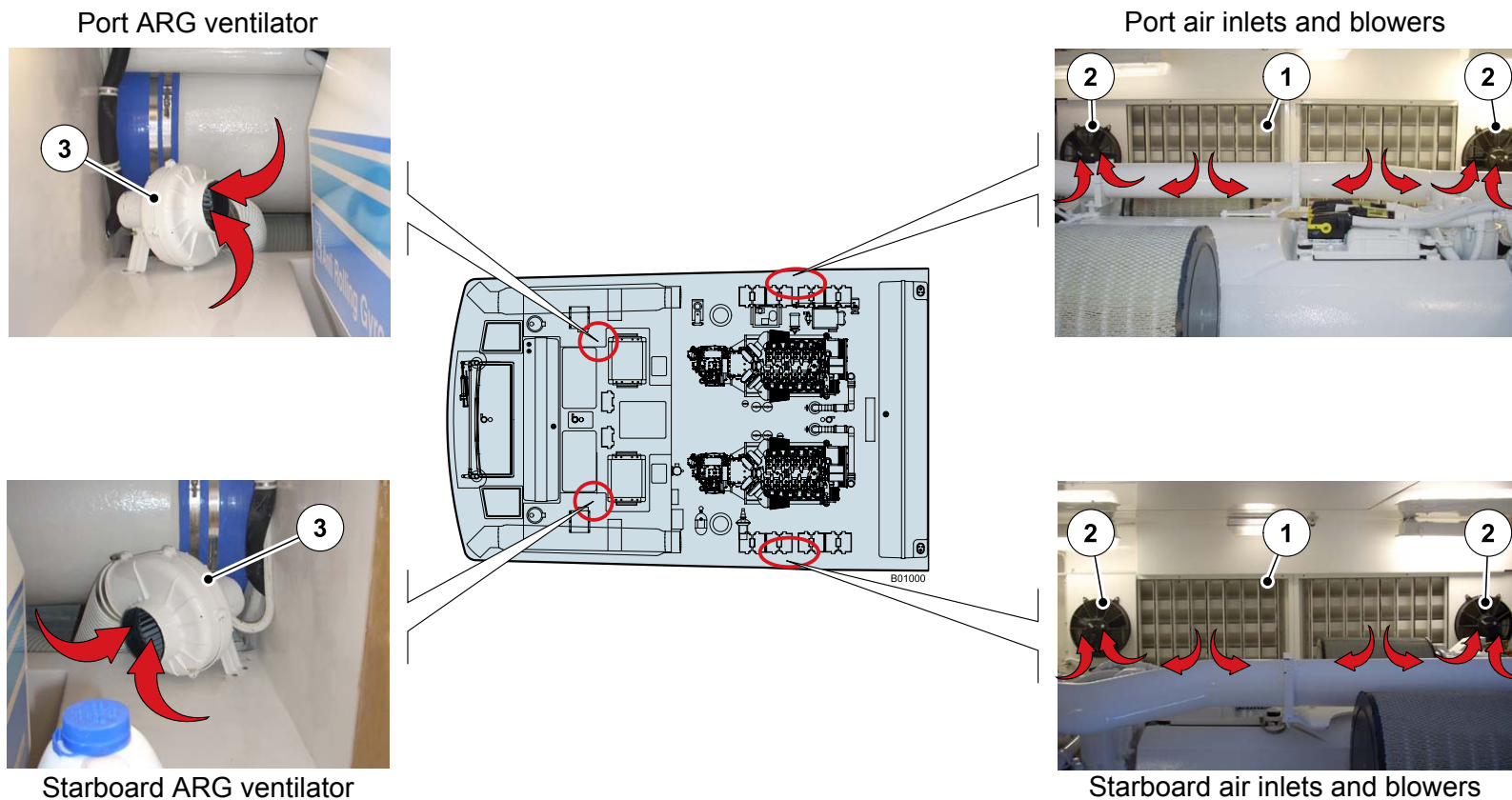


#### WARNING

*Carbon Monoxide Hazard - Ensure engine exhaust system is working properly. Carbon monoxide poison is extremely toxic.*

## 8.15 ENGINE ROOM VENTILATION SYSTEM

### Engineroom ventilation system displacement



1. Air inlets
2. Engineroom ventilator blowers
3. ARG ventilators

## Operation

The engineroom ventilation system provides the necessary air exchange for the correct operation of the propulsion systems of your BERTRAM 700 yacht.

The ventilation system consists of four ventilators equipped with grids; they convey outside the air drawn inside, and by two lateral air inlets which provide natural ventilation to the engineroom. The air inlets are equipped with a air separating system from suspended water

To supplement the natural air ventilation, there is also a thermostatically controlled forced air ventilation system.

The electric supply of the ventilators is performed by a switch located on the main electric panel of the salon. When the blowers are in their normal operating mode and the circuit breaker is turned on, the blowers automatically operate when the engineroom temperature rises above 110 °F and turn off below 90 °F. The ventilators have a manual override switch on the thermostat housing, which allows them to operate regardless of engineroom temperature. This is valuable when working in the engineroom.

### NOTICE

*Do not place tools or clothing on the extractors. Do not allow anything to block the air inlets. Do not block the emergency closing device.*

### NOTICE

*After navigation in particularly rough seas, it may be necessary to rinse the salt residuals from the components near the inlets of the engineroom.*

### NOTICE

*With the engines on, it is recommended to have the ventilators under thermostatic control. It is suggested to keep them on for at least 30 minutes after running the engines, to dissipate the engineroom heat.*



### DANGER

#### CARBON MONOXIDE DANGER NOTICE

*Carbon monoxide (CO) is a potentially deadly, odorless, colorless vapor present in the exhaust by-products of all fossil fuel burning engine. While there is a substantially reduced CO presence in the exhaust of diesel engines and a corresponding reduced hazard to human beings, as compared to gasoline fueled engines, the hazard, however limited, should be noted.*

*Keep cockpit, enclosed bridge and staterooms area well ventilated when engines and/or generators are running and prevent the exhaust clogging. Do not occupy swim platforms or aft lounging areas when engines and/or generators are running.*

*Signs of exposure include nausea, dizziness and drowsiness, symptoms similar to those of seasickness.*

**NOTES:**

[illegible]





9



## HYDRAULIC SYSTEMS

*INTRODUCTION*

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*HOW TO USE THIS MANUAL*

---

*DESCRIPTION OF THE YACHT*

---

*GETTING UNDERWAY*

---

*INSTRUMENTATION & EQUIPMENT*

---

*HELM STATION*

---

*ON DECK*

---

*PROPULSION SYSTEMS*

---

***HYDRAULIC SYSTEMS***

---

*ELECTRICAL SYSTEM*

---

*INTERIOR DETAILS*

---

*SAFETY DEVICES & EQUIPMENT*

---

*YACHT LIFTING & ONSHORE HANDLING*

---

*MAINTENANCE*

---

*TROUBLESHOOTING*

---

## 9.1 ELECTRIC PUMPS

### 9.1.1 Bilge pumps

Automatic bilge pumps controlled by float switches pump the bilge water and discharge it overboard.

The bilge pumps are connected directly to the batteries and can be operated when the battery disconnect switch is positioned to OFF. They provide bilge water drainage at any time (keep the circuit breakers on the electric panel of engineroom connected).

The pump suction intakes are fitted with mesh strainers to prevent foreign materials and debris from entering the intake pipes and clogging the piping and/or jamming the pump.

Bilge pumps can work in automatic mode, thanks to float switches, and in manual mode.

To activate the pumps manually push relevant buttons in the helm station. To run the bilge pumps you have to activate the fuses placed on the electric panel of the engineroom.

For a better understanding consult the owner's manual "Electrical System".

For more directions about the use of the individual systems and equipment, consult the manuals provided by the individual equipment manufacturers.

Should the bilge automatic suction pumps of the engineroom not be able to drain water from the bilge, you can use an emergency draining system installed in the bilge; this system operates by means of some selector valves at manual operation, allowing to use the sea water pumps of propulsion engines, as draining pumps.

These selector valves ensure, when set to normal position, the seawater suction for engine cooling, through the intake seacocks and filters. In emergency case, operate levers of both valves, by setting the valves to emergency position: the pumps suction, driven by the engines, is then diverted directly to the bilge. The levers are equipped with a spring mechanism, because their operation must absolutely be wanted and not accidental.

Should it be necessary to use this draining system, the bilge level must be checked continuously, because in case of complete drainage, the engines will not be cooled down.

For correct procedure see "Engines emergency suction from the bilge".



#### **WARNING**

*In emergency the sea water pumps of each engine can be used to drain the engineroom bilge (for the correct procedure see the chapter "Engine cooling system").*



#### **WARNING**

*SINKING HAZARD - Ensure proper pump operation.*



**CAUTION**

*Don't run the electric pumps dry.*



**WARNING**

*Care has to be taken because the intake seacock of the engine is quickly closed after opening the bilge strainer valve.*

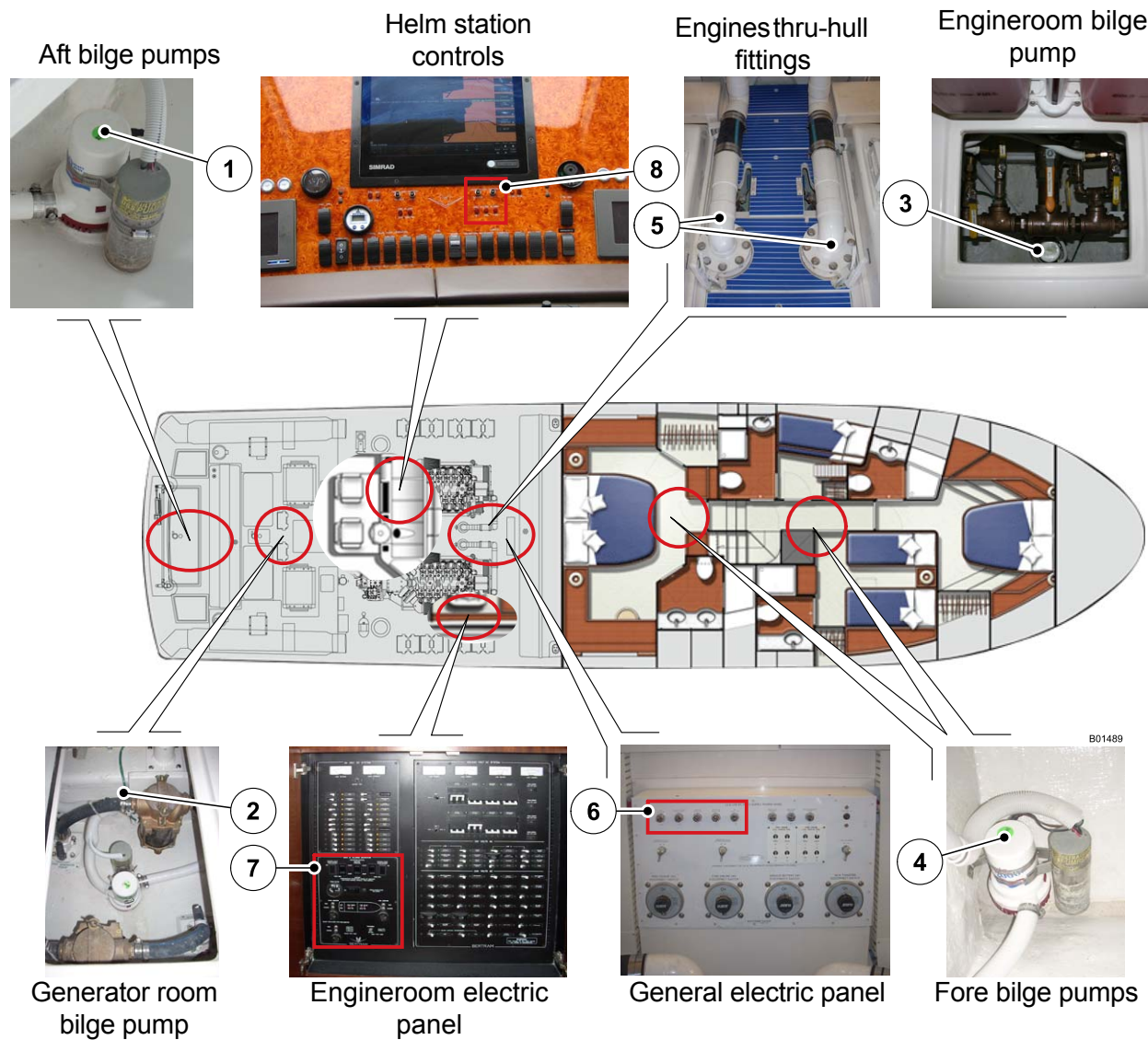


**WARNING**

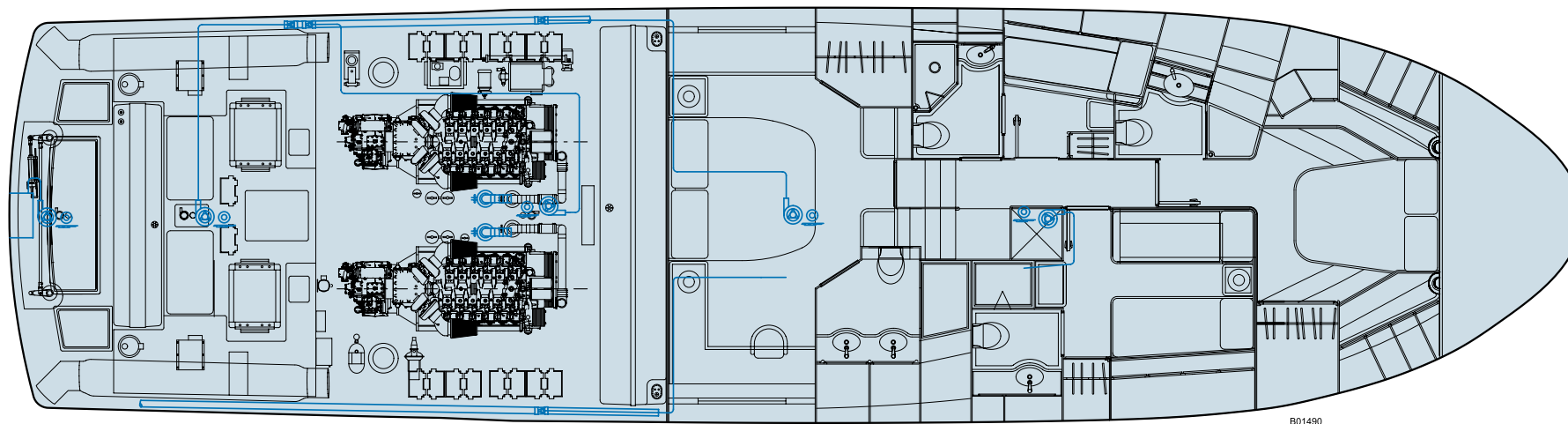
*Be very careful when resetting the valves to the outboard suction position when the bilge is dry, in order not to compromise the engine parts.*

## 9.1.2 Bilge automatic/manual suction system displacement

1. Helm gear compartment aft bilge pumps
2. Generator room bilge pump
3. Engineroom bilge pump
4. Fore bilge pumps
5. Engines thru-hull fittings
6. Bilge pump fuses
7. Synoptic panel inside of general cabinet
8. Helm station controls and LEDs



# Bilge automatic/manual suction system



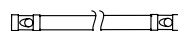
Bilge pump



Engines thru-hull fittings



Level sensor



Drain manifold

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**WARNING**

*Clean the bilges frequently and meticulously.  
Remove any rags or other materials from the bilge, to avoid clogging the intakes and damaging the pumps.*



**WARNING**

*In case of water presence in some compartments of the belowdeck, before getting alert, verify if the bilge water is fresh or salted. This will be of fundamental help while analyzing its origin.*



**ENVIRONMENT**

*Possible oil or diesel fuel spilled in the bilge must be collected and stowed.  
It is forbidden to discharge bilge water mixed with oil or diesel fuel into the sea, because this is cause of heavy pollution.  
During the maintenance operation in the engineroom, it is compulsory to disconnect the circuit breakers for the pumps of the bilge automatic suction system, in this way accidental spills of liquids and consequently water pollution are avoided.*

**NOTICE**

*The bilges should be kept as dry as possible to minimize excess weight. The added weight of bilge water causes the vessel to ride lower in the water, which increases resistance. This increased resistance reduces your vessel's speed and increases fuel consumption. Another consequence of excess bilge water is called the free-water effect. As the bilge water "sloshes" from side to side, it may influence the amount of roll at low speeds, or make it difficult to trim the vessel at higher speeds.*



**WARNING**

*Keep the bilge dry to allow a prompt detection of water presence and to reduce the risk of slipping, besides creating a less aggressive environment for the fixtures.*



### 9.1.3 Bilge pump operation check

- Fill the bilge with enough water to activate the floater switches. Check the operation of each bilge pump, including the hand pump. Check the overboard drain to see that water is pumped out. When checks are completed, turn the pump switches to AUTO.

Bilge pumps normally do not need routine service.

You can, however, take measures to prolong their useful service life.

Ensure that a pump never runs dry. Running dry can destroy the pump impeller.

- Where the possibility of freezing exists, drain the pump body. Before restarting the pump, refill it with water and follow the priming sequence described in “Priming A Pump”.
- Where a check valve and suction filter are installed, check them periodically for cleanliness and proper operation.
- If the yacht will be inactive for a long period, drain and clean the pump bodies and tanks.

Ensure that a pump never runs dry. Running dry can destroy the pump impeller.



#### CAUTION

*The bilge pumps are connected directly to the batteries and can be operated when the battery disconnect switch is positioned to OFF. Starting a pump while it is being serviced could cause personal injury or damage the pump.*

*Before doing any kind work on the bilge pumps, DISCONNECT the pumps' electrical power from the battery.*



### 9.1.4 Maintenance of other electric pumps



#### CAUTION

*Before doing any kind of work on an electric pump, make sure that the electric power to the pump is switched OFF, and that there is no possibility of accidentally starting the pump. Starting a pump while it is being serviced could cause personal injury or damage the pump.*

The electric pumps on your yacht are generally maintenance free, provided some precautions are taken to extend their useful life.

- Ensure that a pump never runs dry. Running dry can destroy the pump impeller.



- Where the possibility of freezing exists, drain the pump body. Before restarting the pump, refill it with water and follow the priming sequence described in **Priming A Pump**.
- If the yacht will be inactive for a long period, drain and clean the pump bodies and tanks.
- Check that the pump shaft turns freely. Use a suitable tool or a screwdriver at the end of the motor shaft.
- Check to ensure that the rotation direction of the pump output shaft is correct, and that the pump motor does not draw more than its rated amperage when operating.
- Check the impeller. If it is obstructed, the electric motor will be seriously damaged. If the impeller is obstructed, remove the obstruction, and clean the impeller and the pump body.
- If the impeller or the mechanical seals need replacement. This requires the services of a skilled technician.
- Check the brushes and brush springs in DC motors at regular intervals.
- To prevent damage to the motor, check that the turning attachment is not blocked.
- Check the pressure inside the pump tank. This must be the same as the connection pressure of the electric pump.

#### **NOTICE**

*Avoid voiding the manufacturer's warranty. An electric pump should be repaired only by an authorized and qualified technician, using approved spare parts designed for the pump.*

### **9.1.5 Priming a pump**

When a pump has been drained or opened for inspection or service, it should be primed before it is used. A newly installed pump also requires priming.

- Fill the pump body with water to allow the pump to prime. This operation is very important and must be carried out at the first start of a new pump and at any time that the pump body was drained. Priming the pump helps avoid damaging the pump and the impeller.
- Turn ON the pump with the water inlet CLOSED and the discharge outlet completely OPEN. Then slowly OPEN the water inlet to start the water flow. If water does not flow, refill the pump body and repeat the priming procedure.

#### **MAINTENANCE**

*Verify the operation of the pumps and of the floating switches at least once a week.*

*At least once a month:*

- *verify the condition of the connections;*
- *carefully clean the pumps and the floating switches;*
- *carefully clean the bilges.*

*Verify any sign of obstruction in the pipes at least once every six months.*

## 9.2 FRESH WATER SYSTEM

Water is taken from the tank and through a pump to relevant distribution manifolds, and then sent to the various users:

- VIP stateroom head;
- guests staterooms head;
- Master head;
- galley sink;
- cockpit sink;
- engineroom faucet;
- cockpit washdown faucets;
- the air-conditioning unit;
- washing of watermaker membranes (if installed);
- washer-dryer;
- Icemaker (optional).

The system is held under pressure by the tank and captive air tank, while the water heaters warm water.

The operation of your vessel's fresh water pump is automatic and normally does not need priming, except before its initial use or if the fresh water tank is empty.

The pump holds an average static pressure of 30 PSI. When the pressure drops below approximately 21 PSI, the pump automatically turns on and raises the pressure. If the pressure continues to drop because of an empty tank, the low-pressure cut-out switch will shut off the pump.

To prime the pump:

- ensure that the tank is at least partially full;
- start the pump by lifting the momentary pump restart switch located in the salon DC distribution panel;
- hold the momentary pump restart switch until the pump continues to run on its own, then release the switch;
- Once the pump has raised the pressure, open a faucet to release any trapped air.

The water heaters are located in the fore bilge. The thermostats are pre-set by the manufacturer to 140-145 °F.

We recommend that you do not raise the temperature above this setting. Avoid switching on the differential circuit breakers of the water heater when these latter are empty. The hot water heaters operate at 230 V AC either by generator or by shore power supply.



### **WARNING**

*Do not open the water heater thermostat access panel, unless the differential circuit breaker is turned off.*

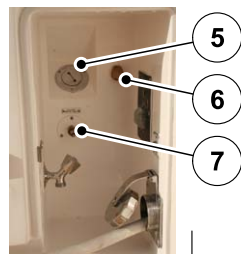
The fresh water system is equipped, beyond normal fresh water inlet, also with two extra dockside inlets. This system is equipped with a pressure relief valve.

### **NOTICE**

*The fresh water tank can be filled only through fill fitting. It cannot be filled using the shoreside quick-connect fitting.*

1. Tank
2. Pump with filters
3. Water heater
4. Captive air tank
5. Fill fitting
6. Tank vent
7. Shoreside water inlet with quick-connect fitting
8. Pressure switch
9. Distribution manifolds
10. Tank water level gauge

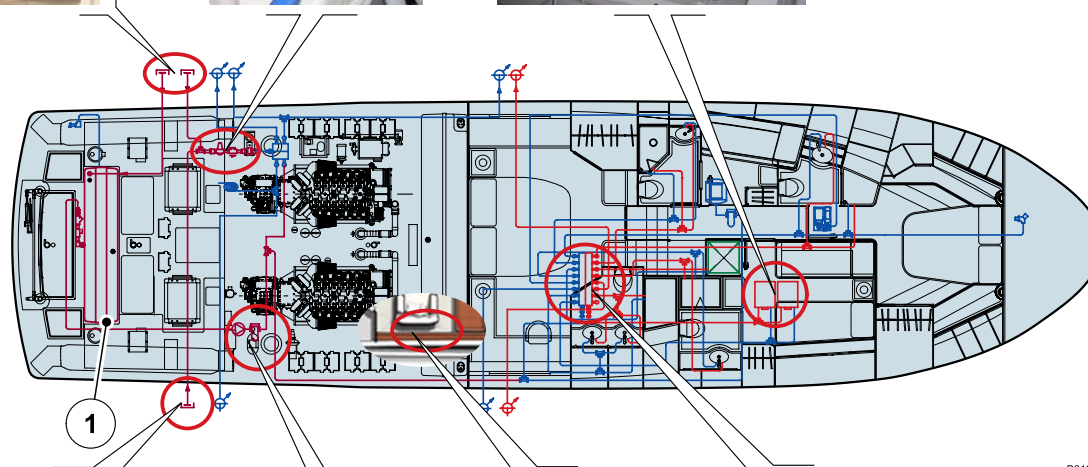
Inlet/Intake/Vent



Pressure switch



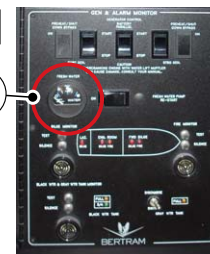
Water heater



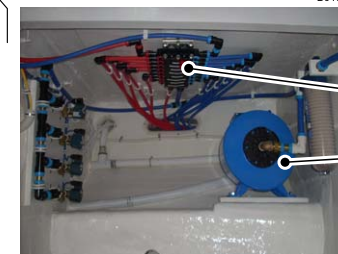
Shore water inlets



Pump & filter



Salon electric panel



Manifolds and captive air tank

B01004

**WARNING**

*The fresh water circuit, and particularly the tanks, must be cleaned periodically by pouring in the case a specified disinfectant solution. We do not recommend to drink the water supplied by the onboard system.*

**WARNING**

*Before refilling the fresh water tank, check that fresh water supplied by the shore system is drinkable.*

**WARNING**

*When the yacht is left unguarded for a long period of time, the pump must and water heater must be disconnected by means of relevant circuit breaker.*

**WARNING**

*In yachts equipped with direct connection to shore fresh water the maximum operation pressure should not exceed 29 PSI/2 bar and the pipes must be disconnected during periods of unattendance for safety reasons. Notwithstanding the presence of a pressure switch, check the pressure on the pressure gauge installed on the switch.*

**WARNING**

*Periodically carry out inspection of the fresh water circuit and of the bilge to find out the possible presence of leaks.  
Repair leaks by releasing the pressure in the system, in order to avoid damages to the furniture and to the electric devices.*

**WARNING**

*The intake plug carries the indication "WATER" to avoid accidental introduction of different liquids.  
To avoid damages to the system and tanks, we recommend to replenishing by liquid fall and not by pressure.*

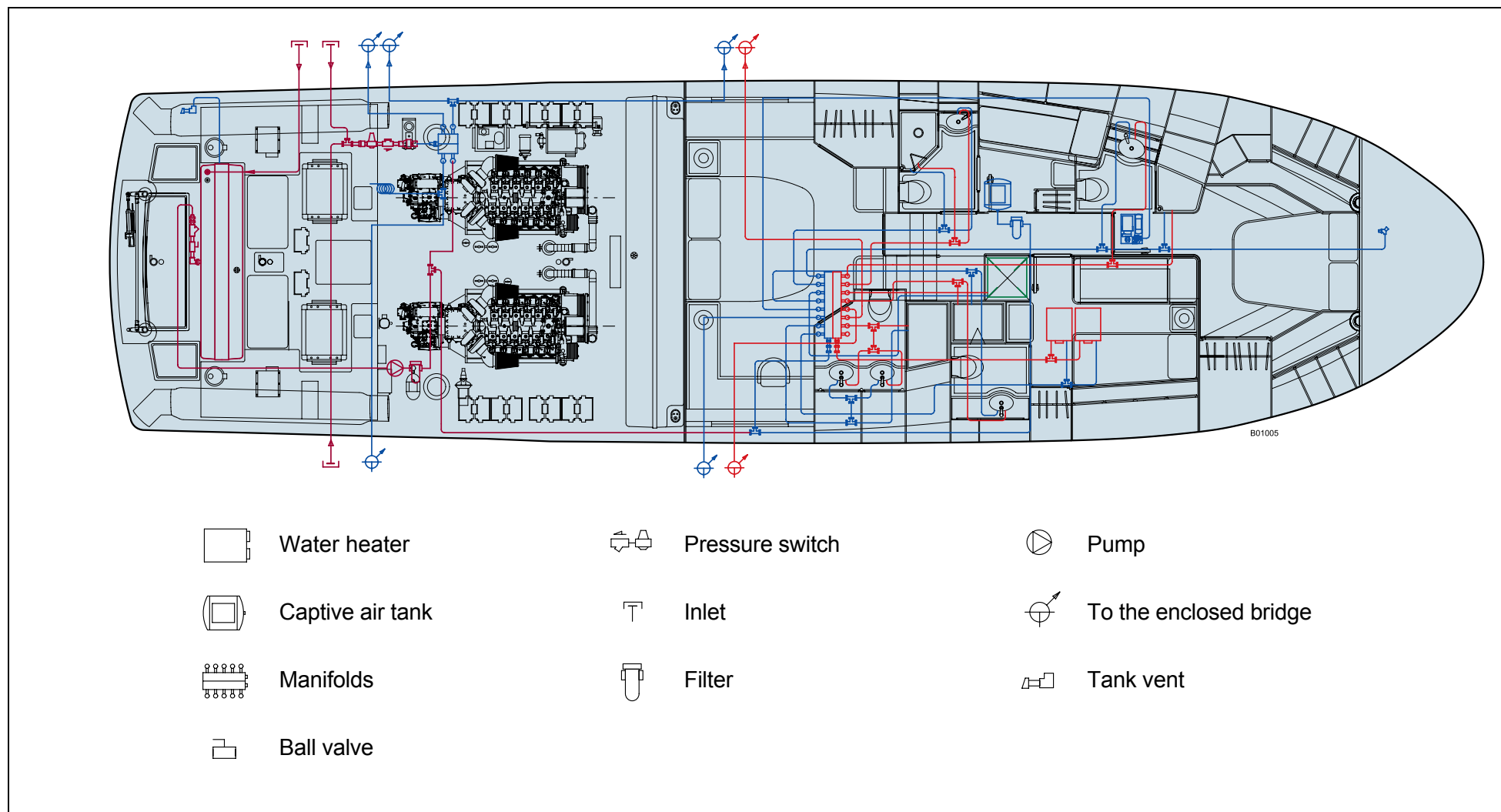
**CAUTION**

*It is a good rule to optimize the use of water, especially if you are during high sea navigation.*

**CAUTION**

*When leaving the vessel unattended, the dockside fresh water supply should be disconnected to prevent flooding the bilges in the event of a broken pipe.*

# Fresh water system



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### 9.3 REFILLING THE WATER TANK

- Ensure that the yacht is properly moored and stop engines and generators.
- Loosen the fill fitting plug and insert the hose, which must have the correct dimensions. The water fill fitting is inside of the cockpit afterpeak.
- During refilling, check the tank level through the gauge located on the general electric panel.
- At the end of filling, remove the hose and tighten filler plug.

#### NOTICE

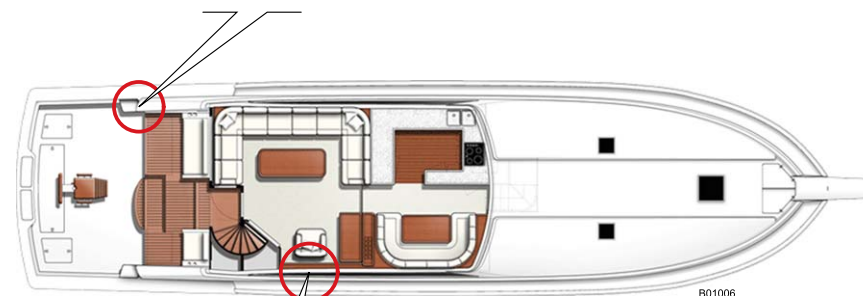
*Replace freshwater in the tank frequently, and, if necessary, disinfect the system with suitable products. Never leave the yacht unattended while taking on fresh water. If there is a risk of freezing, do not top off tanks.*



#### WARNING

*During the refilling of fresh water pay attention to the filling hose. Water spillage may cause electrical short-circuits. Do not leave the fresh water hose and fill fitting unattended.*

Inlet



B01006



Level gauge

## 9.4 FRESH WATER SYSTEM MAINTENANCE

### 9.4.1 Fresh water tank

The fresh water tank is placed at stern and can be inspected through the helm gear compartment.

Clean the tank inside at least once a year.

#### NOTICE

*Before servicing the fresh water tank, disable the operation of the fresh water system.*

#### Pump check and cleaning



#### WARNING

*When the yacht is left unguarded for a long period of time, the surge tank must be disconnected by means of the relevant circuit breaker.*

- Check the cleanliness of the pump and of the captive air tank. Wash them with well-diluted detergent, and then dry them.
- Check the fittings for tightness and evidence of corrosion.
- Check the air pressure inside the tank. If it is lower, restore it to a maximum with a bicycle pump or a compressor. For range values refer to the specific equipment manufacturer's handbook.

### 9.4.2 Water system maintenance

For service purposes, you may isolate parts of the system or individual services without affecting the general system operation. To do this, handle on suitable valves installed on the main manifold. Also, to stop a failure in the hot water system, you can close the valves located at the hot water heater inlet. Check and clean the fresh water tank at least every three months. Fill the tank with clean water, and then drain it. Repeat the operation two to three times. You may add an appropriate disinfectant or a sanitizing product through the tank fill fitting. Follow the directions on the product label. Fill and drain the tank at least one more time, after draining the water containing disinfectant or sanitizing agent. Verify for possible leaks in the system at least once every six months. Verify the operation of the cocks at least once a month.



#### WARNING

*When operating in shallow water, care must be taken that debris do not penetrate through the raw water intake seacocks of generators. Excessive use of the yacht with generators running in shallow water, may damage the raw water pump impellers.*



## 9.5 SEAWATER SYSTEM

The onboard seawater systems are following:

- **Engines cooling system**, consists of two circuits, one for the starboard engine and the other for the port engine. Sea water is drawn directly from the inner pumps of the engines, by means of intake sea cock equipped with cut-off valve and filter. The water sucked by the engines, flows through the strainers and is then delivered to the heat exchanger of the stabilizers and to the heat exchangers of the engines, and then discharged overboard. Moreover, suitable circuits branches allows the cooling of the seals at shafts output and the cooling of the exhaust manifolds.
- **Generators cooling system**, consists of two circuits, one for the starboard generator and the other for the port generator. Sea water is drawn directly from the generator pumps by means of intake seacock equipped with cut-off valve and strainer. The water sucked by the generators, flows through the filters and is then delivered to the heat exchangers of the generators and discharged overboard.
- **Sea water system for washdown**, consists of an electric pump that sucks seawater through a intake seacock equipped with cut-off valve and filter and delivers it to the washdown faucets.



### CAUTION

*The seawater faucets are clearly labeled to prevent the accidental use of seawater for drinking or cooking. Do not use this system for fighting electrical fires, because of the potential for shock hazard.*

### NOTICE

*The seawater system should always be switched off when the boat is left unattended.*

The seawater washdown system will make the cleaning of fish, fish boxes, and the cockpit area while at sea easier. The system is also an integral part of the live well system.

#### – Live Bait Well System

The live well will keep bait alive only when it is operating and aerating the water. When the water in the live well reaches the drain near the top of the tank, the excess water will drain overboard.

To operate the live well:

- turn on the seawater washdown pump;
  - open the water supply valve located near the overhead in the machinery room;
- close the live well drain valve located near the supply valve.

To drain the live well after use:

- turn off the washdown pump or close the water supply valve;
- open the drain valve.

- **Cooling system for air conditioning**. Sea water is drawn directly by an electric pump by means of a intake seacock equipped with cut-off valve and filter. The sucked water is sent to the heat exchanger of the air conditioner and then discharged overboard.

- **Sea water system** for water maker (optional), consists of an electric pump that sucks sea water through a intake seacock equipped with cut-off valve and filter and delivers it to the watermaker for the production of fresh water. The intake seacock and the filter are the same delivering the firefighting system. The brine left over after the process is drained overboard.



### WARNING

*Use the watermaker only in clean waters, in order not to contaminate its membranes, the tanks and the whole circuit.*



### WARNING

*Before carrying out the cleaning of the intake seacock filter, check that the users supplied with seawater are disconnected.*



### WARNING

*In case of risk that the yacht sinks, if you can and escaping condition allow you this, close all ball valves of the intake seacock.*



### CAUTION

*Before carrying out maintenance on the sea water circuit, cut-off its operation and close the intake seacock valve.  
Before restarting the system circuit, make sure that the cut-off valve is completely open.*



### CAUTION

*During navigation check periodically the cleaning condition of the seawater strainers.*

*If the yacht is crossing a dirty sea area, check the strainers condition and proceed with their cleaning.*

*This precaution is very important, to avoid damaging of mechanical parts (like engines, generators, etc.), of the exhausts systems and to prevent endangering the yacht safety.*



### CAUTION

*It is advisable, when leaving the yacht in water for a long time, to close all intake seacocks.*



### WARNING

*When operating in shallow water, care must be taken that debris do not penetrate through the raw water intake seacocks of generators.*

*Excessive use of the yacht with generators running in shallow water, may damage the raw water pump impellers.*

## 9.6 Thru-hull fittings and intake seacock

The sea valves and the outer intake seacocks of the hull must be free from barnacles, seaweed, corrosion or other obstructions. The intake seacocks and valves must be kept clean, using a brush if necessary. Because this operation has to be performed from the outside of the hull, the yacht should be in a dry shore. If necessary, the cleaning may be done underwater by a diver, thus preventing anybody from starting the engines.

### 9.6.1 Seawater cooling system check

Never leave water in the system when the yacht is out of water. At least once a month, flush the seawater system with fresh water to remove any scale that could clog the passages of the seawater cooling circuit.



#### CAUTION

*During navigation check periodically the cleaning condition of the seawater filters.*

*If the yacht is crossing a dirty sea area, check the strainers condition and proceed with their cleaning.*

*This precaution is very important, to avoid damaging of mechanical parts (like engines, generators, etc.), of the exhausts systems and to prevent endangering the yacht safety.*

### 9.6.2 Maintenance of the sea filters

Clean the sea filter at regular intervals, according to the use of the system and the level of pollution (seaweeds, jellyfish, other foreign matter, etc.) in the water in which the yacht is operating.

Moving the valve handles repeatedly and regularly helps prevent sea valves from becoming difficult to open or close.

Clean the intake seacock filters according to the frequency of the system use and to the pollution condition of the sucked waters (seaweeds, mucilages, etc.).

- Close the intake seacock valve concerned.
- Cut-off valves upstream of concerned filter.
- Loosen the filter cover.
- Remove the filter basket and wash away all impurities with fresh water. Replace, if necessary.
- Reinstall the baskets and the cover.
- Open the valves upstream of concerned filter.
- Before restarting the system circuit, ensure that the screws and relevant washers are correctly fastened with the ring and disc on filter's body.
- Re-open the intake seacock valve completely and check for leaks presence from the filter cover.

All intake seacocks must always be fully open or fully closed, as needed. Do not use the intake seacock in a partially open or partially closed position.

If a valve handle is difficult to operate, you may use an extension on the handle to increase leverage. However, the sea valve should be serviced at the next dry-docking of the yacht to correct the problem.



#### DANGER

*The lack of care during the cleaning of the intake seacock filters can cause heavy damages to the on board devices and in some cases fire, with very serious consequences. Check before setting up for navigation and at regular intervals also during navigation, the condition of the intake seacock filters of the various devices.*

## 9.7 AIR-CONDITIONING SYSTEM

### 9.7.1 Air-conditioning system operation

The basic principle of an air conditioner is the movement of heat. In a marine, direct expansion (DX) seawater-cooled air conditioner, heat is transferred from the cabin air to the refrigerant gas, which then releases the heat into the seawater. In reverse cycle heating (heat pump), the refrigerant flow is reversed and heat is extracted from the seawater and discharged into the cabin.

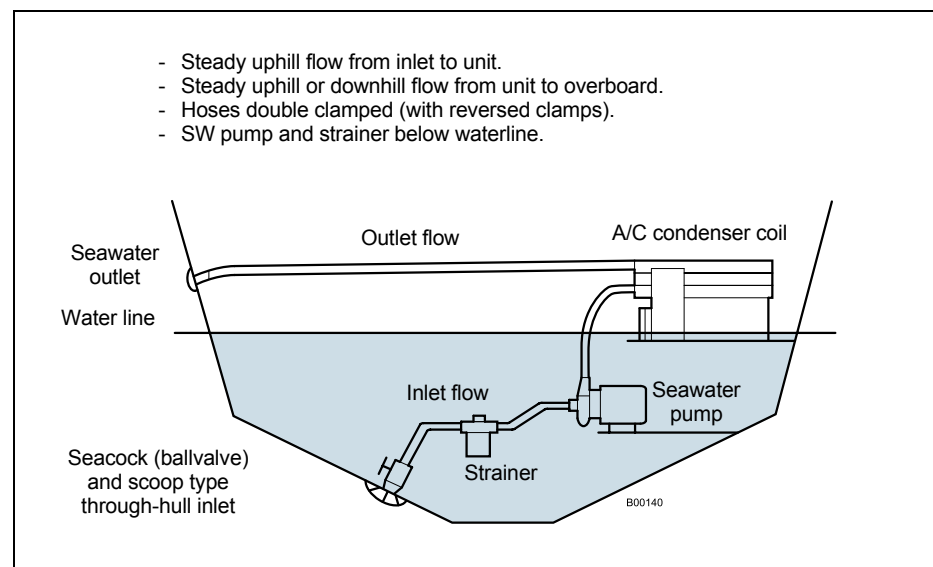
Part of the cooling process, in addition to lowering the air temperature, is the removal of moisture from the air. This lowers the humidity, making the area feel more comfortable and helping to keep the boat dry, reducing mold growth and other moisture related problems.

**Seawater System:** The seawater cooling system consists of an inlet through-hull fitting, seacock (water valve), strainer, pump, and overboard discharge fitting all connected by hose or piping.

If multiple air conditioning units are served by a single seawater pump, then a pump relay and water manifold are required.

Cruisair recommends a centrifugal seawater pump for efficient, quiet operation and long life. Centrifugal pumps are not self-priming and must be mounted below the water-line. It is important that the seawater plumbing be “self-draining”, meaning that if the boat is lifted all water in the piping will drain out. An air conditioning system plumbed this way will have no air locks which could disrupt the flow of seawater.

For shallow-draft boats where it is impossible to mount the pump below the water-line, a self-priming pump must be used.



On this yacht each air-conditioned space has an independent temperature control panel. The air conditioning units are located in the bilge below the stateroom areas, while the relevant intake seacocks, strainers and pumps for seawater supply are located in the engine room. The components in your air conditioning system are designed and built for saltwater use. Your system operates with seawater cooled, reverse-cycle condensers and either cools or heats as required for your comfort. The condensate from the forward cooling units drains into the gray water sump tank and is automatically pumped overboard. Important: do not turn off the gray water differential circuit breaker. If the differential circuit breaker is turned off, condensate may overflow the gray water tank. The salon cooling unit drains overboard via the common drain. The machinery room cooling units have a dedicated sump pump to discharge the condensate water.

All air conditioning units are 230 V AC and powered through the differential circuit breakers in the salon AC distribution panel.

Please see the documentation provided in the owner's information case for detailed information on your system.



**CAUTION**

*It is very important that you read and understand the air conditioning operation's manual before you attempt to operate your air conditioning. Please read the air conditioning manufacturer's manual, provided with your owner's information.*



**CAUTION**

*Before starting the air conditioning system, make sure that the air conditioning seawater seacock is open. After starting the unit(s), confirm that seawater discharge is flowing from the through hull outlet.*



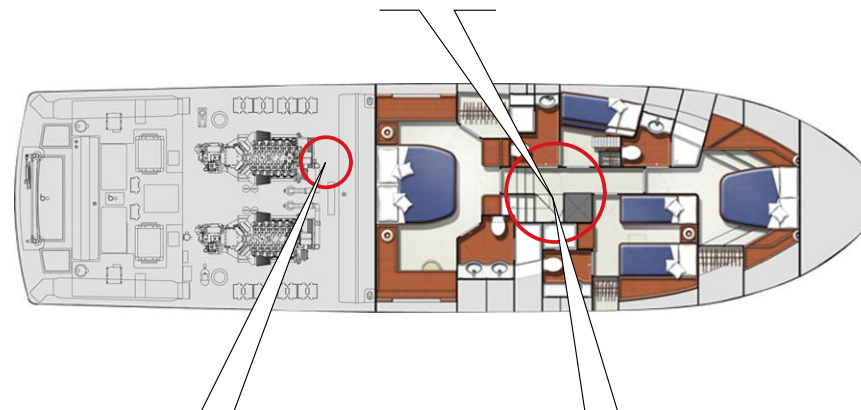
**CAUTION**

*If your boat has been hauled from the water, seawater may have drained from the system. When the boat is returned to the water, air may need to be bled from the seawater strainer before the A/C pump is operated.*

**NOTICE**

*It is recommended to always keep a good air circulation inside the yacht; for this purpose it can be helpful to keep the system set to dehumidifier or anyway on.*

Air conditioning units and A/C pump



Intake seacock and filter



Distribution manifolds

## 9.8 CHILLER UNIT CONTROL PANEL

### 9.8.1 Basic operation

#### Turning the system on

Press the POWER or MODE keys to turn the system on. In three seconds, the system will start operating in whatever mode it was running prior to the last shut down. Press the MODE key prior to three seconds (while the display is flashing) to change mode before system starts, or any time to change the mode while the system is on. The modes available are: Cool, Heat Auto Switchover (automatically switches from Cool to Heat Mode), or Dehumidification Mode. A solid dot will light up next to the words COOL or HEAT when the compressor is on and running in that mode.

#### Selecting the setpoint

Press the Up or Down arrow keys to adjust the setpoint (press and hold keys to scroll); wait three seconds after powering up system. The word SET will appear in the display while setpoint is being adjusted. The setpoint range is 55-99 °F (10-40 °C). After selecting the desired setpoint temperature, if no buttons are pressed for three seconds, the display will automatically revert back to showing the inside cabin temperature. Inside cabin temperature is continuously displayed.

#### Adjusting the fan speed

The Fan key is used to adjust the fan speed while in manual fan Speed mode and to switch from manual to automatic fan speed modes. The fan may be run manually whether the system is on or off. The word MANUAL appears in the display while in that mode. Automatic fan speed mode may be operated only when the system is on. Fan behavior also depends on how the Fan Mode function is programmed: - "C" for continuous or "I" for intermittent running with the compressor (see SMXht keypad/display programming summary table).

#### Dimming the display

Press the MODE and Up arrow keys simultaneously and repeatedly to select the display brightness setting.

#### Backlight mode

While in the Sleep Mode (backlight is off, see function #20) press any button to light the display, and then operate as usual.

#### Important memory function

After changing modes, programming settings, setpoint, etc., wait at least 30 seconds before turning off main power supply in order for new settings to be maintained in memory.



## Programming

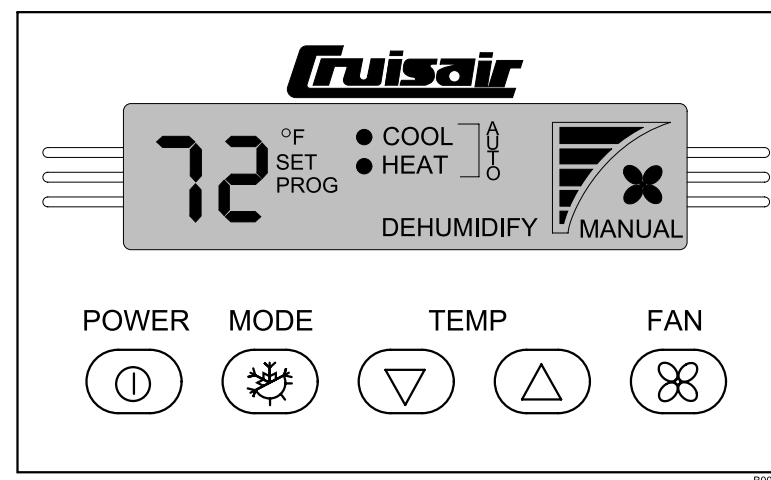
SMXht must be in the Off mode prior to entering Programming Mode; pressing the POWER key turns the display off or on. Once in the Off mode:

1. Simultaneously press and hold the MODE and Down arrow keys for three seconds. The word "PROG" will flash in the display while the buttons are being held. Successful entry into the Programming Mode is indicated when the word "PROG" stops flashing, and a flashing "1" appears in the display.
2. Use the Up or Down arrow keys to scroll until the desired program function number is displayed. See SMXht keypad/display programming summary table.
3. Press the MODE key to enter the desired function. The current value and the word "PROG" will be displayed.
4. Use the Up or Down arrow keys to change the value of that program.
5. Press the POWER key to save the new settings, exit the Programming Mode, and return to the Off mode.

Note: If SMXht is programmed for displaying °C (rather than the factory setting °F), then functions 3 & 4 should be adjusted.

For function 3, the factory setting of 12 (or 1.5 °F) should be changed to 7 ( $7/8 = 0.8$  °C). For function 4, the factory setting of 4 (or 0.5 °F) should be changed to 2 ( $2/8 = 32.54$  °F). For these functions °F (or 8) = 0.6 °C (or 5).

For more information, consult the manufacturer's manual delivered separately.



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### 9.8.2 Air conditioning system maintenance

#### Condensate drains

At least once every three months, check the condensate drains for obstructions by pouring a quart of water rapidly into the condensate pan. If it does not drain completely within 30 seconds, check the drain outlets for clogging. Remember that many air conditioning units have two drains and hoses, one at each end of the drain pan.

#### Air filters

At least once a month, check the lint screen or filter behind the return air grill or on the face of the cooling/heating unit and clean if necessary.

#### Seawater connections

Verify that all seawater connections are tight, and check for water flow from each unit's overboard discharge.

#### Seawater pump

If the seawater pump has a plastic pump head, then the impeller is made of either plastic or rubber, and should be inspected after 300 hours of operation. Replace the impeller if it is worn. Whereas, if the pump's head is made of bronze, then the impeller is too, and regular maintenance is not needed as often.

#### Seawater filter

Check the seawater strainer daily. Remove any debris.

#### Refrigerant gas

The refrigerant gas used in the air conditioning system is adequate for the life of the system. Routine "seasonal" charging of the system is not typically necessary.

#### Winterizing the system

Close the seacock and remove the water inlet hose from the air conditioner. Allow all water to drain from the system. Loosen the screws on the pump head to allow the water to drain from the pump. Drain and clean the seawater strainer.



## 9.9 BLACK WATER (SEWAGE) SYSTEM

### 9.9.1 Operating the WCs

The WCs of the heads are ceramic marine-type and are flushed with fresh water. The waste from the WCs is directed to the black water (sewage) holding tank. The WCs have two buttons: BEFORE USE & AFTER USE.

1. Button BEFORE USE
2. Button AFTER USE

Pushing the BEFORE USE button automatically introduces a pre-determined quantity of seawater into the bowl, preventing waste remains from clinging to the ceramic walls. Pushing the AFTER USE button floods the bowl with fresh water, which breaks up the waste and sends it to the black water (sewage) holding tank.

On the toilets control panel a LED indicates:

3. Green, system activate - red, holding tank full toilet disabled

To change the quantity of water introduced into the WC by the AFTER USE button, and therefore the opening time of the solenoid valve, remove the toilet control panel (4) and change the setting of the adjustment regulator.

Regularly pour an appropriate marine disinfectant/treatment liquid into the WCs, following directions on the product label.

#### NOTICE

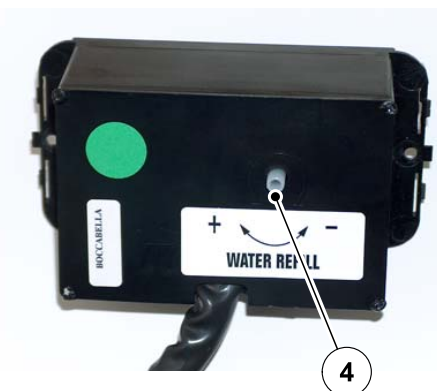
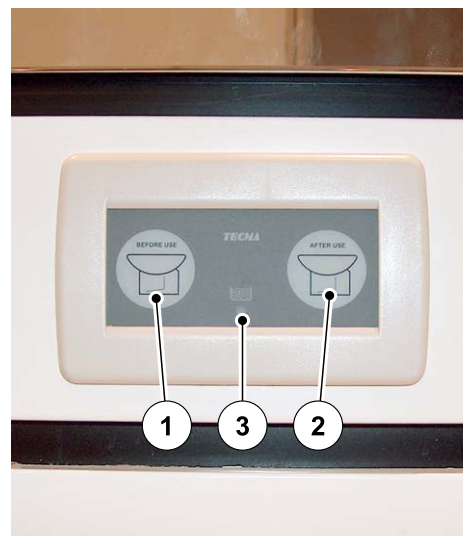
*Do not put anything other than human waste and single-ply toilet paper into the WC.*

Before entering the harbor, check the black water (sewage) tank and drain it if necessary (beyond land borders) to avoid having to return to the open sea to empty the tank.



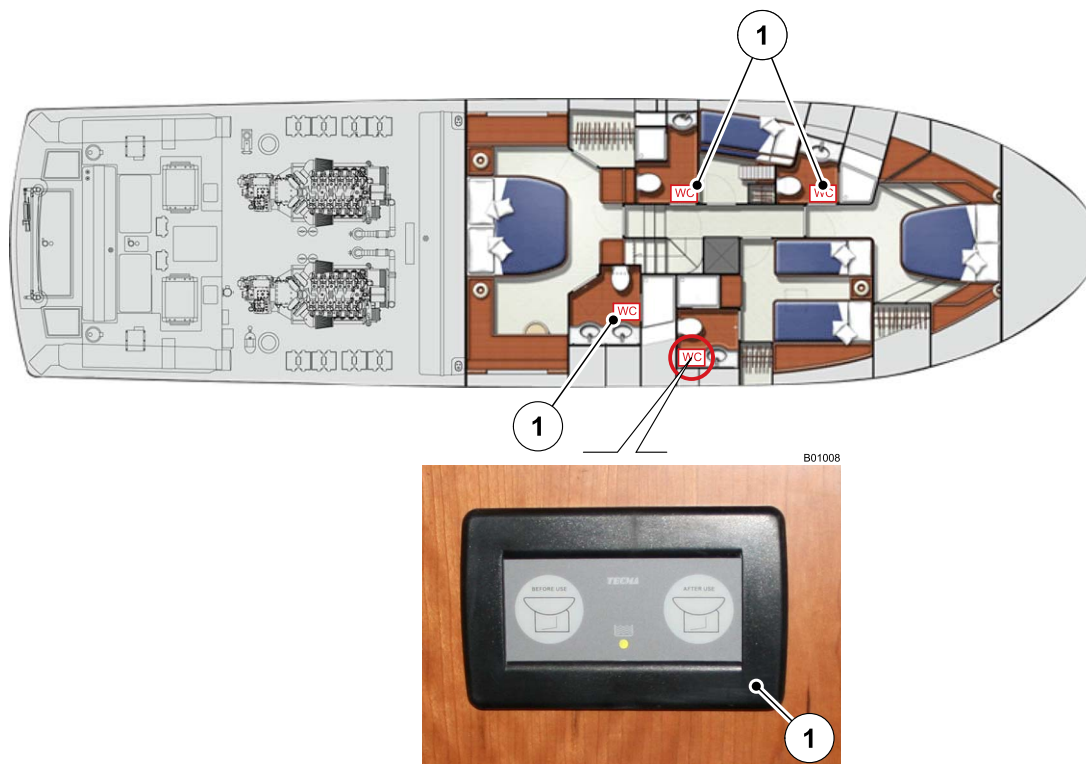
#### ENVIRONMENT NOTICE

*Do not discharge black water (sewage) inside harbors or marinas or near beaches. Observe the applicable environmental laws and regulations for overboard discharge.*



B00143

### 9.9.2 WC Control Panels



Toilets control panel

#### 1. WC Control Panels



#### CAUTION

*Close the various safety valves of the WCs drains and intakes, when they are not used.*

### 9.9.3 System Operation

#### NOTICE

*It is unlawful to discharge untreated waste within the territorial waters of the United States. Violators are subject to fine of \$5,000.00 per incident.*

Marine toilets on vessels operating within the territorial water of the United States shall discharge directly into a holding tank, which is to be emptied by a dockside pump-out facility, or at sea beyond the territorial limits. To satisfy U.S. regulations, all intake seacocks on vessels operating within the Territorial waters must be locked shut with a padlock, a non-reusable wire-tie, or have the valve handle removed.

For vessels operating outside of the U.S. Territorial waters, it is generally acceptable to have a toilet system where the waste is either discharged into a holding tank and then pumped overboard, or where the toilet discharges directly overboard through a discharge seacock. However, you, as the owner, must determine and conform to local regulations whenever you operate your vessel.

The system consists essentially of a tank and of a black waters pump, draining overboard. The water used for WCs flushing is taken from the cold water system by means of the distribution manifold. On the manifolds are installed the solenoid valves, each one of them concerns one toilet; they allow the flush of water each time the buttons "Before use" or "After use" are pressed. Each WC has a retting pump conveying black waters into the black water (sewage) tank.

The tank, the macerator pumps and the draining valves are located in the bilge under the passageway of the stateroom area.



#### CAUTION

*In case of need, break or pollution of the tanks, they can be replaced. Contact BERTRAM Customer Support.*



#### WARNING

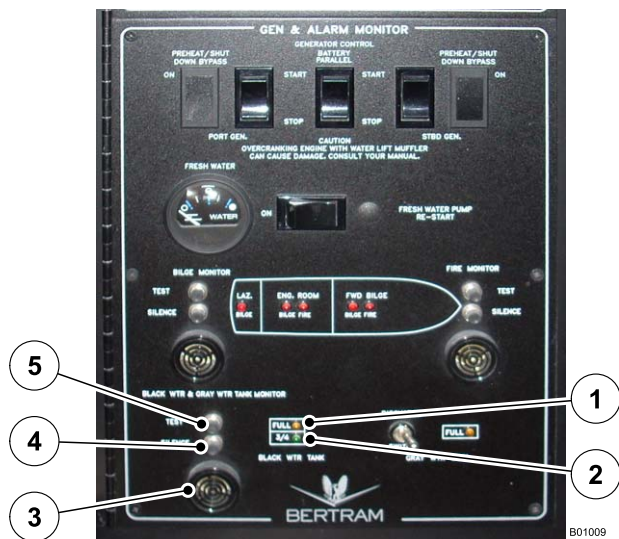
*In case of sinking hazard, if escaping condition allow you this, close the ball valves of the **black water drain**, located in the bilge under the stateroom area*



#### CAUTION

*To optimize the system's use, do not let the black water (sewage) tank overflow.*

The checks of the black water (sewage) holding tank are located on the electric panel of the salon.



1. Full tank alarm warning light. The toilet pumps are disconnected and cannot be used
2. Pre-alarm warning light for black water level. Only a limited number of operations is available
3. Buzzer. Sounds when the tank is full
4. It clears off the buzzer
5. System test

There are two ways to empty the holding tank:

- dockside pump-out using the WASTE drain fitting (within Territorial waters);
- onboard holding tank pump (outside Territorial waters).

To accomplish onboard holding tank pump-out:

- switch on the holding tank pump differential circuit breaker;
- open the intake seacock for overboard drain;
- under the forward companionway sole, you will find the momentary switch for the pump. Depress the momentary switch, and hold it until you hear a change in the sound from the pump, indicating that the tank is empty.

### NOTICE

*After draining the holding tank overboard, close the sea valve serving the tank discharge thru-hull to prevent seawater from coming back into the tank.*



### CAUTION

*For all pleasure yachts it is prohibited to drain at sea the on board toilets inside of harbors, landings and moorings dedicated to craft's anchor riding, and also within the limit of beaches visited by swimmers, as stated in the single decree of the Port Authorities.*

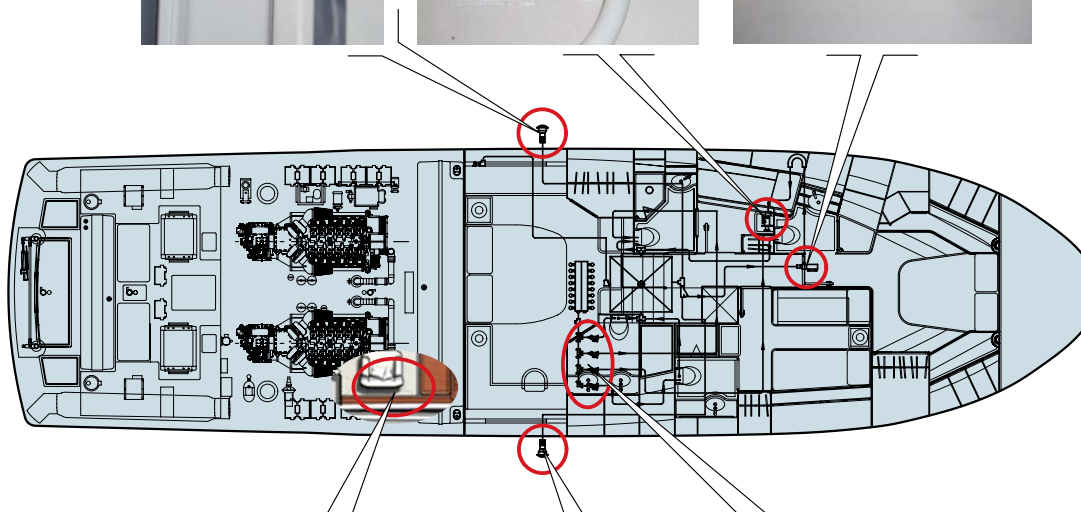
WASTE fitting



Overboard discharge



Macerator pump



Salon electric panel



WASTE fitting



Manifolds and WC solenoid valves

B01010

### 9.9.4 Tank pump-out by shore pump

Observe local regulations that prohibit overboard discharge from holding tanks. You may empty the black water (sewage) tank at the shore into a designated shoreside pump-out station.

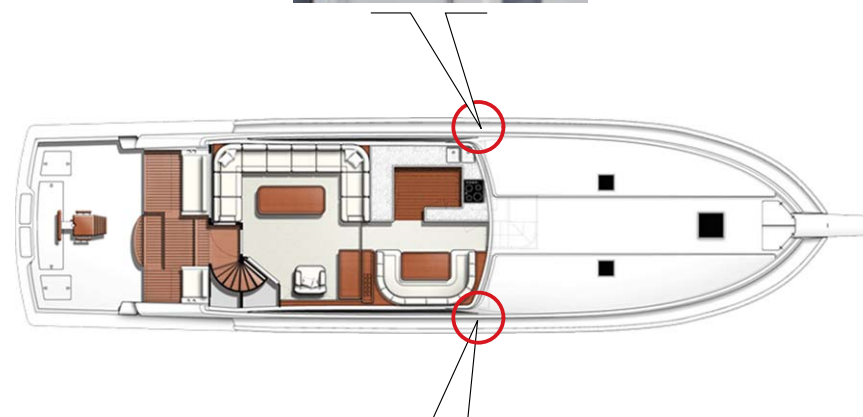
To empty the black water (sewage) tank into a shoreside pump-out station, first make sure the yacht is moored correctly and the engines are shut down.

Connect the shoreside suction line to the yacht black water system. This yacht is equipped with two WASTE drain fittings, installed on both corridors.

When the line is connected, activate the direct pump-out circuit by opening the suction valve, located near the black water pump, located in the bilge below the stateroom area.

When the draining is complete, remove the hose and firmly tighten the cap of drain fitting.

WASTE port drain fitting



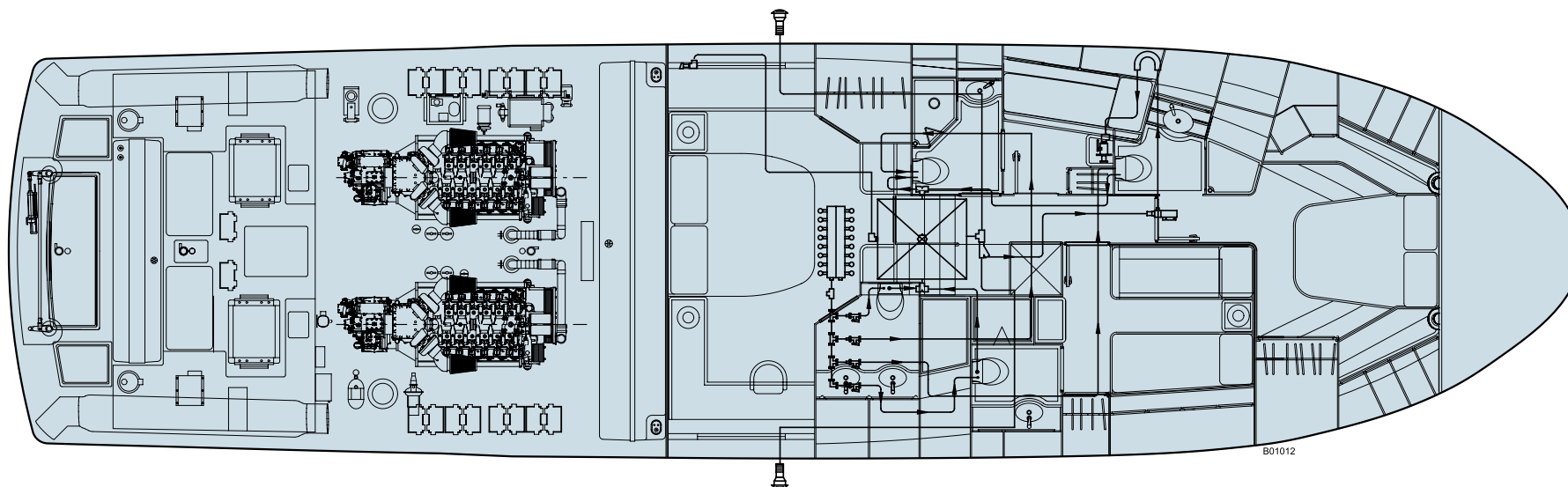
B01011



WASTE starboard drain fitting



# Black water system



Electric pump



WC solenoid valve



Siphon break



Tee connection



Overboard draining



Tank vent



Fresh water manifolds



Outlet dockside suction

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### 9.9.5 Black water system maintenance

Periodically or by each yacht onshore handling, flush out the black water (sewage) tank with fresh water. Flush it several times until clean. All cleaning water should be drained into the proper shoreside pump-out facility. Add an appropriate black water (sewage) tank sanitizing product for the final fill and perform a drain cycle, following the product directions. This service procedure will help prevent undesirable odors. See the **Long-Term Lay-up** section in the **MAINTENANCE** chapter of this manual.

#### **NOTICE**

*Verify the correct operation at least once a week:*

- *of the toilets;*
- *of the black water pump.*

*Verify the pipe and connection condition at least once every three months.*

*Protect with suitable products at least once every six months:*

- *the toilet solenoid valves;*
- *the black water pump.*

*Carefully clean the black water tank when required but at least once a year.*

### 9.10 GRAY WATER SYSTEM

The water drained by showers, bidets and washbasins is collected into a gray water tank located in the bilge under the stateroom area. This tank has a pump and automatic float switch. The pump, discharges automatically the shower and sink water overboard and is powered by the gray water pump differential circuit breaker.



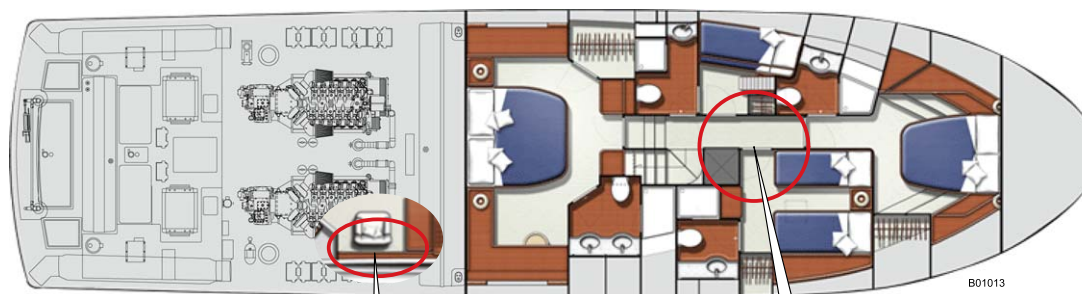
#### ENVIRONMENT

*Do not discharge soaped waters drained by washing machines and dishwashers in the harbor, inside of marinas or near beaches, because of the large amount of foam produced.*

The galley sink and dishwasher drain directly overboard.

On the electrical panel of the salon you can monitor the status of the gray waters tank.

When the liquid level of the gray water tank reaches a nearly full condition, an indicator light will come on and an alarm will sound. A momentary push button switch is provided to manually override the automatic operating function.



B01013



Salon electric panel



Gray water pump

If pressing and holding the switch for a few minutes does not cause the alarm horn to stop sounding and the light to extinguish, briefly press the silence button. The light will remain lit until the problem is fixed, but the alarm horn will stop sounding. Correct the problem as soon as possible to prevent the tank from overflowing.

The monitor system can be disabled permanently by turning off the differential circuit breaker. This monitor also includes the tank level signal system. Turning off the circuit breaker will disable the holding tank warning system as well as the gray water tank system.

### 9.10.1 Gray water system maintenance

Flush the gray water tank at least every three months. Fill and empty the tank with clean water.

Repeat the operation two to three times.

To prevent the formation of bacteria and the consequent production of bad smells, pour regularly an appropriate disinfectant into the drains of sinks, showers and bidets that discharge into the gray water tank.

#### **NOTICE**

*At least once every three months:*

- *fully clean the tank;*
- *fully clean the pump;*

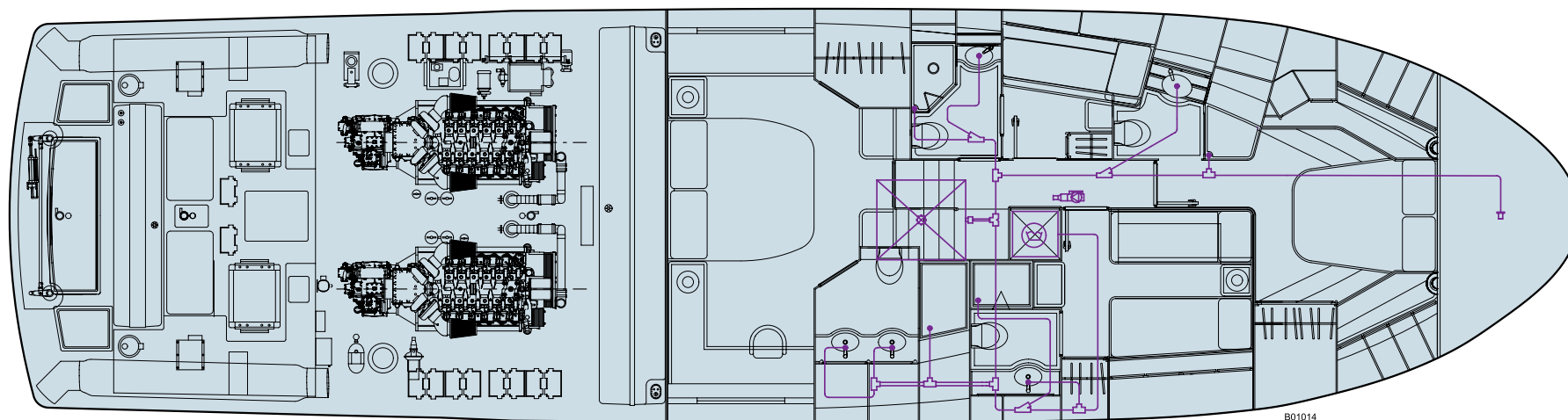
*Verify the pump condition at least once every six months.*




#### **NOTICE**

*Do not use very aggressive products or lye-based dissolvers for the tank cleaning. For more information contact BERTRAM Customer Support.*

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## Gray water system



-  Electric pump
-  Overboard draining
-  Tee connection

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**NOTES:**

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**NOTES:**

This image shows a blank sheet of white paper with horizontal ruling lines, resembling notebook paper. The page is divided into two equal vertical sections by a central vertical crease or fold. Each section contains ten horizontal lines, creating eleven rows of writing space per side. The lines are evenly spaced and extend across the width of each half of the page.







