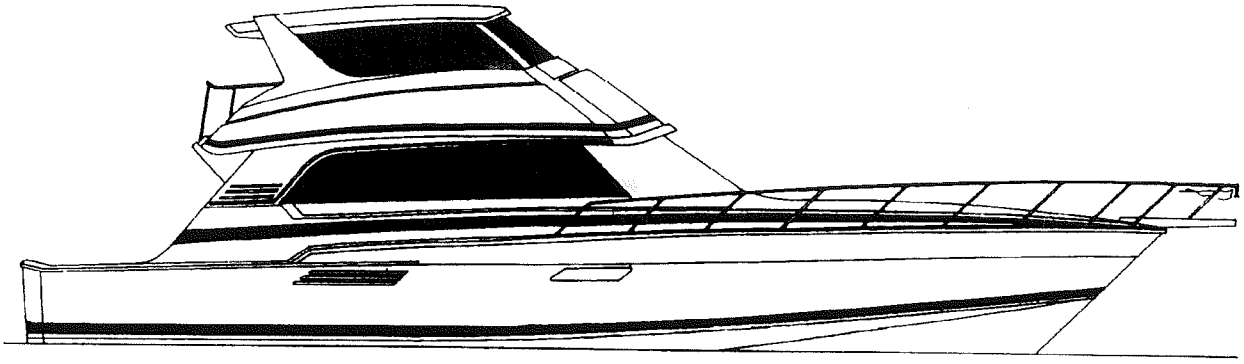
BERTRAM



Operator's Manual

72' Convertible

Model 725
Part Number 18A10072

Issue 501

BERTRAM YACHT
A DIVISION OF BERTRAM-TROJAN, Inc.

3663 NW 21st Street
Miami, Florida 33142

Foreword

Congratulations!

Your Bertram's unique design and the care taken in its manufacturing mean it should give you outstanding performance and many years of boating pleasure. Your Bertram is built of the finest materials, hand crafted to Bertram's demanding quality standards. It is factory tested and thoroughly inspected.

As durable as it is, your Bertram will benefit from reasonable care. A yacht is a complex mechanism, and it will require preventive and corrective maintenance, minor adjustments, and repairs. This operator's manual helps explain the operation and required maintenance of the many systems on your yacht.

The better you understand your Bertram, the more pleasure you will get from it. We recommend that you read this manual thoroughly and keep it on board for reference. If any points are not clear, your Bertram dealer will be glad to assist you.

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

About Your Vessel's Documentation

This manual is divided into four parts.

Part I includes a history of the Bertram Yacht and three glossaries of nautical, wave and weather terms.

Part II locates and describes the equipment and systems that make up your Bertram, and discusses their operation.

Part III contains maintenance, troubleshooting, and service information.

Part IV contains supplementary illustrations including the docking plan and electrical and mechanical drawings.

In addition, you will find:

1) an envelope containing important warranty information;
2) a package containing user's manuals and operating instructions supplied by the manufacturer of each major mechanical, electrical, and comfort equipment component.

Please open the Warranty Materials envelope immediately, fill out the warranty cards and send them in. This will help you get service rapidly and efficiently. Manufacturers *need* your warranty cards!

The user's manuals will help you to get a better understanding of the systems on your Bertram and how they operate. They will also be extremely valuable to the technicians who service your Bertram.

--- See Part III for Maintenance Information ---

Warnings, Cautions and Notes

Throughout this manual you will find special information in the form of warnings, cautions, and notes. These are intended to alert you to possible dangers to yourself, the crew or passengers, and/or to your vessel. **Read these special information items carefully.**

Just reading a warning or a caution note within a box will not eliminate the danger(s). Pay close attention to these warnings, and exercise "good seamanship." **YOU are the most important factor in preventing accidents.**

Here is the format for the Warnings, Cautions and Notes you will see in this manual:

⚠ WARNING

Failure to heed a WARNING may result in death or serious injury.

⚠ CAUTION

Failure to heed a CAUTION may result in injury and/or damage to the vessel.

NOTE:
A note is intended to emphasize important information.

U.S. Coast Guard Regulations

If your Bertram is to be operated in waters regulated by the U.S. Coast Guard, there are certain requirements you must meet. These are discussed in the Coast Guard publication *Federal Requirements for Recreational Boats.*

Some -- but not all -- of the items you are required to carry are furnished as standard equipment on your vessel.

If you are operating in U.S. territorial inland waters, Coast Guard regulations require that all boats of 12 meters (39.4 feet) or more in length carry aboard a copy of the USCG publication *Navigation Rules, International -- Inland.*

NOTE:
U.S. Coast Guard regulations state that it is the responsibility of the vessel owner to be sure all required equipment is on board and in proper working order.

A Few Words About Maintenance

Some of the on-board systems and equipment require scheduled *preventive* maintenance which may not be covered in your collection of manufacturer's manuals. Such scheduled maintenance is covered in this manual in **Part III: Maintenance.**

Part III also includes recommended troubleshooting techniques, recommended storage and refloating procedures, plus other special maintenance procedures.

When your Bertram does require service, we suggest you first contact your Bertram dealer. He is trained to help you, and our factory service representatives are available to assist him if needed.

We wish you many years of pleasurable yachting with your Bertram.

CAUTION

High Performance Vessel

This vessel is a high performance yacht. It has sufficient power to propel it at speeds beyond those which are reasonable and prudent in some sea conditions.

Although you may be very comfortable on the flybridge at high speeds in heavier seas, there can be a great deal of motion at the forward end of your vessel. This motion can result in heavy impact as your Bertram contacts the sea. ***The buffeting can injure your passengers, damage the contents of your vessel, and damage the structure of the vessel itself.***

You must be a careful seaman in heavier sea conditions.

When entering seas at higher speeds, take these precautions:

- Know where your passengers are. They could be injured if they are in a place where they cannot hang on to the vessel.
- Be sure all cargo is carefully stowed where it cannot fly about the cabin.
- Be sure all compartment doors, Cabinet doors and appliance doors are dogged down so they cannot swing back and forth and be damaged.

When your are under way and seas get heavier, send someone below to be sure that passengers, cargo and the vessel itself are unharmed. If necessary or prudent, slow your vessel.

Don't take chances with your vessel and with the comfort and well being of your passengers.

Slow down when seas increase in size.

BERTRAM YACHT
A DIVISION OF BERTRAM-TROJAN, Inc.

3663 NW 21st Street
Miami, Florida 33142

Table of Contents

Part III: Maintenance

Part IV: Supplement

List of Illustrations

Part I: Introduction

Part II: Operation

Part III: Maintenance

Table of Contents

Part I: Introduction

Table of Contents

Part II: Operation

Safety Precautions and Emergency Procedures — *Section 3*

Propulsion System — *Section 4*

Fuel System — *Section 5*

12-Volt DC Electrical System — *Section 10A*

24 Volt DC Electrical System — *Section 10B*

120/240 Volt AC Electrical System — *Section 11A*

Seawater System — *Section 13*

Accessories — *Section 14*

Section 1A

Operating Your Bertram

This section describes your Bertram's controls, instruments and indicators, and explains how to operate the vessel.

NOTE:
Do not attempt to operate this vessel until you are familiar with the contents of this manual and the manuals of all your vessel's on-board systems. Included in or with this manual are the appropriate WARNING and CAUTION notices plus operating and maintenance information for each factory-installed system.

Your Bertram is factory-equipped with indicators and meters that you need to:
- operate your vessel efficiently;
- monitor the status of your vessel's systems;
- properly maintain your vessel.

To operate your vessel properly, you should:
1) become familiar with the function of each of your Bertram's controls and monitors;
2) note what constitutes "normal" readings or operating ranges of each device.
3) check your monitors carefully when you first start your engines;
4) make it a habit to frequently check your monitors when underway;
5) be aware that the gauges may not return to any particular position when the ignition is switched **OFF**.

NOTE:
During operation, there may be some slight fluctuations in gauge readings. This is normal.

NOTE:
When you first start your engines, especially in cool weather, oil pressure will read higher than normal and will return to normal as soon as engines, transmissions, and lubricating oils reach normal operating temperature.

NOTE:
*Paying attention to your gauges is important, but it does not replace visual engine room inspections. You **must** check the engine room **regularly.***

Your Bertram's underway maneuvering controls and almost all of your Bertram's remaining functions are managed from the flybridge control station. The exceptions are:
1) some electrical distribution functions managed from distribution panels in the engine room (see ***Section 10A***, ***Section 10B*** and ***Section 11***);
2) some entertainment functions managed from the salon and the cabins;
3) galley appliances;
4) some climate control functions managed from the cabins (see the manufacturer's user's manual, provided separately);
5) lubricating oil transfer, which is managed from the engine room.

--- See Part III for Maintenance Information ---

Control Stations

Flybridge Control Station

The controls, instruments and systems on the flybridge instrument and overhead panels are shown in Figures 1A-1 and 1A-2. The flybridge is your vessel's main navigation and engine control station. This station is equipped with:

- engine, transmission, rudder, and bow thruster controls and indicators
- trim tab controls
- propulsion and control systems performance instruments
- horn switch
- magnetic compass
- system and accessory control switches and indicators
- alarm systems switches and indicators
- generator running indicators
- battery condition meters
- emergency engine stop
- optional features you have ordered from the factory
- additional features you have had installed (these features are not covered in this manual).

Bridge Deck and Cockpit Engine Control Stations

An engine control station is installed on the bridge deck, and an optional engine control station may be installed in the cockpit. These control stations are -- as their name implies -- for **engine control only.** They are not intended for use in navigating your vessel.

Although they do have helm, throttle and transmission controls, they are not equipped with engine performance gauges or alarm monitors.

> ⚠ CAUTION
>
> Read the information in ***Part II, Section 3*** on the ***Bridge Deck and Cockpit Engine Control Stations.***

Flybridge Instrument Panel

All the controls for your Bertram's engines and maneuvering functions are located on the flybridge control console (Figure 1A-1).

Throttle/Clutch/Transmission Controls

> ⚠ CAUTION
>
> To avoid transmission damage while maneuvering, do not shift from NEUTRAL into either FORWARD or REVERSE until engine speeds have dropped to idle.

A single lever controls each engine, clutch and transmission. The two single-lever controls for your Bertram are twin levers on the flybridge control console, starboard of the helm. A detent at the midpoint of the levers' travel lets you feel the **NEUTRAL** position. Each control is powered by the compressed air control system.

Section 1B

Important Notes on Operating Your Bertram

This section provides additional information on operating your Bertram, and alerts you to precautions that help minimize the chances of injury to you or your guests aboard, and of damage to your vessel.

Compass Basics

The magnetic compass can be the most important navigation instrument on a boat.

Compass Construction

A compass is basically a permanent magnet free to swing into alignment with the influence of existing magnetic fields. A typical marine magnetic compass consists of:

- one or more magnets;
- a calibrated card;
- a jeweled pivot;
- the compass bowl;
- a means of illumination for night use.

The permanent magnet provides the magnetic field seeking element of the compass and is usually attached to the underside of the calibrated card. Additional magnets may be located inside the compass and are used for adjustments.

The card is a non-magnetic material marked with a scale calibrated from 000° at North, then clockwise through 090° (East), 180° (South), 270° (West) to 360° (which is also 000° and North). This card is centered on a jeweled pivot in the center of the compass bowl.

The bowl may be filled with a mixture of alcohol and water or light oil. The compass card is partially supported by the liquid, reducing the friction and damping out excessive motion.

The housing for your compass is called the binnacle. When mounted, the compass card magnet aligns with the strongest magnetic field, normally the earth's magnetic field (but the effect of this field can be modified by electrical and electronic equipment, machinery, other compasses, and other nearby magnetic materials). When a compass is properly adjusted (compensated), the compass card will align itself closely with the earth's magnetic field and point approximately toward magnetic north.

Compass Error

Compass error is the observed difference between an indicated compass bearing and the actual bearing relative to true north (based on the north star, Polaris).

All navigation at sea is plotted on charts which use true north as a reference. If you are doing any long distance cruising that could require you to work navigation plotting problems and plot compass courses, it is vital that you know two things:

1) local variation (the difference in degrees east or west between true north and what your compass indicates as north (magnetic north) as shown on the local chart;
2) your compass' deviation for a given heading.

To obtain your correct bearing from the vessel's compass, you must correct for these two compass errors.

Variation

Local variation is the angular difference between magnetic north and true north. Variation is expressed in degrees east or west of true north and is not affected by your vessel's heading. It ranges from zero to about 20 degrees east or west error, depending on your global location.

This variation in the world's magnetic field is shifting continuously and irregularly, so magnetic north moves slightly each year. You will find local variation readings printed on current navigation charts.

Deviation

Every compass is affected by objects in the immediate vicinity. 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 caused by such shipboard magnetic influences such as your engines, electric motors, instruments with meter movements, electronic equipment, speakers, and other objects placed near the compass.

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

Your marine 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 the instruments and electronics on or near the instrument panel.

There is a vertical mark on the compass bowl called the "lubber line". This line was oriented when your compass was installed so an imaginary line drawn from the compass pivot point to the lubber's line will be parallel to the longitudinal axis of your vessel. Thus, your vessel's course (compass heading) is the compass card reading under the lubber's line.

Slow Speed Maneuvering

For maximum maneuverability your twin-engine Bertram has counter-rotating propellers. These propellers rotate in opposite directions and give your Bertram exceptional maneuverability at low speeds where many boats are difficult to handle.

For example, to turn your Bertram in its own length in a confined area, set the throttles at or near idle (but below the 1,000 rpm shift maximum), and set one engine in forward and the other in reverse, with the rudders amidships.

You can make this turn in either direction. Running the port engine forward and the starboard engine in reverse turns you clockwise. Running the starboard engine in forward and the port engine in reverse turns you counter-clockwise. You can turn faster by applying rudder in the direction of the turn.

Single Engine Operation

At some time it may become necessary to operate your Bertram with a single engine. Before this happens, Bertram suggests that you practice, first with one engine dead, then with the other, to see how your vessel handles. You will see that your vessel must be moving fairly fast after a dead stop before the rudders will "bite" the water enough to make the course correction you desire. You will also notice that with only one engine operating, steering while in reverse is very poor.

Docking

Docking parallel to a dock or pier is a good place to use your Bertram's slow-speed maneuverability. Approach the dock at minimum maneuvering speed, at a 30°angle, and, if possible, against either the tide flow or wind, whichever is greater. When the bow is about five feet from the dock, put the dockside engine in neutral and the other engine in reverse. This reduces your forward movement and should bring your stern smoothly alongside the dock without a jolt.

With some practice, you should be able to accomplish this type of docking with minimum fuss and noise, using the clutches alone, without steering or using the throttle.

Course Changes

At any speed above idle, your Bertram will settle smoothly into a turn due to the forces of the water on your deep "V" hull. Once your rudders bite, your vessel pivots around a point forward of amidships. The pivot point moves as speeds and hull attitudes vary. The bow pivots around a circle that is smaller than that of her stern with her bow initially just inside the intended turning track and her stern just outside.

As long as your helm is over, the lifting force of the rudders exists, and she will continue to turn. When you return the rudders to amidships, her turn will slow and her track through the water will straighten out. With a vessel of this size, particularly at slower speeds, steering slightly to the opposite direction ("meeting her") can be helpful in settling her in on her new course.

Marine Growth

To obtain maximum hull efficiency, which directly translates into speed, the bottom of your Bertram must be kept free of marine growth, including grass. Any growth will cause an increase in water resistance, decreasing speed and fuel efficiency.

--- See Part III for Maintenance Information ---

Water in the Bilge

The bilge should be pumped dry to minimize excess weight and sloshing. The added weight of bilge water makes your vessel ride lower, increasing water resistance and drag, and reducing speed and fuel efficiency.

The bilge is kept dry by a sump pump and by three bilge pumps equipped with sensor switches (see ***Part II, Section 7***). The galley and lavatory sinks have their own drains directly overboard. The shower has a sump with a pump that discharges overboard.

Atmospheric Conditions

While operating your Bertram, there are some operational considerations to keep in mind:

- a planing hull will perform slightly better in salt water than in fresh water due to the difference in the weight of water that it displaces.
- engine performance will be affected to a slight degree by local atmospheric conditions; among other things, you will find that the engines may develop less power in warm air temperatures.
- similarly, dry air reduces power, as will high altitudes; if you are cruising regularly in waters well above sea level, you will want to have a certified mechanic make the necessary adjustments to your engines to get the correct air/fuel mixture.

Preparing for a Trip

To minimize problems and to get the maximum pleasure from your Bertram, we suggest that you go over a written checklist each time you prepare for a cruise. The items listed in Table 1B-1 should be part of this list. There are blank spaces left so you may add other items to your personal list.

Of course, all gear and equipment on board should be properly stored while cruising.

Adding Weight Means Reduced Performance, Higher Fuel Consumption

You should be aware that adding passengers, personal equipment, provisions and accessories will add weight and decrease your vessel's speed.

Remember to take the effect of this added weight into consideration when calculating your vessel's performance, and particularly when calculating fuel consumption.

Calling at Ports Away From Home

Shore Current

You are not likely to have trouble with shore current in the United States. However, you should be careful when cruising abroad. Check shore power for 50 or 60 Hz single phase alternating current (ac).

Section 2

Fire Alarms and Fire Safety

Boating safety studies show that the best way to fight shipboard fires is to prevent them. Most shipboard fires are preventable if you:

- do not allow fuel spillage to accumulate in the bilge;
- properly store paint and other combustibles;
- take appropriate care when cooking, especially frying;
- take appropriate care with smoking materials;
- do not exceed the safety factor built into electric wiring.

Unfortunately, some on-board fires are unpreventable. Boating safety statistics[1] show that of those pleasure craft that burn, 80% are destroyed unless the fire is put out in the first 5 to 10 minutes. These same sources show that more than 80% of the fires on pleasure craft start in the engine room.

To give you fire warning and fire fighting capabilities, your Bertram's factory-installed equipment includes:

- engine room fire alarm system;
- fixed Halon engine room fire extinguisher system with fire extinguisher discharged audio/visual alarm system;
- four portable fire extinguishers;
- salon smoke detector.

Engine Room Fire Alarm System

NOTE:
You can disable the fire alarm system only by removing the panel fuse or disconnecting the batteries.

The engine room fire detection system uses heat sensing switches, located on the overhead, which activate the alarm system at approximately 200°F. These switches automatically reset after the temperature drops below the critical point.

The fire alarm bell and **ENGINE ROOM OVERHEAT DETECTION** indicator lights on the flybridge overhead instrument panel (Figure 1A-2) warn if the heat sensing switches have detected an overtemperature condition. There is also an alarm panel located between the salon and galley above the air conditioning control units. This panel warns of both fire and bilge flooding conditions.

The fire detection system is limited solely to detecting fires in the engine room.

NOTE:
The engine room fire detection alarm system is completely separate from the onboard fixed fire extinguishing system's own audio/visual alarms.

1 U.S. Department of Transportation, U.S.C.G. COMDTINST M16754.1G, *Boating Statistics*, June, 1986.

Testing the Fire Alarm Lamp and Bell

On the flybridge overhead instrument panel are the **OVERHEAT DETECTION & HALON BOTTLE DISCHARGED** **MONITORS** push-button switches. You can test the fire alarm lights and bell by pressing the push-button switch labeled **TEST**.

Silencing the Fire Alarm Bell

You can override the fire alarm lights and bell by pressing the **OVERHEAT DETECTION & HALON BOTTLE DISCHARGED** **MONITORS** push-button switch labeled **SILENCE**. This switch is located on the flybridge overhead panel.

Fixed Fire Extinguisher System

⚠ CAUTION

Your fixed fire extinguishing systems will only fight engine room fires. Fires outside of this compartment are fought with hand-held extinguishers.

Your Bertram has two fixed fire extinguisher systems that protect the engine room. Each independent fixed fire extinguisher system consists of a Halon 1301 gas bottle with its controls and indicators.

There are two systems in case a reignition occurs, or if the first Halon discharge fails to completely put out a fire.

Both bottles are AFT in the engine room and both discharge only into that compartment. Each bottle has sufficient Halon for more than the necessary 5% concentration needed to extinguish engine room fires.

Halon System #1 is automatically discharged when a rapid rise in engine room temperature is detected by rate-of-rise detectors. You can also discharge the system manually.

Halon System #2 is intended solely as a backup system, so you must discharge it manually from the control panel on the port side of the cockpit entrance well.

Halon 1301

Halon 1301 was selected as a fire extinguishing agent for several reasons:

- It is safe and clean (it leaves no water, foam, powder, or other residue behind).
- Halon 1301 works chemically to stop a fire. It breaks the chain reaction by which the fire propagates itself from one fuel molecule to another.
- With a minimum Halon 1301 concentration of at least 5%, it will prevent reignition and flashback.

⚠ WARNING

Although unburned Halon is relatively safe, *burned* halon can be TOXIC. Do not breath the fumes, the smoke from the fire, or the engine exhaust.

Table 1B-1: Trip Preparation Checklist

Check items off as you complete them:

___ 1) Daily Maintenance checklist performed (see **Part III: Maintenance, Section 1**)

___ 2) Fuel and fresh water tank levels checked

___ 3) One correct sized life jacket (PFD) for every person aboard

___ 4) Throwable Type IV PFD (life preserver) on board and in its mounting bracket

___ 5) Current visual distress signals are on board

___ 6) Portable fire extinguishers on board, usable, and in their mounting brackets

___ 7) First aid kit on board

___ 8) Necessary charts on board

___ 9) Communications and navigation equipment working

___ 10) Latest marine weather forecast obtained

___ 11) Fire Alarm and Bilge Flood Alarm circuits tested

___ 12) Fire extinguishing system operational; Fire System Panel checked

___ 13) _____

___ 14) _____

___ 15) _____

___ 16) _____

___ 7) _____

___ 18) _____

___ 19) _____

___ 20) _____

___ 21) _____

___ 22) _____

___ 23) _____

___ 24) _____

___ 25) _____

Diesel Fuel

When cruising abroad, try to purchase fuel equal to American standards. For your engines' requirements, see under ***Fuel System*** in ***Part II, Section 5***, and in your engine Operator's Manual. Carry extra fuel filters with you, since replacement may be necessary.

Drinking Water

In some areas, it may be advisable to use iodine type water purifying tablets. Be sure to take these with you when cruising to places where the water supply is suspect.

Leaving Your Bertram

Follow these procedures when leaving your boat overnight or for a short time:

1) Switch **OFF** all ignition or engine circuits.
2) Lock all doors, windows, and hatches.
3) Set fenders and spring lines.
4) Make sure mooring lines are well secured with adequate allowance for tides.
5) Leave the automatic bilge pump on the **AUTO** position. If your vessel is taking on water, check the batteries' voltage frequently.
6) Disconnect dockside fresh water line.

System Operation

The first warnings of an overtemperature condition will usually be the fire alarm bell and the fire alarm light, which signal the detection of an overtemperature condition in the engine room. But when the temperature rises rapidly due to a fire, there may be only a brief time span between the alarm and the discharge of Halon System #1.

NOTE:
The time between the fire warning system alarm and the HALON DISCHARGED alarm may be too short for you to act upon them as separate events.

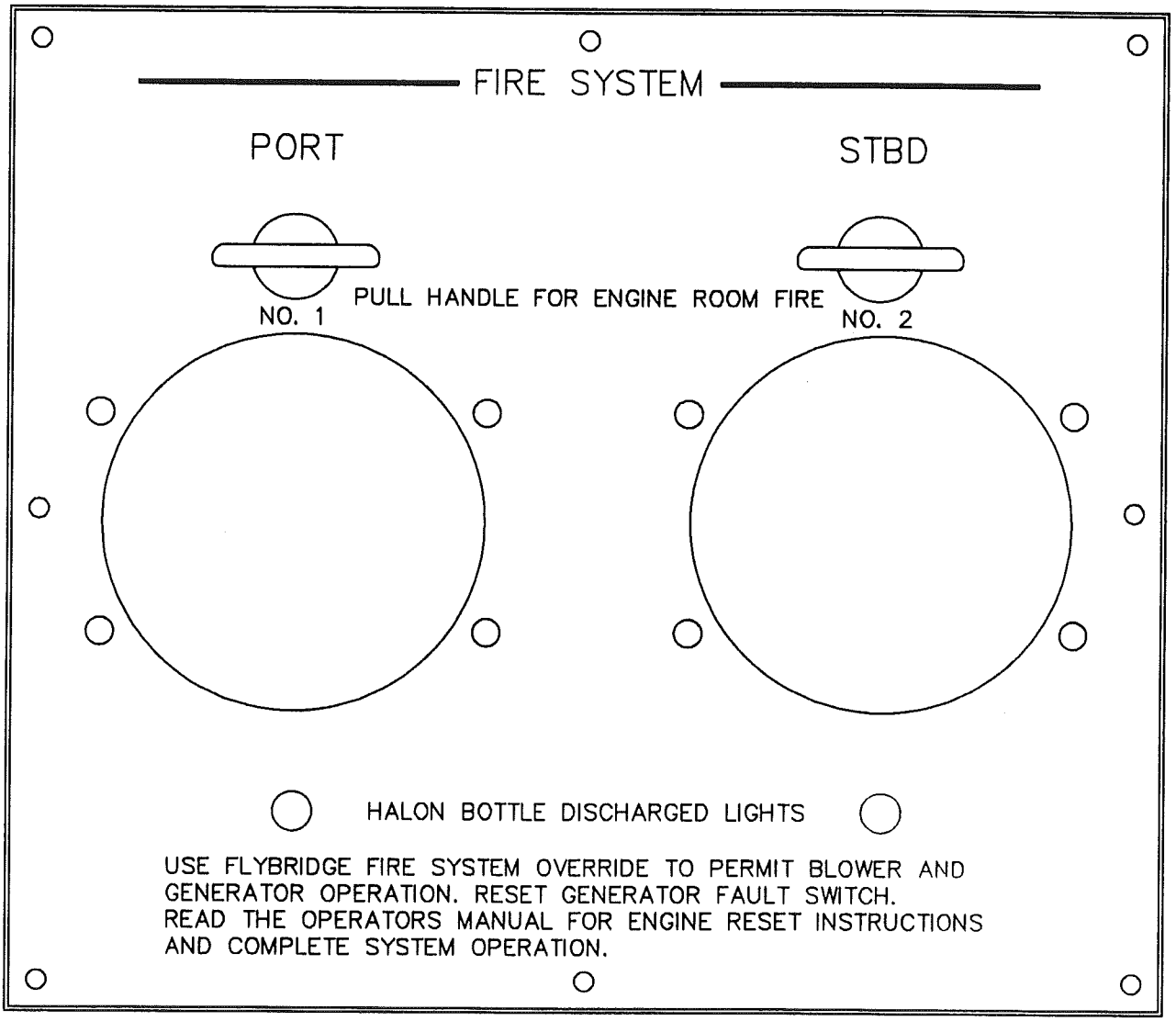


Figure 2-1: Fire System Panel

⚠ WARNING

Most fire fighting agents stop engines by oxygen depletion, but Halon 1301 may not stop Diesels. If you do not quickly stop your Diesel engines in the event of fire in the engine room, the Halon gas concentration will be rapidly lowered and may no longer be effective as a fire fighter.

NOTE:
In the event of a fire in the engine room, you must keep the engine room hatches closed. This keeps the Halon concentration as high as possible, and gives the Halon the chance to put out the fire.

Halon System #1

When either Halon system is discharged -- automatically or manually -- the system:

- shuts down the forced ventilation system;
- shuts down the ac generators;
- releases Halon gas into the engine room;
- sounds the Halon discharged alarm bell.

NOTE:
For Halon to be fully effective as a fire extinguisher in your engine room, the engines must be shut down as soon as possible after Halon system #1 automatically discharges, or before you manually discharge either system (the ac generators and the blowers are automatically shut down when either Halon bottle is discharged).

NOTE:
To keep Halon bottles from exploding due to pressures created by overheating, they have relief devices that release the Halon if the engine room temperature reaches a preset level.

Halon System #2

The fire extinguisher system controls are in the starboard cockpit pilaster. Halon System #2 is intended as a backup for Halon System #1 and has only a manual discharge mode. This system is discharged by removing the safety pin and pulling the system release "T" handle.

After the Discharge of Either Fixed Fire Extinguisher System

⚠ WARNING

Do not open the engine room hatches or try to enter this compartment for at least 15 minutes after a Halon discharge. Allowing oxygen to enter this compartment before hot metals or fuels are cool may cause reignition or flashback.

Except in the rare case of a coincidental emergency requiring immediate power to maneuver your vessel out of danger from another source, you must give the Halon sufficient time to completely extinguish the fire.

Therefore, once the Halon is discharged, to minimize the risk of reignition or flashback, you should wait a minimum of fifteen minutes for any heated metal or fuel to cool off before opening the engine room hatches.

If you hear the **EXTINGUISHER DISCHARGED** bell, Halon System #1 has discharged. Take these steps immediately:

1) Unless other dangers make maneuvering power necessary, immediately shut down the engines if the Halon has not already done so. The engine **STOP** switches are on the flybridge control console instrument panel (Figure 1A-1).

There is one **ON/STOP** switch for each engine. The standard method for stopping a Diesel engine is to move its **ON/STOP** switch into the **STOP** position. Your Bertram also has an emergency engine shutdown system. If an immediate Diesel engine shutdown is necessary, and if the engines do not shut down when you hold the **ON/STOP** switch in the **STOP** position, you should use the Emergency Stop system. This system consists of two Emergency Stop "T" handles on the Fire System panel (Figure 2-1) on the starboard cockpit pilaster. To use this system, you pull each emergency stop "T" handle out as far as it will go.

NOTE:
If you choose to manually discharge this system, you should always attempt to manually discharge Halon System #1 first.

2) Shut down all electrical power except for the bilge pumps, navigation lights (if after dark), and the emergency radio.
3) Extinguish all open flames, including galley stoves, smoking materials, etc.
4) Do not open the engine room hatches for at least 15 minutes. Then carefully check to be sure that the fire is totally out. Verify by feeling around the hatches and bulkheads to ensure these surfaces are cool before opening the hatches. If you have reason to believe the fire is not out, discharge Halon System #2.
5) Stand by with portable fire extinguishers in case the fire spreads past the engine room bulkheads.

Inspecting and Restarting Boat Systems

⚠ WARNING

Halon 1301 itself is safe to breath, but, after it has burned, its combustion products are TOXIC. Do not breath the fumes, the smoke from the fire, or the engine exhaust.

After determining the fire is out:

1) Use the **FIRE SYSTEM MONITOR OVERRIDE** switch to allow switching **ON** the blowers and generator;
2) Ventilate the engine room to remove any burned Halon, which is ***TOXIC***;
3) Have the proper type of United States Coast Guard-approved hand-held fire extinguishers ready when you cautiously open the engine room hatches;
4) Carefully examine the engine room for damage and determine the cause of the fire.
5) Make the necessary emergency repairs.
6) Reset the fault resets on the ac generator control panels (mounted on the generators);
7) Restart your ac generator;
8) Restart your engines.

NOTE:
The engines and the ac generators may be hard to start due to residual Halon in the engine room.

8) Turn **ON** only those electrical circuits necessary to safely maneuver your vessel.
9) Return to port.
10) Have the Halon fixed fire extinguisher system(s) and any hand held fire extinguishers that were used checked and serviced as soon as possible.

Using Portable Fire Extinguishers

⚠ CAUTION

Before you operate your vessel, you should review the operating instructions in the hand-held fire extinguisher operator's manual included in your vessel's documentation.

⚠ CAUTION

Do not use water-based extinguishing agents on electrical fires. There is danger of electric shock to the fire fighter and the possibility of short circuiting the electrical circuits and causing more fires.

For fires other than engine room fires, Bertram supplies five Halon portable (hand held) fire extinguishers, USCG approved Type BC1. These are mounted:

- on the flybridge, in a cabinet on the port side of the wet bar;
- starboard on the stairwell of the engine room entrance;
- in the engine room;
- in a cabinet near the galley, outboard of the desk;
- in the wardrobe closet of the master stateroom.

There is a label (Figure 2-2) on the surface of the cabinet, locker or recess in which each portable extinguisher is located.

NOTE:
If you hold down the trigger on a hand-held fire extinguisher, it will be empty in 8 to 20 seconds, and some fires can reignite. Use only the amount of chemical necessary to suppress the fire -- don't waste the resource you may need soon.

For more information on the operation, use, inspection and care of the hand-held fire extinguishers installed on your vessel, see the operator's manual provided by the manufacturer. It is included with your vessel's documentation.

Classes of Fires

To help you select the correct fire fighting tool, fires are divided into three classes:

Class "A" Fires

Class "A" fires are fueled by paper, wood, fabric, rubber, and some plastics. Water is the best means of extinguishing a Class "A" fire. It is important to use it as soon as possible. Drench the fire, open the material to expose all burning embers and redrench, or throw the smoldering material overboard.

Class "B" Fires.

Class "B" fires are fueled by flammable liquids such as gasoline, oils, paint, and cook-

Figure 2-2: Portable Fire Extinguisher Location Label

ing fats (galley grease). Carbon dioxide, dry chemical, and Halon fire extinguishers are suitable against Class "B" fires. Aim the extinguishing spray at the base of the fire, not at the smoke, working in a horizontal sweeping motion from the front to the back of the fire.

Galley grease fires may be fought with dry chemical extinguishers, by smothering the fire (covering with a pot lid), or with baking soda.

You should *never* fight galley grease fires with water, which splatters hot grease, possibly spreading the fire and causing injuries.

Class "C" Fires

Class "C" fires are caused by energized electrical equipment. Carbon dioxide, dry chemical, and Halon fire extinguishers will extinguish Class "C" fires.

You should *never* fight Class "C" fires with water because water could cause short circuits and more fires or could endanger your life by electrocution.

Salon Smoke Alarm

The salon smoke alarm is located on the overhead (ceiling) of the salon near the cockpit door.

If the salon smoke alarm sounds, unless the smoke is from the galley and the fire is easily extinguished, you should follow the procedures you have developed according to the discussion at the end of this section under ***Fire Fighting Plan***. If necessary, you should follow the ***Emergency Evacuation Plan*** you have developed according to the material discussed in ***Part II, Section 3***.

Fire Fighting Plan

After an active fire *prevention* program is the most important precaution you can take.

The next step is to develop a well thought out and well rehearsed vessel fire fighting plan. This helps organize the fire fighting efforts of vessel operator, crew members and guests.

Organization is vital -- studies of fires at sea show that quick reaction time is critical in putting out a shipboard fire.

Therefore, the vessel operator, crew members and other designated persons on board should know:

- the location of controls and the operation of both fixed Halon fire extinguishing systems;
- the location of the switches to shut down the:
  a) engines;
  b) ac generators;
  c) 12Vdc and 32Vdc power supplies;
  d) forced air ventilation blower system;
- the location and operation of every hand-held portable fire extinguisher on board;
- what type of fire extinguisher to use in fighting different types of fires.

We suggest you assign specific duties and have at least one "dry run" fire-fighting practice session each time you go to sea. This helps prevent panic in case there is an actual fire, and builds your confidence that operator, crew and guests understand what to do.

In dry runs, you should not discharge the fire extinguishers.

This space reserved for operator notes.

Section 3

Safety Precautions and Emergency Procedures

Carbon Monoxide Gas

⚠ WARNING

Gasoline and Diesel internal combustion engines use petrofuels and emit carbon monoxide gas. This gas is colorless, tasteless, odorless, and *lethal* if breathed in sufficient quantities.

Gasoline and Diesel internal combustion engines use petroleum-based fuels. These engines emit carbon monoxide (CO) gas, which is colorless, tasteless, odorless, and ***lethal*** if breathed in sufficient quantities.

You should always observe certain precautions to be sure of safe and pleasant power boating. These precautions are essential to the continued good health of you, your crew, and your passengers.

Be sure you open sufficient windows, hatches, and vents to maintain adequate ventilation, even with the air conditioner operating. Be especially careful when operating auxiliary equipment such as the ac generator.

When you are tied up to a dock, or are rafting with other vessels, or are immediately alongside other vessels, a lethal concentration of carbon monoxide may be drawn into your ventilation system from engine or generator exhaust fumes of nearby vessels.

Remember that carbon monoxide poisoning is one of boating's most treacherous hazards. Carbon monoxide poisoning first attacks the brain's judgment center; early symptoms (headache and nausea) are easily confused with seasickness.

Carbon monoxide is lethal, and its effects are cumulative. As carbon monoxide builds up in your body, your blood can carry less and less oxygen. This can take place over a long period of time and at relatively low concentrations.

Carbon monoxide gas is colorless, odorless and tasteless.

Don't take chances with your life and health. Learn these symptoms of carbon monoxide poisoning:

1) throbbing in the temples;
2) dizziness;
3) ringing in the ears;
4) watering and itching eyes;
5) headache;
6) nausea;
7) cherry pink or red skin color.

If you even *think* you smell excessive exhaust odor, or if you think you or anyone on your vessel might possibly have one or more of these symptoms of carbon monoxide poisoning, you should immediately:

a) move everyone out on deck into fresh air;
b) open all hatches, windows, and vents;
c) shut down the engines and the ac generators until you have located the source of the carbon monoxide.

--- See Part III for Maintenance Information ---

If the carbon monoxide comes from your vessel, make all the necessary corrections and repairs before getting underway again.

Once again, be very aware that you can get Carbon monoxide poisoning from the exhaust fumes of vessels nearby.

When Underway

⚠ WARNING

When underway, to reduce the chances of someone falling overboard, do not let anyone: 1) move to or from the foredeck along the outside of the cabin; 2) leave the transom door open; 3) move about topside without the proper nonslip "boater" footwear.

Certain aspects of being on any moving vessel can be dangerous. However, you can reduce these dangers if you exercise caution.

For instance, moving forward on deck or moving about the foredeck when your vessel is underway should always be done cautiously, and the transom door should be kept shut when underway.

Prudent Speeds

Your Bertram's deep "V" hull cushions pounding by slicing through the waves rather than slapping against them. However, even a Bertram will eventually encounter extreme conditions that a sensible seaman must not ignore. You should reduce speed as required by adverse sea conditions in the interest of your comfort. This also reduces needless strain on the engines and vessel structure.

Navigation Lights

Your Bertram is delivered to you with approved navigation/running lights installed. From both the safety and legal aspects, your navigation or anchor lights must be illuminated between dusk and dawn, unless you are dockside or at anchor in a marked anchorage.

All vessels may use the International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS) as the controlling document when in international waters and in U.S. navigable waters where the Inland Navigational Rules apply. However, you must refer to the Great Lakes and Western Rivers Rules when in U.S. navigable waters where these rules apply.

To comply with USCG and international regulations, you must use the correct bulbs in your navigation lights. A table in Part I, Section 3 lists the correct replacement bulb part numbers for your navigation lights.

NOTE:
It is the legal responsibility of the vessel's owner: a) to be sure that if the vessel superstructure is modified (i.e., you add a fishing tower, radar or other electronic equipment), the required visibility for each navigation light is not obstructed; b) to be sure the vessel complies with any future changes to the existing 72 COLREGS.

NOTE:
Keep the transom door closed while underway at night to avoid obscuring the stern light.

Sound Signals

The length of this vessel falls within the Coast Guard category that requires it to carry both a bell and a whistle or a horn. Bertram has equipped this vessel with a suitable (unmounted) bell that satisfies the Federal Requirement of a bell for use in fog, and a dual horn suitable for the sound signals required by the Rules of the Road, under Fog and Other Signaling. The horn push button switch is on the bottom edge of the flybridge control console instrument panel at the far starboard side of the row of switches.

Personal Flotation Devices

By federal regulation and the laws in most states, this, or any other vessel, powered or not, is required to have one U.S. Coast Guard approved Personal Flotation Device (PFD) of suitable size and ready availability for each adult and each child on board (this device is commonly referred to as a life preserver or life jacket). If the vessel is not used commercially, PFDs may be Type I, II, or III. If the vessel is used commercially and carries 6 or fewer passengers for hire (charter boat operation), the PFDs must be Type I.

NOTE:
To satisfy U.S. Coast Guard regulations, you must unwrap your Personal Flotation Devices. The U.S. Coast Guard does not consider as "readily available" any PFDs found left in their original plastic wrappers, since persons under stress may be unable to get them out quickly.

For this vessel, Bertram furnishes 4 adult size Type I buoyant vests. This type of Personal Flotation Device (PFD) is capable of turning its wearer to a vertical or slightly backward position in the water.

The Bertram supplied vests are high visibility orange, comply with all U.S. Coast Guard requirements for a Type I device, and carry the U.S. Coast Guard's approval label.

Type I PFDs come in four sizes: adult (90 pounds and heavier); child medium (50 to 90 pounds); child small (30 to 50 pounds); and infant (less than 30 pounds).

NOTE:
Bertram furnishes only adult sized PFDs. The U.S. Coast Guard requires that every one on board have the correct size PFD. If you plan to carry passengers who require smaller PFDs, you must obtain them yourself.

Donning PFDs

Don this type of PFD by placing it over the head with the collar behind the neck. Then connect the waist strap and adjust to prevent the PFD from riding up.

Everyone should know where the PFDs are stowed. Each person should practice putting on a PFD and should know how to properly put one on, even in the dark (in this case, it helps to practice donning a PFD while blindfolded).

If time and conditions permit – for instance during a swim – all hands should practice water entry while wearing a PFD, and swimming while wearing one.

The recommended technique for water entry while wearing a PFD is to wrap both arms as tightly as possible around the chest, under the chin. This protects the face and keeps the PFD from riding up. Always jump into the water feet first, with both the feet and knees

together and the knees slightly bent. Tuck the head down into the pocket made by the folded arms.

As soon as each wearer is in the water, they should join others for mutual help and warmth.

Storing PFDs

Storage of PFDs is important. If PFDs are put away wet or stored in a damp locker, they may mildew, which hastens their deterioration. They should first be thoroughly rinsed off in fresh water, dried, and stored in a cool dry place out of direct sunlight. They should be kept away from oil, paint, and greasy substances.

Ring Buoy

In addition to life jackets (PFDs) mentioned in the previous paragraphs, federal regulations require at least one U.S. Coast Guard approved throwable Type IV (buoyant cushion or life ring) aboard. This device must be carried where it is immediately available to those on deck.

Bertram supplies one Coast Guard-approved 20-inch diameter ring buoy with three mounting brackets. Mount this buoy in a suitable location. Bertram recommends that you attach about 60 feet of light line to the ring buoy.

You may add to the one on-board "throwable" or replace the ring buoy with any other approved Type IV device if you choose.

Radios as Emergency Equipment

Bertram recommends that you install a quality marine radio on your vessel for use in obtaining help in the event of an onboard emergency. Reliable radio communications can measurably add to the safety of your vessel and to the comfort of your crew and passengers.

Visual Distress Signals

A Federal regulation requires your Bertram to carry U.S. Coast Guard approved visual day and night distress signals.

NOTE:
You must always carry visual distress signals on board when you are operating in U.S. waters and on the high seas.

If you choose to carry pyrotechnic signaling devices, it is your responsibility to ensure that they have not exceeded their expiration date (42 months from date of manufacture). This expiration date is on the approval label.

Bertram does not supply such equipment. You should study the latest issue of the Coast Guard pamphlet *Visual Distress Signals for Recreational Boats.* You can obtain a copy from the U.S. Coast Guard.

WARNING

Do not use automotive road flares as your required night signals. The "slag" from road flares can cause serious injury and start fires.

Engine Control Stations

A second engine control station is installed on the bridge deck, and an additional engine control station may be installed in the cockpit.

> **CAUTION**
>
> The engine control station has little or no forward visibility. Use the engine control station only when:
> 1) a lookout is on the flybridge;
> 2) the vessel is in safe, open waters or is operating at low speed;
> 3) you restrict operations to limited maneuvering such as when boating a large fish or backing into a docking area.

The engine control station is -- as its name implies -- a station for **engine control only.** It is not intended for use in navigating your vessel.

Although it does have helm, throttle and transmission controls, it has no engine performance gauges except the tachometer, and it has only an audible alarm without alarm monitors.

You should use the engine control station only under these conditions:

1) there is a **qualified** lookout on duty on the flybridge. This lookout must be prepared to take over control of the vessel if necessary;
2) you are operating the vessel in open seas well clear of obstructions or dangers, or at very low speeds in other areas;
3) you restrict operations to limited maneuvers such as those performed when boating a large fish or backing the vessel into a docking area.

Preparing for Heavy Weather

> **CAUTION**
>
> Keep deck hatches dogged and secured while underway to prevent lazarette flooding.

One of the compelling reasons you operate a Bertram may be its long tradition of exceptional strength and seaworthiness. Even so, there is no vessel, regardless of its size and strength, that is completely immune to the dangers of heavy weather.

When preparing for heavy weather, or if you are running ahead of a heavy following sea, be sure that the cockpit hatches are tightly shut and dogged to prevent flooding below decks.

Table 3-1 provides a checklist of things you should do to prepare for rain, fog, high winds, or rough seas that you will eventually encounter. There are blank lines in case you wish to add your own items to this list.

Fog or Limited Visibility

In case of fog or other limited visibility, you are required by the law (Rules of the Road) to:

1. **Slow down.** If you are navigating in waters marked on your charts as falling under the Inland rules, you must slow to a "Moderate Speed" to comply with the Inland Rules. Under the International Rules you must slow to a "Safe Speed."
   Admiralty courts have generally held that a "safe speed" is the maximum speed at which a vessel can come to a complete stop in one-half (1/2) the existing visibility.
2. **Post at least one lookout** (in addition to the helmsman) whose sole responsibility is to watch for vessels and other hazards to navigation.

Table 3-1: Heavy Weather Checkoff Sheet

Check items off as you complete them:

___ 1) Close and secure all hatches, doors, ports, and windows, and in particular, double check that the cockpit hatches are tightly shut and dogged down.

___ 2) Use the MAN (manual) bilge pump switch positions to ensure that all bilges are pumped dry. This should be repeated as often as may be necessary, since "free" water sloshing in your bilges degrades your vessel's performance.

___ 3) Secure all loose gear. Stow all the smaller items and securely lash down all the larger ones.

___ 4) Break out the Personal Flotation Devices (PFDs) (life jackets) and have everyone don and properly adjust one before the weather turns this chore into a real problem.

___ 5) Get the best fix possible on your current position and track and update the plot on your chart.

___ 6) Break out and keep handy whatever emergency gear you feel may be needed, such as flashlights, the first aid kit, a sea anchor, distress flares, etc.

___ 7) Plot course changes to the nearest protected harbor or sheltered waters in case the storm worsens.

___ 8) Stay current with local marine weather reports. If possible, have one person assigned to monitor the marine weather channel(s).

___ 9) Any time there is reduced visibility, post at least one lookout whose sole responsibility it is to watch for other vessels or possible dangers.

___ 10) If at all possible, keep all hands busy rather than sitting and worrying. Keep your crew and passengers informed:

a) what you are doing;

b) what you want each of them to do or not to do.

___ 11) _____

___ 12) _____

___ 13) _____

___ 14) _____

___ 15) _____

Fishing Tower – Heavy Weather Warning

WARNING

No one should occupy the fishing tower under adverse sea or wind conditions.

The height and weight of a fishing tower (also called a tuna or marlin tower), and the weight of any occupant(s), significantly raise your vessel's center of gravity. This may result in excessive heeling and slower recovery to an upright condition and may make it difficult to leave the tower if sea conditions worsen.

Therefore, under adverse sea or weather conditions, do not allow anyone to occupy this tower.

The Beaufort Scale Of Wind Force

To more accurately and quickly transmit wind and wave information, the British Royal Meteorological Office developed a table (with comparison photographs) of each of wind forces called the Beaufort scale (Table 3-2).

Some of these photographs can be seen in Chapman's basic textbook for boaters: *Piloting -- Seamanship and Small Boat Handling*, available from Motor Boating & Sailing Books (New York, NY) and some yacht supply stores.

Emergency Evacuation Plan (the Abandon Ship Plan)

You should plan for the possibility of an uncontrollable fire or other emergency at sea requiring that all hands leave your vessel. As an important part of your emergency preparedness plan, you, along with the crew and regular guests, should develop and practice an emergency evacuation plan (Abandon Ship Drill). As a minimum, this plan should cover:

- location of the PFDs (life vests) and how to don them;
- location and operation of any other emergency flotation equipment such as life ring, life raft, dinghy, etc.;
- speedy operation of the forward hatch;
- when and how to quickly summon help by:
  a) using the hailing/emergency channel for the onboard VHF (in inland or coastal waters) or the single side band radio (past the continental limits);
  b) using flares or daylight visual distress signals;
  c) using the orange and black distress flag;
  d) using the Emergency Position Indicating Radio Beacon (EPIRB).

Draft

To avoid going aground or damaging your underwater gear in shallow waters, it is absolutely vital you know your vessel's draft. Draft is the distance from the surface of the water to the lowest external part of the boat. Be aware that any vessel's draft varies depending on her load.

You should determine draft fully equipped and at or near the maximum load you expect to be carrying. Any vessel will draw slightly less

Table 3-2: The Beaufort Scale of Wind Force

Beaufort Scale	Wind Description	Sea Conditions	Wave Speed (Knots)	Wave Height (Feet)
0	Calm	Glass smooth	0 - 1	0
1	Light air	Ripples without crests	1 - 3	0.25
2	Light breeze	Small wavelets, crests do not break	4 - 6	0.50
3	Gentle breeze	Large wavelets, occasional white foam crests	7 - 10	2.0
4	Moderate breeze	Small waves, growing, frequent foam crests	11 - 16	4.0
5	Fresh breeze	Moderate waves, white foam crests and spray	17 - 21	6.0
6	Strong breeze	Large waves, white foam crests and more spray	22 - 27	10.0
7	Near gale	Very large waves, foam streaks blown, spindrift	28 - 33	14.0
8	Gale	High, long waves, blown foam and spindrift	34 - 40	18.0
9	Strong gale	Higher waves, much foam, crests start to topple	41 - 47	23.0
10	Storm	Very high waves, white tumbling seas, reduced visibility	48 - 55	29.0
11	Violent storm	Exceptionally high waves, white sea, wave crests blown to froth, visibility further reduced	56 - 63	37.0
12	Hurricane	Air filled with foam & spray, white sea, almost no visibility	64 & up	45.0

in saltwater than when equally loaded in fresh water. To determine draft:

1) measure the freeboard (hull height above the water) from the covering board top to the waterline at the transom's center.
2) subtract this measurement from the dimension given for the distance between the covering board top (at the transom's center) to the bottom of the propeller; see the docking plan supplied with this manual to find your vessel's maximum draft at the transom.
3) record this dimension where it will be readily available. An excellent place is on your compass deviation card.

Height

In addition to knowing your vessel's draft, it is also vital you know her height, including any optional equipment such as fishing towers or antennae for your electronic equipment. Take this measurement when she has the lightest possible load of fuel, passengers, and equipment.

This measurement should also be recorded where it will be readily available, as on your compass deviation card.

Running Aground

CAUTION

If aground, do not attempt to drive this vessel off. Trying to refloat this vessel under its own power could result in damage to the propellers, propeller shafts, struts, and the clutch/transmission system.

CAUTION

Do not run engines while aground; sand, dirt, and other foreign matter could be drawn into the cooling system and damage your engines.

If you run aground, take these steps to protect your vessel and to minimize the damage:

1. Resist the natural impulse to "throw" the transmission into reverse and, instead, pull both throttles back to idle.
2. Shift both transmissions into neutral.
3. Stop both engines and follow the instructions below.

Refloating Your Vessel

Most vessels run aground at the bow. Unless your vessel has received hull damage that requires repair before refloating, the most important things are:

- to avoid damaging your propulsion system, holing your vessel, or allowing it to be driven farther ashore;
- to prevent possible vessel damage from pounding or broaching.

Pounding

Pounding occurs when successive waves raise a grounded vessel's hull and drop it repeatedly against the sea bed. Bottom damage

from pounding can range from cracked fiberglass to open holes in the hull. As each wave strikes the vessel, continuing wave action tends to drive the vessel harder aground.

Broaching

Broaching is the most serious problem a grounded vessel may face. It occurs when the vessel is thrown or turned broadside to the shore or the shoal by wave action.

Broaching is dangerous for two reasons. First, broaching continually drives a grounded vessel harder aground. Second, currents are set up around a grounded vessel's bow and stern. These currents tend to scour sand away from the vessel's hull fore and aft, and pile it up amidships and to leeward of the vessel. This action eventually leaves the hull supported only amidships, and can break the vessel's back.

Staying Afloat

1) Determine the location and extent of any hull damage. Bertram hulls are among the strongest made, but running any vessel onto a sharp coral reef or pointed rock can damage it.

2) Establish or restore your watertight integrity. If necessary, make a patch using one or more hull patch kits containing two-part emergency fast-setting epoxy. These kits are readily available at marine hardware stores. You can apply the material to almost any hole from either inside or outside your Bertram as the situation requires. At least one of these kits should be a part of your emergency supplies. Otherwise, cram anything available into the hole to stop or reduce the influx of water.

3) Call for a tow as soon as time permits.

4) If you can remain afloat, you may wish to set one or more stern anchors as quickly as possible to prevent broaching or being driven farther aground.

5) If a tow is not immediately available, you may have to wait for the next high tide. A lead (a weighted hand line marked in feet) can be very useful to check around a grounded vessel to determine where the deeper water is.

Propeller Hazard

⚠ WARNING

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

When swimming or working in the water near your vessel, remember that propellers have sharp blades that can seriously hurt anyone who is pushed against them by a wave or the current, even if that propeller is not turning. To reduce the risk of death or serious injury from your props, shut down both engines and ensure that both propellers have stopped turning before allowing anyone to:

- go out on the swim platform;
- enter or leave the water;
- board or disembark from your vessel by climbing out of or into a dinghy.

Flotsam (Floating Debris)

If you observe flotsam while at cruising speed, immediately throttle back to idle speed. Once at idle, shift into reverse or forward depending on the situation and proceed cautiously until out of the danger area.

Damaged Underwater Equipment

⚠ CAUTION

Only under emergency conditions should you operate at cruising speed with a vibration caused by damaged propeller(s) or running gear. Get a tow, or, if necessary, proceed with extreme caution at idle speed.

Should you either run aground and refloat or strike a piece of flotsam, before you accelerate to cruising speed, proceed at a slow speed and check that there is no noticeable vibration which might indicate damage to your vessel's underwater gear. If any vibration is noticed, proceed to dockside at the reduced speed. Depending on the damage done, it might be necessary to shut down one engine.

A significant loss of speed and excessive vibration can -- and usually does -- result from damaged propellers, shafts, struts, or misaligned rudders and engines.

The rudders on your Bertram always should be kept parallel, neither "toed in" nor "toed out." You should have propeller shaft alignment checked periodically.

Towing

⚠ WARNING

Do not secure tow lines to deck cleats, which are only for mooring. Cleats are not fastened to your vessel for towing. Rather, use a long line to form a towing bridle around her hull.

⚠ WARNING

Take added care if towing or being towed with dock lines which are quite often "Nylon." These lines stretch and if a fitting fails or the line parts, the ends can snap back with sufficient force to injure.

Although towing is a common courtesy among pleasure vessel skippers, it is not recommended, since it can be dangerous to the occupants of the towing and towed vessels.

Towing is best left to professional salvors or those trained to minimize the risks.

The U.S. Coast Guard Auxiliary's manual CG 484 (1977), *Auxiliary Towing Guide,* states that most marine accidents occurring during towing fall into one of three categories:

1) Most recreational boats do not have suitable deck fittings for towing other vessels, and many do not have suitable deck fittings to be towed.
2) Boaters may have limited knowledge and limited experience in the practice of good seamanship.
3) Boaters sometimes fail to use good seamanship practices through inexperience or haste.

Safety First in Towing

We strongly recommend against towing. If you choose to tow or be towed by someone other than a professional towing or salvage operator, despite the risks involved, please understand that in all towing operations the primary objective is to be sure of the safety of the people on both vessels. Thus your first goal must always be to save lives and to avoid inflicting personal injury. Saving property is only secondary and must never take precedence over personal safety.

Section 4

Propulsion System

⚠ WARNING

If you come into contact with moving machinery, you can be seriously injured.

⚠ CAUTION

Operating engines and generators may produce high noise levels in the engine/ generator room. To protect your hearing, obtain and wear hearing protection equipment that meets recommendations of the U.S. Occupational Safety & Health Administration (OSHA).

Carbon Monoxide Hazard

⚠ WARNING

Diesel internal combustion engines use petrofuels and emit carbon monoxide gas. This gas is colorless, odorless, and lethal if breathed in sufficient quantities.

Carbon monoxide poisoning is one of boating's most treacherous hazards. *Please read very carefully* the information in ***Part II, Section 3*** under ***Carbon Monoxide Gas***.

Propulsion System Care

⚠ CAUTION

1) check engine oil level, transmission oil level, coolant level, and air cleaner indicators before you start the engines; 2) monitor the propulsion system performance gauges, especially for the first several minutes after engine startup.

Your propulsion system is manufactured from high quality materials in a design of proven ruggedness. Nonetheless, your system's performance and life expectancy depend very much on the care you give it.

To maintain its rugged reliability and ensure long life for all the components, your system demands your careful attention, gentle treatment and a consistent program of preventive maintenance.

--- See Part III for Maintenance Information ---

Part III of this manual contains information on maintaining your vessel; ***Part III, Section 1*** covers ***Periodic Maintenance***. You should also follow the instructions in the engine and transmission operator's manuals provided by the manufacturers for:

- selection of fuel and lubricants;
- monitoring performance instruments;
- scheduled preventive maintenance.

You can find these manuals in the supplementary information delivered with your Bertram.

Engine Room Engine Performance Gauges (one set per engine)

A performance gauge panel for each engine is located in the engine room. These panels are outbard and aft of each engine, but can be read from the engine room walkway. For information on the use of information from these gauges, see the MTU engine Operator's Manual included with your vessel's documentation.

Fuel System

The fuel system is discussed in ***Part II, Section 5***.

Engine Air System

To keep dust and grit out of your Diesel engines, they are equipped with air cleaners located aft of the engines over the generator cabinets.

For information on the maintenance requirements of your engine air filtering systems, see the MTU engine Operator's Manual included with your vessel's documentation.

Engine Lubrication System

As with any internal combustion engine, proper lubrication is critical to engine life and performance. For information on the requirements of your engine lubricating systems, see the MTU engine Operator's Manual included with your vessel's documentation.

Engine Cooling

Your engines are fresh water cooled. This means a closed and pressurized mixture of fresh water and a suitable antifreeze/corrosion inhibitor provides cooling for the engine blocks, cylinder heads, exhaust manifolds and turbochargers. This coolant mixture is in turn cooled by passing it through the seawater-cooled heat exchanger.

Fresh Water and Antifreeze Mixture

Your engine coolant provides the medium for heat transfer to control engine internal temperature during operation. In an engine with proper coolant flow, combustion heat moves through the cylinder walls and the cylinder head into the coolant. Without adequate

coolant, normal heat transfer cannot occur and engine temperature will rise rapidly.

The coolant solution in your engines must provide the following functions:

- adequate heat transfer;
- corrosion inhibition;
- protection against the formation of sludge or scale in the system;
- compatibility with system hoses and seals;
- adequate freeze protection during cold-weather operation, and boil-over protection during hot weather.

For more information on the requirements of your engine cooling systems, see the MTU engine Operator's Manual included with your vessel's documentation.

Seawater Inlet System

The seawater cooling system for the engines consists of:

- seawater piping system
- seawater side of the heat exchangers.

There is a seawater heat exchanger system mounted on each engine.

Cooling seawater is taken in from the seawater system and pumped into the seawater side of the heat exchangers. As it travels through the heat exchangers, heat is transferred from the engine coolant mixture (which is on the fresh water side of the heat exchangers) to the seawater.

Then the seawater is piped to the engine exhaust riser mixing sections, called "mixing elbows"). To keep the seawater from getting back into the exhaust manifold, the cooling seawater is injected into the exhaust flow at a point several inches beyond the highest point of the riser.

The seawater is mixed with the exhaust gases and cools them, and the mixture is expelled overboard after passing through the exhaust silencers (mufflers).

NOTE:
To avoid engine (or ac generator) overheating, it is very important that the seacocks be completely open and that you keep the seawater strainers clean.

Wet Exhaust System

Exhaust systems are called "wet" exhaust systems when the entire system or any portion of it is cooled by water. Your Bertram has a wet exhaust system.

Exhaust gases go from the exhaust manifold to an exhaust riser. This area is dry (not cooled by seawater) and will get *very hot.* You should treat it with great respect.

Special heat-resistant insulation covers your exhaust risers to protect anyone working near them and to reduce the chance of an engine room fire caused by contact between the risers and an inflammable material. These covers should be inspected and repaired if necessary according to the information in ***Part III, Section 3.***

Cooling seawater is injected into and mixed with the exhaust gases just below each exhaust riser. This seawater cools the remainder of the exhaust system.

CAUTION

Be careful when working near the exhaust risers. They are not cooled by seawater; when the engines are operating, they get very hot and can burn you.

Marine Gears

Specifications, operating information and maintenance procedures for your marine gears can be found in the transmission manufacturer's Operator's Manual included with your vessel's documentation.

Shaft Logs and Stuffing Boxes

See ***Part III: Maintenance.***

Propeller Shafts

Technical data on the propeller shafts can be found in ***Part I, Section 3.***

For information on propeller shaft alignment, see ***Part III: Maintenance.***

Propellers

Propeller Installation

To provide maximum shaft and propeller life, the propeller must be properly fitted to the shaft. If you replace the propeller or the shaft, follow the guidelines in ***Part III, Section 4.***

Changing Propeller Size or Style

Bertram's Engineers calculated a specific combination of propeller diameter and pitch to give your vessel maximum efficiency. Calculations were based on engine power (at rated rpm), hull design and vessel weight, and were followed by extensive testing.

Your vessel is delivered with two sets of propellers. Both sets were tuned to your vessel at the factory.

Changes in size or pitch could reduce engine performance, or could reduce propulsion system life by placing undue stress on running gear components.

If you replace your propeller, it is vital to use the original propeller size, diameter, and pitch as specified in ***Part I, Section 3.***

In the future, if there is a significant change in your vessel's primary use, or if you make a modification such as adding a fishing tower, you may wish to consider changing propellers. If you feel a different size or style of propeller could improve your vessel's performance, please send Bertram's Service Department a complete written report on your boat's modifications and past performance.

Your data should include measured speeds at six evenly-spaced engine rpm, including wide open throttle. You should record these figures using an accurate hand-held speed recording device.

When the Bertram Service Department receives your report, the staff will consult with Bertram's design and test engineers to see if a change in propellers might be worthwhile.

Section 5

Fuel System

Your fuel system consists of:

- fuel fill ports
- fuel lines;
- interconnected fuel tanks;
- fuel valves;
- fuel filter/water separator units;
- fuel coolers.

See ***Part IV*** for engineering drawings of the fuel system.

System Operation

The interconnected fuel tanks feed a fuel supply manifold between the midship and aft fuel tanks. The engines draw fuel from the supply manifold through fuel filter/water separator units.

Diesel engines do not burn all the fuel provided by the fuel system. Unused fuel is used to cool the Diesel injectors, after which it passes through fuel oil coolers and returns to the tanks through return lines.

System Components

⚠ CAUTION

Never use galvanized steel fittings in any Diesel fuel system. Diesel oil reacts chemically with the zinc coating to form a powder that clogs filters and damages engines.

Fuel Fill Ports

NOTE:
The first time you fill the fuel system, check carefully to be sure the fuel level rises enough to sound the fuel vent tank alarm when full. If not, do not start engines, and immediately notify the dealer and the Bertram Service Department.

Your Bertram has a pair of fuel fill ports, one on each side of the vessel. Each port is a flush-mounted deckplate with a captive, screw-on cover. They are just aft of the salon superstructure.

Fuel Tanks and Shutoff Valves

Each fuel tank has a manual shutoff valve located in the fuel lines that interconnect the tanks.There are also shutoff valves in the supply manifold line that connects the midship and aft tanks.

NOTE:
*The manual shutoff valves on the forward end of the aft tank and on the forward end of the midships tank should be **FULLY OPEN** when you are filling the fuel system. They should be left in **HALF OPEN** position under normal operation.*

Forward Fuel Tank

The forward tank, made of reinforced molded fiberglass with fire retardant resin is located below the master stateroom sole. The manual shutoff valve is at the bottom of the tank.

Mid Tank

The mid tank, made of reinforced molded fiberglass with fire retardant resin is located beneath the engines. The manual shutoff valve to the forward tank is located at the bottom of the forward end of the tank. The manual shutoff valves to the aft tank are located at the bottom of the aft end of the tank.

Aft Fuel Tank

The aft tank, made of reinforced molded fiberglass with fire retardant resin, is beneath the cockpit. The manual shutoff valve is located at the bottom of the forward end of the tank. A small cockpit hatch provides access to the fuel supply fittings. The tank fill and vent plate assembly are inspected from the engine room and on the port pilaster.

Fuel Filters

The fuel travels from the tanks to combination fuel filter/water separators located aft of each engine. Filter service valves are located on the fuel line at each filter bank so you can service the units without fuel draining or leaking into your bilge.