10



ELECTRICAL SYSTEM

*INTRODUCTION*

---

*HOW TO USE THIS MANUAL*

---

*DESCRIPTION OF THE YACHT*

---

*GETTING UNDERWAY*

---

*INSTRUMENTATION & EQUIPMENT*

---

*HELM STATION*

---

*ON DECK*

---

*PROPULSION SYSTEMS*

---

*HYDRAULIC SYSTEMS*

---

***ELECTRICAL SYSTEM***

---

*INTERIOR DETAILS*

---

*SAFETY DEVICES & EQUIPMENT*

---

*YACHT LIFTING & ONSHORE HANDING*

---

*MAINTENANCE*

---

*TROUBLESHOOTING*

---

## 10.1 ELECTRICAL SYSTEM DESCRIPTION

**WARNING****ELECTRICAL SYSTEMS AND CIRCUITS**

*For the plans and the specifications of the electric components, refer to the specific manual.*

**WARNING**

*If an operation fault on the re-charging alternators occurs when underway, set to "ON" the parallel link selector between the battery banks and let it connected until the fault has been removed.*

**WARNING**

*Before undertaking any navigation, check that the batteries are in good condition and that they supply the correct rated voltage.*

**WARNING**

*If during navigation a considerable and persisting voltage decrease in the batteries is noticed, it is necessary to switch on the power generator and to ensure that the independent electric battery charger is activated.*

**WARNING**

*During navigation both selectors of user and engine batteries, must always be switched to ON. The selector for parallel connection on both batteries banks must normally be disconnected, OFF.*

**WARNING**

*The parallel connection system between the battery banks, controlled by a switch from the helm station, is used to increase the cold cranking amps at engines start, under particularly climate conditions or charge condition, and for a short period of time.*

*The switch for batteries parallel connection has to be activated only by placing selectors connecting the engines batteries banks and users to ON.*

*Do not use in case of faults on the batteries recharging circuits, for instance of the engines alternators. We advise to use this system only in emergency cases.*

**WARNING**

*Do not start sailing without having set to ON both switches: engine and user batteries and do not disconnect them during navigation.*

The electrical system of your yacht has been designed with the utmost attention to all aspects of safety. The system has been manufactured and installed using high-quality materials that meet or exceed industry standards.

This system has been manufactured according to the standards of Registro Italiano Navale (section D - RINA), of UNI EN ISO and of ABYC, which regulate the electrical systems of pleasure yachts.

The yacht electric system consists of three distinct and separated sections:

- Users network supplied at a rated voltage of 24 V DC by eight banks of accumulators at 12 V DC each, series or parallel connected to deliver 24 V.  
The above mentioned battery bank is re-charged by the 100 A output of the on board battery charger and by the alternator, driven by the port propulsion engine of the yacht.
- Engine network, supplied at a rated voltage of 24 V DC, by eight accumulators banks of 12V DC each, linked to obtain 24 V. This bank of batteries is recharged by a second output of the onboard battery charger, and by the alternator driven by the starboard engine.
- 230 V - 50 Hz user network supplied from shore, or alternatively, by the power generators installed onboard (standard generator power 23 kW). Each power generator is supplied by a bank of 12 V DC accumulators, located near the generator and is recharged by an alternator, driven by the same unit.

The system is made of PVC insulated cables, type N07V-K; they are also protected with sheaths and/or PVC self-extinguishing raceways, each junction consists of screw tightening terminals, housed inside of self-extinguishing PVC boxes. The protection of the system's single parts is ensured by automatic breakers of different amperage and sized according to the absorption of each single user to be protected, and to the size of the wires used for their supply. All the damp metallic parts are interlinked with equipotential connections and connected on sacrificial anodes located on the submerged quick-work.

Regular service and proper use of the system will contribute greatly to its continued safety. Like any other system onboard, the electric system is subject to the stresses and vibrations of the hull. In addition, the electric system is exposed to high levels of corrosive salt humidity. Therefore, you must check the condition of the system and its individual components as part of a scheduled service plan.

**NOTE:** the **230 V AC** system has features (and hazards) similar to those of a domestic household system. If the system or components are misused, or poorly maintained, there is a risk of fire or personal injury. Statistically, the electrical system is one of the most frequent causes of fire onboard.

There are two separate electrical systems onboard, each one having own features:

- 24 V DC
- 230 V AC (50 Hz)

The DC power systems are supplied by three banks of batteries: engine bank (24 V), user bank (24 V) and generator batteries (12 V).

The AC system can be powered either by the shore electric network or by the onboard generators.

All electrical users are completely protected by circuit breakers, fuses and differential circuit breakers for total protection against accidental contacts on the whole 230 V AC system.



### CAUTION

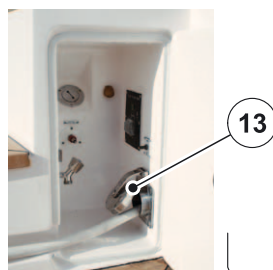
#### NEVER:

- *work on the electric system while under voltage.*
- *modify the electric systems of a unit or the relevant drawings: the installation, the modifications and the maintenance must be carried out only by a skilled marine electrician.*
- *alter or modify the intensity of rated current of protections against overcurrent.*
- *install or replace electric equipment or devices with components exceeding the rated current intensity of the circuit.*
- *leave the yacht unguarded with the electrical system powered, except for the circuits of the bilge automatic suction pumps, of the firefighting protection and of the alarms (driven by batteries).*

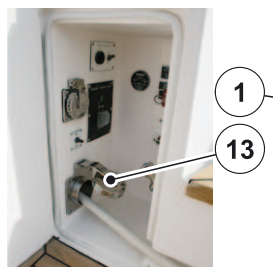
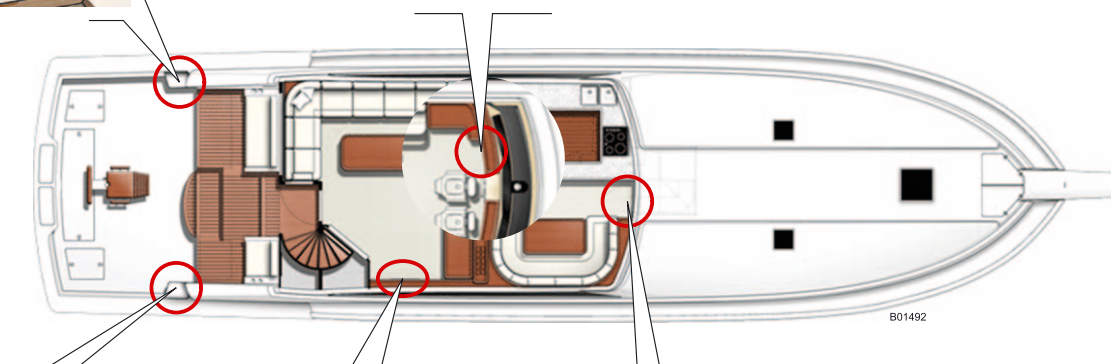
1. Main electric panel
2. Secondary electric panel
3. 24 V DC user enclosed bridge electric panel
4. 230 V AC user enclosed bridge electric panel
5. 12 V DC user enclosed bridge electric panel
6. Battery disconnect panel
7. 24 V/100 A battery charger
8. 24 V/50 A battery charger
9. 12 V/10 A battery charger
10. 50 A battery equalizer
11. Generators (23 kW - 50 Hz)
12. 24 V/2500 VA inverter
13. Shore electric power supply with electric cablemaster (no. 2)
14. Engine power unit
15. Engines control panels
16. 24 V/5000 VA inverter

### 10.1.1 Location of electrical equipment on board

Port electric power connection from shore



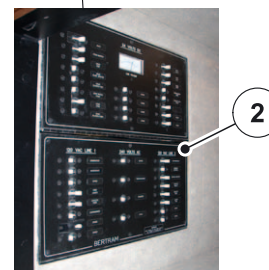
Helm station electric panel



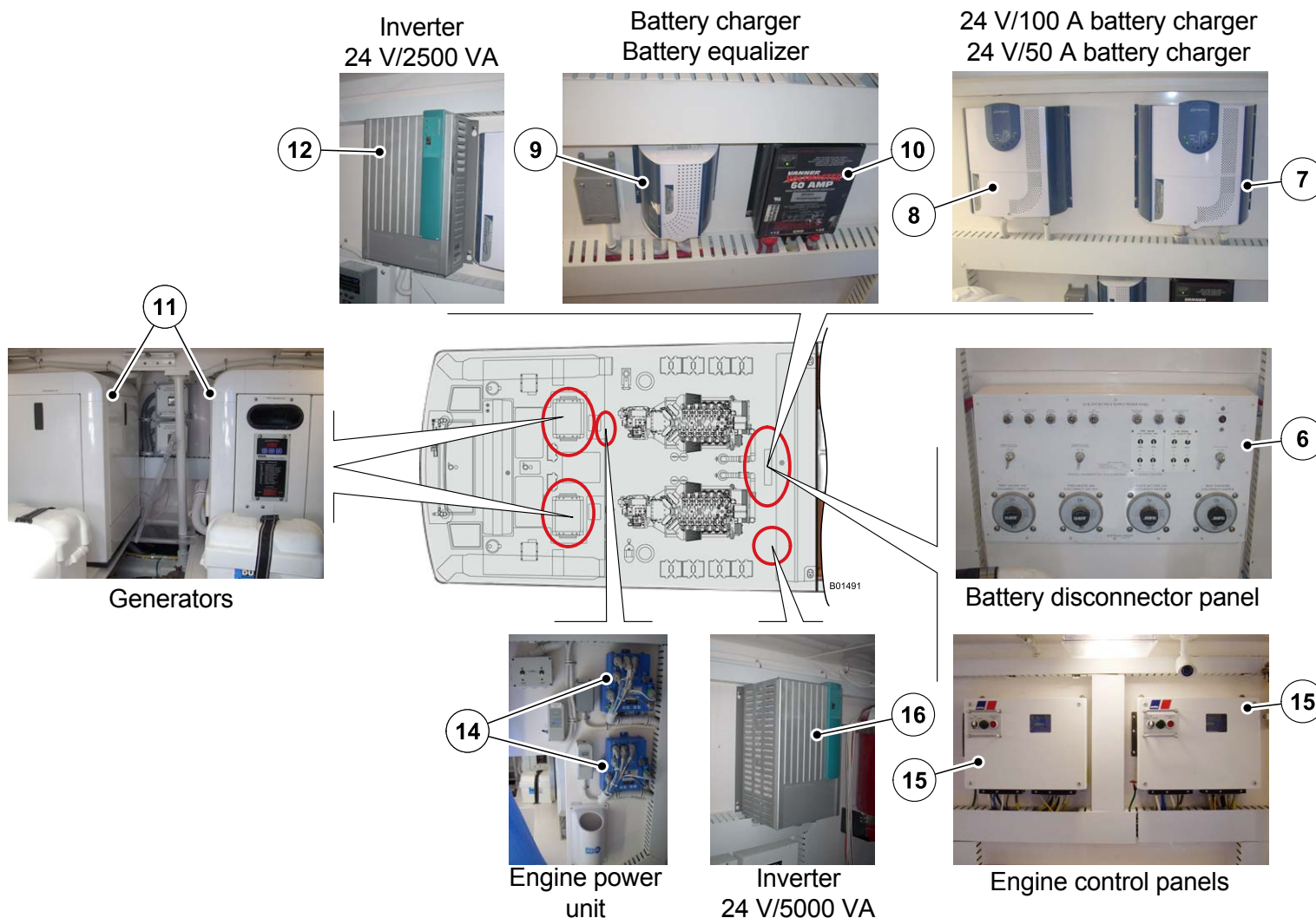
Starboard electric power supply



Main electric panel



Secondary electric panel





**WARNING**

*Do not modify the electric systems of the unit or the relevant drawings. The installation, the modifications or the service must be performed only by a skilled marine electrician. Inspect the system at least once a year.*

**WARNING**

*Disconnect shore power supply when the system is not used.*

**WARNING**

*Use electric devices with double isolation or earthing (ground).*

**WARNING**

*Do not allow the cable end of shore supply to float in the water. This can cause an electric field and following injuries or even the death of the swimmers nearby.*

**CAUTION**

*To reduce to the lowest the hazard of electrocution or fire:*

- turn OFF switch for connection to shore supply of the unit, before connecting or disconnecting the shore power supply cord;*
- disconnect the shore power cable and rewind it by means of the cablemaster;*
- fasten tightly lid of shore power supply outlet.*

**WARNING**

*Do not modify the connectors of the shore power supply cable, use only compatible connectors.*

## 10.2 ELECTRICAL SYSTEM WARNINGS

**DANGER**

*Electric shock hazard exists in an energized electrical system. To avoid electric shock that can cause serious injury or death, turn OFF power before opening the cover and servicing any internal components of electrical equipment.*

**CAUTION**

*Use the switch for engine/user battery parallel connection, only if absolutely necessary, to provide additional battery power for starting the engines. To prevent damage, turn off all electrical equipment prior to operating the battery parallel system. Disconnect the parallel link as soon as possible.*

**WARNING**

*Operate all electrical equipment and systems (including low voltage systems) with special attention. Avoid overloading to prevent short circuits, dangerous overheating, and potential fire hazards that can lead to serious injury or death.*

**WARNING**

*Only a qualified marine electrical technician may service the yacht's electrical system.*

**WARNING**

*The 230 V AC system is similar to a domestic system as to its features and hazards. If improperly operated or maintained, it can cause a fire or personal injury or death.*

**CAUTION**

*Do not replace an existing circuit breaker or fuse with one of a higher rating. Such modification could cause equipment and/or circuit failure and fire.*

**CAUTION**

*Never deactivate the battery disconnectors with the engines running or you may damage the engine alternators.*

**CAUTION**

*Have a BERTRAM authorized electrical engineer inspect the differential circuit breakers, the electric panels and other components of the electrical system, to ensure the correct operation and to detect any overheating signal.*





**WARNING**

**SHOCK/FIRE HAZARD**

Replace automatic breakers or fuses with same amperage. Never alter overcurrent protection.



**WARNING**

**AC ELECTRICAL SYSTEM: EXTREME HAZARD**

Extreme hazard - swimming near a vessel equipped with AC-electrical system operating can lead to severe shock or death. Never swim or allow anyone to swim when the AC-system is powered.



**WARNING**

**A.C. CIRCUITS CAN DELIVER A LETHAL SHOCK!**

Before opening an electrical distribution panel or servicing any electrical equipment:

- disconnect the shore power cord;
- stop the generators;
- deactivate the main battery disconnectors.



**WARNING**

Do not replace your vessel's circuit breakers or fuses with breakers or fuses of higher amperage than those installed by BERTRAM. Choose differential circuit breakers and fuses for the spare circuits with ratings that match the load of the equipment, but does not exceed the current carrying capacity of the cables in each branch circuit.



**DANGER**

**Extreme Hazard:**

- Never use an open flame in battery storage area.
- Avoid sparks near battery.
- Battery will explode if a flame or a spark ignites the free hydrogen given off during charging.



**WARNING**

**SHOCK/FIRE HAZARD:**

- Disconnect the electrical system from its power source before performing any service. Never work on the electrical system while it is energized.
- Electrical fixtures must not exceed the rated amperage of the yacht's circuits.
- Observe the electrical system carefully while it is energized.  
The only electrical components which can be left unattended are the automatic bilge pumps, fire protection and alarm circuits.

**CAUTION**

- Turn off engine before inspecting or servicing the battery.
- Disconnect the battery cables before working on electrical system to prevent arcing or damaging the alternator. Disconnect the negative cable (-) first, then the positive (+) cable.

**WARNING**

*Explosion/Fire Hazard - Check bilge and generator compartment for fumes.*

**WARNING**

*Carbon monoxide poisoning:*

- Operate generator only in a well ventilated area. Carbon monoxide poison, created by the engine internal combustion, is extremely toxic.

**WARNING**

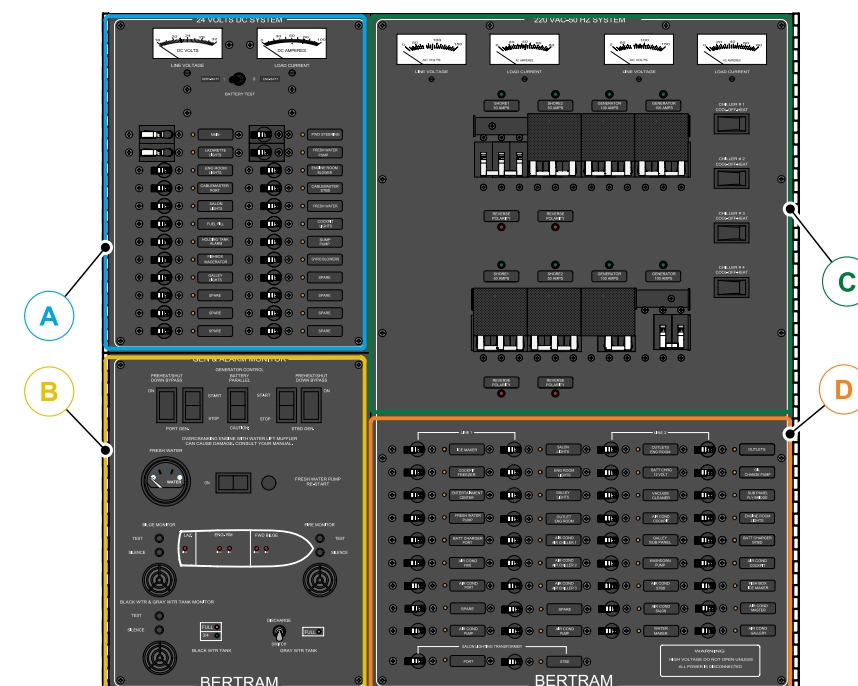
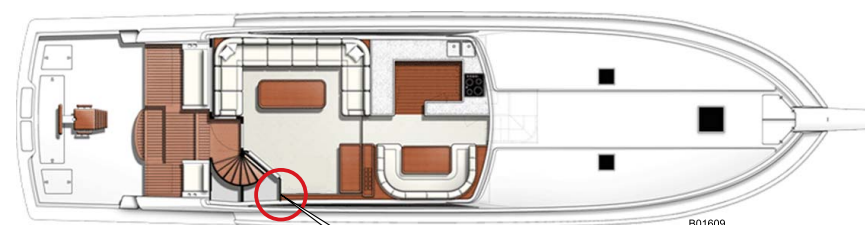
*Shock Hazard*

*Persons with heart problems or other conditions which make them susceptible to electric shock may still be injured by ground faults on circuits protected by GFI (Ground Fault Interrupter) outlets. No safety devices yet designed will protect against all hazards or carelessly handled or misused electrical equipment or wiring.*

## 10.3 MAIN ELECTRIC PANEL

The electric system is monitored from the panel located in the salon starboard. The following main sections have been identified, in order to make the descriptions easier:

- A. Voltmeters, ammeters for 24 V DC and circuit breakers protecting the 24 V DC users
- B. Generator signal and control panel
- C. Voltmeters, ammeters for 230 V AC lines, circuit breakers protecting the 230 V AC network when powered by shore network or by generators and switches for A/C units
- D. Circuit breakers protecting the 230 V AC users



**WARNING**

**High voltage**

*Disconnect the electric power supply before opening the door.*

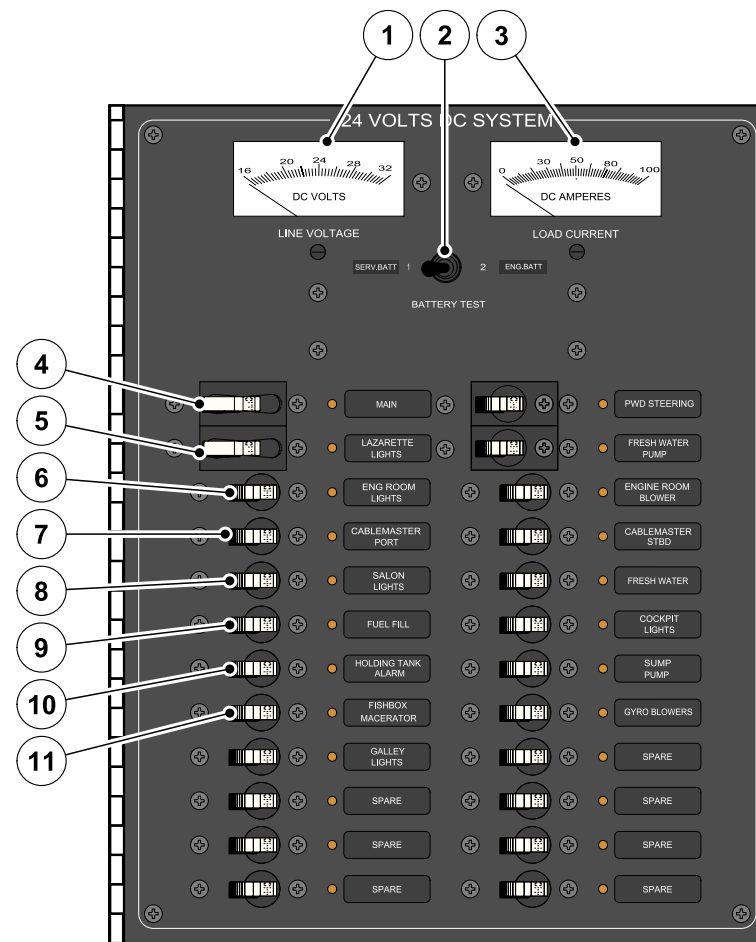


**WARNING**

*Switch off the generators and disconnect the shore power supply before opening the panel.*

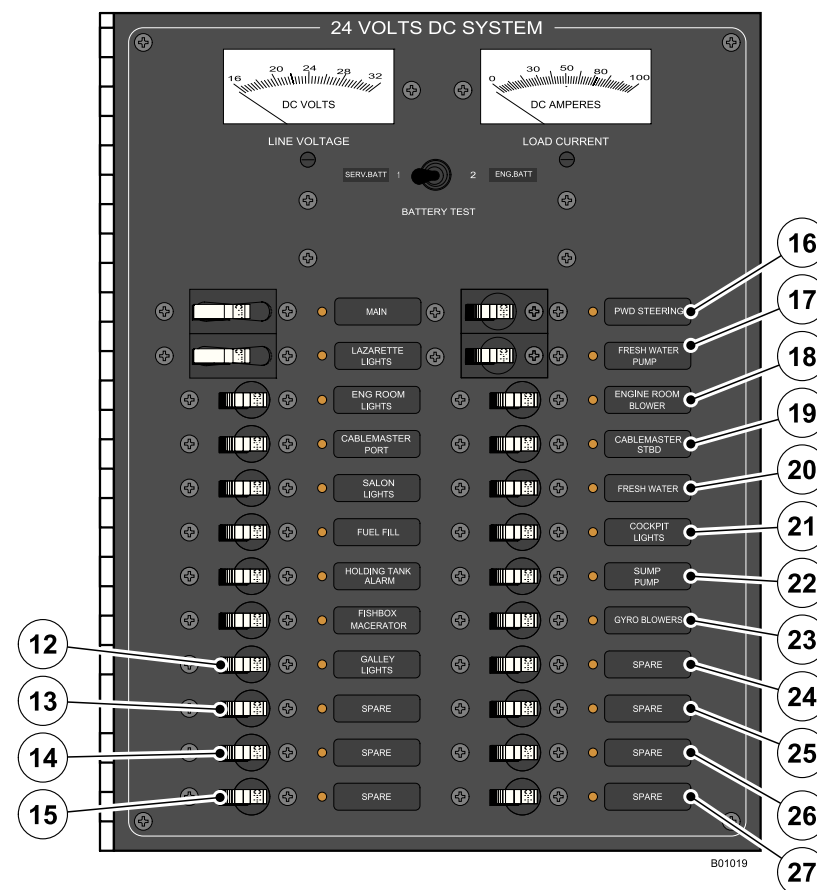
## 10.3.1 SECTION A - Voltmeter, ammeter for 24 V DC and circuit breakers protecting the 24 V DC users

1. **Voltmeter for battery voltage**  
Measures the voltage detected at the terminals of the 24V DC user/engine batteries, according to selection by relevant switch (2).
2. **Switch for the engine/users batteries**  
Allows to select on voltmeter and ammeter the reading of the voltage and current values at engine, user battery terminals.
3. **Ammeter for battery current absorption**  
It measures the current (amperes) absorbed by the user/engine batteries 24 V DC, according to relevant switch (2) selection.
4. **Master**  
When disconnected it cuts out all users.
5. **Helm gear compartment lights**  
Powers the helm gear compartment lights.
6. **Engineroom lights**  
Powers the light system of the engineroom.
7. **Port electric cablemaster**  
Powers the port electric cablemaster.
8. **Salon lights**  
Powers the light system of the salon.
9. **Fuel level gauge**  
Powers the fuel level gauge.
10. **Black water (sewage) tank signal**  
Powers the signal system of black waters (sewage) holding tank.
11. **Fish box macerator**  
Powers the fish box macerator.



B01018

- 12. Galley lights**  
Powers the galley light system.
- 13. Available**  
Switch available for auxiliary system.
- 14. Available**  
Switch available for auxiliary system.
- 15. Available**  
Switch available for auxiliary system.
- 16. Helm system control**  
Powers the control of the helm gear compartment.
- 17. Fresh water pump**  
Powers the fresh water pump.
- 18. Engine room ventilation**  
Powers the ventilators of the engineroom.
- 19. Starboard electric cablemaster**  
Powers the starboard electric cablemaster.
- 20. Fresh water level gauge**  
This switch powers the fresh water level gauge.
- 21. Cockpit lights**  
Powers the cockpit lights system.
- 22. Sump pump**  
Powers the sump pump.
- 23. Anti rolling gyro ventilators**  
This switch powers the ventilators of the anti rolling gyros (ARG).
- 24. Available**  
Switch available for auxiliary system.
- 25. Available**  
Switch available for auxiliary system.
- 26. Available**  
Switch available for auxiliary system.
- 27. Available**  
Switch available for auxiliary system.



## 10.3.2 SECTION B - Generator signal and control panel

### 1. Port generator switch

Allows to start/stop the port generator.

- Stop
- Start

### 2. Battery parallel switch

Should the engine batteries be flat or not sufficiently loaded to allow the start of propulsion engines, this switch sets the user and engine batteries to parallel connection, and enables the engines start.



### WARNING

*This operation has to be performed only if the engine batteries are not sufficiently charged. The switch for batteries parallel connection can be activated, only if selectors for users batteries banks and engines batteries banks are set to ON.*

### 3. Starboard generator switch

Allows to start/stop of the starboard generator.

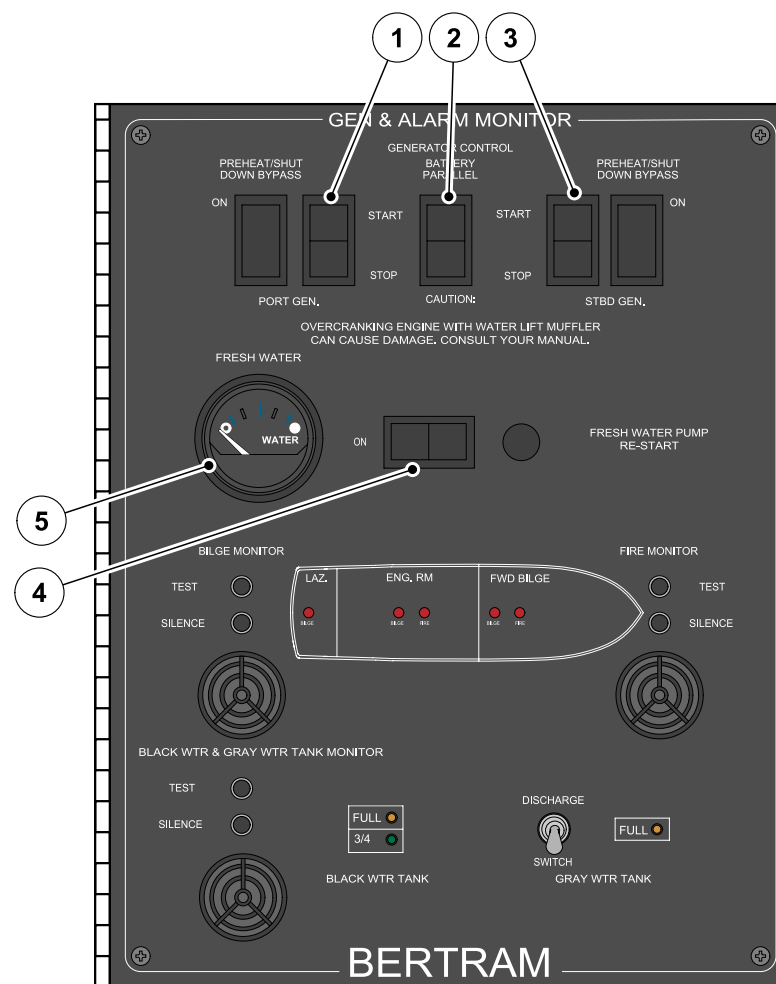
- Stop
- Start

### 4. Fresh water pump switch

Allows to start/stop the fresh water pump.

### 5. Fresh water level gauge

Indicates the fresh water level in the tank.



B01020

- **Bilge flood alarm signal panel**

**6. Test button**

The test button is used to verify the correct operation of all LEDs on the synoptic panel. When using the test button, all LEDs must be ON and buzzer must sound to indicate the correct operation of the bilge flood signal system. When releasing the button all LEDs must go out and the buzzer must clear off.

**7. Squelch button**

This button allows to disconnect the buzzer.

**8. Buzzer**

Activates to indicate a bilge flood signal.

- **Firefighting signal panel**

**9. Test button**

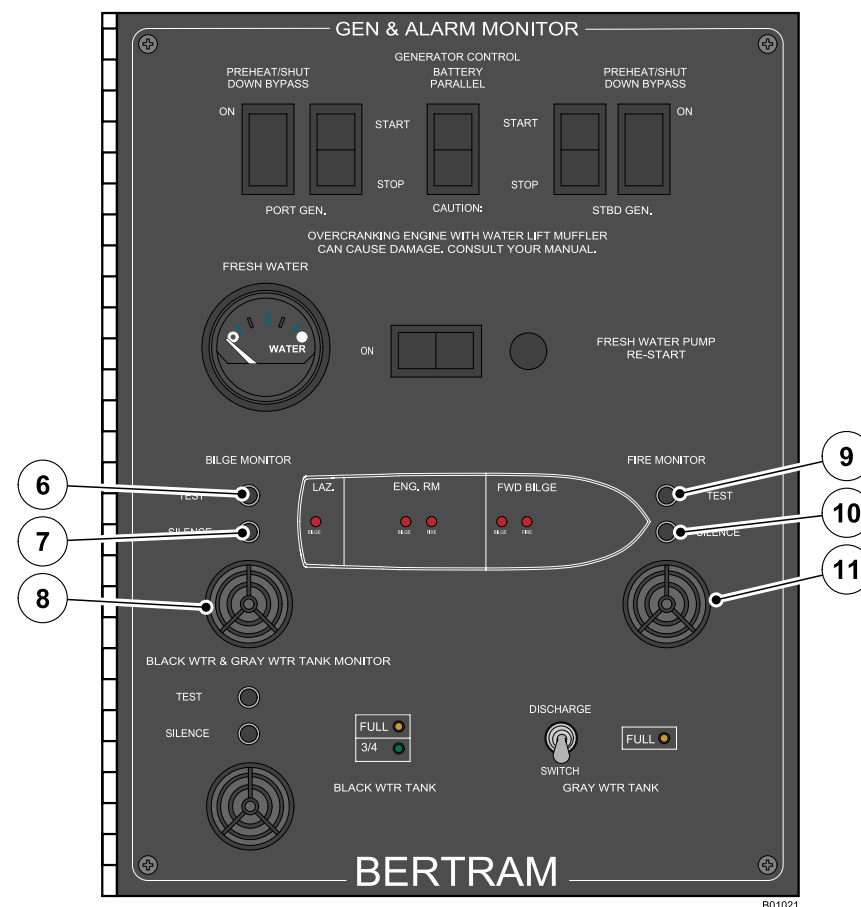
The test button is used to verify the correct operation of all LEDs on the synoptic panel. When using the test button, all LEDs must be ON and the buzzer must sound to confirm the correct operation of the firefighting system. When releasing the button all LEDs must go out and the buzzer must clear off.

**10. Squelch button**

This button allows to disconnect the buzzer.

**11. Buzzer**

This signal buzzer activates to indicate a fire hazard.



B01021

- Synoptic panel for bilge flood and fire signals

**12. Helm gear compartment bilge**

Red light, indicates the flood of the helm house.

**13. Engineroom bilge**

Red light, indicates the bilge flood in the engineroom.

**14. Fire in the engineroom**

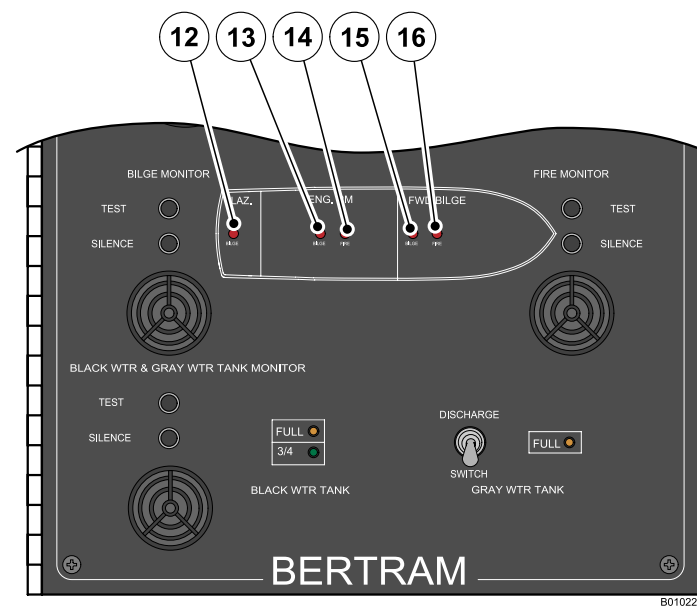
Red light, indicates a fire in the engineroom.

**15. Fore bilge**

Red light, indicates the foredeck bilge flood.

**16. Foredeck fire**

Red light, indicates a fire in the foredeck.





• **Gray and black water tanks panel**

**17. Test button**

This button is used to verify the correct operation of each LED of the synoptic panel. When using the test button, all LEDs must be ON and buzzer must sound to indicate the correct operation of the gray and black water systems. When releasing the button all LEDs must go out and the buzzer must clear off.

**18. Squelch button**

This button allows to disconnect the buzzer.

**19. Buzzer**

Activates if a signal is detected from the gray and black waters tanks.

**20. LED of black waters (sewage) holding tank**

Indicates the level of the black water (sewage) holding tank.

- Full: red light on, indicating that the black water (sewage) tank is full and that the operation of the onboard WCs is automatically disconnected.
- 3/4: light on, indicates that the black water (sewage) tank is almost full and that after a few cycles the onboard WCs cannot be used.

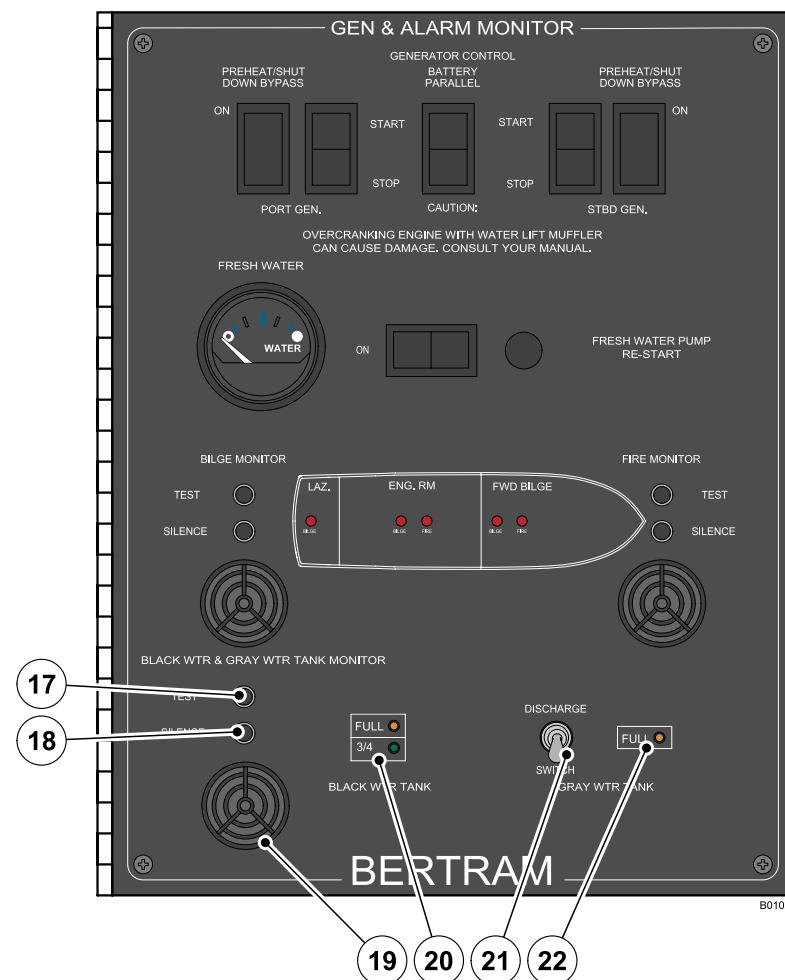
**21. Gray water tank drain switch**

Allows the drain of the gray water tank.

**22. LED of gray water tank**

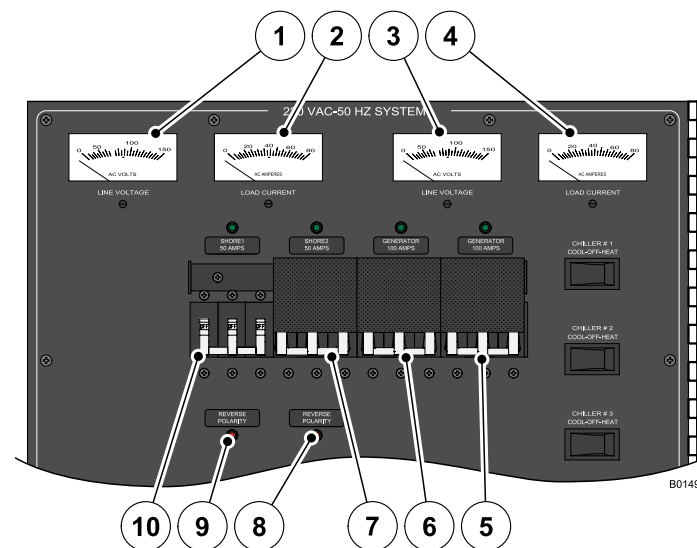
Indicates the level of the gray water tank.

- Full: if light is on the gray water tank is full.



## 10.3.3 SECTION C - Voltmeters, ammeters for 230 V AC lines and circuit breakers protecting the 230 V AC network and switches for A/C units

1. **Line 1 voltmeter**  
This instrument measures the voltage at line 1 terminals.
  2. **Ammeter line 1**  
This instrument measures the current (amperes) absorbed by line 1.
  3. **Line 2 voltmeter**  
This instrument measures the voltage at line 2 terminals.
  4. **Ammeter line 2**  
This instrument measures the current (amperes) absorbed by line 2.
- **Line 1 circuit breakers and signal lights for reverse polarity**
5. **Generator 2**  
It powers generator 2.
  6. **Generator 1**  
It powers generator 1.
  7. **50 A shore outlet 2**  
This switch powers shore outlet 2.
  8. **Signal light of shore outlet 2 reverse polarity**  
This light indicates reverse polarity on shore outlet 2.
  9. **Signal light of shore outlet 1 reverse polarity**  
This light indicates reverse polarity on shore outlet 1.
  10. **50 A shore outlet 1**  
This switch powers shore outlet 1.



- Line 2 circuit breakers and signal lights for reverse polarity

**11. 50 A shore outlet 1**

This switch powers shore outlet 1.

**12. 50 A shore outlet 2**

This switch powers shore outlet 2.

**13. Generator 1**

It powers generator 1.

**14. Generator 2**

It powers generator 2.

**15. Signal light of shore outlet 1 reverse polarity**

This light indicates reverse polarity on shore outlet 1.

**16. Signal light of shore outlet 2 reverse polarity**

This light indicates reverse polarity on shore outlet 2.

- Switches for A/C units

**17. Chiller 1**

This switch allows to select on chiller 1 the heat/cool/off modes.

**18. Chiller 2**

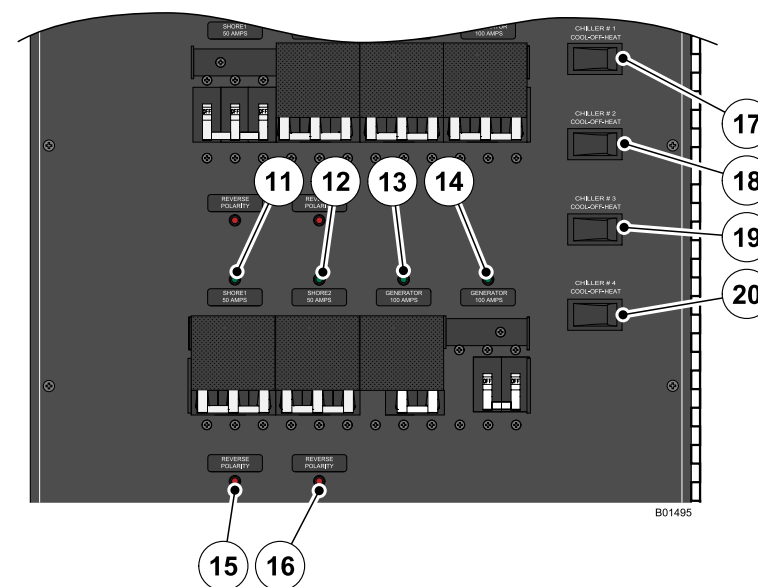
This switch allows to select on chiller 2 the heat/cool/off modes.

**19. Chiller 3**

This switch allows to select on chiller 3 the heat/cool/off modes.

**20. Chiller 4**

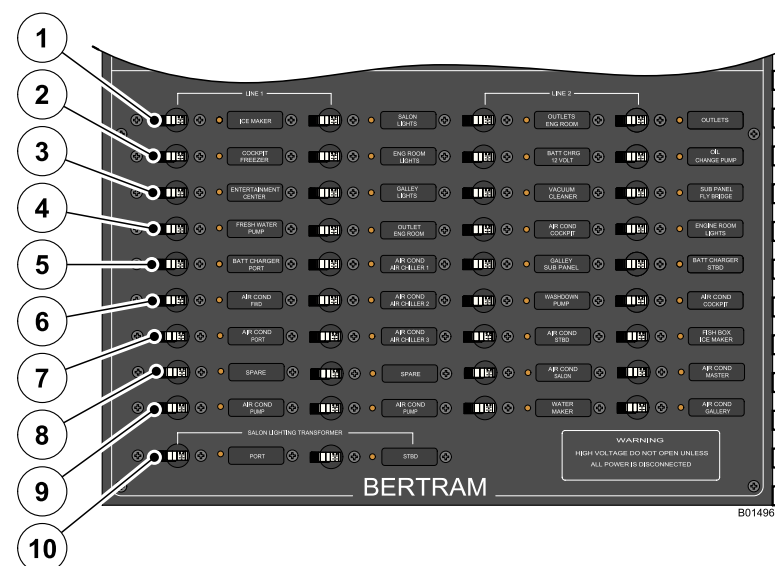
This switch allows to select on chiller 4 the heat/cool/off modes.



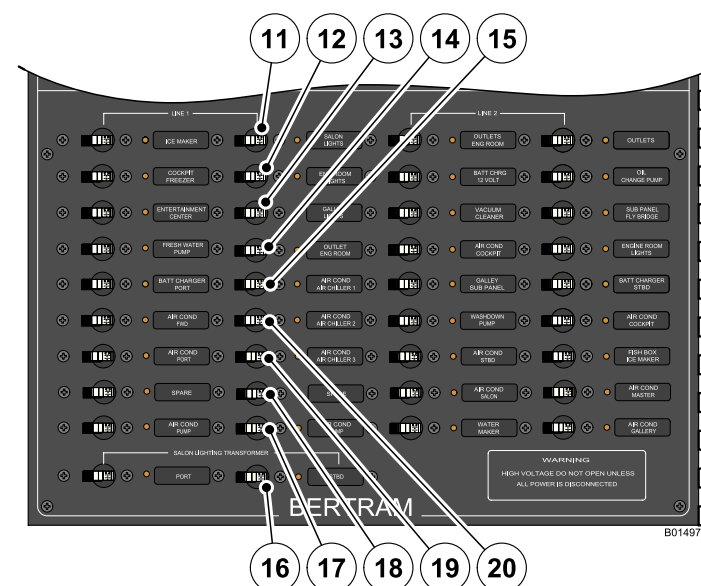
## 10.3.4 SECTION D - Circuit breakers protecting the 230 V AC users

### • Line 1

1. **Icemaker**  
This switch powers the icemaker.
2. **Cockpit freezer**  
Powers the cockpit freezer.
3. **Entertainment center**  
Powers the electro-hydraulic system of the entertainment center.
4. **Fresh water pump**  
Powers the fresh water pump.
5. **Port engine battery charger**  
Powers the port engine battery charger.
6. **Forward air conditioning**  
Powers the fore air conditioning unit.
7. **Port air conditioning**  
Powers the port air conditioning unit.
8. **Available**  
Switch available for auxiliary systems.
9. **Air conditioning pump**  
Powers the air conditioning system pump.
10. **Port salon lights**  
Powers the port light system of the salon.



11. **Salon lights**  
Powers the light system of the salon.
12. **Engineroom lights**  
Powers the light system of the engineroom.
13. **Galley lights**  
Powers the galley light system.
14. **Engineroom electric outlets**  
Supplies the electric outlets in the engineroom.
15. **Air conditioning 1**  
Powers the air conditioning unit 1.
16. **Starboard salon lights**  
This switch powers all salon starboard lights.
17. **Air conditioning pump**  
Powers the air conditioning system pump.
18. **Available**  
Switch available for auxiliary systems.
19. **Air conditioning 3**  
Powers the air conditioning unit 3.
20. **Air conditioning 2**  
Powers the air conditioning unit 2.



- Line 2

**21. Engineroom electric outlets**

Supplies the electric outlets in the engineroom.

**22. 12 V battery charger**

Powers the battery charger.

**23. Vacuum cleaner**

Powers the vacuum cleaner.

**24. Cockpit air conditioning**

Powers the air conditioning unit in the cockpit.

**25. Galley secondary panel**

Powers the secondary panel on galley.

**26. Watermaker**

This switch powers the watermaker.

**27. Starboard air conditioning**

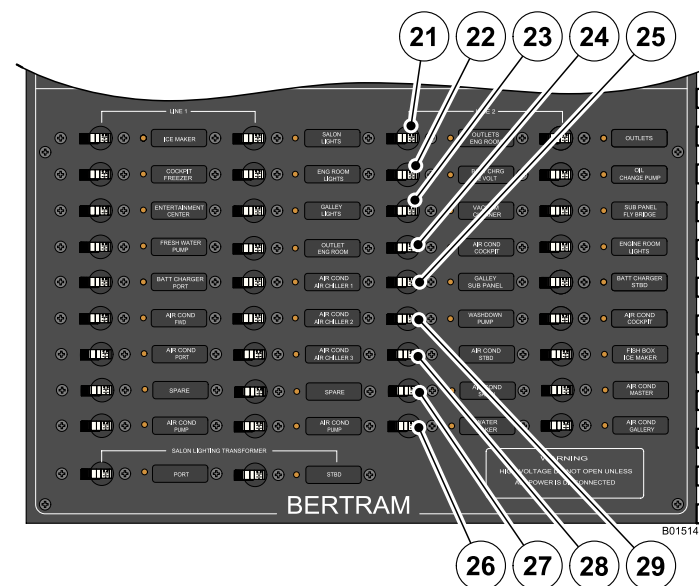
Powers the air conditioning unit starboard.

**28. Salon air conditioning**

This switch powers the air conditioning unit of the salon.

**29. Washdown pump**

Powers the washdown pump.



### 30. Electric outlets

This switch powers the electric outlets.

### 31. Oil change pump

Powers the oil change pump.

### 32. Secondary panel on the enclosed bridge

Power the secondary panel on the enclosed bridge.

### 33. Engineroom lights

Powers the light system of the engineroom.

### 34. Starboard battery charger

Powers the starboard engine battery charger.

### 35. Cockpit air conditioning

Powers the air conditioning unit in the cockpit.

### 36. Ice maker (Eskimo)

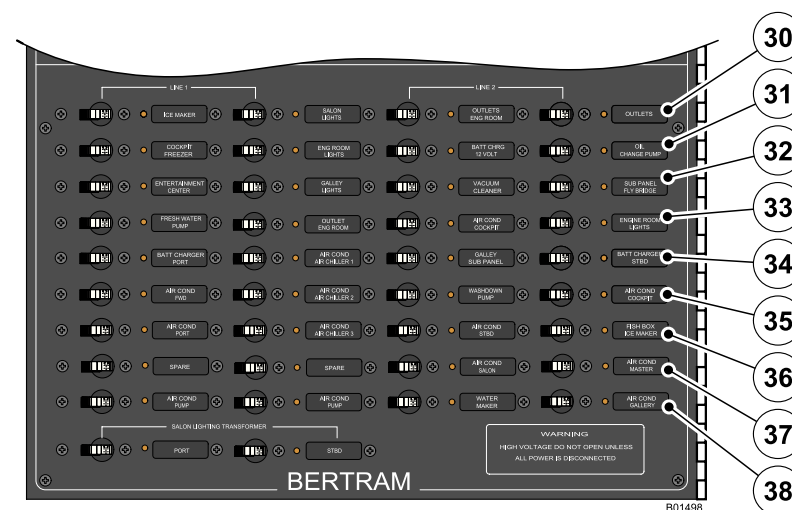
This switch powers the icemaker.

### 37. Master stateroom air conditioning

Powers the air conditioning of the Master stateroom.

### 38. Galley air conditioning

Powers the air conditioning unit in the galley.



## 10.4 SECONDARY ELECTRIC PANEL

In the passageway giving access to the belowdeck is installed an electric panel equipped with circuit breakers and system measuring instruments. The following main sections have been identified, in order to make the descriptions easier:

A. Circuit breakers protecting the 24 V DC users

B. Circuit breakers protecting the 230 V AC users



**WARNING**

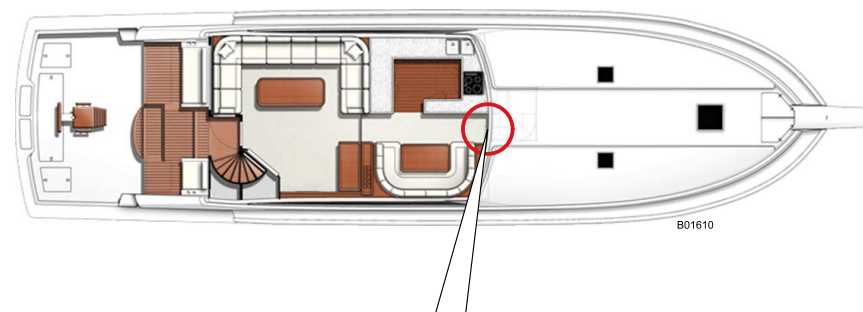
**High voltage**

*Disconnect the electric power supply before opening the door.*

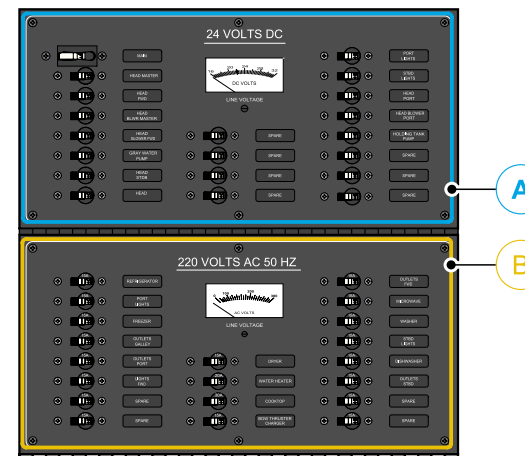


**WARNING**

*Switch off the generators and disconnect the shore power supply before opening the panel.*



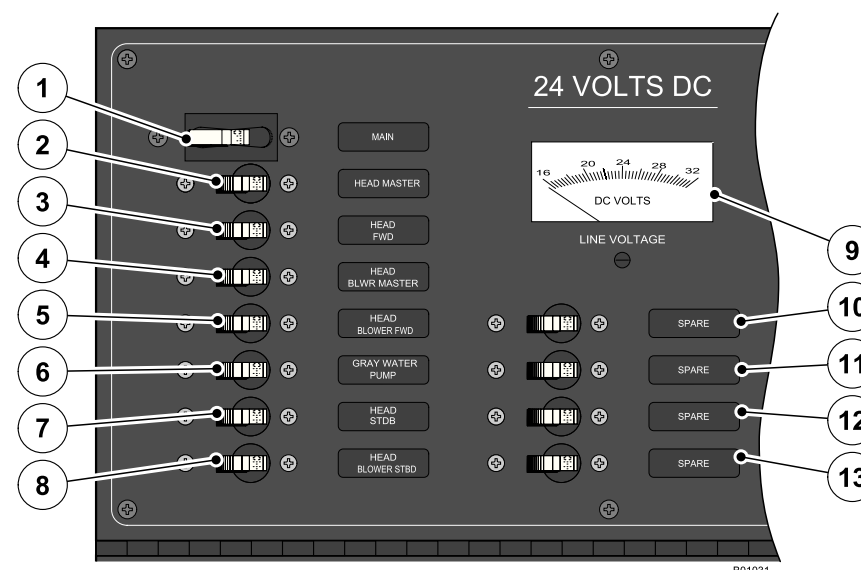
B01610





### 10.4.1 SECTION A - Circuit breakers protecting the 24 V DC users

1. **Master**  
When disconnected it cuts out all users.
2. **Master stateroom head**  
This switch powers the electric controls of the Master stateroom head.
3. **Bow head**  
This switch powers the electric controls of the bow head.
4. **Master head ventilator**  
This switch powers the ventilator of the Master head.
5. **Bow head ventilator**  
This switch powers the ventilator of the bow head.
6. **Gray water pump**  
This switch powers the gray water pump.
7. **Starboard head**  
This switch powers the electric controls of the starboard head.
8. **Starboard head ventilator**  
Powers the ventilator of the starboard head.
9. **24 V DC line voltmeter**  
This instrument measures the voltage of the 24 V DC line.
10. **Available**  
Switch available for auxiliary systems.
11. **Available**  
Switch available for auxiliary systems.
12. **Available**  
Switch available for auxiliary systems.
13. **Available**  
Switch available for auxiliary systems.



### 14. Port lights

This switch powers all yacht port lights.

### 15. Starboard lights

This switch powers all yacht starboard lights.

### 16. Port head

Powers the electric controls of the port head.

### 17. Port head ventilator

Powers the port head ventilator.

### 18. Black water pump

This switch powers the black waters pump.

### 19. Available

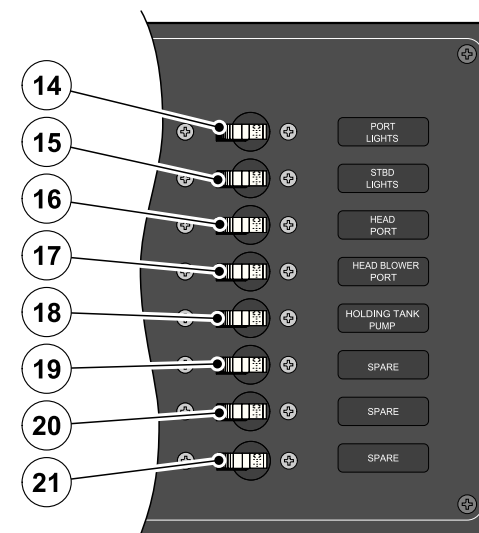
Switch available for auxiliary systems.

### 20. Available

Switch available for auxiliary systems.

### 21. Available

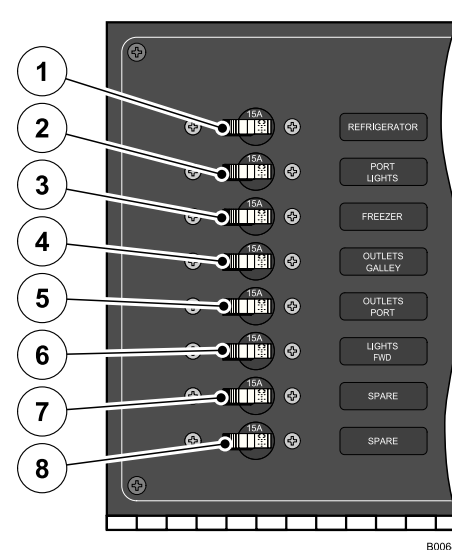
Switch available for auxiliary systems.



B01032

## 10.4.2 SECTION B - Circuit breakers protecting the 230 V AC users

1. **Refrigerator**  
This switch powers the refrigerator.
2. **Port lights**  
This switch powers all yacht port lights.
3. **Freezer**  
This switch powers the freezer.
4. **Galley electric outlets**  
Powers the galley electric outlets.
5. **Port electric outlets**  
This switch powers the port electric power outlets of the yacht.
6. **Bow lights**  
Powers the bow light system.
7. **Available**  
Switch available for auxiliary systems.
8. **Available**  
Switch available for auxiliary systems.



B00646

## 9. 230 V AC line voltmeter

This instrument measures the voltage of the 230 V AC line.

## 10. Dryer

This switch powers the dryer.

## 11. Water heater

This switch powers the water heater.

## 12. Cooking top

This switch powers the cooking top.

## 13. Bow thruster battery charger

This switch powers the bow thruster battery charger.

## 14. Fore electric outlets

Powers the bow electric outlets.

## 15. Microwaves oven

This switch powers the microwave oven.

## 16. Washing machine

Switch powering the washing machine.

## 17. Starboard lights

This switch powers the starboard light system.

## 18. Dishwasher

This switch powers the dishwasher.

## 19. Starboard electric outlets

This switch powers the starboard electric power outlets of the yacht.

## 20. Bow lights

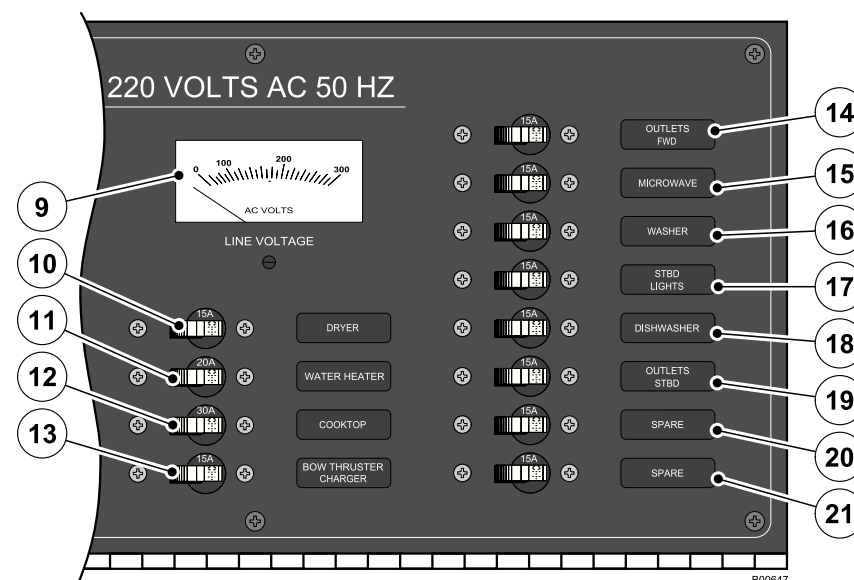
Powers the bow light system.

## 21. Available

Switch available for auxiliary systems.

## 22. Available

Switch available for auxiliary systems.



## 10.5 24 V DC USER HELM STATION ELECTRIC PANEL

In the helm station is installed an electric panel equipped with circuit breakers protecting the 24 V DC users and the measuring instruments of the system.

The following main sections have been identified, in order to make the descriptions easier:

A. Voltmeter and ammeter for 24 V DC batteries

B. Circuit breakers protecting the 24 V DC users



### WARNING

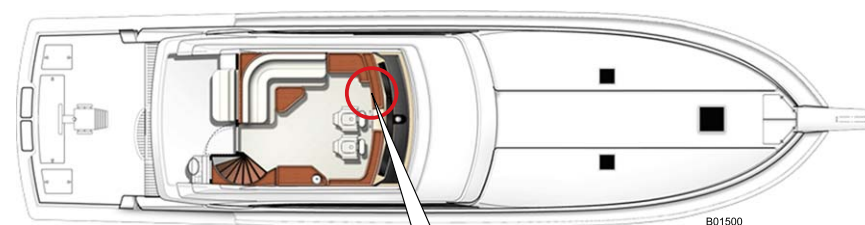
#### High voltage

*Disconnect the electric power supply before opening the door.*

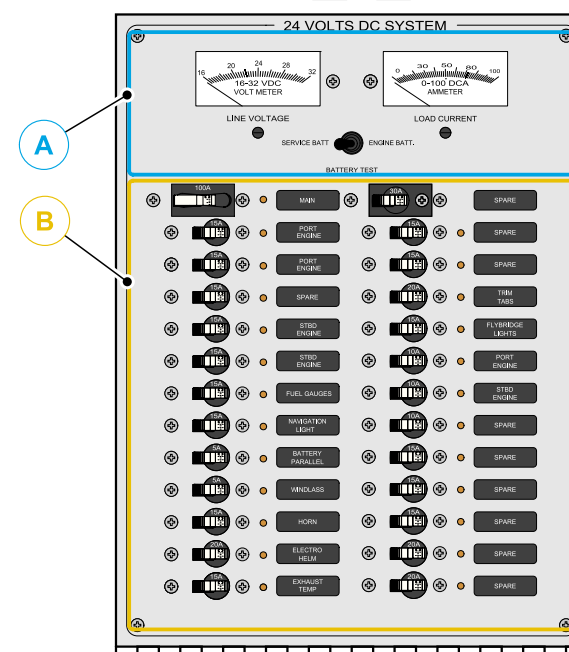


### WARNING

*Switch off the generators and disconnect the shore power supply before opening the panel.*



B01500



## 10.5.1 SECTION A - Voltmeter and ammeter for 24 V DC batteries

### 1. Voltmeter for battery voltage

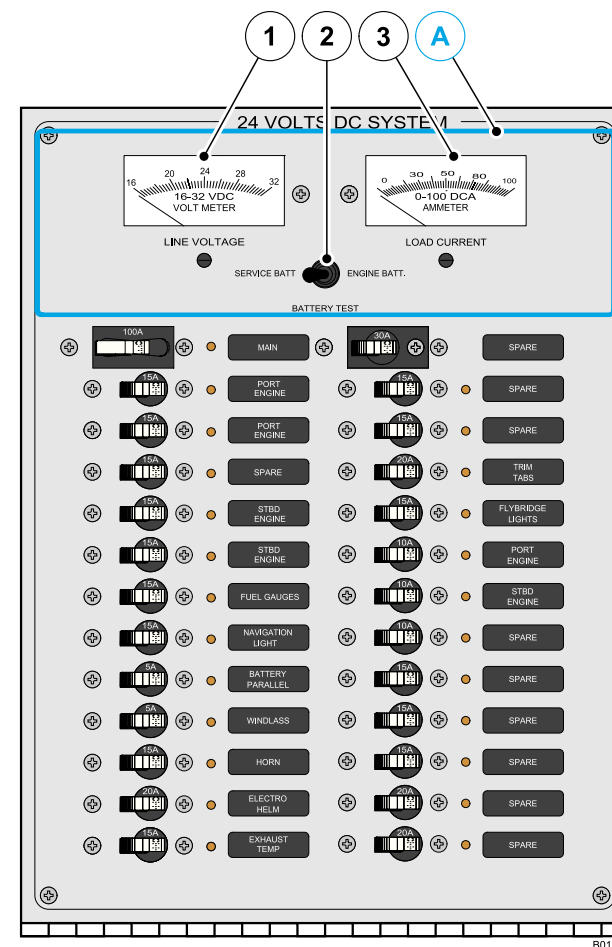
Measures the voltage detected at the terminals of the 24V DC user/engine batteries, according to selection by relevant switch (2).

### 2. Switch for the engine/users batteries

Allows to select on voltmeter and ammeter the reading of the voltage and current values at engines, users battery terminals.

### 3. Ammeter for battery current absorption

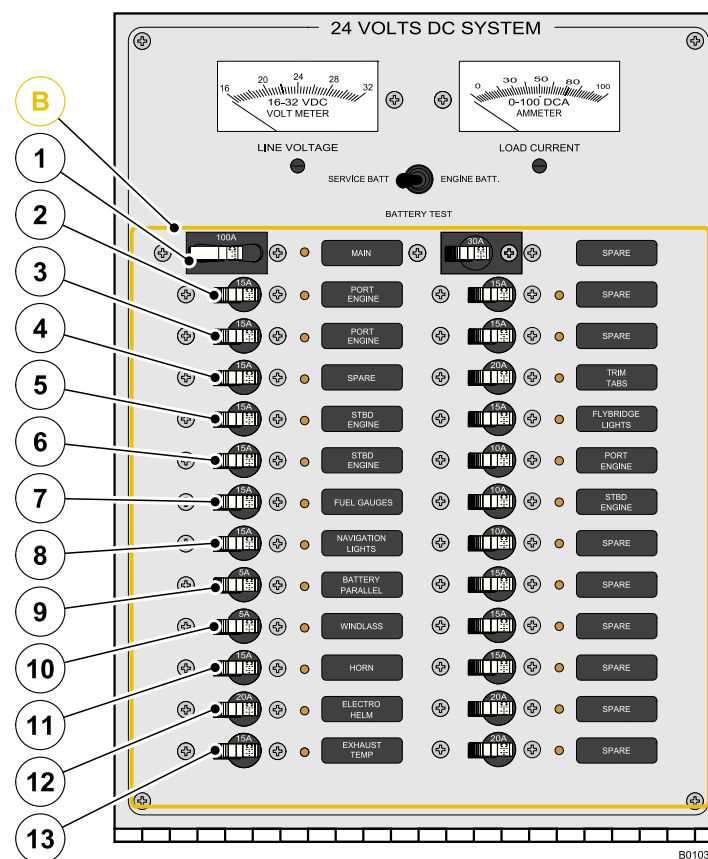
It measures the current (amperes) absorbed by the users/engines 24V DC batteries banks, according to relevant switch (2) selection.



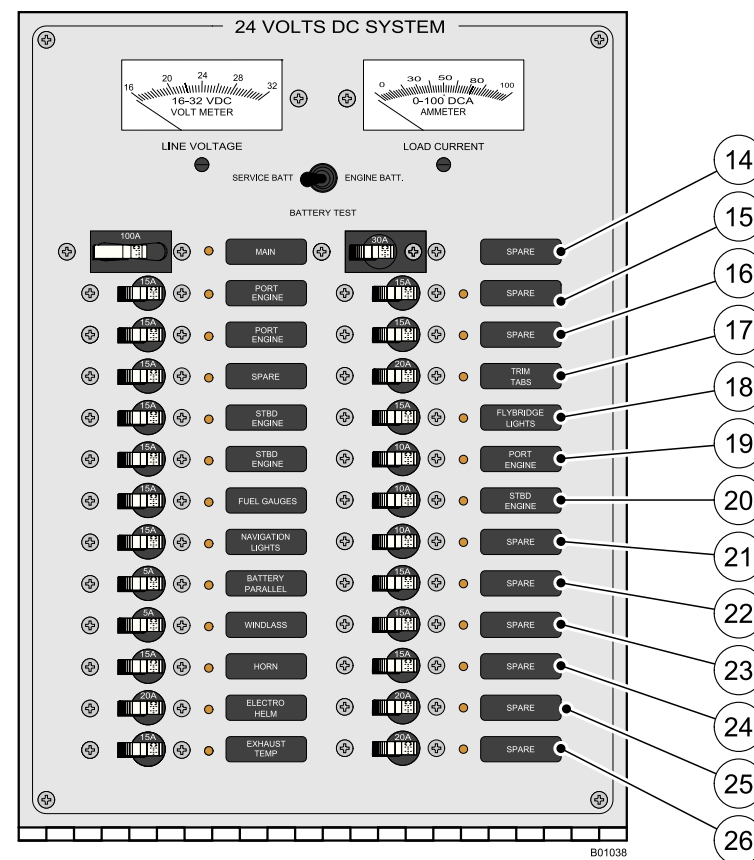
B01036

## 10.5.2 SECTION B - Circuit breaker protecting the 24 V DC users

1. **Master**  
When disconnected it cuts out all users.
2. **Port engine start system**  
This switch powers the port engine start system.
3. **Port engine monitoring system**  
This switch powers the port engine controller (ECU).
4. **Available**  
Switch available for auxiliary systems.
5. **Starboard engine start system**  
Powers the starboard engine start system.
6. **Starboard engine power unit**  
This switch powers the starboard engine controller (ECU).
7. **Fuel level gauge**  
Powers the fuel level gauge.
8. **Navigation Lights**  
Powers the navigation lights.
9. **Batteries parallel connection**  
Powers the parallel connection between engines and users batteries banks.
10. **Anchor windlass**  
This switch powers the anchor windlass.
11. **Horn**  
This switch powers the air compressor for the operation of the horn.
12. **Electro-hydraulic steering system**  
This switch powers the power unit of the electro-hydraulic helm system.
13. **Exhaust gas temperature**  
This switch powers the sensor of the exhaust gas temperature.