NOTE:
If Diesel fuel does get into your bilge, it is a violation of U.S. law to pump it overboard in U. S. territorial waters. Other countries may have similar regulations.

Each separator assembly has a drain plug at the bottom to allow removal of collected water. You should visually inspect these separators regularly, depending on climatic conditions, and remove the water when required.

Part I, Section 3 lists the make and part numbers for main engine and generator filters. This information is also in the manufacturers' manuals.

Fuel Coolers

Unburned fuel is used to cool the injectors in the engines. This unburned fuel then passes through seawater-cooled heat exchangers, and then is returned to the tanks. The heat exchanger cooling seawater is taken from the seawater system.

Fuel System Priming

If you have drained the fuel system or allowed it to run dry, you must bleed air from the system before you can run the main engines or the generators.

Main Engine Priming

Bertram has installed one port and one starboard quick-disconnect lines, aft of the engines, for the purpose of priming your engines, (drawing 10102-12 Part IV, Section 3). As part of your onboard gear, you will find a hose used to connect the priming pump to the engine.To prime either main engine, you must physically connect the hose to the fitting aft of the engine and the fitting at the Racor fuel filter in-line to the engine your priming. Once this hose is connected, open the valve . To prime either main engine, you must also bleed the air from the system:

1) Loosen the fuel line connection at the engine side of the Racor fuel filter.
2) Use gravity to fill the filter from the tanks.
3) When fuel comes out of the loosened connection, tighten it.
4) Crank the engine to fill the engine-mounted fuel filter. The engine should start.

NOTE:
Limit cranking to seven seconds; wait two minutes before cranking again.

Generator Priming

Bertram has installed one port and one starboard quick-disconnect lines, aft of the engines and aft of the engine priming connections, for the purpose of priming your generators. As part of your onboard gear, you will find a hose used to connect the priming pump to the generator. The generator has a manual fuel pump with a priming lever extending from the bottom. You can manually prime the generators, but you must bleed air from the system for the priming process to work. To prime a generator, follow the instructions provided in the generator operator's manual.

Fuel and Fuel Additives

⚠ WARNING

Never add commercially marketed Diesohol or gasohol to Diesel fuel. Mixing these blends with Diesel fuel creates both an explosion hazard and a fire hazard.

⚠ CAUTION

Only use the types of clean, high-quality Diesel fuel oil specified in your engine manual. Diesel fuel must be clean and free from contamination. You must regularly inspect fuel tanks and stored fuel for dirt, water, bacteria and water-emulsion sludge.

You should use only the types of clean, high-quality Diesel fuel oil specified in your

engine manual. Fuel must be clean and free from contamination.

You must regularly inspect fuel tanks and stored fuel for dirt, water, bacteria and water-emulsion sludge.

You may choose to use very small amounts of fuel additives to prevent fuel line freeze-up in winter months. Refer to your engine manufacturers' operator's manual for information on the specific grades of fuel and fuel additives suitable for use in your engines.

Spoiled Diesel Fuel

Diesel fuel kept in your vessel's tanks for long periods deteriorates. Spoiled Diesel fuel can damage your engines.

Bertram and Diesel engine manufacturers recommend that, when possible, you refill your fuel tanks at the end of each day's running to prevent condensation from contaminating the fuel.

Fuel Gallonage

The fuel tanks fit athwartships inside your Bertram's hull. The shapes of these fuel tanks follow your hull's deep V interior shape. To make the best use of the space available, the tanks are necessarily larger at the top than they are at the bottom.

The result of this design is that there is space for more fuel in the top half of the tanks than there is in the lower half. The fuel gauge can only show the approximate amount of fuel remaining in the tanks, not the exact quantity.

Keep this in mind to avoid running too low on fuel and to reduce the chance of running out of fuel at sea.

Section 6

Fresh Water System

> **CAUTION**
>
> To avoid damage to your vessel, do not use lye-based clog dissolvers on the fresh water, toilet, or bilge pump systems.

Your Bertram's fresh water system functions almost the same as shoreside plumbing.

The system's primary components are:

1) a fresh water maker;
2) fresh water tanks;
3) a low noise, high-output water pump;
4) a pressure sensing device and gauge;
5) lines and valves;
6) water-using appliances.

There are two sources of fresh water: the water maker, and dockside supply.

Fresh Water Maker

Your Bertram has a fresh water maker in the lazarette beneath the cockpit sole. This unit produces fresh water from seawater through reverse osmosis. The unit includes an oil/water separator and an ultraviolet (UV) sterilizer.

The water maker is powered through the **FRESH WATER MAKER** circuit breaker on Panel D of the Engine Room 120/240Vac Distribution Panel (Figure 11A- 2).

The control system for the water maker is located at the unit or remote control from the flybridge portside instrument panel.

Specifications, operating information and maintenance procedures for your water maker can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Dockside Water Supply

> **CAUTION**
>
> When leaving your vessel unattended, you should disconnect the dockside fresh water hose.

There are two dockside quick-disconnect fresh water hose connections, one on each side of the cockpit. They are behind hinged doors on the pilasters, with the shoreside electrical, cable television and telephone connections.

This convenience feature allows you to use available fresh water at dockside. A pressure regulator in the supply line reduces the normal city water pressure to within the limits of the onboard system.

NOTE:
You cannot use this system to fill the water tank. Instead, you must use the water tank deck fill plate.

Fresh Water Tanks

Your Bertram has two interconnected stainless steel fresh water tanks amidships in the lazarette, aft of the aft fuel tank. The tanks are filled by the fresh water maker, or they can be filled from the dockside fresh water source through the deck fill plate. The plate is located on the gunwale.

The water tank level gauge sender is inside the tank; the gauge is on the flybridge overhead panel. The gauge is powered through the **FUEL/WATER LEVEL** circuit breaker on the Flybridge 24Vdc Distribution Panel (Figure 10B-3).

NOTE:
If you fill the water tank from a source other than the water maker, you must use the deck fill system. You cannot fill the water tank using the dockside water supply quick-connects on the cockpit pilasters.

Water Pump

⚠ CAUTION
When the tanks are empty, you must turn **OFF** the fresh water pump circuit breaker.

For day-to-day operation, your vessel's fresh water pump is automatic. The pump is located forward of the port engine on the outboard side. It is powered through the **FRESH WATER PUMP** circuit breaker on Panel B of the Engine Room 120/240Vac Distribution Panel (Figure 11A-2).

The pump normally needs no priming, except before its initial use or if the fresh water tanks are pumped dry.

Specifications, operating information and maintenance procedures for your water pump can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Priming the Water Pump

To prime your water pump:

1) be sure the tanks are at least partially full;
2) open the faucets;
3) run the water until the air is out of the system and the faucets stop spitting;
4) close the faucets;

Expansion (Captive Air) Tank

The expansion tank holds a limited amount of fresh water under pressure. It is in the fresh water system primarily to extend the life of your fresh water pump by minimizing pump "short cycling." The tank also allows a limited

use of the fresh water system if the fresh water system is not switched **ON**.

The expansion tank is on the port side of the engine room, outboard of the port main engine, near the water heater.

Specifications, operating information and maintenance procedures for your expansion tank can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Water Heaters

> **CAUTION**
>
> Turn ac power OFF before removing heater access panels. Do not remove thermostat protective covers.

> **CAUTION**
>
> To avoid burning out the heater element, do not turn water heater ON if water level is below the heater element. Open a hot water tap until water stops spurting to bleed air from the hot water system, then turn the water heater ON.

Water Heater Operation

The automatic water heaters are forward in the engine room, on each side, outboard of the main engines. The thermostats on these heaters are preset by the manufacturer at 140° to 145°F, which Bertram recommends as maximum. The water heaters are powered by 240Vac from the **WATER HEATER #1** and **WATER HEATER #2** circuit breakers on Panel B of the Engine Room 120/240Vac Distribution Panel (Figure 11A-2).

Specifications, operating information and maintenance procedures for your water heaters can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Filling the Water Heater

To fill the water heaters for the first time or after storage or repairs, follow these steps:

1) be sure the 240Vac circuit breakers listed above are **OFF**;
2) be sure the water heater outlet valve is open;
3) open the cold water supply valve to the water heater;

NOTE:
The cold water supply valve MUST be open whenever the water heater is in use.

4) open a hot water faucet;
5) fill the water heater until water runs out of the open faucet;
6) allow all the trapped air in the heater tank and pipes to escape before closing the faucet;
7) set the 240Vac circuit breakers **ON**.

Sinks and Showers

The galley sink, bar sinks, lavatory sinks and showers get cold water from the fresh water tank and hot water from the water heater. The fresh water tank also supplies fresh water to the refrigerator, galley drinking water faucet, and icemakers.

The galley sink, bar sinks and clothes washer drain overboard. The lavatory sinks and showers drain to the grey water holding tank. See ***Part II, Section 9*** for information on the grey water holding system.

The showers have mixing controls for adjusting the water temperature, plus hand held shower heads equipped with push-button cut-offs that retain the water temperature setting.

Specifications, operating information and maintenance procedures for your sink hardware and shower heads can be found in the manufacturer's Operator's Manuals included with your vessel's documentation.

Water Filtration Units

The galley drinking water faucet, the refrigerator and the ice makers all have in-line drinking water filters. See ***Part III: Maintenance*** for information on maintenance and replacement of the filter elements.

Specifications, operating information and maintenance procedures for your water filters can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Garbage Disposal

The galley sink has a garbage disposal powered through the **DISPOSAL** circuit breaker on Panel C of the Engine Room 120/240Vac Distribution Panel (Figure 11A-2). This circuit breaker must be **ON** and the cold water must be running for the garbage disposal to operate. Waste from the disposal goes into the galley sink drain and then overboard.

Specifications, operating information and maintenance procedures for your garbage disposal can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Clothes Washer

The clothes washer gets cold water from the fresh water tank and hot water from the water heater.

Specifications, operating information and maintenance procedures for your laundry facilities can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Engine and Generator Cooling Water

The engine room is equipped with a fresh water outlet located behind the port generator. This system allows you to easily add water to the closed fresh water cooling systems on the main engines and the ac generators.

Washdown System

The fresh water washdown system is supplied by the fresh water pump. There are faucets in the cockpit and on the foredeck.

Prep Center

Fresh water for the cockpit fishing prep center is supplied by the fresh water system.

This space reserved for operator notes.

--- See Part III for Maintenance Information ---

Section 7

Bilge and Sump Pump Systems

NOTE:
The factory-installed bilge pumps on your Bertram are intended for control of spray, rainwater and normal accumulation of water due to seepage and spillage. They are not intended for damage control or other emergency use.

OIL DISCHARGE WARNING:
The "Federal Water Pollution Control Act" prohibits the discharge of any oil or oily waste into or upon the navigable waters and contiguous zone of the United States. If such a 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. This applies to any overflow of Diesel fuel oil or gasoline as well as any bilge pump discharge. Violators are subject to a penalty of $5,000.00.

⚠ CAUTION

To avoid damage to your vessel, do not use lye-based clog dissolvers on the fresh water, toilet or bilge pump systems.

The bilges on your Bertram are divided into three sections, and are watertight up to the hull chine. Each section has a pump system that removes excess bilge water, and the center section also has an engine room sump pump.

Each bilge pump system consist of a submersible pump and an automatic pump switch.

The engine room sump pump system consists of a non-submersible pump and an automatic pump switch.

Forward Bilge Pump

The forward bilge pump and bilge water level sensing switch are in the bilge forward of the master stateroom next to the holding tanks.. They are accessible through the first hatch in the companionway sole.

Power for this system is through the **BILGE PUMP FORWARD** fuse on the Engine Room 24Vdc Distribution Panel.

Midships Bilge Pump

The midships bilge pump and switch are in the keel sump forward of the aft fuel tank . They are accessible from the engine room.

Power for this system is through the **BILGE PUMP ENG. ROOM** fuse on the Engine Room 24Vdc Distribution Panel.

Engine Room Sump Pump

The engine room sump pump and switch are in the keel sump (near the midships bilge pump system) forward of the aft fuel tank . They are accessible from the engine room.

Power for this system is through the **SUMP PUMP ENG.ROOM** fuse on the Engine Room 24Vdc Distribution Panel.

--- See Part III for Maintenance Information ---

Aft Bilge Pump

The aft bilge pump and switch are near the transom in the aft bilge area, and are accessible from the cockpit.

Power for this system is through the **BILGE PUMP AFT** fuse on the Engine Room 24Vdc Distribution Panel.

Bilge and Sump Pump Switches

There are four 2-position toggle switches for the bilge and sump pumps:

1) the **FWD PUMP**
2) the **ENG ROOM SUMP PUMP**
3) the **ENG ROOM BILGE PUMP**
4) the **AFT PUMP**.

Each switch selects the operating mode for its pump. For your protection, these three switches have no **OFF** position; this prevents an inadvertent pump shutdown.

The pumps can be set on **MANUAL** (operate continuously) or on **AUTOMATIC** (controlled by the pump sensor and switch). Pump switches are normally kept in the **AUTOMATIC** position.

If the water in a bilge rises, and if the bilge pump's switch is in the **AUTOMATIC** mode, the bilge pump will be activated. This arrangement ensures that there will be a positive shutdown signal to the pump when the bilge is nearly dry.

To avoid accidental shutdown, the switches cannot be switched **OFF** from either the flybridge overhead panel or from the electrical distribution panels. To remove power from these circuits, you must either remove the fuses or disconnect the batteries.

Bilge and Sump Pump Meters

Above the switches are resettable hour meters for the **FWD BILGE PUMP**, the **ENG ROOM SUMP PUMP** and the **AFT BILGE PUMP**. These meters record the time each pump operates.

Whenever the meters accumulate time, their operation indicates that the corresponding pump is operating.

Bilge Flood Monitors

> **⚠ CAUTION**
>
> When a bilge flood alarm sounds and a bilge flood monitor light illuminates, you should determine the reason for the increased water level immediately, and correct the problem as soon as possible.

The **BILGE FLOOD MONITORS** are starboard of the switches and hour meters. They are marked **FWD**, **ENG. ROOM** and **AFT**, and are connected to sensors mounted approximately three inches above the bottom in the forward bilge, engine room bilge, and aft bilge.

The lights illuminate when water in the bilges rises to that level, and the alarm horn sounds at the same time. When a bilge flood alarm sounds and the light illuminates, you should determine the reason for the increased water level immediately, and correct the problem as soon as possible.

Bilge and Sump Pump Maintenance

Specifications, operating information and maintenance procedures for your bilge pumps can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Also, please review maintenance information on bilge pumps in ***Part III, Section 4,*** under ***Bilge Pump Systems.***

Cleaning the Bilge and Sump Pump Strainers

Each bilge and sump pump has a strainer that must be kept clean and free of debris. For suggested maintenance intervals, see ***Part III, Section 1.***

Engine Driven Auxiliary Bilge Pump

An auxiliary engine-driven bilge pump is belt-driven from the port engine, and is engaged by a manual clutch. The pump is mounted outboard on the forward end of the port engine.

The pump manifold is at the forward end of the port engine, along the engine room walkway. In each bilge compartment, there is a suction pickup on a hose connected to the pump manifold. Each pickup is protected from plugging by a strainer.

See Drawing 10102-4 in ***Part IV, Section 3,*** for system layout.

Auxiliary Bilge Pump Operation

The four manifold valves should normally be closed; when the pump is used, only the valve for the flooded bilge should be open. If other valves to dry bilges are open, the pump will suck air and will not pump the flooded bilge.

The pump should never be used when the bilges are dry, and must never run for more than 30 seconds after a bilge is pumped dry. If the pump runs dry, the rubber impeller can be damaged.

To use the auxiliary engine-driven bilge pump you must:

1) open the valve to the bilge compartment you wish to pump (and be sure the other valves are closed to avoid the loss of suction);
2) engage the clutch by pushing the clutch handle away from the vessel's centerline;
3) pump the bilge(s) dry;
4) disengage the clutch by pulling the lever toward the vessel's centerline;
5) be sure all the manifold valves are closed.

NOTE:
For maximum pump life:
1) Do not operate the pump dry;
2) do not operate at engine speeds exceeding 1,400 rpm;
3) operate the pump periodically from the fresh water system to check operation and keep the rubber impeller from taking a "set" or seizing. See below.

Exercising the Auxiliary Bilge Pump

The auxiliary engine-driven bilge pump has a rubber impeller. You must exercise the pump periodically (Bertram recommends once a month) to check system operation and to prevent the rubber impeller from seizing or taking a "set".

To make exercising it easy for you, the pump is connected through the manifold to the seawater system.

To exercise the pump, follow the directions in ***Part III, Section 1*** under ***Monthly Maintenance.***

Section 8

Ventilation and Air Conditioning Systems

Ventilation Systems

Your Bertram has both natural air and forced air ventilation systems. Natural air ventilation for the staterooms uses the foredeck hatch(es) to bring in fresh air. Natural air is delivered to and heated air removed from the engine room via the hullside vents on both sides of the hull. These vents are equipped with built-in water traps.

Engine Room Ventilation

The forced air ventilation system is designed to take air in through forecabin vents and duct it down to the forward end of the engine room. This air cools the engine room, is drawn into blowers on the sides of the engine room, and is exhausted overboard.

Electric power for these blowers is connected to the blower circuits through the **E/R PORT BLOWER** and the E/R **STBD BLOWER** circuit breakers on panel C of the Engine Room 120/240Vdc Distribution Panel (Figure 11A-2).

Stateroom Natural Air Ventilation

If the air conditioning is not being used, the foredeck hatches can be opened either partially or completely to bring fresh air into the stateroom areas.

Each hatch is hinged at the rear, and each has two pairs of locking dogs, one set at the forward edge of the hatch and the other set midway from the forward edge to the hinge. Both sets of locking dogs are operated from inside the vessel, and both sets can be locked shut to secure the hatch. The second pair of dogs is for added security and to ensure a water tight seal when the hatch is secured.

The hatches also serve as a means of exiting the stateroom areas if necessary.

Toilet (Head) and Shower Ventilation

To keep a comfortable climate in the heads on your Bertram, each head has two separate ventilation systems:

1) Ducts vent some of the interior conditioned air into the head and shower areas.
2) In each head, there is a 24Vdc exhaust blower and ducting. This blower is activated by a bulkhead-mounted **ON-OFF** switch.

The exhaust blower systems lower the humidity level in the head and shower areas by drawing moist air from the showers out of the head areas and exhausting it overboard.

Air Conditioning System

NOTE:
It is VERY important that you read and understand the "Cruisair SMX Microprocessor Air Conditioning Control Owner's Operation Manual" BEFORE you attempt to start or operate your vessel's air conditioning system.

The components in your onboard, reverse-cycle heat pump air conditioning system were designed and built for saltwater marine use. Your system employs chilled water cooling and individual air handlers for each of the accomodation areas.

There are two control panels for two air conditioning units on a panel between the salon and galley. System No. 1 is a 5-Ton unit and System No. 2 is a 2 1/2 Ton unit. System No. 1 is the primary unit handling most of your cooling/heating needs. System No. 2 can be used in conjunction with System No. 1 when extra cooling is needed. A case in point might be when you first come onboard. A large party onboard would probably warrant the extra cooling capacity of Sysytem No. 2 as well.

Chiller Units

There are two air conditioning chiller units at the aft end of the engine room, one on each side of the engine room entrance.

Chiller units are powered through individual circuit breakers on the Engine Room 120/240Vac Distribution Panels (Figure 11A-2):

- air conditioning pump – **A/C PUMP RELAY** circuit breaker on panel A;
- main tempering unit – **MAIN TEMPERING UNIT** circuit breaker on panel A.
- auxiliary tempering unit – **A/C AUX. TEMPER. UNIT** circuit breaker on panel C.

Air Handling Units

There are seven air handling units that work with the compressor/condenser units.

One air handling unit cools each stateroom; a fourth unit cools the master head (or the fourth stateroom, in a four-stateroom configuration); and the fifth and sixth units cool the salon and galley areas.

Condensate from the air handling units drains into the shower sump, from which it is pumped overboard.

Six of the chiller units are powered through individual circuit breakers on the Engine Room 120/240Vac Distribution Panels (Figure 11A-2):

- salon – **SALON A/C HANDLER** circuit breaker on panel B.
- galley – **GALLEY A/C HANDLER** circuit breaker on panel A.
- master stateroom – **MASTER ST/RM A/C HANDLER** circuit breaker on panel B.
- master head – **MASTER HEAD A/C HANDLER** circuit breaker on panel A.
- starboard stateroom – **STBD ST/RM A/C HANDLER** circuit breaker on panel B.
- forward stateroom – **FWD ST/RM A/C HANDLER** circuit breaker on panel A.

The seventh chiller unit is powered through the **FLYBRIDGE A/C HANDLER** circuit breaker on the Flybridge 120/240Vac Distribution Panel (Table 11A-1):

Heating and Air Conditioning SMX Control

Your vessel's air conditioning system has seven SMX microprocessor-based controls, one for each of its cooling/heating units. One SMX controller is located in each stateroom,one in the master head (or forth stateroom, in a four-stateroom configuration) one in the flybridge, and the sixth and seventh is located between the salon and the galley.

The primary purpose of these state-of-the-art controls is to give you the maximum benefit from your vessel's air conditioning system. They also monitor the operation and interaction of all system components so effectively that component life is substantially extended.

Among its other features, each SMX control has a memory that stores all settings during any ac power interruption; it returns to those settings when power is restored (one second later, or a year later). Since ac power interruptions are a fact of marine life, as when switching over from shore power to generator power or the reverse, this feature eliminates constant resetting of your air conditioning controls.

In addition to the memory feature, the SMX controllers also have a compressor restart pressure-equalization feature. Air conditioning compressors may be damaged if they are restarted before systems pressures are allowed to equalize, since this can result in a "compressor stall." Compressor stalls can be harmful to wiring, circuit breakers and switchgear, and they are likely to result in inconvenient trips ashore to find and reset the dockside circuit breakers.

Built into the SMX controller programming is a 2-second subroutine that equalizes system pressure every time a compressor is started. This prevents compressor stall and thus avoids possible system damage.

The SMX controllers also feature compressor restart sequencing. If the compressors are shut down by a power interruption, they are restarted one at a time, with a programmed ten second delay between restarts. This delay eliminates the heavy load of two compressors starting simultaneously.

To fully understand and get the most from the many added features available on the SMX controllers, you should first read and thoroughly understand the *Cruisair SMX Microprocessor Air Conditioning Control Owner's Operation Manual* (included in your vessel's documentation package) before you attempt to start or operate this system.

Most of the operating parameters for your air conditioning system have been factory preset and should not require changing. However, if it is necessary and/or desirable to change the preset system parameters, this manual takes you through each of the step-by-step processes.

Seawater Cooling System

NOTE:
*The air conditioning cooling water seacock must be set to **OPEN** before any air-conditioning system is switched **ON**. Failure to do this or failure to keep the seawater strainer and filter clean will cause a thermal overload and a system shutdown.*

The cooling seawater supply system consists of a seacock, a strainer, and a pump.The seacock and strainer are located forward of the port generator, outboard of the generator seacock and strainer.

Cooling seawater is drawn up through a through-hull fitting and the strainer. From the strainer, the seawater goes to the pump, then through one of the air conditioning compressors and back overboard. The seawater pump cycles with the compressors.

The air conditioning seacock and strainer are located forward of the port generator, outboard of the generator seacock/strainer.

NOTE:
When starting the air conditioning system, always visually check that there is a seawater discharge from the hullside fitting (on the port side) to ensure that the pump is operating properly.

Heating System

CAUTION

Use the heating strips only with the **COOL** option selected. For central heating choose the **HEAT** option. Do not use the heating strips and the central heating unit simultaneously.

The reverse-cycle heat pump provided with your central air conditioning is used as the *primary* heating system. There are heating strips placed in the vents of the forward staterooms which provide short term heating, intended just to break the chill off the air. To use the device, the switch on the salon's main central air control has to be on **COOL**. (Figure 8-1). The heating strips are turned on from the stateroom controls. A circumstance which might warrant the use of this device would be when the glass enclosed flybridge requires air conditioning but the interior rooms are still cool.

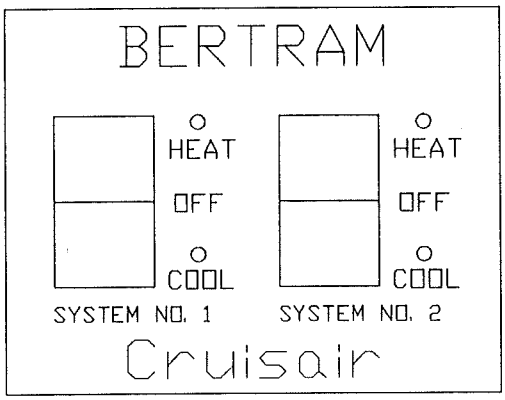


Figure 8-1: Main Central Air Control

--- See Part III for Maintenance Information ---

Section 9

Toilet, Sewage and Grey Water Systems

⚠ CAUTION

To avoid damage to your vessel, do not use lye-based clog dissolvers on the fresh water, toilet, and/or bilge pump systems.

NOTE:
Federal law prohibits the discharge of improperly treated sewage into the territorial waters of the United States. Violators are subject to a fine of $5,000 per incident. Some areas may be declared NO DISCHARGE areas.

Marine toilets on vessels operating within U.S. territorial waters must discharge directly into a sewage holding tank which is to be emptied by a dockside pump-out facility or at sea beyond the U.S. territorial limits. To satisfy U.S. regulations, all outlet seacocks on vessels operating within U.S. territorial waters must be locked shut with a padlock or a non-releasable wire-tie, or have the valve handle removed.

NOTE:
For vessels operating outside U.S. territorial waters, it is 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.

Sinks, showers and other devices which produce dirty but uncontaminated water may legally discharge directly into most waterways. Your Bertram has a grey water holding tank to receive the waste from these devices.

Pneumatic Toilet Systems

⚠ CAUTION

Do not flush the toilet when the holding tank is full, as shown by the illuminated red **CAUTION: DO NOT FLUSH TOILET SYSTEM. DAMAGE MAY RESULT** lamp on the **HOLDING TANK MONITOR** panel.
Continued flushing could severely damage the toilet system.

The pneumatic toilets (heads) in your Bertram are complete Marine Sanitation Devices (MSDs) and comply in all respects with the U.S. Coast Guard regulations and standards. The term MSD means that these are complete marine disposal systems and include the following hardware:

- water supply system;
- toilets, toilet pumps and flush timers;
- discharge seacocks (one per toilet);
- holding tank equipped with electric overboard discharge pump;

- holding tank **ALMOST FULL** and **DO NOT FLUSH** alarm;
- deck mounted dockside pump-out fitting;
- associated plumbing;

In this marine toilet system, a timer in each head controls an electric toilet pump. This pump pulls up raw seawater for flushing and simultaneously removes the waste from the toilet.

Pneumatic Toilet System Operation

⚠ CAUTION

Do not flush non-soluble items or materials such as cigarette butts, sanitary napkins, or paper towels. They will clog the system.

⚠ CAUTION

To avoid damaging the toilet pump impeller, do not flush a toilet unless there is water in the toilet bowl.

Specifications, operating information and maintenance procedures for your toilet systems can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Inside U.S. Territorial Waters

For your marine toilet systems to operate in U.S. territorial waters in compliance with U.S. regulations, these conditions must be met:

- Thefresh water valve to each marine toilet system must be open.
- The discharge seacock control "Y" valves must be set to direct the flow of waste materials into the holding tank.
- The discharge seacock must be **CLOSED** and its handle secured or removed. These seacocks are accessible through the hatch in the companionway sole.

Outside U.S. Territorial Waters

For your marine toilet system to function without using the holding tank, legal only for operation outside U.S. territorial waters:

- The seawater valve to each marine toilet system must be open. These valves are accessible through the hatch in the companionway sole.
- The discharge seacock control "Y" valves must be set to direct the flow of waste materials directly overboard.
- The discharge seacocks must be **OPEN**. These seacocks are accessible through the hatch in the companionway sole.

Flushing

Inside each toilet room (head) is a control panel for flushing the toilet. This control panel has one **ON/EMERGENCY OFF** rocker type switch and one pushbutton type switch. The **ON/EMERGENCY OFF** switch must be in the **ON** position for your marine toilet to operate.

To flush your marine toilet:

1) position the **ON/EMERGENCY OFF** switch in the **ON** position;
2) depress the push-button switch.

The toilet functions automatically. A timer runs the flushing pump for a preset time (between 10 and 15 seconds). Your marine toilet uses a gallon of water for each ten seconds of operation and you can stop flushing at any time by placing the **ON/EMERGENCY OFF** switch in **EMERGENCY OFF**. However, Bertram recommends this not be done unless the toilet is backing up or something in the toilet bowl is clogging the system and could damage the pump motor.

Section 10A

12-Volt DC Electrical System

The 12Vdc (12-Volt direct current) system is a secondary electrical system. It provides electric power for onboard 12Vdc equipment.

The system has two 12Vdc control panels:
- Power Center (Figure 10A-1);
- Flybridge Electronics Panel (Figure 10A-3).

Negative Ground System

The 12Vdc system uses negative ground. The negative 12Vdc conductors are connected to ground buses in the 12Vdc panels. The positive 12Vdc conductors are protected by circuit breakers or fuses.

12Vdc Batteries

The 12Vdc system is powered by two banks of 12Vdc lead-acid marine batteries located on either side as you enter the engine room; each bank contains a single battery. The battery banks are independent of each other, but can be used in parallel when starting the Diesel ac generators (Bertram suggests that you parallel the battery banks every time you start a generator).

The 12Vdc battery banks serve two functions:
- they are used to start the ac generators (generator starting procedure is discussed in **Part II, Section 11**);
- they provide power for the Flybridge 12Vdc Electronics Panel (Figure 10A-2).

You can set the **BATTERY SELECTOR** switch on the Engine Room 12Vdc Power Center (Figure 10A-1) to choose either battery bank as the power source.

The 12Vdc battery banks are charged by ac shore power or the onboard ac generators via the 12Vdc converter. The ac generators also have a battery charging circuit to maintain the charge when the batteries are used only to start the generators, but this circuit cannot keep up with battery power used by shipboard systems.

12Vdc Converter

The 12Vdc battery banks are charged through the 12Vdc converter by ac shore power or the onboard ac generators. The converter takes 50Hz or 60Hz ac power and converts it to 12Vdc; when both batteries are charged, it maintains them at peak level with a "trickle charge" feature.

The 120Vac power for the converter is supplied through Panel B circuit breaker **#10 – 12V BATT CHARGER** on the Engine Room 120/240Vac Distribution Panel (Figure 11-2).

The converter is located on the port side of the forward engine room bulkhead. It is the bottom one of the three converters located there (the top two are the 24Vdc converters).

Each converter has an **ON/OFF** switch with a pilot light. Bertram recommends that the 12Vdc converter be left on all the time.

12Vdc System Distribution and Control Panels

Each circuit that uses 12Vdc power is protected by its own circuit breaker or fuse. There is space on the Flybridge 12Vdc Electronics Panel so you can provide circuit breaker protection for additional 12Vdc equipment you may wish to add to your Bertram.

Engine Room 12Vdc Power Center

The Engine Room 12Vdc Power Center (Figure 10A-1) is aft in the engine room on the port side of the engine room entrance walkway. This panel contains:

- 12Vdc battery disconnect switches;
- flybridge 12Vdc panel main switch;
- battery selector switch;
- dc Voltmeter and switch;
- battery parallel circuit fuses.

12Vdc Battery Disconnect Switches

The 12Vdc battery disconnect switches connect and disconnect the 12Vdc batteries and the 12Vdc circuits and equipment.

The switches are rated at 175Amp continuous and 800Amp momentary. In case of fire, these switches should be **OFF**.

To activate your vessel's 12Vdc system, the main battery disconnect switches must be **ON**. However, Bertram suggests that these switches should be left in the **OFF** position when your vessel is unattended for long periods.

The battery disconnect switches do not interrupt 12Vdc converter output to the batteries. If the ac shoreline is plugged in and the shoreline input circuit breaker is **ON**, the converter will normally keep the batteries charged during those periods when your vessel's ac generators are not operating.

Flybridge 12Vdc Panel Main Switch

This circuit breaker allows you to turn **ON** or **OFF** power to the flybridge 12Vdc electronics panel.

Battery Selector Switch

The selector switch on this panel allows you to choose which 12Vdc battery bank will supply the power to the Flybridge electronics panel.

DC Voltmeter and Switch

The dc Voltmeter enables you to read the Voltage level on either battery bank with a single meter. Use the selector switch to determine which battery is checked.

A fully charged battery bank should read about 13.6Vdc. When the converters or the engine alternators are running, a reading of 13.2Vdc to 14.1Vdc indicates normal operating loads. The reading should remain within this range; a higher reading indicates overcharging, and a lower reading indicates excessive power usage.

If either voltmeter reads below12Vdc, you may be unable to start that generator unless you hold the **BATTERY PARALLEL** switch on the flybridge instrument panel in its battery paralleling position.

--- See Part III for Maintenance Information ---

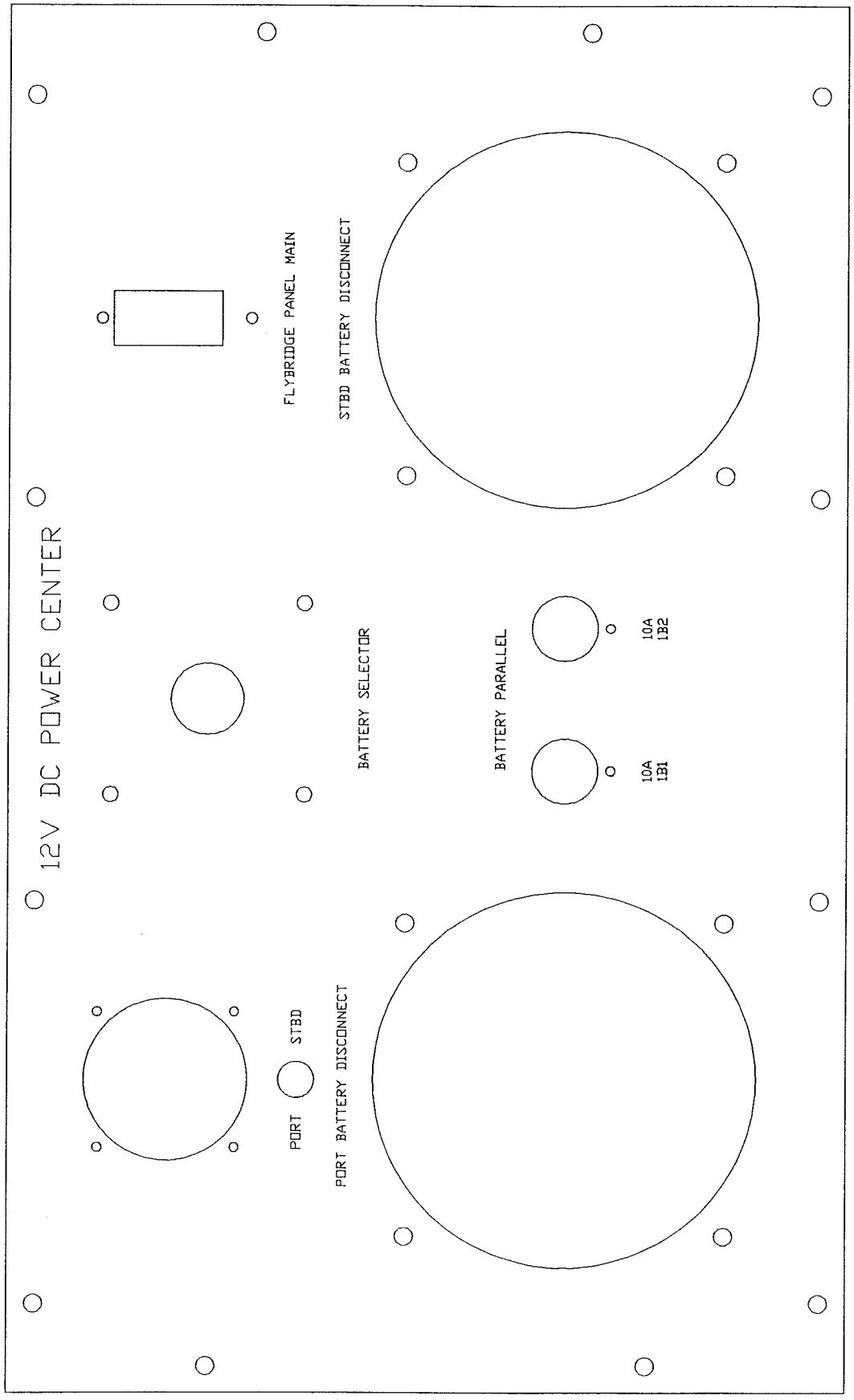


Figure 10A-1: Engine Room 12Vdc Power Center

Ref: D9841

Fuses

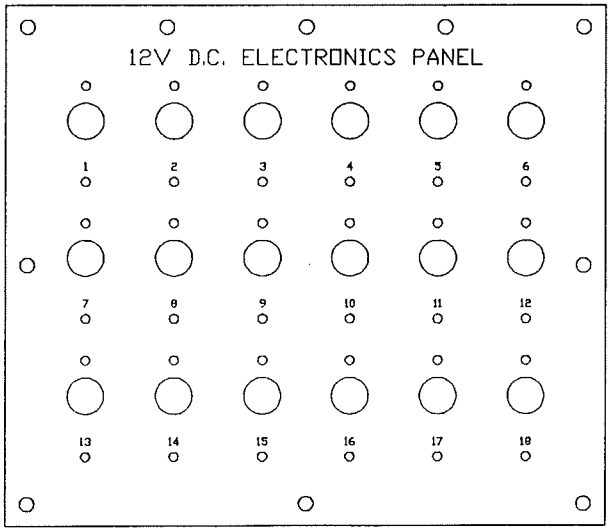
The 12Vdc Supply Panel contains the Battery Parallel circuit fuses (10Amp).

NOTE:
The Engine Room 12Vdc Power Center ***FLYBRIDGE PANEL MAIN*** *circuit breaker must be* ***ON*** *for circuits on the Flybridge 12Vdc Electronics Panel to be powered. Similarly, the* ***BATTERY PARALLEL*** *fuses must be in place for the 12Vdc battery paralleling system to function.*

Flybridge 12Vdc Electronics Panel

The Flybridge 12Vdc Electronics Panel (Figure 10A-2) is in a cabinet on the port side of the flybridge control console, below the 24Vdc panels. Th electronics panel is powered through the **FLYBRIDGE PANEL MAIN** breaker on the Engine Room 12Vdc Power Center (Figure 10A-1).

The electronics panel provides space for up to 18 circuit breakers. These breakers are to be installed for operator-selected equipment. Table 10A-1 provides a place to list these circuit breakers as they are installed.



Ref: D9808

Figure 10A-2: Flybridge 12Vdc Electronics Panel

Table 10A-1: Circuit Breakers
on the 12Vdc Electronics Panel

Breaker	Circuit Protected
1	Synchronizer
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	

(to be filled in as equipment is installed)

DC Equipment Protection

A tripped circuit breaker or a blown fuse may indicate either that you have a problem in that circuit or in the equipment that is being protected by that circuit breaker or fuse.

> **CAUTION**
>
> Do not replace existing circuit breakers or fuses with circuit breakers or fuses having a higher trip value than the originals. Such modifications could cause equipment and/or circuit failure and/or fires.

If the same circuit breaker trips repeatedly or the same fuse blows repeatedly, the cause of the problem must be found and corrected to avoid possible damage and further complications.

Under no circumstances should any circuit breaker or fuse be replaced with one having a higher trip value than the original.

Section 10B

24 Volt DC Electrical System

The 24 Volt direct current (24Vdc) electrical system is your vessel's primary dc electrical system. There are 24Vdc distribution panels in the engine room and on the flybridge.

Batteries

The 24Vdc system is powered by two banks of 8Vdc lead-acid batteries, located aft in the engine room on both sides of the engine room walkway. Each bank contains three batteries (the smaller fourth battery on each side is the 12Vdc battery).

When under way, the 24Vdc battery banks are continually charged by the engine alternators. If the generators are running, the batteries are also charged through the two 24Vdc converters. When you are dockside and have shore power available, the batteries are charged by the converters.

The two main battery banks are independent of each other, but can be used in parallel when starting a main engine (Bertram suggests that you parallel the battery banks *every* time you start a main engine).

Circuit Breakers and Fuses

Each system or piece of equipment that requires 24Vdc power is protected by its own circuit breaker or fuse. On the dc power distribution panels, there is a provision for 24Vdc equipment you may wish to add.

A tripped circuit breaker or a blown fuse may indicate a problem in the circuit or in the equipment protected by the circuit breaker or fuse. If a circuit breaker trips repeatedly, or if a fuse blows repeatedly, you must locate and correct the problem to avoid possible equipment damage.

⚠ CAUTION

Do not replace existing circuit breakers or fuses with circuit breakers or fuses having higher trip values than the originals. Such modifications could cause equipment failure, circuit failure or fire.

Engine Room 24Vdc Power Center

> **CAUTION**
>
> Battery switches are designed for use under normal operating conditions. If the switches are used to open the dc circuit while the engine is being cranked, the switch should be replaced as soon as possible to avoid future failure.

The 24Vdc Power Center is in the engine room, aft on the starboard side of the engine room entrance walkway.This panel contains:

- 24Vdc battery disconnect switches
- flybridge 24Vdc panel main switches
- battery selector switch
- dc Voltmeter and switch
- lube oil waste tank gauge and gauge switch

24Vdc Battery Disconnect Switches

The 24Vdc battery disconnect switches connect and disconnect the 24Vdc batteries and the 24Vdc circuits and equipment.

The switches are extra heavy duty units rated at 600 Amps continuous and 1,000 Amps momentary. To activate your vessel's 24Vdc systems, including starting and operating your main engines, one or both 24Vdc battery disconnect switches must be in the **ON** position.

Bertram suggests that these switches should be left in the **OFF** position whenever your vessel is left unattended for long periods.

The battery disconnect switches do not control power to some systems on the Engine Room 24Vdc Main Supply Panel. These circuits are protected by fuses and are normally continually energized.

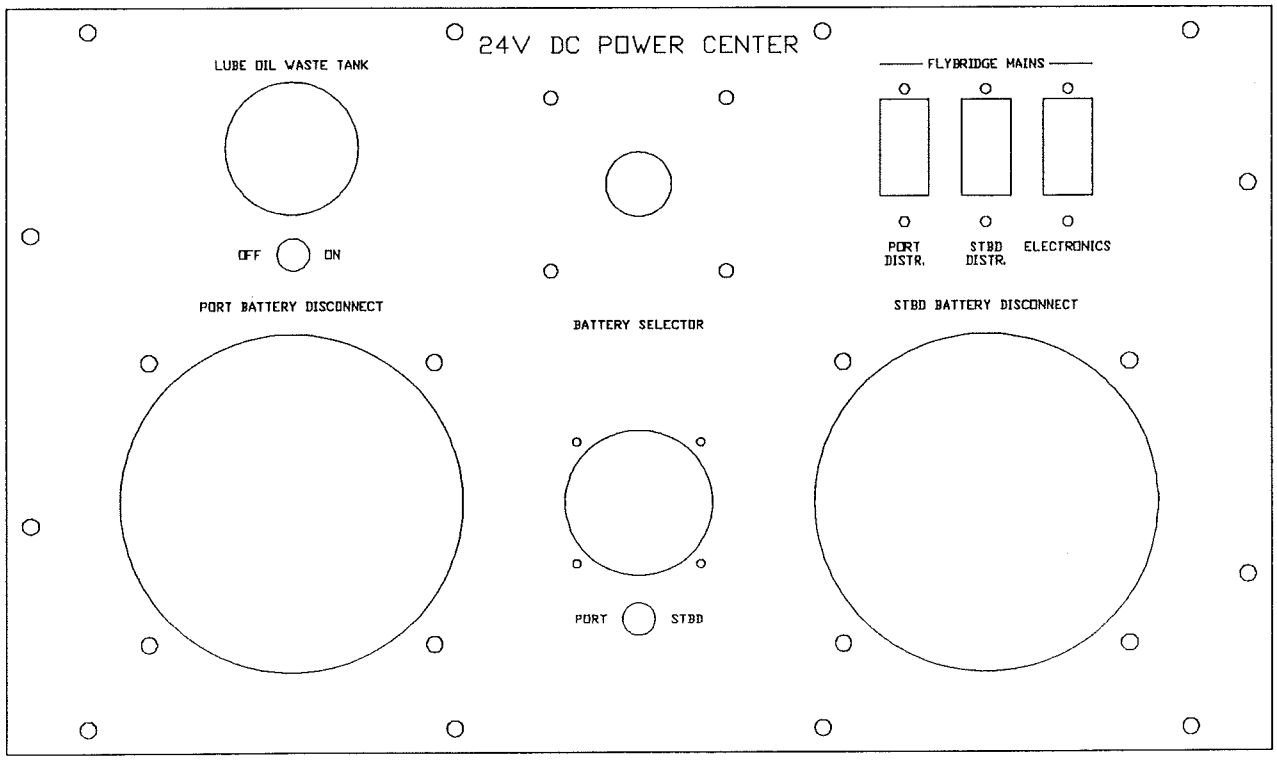


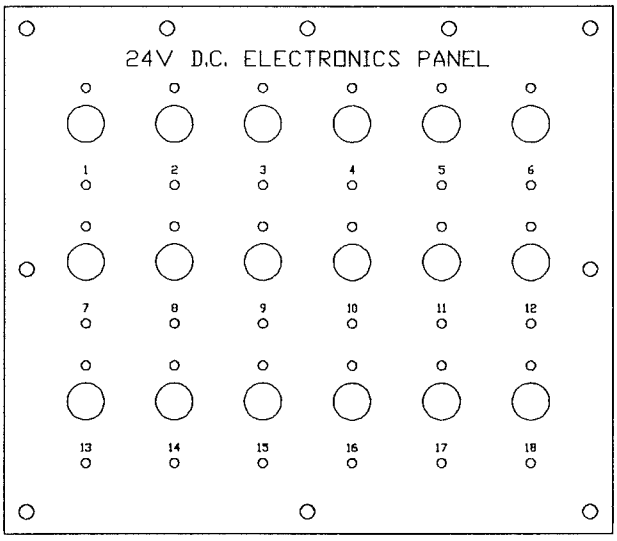
Figure 10B-1: Engine Room 24Vdc Power Center

--- See Part III for Maintenance Information ---

24Vdc Distribution Panel (Engine Room)

The 24Vdc Distribution Panel (Figure 10B-2) in the engine room, is mounted aft on the starboard side of the engine room entrance walkway. It is powered through the Engine Room 24Vdc Power Center (Figure 10B-1) below it.

The panel has spaces for 10 fuses and 10 circuit breakers (Table 10B-1). The fused circuits are always powered and cannot be shut off except by removing the fuses or disconnecting the batteries. The circuits protected by the circuit breakers are powered through the battery disconnect switches.



Ref: C9806

Figure 10B-5: 24Vdc Electronics Panel (Flybridge)

Table 10B-2: Circuit Breakers: 24Vdc Electronics Panel (Flybridge)

Port Side		Starboard Side	
Breaker	Circuit Protected	Breaker	Circuit Protected
1		10	
2		11	
3		12	
4		13	
5		14	
6		15	
7		16	
8		17	
9		18	

24Vdc Distribution Panel (Flybridge)

The 24Vdc Distribution Panel (Figure 10B-3) on the flybridge is located in a cabinet on the port side of the control console. It contains the circuit breakers listed in Figure 10B-4, and is powered through the **FLYBRIDGE MAINS PORT DISTR.** and **STBD DISTR.** circuit breakers on the Engine Room 24Vdc Power Center (Figure 10B-1).

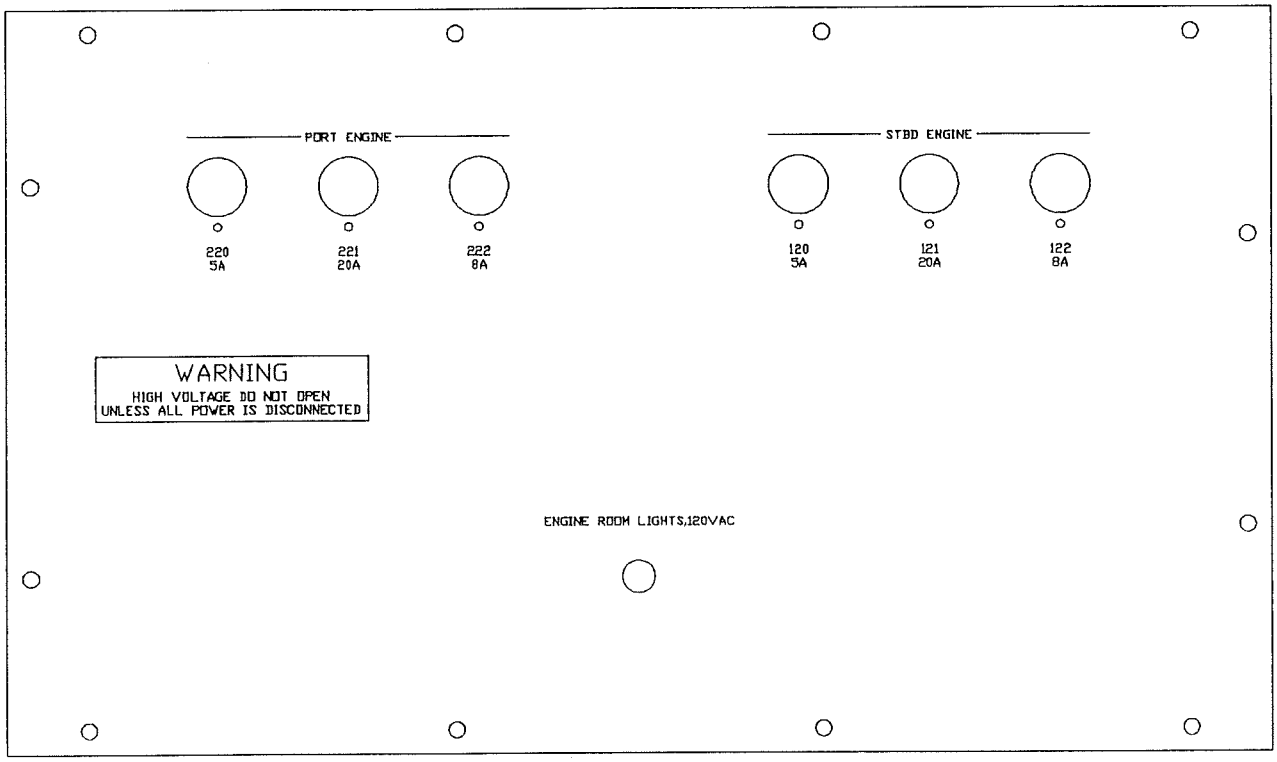
24Vdc Electronics Panel (Flybridge)

The 24Vdc Electronics Panel (Figure 10B-4) on the flybridge is located in a cabinet on the port side of the control console. It is powered through the **FLYBRIDGE MAINS ELECTRONICS** circuit breaker on the Engine Room 24Vdc Power Center (Figure 10B-1).

The panel has spaces for up to 18 branch circuit breakers to be installed for operator-selected equipment. Table 10B-2 provides a place to list these circuit breakers as they are installed.

Converters

The 24Vdc battery banks are charged by ac shore power or the onboard ac generators through two 24Vdc converters. The converters take 50Hz or 60Hz ac power and convert it to 24Vdc; when all batteries are charged, the con-



Ref: D9840A

Figure 10B-6: Engine Room 24Vdc Engine Fuse Panel

--- See Part III for Maintenance Information ---

verters maintain them at peak level with a "trickle charge" feature.

The 120Vac power for these converters is supplied through Panel A circuit breaker **#6 – PORT 24V BATT CHARGER** and Panel B circuit breaker **#9 – STBD 24V BATT CHARGER** on the Engine Room 120/240Vac Distribution Panel (Figure 11A-2).

The two 24Vdc converters are mounted on the port side of the forward engine room bulkhead. There are three converters; the top two are 24Vdc (the bottom one is 12Vdc). The upper one of these converters charges the port battery bank, and the lower one charges the starboard battery bank.

Each converter has an **ON/OFF** switch with a pilot light. Bertram recommends that the 24Vdc converters be left on all the time.

This space reserved for operator notes.

Section 11A

120/240 Volt AC Electrical System

The 120/240 Volt alternating current (120/240Vac) electrical system on your Bertram can be powered by shore power, by either or both of your two Diesel 30kW and 20kW generators, or by a combination of shore power and generator power.

Each circuit that uses ac power is protected by its own circuit breaker or fuse. There is space on the ac distribution panels so you can add circuit breakers for additional ac equipment you place aboard your Bertram.

120/240Vac Distribution Panels

> **CAUTION**
>
> Before opening any 120/240Vac distribution panel or servicing any 120/240Vac equipment:
> 1) disconnect the shore power cords;
> 2) stop the ac generators.

There are 120/240Vac distribution panels in the engine room and on the flybridge.

Engine Room 120/240Vac Distribution Panels

The Engine Room 120/240Vac Distribution Panels (Figures 11A-1 and 11A-2) are on the forward bulkhead of the engine room. The starboard panel (Figure 11A-2) houses the AC branch circuit breakers. This is where you would reset a tripped breaker. What these breakers operate is shown on the port panel (Figure 11A-1). Panel A and Panel B are given a higher priority than Panel C and Panel D. The electrical distribution plan was designed to make the most out of a limited amount of electricity.

NOTE:
It is not advisable to manually operate switching of the panels. It is normally done only when servicing the engine room panel or when remote operating of the switches is non-operative.

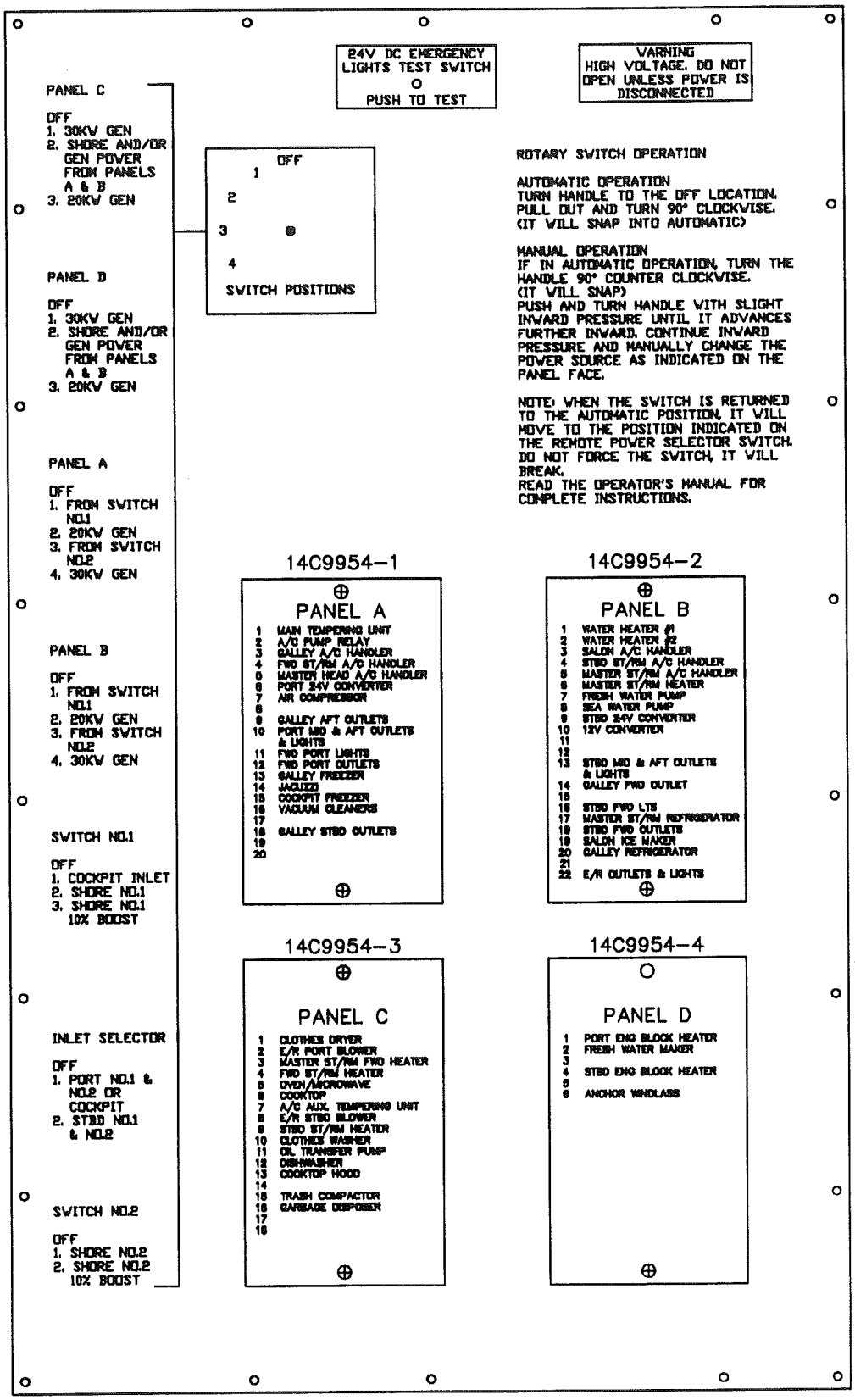
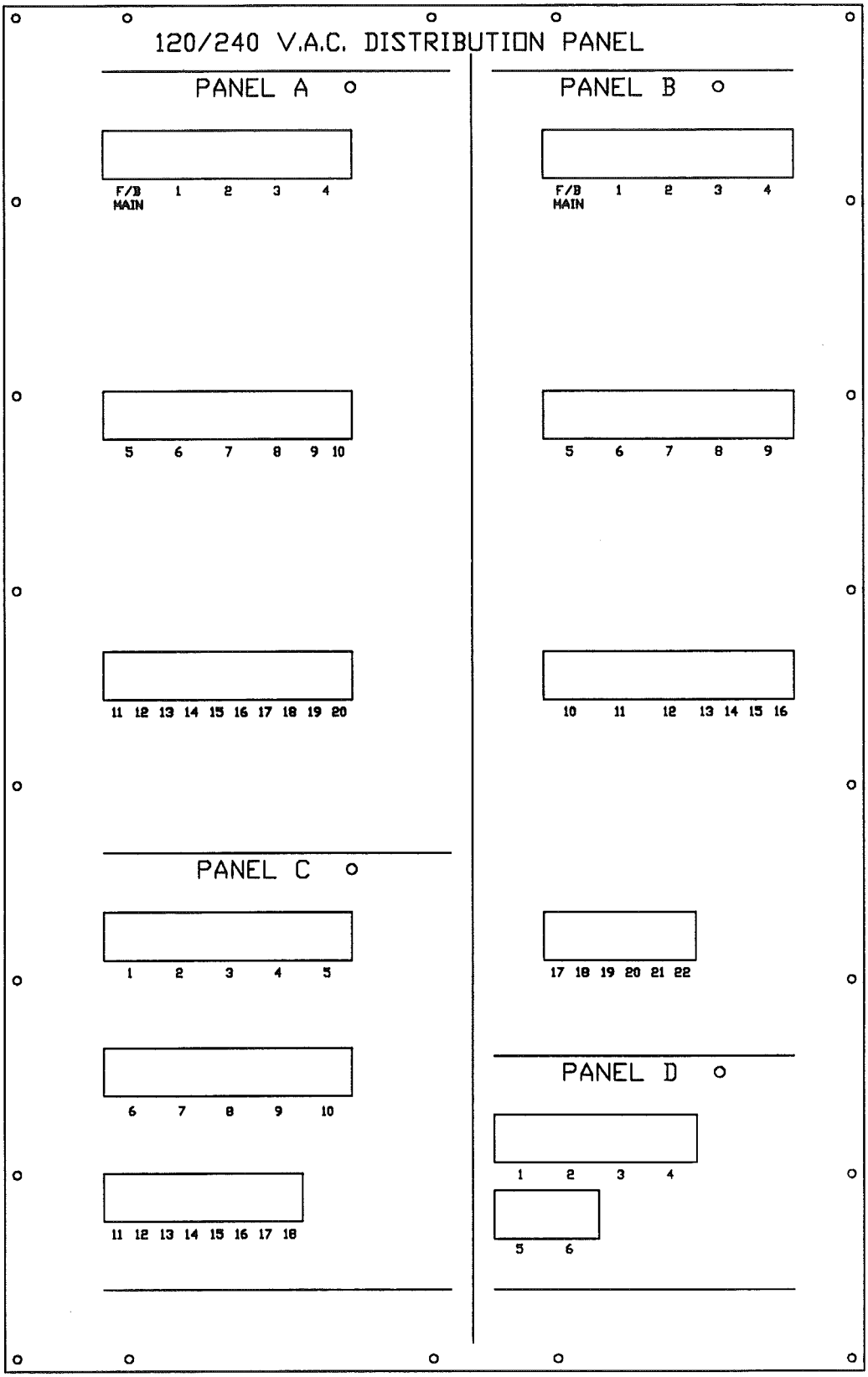


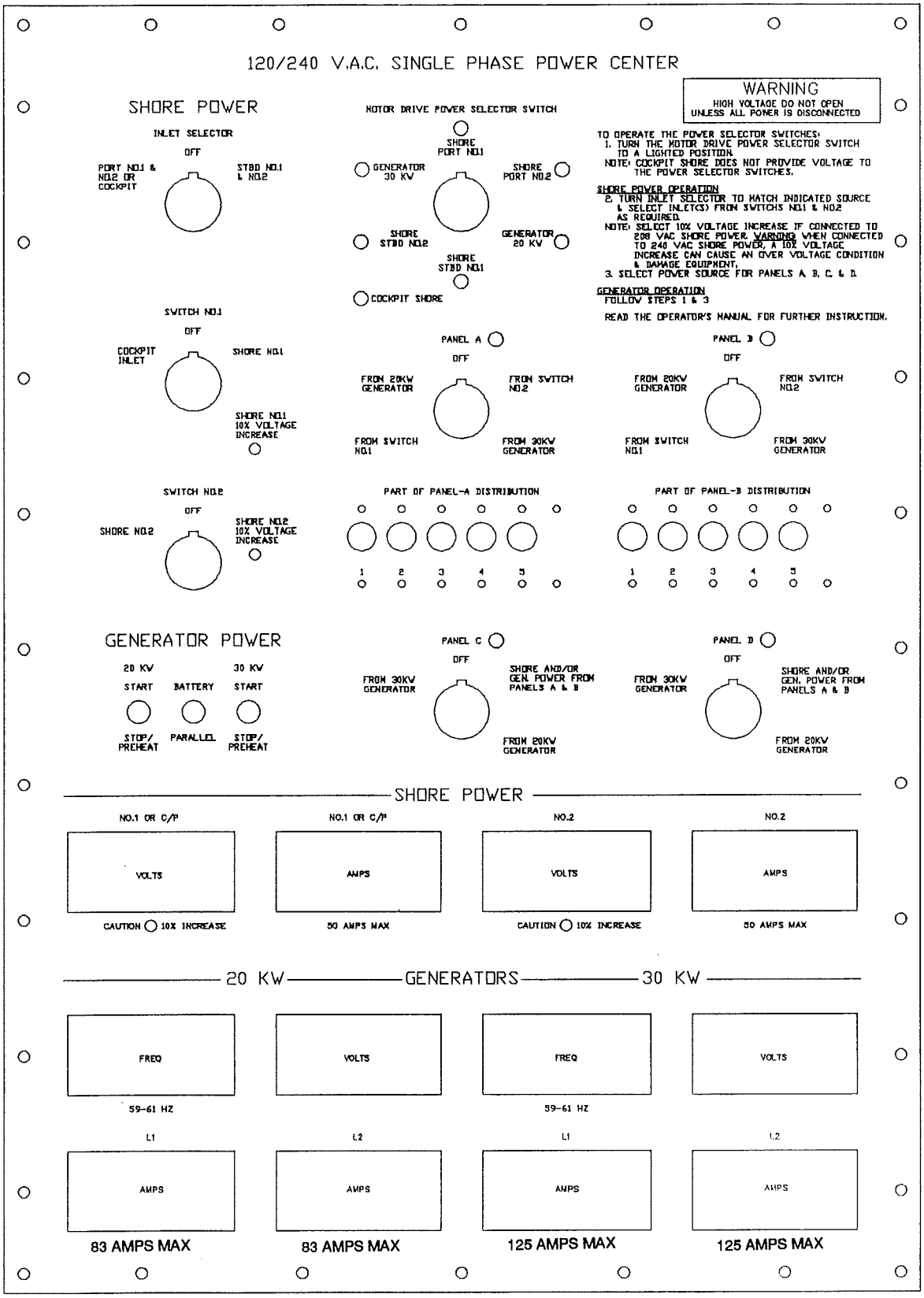
Figure 11A-1: 120/240Vac Distribution Panel (port side)

--- See Part III for Maintenance Information ---



Ref: D9810B

Figure 11A-2: 120/240Vac Distribution Panel (stbd side)



Ref: D9812

Figure 11A-3: Flybridge 120/240Vac Distribution Panel
(for circuit breaker listing, see Table 11A-1)

--- See Part III for Maintenance Information ---

Flybridge 120/240Vac Power Center

CAUTION

The 120/240Vac Distribution Panel Voltmeters, Ammeters and Frequency meters monitor the power source in use. If the Voltage drops below 110Vac, any ac motor in use may be damaged.

The Flybridge 120/240Vac Single Phase Power Center (Figure 11A-4) is in a cabinet on the flybridge control console.

While this panel system looks complex, its operation is simple; just follow the instructions in this section.

Generator Control Panels

The Generator Control Panels supply power from the generators to the 120/240Vac system. The remote controls for starting and stopping the generators are on the Flybridge 120/240Vac Single Phase Power Center panel (Figure 11A-4). To operate;

1) Turn the Motor Drive Power Selector Switch to a lighted position.
2) Start the 20kW or 30kW generator using the Generator Power Switch.
3) Select the power source for panels A, B, C, and D.

120/240Vac Distribution Panel

The 120/240Vac Distribution Panel is equipped with the accessory circuit breakers listed in Table 11A-1. The main circuit breakers for Panels A and B flybridge branch ciruits are located on the engine room 120/240Vac Distribution panel (Figure 11A-2).

Table 11A-1: Circuit Breakers on the Flybridge 120/240Vac Distribution Panel

From Panel A Distribution

Breaker	Circuit Protected
1	Flybridge Outlets
2	Ice Maker
3	
4	Fwd Holding Tank Pump
5	Flybridge A/C Handler

From Panel B Distribution

Breaker	Circuit Protected
1	Flybridge Refrigerator
2	Flybridge Lights
3	Power Windows
4	
5	

Shore Power

NOTE:
With a limited amount of shore power, the Vac compressor and refrigeration must be at cycling or normal operating temperatures to avoid over taxing the electrical distribution.

NOTE:
When power is being used, any heavy loads such as the air conditioning or the range should be turned OFF at the equipment controls before shifting to another power source.

NOTE:
In order for both shorelines to be used simultaneously, you must plug into **ONE** *side of the boat only.*

WARNING

Do not cut or disconnect the green grounding conductor in the shore line at the dock outlet or the boat inlet.
This conductor is needed to provide the same ground potential between shore ground and your vessel's ground and minimizes the shock hazard to persons on the vessel or in the water.

CAUTION

Before connecting or disconnecting the shore lines, be sure all the main circuit breakers are OFF or that the Power Selector Switches are OFF.
This will help prevent connector arcing and fitting damage.

CAUTION

The shorelines have a twist-to-lock fitting. Be sure these are properly locked in place before switching the shore power circuit breakers ON.
This will help to prevent connector arcing and fitting damage.

WARNING

To minimize shock hazard:
1) Always plug the 125V cockpit line into the *vessel* first, and unplug from the *shore* first (this prevents accidentally dropping a "hot" shore cord into the water).
2) Close the shore power inlet cover tightly.
3) Do not alter the shore power cable connections.

CAUTION

Each shore inlet is rated at 50 Amperes. To protect your inlet fittings from damage and prevent the inlet circuit breaker from tripping, do not exceed 50 Amperes current draw.

Shore Power Inlets

There are two shore power inlets on each side of the cockpit, located behind hinged doors on the outside of the port and starboard pilasters. On each side, one inlet is for 120/240Vac (Shoreline No. 1) and the other is for 120/240Vac (Shoreline No. 2).

The 50Amp main shore breakers are located outboard and forward of the each engine.

You can use shore power *and* generators to provide power for loads above the 50Amp shoreline limit.

Using Shore Power

The remote controls for selecting the shore power options are on the Flybridge 120/240Vac Single Phase Power Center panel (Figure 11A-4). To operate;

1) Turn the selector switch to a lighted position.

2) Turn Inlet Selector to match indicated source and select inlet(s) from switches NO.1 and NO.2 as required.

3) Select Power Source for panels A, B, C, and D.

Your Bertram shore cords and shore connection inlets are wired in accordance with current industry standards, but you may occasionally find some dock outlets that are improperly wired.

AC Circuit Protection

CAUTION

Do not replace existing circuit breakers or fuses with breakers or fuses that have higher trip values. This change can cause circuit failures and/or fires.

A tripped circuit breaker or fuse may indicate a problem in that circuit or in the equipment protected by that circuit breaker or fuse. If the same circuit breaker trips repeatedly, or the same fuse burns out repeatedly, the cause must be found and corrected to avoid possible equipment damage.

Never replace a circuit breaker or fuse with one having a higher trip value than the one already in the circuit.

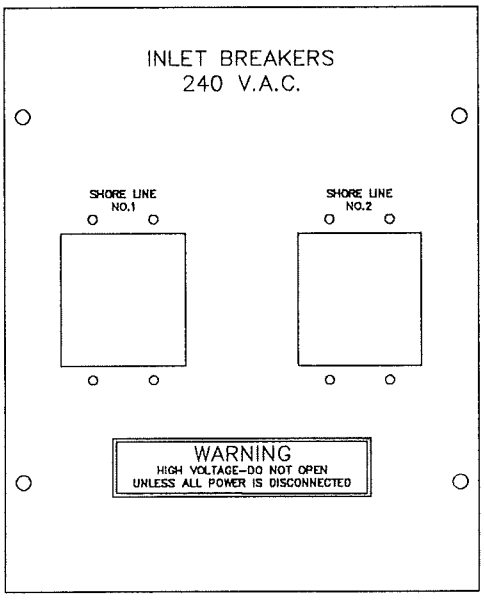


Figure 11A-4: 240Vac Shore Power Inlet Breaker Panel

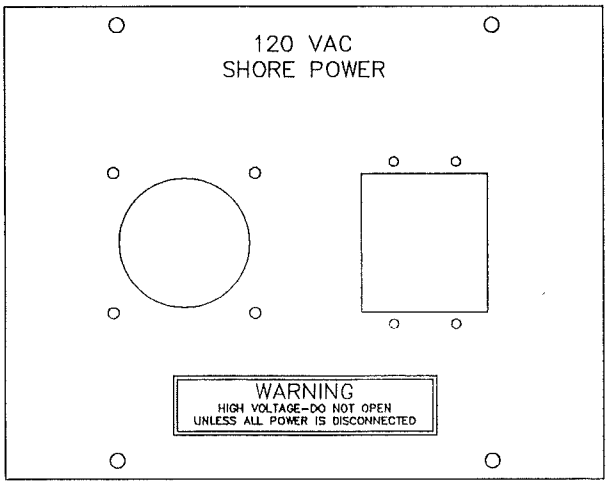


Figure 11A-5: 120Vac Shore Power Inlet Breaker Panel

Ref: C9839

NOTE:
Bertram recommends that any added ac equipment be installed in the same manner as the factory installed equipment and that it be installed using the proper-sized circuit breakers and wire.

NOTE:
If your vessel has the optional 120Vac power windlass, keep its circuit breaker (#151) OFF except when the windlass is actually being used. Other branch circuit breakers may be ON or OFF depending on your needs.

Ground Fault Circuit Interrupters

Circuit breakers and fuses on this vessel protect you and your equipment and circuits against overloads and short circuits. However, circuit breakers and fuses may not protect people from electric shock, particularly from ground fault shock.

Ground fault is a leaking of current to ground, often through the body of a person who accidentally provides the electrical path to ground. It is the most common type of current responsible for electric shock accidents.

Your Bertram is equipped with Ground Fault Circuit Interrupters (GFCIs) in the galley; in the port, starboard, and forward toilets (heads); on the flybridge; and in the engine room. These areas contain GFCIs because they are most likely to have wet decks, so they are the most likely places for a ground fault accident.

Except for a red **RESET** push-button and a black **TEST** pushbutton located between the two receptacles, GFCI receptacles look similar to common household 120Vac receptacles.

GFCI Outlet Operation

For all practical purposes, each GFCI outlet is a standard double 120Vac outlet, but with a safety feature: if the GFCI outlet senses 6 or more milliAmperes of ground fault current, it will act as a circuit breaker and open the circuit. When the circuit is opened, the **RESET** push-button extends out of the receptacle plate. To reset a tripped GFCI outlet, depress the red **RESET** push-button until it locks in place. If the push-button will not reset, there is a problem with that part of the 120Vac circuitry – or the appliance used – that requires attention.

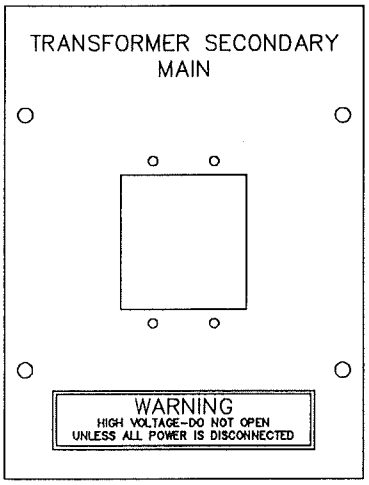


Figure 11A-6: Transformer Secondary Main Panel

Testing a GFCI Outlet

To test a GFCI outlet, depress the black **TEST** push-button switch. The red **RESET** push-button switch should pop out. If so, depress the **RESET** push-button until it is once more locked in place. If the **RESET** push-button does not pop out when the GFCI is tested, *do not use it.* Have the GFCI outlet checked and

possibly replaced by a competent marine electrician.

NOTE:
The test circuit requires 120Vac to operate.

Automatic Converters

Three onboard ac/dc converters change 120Vac input into 12Vdc or 24Vdc output to charge the appropriate battery banks. When the batteries are fully charged, the converters maintain a trickle charge condition. Bertram recommends that the converters normally be left in the **ON** position with either shore power or the generator supplying the power.

Additional information on the converters can be found in ***Section 10A: 12-Volt DC Electrical System*** and ***Section 10B: 24-Volt DC Electrical System.***

Corrosion Of Underwater Fittings

Bonding

As a part of the electrical system, your Bertram is equipped with a bonding system designed to minimize stray current corrosion. The main grounding strap runs fore and aft through the bilge area. This main grounding strap is connected by jumpers or grounding conductor to:

- all underwater fittings and hardware;
- engine blocks;
- all onboard ac equipment.

Electrolysis

If your vessel will remain idle for extended periods of time, Bertram suggests that you use a zinc "fish". For details of this preventive maintenance procedure, see ***Part III, Maintenance.***

Galvanic Isolator

The galvanic isolator on your Bertram is a solid state device designed to stop accelerated underwater corrosion that can occur when the vessel is dockside and connected to shore power. This is a passive unit that requires no maintenance. It acts as an electrical filter to prevent the flow of dc galvanic corrosion currents through the power system grounding conductor (the green wire) without sacrificing the safety features of the ac grounding system.

A grounding conductor is not normally a current carrying conductor, but under abnormal conditions an ac current may flow in this conductor. Two of the possible conditions are:

1) A breakdown of the insulation between a current carrying conductor and the grounding conductor.
2) Incorrect or inadequate wiring on shore or on your vessel.

To minimize shock hazard when your vessel is connected to shore power, the shore power green grounding conductor is electrically tied to the vessel grounding system. This electrically connects your vessel's underwater metal fittings through the bonding system to the shore ac grounding system and to other vessels which are connected to the shore grounding system. This connection can cause difficulties, in that your expendable zinc anode system may be overloaded.

To stop the overload, the galvanic path must be broken without cutting the green

grounding conductor in your shoreline. Your Bertram is equipped with a galvanic isolator to do this. It is installed in series with the (green) shoreline grounding conductor and the ac panel or power selector switches.

European Shore Power

If this vessel will be operated in foreign ports that have shore power of 220 to 250Vac and 50Hz, instead of 120/240Vac 60Hz, Bertram's European shore power option should be installed. This system uses built-in isolation transformers that provide shipboard 120Vac and 240Vac when using the shorelines.

The generators remain unchanged with an output of 120/240Vac at 60Hz. The standard ac electrical equipment remains the same since it was selected to be able to operate on 50 or 60Hz (although motor driven equipment will be less efficient when used on 50Hz).

The shorelines are equipped with connectors on the dock end that will mate with connectors used at American marinas. If your vessel is to be used in other ports, you may wish to buy adaptors to match the connectors at your ports of call.

This space reserved for operator notes.

Section 11B

AC Generator Systems

⚠ WARNING

If you come into contact with moving machinery, you can be seriously injured.

⚠ CAUTION

Operating engines and generators may produce high noise levels in the engine/ generator room. To protect your hearing, obtain and wear hearing protection equipment that meets recommendations of the U.S. Occupational Safety & Health Administration (OSHA).

Carbon Monoxide Hazard

⚠ WARNING

Diesel internal combustion engines use petrofuels and emit carbon monoxide gas. This gas is colorless, odorless, and lethal if breathed in sufficient quantities.

Carbon monoxide poisoning is one of boating's most treacherous hazards. *Please read very carefully* the information in ***Part II, Section 3*** under ***Carbon Monoxide Gas.***

Generator Maintenance

Your generators are manufactured from high quality materials in designs of proven ruggedness. Nonetheless, your generators' performance and life expectancy depend very much on the care you give them.

To maintain its rugged reliability and ensure long life for all the components, your generators demand your careful attention, gentle treatment and a consistent program of preventive maintenance.

Part III of this manual contains information on maintaining your vessel; ***Part III, Section 1*** covers ***Periodic Maintenance.*** You should also follow the instructions in the generator operator's manuals provided by the manufacturers for:

- selection of fuel and lubricants;
- monitoring performance instruments;
- scheduled preventive maintenance.

Operating the Generators

⚠ CAUTION

To avoid circuit overloading and tripping the circuit breakers, do not exceed 65Amp current draw when using a generator.

NOTE:
Both generators can be run simultaneously if needed. Generator No. 1 can power the right section of the Salon AC Power Center, and Generator No. 2 can power the left section, or vice versa.

The controls and gauges for starting, stopping, and monitoring your two 240Vac generators are on the Flybridge 120/240Vac Distribution Panel (Figure 11A-3). For each generator, this panel has a frequency meter, a Voltmeter and two Ammeters (one for each leg of the generator output). There are **START-STOP/PREHEAT** switches for each generator and a battery paralleling switch for the 12Vdc battery banks to make it easier to start the generators' Diesel engines.

NOTE:
Each generator has a main "E" type circuit breaker mounted on it. Since the generators are both oriented the same way for ease of maintenance, on the port generator this circuit breaker is inboard and on the starboard generator this circuit breaker is outboard. Under normal operating conditions, this circuit breaker is always in the ON position.

Before Starting the Generators

1) Be sure the seawater valve is open.
2) Be sure the heat exchanger expansion tank on top of each generator is full of the proper coolant.
3) Check each generator's lubrication oil level.
4) Select either the aft or forward fuel tank as the Diesel fuel source.
5) On the Engine Room 12Vdc Battery Disconnect Panel (Figure 10A-1), set both Battery No. 1 and Battery No. 2 battery disconnect switches to **ON**.

Starting the Generators

⚠ CAUTION

If a generator won't start after several tries, its waterlift muffler may fill with water. To keep seawater out of the generators' exhaust manifolds, use the muffler drain plugs to empty the mufflers before moving your vessel.

⚠ CAUTION

When starting your generators:
do not exceed 30 seconds of warmup or 30 seconds of cranking. If a generator fails to start, wait 2 to 3 minutes before trying to start it again.

On the Flybridge 120/240Vac Distribution Panel (Figure 11A-3):

1) Push the **START-STOP/PREHEAT** switch down to **PREHEAT** for up to 30 seconds, depending on temperature.

2) Depress and hold the **BATTERY PARALLEL** switch.
3) Push the **START-STOP/PREHEAT** switch up to **START** for 30 seconds or until the generator starts. Do not exceed 30 seconds of continuous cranking.
4 The **A.C. GENERATORS** lamp on the starboard side of the flybridge overhead panel illuminates when the generator is running.
5) Repeat steps 1 through 4 for the other generator if you want both generators on line.
6) After starting the generator(s), check to be sure that seawater is flowing from the exhaust outlet on the port and/or starboard corners of your vessel's transom. If there is no flow of water from a generator's exhaust port when it is running, to avoid damaging the generator, immediately shut it down until you solve this problem.
7) To use the electric power from one or both generator(s), set the selector switch(es) on the Flybridge 120/240Vac Distribution Panel (Figure 11A-3). Then set the circuit breakers for the desired appliances and equipment to **ON**.

Stopping the Generators

Manual Stop

1) Remove the ac load from the generators at the 120Vac and 120/240Vac Shore Panels.
2) On the Flybridge 120/240Vac Distribution Panel (Figure 11A-3), set the selector switches to **OFF** or **SHORE**.
3) Hold one **START-STOP/PREHEAT** switch in the **STOP** position until that generator is fully stopped.
4) Repeat step 3 for the other generator.

Automatic Shut-Down

Your generators each have an automatic shut-down system that requires no action from the operator. The system stops the Diesel generator engine before it can be damaged if it detects:

- low oil pressure;
- high exhaust temperature;
- high coolant temperature;
- overspeed.

If the generator shuts down automatically:

1) determine the source of the fault;
2) correct the fault;
3) move the selector switches to **OFF**;
4) perform the ***Before Starting the Generators*** procedure (above);
5) perform the ***Starting the Generators*** procedure (above).

Generator Fuel System

The fuel system is discussed in ***Part II, Section 5.***

Generator Cooling System

Your generators are fresh water cooled. This means a closed and pressurized mixture of fresh water and a suitable corrosion inhibitor provides cooling for the generator blocks, cylinder heads and exhaust manifolds. This coolant mixture is in turn cooled by passing it through the seawater-cooled heat exchanger.

Fresh Water and Antifreeze Mixture

Your generator coolant provides the medium for heat transfer to control generator internal temperature during operation. In a generator with proper coolant flow, combustion heat moves through the cylinder walls and the cylinder head into the coolant. Without adequate coolant, normal heat transfer cannot occur and generator temperature will rise rapidly.

The coolant solution in your generators must provide the following functions:

- adequate heat transfer;
- corrosion inhibition;
- protection against the formation of sludge or scale in the system;
- compatibility with the system's hoses and seals;
- adequate freeze protection during cold-weather operation, and boil-over protection during hot weather.

Follow the generator manufacturer's instructions for coolant selection, coolant concentration, and system maintenance. These instructions are in the generator operator's manual included with your supplementary information.

Seawater Inlet System

The seawater cooling system for the generators consists of:

- seawater piping from the seachests
- seawater side of the heat exchangers.

Your Bertram has a seawater heat exchanger system mounted on each generator.

Cooling seawater is taken from the seawater system and pumped into the seawater side of the heat exchangers. As it travels through the heat exchangers, heat is transferred from the generator coolant mixture (which is on the fresh water side of the heat exchangers) to the seawater. Then the seawater is piped to the generators' exhaust systems, where it mixes with the exhaust gases and goes overboard with them.

--- See Part III for Maintenance Information ---

Section 12

Compressed Air System

WARNING

The compressed air system aboard your Bertram is critical to your vessel's operation. You must be sure the air in the system is CLEAN. Keep the filters and water traps cleaned at all times.

The compressed air system powers your vessel's controls, plus the horn, windshield wipers and toilets (heads).

Compressed air is supplied by the engine-driven compressor mounted on the port engine and by a a 120Vac compressor mounted on the air tank supplies compressed air.

Air Tank

The air tank is in the engine room, outboard of the port engine.

Specifications, operating information and maintenance procedures for your air tank can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Air Compressors

WARNING

Neither compressor/pump is equipped for nor meant to supply breathing quality air. To use air from the compressors as a breathable air supply could result in serious lung injury or even death.

WARNING

Do not tamper with the compressor safety valve or the automatic regulator switch mechanism. Tampering with either device could result in severe injury or equipment damage.

Engine-Driven Compressor

The engine-driven compressor maintains the compressed air supply when the main engines are operating.

Specifications, operating information and maintenance procedures for your engine-driven air compressor can be found in the

manufacturer's Operator's Manual included with your vessel's documentation.

120Vac Compressor

The 120Vac compressor is powered through through circuit breaker #7 – **AIR COMPRESSOR** on Panel A of the Engine Room 120/240Vac Distribution Panel (Figure 11A-2).

On top of the compressor is a control box with two air pressure gauges, a regulator knob, an ASME safety valve, an **OFF/AUTO** switch, and a standard compressed air fitting. One pressure gauge shows tank pressure, and the other shows air line pressure. Both gauges display pounds per square inch (psi).

Normally, the circuit breaker for this compressor is in the **ON** position even when the engines are operating. Keep in mind, however, that you need an ac power source to supply 120Vac power to the compressor motor.

When the operating switch on the compressor control box is in the **AUTO** position, the compressor motor is automatically switched **ON** when the pressure in the tank drops below 80psi and is switched **OFF** when the tank pressure reaches 100psi.

Specifications, operating information and maintenance procedures for your 120Vac air compressor can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Section 13

Seawater System

Seawater is used several ways on your vessel:

- to cool the engines and generators;
- to cool the air conditioning systems;
- to supply raw water for the water maker;
- to wash down the decks;
- in the baitwell and prep center.

The system is diagrammed in Drawing 10102-6 in ***Part 4 - Supplement.***

Sea Chests

All seawater is taken into the vessel through a pair of cross-connected sea chests. These sea chests are located in the engine room forward of each main engine. Piping supplies seawater from the sea chests to the various devices that use it. The main seawater valves are directly forward of each sea chest.

Sea water Drainage System

Just as seawater is taken into your vessel through the sea chests, most seawater leaving the vessel is pumped overboard from a seawater holding tank. This tank is between the engines, beneath the engine room catwalk.

Seawater Washdown System (Optional)

⚠ WARNING

SEAWATER FAUCET(s) should be clearly labeled to prevent accidental use of seawater for drinking or cooking.

NOTE:
Always switch this system **OFF** *when you leave your vessel unattended.*

The basic seawater washdown system is a convenience feature for fishermen. The seawater washdown system makes cleaning of fish, fish boxes, baitwells, and the cockpit area easier and neater while at sea. You can also use it to aerate the optional live baitwell and wash off the anchor.

The seawater washdown system draws its electrical power fromthe **SEAWATER PUMP** circuit breaker on Panel B of the Engine Room 120/240Vac Distribution Panel (Figure 11A-2), and consists of:

- raw water pump;
- shutoff valve;

- pressure relief valve;
- seawater faucets.

If the optional baitwell is installed, there is additional seawater plumbing to the baitwell in the cockpit preparation center.

System Operation

The components of this system are aft on the port side of the lazarette.

To operate, the **SEA WATER PUMP** circuit breaker must be **ON**.

With the deck wash valve (on the lower aft side of the port cockpit pilaster) open, switch the system **ON** using the **SEA WATER WASHDOWN PUMP** switch On the starboard cockpit locker. Shut the system **OFF**when you are finished.

A relief valve and an overboard discharge through-hull fitting relieve pressure on the system when the faucets are closed.

Bertram recommends that you switch the **SEA WATER PUMP** circuit breaker **OFF** except when you are using the system.

Bilge Manifold

Seawater is also used to exercise the Auxiliary Engine-driven Bilge Pump. See ***Part III, Section 1 for instructions on operating this pump as a part of your regular maintenance procedures.***

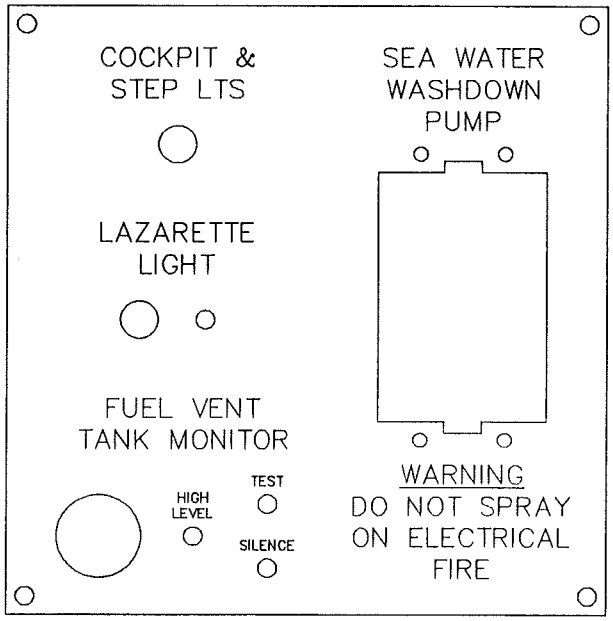


Figure 13B-1: Cockpit Monitor Panel

Section 14

Accessories

Entertainment Center

NOTE:
The U.S. Coast Guard warns that stray electronic impulses from onboard television sets can adversely affect your Loran receiver accuracy. The offending signals are harmonics of the horizontal sweep frequency and may be present any time the television set is operating.

For your entertainment, your Bertram is equipped with a multi-media, electronic entertainment system which includes:

- two television monitors;
- a VHS video cassette recorder/player (VCR);
- two am/fm tuner/amplifiers;
- a compact disc (CD) player.

With two televisions and a VCR on board, you and your guests can enjoy two different television programs and record yet another.

Similarly, the audio components interconnect with five pairs of built-in stereo speakers located through your vessel. This allows the five areas of your Bertram to listen to either am/fm receiver or the compact disc player.

The television/VCR system and the stereo system operate independently.

Components

Specifications, operating information and maintenance procedures for the components of your entertainment center can be found in the manufacturer's Operator's Manuals included with your vessel's documentation.

There are two antenna sources: a built-in 22-inch diameter, omni-directional antenna located within the flybridge structure, and the port and starboard cable television (CATV) inputs.

A three position selector switch – mounted in the aft side of the galley peninsula – allows you to select the input you want. Position **A** is for the port side CATV connection; position **B** is for the omni-directional antenna; position **C** is for the starboard side CATV connection.

The selector box connects to a tv/fm band separator, which separates the TV frequency signals from the fm signals. FM signals are sent to a signal splitter. One leg of this splitter is connected to an am/fm stereo receiver in the master stateroom, and the other is connected to a similar system in the salon.

These am/fm receivers are connected to five sets of stereo speakers in:

1) the master stateroom (volume in these speakers is controlled by the master stateroom receiver);
2) the salon (volume in these speakers is controlled by the salon receiver);
3) the port guest stateroom (these speakers have an independent volume control);

--- See Part III for Maintenance Information ---

4) the flybridge (these speakers have an independent volume control;
5) the cockpit (these speakers have an independent volume control).

The compact disc player, located in the salon, can play through either am/fm receiver.

NOTE:
To use the compact disc player, switch ON the am/fm receiver in the salon.

Telephones

Your Bertram has two standard telephone jacks, one in the salon and the other in the master stateroom. Telephone inlets are on the outsides of the cockpit pilasters with the electrical and CATV connections.

Built-in Vacuum System

⚠ CAUTION

To avoid electric shock, do not use on wet surfaces or pick up water or damp materials.

⚠ CAUTION

FIRE DANGER:
Do not pick up hot ashes, cigarette butts, or flammable powders.
Do not operate near flammable gases or liquids.

⚠ CAUTION

To avoid possible injury, do not change the bag when the hose is connected.

To make it easier for you to keep your Bertram "shipshape," your vessel has a built-in vacuum system in the starboard salon cabinets. Your system's accessories will allow you to reach all the staterooms, the heads, the salon and the galley areas. However, the system is *not* a wet vacuum system. It is not designed or intended for use in the bilges or in the engine room.

Specifications, operating information and maintenance procedures for your central vacuum system can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Operation

Your vacuum system is powered by 120Vac, through the **CENTRAL VAC OUTLETS** circuit breaker on the Engine Room 120/240Vac Distribution Panel (Figure 11A-2). It is automatically switched **ON** when you plug the hose into the hose receptacle, and is automatically switched **OFF** when you remove the hose. You can connect or disconnect the system accessories (hose, extension wands, and vacuum heads) with a slight twisting motion.

The vacuum system is manufactured by Wal-Vac Inc., 318 Mart St. SW, Grand Rapids, Michigan 49508. It uses easily replacable dust bags that are available from Bertram or from the manufacturer in packages of five. These carry Bertram part number 181433 and Wal-Vac part number 54062 (Bag, Disposable).

You should wash the secondary filter with a mild detergent as required and replace it when

worn or torn. It carries Wal-Vac part number 54230 (Filter, Secondary).

For more specific information on operating your vacuum system, see the separate Wal-Vac operator's manual provided with your vessel's documentation.

Windlass with Wildcat

⚠ WARNING

Exercise extreme caution when working with a windlass. This device can inflict severe injury.

⚠ CAUTION

To avoid possible accidental operation, the WINDLASS circuit breaker on Panel D of the Engine Room 120/240Vac Distribution Panel should always be OFF except when the windlass is in use.

The windlass is intended only to lift up your anchor. It is not built as a mooring bitt, nor is it intended as one.

The capstan head is keyed directly to the windlass motor shaft and will revolve whenever the windlass motor is switched **ON**.

The windlass is powered by 120/240Vdc power through the **WINDLASS** circuit breaker on Panel D of the Engine Room 120/240Vac Distribution Panel.

The windlass is connected to an overload circuit breaker and fuse box located beneath the bed in the forward stateroom. To get to the breaker box, remove the starboard drawers under the bed. Switch the master switch **OFF** by turning it until the **O** shows under the viewport in the switch handle. Then use the key hanging near the box (another is in the owner's documentation) to unlock the 1/4-turn cabinet latches. Open the door, and the overload circuit breaker is in the upper port corner of the box.

To raise an anchor line:

1) set the **WINDLASS** circuit breaker **ON**;
2) remove the chain latch;
3) step on the black foot switch to switch the windlass **ON**;
4) release the foot switch when the anchor is retrieved;
5) replace the chain latch.

To lower an anchor line:

1) on the Engine Room 120/240Vac Distribution Panel, set circuit breaker # **6 – WINDLASS** to **ON**;
2) remove the chain latch;
3) step on the red foot switch to switch the windlass **ON**;
4) release the foot switch when the anchor is lowered as far as you want;
5) replace the chain latch.

NOTE:
The fit of the chain links to the wildcat is critical. For safety's sake, the chain must not jam, skip, or jump.

Specifications, operating information and maintenance procedures for your windlass can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Refridgerated Fish Box (Optional)

An optional refridgerated fishbox can be installed in the cockpit sole.

Ice Makers

The salon ice maker is powered through the **SALON ICE MAKER** circuit breaker on Panel B of the Flybridge 120/240Vac Distribution Panel.

Water for the ice maker is supplied by the fresh water system.

Specifications, operating information and maintenance procedures for your ice makers can be found in the manufacturer's Operator's Manual included with your vessel's documentation.

Power Riggers (Optional)

The power riggers can be remotely controlled from the aft steering station. The controls are on the underside of the aft steering station.

There are seperate switches for the port ans starboard riggers . Pressing the switch outboard will cause the rigger to extend outboard and pressing inboard will bring it back in.

Table of Contents

Part III: Maintenance

Periodic Maintenance — Section 1

Maintenance Procedures — *Section 4*

Care of Fiberglass and Other Materials — *Section 6*

This section reserved for operator notes.

Section 1

Periodic Maintenance

The maintenance required by your Bertram during a boating season — and throughout the year — will partially depend on the way you use it and store it. Example: adequate cabin ventilation when the vessel is not in use reduces interior maintenance because it minimizes mildew and odors. Example: a good coat of wax minimizes exterior maintenance.

There are health considerations, too. One prominent threat to avoid is carbon monoxide poisoning. To prevent exhaust gases from leaking and escaping, you should make a thorough, periodic inspection of the engine and ac generator exhaust gas systems. Be especially thorough in checking for faulty hoses and loose hose connections.

This section provides a suggested basic preventive maintenance program for a vessel under "average use" conditions. You'll want to combine this program with the detailed periodic maintenance programs in each of the manufacturer's operating manuals for major onboard components such as engines, ac generator, and other systems.

Onboard Maintenance Supplies

Bertram suggests that you have an onboard tool kit. Here's a basic list:

- a selection of wire and paint brushes;
- a selection of files;
- a set of open end wrenches;
- a set of socket wrenches with 1/4 and 1/2 inch drives;
- emery and crocus cloth;
- steel and bronze wool;
- spray cans of metal primer and engine touch-up paint;
- a small (5 inch by 7 inch) inspection mirror;
- an assortment of electrical connectors;
- a roll of electrical tape;
- spray lubricant (*WD-40, CRC, LPS,* etc.).

Assorted hand tools can be very helpful:

- pocket knife (a seaman's knife with marlinspike is best);
- socket wrench set;
- combination wrench (open-end and box) set;
- hex key (Allen wrench) set;
- small, medium, and large straight and Phillips screwdrivers;
- ball peen and "soft" hammers;
- gas pipe and long-nosed pliers;
- small, medium, and large "Vise Grip" and "Channel Lock" type pliers;
- electrical crimp-on connector tool;
- hand-held Volt-Ohmmeter;
- 1/4-inch or 3/8-inch electric drill and assorted bits.

You may also wish to carry some spare parts:

- engine accessory drive belts;
- fuel filter elements;
- bulbs for all navigation lights;
- fuses, including spares for electronic gear;
- hoses;

- hose clamps;
- epoxy mender kit;
- plastic tie-wraps;
- duct tape.

Periodic Maintenance Schedule

Bertram suggests that you develop a periodic maintenance schedule for all pieces of equipment installed on your vessel, including standard and optional systems, and including any equipment installed after initial delivery from the factory. This list can be compiled from the operator's manuals supplied with each system or piece of equipment.

Daily Maintenance

When Starting Engines and Generator and Before Putting to Sea

__ 1) Pump the bilges dry by moving each **BILGE PUMP** switch on the flybridge control console instrument panel from its normal **AUTO** position to the **MAN** position. (While pumping the bilges, check each bilge pump electronic switch and each alarm float switch and sump pump float switch operation). Return the **BILGE PUMP** switches to **AUTO**.

__ 2) Use the blowers to ventilate the engine room (while you are ventilating, check blower operation).

__ 3) Check engine and generator lubricating oil levels; add oil if necessary.

__ 4) Check transmission oil levels; add oil if necessary.

__ 5) Check engine and generator coolant levels; add coolant if necessary.

__ 6) Drain accumulated water from the fuel oil/water separators.

__ 7) Check the air cleaner indicators; if required, replace the air filters.

__ 8) Check fuel, coolant, and lubricating oil systems on engines and generators for leaks.

__ 9) Check that all engine and generator belts are in good condition and have proper tension.

__ 10) Check that all cooling seawater valves are fully **OPEN**. This includes valves for:

__ a) engines;
__ b) generators;
__ c) water maker;
__ d) air conditioning systems;
__ e) seawater washdown system;

__ 11) Visually check seawater strainers for dirt accumulation. Clean as necessary.

__ 12) Check the water level in the batteries (see ***Part III, Section 4***).

__ 13) Check for a slow drip at the shaft stuffing boxes.

__ 14) Check for proper operation of navigation and anchor lights.

__ 15) Check the steering system reservoir sight glass for the proper hydraulic steering fluid level. (This reservoir is in the lazarette).

__ 16) Check the pressure gauge on top of the steering system reservoir for proper air pressure level.

__ 17) Once each engine is started, check that a water stream is coming from its engine exhaust transom outlet.

__ 18) With the ac generators running, check the generator cooling seawater flow by observing the generator exhaust outlets. Water should be exhausting from transom outlets.

__ 19) Check fuel and water levels. Refill as necessary.

After Docking

__ 1) Pump bilges as necessary.

__ 2) Top off (refill) fuel and water tanks.

__ 3) Wash down the boat with fresh water. Be sure to close shore power inlets or see that lines are properly connected.

__ 4) Turn 24Vdc and 12Vdc battery switches **OFF** if you plan to leave your vessel unattended.

__ 5) Turn all unnecessary 120Vac equipment **OFF**. Leave the converters **ON** to keep batteries charged.

Monthly Maintenance

Fire Extinguishing Systems

__ 1) Check the portable (hand held) dry chemical fire extinguishers per instructions in this section under ***Maintenance of Portable Dry Chemical Fire Extinguishers.***

__ 2) Check the Halon 1301 fixed fire extinguisher system per instructions in this section under ***Halon 1301 Fixed Fire Extinguisher System Maintenance.***

Auxiliary Engine Driven Bilge Pump

Exercise the pump to keep the rubber impeller from taking a "set":

1) open the manifold valve to the seawater system (and be sure the valves to the bilges are closed to avoid the loss of suction);

2) engage the clutch by pulling it toward the vessel's centerline;

3) pump a few gallons of water overboard;

4) disengage the clutch by pushing the lever away from the vessel's centerline;

5) close the manifold valve to the seawater system.

Engine Zincs

__ Follow the engine, marine transmission, and generator manufacturer's instruction on maintenance of zinc anodes. These are specified in the manufacturer's manuals and are part of your vessel's documentation.

Every 25 Hours or Twice per Season

NOTE:
You must inspect and clean the fuel filter canisters every 25 hours of operation, or at least twice each season, whichever comes first.
This inspection is mandatory.

__ 1) Inspect and clean the fuel filter/water separator canisters. Remove all sediment and water which may have collected. Inspect the canisters closely for possible deterioration from corrosion. If you you find such signs, replace the canister.

While checking the fuel filter canisters, make a complete inspection of the entire engine fuel system for possible leaks or damage.

__ 2) Check the hatch dogs on forward and cockpit hatches for proper operation and for "snug" fit.

__ 3) Check that the engine mounting bolts and the propeller shaft coupling bolts are tight.

__ 4) Check the emergency shutdown system: with the Diesel engines off, check the operation of the emergency shutdown system cables by pulling the "T" handles on at the entrance to the engine room.

__ 5) Check the engine room and completely inspect the engines and the ac generators on the inboard and outboard sides including the engine mounts, etc, for rust and corrosion. Rust must be wire brushed down to bare metal, primed, allowed to dry, and painted.

While looking for rust, check for leaking hoses or gaskets, loose wires, loss of electrical ground, and the oxidation of leads and connectors.

Every 100 Hours or 60 Days

Exterior

__ 1) Clean and wax exterior fiberglass finish.

__ 2) Clean hardware, apply protective polish.

__ 3) Tighten loose fittings.

__ 4) Lubricate locks and latches.

__ 5) Inspect varnished areas. Where varnish has begun to deteriorate, sand lightly and apply high quality marine varnish.

__ 6) Clean exterior seat cushions with a mild soap solution or a light household bleach solution. Rinse off with fresh water.

__ 7) Check oil level in the windlass. Oil should be up to the line in the oil level viewport on the front of the windlass. If additional oil is required, remove the plug above the viewport and fill to the proper level. Replace the fill plug.

Interior

CAUTION

Do not use a bleach solution or solvents on vinyl headliner or wall coverings.
Clean vinyl with mild soap and warm water.
Clean ***Novasuede*** per instructions in Part III, Section 6, Table 6-2.

__ 1) Completely air out the vessel.

__ 2) Clean, dry and air out all life jackets.

__ 3) Use your nose and eyes to check your boat for mildew. If you find mildew:

__ a) Thoroughly wash down any mildewed painted or other hard surfaces with a household bleach solution.

__ b) Wash mildewed vinyl surfaces with commercial cleaners such as *409*, *Fantastic*, or the equivalent.

__ c) Clean mildewed *Novasuede* surfaces using the cleaning agents listed in Table 6-2 in ***Part III, Section 6***.

__ 4) Operate all drawers and doors. Slight adjustments may be necessary on the doors and drawers because they may have expanded from moisture. Drawers will slide easier if you lubricate the runners with wax or other solid lubricant.

__ 5) Check that all hand held fire extinguishers:

__ a) are secure in their mountings;

__ b) are free from rust and corrosion;

__ c) have a full charge.

__ 6) Check first aid kit.

Forward Cabin

__ 1) Check for proper light operation.

__ 2) Check that there is electrical power to the 120 Vac duplex outlets (requires 120Vac electrical power).

__ 3) Check the deck hatches for smooth operation, secure locking, and watertight fit.

__ 4) Check the air conditioning systems for cooling and heating (requires 120Vac electrical power).

__ 5) Check the entertainment and telephone systems for proper operation.

Companionway to the forward cabin

__ Check the forward compartment bilge pump and bilge pump switch for proper operation (refer to ***Part III, Section 4*** under ***Bilge Pump Systems*** for the correct procedures in bilge pump system testing and maintenance).

Heads

__ 1) Check for proper light operation.

__ 2) Check for electrical power to the 120 Vac GFCI duplex outlet (see ***Testing a GFCI Outlet*** in ***Part II, Section 11***).

__ 3) Check lavatory water faucets for proper operation.

__ 4) Check the lavatory sink drain for plugging and leaks.

__ 5) Check the toilets for proper operation.

__ 6) Check shower water faucets for proper operation.

__ 7) Check the head exhaust blower for proper operation.

__ 8) Check the head ventilation blower for proper operation.

__9) Check the head air conditioning duct (requires that the air conditioning system be operating).

Galley and Salon

__ 1) Check proper light operation.

__ 2) Check for electrical power in both sockets of the 120 Vac GFCI duplex outlet (requires 120 Vac electrical power).

__ 3) Check water faucet for proper operation.

__ 4) Check the galley sink drain for plugging and leaks.

__ 5) Clean and check the stove burners for proper operation (requires 120 Vac power).

__ 6) Clean and check the microwave oven for proper operation (requires 120 Vac electrical power).

__ 7) Check the refrigerator for proper operation; clean it with a solution of baking soda in water (requires 120 Vac power).

__ 8) Check the freezer and the salon icemaker for proper operation; clean them with a solution of baking soda in water (requires 120 Vac electrical power).

Engine/Generator Room

__ 1) Follow the engine, marine transmission, and generator manufacturers' periodic preventive maintenance programs as specified in the manufacturer's manuals (these are part of your vessel's documentation).

__ 2) Check the engine and generator for oil leaks.

__ 3) Check the engine mounting bolts for tightness. If you find they are loose, have the

engine and propeller shaft realigned. ***Part III, Section 4*** discusses alignment procedures.

__ 4) Check the generator mounting bolts for tightness.

__ 5) Check all engine and generator hoses and hose clamps.

__ 6) Check all engine and generator fuel lines, flare nuts, and valves for leaks.

__ 7) Unscrew and remove the drain plug from the bottom of each fuel/water separator; drain any accumulated water and any residual fuel into a container suitable for disposal; reinstall the drain plug.

> **CAUTION**
>
> To eliminate a possible fire hazard and avoid violating the law by pumping fuel overboard, do not allow fuel to spill onto the engine compartment decks or collect in the bilges.

__ 8) Check the control cable brackets for tightness.

__ 9) Lubricate the threaded cable ends and check the adjustment nuts for tightness.

__ 10) Check the engine room sump pump and its associated sump pump switch for proper operation (refer to ***Part III, Section 4*** under ***Bilge Pump Systems*** for the correct procedures in bilge pump system testing and maintenance).

__ 11) Check that the engine room sump pump screen and strainer are clean.

__ 12) Check the engine room bilge pump and its associated bilge pump switch for proper operation (refer to ***Part III, Section 4*** under ***Bilge Pump Systems*** for the correct procedures in bilge pump system testing and maintenance).

__ 13) Manually test the bilge flood alarm float switch for proper operation. Lift the float to test the alarm light and bell.

__ 14) Check all electrical connections for corrosion, and clean or replace as necessary.

__ 15) Check the exhaust blowers for proper operation.

__ 16) Check the exhaust hoses and hose clamps for leaks.

__ 17) Check that wires are not rubbing against sharp edges and that the insulation has not been worn off.

__ 18) Check the gauge senders and alarm system connections.

__ 19) Check raw water seacocks; lubricate with petroleum jelly.

__ 20) Check the seawater strainers and be sure they are free of all foreign matter. If the strainers need cleaning:

__ a) close the appropriate seacock;

__ b) loosen the wing nuts atop the strainer body;

__ c) swing the top to one side; remove the strainer basket for cleaning;

__ d) replace the basket;

__ e) resecure the top;

__ f) reopen the seacock;

__ g) check for leaks.

__ 21) Check the seawater system lines and fittings for leaks.

__ 22) Check the stuffing boxes. A slight drip is desirable, as seawater lubricates the packing. However, if the stuffing box is leaking excessively, follow the procedure discussed in ***Part III, Section 4.***

__ 23) If the optional seawater washdown system is installed, check lines and fittings for leaks.

__ 24) Check the seawater pump and relief valve for proper operation and for leaks (requires 120Vac electrical power).

__ 25) Check the air compressor and lines for proper operation and for leaks (requires 120Vac electrical power).

__ 26) Check the following items on the air conditioning:

NOTE:
*This is a **sealed system.***
Do not loosen flare nut fittings
on any air conditioning line.

__ a) check the condensing units for rust and loose fittings;

__ b) check the seawater hose clamps for loose fittings;

__ c) clean the seawater strainer;

__ d) check for proper pump operation (requires 120Vac electrical power);

__ e) check for corrosion-free and tight electrical connections.

Batteries

WARNING

The gases that escape from any charging lead acid battery are an explosive mixture of oxygen and hydrogen. This mixture will explode with great violence and spray battery acid if a spark or open flame is allowed too close.

CAUTION

1) Do not overfill battery cells. Overfilling causes acid leaks during charging, and this corrodes the battery terminals and cables.
2) ***Never*** add acid to a battery cell.

NOTE:
Always turn off all dc power and the converters prior to cleaning or working on battery terminal connections.

__ 1) Check each battery cell with a hydrometer. The cells will read between 1.250 and 1.265 if the battery is fully charged.

__ 2) Add distilled water if necessary.

__ 3) Service the battery terminals:

__ a) Remove the **NEGATIVE** battery cable terminal first and then the **POSITIVE** cable terminal.

__ b) scrape the battery terminals and the inside of the cable clamps;

__ c) wipe off the top of each battery with a cloth wetted with ammonia or baking soda in water, do not allow this mixture to get into the battery cells;

__ d) wipe off the top of each battery with a cloth wetted with fresh water;

__ e) Remove all accumulated liquid from battery boxes;

__ f) coat both the terminals and the clamps with petroleum jelly or a silicone grease;

__ g) reassemble the battery cable terminal connections ensuring that each terminal clamp is tight, attach **POSITIVE** terminal, then **NEGATIVE** terminal.

NOTE:
*See **Part III, Section IV** under **Spilled Battery Acid.***

Lazarette

__ 1) Clean the screen on the bilge pump.

__ 2) Check the bilge pump and the pump float switch for proper operation.

__ 3) Manually check the bilge flood alarm float switches for proper operation. Lift the float to test the alarm light and bell.

__ 4) Check the trim tab hydraulic fluid level; for service see ***Part III, Section 3*** under ***Trim Tab System Troubleshooting.***

__ 5) Check each trim tab motor, pump, and cylinder for proper operation.

__ 6) Inspect both rudder ports for leaks. The rudders use a packing gland similar to the propeller shaft stuffing box. Follow the procedure described in ***Part III, Section 4*** for packing the propeller shaft stuffing boxes to stop excessive rudder post leaking.

__ 7) Check the following steering system components for tightness, fluid level, and for smooth, proper operation:

__ a) hydraulic fluid reservoir (the fluid level indicator that should show the fluid level to be about two inches from the top);

__ b) clevis bolts;

__ c) rudder arms;

__ d) lock nuts; and,

__ e) lock bolts.

__ 8) Add grease to the both tie rod end fittings and to both rudder upper bearing fittings.

__ 9) Check for fresh water system line and fitting leaks.

__10) Check the fresh water pump for proper operation and for leaks.

Flybridge Control Console

__ 1) Try switches, gauges, and controls for proper operation.

__ 2) Check the electrical connections for tightness and signs of corrosion. Clean if necessary.

__ 3) Lubricate the control heads as required.

Every Six Months

Flush The Air Conditioning System

Flush the air conditioning system coolant (fresh water) lines every six months to keep the coolant in an alkaline state. If the system water becomes acidic, the Qest fittings may deteriorate.

For more information on your air conditioning system, see the manufacturer's operator's manual included with your vessel documentation.

As Required

Clean the Bottom

Haul your vessel out of the water, scrub the bottom, and if necessary repaint with anti- fouling paint. See ***Part III, Section 6*** for information on ***Bottom Anti-Fouling Paint***.

NOTE:
Never paint transducers or zincs.

Change Engine Oil and Filters

Change the lubricating oil in the engines and in the generator at least as often as required in the manufacturer's operator's manuals.

Change the lubricating oil filters each time you change the lubricating oil.

Change Turbocharger Silencer Air Filters (Diesel Engines)

Check the air filter indicators on the engine turbocharger silencers each time you check the engine oil. You can check the indicators with engines stopped.

There is one indicator on each filter. The indicator is located on the end of the air filter, and holds the filter onto its support shaft. The indicator should have a small green dot showing when the filter is operating properly. When filter replacement is necessary, the green dot disappears, and the entire indicator area is red. Replace the filter as soon as possible. Reset the indicator by applying suction to the indicator window.

Clean the Bilges

Check the bilges for debris; clear any debris to keep it from clogging the bilge pump.

Check the limber holes along the keel and clear them of any debris.

Drain and Clean the Engine and Generator Cooling Systems

Follow manufacturers' recommendations for draining and cleaning the fresh water cooling systems in both engines and both generators.

NOTE:
Coolant specifications for Detroit Diesel engines are not the same as those for your generators. Follow the engine and generator manufacturer's recommendations for coolant mixtures.

For recommendations on engine cooling system maintenance, see Detroit Diesel publication 7SE298, *Coolant For Detroit Diesel Engines*. A copy is included with this manual.

For recommendations on generator cooling system maintenance, see your generator manufacturer's operator's manual. A copy is included with your vessel's supplementary information.

Crevice Corrosion

When your vessel is in wet storage, rotate both propeller shafts about once a week to prevent crevice corrosion, which may occur in the area of the struts and shaft logs if the shafts stay in the water in the same position over a long period.

Electrolysis

If your vessel is idle for extended periods, Bertram suggests that a zinc "fish" be hung over the side in the water on a heavy wire with a clip at the other end of this wire attached to your vessel's electrical bonding system.

The use of a zinc "fish" will help control the electrolytic action affecting the components mounted through the hull. When a zinc has greatly disintegrated, you should replace it, as it will no longer be effective. You can purchase zinc "fish" from a marine supply store, or make them if desired. Remove the zinc from the water before making any attempt to move the boat under power. Replace standard transom zincs as required.

Maintenance of Portable Dry Chemical Fire Extinguishers

Examine the portable (hand held) fire extinguishers at least monthly that:

__ 1) they are properly secured in their intended mounts;

__ 2) they have not suffered rust, corrosion, or mechanical damage;

__ 3) they are fully charged.

Extinguishers that have pressure gauges or indicators should show that the pressure is within the prescribed limits.

Fire extinguishers without pressure gauges or indicators should all be periodically weighed and the exact weight should be noted on the tag attached to the extinguisher);

__ 4) the tamper-resistant seal proves the extinguisher has not been operated;

__ 5) the nozzle orifice is unobstructed and the extinguisher hose is in good condition.

Portable Fire Extinguisher Service

Have a qualified fire extinguisher service facility make an annual full check of all portable fire extinguishers according to the maintenance instructions on the extinguisher nameplate. This firm should attach a tag to each extinguisher showing the date of the maintenance check.

After Using a Fire Extinguisher

After any use, a qualified fire extinguishing service facility should recharge or replace portable fire extinguishers.

Halon 1301 Fixed Fire Extinguisher System Maintenance

⚠ WARNING

Never attempt to disassemble any part or portion of your fixed fire extinguisher system. The system's contents are under high pressure. Serious injury could result.

You are not required to empty and hydrotest this system at regular intervals. However, the manufacturer specifies that the system must be examined once a month for accidental damage, and to be sure no equipment has blocked the system's operation.

The Halon tank (without the brackets) should be removed and carefully weighed on an accurate (certified) scale at least once a month. The exact weight for each unit should be noted on the tag provided for this purpose attached to the unit.

Follow the system manufacturer's instructions (found in the system operator's manual) for acceptable weight loss from the weight shown on each unit's nameplate. When either unit has reached the maximum weight loss, that unit must immediately be replaced with a serviceable unit.

Section 2

Engine Troubleshooting

Information on troubleshooting your engines is included in the engine manufacturer's documentation. These publications are included in your operator's information packet as a part of your shipboard documentation.

⚠ CAUTION

Loud noise can damage your hearing. To prevent possible hearing loss, before you enter the engine room when the engines or the ac generator are running, Bertram strongly recommends that you put on hearing protection (ear muffs or ear plugs) with an OSHA Noise Reduction Ratio of at least 20 dB.

Spare Parts You May Wish to Keep On Hand

While you're away from home port, you may wish to keep on hand replacement air, fuel and lubricating oil filters, extra engine lubricating oil for the main engines and the generator, and extra transmission lubricating oil.

You may also choose to keep aboard a spare fuel pump and a spare engine cooling system thermostat.

Rags or shop wipes are also handy to have aboard, but you should store them with care.

⚠ WARNING

Oily or fuel-soaked rags and wipes may be subject to spontaneous combustion. Do not keep used rags and wipes in the engine room. They should be stored in a fire-resistant container specifically intended for such storage.

Troubleshooting MTU Diesel Engines

Table 2-1: Troubleshooting MTU Diesel Engines

Problem	Cause	Solution
1) Engine doesn't turn over when **START** switch is pressed.	Main 24Vdcbattery disconnect switch is set to **OFF**.	Set the main 24Vdc battery disconnect switches to **ON**.
	24Vdc main circuit breakers set to **OFF**.	Set the main circuit breakers on the engine/generator room 24Vdc distribution panels to **ON**.
	24Vdc engine circuit breakers set to **OFF**.	Set circuit breakers **3F1** and **3F2** on the flybridge 24Vdc distribution panel to **ON**.
	Battery terminals corroded.	Clean battery terminals.
	Battery cable(s) loose.	Tighten battery cable connections.
	Battery cell or bank low or dead.	Use **BATTERY PARALLEL** switch. Charge or replace dead battery.
	Starter motor cable connection(s) corroded.	Clean and tighten all cable connections. Replace badly corroded starter cable(s).

Table 2-1: Troubleshooting MTU Diesel Engines (Continued)

Problem	Cause	Solution
2) Nonoperating or chattering starter solenoid.	Battery terminals corroded.	Clean battery terminals.
	Battery cable(s) loose.	Tighten battery cable connections.
	Battery cell or bank low or dead.	Use **BATTERY PARALLEL** switch. Check battery voltages.Charge or replace dead battery.
	Starter motor cable connection(s) corroded.	Clean and tighten all cable connections. Replace badly corroded starter cable(s).
	Bad starter solenoid.	Replace starter solenoid.

Table 2-1: Troubleshooting MTU Diesel Engines (Continued)

Problem	Cause	Solution
3) Engine starts, runs rough, stalls.	Fuel filters clogged.	Clean or replace fuel filters.
	Fuel tank and/or selector valves not fully open.	Reset fuel tank and selector valves.
	Contaminated or spoiled Diesel fuel.	Switch tanks. Replace fuel.
	Fuel lines or fittings leaking (resulting in inadequate flow or aerated fuel).	Check system for fuel leaks.
	Fuel control linkages binding.	Inspect, clean, and adjust linkages.
	Insufficient air intake.	Inspect intakes for dirty or obstructed air silencer(s); check filter indicators. Replace filters if necessary and follow instructions on indicators to reset them.
	Turbocharger failure.	Shut down engine and contact engine manufacturer's service department.

Table 2-1: Troubleshooting MTU Diesel Engines (Continued)

Problem	Cause	Solution
4) Engine over speeds, slows down, or runs on.	When a Diesel's rpm increase or decrease at a given throttle setting, you may have an internal malfunction: a stuck injector, a faulty governor, and/or a ruptured lubricating oil seal.	If a Diesel runs normally at cruising speeds, but does not slow down when the throttle is backed off, do not put the clutch in neutral until you are sure you have lost engine control. Keeping the engine in gear may prevent engine or gear damage. To Shut Down A Diesel Engine (take these steps in the order shown): 1) Set the **ON/STOP** switch to **STOP**. 2) If the engine does not stop, use the **EMERGENCY SHUTDOWN** system. 3) If the engine still does not stop, shut off fuel supply.
	Fault in mechanical throttle control cable system.	Check the throttle linkages. Readjust system to stop "creep."
5) Engine lubricating oil pressure too high.	Wrong grade of lubricating oil.	Watch oil pressure gauge closely. If the oil pressure exceeds the manufacturer's specified upper limit, stop engine. Change lubricating oil.
	Clogged oil filter and bypass relief valve stuck.	Change oil filter and contact engine manufacturer's service department.

Table 2-1: Troubleshooting MTU Diesel Engines (Continued)

Problem	Cause	Solution
6) Engine lubricating oil pressure too low.	Faulty oil pressure alarm.	Check engine oil level. Watch engine temperature gauge. Low oil pressure and high operating temperature usually go together.
	Low oil level.	Add oil.
	Wrong grade of oil.	Change oil.
	Water or fuel diluting oil.	Stop engine. Do not run engine until leak is found; change oil before running.
	Faulty oil pump.	Replace pump.
7) Excessive engine lubricating oil consumption.	External oil leaks.	Check all lubricating oil lines and connections. Tighten loose fittings, add oil, and watch closely. If problem persists, stop engine.
	Damaged engine parts.	Stop engine.
	Worn engine parts.	Add oil and watch oil level closely. If problem persists, stop engine.
8) Engine surges.	Air in fuel system.	Stop engine. Bleed air from fuel system. Check fuel lines for leaks.
	Clogged fuel filters.	Change fuel filters.

Table 2-1: Troubleshooting MTU Diesel Engines (Continued)

Problem	Cause	Solution
9) Transmission fails to engage.	Loss of transmission lubricating oil.	Stop engine. Check for oil leaks. Add oil to transmission.
	Transmission oil strainer/filter clogged.	Clean strainer, replace filter.
	Loose, broken, or maladjusted gear shift linkage.	Check linkage. Clean and adjust linkage as necessary. Contact engine manufacturer's service department for repairs.
10) Unusual noise in engine or transmission.	Loss of lubricating oil.	Stop engine. Check oil levels. Refill and resume operation at reduced speeds. Stop engine if noise persists.
	Worn gears.	Have transmission overhauled.
11) Loss of transmission oil pressure.	Faulty transmission low oil pressure alarm circuit.	Check transmission oil. Refill if needed and watch closely.
	Loss of transmission oil.	Check all high pressure oil lines for leaks. Repair if possible or shut down engine.

Table 2-1: Troubleshooting MTU Diesel Engines (Continued)

Problem	Cause	Solution
12) Engine coolant temperature too high.	Engine cooling water seacocks completely or partly closed.	Open seacocks.
	Engine cooling water seacock strainers clogged.	Stop engine. Clean seacock strainers.
	Engine cooling water intake clogged from outside.	Stop engine. Remove obstruction from intake.
	Leaking cooling water hoses.	Tighten hose clamps. Check for and replace leaking hose(s). Add coolant.
13) Hot water in bilge.	Engine coolant or seawater leaking.	Check all cooling system hoses and clamps. Replace leaking hoses, tighten all clamps.
14) Engine oil level rises. Oil looks and feels gummy.	Engine coolant or cooling seawater leaking into engine crankcase.	Do not run engine until leak is found and repaired.
15) Engine oil level rises. Oil looks and feels very thin.	Diesel fuel oil leaking into engine crankcase.	Do not run engine until leak is found and repaired. Replace oil filter(s) and change lubricating oil before operating.
16) Excessive smoke.		Refer to Diesel engine manufacturer's operator's manual.

Section 3

On-Board Systems Troubleshooting

Troubleshooting Using the Engine Alarms

Once alerted to a potential problem by the engine alarm horn and the illumination of one or more engine alarm lights, you can isolate and possibly correct the problem by taking the steps listed in the following procedures:

Engine Oil Pressure

If the engine alarm horn sounds and either engine **OIL PRES** light illuminates, there is a low engine oil pressure condition. See your engine manufacturer's operator's manual for the specific minimum oil pressure. Check:

__ 1) The oil pressure gauge (verify the low oil pressure condition).

__ 2) Low lube oil in the crankcase.

__ 3) A leak in the oil system.

__ 4) A defective alarm circuit or switch.

See ***Part III, Section 2*** for additional information.

Coolant Temperature

⚠ WARNING

At operating temperature, coolant is hot and under pressure. Steam can cause burns and alkalai in coolant can damage eyes.
Check the coolant level ONLY when engine is stopped and the filler cap is cool enough to touch with your bare hand. Remove the filler cap SLOWLY to relieve pressure.

If the alarm sounds and the engine **WATER TEMP** alarm light illuminates, there is an engine overheat problem. Check for:

__ 1) Inaccurate engine temperature gauge (verify the high temperature condition).

__ 2) Loose expansion tank cap.

__ 3) Low coolant in the heat exchanger. Check the coolant level in the expansion tanks *after* you have shut down the engines and allowed them to cool. Carefully remove the caps from the heat exchangers (use a rag over the cap to protect yourself, and open the cap slowly). Check the water level. If it is necessary to add water, start the engine and add water with the engine running.

CAUTION

Do not add cold water to a hot engine unless the engine is running. If the engine is not running, you may crack the engine block.

If the unit will not hold water, check for a blown hose. Before replacing the hose, make sure the nipple and the inside of the hose are free of paint.

__ 4) Restricted seawater strainer (the **EXHAUST TEMP** alarm light may also illuminate).

__ 5) Closed or partially closed seacock (the **EXHAUST TEMP** alarm light may also illuminate).

__ 6) Loose engine belt; see the engine operator's manual for tightening technique.

__ 7) Defective water pump(s); check inside the heat exchanger for water flow. This will tell you whether the pump is working.

__ 8) Defective thermostat.

CAUTION

DO NOT remove the thermostat and run the engine without it.

__ 9) Defective alarm circuit or switch.

__10) Collapsed water suction hose (check for this problem with the engine running at moderate speed and with no load, but after the engine has cooled down).

Gear Oil Temperature

If the alarm sounds and the **GEAR TEMP** alarm light illuminates, there is a gear box overheat problem. Check:

__ 1) Low transmission fluid.

__ 2) Fault in transmission cooling system.

__ 3) Clutch slipping (check control cable adjustment).

__ 4) Defective alarm circuit or switch.

See ***Part III, Section 2*** for additional information.

Exhaust Temperature

If the alarm sounds and the **EXHAUST TEMP** light illuminates, there is an exhaust system overheat problem. Check:

__ 1) Absence of water flow from exhaust outlet at transom.

__ 2) Restricted seawater strainer.

__ 3) Closed or partially closed seacock.

__ 4) Defective sea water pump.

__ 5) Collapsed water suction hose.

__ 6) Defective exhaust cooling seawater temperature sensor (located on the engine exhaust riser) or sensor alarm circuit.

Fresh Water System

Table 3-1 includes a list of potential on-board fresh water system problems, their possible causes, and some suggested solutions.

3-1:Fresh Water System Troubleshooting

Problem	Cause	Solution
1. Pump cycles, no apparent water usage.	Leak in pressure lines.	Repair leak.
	Leak in suction lines.	Repair leak.
	Dirt under check valve seat causing pump to lose its prime.	Remove, clean, and replace check valve.
2. Pump motor operates, no water supplied.	Broken suction or supply water line.	Repair or replace the broken line.
3. Pump cycles rapidly with minimum use of water (an ounce or less).	Deflated or leaking tank bladder.	Return to boat dealer for repair or replacement.
4. Water leaks from pump seal.	Defective seal.	Replace seal.
5. Pump runs, won't reach cut off pressure level.	Worn pump stator.	Replace worn stator.
	Leak in system.	Repair leak.

Fresh Water Maker

Your automatic fresh water maker continuously produces fresh water. Excess water is allowed to flow overboard. Troubleshooting instructions for the fresh water maker are in the manufacturer's operator's manual included as a part of your vessel's documentation.

Water Pump

Your automatic water pump responds to a demand for hot or cold fresh water. For troubleshooting information, see Table 3-1 in this section.

Water Heater

The thermostat on this heater is preset by the manufacturer at 140 to 145°F, which Bertram recommends as maximum. The water heater is connected to the Salon 120Vac Dis-

Table 3-2: Hydraulic Steering System Troubleshooting

Problem	Cause	Solution
1. Steering stiff at dock & under way.	High viscosity hydraulic fluid used in system.	Drain high viscosity fluid, replace with low: MIL-0-5606 aircraft hydraulic fluid, Texaco #15, or Shell "Tellus" #15 or equivalent.
	Restriction(s) in port and/or stbd lines, tubing, or fittings.	Find restrictions and repair or replace the damaged lines, tubing, and/or fittings.
	Helm shaft binding.	Adjust for proper clearance.
	Cylinder out of alignment.	Remount cylinder per manufacturer's installation information.*
	Fittings in cylinder over-tightened.	Remove & inspect fitting. A circular mark is reason to replace.*
	Rudder stuffing box(es) too tight.	Loosen packing & jam nuts on stuffing box(es). For instruction, see **Part III, Section 4.**
	Damaged or bent rudder post(s).	Replace rudder.
2. Fluid leaking.	Worn rod or shaft seal.	Return unit for factory repair as soon as possible; the problem will only get worse.*
	Pinched or cut parting line "O" ring.	Return unit to factory for repair.*
3. Helm pumps in only one direction.	Dirt in makeup check valve.	Return unit to factory for overhaul.*
	Air in system.	Re-purge system per instructions.