- 14. Available**  
Switch available for auxiliary systems.
- 15. Available**  
Switch available for auxiliary systems.
- 16. Available**  
Switch available for auxiliary systems.
- 17. Trim tabs**  
Powers the electro-hydraulic power unit for trim tab operation.
- 18. Enclosed bridge lights**  
This switch powers the enclosed bridge lights.
- 19. Port engine monitoring system**  
This switch powers the port engine monitoring system.
- 20. Starboard engine controller**  
This switch powers the starboard engine monitoring system.
- 21. Available**  
Switch available for auxiliary systems.
- 22. Available**  
Switch available for auxiliary systems.
- 23. Available**  
Switch available for auxiliary systems.
- 24. Available**  
Switch available for auxiliary systems.
- 25. Available**  
Switch available for auxiliary systems.
- 26. Available**  
Switch available for auxiliary systems.





## 10.6 230 V AC USER HELM STATION ELECTRIC PANEL

In the helm station is installed another electric panel equipped with circuit breakers protecting the 230 V AC users.



### WARNING

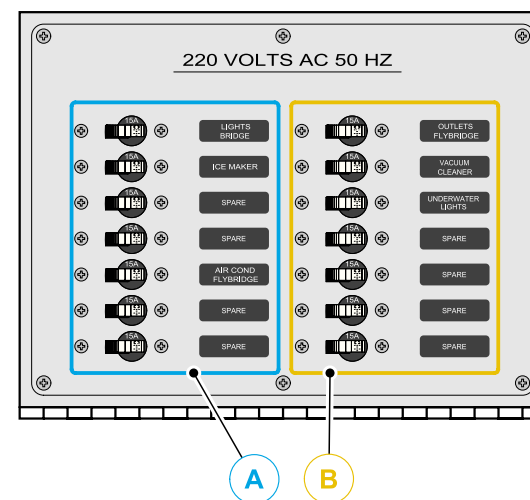
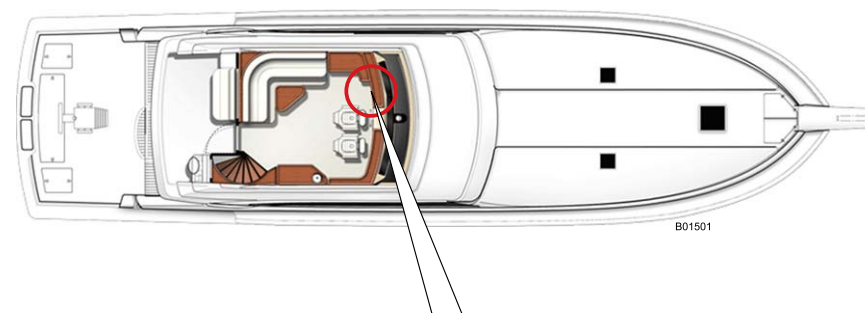
#### High voltage

*Disconnect the electric power supply before opening the door.*

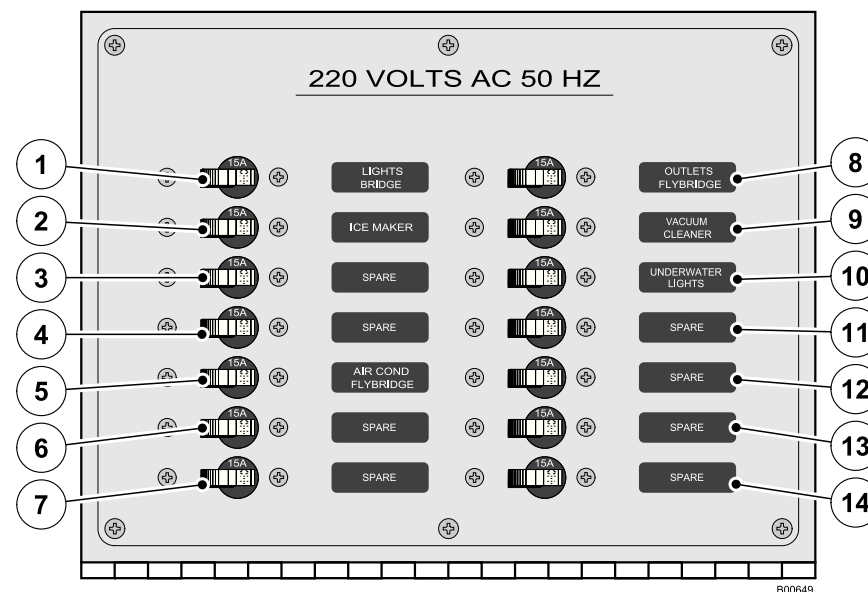


### WARNING

*Switch off the generators and disconnect the shore power supply before opening the panel.*



1. **Enclosed bridge lights**  
Powers the enclosed bridge lights.
2. **Icemaker**  
This switch powers the icemaker.
3. **Available**  
Switch available for auxiliary systems.
4. **Available**  
Switch available for auxiliary systems.
5. **Air conditioning on the enclosed bridge**  
Powers the air conditioning unit on enclosed bridge.
6. **Available**  
Switch available for auxiliary systems.
7. **Available**  
Switch available for auxiliary systems.
8. **Enclosed bridge electric outlets**  
This switch powers the enclosed bridge electric outlets.
9. **Vacuum cleaner**  
Powers the vacuum cleaner.
10. **Underwater lights**  
Powers the underwater light system.
11. **Available**  
Switch available for auxiliary systems.
12. **Available**  
Switch available for auxiliary systems.
13. **Available**  
Switch available for auxiliary systems.
14. **Available**  
Switch available for auxiliary systems.



## 10.7 12 V DC USER HELM STATION ELECTRIC PANEL

In the helm station, at the side of the 24 V user electric panel is installed a further electric panel equipped with circuit breakers protecting the 12 V DC users.

A. Circuit breakers protecting the 12 V DC users

B. Voltmeter for 12 V DC batteries



**WARNING**

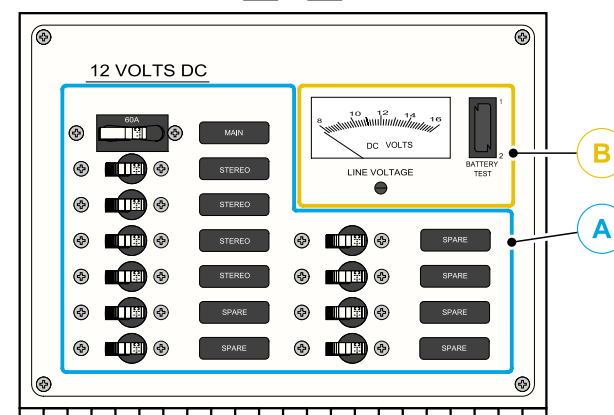
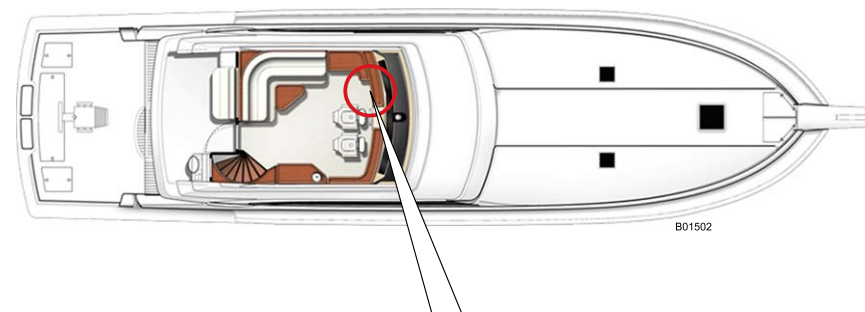
**High voltage**

*Disconnect the electric power supply before opening the door.*



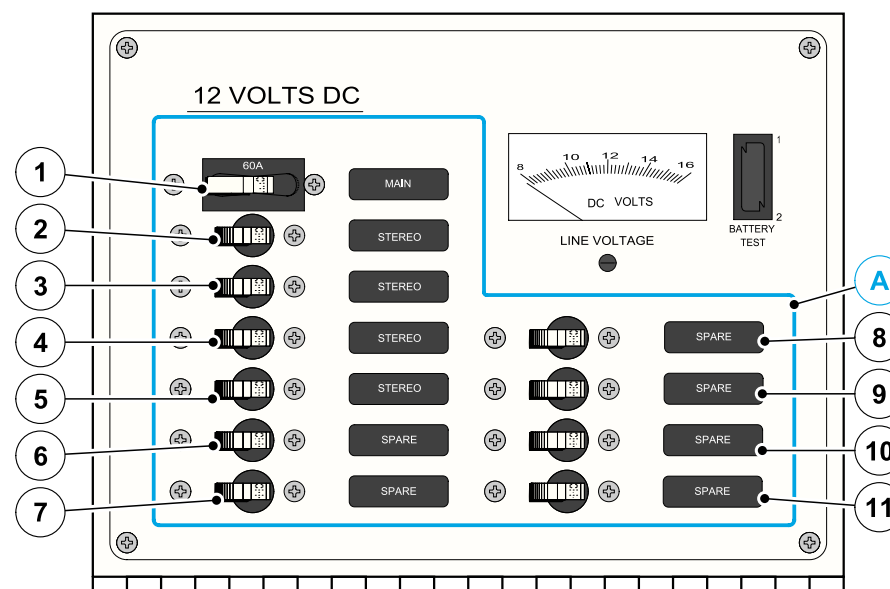
**WARNING**

*Switch off the generators and disconnect the shore power supply before opening the panel.*



## 10.7.1 SECTION A - Circuit breakers protecting the 12 V DC users

1. **Master**  
When disconnected it cuts out all users.
2. **Stereo**  
Powers the HI-FI stereo systems.
3. **Stereo**  
Powers the HI-FI stereo systems.
4. **Stereo**  
Powers the HI-FI stereo system.
5. **Stereo**  
Powers the HI-FI stereo system.
6. **Available**  
Switch available for auxiliary systems.
7. **Available**  
Switch available for auxiliary systems.
8. **Available**  
Switch available for auxiliary systems.
9. **Available**  
Switch available for auxiliary systems.
10. **Available**  
Switch available for auxiliary systems.
11. **Available**  
Switch available for auxiliary systems.



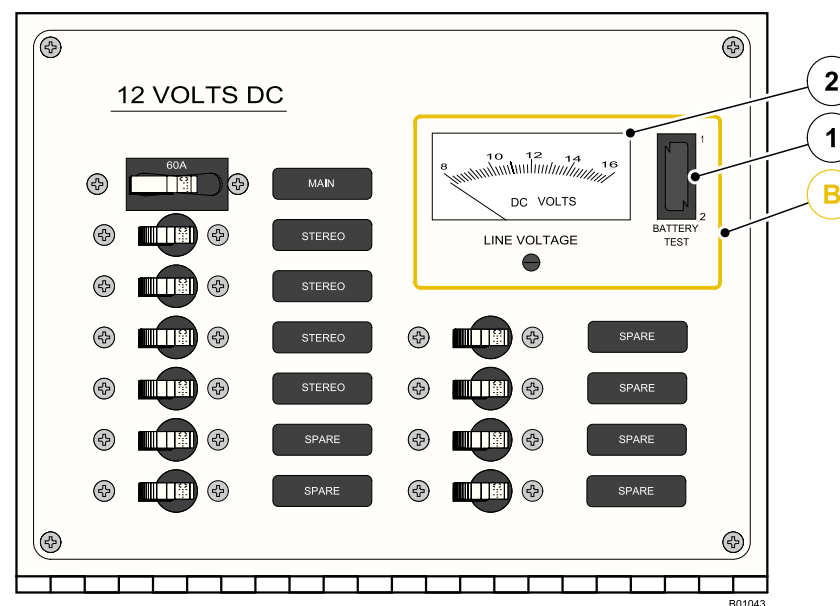
## 10.7.2 SECTION B - Voltmeter for 12 V DC batteries

### 1. Voltmeter for 12 V DC batteries

It measures the voltage at the terminals of the 12 V DC batteries, actuated by proper test switch (2).

### 2. Battery test switch

Checks the correct operation of batteries confirmed by voltmeter (1).

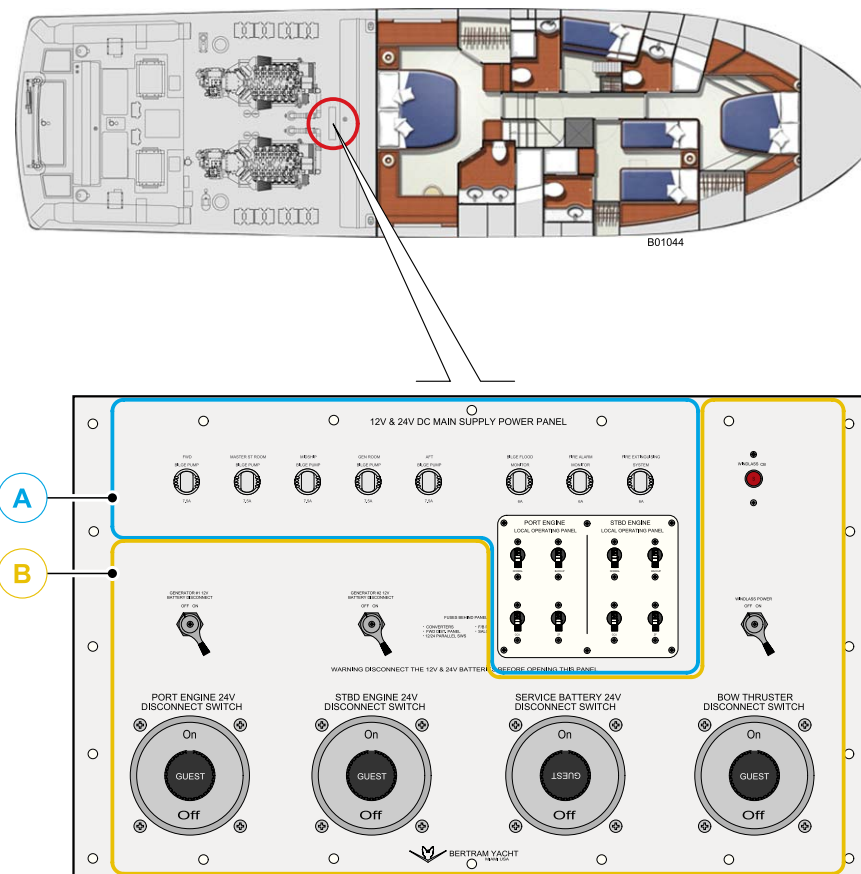


## 10.8 12 V /24 V DC BATTERY DISCONNECTOR PANEL

In the engineroom is located an electric panel equipped with circuit breakers and battery disconnectors.

The following main sections have been identified, in order to make the descriptions easier:

- A. Circuit breakers protecting the engines and fuses for bilge pumps and firefighting system
- B. 12 V/24 V DC battery disconnectors





**WARNING**

*Before opening the door disconnect 12 V and 24 V DC batteries*



**WARNING**

*Remove fuse from bilge pump of engineroom, before beginning any mechanical intervention in the engineroom.*



**CAUTION**

*The battery disconnectors are designed for use under normal operating conditions. If this switch opens the DC circuit while the engine is being started, the switch should be replaced as soon as possible to avoid future failure.*



**CAUTION**

*Do not disconnect the battery disconnectors with the engines running or you may damage the engine alternators.*



**DANGER**

*The emergency parallel system is intended for emergency use only. If the batteries are paralleled, they will both charge and discharge at the same rate.  
Do not use this system on a continual basis because of the possibility of both battery banks going dead and leaving the main engines without a source of starting power.*

## 10.8.1 SECTION A - Circuit breakers protecting the engines and fuses for bilge pumps and firefighting system

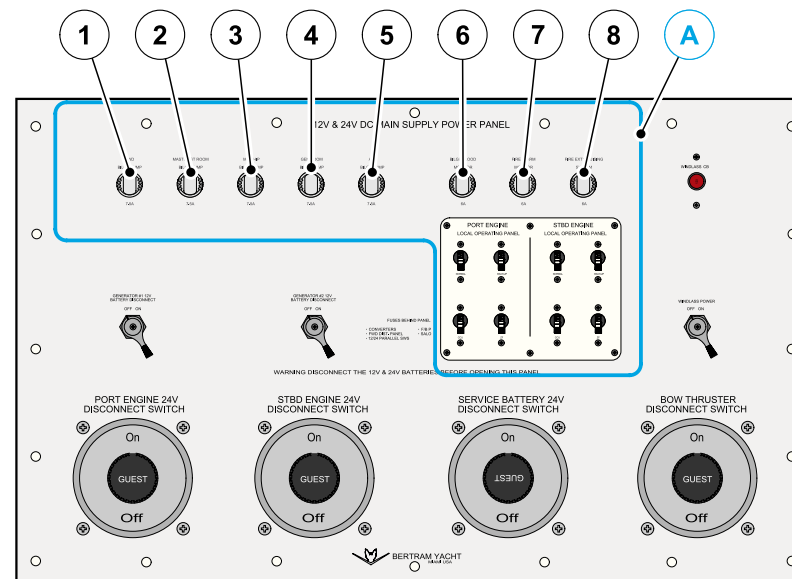
### Fuses for bilge pumps & firefighting system

1. Fore bilge pump
2. Master stateroom bilge pump
3. Engineroom bilge pump
4. Generator room bilge pump
5. Aft bilge pump
6. Bilge flood alarm signal panel
7. Firefighting signal panel
8. Firefighting system



### WARNING

*Remove fuse from bilge pump of engineroom, before beginning any mechanical intervention in the engineroom.*



B01045



- **Circuit breakers for engine control**

## PORT ENGINE

### 9. Normal

It provides power to the engine battery banks.

### 10. Backup

It provides power to the service (house) battery banks.

### 11. CCU

Powers the engine control panel (CCU).

### 12. ZF

Powers the gearbox (ZF) electronics.

## STARBOARD ENGINE

### 13. Normal

It provides power to the engine battery banks.

### 14. Backup

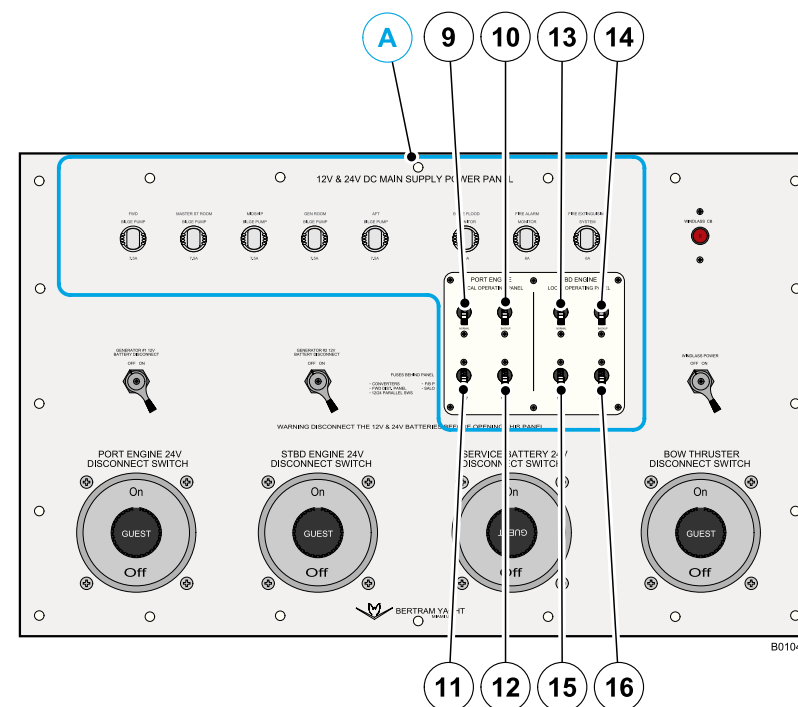
It provides power to the service (house) battery banks.

### 15. CCU

Powers the engine control panel (CCU).

### 16. ZF

Powers the gearbox (ZF) electronics.



## 10.8.2 SECTION B - 12 V/24 V battery disconnectors

### 1. 1st generator 12 V battery

This switch connects or disconnects the 12 V DC battery for generator 1.

### 2. 2nd generator 12 V battery

This switch connects or disconnects the 12 V DC battery for generator 2.

### 3. Anchor windlass fuse

Fuse protecting the anchor windlass

### 4. Anchor windlass

This switch connects or disconnects the anchor windlass.

### 5. Port engine 24 V battery

This switch connects or disconnects the 24 V DC battery bank for port engine.

### 6. 24 V starboard engine

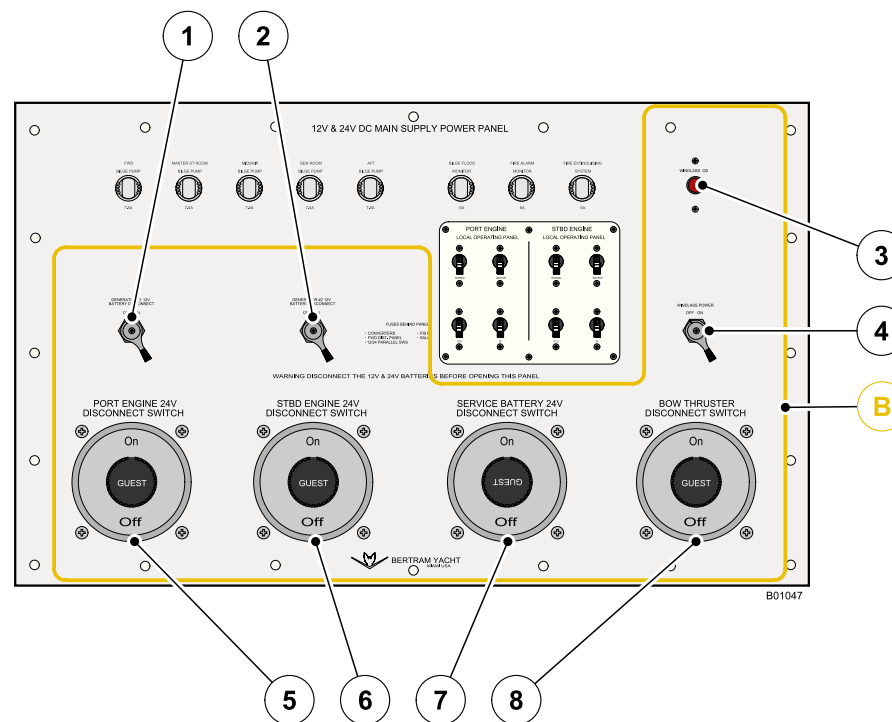
This switch connects or disconnects the 24 V DC battery bank for starboard engine.

### 7. Users 24 V batteries

This switch connects or disconnects the 24 V DC battery bank for users.

### 8. 24 V bow thruster batteries

Switch allowing to connect or disconnect the bow thruster.



## 10.9 GENERATOR

### 10.9.1 Operation

On board of your BERTRAM 700 yacht are installed two KOHLER generators, located in the generators' room.

On the fuel tank, you can easily locate the power generator supply, which can be cut-off by means of two delivery valves, on which you can handle to cut off the fuel lines in case of emergency and to shut off the generators.

The connections going from the generators to the tank are for fuel flow-back. The exhaust gases, instead of being discharged directly overboard, are conveyed by means of a silencer, installed on each generator and located in the helm gear compartment and then discharged overboard.

This silencer, by means of the water injection in the exhaust tubes, allows to cool down the exhaust gases and at the same time to reduce the noise caused by the water out-flow.

The intake seacocks of the cooling circuit are installed on the hull with the sea water filters fastened to a surface near to intake seacock valves.

Clean the intake seacock filters according to the frequency of the system use and to the condition of the sucked waters.

Before cleaning the filters, remember to close the thru-hull valves and then proceed with maintenance. When the cleaning is complete, REOPEN the valves feeding the cooling circuit.

The generator may be operated either by the remote electric panel or at the generator through the control panel located on the unit in the engineroom.

The generator is also equipped with a battery disconnect switch.

For detailed information about generators operation and maintenance procedures, see the manufacturer manual.

KOHLER 2 x 23 EFOZD (230 V - 50 Hz)



### 10.9.2 Generator control panel

On the generator is located a control panel to carry out the start up and stop operations and checks. A display shows, by means of LEDs, the trouble detected allowing in this way the monitoring of the generator.

#### Keys function

1. Display
2. Confirmation key “⊙”
3. Scroll key “V”
4. Scroll key “^”
5. Start/stop switch
  - RUN/OFF-RESET/AUTO  
To switch on the generator by control station, set switch (5) to AUTO.
6. Main power generator switch output

For more information, consult the Manufacturer's manual.



#### **WARNING**

**Carbon monoxide poisoning:**

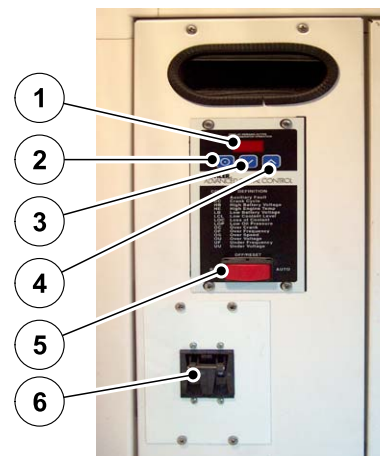
- Operate generator only in a well ventilated area. Carbon monoxide poison, created by the engine internal combustion, is extremely toxic.



#### **WARNING**

**Fire/explosion danger**

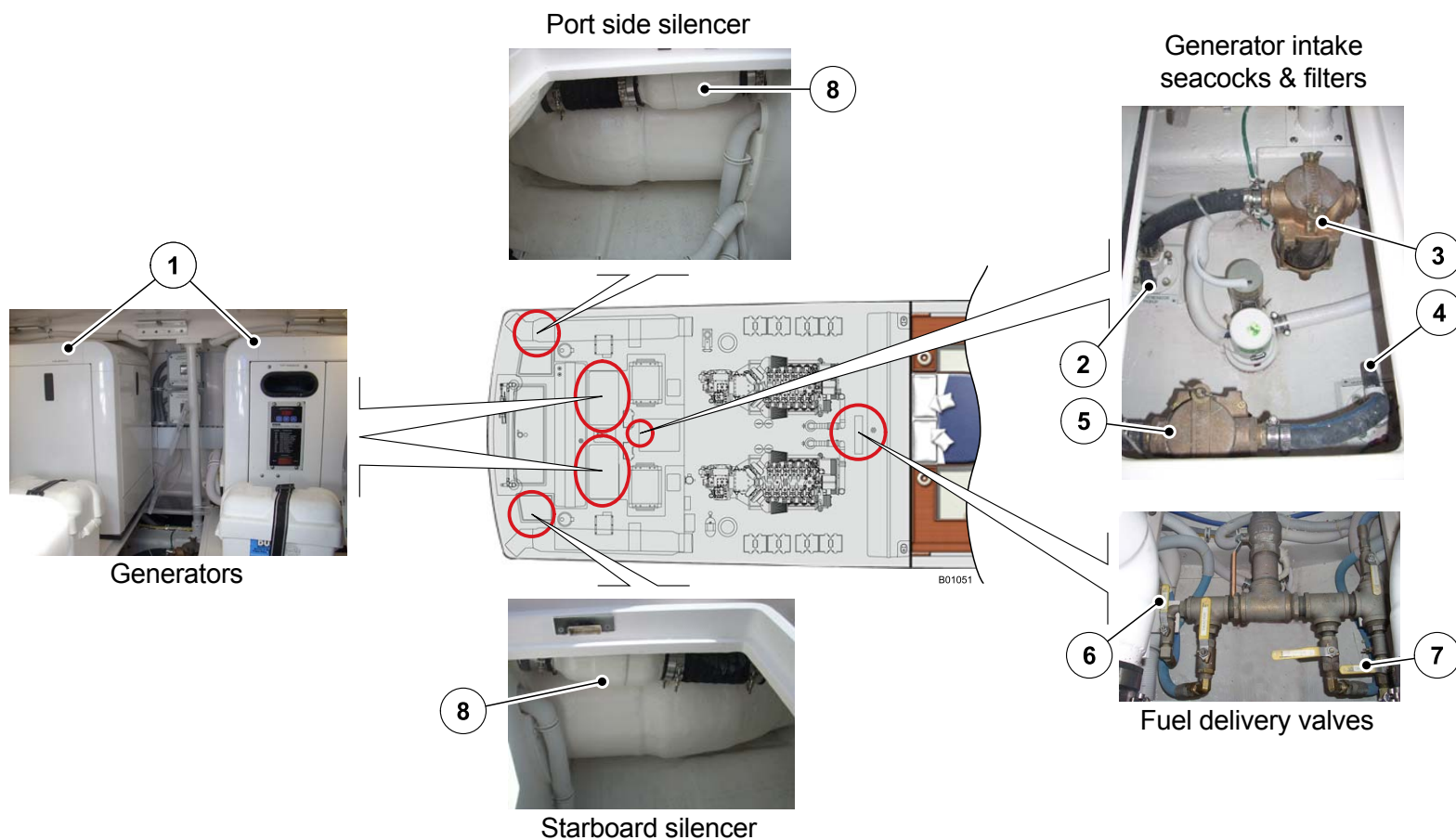
Check generator compartment for fumes.



Generator control panel



B01050



1. Generators
2. Port generator intake seacock valve
3. Port generator intake seacock filter
4. Starboard generator intake seacock valve
5. Starboard generator intake seacock filter

6. Valve of the fuel line to port generator (close in case of generator leaks or carry out maintenance)
7. Valve of the fuel line to starboard generator (close in case of generator leaks or carry out maintenance)
8. Generator silencers

### 10.10 GENERATOR LUBRICATION SYSTEM

See the **SCHEDULED MAINTENANCE** section of the generator manual for details about oil change and oil filter replacement intervals.

#### 10.10.1 Generator oil specifications

Refer to generator manual for the oil specifications.

##### **NOTICE**

*Failure to observe the oil specifications may cause cold-starting difficulties and engine damage from inadequate lubrication and oil pressure.*

#### 10.10.2 Oil Check

Check the oil level in the crankcase daily or before each startup to ensure that the level is in the safe range. To check the oil level, remove the dipstick and wipe the end clean, reinsert as far as possible and remove. Maintain the oil level between the Min and Max marks on the dipstick.

##### **NOTICE**

*Do not operate the generator if the oil level is below the Min or above the Max mark.*

#### 10.10.3 Oil change procedure

See manufacturer's manual.

## 10.11 GENERATOR COOLING SYSTEM

### 10.11.1 Closed oil coolant

In the closed cooling system, the seawater circulates through separate chambers within the oil coolant or manifold to cool the engine coolant. The seawater then mixes with the engine exhaust and exits from the exhaust outlet.

Consult the generator manual for the location of the protective anodes in the cooling system. Check the anodes at the intervals prescribed in the generator manual. The anodes protect the cooling system from corrosion damage; if the anodes are wasted away, corrosion protection will cease. See the **Sacrificial Anodes** section in the **MAINTENANCE** chapter in this manual.



#### **WARNING**

*Hot coolant and steam in the cooling system of a warm engine may cause severe injury or death.*

#### **Coolant Check and Filling**

See manufacturer's manual.

#### **Flushing and Cleaning Procedure**

See manufacturer's manual.

#### **Impeller Inspection and Replacement Procedure**

See manufacturer's manual.

#### **Sacrificial anodes**

The generator has internal zinc anode(s) to help prevent internal corrosion. Consult the generator manual for instructions on checking and replacing the anode(s). Failure to replace the zinc anode at the recommended service intervals will cause internal corrosion of the generator's cooling system.



## 10.12 GENERATOR FUEL SYSTEM

### Fuel filter cleaning/replacement (optional)

The fuel before reaching the generator, flows through the filter, that holds impurities and separates the possible present water, to prevent that it reaches the engine. Clean the filter if dirty or replace it.

To service the fuel filter see the Manufacturer's manual.

### Air inlet filter replacement and service

The air penetrating inside of the generator is filtered by the air inlet filter, which helps making the generator operation less noisy.

To clean a dirty filter or replace a damaged filter, see the equipment Manufacturer's manual.

### Generator exhaust system inspection

- Check the components of the exhaust system (exhaust manifold, mixing elbow, exhaust line, hose clamps, muffler and outlet flapper) for cracks, breaks and corrosion.
- Check the hoses for cracks, leaks, or dents. Replace them as needed.
- Check for corroded or broken metal parts. Replace them as needed.
- Check for loose, corroded, or missing clamps.
- Tighten or replace the hose clamps and/or hangers as needed.
- Check that the exhaust outlet is unobstructed.
- Visually inspect for exhaust leaks.
- Check for carbon or soot residues in the exhaust components. These residues indicate exhaust leaks, which must be repaired.



#### CAUTION

*If the generator does not start after several attempts, the muffler could be full of water. In order to prevent seawater from entering the generator engine and causing serious damage, unscrew the muffler drain plug and drain the muffler.*

*When attempting to start the generator, do not exceed 20 seconds of cranking. Wait 2 to 3 minutes before trying again.*



### 10.13 BATTERIES

The batteries are normally charged by the alternators during the engine operation. Alternatively, you can recharge them with the battery charger by shore power supply or by the generator (selecting the power source).

Description	Element number	Features
Engines start	8	12V 75 Ah
Generator start	2	12V 50 Ah
Service	8	12V 75 Ah

**CAUTION**

*If batteries are not recharged over long periods of inactivity, they lose progressively their charge, until they become definitively flat and irreparably damaged.*

**DANGER**

*NEVER clog the air inlets of the cases containing the batteries because the natural ventilation of the batteries must always be ensured so that they do not overheat.*

**WARNING**

*Always keep the batteries charged and recharge them periodically even if the yacht is left unattended. If the charge level drops to the minimum, they can irreparably get damaged. Verify the charge every week.*

**WARNING**

*Check the voltage of the batteries. During the charging phase 29.1 V can be achieved, this is a temporary value well tolerated both by the batteries and by the battery charger. This value has to be monitored and if this situation lasts for a too long period, the circuit breakers of the battery chargers must be disconnected.*

**WARNING**

*A frozen battery may explode if used or charged; do not start a yacht with a frozen battery. To avoid the battery freezing keep it always completely charged.*

**DANGER**

*The battery releases explosive gas: do not approach sparkles or flames nor smoke near it. If the battery is used or charged in a closed area, check for good ventilation. Do not check the battery charge by short-circuiting the terminals with metal tools: use a densimeter or a voltmeter.*

### 10.14 SHORE ELECTRIC POWER SUPPLY

In order to power the electric system of the yacht, so as to operate the various systems on board, two connections (1) for 230 V electric power supply from shore have been arranged, each one equipped with circuit breaker (2) protecting against overloads or short-circuits.

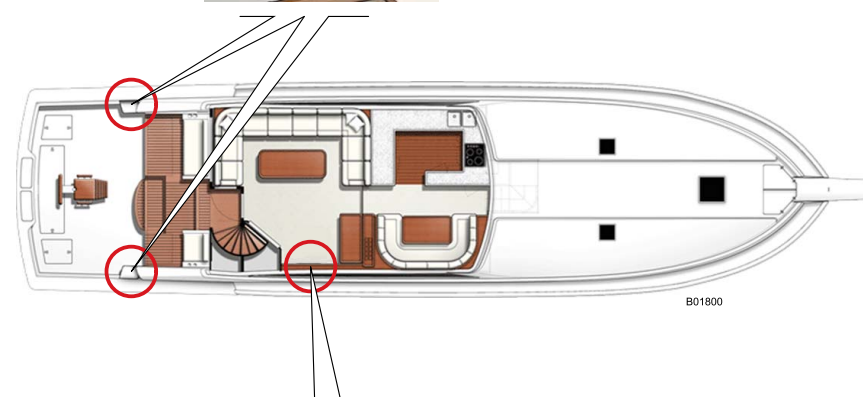
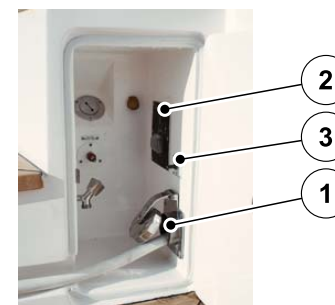
The connections are located on each side of the aft cockpit inside of a suitable peak closed with a lid.

Frequently the shore power outlets are not compatible with the one provided; in this case it is necessary to ask the Port Management for a new plug or adaptor.

Each connection consists of an electric cablemaster (Glendinning 230V/ 50 A) placed in the engineroom, allowing easy recovery of the cable, and activable by switch (3) close to the cable outlet (see figure).

The cablemaster consists of hawse pipe and power unit. Within the hawse pipe, a neoprene gasket/wiper prevents the entrance of water and helps clean the cable as it is retracted into the boat. When the cable is retracted completely into the boat, the shore cord cover activates the “in-limit” switch, turning off the motor. The “out-limit” switch is located in the guide and roller assembly. The nylon safety collar activates the “out-limit” switch and serves as a mechanical stopping device should the “out-limit” switch fail.

Shore power connection



B01800



Polarity indicators on main electric panel

To use shore electric power supply:

- Turn OFF the AC shore master power supply breakers on the main electric panel of the salon.
- Set to OFF the circuit breaker placed on the shore column.
- Plug the cabledmaster into the shore power electric outlet.



**WARNING**

*Do not modify the connectors of the shore power supply cable, use only compatible connectors. If the yacht power cord cannot be plugged into the shore outlet, ask the port authority for an adapter. Anyway do not use adaptors breaking the connection of neutral cable between the electrical system shore and the unit electrical system.*

*Using the above mentioned adapters could damage irreparably the 230 V power supplied fixtures.*



**DANGER**

*If the reverse polarity indicator is activated, do no use the electrical installation, a reverse polarity can damage the equipment.*

*Correct the polarity error before activating the electric installation on the unit.*

- Turn ON the circuit breaker on the shore column.
- Check the polarity indicators (installed on the main electric panel of the salon, see picture in the previous page), relevant to the outlet in use. If the polarity is reversed, red light lit, check shoreside power supply for connection or reverse wiring and restore correct polarity, taking advantage of specialized personnel.
- If the polarity is correct, red light off, turn ON the master circuit breaker relevant to the shore outlet in use, then select the shore power source on main electric panel.



**WARNING**

*Do not place your hands into the hawse pipe when retrieving the cable.*



**CAUTION**

*To prevent the cable from becoming tangled in moving machinery, always check to be certain that all of the cable is contained in the drum when completely retrieved.*

To service the electric power supply from shore:

- In a saltwater environment, periodically wipe uncovered metallic parts of cables and fresh water ducts while the shore power supply is not in use. Dry and spray with moisture repellent.
- Periodically apply vinyl protector to the cables' plug.



**WARNING**

*The connection must be performed under safety conditions with no powered connections and by paying attention to carry out a correct grounding.*



**DANGER**

*Do not leave electric power from shore connected with no one onboard.*

**DANGER**

*Before carrying out any intervention on the electric system, disconnect all circuits and the shore power outlet.*

**DANGER**

*Before connecting the shore power outlet, check the voltage and electric outlets available, check their entirety and the absolute absence of moisture on the wire, on the outlet, and on the plug.*

*With plug connected check that wire:*

- cannot get in traction as a result of tide variations, yacht movements, etc.;*
- cannot get crushed, etc.;*
- is not in contact with water.*

**WARNING**

*Do not modify the electric systems of the unit or the relevant drawings. The installation, the modifications or the maintenance must be carried out only by a skilled marine electrical technician. Inspect the system at least once a year.*

**WARNING**

*Disconnect shore power supply when the system is not used.*

**WARNING**

*Use electric devices with double isolation or earthing (ground).*

**CAUTION**

*Do not allow the cable end of shore supply to float in the water. This can cause an electric field and following injuries or even the death of the swimmers nearby.*

**CAUTION**

*To reduce to the lowest the hazard of electrocution or fire:*

- turn OFF switch for connection to shore supply of the unit, before connecting or disconnecting the shore power supply cord;*
- disconnect the shore power cable and rewind it by means of the cabledmaster;*
- fasten tightly lid of shore power supply outlet.*

**WARNING**

*Do not modify the connectors of the shore power supply cable, use only compatible connectors.*

**WARNING**

*To interrupt shore electric power supply:*

- turn OFF the main circuit breaker of the shore power outlet used;
- set to OFF the protection on the shore column;
- disconnect the shore power supply cord before the source (shore column);
- fasten tightly lid of shore power supply outlet.

**CAUTION**

*Before connecting or disconnecting the shore power cord, ensure that the main shore power circuit breakers are switched off or that the power selector switch is off. This will help to prevent connector arcing and damage. The shore power cord is a twist-to-lock fitting. Ensure that this fitting is properly locked-in place before switching the main shore power breaker to the on position. This will help to prevent arcing. The shore power outlet is set at 50 A to protect the shore power supply cord fitting. Do not exceed a current absorption of 50 A.*

**DANGER**

*Before any operation on the electrical system, cut off all circuits (shore power and generator):*

- disconnect the shore power outlet;
- set to OFF the generator circuit breaker.

**WARNING**

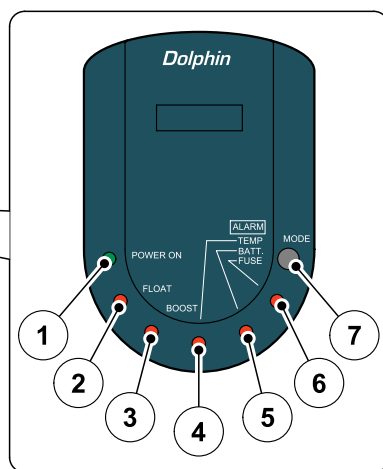
*To minimize shock hazard, unplug the shore power cord and close the inlet cover tightly. Do not alter the shore power cord connections. Do not cut or disconnect the green bonding conductor inside of shore cord or at dock outlet. This conductor is needed to provide the same bonding potential between the shore ground and your boat's ground and minimizes the shock hazard to people on the boat or in the water.*

### 10.15 BATTERY CHARGER

Your yacht's battery charger is a fully automatic fixture not needing any manual intervention. This battery charger has a special charging technique designed to charge the battery rapidly and safely, while also supplying power to the onboard DC equipment. The battery charger is protected from short-circuits, overloads, and high engine room temperatures.

The battery charger displays following keys, "MODE" (7), five LEDs "FLOAT" (2), "BOOST" (3), "TEMP" (4), "BATT" (5), "FUSE" (6) and one LED of "POWER ON" (1).

This battery charger allows to use up to 10 charging programs, according to the kind of batteries installed on the yacht.



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#### To begin

- All 6 LEDs will blink for 5 seconds
  - CPU initialization
  - Charge position is charging

#### Absorption phase (maximum 6 hours)

- LED "Power On" is on
- LED "Boost" is on
  - The batteries are in absorption phase

#### Equalization phase (maximum 4 hours)

- LED "Power On" is on
- LED "Boost" blinks
  - The batteries are in equalization phase

#### Floating stage

- LED "Power On" is on
- LED "Float" blinks
  - Batteries charged and in floating stage

#### Communication fault

- LED "Power On" blinks
  - LED "Float" or "Boost" is on
    - Communication network fault
    - Security voltage charge
  - Check the network connection (internal & external)

**Internal temperature fault**

- LED “Power On” blinks
- LED “Float” or “Boost” is on
- LED “Temp” is on
  - Internal temperature fault on one of the cards
  - The charging current has been reduced by half
  - Return to normal state upon removal of fault
- LED “Power On” blinks
- LED “Temp” is on
- Internal temperature fault
- The charger is on stand-by for 30 seconds and will reboot automatically once the fault is resolved
- Check the installation and climatic conditions
- Check the internal fan is operational
- Check charger’s confinement

**Faulty battery temperature**

- LED “Power On” blinks
- LED “Temp” blinks
  - External temperature fault
  - The charger is on stand-by for 30 seconds
    - Check the installation and climatic conditions
    - Check the external sensors

**Faulty external sensors**

- LED “Power On” blinks
- LED “Temp” blinks
- LED “Bat” blinks
  - Faulty external sensor temperature
  - The charger is on stand-by for 30 seconds
  - Check the external sensors connections

**Faulty output load**

- LED “Power On” blinks
- LED “Bat” is on
  - Faulty output load
  - The charger is on stand-by for 30 seconds
    - Check external sensor
    - Check the condition of the electronic card

**Faulty battery fuse**

- LED “Power On” blinks
- LED “Bat” is on
  - Faulty battery fuse
    - Check batteries connections
    - Check the status of the fuses box

**Sulphation boost (maximum 1 h)**

- LED “Power On” is on
- LED “Boost” blinks
- LED “Temp” blinks
- LED “Bat” blinks
- LED “Fuse” blinks
  - equalization phase to 09 position

**Sulphation Float**

- LED “Power On” is on
- LED “Float” blinks
- LED “Temp” blinks
- LED “Bat” blinks
- LED “Fuse” blinks
  - floating phase to 09 position



**Manual equalization**

- LED “Power On” is on
- LED “Boost” blinks
  - Holding down the “mode” button on the front for 2 seconds will begin an extra equalization phase
  - The short anti cycle lasts 24 hrs
  - Please note that holding down the “mode” button will confirm and begin the desulphation programme

Cycle number	Length of equalization phase
0, 1, 2, 3	2 hours
4, 5, 6	1 hour
7, 8	/
9	begins programme 9

**1/2 CHARGE**

- LED “Power On” blinks rapidly
- LED “Float” or “Boost” is on
  - A short press of less than 1 second on the mode button will set the charger in 1/2 charge mode: the maximum voltage delivered by device being reduced by half; this is regardless of the cycle of the charger
  - Another short press allows the charger to revert to its normal operation status

For further information, refer to manufacturer manual.

**DANGER**

*Before working on the battery charger, disable the generators and the shore power supply line. Risk of electrical shock, which can cause severe injury or death, exists when electric power is present or is turned on by accident.*

- This device is suitable for connection to electric single-phase network of 230 V 50 Hz or to 115 V 50 Hz.
- The toggle between 115 V and 230 V is performed automatically.
- For safety reasons, the PE terminal of device must absolutely be connected to the system bonding (yellow/green wire of power supply cord).
- To prevent overheating, carry out cable connection correctly.

**NOTE:** If reverse battery polarities get connected, the relevant protection fuses will blow.

**Start up precautions**

In order to prevent all risk of electric shocks at either start up or during the utilization of the system, the protection cap must rest in place and be tightly screwed.

**Precautionary maintenance**

In order to prevent risk of electric shocks during maintenance, please follow closely all recommendations below before any maintenance begins.

- Disconnect the cable.
- The access to -DC or \_BAT must be disconnected in order to avoid transfer of energy.
- Please wait five minutes before accessing the casing as the high-tension condensation will need time to discharge.
- Fuses must be replaced by fuses that have the same characteristics and performance levels.



**CAUTION**

- *This device is not protected against reverse battery polarity. Irreversible damage may result.*
- *If the mechanical components of the device are not protected by the casing and fall, irreversible damage of the ventilation system and certain electrical components may result.*
- *Modifications made to the casing (and in particular if holes are bored), may result in the deposit of metallic shavings or filings onto the electronic card and consequently may cause the malfunction of or damage to the device.*
- *Interfering with or modifications made to the electronic card may result in unforeseen operations and consequently may cause the malfunction of or damage to the device.*
- *Use of a non-adapted power supply (as a general rule, the input voltage will be too high) may cause the malfunction of or damage to the device.*
- *An accidental electrical surcharge or lightening strike will generally cause the malfunction of or damage to the device.*
- *Replacement of battery fuses with fuses types other than those recommended (same characteristics) may cause the malfunction of or damage to the device.*
- *Obvious connection errors will result in the malfunction of or damage to the device.*
- *Water gaining access to the interior of the device may cause the malfunction of or damage to the device.*

**Electrical Lines and Switchboards Check**

- Check the inside of the switchboard and clean it if necessary.
- Check the operation of all switches.
- Inspect for any evidence of overheating at terminals or wiring.
- Do not permit metal tools or metal items to bridge across the battery terminals. Cover battery terminals with proper, non-conductive terminal covers.

**DANGER**

*Wear eye protection and liquid-proof gloves when working with or around batteries. Battery acid is a strong corrosive. Contact with acid will damage eyes and skin.*

**WARNING**

*These operations should be performed only by qualified personnel.*

**CAUTION**

*Charge batteries with extreme caution.  
If the battery is located in a closed area, ensure adequate ventilation for the dissipation of battery charging gas. Prevent battery electrolyte from freezing by keeping the batteries fully charged. Never attempt to charge a frozen battery or to use it to start engines. Charging or drawing on a battery with frozen electrolyte may cause an explosion and/or fire.*

### 10.15.1 12 V/24 V DC Voltage Equalizer

T

he voltage equalizer is a device that will keep both 12-volt batteries of the same 24-volt bank at an equal state of charge when uneven loads are applied to the individual 12-volt batteries of the 24-volt bank.

This device draws current from the 24-volt battery bank, to recharge one of the 12-volt batteries of the same bank.

The 12-volt battery being charged is the one at the ground (low) end of the 24-volt battery bank.

Never connect a 12-volt load to the high end of the 24-volt battery bank.

A voltage equalizer is used when it is desirable to draw a 12-Volt load from a 24-Volt system, rather than installing a separate 12-Volt battery and charging device. If an equalizer was not used, the battery bank would quickly become unbalanced and cause power and battery failure. A marine converter, when used alone, is not suitable for this type of charging, because it senses the over-all voltage of the 24-volt bank, and it is not capable of sensing unbalanced loads within the battery bank.

For further information, refer to manufacturer manual.



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## 10.16 INVERTER

The inverter is an highly efficient device, completely automatic. The inverter transform the 24 V DC in 230 V AC.

### - ON, Start

Position the start/stop switch on front side of inverter to "ON". Green light "inverter activated" lights up and the inverter operates.

### - OFF, Stop

Position the start/stop switch on front side of inverter to "OFF". The inverter stops and all lights switch off.



### Signal lights

The signal lights on front side of inverter have following functions:

#### - Inverter on

The green light indicates that the inverter is on.

#### - Overload

This light indicates that the inverter is overloaded. When the inverter is overloaded, the power limiter decreases the output voltage. According to the load the inverter will switch off after a short period.

#### - Overload + on slow (overload for long period)

After a long period of time that the inverter has been overloaded, it will switch off and the "overload + on" indicator will blink slowly. This will last for about 20 seconds after that the inverter will restart automatically. This is called "stand-by time" and allows the inverter to recover from any load source and to the battery the time to recover in case it should be flat.

#### - Overload + on fast (overload for a short period)

The inverter is OFF. When the inverter switches off ten times at time intervals not longer than 30 seconds each, it will switch off permanently and the "overload" and "ON" indicators will blink quickly. To restart the inverter again, switch this on and off manually. When the output terminal is short-circuited, the inverter will get overloaded. The indicator lights of "overload" and "on" will blink slowly. The inverter will try to restart for about ten times. If the short-circuit is not removed, the inverter will switch off permanently. Remove the short-circuit and reset the inverter by switching the same on and off.

#### - Low battery (battery nearly flat)

The inverter switches off if the battery voltage is too low. If the voltage rises above certain values, the inverter restart automatically.

#### - Temperature

The inverter will switch off in rooms with high temperatures and/or heavy overload. After cooling, the inverter will restart automatically.



**DANGER**

*If the inverter is disabled by means of switch placed on the front panel, the link with network power supply is not cut out.*

**NOTES:**

[illegible]



11



INTERIOR DETAILS

*INTRODUCTION*

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*HOW TO USE THIS MANUAL*

---

*DESCRIPTION OF THE YACHT*

---

*GETTING UNDERWAY*

---

*INSTRUMENTATION & EQUIPMENT*

---

*HELM STATION*

---

*ON DECK*

---

*PROPULSION SYSTEMS*

---

*HYDRAULIC SYSTEMS*

---

*ELECTRICAL SYSTEM*

---

***INTERIOR DETAILS***

---

*SAFETY DEVICES & EQUIPMENT*

---

*YACHT LIFTING & ONSHORE HANDING*

---

*MAINTENANCE*

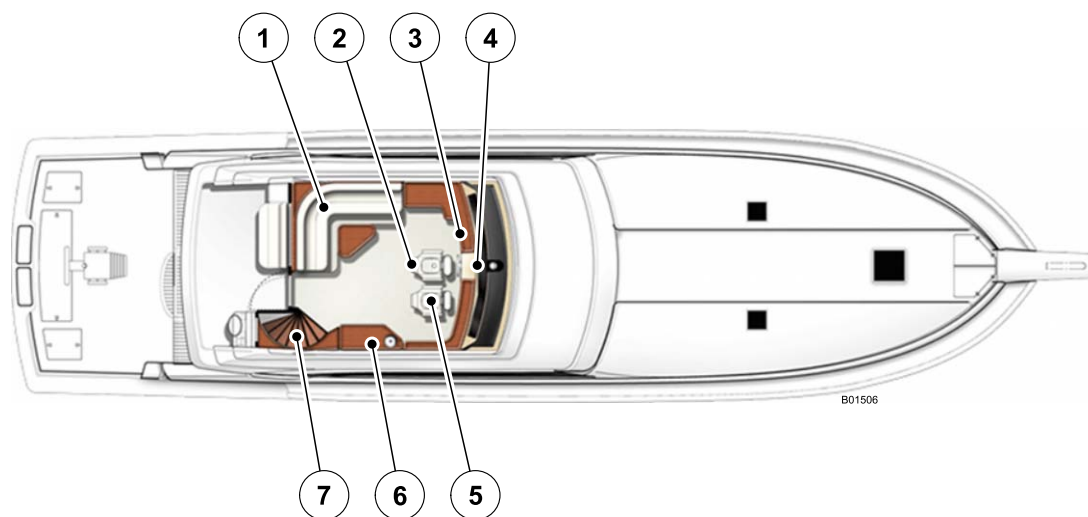
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*TROUBLESHOOTING*

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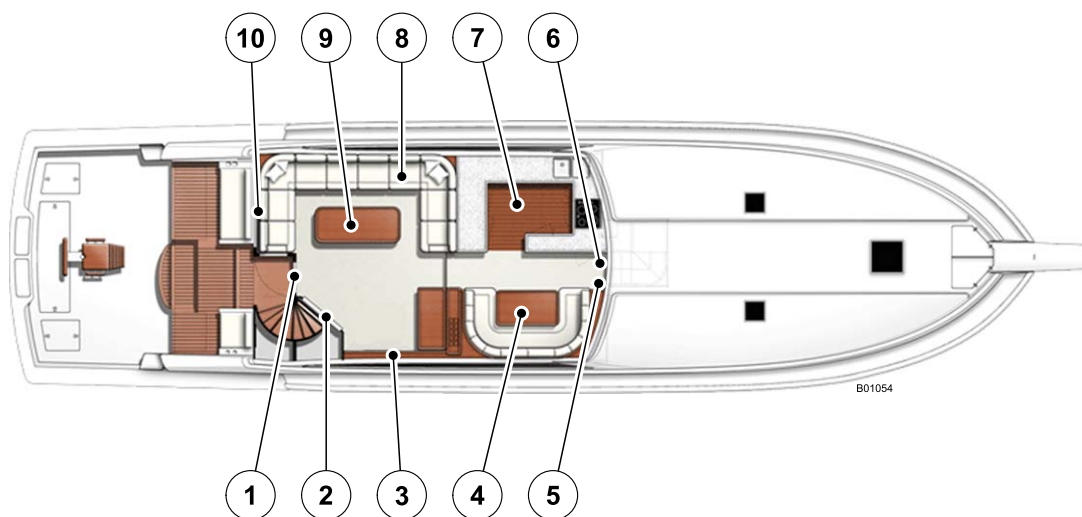
## 11.1 INTERIOR DETAILS - ENCLOSED BRIDGE

1. Sofa with peaks below and ventilation system
2. Port first mate seat
3. Electric wiring location
4. Helm station
5. Starboard first mate seat
6. Services cabinet
7. Main deck access stair (interior)



## 11.2 INTERIOR DETAILS - MAIN DECK

1. Salon access door
2. Entertainment center
3. Main electric panel
4. Forward Upper Dinette With Table
5. Secondary electric panel
6. Stateroom area access stairs
7. Galley
8. Salon sofa
9. Salon table
10. Salon window





### 11.2.1 Access to the enclosed bridge

The enclosed bridge can be reached through the aft cockpit by climbing the port stair.

Inside of the enclosed bridge, port, is arranged a leather sofa storing some peaks underneath and the outlet for central vacuum system.

**WARNING**

*To prevent an electric shock, do not use on wet surfaces or suck water and damp materials.*

**DANGER**

*Do not vacuum hot ashes, cigarette butts, or flammable powders. Do not operate near flammable gasses or liquids. Do not change the bag when the hose is connected and the vacuum is operating.*

Your vacuum system's accessories will allow you to reach all the living areas. However, the system is not a wet vacuum system and is not designed or intended for use in the bilges or engine room.

The system is supplied at 230 V AC. It is automatically switched on when the hose is plugged into the vacuum receptacle, and is automatically switched off when the hose is removed. Replacement collection bags are available from:

Wal-Vac, Inc.

318 Mart Street SW

Grand Rapids, Michigan 49508

**WARNING**

*While underway, the access door must be closed.*

**NOTICE**

*At least once a month vacuum out all A/C filters, by means of the centralized suction system.*

**CAUTION**

*When underway, the yacht's normal movement in the water can cause the slipping or falling of persons with the potential hazard of serious injury or even death. Persons should remain seated in secure locations when the yacht is underway.*



Proceeding towards the bow you can access the helm station, which allows to use and to view all instruments of the yacht. The helm station is equipped with three comfortable drive seats, allowing a perfect view also during navigation. In fact the seats can turn, lift and lower manually.



**WARNING**

*The access to the helm station is for the captain only, in order to avoid accidental alterations of the instruments by incompetent people.*

Starboard of the enclosed bridge is located the access stair of the main deck, whose steps are equipped with slip-resistant coating. Close to the access stair is located a cabinet, containing a sink, a faucet and a refrigerator.



**CAUTION**

*The helm area is equipped with air conditioning system, as the majority of the yacht's rooms, therefore we recommend to open the door as less as possible, when the system is operating.*



**CAUTION**

*Use extra caution when moving from one place to another, especially if the change involves using a ladder or stairs. To prevent falls on ladders and stairs, always use handrails when ascending or descending.*



### 11.2.2 Main deck description - interior

From the cockpit it is possible to access the interior of the deck bridge through a door with frameless glass.

The salon is arranged with a table and a comfortable L-shaped settee, lit through a wide window.

The windows of the salon are all equipped with wood blinds.

The room is made comfortable on the sides by a set of curtains with package folding which makes the salon well-lighted.



#### **WARNING**

*While underway, the access door must be closed.*

Starboard of the salon is arranged with the entertainment center consisting of a color TV-set and of a stereo system with relevant speakers; with various cabinets housing inside the main electric panel and the icemaker.



Toward the bow, by climbing one step, you can reach the dinette arranged starboard with a table and an U-shaped settee and port with the galley; this latter is equipped with all necessary appliances. Under the settee is located the central vacuum system.



**WARNING**

*To prevent an electric shock, do not use on wet surfaces or suck water and damp materials.*



**DANGER**

*Do not vacuum hot ashes, cigarette butts, or flammable powders. Do not operate near flammable gasses or liquids. Do not change the bag when the hose is connected and the vacuum is operating.*

Your vacuum system's accessories will allow you to reach all the living areas. However, the system is not a wet vacuum system and is not designed or intended for use in the bilges or engine room.

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Wal-Vac, Inc.

318 Mart Street SW

Grand Rapids, Michigan 49508

**NOTICE**

*At least once a month vacuum out all A/C filters, by means of the centralized suction system.*

The galley is equipped with a cooking top of four burners, fridge and freezer, countertop, sinks, microwave oven, dishwasher and trash compactor.

Various cabinets and drawers stow inside crockery and china plates, glasses and stainless steel cutlery.



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**NOTICE**

*At least once a month perform accurate cleaning of dishwasher. Check for the operation at least once every three months.*

**NOTICE**

*Do not leave cooking pans unattended on the cooking top. Do not cook while underway. Do not put liquid food inside the oven.*

**NOTICE**

*Verify the operation of the oven at least once a month. Carefully clean each time after use.*

**NOTICE**

*Normal yacht motion in a seaway can cause accidental movement of staterooms doors and other access doors and hatches. Personal injury can result if doors and hatches move suddenly. Before getting the yacht underway, close and secure all access and staterooms doors and hatches.*

**WARNING**

*Children are allowed to use the galley only when they are able to use its items correctly and to understand the dangers specified in the special instruction handbooks. The help of an adult is essential.*

**CAUTION**

*When underway, the yacht's normal movement in the water can cause the slipping or falling of persons with the potential hazard of serious injury or even death. Persons should remain seated in secure locations when the yacht is underway.*

**CAUTION**

*Use extra caution when moving from one place to another, especially if the change involves using a ladder or stairs. To prevent falls on ladders and stairs, always use handrails when ascending or descending.*

The stateroom access stair leads to the belowdeck area, where are arranged the four main staterooms. Doorways, ladders, stairs, passageways, etc., should be kept dry and free from obstructions.

**NOTICE**

*For more directions about the use of the individual systems and equipment, consult the manuals provided by the individual equipment manufacturers.*

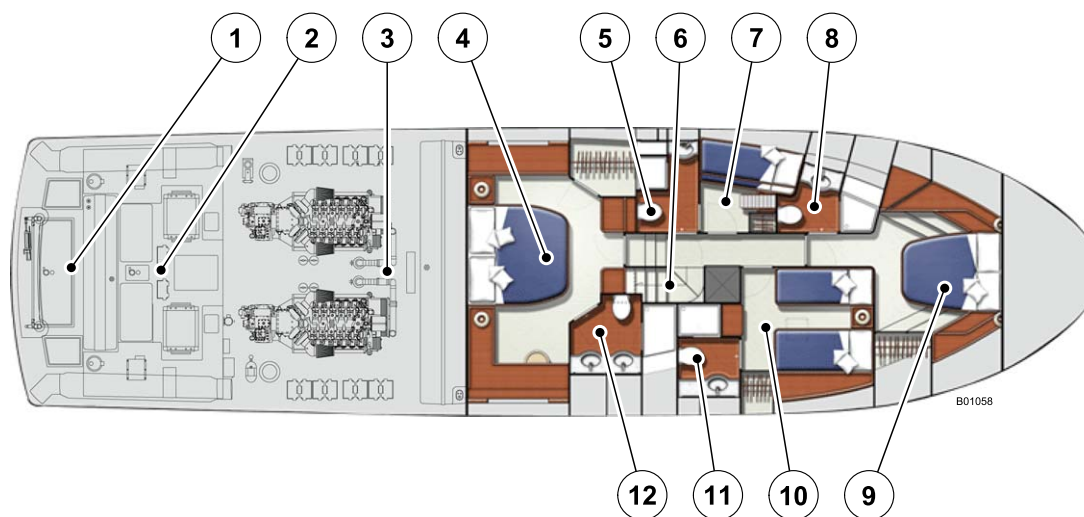
Along the stairs, protected by a lid is installed the secondary electric panel.





### 11.3 BELOWDECK

1. Helm gear compartment
2. Generators room
3. Engineroom
4. Master stateroom
5. Crew/Day head
6. Access stairs
7. Crew stateroom
8. VIP head
9. VIP stateroom
10. Starboard guests' stateroom
11. Starboard guests' head
12. Master head



### 11.3.1 Staterooms with head: Master, guests, VIP

You can reach the staterooms by the stairs located at fore upper dinette. Down stairs port is located the Master stateroom.

The Master stateroom is equipped with a double bed and storage drawer underneath, two nightstands and a roomy closet.

This stateroom is arranged with a LCD-TV-set, with a stereo system and relevant speakers, installed on the ceiling.

The stateroom has its own head with shower.



Along the passageway, starboard is located the guests stateroom, arranged with two single beds with drawer underneath and adjacent head.

The dunnages under the carpeting of the passageway and of the Master stateroom, give access to the yacht bilge housing:

- the water heaters;
- the gray water tank;
- the black water (sewage) tank;
- the air-conditioning unit;
- the distribution manifolds;
- the sump pump;
- the bilge pumps;
- holding tank discharge;
- holding tank pump;
- bow thruster;
- grey water pump.

Besides the passageway, a structure shaped as a closet contains a washing machine and a dryer.



**CAUTION**

*Empty the content of washing machine while underway.*



**WARNING**

*Before getting underway, check if the stateroom access doors are closed. You will avoid unpleasant bangings and accidental dangers.*

Port is located the crew stateroom, arranged with two bunk beds, with peak under the lower bed.

At far foredeck is located the VIP stateroom, arranged with a double bed and annex head.

All staterooms are equipped with self-adjusting air conditioning and portholes, illuminating and ventilating the room.

All portholes are equipped with shading mosquito net.



**CAUTION**

*During navigation it is necessary to unlock the safety closure of the fore skylight.*

## 11.4 APPLIANCES

For complete information about galley appliances, refer to the manuals provided by the Manufacturers of the individual appliances.

### Cooking top maintenance

See manufacturer's manual indicated.

### Oven maintenance

See manufacturer's manual indicated.

### Dishwasher maintenance

See manufacturer's manual indicated.

### Fridge/freezer maintenance

See manufacturer's manual indicated.

## 11.4.1 Skylights

The skylight can be used as a window or as a passage (in the VIP stateroom). Three skylights are installed onboard. It has a transparent structure made of unbreakable plastic material. These skylights are equipped with gas springs adjustable for opening and closing.

### **MAINTENANCE**

*Verify the correct operation of the closing systems at least once a month. Check for water seal at least once every three months. Clean seals when required and replace if necessary*



### **CAUTION**

*During navigation it is necessary to unlock the safety closure of the fore skylight.*



**NOTES:**

[illegible]

**NOTES:**

[illegible]



12



## SAFETY DEVICES AND EQUIPMENT

*INTRODUCTION*

---

*HOW TO USE THIS MANUAL*

---

*DESCRIPTION OF THE YACHT*

---

*GETTING UNDERWAY*

---

*INSTRUMENTATION & EQUIPMENT*

---

*HELM STATION*

---

*ON DECK*

---

*PROPULSION SYSTEMS*

---

*HYDRAULIC SYSTEMS*

---

*ELECTRICAL SYSTEM*

---

*INTERIOR DETAILS*

---

***SAFETY DEVICES & EQUIPMENT***

---

*YACHT LIFTING & ONSHORE HANDING*

---

*MAINTENANCE*

---

*TROUBLESHOOTING*

---

## 12.1 GENERAL SAFETY STANDARDS

BERTRAM designed and built your yacht with your safety and the safety of your guests as its highest priority. Nevertheless, the primary responsibility for the safe operation of your yacht and the safety of all persons onboard is yours. Always operate your yacht with care, courtesy and common sense.

You, as the yacht's owner and/or operator, are responsible for knowing the navigation and safety rules and good seamanship practices. Take the time to learn the Nautical Rules of Navigation (COLREGS), the navigation techniques, and the safe practices for operating and maintaining your yacht and its equipment safe.

You, as the owner of the yacht, and everyone who is responsible for your yacht's operations and maintenance should carefully read and understand the guidelines and instructions contained in this manual and in the manuals of the Manufacturers of the different equipment, as well as the signs and directions installed on the yacht. Pay particular attention to safety notices, warnings and cautions in this manual and elsewhere. This information is essential for the safety of persons aboard and the safety of the yacht.

Safety is also in the hands of everyone aboard.

All persons should be informed about the unique circumstances that are experienced aboard a yacht. They should be instructed about the necessary actions to take in emergency as well as routine situations. Specific safety information follows in this section.

The time you invest in reading this manual about safety will provide you with the knowledge to prevent and/or respond properly to potentially hazardous circumstances.



### **WARNING**

*Persons operating your ship must never be under the influence of alcohol or drugs. The yacht's pilot should be experienced in the use of all instruments and controls, and know the handling characteristics of the yacht at all speeds and sea conditions.*

*You should be certain that persons intending to operate your yacht are completely knowledgeable about its proper operation. If you are not certain about an individual's qualifications or competence, the person must be supervised by a qualified operator.*



### **WARNING**

*When boarding or leaving the yacht, always use the designated boarding or disembarking routes and equipment. Use the steps, ladders, rails and handholds provided. Wear rubber soled shoes that are clean and dry. Never jump from or onto the yacht. Never use machinery control devices, drive wheels, etc. as handholds. Failure to observe these practices can result in illness, serious injury or death.*

### NOTICE

*Make sure that required and approved lifesaving and firefighting equipment is on board and in proper working condition. All safety devices should be periodically inspected to ensure their reliable performance when needed. These items should be stored in a visually conspicuous location and be readily and easily accessible in an emergency situation. All persons onboard should be instructed in the proper use of all safety equipment.*



### WARNING

*Safety equipment and systems must comply with the existing local, and national or international regulations. This equipment must be periodically inspected and maintained by qualified technical personnel prior to the expiration date, if any, indicated on the equipment or systems. Refer to the local port authorities, and national or international regulations for information about the requirements for the carriage of safety equipment.*

*Failure to adhere to these rules could result in equipment failures that lead to personal injury or death and/or fines and/or other punishment imposed by the respective regulatory agencies.*



### DANGER

*It is absolutely forbidden to perform reverse run with one of the two engines stopped. This operation is allowed only in case of life danger for the persons onboard and for the safety of the yacht itself, however when the engine is running it should not run higher than 1000 rpm.*

## 12.2 GENERAL SAFETY CONSIDERATIONS

Never deploy emergency signals or messages (visual or radio) unless there is a need for emergency service responders.

Every person aboard the yacht must:

- know the storage location of PFD's.
- know the location of the throwable PFD's (e.g., ring buoy, horseshoe buoy).
- know the location of the life raft.
- know how to release the personal PFD's for use.
- know how to properly put on and wear a PFD.
- know how to launch a throwable PFD.
- know how to launch the life raft.
- be very aware of the risks posed by a fire.
- know what to do in case of fire.
- know the location of and be trained in the use of the fixed firefighting systems and the portable, hand-held fire extinguishers.

Do not hesitate to require that persons wear PFD's (life jackets). PFD's may be worn in any weather. Inflatable PFD's are comfortable to wear, and some types will inflate automatically if the wearer falls overboard. These PFD's are excellent safety gear to have for yourself and your guests.

### 12.2.1 Yacht stability and safety

Your yacht's stability afloat may be suddenly affected by wave action or a sudden maneuver. Persons onboard should be required to sit in safe seating areas while the yacht is underway. Persons onboard should be aware of the possibility of falling or being thrown into the water, if they are not securely seated while the ship is underway.

Make sure that all objects on board are rigged and stowed properly to prevent movement when the ship is underway. Items that may be needed while cruising should be stowed to enable quick and ready access.

During all underway operation or during any activities onboard, passageways and escape routes must always be kept clear and available for use. Doors shall not be obstructed from opening in case of an emergency.