Table 3-2: Hydraulic Steering System Troubleshooting (continued)

Problem	Cause	Solution
4. Helm has no stop in either direction.	Relief valve screws have been left open.	Close and tighten the relief valve screws.
	Excessive air in the system.	Purge system per instructions.
5. Helm takes excessive turns from hardover to hardover.	Excessive air in the system	Purge system per instructions.
6. System seems to always need to be purged.	Air saturated hydraulic fluid.	Purge system per instructions.
	Hydraulic fluid foaming.	Purge system per instructions.
7. Rudders drift excessively.	Relief valve screws have been left open.	Close and tighten the relief valve screws.
	Internal leakage in relief valve.	Return unit to factory for repair.*
	Cylinder internal seals worn & leaking.	Return unit to factory for repair.*
8. Loss of fluid & pressure in reservoir.	System fluid leak.	Check all components and fittings, repair or replace as needed.*
9. Loss of system pressure but no loss of fluid.	Air leak in upper reservoir.	Repressurize. If problem continues, check for leaks.* Repair & repressurize per instructions.
10. Fluid leak from tubing.	Damaged hydraulic tubing.	Replace or splice tubing.*

** Note: If your vessel has the optional fishbox installed in the cockpit sole, you must remove the fishbox to access some steering system components.*

tribution Panel at circuit breaker **#201** (see Figure 11-1 in ***Part II, Section 11***). Only qualified, trained technicians should work on or attempt to adjust this unit. The manufacturer's documentation includes instructions for cleaning/descaling or replacing the heating element.

Grey Water Tank

The grey water tank is located in the bilge below the cabin sole. It has its own submersible pump equipped with an automatic float switch, and will automatically discharge overboard. You should regularly inspect and clean the filter screen between the pump and the float switch.

Hydraulic Steering System Maintenance

Drawing 10102-10 (in ***Part IV, Section 3: Mechanical Supplement***) shows the hydraulic steering system, which is designed and built specifically for marine use. Its primary components are:

1) axial piston steering pump;
2) relief valve with filters;
3) double-action slave (steering) cylinder;
4) reservoir with sight glass, system fill location and system pressure gauge.

When you turn the helm (steering wheel), the axial piston steering pump sends hydraulic fluid into either side of the single action steering cylinder attached to the starboard rudder arm. The piston pushes or pulls the starboard rudder away from amidships. The port rudder moves at the same time because a tie rod connects it to the starboard rudder.

From the steering cylinder, the hydraulic fluid is piped to the relief valve, which is equipped with system purging valves and filters. From the relief valve the hydraulic fluid is piped to the system reservoir. The reservoir has the system pressure gauge and the air and hydraulic fluid intake ports. The hydraulic fluid reservoir holds two quarts of hydraulic fluid.

The steering system is designed specifically to prevent outside air from entering the reservoir. If needed, you can recharge the steering system's air pressure using an ordinary bicycle pump attached to the valve on top of the reservoir. This reservoir is located in the lazarette and has a sight glass to allow you to check its fluid level.

Table 3-2 includes a list of potential onboard hydraulic steering system problems, their possible causes, and some suggested solutions.

Hydraulic System Filling and Purging

NOTE:
"Hynautic" steering oil is preferred; however, you may use the following listed hydraulic steering oils, or any hydraulic fluid that meets the specifications of MIL-H-5606: Texaco #15, Exxon Univis J-13, Castrol AWH-15, Castrol Aero-585-B, or Shell Tellus 15. You may use heavier oils such as automatic transmission oil Type A or Dextron II, if necessary, but they will cause harder steering.

Adding Hydraulic Steering Fluid.

__ 1) Locate the two screws with pinned 1/2-inch hex head nuts on the top of the relief valve.

__ 2) Loosen and back-off these screws by hand, turning them counter-clockwise until they stop.

__ 3) Remove the hex head plug from the top of the reservoir.

__ 4) Fill the reservoir with the proper oil to within 1/2 inch of the top.

__ 5) Replace the hex head plug.

Table 3-3: Onboard Toilet System Troubleshooting

Problem	Cause	Solution
1. Pump does not empty the bowl.	Obstructed suction pump.	Remove obstruction.
	Worn suction stator.	Replace Stator.
	Closed discharge line valve.	Open discharge line valve.
2. Pump does not supply water to the bowl.	Clogged seawater suction line or seawater strainer.	Remove obstruction.
	Closed intake seacock.	Open intake seacock.
	Worn supply stator.	Replace stator.
3. Pump does not operate.	Tripped circuit breaker.	Reset circuit breaker.
	Blown solenoid fuse.	Replace fuse.
	Obstruction in suction housing from hopper bowl.	Remove obstruction.

NOTE:
The reservoir is fitted with a tire type air valve. Use any tire air pump or compressor with a matching fitting to pressurize the system.

__ 6) Slowly pressurize the reservoir to 40 to 45 psig. (As the air pressure rises, the hydraulic fluid will flow into the system. Stop pressurizing when the fluid level drops to within 2 inches of the bottom of the reservoir.)

__ 7) Release the air pressure through the air valve.

__ 8) Repeat steps 3, 4, 5, and 6.

__ 9) With pressure stabilized at 40 to 45 psig, check all connections for leaks.

__ 10) Carefully close the relief valve screws. Do not apply excessive force.

⚠ CAUTION

Be careful when tightening relief valve screws. Loss of steering will occur if the screws are not securely closed, but excessive force will result in damage to screw and relief valve.

Complete Refill and Systems Purging

If it is necessary to completely drain and refill your steering system, first follow the procedure for adding hydraulic steering fluid. Then:

__ 1) Go to the highest helm position and crack open the port and starboard line connections.

__ 2) Allow the air trapped in the system to escape until the hydraulic fluid appears.

__ 3) Retighten the port and starboard line connections.

__ 4) Disconnect the cylinder rod from the rudder.

__ 5) Open the fitting connections on the cylinder just enough to let the trapped air escape.

__ 6) Keep the fitting open until hydraulic fluid appears.

__ 7) Tighten the fitting connections.

__ 8) Verify that the reservoir is at least 3/4 full. If not, follow the procedure for adding hydraulic fluid.

__ 9) Go to your vessel's highest helm position and turn the wheel slowly (2 to 3 seconds per revolution) 170 times in the same direction.

__ 10) If your vessel has two helm positions, repeat step 9 at the lower position.

__ 11) Repeat steps 5, 6, and 7.

__ 12) Verify that the reservoir is at least 1/2 full. If it is not, repeat steps 7, 8, and 9.

__ 13) Repeat steps 9 and 10 in the opposite direction.

__ 14) Repeat steps 5, 6, 7, and 12.

__ 15) Close the two relief valve screws with the pinned hex head nuts by turning clockwise.

__ 16) Use a wrench to carefully snug down the relief valve screws. Do not apply excessive force.

__ 17) Go to a helm station.

__ 18) Turn the steering wheel in one direction until you feel the resistance that indicates **HARDOVER**.

__ 19) Go to the cylinder.

__ 20) Open the fitting at the end of the cylinder with the rod extending from it.

Open it just enough to let the trapped air escape

__ 21) Keep the fitting open until hydraulic fluid appears.

__ 22) Retighten the fitting.

__ 23) Go back to the helm station.

__ 24) Turn the steering wheel in the other direction until you feel **HARDOVER** again.

__ 25) Repeat steps 18 through 22.

__ 26) Go back to the helm station.

__ 27) To check purge, turn steering wheel lock-to-lock. The usual is 6.5 turns +/- 0.5 turns with properly purged steering system. Excessive turns meanyou should repeat steps 18 through 27.

__ 28) After 24 or more hours, recheck purge.

__ 29) Check system for leaks.

__ 30) Check reservoir gauge for pressure loss.

__ 31) Open the relief valve screws.

__ 32) Start at the top helm.

__ 33) Turn 40 turns in one direction.

__ 34) Repeat at any lower helm(s).

__ 35) Repeat steps 32 and 33 in the opposite direction.

__ 36) Close the two relief valve screws with the pinned hex head nuts by turning clockwise.

__ 37) Snug down carefully with a wrench; do not force.

__ 38) Verify:

__ a) 6.5 turns lock-to-lock

__ b) Reservoir level 1/2 to 2/3 full.

__ c) Reservoir pressure 20 to 30 psig.

Toilet System Troubleshooting

Table 3-3 includes a list of potential on-board toilet system problems, their possible causes, and some suggested solutions.

Trim Tab System Troubleshooting

To determine the cause of a problem in the trim tab system:

__ 1) use a flashlight or work light to check the hydraulic fluid level in the trim tab motor/pump;

__ 2) if fluid is needed, use a Phillips screwdriver to remove the motor/pump cover retaining screw;

__ 3) remove the plug from the starboard forward corner of the motor/pump;

__ 4) add the correct hydraulic fluid per the manufacturer's operator's manual;

__ 5) replace the plug, the motor/pump cover, and the cover retaining screw;

__ 6) check each trim tab motor, pump, and cylinder operation.

This space reserved for operator notes.

Section 4

Maintenance Procedures

Lubrication Oil Transfer System

CAUTION

Do not run the engines or the a.c. generators while changing oil. Damage will result.

OIL DISCHARGE WARNING:

The "Federal Water Pollution Control Act" prohibits the discharge of any oil or oily waste into or upon the navigable waters and contiguous zone of the United States. If such a 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. This applies to any overflow of Diesel fuel oil, gasoline or lubricating oil as well as any bilge pump discharge. Violators are subject to a penalty of $5,000.00.

The lube oil transfer system (Figure 4-1) lets you remove, change, or add lubricating oil to the engines or transmissions, and remove used lubricating oil from the ac generators. You must only connect and disconnect two hoses and set the appropriate valves. The hoses have quick-disconnect fittings.

Lube Oil Transfer System Components

The lubricating oil pump is powered from the Salon 120/240Vac Distribution Panel (Figure 11-1). Circuit breaker **#153 – LUBE OIL PUMP** must be **ON** to use the pump.

To operate this system, first locate each of the following components on Figure 4-1 and then locate them on your vessel:

1) The lubricating oil pump with its 120Vac motor and switch, mounted amidships on the aft engine room bulkhead next to the converters. The pump has a pipe nipple extending from each side. The pump switch is on the starboard side of the pump motor.
2) A "T" fitting mounted on the pump portside nipple (**INTAKE**) is followed by a quarter-turn ball valve and an adapter to fit the hose from the lubricating oil tank. This input is labeled **TANK OIL SUPPLY.**
3) The other leg of the "T" is fitted with a right angle adapter that mates with the pump-out (suction) hose. This input is labeled **WASTE OIL REMOVAL.**
4) The pump starboard side nipple (**OUTPUT**) is connected to the flow meter followed by a quarter-turn ball valve and an adapter to fit the hose to the cockpit waste oil discharge valve. This fitting is labeled **COCKPIT WASTE DISCH.**
5) Extending down from the flow meter is an adapter to the tank supply hose from the lubricating oil tank. This fitting is labeled **CLEAN OIL FILL.**

6) The waste-oil discharge hose free end has a quarter-turn valve.
7) The generator suction hose connects a quick-disconnect fitting on the port side inboard stringer aft of the port engine to a "T" connection on the port side inboard stringer near the forward end of the engine.
8) Hoses connect the "T" to the port and starboard ac generator oil drain fittings.
9) Each generator oil drain fitting has a quarter-turn valve.
10) On the inboard side of each engine and each transmission is a quick-disconnect fitting protected with a red dust cover.
11) Near the oil fittings on each engine and transmission are the engine sump and transmission sump lube oil level dipsticks;
12) A suction or a pressure transfer hose can connect the lube oil pump to any of the four engine/transmission quick-disconnect fittings.

Be sure all input hoses and all screw-type and quick-disconnect fittings are kept clean to avoid getting dirt and other contaminants into the lubricating oil.

Engine/Transmission Pump-out Procedure

To pump the used lubricating oil out of the engines or the transmissions:

1) unship the free end of the suction-oil transfer hose;
2) remove the quick-disconnect fitting dust covers from the suction-oil transfer hose and from the engine or transmission sump you want to drain;
3) connect the suction-oil transfer hose to the sump quick-disconnect fitting;
4) arrange for the waste-oil discharge hose free end to empty into a suitable dockside disposal tank or into containers suitable for proper disposal of waste lubricating oil;
5) on the pump:
   a) **CLOSE** the line valve from the lubricating oil tank to the pump (valve handle at right angles to the line);
   b) **OPEN** the valve to the waste-oil discharge hose;
   c) **OPEN** the valve at the free end of the waste-oil discharge hose.
6) switch the pump **ON** to drain the waste oil;
7) when the selected sump is empty, you will hear the pump speed change due to the no-load condition; switch the pump **OFF**;
8) disconnect the suction-oil transfer hose from the sump;
9) replace the dust cover on the sump fitting;
10) repeat steps 2, 3, 6, 7, 8 and 9 for each sump;
11) wipe off the suction-oil transfer hose quick-disconnect fitting and replace the dust cover;
12) restow the suction oil transfer hose in its hanger.
13) wipe off the waste oil discharge hose nozzle;
14) restow the waste oil discharge hose.

Generator Pump-out Procedure

⚠ CAUTION

To avoid generator damage, you MUST CLOSE oil sump drain valves once the used oil is out.

NOTE:
This system both drains and replaces or adds oil to the engines and transmissions and drains used oil from the generators. Do NOT use it to put fresh oil in the generators because:

1) The Diesel engines and the marine transmissions have different lubricating oil requirements than do the generators;

2) the length of the hose leading to the generators means that a quart or more of oil would always be in this hose. Therefore, Bertram recommends that you use this system only to remove used oil from the a.c. generators. Be sure the generator sump ball valves are ***CLOSED*** *before refilling the generators by hand, and be sure you do not try to drain both ac generator oil sumps at once.*

To pump used lubricating oil out of the generators:

1) unship the free end of the suction-oil transfer hose;
2) remove the quick-disconnect fitting dust cover from the suction-oil transfer hose;
3) remove the quick-disconnect fitting dust cover from the generator waste-oil line (the fitting is on the port side inboard stringer aft of the port engine);
4) connect the suction-oil transfer hose to the generator oil line quick-disconnect fitting;
5) arrange for the free end of the waste-oil discharge hose to empty into a suitable dockside disposal tank or into containers suitable for proper disposal of waste lubricating oil;
7) **OPEN** the sump valve on the generator you want to drain;
8) on the pump:
   a) **CLOSE** the line valve from the lubricating oil tank to the pump (valve handle at right angles to the line);
   b) **OPEN** the line valve on the used-oil discharge hose;
   c) **OPEN** the valve at the free end of the waste-oil discharge hose;
9) switch **ON** the pump;
10) when the generator sump is empty, you will hear the pump speed change due to the no-load condition; switch the pump **OFF**;
11) **CLOSE** the sump ball valve on the empty generator;
12) **OPEN** the sump ball valve on the other generator;
13) repeat steps 8 through 10;
14) disconnect the suction-oil transfer hose from the generator line;
15) wipe off the sump fitting and replace the dust cover;
16) **CLOSE** the line valve on the free end of the suction-oil transfer hose;
17) wipe off the suction-oil transfer hose quick-disconnect fitting and replace the dust cover;

Filling or Refilling the Engines and Transmissions

NOTE:
You should change engine lubrication oil filters with each engine oil change. This requires about one additional gallon of oil per engine.

NOTE:
After running the engine, wait at least 1 hour for the oil to drain back into the sump and then recheck the dipstick level.

NOTE:
After filling the transmission sump, start and idle the engine with gears in neutral. Then shut down engine and check the dip stick level. Continue to fill as required.

To pump fresh lubricating oil into the engines or the transmissions:

1) Unship the discharge-oil transfer hose free end and remove the quick-disconnect fitting dust cover;
2) remove the quick-disconnect fitting dust cover from the sump you want to fill;

3) connect the hose to the sump quick-disconnect fittings;
4) on the pump:
   a) **OPEN** the valve on the line between the oil tank and the pump (valve handle parallel to the line);
   b) **CLOSE** the waste-oil discharge hose valve;
   c) set meter to **0** (turn counterclockwise)
5) switch the pump **ON** (its meter measures 4 quarts per revolution);
6) switch the pump **OFF** before the meter indicates you have reached the sump capacity;
7) check the oil level with the dip stick;
8) continue to fill as required;
9) switch **OFF** the pump;
10) disconnect the discharge-oil transfer hose from the sump;
11) replace the dust cover on the sump fitting;
12) repeat steps 2, 3, and 5 through 11 for each remaining sump;
13) wipe off the discharge-oil transfer hose quick-disconnect fitting and replace the dust cover;
14) restow the discharge oil transfer hose.

Transfer Pump Bypass Adjustment

The lubrication oil transfer system has a built-in bypass control on the side of the transfer pump body. This control is factory preset by Bertram. Under most conditions, no further adjustment is necessary. However, your transfer pump may not work properly in very cold weather. To adjust the by-pass:

1) loosen the lock nut on the bypass;
2) have at least four gallons of lubricating oil in the storage tank;
3) close the used oil discharge valve;
4) open the tank supply valve;
5) have a one gallon container at hand;
6) insert a quick-disconnect fitting (Bertram Part No. 21821) into the fill oil transfer hose;
7) switch **ON** the pump;
8) fill the system lines (check by pumping about one quart of oil into the container);
9) with the pump still running, remove the quick-disconnect fitting from the fill oil transfer hose;
10) the following will happen:
   a) the flow of oil should stop
   b) the pump will either stop or run free;

11a) if the pump stops, turn the bypass screw counter-clockwise until the pump runs free; then turn the bypass screw clockwise until there is a slight load on the pump (the load will cause a drop in pump rpm);

11b) if the pump runs free, turn the bypass screw clockwise until there is a slight load on the pump (the load will cause a drop in pump rpm);

12) switch **OFF** the pump;
13) tighten the locknut.

Propeller Shaft Alignment

Two separate propeller shaft alignment procedures were performed by Bertram to ensure that your vessel's propulsion system was aligned correctly at the factory. These same procedures are necessary any time an engine has been moved or the shaft line changes because of underwater gear repairs.

Parallel or Bore Misalignment

The first procedure checks the parallel or bore alignment. In this case, a misalignment occurs when the centerline of the transmissions and the centerline of the mating propeller shafts are parallel but are not coaxial. The allowed misalignment is less than 0.005 inch.

Since the slip fit of the pilot surfaces of these two shafts holds the shafts in alignment, it is most unlikely that this alignment will change unless you replace an engine, move an engine, or seriously damage the underwater gear. To do a parallel or bore alignment procedure requires precision measuring equipment and a competent technician.

Angular or Face Misalignment

The centerlines of the marine transmission and its mating propeller shaft must be parallel. When the shafts are not, the mating faces of the transmission flange and the mating propeller shaft flange are not parallel.

The initial alignment check is a part of predelivery preparation. After delivery, alignment is an owner maintenance responsibility.

You should have angular or face misalignment checked periodically to be sure of proper alignment and optimum performance.

Allowable Angular or Face Misalignment

Only a small amount of misalignment is acceptable: 0.0005 inch of angular or face misalignment per inch (of outside diameter) of the propeller shaft companion flange, measured at the mating surface of the flanges.

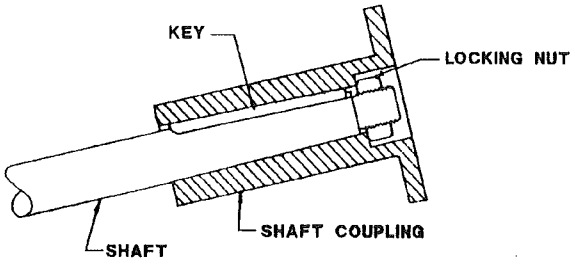
Here's an example: if we have a 5.0 inch outside diameter companion flange, the allowable misalignment is 0.0025 inch.

Engine alignment is best performed by an experienced mechanic working with the proper tools. Here is the technique used:

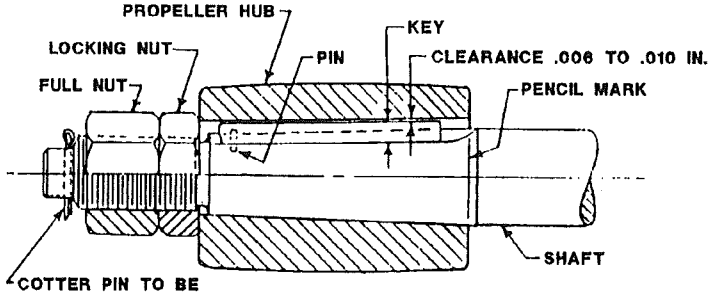
1) Open the two couplings before haulout.
2) Check the alignment after launching:
   a) Let the vessel settle in the water for a day or two before making the final alignment adjustments.
   b) Remove all the bolts in the coupling flanges at the end of the marine gear.
   c) Slide the shaft aft until the flanges are about 1/4 of an inch apart.
   d) Press the flanges together by hand with a 0.010 inch or larger feeler gauge between them.
   e) Place another feeler gauge between the flanges at 90° or less intervals around the flange to assure equal clearance.
   f) With correct alignment, the 0.010 inch or larger feeler gauge will be a tight fit all around the coupling edges. If the alignment is incorrect, the engine must be moved to align the flanges.

NOTE:
At this point gauge thickness is not vital. What is important is that as you bring the flange faces closer together, the differences between the opposite side gaps stay within the allowed tolerance. You find this difference by subtracting the thickness of the thinner feeler gauge from that of the thicker gauge.

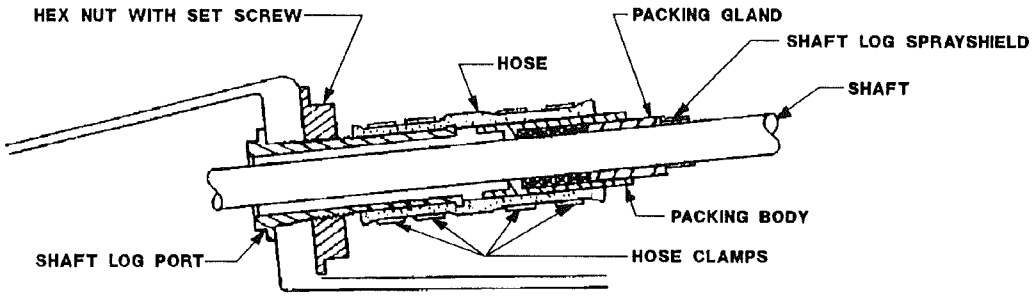
   g) Repeat steps (d) through (f), gradually moving the two flanges closer until they touch.



ENGINE COUPLING ASSEMBLY:
DIESEL ENGINES



PROPELLER INSTALLATION



SHAFT LOG ASSEMBLY

DRIVELINE ASSEMBLY

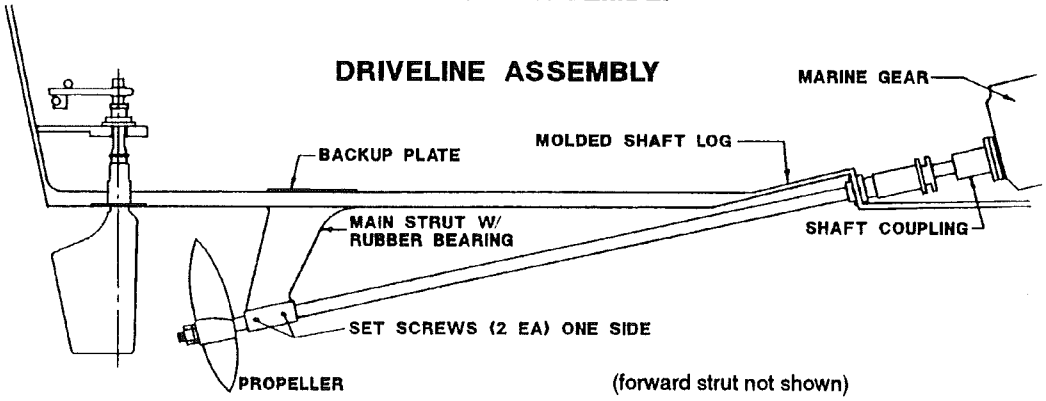


Figure 4-1: Driveline Sketches

Propeller Installation

Propeller installation is crucial to maximum shaft and propeller life. If you must replace either the propeller or the shaft, follow these guidelines:

1) Each propeller is keyed to its shaft with a locating pin extending from the key. Check that the key fits snugly in its slot with the pin in its matching hole in the shaft keyway. See Figure 4-2.
2) Check the fit of the propeller on the shaft with the key.
3) If the key does not fit, carefully file the propeller keyway using gentle and even file strokes along the whole keyway.
4) Place the propeller on the shaft (without the key) and seat the propeller on the shaft taper. The fit should be tight with no wobble and no space between the shaft and forward and aft ends of the propeller hub.
5) Mark the location of the propeller on the shaft at the forward end of the hub with a sharp pencil. See Figure 4-2.
6) Remove the propeller.
7) Insert the key into the shaft keyway, ensuring that the locating pin is in its hole in the propeller shaft keyway.
8) Reinstall the propeller.
9) Be sure the propeller is fully seated with the forward end of the hub touching the pencil line you made in Step 5.
10) Use a feeler gauge to check for 0.006 and 0.010 inch clearance between the top of the key and the bottom of the keyway in the propeller hub.
11) Remove the propeller.
12) Coat the bore with any *non-graphite* waterproof grease.
13) Reinstall the propeller.
14) Install the plain (full) nut.
15) Torque the nut with a wrench to seat the propeller.
16) Remove the full nut and install a jam (half) nut.
17) Tighten the jam nut slightly more than finger tight.
18) Install the full nut.
19) Lock both nuts together by holding the jam nut while tightening the full nut. The completed installation should match Figure 4-2.
20) Install a cotter pin and bend the legs.

The sequence and method of nut installation described above is in accordance with S.A.E. Specification #J-755.

Propeller Shaft Replacement

⚠ CAUTION

When using any type of hammer against metal, wear safety glasses and take all other usual precautions against injury.

NOTE:
Propeller shaft and coupling sets are manufactured to very close tolerances and are matched for proper fit. When replacing a shaft, have a competent machine shop match the new shaft to the coupling.

To replace a propeller shaft, you must unbolt the coupling from the engine and make some space in which to work (Figure 4-2).

1) Loosen and remove the bolts that fasten the coupling to the transmission flange.
2) Push the shaft aft until you have room to work (4 to 6 inches).
3) Follow instructions below for coupling removal.

Coupling Removal

See Figure 4-2.

1) Place the correct size socket wrench in the coupling shaft nut cavity (in the center of the coupling flange) so the nut is secure within the socket.
2) Strike the breaker bar fitted to the socket wrench sharply to loosen the nut (Bertram recommends that you use a small to medium sized lead, lead shot, or other soft faced mallet). Repeat if necessary.
3) Hold the shaft with one hand and use the wrench to unscrew the nut.
4) Remove the nut.
5) Tap around the coupling's aft end with the lead mallet to remove the coupling from the tapered propeller shaft.

Coupling Installation

See Figure 4-2.

1) Place the new shaft in position.
2) Check the fit of the key in the shaft keyway. If the key does not fit, carefully file the coupling keyway using gentle and even file strokes along the whole keyway.
3) Place the coupling on the shaft (without the key) and seat the coupling on the shaft taper. The fit should be tight with no wobble and no space between the shaft and forward and aft ends of the coupling hub.
4) Mark the location of the coupling on the shaft at forward end of the hub with a sharp pencil (similar to that shown on Figure 4-2).
5) Remove the coupling.
6) Insert the key into the shaft keyway, ensuring that the key is clear of the radius at the shaft end of the propeller shaft keyway.
7) Reinstall the coupling.
8) Ensure that the coupling is fully seated with the forward end of the hub touching the pencil line you made in Step 4.
9) Use a feeler gauge to check for 0.006 and 0.010 inch clearance between the top of the key and the bottom of the keyway in the coupling hub.
10) Remove the coupling.
11) Coat the bore with any *non-graphite,* waterproof grease.
12) Reinstall the key and coupling.
13) Place the nut on the end of the shaft.
14) Use the wrench to tighten as far as possible; take care not to mar or scratch the shaft.
15) Using the lead mallet, strike the ear of the wrench two or three times to tighten the nut.

Shaft Logs And Stuffing Boxes

Shaft Logs

The shaft log recess is the tunnel in which each propeller shaft turns. In your Bertram, the shaft logs are a part of the hull and are the same material as is the hull (Figure 4-2). Each stuffing box is attached to its shaft log recess by a flexible hose held in place by hose clamps. This flexible hose serves to absorb any normal shaft vibration.

Stuffing Boxes

Stuffing boxes keep water from leaking in around the shaft into the boat. The stuffing box contains braided flax packing and the packing gland. A tight packing gland stops excessive stuffing box leakage. However, a slight drip is necessary.

Seawater lubricates the propeller shafts. If leaking is excessive, retighten the packing

gland. Do not over-tighten or you may glaze the packing and could score the shaft. If the packing is too tight, the gland will get too hot to comfortably hold with your bare hand. When running at full speed, the gland should feel warm.

CAUTION

Do not over-tighten the packing gland on the stuffing boxes. If this gland is too tight, the packing may become glazed and the shaft may be scored. A slight drip is necessary.

Repacking a Stuffing Box

If you must repack the stuffing box:

1) remove the boat from the water;
2) remove the sprayshield;
3) unbolt the packing gland;
4) slide the packing gland forward on its shaft;
5) remove the old packing and install sufficient 1/4 inch by 1/4 inch new packing rings to come within about 1/4 inch of filling the stuffing box (always use tallow flax packing; do not spiral the packing around the shaft -- each packing ring must be separate);
6) slide the packing gland aft;
7) tighten the packing gland until the shaft will not turn to seat the packing;
8) relaunch the boat;
9) back the gland off until the shaft is free to turn and there is the slight drip necessary for proper shaft lubrication;
10) run the shaft for a while, and reset if necessary;
11) replace the sprayshield.

Shaft Log Sprayshield

Each stuffing box has a sprayshield to prevent water which leaks past the stuffing box from spraying around the engine room.

Rudder Stuffing Boxes

When tightening the packing gland, it is not necessary or desirable to have a rudder stuffing box drip, but you must be sure the rudders turn freely. Otherwise, the rudder stuffing boxes are packed in the same manner and with the same material as are the propeller stuffing boxes.

Rudder Alignment

The twin rudders on your Bertram should *always* be kept parallel. If they are "toed in" or "toed out," your Bertram may not handle properly.

Battery Care

⚠ WARNING

Gases escaping from any charging lead acid battery are an explosive mixture of hydrogen and oxygen. This mixture will explode with great violence and spraying of battery acid if a spark or open flame gets too close.

⚠ CAUTION

1) Do not overfill battery cells. Excessive liquid will cause acid to spill out the vents when the battery is charging. This causes corrosion at the terminals and the battery cables.
2) NEVER add acid to the battery.

Distilled Water

The first choice for adding liquid to the electrolyte is distilled water. If distilled water is not available, you can use a good grade of potable (drinking) water if this water is free of minerals, particularly iron.

Adding water to a cell will temporarily lower the specific gravity of the electrolyte in that cell. However, this does not mean that the cell has lost any of its charge.

Filling Procedure

1) Inspect each cell;
2) fill each cell with distilled water, when required, (the top of the plate separators should never be exposed);
3) fill until the liquid level is about 3/8 of an inch above the top of the separators.

Do not overfill the battery. Excessive liquid will cause acid to spill out the vents when the battery is charging. This causes corrosion at the terminals and the battery cables.

Cleaning Procedure

Be sure battery caps are on tightly, then clean battery top with a stiff, non-metallic brush. Be careful not to scatter corrosion products. Wipe off with a cloth damped with ammonia or baking soda in water. Wipe with a clean cloth dampened with clear water.

Clean the battery terminals and cable terminals to a bright metal finish whenever you remove the cables. Coat the contact surfaces with petroleum jelly before reconnecting the terminals.

Excessive Loss of Liquid

Under proper operating conditions, your batteries should require only a slight amount of distilled water every few weeks. If excessive water is required, this is often a sign that the battery is overcharging. You should check the engine alternators and converter. Never add acid to batteries.

Battery Charging

Use the battery condition meters on the engine room panels to check the Voltage of your battery banks.

Maximum Charge Voltage

12 Volt system: 13.9 Volts

24 Volt system: 27.6 Volts

Battery Gases -- EXPLOSIVE HAZARD

To avoid sparks:

1) do not disturb the battery connections while charging;
2) when working on battery terminals be sure that:
   a) the engines are not running;
   b) all dc loads are turned off;
   c) the converters are turned off;
   d) you are not wearing rings or metal watchbands or bracelet;
   e) you use extreme caution to avoid having tools contact both terminals.

Spilled Battery Acids

If battery acid is spilled, immediate action is required to check or eliminate its damaging effects.

Acid splashed in the eye

1) wash the eye out *immediately and continuously* with plenty of cold, fresh water for at least twenty minutes;
2) if cold, fresh water is not available, use milk or any available fresh-water-based potable liquid to dilute the acid;
3) see a doctor as soon as possible.

Acid splashed on other parts of the body, the clothing, or your vessel

1) immediately remove acid by washing thoroughly with cold water;
2) neutralize the area with a solution of baking soda or household ammonia in water.

If a considerable amount of acid is spilled from the battery, a battery repairman should replace the battery.

Diesel Fuel

WARNING

Never add commercially marketed diesohol or gasohol to diesel fuel. This mixture creates both explosive and fire hazards.

Use only high quality Diesel fuel that meets the engine manufacturer's specifications. See the engine manufacturer's manual for details.

You may use small amounts of isopropyl alcohol (isopropanol) to prevent fuel line freeze-up in winter months. Add no more than one pint of isopropyl alcohol to each 125 gallons of fuel.

Electrical Repairs

NOTE:
Bertram recommends that a qualified marine electrician perform electrical maintenance.

NOTE:
If electrical repairs or modifications are done incorrectly, there is the danger of an electrical fire.

Point-to-point wiring diagrams of each of the circuits installed on your Bertram are included in this manual.

WARNING

The 120Vac circuits can deliver a lethal shock. Before opening any 120Vac distribution panel or servicing any 120Vac equipment:
1) disconnect shore power cord;
2) stop the generator.

CAUTION

Do not replace your vessel's circuit breakers or fuses with breakers or fuses of higher amperage ratings than those installed by Bertram. Select breakers or fuses for the spare circuits on the dc and ac distribution panels with ratings that do not exceed the current-carrying capacity of the wires in each branch circuit.

Bilge Pump Systems

Automatic Bilge Pump Switches

All three bilge pumps, the engine room sump pump, and the shower sump pump, have associated water level sensing switches.

You should check these switches periodically to be sure they are operating properly.

To check a bilge pump float switch, lift the float. The pump should run and the instrument panel **BILGE PUMP** operating lamp should illuminate. Release the float; the switch should shut off the pump and the indicator light should go out.

If the switch does not function, closely monitor the water level in that bilge and have the system repaired as soon as possible.

To check a sump pump switch, lift the switch float; the switch should turn on the

pump. Release the float; the switch should shut off the pump.

Cleaning the Pumps

Each submersible pump has a strainer on the bottom of its intake. This intake must be kept clean and free of debris.

The engine room sump pump and the shower sump pump have strainers in their suction lines and at their pick-ups. These strainers must be kept clean and free of debris.

For cleaning, follow the manufacturer's instructions in the data sheets included with your information packet.

Cockpit Hatch Dog Adjustment

The hatch dogs on the cockpit hatches require adjustment to eliminate seepage. Turn the nut on the underside of the hatch dogs to adjust the fitting tightness. You must not overcompress the gaskets, so you should not overtighten the dogs. Where possible, someone should be in the compartment below the hatch when you test for seepage.

1) Lift and turn the hatch dogs 1/4 turn to release the hatch.
2) Loosen the upper jam nut on the bottom of each hatch fitting so that you can tighten the lower locking nut until the hatch is snug against the gasket all the way around.
3) After you have adjusted all cockpit hatch dogs, use a flashlight to check for seepage after water is poured over the hatches and surrounding deck.
4) Repeat steps 1 through 3 to eliminate any seepage.

Inspection and Repair of Hanlon and Wilson Exhaust System Insulation

Inspection

> **CAUTION**
> Inspect only when exhaust system is cool.

Frequency of Inspection

1) twice a year;
2) after repair work on the exhaust system;
3) if damage to the insulation is observed or suspected.

How to Inspect

Visually examine the insulation for cracking, splitting, tearing, or a light-colored threadbare appearance. Any of these conditions require repair.

Repair Procedure

The material used to repair the exhaust system insulation is Devcon Wear Resistant Liquid, Stock No. 11220, from Hanlon and Wilson, P.O. Box 641, Jeanette, PA 15644.

NOTE:
Carefully read the instructions and especially the Warnings on the epoxy containers before using this product.

Surface Preparation

The surface of the area being repaired and the surrounding surface area for two inches in all directions must be completely dry and free of all oil, dust, and cleaning agents.

Mixing

Mixing by Volume: Four parts of resin to one part of hardener (4:1).

Mixing by Weight: Nine parts of resin to one part of hardener (9:1).

In a well ventilated area, add the hardener to the resin. Mix thoroughly until a uniform consistency is obtained; this should take about 4 minutes. Be sure to stir in the material from the bottom and sides of the mixing container.

Application

Pour, trowel, or brush a 1/2-inch thick coating of epoxy over the properly prepared surface. Epoxy working time (pot time) is 50 minutes at 75°F.

Cure

A one-half inch (1/2") thick section of epoxy will harden in four hours at 75°F. This same 1/2" section will be fully cured in 16 hours at 75°F.

The epoxy will not cure properly at temperatures below 60°F. To speed up cure time, place a heat lamp no closer than 18 inches from the repaired area.

CAUTION

Do not leave a heat lamp unattended.

NOTE:
Epoxy materials will burn. Never expose epoxy to direct flame.

Section 5

Storing Your Bertram

Dry Storage

Indoor storage is the preferred method for storing your Bertram providing there is good ventilation and the location is otherwise safe and dry. For special instructions on a covering for outdoor storage, refer to the Docking Plan, Figure 1-1 in ***Part IV, Section 1***.

Keep Your Bertram Dry

__ 1) **OPEN** all valves and/or seacocks;

__ 2) Flush the toilet two or three times to clean out the system;

__ 3) Have the holding tank flushed and pumped out;

__ 4) Where possible, drain the water from the following to prevent damage from freezing in cold climates and water stagnation in warm climates:

- __ a) water tank and water heater;
- __ b) fresh water lines;
- __ c) seawater cooling system lines for the engines and generators;
- __ d) all bilges;
- __ e) sewage and wastewater tanks and lines;
- __ f) pumps. If possible, remove the pump and its motor for storage. If the pump must stay aboard for the winter, drain thoroughly and remove the pump inlet and outlet connections.

__ 5) If local weather requires, add a non-alcohol based antifreeze to low position water lines that you cannot drain;

Electric and Electronic Equipment

The best practice is to remove and store your electrical and electronic equipment in a safe, warm, and dry place over the time during which your Bertram will not be used.

Ventilating Your Bertram

__ 1) Open the windows and hatches sufficiently to allow air to circulate.

__ 2) Leave the locker doors and the drawers open.

__ 3) Wash and thoroughly dry the refrigerator and freezer units.

__ 4) If possible, clean and store mattresses and cushions in a dry place. If they must be

left aboard, prop up on one side for maximum ventilation.

__ 5) Synthetic nylon and polypropylene dock, anchor and working lines need only proper handling and occasional cleaning.

__ 6) Natural fiber anchor, working, and dock lines should be carefully dried and kept in a cool, well ventilated place.

__ 7) After the toilet holding tank, seawater supply, and discharge lines are flushed and drained, apply a light coat of oil to all metal parts.

⚠ CAUTION

When preparing the toilet for storage, do not put oil on any rubber or leather parts.

__ 8) To protect chrome, stainless steel, or aluminum deck hardware:

__ a) remove all salt deposits with fresh water;

__ b) clean with a good quality, non-abrasive type metal cleaner;

__ c) coat lightly with grease.

Diesel Engines and AC Generators

NOTE:
Diesel engine maintenance should be performed by a trained, qualified diesel mechanic.

__ 1) Clean the air cleaners thoroughly (do *not* service the air cleaners with oil);

__ 2) Cover or seal exposed air intake openings;

__ 3) Clean the governor linkage thoroughly;

__ 4) Lubricate metal ball joints with graphite (do *not* lubricate plastic ball joints);

__ 5) With the engines and generators still warm, drain the lubricating oil;

__ 6) Replace the lubricating oil;

__ 7) Remove the fuel injectors;

__ 8) Pour in two tablespoons of rust inhibitor oil (SAE 10 substitute) into each cylinder;

__ 9) Crank the engine over by hand several complete revolutions to lubricate cylinder walls, pistons, and rings;

__ 10) Lubricate fuel injector threads lightly;

__ 11) Install fuel injectors;

__ 12) Remove and replace engine and generator oil filters;

__ 13) Clean crankcase breather valve;

__ 14) Drain the engine and generator cooling systems including:

__ a) water cooled exhaust manifolds;

__ b) water cooled exhaust lines;

__ c) heat exchangers;

__ d) engine cylinder blocks.

__ 15) If freezing temperatures are expected, cooling systems should be filled with an antifreeze solution according to specifications in your engine and generator manufacturers' operator's manuals;

__ 16) Remove dust and dirt deposits from control box and junction boxes with dry, low-pressure air.

__ 17) Cover or seal all exposed openings (i.e., exhaust outlets, cooling passages, hoses, etc.);

__ 18) Inspect exhaust system for deterioration and/or leaks;

__ 19) Disconnect batteries and remove from your vessel;

__ 20) Coat the battery cable connections with grease;

__ 21) During storage, check and replace battery fluid and use a trickle charger to maintain battery voltage;

__ 22) Drain generator water lift mufflers.

CAUTION

Discharged batteries are subject to severe damage if exposed to freezing temperatures. Store all batteries in a fully charged condition and maintain charge during storage.

Wet Storage

Follow ***Dry Storage*** instructions, except:

__ 1) Check all seacocks and valves for freedom of movement and then placed in the **CLOSED** position

__ 2) The vessel's batteries will remain on board with the main battery switches in the **OFF** position;

All of the other steps required to prepare your vessel for dry storage applies to wet storage also. However, Bertram also recommends that you:

__ 1) Use a zinc "fish", as discussed in ***Part III, Section 1*** under ***Electrolysis;***

__ 2) Keep the bilge pumps in the **AUTO** (automatic) mode;

__ 3) Provide dockside electrical power to keep the batteries charged.

Fitting Out

After an extended layup, you should thoroughly check your vessel and her onboard equipment. Some maintenance will be required. The following list is intended as a guide to the more important items; they are not necessarily in order of importance.

NOTE:
Prelaunch and Postlaunch Checks
In all likelihood, if you are taking delivery of a new Bertram, she has been delivered to you in the water with all of the following checks made by your Bertram dealer. However, if your Bertram was hauled and stored for the winter, and you are fitting out for the new season, be sure these checks are made.

Prelaunch

Check to be certain that:

__ 1) All through-hull fittings and their associated strainers are clean and secure;

__ 2) Both propeller shafts turn freely;

__ 3) The propeller nuts, jam nuts, and cotter pins are secured.

__ 4) The rudders fit well in the rudder port;

__ 5) The set screws holding bearing shells on the struts are in place.

Postlaunch

Check to be certain that:

__ 1) If moored, the electric line, water supply line, water discharge line, and sewage discharge line are secured at both ends;

__ 2) All fittings are tight;

__ 3) Both propeller shaft stuffing boxes are properly adjusted;

__ 4) Propeller shaft alignment is checked per the procedure outlined in ***Part III, Section 4*** of this manual;

__ 5) The rudder packing glands are properly adjusted;

__ 6) The bilge pumps are working;

__ 7) The heat removal blowers are working.

Electrical System Check

Before putting to sea for the first time after taking your Bertram out of storage, check to ensure that:

__ 1) The batteries are properly charged. If they indicate a specific gravity reading of less than 1.220, have them charged.

__ 2) The engine wire looms are:

__ a) in good repair;

__ b) secure;

__ c) away from the exhaust manifolds;

__ 3) All electrical connections are tight.

__ 4. Each piece of standard and optional electrically operated equipment is working properly.

Diesel Engine and AC Generator Check

NOTE:
Diesel engine maintenance should be performed by a trained, qualified diesel mechanic.

Before putting to sea for the first time after taking your Bertram out of storage, thoroughly check your engine and generator systems:

__ 1) Be sure the following (1) are in good repair; (2) are secure; and (3) have all fittings tight:

__ a) fuel lines;

__ b) cooling lines;

__ c) exhaust systems;

__ d) engine mount systems.

__ 2) Check that the engines, transmissions, and shafts are in the proper alignment per the specifications given in ***Part III, Section 4***.

__ 3) Remove all protective wrappings;

__ 4) Wipe the oil off all exposed engine and generator parts;

__ 5) Remove the plugs from the exhaust outlets;

__ 6) Visually inspect each engine and motor-generator for signs of damage and/or rust;

__ 7) Check the oil level;

__ 8) If removed for dry storage, reinstall the batteries and be sure:

__ a) they are fully charged;

__ b) proper polarity is observed (ground is negative);

__ 9) Check fuel systems for moisture or contamination; if either is found:

__ a) bleed the fuel system;

__ b) clean the primary fuel filter; and,

__ c) replace secondary fuel filter.

__ 10) Check the closed cooling system and top off the anti-freeze mixture;

__ 11) Open seacocks

__ 12) Turn on fuel and prime the engines and ac generator;

__ 13) Remove all loads and start the engines and ac generator;

NOTE:
Diesel engines and the ac generator may be slow to start due to the rust inhibiting oil or to rust in the cylinders. Excessive smoke and rough operation will occur until the oil or rust inhibitor is burned off.

__ 14) Do not apply a load until the engines or ac generator run smoothly. Then apply not more than a 50% load for the first hour; slowly work up to maximum load.

Controls Check

Before putting to sea for the first time after taking your Bertram out of storage, check to be sure that:

__ 1) The clutches are properly adjusted;

__ 2) All clutch fittings are secured;

__ 3) The shift levers on the transmission have full engagement when control levers on the flybridge are moved to full ahead or full astern;

__ 4) Both throttles are properly adjusted;

__ 5) All throttle fittings are secured;

__ 6) The throttle and governor linkages move freely;

__ 7) The steering is positive;

__ 8) The steering linkage is secure;

__ 9) The steering system hydraulic fluid reservoir has the correct amount of hydraulic fluid;

__ 10) The rudders move freely;

__ 11) All gauges and indicators are fully operational (check after starting engines).

This space reserved for operator notes.

Section 6

Care of Fiberglass and Other Materials

These maintenance recommendations will help you keep the fiberglass and other components of your Bertram in factory-new condition.

Seasonal Care (at fitting out time)

1) Clean the surface with soap and water.
2) Treat with white automotive type polishing compound; use this polish lightly and follow the manufacturer's directions.
3) Wax and polish the gelcoat surface with a paste type of automobile wax.

NOTE:
Some modern paste wax products provide both rubbing and waxing action in one. These products are acceptable.

NOTE:
Fiberglass repairs more extensive than those described here should be made only with the help and advice of your Bertram dealer.

Loss of Gloss

To restore the glossy appearance of the gelcoat surfaces, a light buffing may be advisable.

1) For hand buffing, use a slightly abrasive rubbing compound similar to *DuPont Number 71;* or
2) If a power buffer is used, Bertram recommends that *MirrorGlaze Number 1* or a similar product be used.
3) After buffing, the gelcoat surface should be waxed and polished as described above for ***Seasonal Care***.

Stains

The fiberglass gelcoat surface on your Bertram was chosen to retain its beauty and be highly resistant to most stains. Table 6-1 lists stain removers Bertram recommends. If none of the methods shown in Table 6-1 are successful, it may be necessary to sand down through the gelcoat to remove the stain. This will require refinishing using the techniques described here.

Scratches & Abrasions

Any scratches /or abrasions that do not penetrate the full thickness of the gelcoat can usually be treated by lightly sanding and buffing the area.

Larger scratches that do penetrate the gelcoat but do not go deeply into the fiberglass or weaken the structure can usually be repaired as follows:

1) Clean the damaged area first with mineral spirits or turpentine to remove dirt and wax, then follow with a detergent and rinse, and allow to dry completely.

2) Secure a small amount of pigmented gelcoat resin whose color matches the color of the area to be repaired. This material should be available from your Bertram dealer.

3) Add two drops of catalyst per cubic inch of gelcoat and mix thoroughly. The mixture will gel (harden) in approximately 15 minutes.

4) Fill the scratch with the mixture before it hardens.

5) Round the patch off to about 1/16 to 1/8 inch above the surrounding surface.

6) Lay a piece of waxed paper or cellophane on top of the patch and press lightly to remove any trapped air. Take off the waxed paper after at least 20 minutes and allow the patch to cure overnight.

7) Lightly sand the area with 600 grit wet sandpaper.

8) Finish the patch by rubbing and buffing with a commercial buffing compound.

Painting Fiberglass Surfaces

1) Thoroughly clean all of the dirt and grease from the fiberglass part to be painted with mineral spirits, turpentine, or other commercial solvents.

2) Wash with a detergent and water solution and rinse.

3) After the surface is dry, sand it lightly with garnet, fine oxide, wet and dry, or 220 sandpaper. Wipe the surface clean of all dust.

Table 6-1: Recommended Stain Removers for Fiberglass

Stain	Recommended Remover
Common stains	Household detergent, full strength or diluted with water
Crayon, lipstick, & shoe polish	Alcohol
Ink spots	Ajax cleanser
Resistant stains	Ammonia cleaners or a weak solution of hydrochloric acid

4) Apply two thin coats of primer following the directions of the marine paint manufacturer.

5) Apply the marine paint as recommended by the manufacturer.

Bottom Anti-fouling Paint

Bottom anti-fouling paints should only be applied per the manufacturer's instructions. Bertram's usual procedure is to apply anti-fouling paint unless an owner specifically requests something different. Before repainting your vessel's bottom, you should check to be sure the brand and type of paint you've chosen are fully compatible with the type presently on the vessel's bottom.

NOTE:
Some types of bottom paint are not compatible unless a primer is used first.

NOTE:
Do not paint on zinc(s). Use only the manufacturer's recommended paint on depth sounder transducers.

Before Applying Anti-Fouling Paint

Before applying any additional anti-fouling paint, you should be sure the trim tab assemblies are covered (masked off), particularly the hydraulic cylinder piston rods. Take care that the lower portion of the cylinder where the ram comes out of the cylinder has been fully protected.

Bottom Blisters

Regardless of the quality of the materials used and of the care taken in construction, bottom blisters may occur on any fiberglass hull. If you do observe bottom blisters, Bertram suggests that you contact the Bertram Service Department before you attempt any repairs.

Cleaning Non-fiberglass Plastics

In addition to Fiberglass Reinforced Plastic (FRP), better known as fiberglass, your Bertram has both acrylic and ABS (Acrylonitrile Butadiene Styrene) parts. These parts are light weight and are very strong. However, they are relatively soft and their surfaces can easily be scratched by improper cleaning. The scrubbing that may be necessary to clean a badly soiled fiberglass deck or hull surface should never be used to clean these parts.

When installing or reinstalling an acrylic or ABS part that is fastened with screws, do not use a power screwdriver to run the screws all the way down. Make the last few turns by hand to avoid overtightening and stress-cracking the part.

CAUTION

When cleaning acrylic parts, use mild detergent in warm water and 100% natural (cotton) cloths or a commercial plastic cleaner such as *Novus Number 1 Plastic Polish*. Use *Novus Number 2 Plastic Polish* or equivalent product as directed to remove fine scratches. Do not use solvents such as lacquer thinner, acetone, or mineral spirits, and do not use abrasive cleaners.

CAUTION

When cleaning ABS plastic parts, do not use solvents such as lacquer thinner, acetone, or mineral spirits, and do not use abrasive cleaners. Use a mild detergent in warm water and 100% natural (cotton) cloths on painted ABS surfaces. Use a commercial liquid cleaner such as *Armorall* on unpainted ABS surfaces.

Acrylic Parts

Acrylic plastics are much tougher than glass and are resistant to stains, sea spray, and sunlight. However, they are readily scratched by hard objects, grit, or abrasives such as scouring powders and they are readily attacked by solvents such as acetone, mineral spirits and lacquer thinner.

To clean acrylic plastic, use a prepared commercial cleaner such as *Novus Number 1 Plastic Polish* or a solution of warm water and a mild detergent such as *Formula 407* or *Fantastic* with a soft, all-cotton cloth.

ABS Plastics

Bertram uses both painted and unpainted ABS plastic parts.

Unpainted ABS can be cleaned with a commercial plastics cleaner such as *Armorall* cleaner.

Painted ABS looks very much like fiberglass but must not be scrubbed. Painted ABS should be cleaned with a solution of water and mild detergent such as *Formula 407* or *Fantastic*, using a soft sponge or a soft all-cotton cloth.

Maintaining Nevamar "Fountainhead" Countertops

Clean and care for *Nevamar* countertops according to the manufacturer's suggestions, reprinted on the next page for your convenience.

FOUNTAINHEAD™
BY NEVAMAR

CARE AND CLEANING

FOUNTAINHEAD is an elegant, modern solid surfacing material manufactured by Nevamar Corporation, a major manufacturer of decorative surfaces for more than forty years. FOUNTAINHEAD provides a choice of solid colors and patterned items to give a rich, luxurious feeling to kitchen counters, work islands, wet bars, shower enclosures, tub surrounds, vanity tops, windowsills, tabletops and many other applications throughout the home.

FOUNTAINHEAD'S color and pattern run throughout its thickness giving it a soft, deep translucence and natural feeling of warmth. This feature also allows the selection of a wide variety of edge treatments for a customized look and also allows you to repair incidential damage to maintain a new appearance indefinitely. No special cleaning products are needed to keep FOUNTAINHEAD looking beautiful day in and day out.

While FOUNTAINHEAD is extremely tough and durable, like any fine material it can be damaged if abused or mistreated. Reviewing these care and cleaning instructions can assist you in understanding how easy it is to care for your new FOUNTAINHEAD top and how you can prevent more severe damage that may require professional repairs. With a little knowledge, you can enjoy the elegance and beauty of FOUNTAINHEAD in your home for years to come.

NORMAL CLEANING

Fountainhead surfaces are non-porous so they can be easily wiped clean with a damp cloth or sponge and mild detergents or general purpose cleaner such as Mr. Clean® or LesToil®. If you have a factory (satin) matte finish, abrasive cleaners like Ajax or Comet may also be used. Periodically, it may also be helpful to go over the entire surface with abrasive cleaner or Scotch Brite® (if matte finish) to maintain a unitorm appearance.

SPILLS AND STAINS

While most everyday spills can be removed with cleaning techniques listed above, some troublesome spills and stains such as food dye, tea and fruit drinks may require more aggressive cleaning. These items can be removed with full strength bleach for two to five minutes, followed by a general cleaner and flushed with water. On factory matte finish, if you prefer you can scrub with an abrasive cleaner.

Even nail polish can be removed from Fountainhead with nail polish remover or an abrasive cleanser.

CIGARETTES

While Fountainhead will not burn, should a lighted cigarette accidently come in contact with the surface, it could leave a nicotine stain or a scorch mark. Either of these can be removed by cleaning with an abrasive cleaner or buffing with a Scotch Brite® pad.

SOME SIMPLE PRECAUTIONS

Avoid placing hot pans directly from the burner or oven on the Fountainhead surface. Even though Fountainhead can withstand heat up to 350°F., prolonged or extreme heat could cause yellowing. A trivet under heated appliances is always recommended.

Do not use your countertop as a cutting board. Although minor cuts and scratches in Fountainhead can be repaired, deep cuts will require the services of a professional which is an extra expense. (An extra piece of Fountainhead from your fabricator makes an excellent cutting board to protect your counter.)

Strong acids such as those found in drain cleaners, toilet bowl and oven cleaners should be used cautiously around Fountainhead. If these items are accidently spilled, wipe them up at once. Some of these items if left on the surface may cause whitening, which can be difficult to remove.

REPAIRING SCRATCHES

- **SOLID COLORS** - Typically your solid color Fountainhead top will be finished to a level equivalent to sanding with a 350 grit sandpaper or buffing with a #7447 Scotch Brite® pad.

  For removing superficial scratches, use Scotch Brite buffing pad #7447 (available in most supermarkets) until the scratches are removed. Clean thoroughly with soap and water and let dry. Note: Deep scratches can be removed by first carefully sanding lightly with 120 grit sandpaper followed by 320 (very fine) grit sandpaper. Then use a 7447 Scotch Brite® pad to restore the finish.

- **MATRIX PATTERNS**

  SATIN FINISH - Typically finished to a level equivalent to 400 grit wet sanding or buffing with a 7448 Scotch Brite® pad. For removing superficial scratches, use a Scotch Brite® buffing pad #7448 until the scratches are removed. Clean thoroughly with soap and water and let dry. If additional luster is desired, after surface is dry, spray Countertop Magic® on the surface and wipe with a clean, dry cloth. Wipe dry using another clean cloth. Note: Deep scratches should always be removed professionally.

  HIGH GLOSS FINISH - For removing minor superficial or abrasive scratches, clean the area thoroughly with soap and water. Minor touch up can be achieved by applying Dico Plastic Polish Compound (No. PBC-J) on the area like a crayon and polishing with a light hand buffing wheel or a soft clean dry cloth.

Cleaning "Nautolex"

Clean soiled *Nautolex* surfaces according to the manufacturer's suggestions, reprinted here for your convenience.

This Nautolex material has been coated with PreFixx protective finish. It's designed to be cleaned easily, over and over, without showing signs of wear. With PreFixx protection, it is possible to remove stains that could never be removed before. Now, with test-proven stain resistance and cleanability, plus superior abrasion resistance, PreFixx-protected Nautolex protects you from high maintenance costs.

PreFixx finish goes beyond previous protection.

Performance. State-of-the-art resistance to staining, abrasion, scuffing, burnishing and blocking demonstrated in repeated laboratory tests.

Durability. Resists stain penetration of the vinyl for unique, long-term protection never before possible. The superior stain resistance and improved wear properties help keep PreFixx-protected Nautolex looking new far longer than other vinyl upholstery.

Easy maintenance. Common stains like dirt and smudges simply wipe off. More difficult stains like ballpoint ink can be cleaned with active solvents such as nail polish remover without damaging the PreFixx finish, when following the recommended cleaning instructions.

PreFixx protective finish.

- Outstanding stain resistance and cleanability — most stains wash off easily with mild cleaners, but active solvents may be used to remove difficult stains.
- Abrasion resistance — Wyzenbeek wire screen abrasion tests performed by GenCorp Polymer Products show 10 to 12 times better abrasion resistance than a similar product coated with vinyl finish. These tests show that vinyl upholstery with a clear vinyl finish withstands about 6,000 test cycles, while Nautolex with PreFixx withstands 60,000 to 75,000 test cycles.
- Resistance to common scuffing and burnishing.
- Eliminates blocking and resists premature aging.

Care and cleaning.

Day-to-day soil. Remove ordinary dirt and smudges with a mild soap and warm water solution. Dry with a soft, lint-free cloth or towel. For more difficult stains, use of a stronger detergent is recommended provided the detergent manufacturer's instructions are followed closely.

Special cleaning problems. The following steps are recommended to clean stains on PreFixx-protected vinyl upholstery. Many difficult stains can be removed when these cleaning agents are used in the following order.[1]

Step 1 cleaners: Nonabrasive household cleaners to be used with a cloth, damp sponge or fine bristle brush.
- Formula 409® All-Purpose Spray Cleaner.
- Fantastik® Spray Cleaner.
- Other similar household cleaners and bleaches. Rinse cleaned area with fresh water and dry with a clean cloth.

Step 2 cleaners:* Solvent-type cleaner to be liberally applied with a cloth, damp sponge or fine bristle brush.
- Rubbing alcohol (isopropyl alcohol).
- Lighter fluid (naptha). Rinse cleaned area with fresh water and dry with a clean cloth.

Step 3 cleaners:* Strong, active cleaners to be applied with a soft cloth or damp sponge. Use no more than six rubs; if stain persists, contact manufacturer. Dry with another cloth, then rinse with clear water and dry.
- Nail polish remover (acetone/water).

[1]**NOTE:** It is extremely important to clean the stained area as quickly as possible, making sure the recommended cleaning steps are followed in order.

*__CAUTION:__ These solvents are highly flammable. Exercise proper care in cleaning and notify personnel in area of danger. Wear rubber gloves during all cleaning activity. Use caution in cleaning around buttons, stitching and wooden or other decorative trim, since these solvents could seriously damage such areas.

Staining Agent	Cleaning Steps
Spray paint	1-2-3
Ballpoint pen	1-2-3
Lipstick	1-2-3
Yellow mustard	1-2-3
Bird droppings	1-2-3
Suntan lotion *(See Caution Below)	1-2-3
Crayons	1-2
Eye shadow	1-2
Oily soot	1-2
Petroleum products	1-2
Coffee	1
Tea	1
Hair oil tonic	1
Blood	1
Urine	1
Grape juice	1
Olive oil	1
Chocolate	1
Ketchup	1
Baby oil	1

*Independent laboratory testing has shown that most sunscreen lotions and oils can permanently stain all vinyls including those protected with PreFixx.

GENCORP
POLYMER PRODUCTS
P.O. Box 875
Toledo, Ohio 43696-0875
(419) 729-3731
Telex: 4320104 DTGIC TOL.

Cleaning "Novasuede"

Clean mildewed *Novasuede* surfaces according to the suggestions in Table 6-2.

Table 6-2: Recommendations for Cleaning *Novasuede*

Stain	Cleaner
Coffee, wine, milk, soft drinks, ink, or chocolate	Mild household detergent in warm water
Grease, lipstick	Upholstery solvent

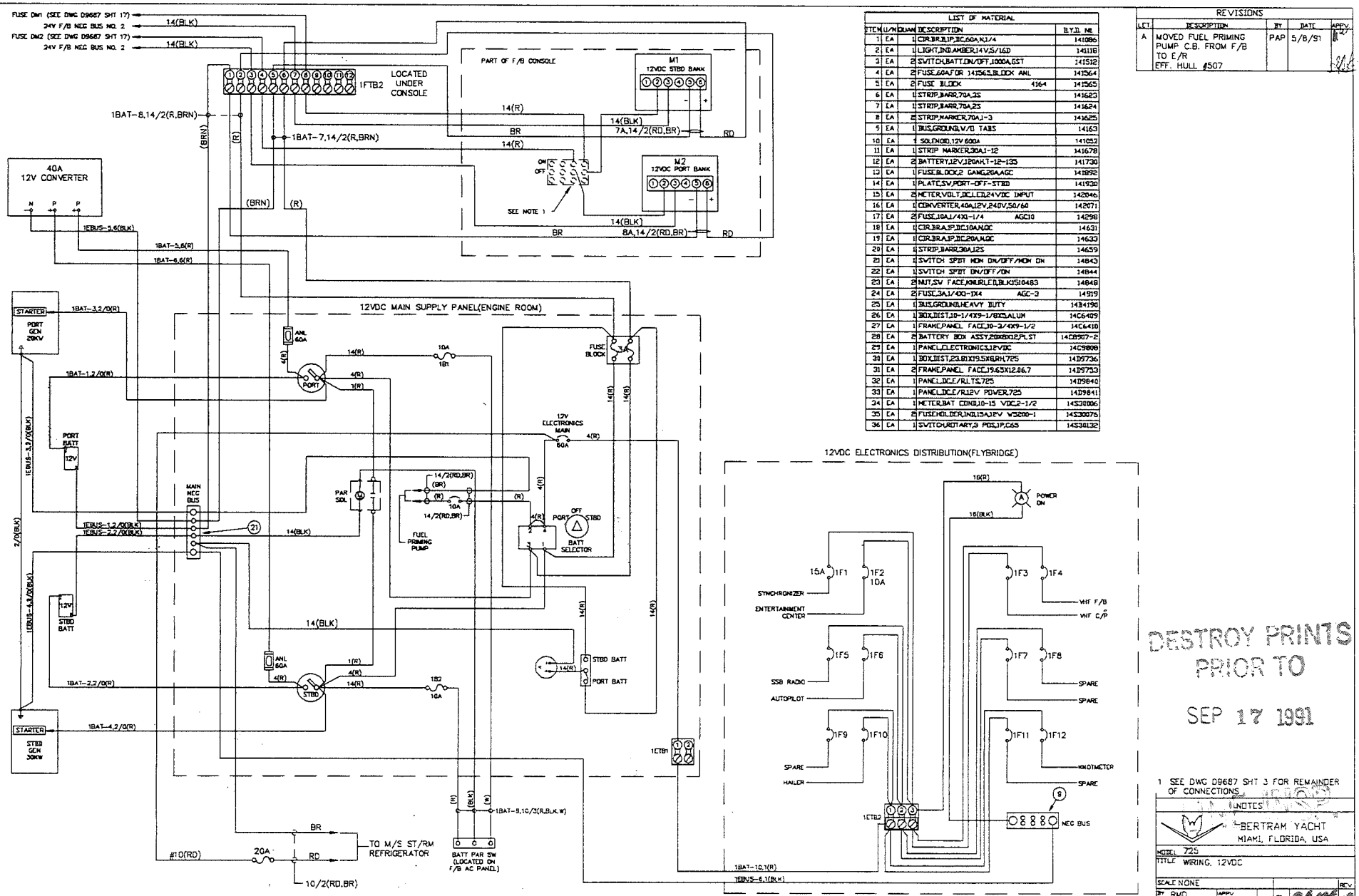
This space reserved for operator notes.

This space reserved for operator notes.

Table of Contents

Part IV: Supplement

This space reserved for operator notes.



LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO.
1	EA	1	CIR.BRK,1P,3C,60A,M,1/4	141086
2	EA	1	LIGHT,IND,AMBER,14V,S/16D	141116
3	EA	2	SWITCH,BATT,ON/OFF,100DA,GST	141512
4	EA	2	FUSE,60A,FOR 141565,BLOCK ANL	141564
5	EA	2	FUSE BLOCK 4164	141565
6	EA	1	STRIP,BARR,70A,2S	141683
7	EA	1	STRIP,BARR,70A,2S	141624
8	EA	2	STRIP,MARKER,70A,1-3	141625
9	EA	1	BUS,GROUND,W/O TABS	14163
10	EA	1	SOLENOID,12V 600A	141052
11	EA	1	STRIP MARKER,30A,1-12	141678
12	EA	2	BATTERY,12V,120AH,T-12-135	141730
13	EA	1	FUSE BLOCK,2 CANG,250A,AGC	141892
14	EA	1	PLATE,SV,PORT-OFF-STBD	141930
15	EA	2	METER,VOLT,DCL,CL,24VDC INPUT	142046
16	EA	1	CONVERTER,40A,12V,240V,50/60	142071
17	EA	2	FUSE,10A,1/4X1-1/4 AGC10	14298
18	EA	1	CIR.BRK,1P,3C,10A,M,QC	14631
19	EA	1	CIR.BRK,1P,3C,20A,M,QC	14633
20	EA	1	STRIP,BARR,30A,12S	14659
21	EA	1	SWITCH SPDT MOM ON/OFF/MOM ON	14843
22	EA	1	SWITCH SPDT ON/OFF/ON	14844
23	EA	2	NUT,SV FACE,KNURLED,BLK,S10483	14848
24	EA	2	FUSE,3A,1/4X1-1/4 AGC-3	14919
25	EA	1	BUS,GROUND,HEAVY DUTY	1434190
26	EA	1	BOX,DIST,10-1/4X9-1/8X5,ALUM	14C6409
27	EA	1	FRAME,PANEL FACE,10-3/4X9-1/2	14C6410
28	EA	2	BATTERY BOX ASSY,28X8X12,PLST	14C8907-2
29	EA	1	PANEL,ELECTRONICS,12VDC	14C9806
30	EA	1	BOX,DIST,23.81X19.5X6,RH,725	14D9736
31	EA	2	FRAME,PANEL FACE,19.65X12.86,7	14D9753
32	EA	1	PANEL,DCE/RL,TS,725	14D9840
33	EA	1	PANEL,DCE/R,12V POWER,725	14D9841
34	EA	1	METER,BAT COND,10-15 VDC,2-1/2	14S30006
35	EA	2	FUSEHOLDER,ING,15A,32V W5200-1	14S30076
36	EA	1	SWITCH,ROTARY,3 POS,1P,C&S	14S36132

REVISIONS

LET	DESCRIPTION	BY	DATE	APPV
A	MOVED FUEL PRIMING PUMP C.B. FROM F/B TO E/R EFF. HULL #507	PAP	5/8/91	

DESTROY PRINTS PRIOR TO SEP 17 1991

1 SEE DWG 09687 SHT 3 FOR REMAINDER OF CONNECTIONS

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 12VDC
SCALE NONE
REV
BY RMD APPV

24VDC MAIN SUPPLY
D9687-1

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	CIR,BRA,1P,DC,30A,N,10SC	141085
2	EA	3	CIR,BR,B,1P,DC,60A,N,1/4	141086
3	EA	2	SWITCH,BATT,ON/OFF,1000A,GST	141512
4	EA	2	FUSE,60A,FOR 141563,BLOCK ANL	141564
5	EA	4	FUSE BLOCK 4164	141565
6	EA	2	STRIP,BARR,70A,2S	141624
7	EA	1	STRIP,MARKER,70A,1-3	141625
8	EA	6	BATTERY,8V 205AH,8ST-205	141732
9	EA	2	FUSE, 80AMP, BUSS ANL 80A	141795
10	EA	1	FUSEBLOCK,2 GANG,28A,AGC	141892
11	EA	1	PLATE,SW,PORT-OFF-STBD	141930
12	EA	10	FUSE HOLDER,IND,15A,24V,5200-2	142019
13	EA	2	CONVERTER,40A,24V,240V,50/60	142043
14	EA	1	SOLENOID,24V,1100AL-4424SA	142044
15	EA	1	METER,BAT CONS,15-35VDC,2-1/2	142045
16	EA	3	FUSE,10A,1/4X1-1/4 AGC10	14298
17	EA	1	CIR,BRA,1P,DC,5A,N,OC	14630
18	EA	1	CIR,BRA,1P,DC,10A,N,OC	14631
19	EA	4	CIR,BRA,1P,DC,15A,N,OC	14632
20	EA	2	CIR,BRA,1P,DC,20A,N,OC	14633
21	EA	1	SWITCH SPDT ON/OFF/ON	14844
22	EA	1	NUT,SV FACE,KNURLED,BLK1510483	14848
23	EA	4	FUSE,5A,1/4X1-1/4 AGC-5	14918
24	EA	2	FUSE,3A1/4X1-1X4 AGC-3	14919
25	EA	1	BUS,GROUND,MED,HVY	14A6080
26	EA	1	BUS,GROUND,HEAVY DUTY	14B4198
27	EA	6	BATTERY BOX ASSY,545	14C8907-4
28	EA	1	BOX,DIST,23.81X19.5X8,LH,725	14D9737
29	EA	2	FRAME,PANEL FACE,19.63X12.86,7	14D9753
30	EA	1	PANEL,DCE/R,24V POWER,725	14D9842
31	EA	1	PANEL,DCE/R,24V DIST.,725	14D9843
32	EA	1	PANEL,CENTER FB CONSOLE,725	14D9916
33	EA	1	PANEL,LEFT & RIGHT FB CONSOLE	14D9920
34	EA	1	PANEL,F/B DVHD,725,LEFT	14D9979-1
35	EA	1	PANEL,F/B DVHD,725,CENTER	14D9979-2
36	EA	1	PANEL,F/B DVHD,725,RIGHT	14D9979-3
37	EA	1	SWITCH,ROTARY,3 POS,1P,C65	14S30132
38	EA	1	FUSE,7-1/2A,1/4X1-1/4 AGC7.5	141007
39	EA	1	NAMEPLATE,2X.5X.125,PHENOLIC	14S30360
40	EA	1	NAMEPLATE,1X.5X.125.	14S30361-2

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	AR	PLUG,HOLE,NYLON,BLACK,5/32 DIA	14S30009-2
2	EA	AR	PLUG,HOLE,NYLON,BLACK,5/8 DIA	14S30010-9
3	EA	AR	BHMS,#10-32X3/8,NYLON,BLACK	51653
4	EA	AR	BHMS,#6-32X1/4,NYLON,BLACK	51654

24VDC DISTRIBUTION
D9687-2

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,8S	14022
2	EA	1	STRIP,BARR,70A,2S	141624
3	EA	1	STRIP,MARKER,70A,1-3	141625
4	EA	1	BUS,GROUND,W/O TABS	14163
5	EA	2	FUSEBLOCK,2 GANG,20A,AGC	141892
6	EA	1	BUS,GROUND,COLE HERSEE #M-449	141973
7	EA	2	METER,VOLT,DC,1,CID,24VDC INPUT	142046
8	EA	1	SWITCH,TOG,MIN,4PDT,MOM/OFF/ON	142095
9	EA	2	FUSE,10A,1/4X1-1/4 AGC10	14298
10	EA	1	CIR,BRA,1P,DC,5A,N,OC	14630
11	EA	7	CIR,BRA,1P,DC,10A,N,OC	14631
12	EA	7	CIR,BRA,1P,DC,15A,N,OC	14632
13	EA	1	CIR,BRA,1P,DC,20A,N,OC	14633
14	EA	1	SWITCH SPDT ON/OFF/ON	14844
15	EA	2	LIGHT,IND,AMBER,28V,5/16D	14853
16	EA	2	FUSE,3AJ/4X1-1X4 AGC-3	14919
17	EA	1	NAMEPLATE,2FTB16	14A7296-30
18	EA	1	BOX,DIST,10-1/4X9-1/8X5,ALUM	14C6489
19	EA	1	FRAME,PANEL FACE,18-3/4X9-1/2	14C6410
20	EA	1	PANEL,F/B DISTR,24VDC	14C9806
21	EA	1	STRIP,MARKER,30A,1-8	14S30037
22	EA	1	NAMEPLATE,1.5X.5X.125, PHENOLIC	14S30362

24VDC ELECTRONICS DISTRIBUTION
D9687-3

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,70A,2S	141624
2	EA	1	STRIP,MARKER,70A,1-3	141625
3	EA	1	BUS,GROUND,W/O TABS	14163
4	EA	1	LIGHT,IND,AMBER,28V,5/16D	14853
5	EA	1	BOX,DIST,10-1/4X9-1/8X5,ALUM	14C6489
6	EA	1	FRAME,PANEL FACE,18-3/4X9-1/2	14C6410
7	EA	1	PANEL,ELECTRONICS,24VDC	14C9807

NAVIGATION LIGHTS
D9687-5

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,MARKER,30A,1-10	141916
2	EA	2	SWITCH,SPST,ON/OFF,T,TOG	142006
3	EA	1	LIGHT,NAV,STBD,MOD.55,AQS	142010
4	EA	1	LIGHT,NAV,PORT,MOD.55,AQS	142011
5	EA	1	LIGHT,MASTHEAD,MOD.55,AQS	142012
6	EA	1	LIGHT,NAV,STERN,MOD.55,AQS	142013
7	EA	1	LIGHT,NAV,ANCHOR,MOD.55,AQS	142014
8	EA	2	BRACKET,NAV,L.T,MAST/STERN,M.55	142015
9	EA	2	BRACKET,NAV,L.T,PORT/STBD,M.55	142016
10	EA	5	BUL.B,LT,NAV,24V,25W,MOD.55	142017
11	EA	1	LIGHT,IND,GRN,LED,28V,1/4D	142067
12	EA	1	LIGHT,IND,RED,LED,28V,1/4D	142069
13	EA	3	LIGHT,IND,WHT,LED,28V,1/4D	142070
14	EA	1	SWITCH,TOG,MIN,4PDT,MOM/OFF/ON	142095
15	EA	1	SWITCH,TOG,MIN,SPDT,MOM/OFF/ON	142096
16	EA	1	STRIP,BARR,30A,10S	14667
17	EA	2	LIGHT,IND,AMBER,28V,5/16D	14853

OPTIONAL
FWD DOCKING LIGHTS
D9687-6

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,4S	14021
2	PR	2	LIGHT,DOCKING,BOW SS,28V,150W	141520
3	EA	1	STRIP,MARKER,30A,1-4	141917
4	EA	1	SWITCH,SPST,ON/OFF,T,TOG	142006
5	EA	1	CIR,BRA,1P,DC,10A,N,OC	14631
6	EA	1	NUT,SV FACE,KNURLED,BLK1510483	14848

OPTIONAL
AFT DOCKING LIGHTS
D9687-7

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,4S	14021
2	PR	2	LIGHT,DOCKING,TRANSOM,28V,150W	141521
3	EA	1	STRIP,MARKER,30A,1-4	141917
4	EA	1	SWITCH,SPST,ON/OFF,T,TOG	142006
5	EA	1	CIR,BRA,1P,DC,10A,N,OC	14631
6	EA	1	NUT,SV FACE,KNURLED,BLK1510483	14848

HORN
D9687-8

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	SWITCH,SPST,OFF/MOM,ON,T,TOG	142008
2	EA	1	NUT,SV FACE,KNURLED,BLK1510483	14848

TRIM TABS
D9687-9

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,MARKER,30A,1-10	141916
2	EA	1	STRIP,BARR,30A,10S	14667

ITT SEARCH LIGHT
D9687-10

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	SEARCH LIGHT,REGULATOR32/12ITT	141958
2	EA	1	BUL.B,LIGHT,24V,ITT,SRCH,T	142020

ACR SEARCH LIGHT
D9687-11

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	2	STRIP,BARR,30A,8S	14022
2	EA	1	STRIP,MARKER,30A,1-8	14S30017

FUEL/FRESH WATER LEVEL INDICATORS
D9687-12

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,6S	141679
2	EA	1	STRIP,MARKER,30A,1-10	141916
3	EA	1	STRIP,MARKER,30A,1-6	141918
4	EA	1	LIGHT,IND,RED,LED,28V,1/4D,FLS	142066
5	EA	10	LIGHT,IND,GRN,LED,28V,1/4D	142067
6	EA	1	LIGHT,IND,AMBER,LED,28V,1/4D	142068
7	EA	1	SWITCH,TOG,MOM,4PDT,ON/NONE/ON	142114
8	EA	2	FUSEHOLDER,IN-LINE,20A CAPY HHJ	14598
9	EA	1	STRIP,BARR,30A,10S	14667
10	EA	2	FUSE,3A1/4X1-1X4 AGC-3	14919

OPTIONAL
WINDLASS WITH BOW THRUSTER
D9687-13

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	SWITCH,SPST,ON/OFF,T,TOG	142006
2	EA	2	SWITCH SPST OFF/MOM ON	14841

OPTIONAL
WINDLASS WITHOUT BOW THRUSTER
D9687-14

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	SWITCH,SPST,ON/OFF,T,TOG	142006
2	EA	2	SWITCH SPST OFF/MOM ON	14841

BOW THRUSTER
D9687-15

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	RELAY,SPST,24V,20A,NO,BRK MNT	142094
2	EA	1	CIR,BRA,1P,DC,15A,N,OC	14632

CABLE MASTER
D9687-16

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	2	FUSEBLOCK,2 GANG,20A,AGC	141892
2	EA	4	SHORE CORD,50A,250V,100FT,MALE	142084
3	EA	4	CABLE MASTER UNIT,24V,6/4CBL	142092
4	EA	4	FUSE,5A,1/4X1-1/4 AGC-5	14918

LUBE OIL WASTE TANK LEVEL
D9687-17

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	GAUGE,FUEL,12V 306702 VDO	141462
2	EA	1	GAUGE ADAPTER,12/24V,VDO391784	142047
3	EA	1	SWITCH SPST ON/OFF	14840
4	EA	1	NUT,SV FACE,KNURLED,BLK1510483	14848

NOTE:
THE LIST OF MATERIALS IS NOT COMPLETE

SHEET REVISION RECORD

SHT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
REV#	B	—	B	—	—	—	A	—	A	A	—	A	A	A	—	—	—	—

REVISIONS

LET	DESCRIPTION	BY	DATE	APPV
A	ADDED REVISION RECORD	MFW	5/13/91	OK
B	REVISED REVISION RECORD	PAP	5/20/91	

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WRING, 24VDC

SCALE NONE | SHT 1 of 18 | REV
BY RMD | APPV | DATE 9/20/88 | DATE | D 9687 B

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV

GREY WATER PUMP
D9687-19

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,4S	14021
2	EA	1	STRIP,BARR,30A,6S	141679
3	EA	1	STRIP,MARKER,30A,1-4	141917
4	EA	1	STRIP,MARKER,30A,1-6	141918
5	EA	1	SWITCH,SPST,ON/OFF,LT,TOG	142006
6	EA	1	NUT,SW FACE,KNURLED,BLK151048J	14848

TROLLING VALVES
D9687-20

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	2	DIODE,3A,100-600PRV	141166
2	EA	6	LIGHT,IND,RED,28V,3/8 DIA	141942
3	EA	2	TACH,DIGITAL,LED,24VDC INPUT	142042
4	EA	2	BELL,ALARM,24VDC	142050

SALON DECK TOILET
D9687-21

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	FUSEHOLDER,INLINE,20A CAPY HHJ	14598
2	EA	1	FUSE,5A,1/4X1-1/4 AGC-5	14918

BILGE PUMPS AND MONITORS
D9687-22

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	2	STRIP,BARR,30A,8S	14022
2	EA	4	SWITCH,SPST,ON/OFF,LT,TOG	142006
3	EA	3	MONITOR,PUMP WATCH,24V,WPUV-4	142049
4	EA	1	NAMEPLATE,2FTB8	14A7296-21
5	EA	2	STRIP,MARKER,30A,1-8	14S30017

PORT AND STBD GM ENGINE ALARM
D9687-23

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	2	STRIP,BARR,30A,8S	14022
2	EA	4	SWITCH,PUSH BUT,MIN,MOM,SPDT	141630
3	EA	2	STRIP,BARR,30A,6S	141679
4	EA	2	STRIP,MARKER,30A,1-6	141918
5	EA	2	SWITCH,TEMP,NC,2T 180D,SURF,50	141950
6	EA	2	SIGNAL,AUDIBLE,6-16VDC CHIME	142051
7	EA	2	RESISTOR,2.4K OHM,2 WATT	142053
8	EA	2	LIGHT,WARNING,AMBER,24VDC	142054
9	EA	8	LIGHT,IND,RED,LED,28V,1/4D,FLS	142066
10	EA	1	NAMEPLATE,ALARM,PORT ENGINE	14A7296-1
11	EA	1	NAMEPLATE,ALARM,STBD ENGINE	14A7296-2
12	EA	2	STRIP,MARKER,30A,1-8	14S30017
13	EA	2	ALARM,M20,4NC,V/R,24V	14S30324

BILGE FLOOD MONITOR
D9687-24

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,8S	14022
2	EA	2	SIGNAL,AUDIBLE,SONALERT 6-28V	141260
3	EA	3	SWITCH,FLOAT,ALARMDEMS 01701	141584
4	EA	2	SWITCH,PUSH BUT,MIN,MOM,SPDT	141630
5	EA	1	STRIP,BARR,30A,6S	141679
6	EA	1	STRIP,MARKER,30A,1-6	141918
7	EA	6	LIGHT,IND,RED,LED,28V,1/4D,FLS	142066
8	EA	1	BRACKET,FLOAT SW	14A7243
9	EA	1	NAMEPLATE,BILGE MONITOR	14A7296-3
10	EA	1	NAMEPLATE,MONITOR,DH-1725	14C9836
11	EA	1	STRIP,MARKER,30A,1-8	14S30017
12	EA	1	ALARM,M21,3NC,V/D,24V	14S30323

FIRE SYSTEM MONITOR
D9687-25

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	2	SWITCH,PUSH BUT,MIN,MOM,SPDT	141630
2	EA	2	LIGHT,IND,RED,28V,5/16 DIA	141887
3	EA	1	STRIP,MARKER,30A,1-10	141916
4	EA	6	SWITCH,TEMP,NC,2T 180D,SURF,50	141950
5	EA	2	BELL,ALARM,24VDC	142050
6	EA	8	LIGHT,IND,RED,LED,28V,1/4D,FLS	142066
7	EA	1	STRIP,BARR,30A,10S	14667
8	EA	1	NAMEPLATE,2FTB10	14A7296-23
9	EA	1	NAMEPLATE,FIRE SYSTEM MONITOR	14A7296-5
10	EA	6	PLATE,FIRE SENSOR	14A9804
11	EA	1	NAMEPLATE,FIRE SYSTEM,C/P,725	14D9845
12	EA	1	ALARM,M19,5NC,V/R,24V	14S30325

HOLDING TANK AND GREY WATER MONITOR
D9687-26

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,8S	14022
2	EA	2	SWITCH,PUSH BUT,MIN,MOM,SPDT	141630
3	EA	1	SIGNAL,AUDIBLE,6-28VDC S.TONE	142052
4	EA	4	LIGHT,IND,RED,LED,28V,1/4D,FLS	142066
5	EA	4	LIGHT,IND,RED,LED,28V,1/4D	142069
6	EA	1	NAMEPLATE,MONITOR,TANK,GRY WAT	14A7296-14
7	EA	1	NAMEPLATE,2FTB11	14A7296-24
8	EA	4	NAMEPLATE,HOLDING TANK MONITOR	14B9918
9	EA	1	STRIP,MARKER,30A,1-8	14S30017
10	EA	1	ALARM,M21,3NC,V/D,24V	14S30323

FUEL VENT LEVEL,E/R OVER TEMP AND LOW AIR PRESSURE MONITOR
D9687-27

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,8S	14022
2	EA	2	SIGNAL,AUDIBLE,SONALERT 6-28V	141260
3	EA	4	SWITCH,PUSH BUT,MIN,MOM,SPDT	141630
4	EA	1	STRIP MARKER,30A,1-12	141679
5	EA	1	METER,PRESS,LED,24VDC INPUT	142038
6	EA	1	METER,TEMP,LED,24VDC INPUT	142040
7	EA	1	SENDER,TEMP,PROBE,FOR 142040	142041
8	EA	3	LIGHT,IND,RED,LED,28V,1/4D,FLS	142066
9	EA	1	STRIP,BARR,30A,12S	14659
10	EA	1	NAMEPLATE,MONITOR,TEMP,PRES	14A7296-13
11	EA	1	NAMEPLATE,2FTB12	14A7296-25
12	EA	1	NAMEPLATE,2FTB12A	14A7296-26
13	EA	1	NAMEPLATE,WSHDWN,LT,VENT,725	14C9844
14	EA	1	STRIP,MARKER,30A,1-8	14S30017
15	EA	1	ALARM,M21,3NC,V/D,24V	14S30323

STANDARD LIGHTING
D9687-28

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,4S	14021
2	EA	1	STRIP,BARR,30A,6S	141679
3	EA	1	WALL PLATE,INTCHG,3 HOLES,IVORY	141828
4	EA	7	LIGHT,ENG ROOM,WHT,TUMA #18/81	141844
5	EA	3	SWITCH,SPDT,ON/NONE/ON,CARLING	141846
6	EA	1	STRIP,MARKER,30A,1-4	141917
7	EA	1	STRIP,MARKER,30A,1-6	141918
8	EA	7	BUL,B,LT,24V,25W,MED,SC	142086
9	EA	1	BUL,B,LT,24V,60W,MED,SC	142087
10	EA	7	LIGHT,DVAL,CHROMIUM PLATED,BRS	142088
11	EA	7	BUL,B,LT,24V,20W,DC BAY	142089
12	EA	4	LIGHT,FIXED,SURF,24V,15W	142120
13	EA	4	BUL,B,24V,15W,FOR BYD#142120	142121
14	EA	1	LIGHT,RCES,25FT CORD,ALERT1000	142164
15	EA	1	SWITCH,WALL,TOG,INTCHG,IV	14495
16	EA	3	SWITCH SPST ON/OFF	14840

REFER TO WIRING,24VDC,LIGHTING DWG # D10086
FOR S DRAWING # OF REMAINING MATERIAL

EMERGENCY LIGHTING
D9687-29

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,4S	14021
2	EA	5	LIGHT,ENG ROOM,WHT,TUMA #18/81	141844
3	EA	1	STRIP,MARKER,30A,1-4	141917
4	EA	5	BUL,B,LT,24V,25W,MED,SC	142086
5	EA	2	RELAY,SPDT,120V,20A,NC/NO,LBM	142093
6	EA	1	SWITCH,PUSH BUT,MIN,MOM,DPDT	142097
7	EA	1	LIGHT,FLEXLITE,12 IN,CLEAR	142160
8	EA	1	NAMEPLATE,2FTB13	14A7296-27

F/B LIGHTS
D9687-31

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	STRIP,BARR,30A,4S	14021
2	EA	2	SWITCH,WALL,TOG,INTCHG,IV,3WAY	141222
3	EA	2	LIGHT,CHART,12V,AQUA-SIGNAL	141671
4	EA	2	WALL PLATE,INTCHG,3 HOLES,IVORY	141828
5	EA	4	LIGHT,ENG ROOM,WHT,TUMA #18/81	141844
6	EA	1	STRIP,MARKER,30A,1-4	141917
7	EA	4	BUL,B,LT,24V,25W,MED,SC	142086
8	EA	2	BUL,B,LT,24V FOR 141671	142168
9	EA	1	NAMEPLATE,2FTB17	14A7296-31

DIGITAL METERS
D9687-32

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. NO
1	EA	1	FUSEBLOCK,6 GANG,30A,AGC	142102
2	EA	1	FUSEBLOCK,12 GANG,30A,AGC	142103
3	EA	18	FUSE,5A,1/4X1-1/4 AGC-5	14918

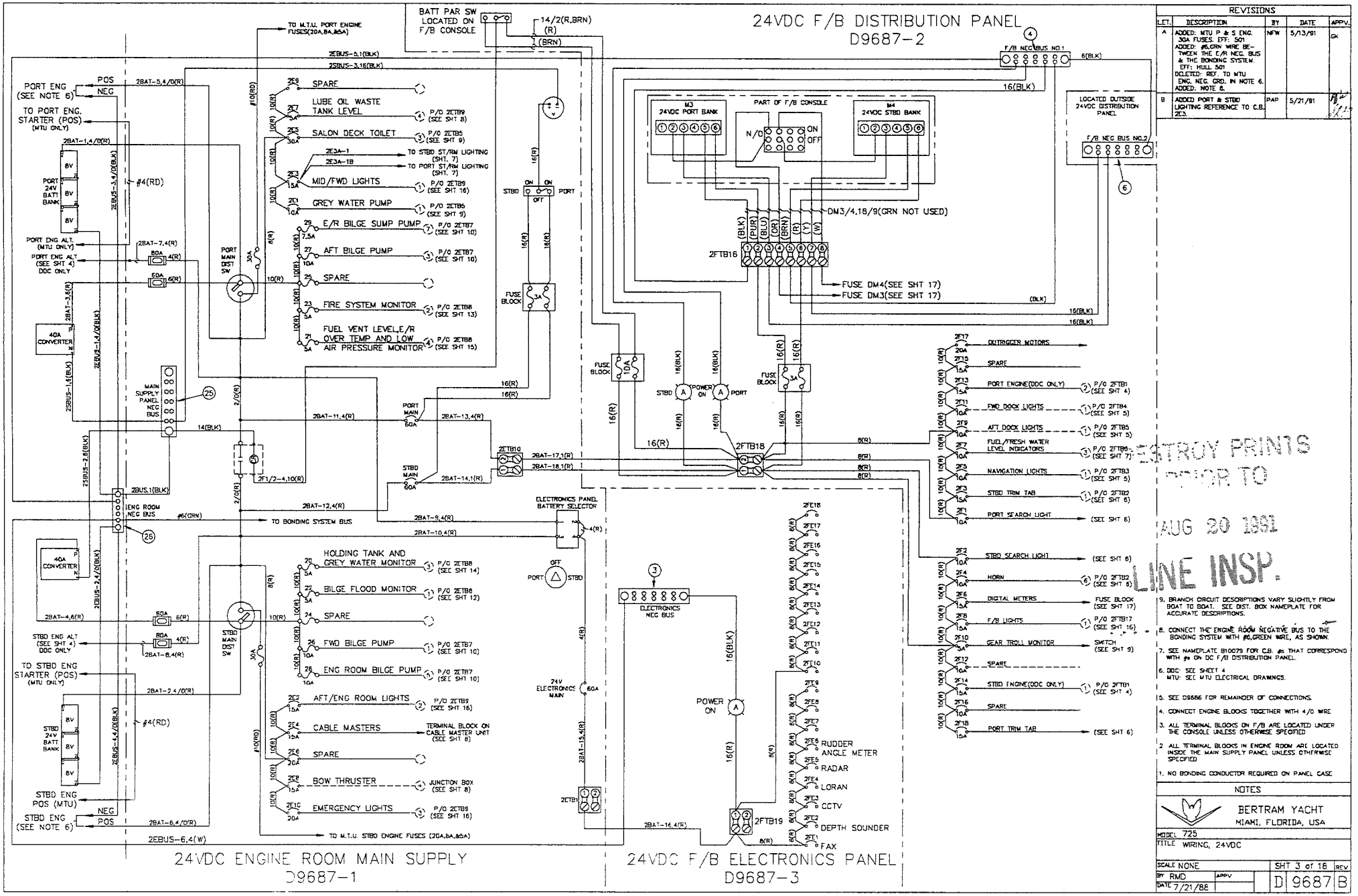
THE LIST OF MATERIALS ARE INCOMPLETE.

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING,24VDC

SCALE NONE | SHT 2 of 18 | REV.
BY RWD | APPV | DATE 1/13/88 | DATE | D | 9687



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.
A	ADDED: MTU P & S ENG. 30A FUSES. EFF: 501 ADDED: #6GRN WIRE BETWEEN THE E/R NEG. BUS & THE BONDING SYSTEM. EFF: HULL 501 DELETED: REF. TO MTU ENG. NEG. GRD. IN NOTE 6. ADDED: NOTE 8.	NFW	5/13/91	GK
B	ADDED PORT & STBD LIGHTING REFERENCE TO C.B. #'S.	PAP	5/21/91	

DESTROY PRINTS PRIOR TO AUG 20 1991 LINE INSP.

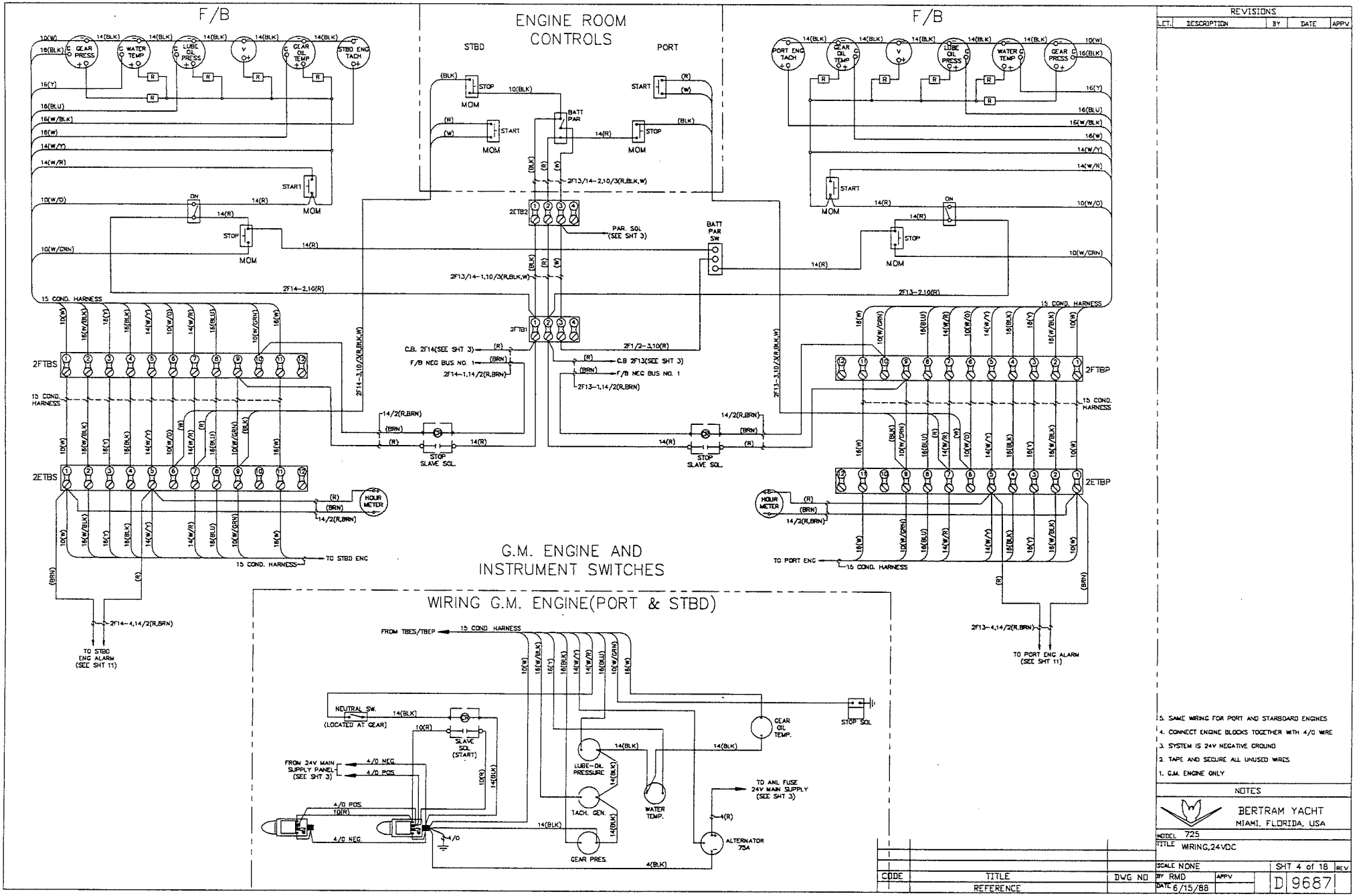
9. BRANCH CIRCUIT DESCRIPTIONS VARY SLIGHTLY FROM BOAT TO BOAT. SEE DIST. BOX NAMEPLATE FOR ACCURATE DESCRIPTIONS.
8. CONNECT THE ENGINE ROOM NEGATIVE BUS TO THE BONDING SYSTEM WITH #6,GREEN WIRE, AS SHOWN.
7. SEE NAMEPLATE B10079 FOR C.B. #'s THAT CORRESPOND WITH #'s ON DC F/B DISTRIBUTION PANEL.
6. DDC: SEE SHEET 4
MTU: SEE MTU ELECTRICAL DRAWINGS.
5. SEE D9686 FOR REMAINDER OF CONNECTIONS.
4. CONNECT ENGINE BLOCKS TOGETHER WITH 4/0 WIRE
3. ALL TERMINAL BLOCKS ON F/B ARE LOCATED UNDER THE CONSOLE UNLESS OTHERWISE SPECIFIED
2. ALL TERMINAL BLOCKS IN ENGINE ROOM ARE LOCATED INSIDE THE MAIN SUPPLY PANEL UNLESS OTHERWISE SPECIFIED
1. NO BONDING CONDUCTOR REQUIRED ON PANEL CASE

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 24VDC

SCALE NONE	SHT 3 of 18	REV
BY RMD APPV	D 9687	B
DATE 7/21/88		



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV

5. SAME WIRING FOR PORT AND STARBOARD ENGINES
4. CONNECT ENGINE BLOCKS TOGETHER WITH 4/0 WIRE
3. SYSTEM IS 24V NEGATIVE GROUND
2. TAPE AND SECURE ALL UNUSED WIRES
1. G.M. ENGINE ONLY

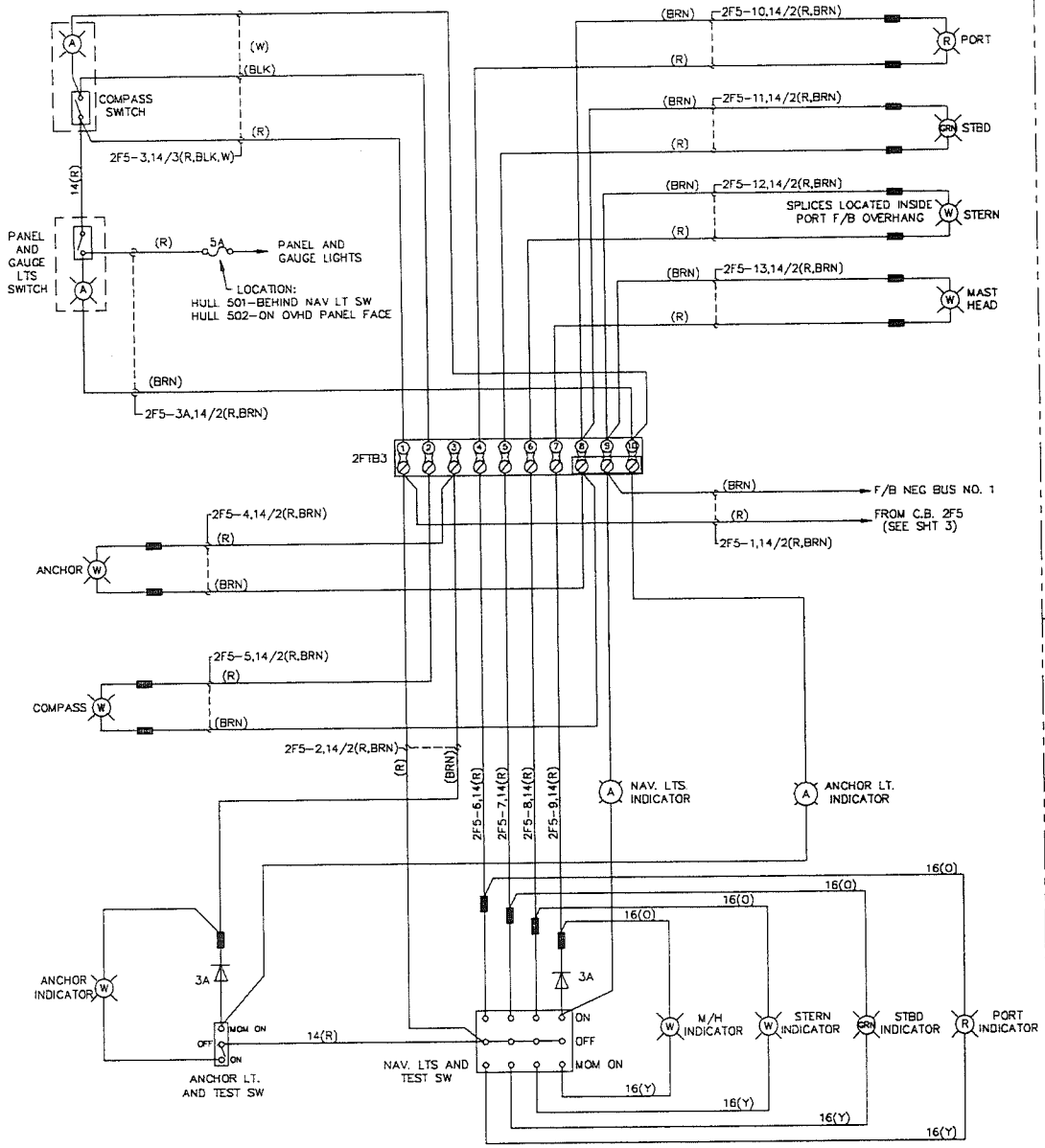
NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

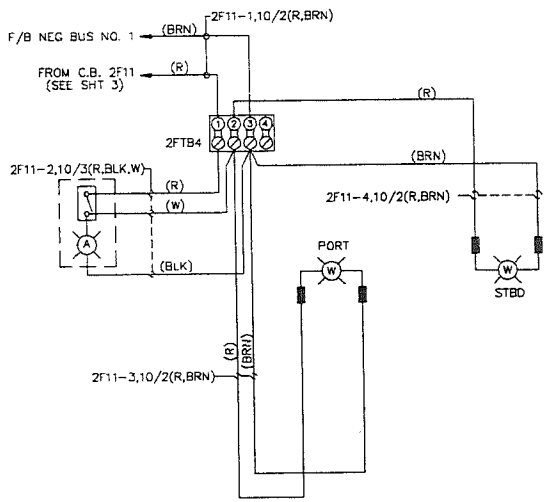
MODEL 725
TITLE WIRING,24VDC

CODE	TITLE	DWG NO
	REFERENCE	

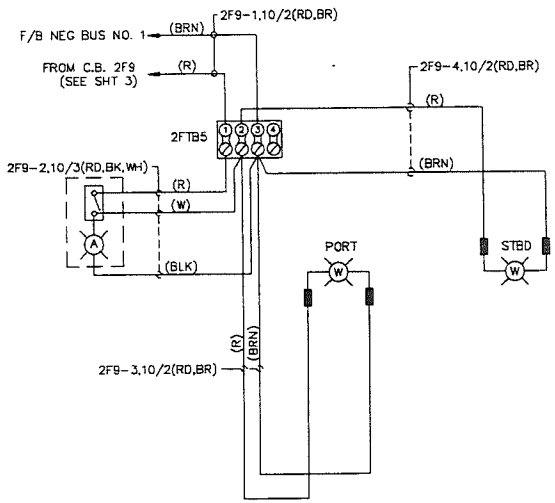
SCALE NONE
SHT 4 of 18
REV
BY RMD
APPV
DATE 6/15/88
D 9687



NAVIGATION LIGHTS
D9687-5



FWD DOCKING LIGHTS
D9687-6



AFT DOCKING LIGHTS
D9687-7

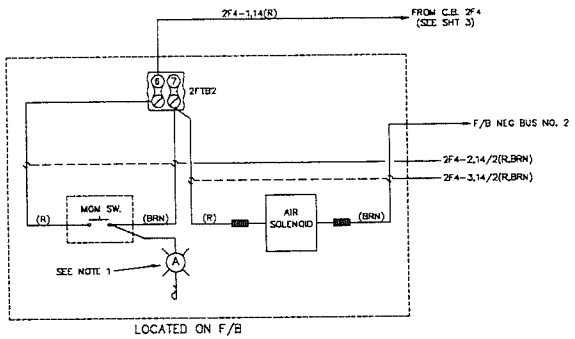
REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV.

1. ALL SWITCHES AND INDICATORS ARE LOCATED ON F/B OVERHEAD CONSOLE.

NOTES

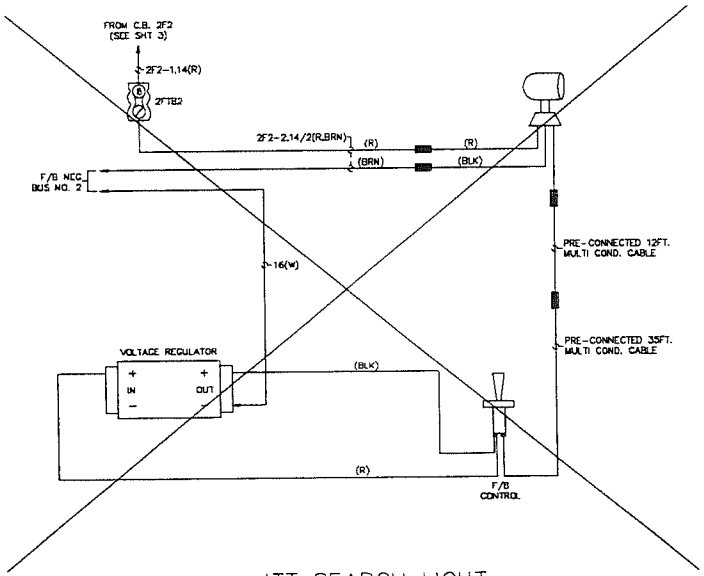
BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 24VDC
SCALE NONE
SHT 5 of 18
REV
BY RMD
APPV
DATE 2/24/88
D 9687

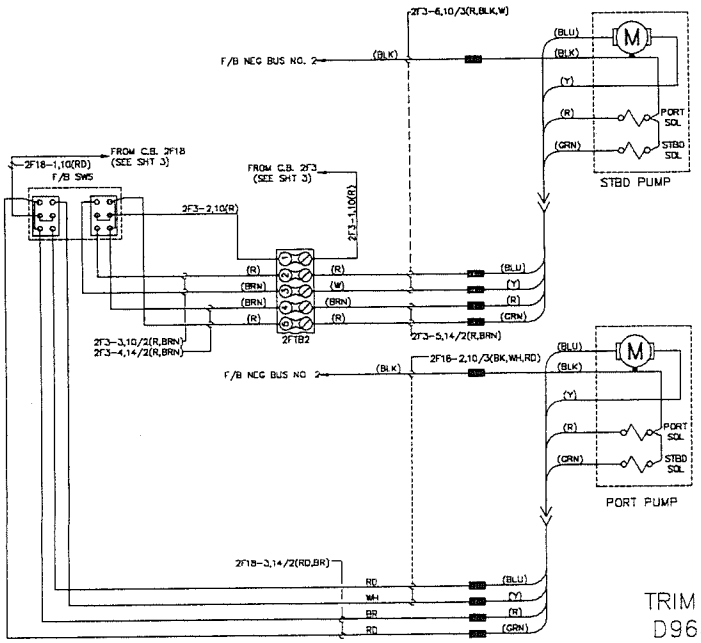


NOTE:
1. TERMINAL "RED" ON LIGHTED TOGGLE SWITCH NOT CONNECTED.

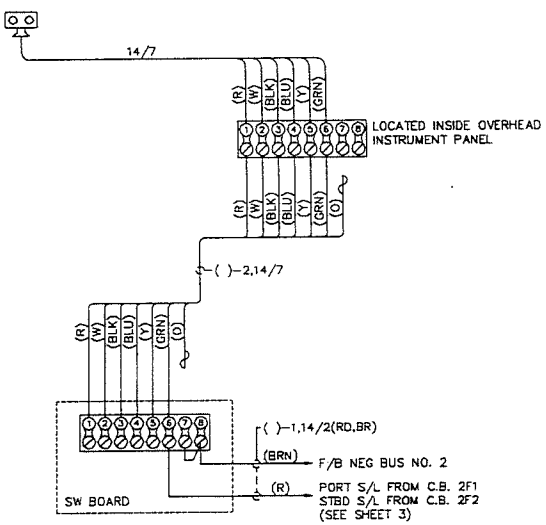
HORN
D9687-8



ITT SEARCH LIGHT
D9687-10



TRIM TABS
D9687-9



ACR SEARCH LIGHT
D9687-11

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.

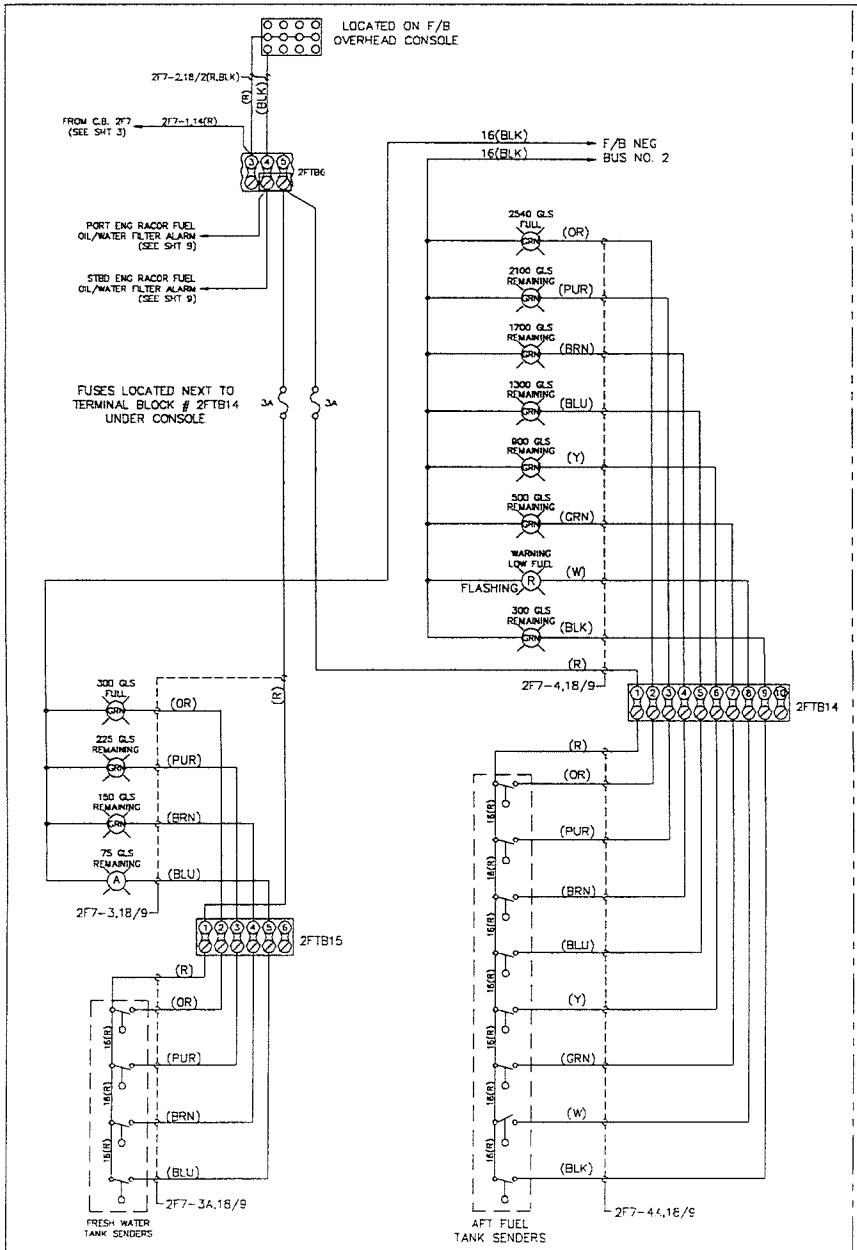
1. TERMINAL "RED" ON LIGHTED TOGGLE SWITCH NOT CONNECTED

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

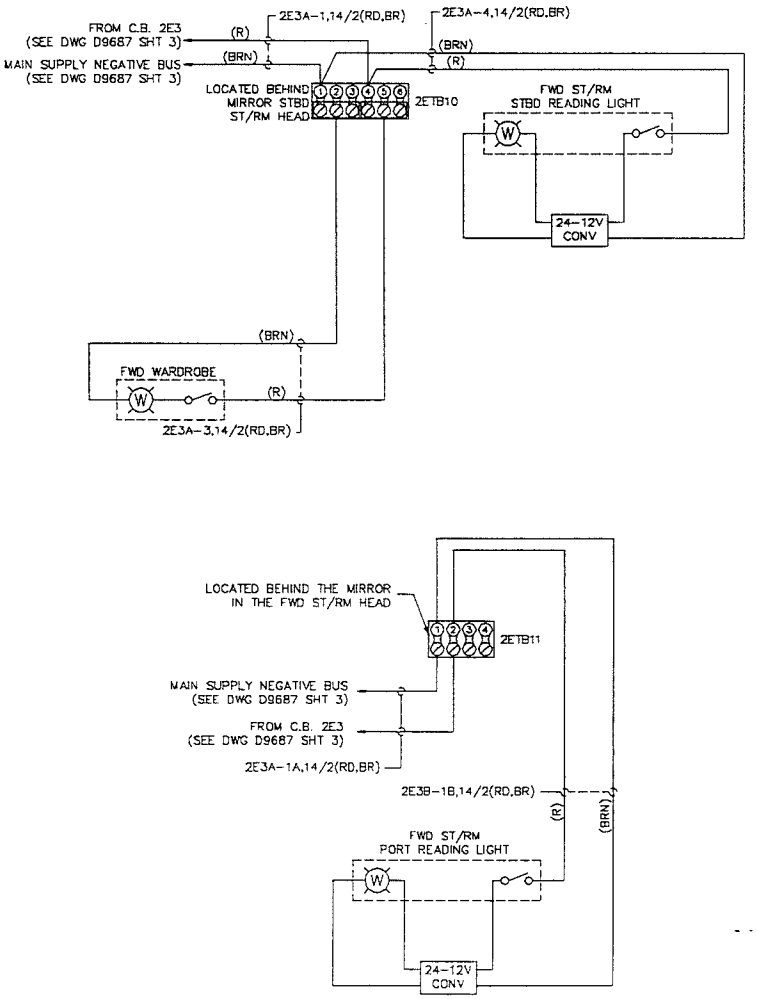
MODEL 725
TITLE WIRING, 24VDC

SCALE NONE		SHT 6 of 18	REV.
BY RMD	APPV.	D 9687	
DATE 4/11/88	DATE		



FUEL/FRESH WATER LEVEL INDICATORS
D9687-12

LIGHTING, 24VDC



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.
A	ADDED LIGHTING CIRCUIT	PAP	5/21/91	

NOTES

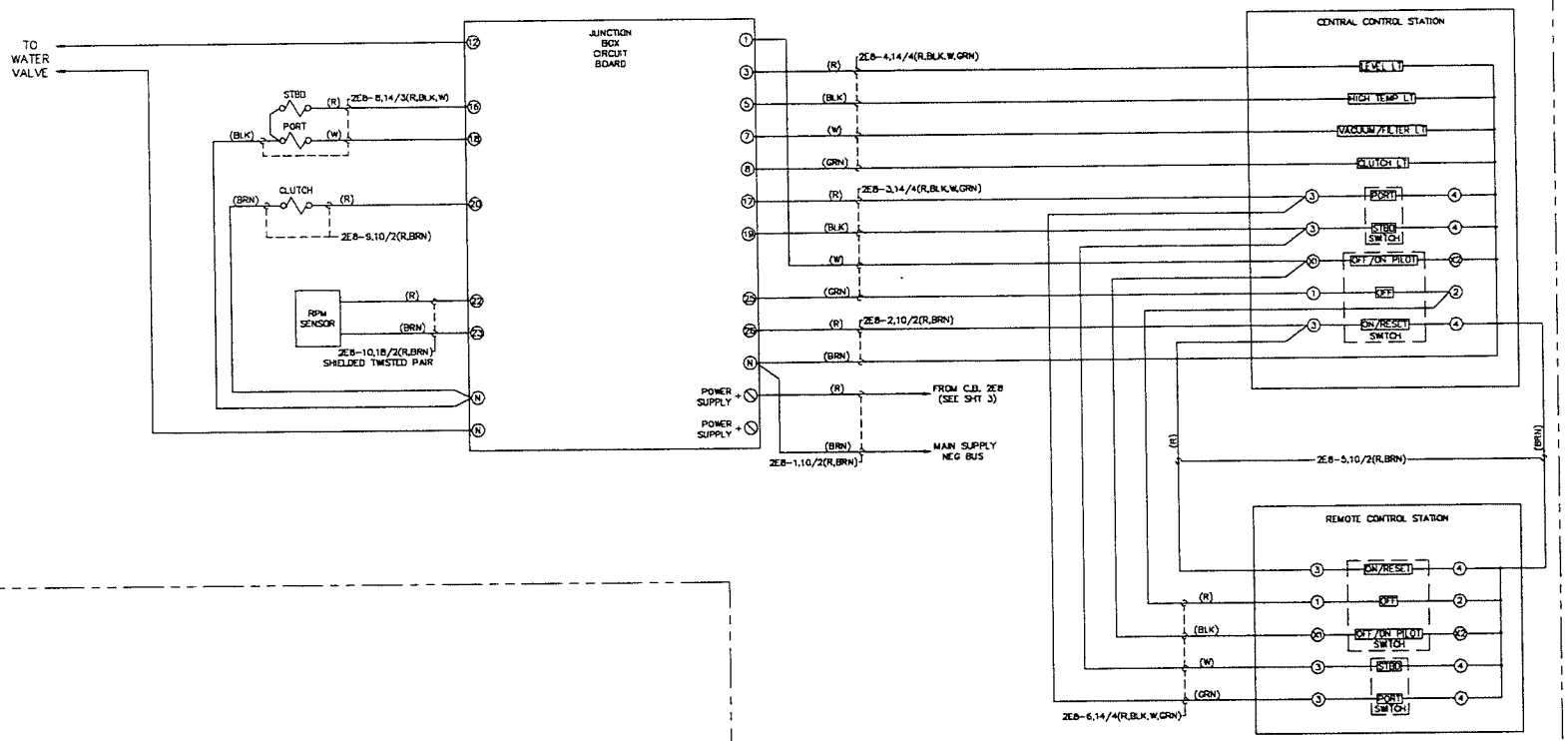
BERTRAM YACHT
MIAMI, FLORIDA, USA

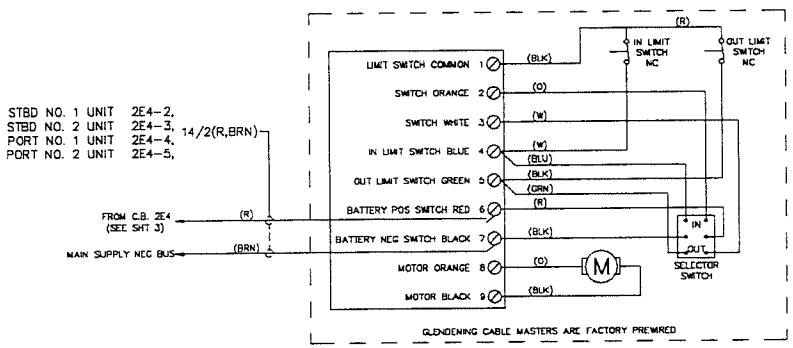
MODEL 725
TITLE WIRING, 24VDC

REF	LIGHT,FIXTURES & CONTROLS SPECS, 725-501	S303.36
CODE	TITLE REFERENCE	DWG NO

SCALE NONE | SHT 7 of 18 | REV.
BY RWD | APPV | DATE 6/19/88 | DATE
D 9687 A

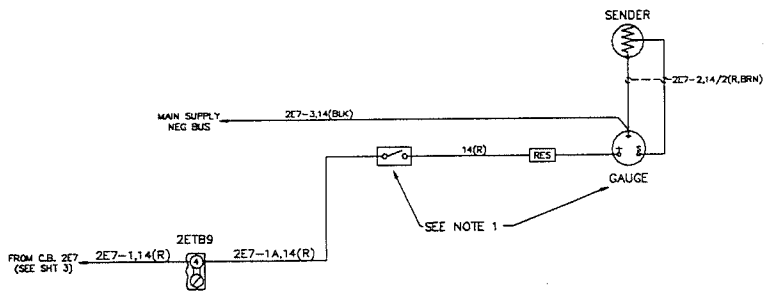
BOW THRUSTER
D9687-15





CABLE MASTER
D9687-16

NOTE:
1. FUSEBLOCKS LOCATED INSIDE 24VDC E/R BOX.



LUBE OIL WASTE TANK LEVEL
D9687-17

NOTE:
1. SWITCH AND METER LOCATED ON 24VDC E/R PANEL.

REVISIONS

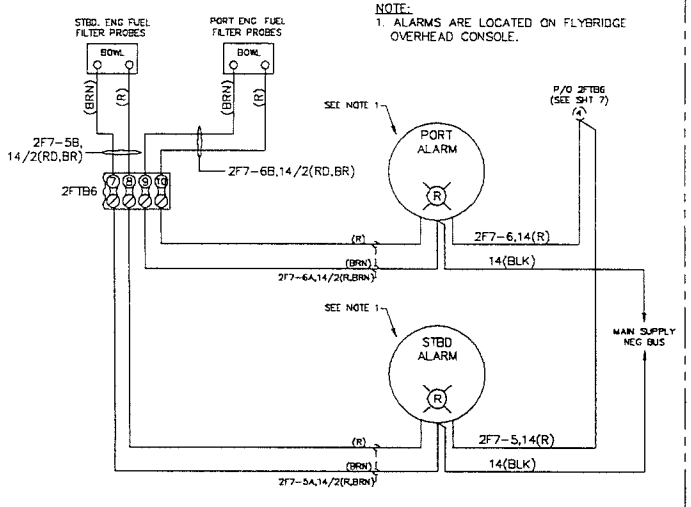
LET.	DESCRIPTION	BY	DATE	APPV.

NOTES

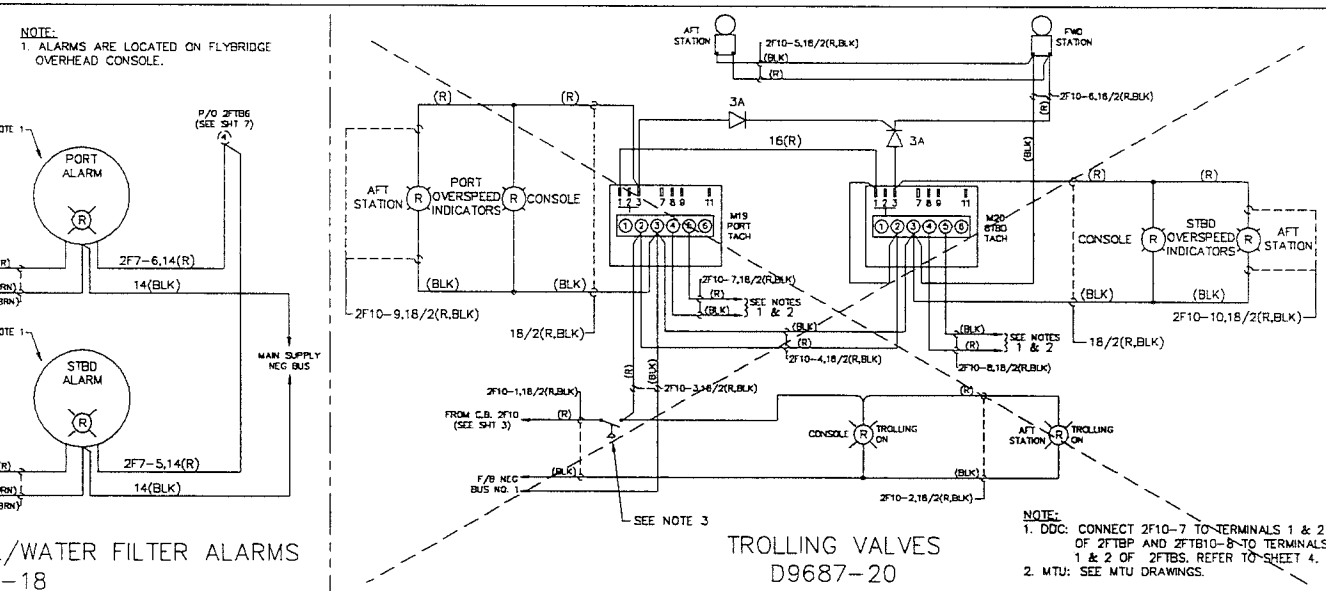
BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 24VDC

SCALE NONE		SHT 8 of 18	REV
BY RMD	APPV	D 9687	
DATE 8/10/88	DATE		

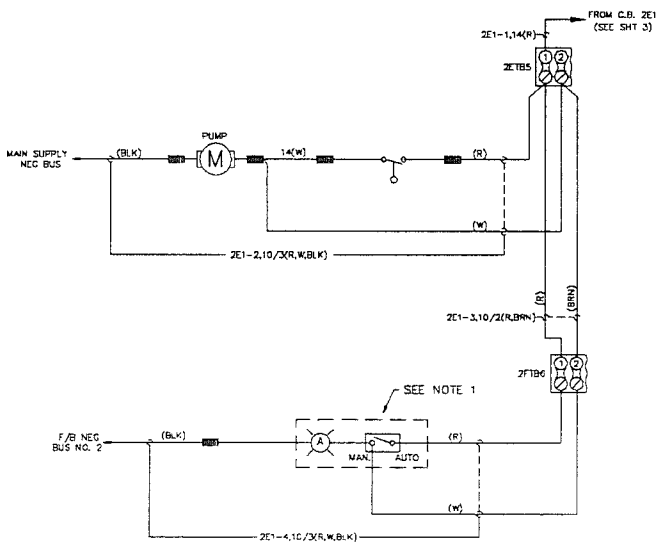


P&S ENG RACOR FUEL OIL/WATER FILTER ALARMS
D9687-18



TROLLING VALVES
D9687-20

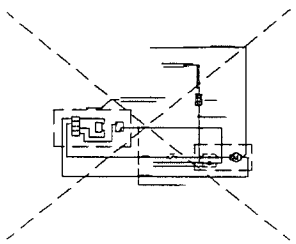
NOTE:
1. DDC: CONNECT 2F10-7 TO TERMINALS 1 & 2 OF 2FTBP AND 2FTB10-8 TO TERMINALS 1 & 2 OF 2FTBS. REFER TO SHEET 4.
2. MTU: SEE MTU DRAWINGS.
3. AIR SWITCH LOCATED IN F/B.



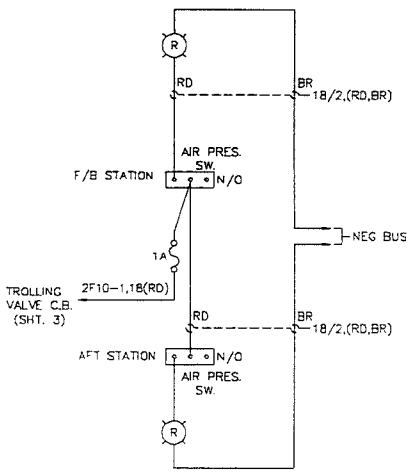
GREY WATER PUMP
D9687-19

NOTE:
SWITCH IS LOCATED NEXT TO GREY WATER ALARM INDICATORS.