#### **CAUTION**

*When boarding or leaving the yacht, always use the designated boarding or disembarking routes and equipment. Use the steps, ladders, rails or handholds provided. Wear rubber soled shoes that are clean and dry. Never jump from or onto the yacht. Never use machinery control devices, drive wheels, etc. as handholds. Failure to observe these practices can result in illness, serious injury or death.*



### WARNING

*Persons onboard the yacht should be specifically prohibited from riding on parts of the yacht that are not designed for such use, such as the foredeck, swim platform or forward and aft sun bathing cushions. Persons onboard should be required to sit in safe seating areas while the yacht is underway. Failure to comply with these directions can result in falls overboard and other serious personal injury or death.*



### CAUTION

*Never exceed the weight limits for people and load carried. People and loads onboard should be distributed evenly. Make sure that safety equipment is perfectly efficient and available to each passenger.*

## 12.2.2 Rules of Navigation

Know and observe the Rules of Navigation and always maintain control of your yacht. Neglecting this is the primary cause for collisions at sea. Provide laminated plastic reference cards for the Rules of Navigation and have them available for quick reference at each helm station.

Keep a proper watch ahead of and around the yacht at all times when underway.

## 12.2.3 Weather

Watch the weather where you are and where you are going. Be especially alert for strong winds and electrical storms. Monitor marine radio weather broadcasts for weather alerts. Storm signals are for your information and safety. Learn their meaning and be guided accordingly.

## 12.2.4 Fuel

Be certain that there is enough fuel aboard for your anticipated cruising needs and an adequate reserve if you change your plans to accommodate weather conditions or for other reasons. Know your fuel tank capacities and your engines' hourly fuel consumption rates. Calculate your fuel usage and use this as a backup check on your fuel tank level gauges.

## 12.2.5 General maintenance safety

Make frequent checks and perform the routine preventive maintenance on the hull, propulsion and auxiliary power generating engines, safety equipment and yacht systems on a regular basis. Failures of key equipment and systems may result in serious consequences such as property damage or injury or death to persons onboard.

Make sure that the engineroom is properly ventilated when engines and/or generator are running.

Persons having access to the engineroom must be aware of potential hazards of the following:

- moving mechanical parts;
- high ambient temperature and hot parts or equipment;
- hot, pressurized and/or toxic fluid systems;
- flammable fluids;
- high noise levels when engines are running;
- risks connected to the unauthorized or accidental operation of valves or switches that are important to the safe conduct of the yacht.

Personnel performing any type of operations, maintenance, repair or other service during the life of your yacht must be technically qualified and have proven abilities and experience acquired and recognized in their specific field.

Failure to follow these instructions and warnings can result in damage to your yacht and compromise the safety and persons onboard.



### **WARNING**

*The captain of a pleasure yacht must know and understand basic fire fighting techniques and how to use the fixed and portable fire extinguishers aboard the yacht. Being unable to use firefighting equipment and techniques effectively could result in injury, death and/or property damage.*



### **WARNING**

*Tampering with, interrupting, removing or bypassing any safety device installed on your yacht can result in serious damage to your yacht and/or cause personal injury or death to persons onboard.*



## 12.3 PFD's - PERSONAL FLOTATION DEVICES AND LIFE-SAVING EQUIPMENT

All PFD's (wearable and throwable) used on the yacht must be approved by the applicable regulatory agencies. In the U.S., the Federal Government, through the U.S. Coast Guard, specifies the requirements for PFD's and other required safety equipment to be carried aboard recreational vessels (supplied or not).

If the vessel is not used commercially, PFDs may be type I, II, or III.

If the vessel is to be used commercially, and will be carrying six or more passengers for hire, the PFDs must be type I.

Do not hesitate to require that persons wear PFD's (life jackets). PFD's may be worn in any weather, underway, at the shore or at anchor.

People can fall off the yacht at any time.

- Non-swimmers and children should wear a PFD at all times.
- People working on deck should wear a PFD at all times.
- PFD's should be worn on deck when underway in cold waters (water temperatures below 20 °C/68 °F).
- In any emergency, persons on board should put on their PFD's.

Inflatable PFD's are comfortable to wear, and some types will inflate automatically if the wearer falls overboard.

These PFD's are excellent safety gear to have for yourself and your guests. Consider providing self-inflating vests or self-inflating "belt pack" vests for yourself and your guests. Make sure that all PFD's are approved by the appropriate national or international regulatory agencies.

Bertram furnishes type II adult size (90 lbs) PFDs. This type of PFD is capable of turning its wearer to vertical or slightly backward position in the water. These PFDs are high visibility orange, comply with all of the USCG requirements for a type II device, and carry the United States Coast Guard approval label. Type II PFDs come in four sizes: adult (90 pounds plus), child large (50 to 90 pounds), child medium (30 to 50 pounds), and child small (less than 30 pounds).

This type of PFD is donned by placing it over the head with the collar behind the neck. The waist strap should then be connected and adjusted to prevent this device from riding up on the wearer.

The technique for donning a PFD should be practiced by everyone, so that they know where to find them and how to properly don one, even in the dark or in the water.

The recommended technique for water entry while wearing a PFD is to wrap both arms as tightly as possible around the wearer's chest and under the chin. This protects the face and keeps the PFD from riding up.

Always jump into the water feet first, with both feet and knees slightly bent. The head should be tucked down into the pocket made by the folded arms. As soon as a wearer is in the water, he should join others for mutual assistance and warmth.

Please keep in mind that Bertram furnishes only adult sized PFDs and that the USCG requires that everyone onboard have the correct size PFD. Please also keep in mind that if a PFD is stowed wet, mildew will hasten the deterioration of the PFD. If used, they should be rinsed with fresh water and dried out in the sunlight.

The USCG does not consider as “readily available” any PFD left in their original plastic wrappers, since persons under stress may be unable to remove them quickly.

In addition to the PFDs, Federal regulations require at least one (1) United States Coast Guard approved type IV throwable device. This device must be located where it is immediately available to those on deck.

Bertram supplies one type IV device. You should mount this device in a suitable location. We recommend about 60 feet of light line be attached to the device.

The captain must make sure that all persons on board know:

- the stowage place of the throwable PFD’s.
- how and when to launch a throwable device.
- what to do in case of “man overboard”.

All yacht owners and captains should conduct regular “man overboard” drills so that all persons on board are familiar with the procedures for rescuing a person who falls overboard.

At the cry, “**MAN OVERBOARD!**” immediate action is of the utmost importance--every second counts, particularly at night or in heavy weather. It is extremely helpful to indicate which side he went over, such as: “MAN OVERBOARD - PORT!”. This focuses the attention of those who did not see the accident and guides their actions.

Circumstances will dictate the best procedure as to how to approach the person in the water. One good procedure is to stop the boat a short distance up-wind from the victim and allow the boat to drift down. As the boat approaches the person in the water, shut down the engines and prepare to throw your type IV throwable device. Once the person is in range, throw the life ring, and pull him to the boat.

## 12.4 YACHT'S AREAS & ESCAPE ROUTES

In order to face the various emergencies that could determine the abandonment conditions of the yacht (fire, collision with sinking hazard etc.), in the quickest and safe way, the rules in force require an “escape route” informing about the safest and most protected paths as well as the quickest (from any yacht's area) for taking shelter and reaching the “collecting areas”, located in the open, from which it will be easier to leave the yacht.

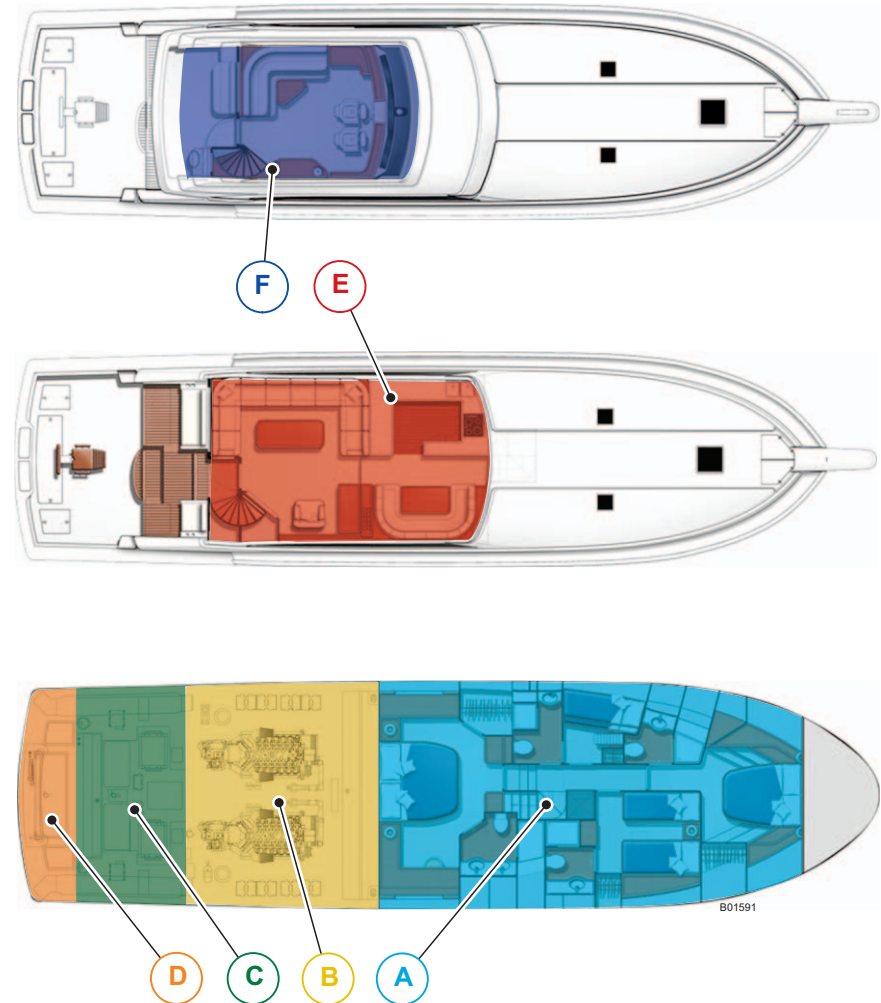
In the plan shown hereunder, are represented the general decks of the yacht subdivided in areas:

- A. Master, guests', VIP staterooms
- B. Engineroom
- C. Generators room
- D. Helm gear compartment
- E. Salon, dinette and galley
- F. Enclosed bridge



### WARNING

*You have therefore, according to the nature and position of the danger or fire source, to choose very carefully the most safe and suitable escape route.*





### CAUTION

*During navigation it is necessary to unlock the safety closure of the fore skylight.*



### CAUTION

*Always keep the escape routes, dry, free and accessible.*



### DANGER

*The various yacht's areas have more than one escape route. You have therefore, according to the nature and position of the danger or fire source, to choose very carefully the most safe and suitable escape route.*



### DANGER

*It is forbidden to stay or to walk on the corridor and on the side yacht foredeck, while underway, because no railing prevents the risk of falling at sea.*

### 12.4.1 Enclosed bridge area

The enclosed bridge area is equipped with a single way out (escape route).  
From the enclosed bridge, by means of a starboard stair you can reach the cockpit (**1st Path**).

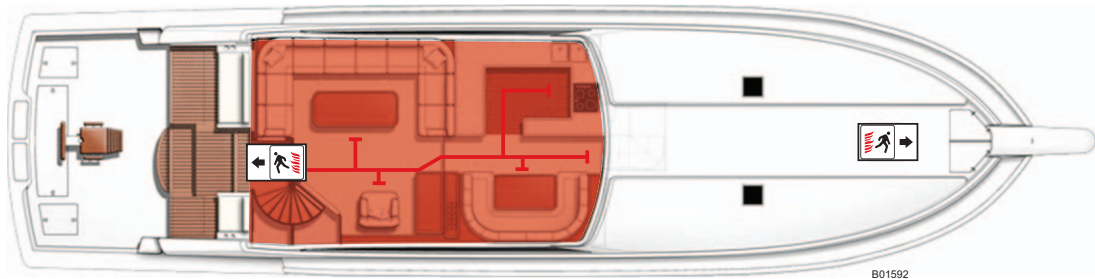
### 12.4.2 Salon, dinette and galley area

The salon, dinette and galley area shows a single access and exit (escape route).  
From salon, dinette and galley area, use the exit path towards the cockpit (**2nd Path**).

1st Path



2nd Path



### 12.4.3 Master, guests' & VIP staterooms area

The plans hereunder show the escape routes and the paths to be used in case of need to escape from Master, guests and staterooms area.

Use to this purpose, the stair leading to the salon, dinette and galley (**3rd Path**), or take shelter through the fore skylight (**4th Path**).

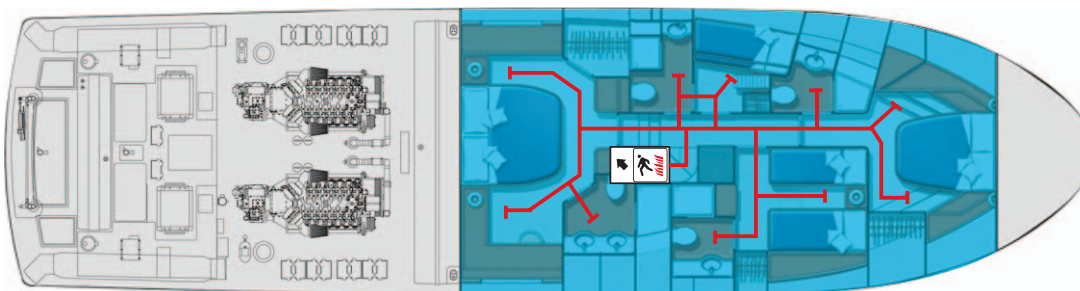


**DANGER**

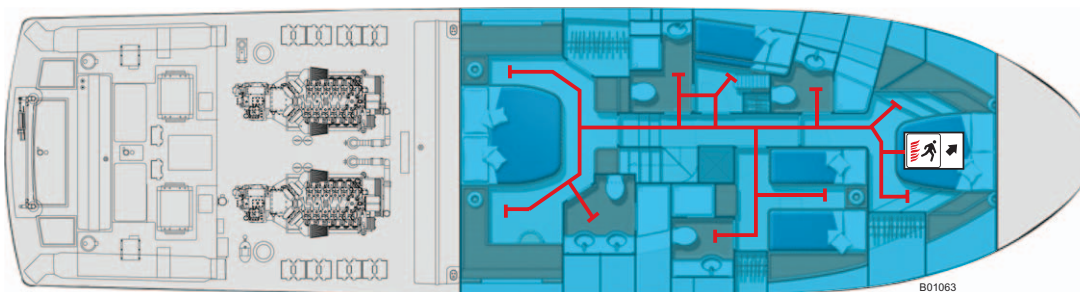
*The Master, guests' & VIP staterooms area shows more than one single escape route. You have therefore, according to the nature and position of the danger or fire source, to choose very carefully the most safe and suitable escape route.*

*During navigation it is compulsory to unlock the safety closure of the fore skylight, so as to grant a safe and quick escape.*

**3rd Path**



**4th Path**



## 12.5 FIRE PREVENTION

The owner/operator/captain of the yacht must be knowledgeable and competent in fire prevention measures and fire fighting techniques.

Your yacht must be equipped with the fire extinguishing equipment required by the law applicable in the waters where the yacht is operated. This includes, but may not be limited to, having an adequate number of portable fire extinguishers.

An automatic engine room fire-suppression system should also be installed and ready for activation.

The yacht owner and the captain are directly responsible for:

- having the fire extinguishers and firefighting systems inspected and serviced as required by the manufacturer and replaced, when necessary, with equivalent or superior equipment, as provided for by the applicable laws and regulations;
- informing all persons onboard about the location and use of fire extinguishers, firefighting systems and emergency exits and escape routes;
- ensuring that fire extinguishers are available in passenger accommodation spaces and that all persons onboard are trained in their use;
- inspecting the bilges and storage areas frequently and ensuring that they are clean and free of any oily residues and that there are no combustible materials (e.g. oily rags and waste materials) anywhere aboard the yacht.

Never allow crew or persons onboard to:

- obstruct passageways and emergency exits
- obstruct the access to safety devices, such as fuel valves, electrical switches, etc.
- obstruct access to fire extinguishers stowed inside cabinets
- leave the yacht unattended when stoves or heat generating equipment are energized
- use open flames
- modify electrical or fuel supply systems, without consulting BERTRAM beforehand;
- smoke near flammable materials or when handling them
- stow highly flammable materials or liquids such as solid or liquid fuel, solvents, etc., near heat sources like engines, cooking appliances, etc.
- stow any flammable material in the engine room;
- do not allow fuel leaks to accumulate in the bilge.



### WARNING

*Fire prevention is a key to safety onboard of your yacht. Fire onboard a yacht is a life-threatening hazard. To avoid serious personal injury or death and property damage, follow all fire prevention and control measures carefully.*



### CAUTION

*Do not use water for extinguishing electric or electronic equipment fires.*



## 12.6 FIRE EMERGENCY

In case of fire, the captain of the yacht should immediately:

- stop the yacht and shut down all engines, including the generators;
  - switch OFF all battery power;
  - locate the fire and activate all available fire extinguishing equipment following standard fire fighting techniques;
  - close the air intakes and the ventilators in the engineroom;
  - avoid breathing smoke.
- 
- Have everyone aboard don a life jacket and move quickly and safely away from the fire.
  - Assign one person to be in charge of your abandon ship bag, which should include a fully charged hand-held VHF radio, emergency flares, dye markers, bottled water, and anything else needed to survive at sea.
  - Contact the Coast Guard on VHF channel 16 (156.800 MHz) or SSB radio frequency 2182 kHz. Say, “MAYDAY, MAYDAY, MAYDAY!”. Describe the situation. Describe the vessel. Give your location and the number of people aboard.
  - If you have an emergency life raft, prepare it for deployment.
  - If you have a tender, launch it immediately, before you lose electrical power.
  - Unless other dangers make maneuvering power necessary, immediately shutdown both engines, if the automatic system has not already done so.
  - Shut down all electrical power except for the bilge pumps, navigation lights, and VHF or SSB radios.
  - Extinguish all open flames.
  - Do not open the engineroom access hatches for at least 15 minutes.

- Verify that the fire is totally extinguished by carefully feeling around the hatches and bulkhead to ensure that these surfaces are cool before opening any hatches.
- Stand by with portable hand-held extinguishers, in case the fire spreads past the engineroom or re-ignites.

If the fire is in the engineroom, the automatic firefighting system may have shut down the engines and discharged the firefighting chemical. Read the section on **Engineroom Fixed Firefighting System** that follows, to learn how this system operates in the event of an engineroom fire.

If the fire involved the engines or engine compartment, care should be taken to determine the cause of the fire before restarting the engine(s).

Study the FIRE PREVENTION and FIREFIGHTING SYSTEMS sections in this chapter.



### WARNING

*Fire fighting equipment and controls must be accessible at all times. Hindering the access to fire fighting equipment and controls could result in serious injury or death and property damage.*



### CAUTION

*Do not open engineroom access hatch, until the fire is completely extinguished.*



### 12.6.1 Leaving the yacht

One situation for which you must be prepared is an uncontrollable fire or other emergency at sea, requiring all hands leave the vessel. As an important part of your fire preparedness plan, the operator, along with the crew and regular guests, should develop and practice an abandon ship drill.

At a minimum, this plan should include:

- Location of the life jackets and how to wear them.
- Location and operation of any other emergency flotation equipment, such as a life raft or throwable devices.
- Speedy operation of the forward emergency egress deck hatch.
- How to summon help quickly by use of the hailing/emergency channels for the onboard radios.
- When and how flares or daylight visual distress signals are used.
- Use of dye markers.
- Use of an Emergency Position Indication Radio Beacon (EPIRB).
- Location of an abandon ship bag and the proper use of each item contained in the bag (The abandon ship bag or container must be one that will float if it is accidentally dropped overboard or must be carried while swimming).

**BURN HAZARD:** Swim against the current or wind when you leave the yacht. The fuel leaks will float with the current and may ignite. When out of danger, verify the presence of all those who were onboard, and help those in need.

- Use the distress signal.
- Keep all together to make the rescue easier.

### 12.7 FIRE EXTINGUISHING

#### 12.7.1 Disconnect the electrical power

In the event of a fire on board, it is recommended that all energized sources of electrical power be disconnected by switching OFF all master switches.



#### **WARNING**

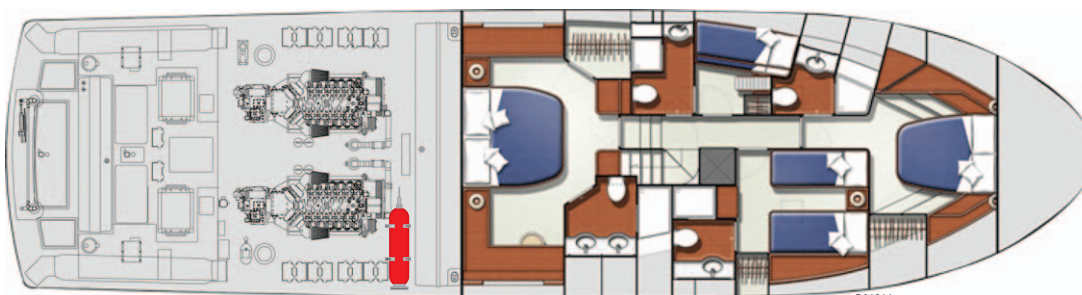
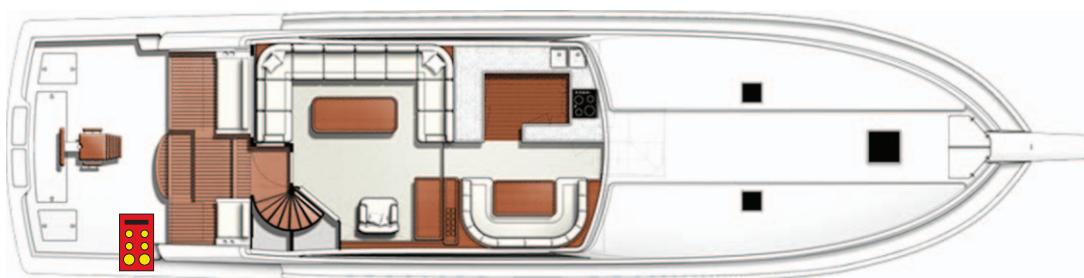
##### **NEVER**

- *obstruct passageways and emergency exits.*
- *obstruct the access to safety devices, such as fuel valves, electrical switches, etc.*
- *obstruct the access to fire extinguishers stowed inside cabinets.*
- *to leave the yacht unattended when burners or heat generating equipment are on.*
- *to use or allow open flames.*
- *modify electrical or fuel supply systems, without consulting BERTRAM beforehand.*
- *smoke near flammable materials or when handling them.*
- *stow highly flammable materials, such as fuel, solvents, etc., near heat sources, like engines, galley appliances, etc.*
- *stow any flammable material in the engineroom. Non-combustible materials may be stowed in the engineroom only if properly protected, isolated and fixed, so they cannot be exposed to engine rotating parts or obstruct access to the engineroom.*


*Failure to observe these practices can result in illness, serious injury or death.*


## 12.8 FIREFIGHTING SYSTEMS

### 12.8.1 Firefighting system displacement



B01614

 Fixed firefighting system emergency control in the engine room

 FM200 fixed fire extinguisher

### 12.8.2 Portable fire extinguishers

#### **NOTICE**

*The person in charge of the yacht must make sure that all persons onboard know the locations of and how to properly operate the portable, hand-held fire extinguishers.*

- Check the extinguisher charge status before use.
- Make sure that the discharge nozzle is not directed towards yourself or anybody else in the vicinity.
- Be cautious when using the extinguisher to fight fire involving electrical panels or electrical equipment.
- Direct the discharge nozzle towards base of the fire and open the discharge valve.
- Try to extinguish the flames and cool the component.
- After using the extinguisher to fight fire in closed spaces, ventilate the space fully before entering.

#### **Portable fire extinguisher checks and tests**

Check the portable extinguisher charge status at least once a month and, in any case, prior to navigation. The pressure gauge needle should be within the green sector of the unit. Service portable extinguishers at an authorized facility and in accordance with the manufacturer's recommendations and applicable regulations.

For further information refer to the extinguisher manual or address to the manufacturer.

### 12.8.3 Maintenance of portable fire extinguishers

At least every six months, a full maintenance check should be made by a qualified fire extinguisher service facility in accordance with the maintenance instructions on the nameplate of the extinguisher. The service technician should attach a tag to each extinguisher showing the date of the maintenance check.

After any use, portable fire extinguishers should be recharged by a qualified fire extinguisher service facility or replaced with a unit of comparable size, rating and extinguishing agent.

All extinguishers should be examined at least monthly to ensure that:

- they are located in their designated places.
- they have not suffered corrosion or mechanical damage.
- they are fully charged. Those extinguishers having pressure gauges or pressure indicators should show that pressure is within the prescribed limits. Those without pressure gauges or indicators and Halon and CO2 portable fire extinguishers should be weighed.
- the tamper seal should be inspected to ascertain that the extinguisher has not been operated.
- the nozzle orifice should be unclogged and the hose in good condition.

For fixed systems, the connections of the distribution piping are secure and the discharge nozzle(s) is (are) unobstructed.

- the fixed system has not been discharged.

#### NOTICE

*Maintain all firefighting equipment and controls according to the Manufacturer's instructions. Have the firefighting equipment serviced at regular intervals by a qualified technician.*

- Verify the extinguisher charge at least once a month and anyway before navigation.
- Verify the outer condition at least once a month and anyway before navigation.
- Verify fastening at least every six months.

#### NOTICE

*For more directions about the use of the individual systems and equipment, consult the manuals provided by the individual equipment manufacturers.*

### 12.8.4 Engine Room Fixed Fire Extinguishing System

The engineroom is equipped with an independent firefighting system that can be activated either automatically or manually and uses FM-200 as extinguishing agent. The cylinder is fitted on the forward bulkhead of the engineroom starboard.

The discharge is controlled by an automatic system, consisting of a glass flask filled with liquid; when the temperature increases, the liquid expands, breaks the flask and activates the extinguisher. The flask is installed on the same cylinder. The fixed fire extinguisher operates automatically when the engineroom temperature exceeds 175 °F (79 °C). The delaying cylinder allows some time to evacuate the engineroom before discharging the firefighting agent.

The extinguisher can also be activated manually, the discharge is controlled by the tie rod placed in the aft starboard cockpit inside of a suitable peak closed with a hatch.

In case of fire, a power unit stops automatically the engines, the generators and the electric ventilators. In this way the extinguishing agent is not sucked by the engines, causing a loss of performance to the firefighting system.

In case of fire in engineroom:

- shut down the engines and generators, if they are operating, using the stop buttons on the helm station console;
- switch OFF the battery breaker switches and all AC input circuit breaker switches;
- remove the pin from the firefighting tie rod located in the aft starboard cockpit by sliding it out and pull the tie rod to discharge the extinguisher. The extinguisher can be automatically discharged, but pull the handle anyway, to be on the safe side.

In the helm station is placed the control panel for the firefighting system. The red indicator light will illuminate on the helm station panel or on main electric panel and the buzzer sounds, indicating an overheat condition in the engineroom or generator room.

Acknowledge the condition by briefly pressing the squelch button, located in the helm station or on the main electric panel. The alarm horn will stop sounding. The light will remain illuminated until the heat detectors reset themselves.

The system can be tested at any time by pressing the relevant test button. When the button is pressed, the light will illuminate, and the alarm horn will sound.

Releasing the button will cause the light to go out, and the horn will stop sounding. An open circuit in the heat detection system wiring will also cause the monitor to respond as if there is an overheat condition.



#### **WARNING**

*The fire monitor system monitors your vessel for fire (overheat) in the engineroom only. The fire system monitor is separate from the onboard fixed fire extinguishing system.*

*The fire system monitor will not detect fire outside of the engineroom. The combination fire and bilge flood monitor is tested and silenced using the same switches and controlled by the same power fuses. It can be disabled completely by removing the fuse in the D.C. main supply panel located in the engineroom.*

**WARNING**

*Toxic by-products are produced when the fire-fighting agent (FM-200) extinguishes the fire. Avoid breathing the fumes.*

*Inhalation of FM-200 (chlorotetrafluoroethane) in high concentrations may cause death without warning. Read the manual provided with the fire extinguishing system for complete information.*

*Most fire-fighting agents will stop engines by oxygen depletion. Agent FM-200 may not stop your engines or generator. If the engines are not stopped quickly, the fire-fighting agent concentration may be rapidly reduced and eliminated as an effective fire-fighting agent.*

*In order to give FM-200 a chance to extinguish a fire, the concentration must remain as high as possible. Do not open the engineroom access hatch.*

*The fixed fire extinguisher will fight fires only in the engineroom. Fires outside the engineroom should be fought with the portable hand-held extinguishers.*

1. **Green light**  
Indicates that the extinguisher is charged.
2. **Red light**  
Indicates that the extinguisher is discharged.
3. **Buzzer**  
Indicates that the system is operating and that the extinguisher is discharging gas.
4. **VERRIDE/NORMAL switch**
  - When the switch is placed to NORMAL position, the control unit actuates and stops engines, generators and electric ventilators, in case of extinguisher discharge.
  - Set on OVERRIDE cuts-out the power unit of the firefighting system.

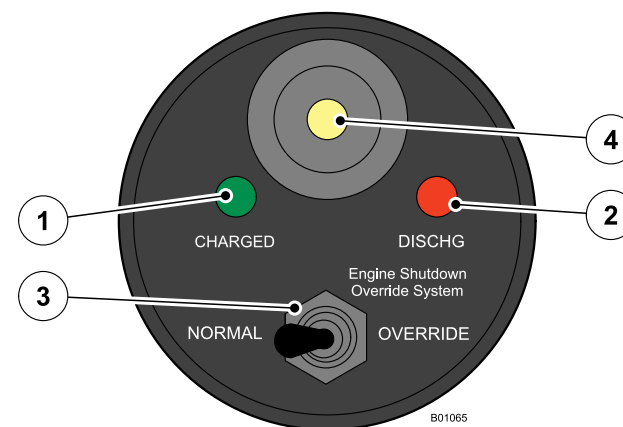
### NOTICE

*The switch must always be set to NORMAL. Use OVERRIDE only in case of collision risk because of navigation in confined waters and to restart the engines after system discharge.*



### WARNING

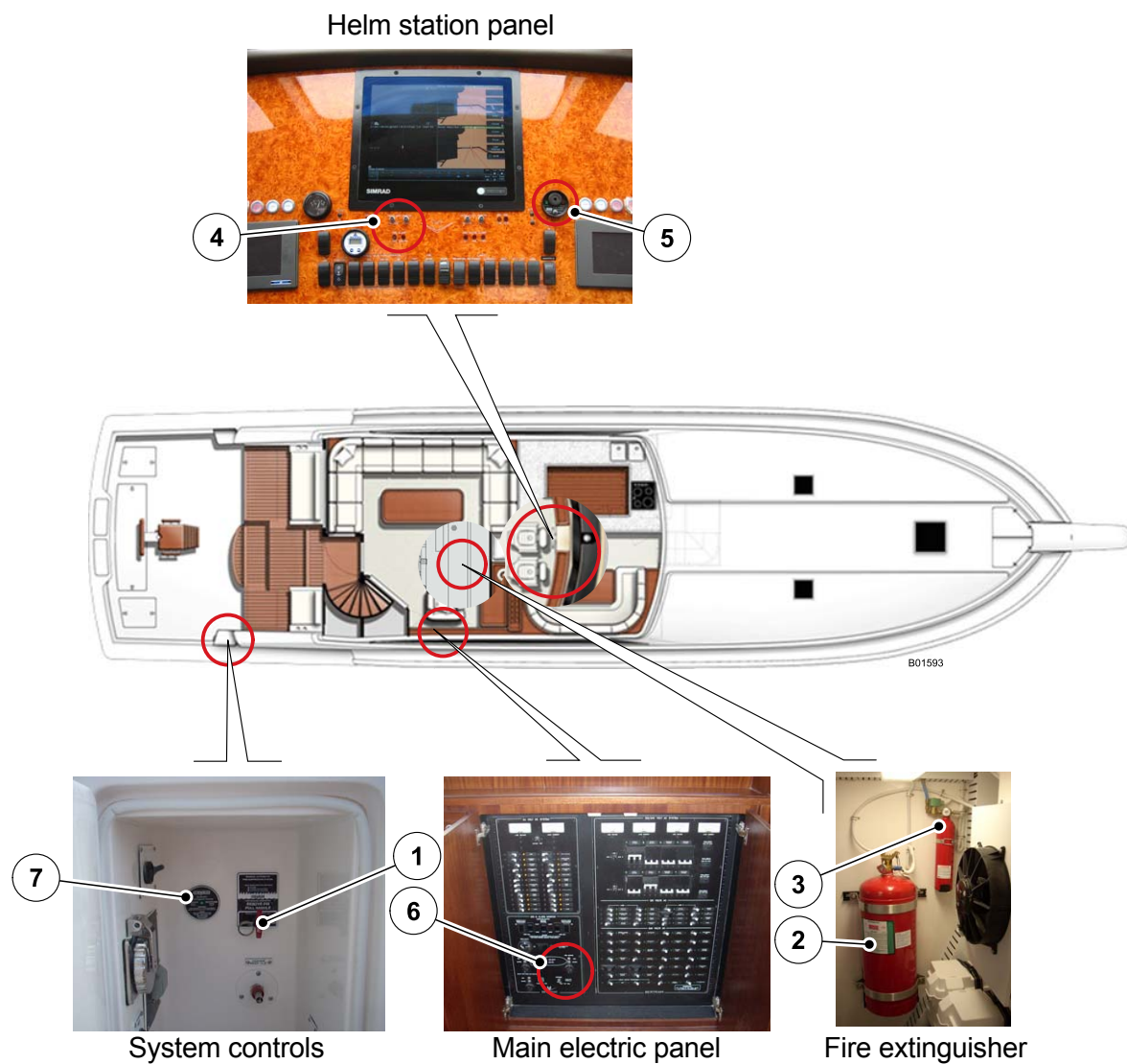
*OVERRIDE switch has to be used only in case of real emergency.*





# Plan of fixed firefighting system

1. Extinguisher tie rod (FIRE)
2. FM200 cylinder
3. Delaying cylinder
4. Firefighting panel on the enclosed bridge
5. Firefighting system control panel
6. Firefighting panel on main electric panel
7. Firefighting system LED



**WARNING**

*Before sailing, open the lock to have the peak and the fire-fighting panel accessible and check that the safety pin of cylinders has been removed.*

**WARNING**

*Everyone aboard must immediately don life jackets (PFDs), move topside, proceed quickly and safely to a location furthest from the fire, and remain there as a group. This should be done before checking the condition of the vessel. Gather all portable hand-held fire extinguishers in the cockpit. If there is an engineroom fire, do not wait for the system to discharge automatically. Discharge the system manually from the cockpit, by removing the safety pin and by pulling the discharge tie rod.*

**WARNING**

*Keep the controls of the firefighting system efficient, by servicing them and by checking their operation at regular intervals (according to rules in force). Verify the operation at least once every three months and grease cables and connections at least once a year.*

**DANGER**

*The automatic firefighting system, that covers exclusively an area of the engineroom, could under particular fire conditions, fail to activate; for this reason THE SAFETY TIE-ROD MUST COMPULSORY BE ACTIVATED.*

**NOTICE**

*Depending on the rate of rise in temperature, the time between the fire monitor system alarm and the fixed system discharge may be too short to be acted upon as separate events. Automatic discharge of the fire system cannot be defeated. It will always discharge at its designed discharge temperature.*

**DANGER**

*Before activating the firefighting system, make sure no one is inside. Before re-entering the engineroom, make sure that the fire is totally extinguished, then ventilate the room by opening the doors, and remove any powder deposits carefully.*

After The Fire Has Been Extinguished:

- Squelch the fire monitoring system by briefly pressing the squelch button on the enclosed bridge or on the main electric panel of the salon. The light will remain illuminated until the heat detectors reset themselves.
- Use the fire system manual override switch to allow switching on the blowers, generators, and main engines.
- Ventilate the engineroom to remove any unburned FM-200.
- Have the proper type of USCG hand-held fire extinguishers ready before you cautiously open the engineroom access hatches.
- Carefully examine the engineroom for damage and determine the cause of the fire.
- Make the necessary emergency repairs, making certain that none of the seawater cooling intake hoses for the main engines are burned through.
- If your vessel was built to RINA (Registro Italiano Navale) standards, or is over 67 feet long, you must manually reopen the air intake shutters located on the intake plenums outboard of each engine.
- Start your engines.
- Turn on only those electrical circuits necessary to maneuver your vessel safely.
- If you have alerted the Coast Guard, inform them that the fire has been extinguished and you are able to get underway under your own power. Contact them again when you are safely secured at your destination.
- Continue to the nearest port.
- Have the fixed fire extinguisher system and any hand-held fire extinguishers serviced as soon as possible.



**CAUTION**

*Do not open engineroom access door, until the fire is completely extinguished.*



**WARNING**

*Do not open the engineroom access hatch, or try to enter the engineroom, for at least 15 minutes after the fire agent has discharged. This would allow oxygen to enter the engineroom before hot metals and/or fuels cool, which might cause re-ignition and flashback.*



**WARNING**

*The combustion by-products of FM-200 are toxic. Wait for the natural ventilation to completely exchange the engineroom air before entering.*



**WARNING**

*Fire extinguishing chemicals and the residues of a system discharge are toxic. To avoid diseases, injuries or death caused by the breathing of the fumes, make sure that nobody stays in the engineroom during the system discharge.*



### **WARNING**

*Fire re-flash is possible following the discharge of an automatic firefighting system. Fire re-flash is a hazard to persons onboard the yacht. Even the opening of the engineroom access hatch can cause through oxygen a new spreading out of fire. If fire spreads out again, to avoid heavy injuries or even death, do not open the hatch or engineroom access door until fire has been completely extinguished.*



### **CAUTION**

*Before entering the engineroom after a fire, be certain that the fire is totally extinguished. Prior to entering, ventilate the room by opening the hatches.*

### Maintenance of fixed firefighting systems

- Check the fixed fire extinguisher charge status at least once a month, and in any case, prior to navigation (pressure gauge needle within the green sector of the same).
- A full maintenance check should be made by a qualified service facility in accordance with the Manufacturer's maintenance instructions. The technician assigned to the service should apply a tag to the system indicating the date of the control.
- Check the discharge indicator before use, to make sure that the fixed firefighting system has not been discharged.
- Fixed firefighting systems should be examined at least monthly.
  - a. for corrosion.
  - b. to ensure that the access to the controls is not obstructed.
  - c. to ensure that cylinders are securely in place.
  - d. to ensure that pull cables are not broken, loose, damaged or kinked.
  - e. to ensure that all cable connectors are securely fastened.
  - f. to ensure that the connectors of the distribution lines are securely tightened, and that the discharge nozzles are not obstructed.
  - g. to make sure that the system has not discharged.



#### WARNING

*The accidental release of the fire-extinguishing chemicals during handling or installation may cause serious injuries. Fire extinguishing chemicals and the residues of a system discharge are toxic. Protect eyes and skin during installation or maintenance of the firefighting systems.*



#### WARNING

*Never attempt to disable any part of your fixed fire extinguisher system. This system contains liquefied gas at high pressure and serious injury or death could result.*



#### DANGER

*The fire-extinguishing cylinder has a safety pin. Check if above mentioned pin has effectively been removed. If this is not the case, should fire spread out, the cylinder would be jammed and would not discharge, with consequent possibility of heavy damages to your yacht up to its sinking.*



#### DANGER

*The safety pin inserted prevents the activation of the manual discharge (by means of tie-rod).*

**WARNING**

*The fire extinguisher CONTAINS CONCENTRATED AND NOXIOUS CHEMICAL AGENTS AND OTHER PRODUCTS SUITABLE FOR FIGHTING FIRE. Avoid the inhalation of vapors or the prolonged exposure to them.*

*THE ACCIDENTAL DISCHARGE DURING HANDLING OR INSTALLATION MAY CAUSE SERIOUS WOUNDS. Don't let it drop. Keep away from extreme heat.*

**WARNING**

*Read carefully the instruction manual.*

*Before installation, removal, activation or service on this device.*

**WARNING**

*During the service, take utmost care not to break the flask unintentionally, to prevent accidental cylinder discharges.*

**WARNING**

*When checking the system pressure, the system or the environment temperature must be determined. The green area of the pressure gauge indicates the system pressure at 70 °F (21.1 °C).*

*To determine the pressure state of the system, adjust the temperature.*

## 12.9 RECOMMENDED ITEMS TO HAVE ONBOARD

In addition to the standard safety and marine equipment required by the existing regulations for pleasure boats, we recommend you also have on board a number of items that can be valuable when your yacht is in use. Some of these items will not be used frequently, but may be essential in emergencies.

- 4 - 3/4 in, 65 ft ropes
- 1 - 1 in, 100 ft rope
- 1 - 66.14 lb spare anchor
- 2 plastic buckets
- 2 synthetic sponges
- 2 empty 5 gals fuel cans
- 2 funnels of different size, complete with 20 in rubber tubes
- 5 gals of engine oil
- 2 gals of reverse gear oil
- 1 gal of hydraulic oil for the rudders
- 1 gal of hydraulic oil for the trim tabs
- 1 gal of anti-freeze coolant liquid
- 35 oz of oil for the bow thruster
- 1 gal of oil for the electro-hydraulic system
- 1 navigation light bulb set
- 10 spare halogen bulbs for spotlights
- 2 spare bulbs for engineroom lights
- insulating tape
- stainless steel hose clamps of various size
- 1 underwater flash light
- 2 pairs of heavy duty rubber gloves
- 5 lbs of white rags
- 1 CRC spray can
- 1 Vaseline jar
- 1 engine spare parts kit
- 1 watermaker spare parts kit
- accumulator for smoke detection unit
- fuses for secondary electric panel
- hearing-protection
- tool kit

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YACHT LIFTING & ONSHORE  
HANDING

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***YACHT LIFTING & ONSHORE HANDING***

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## 13.1 YACHT LIFTING AND LAUNCHING

**WARNING**

*Do not put the lifting straps in the areas shaded on the drawing.*

**NOTICE**

*Yacht lifting and launching operations must be performed by experienced personnel at qualified yards, under their responsibility.*

The marine hoist (travel lift) capacity must be greater than the yacht's weight. Lifting equipment must be in good condition; more specifically, the lifting straps must not be worn out, and should be covered with preserving material that will protect the yacht's hull gel-coat and antifouling paint when the yacht is lifted.

**NOTICE**

*Do not put the lifting straps in way of the intakes, sea exhausts or other protrusions.*

Because a great difference may exist between different load conditions (e.g., yacht empty and yacht fully-loaded) the lifting straps must be arranged at the time of lifting according to the yacht's load conditions.

The arrangement of the lifting straps must be carefully evaluated each time, in order to prevent any damage to the yacht. Entrust this determination to qualified, experienced professional personnel.

**NOTICE**

*Lifting sling geometry depends on the type of the lifting equipment, and must be designed for each individual lifting situation.*

**NOTICE**

*Prior to lifting and launching, check that there are no unnecessary materials and equipment aboard the yacht. Make sure that all gear, furniture, and loose items are properly stowed and secure. No person should be aboard the yacht when it is lifted or launched.*



**WARNING**

*During lifting, launching and blocking activities, no person should be underneath or near the yacht when it is being moved.*

**WARNING**

*The use of lifting equipment such as cranes and hoists is a hazardous activity. All lifting equipment, its operation and its maintenance should comply with local and/or national requirements covering its use. Ensure that the equipment is suited to the intended use. Failure to observe these practices can result in illness, serious injury or death.*

**WARNING**

*Do not allow any personnel to walk under or work under items or equipment supported by hoisting equipment. Hoisted items or equipment can fall if not safely supported leading to serious personal injury or death.*

### 13.1.1 Storing the yacht ashore

When ashore, the yacht must be placed on a cradle with five supports of width and size adequate to distribute the yacht weight evenly. Consult BERTRAM for details.

The hull inclination must be as “natural” as possible, e.g., the yacht’s waterline (not the keel) should be parallel to the ground, so that the level of liquids aboard remains normal and rainwater will drain naturally. You can obtain a copy of the American Boat & Yacht Council’s technical information report titled TY-28, Boat Lifting And Storage, from ABYC at [www.abycinc.org](http://www.abycinc.org) or by calling (in the USA) 1-410-956-1050.

#### **NOTICE**

*BERTRAM declines any responsibility for the location of the lifting straps, the lowering or lifting of the yacht, and the integrity of the support points placed by other yacht yards.*

#### **NOTICE**

*BERTRAM declines any responsibility for damages to things or persons caused by the wrong performance of hereunder listed operations.*

## 13.2 TOWING

Towing should be done only by experienced professionals with the proper equipment. Proper towing of large yachts requires specialized knowledge and equipment. If you need a tow when the water is rough, calling professional assistance is advised because of the dangers to the yacht, the towboat, and personnel, which are created by rough seas. If the yacht is to be towed, fasten the towing lines as shown in the figure, in order to distribute the load evenly.

The towrope length depends upon the sea conditions, and must be adjusted in such a way to control the pulling forces without damaging the yacht's deck fittings.

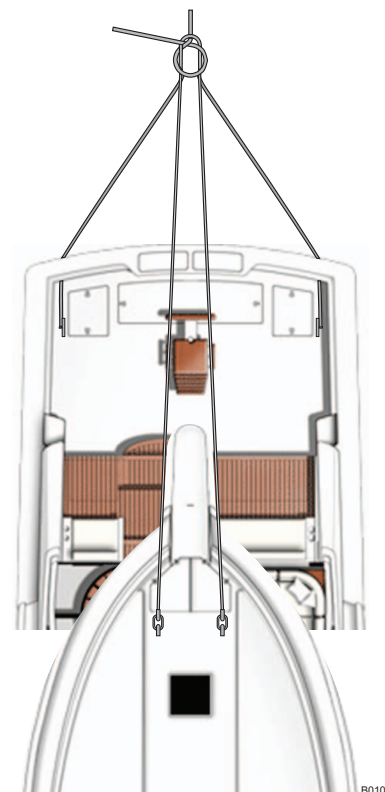


### WARNING

*Do not stand behind or near the ropes during towing operations. Towropes are under a great strain, and if anything breaks, the rope will spring back “whiplash”, possibly striking people behind or near the rope. Serious injury or death will result if anyone is struck by a rope that breaks under strain.*

### NOTICE

*If you need to tow another boat, do this only in calm seas and calm wind conditions. Never attempt to tow a vessel that weighs more than 50% of your yacht's weight (displacement). In case of emergency, if towing is not possible, give assistance by taking people from the other vessel on board your yacht. Take on board only as many persons as your yacht can carry safely, and proceed to the nearest harbor. Inform the Coast Guard immediately.*





### **WARNING**

*Do not secure tow lines to deck cleats, which are for mooring only. Cleats are not fastened to your vessel for towing.*

*Take added care if towing, or being towed, with nylon lines. These lines stretch, and if a fitting fails or the line parts, the end can snap back with sufficient force to cause injury or death.*

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## 14.1 GENERAL MAINTENANCE SAFETY STANDARDS

### Safety Standards for Yacht Maintenance

Do not start any work before being assured that both the operator and the others do not run any risk.

Lack of proper knowledge of the nature, scope and extent of maintenance operations can pose personal injury hazards to personnel involved in the operations. If you are not certain about any aspect of the work to be done, always ask someone with knowledge of the work to clarify the situation. Do not draw any conclusion.

If you are not certain about your knowledge and skills for a specific maintenance operation, entrust it to someone who has the knowledge.

Before carrying out any maintenance or repair operation, the work area must be clear of all unauthorized persons. If others are working in the same area, ensure that there is a clear understanding of the communication signals that will be used to convey messages for action. Manual signals are often used and must be clearly understood when working in high noise areas where verbal instructions may be inadequate.

Operate always with caution, be alert and understand the applicable safety requirements related to the task you are doing.

Apart from the information here, specific warnings appear throughout the entire manual. This section provides general, limited guidelines for warnings and cautions regarding safe maintenance procedures.



#### WARNING

*This section includes a certain number of information for component service, without running any danger. Do not forget that each time you activate the controls you are in fact a driver.*

*You must read and understand the information given before activating the controls.*



#### WARNING

*The use of **faulty lifting devices** can be the cause of accidents; check therefore their efficiency. Ensure the compliance of the hoists with the local standards and their suitability with the job they have to carry out. Besides, check their load carrying capacity according to the work to carry out.*



#### WARNING

*The use of unsuitable **clothing** can cause accidents; do not wear fluttering clothes which could be easily caught by the yacht movements. Wear protective clothes suitable with the kind of work to carry out (helmets, safety shoes and protective goggles, overalls). Button up the cuffs, do not use ties or scarves and do not leave your long hair loose.*



**WARNING**

*During the restoring operations of metallic or non metallic components, wear **safety goggles**. Move away from the area or protect possible flammable materials, which could catch fire from sparks.*



**WARNING**

*It is extremely dangerous to operate the yacht controls under the **influence of alcohol or drugs**. Refrain from taking **alcohol or drugs** before and during the work. Do not take medicines causing numbness.*



**WARNING**

*Be highly alert and **use greatest caution** for the whole time of the work. Pay great attention to avoid possible dangers.*



**WARNING**

*The **lifted equipment** may fall and hurt you. Do not walk or work under lifted equipments not safely supported and secured.*



**DANGER**

*The moving parts of the engine are dangerous; do not open the housings if the yacht is in use.*



**WARNING**

***Yacht entrance.** Always face the yacht to enter or leave it and use the handles and the steps. Make sure that steps, handles and rubber-soled shoes are clean and dry. Better to take them off. Do not jump down the yacht; do not use the yacht controls as handholds; use the rails.*



**WARNING**

*The **control heads** outside the helm station, if erroneously activated, can cause heavy accidents even death: the controls must be operated exclusively in the correct helm station.*



**WARNING**

***Metallic chips** hurled during the machining of metallic parts can cause injuries: always wear protective goggles and use a mallet or punch in soft material.*

**WARNING**

*Insufficient information may cause accidents. If two or more people are working simultaneously on the same area, be sure that each one of them is aware of the operation carried out by the others. Before running the engine, push away the other people from the risky areas (rotary blades and engine belt, tools and movements, engine inner and rear part). The lack of following these cautions can cause heavy accidents, even death.*

**DANGER**

*Do not smoke while refueling or while working on the engine. Shut down the engine before refueling. The failure to observe these precautions can cause fires and injuries.*

**WARNING**

*A **frozen** battery may explode if used or charged; do not start a yacht with a frozen battery. To avoid the battery freezing keep it always completely charged.*

**DANGER**

*The **battery** releases explosive gas: do not approach sparkles or flames nor smoke near it. If the battery is used or charged in a closed area, check for good ventilation. Do not check the battery charge by short-circuiting the terminals with metal tools: use a densimeter or a voltmeter.*

**WARNING**

*Do not remove the tank **filling plug** when the engine is running, because the hydraulic installation under pressure may cause injuries. Before releasing pressure, stop the engine.*

**WARNING**

*The spilling of hydraulic oil **under pressure** may cause injuries: before disconnecting or connecting the hoses, stop the engine and operate the controls to release the residual pressure. Prevent the engine start with disconnected hoses.*



**DANGER**

**Cooling fluid hot.** When the engine temperature is high, the cooling system is under pressure and the hot fluid can spill over when you remove the radiator plug. Therefore, before removing it, wait until the system has cooled down, then turn the plug up to the first notch and release the system's pressure.



**WARNING**

**Hydraulic oil** sprayed at high pressure penetrates the skin: do not check oil leaks with your fingers, nor approach your face to them. Use a cardboard blank to verify the possible presence of hydraulic oil leaks. If oil penetrates the skin, ask immediately for a doctor for the relevant treatment.



**WARNING**

If damaged, the **hydraulic hoses** may cause death, carry out appropriate periodical checks to verify the presence of:

- damaged fittings;
- wear of outer coatings as consequence of rubbing;
- swelling of outer coatings;
- bent or squashed pipes;
- fittings not properly located.



**WARNING**

Clean the **cylinders of the trim tabs** periodically, to remove possible dirt drifts, which can jeopardize their efficiency. If possible, to reduce the corrosion risk, pull back the rods each time you leave or you harbor the yacht.



**WARNING**

The **oil** is poisonous: do not swallow it. The engine oil contains dangerous polluting agents which can generate skin tumors. Handle oil as less as possible, protect your skin with creams and gloves. Wash accurately with warm water and soap the skin eventually polluted with oil: do not use gasoline, diesel or petroleum and anyway seek expert medical help.



**WARNING**

The **cleaning** of the metallic parts with unsuitable solvents, may cause corrosion; use detergents and solvents of the prescribed type only.

**WARNING**

*Seals and O-rings fitted in the wrong way, damaged or worn out, may cause leaks or accidents; replace them immediately, except if otherwise prescribed. Never use trichloroethylene or solvent near O-rings and seals.*

**WARNING**

*When working in the engineroom, switch bilge automatic pumps off, to prevent that fuel, lubricants and other liquid spilling cause's sea pollution.*

**CAUTION**

*BERTRAM declines any responsibility concerning installation and operation of electric, electronic, mechanical equipment carried out by third parties in a manner that is not authorized by the Manufacturer's Yard.*

*BERTRAM declines all responsibility concerning tampering carried out by third parties on equipment installed in the Yard. Such non authorized tampering, besides causing the immediate lose of warranty rights, can cause damages to the yacht and to people on board.*

*BERTRAM declines all responsibility concerning periodical maintenance activities scheduled by the Yard or by Manufacturers, but not carried out, of equipment/components, for which it is necessary to refer to their own Direction Books.*

## 14.2 SACRIFICIAL ANODES

The submerged, external metal parts of the yacht and internal parts of the engines and generators are protected from corrosion by means of sacrificial anodes. The anodes waste away to protect the metals on which they are installed. Outside the hull there is a sacrificial anode fixed to the stern.

If the bow thruster is installed also this one must carry a sacrificial anode.

These anodes are intended to waste away sacrificially as a protection for metals that are in contact with seawater. If the anodes waste away completely, other metal components may undergo corrosion.

All anodes should be inspected regularly to monitor their wasting rate. Any anode that is fifty percent (50%) wasted from its original size should be replaced. The rate of wasting away of sacrificial anodes depends on many factors, e.g., internal electrical faults, external electrical faults and the presence of other corrosion accelerators or galvanic activity near your yacht.

The anodes that protect the internal parts of the engines and generators are located in the internal seawater cooling circuits. Check the engines and generators manuals for the location of these important internal anodes. The internal anodes should be checked at regular intervals, depending upon how many hours the engines or generator is used.

There also may be internal anodes in other equipment that uses seawater as a cooling liquid. Check and replace these anodes according to the maintenance schedule and instructions in the Manufacturer's manuals for the specific equipment.

### NOTICE

*Each time the yacht is dry-shored, check the condition of the propeller, shafts and all underwater metals. Examine the protective anodes, and the fastening system. Replace the anodes, if they have worn off over 50% of their volume.*

### 14.2.1 Periodic Check Of External Anodes

This operation is usually carried out when the yacht is in a dry shore. It may be done in water with help of a diver. If the underwater anodes have not been checked recently and a haul-out is not planned, you should hire a diver to check and replace anodes.

**CAUTION**

*Before cleaning the bottom hull or checking the underwater anodes, while the yacht is underway, disconnect engines and generators so they cannot be started accidentally. Serious injury or death to the diver could result. Remove the ignition keys.*

**NOTICE**

*Failure to replace the anodes can cause the spreading of corrosion on the other metallic parts.*

**NOTICE**

*It is necessary to check the wear (wasting) of the anodes frequently, and to replace them when they are 50% of their original size.*

### 14.2.2 Replacing the external anodes

The sacrificial anodes are fastened to the yacht in several positions on the hull. Before installing a new anode, clean the area under the old anode with a wire brush or fine sandpaper. Remove all of the residuals left by the anode. Install the new anode and put some silicone on each of the screw ends that fasten the anodes. This will make replacement easier when they are worn out.

Do not fasten anodes with glue or other adhesives that may hinder their removal, and will actually prevent the anodes from doing their job. Do not paint the anodes.

There are internal anodes in the engines, generators, and other equipment that use seawater as a cooling liquid. Check and replace these anodes according to the maintenance schedule in the Manufacturer's manuals for the specific equipment.



## 14.3 LONG-TERM LAY-UP (DECOMMISSIONING)

The following section provides a limited, general guide to help you understand the ordinary maintenance that should be carried out when the yacht is decommissioned for any length of time.

Check carefully the instruction manuals of the single devices.

As with all maintenance and service requirements on your yacht, only qualified and/or certified technicians should be employed to carry out these activities.

### 14.3.1 General Long-term Lay-up Guidelines

- Wash the yacht with fresh water.
- Prior to land storage, the yacht's bottom and all underwater gear should be pressure washed to remove marine growth and fouling.
- Inspect the outer hull and all equipment: propellers, anodes, shafts and strut supports, rudders, trim tabs, fan-coils, thru-hull fittings and sea valves and bow thruster.
- Check all lights on deck, the enclosed bridge and the radar arch.
- Clean all staterooms and inspect all storage areas; remove all trash and garbage.
- Remove all flammables, e.g., paints, fuels, cleaning products, rags, etc. Dispose of these materials in a toxic waste facility.
- Check all hatches, seals and closures and lubricate.
- Clean all fan-coils with a vacuum cleaner.
- Check all systems and fastenings on the yacht to avoid damages.

Store the yacht in a sheltered place away from wave action and high wind exposure.

If the yacht is stationed outside, cover it with a waterproof sheet placed in such a way that allows ventilation. Otherwise the formation of mould on the yacht surface could be helped.

### 14.3.2 Engines and generators lay-up

For specific directions for service to be performed prior to an extended period of inactivity. Perform all the engine manufacturer's recommendations for engine lay-up in accordance with the engine service manuals. These activities include, but may not be limited to, servicing oil and air filters, pumps, etc.

- Generally, before an extended yacht lay-up period (including winter storage), the seawater-cooled components of all engines should be flushed with fresh water and the closed-system coolant levels should be checked and filled to specification as indicated. If winterizing, the seawater-cooled systems also should be properly protected with a suitable, non-toxic antifreeze.
- Check the condition of the engines' internal sacrificial anodes. Replace if indicated.
- Clean engineroom and bilge. Ensure that contaminated bilge water is not pumped into the marine environment. Use oil absorbent products to trap oil and petroleum byproducts. Dispose them in an approved manner.
- Spray all electrical, mechanical and hydraulic equipment and fittings and engines with a corrosion-inhibiting formula suitable for use on metals, electrical equipment and non-metal items such as rubber and plastics.
- Perform pre-lay-up maintenance for transmissions (gearboxes) in accordance with the recommendations found in the manufacturer's equipment service manual.

**Batteries**

- Optimally, batteries should be removed from the yacht and stored in a cool, dry area and periodically charged during the lay-up period. Ensure that battery electrolyte levels are topped up and batteries are fully charged. Protect terminals with a corrosion-inhibiting product.
- Maintenance charging should be via the yacht's marine battery charging system. Never use a portable charger to maintain battery charge levels.

Guidelines for performing some of the following maintenance tasks are found elsewhere in this manual, e.g. water system and tank cleaning, as well as in specific equipment manuals.

**Electric hydraulic power units**

Protect components and connections with a corrosion-inhibiting product. Check the oil level and top-up as indicated.

**Hydraulic helm system**

Inspect all connections and lines for leaks. Check operation. Check and top-up oil as indicated.

**Bow thruster (optional)**

Protect the electrical components with a corrosion-inhibiting product. Check the oil level and top-up as indicated.

**Sacrificial Anodes (underwater and internal)**

Inspect for condition and replace if indicated.

**Teak wood deck and trim**

Clean teak decks and trim with a cleaning solution recommended for teak. Avoid harsh cleaning products that can strip the wood of its natural oils.

**Transducers**

Remove the sending unit(s) and replace them with the cap plug provided. This will prevent the sender from becoming fouled with marine growth if the yacht is laid-up afloat. Clean the transducer units according to directions in the equipment manuals.

**Diesel fuel tanks**

Service diesel fuel system filters. Treat fuel with a diesel-fuel biocide to prevent formation of algae growth and other contaminants. Fill tanks before storage to prevent condensation from forming and contaminating fuel with water. Inspect all lines and fittings for leaks; service as indicated.

**Anchor windlass**

Check oil level on the gearbox body, if accessible. Protect the electrical components with a corrosion-inhibiting product suitable for electrical equipment. Lubricate the clutches and wildcat, according to the instructions in the equipment manuals.

**Exterior cushions**

Clean and remove all sunpad and other upholstered cushions and store them in a dry place.

**MAINTENANCE**

*Check seams and buttons at least every six months.  
Wash the cushions at least every month.*

**Aluminum and steel fittings**

Wash all metallic parts with fresh water and protect them with a corrosion-inhibiting product.

### **Fresh water tanks and system**

Sanitize fresh water system lines and tanks by flushing with a disinfecting solution. Flush tank and pump dry. To protect the system from freeze damage, disconnect and drain all lines and pumps, or install non-toxic antifreeze in the system. Switch OFF the pressurization systems of water.

### **Gray water tank**

Sanitize the system by pouring a suitable marine type cleaning/ disinfecting solution into the sink drains, showers and bidets. Flush tank and pump dry. To protect the system from freeze damage, disconnect and drain all lines and pumps, or install non-toxic antifreeze in the system.

### **Black water (sewage) tank**

Empty the tank into a shoreside disposal facility or at sea. Flush system and tank with a suitable cleaner/disinfectant by pumping the solution into the toilets. Flush the system by discharging water in the waste tank. Repeat the process several times to ensure that tank and lines are completely flushed.

To protect the system from freeze damage, disconnect and drain all lines and pumps, or install non-toxic antifreeze in the system.

### **Clothes washer and dishwashers**

Clean interior of machines by running them through a full cycle, including a drying phase for the dishwasher, so as to remove the residuals of washing powder. Leave doors or lids open to enable ventilation. Protect pumps and lines against freezing by draining them.

### **Refrigerators and icemaker**

Remove all foodstuffs/ice, etc. and clean the interiors. Leave doors open to allow ventilation. Clean the exteriors of the units. Disconnect and drain icemaker supply lines.

### **Interior Wood and Soft Goods (carpets, upholstery, curtains, etc.)**

Cover these materials to avoid direct exposure to light and moisture. Close all window (curtains, blinds) to minimize UV damage to interior woodwork, carpets, furnishings, etc. Clean interior wood trim with a suitable wood cleaner.

## 14.4 COMMISSIONING THE YACHT

If the yacht has been winterized, all unused equipment will have to be prepared for service. After commissioning, the activities that follow should be performed.

### 14.4.1 Preparing the yacht for use after a period of inactivity

The following is a general listing of activities to be performed prior to using the yacht after a period of inactivity, including a lay-up period. Other specific recommendations will be found in the individual equipment manufacturer's service manuals.

Refer to the engines and generators manufacturer's service manuals and follow the manufacturer's directions for servicing the engines and generators.

These activities include, but are not limited to the following:

- Check the engines coolant level. Change oil and filters of engines and generator.
- Check all belt tension and the condition of hoses and connections.
- Check that all hoses are securely clamped and that all thru-hull fittings and sea valves serving the engines are open.
- Check the battery voltage.
- Start the propulsion engines.
- Warm up the engines by allowing the engine rpm to advance at intervals of several minutes at each speed before bringing them to full speed.
- Stop the engines. Replace fuel filters. Replace oil filters. Top up engine oil if necessary. See the engine manuals for instructions.
- Start the generator engine. Repeat the same sequence as for the propulsion engines.
- If the yacht has been stored afloat, have the hull, rudders, propellers, shafts and the trim tabs thoroughly cleaned to remove marine growth and fouling.
- Inspect the condition of the antifouling paint on the bottom hull. If necessary, have two layers of suitable antifouling applied by qualified personnel (the yacht will have to be hauled).
- Check propeller and shafts. Inspect for leaks in the shaft seals. Repair as needed;
- Check the condition of underwater anodes; replace if indicated;
- Check the condition and operational status of:
  - all hoses;
  - all bilge pumps, seawater, fresh water, black water and gray water pumps;
  - the helm system connections;
  - trim tab fluid and connections;
  - gangway and swim ladder operation;
  - all controls, system monitoring gauges and meters and instruments used for navigation.

## 14.5 BOTTOM MAINTENANCE

### 14.5.1 Bottom Antifouling Coating

Your yacht's hull bottom was coated with two coats of a high-quality antifouling paint that must be maintained to prevent the formation of marine growth. Uncontrolled marine growth (barnacles, slime, grasses) on the bottom of the yacht and on the propellers and other running gear causes a remarkable reduction in operating efficiency and with time can damage the gel-coat.

Selecting the proper antifouling paint for your yacht is important to maintaining a clean bottom in the waters in which you operate the yacht. There are many antifouling products available, each designed for specific uses. Knowing the performance characteristics of each paint is key to making the right choice of the coating that will best protect your yacht's bottom in your area of operation. If you need assistance to select the right coating for Your yacht, contact the BERTRAM Customer Support.

### 14.5.2 Bottom inspection

Periodic bottom cleaning and inspections should be performed on a regular schedule when the yacht is in a dry shore. The effectiveness of the antifouling paint primarily depends on local conditions in the waters where the yacht operates.

Marine growth building up on the hull can be removed with the help of a qualified and experienced diver.

**A diver can remove marine growth from the hull bottom, rudders, propellers, shafts and trim tabs with a scraper, sponges and/or brushes.**

At the same time, the diver can check the paint, the equipment and fittings. He can determine if the antifouling paint is still effective. If a fresh application is needed to retard marine growth, it will be necessary to arrange for the yacht to be dry-shored.



#### CAUTION

*While carrying out cleaning and checks with the yacht in water: disconnect the engines and generators start.*



#### WARNING

*Bad maintenance condition (barnacles, etc.) may cause cavitation and damage shafts, rudders, propellers, etc.*



#### WARNING

*Small areas of paint may peel off from the propellers even after a short period of operation.*

### 14.5.3 Renewing antifouling protection

Periodically, it will be necessary to apply a fresh coating of antifouling paint to the yacht's bottom. Before doing so, make sure that the new paint to be applied is compatible with the existing coating. Antifouling formulas vary, and a new coating will not adhere well if its formula is incompatible with the layer beneath it.

If the existing coating is smooth, adhering well and is not peeling, you can apply a fresh coat directly over the existing layer. If the existing coating is worn, peeling, flaking, cracking, etc. it will have to be removed before repainting.

If you apply a fresh coating over thick, built-up coats of antifouling, the newly applied paint will not adhere well to the bottom and it will peel away. To prevent this condition, prior to applying fresh antifouling paint, it will be necessary to remove all the previously applied layers and to prepare the yacht's bottom in the same way as it was prepared treated before the first application of an antifouling paint. This will ensure that the antifouling paint will adhere well.

Removing old coatings and applying new coatings is hazardous to your health. Read and follow all warnings on the product labels for the use and disposal of these materials.



#### CAUTION

*Antifouling is poisonous, it should never be burnt, use only authorized elimination procedures and in case of doubts contact the authorities in charge. The sandblasting operations and removal of anti-fouling must be carried out with suitable clothes and protections.*

#### NOTICE

*Certain underwater fittings on the yacht must never be painted. Paint will prevent the proper performance of depth sounder and speedometer sensors and anodic (sacrificial zinc) protection. To prevent compromising the effectiveness of these fittings, do not paint transducers or anodes.*

*Shaft and propellers that have been painted may quickly lose their coatings due to the velocity of water action during their normal function.*

#### NOTICE

*Removing old antifouling by particle blasting may damage the hull bottom gel-coat and/or the anti-blister barrier coating applied by the yacht's builder.*

*To avoid damaging the hull bottom gel-coat and/or other prophylactic coating, follow the paint manufacturer's directions for removing antifouling coatings, e.g., with paint removers, by wet sanding, etc.*



#### CAUTION

*To remove the old antifouling, do not use sandblasting that may damage gel-coat surface and the anti-osmosis applied by the manufacturer. As suggested by the antifouling manufacturer's use paint removers or, as an alternative, wet sanding.*

## 14.6 GENERAL MAINTENANCE

### 14.6.1 Gel-coat cracks

When underway, some structural parts of the yacht are subject to bending, and create tension or compression stresses in fiberglass and on gel-coat.

The differences in the modulus of elasticity of gel-coat and fiberglass can cause small, hairline cracks on the gel-coat surface, in particular in the more heavily loaded spots, e.g., near cleats, handrail stanchion bases and at radius angles in the moldings.

These cracking patterns, however, do not generally compromise the mechanical and structural strength characteristics of the fiberglass moldings.

### 14.6.2 Gel-coat voids

In some areas of the yacht, the gel-coat may show bubbles, which can break exposing the fibers underneath. The inconvenient occurs generally in vicinity sharp angles, and depends on air bubbles that, during manufacturing, remain entrapped between GRP and gel-coat, although Quality Checks are carried out by specialized personnel. Broken gel-coat bubbles are easy to repair by filling the voids and touching up with gel-coat that can be requested to the Yard Customer Support.



#### CAUTION

*The alteration of color and brightness in correspondence of areas which are greatly exposed is considered as normal. The necessary polishing has to be considered as normal maintenance.*

#### MAINTENANCE

*Carefully clean the GRP-parts at least once a month. Verify the GRP condition at least once every six months. Polish all the GRP-parts when required but at least once every two years.*



#### WARNING

*In case of particularly persistent dirt, wash always by using neutral products. Do not use products containing ammonia that turn the surface yellowish; if necessary use powder products dissolved in water.*



#### WARNING

*To remove the old antifouling, do not use sandblasting that may damage gel-coat surface and the anti-osmosis resin and expose fibers. As suggested by the antifouling Manufacturer's use paint removers or, as an alternative, wet sanding.*

**WARNING**

*Some hull areas (fastening area of the propeller shafts supports, of submerged exhausts, around the thrust propellers housings, etc.) at which can be carried out further works after the hull molding; in those areas are usually used fillers that, with time, may generate localized faults, as for instance bubbles or small cracks. These small faults do not impair at all the mechanical resistance of the hull. To repair them, it is sufficient to sandpaper the area, by removing possible bubbles and by re-applying fillers suitable for the bottom hull.*

**14.6.3 Light alloys and stainless steel**

It is a good rule, to wash down the entire yacht after each navigation, in particular all metal parts, that are damaged by salty humidity. Have plenty of fresh water sprayed on handrail, windows, skylights, rub rail, anchors and cleats.

Protect all metal parts with Vaseline oil periodically.

**MAINTENANCE**

*At least once a year check the fastening of all yacht's metallic parts.*

**WARNING**

*The aft glass wall is not watertight, so do not point the bolt of water towards the window, when washing.*

**WARNING**

*Do not use brushes or abrasive rags on metallic fittings, not even on rusty spots, scratches on the surface result in a less shiny appearance.*



#### 14.6.4 Sunpad cushions

Remove the sunpad cushions at regular intervals and let their bottom side and the seat surface dry. When washing or when it is raining, remove the cushions and stow them in a covered place; however, when cushions are wet, remove them from their seats, to prevent that water or humidity remain entrapped between cushions and underneath surface. This could affect the gel-coat and also create osmosis bubbles and deteriorate the cushion cover. The cushions should be flushed with fresh water, do not use jet-cleaners, brushes or abrasive sponges.

##### **MAINTENANCE**

*Check seams and buttons at least every six months.  
Wash the cushions at least every month.*



##### **CAUTION**

##### *Current use:*

- *do not walk nor jump on the cushions;*
- *prevent the cushions from becoming yellowish, do to direct exposure to sun light;*
- *prevent the soaking of water or of moisture, avoiding upholstery exposure to bad weather, particularly during inactivity periods.*

##### *Cleaning:*

- *remove ordinary dirt with a solution of warm water and neutral soap: do not use detergents or solvents;*
- *dry with a soft cloth not leaving any residuals.*

##### *Preservation:*

- *store the upholstery clean and dry in a cool and ventilated area without moisture;*
- *do not lay heavy objects on the upholstery when stored.*

### 14.6.5 Instrumentation and navigation lights

Use clean wet rags for cleaning.

After navigation, cover instrumentation and equipment.

#### **MAINTENANCE**

*Verify the correct operation of the navigation lights at least once a month.*

*Carefully clean the light glass at least once a week.*

*Verify any trace of corrosion of the cable connections of the navigation lights at least once every six months.*

*Tighten the cable connections of the navigation lights at least once every six months.*

#### **MAINTENANCE**

*Verify at least once a week the operation of the enclosed bridge gauge cluster and on board instruments.*

*Clean them at least once a week.*

*Protect the piston for the enclosed bridge gauge console opening with suitable products, at least once every six months.*



#### **WARNING**

*Do not use chemical or abrasive products.*

## 14.7 REPLACEMENT

This Section describes the operations for the correct replacement of parts which do not require skilled staff.



### CAUTION

*Look over the maintenance safety rules contained in this manual in order to act with the maximum safety and follow the indications herebelow.*



### CAUTION

*During the replacements, remove the parts with care and order. In this way the assembly operations are as easy as possible.  
Make sure to install genuine spare parts. In this way the system efficiency is not altered.  
Sometimes the use of non-genuine spare parts may cause the withdrawal of the Manufacturer's warranty.*



### WARNING

*Check the bulb operation before setting up for navigation to avoid any inconvenient by night use.*

## 14.8 BULB REPLACEMENT

### 14.8.1 Watertight lights

The watertight lights are located inside the heads and on the exterior ceiling of the main deck and enclosed bridge. With lights off and cold bulb: periodically remove the salt deposits from the light glass with a cloth moistened with fresh water.

#### Bulb replacement

Before carrying out the replacement of the bulbs, make sure to disconnect the circuit breaker protecting the area of the built-in spotlight. With lights off and cold bulb: remove the glass of the light, remove the bulb and replace the light. Pay attention during replacement of the bulb, not to touch with your fingers the glass of the new bulb. The bulb graft is of indent-type. After grafting the new bulb, proceed in reverse sequence to restore the initial conditions.



### 14.8.2 Overhead lights

#### Bulb replacement

Before carrying out the replacement of the bulbs, make sure to disconnect the circuit breaker protecting the area of the built-in spotlight.

With lights off and cold bulb: remove the glass-holder frame. Force the retaining springs and remove the reflecting and illuminating holder of the light. Then replace the bulb.

Pay attention during replacement of the bulb, not to touch with your fingers the glass of the new bulb.

The bulb graft is of indent-type. After grafting the new bulb, proceed in reverse sequence to restore the initial conditions.



**DANGER**

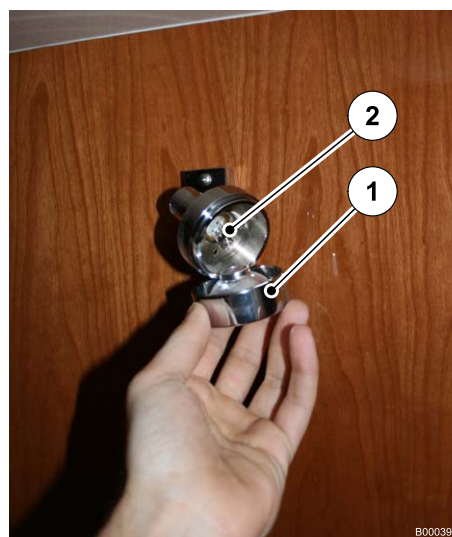
*Lights develop heat. Do not approach inflammables.*

### 14.8.3 Directable light

#### Bulb replacement

Before carrying out the replacement of the bulbs, make sure to disconnect the circuit breaker protecting the area of the built-in spotlight.

With lamp off and cold bulb: remove the glass holder frame (1) and replace the bulb (2). Pay attention during replacement of the bulb, not to touch with your fingers the glass of the new bulb. After grafting the new bulb, proceed in reverse sequence to restore the initial conditions.



### 14.8.4 Table lamp

#### Bulb replacement

Before carrying out the replacement of the bulbs, make sure that the circuit breaker protecting the area concerning the bulb replacement, is disconnected.

With table lamp off and cold bulb: remove the bulb and replace it. Pay attention during replacement of the bulb, not to touch with your fingers the glass of the new bulb. After grafting the new bulb, proceed in reverse sequence to restore the initial conditions.



### 14.8.5 Passageway bilge overhead light

#### Bulb replacement

Before carrying out the replacement of the bulbs, make sure to disconnect the circuit breaker protecting the area of the overhead light. Remove the bulb protecting glass by unscrewing fixing screw with a screw driver. Then replace the bulb. The bulb is screw-tightened.

After grafting the new bulb, proceed in reverse sequence to restore the initial conditions.



### 14.8.6 Closet overhead light

#### Bulb replacement

Before carrying out the replacement of the bulbs, make sure that the circuit breakers protecting the area concerning the bulb replacement, is disconnected.

Remove the bulb protecting glass by unscrewing fixing screw (1) with a screw driver. Then replace the bulb. The bulb is screw-tightened. After grafting the new bulb, proceed in reverse sequence to restore the initial conditions.



### 14.8.7 Step lights

#### Bulb replacement

Before carrying out the replacement of the bulbs, make sure to disconnect the circuit breaker protecting the area of the built-in spotlight.

With lights off and cold bulb: take out the glass-holder frame and remove the reflecting and illuminating holder of the light.

Pay attention during replacement of the bulb, not to touch with your fingers the glass of the new bulb. After grafting the new bulb, proceed in reverse sequence to restore the initial conditions.



### 14.8.8 Neon

#### Neon replacement

Before carrying out the replacement of the bulbs, make sure that the circuit breaker protecting the area concerning the bulb replacement, is disconnected.

Remove the bulb protecting glass by unscrewing the fixing screws with a screw driver.

After insertion of the new neon, follow the reverse sequence to recover the previous conditions.



NOTES:






15



TROUBLESHOOTING

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*HOW TO USE THIS MANUAL*

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*DESCRIPTION OF THE YACHT*

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*PROPULSION SYSTEMS*

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*YACHT LIFTING & ONSHORE HANDING*

---

*MAINTENANCE*

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***TROUBLESHOOTING***

### 15.1 MAIN NOTES

This section provides some possible causes of defects on the yacht main equipment/machinery.

This section suggests also the corrective action for each failure described; as well as the possible damage suffered if the corrective action is not carried out.

The corrective actions must be performed by specialized personnel.



#### **CAUTION**

*BERTRAM declines any responsibility for proposed corrective action carried out by unskilled personnel.*



#### **CAUTION**

*For matters relating to specific equipment and for troubleshooting any equipment, please refer to the Owner's manual of that equipment.*

## 15.2 EQUIPMENT

For further information, please refer to BERTRAM Customer Support.

Problem	Cause	Action
1. Equipment not powered on	<ul style="list-style-type: none"> <li>– Power line fuses of users blown</li> <li>– Wiring disconnected</li> <li>– Connections oxidized and lack of maintenance</li> </ul>	<ul style="list-style-type: none"> <li>– Check the line and replace the fuses</li> <li>– Check wiring connections</li> <li>– Check and carry out proper maintenance</li> </ul>

### 15.3 FUEL SYSTEM

For further information, please refer to BERTRAM Customer Support.

Problem	Cause	Action
1. Irregular fuel supply to engines and generators	<ul style="list-style-type: none"><li>– Circuit valves closed or not fully open</li><li>– Filters clogged</li></ul>	<ul style="list-style-type: none"><li>– Check/open</li><li>– Clean</li></ul>

## 15.4 BLACK AND GRAY WATER SYSTEM DRAIN

For further information, please refer to BERTRAM Customer Support.

Problem	Cause	Action
1. Black water (sewage) tank or gray water tank drain irregular	<ul style="list-style-type: none"> <li>– Circuit valves closed or not fully open</li> <li>– Lack of maintenance</li> <li>– Abnormal pump operation</li> </ul>	<ul style="list-style-type: none"> <li>– Check/open</li> <li>– Carry out maintenance</li> <li>– Check</li> </ul>

## 15.5 PROPELLERS SHAFTS

For further information, please refer to BERTRAM Customer Support.

Problem	Cause	Action
1. Excessive vibrations and noise	<ul style="list-style-type: none"><li>– Too long inactivity period and lack of maintenance</li><li>– Failure in the propulsion system</li></ul>	<ul style="list-style-type: none"><li>– Carry out proper maintenance</li><li>– Check shafts, mechanical connections, propellers and rudders</li></ul>
2. Water leaks from shaft seals	<ul style="list-style-type: none"><li>– Seals are not correctly adjusted</li><li>– Poor maintenance</li></ul>	<ul style="list-style-type: none"><li>– Check the seals</li><li>– Carry out proper maintenance</li></ul>

## 15.6 FRESH WATER SYSTEM

For further information, please refer to BERTRAM Customer Support.

Problem	Cause	Action
1. No water at the outlets	<ul style="list-style-type: none"> <li>– Circuit valves closed or not fully open</li> <li>– Empty tanks</li> <li>– Pump not powered up</li> </ul>	<ul style="list-style-type: none"> <li>– Check/open</li> <li>– Fill the tanks and bleed the circuit</li> <li>– Check/Supply</li> </ul>
2. Fresh water pump starts with no outlet open	<ul style="list-style-type: none"> <li>– Circuit leaking</li> </ul>	<ul style="list-style-type: none"> <li>– Clear leakages</li> </ul>

## 15.7 BILGE PUMP

For further information, please refer to BERTRAM Customer Support.

Problem	Cause	Action
1. The pump does not start	<ul style="list-style-type: none"> <li>– No voltage</li> <li>– Blocked impeller</li> <li>– Electric section defective</li> </ul>	<ul style="list-style-type: none"> <li>– Check the value of the line voltage</li> <li>– Clean the impeller and the pump casing</li> <li>– Consult BERTRAM Customer Support</li> </ul>
2. The pump runs but it does not work	<ul style="list-style-type: none"> <li>– Dirty valve and filter</li> <li>– Over suction depth</li> <li>– Air in suction</li> </ul>	<ul style="list-style-type: none"> <li>– Clean valve and filter</li> <li>– Install the pump closer to the water static level</li> <li>– Check the seal of the suction pipe</li> <li>– Fill the pump casing of liquid</li> <li>– With DC and three-phased motors invert the polarities</li> </ul>
3. The pump vibrates and is noisy	<ul style="list-style-type: none"> <li>– The pump has not been primed at first start</li> <li>– Wrong rotation direction</li> </ul>	<ul style="list-style-type: none"> <li>– Increase or decrease the capacity</li> <li>– Vent air from the system</li> </ul>
4. The operation of one pump is irregular	<ul style="list-style-type: none"> <li>– Damaged impeller and blower</li> <li>– Pressure required from the system higher than that-one the pump can supply</li> </ul>	<ul style="list-style-type: none"> <li>– Check the internal air pressure in the membrane</li> <li>– Check/Have it cleaned</li> </ul>



## 15.8 FRESH WATER PUMP

For further information, please refer to BERTRAM Customer Support.

Problem	Cause	Action
1. The pump does not start	<ul style="list-style-type: none"> <li>– No water</li> <li>– Overheating due to high temperature</li> <li>– Voltage too low or too high</li> </ul>	<ul style="list-style-type: none"> <li>– Check the water supply</li> <li>– Add cold water &lt;95 °F (35 °C)</li> <li>– Check the supply voltage</li> </ul>
2. The pump operates continuously	<ul style="list-style-type: none"> <li>– Pipes leaking</li> <li>– One-way inlet valve is jammed or leaking</li> </ul>	<ul style="list-style-type: none"> <li>– Repair leaking</li> <li>– Clean check valve or install a new one. Check the filter</li> </ul>
3. Pump stops during operation	<ul style="list-style-type: none"> <li>– Dry running</li> <li>– Overheating due to high water temperature</li> <li>– Voltage too low or too high</li> </ul>	<ul style="list-style-type: none"> <li>– Check the water supply</li> <li>– Add cold water &lt;95 °F (35 °C)</li> <li>– Supply a proper voltage</li> </ul>

## 15.9 OIL TRANSFER PUMP

For further information, please refer to BERTRAM Customer Support.

Problem	Cause	Action
1. Water flow restriction	<ul style="list-style-type: none"> <li>– Closed valves</li> <li>– Plugged suction</li> <li>– Air leak at suction</li> <li>– Suction lift too high</li> <li>– Incorrectly wired motor</li> <li>– Wrong rotation</li> </ul>	<ul style="list-style-type: none"> <li>– Open valves</li> <li>– Eliminate restriction</li> <li>– Locate and repair leak</li> <li>– Do not exceed vapor pressure of liquid</li> <li>– Check wiring diagram</li> <li>– Correct rotation</li> </ul>
2. Water flow restriction	<ul style="list-style-type: none"> <li>– Pump shaft speed incorrect</li> <li>– Discharge pressure too high</li> <li>– Air leak at suction</li> <li>– Worn or damaged pump</li> <li>– Low viscosity</li> </ul>	<ul style="list-style-type: none"> <li>– Check driver speed, motor wiring, pulley tension</li> <li>– Decrease downstream pressure</li> <li>– Locate and repair leak</li> <li>– Inspect and repair as required</li> <li>– Verify original application conditions</li> </ul>

Problem	Cause	Action
3. Gradually loses prime	<ul style="list-style-type: none"> <li>– Suction lift too high</li> <li>– Air or gas in the fluid</li> <li>– Air leak at suction</li> <li>– Worn or damaged pump</li> </ul>	<ul style="list-style-type: none"> <li>– Improve suction pressure</li> <li>– Eliminate air or gas from fluid</li> <li>– Locate and repair leak</li> <li>– Inspect and repair as required</li> </ul>
4. Noise	<ul style="list-style-type: none"> <li>– Cavitation</li> <li>– Solid particles in fluid</li> <li>– Air or gas in the fluid</li> <li>– Worn or damaged pump</li> </ul>	<ul style="list-style-type: none"> <li>– Improve system suction pressure, provide adequate NPDSH</li> <li>– Install the suction strainer. Clean the suction strainer</li> <li>– Eliminate air or gas from fluid</li> <li>– Inspect and repair as required</li> </ul>

Problem	Cause	Action
5. Motor runs hot or overloads	<ul style="list-style-type: none"> <li>– Discharge pressure too high</li> <li>– Shaft speed too fast</li> <li>– Fluid viscosity higher than expected</li> <li>– Incorrectly wired motor</li> <li>– Binding internal pump parts</li> <li>– Motor normally feel hot</li> </ul>	<ul style="list-style-type: none"> <li>– Reduce downstream pressure. Check relief valve setting. Be sure discharge pressure gages function correctly.</li> <li>– Reduce speed</li> <li>– Change to larger horsepower or higher service factor motor. Thin fluid.</li> <li>– Check wiring diagram</li> <li>– Inspect and correct condition</li> <li>– Verify if actual motor amperage draw is within range.</li> </ul>
6. Seal leaks	<ul style="list-style-type: none"> <li>– Dry running</li> <li>– Solid in fluids</li> <li>– Damaged during field replacement</li> <li>– Seal material incompatible with fluid</li> </ul>	<ul style="list-style-type: none"> <li>– Open valves</li> <li>– Add suction strainer</li> <li>– Inspect and replace damaged components</li> <li>– Verify original application conditions. Address to Customer Support.</li> </ul>

## 15.10 ELECTRO-HYDRAULIC HELM SYSTEM

For further information, please refer to BERTRAM Service Department.

Problem	Cause	Action
1. Air bubbles or foam into the system	<ul style="list-style-type: none"> <li>– The oil level into the tank is too low and doesn't allow suction pipe to be completely plunged. In this way, the pump sucks oil and air contemporarily</li> <li>– Possible openings and little holes on suction pipes or faulty pump seals, which allow air to enter inside</li> </ul>	<ul style="list-style-type: none"> <li>– Verify/Check</li> <li>– Verify/Check</li> </ul>
2. Pump doesn't deliver oil	<ul style="list-style-type: none"> <li>– Wrong rotation direction</li> <li>– Obstructed conduits or suction filters</li> <li>– Too low oil level into the tank</li> <li>– Air in leakages in suction system</li> <li>– Too viscous oil with some difficulties in passing through</li> <li>– The shaft or other components of the pump are broken</li> </ul>	<ul style="list-style-type: none"> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Replace</li> </ul>

Problem	Cause	Action
3. Lack of pressure in the system	<ul style="list-style-type: none"> <li>– Pump doesn't deliver oil</li> <li>– Relief valve is not calibrated</li> <li>– Free discharge of oil to the tank somewhere into the system</li> </ul>	<ul style="list-style-type: none"> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> </ul>
4. System pressure is low or fluctuating	<ul style="list-style-type: none"> <li>– Possible leaks in the piping or elsewhere in pressurized parts of the system</li> <li>– Relief valve set at a too low rate</li> <li>– The relief valve remains open or oscillates in its housing</li> <li>– Restriction of the pump suction pipes or possible obstruction of the filter</li> <li>– Air in leakages into the suction pipes or by the pump's seals</li> <li>– Worn pump</li> </ul>	<ul style="list-style-type: none"> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> </ul>

Problem	Cause	Action
5. Too noisy pump	<ul style="list-style-type: none"> <li>– Wrong pump rotation direction</li> <li>– Presence of some air in oil</li> <li>– Oil viscosity causing obstructions to the suction system</li> <li>– Irregular inflow of oil to the pump, caused by an insufficient filtering capacity of the filter (the filter could be dirty or not suitable)</li> <li>– Big lacks of charge along the suction line</li> <li>– Worn pump's components</li> <li>– Relief valve vibrations</li> <li>– Mechanical vibration due to a bad anchor action</li> </ul>	<ul style="list-style-type: none"> <li>– Verify/Check</li> <li>– Bleed</li> <li>– Verify/Check</li> <li>– Verify/Check/Clean</li> <li>– Verify/Check</li> <li>– Verify/Check/Replace</li> <li>– Verify/Check</li> <li>– Verify/Check</li> </ul>

Problem	Cause	Action
6. Too high temperature rating	<ul style="list-style-type: none"> <li>– The pump is working at a higher pressure than the allowed one</li> <li>– Faulty or worn pump causing internal blow-by</li> <li>– Excessive blow-by through valves and cylinder</li> <li>– Too viscous oil</li> <li>– Continuous overloaded operation</li> <li>– Too high temperature in the room where the pump unit is placed</li> </ul>	<ul style="list-style-type: none"> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> </ul>
7. Leakages by seals	<ul style="list-style-type: none"> <li>– Possible abrasive substances entered into the system and circulating with oil, which have damaged pump shaft</li> <li>– Seals are faulty, broken or mounted in a wrong way</li> <li>– Too hot oil</li> </ul>	<ul style="list-style-type: none"> <li>– Verify/Check</li> <li>– Verify/Check</li> <li>– Verify/Check</li> </ul>
8. Pump overcharged motor	<ul style="list-style-type: none"> <li>– Too viscous oil</li> <li>– Obstructed delivery fine or excessive resistance</li> </ul>	<ul style="list-style-type: none"> <li>– Verify/Check</li> <li>– Verify/Check</li> </ul>



## 15.11 TRIM TAB SYSTEM

For further information, please refer to BERTRAM Customer Support.

Problem	Cause
1. Air bubbles or foam into the system	<ul style="list-style-type: none"> <li>– The oil level into the tank is too low and doesn't allow suction pipe to be completely plunged. In this way, the pump sucks oil and air contemporarily</li> <li>– Possible openings and little holes on suction pipes or faulty pump seals, which allow air to enter inside</li> </ul>
2. Pump doesn't deliver oil	<ul style="list-style-type: none"> <li>– Wrong rotation direction</li> <li>– Obstructed conduits or suction filters</li> <li>– Too low oil level into the tank</li> <li>– Air in leakages in suction system</li> <li>– Too viscous oil with some difficulties in passing through</li> <li>– The shaft or other components of the pump are broken</li> </ul>
3. Lack of pressure in the system	<ul style="list-style-type: none"> <li>– Action</li> <li>– Pump doesn't deliver oil</li> <li>– Relief valve is not calibrated</li> <li>– Free discharge of oil to the tank somewhere into the system</li> </ul>
4. System pressure is low or fluctuating	<ul style="list-style-type: none"> <li>– Possible leaks in the piping or elsewhere in pressurized parts of the system</li> <li>– Relief valve set at a too low rate</li> <li>– The safety valve remains open or oscillates in its housing</li> <li>– Restriction of pump suction pipes or possible obstruction of filter</li> <li>– Air in leakages into the suction pipes or by the pump's seals</li> <li>– Worn pump</li> </ul>

Problem	Cause
5. Too noisy pump	<ul style="list-style-type: none"> <li>– Wrong pump rotation direction</li> <li>– Presence of some air in oil</li> <li>– Oil viscosity causing obstructions to the suction system</li> <li>– Irregular inflow of oil to the pump, caused by an insufficient filtering capacity of the filter (the filter could be dirty or not suitable)</li> <li>– Big lacks of charge along the suction line</li> <li>– Worn pump's components</li> <li>– Relief valve vibrations</li> <li>– Mechanical vibrations due to a bad anchor action</li> </ul>
6. Too high temperature rating	<ul style="list-style-type: none"> <li>– The pump is working at a higher pressure than the allowed one</li> <li>– Faulty or worn pump causing internal blow-by</li> <li>– Excessive blow-by through valves and cylinder</li> <li>– Too viscous oil</li> <li>– Continuous overloaded operation</li> <li>– Too high temperature in the room where the pump unit is placed</li> </ul>
7. Leakages by seals	<ul style="list-style-type: none"> <li>– Eventual abrasive substances entered into the system and circulating with oil, which have damaged pump shaft</li> <li>– Seals are faulty, broken or mounted in a wrong way</li> <li>– Too hot oil</li> </ul>
8. Pump overcharging the motor	<ul style="list-style-type: none"> <li>– Action</li> <li>– Too viscous oil</li> <li>– Obstructed delivery line or excessive resistance</li> </ul>

## 15.12 GLENDINNING CABLEMASTER

For further information, please refer to BERTRAM Customer Support.

Problem	Cause	Action
1. Non-functional (either no power or unit has power and does not respond)	<ul style="list-style-type: none"> <li>– Tripped breaker</li> <li>– Power wire incorrectly connected to relay assembly</li> <li>– Defective motor. Defective relay box</li> </ul>	<ul style="list-style-type: none"> <li>– Reset breaker</li> <li>– Replace relay assembly</li> <li>– With power switch on and voltage across motor wires - if no response, replace motor</li> </ul>
2. Pays out cable only	<ul style="list-style-type: none"> <li>– In-limit switch circuit open</li> <li>– Power inputs reversed</li> <li>– Defective relay or diode</li> <li>– Bad power switch</li> </ul>	<ul style="list-style-type: none"> <li>– Check in-limit switch</li> <li>– Check polarity on DC input wires</li> <li>– Replace relay assembly</li> <li>– Check power switch</li> </ul>
3. Retracts cable only	<ul style="list-style-type: none"> <li>– Out-limit switch circuit open</li> <li>– Defective relay</li> <li>– Bad power switch</li> </ul>	<ul style="list-style-type: none"> <li>– Check in-limit switch</li> <li>– Replace relay assembly</li> <li>– Check power switch</li> </ul>

Problem	Cause	Action
4. Tripped DC breaker	<ul style="list-style-type: none"><li>– Main pulley too tight</li><li>– Cable jammed and kinking</li><li>– Defective motor</li></ul>	<ul style="list-style-type: none"><li>– Adjust pulley</li><li>– Check for adequate storage space and/or cable for undue kinking - see cable adjustment</li><li>– Disconnect motor wires from relay box. Apply power directly to motor wires, motor should run one direction of other. No response from motor, replace</li></ul>

### 15.13 AIR-CONDITIONING UNIT

For further information, please refer to BERTRAM Customer Support.

Problem	Cause	Action
1. Display does not operate	–	<ul style="list-style-type: none"> <li>– Turn circuit breaker on</li> <li>– Check CX/CXP cable and connections</li> <li>– Replace keypad/display</li> <li>– Replace power logic board</li> </ul>
2. Erratic temperature display	–	<ul style="list-style-type: none"> <li>– Perform a factory memory reset</li> <li>– Check temperature sensor, cable and connection</li> <li>– Ensure the temperature sensor is installed properly</li> <li>– Calibrate temperature</li> <li>– Replace power logic board</li> </ul>
3. Erratic system operation	–	<ul style="list-style-type: none"> <li>– Perform a factory memory reset</li> <li>– Check CX/CXP cable and connections</li> <li>– Check temperature sensor, cable and connection</li> <li>– Replace keypad/display</li> <li>– Replace power logic board</li> </ul>
4. The unit will not operate at all	<ul style="list-style-type: none"> <li>– Blown fuse or tripped circuit breaker</li> <li>– Low voltage to unit</li> </ul>	<ul style="list-style-type: none"> <li>– Replace fuse with time delay type or reset breaker. Check for correct sizing</li> <li>– Check shore power supply and rating of electrical power cord to boat</li> </ul>

Problem	Cause	Action
5. Air from the unit does not feel cool in the "Cool" Mode or warm in the "Heat" Mode	<ul style="list-style-type: none"> <li>– The selector switch is set for "Fan only"</li> <li>– The thermostat is set incorrectly</li> <li>– Water flow is restricted</li> </ul>	<ul style="list-style-type: none"> <li>– Switch the system into the "Cool" or "Heating" mode</li> <li>– Set the thermostat for a cooler or warmer setting</li> <li>– Clear restriction</li> </ul>
6. The unit operates but the cabin fails to cool normally	<ul style="list-style-type: none"> <li>– Dirty air filter</li> <li>– The thermostat is set too high</li> <li>– The evaporator coil has iced</li> </ul>	<ul style="list-style-type: none"> <li>– Clean lint screen or air filter</li> <li>– Reset the thermostat to a cooler setting</li> <li>– Turn the system to "Fan only" for five minutes, then restart</li> </ul>
7. Compressor cycle on and off	<ul style="list-style-type: none"> <li>– Dirty air filter</li> <li>– Water flow restriction</li> </ul>	<ul style="list-style-type: none"> <li>– Clean lint screen or air filter</li> <li>– Clear restriction</li> </ul>
8. Water dripping inside cabin	<ul style="list-style-type: none"> <li>– Condensate drain is clogged</li> <li>– Blockage in hose</li> </ul>	<ul style="list-style-type: none"> <li>– Clean out drain holes</li> <li>– Clean hose. Check downhill routing of hose</li> </ul>

**NOTES:**

[illegible]

NOTES:



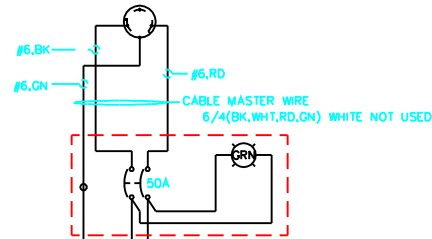
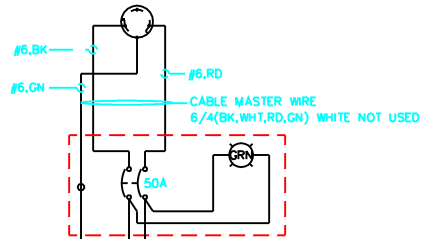



*TECHNICAL PLANS*

SHORE POWER #1  
220VAC/50HZ

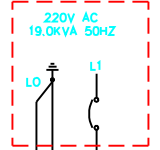
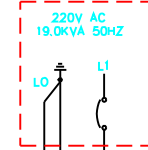
SHORE POWER #2  
220VAC/50HZ

SHEET REVISION RECORD								REVISIONS			
SHT	1	2	3	4	5	6	7	8	LET.	DESCRIPTION	BY
REV#	—	—	—	—	—	—	—	—			APPR.



GENERATOR #1

GENERATOR #2



100-1.6/4(BK,WH,TD,GN)  
WHITE NOT USED

200-1.6/4(BK,WH,TD,GN)  
WHITE NOT USED

POWER SELECTOR  
PANEL BY  
PANELTRONICS

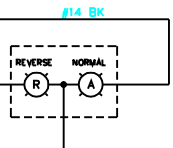
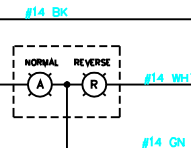
PANELTRONICS TO PROVIDE PANEL PRE-WIRED  
AND TO INCLUDE APPROPRIATE METERING.  
PANELS A & B TO BE INDEPENDENT & ABLE  
TO BE POWERED BY EACH POWER SOURCE.

LOCATED IN ENGINE ROOM  
GALVANIC ISOLATOR

GR-1, #6 GN GR-2, #6 GN

GN  
NEUTRAL  
BK  
SHORE 1

#6, GN GN  
NEUTRAL  
BK  
SHORE 2



TO GALLEY PANEL  
GROUNDING BUS  
(SEE SHT 3)

P/O 201-1.6/4(BK,TD,WH,GN)

AC GROUND BUS

TO F/B PANEL  
GROUNDING BUS  
(SEE SHT 4)

P/O 204-1.6/4(BK,TD,WH,GN)

TO PANEL A (LINE 1)  
CIRCUIT BREAKERS  
(SEE SHT 2)

BK  
WH

L1  
NEUTRAL

L1  
NEUTRAL

BK  
WH

NOTE

1. CONNECT GREEN GROUNDING CONDUCTORS (EQUIP.  
GROUND WIRES) TO THE A.C. GROUNDING BUS.

NOTES

BERTRAM YACHT  
MIAMI, FLORIDA, USA

MODEL 670  
TITLE

WIRING, 220VAC, EURO

SCALE NONE SHT 1 OF 15  
BY MB DATE 5/15/02  
APPR. D 12438EU

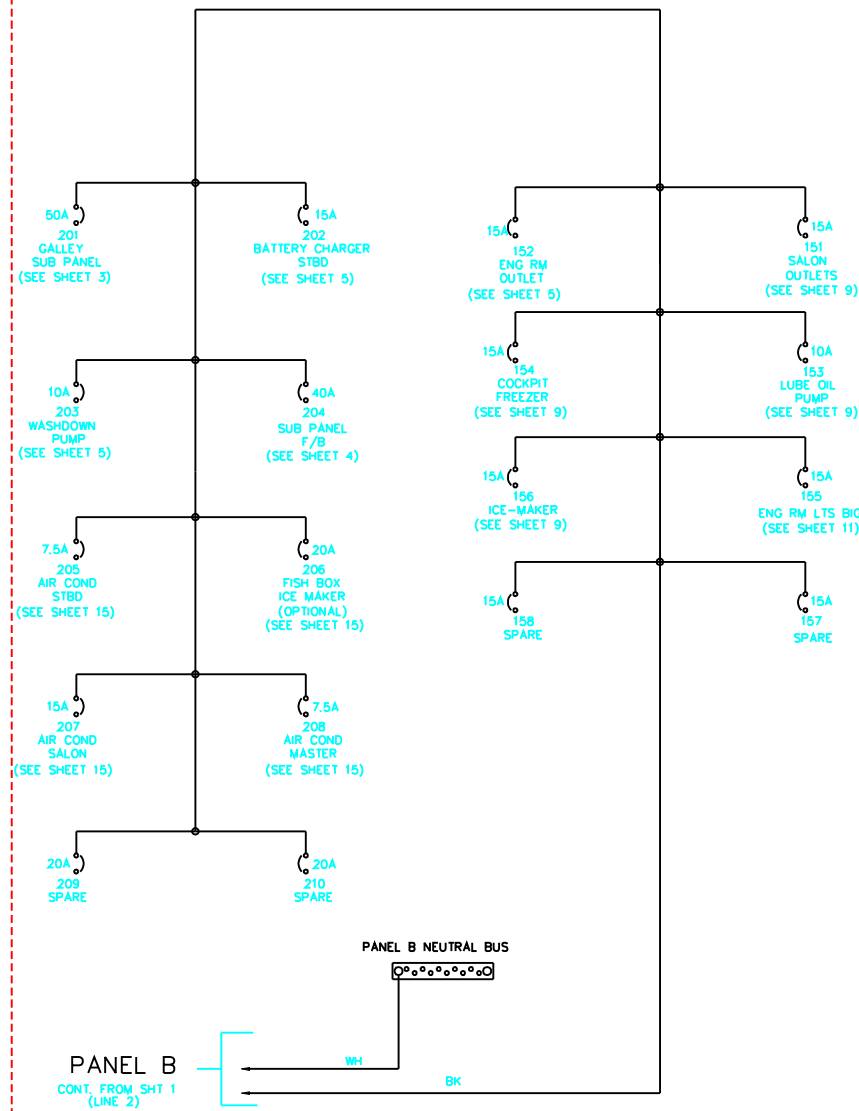
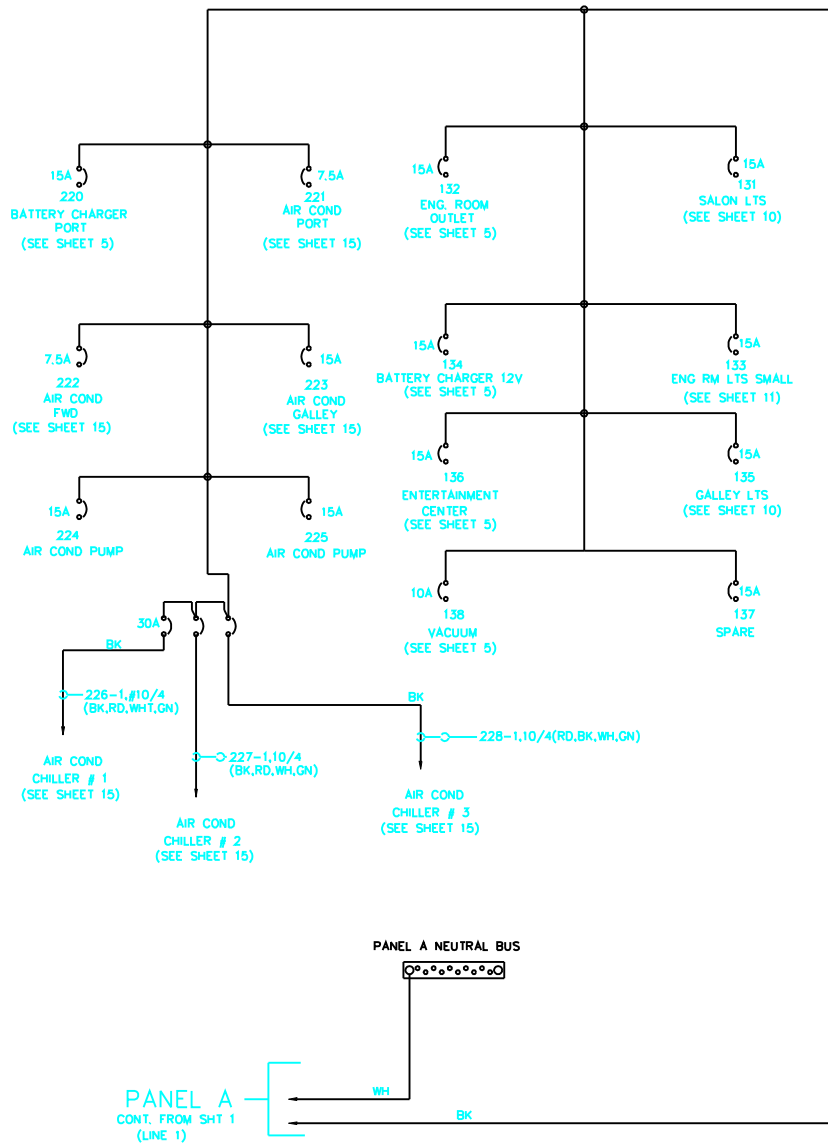
TO DC NEGATIVE &  
COMMON BONDING  
SYSTEM

#6,GN

# SALON PANEL BY PANELTRONICS

P/O A.C. PANEL SHEET 1

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPL.



## NOTES:

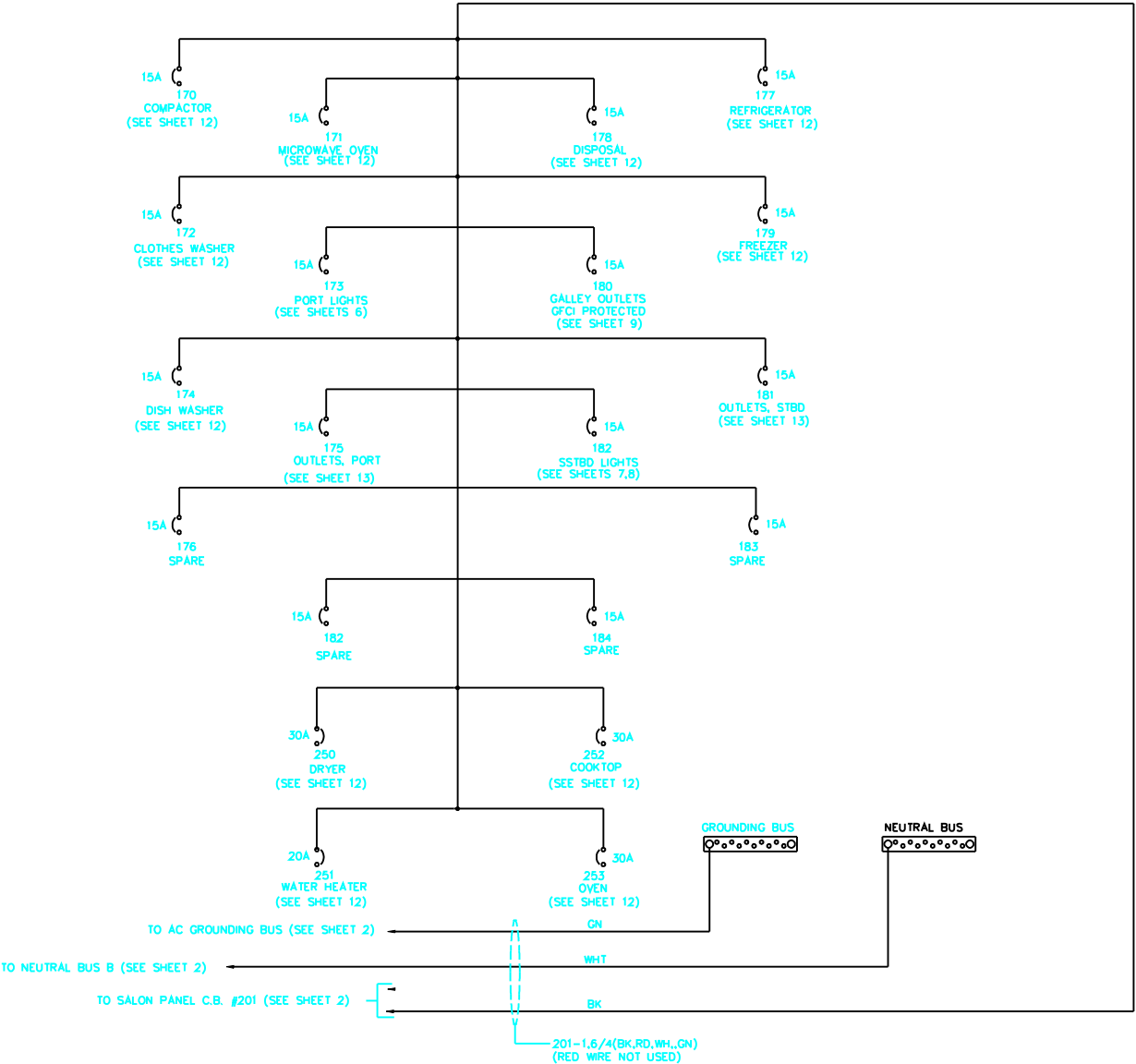
- IF A CIRCUIT IS POWERED FROM PANEL A, THE NEUTRAL MUST CONNECT TO THE PANEL A NEUTRAL BUS. THE SAME SITUATION APPLIES TO THE PANEL B AND PANEL B NEUTRAL BUS.


CONNECT GREEN GROUNDING CONDUCTORS TO THE AC GROUNDING BUS (SEE SHEET 1)

NOTES				
BERTRAM YACHT				
MIAMI, FLORIDA, USA				
MODEL	670			
TITLE	WIRING, 220VAC, EURO			
SCALE	NONE	SHT 2 OF 15	REV.	
BY MB	APPL.	D	12438EU	
DATE	5/15/02			

GALLEY PANEL BY PANELTRONICS

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPR.
-		-		

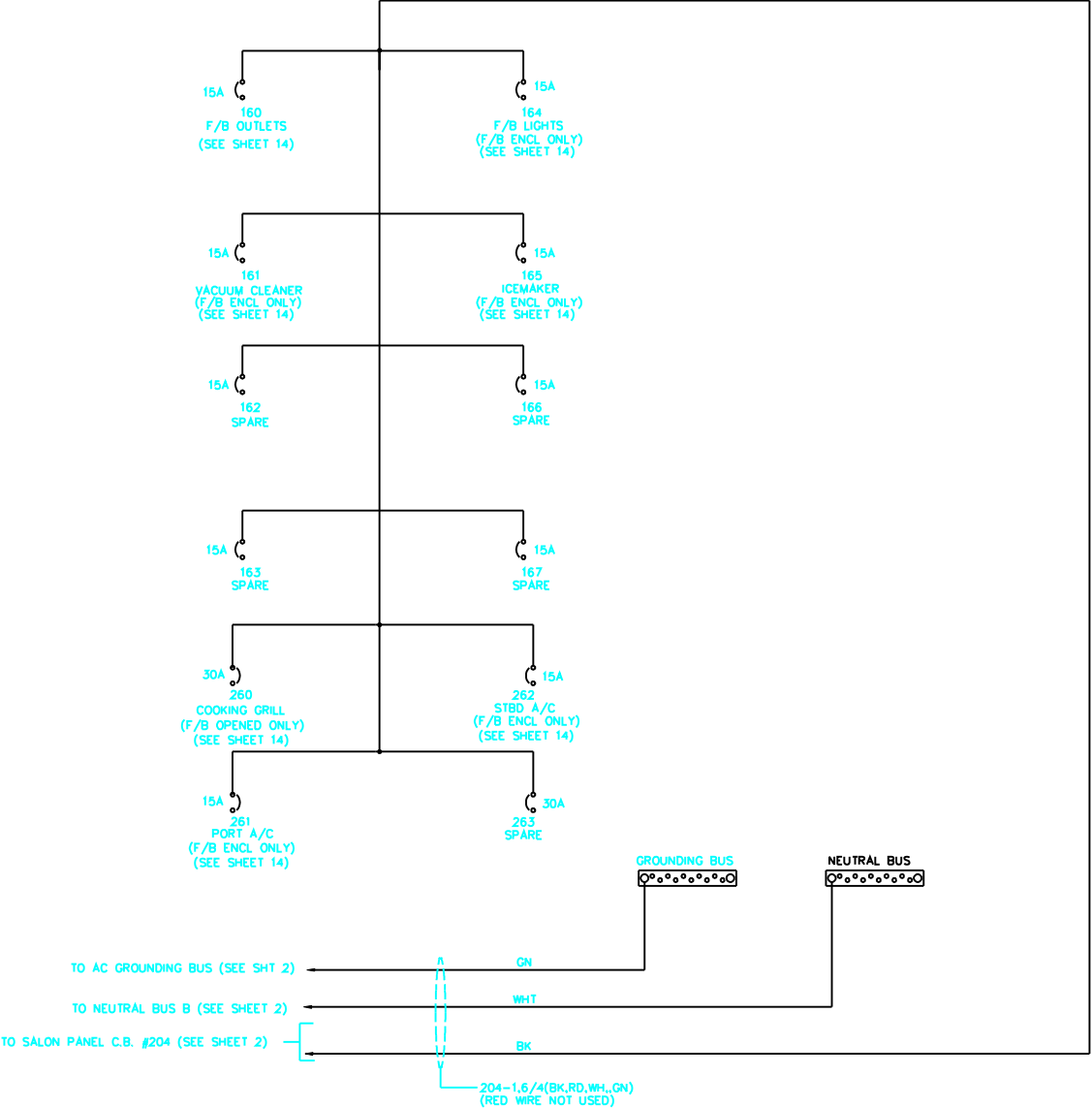



NOTES				
 BERTRAM YACHT MIAMI, FLORIDA, USA				
MODEL 670				
TITLE WIRING, 220VAC, EURO				
SCALE NONE		SHT 3 OF 15		REV.
BY MB	APPR.	D 12438EU		
DATE 5/18/02				

CODE	TITLE	DWG NO	BY	APPR.	DATE
	REFERENCE		MB		5/18/02

F/B PANEL BY PANELTRONICS

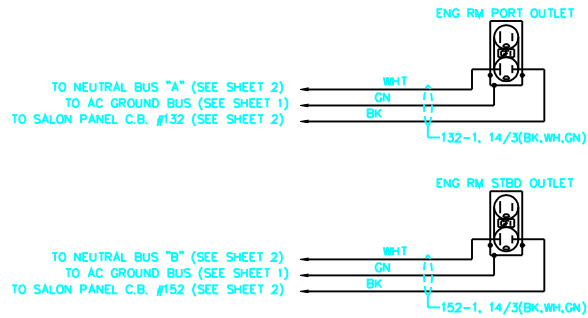
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPL.



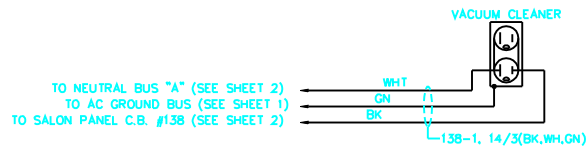
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MODEL 670				
TITLE WIRING, 220VAC, EURO				
SCALE NONE	BY MB	APPLY	SHT 4 OF 15	REV.
DATE 5/15/02			D 12438EU	

CODE	TITLE	DWG NO
	REFERENCE	

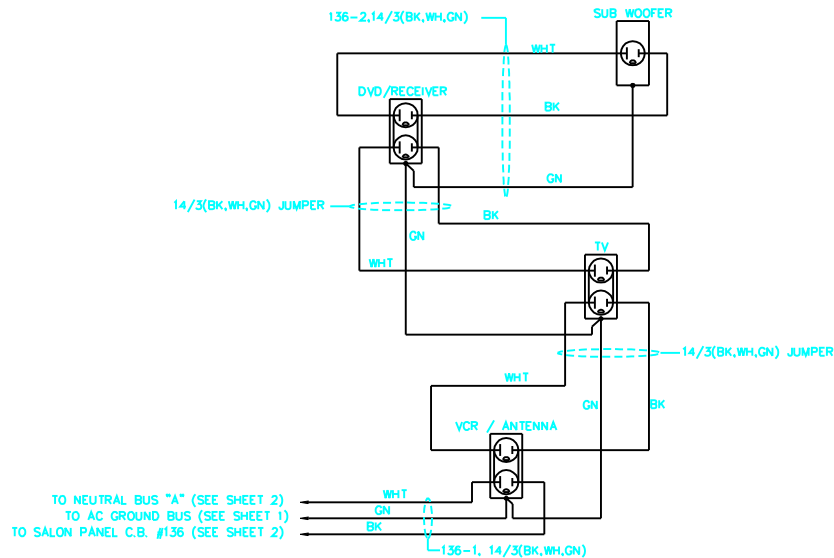
## ENGINE ROOM OUTLETS



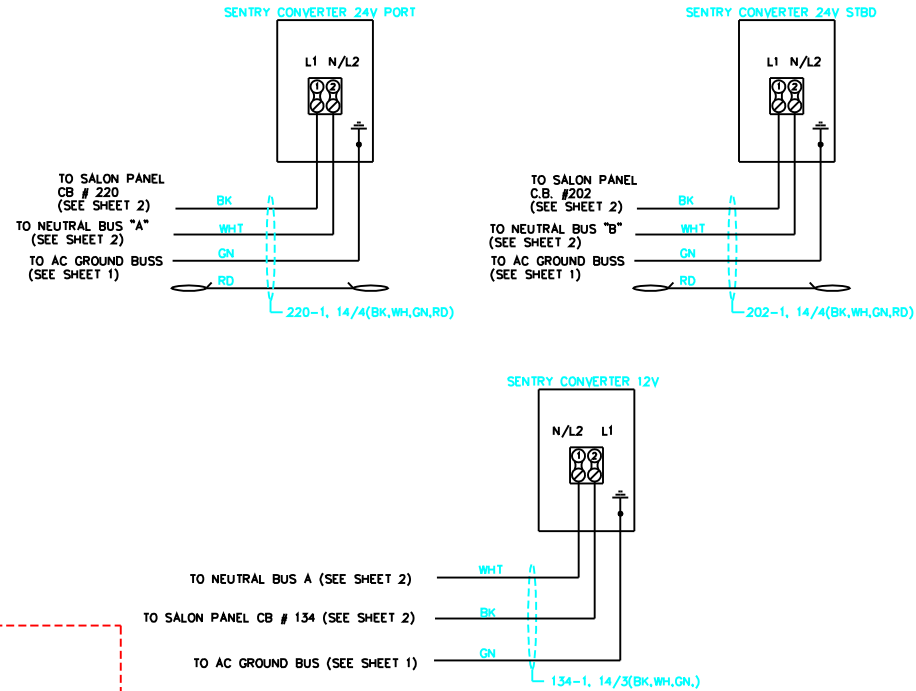
## SALON VACUUM CLEANER



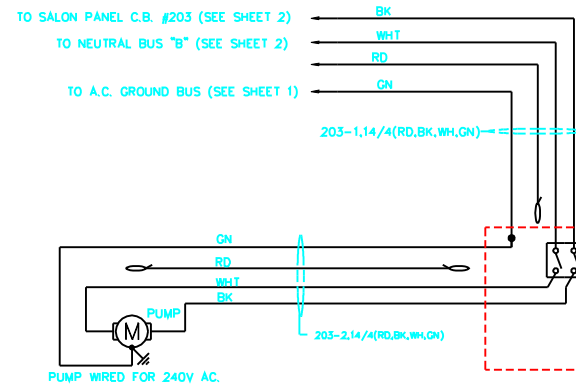
## SALON ENTERTAINMENT CENTER




## CONVERTERS



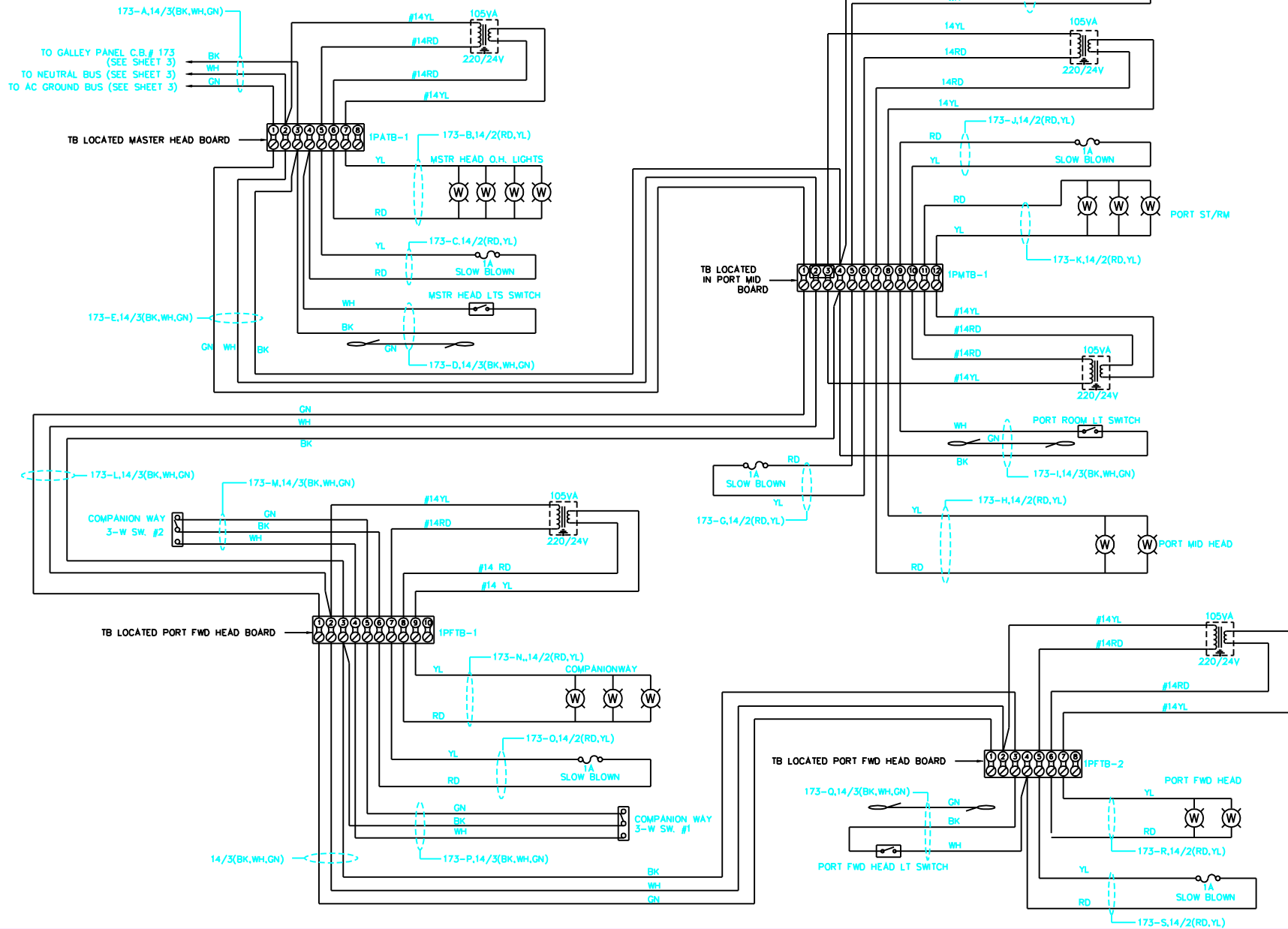
## WASHDOWN PUMP



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.


NOTES				
		BERTRAM YACHT MIAMI, FLORIDA, USA		
MODEL	670			
TITLE	WIRING, 220VAC, EURO			
SCALE	NONE		SHT 5 OF 15	REV
BY	MB	APPY	D	12438EU
DATE	5/15/02			

# FWD LIGHTS (MTR HEAD,PORT MID HEAD/RM,PORT FWD HEAD)

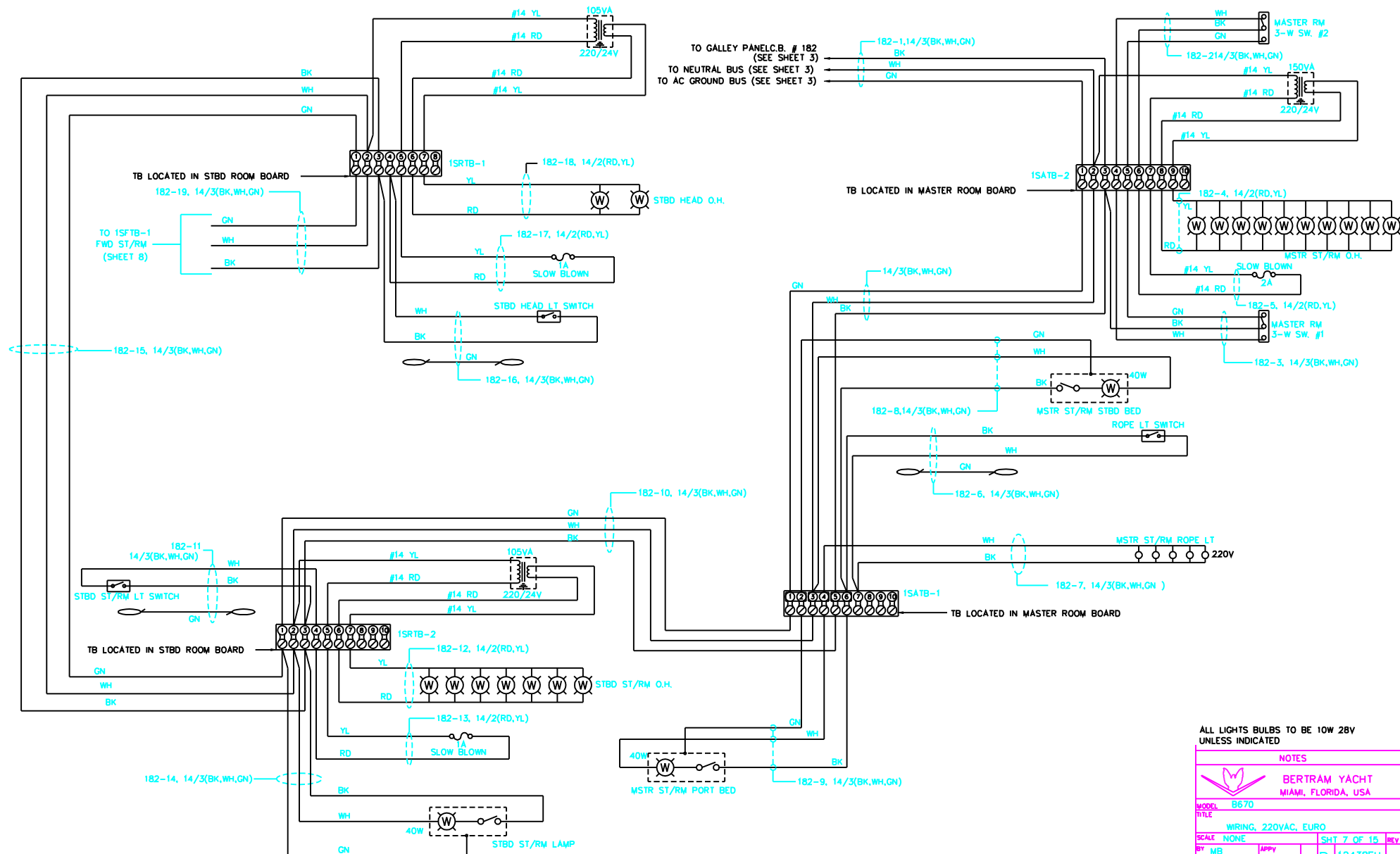


REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.

ALL LIGHTS BULBS TO BE 10W 28V UNLESS INDICATED

NOTES				
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA				
MODEL	B670			
TITLE	WIRING, 220VAC, EURO			
SCALE	NONE	SHT	6 OF 15	REV.
BY	MB	APPY		
DATE	5/15/02		D	12438EU

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APP.



ALL LIGHTS BULBS TO BE 10W 28V  
UNLESS INDICATED

## NOTES



BERTRAM YACHT  
MIAMI, FLORIDA, USA

MODEL	B670
TITLE	

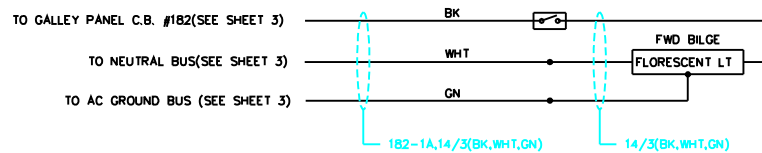
WIRING, 220VAC, EURO


SCALE	NONE	SHT 7 OF 15	REV
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BY MB	APPV				
DATE 5/15/02			D	12438EU	

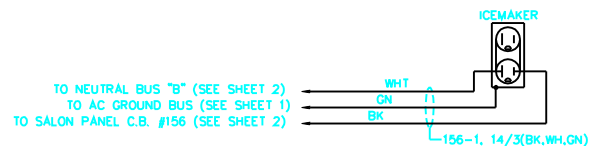


REVISIONS				
LET.	DESCRIPTION	BY	DATE	APP.

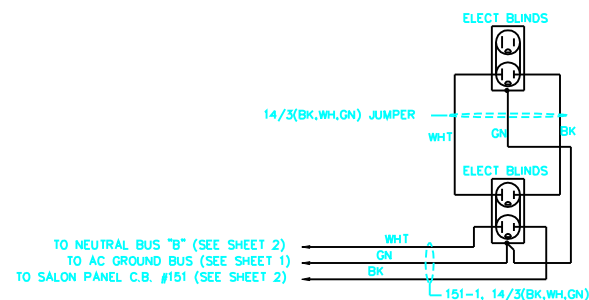
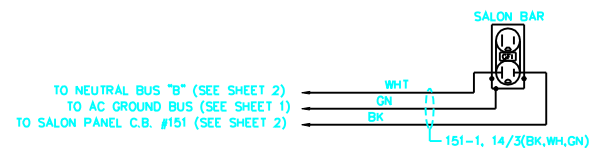


		NOTES	
		BERTRAM YACHT MIAMI, FLORIDA, USA	
MODEL	B670		
TITLE	WIRING, 220VAC, EURO		
SCALE	NONE	SHT 8 OF 15	REV
BY MB	APPY	D	12438EU
DATE	5/15/02		

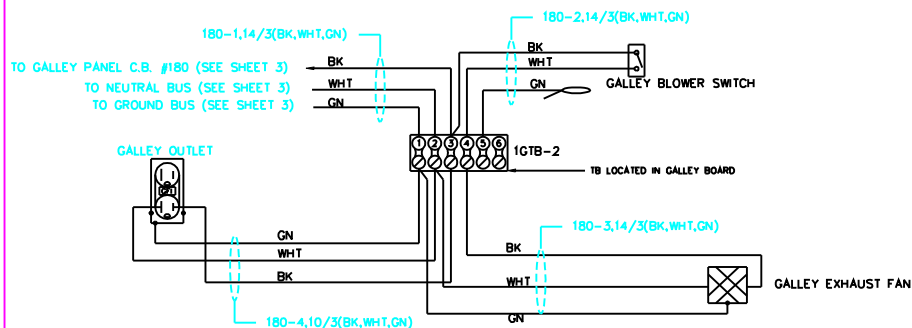
## ICE MAKER SALON



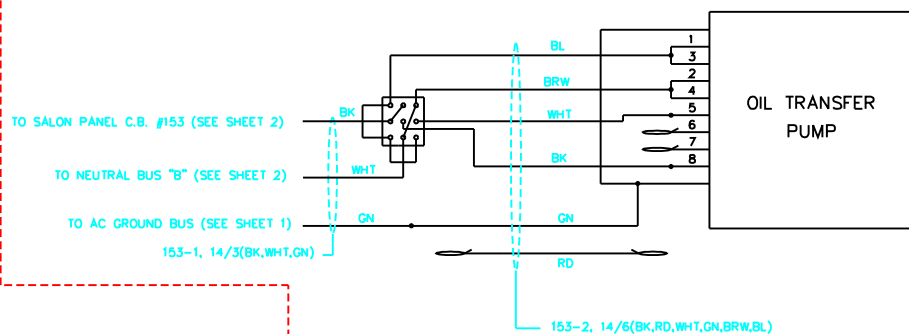
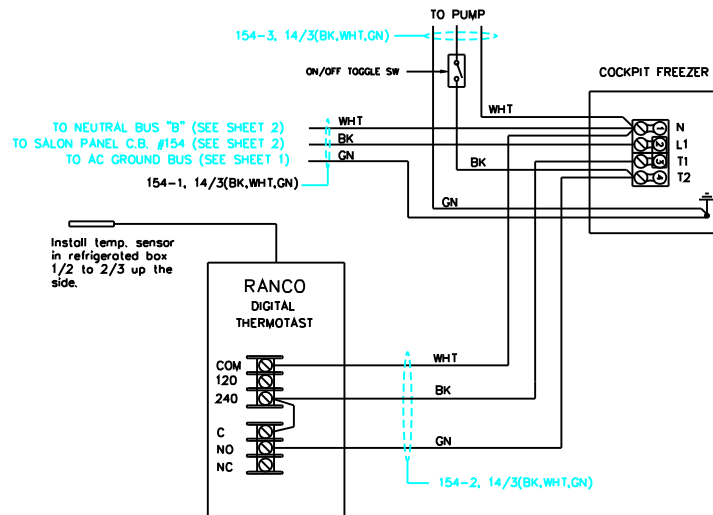
## SALON OUTLETS




## GALLEY OUTLETS / BLOWER



## COCKPIT FREEZER



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.

NOTES				
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA				
MODEL	B670			
TITLE	WIRING, 220VAC, EURO			
SCALE	NONE	SHT	9 OF 15	REV.
BY	MB	APPY		
DATE	5/15/02	D	12438EU	

# GALLEY AC LIGHTS

The diagram illustrates the electrical wiring for the Galley AC Lights. It features a central terminal block labeled 1G7B-1 with 12 terminals. The wiring is as follows:

- Line 135-3, 14/2(RD,YL):** A red wire with yellow braid, passing through a 1A SLOW BLOWN fuse, connected to terminal 1 of the terminal block. The wire is labeled YL (Yellow) and RD (Red).
- Grounding:** A green wire (GN) is connected to terminal 2. A black wire (BK) is connected to terminal 3. A white wire (WH) is connected to terminal 4. These are labeled TO SALON PANEL C.B. #135 (SEE SHEET 2), TO NEUTRAL BUS "A" (SEE SHEET 2), and TO AC GROUND BUS (SEE SHEET 1) respectively.
- Line 135-1, 14/3(BK,WH,GN):** A three-core cable connected to terminals 5, 6, and 7 of the terminal block. The wires are labeled BK, WH, and GN.
- Transformer:** A 105VA transformer with 220/24V taps is connected to terminals 8 and 9. The primary is connected to #14 YL and #14 RD. The secondary is connected to #14 RD and #14 YL.
- Counter AC LTS:** Three light bulbs connected to terminals 10, 11, and 12. The wires are labeled YL, RD, and YL. The label 135-5, 14/2(RD,YL) is also present.
- Galley AC OH LTS:** Five light bulbs connected to terminals 1, 2, 3, 4, and 5. The wires are labeled YL, RD, YL, RD, and YL. The label 135-4, 14/2(RD,YL) is also present.
- Other Labels:** TB LOCATED IN GALLEY BOARD, 135-2, 14/3(BK,WH,GN), and 135-1, 14/3(BK,WH,GN).