SALON DECK TOILET
D9687-21



TROLLING VALVE



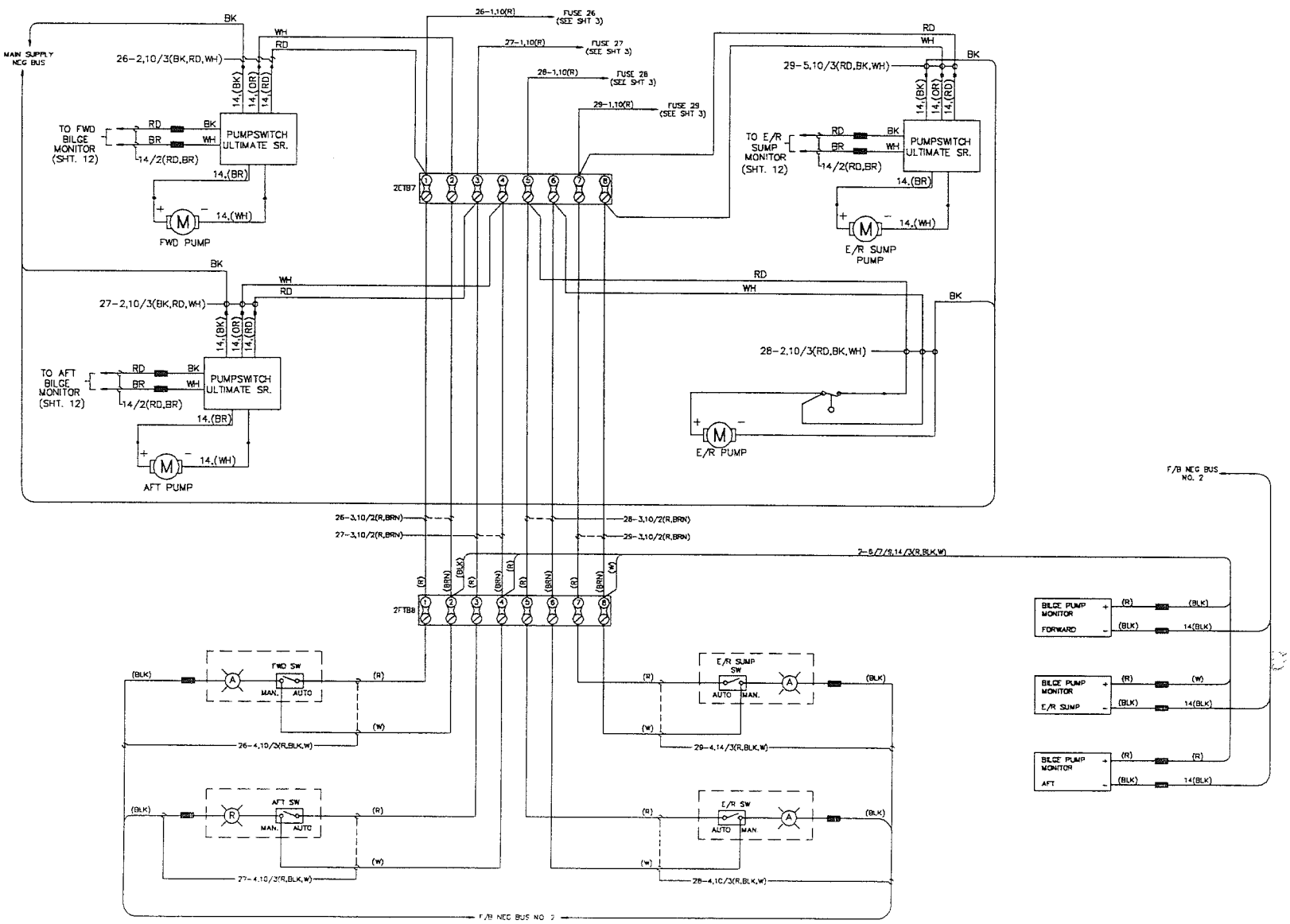
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV
A	DELETED TROLLING VALVES & SALON DECK TOILET ADDED TROLLING VALVE FOR HULL #502 EFF. HULL 502	PAP	5/16/91	

DESTROY PRINTS PRIOR TO AUG 20 1991 LINE INSP.

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 24VDC
SCALE NONE
SHT 9 of 18
REV
BY RMD
APPV
DATE 5/24/88
DATE
D 9687 A



BILGE PUMPS AND MONITORS
D9687-22

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.
A	ADDED MONITOR REFERENCES. EFF. HULL #502	PAP	5/20/91	

DESTROY PRINTS PRIOR TO AUG 20 1991

LINE NO.

1. BILGE PUMP MONITORS ARE LOCATED ON F/B OVERHEAD CONSOLE.

NOTES

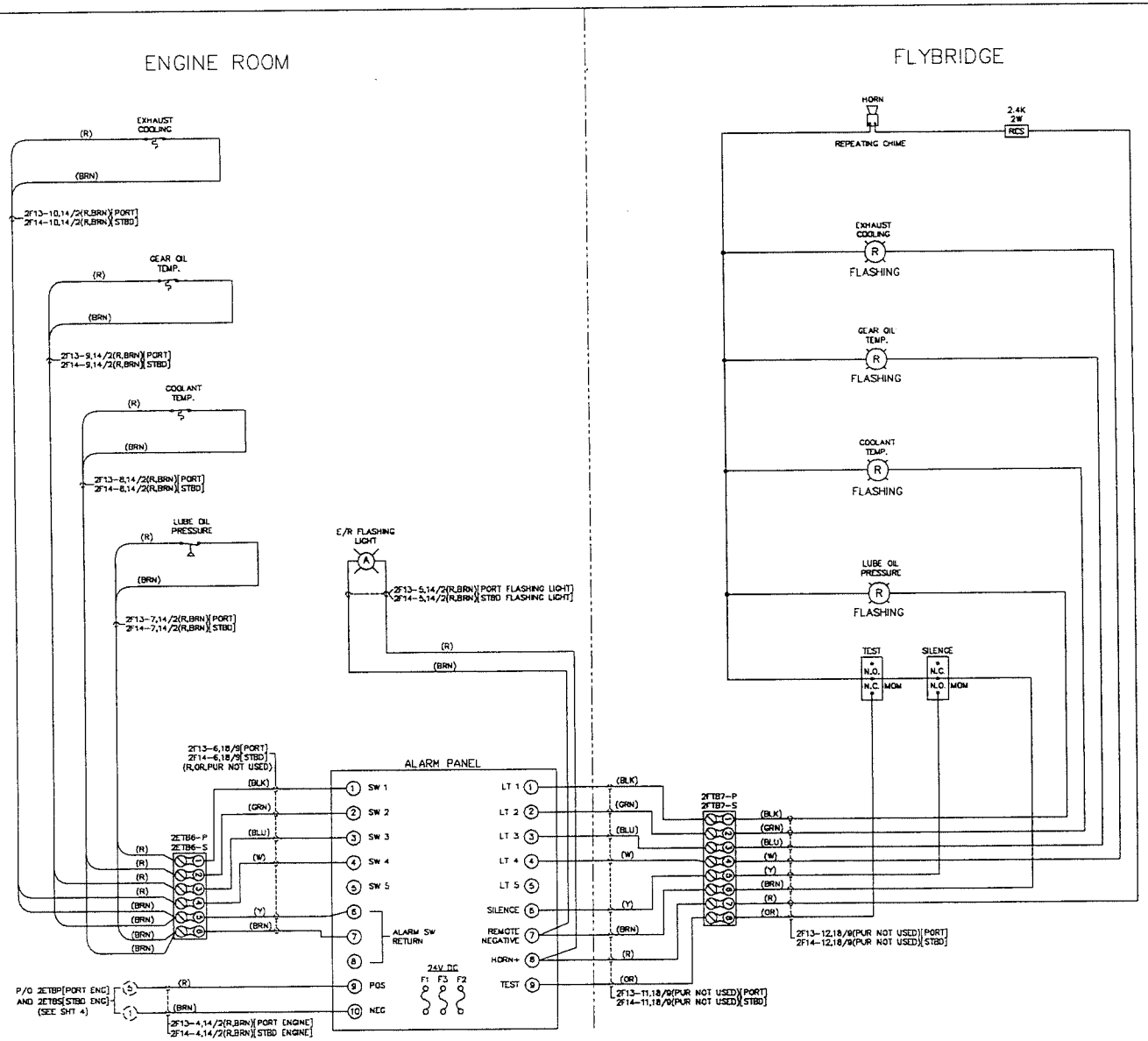
BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 24VDC

SCALE NONE | SHT 10 of 18 | REV

BY RMD | APPV | DATE 4/8/88 | APPV | DATE

D 9687 A



PORT AND STBD DDC ENGINE ALARM
D9687-23

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV

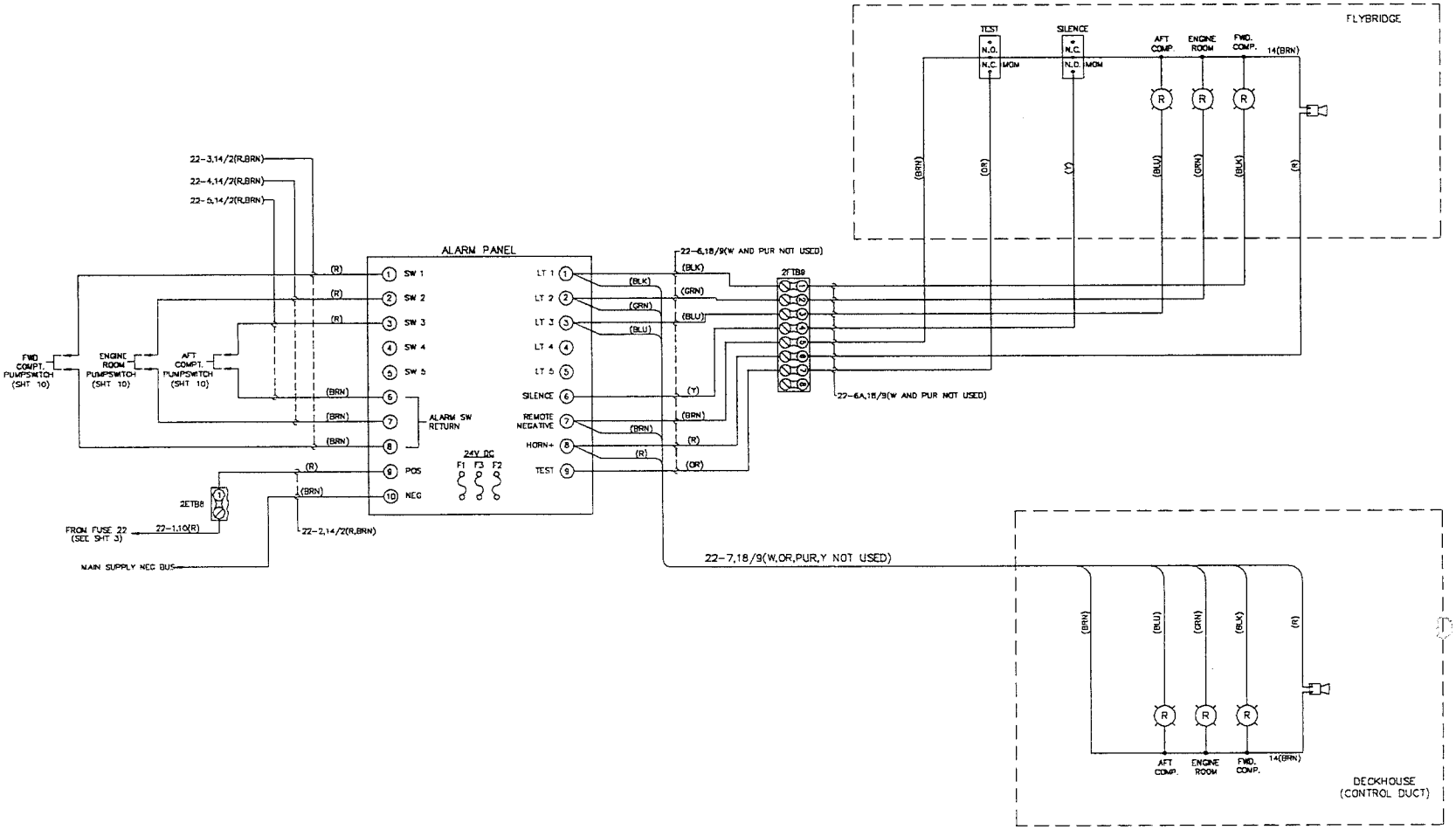
2. 2ETB6-P AND 2ETB6-S ARE LOCATED IN FRONT OF ENGINE
1. SYSTEM OPERATES NORMALLY CLOSED

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 24VDC
SCALE NONE
SHT 11 of 18
REV
BY RMD
APPV
DATE 4/12/88
DATE
D 9687

REVISIONS				
LTR	DESCRIPTION	BY	DATE	APPV
A	DELETED BILGE FLOAT SWITCHES. REMOVED INDICATOR LIGHTS. EFF. HULL #502	PAP	5/16/91	



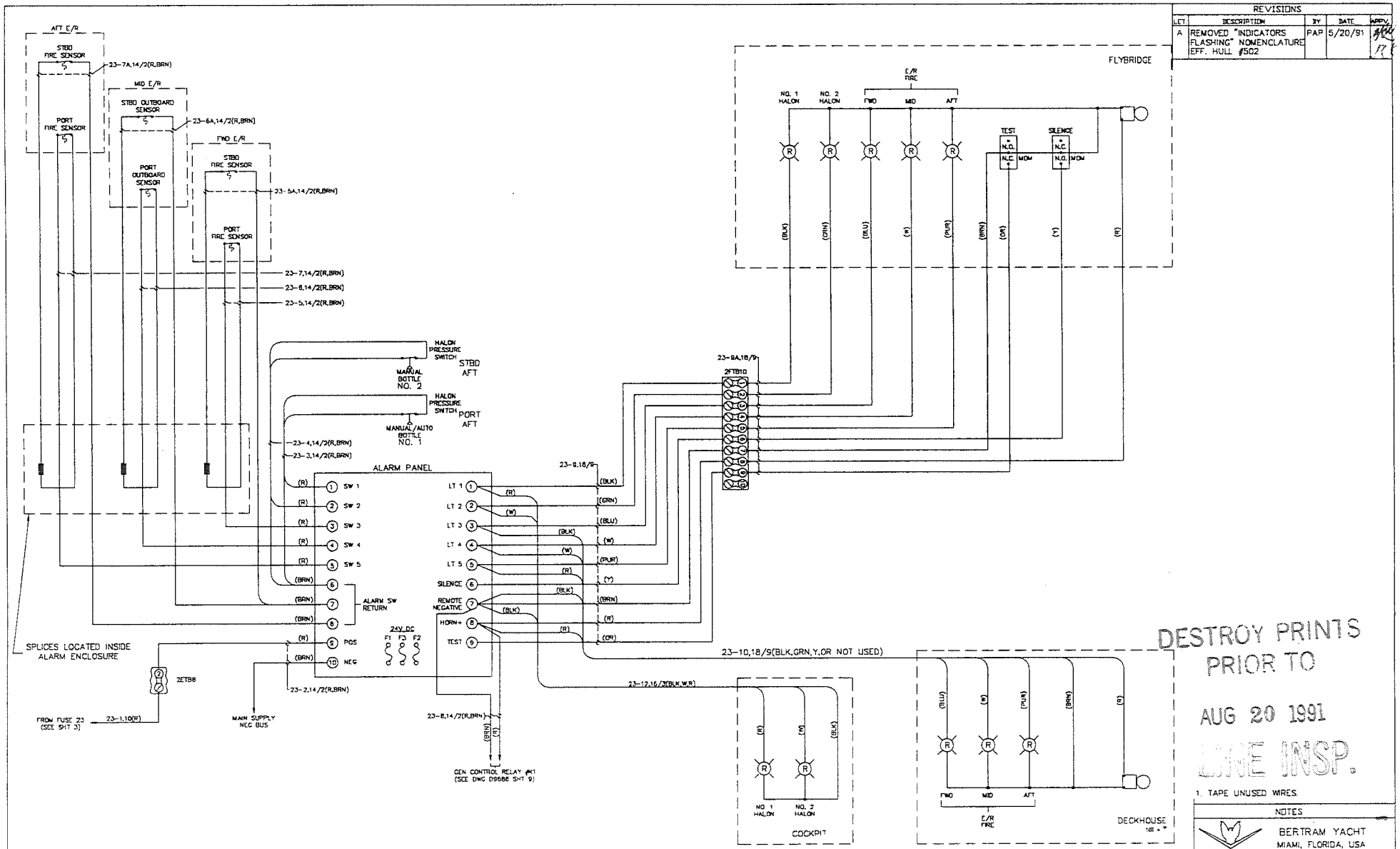
BILGE FLOOD MONITOR
D9687-24

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 24VDC

SCALE NONE | SHT 12 of 18 | REV
BY RMD | APPV | DATE 4/21/88
D 9687 A



FIRE SYSTEM MONITOR
D9687-25

REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV
A	REMOVED "INDICATORS FLASHING" NOMENCLATURE EFF. HULL #502	PAP	5/20/91	

DESTROY PRINTS PRIOR TO
AUG 20 1991
LINE INSP.

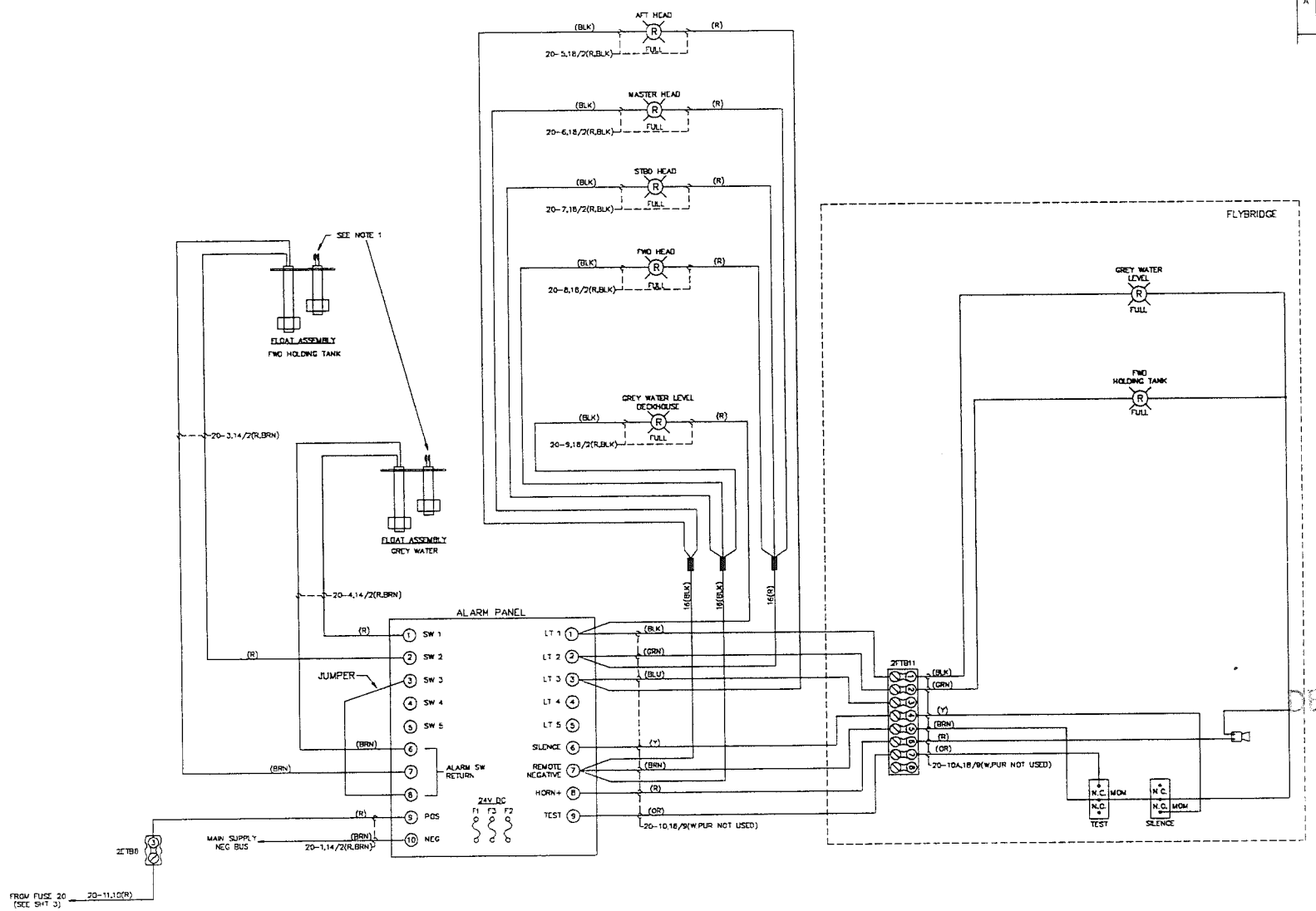
1. TAPE UNUSED WIRES.

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 24VDC
SCALE NONE
SHT 13 of 18
REV
BY RMD
APPV
DATE 4/21/88
DATE
D 9687 A

REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV
A	REMOVED AFT HOLDING TANK FLOAT & INDICATOR EFF HULL #502	PAP	5/20/91	



HOLDING TANK AND GREY WATER MONITOR
D9687-26

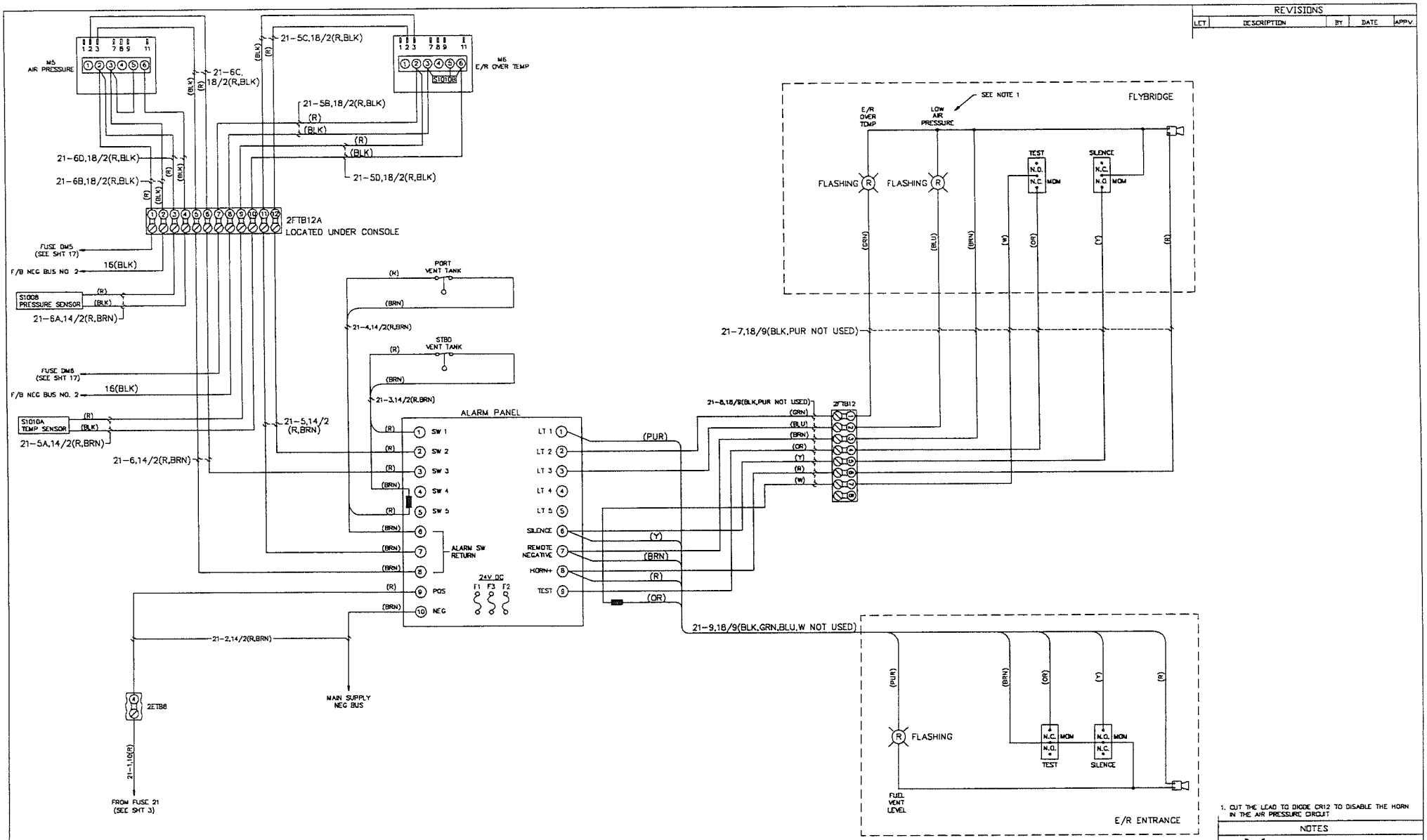
DESTROY PRINTS PRIOR TO AUG 20 1991

1. TAPE UNUSED WIRES

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

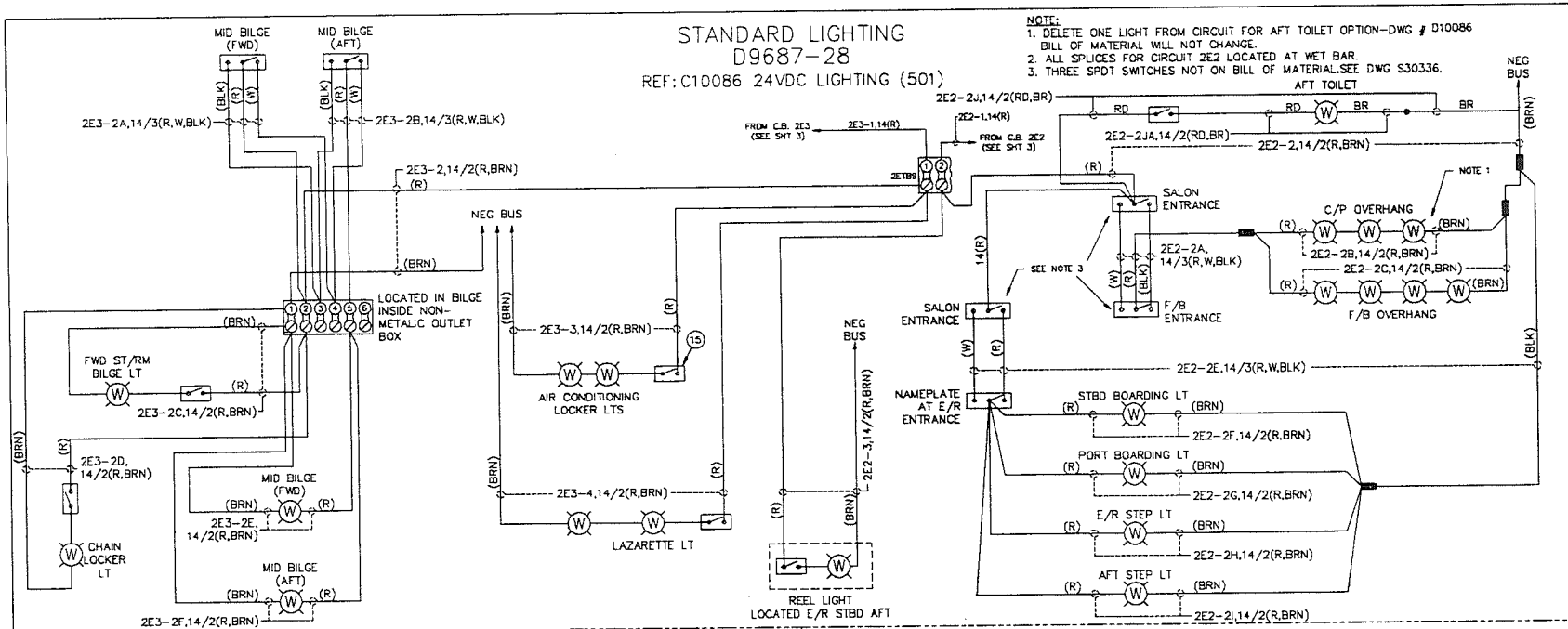
MODEL 725
TITLE WIRING, 24VDC
SCALE NONE
SHT 14 of 18
REV
BY RMD
APPV
DATE 5/15/88
DATE
D 9687 A

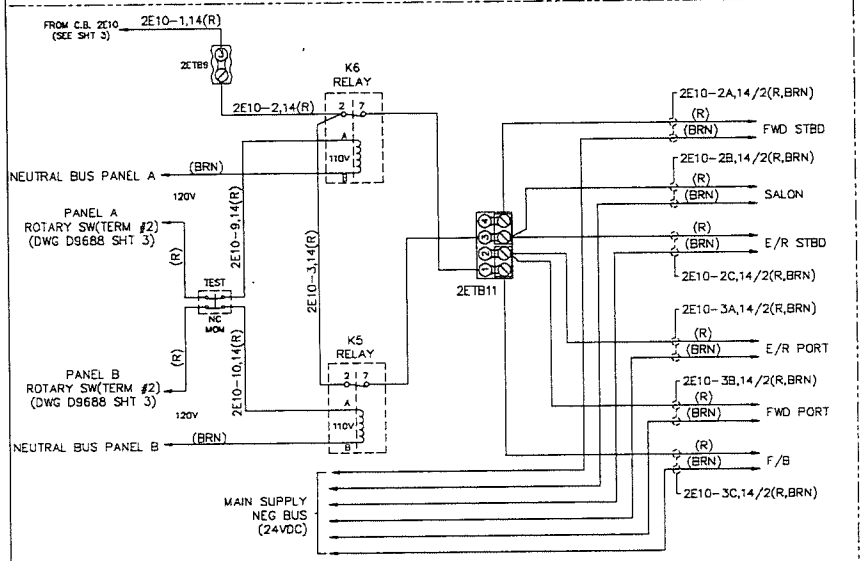


FUEL VENT LEVEL,E/R OVER TEMP AND LOW AIR PRESSURE MONITOR
D9687-27

STANDARD LIGHTING
D9687-28
REF: C10086 24VDC LIGHTING (501)

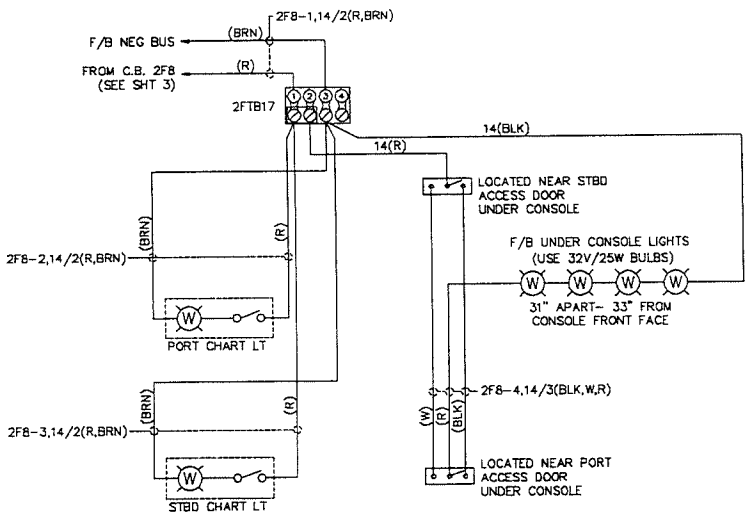
NOTE:
1. DELETE ONE LIGHT FROM CIRCUIT FOR AFT TOILET OPTION-DWG # D10086 BILL OF MATERIAL WILL NOT CHANGE.
2. ALL SPLICES FOR CIRCUIT 2E2 LOCATED AT WET BAR.
3. THREE SPDT SWITCHES NOT ON BILL OF MATERIAL. SEE DWG S30336.





NOTE
1. TEST SW FOR EMERGENCY LIGHTING IS LOCATED ON E/R AC DISTR. PANEL.
2. K5 & K6 RELAYS ARE LOCATED INSIDE 24VDC E/R BOX.

EMERGENCY LIGHTING
D9687-29



F/B LIGHTS
D9687-31

REVISIONS

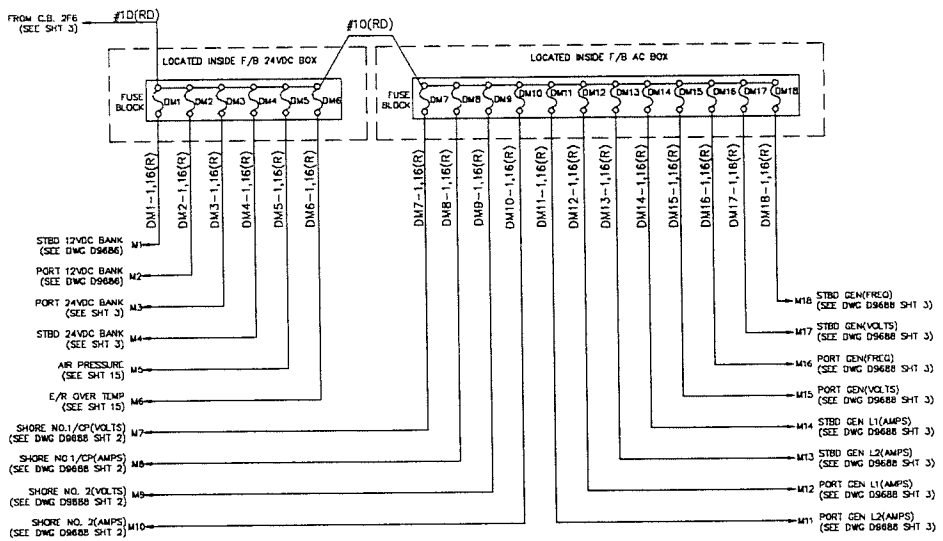
LET	DESCRIPTION	BY	DATE	APPV

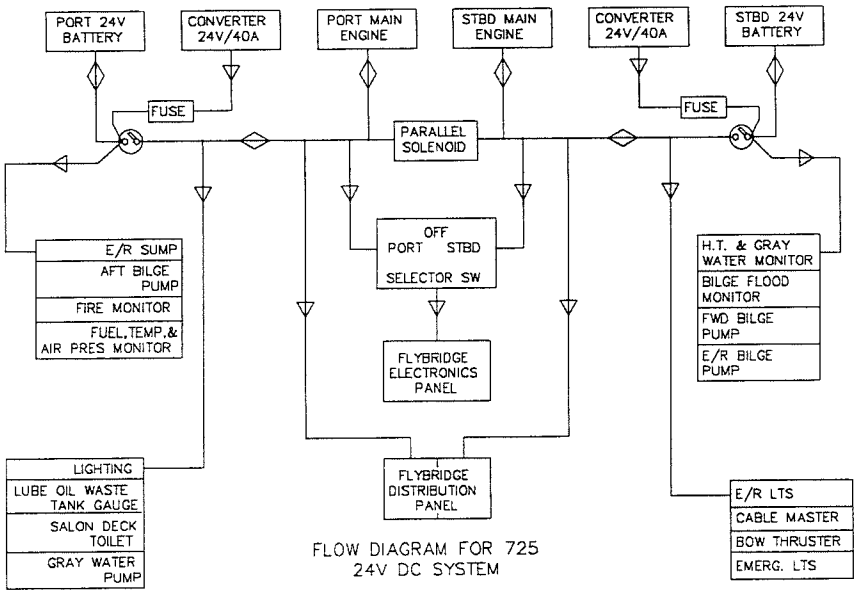
NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 24VDC
SCALE NONE
SHT 16 of 18
REV
BY RMD
APPV
DATE 7/21/88
DATE
D 9687

DIGITAL METERS
D9687-32





FLOW DIAGRAM FOR 725
24V DC SYSTEM

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

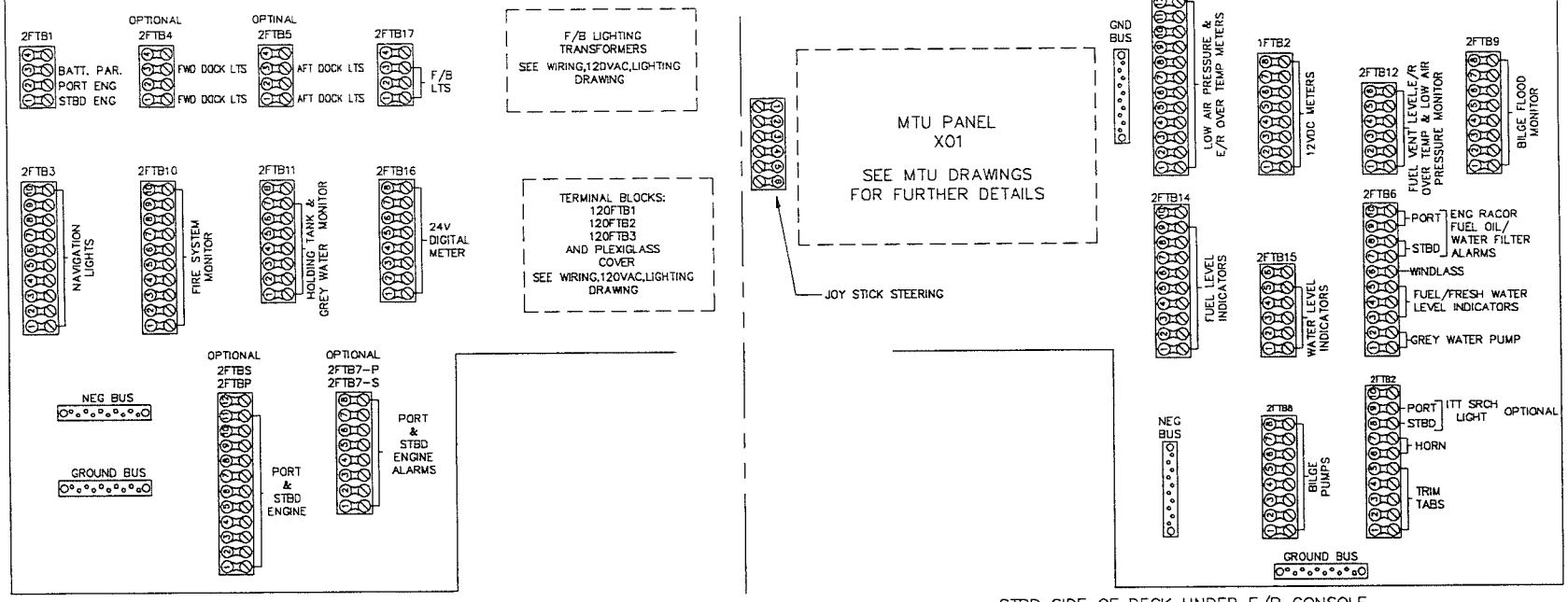
MODEL 725
TITLE WIRING, 24VDC

SCALE NONE | SHT 17 of 18 | REV

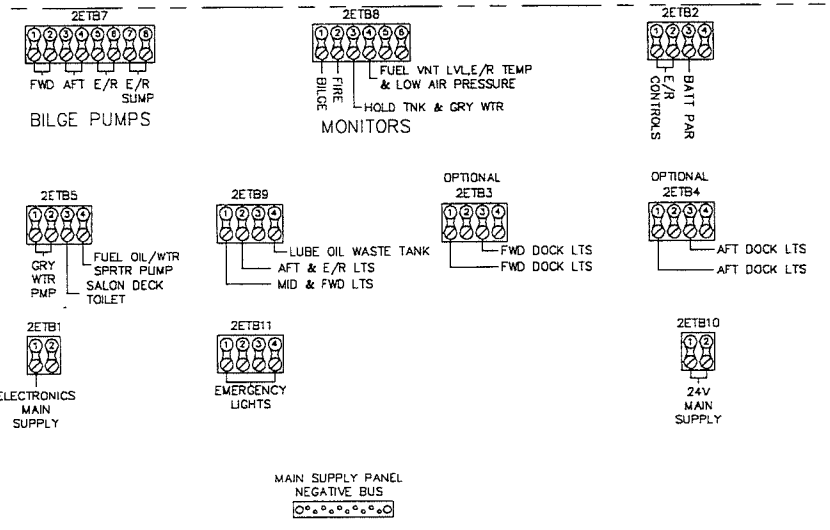
BY RMD | APPV | DATE 9/1/88 | DATE

D 9687

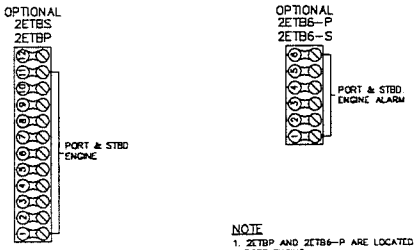
24V F/B TERMINAL BLOCK ARRANGEMENT



24V F/B DISTRIBUTION PANEL TERMINAL BLOCK ARRANGEMENT



24V E/R MAIN SUPPLY PANEL TERMINAL BLOCK ARRANGEMENT



NOTE
1. 2ETBP AND 2ETB6-P ARE LOCATED IN FRONT OF THE PORT ENGINE
2. 2ETBS AND 2ETB6-S ARE LOCATED IN FRONT OF THE STARBOARD ENGINE

24V E/R TERMINAL BLOCK ARRANGEMENT

REVISIONS

LET.	DESCRIPTION	BY	DATE	APPV.

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE 24VDC WIRING

SCALE NONE		SHT 18 of 18	REV
BY RMD	APPV	D 9687	
DATE 4/11/88	DATE		

SHORE POWER
D9688-1

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	1	STRIP,BARR,30A,4S	14021
2	EA	4	SHORE INLET,30A,125/250 63CM74	141269
3	EA	2	TRANSFORMER,50/SAMP,1T,3CT15	141507
4	EA	6	STRIP,BARR,70A,3S	141623
5	EA	5	STRIP,BARR,70A,2S	141624
6	EA	11	STRIP,MARKER,70A,1-3	141625
7	EA	2	GALVANIC ISOLATOR,MERC766644A1	141866
8	EA	6	FUSEBLOCK,2 GANG,20A,AGC	141892
9	EA	2	TRANSFORMER,240/120,50/60,1.5KV	141894
10	EA	1	STRIP,MARKER,30A,1-4	141917
11	EA	1	LIGHT,IND,AMBER,125V,S/16ID	142024
12	EA	4	LIGHT,IND,RED,LED,120V,1/4D	142025
13	EA	1	SWITCH,ROTARY,2POS,6P,W/OFF,MD	142026
14	EA	1	SWITCH,ROTARY,3POS,5P,W/OFF,MD	142027
15	EA	1	SWITCH,ROTARY,3POS,4P,W/OFF,MD	142028
16	EA	2	METER,VOLT,AC,LED,0-24VDC 4S1000	142033
17	EA	2	METER,AMP,AC,LED,0-50A,24VDC	142034
18	EA	5	BUSHING,INSULATING W/NUT,4IN.	142059
19	EA	5	CIR,BR,E,2P,AC,50A,N,1/4	142063
20	EA	2	CIR,BR,E,2P,AC,60A,N,1/4	142064
21	EA	1	CIR,BR,E,3POLE,W/O FRM	142065
22	EA	3	FUSEBLOCK,1 GANG,30A,AGC	142101
23	EA	1	SHORE INLET,30A,125,CPB 63CM72	14799
24	EA	15	FUSE,3A,1/4X1-1/4 AGC-3	14919
25	EA	1	NAMEPLATE,WARNING NEUTRAL BUS	14B9930
26	EA	2	BOX,PULL,ALUM,8X6X4	14C6378
27	EA	2	PANEL,TRANSFORMER SECONDARY MA	14C8238
28	EA	2	PANEL,SHORE INLET BR,2-2PC	14C8239
29	EA	1	BRACKET,E/R BOX RAIL,725	14C9837
30	EA	1	BRACKET,E/R BOX RDT,725,RH	14C9838-1
31	EA	1	BRACKET,E/R BOX RDT,725,LH	14C9838-2
32	EA	1	PANEL,SHORE,120,2PCBC/INLET 50	14C9839
33	EA	1	ANGLE,SUPPORT,RAIL,725	14C9848
34	EA	3	BOX,PULL,ALUM,10X8X4	14D6377
35	EA	1	BOX,DIST,47.68X42X12,725	14D9726
36	EA	1	FRAME,PANEL,L.H,725	14D9727-1
37	EA	2	FRAME,PANEL,RH,725	14D9727-2
38	EA	1	BOX,DIST,28.5X20X8,725	14D9754
39	EA	1	FRAME,PANEL FACE,28.87X20.37	14D9755
40	EA	1	PANEL,DIST,ACE/R,RH,725	14D9810
41	EA	1	PANEL,DIST,ACE/R,LH,725	14D9811
42	EA	1	NAMEPLATE,TB ARRANG,AC BOX,725	14D9846
43	EA	1	PANEL,AC DIST,F/B,725	14E9812
44	EA	4	SCREW,300/500 THICK SS SLOTT.	50883
45	EA	4	WASHER,RETAINER,ALUM,#12 46	50884
46	EA	AR	TIE,CABLE,ADHESIVE MOUNT	23090
47	EA	2	CONNECTOR,MULTIPLE LINE,4 POLE	14980
48	EA	1	FRAME,CB RAIL SUPPORT,725	14C9986
49	EA	1	NAMEPLATE,PANEL AC DIST,F/B 725-501	14C10093

SHORE/GENERATOR POWER
D9688-2

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	3	STRIP,BARR,30A,4S	14021
2	EA	2	TRANSFORMER,150/SAMP,1T,3CT115	141196
3	EA	1	BLOCK,TERM,3POLE,SCREW,90A KUL	141519
4	EA	4	STRIP,BARR,70A,3S	141623
5	EA	4	STRIP,MARKER,70A,1-3	141625
6	EA	2	BUS,GROUND,W/O TABS	14163
7	EA	8	STRIP,BARR,70A,JUMPER 604J	141664
8	EA	2	FUSEBLOCK,2 GANG,20A,AGC	141892
9	EA	3	STRIP,MARKER,30A,1-4	141917
10	EA	2	SWITCH,ROTARY,4POS,3P,W/OFF,MD	142029
11	EA	2	METER,VOLT,AC,LED,24VDC 4S1000	142033
12	EA	2	METER,AMP,AC,LED,0-100A,24VDC	142035
13	EA	2	METER,AMP,AC,LED,0-150A,24VDC	142036
14	EA	2	METER,FREQ,LED,24VDC INPUT	142037
15	EA	3	INSULATOR,CABLE,3/8 BOLT	142061
16	EA	2	CIR,BR,3,2P,AC,20A,RAIL MOUNT	142075
17	EA	2	TRANSFORMER,100/SAMP,2T 3CT21	14814
18	EA	4	FUSE,3A,1/4X1-1/4 AGC-3	14919
19	EA	1	NAMEPLATE,PANEL C2 INSULAT BUS	14A7296-10
20	EA	1	NAMEPLATE,NO. 1 GROUND BUS	14A7296-11
21	EA	1	NAMEPLATE,NO. 2 GROUND BUS	14A7296-12
22	EA	1	NAMEPLATE,PANEL A INSULAT BUS	14A7296-7
23	EA	2	BUS,INSUL,2 EA 3/8&4 EA 1/4	1486495

AC DISTRIBUTION
D9688-3

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	2	STRIP,BARR,30A,4S	14021
2	EA	3	STRIP,BARR,30A,8S	14022
3	EA	11	STRIP,BARR,70A,2S	141624
4	EA	11	STRIP,MARKER,70A,1-3	141625
5	EA	8	STRIP,BARR,70A,JUMPER 604J	141664
6	EA	2	STRIP MARKER,30A,1-12	141678
7	EA	7	STRIP,BARR,30A,6S	141679
8	EA	2	STRIP,MARKER,30A,1-4	141917
9	EA	7	STRIP,MARKER,30A,1-6	141918
10	EA	8	LIGHT,IND,AMBER,125V,S/16ID	142024
11	EA	2	SWITCH,ROTARY,3POS,6P,W/OFF,MD	142030
12	EA	7	CIR,BR,3,2P,AC,5A,RAIL MOUNT	142072
13	EA	2	CIR,BR,3,2P,AC,7.5A,RAIL MOUNT	142073
14	EA	3	CIR,BR,,B,2P,AC,10A,RAIL MOUNT	142074
15	EA	4	CIR,BR,3,2P,AC,20A,RAIL MOUNT	142075
16	EA	20	CIR,BR,3,1P,AC,15A,RAIL MOUNT	142076
17	EA	10	CIR,BR,3,1P,AC,20A,RAIL MOUNT	142077
18	EA	4	CIR,BR,,B,2P,AC,30A,RAIL MOUNT	142079
19	EA	13	CIR,BR,,B,2P,AC,15A,RAIL MOUNT	142080
20	EA	3	CIR,BR,3,2P,AC,40A,RAIL MOUNT	142081
21	EA	4	FUSEBLOCK,1 GANG,30A,AGC	142101
22	EA	2	STRIP,BARR,30A,12S	14659
23	EA	4	FUSE,3A,1/4X1-1X4 AGC-3	14919
24	EA	1	NAMEPLATE,PANEL B INSULAT BUS	14A7296-8
25	EA	1	NAMEPLATE,PANEL C1 INSULAT BUS	14A7296-9
26	EA	2	BUS,INSUL,2 EA 3/8&4 EA 1/4	14B6495
27	EA	3	STRIP,MARKER,30A,1-8	14S30017
28	EA	1	NAMEPLATE,E/R AC PANEL A	14C9954-1
29	EA	1	NAMEPLATE,E/R AC PANEL B	14C9954-2
30	EA	1	NAMEPLATE,E/R AC PANEL C	14C9954-3
31	EA	1	NAMEPLATE,E/R AC PANEL D	14C9954-4

C-80 INTERCONNECTION
D9688-4

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	6	LIGHT,IND,AMBER,250V,S/16D	142023
2	EA	1	SWITCH,ROTARY,6POS,2P,N/OF,CI	142060
3	EA	1	NAMEPLATE,1X.5X.125,PHENOLIC	14S30361-1

TELEPHONE SYSTEM
D9688-7

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	1	TELEPHONE SYSTEM,725	14S30351
2	EA	AR	WIRE,#22/4 SHIELDED	13161
3	EA	2	TELEPHONE INLET,CHR,PH6594	141522

WINDLASS
D9688-8

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	1	BOX,ELECTRIC,PVC,12X12X4	142171

ENGINE ROOM OUTLETS/LTS
D9688-12

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	2	BOX,OUTLET,NON-MET,2-3/4 DEEP	141596
2	EA	2	WALLPLATE,WP,GFCI,LEV 6196	141654
3	EA	2	OUTLET,WALL,DUPLEX,GFI,WHITE	141752
4	EA	1	SWITCH,SPDT ON/NON/ON	141782
5	EA	5	LIGHT,FLRSNT,120V,ENGINE ROOM	142022
6	EA	1	BULB,LT,120V,20W,FLU,F20T12CW	142031
7	EA	1	STRIP,BARR,30A,6S	141679
8	EA	1	STRIP,MARKER,30A,1-6	141918
9	EA	1	LIGHT,ENG ROOM,WHT,TUMA #18/81	141844

ENGINE ROOM BLOWERS
D9688-13

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	1	SOCKET,RELAY,OCTAL,PLS27C122	141946
2	EA	1	RELAY,DPDT,24VDC,8 PIN	142055
3	EA	2	RELAY,DPDT,120VAC,25A RATING	142062
4	EA	1	RETAINER,RELAY,GUARDIAN	142113
5	EA	2	STAND-OFF,FOR 142113/141946	142154

GENERATOR CONTROLS
D9688-14

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	1	STRIP,MARKER,30A,1-4	141917
2	EA	1	SOCKET,RELAY,OCTAL,PLS27C122	141946
3	EA	1	RELAY,DPDT,24VDC,8 PIN	142055
4	EA	1	STRIP,BARR,30A,4S	14021
5	EA	2	SWITCH SPDT ON/OFF/ON	14644
6	EA	2	LIGHT,IND AMBER,28V,S/16D	14653
7	EA	1	RETAINER,RELAY,GUARDIAN	142113
8	EA	2	STAND-OFF,FOR 142113/141946	142154

F/B DISTRIBUTION
D9688-15

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	3	STRIP,BARR,30A,4S	14021
2	EA	6	CIR BR. A,1P,AC,15A	141896
3	EA	8	CIR BR,A,2P,AC,15A,SH	141913
4	EA	1	CIR BR. A2P,AC,SA,SH	141904
5	EA	3	STRIP,MARKER,30A,1-4	141917
6	EA	4	FUSE,1/2A,1/4X1-1/4	14576
7	EA	1	FUSEBLOCK,2 GANG,20A,AGC	141892
8	EA	2	LIGHT,IND,AMBER,250V,S/16 DIA.	142023
9	EA	2	BUS,INSUL,2 EA 3/8&4 EA 1/4	1486495
10	EA	1	BUS,GROUND,W/O TABS	14163

STEREO & TV ANTENNA
D9688-19

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	AR	CABLE,COAX,75 OHM BELDEN9282	13118
2	EA	2	TELEPHONE INLET,CHR,PH6599	141522
3	EA	1	ANTENNA SYSTEM,TV/AUDIO,725	14S30312

PORT & STBD ENG BLOCK HEATER
D9688-20

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	FT	AR	CONDUIT,LT,3/8 GRY,UL	142173
2	FT	AR	CONDUIT,LT,3/4,GRY,UL	142174
3	EA	1	CONNECTOR,LT,3/8,STRAIGHT	142175
4	EA	1	CONNECTOR,LT,3/8,90 DEG	142176
5	EA	1	CONNECTOR,LT,3/4,90 DEG	142177

POWER WINDOWS
D9688-21

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	2	SWITCH,BLANK,ROCKER,BLK	141911
2	EA	1	PLATE,MOUNT,DBL,ROCKER SWITCH	14B9075-1

SALT WATER WASHDOWN
D9688-23

LIST OF MATERIAL

ITEM	U/M	QUAN	DESCRIPTION	B.Y.D. Nº
1	EA	1	BOX,OUTLET,NON-METALIC RA7487	14136
2	EA	1	WALLPLATE,SWITCH,WP,1795	141672
3	EA	1	SWITCH,WALL,TOG,DPST	141873
4	EA	1	LIGHT,IND,RED,250V,S/16	142169
5	EA	1	NAMEPLATE,PUMP,LT,VENT,725	14C9939

SHEET REVISION RECORD

SHT	1	2	3	4	5	6	7	8	9	10	11	12	13
REV#	A	–	–	–	–	–	–	A	A	–	A	–	–

REVISIONS

LET	DESCRIPTION	BY	DATE	APPV
A	ADDED REVISION RECORD	PAP	5/21/91	

STEP BOX PARTS FROM TO

AUG 20 19[illegible]

LINE INSP.

THE LIST OF MATERIALS ARE INCOMPLETE.

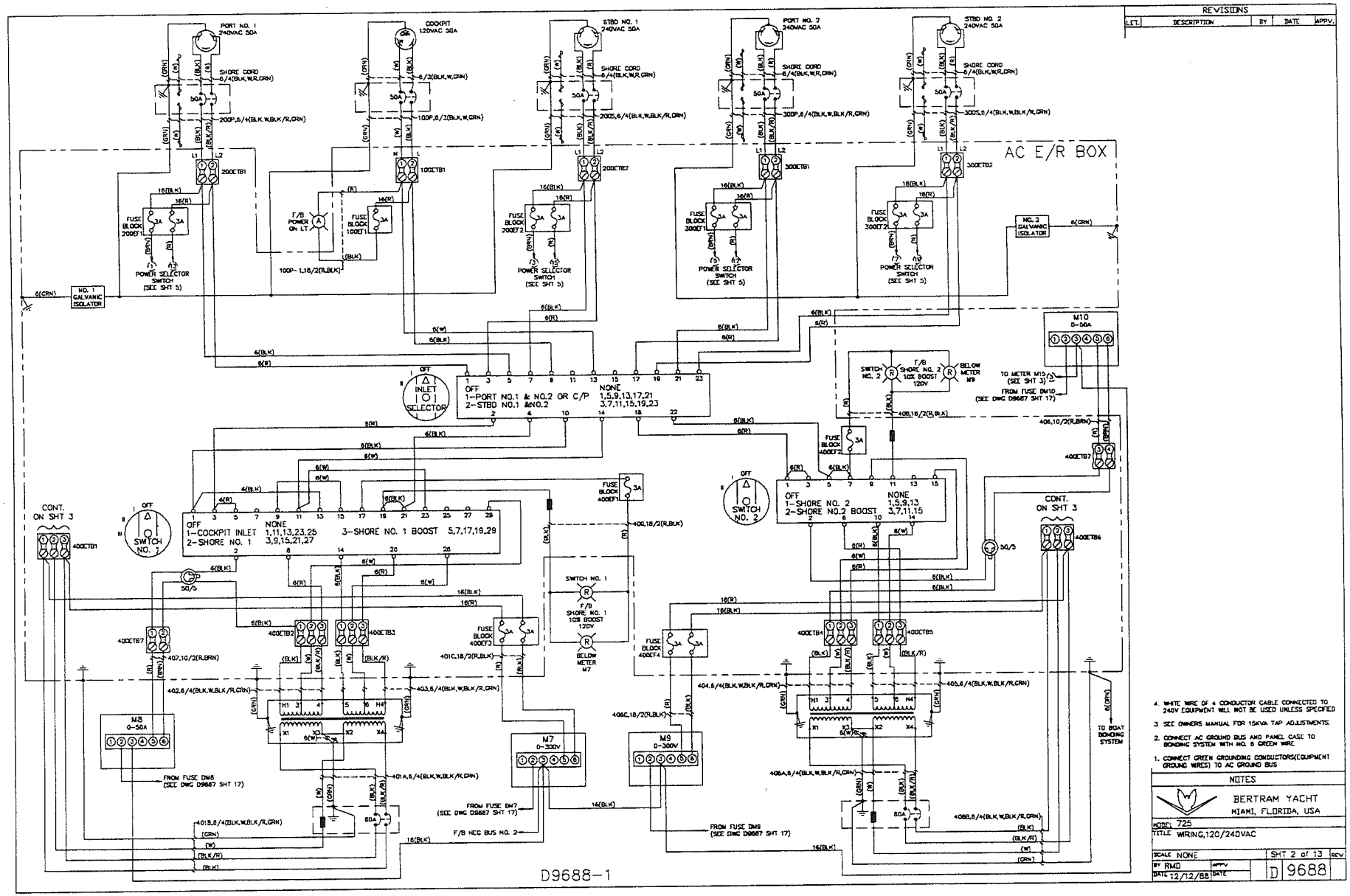
1. SEE DWG D10085 FOR REFERENCE TO BILL OF MATERIAL ON S DWG FOR THE LIGHTING.