[illegible]

ALL LIGHTS ARE TO BE 10W 28V  
UNLESS INDICATED

## NOTES



BERTRAM YACHT  
MIAMI, FLORIDA, USA

MODEL	670
TITLE	

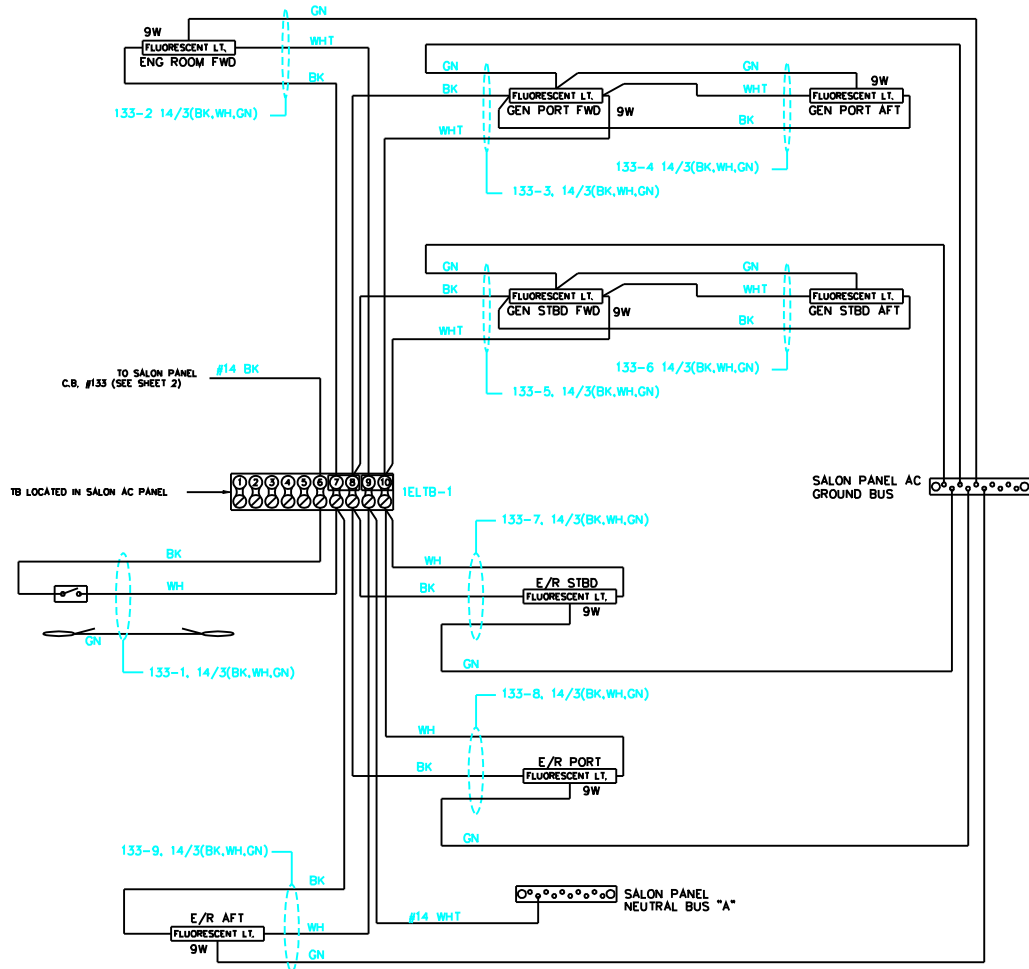
WIRING: 220VAC, EURO

SCALE	NONE	SHT 10 OF 15	REV
-------	------	--------------	-----

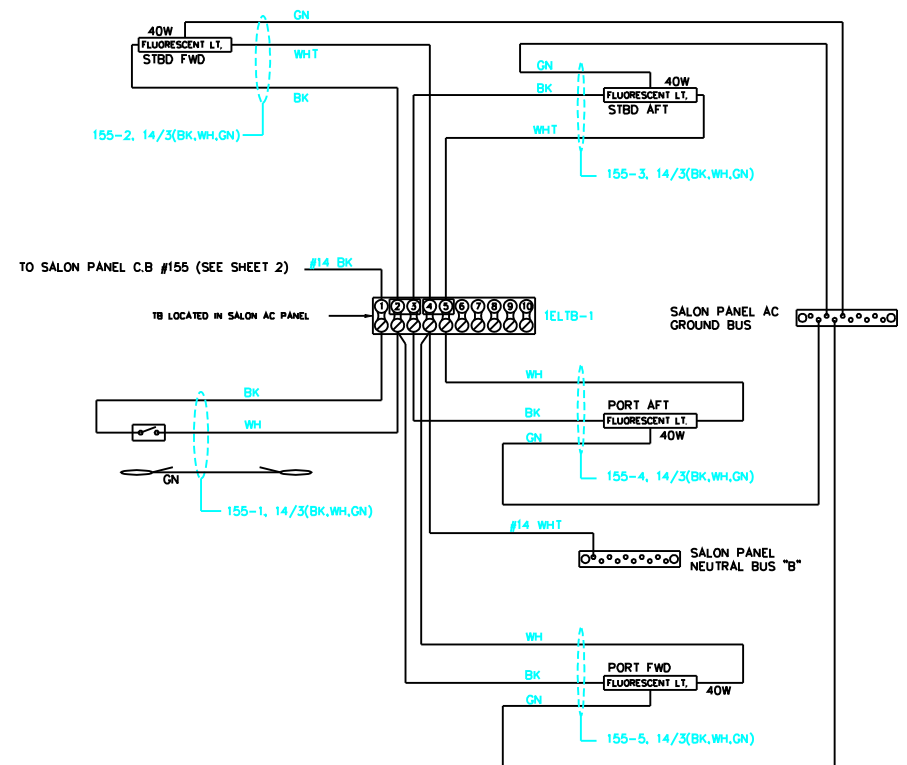
BY MB	Appy		D	124385U	
-------	------	--	---	---------	--


DATE	5/15/02		D	12438EU
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# ENGINE ROOM SMALL AC LIGHTS

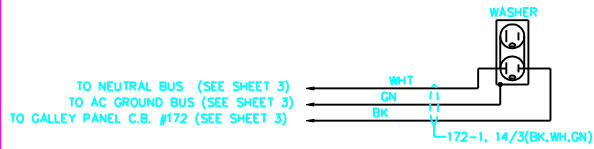


# ENGINE ROOM BIG AC LIGHTS

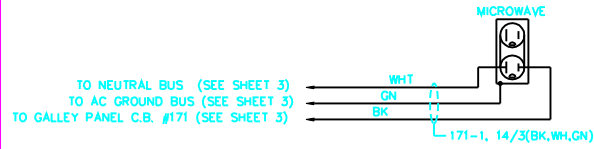


NOTES			
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA			
MODEL	670		
TITLE	WIRING, 220VAC, EURO		
SCALE	NONE	SHT	11 OF 15 REV
BY	MB	APPY	
DATE	5/15/02		D 12438EU

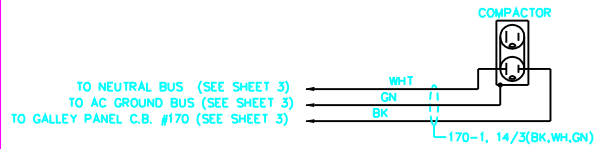
## CLOTHES WASHER



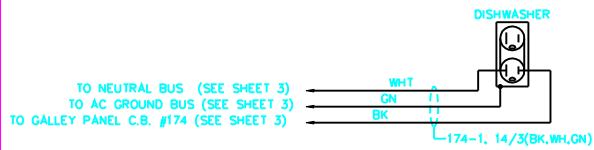
## MICREOWAVE



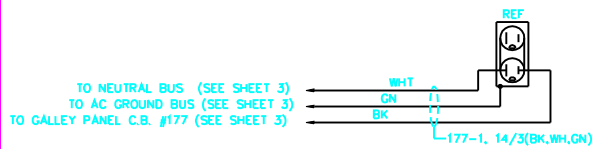
## COMPACTOR



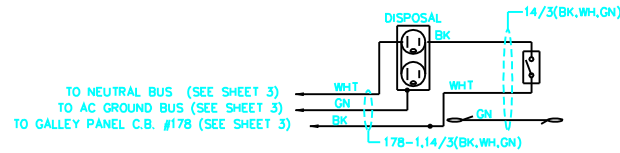
## DISH WASHER



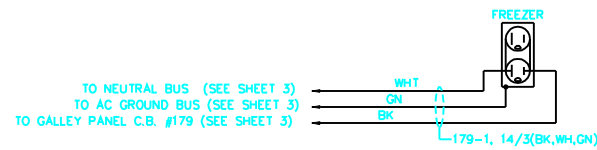
## REFRIGERATOR



## DISPOSAL



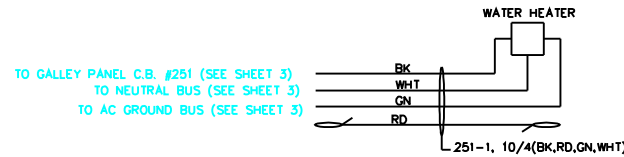
## FREEZER



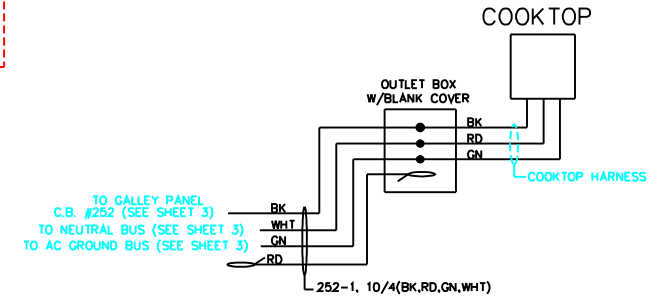
## DRYER



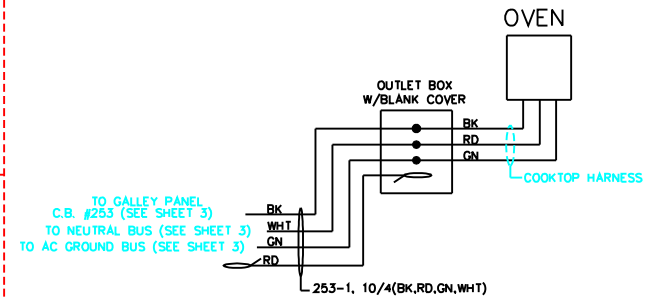
## WATER HEATER




## COOKTOP



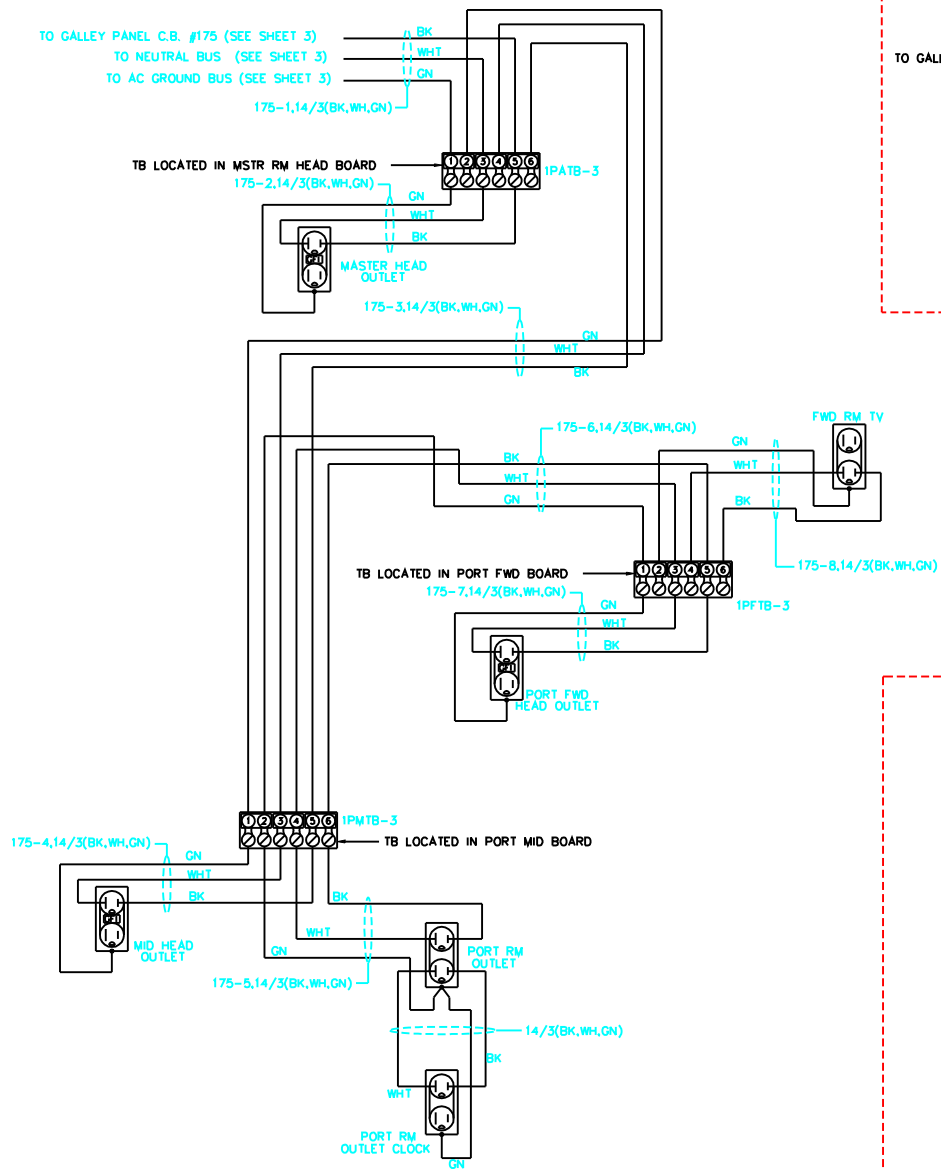
## OVEN



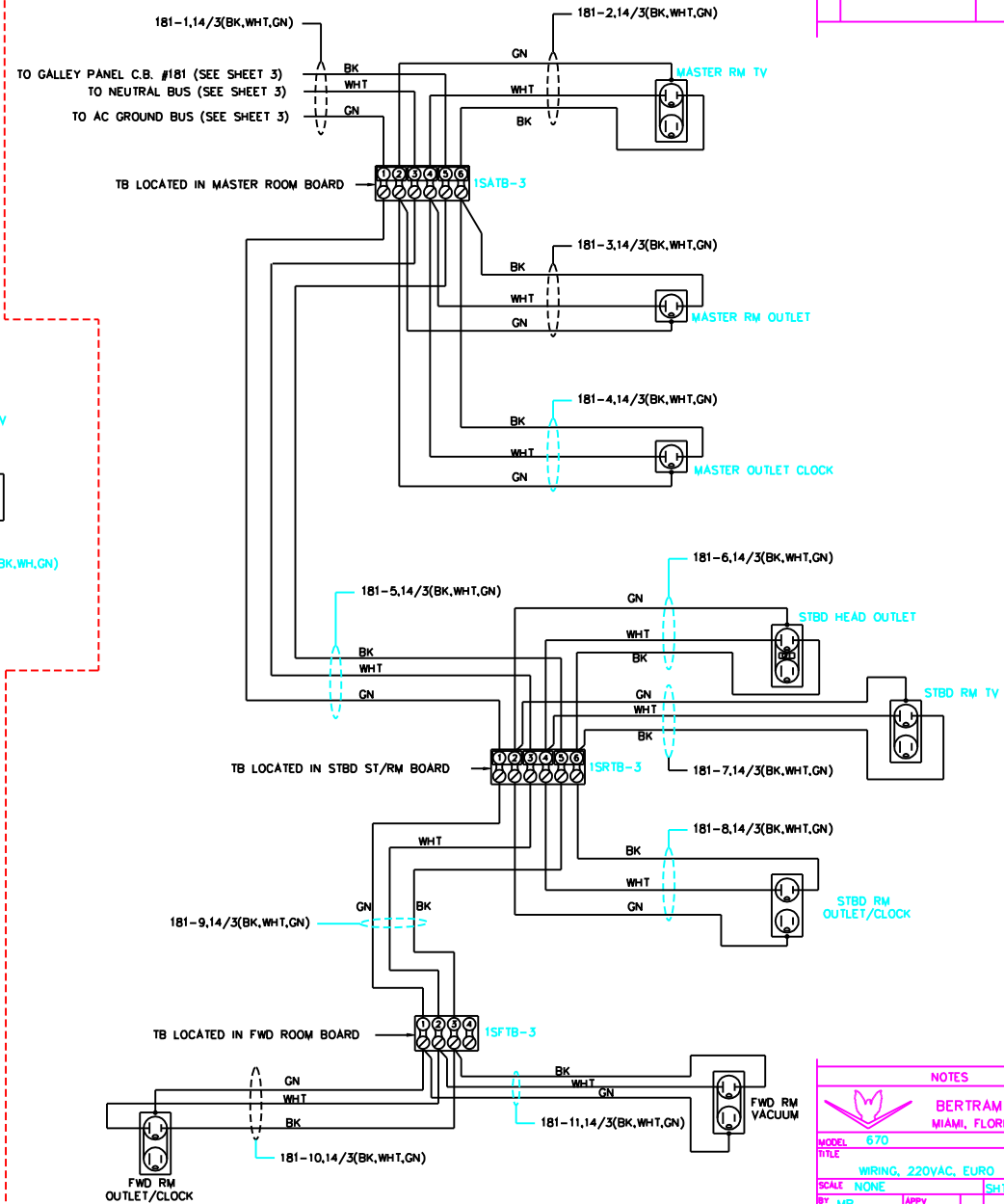
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.

NOTES				
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA				
MODEL	670			
TITLE	WIRING, 220VAC, EURO			
SCALE	NONE	SHT 12 OF 15		REV.
BY	MB	APPY	D 12438EU	
DATE	5/15/02			


## PORT OUTLETS



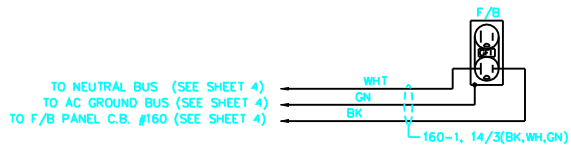
## STBD OUTLETS



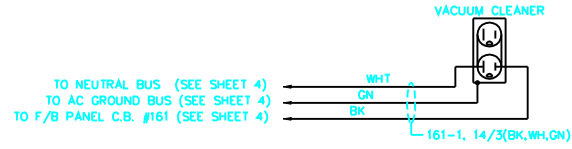
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.

NOTES				
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA				
MODEL	670			
TITLE	WIRING, 220VAC, EURO			
SCALE	NONE	SHT 13 OF 15		REV
BY	MB	APPY	D 12438EU	
DATE	5/15/02			

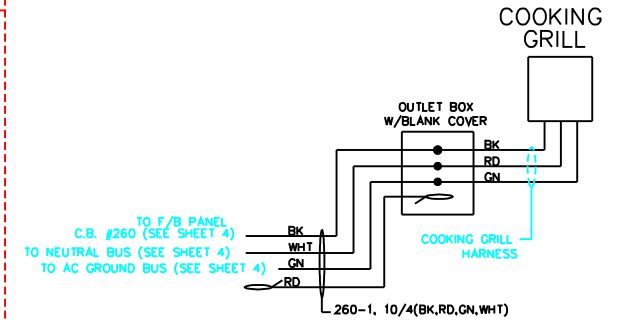
## F/B OUTLET (OPEN F/B ONLY)



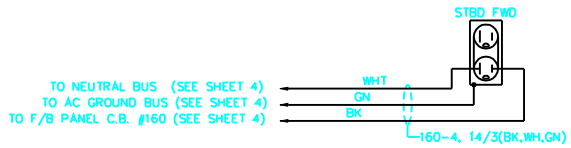
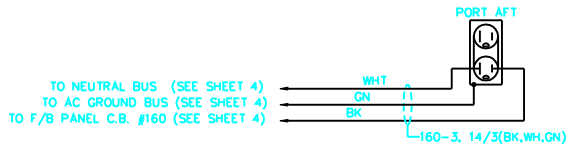
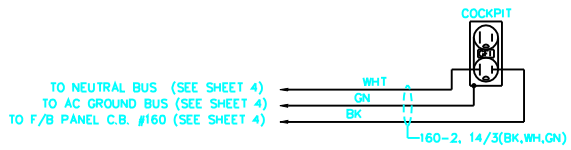
## F/B VACUUM CLEANER (ENCLOSED F/B ONLY)



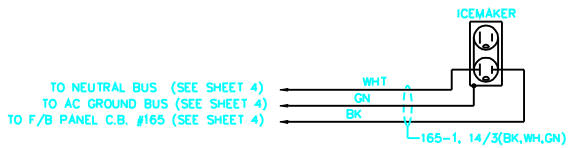
## F/B COOKING GRILL (OPEN F/B ONLY)



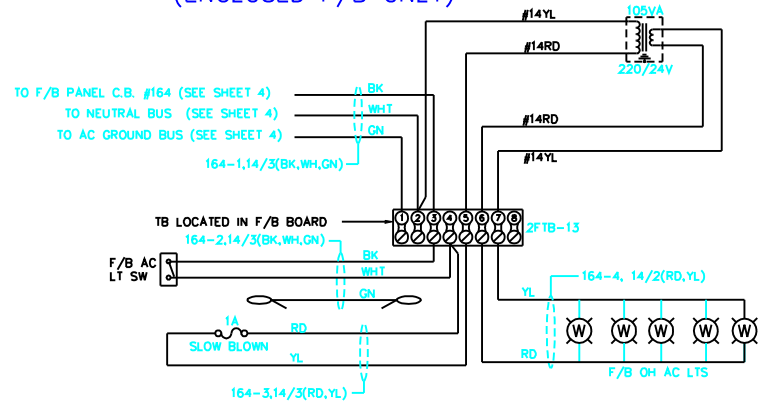
## F/B OUTLET(ENCLOSED F/B ONLY)



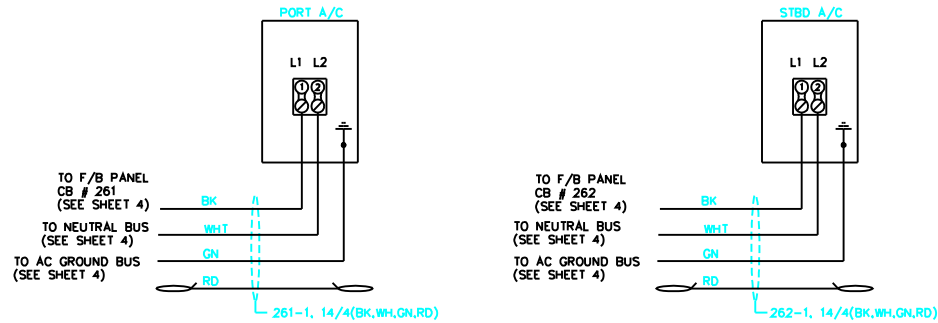
## F/B ICEMAKER (ENCLOSED F/B ONLY)




## F/B AC LIGHTS (ENCLOSED F/B ONLY)



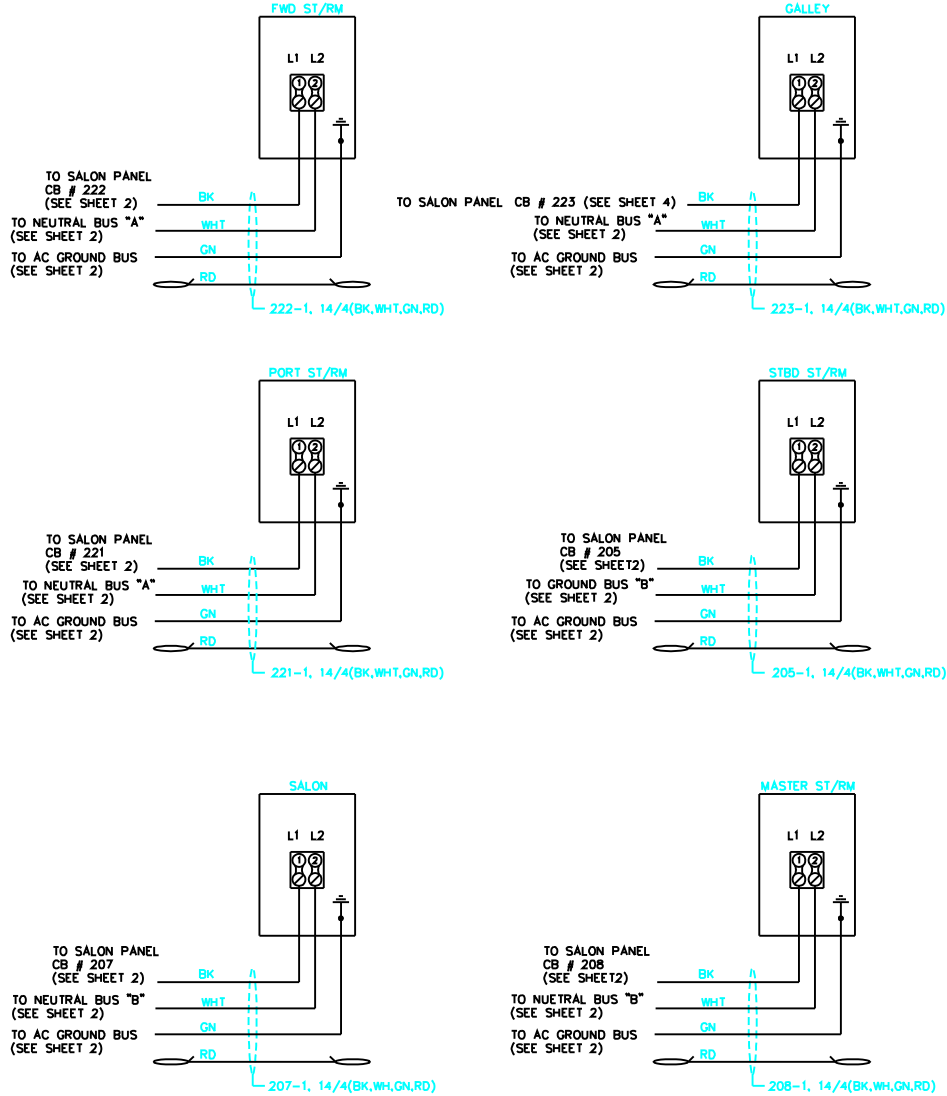
## F/B AIR COND (ENCLOSED F/B ONLY)



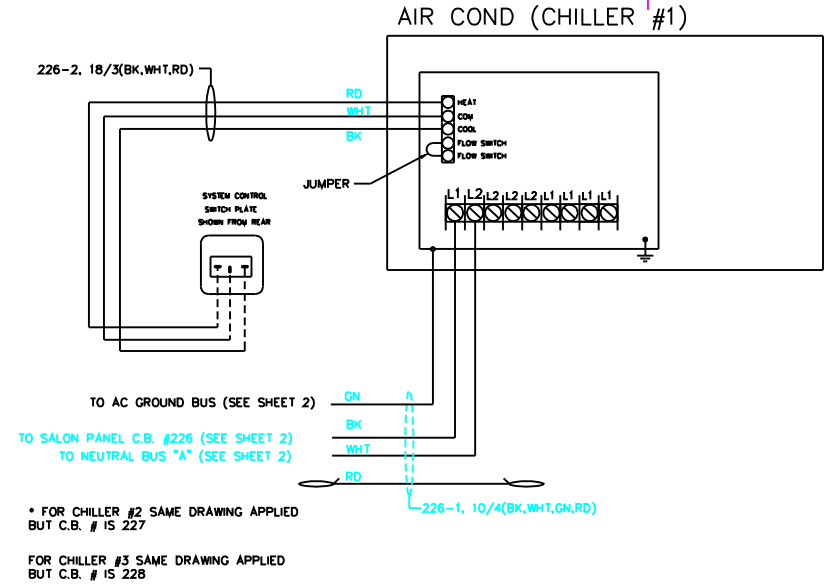
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.

NOTES				
		BERTRAM YACHT MIAMI, FLORIDA, USA		
MODEL	670			
TITLE	WIRING, 220VAC, EURO			
SCALE	NONE		SHT 14 OF 15	REV
BY	MB	APPY	D	12438EU
DATE	5/15/02			

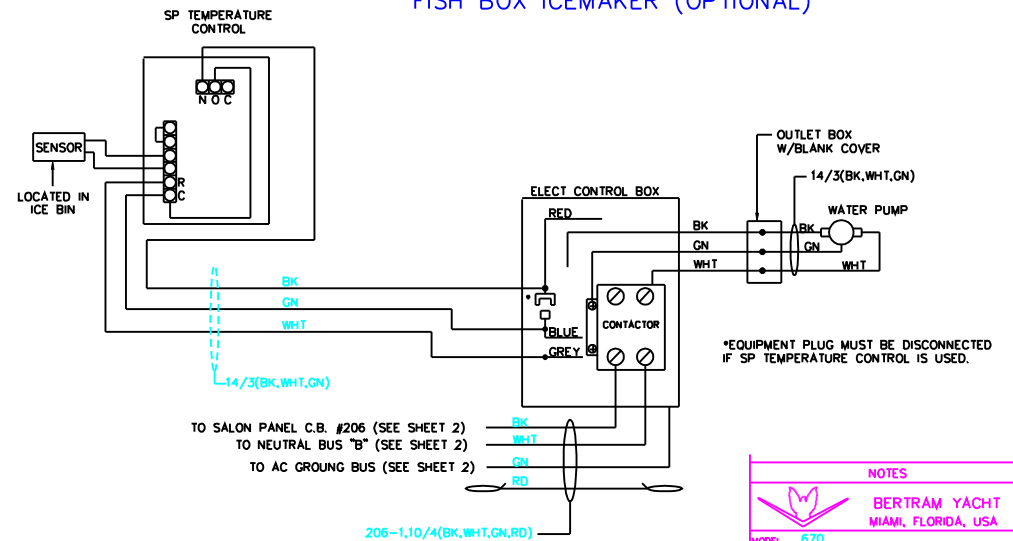
## AIR COND (AIR HANDLERS)



## AIR COND (CHILLERS)



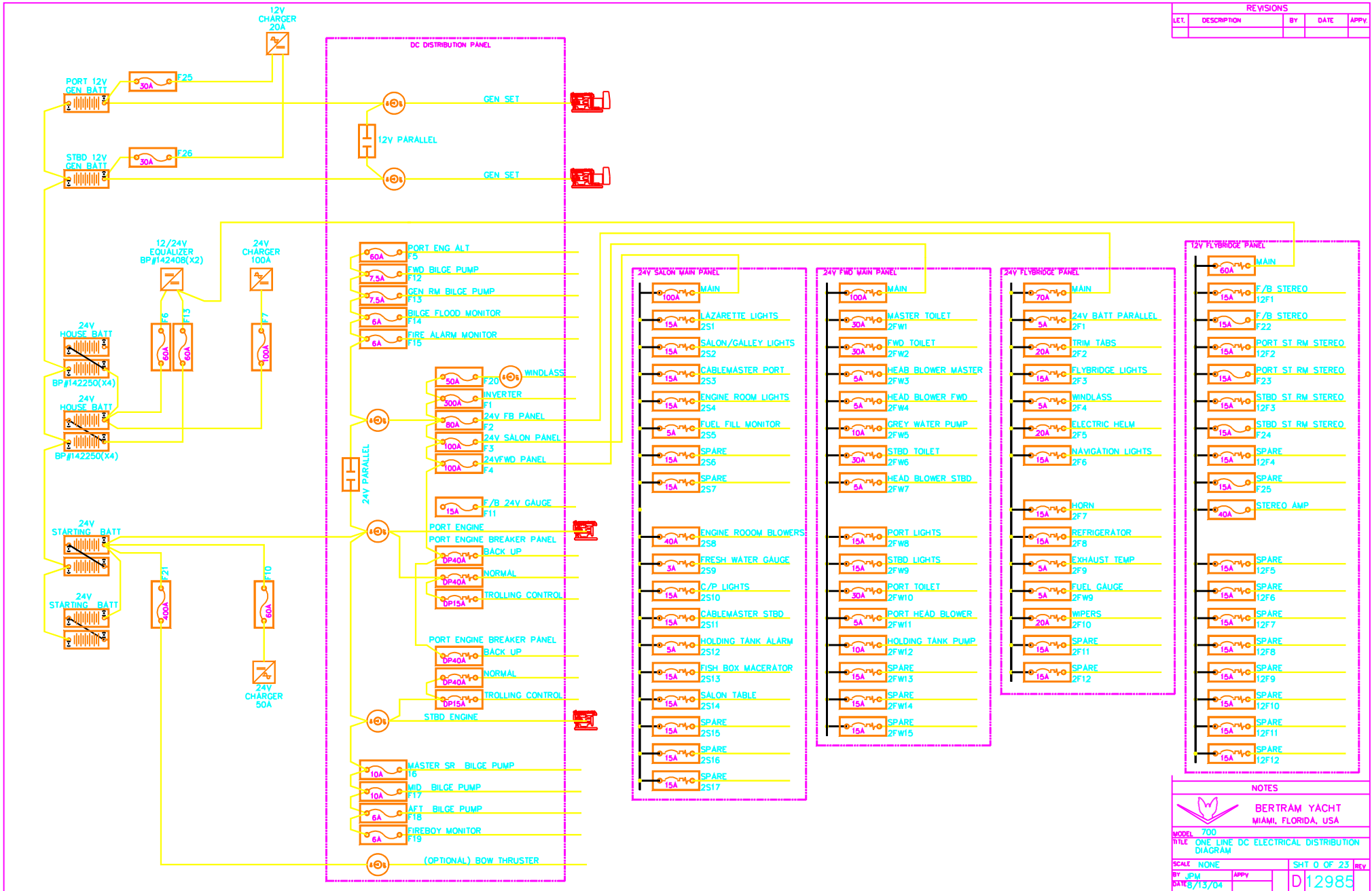
## FISH BOX ICEMAKER (OPTIONAL)



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.

NOTES				
BERTRAM YACHT				
MIAMI, FLORIDA, USA				
MODEL	670			
TITLE	WIRING, 220VAC, EURO			
SCALE	NONE			
BY	MB	APPY		
DATE	5/15/02		D	12438EU





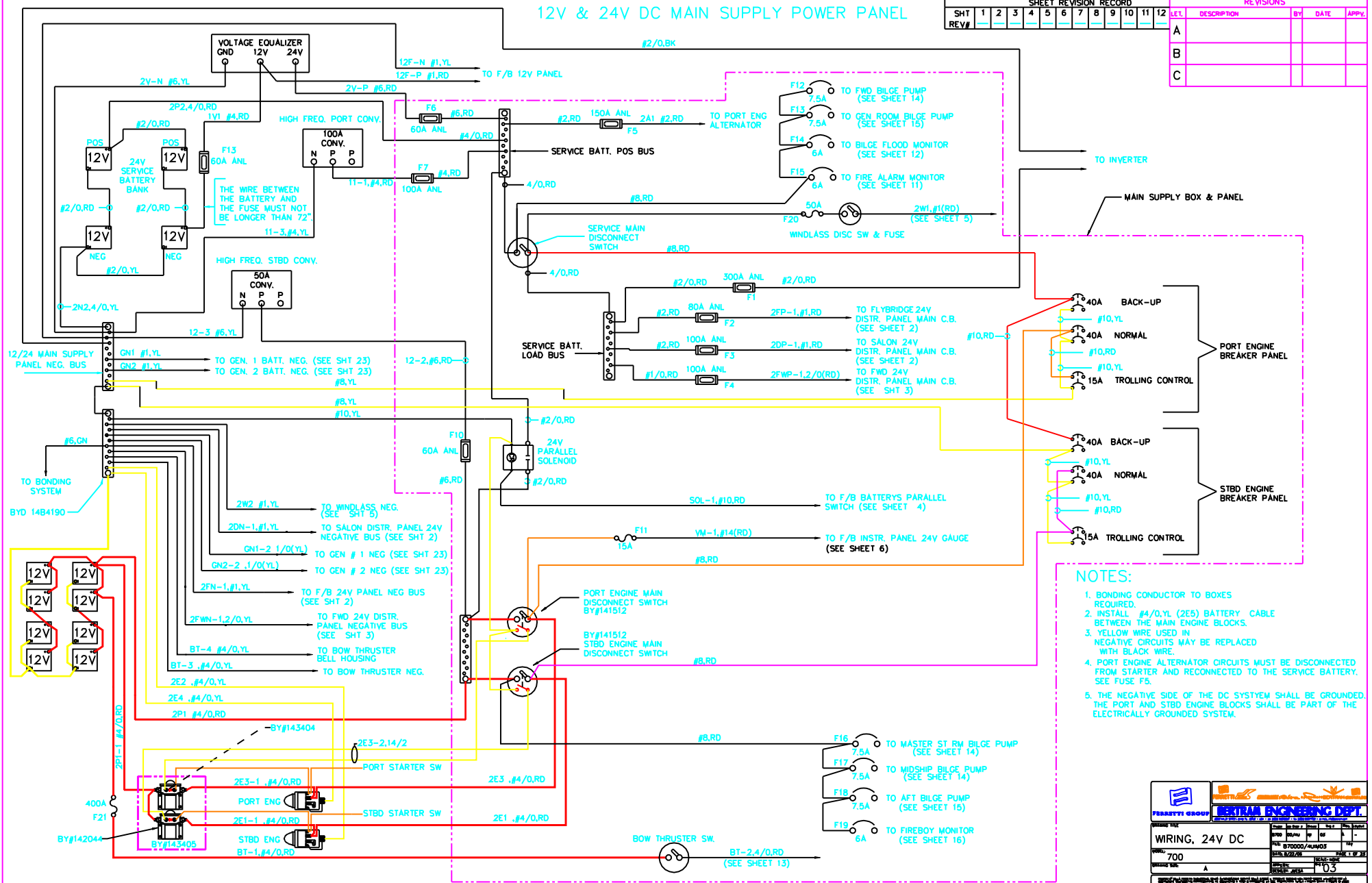
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.

60A	MAIN
15A	F/B STEREO 12F1
15A	F/B STEREO 12F2
15A	PORT ST RM STEREO 12F3
15A	PORT ST RM STEREO 12F4
15A	STBD ST RM STEREO 12F5
15A	STBD ST RM STEREO 12F6
15A	SPARE 12F7
15A	SPARE 12F8
15A	SPARE 12F9
15A	SPARE 12F10
15A	SPARE 12F11
15A	SPARE 12F12

NOTES	
BERTRAM YACHT MIAMI, FLORIDA, USA	
MODEL 700	
TITLE ONE LINE DC ELECTRICAL DISTRIBUTION DIAGRAM	
SCALE NONE	SHT 0 OF 23 REV.
BY JPM	APPV.
DATE 8/13/04	D12985

# 12V & 24V DC MAIN SUPPLY POWER PANEL

SHEET REVISION RECORD												REVISIONS					
SHT	1	2	3	4	5	6	7	8	9	10	11	12	LET.	DESCRIPTION	BY	DATE	APPV.
REV#													A				
													B				
													C				



## NOTES:

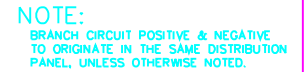
1. BONDING CONDUCTOR TO BOXES REQUIRED.
2. INSTALL #4/O,YL (2E5) BATTERY CABLE BETWEEN THE MAIN ENGINE BLOCKS.
3. YELLOW WIRE USED IN NEGATIVE CIRCUITS MAY BE REPLACED WITH BLACK WIRE.
4. PORT ENGINE ALTERNATOR CIRCUITS MUST BE DISCONNECTED FROM STARTER AND RECONNECTED TO THE SERVICE BATTERY. SEE FUSE F5.
5. THE NEGATIVE SIDE OF THE DC SYSTEM SHALL BE GROUNDED. THE PORT AND STBD ENGINE BLOCKS SHALL BE PART OF THE ELECTRICALLY GROUNDED SYSTEM.



FERRIS GROUP		MARINE ENGINEERING DEPT.	
WIRING, 24V DC			
DATE	REV	BY	CHK
700	A	BY 070000/ALM03	14
SHEET 1 OF 2		PAGE 1 OF 23	

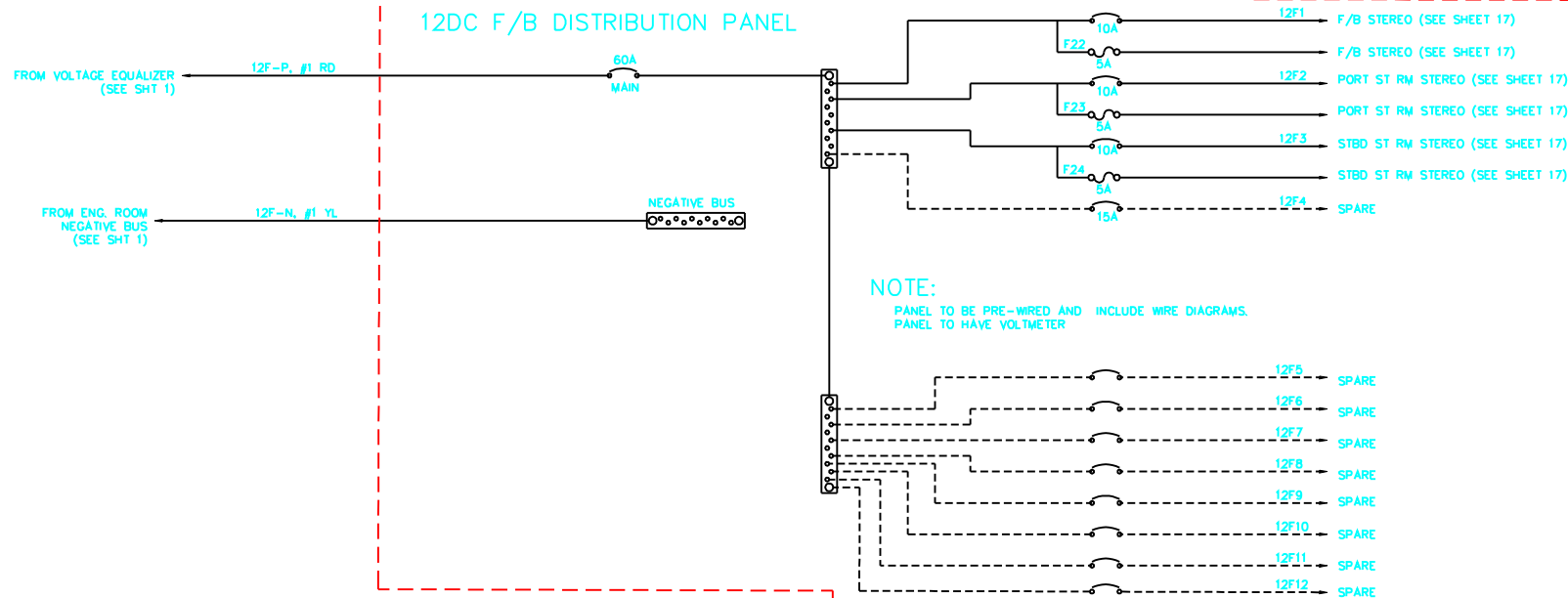
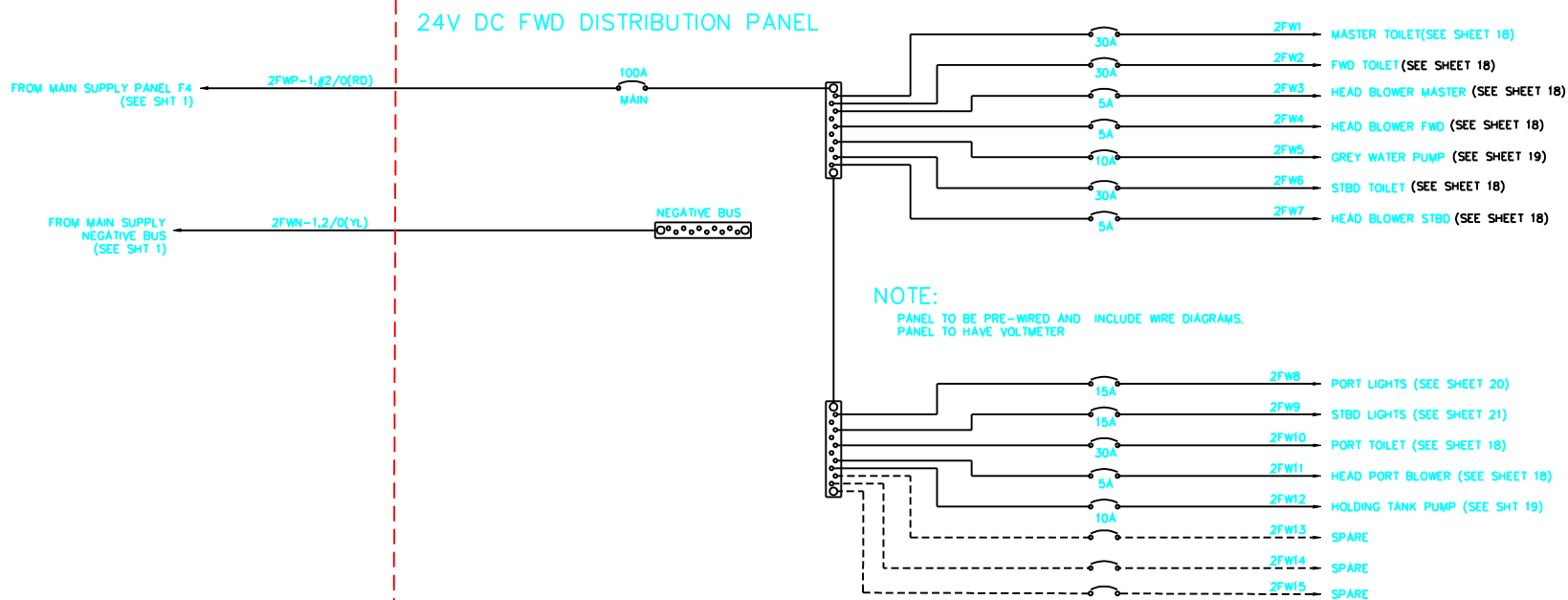
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.



**NOTE:**  
PANEL TO BE PRE-WIRED AND INCLUDE WIRE DIAGRAMS.  
PANEL TO HAVE VOLTMETER



 <b>FERNETTI GROUP</b>	 <b>BENTON ENGINEERING DEPT.</b>			
	<small>INTERNET: WWW.BENTONENGINEERING.COM</small>			
DRAWING NO: <b>WIRING, 24V DC</b>	Client: <b>NOVA</b>	Date: <b>01/04/2014</b>	Page: <b>1</b>	Total: <b>1</b>
PROJECT: <b>700</b>	Project: <b>NOVA</b>	Date: <b>01/04/2014</b>	Page: <b>1</b>	Total: <b>1</b>
DRAWING SET: <b>A</b>	Project: <b>NOVA</b>	Date: <b>01/04/2014</b>	Page: <b>1</b>	Total: <b>1</b>

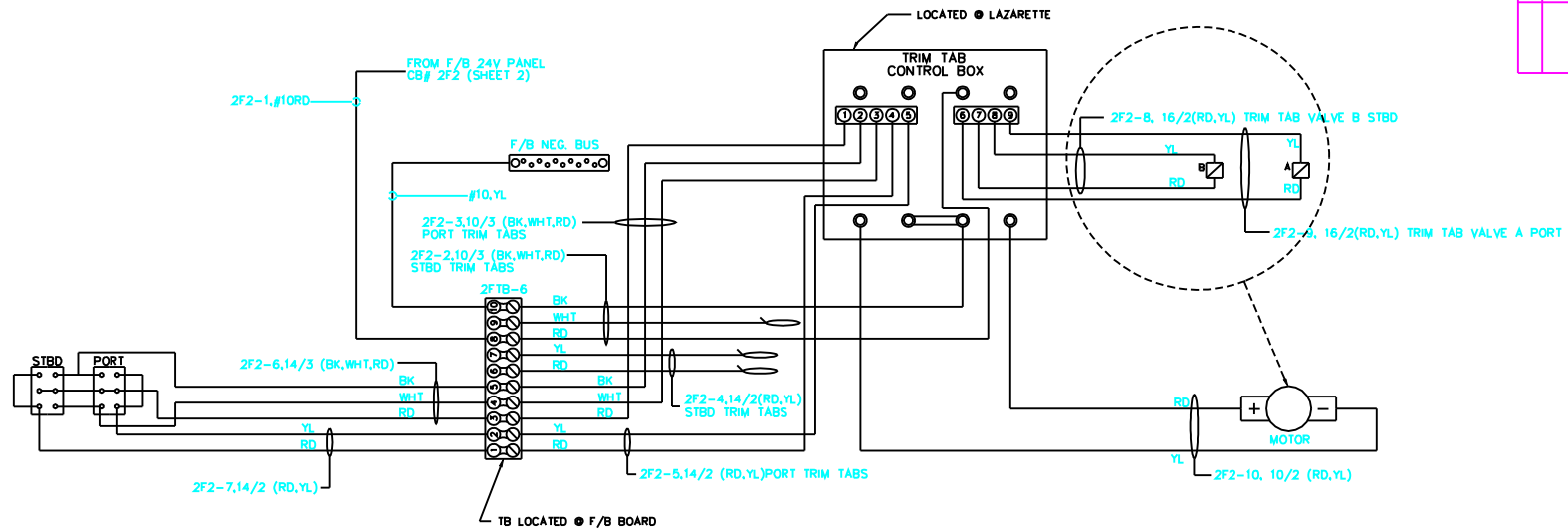


REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.

**NOTE:**  
BRANCH CIRCUIT POSITIVE & NEGATIVE TO ORIGINATE IN THE SAME DISTRIBUTION PANEL, UNLESS OTHERWISE NOTED.

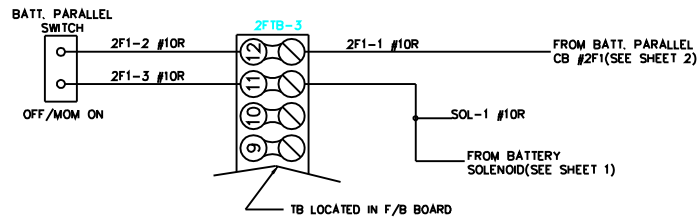
<b>WIRING, 24V DC</b>			
700	A	010000/ALM005	105
DATE: 05/25/05		DATE: 05/25/05	

## TRIM TABS

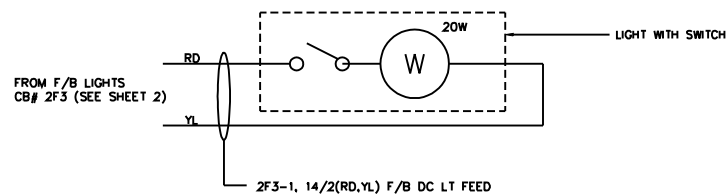


REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.

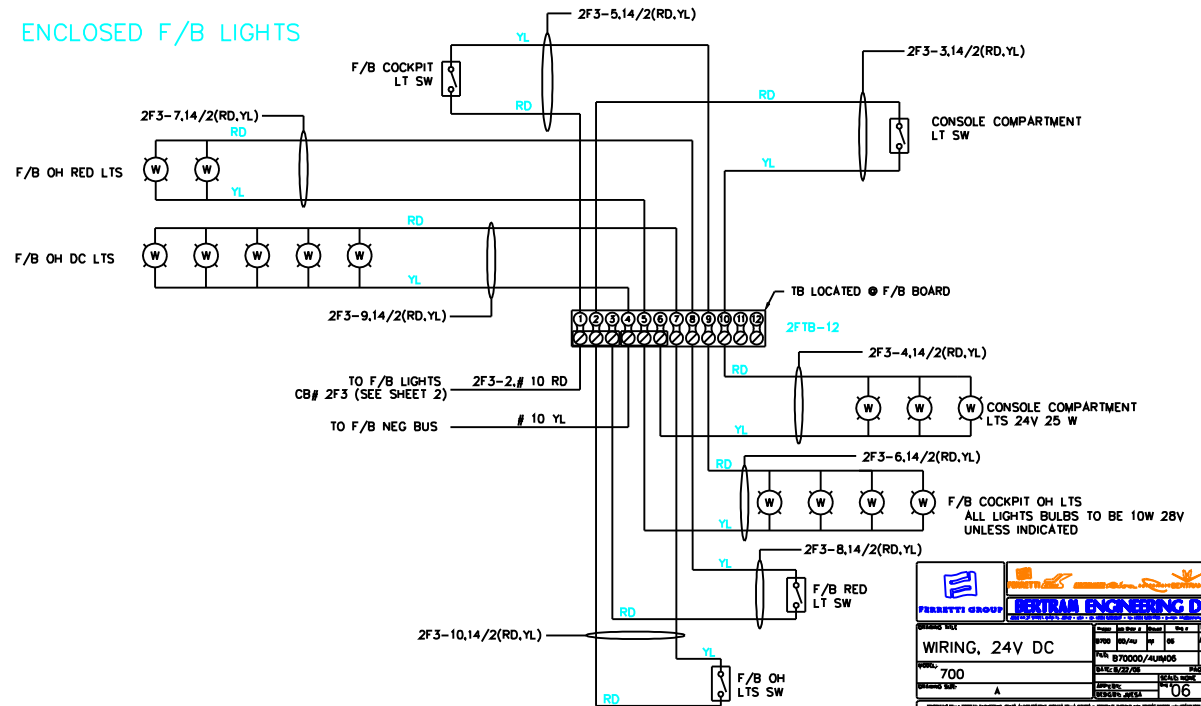
## BATTERY PARALLEL



## F/B LIGHTS

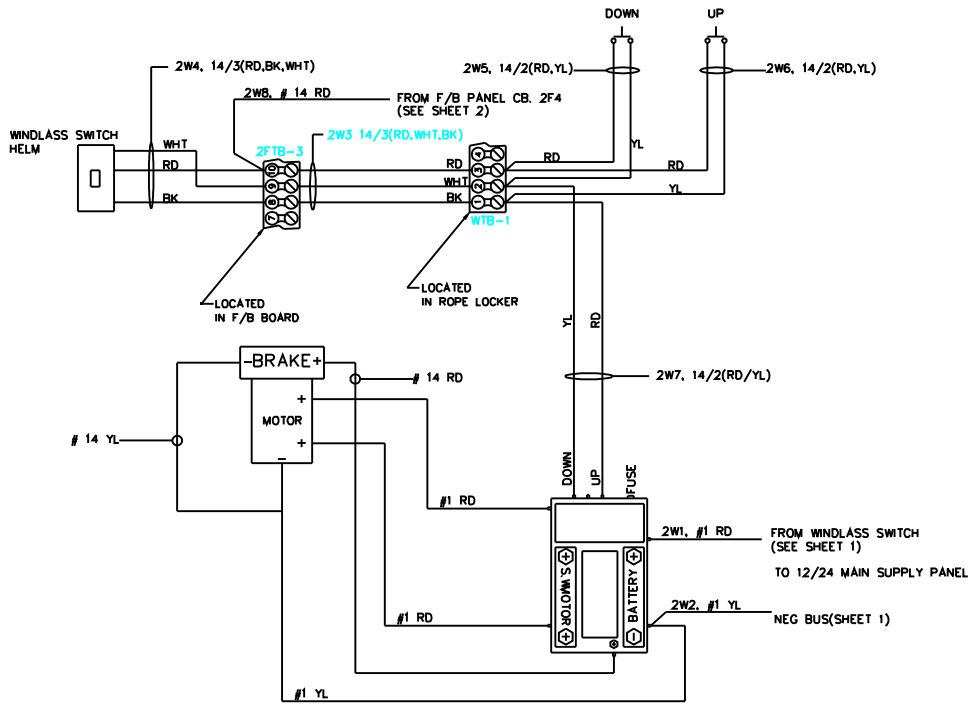


## ENCLOSED F/B LIGHTS

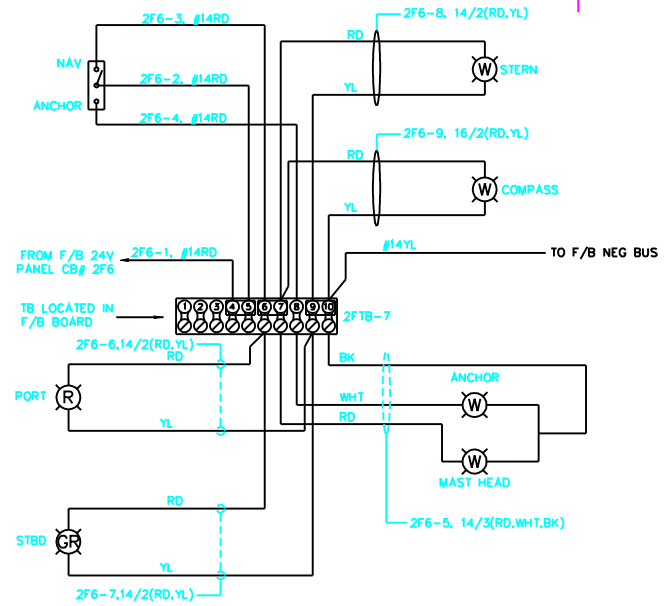


WIRING, 24V DC		DATE	BY	CHK	APP
700	8/10/00/ALM/005	1	06		

SIMPSON LAWRENCE WINDLASS

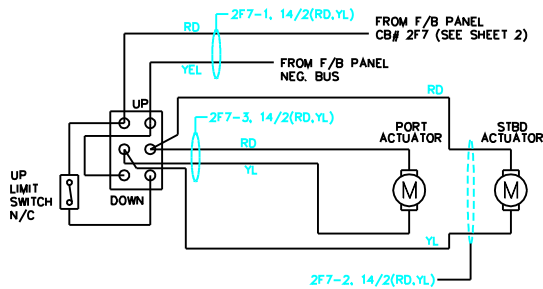


## NAVIGATION LIGHTS

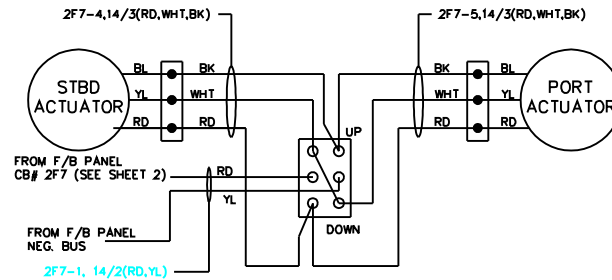


REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPLY.

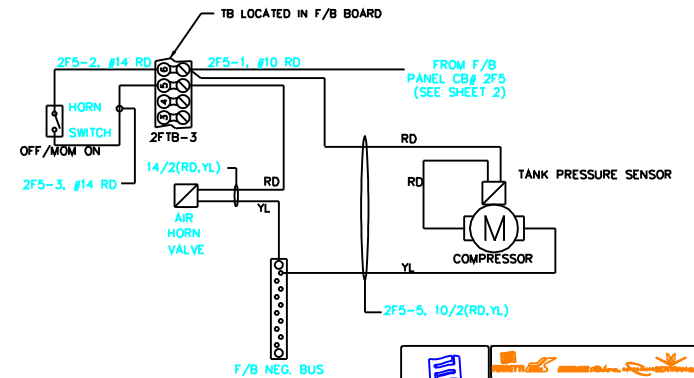
ELECTRIC HELM  
HULL# 1 & 2







## ELECTRIC HELM

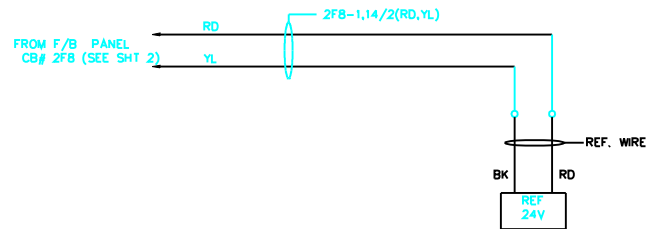


## HORN

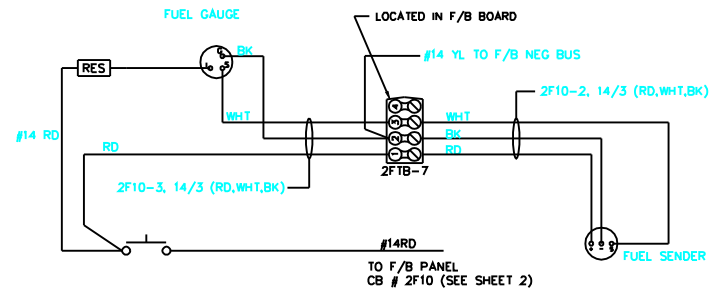


 <b>FIRESTY GROUP</b>	  																						
	<b>BERKLIN ENGINEERING DEPT.</b>																						
Drawing No. <b>WIRING, 24V DC</b>	<table border="1"> <thead> <tr> <th>Order</th> <th>No</th> <th>Part</th> <th>Q'ty</th> <th>Unit</th> <th>Price</th> <th>Amount</th> </tr> </thead> <tbody> <tr> <td>0700</td> <td>00/04</td> <td>01</td> <td>07</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td colspan="7">           Total \$70000/40007         </td> </tr> </tbody> </table>		Order	No	Part	Q'ty	Unit	Price	Amount	0700	00/04	01	07	-	-	-	Total \$70000/40007						
Order	No	Part	Q'ty	Unit	Price	Amount																	
0700	00/04	01	07	-	-	-																	
Total \$70000/40007																							
Price <b>700</b>	Date <b>8/22/08</b> Page <b>1 of 1</b> Drawing No. <b>107</b>																						

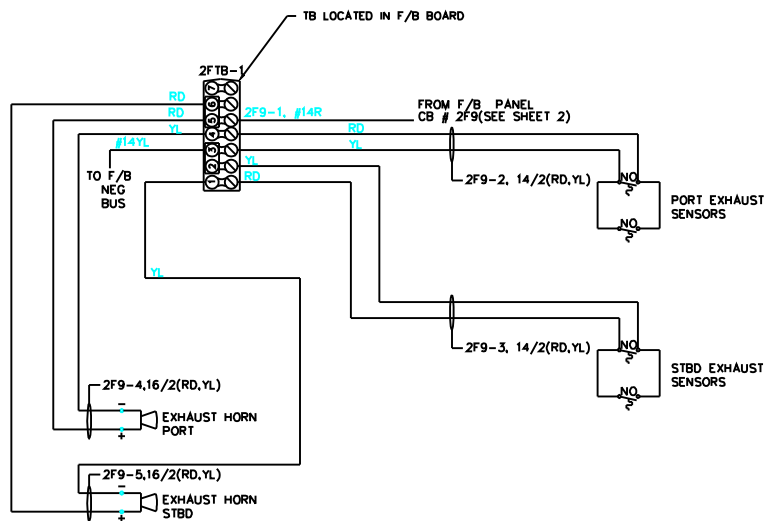
## F/B REFRIGERATOR



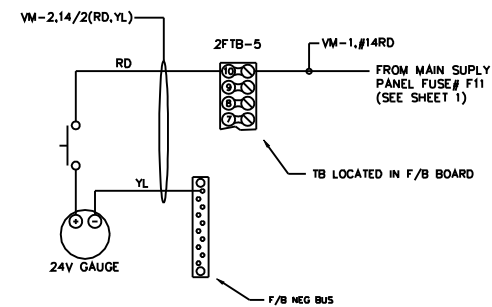
## FUEL GAUGE



## ENGINE EXHAUST SENSORS



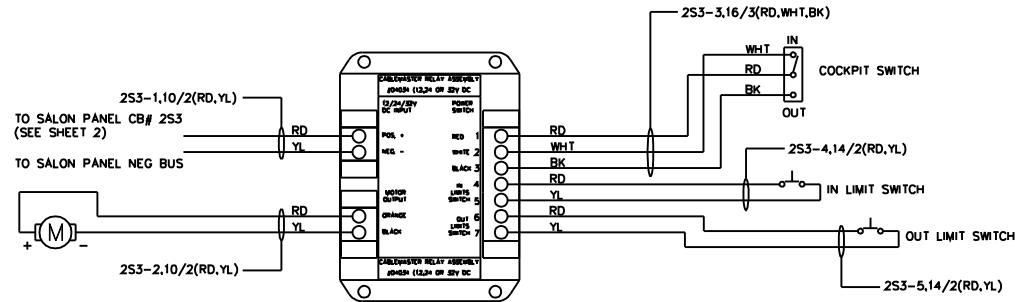
## 24V GAUGE



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.

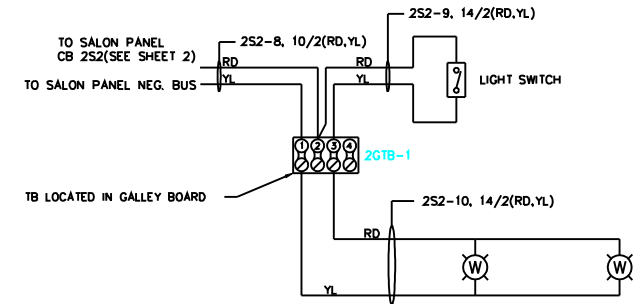
<b>PIERANTTI GROUP</b>		<b>BERTRAM ENGINEERING DEPT.</b>	
WIRING, 24V DC	DATE: 8/20/08	BY: J. J. J.	CHK: J. J. J.
700	DATE: 8/20/08	BY: J. J. J.	CHK: J. J. J.
A	DATE: 8/20/08	BY: J. J. J.	CHK: J. J. J.
<b>BERTRAM ENGINEERING DEPT.</b>		<b>BERTRAM ENGINEERING DEPT.</b>	

## CABLEMASTER — SEE NOTE

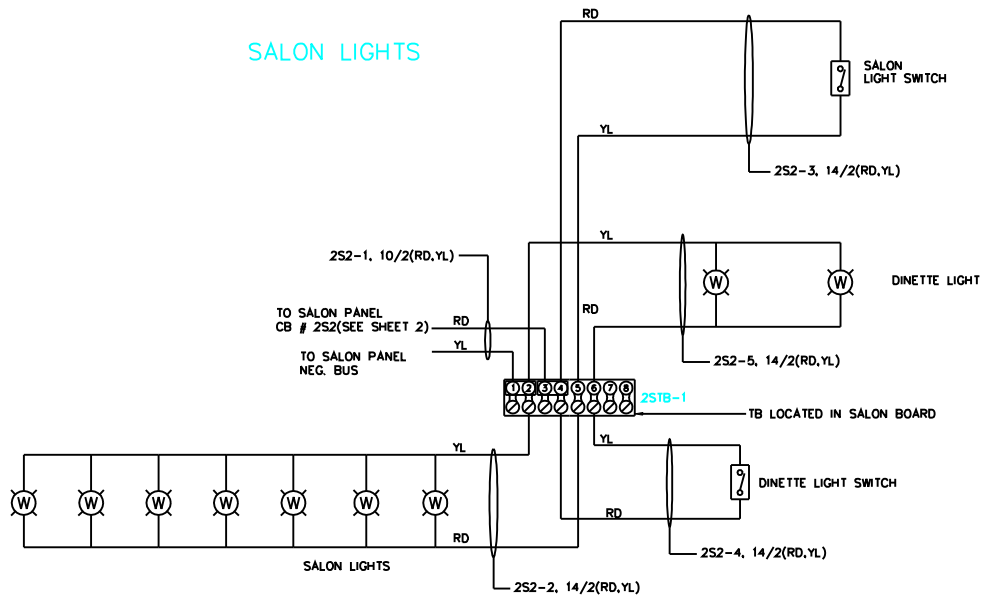


NOTE:  
PORT CABLEMASTER SHOWN  
STBD IS CB# 2511

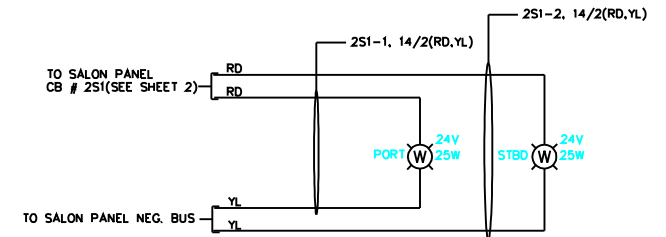
## GALLEY LIGHTS



## SALON LIGHTS



## LAZARETTE LIGHTS



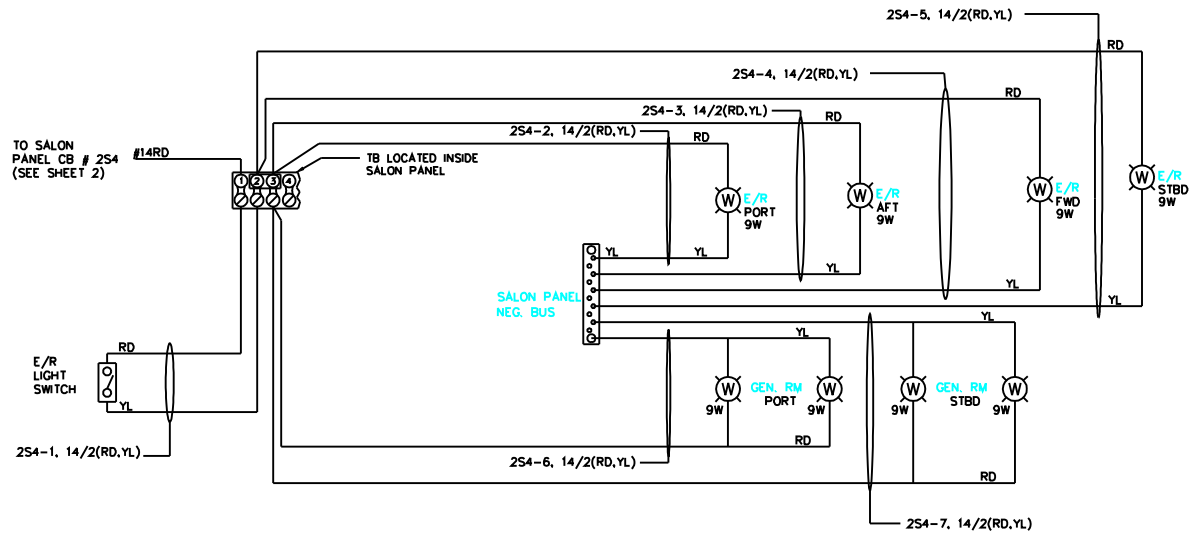
ALL LIGHT BULBS TO BE 10W 28W  
UNLESS INDICATED

NOTE:  
LAZARETTE LIGHTS ARE OPERATED  
FROM SALON PANEL CIRCUIT BREAKER

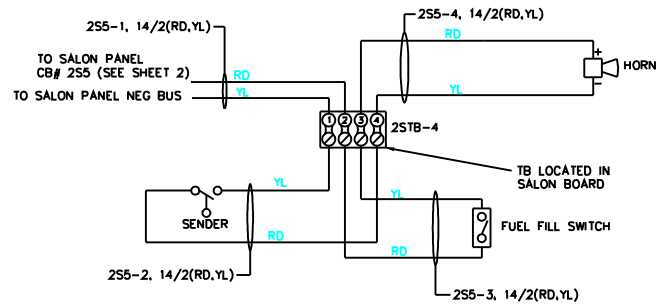
REVISIONS		LET.	DESCRIPTION	BY	DATE	APPY.
1	WIRING, 24V DC					
2	700					
3	A					



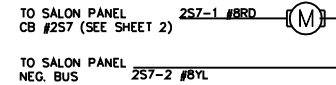
# ENG ROOM LIGHTS



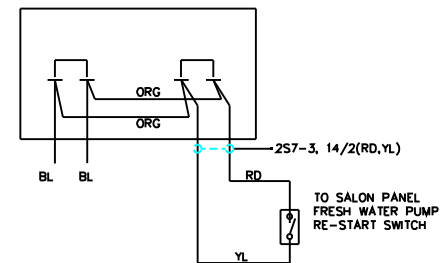
## FUEL FILL



## FRESH WATER PUMP



## FRESH WATER PUMP PRESSURE SWITCH

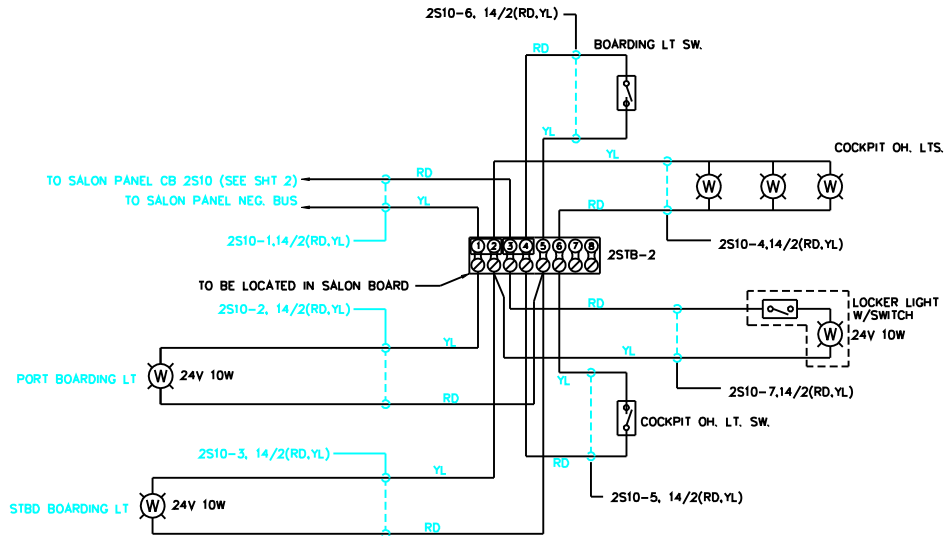


BLUE & ORANGE WIRES  
ARE ALREADY IN EXISTENCE IN THE  
PRESSURE PUMP CIRCUIT

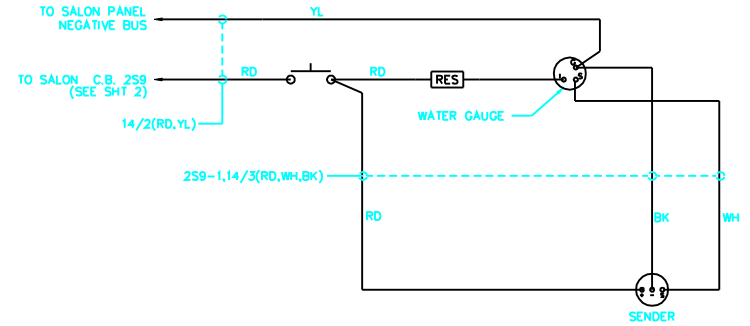
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.

<b>WIRING, 24V DC</b> <b>700</b> <b>A</b>	<b>DATE</b> <b>10/10/2020</b> <b>10/10/2020</b>	<b>BY</b> <b>10/10/2020</b> <b>10/10/2020</b>	<b>APPY.</b> <b>10/10/2020</b> <b>10/10/2020</b>

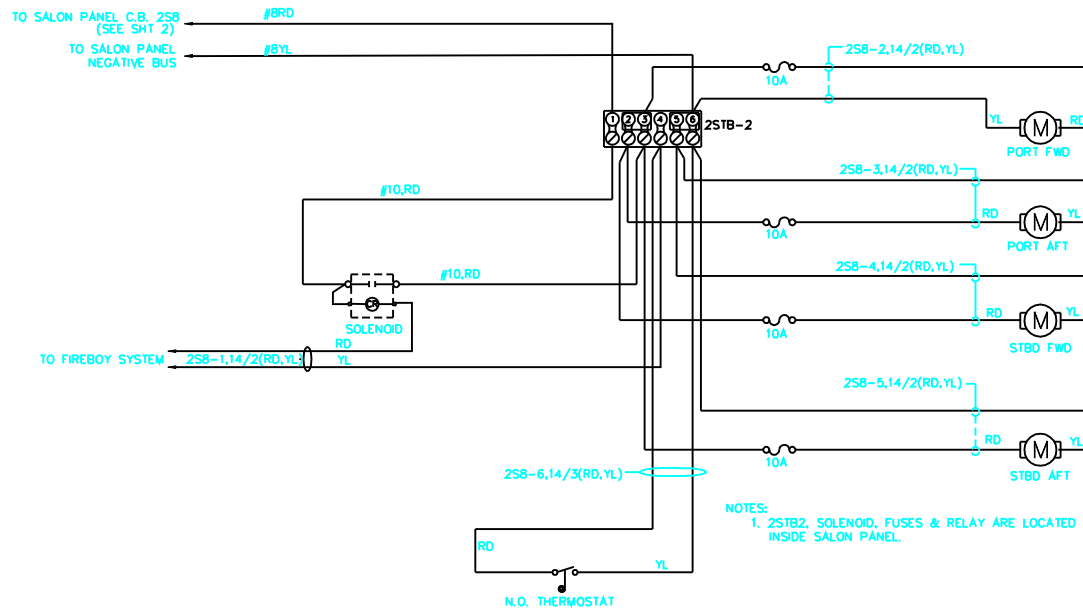
## COCKPIT & BOARDING LIGHTS



## WATER GAUGE




## ENGINE ROOM AUTOMATIC BLOWERS



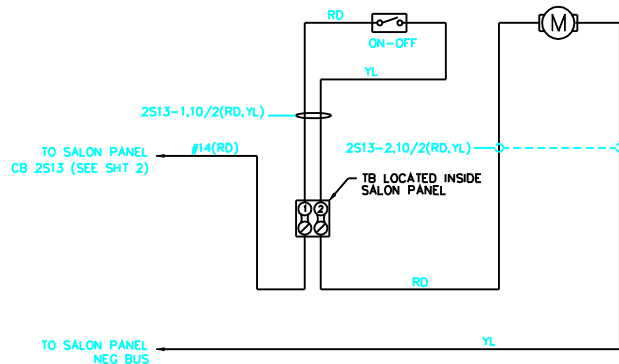
NOTES:  
1. 25TB2, SOLENOID, FUSES & RELAY ARE LOCATED INSIDE SALON PANEL.

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.
A	EN RM BLOWER WIRING	JPM	7/13/06	-

ALL LIGHT BULBS TO BE 10W 28V UNLESS INDICATED

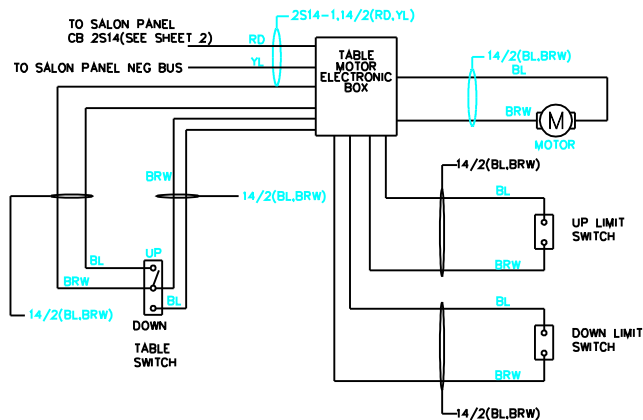
NOTES				
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA				
MODEL	700			
TITLE	WIRING, 24V DC			
SCALE	NONE	SHIT	9 OF 23	REV
BY	MB	APPY		
DATE	7/31/00			
			D12437	A

## FISH BOX DISCHARGE PUMP



## SALON TABLE

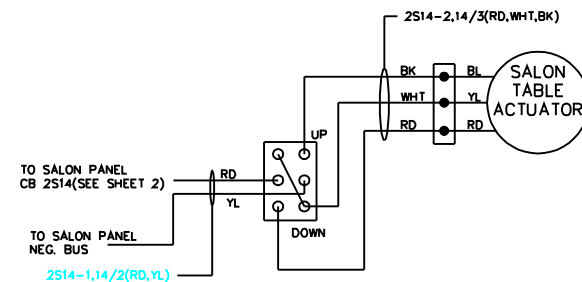
HULL #1-3



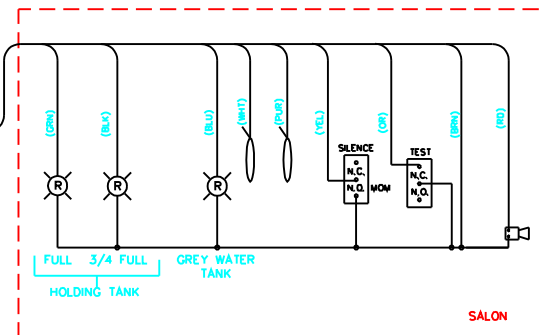
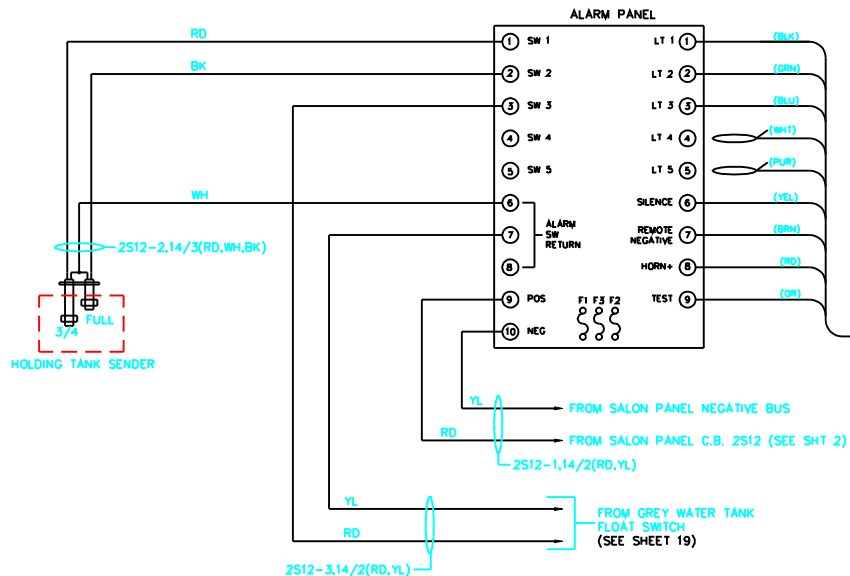
NOTE:  
ALL 14/2 (BL,BRW) WIRES COME WITH EQUIPMENT

## SALON TABLE


HULL #4 & SUBS.



## HOLDING TANK & GREY WATER TANKS MONITOR

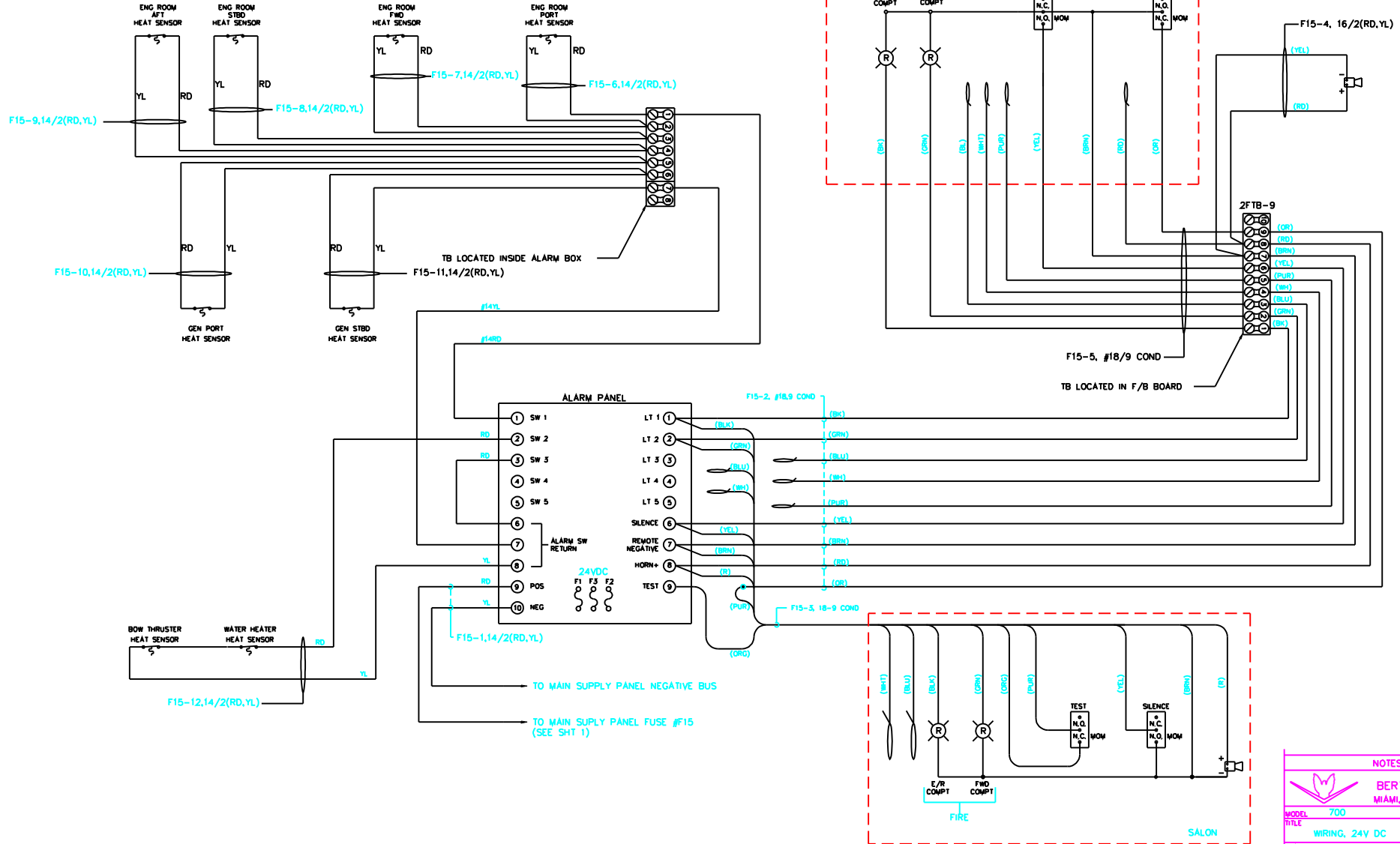


REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPLY

NOTES				
		BERTRAM YACHT MIAMI, FLORIDA, USA		
MODEL	700			
TITLE	WIRING, 24V DC			
SCALE	NONE		SHT 10 OF 23	REV.
BY	MB	APPLY	D12437	
DATE	4/25/01			

# FIRE MONITOR

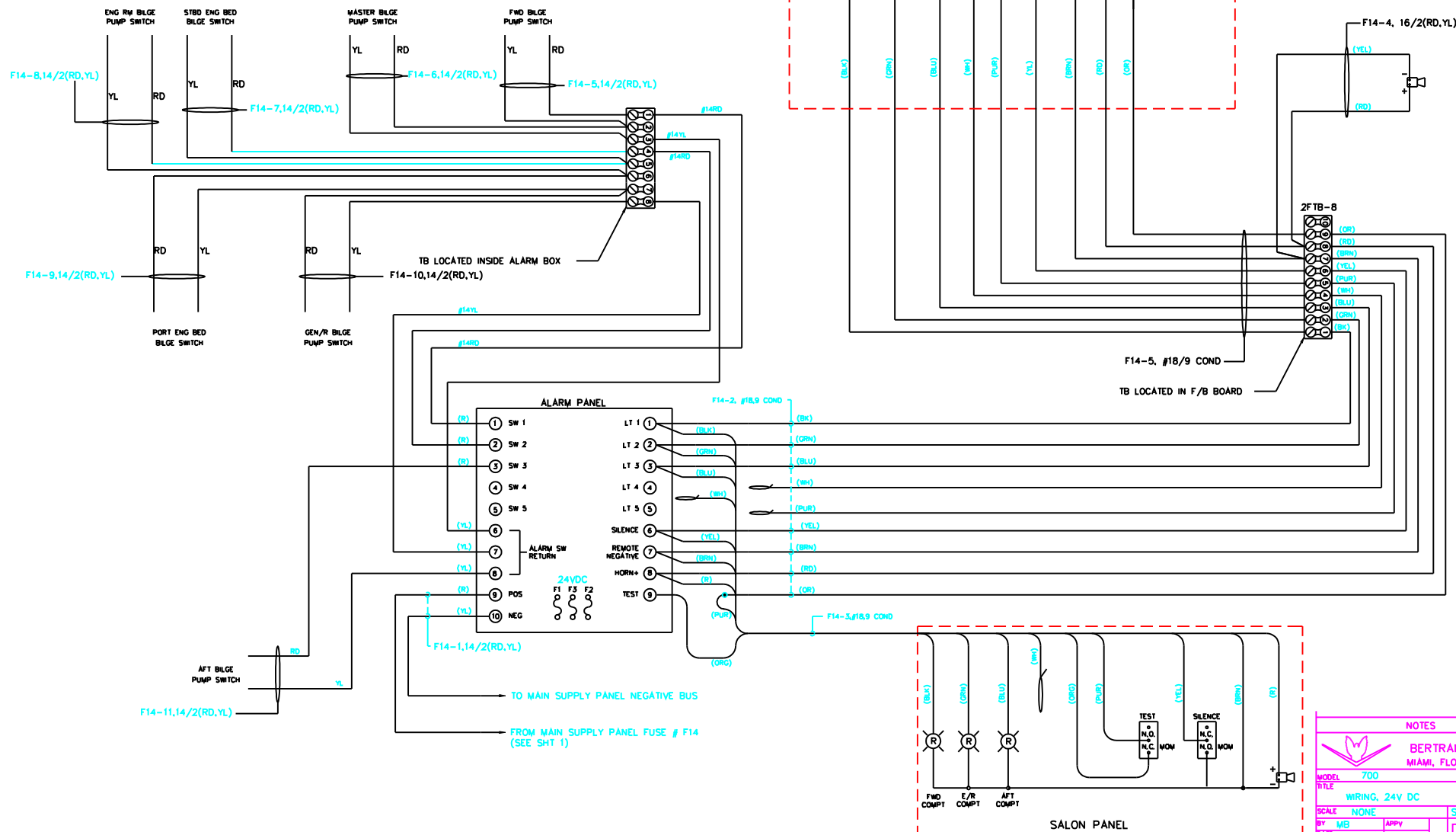
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.




NOTES				
BERTRAM YACHT				
MIAMI, FLORIDA, USA				
MODEL	700			
TITLE	WIRING, 24V DC			
SCALE	NONE	SHT	11 OF 23	REV
BY	MB	APPV		
DATE	4/23/01		D12437	

# BILGE FLOOD MONITOR

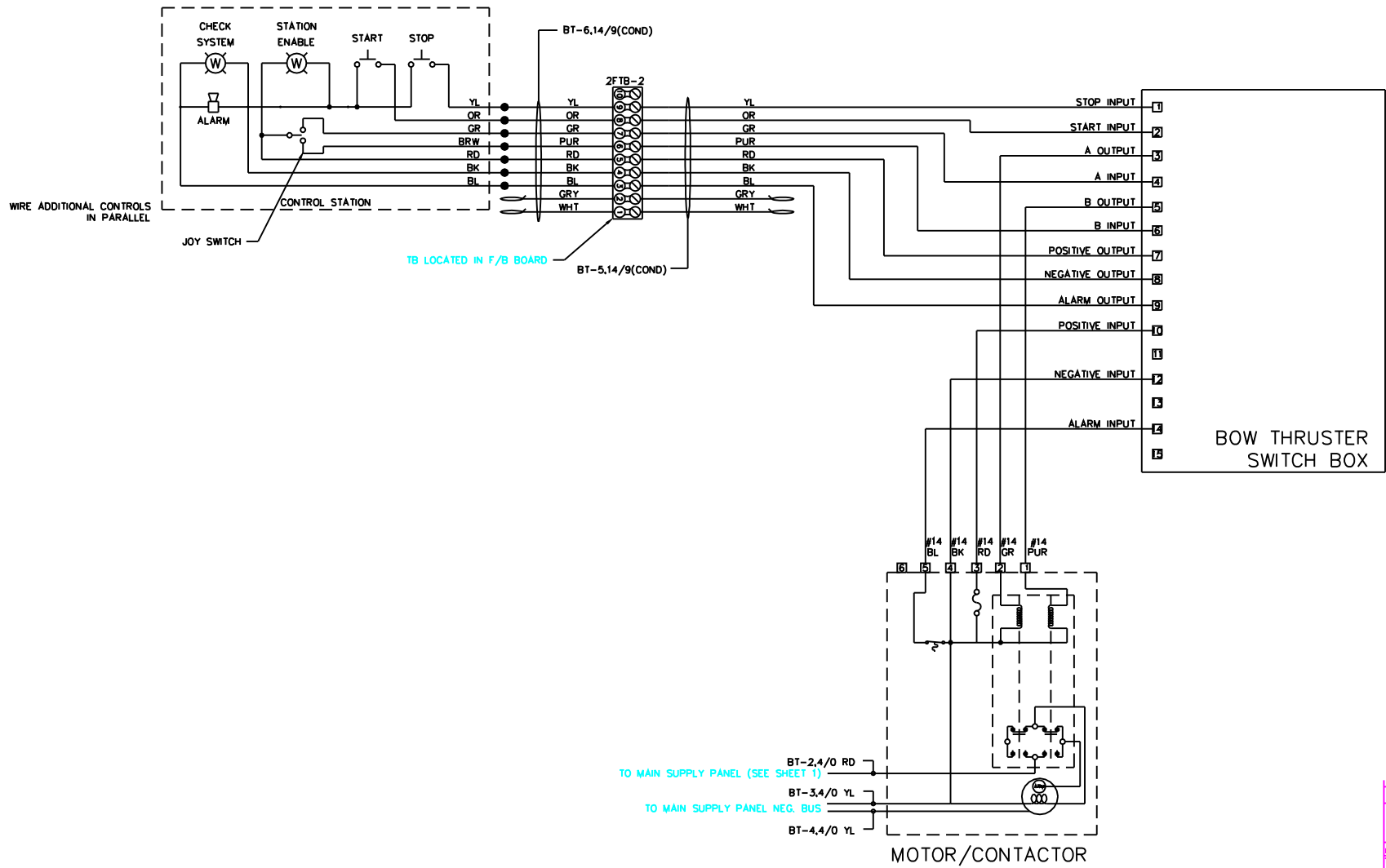
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.




NOTES				
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA				
MODEL	700			
TITLE	WIRING, 24V DC			
SCALE	NONE	SHT	12 OF 23	REV.
BY	MB	APPY		
DATE	4/23/01			
			D12437	

BOW THRUSTER

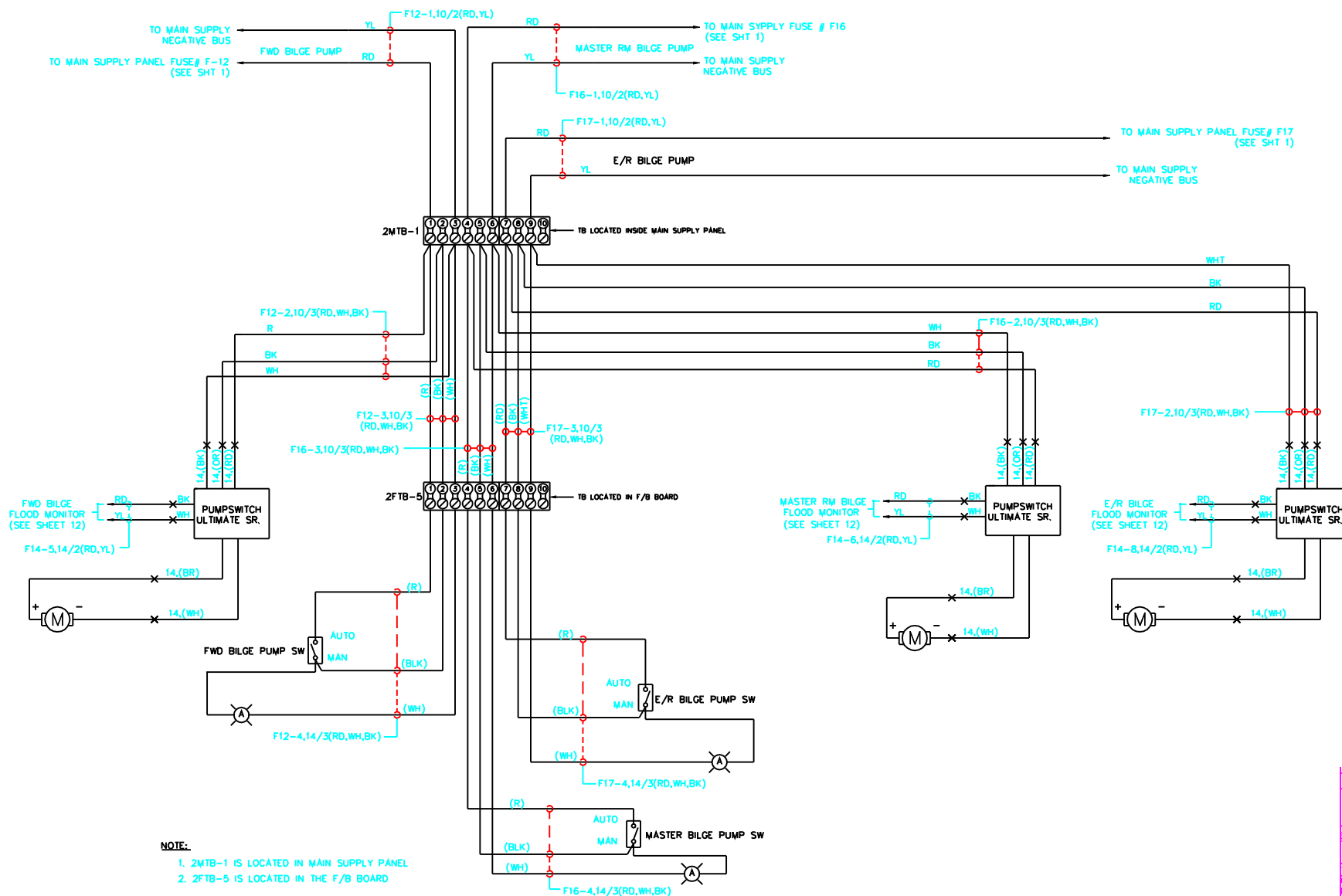
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.




NOTES				
 BERTRAM YACHT MIAMI, FLORIDA, USA				
MODEL	700			
TITLE	WIRING, 24V DC			
SCALE	NONE	SHT	13 OF 23	REV.
BY	MB	APPY		
DATE	4/23/01			
			D12437	

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPR.

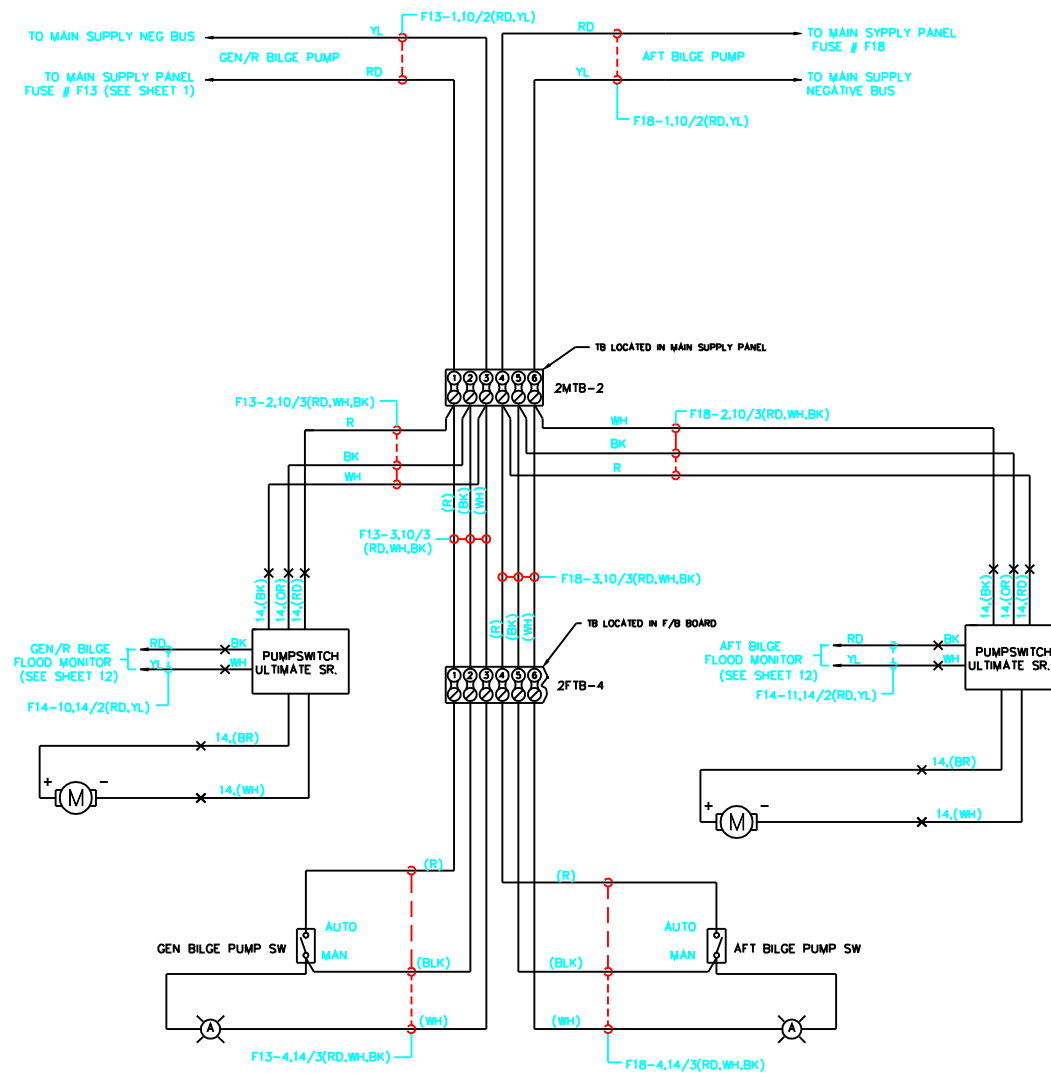
## BILGE PUMPS, FWD, MASTER & E/R



NOTES				
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA				
MODEL	700			
TITLE	WIRING, 24V DC			
SCALE	NONE	SHT	14 OF 23	REV.
BY	MB	APPR.		
DATE	4/23/01		D12437	


REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.

## BILGE PUMPS, GEN/R & AFT



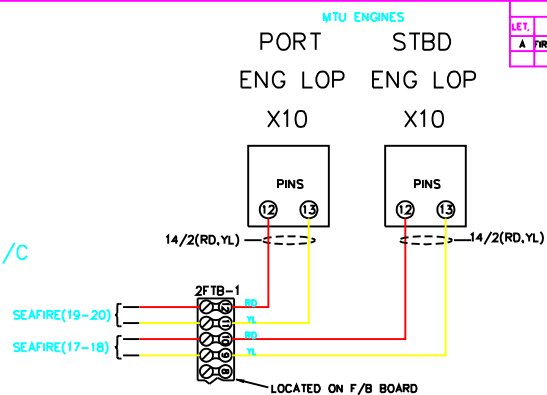
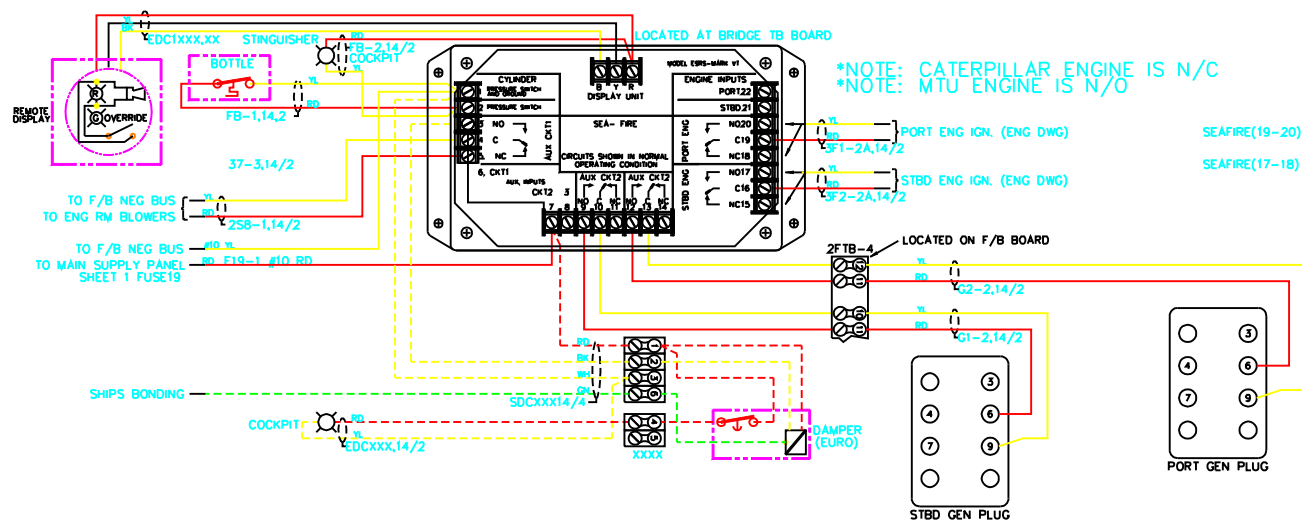
### NOTE:

- 2MTB-2 IS LOCATED IN MAIN SUPPLY PANEL
- 2FTB-4 IS LOCATED IN THE F/B BOARD

NOTES				
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA				
MODEL	700			
TITLE	WIRING, 24V DC			
SCALE	NONE	SHT	15 OF 23	REV
DATE	4/23/01	APPV.		
			D12437	



# FIRE EXTINGUISHER SYSTEM

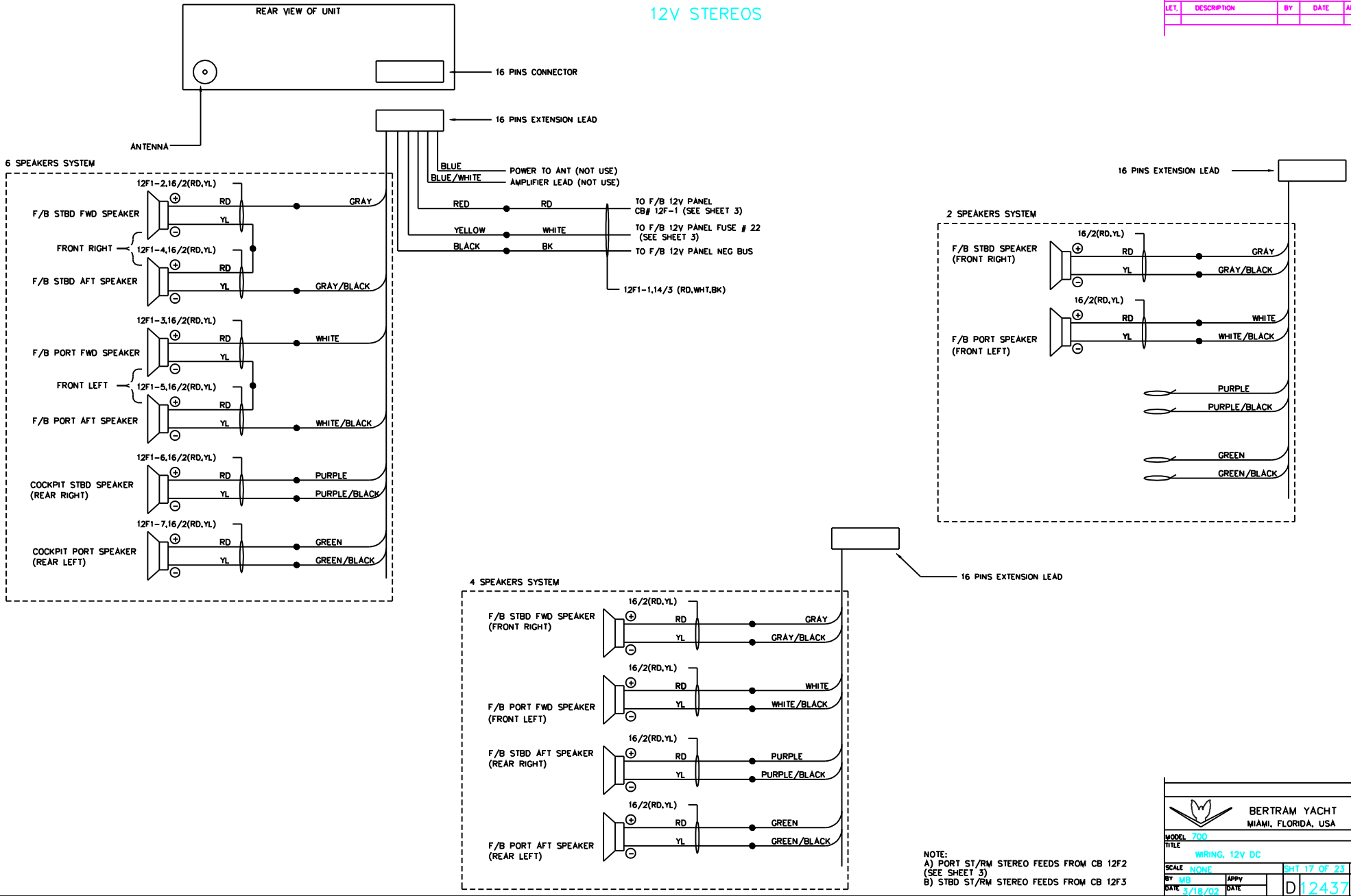



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPLY
A	FIREBOY TO SEAFIRE	JPM	7/15/06	-

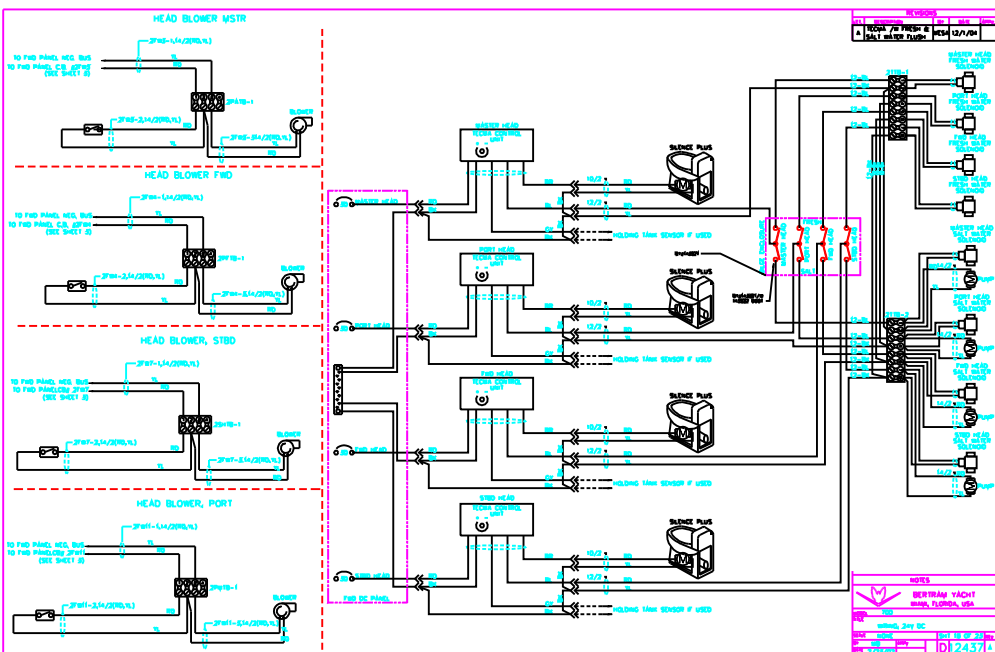
BERTRAM YACHT MIAMI, FLORIDA, USA				
MODEL 700				
TITLE				
WIRING, 24V DC				
SCALE	NONE	SH1	16 OF 23	REV.
BY	MB	APPLY		
DATE	3/12/02	DATE		
D12437				A

12V STEREOS

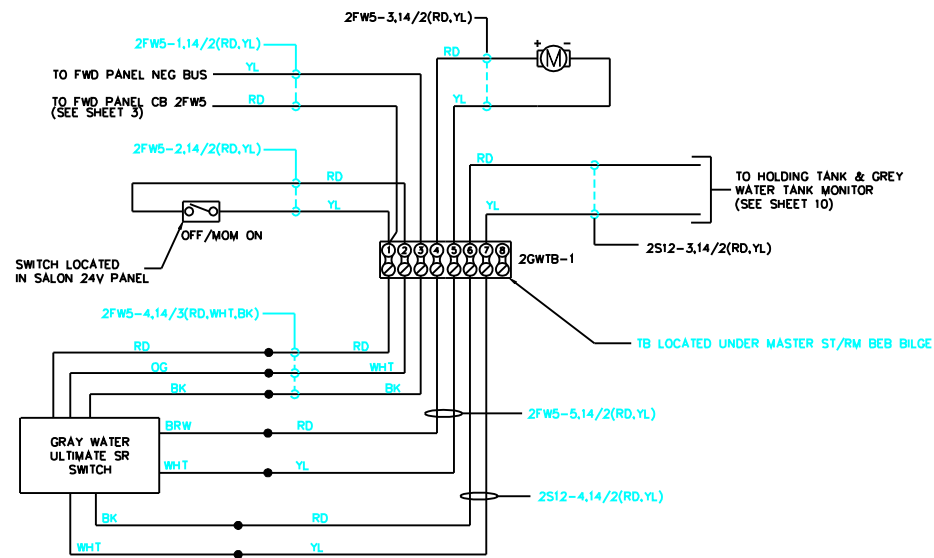
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPL.



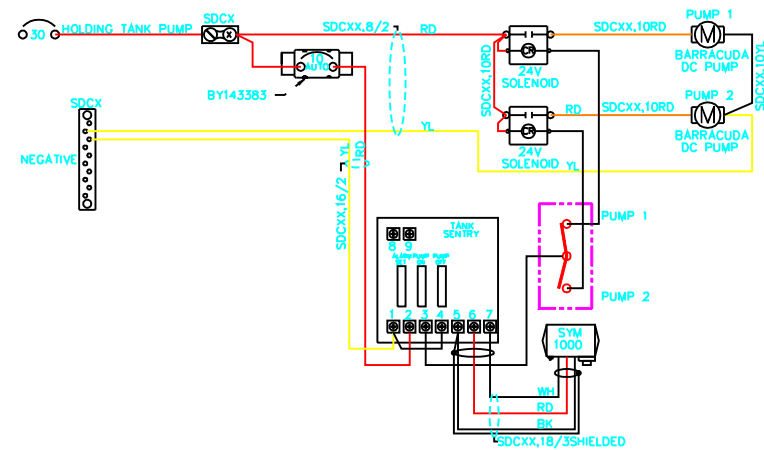
		BERTRAM YACHT	
		MIAMI, FLORIDA, USA	
MODEL 700			
TITLE			
WIRING, 12V DC			
SCALE NONE		SHT 17 OF 23	REV
BY MB	APPLY		
DATE 3/18/02	DATE	D 12437	



## GRAY WATER PUMP

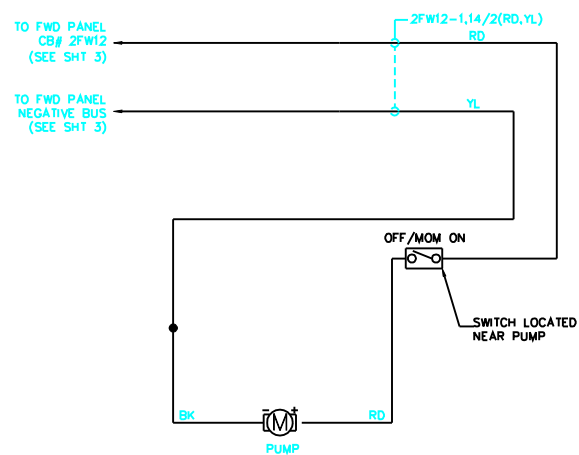



## HOLDING TANK SENTRY DUAL PUMP



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APP.
A	TANK SENTRY	JPW	6/23/06	APP.

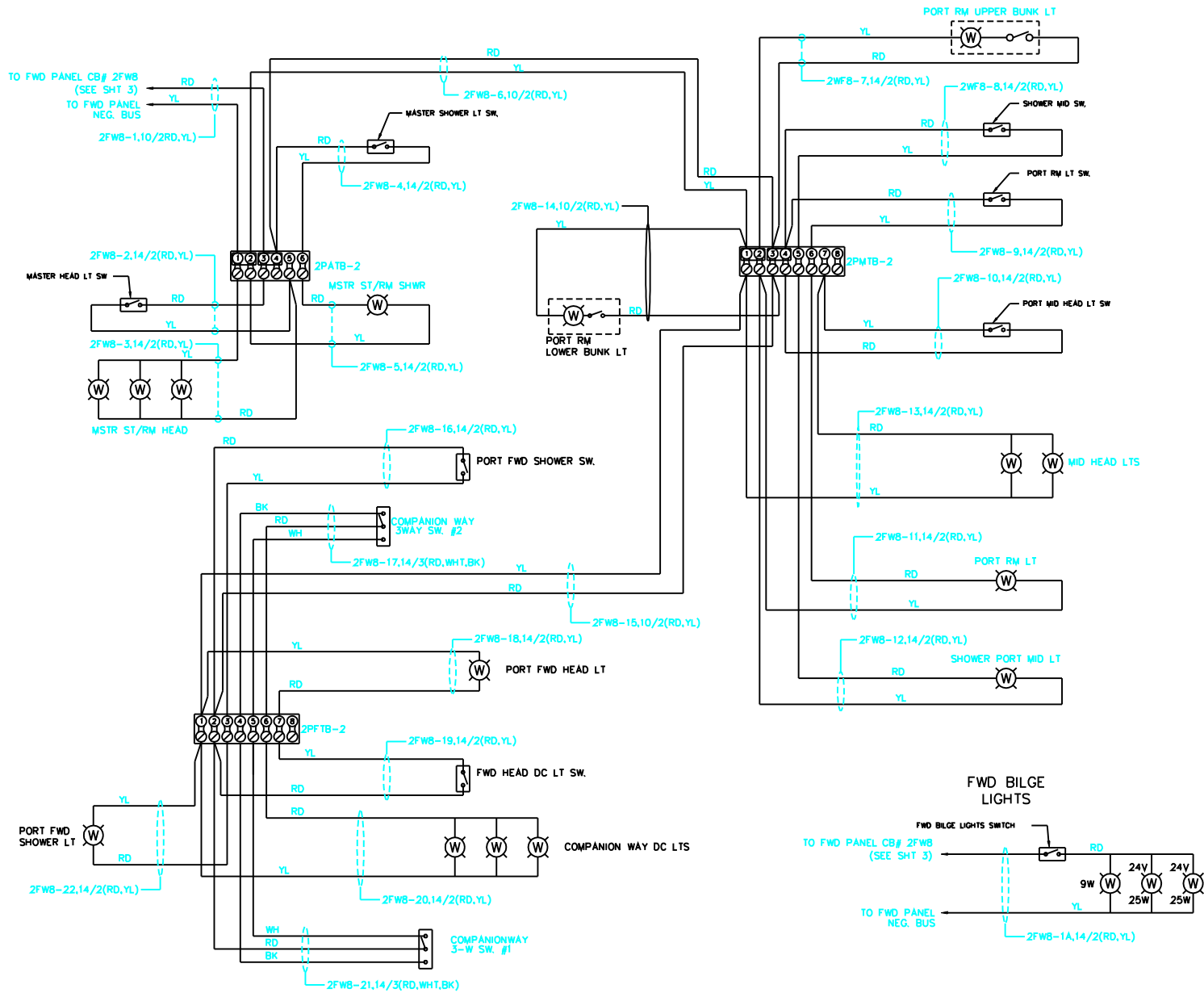
## HOLDING TANK PUMP




NOTES			
		BERTRAM YACHT MIAMI, FLORIDA, USA	
MODEL 700			
TITLE WIRING, 24V DC			
SCALE NONE	SHT 19 OF 23		REV
BY MB	APPY	D12437	A
DATE 3/24/02			

# PORT DC LIGHTS

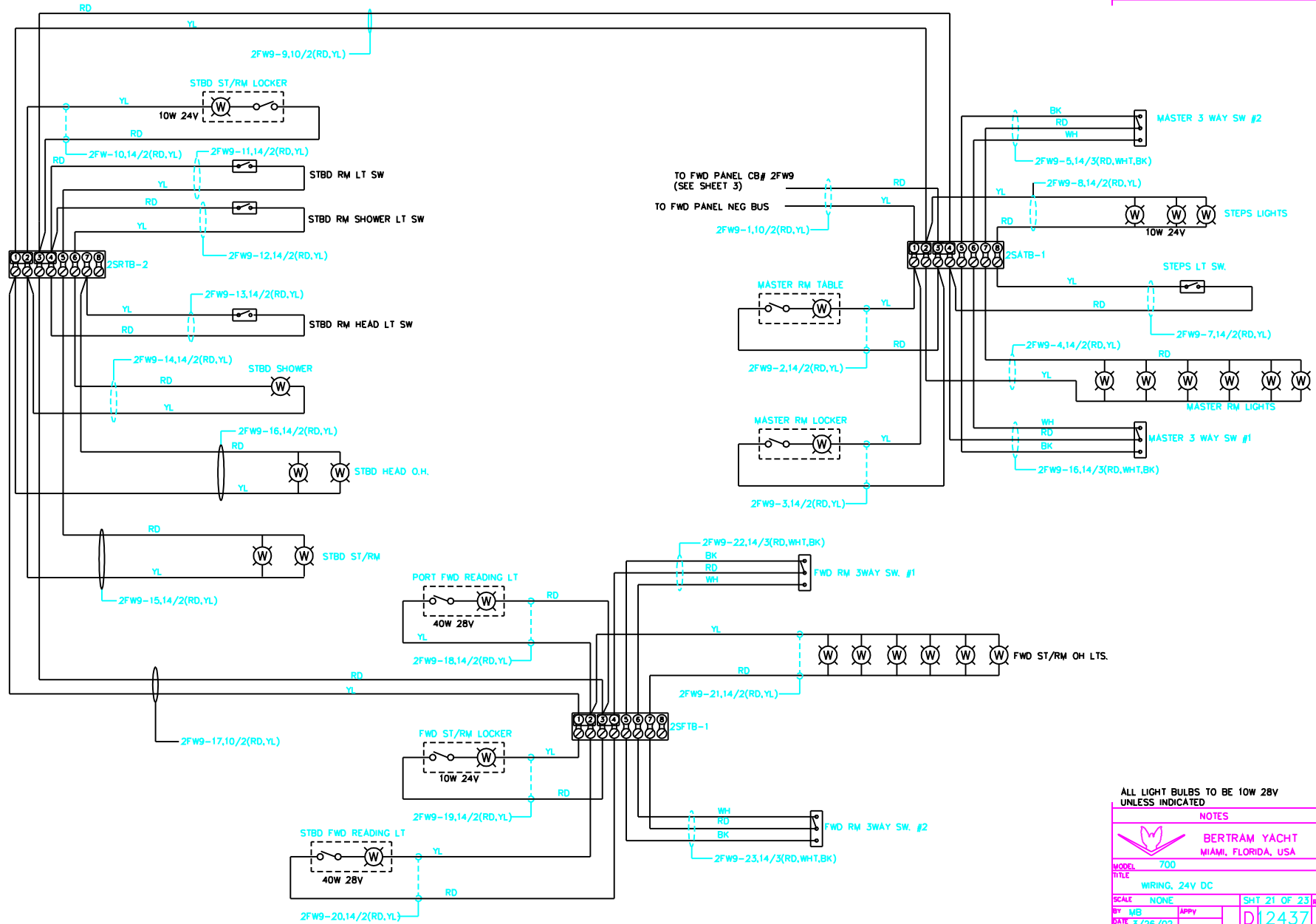
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.




ALL LIGHT BULBS TO BE 10W 28V UNLESS INDICATED				
NOTES				
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA				
MODEL	700			
TITLE	WIRING, 24V DC			
SCALE	NONE		SHT	20 OF 23
BY	MB	APPY	D12437	
DATE	3/27/02		REV	

# STBD DC LIGHTS

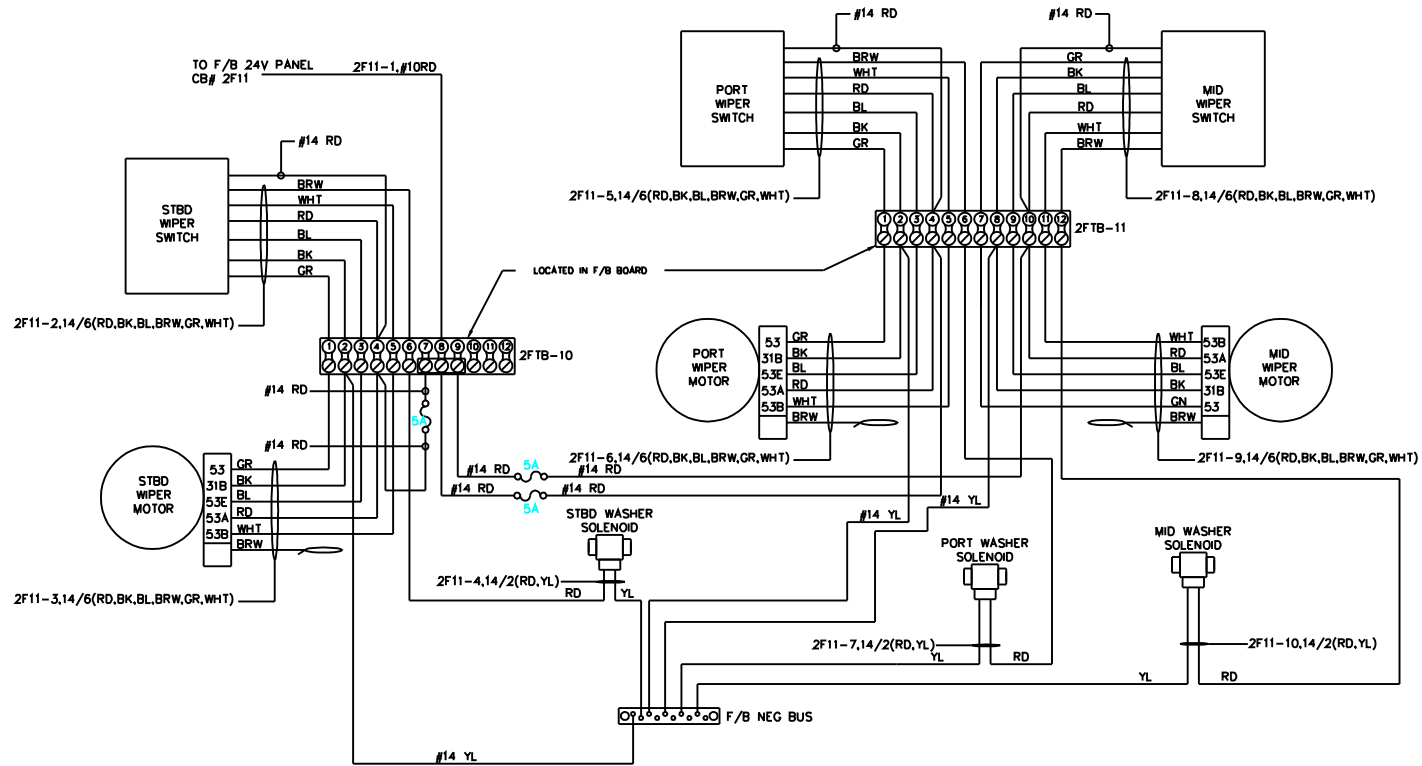
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPLY




ALL LIGHT BULBS TO BE 10W 28V UNLESS INDICATED				
NOTES				
 <b>BERTRAM YACHT</b> MIAMI, FLORIDA, USA				
MODEL	700			
TITLE	WIRING, 24V DC			
SCALE	NONE		SHT	21 OF 23
BY	MB	APPLY	D12437	
DATE	3/26/02		REV	

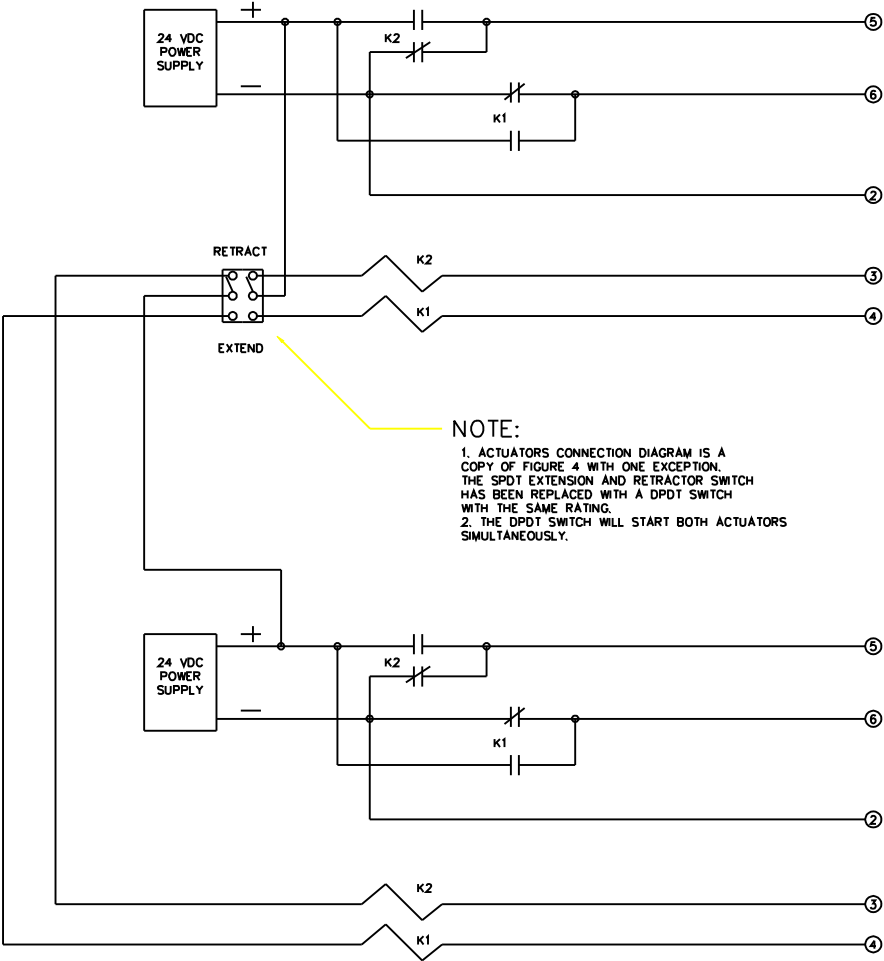
# WIPERS FOR ENCLOSED F/B ONLY

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPLY



NOTES				
 BERTRAM YACHT MIAMI, FLORIDA, USA				
MODEL	700			
TITLE	WIRING, 24V DC			
SCALE	NONE		SHT 22 OF 23	REV
BY	MB	APPLY	D12437	
DATE	2/23/02			


REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.



ACTUATOR #1

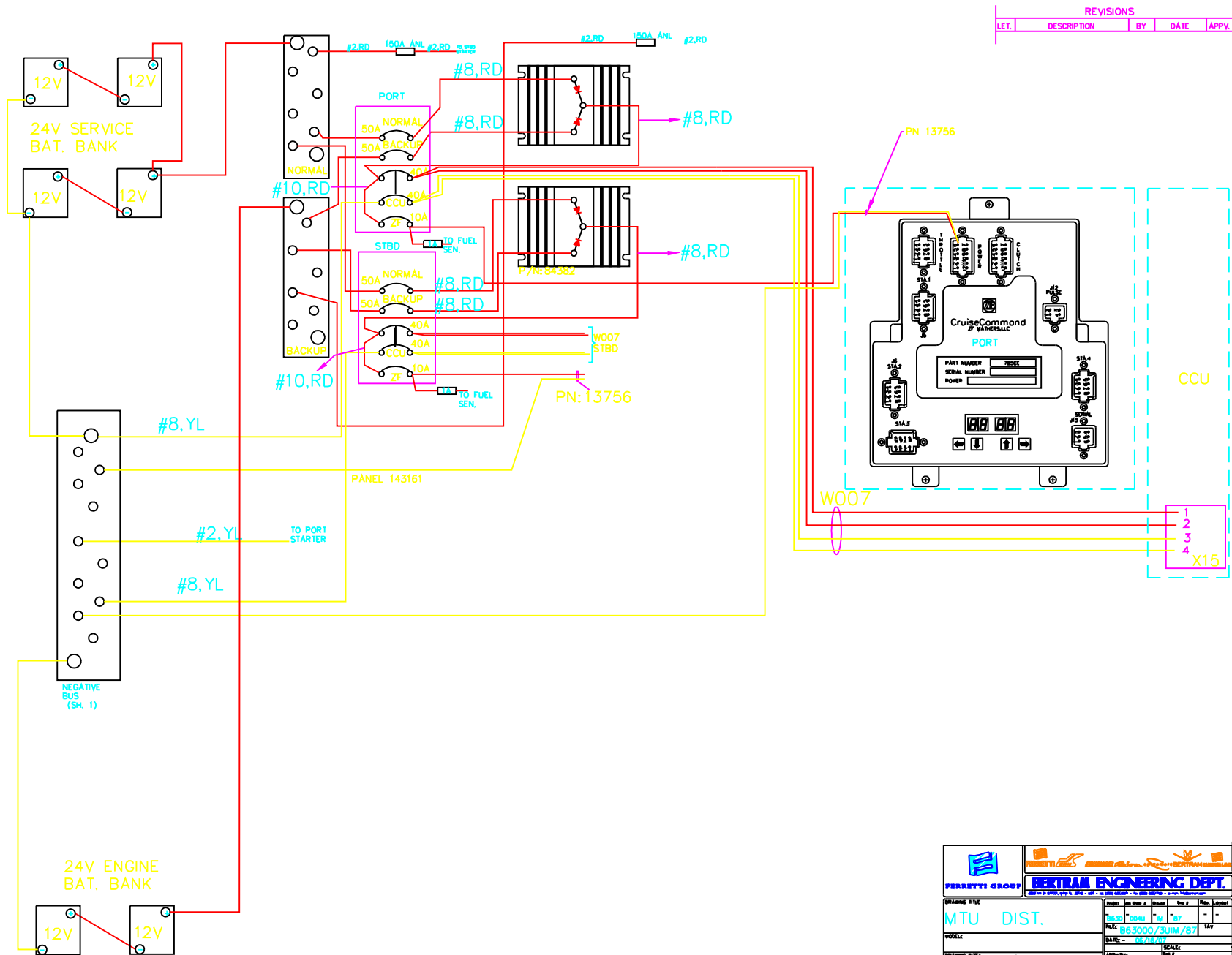
ACTUATOR #2

NOTE:  
1. ACTUATORS CONNECTION DIAGRAM IS A COPY OF FIGURE 4 WITH ONE EXCEPTION. THE SPDT EXTENSION AND RETRACTOR SWITCH HAS BEEN REPLACED WITH A DPDT SWITCH WITH THE SAME RATING.  
2. THE DPDT SWITCH WILL START BOTH ACTUATORS SIMULTANEOUSLY.

NOTES				
 BERTRAM YACHT MIAMI, FLORIDA, USA				
MODEL TITLE				
DUAL ACTUATORS, 24 VDC				
SCALE	BY	DATE	APPY	REV.
	NFW	03/22/01		
			D	

CODE	TITLE	DWG NO
	REFERENCE	

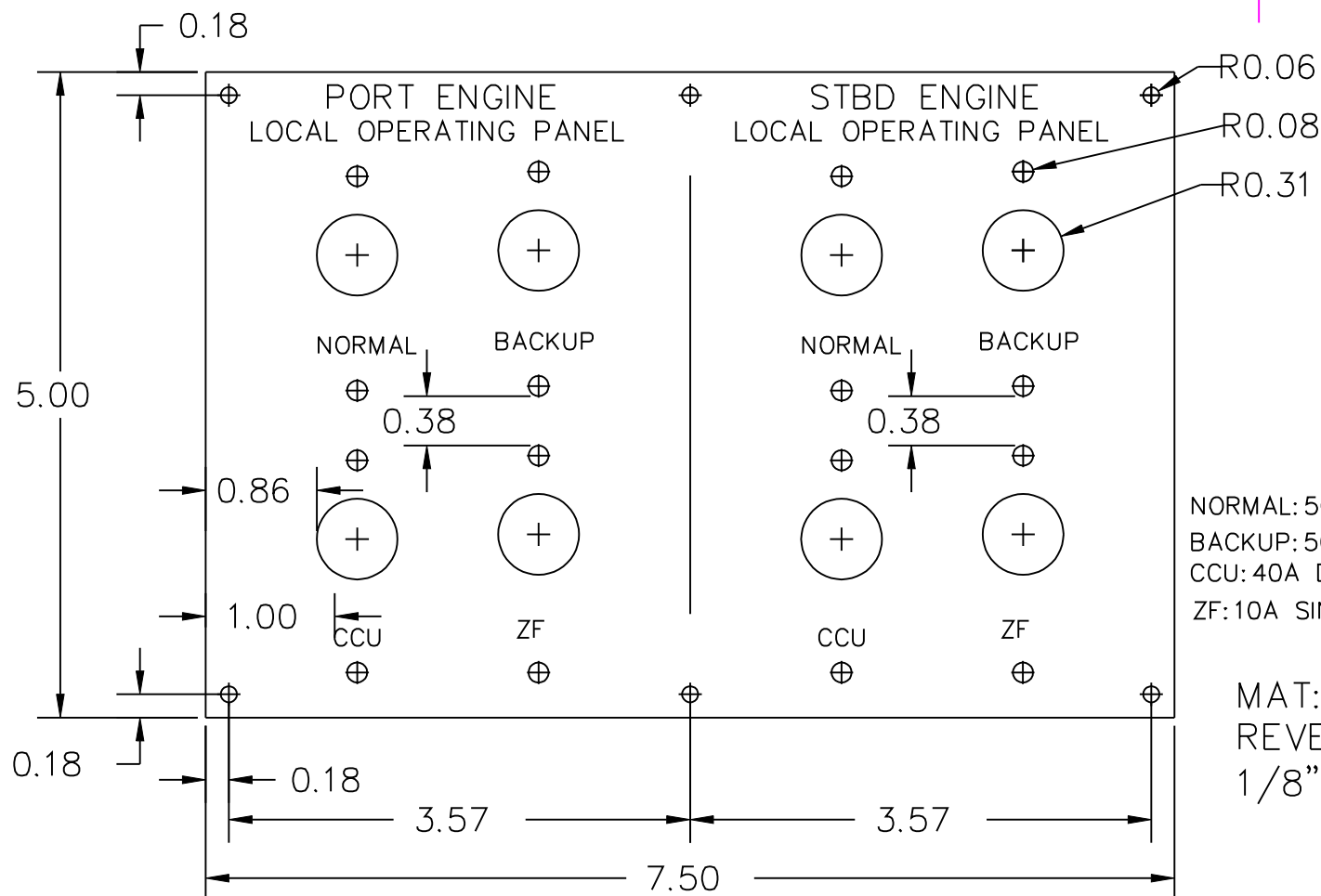




<b>MTU DIST.</b>			
DRAWING FILE: TUCU	Date: 08/12/2017	Rev: 01	Rev: 01
MODEL: C	SCALE: 1:1	DATE: 08/12/2017	SCALE: 1:1
APPROVED BY:			

# REVISIONS

LET.	DESCRIPTION	BY	DATE	APPV.
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NORMAL: 50A SINGLE POLE  
 BACKUP: 50A SINGLE POLE  
 CCU: 40A DOUBLE POLE  
 ZF: 10A SINGLE POLE

MAT: TO BE ABS WHITE WITH  
 REVERSE BLK ENGRAVING.  
 1/8" THICK

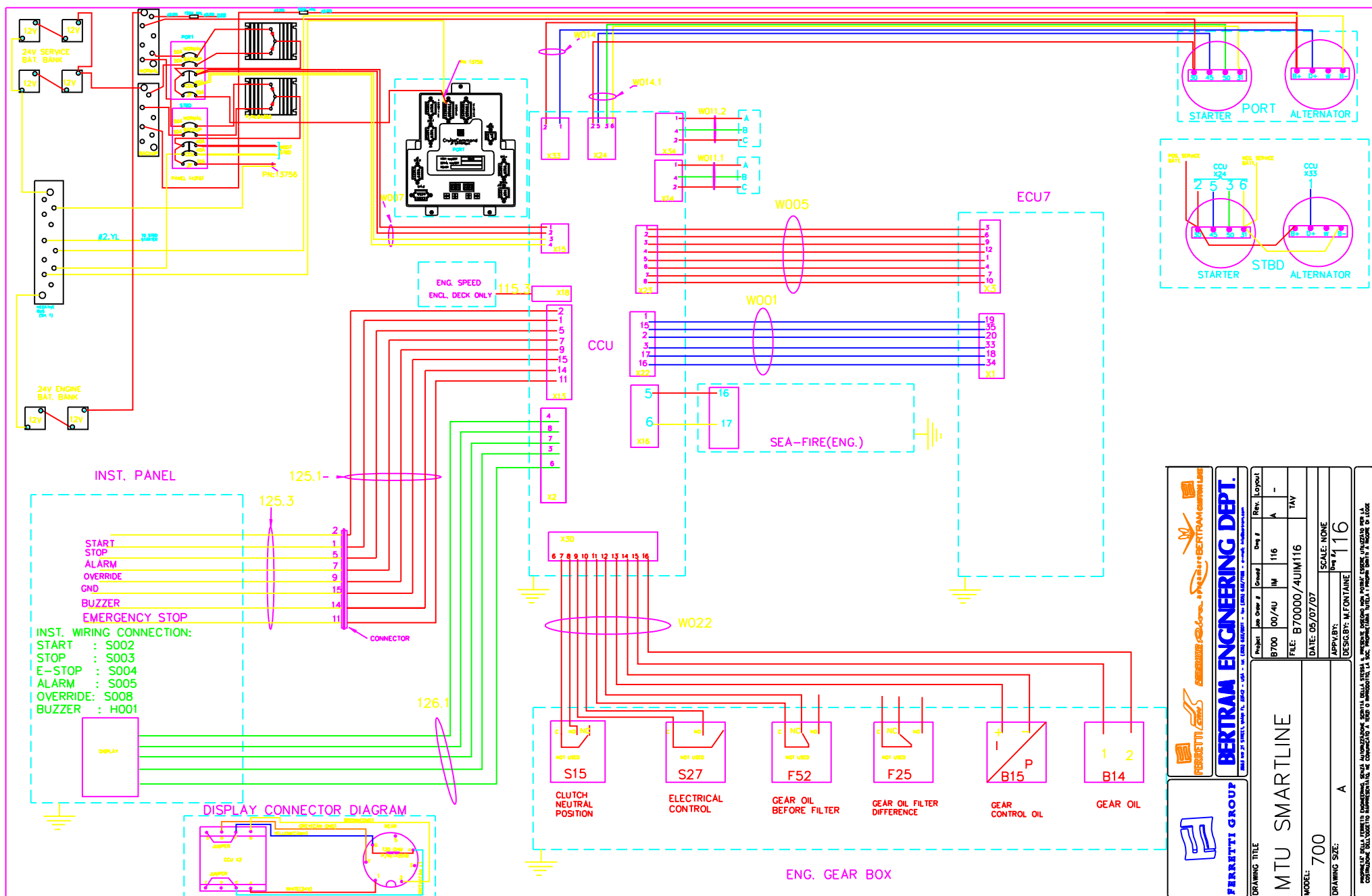
BYD# 143161

CODE

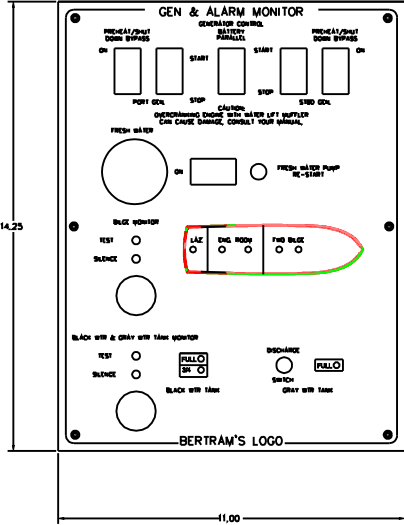
TITLE  
 REFERENCE

DWG NO

<b>MTU ENGINE PNL.</b>		<b>115</b>	
<b>700</b>		<b>115</b>	
<b>A</b>		<b>115</b>	
<b>DATE: 05/07/07</b>		<b>SCALE: NONE</b>	
<b>APPV: M.FONTANE</b>		<b>DESIGN: M.FONTANE</b>	

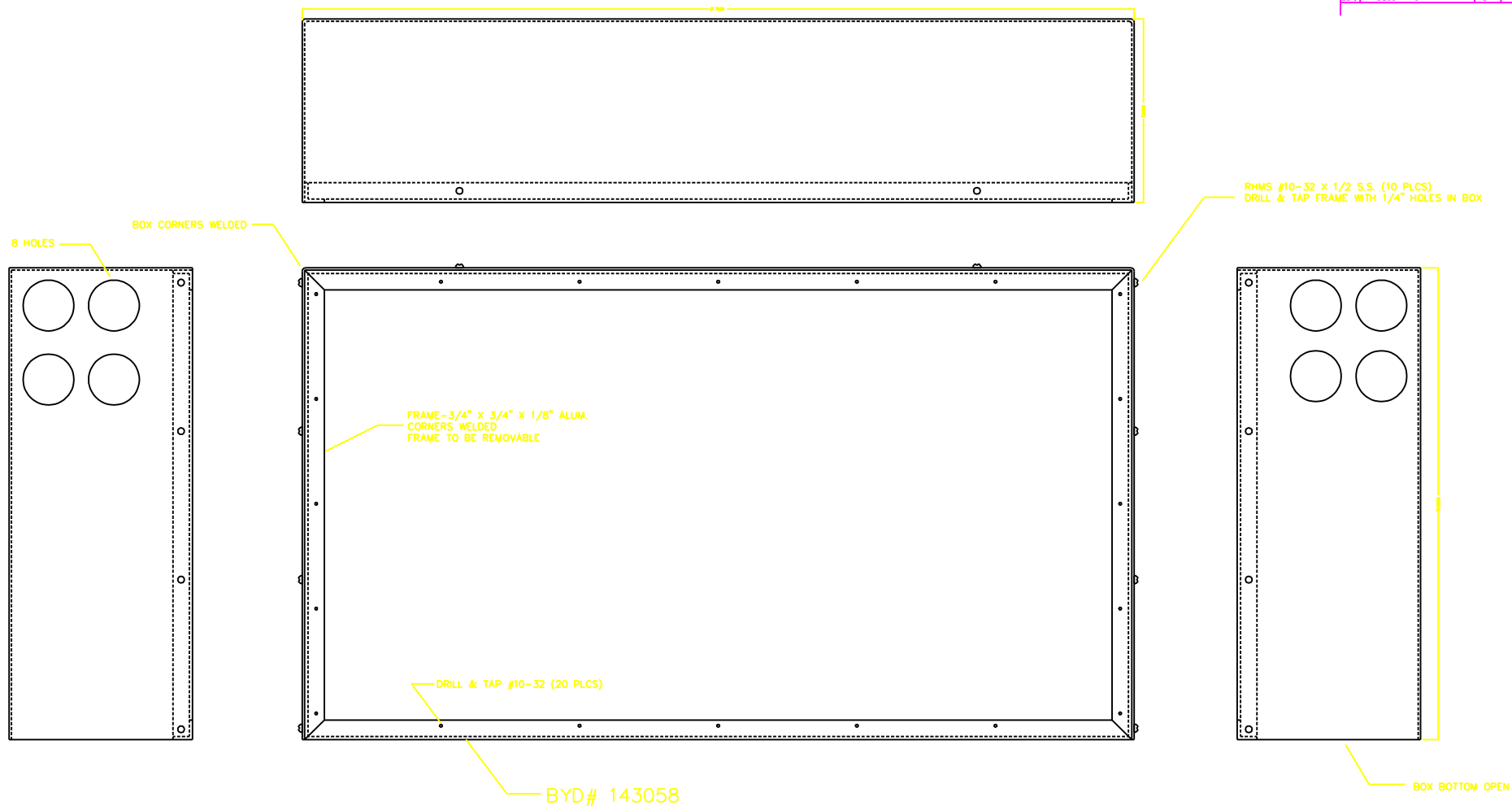
[illegible]

BYD # 143051



LORDS, ROY & ASSOCIATES, INC. 11000 N.E. 8TH COURT SUITE 100, MIAMI, FL 33158 TEL: 305.755.1234 FAX: 305.755.1235		<b>PANELTRONICS</b> Pensacola, FL 32506 TEL: 904.433.1111 FAX: 904.433.1112	
Model No.	TP	Model No.	1417789
Manufacturer	BYD	Manufacturer	BYD
Part No.	1417789	Part No.	1417789
Quantity	2	Quantity	2
Unit Price	1.15	Unit Price	1.15
Total Price	2.30	Total Price	2.30


REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPY.