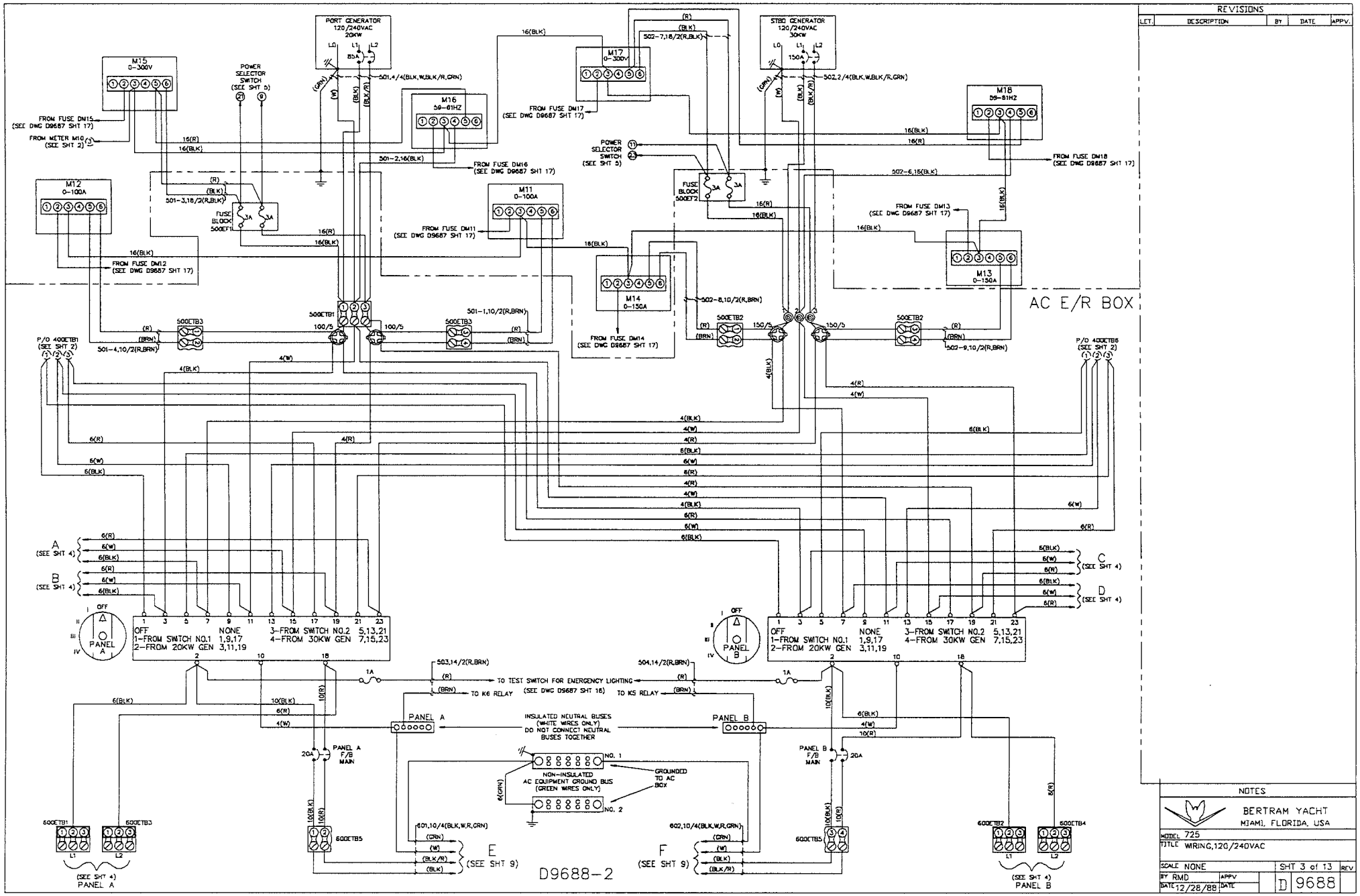
NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING,120/240VAC

SCALE NONE | SHT 1 of 13 | REV
BY RMD | APPV
DATE 1/26/89 | DATE
D | 9688 | A


REVISIONS
LET. DESCRIPTION BY DATE APPV.
AC E/R BOX
PORT NO. 1 240VAC 50A
COCKPIT 120VAC 30A
STBD NO. 1 240VAC 50A
PORT NO. 2 240VAC 50A
STBD NO. 2 240VAC 50A
SHORE CORD 6/4(BLK,W,R,GRN)
200CTB1
100CTB1
200CTB2
300CTB1
300CTB2
FUSE BLOCK 200DF1
FUSE BLOCK 100DF1
FUSE BLOCK 200DF2
FUSE BLOCK 300DF1
FUSE BLOCK 300DF2
POWER SELECTOR SWITCH (SEE SHT 5)
F/B POWER ON LT
NO. 1 GALVANIC ISOLATOR
NO. 2 GALVANIC ISOLATOR
INLET SELECTOR
OFF
1-PORT NO.1 & NO.2 OR C/P
2-STBD NO.1 &NO.2
NONE
1,5,9,13,17,21
3,7,11,15,19,23
M10 0-50A
F/B SHORE NO. 2 10% BOOST 120V
SWITCH NO. 2
BELOW METER M9
TO METER M15 (SEE SHT 3)
FROM FUSE DM10 (SEE DWG D9687 SHT 17)
400CTB7
400CTB6
CONT. ON SHT 3
SWITCH NO. 1
OFF
1-COCKPIT INLET
2-SHORE NO. 1
NONE
1,11,13,23,25
3,9,15,21,27
3-SHORE NO. 1 BOOST 5,7,17,19,29
OFF
1-SHORE NO. 2
2-SHORE NO.2 BOOST
NONE
1,5,9,13
3,7,11,15
400CTB1
400CTB2
400CTB3
400CTB4
400CTB5
FUSE BLOCK 400DF1
FUSE BLOCK 400DF2
FUSE BLOCK 400DF3
FUSE BLOCK 400DF4
F/B SHORE NO. 1 10% BOOST 120V
M8 0-50A
M7 0-300V
M9 0-300V
FROM FUSE DM8 (SEE DWG D9687 SHT 17)
FROM FUSE DM7 (SEE DWG D9687 SHT 17)
FROM FUSE DM9 (SEE DWG D9687 SHT 17)
F/B NEG BUS NO. 2
TO BOAT BONDING SYSTEM
4. WHITE WIRE OF 4 CONDUCTOR CABLE CONNECTED TO 240V EQUIPMENT WILL NOT BE USED UNLESS SPECIFIED
3. SEE OWNERS MANUAL FOR 15KVA TAP ADJUSTMENTS.
2. CONNECT AC GROUND BUS AND PANEL CASE TO BONDING SYSTEM WITH NO. 8 GREEN WIRE
1. CONNECT GREEN GROUNDING CONDUCTORS(EQUIPMENT GROUND WIRES) TO AC GROUND BUS
NOTES
BERTRAM YACHT
MIAMI, FLORIDA, USA
MODEL 725
TITLE WIRING,120/240VAC
SCALE NONE
SHT 2 of 13
REV
BY RMD
APPV
DATE 12/12/88
DATE
D 9688
D9688-1



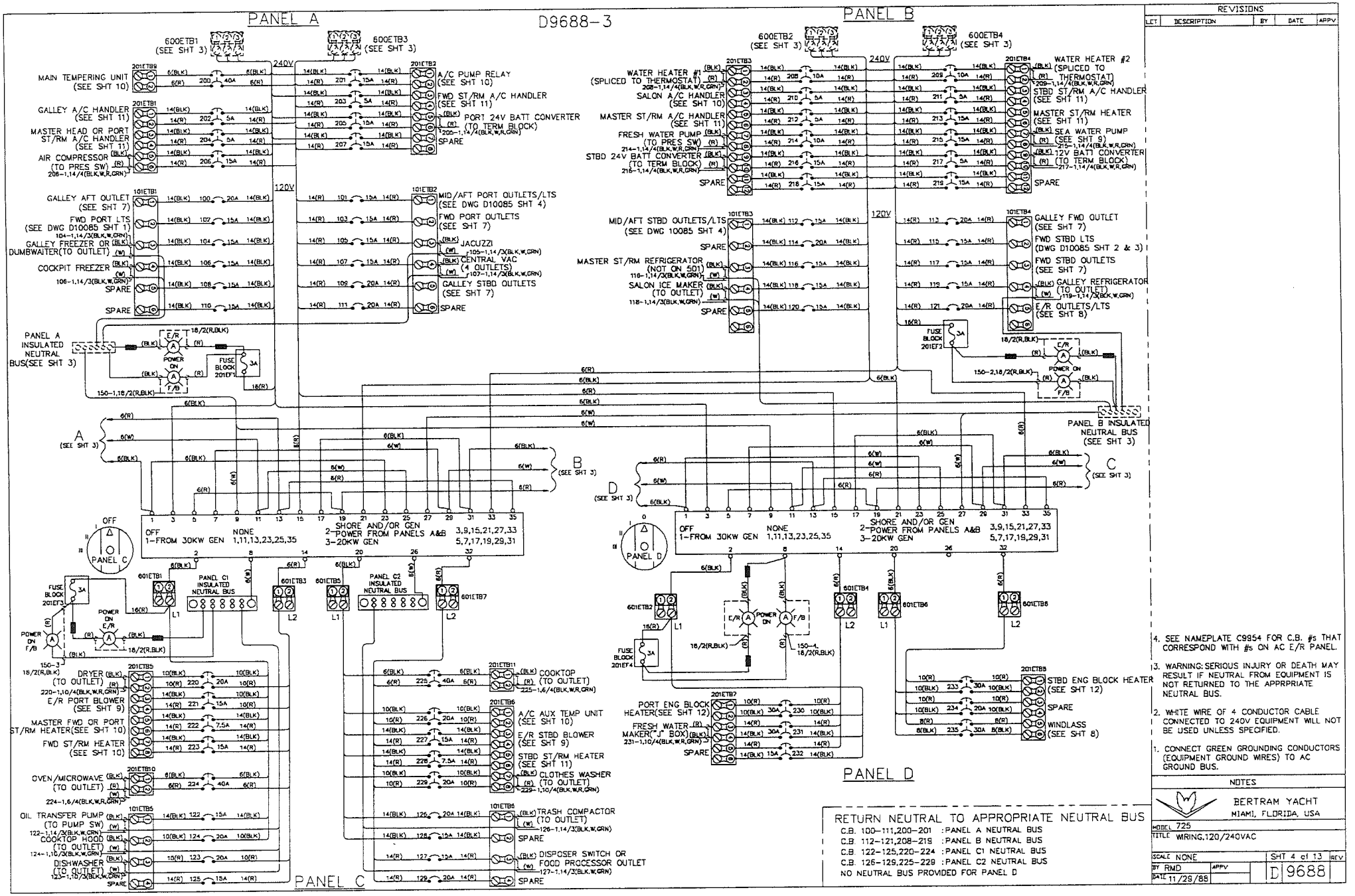
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING,120/240VAC

SCALE NONE | SHT 3 of 13 | REV
BY RMD | APPV
DATE 12/28/88 | DATE
D 9688



REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV

4. SEE NAMEPLATE C9954 FOR C.B. #s THAT CORRESPOND WITH #s ON AC E/R PANEL.

3. WARNING: SERIOUS INJURY OR DEATH MAY RESULT IF NEUTRAL FROM EQUIPMENT IS NOT RETURNED TO THE APPRPRIATE NEUTRAL BUS.

2. WHITE WIRE OF 4 CONDUCTOR CABLE CONNECTED TO 240V EQUIPMENT WILL NOT BE USED UNLESS SPECIFIED.

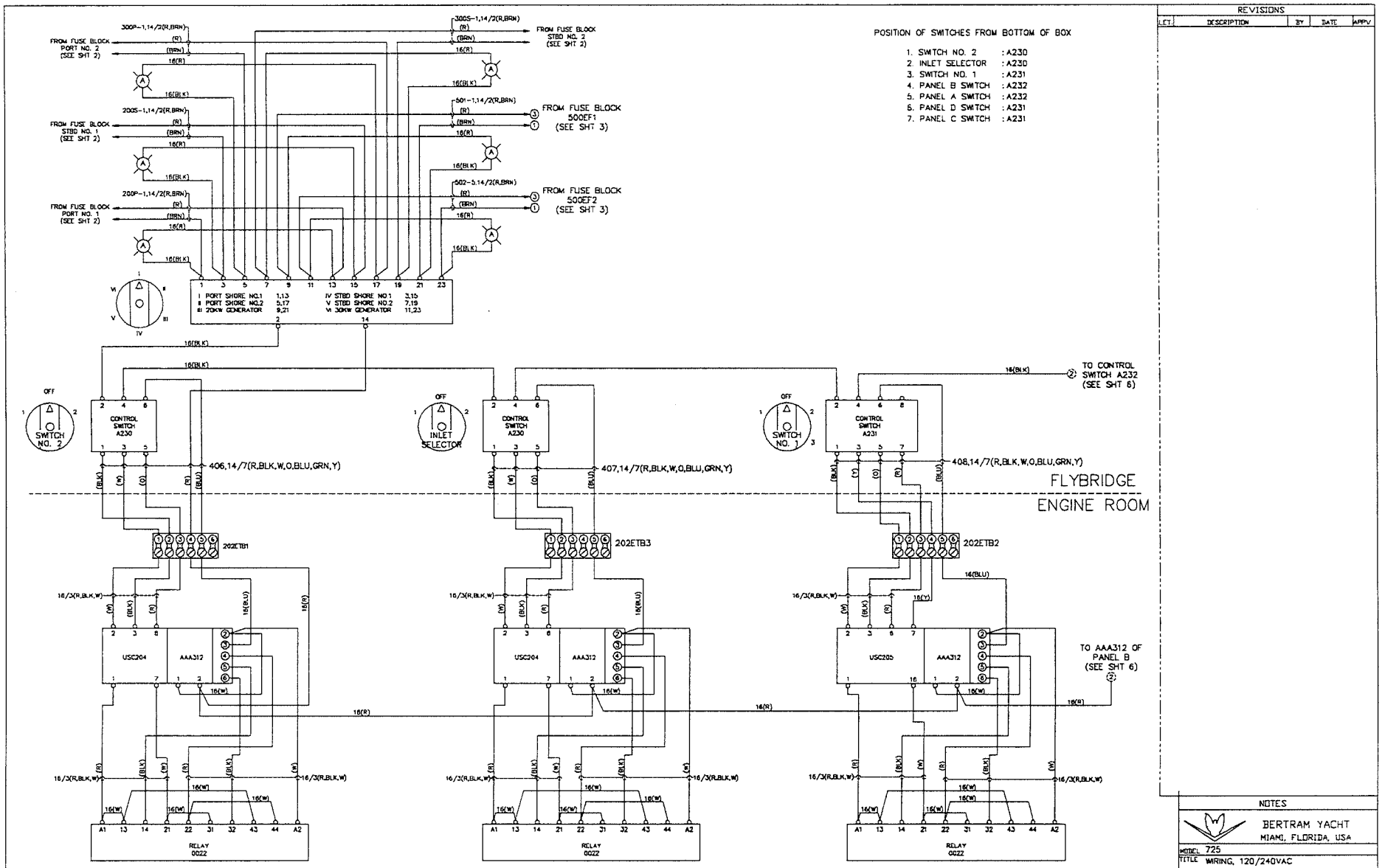
1. CONNECT GREEN GROUNDING CONDUCTORS (EQUIPMENT GROUND WIRES) TO AC GROUND BUS.

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING,120/240VAC

SCALE NONE		SHT 4 of 13	REV
BY RMD	APPV	D 9688	
DATE 11/29/88			



D9688-4

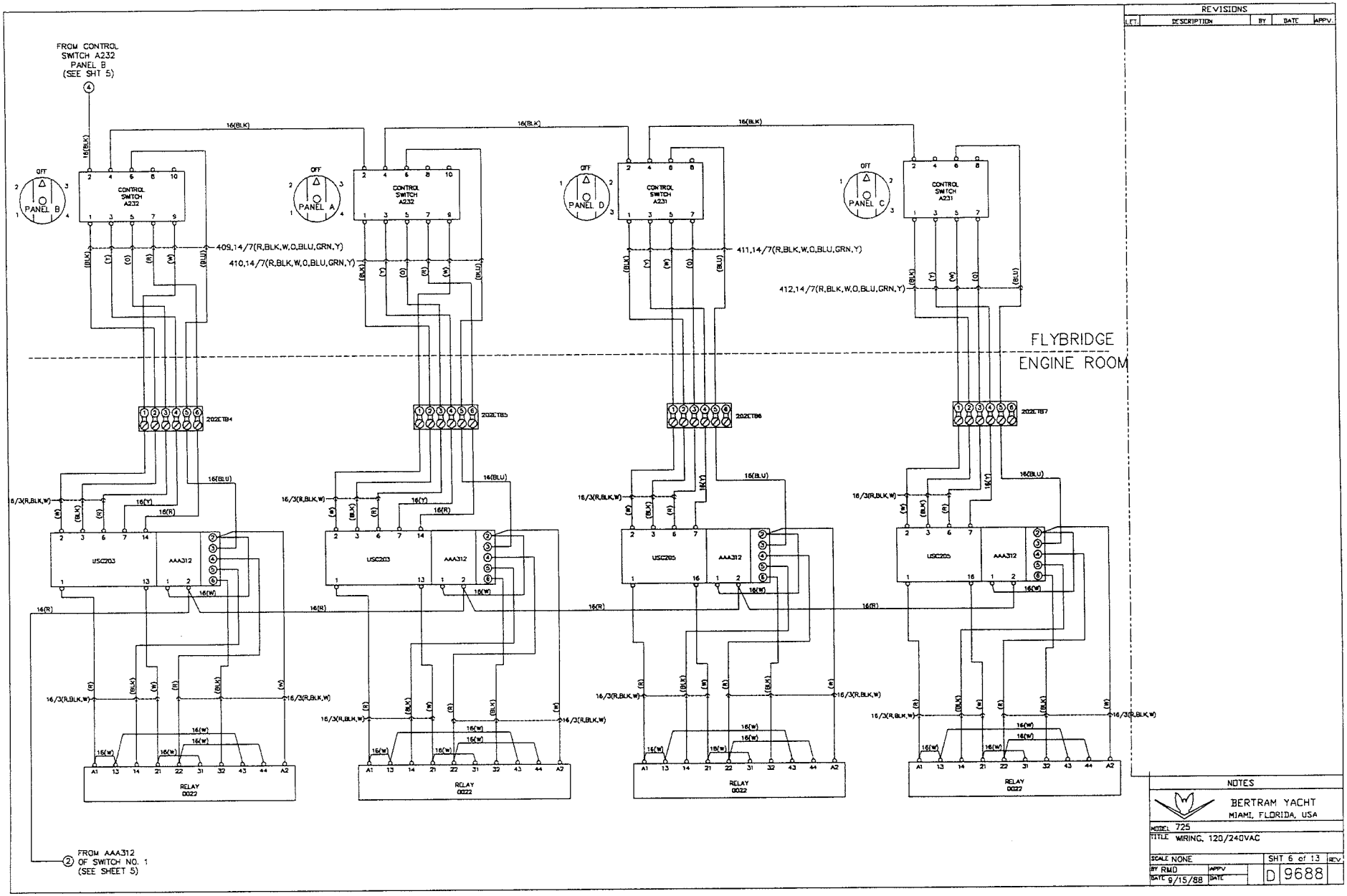
REVISIONS

LET	DESCRIPTION	BY	DATE	APPV

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING, 120/240VAC
SCALE NONE
SHT 5 of 13
REV
BY RMD
APPV
DATE 9/15/88
D 9688



REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

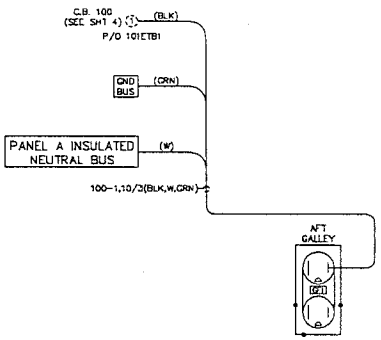
MODEL 725
TITLE WIRING, 120/240VAC

SCALE NONE		SHT 6 of 13	REV
BY RMD	APPV	D 9688	
DATE 9/15/88	DATE		

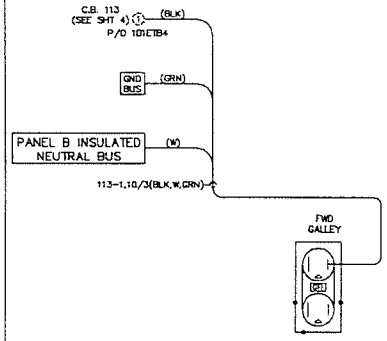
OUTLETS
D9688-5

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.

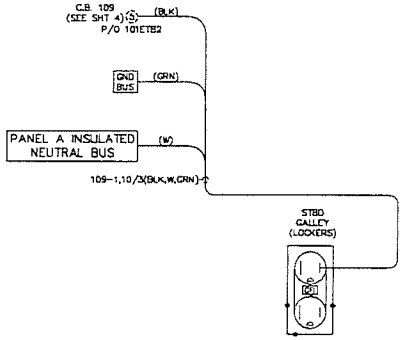
GALLEY AFT OUTLET



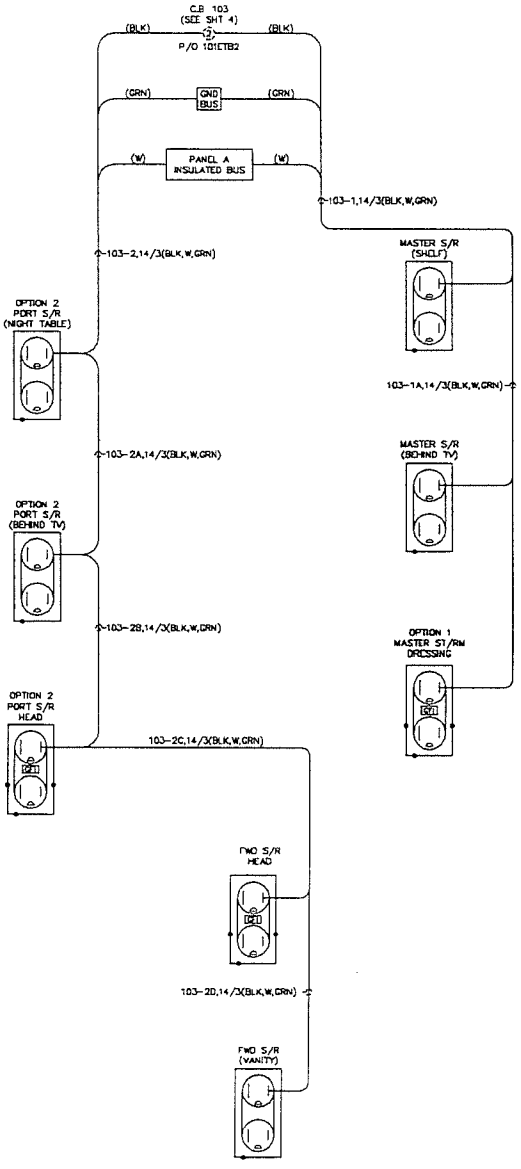
GALLEY FWD OUTLET



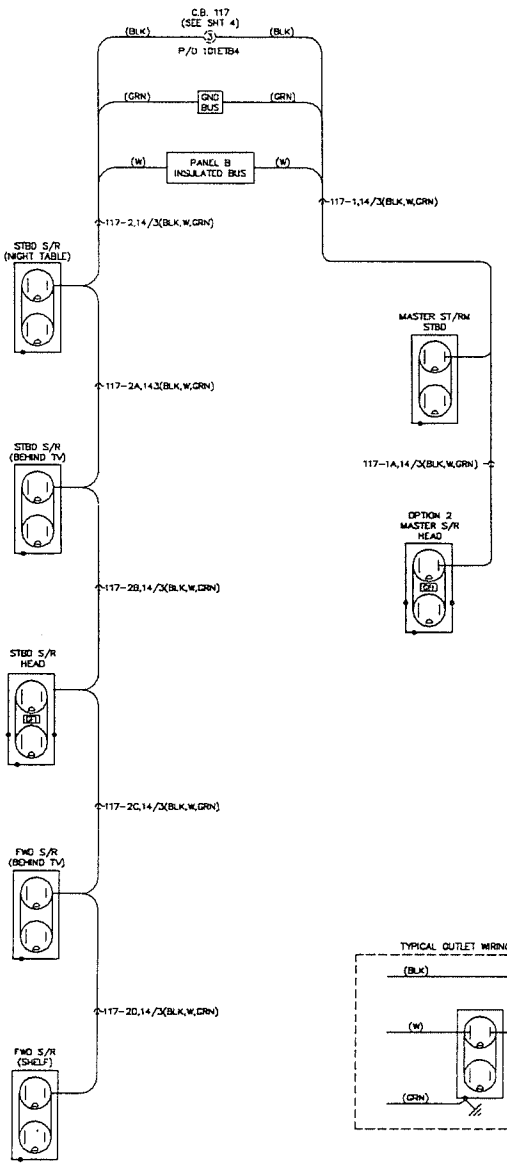
GALLEY STBD OUTLETS



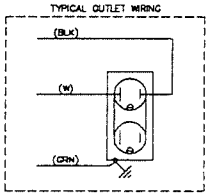
FWD PORT OUTLETS



FWD STBD OUTLETS



TYPICAL OUTLET WIRING



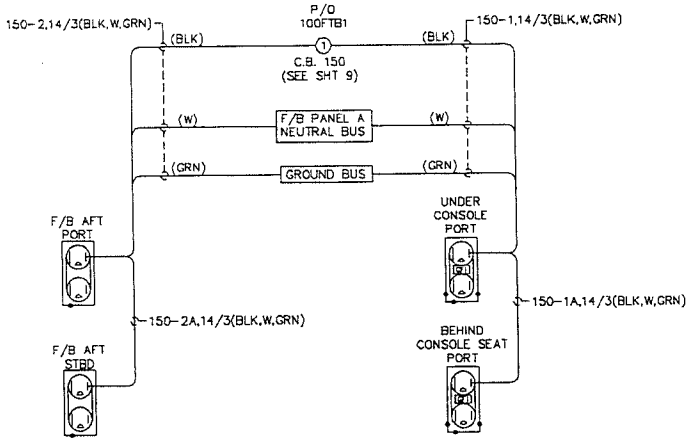
NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE 120/240VAC WIRING

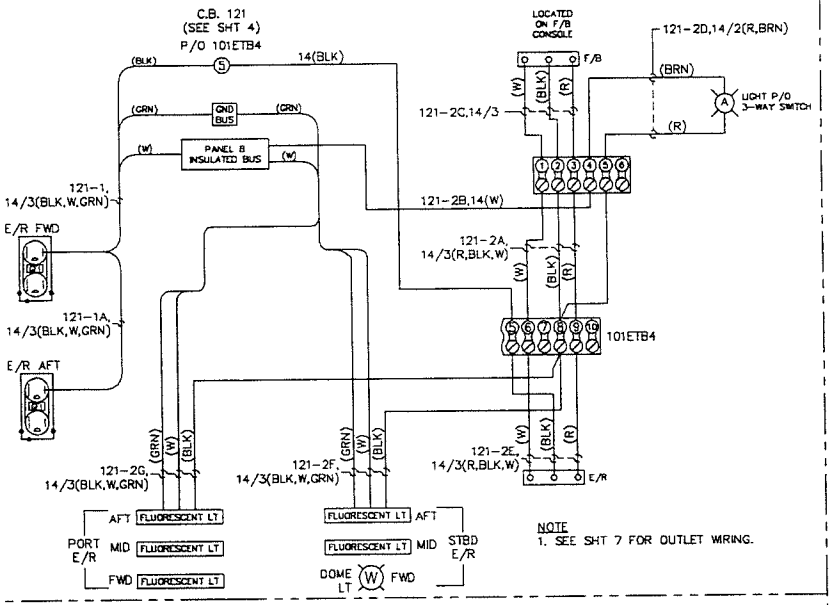
SCALE	NONE		SHT 7 of 13	REV
BY	RMD	APPV	D 9688	
DATE	7/25/88	DATE		

F/B OUTLETS
D9688-6



NOTES
1. SEE SHT 7 FOR OUTLET WIRING.

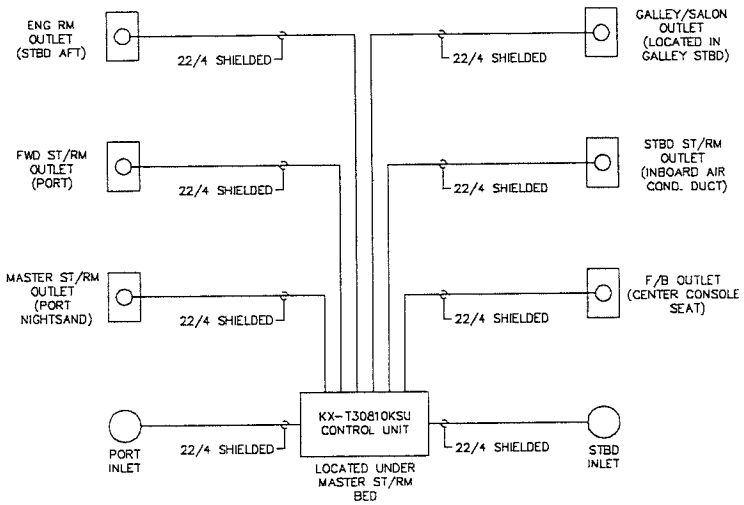
E/R OUTLETS/LTS
D9688-12



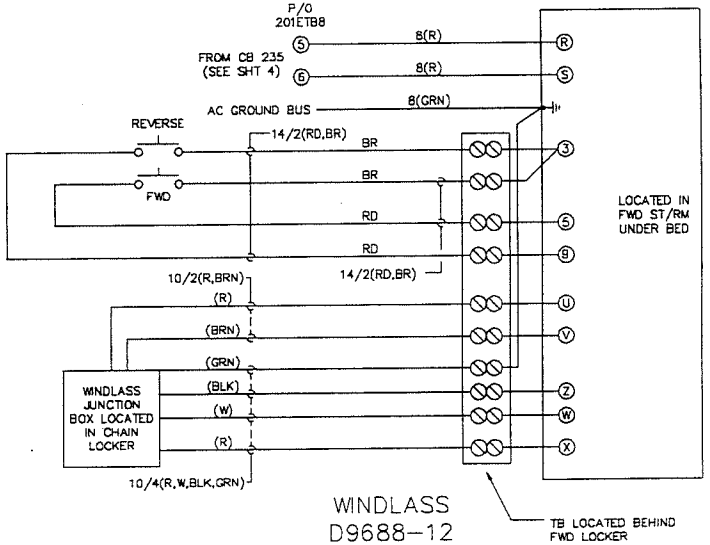
NOTE
1. SEE SHT 7 FOR OUTLET WIRING.

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV
A	101ETB4 WAS 201ETB4 EFF. HULL 502	RMD	5/23/90	

TELEPHONE SYSTEM
D9688-7



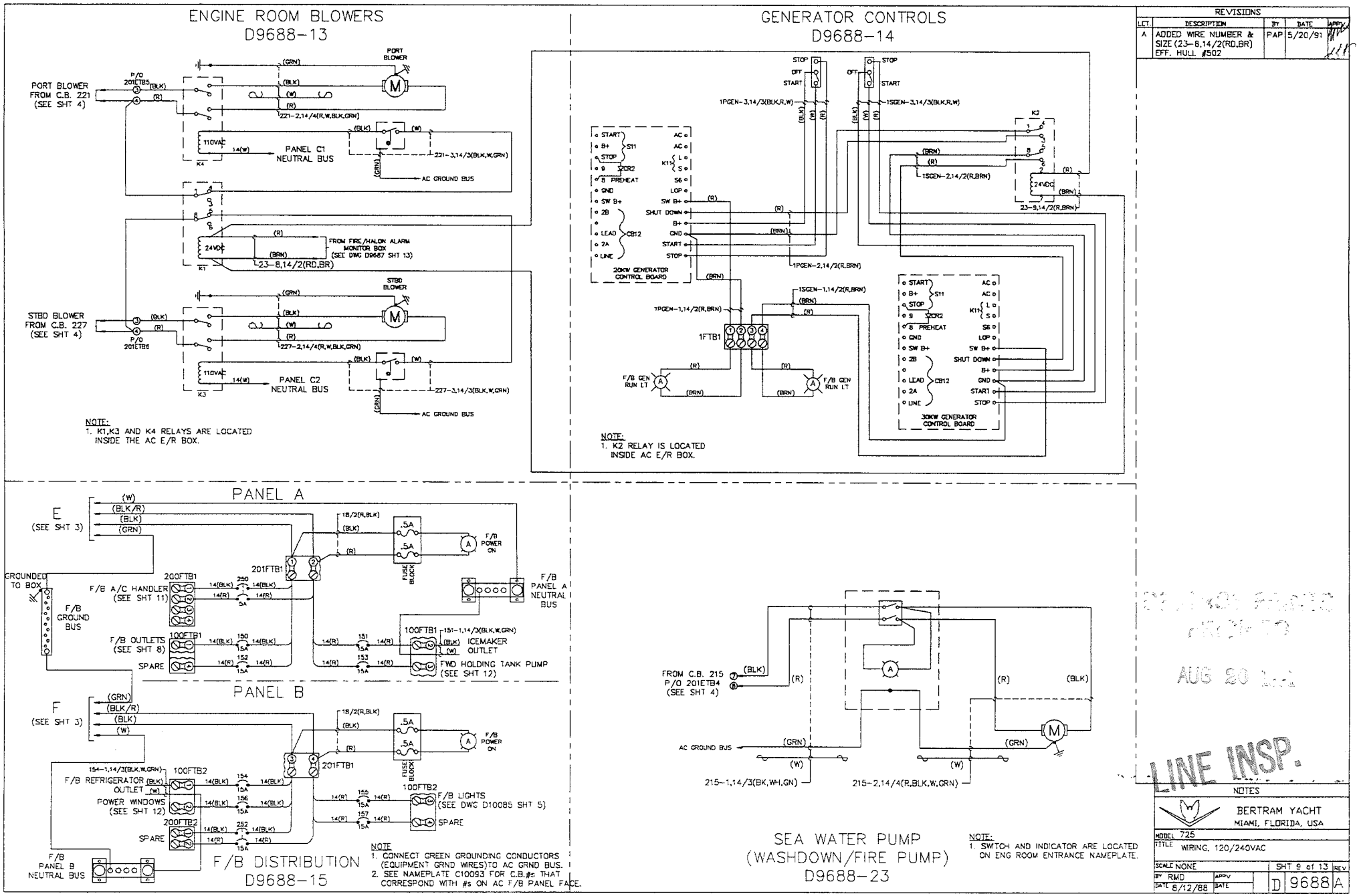
WINDLASS
D9688-12



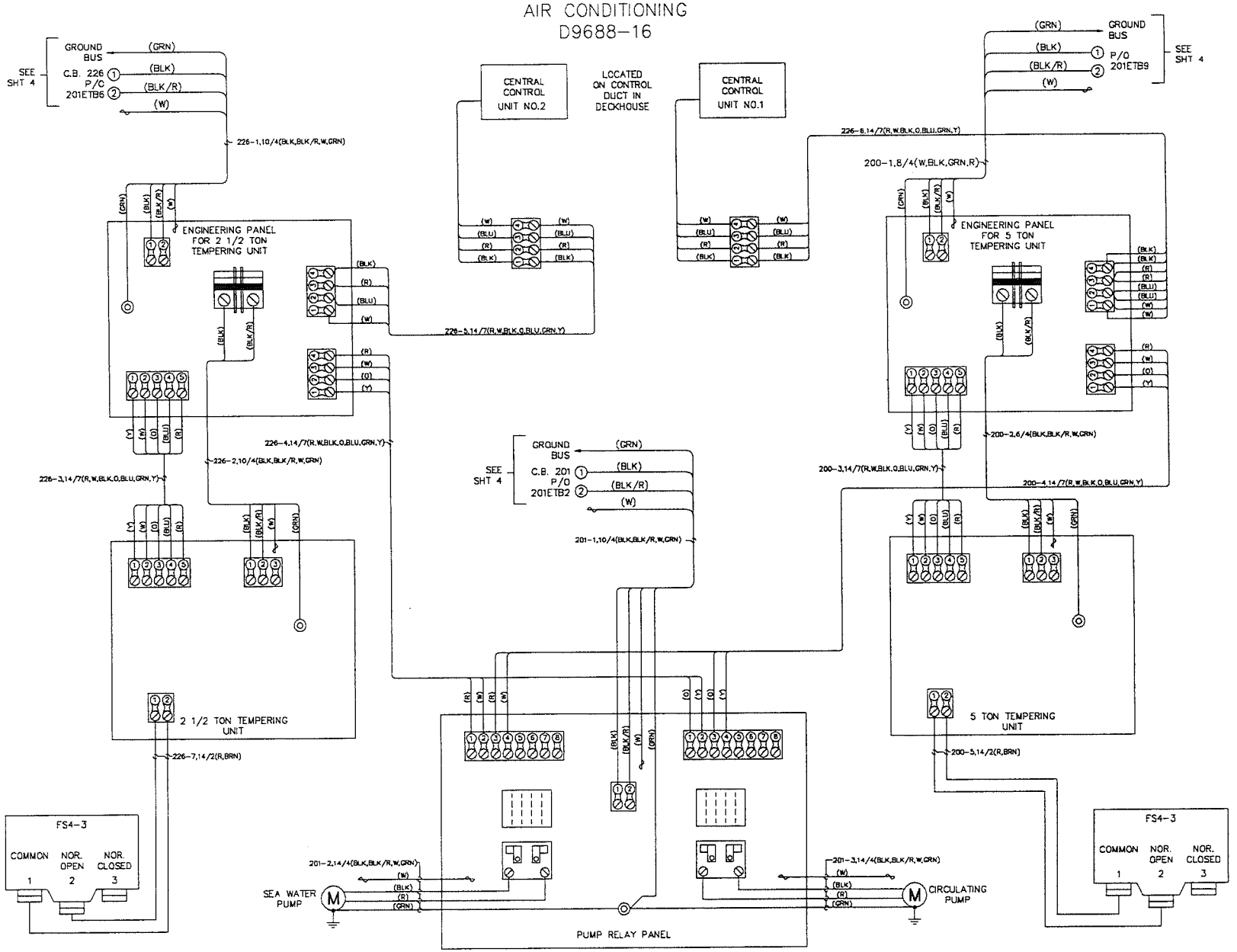
NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING,120/240VAC
SCALE NONE
SHT 8 of 13
REV
BY RMD
APPV
DATE 7/27/88
DATE
D 9688 A


ENGINE ROOM BLOWERS
D9688-13
PORT BLOWER
FROM C.B. 221
(SEE SHT 4)
P/O 201ETB5
PORT BLOWER
221-2,14/4(R,W,BLK,GRN)
110VAC
PANEL C1
NEUTRAL BUS
221-3,14/3(BLK,W,GRN)
AC GROUND BUS
FROM FIRE/HALON ALARM
MONITOR BOX
(SEE DWG D9687 SHT 13)
23-8,14/2(RD,BR)
STBD BLOWER
FROM C.B. 227
(SEE SHT 4)
P/O 201ETB6
STBD BLOWER
227-2,14/4(R,W,BLK,GRN)
PANEL C2
NEUTRAL BUS
227-3,14/3(BLK,W,GRN)
AC GROUND BUS
NOTE:
1. K1,K3 AND K4 RELAYS ARE LOCATED INSIDE THE AC E/R BOX.
GENERATOR CONTROLS
D9688-14
1PGEN-3,14/3(BLK,R,W)
1SGEN-3,14/3(BLK,R,W)
1PGEN-2,14/2(R,BRN)
1SGEN-2,14/2(R,BRN)
23-9,14/2(R,BRN)
1SGEN-1,14/2(R,BRN)
1PGEN-1,14/2(R,BRN)
1FTB1
20KW GENERATOR
CONTROL BOARD
30KW GENERATOR
CONTROL BOARD
F/B GEN
RUN LT
NOTE:
1. K2 RELAY IS LOCATED INSIDE AC E/R BOX.
REVISIONS
LCT. | DESCRIPTION | BY | DATE | APPV
A | ADDED WIRE NUMBER & SIZE (23-8,14/2(RD,BR) EFF. HULL #502 | PAP | 5/20/91
PANEL A
E
(SEE SHT 3)
GROUNDED TO BOX
F/B GROUND BUS
200FTB1
F/B A/C HANDLER
(SEE SHT 11)
201FTB1
F/B POWER ON
F/B PANEL A NEUTRAL BUS
100FTB1
F/B OUTLETS
(SEE SHT 8)
SPARE
151-1,14/3(BLK,W,GRN)
ICEMAKER OUTLET
FWD HOLDING TANK PUMP
(SEE SHT 12)
PANEL B
F
(SEE SHT 3)
100FTB2
F/B REFRIGERATOR OUTLET
POWER WINDOWS
(SEE SHT 12)
200FTB2
SPARE
F/B LIGHTS
(SEE DWG D10085 SHT 5)
SPARE
F/B PANEL B NEUTRAL BUS
F/B DISTRIBUTION
D9688-15
NOTE
1. CONNECT GREEN GROUNDING CONDUCTORS (EQUIPMENT GRND WIRES)TO AC GRND BUS.
2. SEE NAMEPLATE C10093 FOR C.B.#s THAT CORRESPOND WITH #s ON AC F/B PANEL FACE.
FROM C.B. 215
P/O 201ETB4
(SEE SHT 4)
AC GROUND BUS
215-1,14/3(BK,WH,GN)
215-2,14/4(R,BLK,W,GRN)
SEA WATER PUMP
(WASHDOWN/FIRE PUMP)
D9688-23
NOTE:
1. SWITCH AND INDICATOR ARE LOCATED ON ENG ROOM ENTRANCE NAMEPLATE.
AUG 20
LINE INSP.
NOTES
BERTRAM YACHT
MIAMI, FLORIDA, USA
MODEL 725
TITLE WIRING, 120/240VAC
SCALE NONE
SHT 9 of 13
REV
BY RWD
APPV
DATE 8/12/88
DATE
D 9688 A

AIR CONDITIONING
D9688-16



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.

NOTES

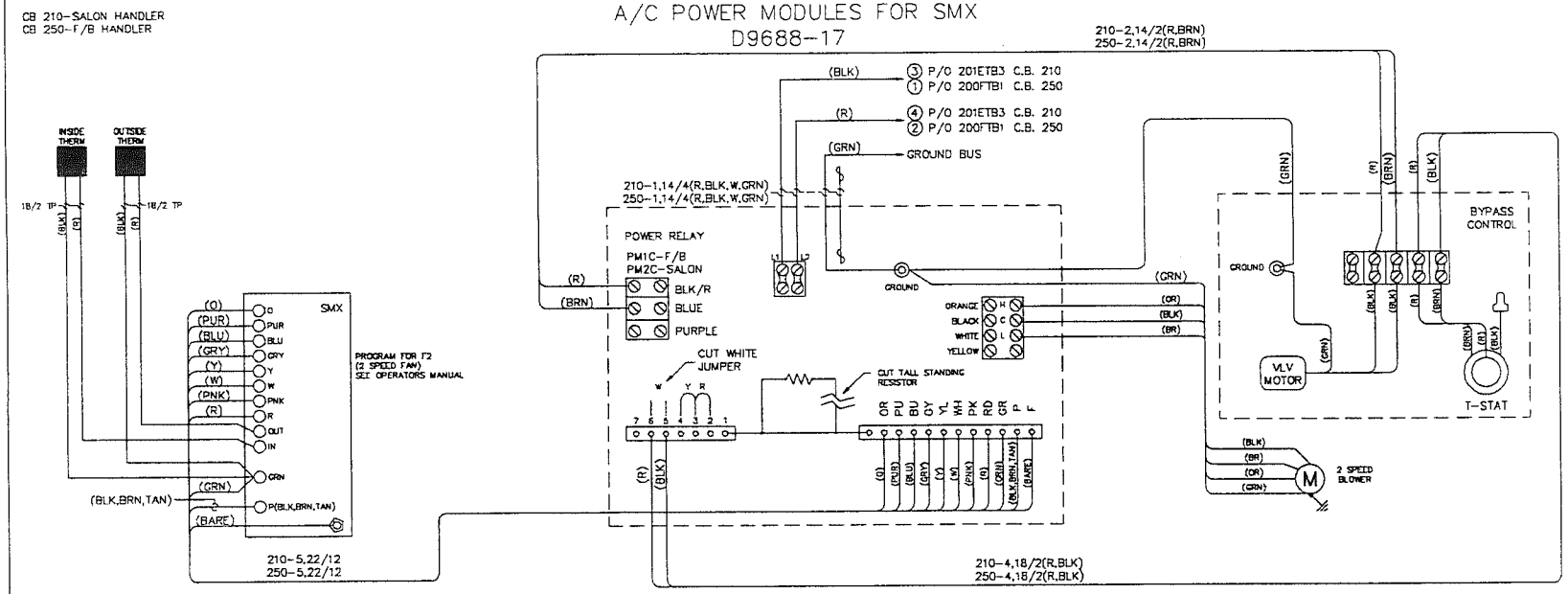
BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING,120/240VAC

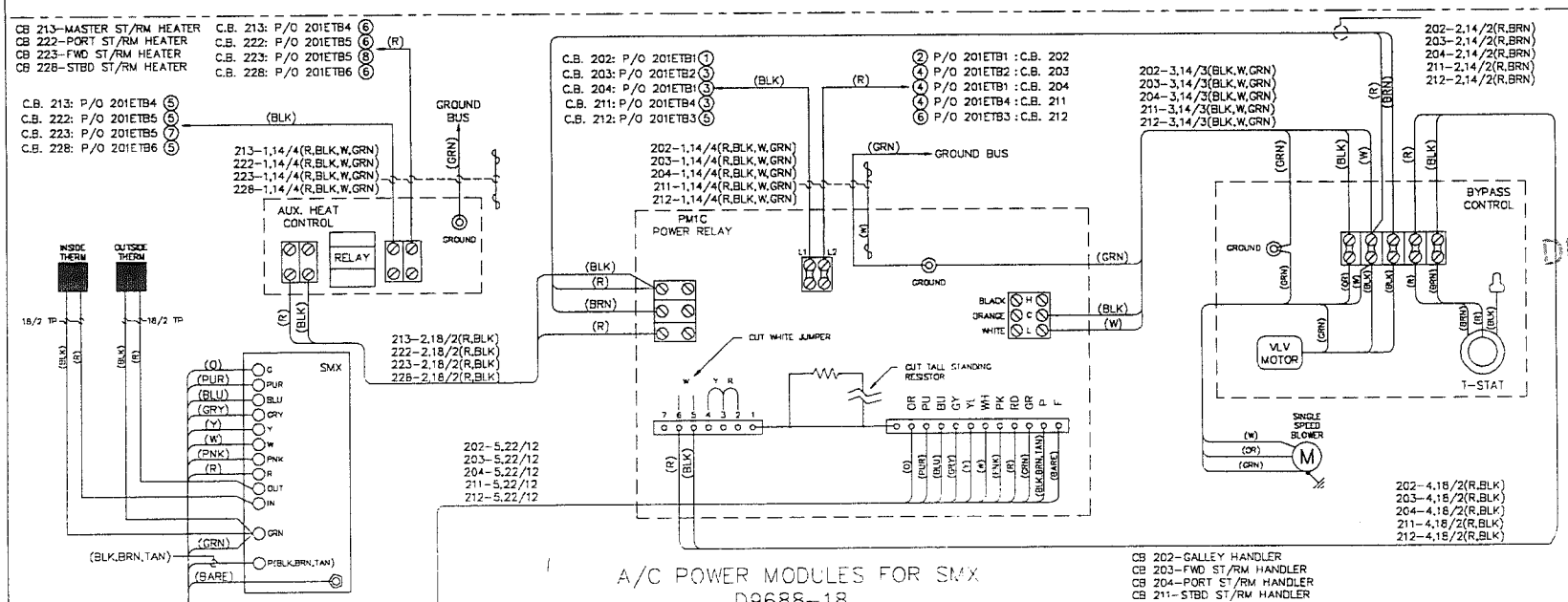
SCALE NONE		SHT 10 of 12	REV.
BY RMD	APPV.	D 9688	
DATE 1/26/88	DATE		

CB 210-SALON HANDLER
CB 250-F/B HANDLER

A/C POWER MODULES FOR SMX
D9688-17



CB 213-MASTER ST/RM HEATER
CB 222-PORT ST/RM HEATER
CB 223-FWD ST/RM HEATER
CB 228-STBD ST/RM HEATER



CB 202-GALLEY HANDLER
CB 203-FWD ST/RM HANDLER
CB 204-PORT ST/RM HANDLER
CB 211-STBD ST/RM HANDLER
CB 212-MASTER ST/RM HANDLER

A/C POWER MODULES FOR SMX
D9688-18

REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV
A	ADDED POWER SUPPLY NOMENCLATURE	PAP	5/16/91	

DESTROY PRINTS PRIOR TO
AUG 20 1991
LINE INSP.

1. AUX. HEAT CONTROLS USED ONLY IN STATEROOMS

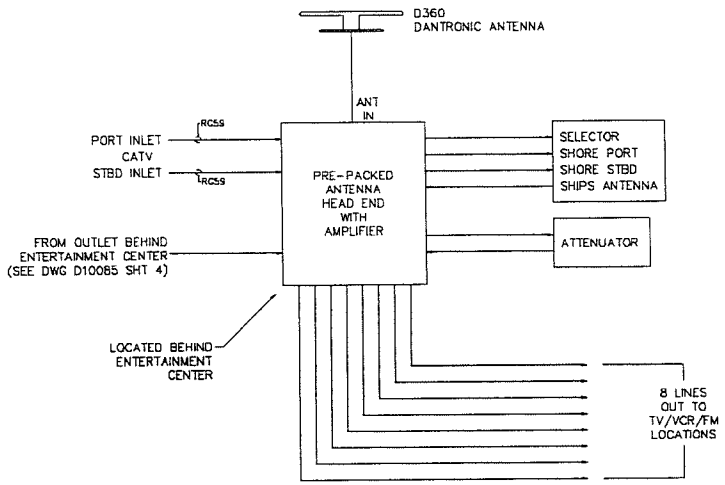
NOTES

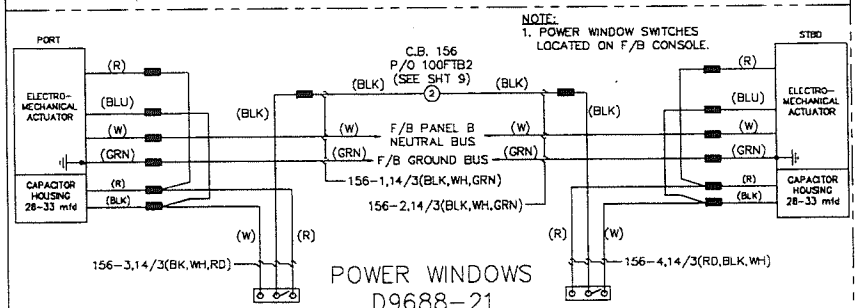
BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING,120/240VAC

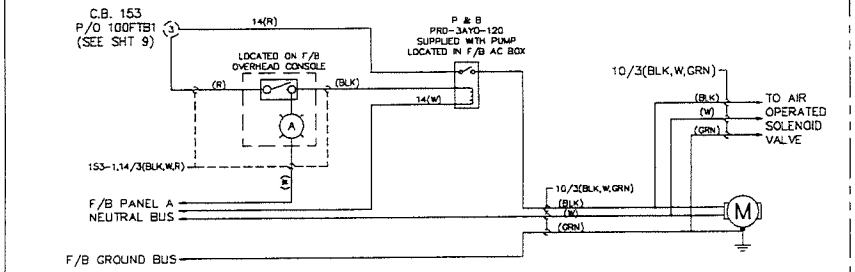
SCALE NONE	SHT 11 OF 13	REV
BY RMD APPV	D 9688	A
DATE 2/3/88 DATE		

STERIO & TV ANTENNA
D9688-19



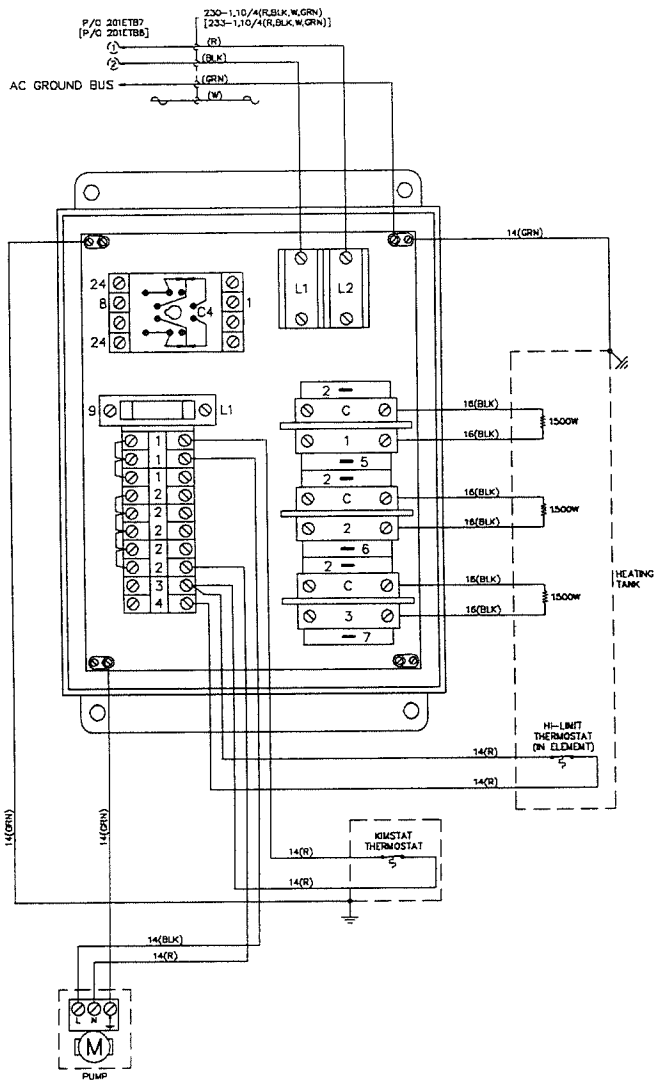


POWER WINDOWS
D9688-21



FWD HOLDING TANK PUMP
D9688-22

PORT ENG BLOCK HEATER : C.B. 230
[STBD ENG BLOCK HEATER] : C.B. 233
D9688-20

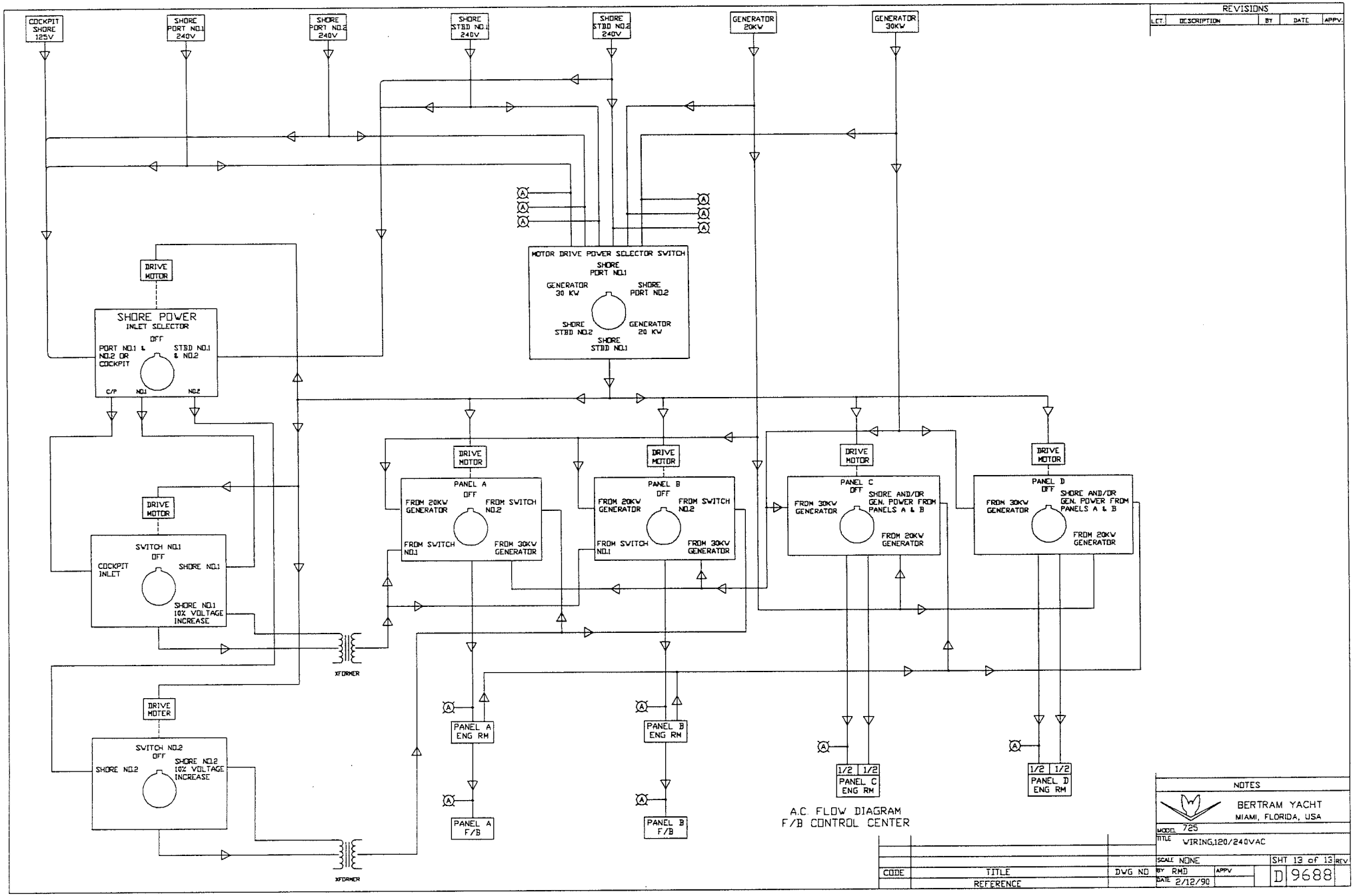


REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV.

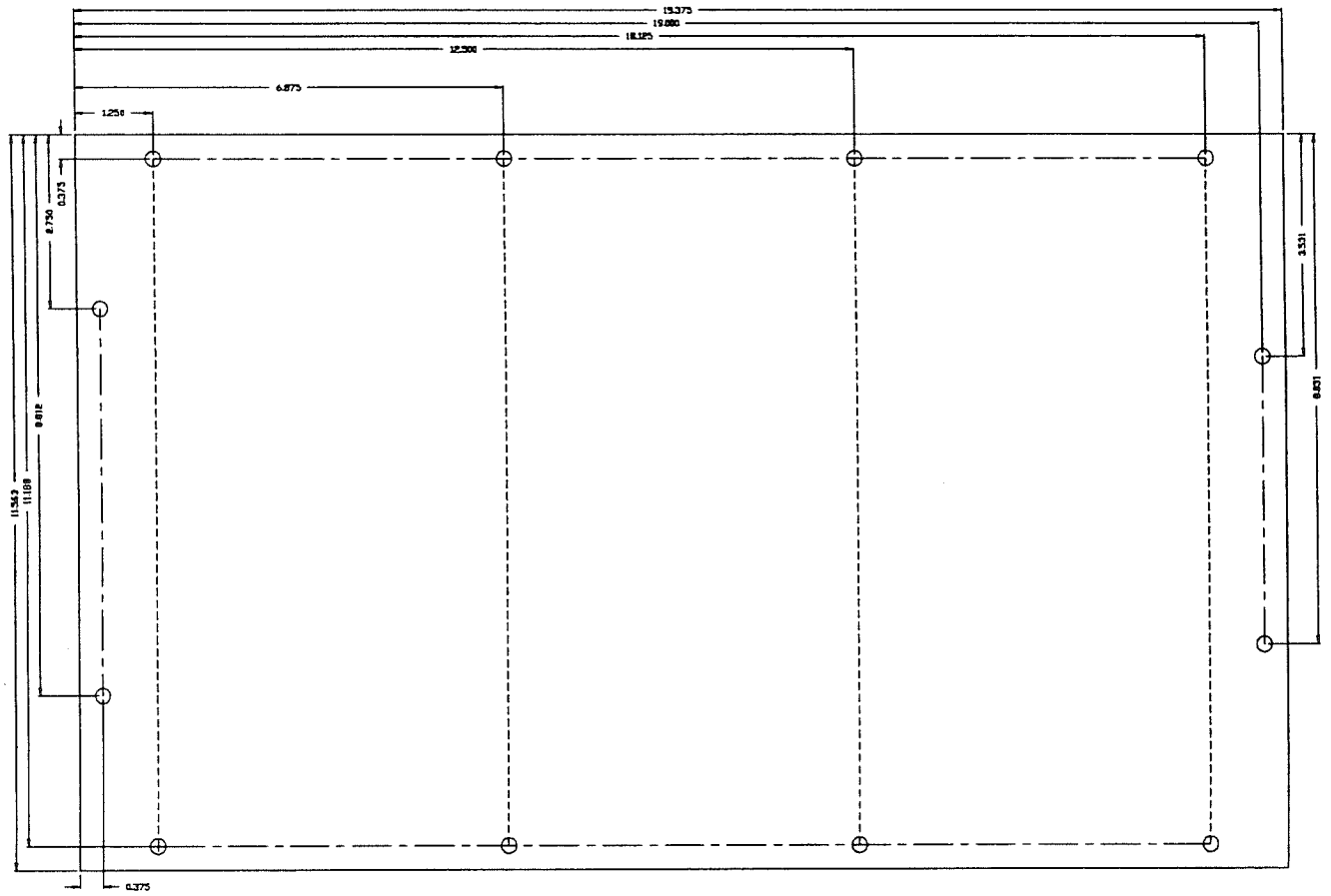
NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING,120/240VAC
SCALE NONE
SHT 12 of 13
REV
BY RMD
APPV
DATE 2/3/89
DATE
D 9688


COCKPIT SHORE 125V
SHORE PORT NO.1 240V
SHORE PORT NO.2 240V
SHORE STBD NO.1 240V
SHORE STBD NO.2 240V
GENERATOR 20KW
GENERATOR 30KW
MOTOR DRIVE POWER SELECTOR SWITCH
SHORE PORT NO.1
GENERATOR 30 KW
SHORE PORT NO.2
SHORE STBD NO.2
GENERATOR 20 KW
SHORE STBD NO.1
DRIVE MOTOR
SHORE POWER
INLET SELECTOR
OFF
PORT NO.1 & NO.2 OR COCKPIT
STBD NO.1 & NO.2
C/P
NO.1
NO.2
SWITCH NO.1
COCKPIT INLET
SHORE NO.1
SHORE NO.1 10% VOLTAGE INCREASE
SWITCH NO.2
SHORE NO.2
SHORE NO.2 10% VOLTAGE INCREASE
XFORMER
PANEL A
FROM 20KW GENERATOR
FROM SWITCH NO.2
FROM SWITCH NO.1
FROM 30KV GENERATOR
PANEL B
PANEL C
FROM 30KV GENERATOR
SHORE AND/OR GEN. POWER FROM PANELS A & B
FROM 20KV GENERATOR
PANEL D
PANEL A ENG RM
PANEL B ENG RM
1/2 1/2
PANEL C ENG RM
PANEL D ENG RM
PANEL A F/B
PANEL B F/B
A.C FLOW DIAGRAM
F/B CONTROL CENTER
REVISIONS
LET. DESCRIPTION BY DATE APPV.
NOTES
BERTRAM YACHT
MIAMI, FLORIDA, USA
MODEL 725
TITLE WIRING,120/240VAC
SCALE NONE
SHT 13 of 13 REV
CODE TITLE DWG NO
REFERENCE
BY RMD APPV
DATE 2/12/90
D 9688

REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV
A	DELETED "OFF" NOMEN. AND DIMS. FOR "ENGINE ROOM LIGHTS 120VAC" "OFF" WAS OFFSET .125" FROM THE RIGHT EDGE TO THE LEFT OF THE .50" DIA. HOLE. EFF. HULL 504	RKD	1/11/90	GK
B	DELETED MTU FUSES DELETED LIGHT CKT. EFF. HULL #507	PAP	5/10/91	



LINE INSP.

PRIOR TO

OCT 11 19

TOLERANCES	
UNLESS OTHERWISE SPECIFIED	
ANGULAR:	± 1/2°
DECIMAL:	± .015"

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.

1. MATERIAL: 5052 ALUM-.090
2. FINISH PANEL TO BE FLAT FACE VERTICAL GRAINED 240 GRIT EDGE AND CORNERS TO BE EASED
3. PAINTING: PRIME COAT-ALODINE OR IRRIDITE FINISH COAT-FACE & EDGES MODIFIED EPOXY FLAT BLACK
4. SILK SCREEN LETTERING-WHITE HELVETICA BOLD CONDENSED 12 & 24 POINT TRACE-WHITE LINE WIDTH .0325"

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725

TITLE
PANEL, DC, E/R, LTS, 725

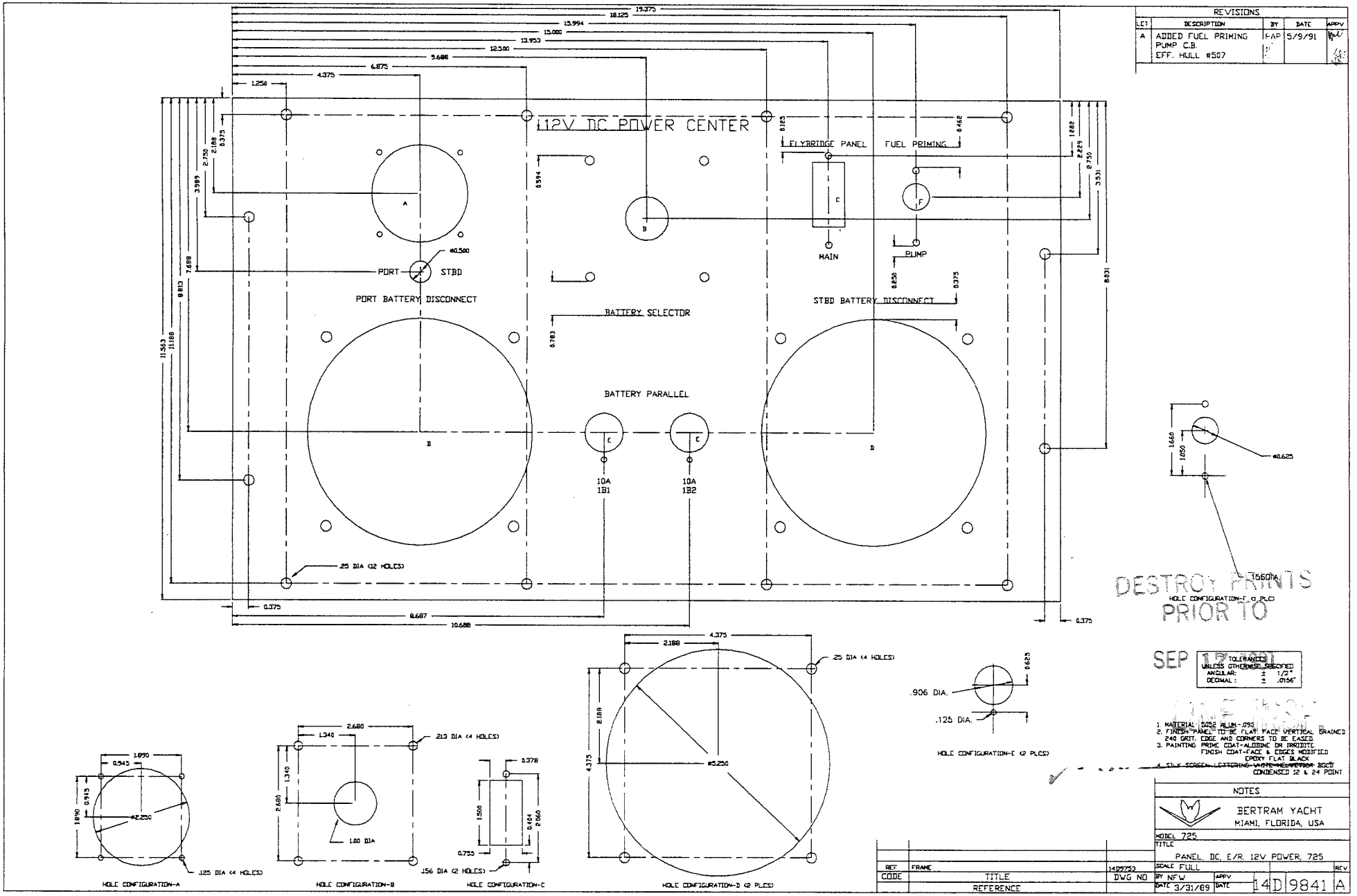
REF	FRAME	14D9753
CODE	TITLE	DWG NO
	REFERENCE	

SCALE FULL

BY NFW APPV GK

DATE 3/31/89 DATE 4/4/89

4D9840 B



REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV
A	ADDED FUEL PRIMING PUMP C.B. EFF. HULL #507	PAP	5/9/91	

DESTROY PRINTS PRIOR TO SEP 17 1993

TOLERANCES UNLESS OTHERWISE SPECIFIED
ANGULAR: ± 1/2°
DECIMAL: ± .0156"

1. MATERIAL 5052 ALUM-.093
2. FINISH PANEL TO BE FLAT FACE VERTICAL GRAINED 240 GRIT, EDGE AND CORNERS TO BE EASED
3. PAINTING PRIME COAT-ALODINE OR IRRODITE FINISH COAT-FACE & EDGES MODIFIED EPOXY FLAT BLACK
4. SILK SCREEN LETTERING WHITE-REVERSE ROCT CONDENSED 12 & 24 POINT

NOTES

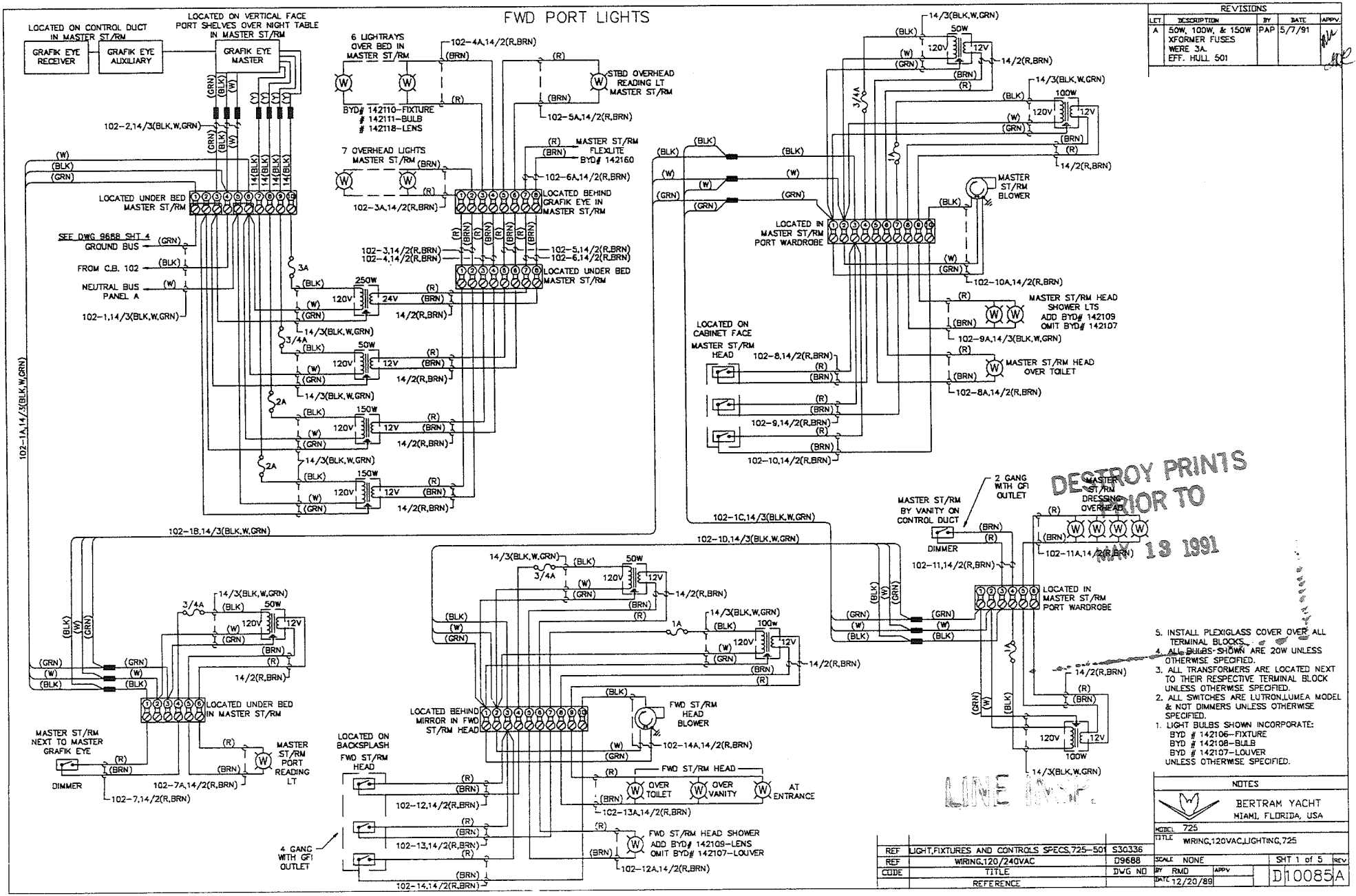
BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725

TITLE
PANEL, DC, E/R, 12V POWER, 725

REF	FRAME	1409752
CODE	TITLE	DWG NO
	REFERENCE	

SCALE FULL
BY NFW
DATE 3/31/89
APPV
DATE
14D9841 A



REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV.
A	50W, 100W, & 150W XFORMER FUSES WERE 3A. EFF. HULL 501	PAP	5/7/91	

5. INSTALL PLEXIGLASS COVER OVER ALL TERMINAL BLOCKS.
4. ALL BULBS SHOWN ARE 20W UNLESS OTHERWISE SPECIFIED.
3. ALL TRANSFORMERS ARE LOCATED NEXT TO THEIR RESPECTIVE TERMINAL BLOCK UNLESS OTHERWISE SPECIFIED.
2. ALL SWITCHES ARE LUTRON,LUMEA MODEL & NOT DIMMERS UNLESS OTHERWISE SPECIFIED.
1. LIGHT BULBS SHOWN INCORPORATE:
BYD # 142106-FIXTURE
BYD # 142108-BULB
BYD # 142107-LOUVER
UNLESS OTHERWISE SPECIFIED.