DRAWINGS ON DISK CAN BE PICKED UP AT BERTRAM  
OR SENT VIA MODEM. SPECIFY THE NECESSARY ACAD  
(VERSION 10) EXTENSION (.DWG OR .DXF) BY CALLING  
633-8011 EXT. 496.

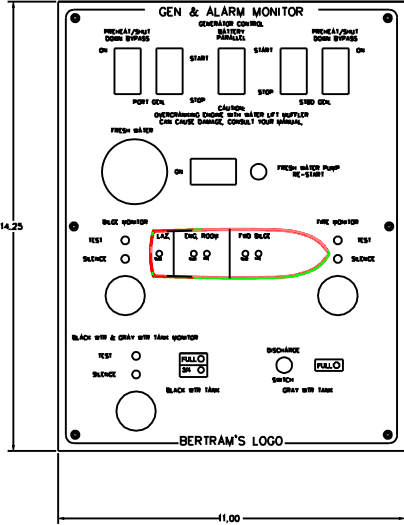
TOLERANCES UNLESS OTHERWISE SPECIFIED
ANGULAR: $\pm 1/2^\circ$
DECIMAL: $\pm .0156"$

BOX MATERIAL: .090 5052 ALUMINUM  
ALL CORNERS TO BE SQUARE  
ALL EDGES TO BE FINISHED SMOOTH

NOTES				
		BERTRAM YACHT MIAMI, FLORIDA, USA		
MODEL	700			
TITLE	BOX, 24V MAIN SUPPLY, 605			
SCALE	NONE			REV
BY	Lamarre	APPY	D	12485
DATE	7/24/00			

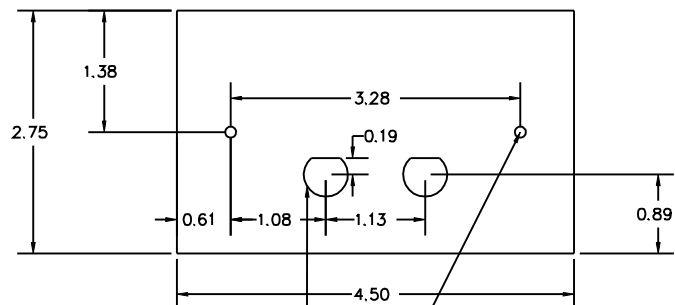
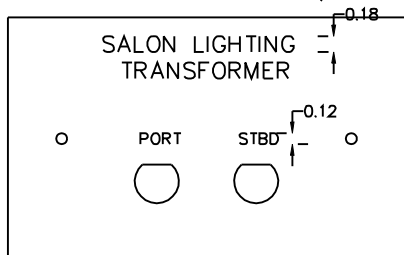
REF	PANEL	TITLE	DWG NO
CODE		REFERENCE	

BYD# 143079



PANELTRONICS Powertronics, Inc. 11000 N.E. 87th Court Miami, FL 33178 Tel: 305-555-1234 Fax: 305-555-1235		PANEL ALARM 670 143079		1.1.1C	
Model No.	RL	Order No.	RL	Rev.	BY
Part No.	RL	Order No.	RL	Rev.	BY
Part No.	RL	Order No.	RL	Rev.	BY
Part No.	RL	Order No.	RL	Rev.	BY

BYD# 143091  
MAT: PHENOLIC BLACK W/ WHITE LETTERS

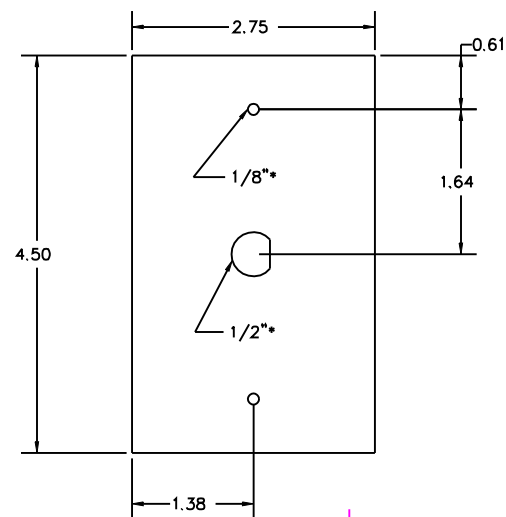
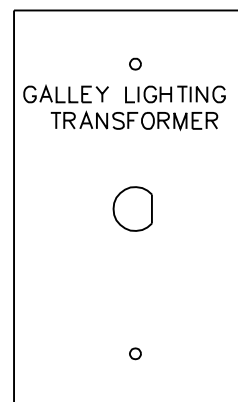


1/2", 2 PLCS.

1/8" HOLE, 2 PLCS.

1 EA REQ'D PER BOAT

BYD# 143092  
MAT: PHENOLIC WHITE W/ BLACK LETTERS



1 EA REQ'D PER BOAT

# REVISIONS

LET.	DESCRIPTION	BY	DATE	APPV.
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## NOTES



BERTRAM YACHT  
MIAMI, FLORIDA, USA

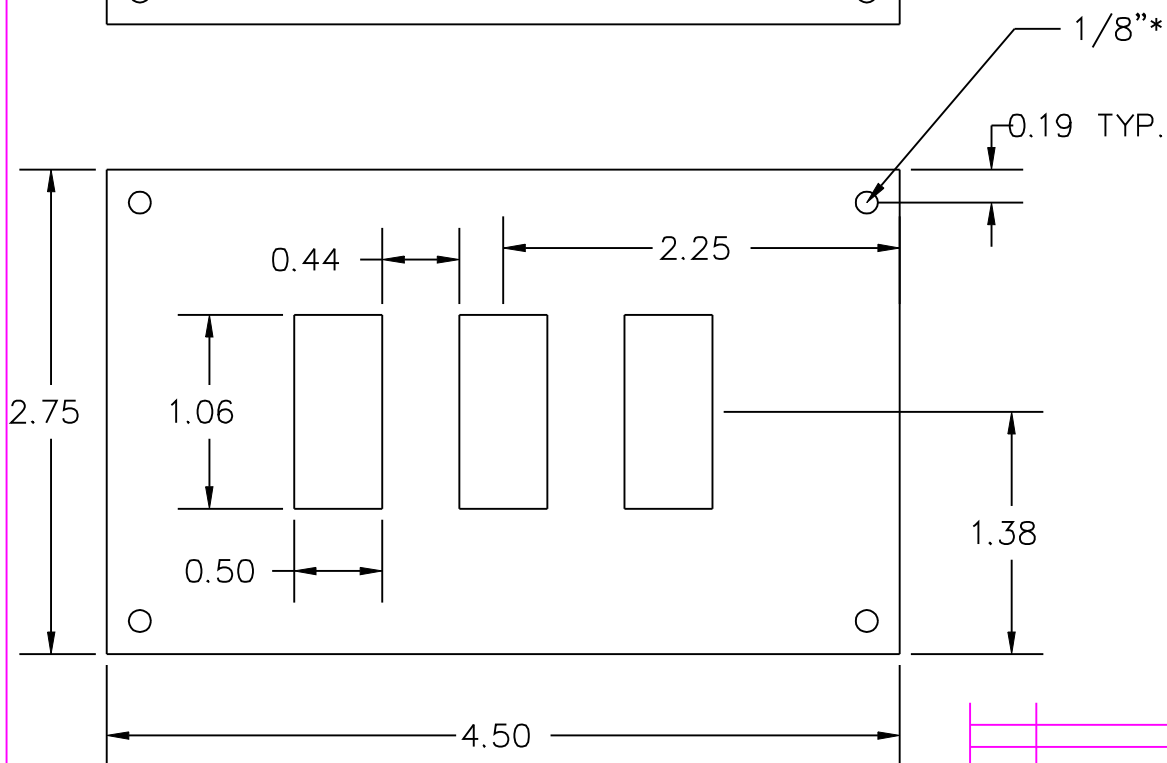
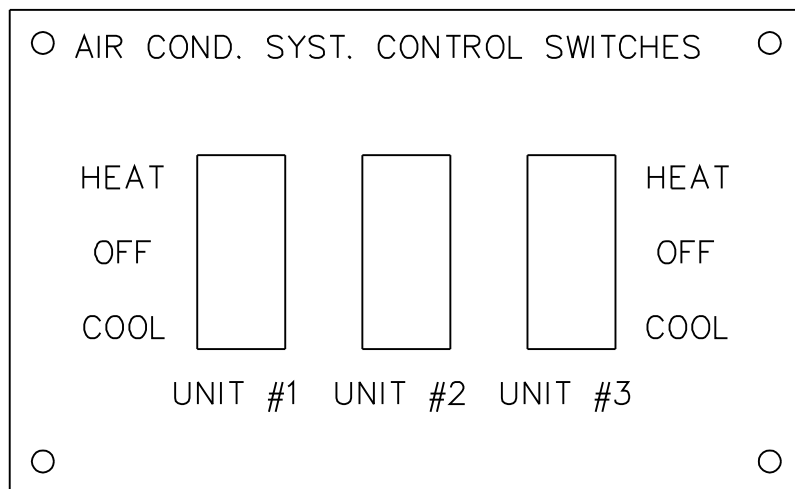
MODEL 670  
TITLE

NAMEPLATE,  
ELECTRICAL


SCALE	FULL	BY	LAMARRE	APPV.	14	C	12638	REV
DATE	4-2-01							

CODE	TITLE	DWG NO	BY	LAMARRE	APPV.	14	C	12638	REV
	REFERENCE								

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.

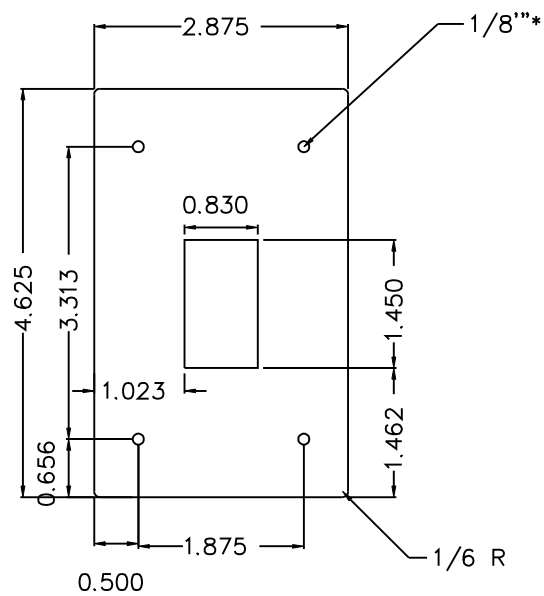
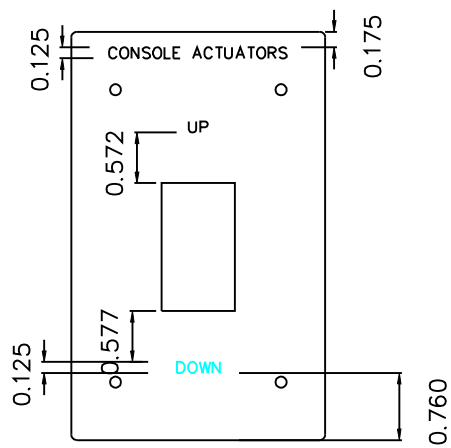


BYD# 143093  
MAT: PHENOLIC BLACK W/ WHITE LETTERS  
1 EA REQ'D PER BOAT

NOTES				
 BERTRAM YACHT MIAMI, FLORIDA, USA				
MODEL 670				
TITLE NAMEPLATE, AIR COND				
SCALE	FULL			
BY	LAMARRE	APPV	14	C
DATE	4-2-01		12639	
REV				


CODE	TITLE	DWG NO
	REFERENCE	



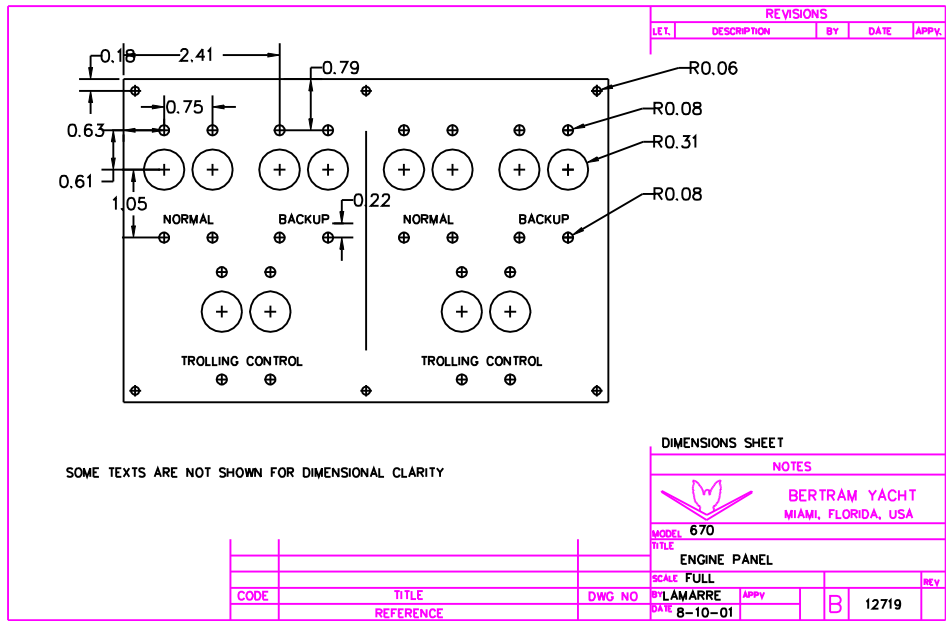
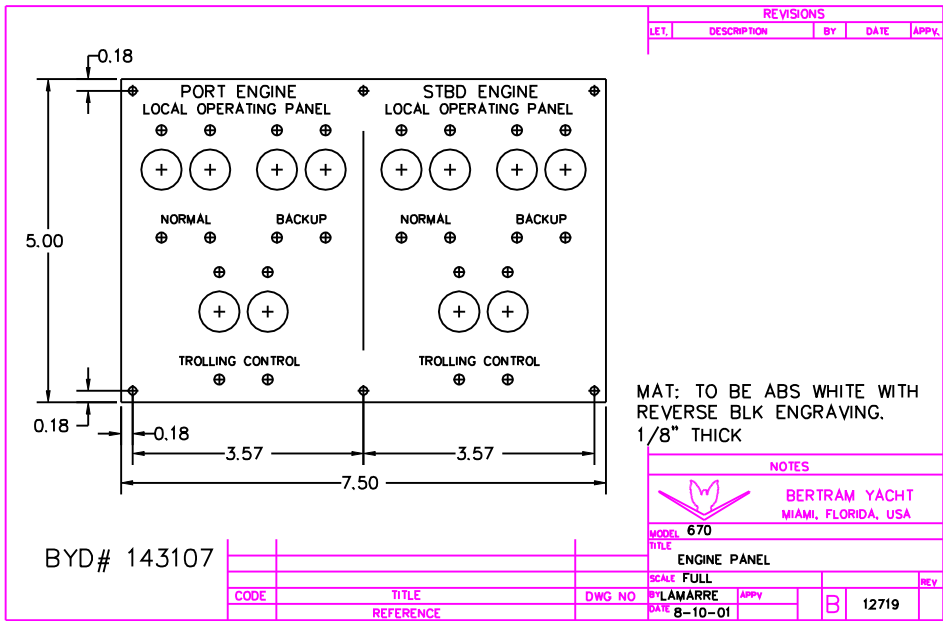


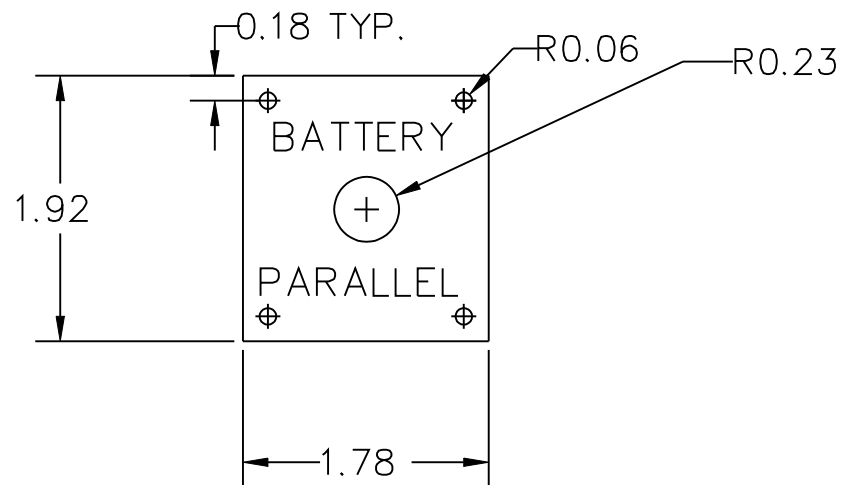
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.

MAT: PHENOLIC WHITE WITH BLACK LETTER.  
1 EA REQ'D PER BOAT  
BYD # 143094

NOTES				
 BERTRAM YACHT MIAMI, FLORIDA, USA				
MODEL 670	TITLE NAMEPLATE, CONSOLE ACTUATORS			
SCALE FULL	DWG NO	BY LAMARRE	APPV	REV
DATE 4-6-01			14 C	12649

CODE	TITLE	DWG NO
	REFERENCE	





MAT: TO BE ABS WHITE WITH  
REVERSE BLACK ENGRAVING.  
1/8" THICK

BYD# 143111

# REVISIONS

LET.	DESCRIPTION	BY	DATE	APPV.
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## NOTES



BERTRAM YACHT  
MIAMI, FLORIDA, USA

MODEL 700

TITLE

BATT. PARALLEL NAMEPLATE

SCALE FULL

REV

CODE

TITLE

DWG NO

BY LAMARRE

APPV

DATE 8-27-01

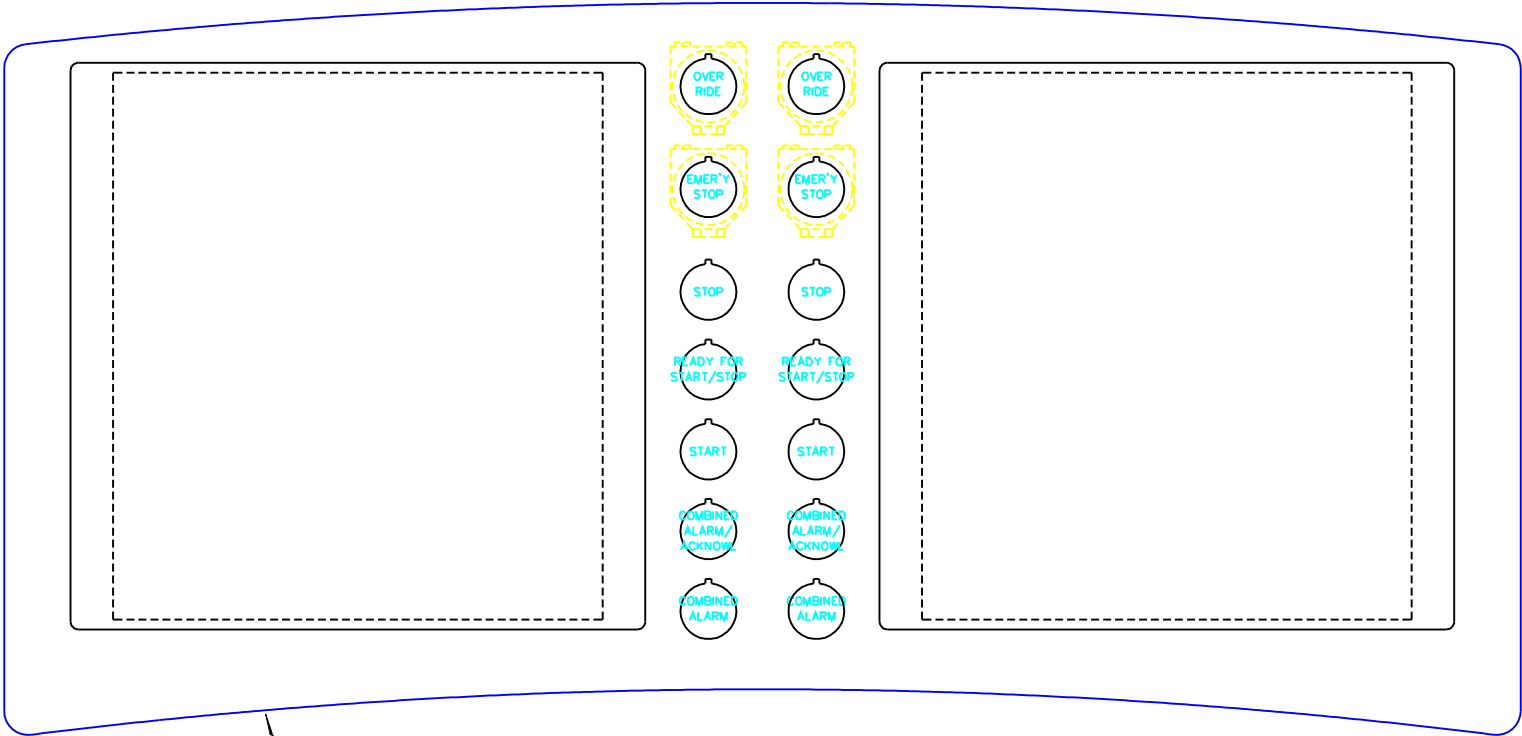
B

12726

REFERENCE




REVISIONS			
DESCRIPTION	BY	DATE	APPY.



BYD 143125

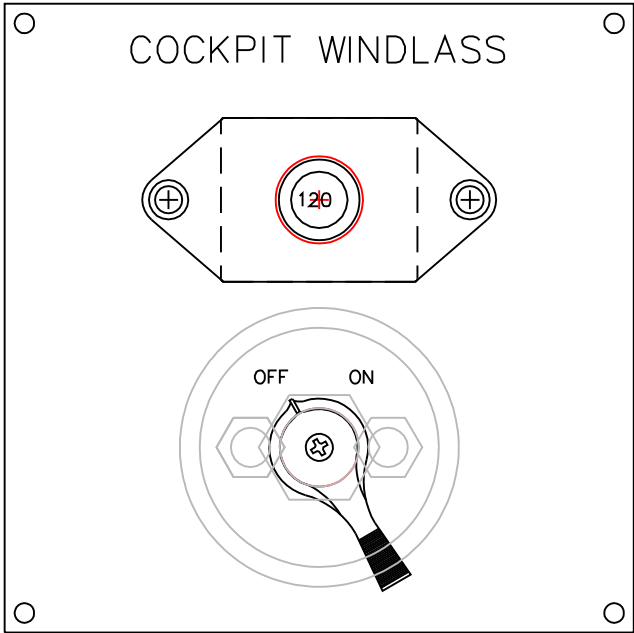
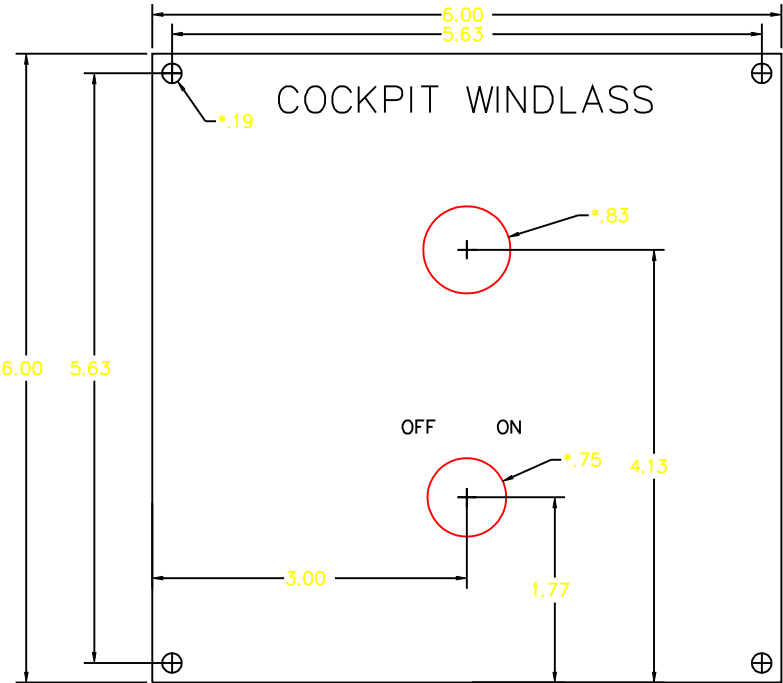
DRAWING ON DISK CAN BE PICKED UP AT BERTRAM.  
DRAWING IS AN AUTOCAD (VERSION 14) EXTENSION  
(DWG).

NOTES			
 BERTRAM YACHT MIAMI, FLORIDA, USA			
MODEL	670		
TITLE	PANEL, INSTR., ENCL. BRIDGE ENG ALARM		
SCALE	FULL	BY	LAMARRE
DATE	11/30/01	APPY	DATE
D12789-			REV.



TOLERANCES	
UNLESS OTHERWISE SPECIFIED	
ANGULAR:	± 1/2°
DECIMAL:	± .0156"

# BY 143440

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPLY
-	...	-	-	-
-	...	-	-	-
-	...	-	-	-
-	...	-	-	-
-	...	-	-	-
-	...	-	-	-

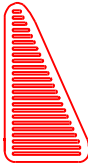
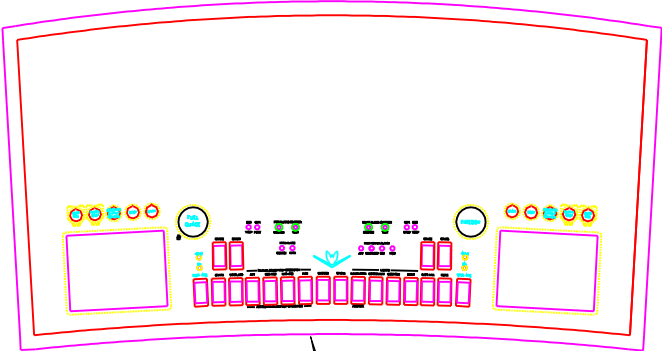
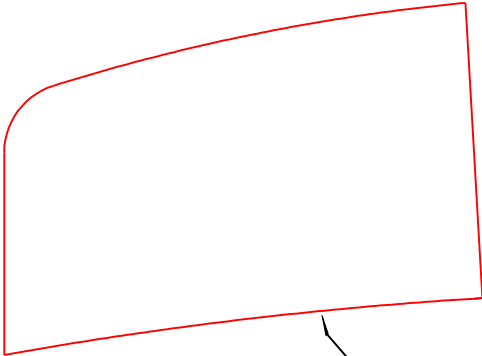
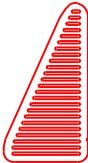


MATERIAL, GRAVOPLY .125, WHITE  
FRONT WITH BLACK ENGRAVED LETTERS  
OR EQUIVALENT


 <b>FERRATTI GROUP</b>		 <b>BERTRAM ENGINEERING DEPT.</b>	
DRAWING TITLE <b>COCKPIT WINDLASS</b>		Subject: 00/10 Rev: 47 Date: 2/24/06 Scale: NONE Appr: J. MESA Desg: J. MESA	
MODEL: <b>660</b>		FILE: B66000/1UIM47 TAY	
DRAWING SIZE: <b>A</b>		No: 47 1 of 1	

REVISIONS			
DESCRIPTION	BY	DATE	APPK

BYD 14000X (COMPLETE SET)



DRAWING ON DISK CAN BE PICKED UP AT BERTRAM.  
DRAWING IS AN AUTOCAD (VERSION 14) EXTENSION  
(DWG).

NOTES			
 BERTRAM YACHT MIAMI, FLORIDA, USA			
MODEL	630		
TITLE	PANEL, INSTR., ENCL. BRIDGE MTU SMARTLINE		
SCALE	FULL	BY	LAMARRE
DATE	04/25/07	DATE	
REV		REV	

TOLERANCES  
UNLESS OTHERWISE SPECIFIED  
ANGULAR: ± 1/2°  
DECIMAL: ± .0156"

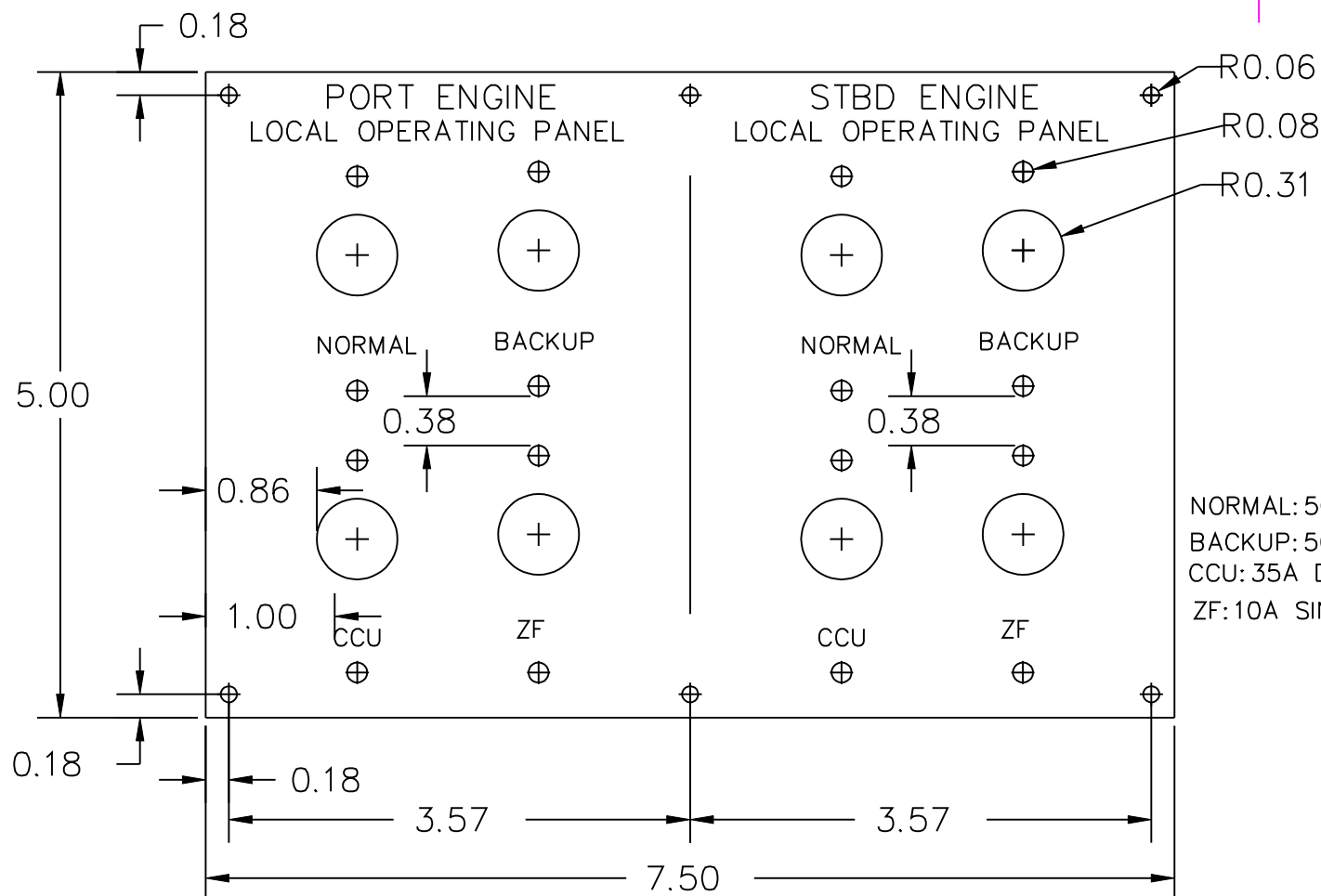
DXXXX





# REVISIONS

LET.	DESCRIPTION	BY	DATE	APPV.
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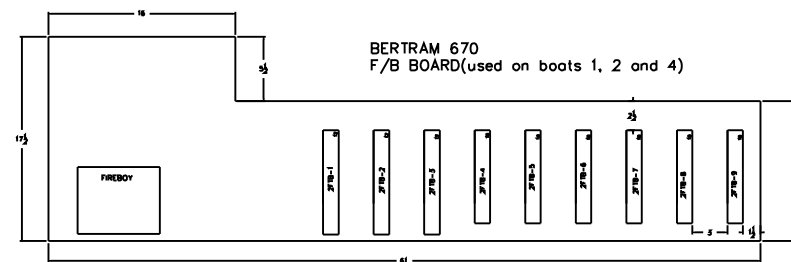
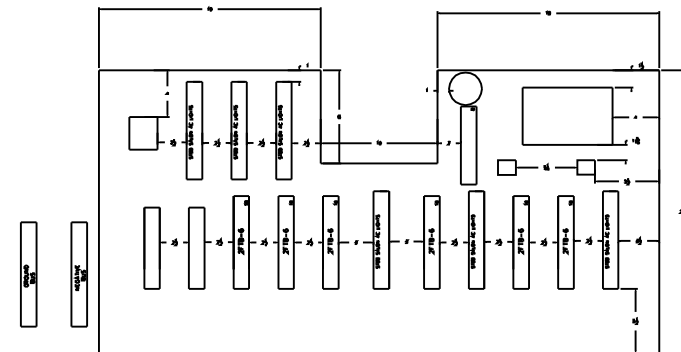
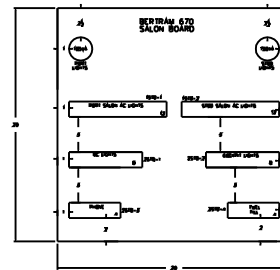
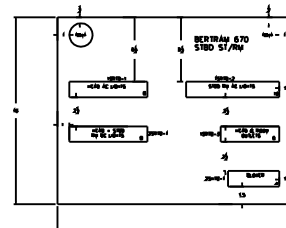
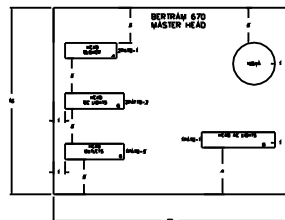
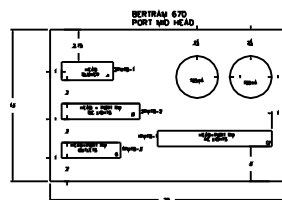
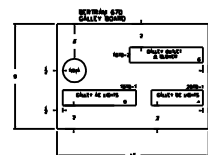
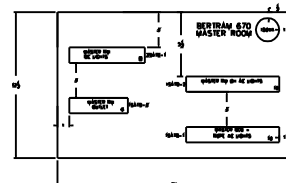
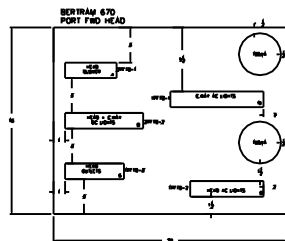
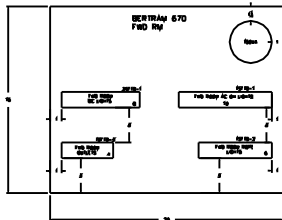


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 CCU: 35A DOUBLE POLE  
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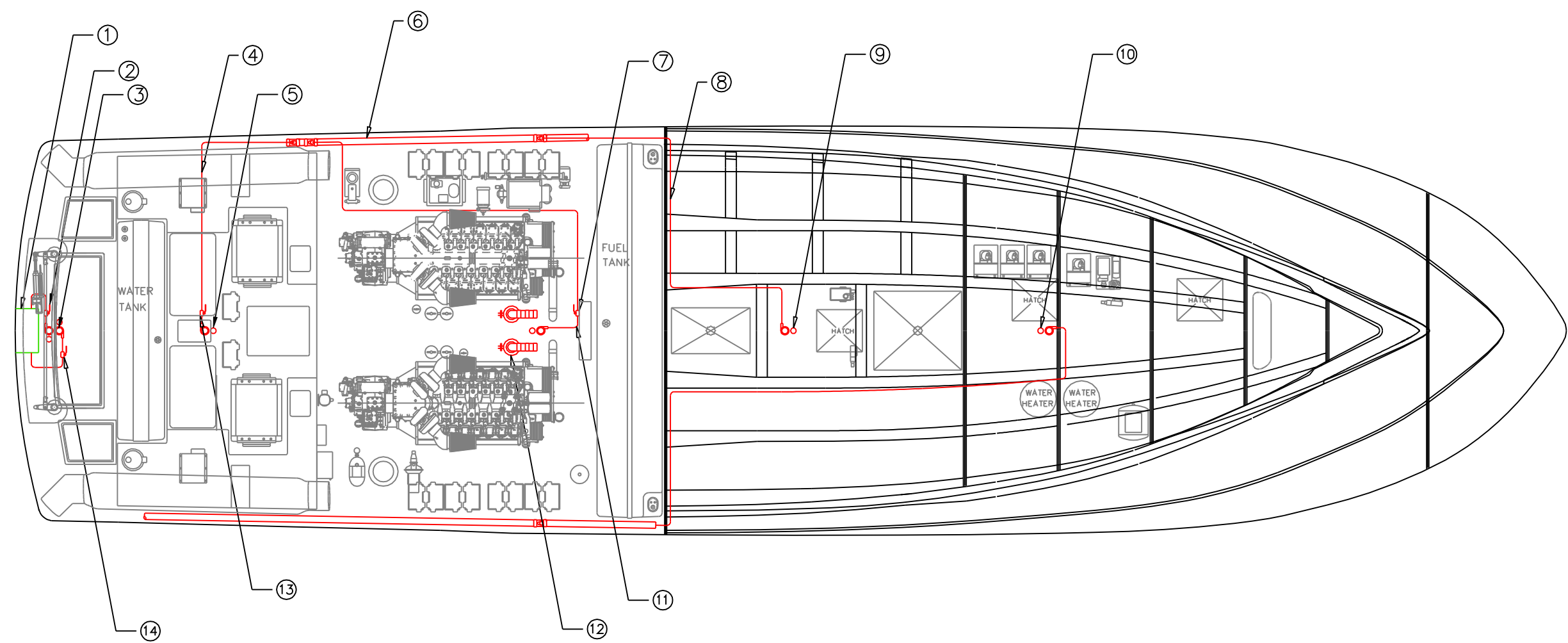
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
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MODEL: 700		DATE: 05/07/07	
DRAWING SIZE: A		SCALE: NONE	
APPV: M.FONTANE		DESG: M.FONTANE	




BERTRAM 700  
BILGE PUMP SYSTEM – EURO BOATS



BERTRAM 700 BILGE PUMP SYSTEM – EURO	
LIST OF COMPONENTS	
ITEM	DESCRIPTION
1	COCKPIT DRAIN COLLECTOR BOX
2	BALL VALVE
3	BILGE PUMP AND FLOAT SWITCH
4	1 1/8" WHITE VACUUM HOSE
5	BILGE PUMP AND FLOAT SWITCH
6	DRAIN MANIFOLD
7	BALL VALVE
8	1 1/8" WHITE VACUUM HOSE
9	BILGE PUMP AND FLOAT SWITCH
10	BILGE PUMP AND FLOAT SWITCH
11	1 1/8" WHITE VACUUM HOSE
12	ENGINE DRIVEN EMERGENCY BILGE PUMP, PORT &STBD
13	BALL VALVE
14	BALL VALVE



**FERRETTI GROUP**



**BERTRAM ENGINEERING DEPT.**

DRAWING TITLE

**BILGE PUMP SYSTEM  
EURO BOATS**

MODEL: **B700**

DRAWING SIZE: **A**

Project	Job Order #	Group#	Dwg #	Rev.	Layout
-	-	-	-	-	-

FILE: - TAV

DATE: 2-21-07

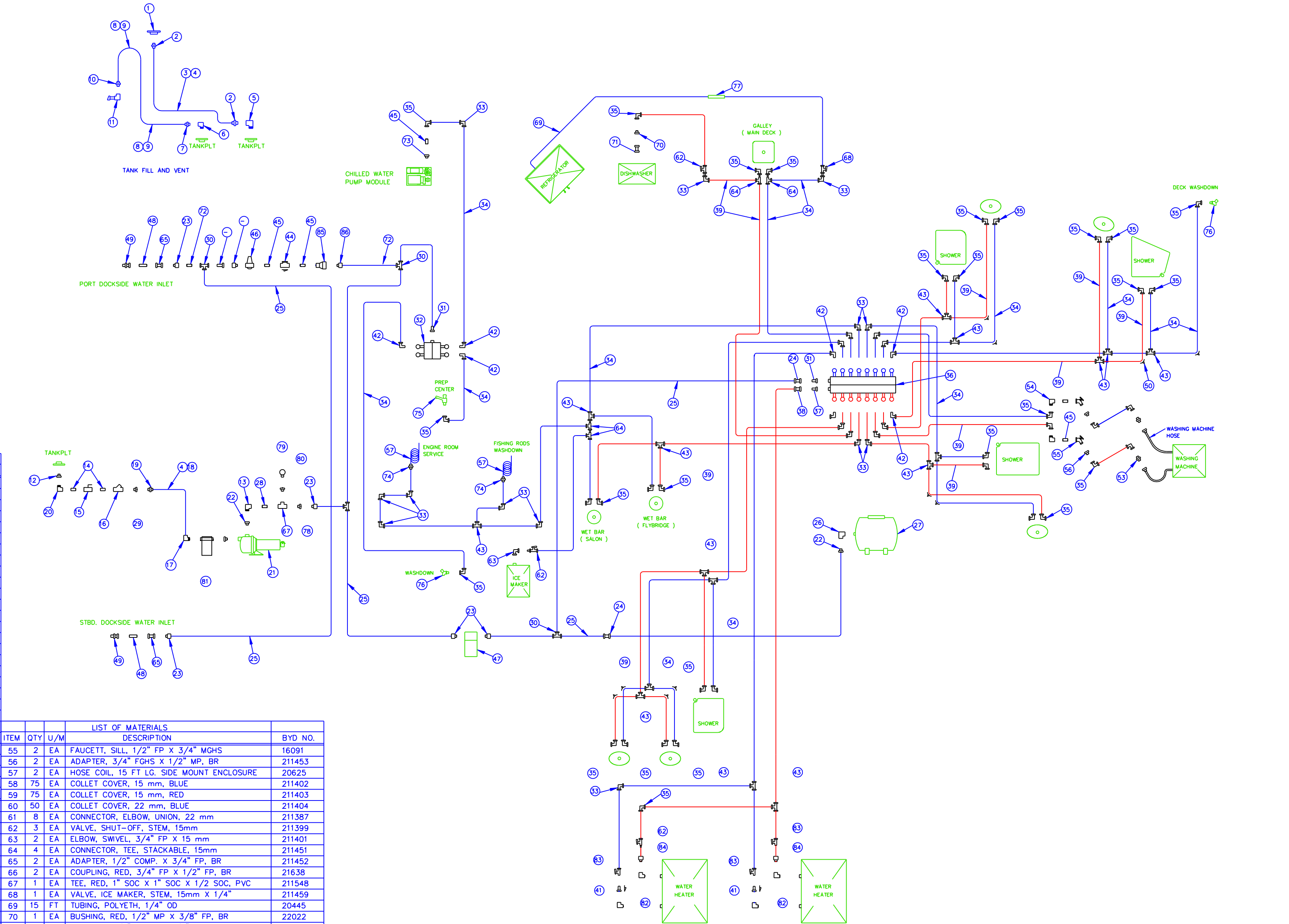
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APPV.BY: Dwg #

DESIG.BY: D.D.


PROPRIETA' DELLA FERRETTI ENGINEERING. SENZA AUTORIZZAZIONE SCRITTA DELLA STESSA IL PRESENTE DISEGNO NON POTRA' ESSERE UTILIZZATO PER LA COSTRUZIONE DELL'OGGETTO RAPPRESENTATO, NE COMUNICATO A TERZI O RIPRODOTTO. LA SOC. PROPRIETARIA TUTELA I PROPRI DIRITTI A RIGORE DI LEGGE

LIST OF MATERIALS				BYD NO.
ITEM	QTY	U/M	DESCRIPTION	BYD NO.
1	1	EA	PLATE, DECK, WTR, 1-1/2" FP	16017
2	2	EA	ADAPTER, 1-1/2" MP X 1-1/2" HS, BR	21067
3	15	FT	HOSE, 1-1/2" ID, 2 BR	20007
4	8	EA	CLAMP, HOSE HF24, SS	23076
5	1	EA	ELBOW, 90, ST, 1-1/2" MP X 1-1/2" FP, BR	21310
6	2	EA	ELBOW, 90, ST, 3/4" MP X 3/4" FP, BR	21364
7	1	EA	ADAPTER, 3/4" MP X 3/4" HS, BR	21366
8	15	FT	HOSE, 3/4" ID, 2 BR	20044
9	8	EA	CLAMP, HOSE, HF20, SS	23003
10	1	EA	ADAPTER, 1/2" MP X 3/4" HS, BR	21438
11	1	EA	VENT, TANK, 1/2" W/ ELL, BR	09208
12	1	EA	BUSHING, RED, 1 1/2" MP X 1 1/4" FP, BR	21266
13	1	EA	ELBOW, 90, 1" FP x 1" SOC, PVC	211547
14	2	EA	NIPPLE, PIPE, 1 1/4" X CLS, BR	21079
15	1	EA	VALVE, BALL, 1 1/4" FP, BR	21809
16	1	EA	VALVE, CHECK SWING, 1 1/4" FP, BR	211127
17	1	EA	ELBOW, 90, 1" MP X 1" HSE, PVC	211439
18	15	FT	HOSE, VACUUM 1" ID, HEAVY DUTY	20599
19	1	EA	ADAPTER, PVC, 1 MP X 1 HS	21942
20	2	EA	ELBOW, 90 ST, 1 1/4" MP X 1 1/4" FP, BR	21462
21	1	EA	PUMP, WTR, 2 30V, 60HZ, HDHNTR MAC5	160261
22	3	EA	BUSHING, RED, 1" MP X 3/4" FP, BR	21031
23	7	EA	CONNECTOR, MALE, 3/4" MNPT X 22mm	211381
24	12	EA	CONNECTOR, UNION, 22mm	211369
25	150	FT	SEAPEX FLEXPIPE, 22mm, BLUE	20607
26	1	EA	ELBOW, 90, 1 FP, BR	21257
27	1	EA	TANK, CAPTIVE AIR, 14 GAL.	16246
LIST OF MATERIALS				BYD NO.
ITEM	QTY	U/M	DESCRIPTION	BYD NO.
28	1	FT	PIPE, PVC 1" NOM. SCH 40	20468
29	1	EA	BUSHING RED, 1-1/4" MP X FP, BR	21321
30	4	EA	CONNECTOR, TEE, UNION, 22mm	211368
31	2	EA	FITTING, INLET, STEM, 22mm	211370
32	1	EA	MANIFOLD, STYLE B, 4 PORTS	211371
33	14	EA	CONNECTOR, ELBOW, UNION, 15mm	211377
34	200	FT	SEAPEX FLEXPIPE, 15mm, BLUE	20609
35	41	EA	ELBOW, FEMALE, SWIVEL, 15mm X 1/2" FP	211373
36	1	EA	MANIFOLD, STYLE A, 16 PORTS	211374
37	1	EA	FITTING, INLET, STEM, 15mm	211375
38	12	EA	CONNECTOR, UNION, 15mm	211376
39	200	FT	SEAPEX FLEXPIPE, 15mm, RED	20610
40	1	EA	HEATER, WATER, 30 GL, 120 V	16219
41	3	EA	VALVE, CHECK, 1/2" FP X 15mm, STEM	211379
42	8	EA	CONNECTOR, ELBOW, STEM, 15mm	211372
43	19	EA	CONNECTOR, TEE, UNION, 15mm	211378
44	1	EA	VALVE, CHECK, 1/2" FP, BR	21483
45	5	EA	NIPPLE, PIPE, 1/2" X CLS, BR	21163
46	1	EA	REGULATOR, PRESS, 1/2" FP, BR	21390
47	1	EA	FILTER, WATER, 3/4" FP, 6 GPM	16254
48	1	FT	TUBE, COP, HRD, 1/2" OD	20412
49	2	EA	ADAPTER, QC, 1/2 TB X STM, QC8-D1-810	21993
50	36	EA	BEND MOUNT, 90 DEG, 15mm	211382
51	150	EA	MOUNT, SEAPEX, 15mm	211384
52	75	EA	MOUNT, SEAPEX, 22mm	211385
53	3	EA	ADAPTER, 3/4" MGHS X 1/2" MP, BR	21562
54	2	EA	ELBOW, 90ST, 1/2" MP X 1/2" FP, BR	21292





**FERRETTI GROUP**



**BERTRAM ENGINEERING DEPT.**

DRAWING TITLE  
**FRESH WATER SYSTEM**

MODEL:  
**B700**

DRAWING SIZE:  
**B**

Project	Job Order #	Group	Dep #	Rev	Layout
-	-	-	-	-	-

FILE: - TAV

DATE: 3-13-07

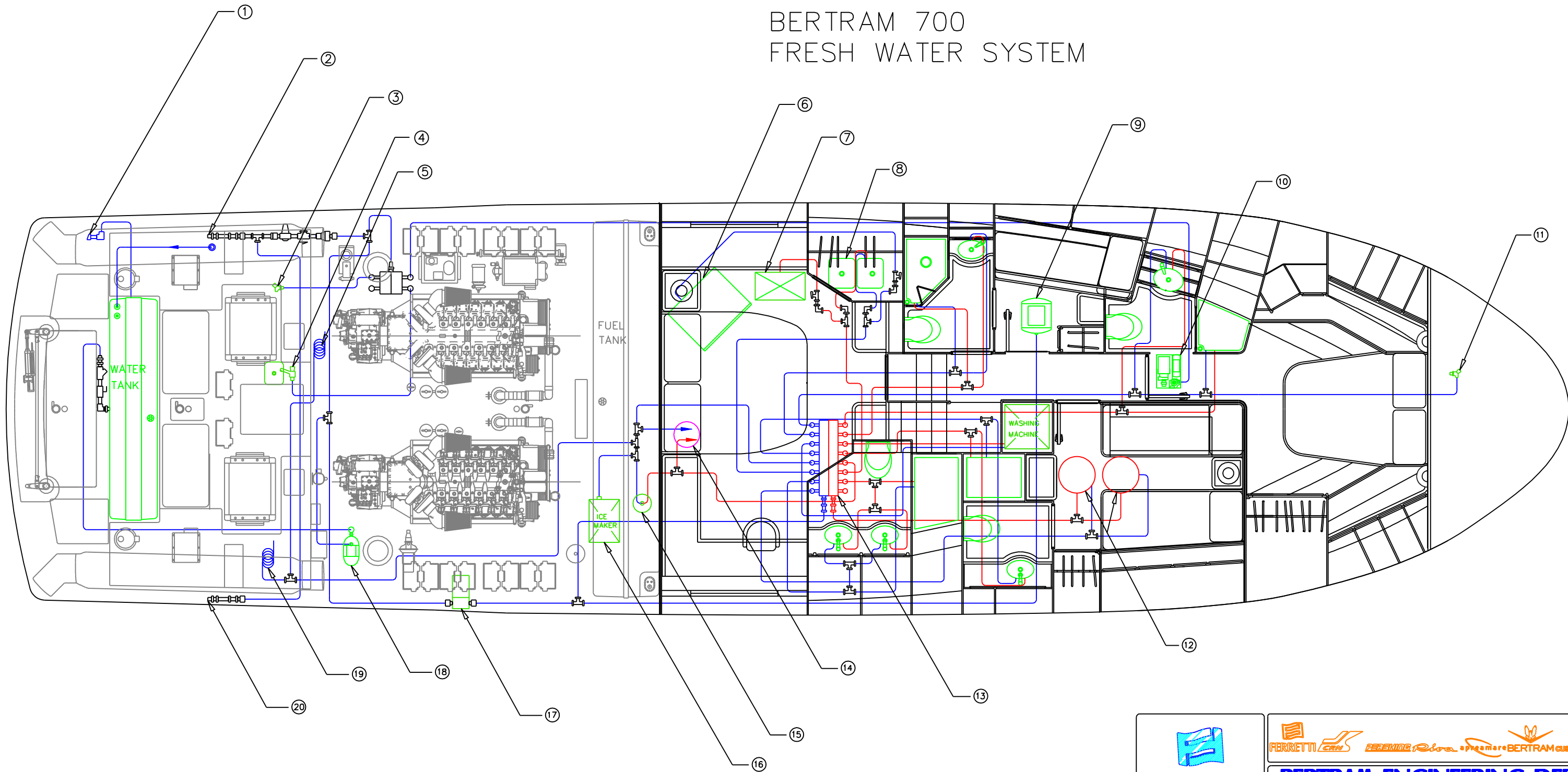
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
APPV.BY: Dep # -

DESIG.BY: D.D.


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BERTRAM 700  
FRESH WATER SYSTEM





**FERRETTI GROUP**



**BERTRAM ENGINEERING DEPT.**



3063 NW 21 STREET, MIAMI FL, 33142 - USA - tel. (305) 633/8011 - fax (305) 633/7188 - e-mail: info@bertram.com

Project	Job Order #	Group #	Dwg #	Rev.	Layout
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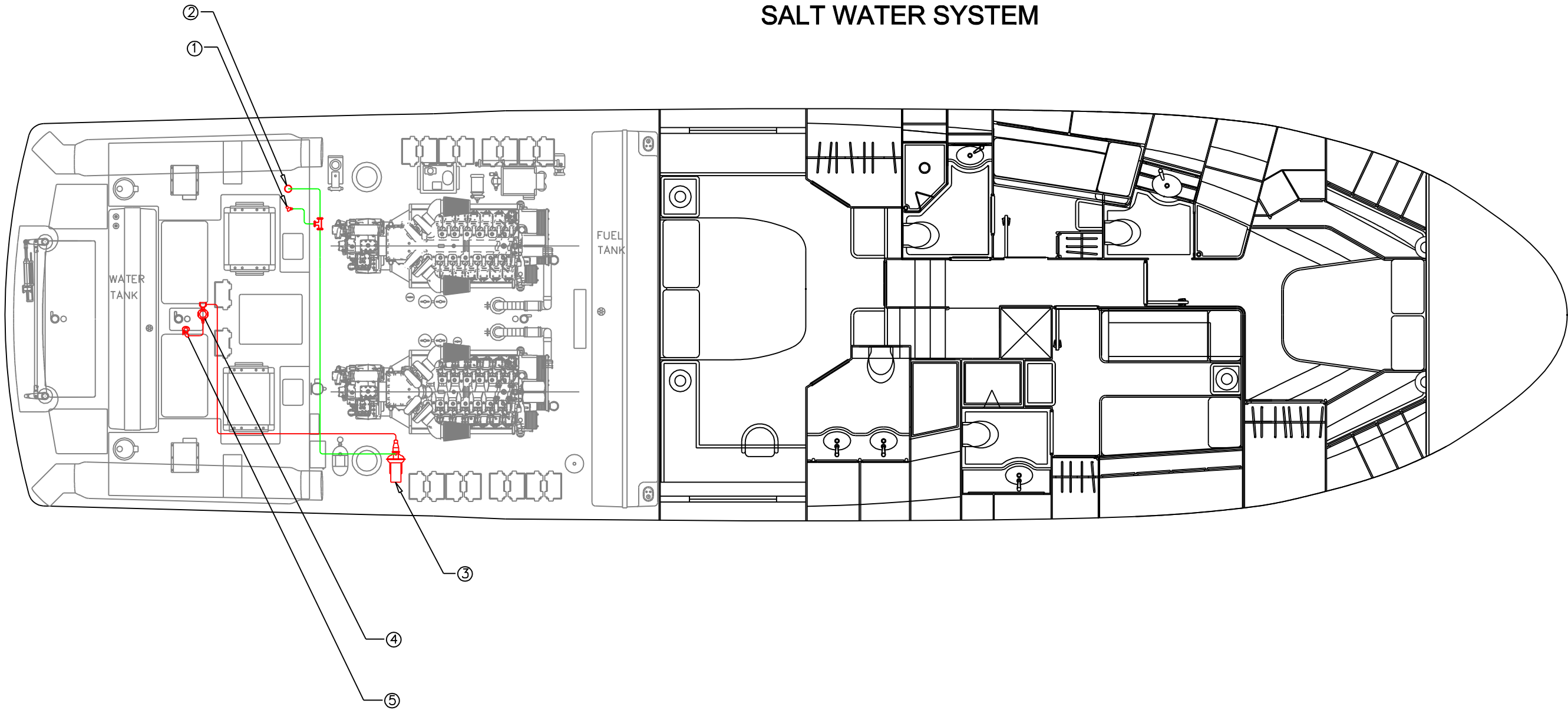
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PROPRIETÀ DELLA FERRETTI ENGINEERING. SENZA AUTORIZZAZIONE SCRITTA DELLA STESSA IL PRESENTE DISEGNO NON POTRÀ ESSERE UTILIZZATO PER LA COSTRUZIONE DELL'OGGETTO RAPPRESENTATO, NÉ COMUNICATO A TERZI O RIPRODOTTO. LA SOC. PROPRIETARIA TUTELA I PROPRI DIRITTI A RIGORE DI LEGGE



BERTRAM 700 FRESH WATER SYSTEM	
LIST OF COMPONENTS	
ITEM	DESCRIPTION
1	WATER TANK VENT
2	PORT DOCKSIDE WATER INLET
3	COCKPIT WASHDOWN
4	PREP CENTER FAUCET
5	ENGINE ROOM SERVICE HOSE
6	REFRIGERATOR
7	DISHWASHER
8	GALLEY SINKS
9	CAPTIVE AIR TANK
10	CHILLED WATER PUMP MODULE
11	DECK WASHDOWN
12	WATER HEATERS (2)
13	FRESH WATER MANIFOLD
14	TO FLYBRIDGE WET BAR
15	SALON WET BAR
16	SALON ICEMAKER
17	WATER FILTER
18	FRESH WATER PUMP
19	FISHING RODS WASHDOWN
20	STBD DOCKSIDE WATER INLET

 <b>FERRETTI GROUP</b>							
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DRAWING TITLE		Project	Job Order #	Group #	Dwg #	Rev.	Layout
FRESH WATER SYSTEM		-	-	-	-	-	-
MODEL:		FILE: -					TAV
B700		DATE: 3-13-07					SCALE: -
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BERTRAM 700  
SALT WATER SYSTEM

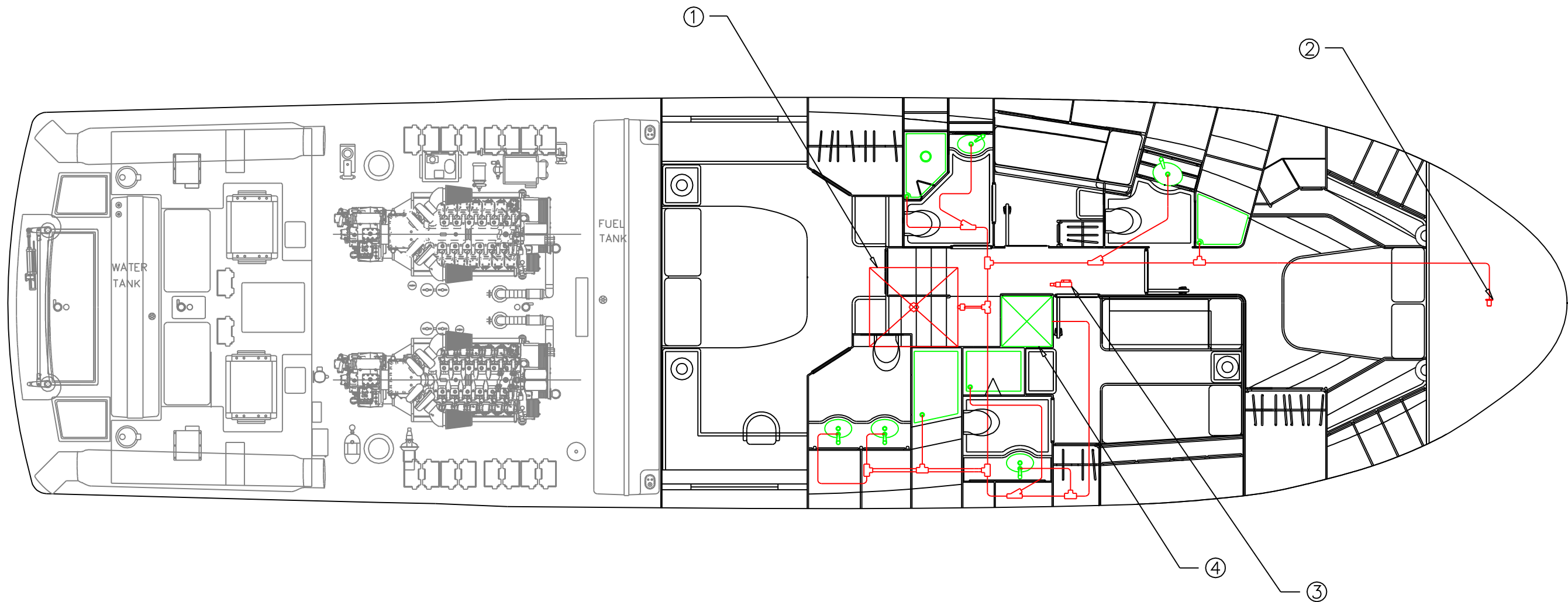


BERTRAM 700 SALT WATER SYSTEM	
LIST OF MECHANICAL COMPONENTS	
ITEM	DESCRIPTION
1	COCKPIT WASHDOWN FAUCET
2	BAITWELL TANK
3	SEA WATER WASHDOWN PUMP
4	RAW WATER STRAINER
5	SEACOCK


 <b>FERRETTI GROUP</b>	 <b>BERTRAM ENGINEERING DEPT.</b> <small>3663 NW 21 STREET, MIAMI FL, 33142 - USA - tel. (305) 633/8011 - fax (305) 633/7188 - e-mail: info@bertram.com</small>												
DRAWING TITLE <b>SALT WATER SYSTEM</b>	<table><tr><td>Project</td><td>Job Order #</td><td>Group #</td><td>Dwg #</td><td>Rev.</td><td>Layout</td></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr></table>	Project	Job Order #	Group #	Dwg #	Rev.	Layout	-	-	-	-	-	-
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MODEL: <b>B700</b>	DATE: 3-9-07												
DRAWING SIZE: <b>B</b>	SCALE: - Dwg # -												
DESIG.BY: D.D.	APPV.BY:												
<small>PROPRIETA' DELLA FERRETTI ENGINEERING. SENZA AUTORIZZAZIONE SCRITTA DELLA STESSA IL PRESENTE DISEGNO NON POTRA' ESSERE UTILIZZATO PER LA COSTRUZIONE DELL'OGGETTO RAPPRESENTATO, NE COMUNICATO A TERZI O RIPRODOTTO. LA SOC. PROPRIETARIA TUTELA I PROPRI DIRITTI A RIGORE DI LEGGE</small>													




BERTRAM 700  
GRAY WATER SYSTEM



BERTRAM 700 GRAY WATER SYSTEM	
LIST OF MECHANICAL COMPONENTS	
ITEM	DESCRIPTION
1	HOLDING TANK
2	CHAIN LOCKER
3	HOLDING TANK DISCHARGE PUMP
4	WASHING MACHINE



**FERRETTI GROUP**



**BERTRAM ENGINEERING DEPT.**

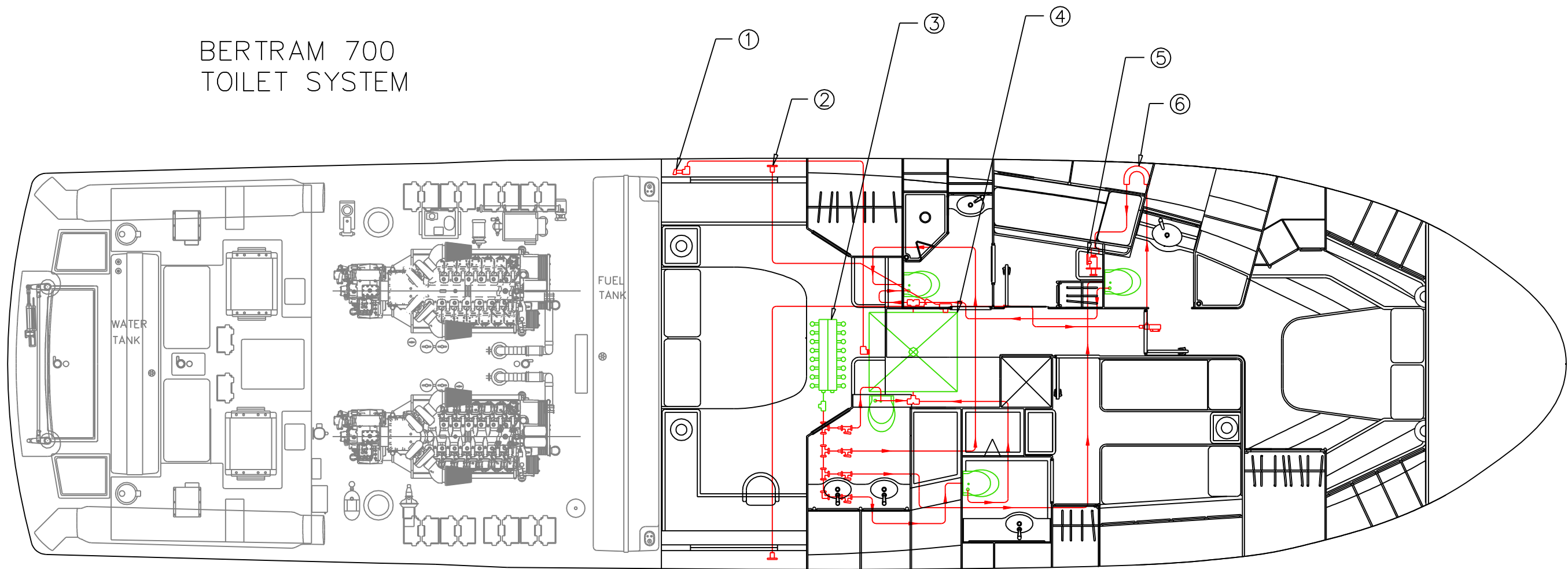
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DRAWING TITLE		Project	Job Order #	Group #	Dwg #	Rev.	Layout
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B700		DATE: 3-5-07					SCALE: -
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
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BERTRAM 700  
TOILET SYSTEM



BERTRAM 700 TOILET SYSTEM	
LIST OF MECHANICAL COMPONENTS	
ITEM	DESCRIPTION
1	TANK VENT
2	DECK WASTE PLATE, PORT & STBD.
3	FRESH WATER MANIFOLD
4	HOLDING TANK
5	SEACOCK AND THRU HULL
6	SIPHON BREAKER, VENTED LOOP



**FERRETTI GROUP**



**BERTRAM ENGINEERING DEPT.**

DRAWING TITLE

TOILET SYSTEM

MODEL:

B700

DRAWING SIZE:

B

Project	Job Order #	Group #	Dwg #	Rev.	Layout
-	-	-	-	-	-
FILE:					TAV
DATE: 3-6-07					
APPV. BY:				SCALE: -	
DESIG. BY: D.D.				Dwg #	

PROPRIETA' DELLA FERRETTI ENGINEERING. SENZA AUTORIZZAZIONE SCRITTA DELLA STESSA IL PRESENTE DISEGNO NON POTRA' ESSERE UTILIZZATO PER LA COSTRUZIONE DELL'OGGETTO RAPPRESENTATO. NE COMUNICATO A TERZI O RIPRODOTTO. LA SOC. PROPRIETARIA TUTELA I PROPRI DIRITTI A RIGORE DI LEGGE