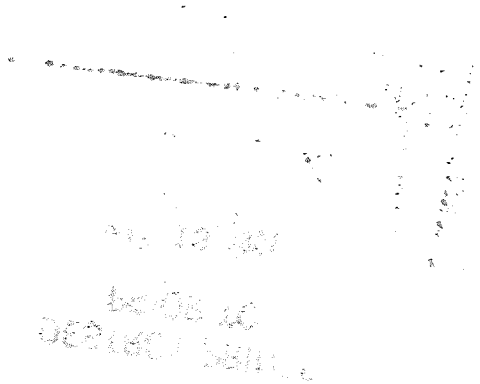
NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

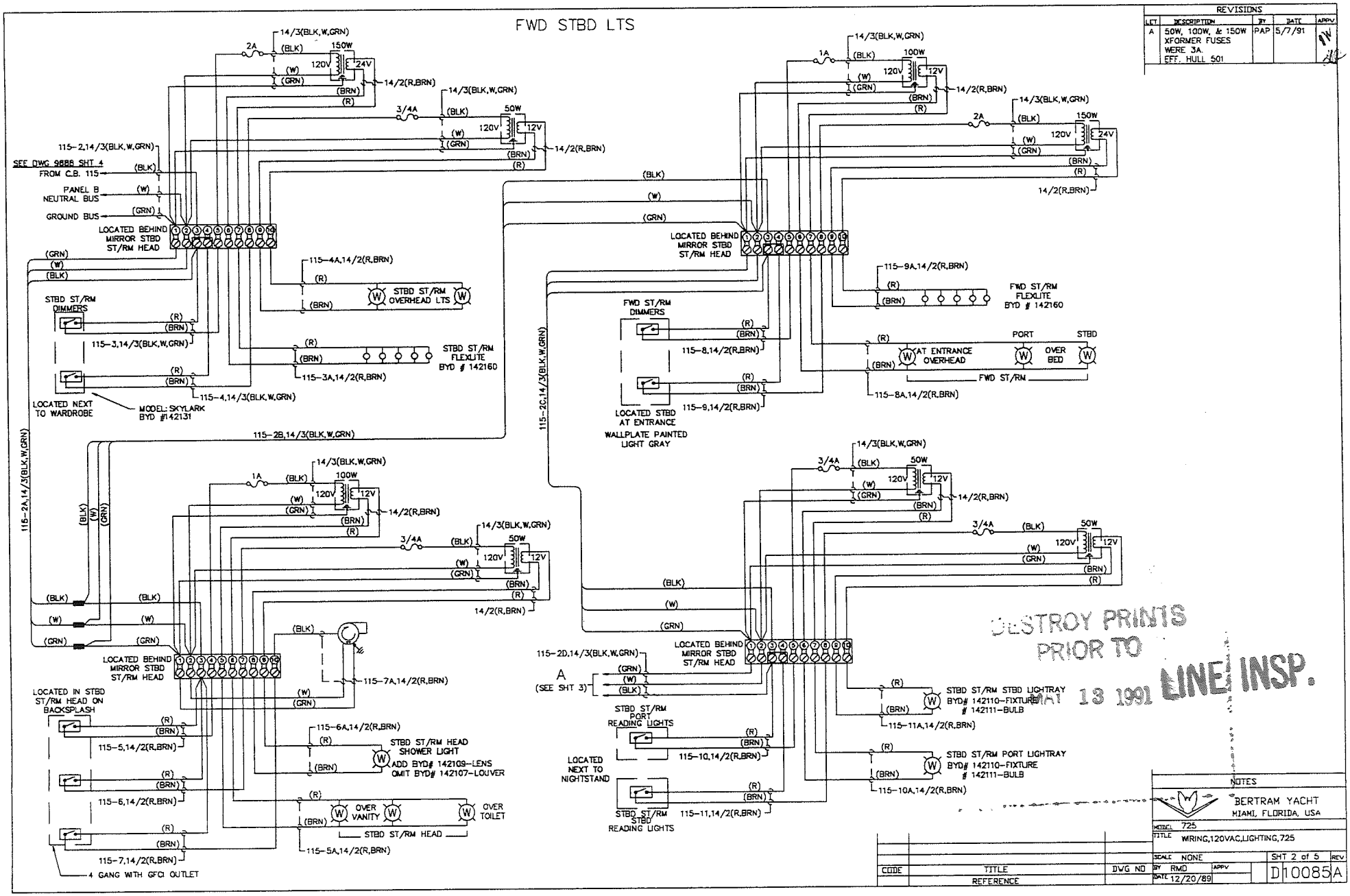
MODEL 725
TITLE WIRING,120VAC,LIGHTING,725

REF	LIGHT,FIXTURES AND CONTROLS SPECS,725-501	S30336
REF	WIRING,120/240VAC	D9688
CODE	TITLE	DWG NO
	REFERENCE	

SCALE NONE | SHT 1 of 5 | REV.
BY RMD | APPV.
DATE 12/20/89
D10085A



FWD STBD LTS



REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV
A	50W, 100W, & 150W XFORMER FUSES WERE 3A. EFF. HULL 501	PAP	5/7/91	

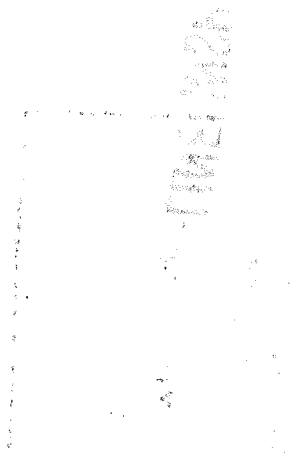
DESTROY PRINTS PRIOR TO MAY 13 1991 LINE INSP.

NOTES

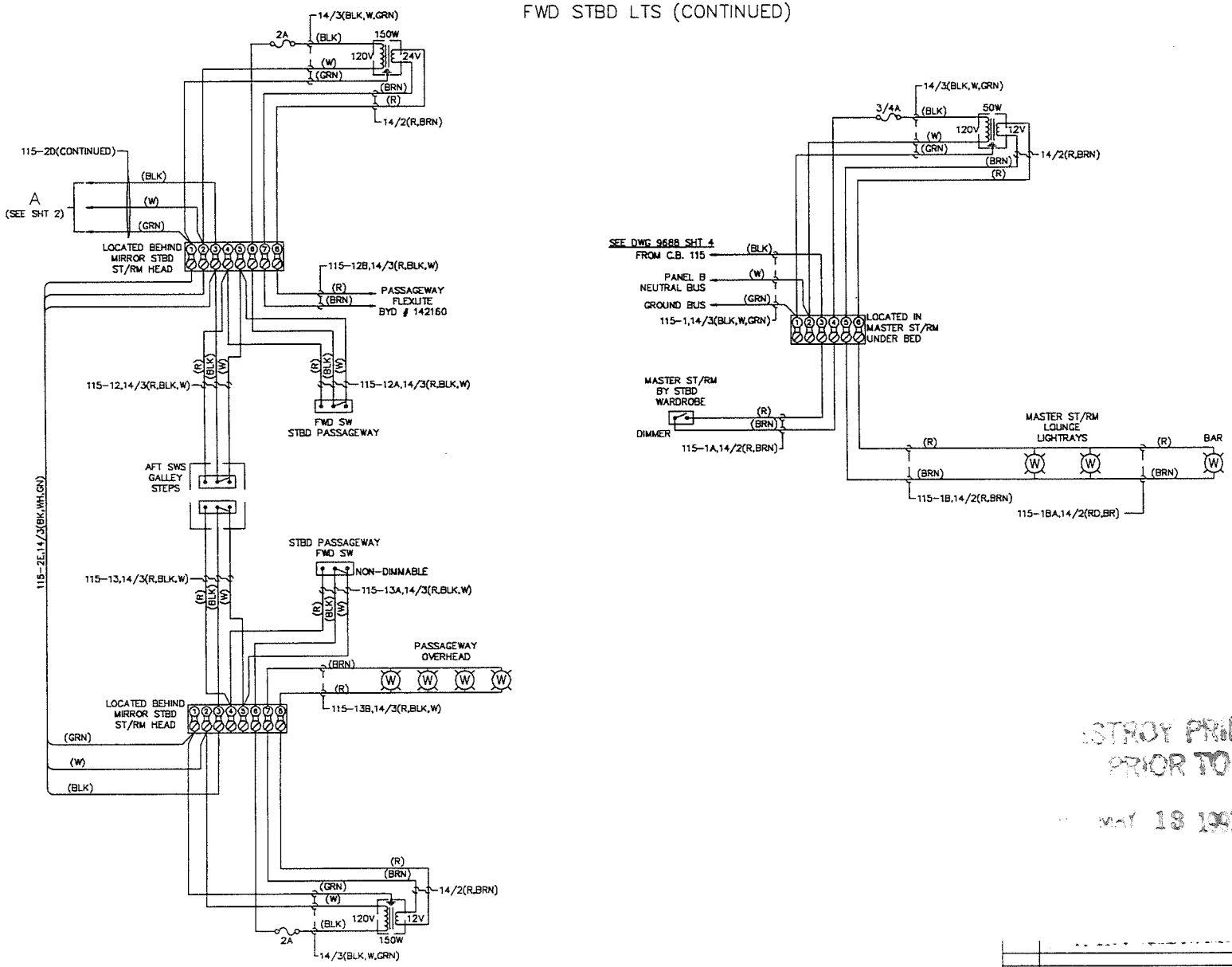
BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE WIRING,120VAC,LIGHTING,725
SCALE NONE
SHT 2 of 5
REV
BY RMD
APPV
DATE 12/20/89
DWG NO D10085A

CODE | TITLE | REFERENCE



FWD STBD LTS (CONTINUED)



REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.
A	50W & 150W XFORMER FUSES WERE 3A. EFF. HULL 501	PAP	5/7/91	

DESTROY PRINTS PRIOR TO MAY 18 1991

LINE INSP.

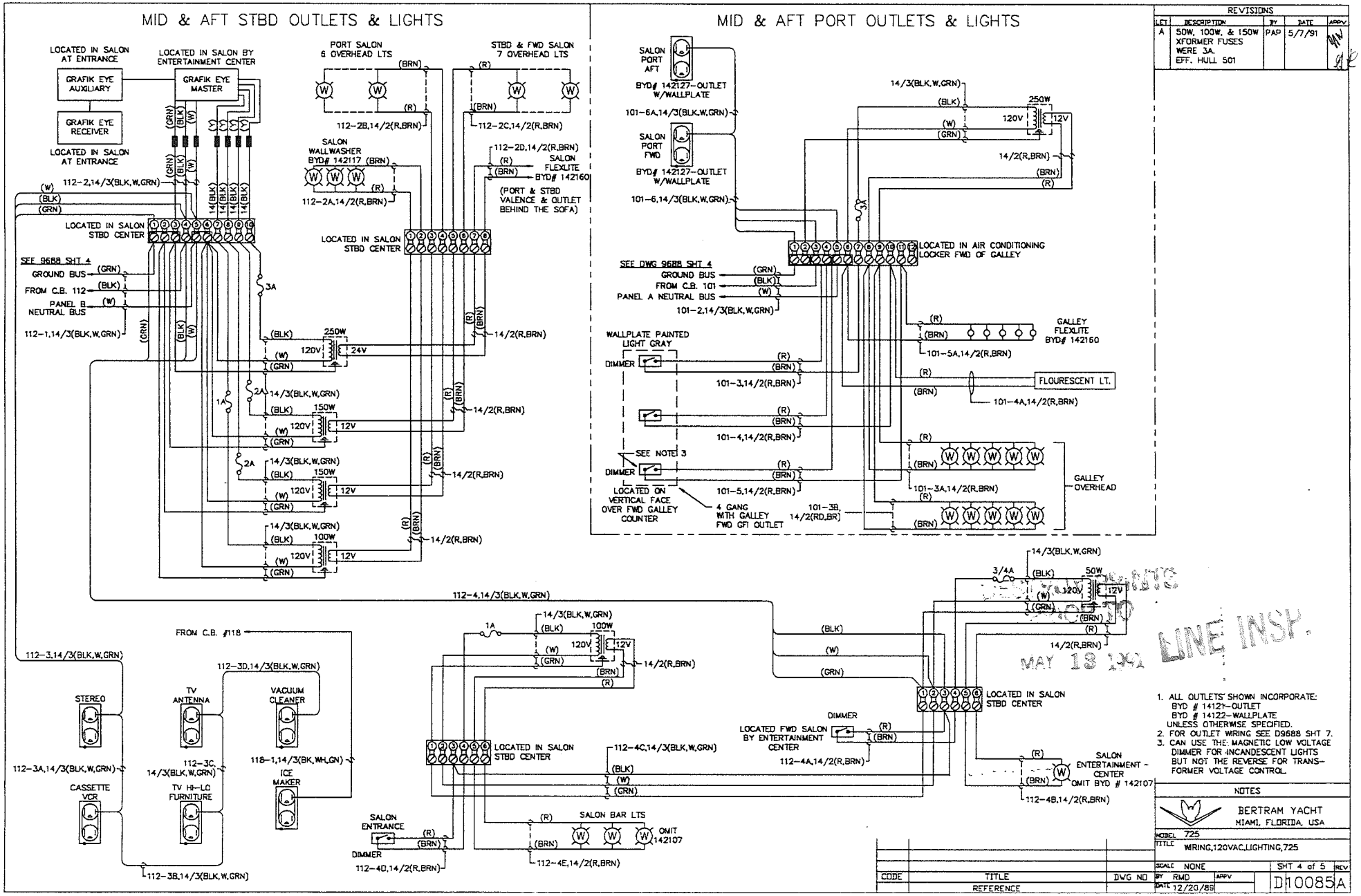
NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725

TITLE WIRING,120VAC,LIGHTING,725

CODE	TITLE / REFERENCE	DWG NO	SCALE NONE	SHT 3 of 5	REV
			BY RMD APPV	D10085	A
			DATE 12/20/89		



REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV
A	50W, 100W, & 150W XFORMER FUSES WERE 3A. EFF. HULL 501	PAP	5/7/91	

1. ALL OUTLETS SHOWN INCORPORATE:
   BYD # 14127-OUTLET
   BYD # 14122-WALLPLATE
   UNLESS OTHERWISE SPECIFIED.
2. FOR OUTLET WIRING SEE D9688 SHT 7.
3. CAN USE THE MAGNETIC LOW VOLTAGE DIMMER FOR INCANDESCENT LIGHTS BUT NOT THE REVERSE FOR TRANSFORMER VOLTAGE CONTROL.

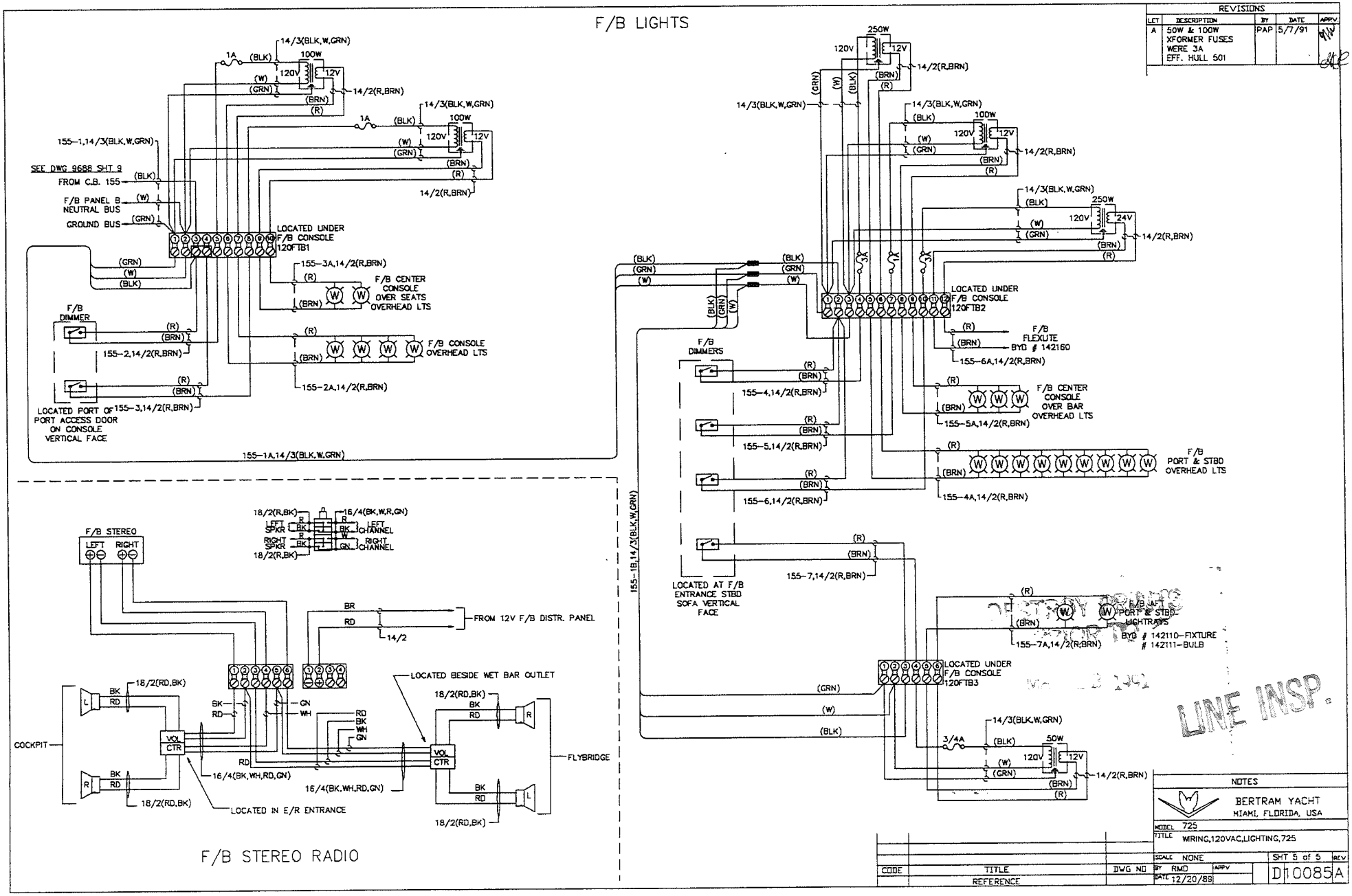
NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

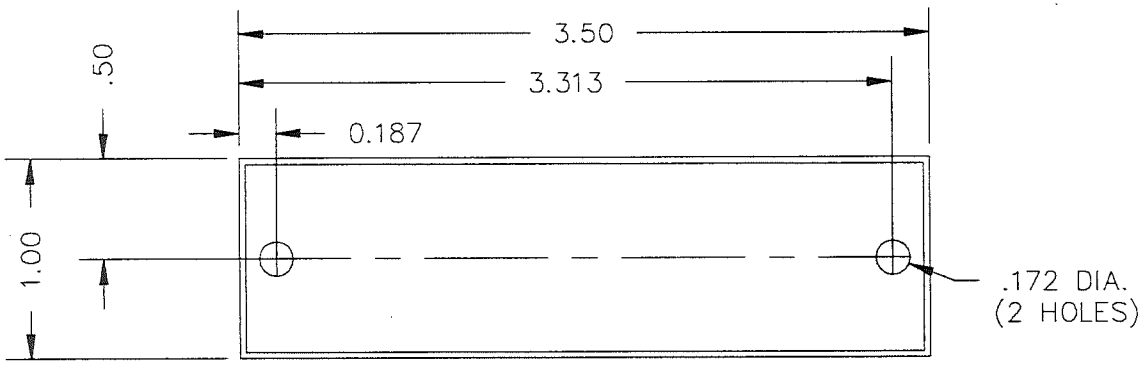
MODEL 725
TITLE WIRING,120VAC,LIGHTING,725

CODE	TITLE / REFERENCE	DWG NO

SCALE NONE | SHT 4 of 5 | REV
BY RMD | APPV
DATE 12/20/89
D10085A


F/B LIGHTS
REVISIONS
LET | DESCRIPTION | BY | DATE | APPV
A | 50W & 100W XFORMER FUSES WERE 3A EFF. HULL 501 | PAP | 5/7/91
14/3(BLK,W,GRN)
1A
(BLK)
100W
120V
12V
(W)
(GRN)
(BRN)
(R)
14/2(R,BRN)
155-1,14/3(BLK,W,GRN)
SEE DWG 9688 SHT 9
FROM C.B. 155
F/B PANEL B NEUTRAL BUS
GROUND BUS
LOCATED UNDER F/B CONSOLE 120FTB1
155-3A,14/2(R,BRN)
F/B CENTER CONSOLE OVER SEATS OVERHEAD LTS
F/B DIMMER
155-2,14/2(R,BRN)
F/B CONSOLE OVERHEAD LTS
155-2A,14/2(R,BRN)
155-3,14/2(R,BRN)
LOCATED PORT OF PORT ACCESS DOOR ON CONSOLE VERTICAL FACE
155-1A,14/3(BLK,W,GRN)
250W
24V
LOCATED UNDER F/B CONSOLE 120FTB2
F/B FLEXUTE
BYD # 142160
155-6A,14/2(R,BRN)
F/B DIMMERS
155-4,14/2(R,BRN)
F/B CENTER CONSOLE OVER BAR OVERHEAD LTS
155-5,14/2(R,BRN)
155-5A,14/2(R,BRN)
155-6,14/2(R,BRN)
F/B PORT & STBD OVERHEAD LTS
155-4A,14/2(R,BRN)
155-1B,14/3(BLK,W,GRN)
155-7,14/2(R,BRN)
LOCATED AT F/B ENTRANCE STBD SOFA VERTICAL FACE
F/B JAT PORT & STBD LIGHTRAYS
155-7A,14/2(R,BRN)
BYD # 142110-FIXTURE
142111-BULB
LOCATED UNDER F/B CONSOLE 120FTB3
3/4A
50W
14/2(R,BRN)
F/B STEREO
LEFT
RIGHT
18/2(R,BK)
16/4(BK,W,R,GN)
LEFT SPKR
RIGHT SPKR
LEFT CHANNEL
RIGHT CHANNEL
BR
RD
FROM 12V F/B DISTR. PANEL
14/2
LOCATED BESIDE WET BAR OUTLET
18/2(RD,BK)
BK
RD
GN
WH
COCKPIT
VOL CTR
FLYBRIDGE
16/4(BK,WH,RD,GN)
LOCATED IN E/R ENTRANCE
F/B STEREO RADIO
NOTES
BERTRAM YACHT
MIAMI, FLORIDA, USA
MODEL 725
TITLE WIRING,120VAC,LIGHTING,725
SCALE NONE
SHT 5 of 5
REV
CODE
TITLE
REFERENCE
DWG NO D10085A
BY RWD
APPV
DATE 12/20/89
LINE INSP.

SHEET REV INDEX			
SHT	1	2	3
REV	F	C	A



SCALE: 1"=1"

TYP. NAMEPLATE FOR FOLLOWING NOMENCLATURE

REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV
A	ADDED 14A7296-4 ECO #6045	NW	9/1/86	GK
B	GEN. REVISION	RMD	4/20/89	NW GK
C	REVISED SHEET 2	RMD	5/10/89	NW GK
D	-7 WAS "NO. 1 INSULATED BUS" -8 WAS "NO. 2A INSULATED BUS" REVISED SHEET 2	RMD	6/20/89	NW GK
E	REVISED SHEET 2 ADDED SHEET 3	RMD	11/30/89	NW GK
F	REVISED SHEET 3	RMD	2/12/90	

DWG# 14A 7296-	NOMENCLATURE	LET HGT
1	PORT ENGINE MONITOR	.156
2	STBD ENGINE MONITOR	.156
3	BILGE MONITOR	.156
4	HALON MONITOR	.156

DWG# 14A 7296-	NOMENCLATURE	LET HGT
5	FIRE SYSTEM MONITOR	.156
6	240 50A SINGLE PHASE	.156
7	PANEL A INSULATED BUS	.188
8	PANEL B INSULATED BUS	.188

NOTES

2. LETTERING: .156 AND .188 WHITE

1. MATERIAL: .125" X 1" X 3.5" BLACK PHENOLIC. BEVEL EDGES .031 X 45 DEG.

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL GENERAL

TITLE NAMEPLATE,.125X1X3.5, PHENOLIC

SCALE NONE | SHT 1 of 3 | REV

BY LCH | APPV LH | DATE 4/10/81 | DATE 4/10/81

14A7296 F

DWG# 14A 7296–	NOMENCLATURE	LET HGT
27	2FTB13	.25
28	2FTB14	.25
29	2FTB15	.25
30	2FTB16	.25
31	2FTB17	.25
32	1FTB1	.25
33	1FTB2	.25
34	202ETB1	.25
35	202ETB2	.25

DWG# 14A 7296–	NOMENCLATURE	LET HGT
36	202ETB3	.25
37	202ETB4	.25
38	202ETB5	.25
39	202ETB6	.25
40	202ETB7	.25
41	120FTB1	.25
42	120FTB2	.25
43	120FTB3	.25

REVISIONS

LET	DESCRIPTION	BY	DATE	APPV
A	ADDED 7296-34 THROUGH 7296-43	RMD	2/12/90	

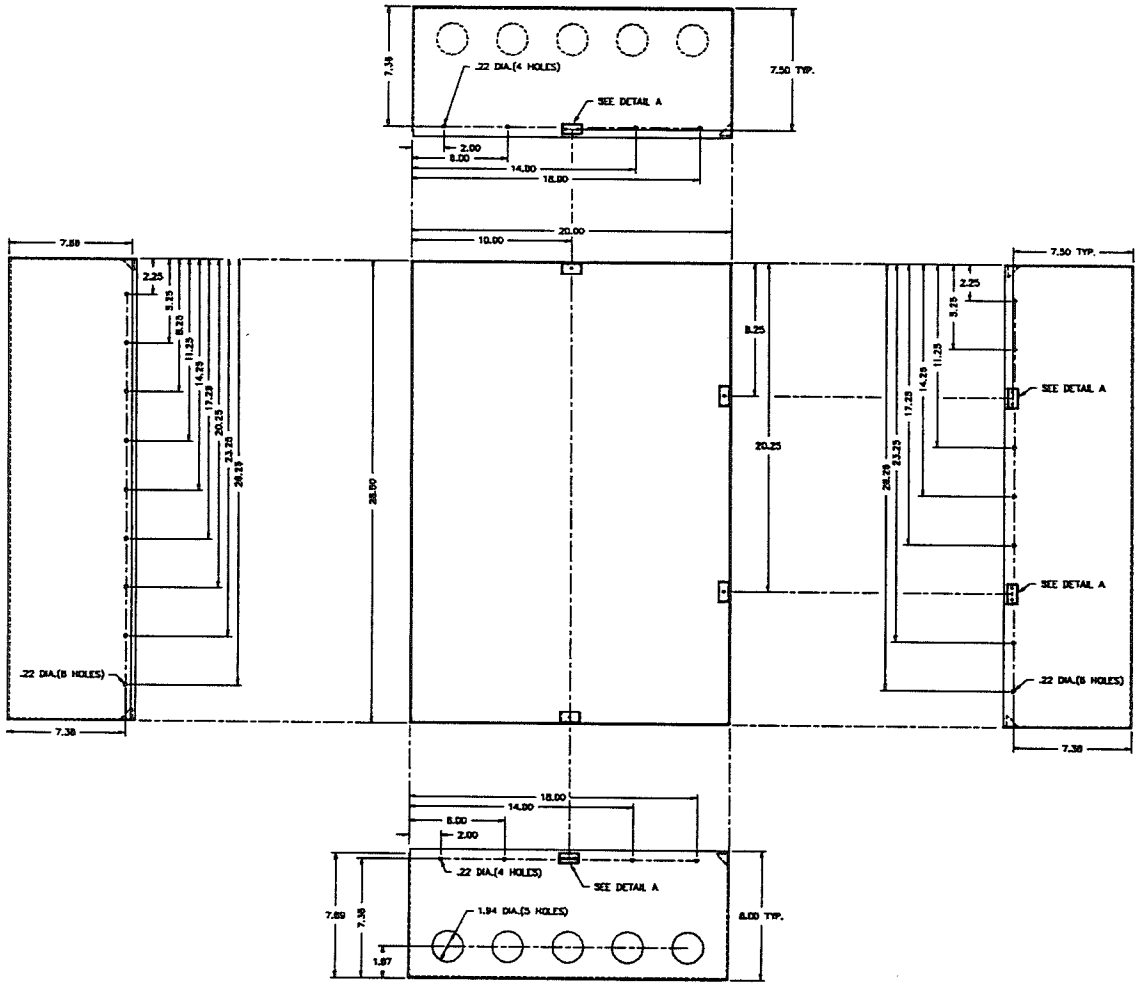
NOTES

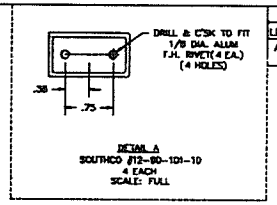
BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL GENERAL

TITLE NAMEPLATE,.125X1X3.5, PHENOLIC

SCALE NONE		SHT 3 of 3	REV
BY	APPV	14 A 7296	A
DATE	DATE		





DETAIL A
SOUTHCO #12-90-101-10
4 EACH
SCALE: FULL

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.
A	GEN. REVISION. SEE PREVIOUS REV. EFF. HULL 505	RMD	4/4/90	

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ANGULAR: ± 1/2°
DECIMAL : ± .0156"

2. FINISH: MILL SMOOTH ALL EDGES
1. MATERIAL: .090" SHEET ALUMINUM,5052-H34

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

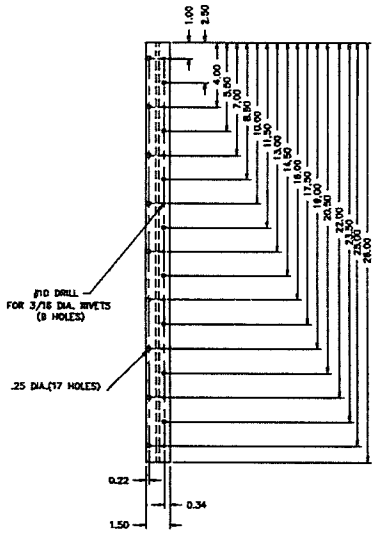
MODEL 725
TITLE BOX,DIST,28.5X20X8,725

REF	FRAME,PANEL FACE,28.87X20.37,725	14D9755	
CODE	TITLE	DWG NO	
	REFERENCE		

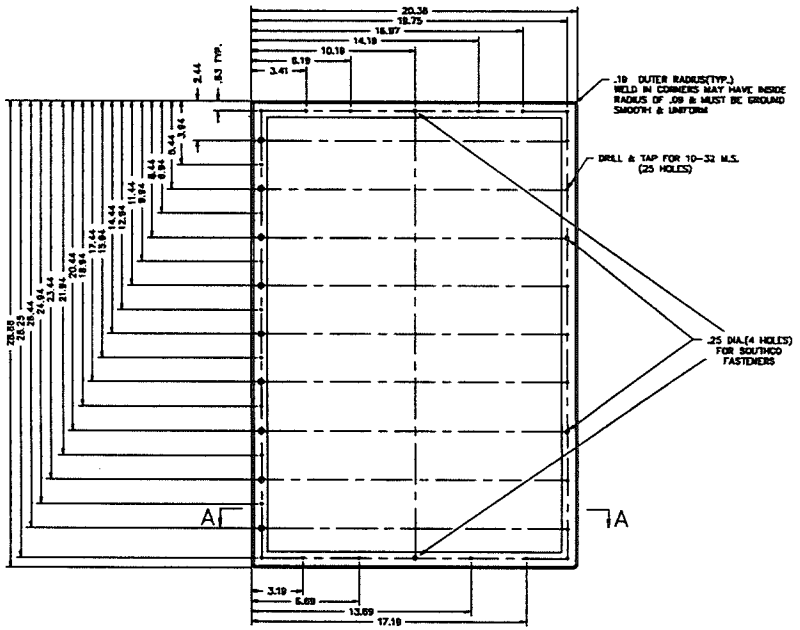
SCALE 1/4"=1"
BY RMD APPV
DATE 12/9/88 DATE
14D 9754 A
REV

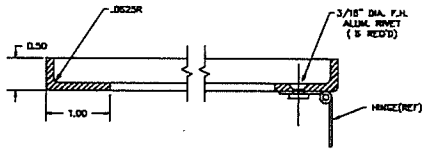
REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.
A	HINGE PORTION WAS CHANGED SEE PREVIOUS REVISION EFF. HULL 506	RMD	4/4/90	

HINGE



FRAME





SECTION A-A
ASSEMBLY DETAIL
SCALE: FULL

TOLERANCES UNLESS OTHERWISE SPECIFIED		
ANGULAR:	±	1/2°
DECIMAL :	±	.0156"

4. CONTINUOUS HINGE: .040" X 1.5" S.S. 304, MILL FINISH
3. FRAME TO BE SQUARE AND FLAT SURFACE TO BE SMOOTH
2. FINISH: ETCHED & ANODIZED
1. MATERIAL: .125" ALUMINUM, 5052-H34 FLAT SHEET

NOTES

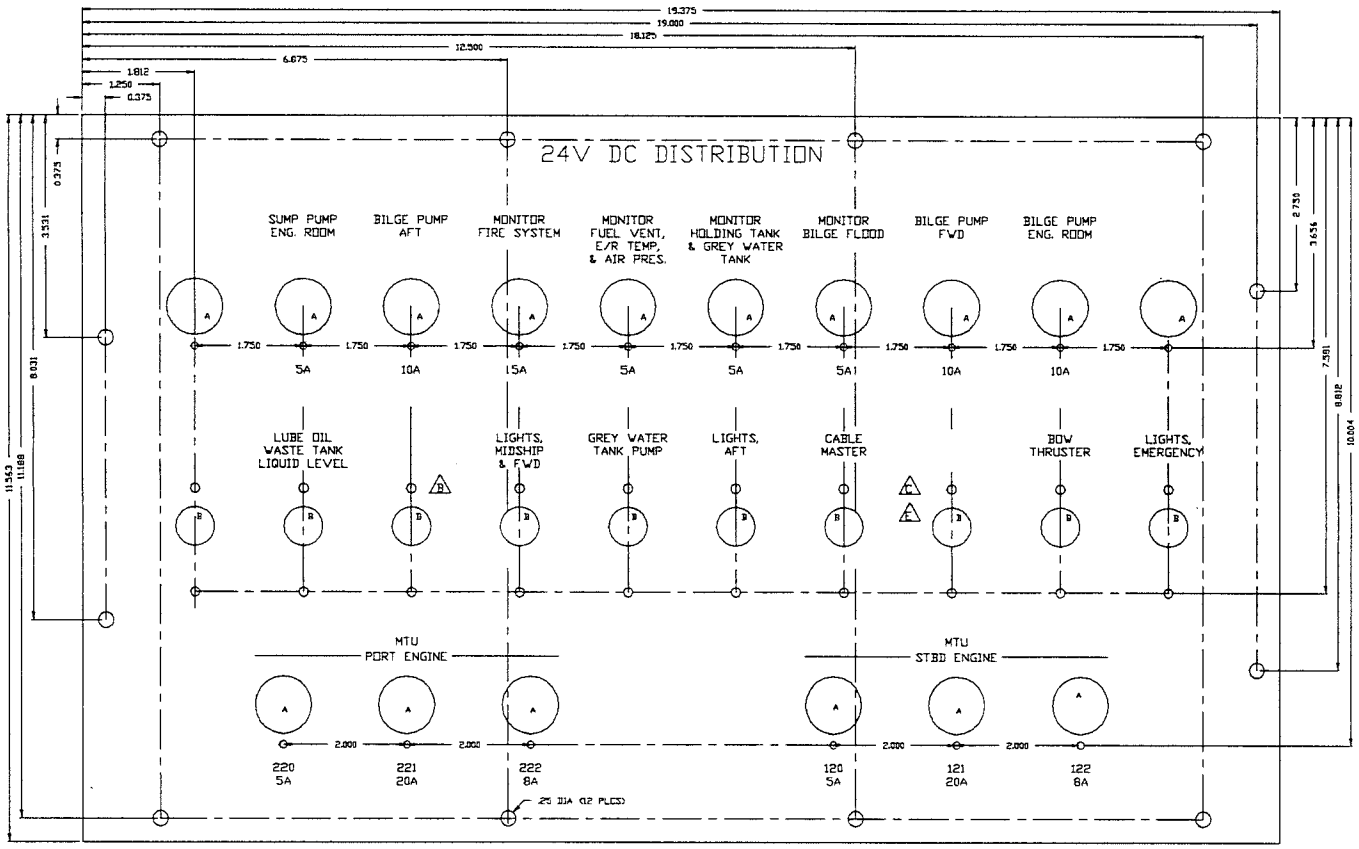
BERTRAM YACHT
MIAMI, FLORIDA, USA

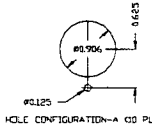
MODEL 725
TITLE FRAME,PANEL FACE,28.87X20.37,725

REF	BOX,DIST,28.5X20X8.725	14D9754	
CODE	TITLE	DWG NO	
	REFERENCE		

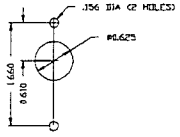
SCALE 1/4"=1" REV
BY RMD APPV
DATE 11/29/88 DATE
14 D 9755 A

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV
A	ADDED FUSE AMPS	NFW	1/16/90	GK
B	DELETED SALON DECK TOILET	NFW	6/22/90	GK
C	CORRECTED SPELLING	PAP	10/9/90	GK
D	ADDED MTU FUSES EFF. HULL 507	PAP	5/13/91	
E	REMOVED NOMENCLATURE	PAP	5/17/91	





HOLE CONFIGURATION-A (10 PLCS)



HOLE CONFIGURATION-B (16 PLCS)

DESTROY PRINTS PRIOR TO AUG 20 1991

LINE INSP

1. MATERIAL: 5052 ALUM-.090
2. ~~FINISH PANEL~~ TO BE FLAT FACE VERTICAL GRAIN 240 GRIT. EDGE AND CORNERS TO BE EASED.
3. PAINTING PRIME COAT-ALODINE OR IRRIDITE. FINISH COAT-FACE & EDGES MODIFIED EPOXY FLAT BLACK
4. SILK SCREEN LETTERING-WHITE HELVETTICA BOLD CONDENSED 12 & 24 POINT.

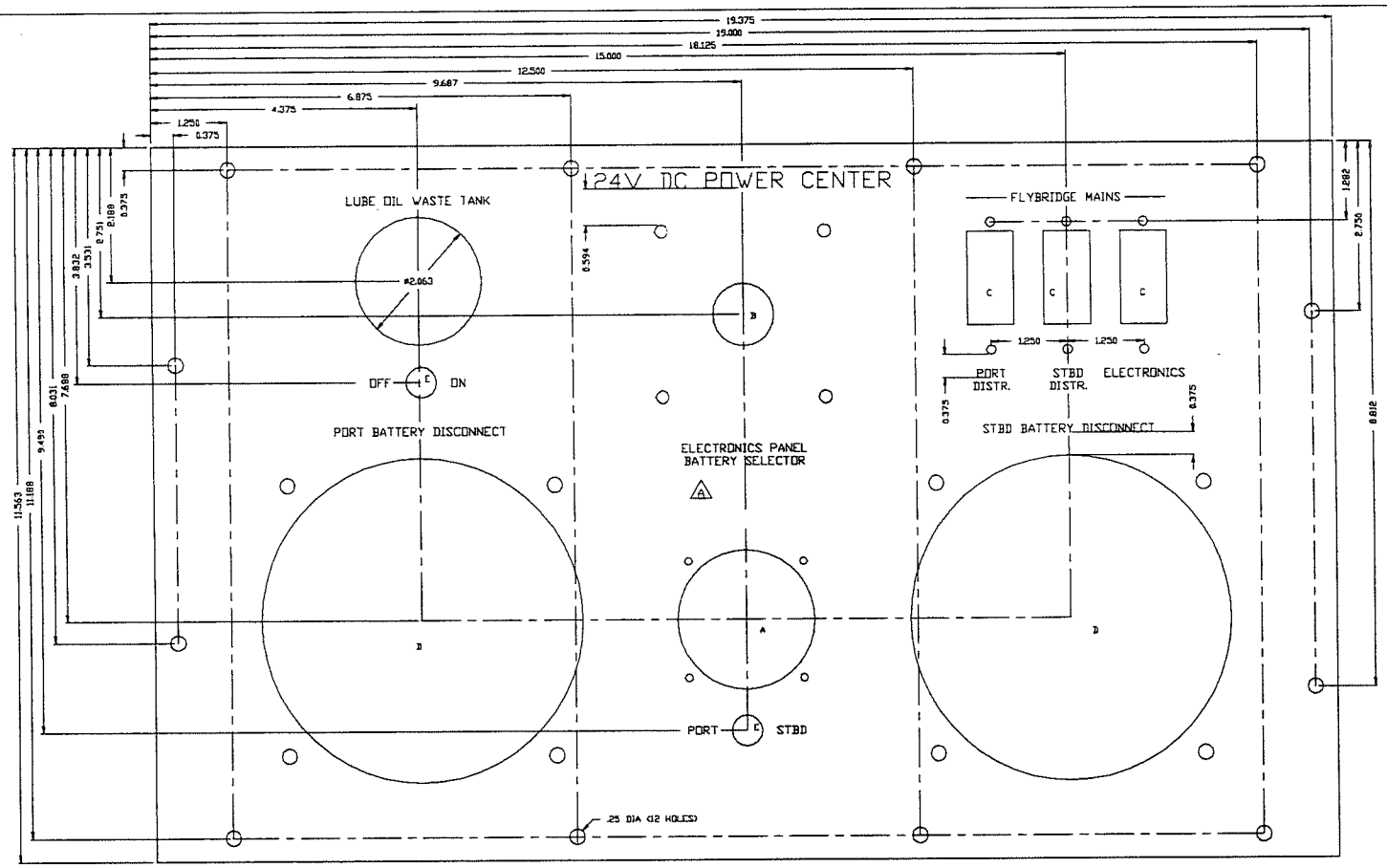
NOTES

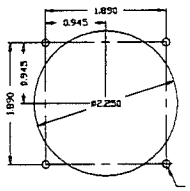
TOLERANCES UNLESS OTHERWISE SPECIFIED	
ANGULAR:	± 1/2°
DECIMAL:	± .015"

BERTRAM YACHT
MIAMI, FLORIDA, USA

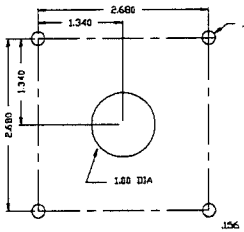
MODEL 725
TITLE
PANEL, DC, E/R, 24V DISTR, 725

REF	FRAME		14D9793	SCALE FULL	REV
CODE	TITLE	DWG NO		BY NFW APPV GK	
	REFERENCE			DATE 4/3/89 14/21/89	14D9843 E

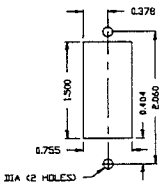




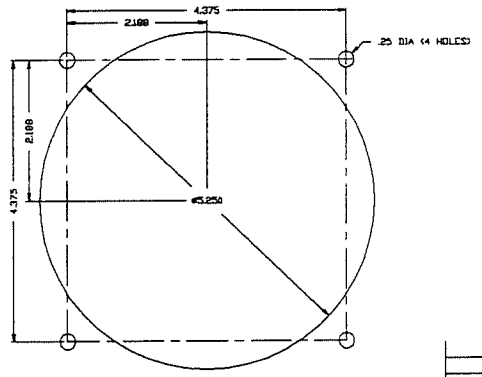
HOLE CONFIGURATION-A



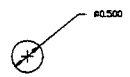
HOLE CONFIGURATION-B



HOLE CONFIGURATION-C (3 PLCS)



HOLE CONFIGURATION-D (2 PLCS)



HOLE CONFIGURATION-E (2 PLCS)

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.
A	ADDED ELECTRONICS PANEL	NFW	9/18/90	

1. MATERIAL: 5052 ALUM.-.090
2. FINISH PANEL TO BE FLAT. FACE VERTICAL GRAINED 240 GRIT. EDGE AND CORNERS TO BE EASED.
3. PAINTING: PRIME COAT-ALODINE OR IRRIDITE. FINISH COAT-FACE & EDGES MODIFIED EPOXY FLAT BLACK.
4. SILK SCREEN LETTERING-WHITE HELVETICA BOLD CONDENSED 12 & 24 POINT.

TOLERANCES
UNLESS OTHERWISE SPECIFIED
ANGULAR: ± 1/2°
DECIMAL: ± .015"

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE
PANEL, DC, E/R, 24V POWER, 725

REF	FRAME	1412733
CODE	TITLE	DWG NO
	REFERENCE	

SCALE FULL
BY NFW APPV
DATE 4/3/89 DATE
REV.
14D9842A

REVISIONS				
LET.	DESCRIPTION	BY	DATE	APPV.
A	MODIFIED TEXT & LENGTH OF 14C9954-1 & 14C9954-2.	NFW	9/18/90	

14C9954-1

PANEL A

1 MAIN TEMPERING UNIT
2 A/C PUMP RELAY
3 GALLEY A/C HANDLER
4 FWD ST/RM A/C HANDLER
5 MASTER HEAD A/C HANDLER
6 PORT 24V CONVERTER
7 AIR COMPRESSOR
8
9 GALLEY AFT OUTLETS
10 PORT MID & AFT OUTLETS & LIGHTS
11 FWD PORT LIGHTS
12 FWD PORT OUTLETS
13 GALLEY FREEZER
14 JACUZZI
15 COCKPIT FREEZER
16 VACUUM CLEANERS
17
18 GALLEY STBD OUTLETS
19
20

FLYBRIDGE

1 F/B OUTLETS
2 ICE MAKER
3
4 FWD HOLDING TANK PUMP
5 F/B A/C HANDLER

14C9954-2

PANEL B

1 WATER HEATER #1
2 WATER HEATER #2
3 SALON A/C HANDLER
4 STBD ST/RM A/C HANDLER
5 MASTER ST/RM A/C HANDLER
6 MASTER ST/RM HEATER
7 FRESH WATER PUMP
8 SEA WATER PUMP
9 STBD 24V CONVERTER
10 12V CONVERTER
11
12
13 STBD MID & AFT OUTLETS & LIGHTS
14 GALLEY FWD OUTLET
15
16 STBD FWD LTS
17 MASTER ST/RM REFRIGERATOR
18 STBD FWD OUTLETS
19 SALON ICE MAKER
20 GALLEY REFRIGERATOR
21
22 E/R OUTLETS & LIGHTS

FLYBRIDGE

1 F/B REFRIGERATOR
2 F/B LIGHTS
3 POWER WINDOWS
4
5

7.7500

.25 DIA (2 HOLES PER PANEL)

14C9954-3

PANEL C

1 CLOTHES DRYER
2 E/R PORT BLOWER
3 MASTER ST/RM FWD HEATER
4 FWD ST/RM HEATER
5 OVEN/MICROWAVE
6 COOKTOP
7 A/C AUX. TEMPERING UNIT
8 E/R STBD BLOWER
9 STBD ST/RM HEATER
10 CLOTHES WASHER
11 OIL TRANSFER PUMP
12 DISHWASHER
13 COOKTOP HOOD
14
15 TRASH COMPACTOR
16 GARBAGE DISPOSER
17
18

1.88 TYP.

14C9954-4

PANEL D

1 PORT ENG BLOCK HEATER
2 FRESH WATER MAKER
3
4 STBD ENG BLOCK HEATER
5
6 ANCHOR WINDLASS

6.2500

.25 (TYP)

3.75 (TYP)

5. LETTER HEIGHT: 12 & 24 POINT
4. SILKSCREEN: WHITE LETTERING
3. PAINTING: PRIME COAT–ALODINE OR IRRIDITE. FINISH COAT–FACE & EDGES MODIFIED FLAT BLACK.
2. FINISH: PANEL TO BE FLAT. FACE VERTICAL GRAINED. 240 GRIT. EDGE & CORNERS TO BE EASED.
1. MATERIAL: 5052 ALUMINUM, 3.75"W X 6.25"H X .0625"THK

TOLERANCES UNLESS OTHERWISE SPECIFIED	
ANGULAR:	± 1/2°
DECIMAL :	± .0156"

NOTES

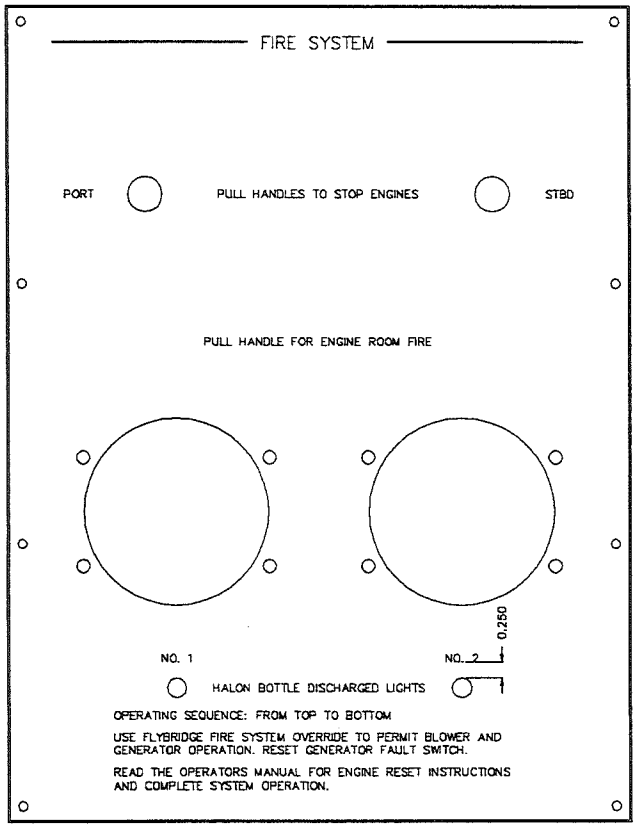
BERTRAM YACHT
MIAMI, FLORIDA, USA

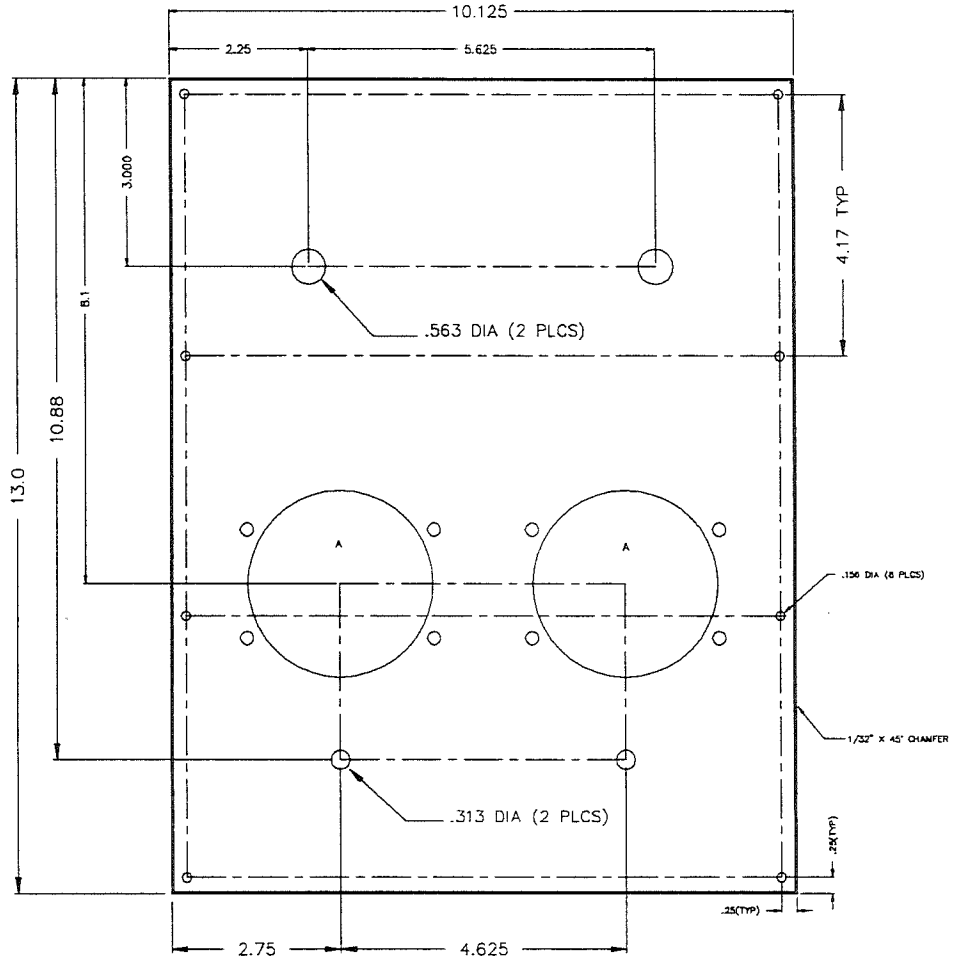
MODEL 725

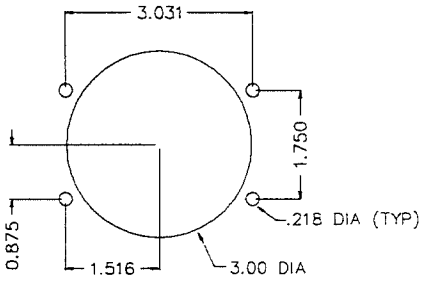
TITLE
NAMEPLATE, E/R AC PANEL, 725–501

NHL	PANEL,DIST,AC,RH,725	14D9810	SCALE 1"=1"				REV
CODE	TITLE	DWG NO	BY RMD	APPV	14	C 9954	A
	REFERENCE		DATE 7/10/89	DATE			

REVISIONS				
LET	DESCRIPTION	BY	DATE	APPV







HOLE CONFIGURATION-A(2)

LINE INSP.

TOLERANCES UNLESS OTHERWISE SPECIFIED	
ANGULAR:	± 1/2°
DECIMAL:	± .015"

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.

1. MATERIAL: 1/8" PHENOLIC LAMINATE, WHITE WITH RED ENGRAVING
2. LETTER SIZE: 1/8" & 3/16"

NOTES

BERTRAM YACHT
MIAMI, FLORIDA, USA

MODEL 725
TITLE NAMEPLATE, FIRE SYSTEM, C/P 725
SCALE FULL
BY PINTZOW
DATE 5/14/91
APP
DATE
REV
DWG NO 4D10311

CODE	TITLE	DWG NO
	REFERENCE	

Service

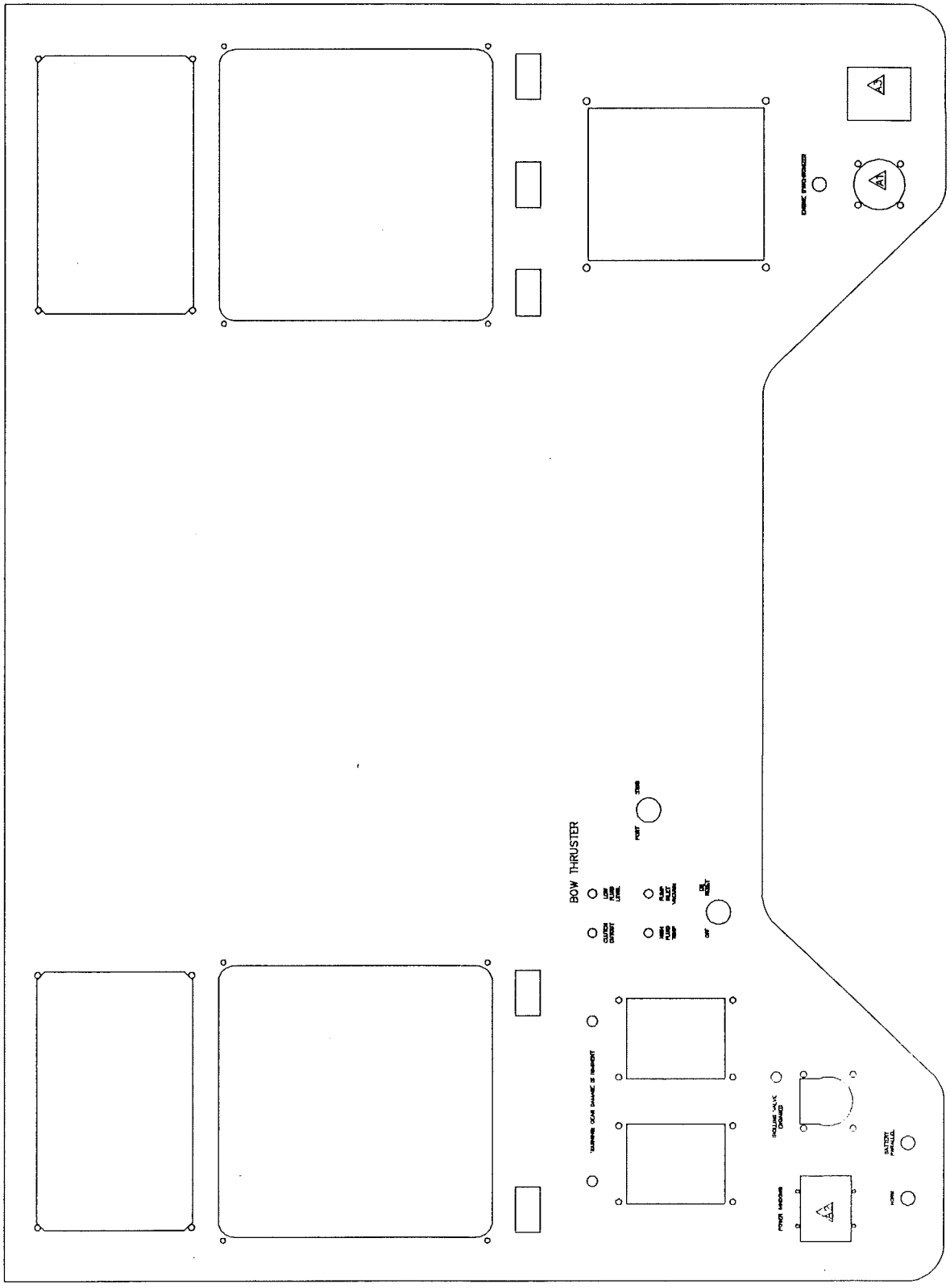
Seatrial Report

Name : Ray Weeks
Date : 5/1/81

Ship Name : Bertram 72' Hull 505
MTU Order No : A 5621
Engine-Type : 12V396TB93
Engine No. : 558-1730 P.t
Oper. Hours : 16.0
Gearbox Type : ~~ZF~~ Twin Disc

Gearbox No. : 43230057
Draft Fo / Stern : 6'9"
Length / Beam : 72 ft x 18.5 ft
Outside-air temp : 28°
Weather : Sunny / warm
Location : Biscayne Bay, Miami, FLA

01	Time		11:00 am	11:30 am	12:00	12:15 pm	12:45 pm	1:05 pm	1:29 pm	1:35 pm	
02	Engine Speed	rpm	750	1007	1251	1583	1794	1777	2045	2100	
03	Fuel Rack	mm	5.2	7.0	9.8	11.3	13.1	14.8	15.6	16.8	
04	Exhaust Temp. A	Deg. C	223	435	610	570	526	498	496	504	
05	Exhaust Temp. B	Deg. C	213	427	605	560	518	488	485	489	
06	Oiltemp.bef.Engine	Deg. C	74.5	78.9	84.9	90.7	92.6	93.8	94.2	96.5	
07	FW Temp.before Engine	Deg. C									
08	FW Temp.after Engine	Deg. C	78	79	80	80	80	81	81	81	
	Gearbox Oil Temp.	Deg. C	42	41	41	41	42	42	48	52	
10	Fuel Oil Temperature	Deg. C	31.5	30.9	31.0	30.7	30.8	30.9	31.1	31.7	
11	Sea Wat.Temp.aft.Pump	Deg. C	28.1	27.5	27.5	27.4	27.7	28.4	28.4	28.0	
12	SW Temp.aft.FW Cooler	Deg. C	30.0	32.6	35.4	35.2	36.0	36.8	35.9	35.6	
13	SW Temp.a.Air Cooler	Deg. C	28.1	27.9	29.1	30.5	33.6	36.3	36.0	38.1	
14	SW Temp.aft.Gearbox	Deg. C	29.8	29.4	28.9	32.2	35.2	36.7	38.4	38.6	
15	Engine Room Temp.	Deg. C	37	38	38	38	41	44	44	41	
16	Air Intake Temp.	Deg. C	29.8	29.5	30.6	30.0	30.0	29.5	29.7	29.7	
17	Charge Air Temp.b.Cyl.	Deg. C	33	32	31	31	33	37	38	40	
18	Engine Oil Pressure	bar	+3.2	+4.8	+5.0	+5.0	+5.0	+5.0	+5.0	+5.0	
19	Gearb.Oil Pressure	bar	+21	+22	+23	+24	+24	+24	+24	+25	
20	Fresh Water Pressure	bar	+.38	+.45	+.70	+.80	+.80	+.80	+.80	+.80	
21	Charge Air Press.b.Cyl.	bar			+.40	+.78	+1.20	+1.55	+1.65	+1.75	
22	Fuel Oil Press.b.Pump	bar	-.10	-.10	-.15	-.15	-.20	-.20	-.20	-.20	
23	SW Press.before Pump	bar	-.10	-.10	-.10	-.15	-.20	-.20	-.20	-.20	
24	SW Press.after Pump	bar	+.15	+.19	+.50	+.80	+1.0	+1.15	+1.20	+1.30	
	Exhaust Back Pressure	mm WG	+8	+48	+50	+133	+277	+390	+382	+440	
26	Air Intake Depression	mm WG	-9	-12	-23	-56	-114	-163	-200	-260	
27	Ship Speed	kn								36 m/h	
28											



Ref: E9916A501

Figure 1A-1: Flybridge Instrument Panel (Center)

Forward Motion

Push the levers forward of **NEUTRAL** to put the transmissions in **FORWARD**. Engine speeds -- and vessel speed -- will increase as you move the lever further forward. Move the lever back toward **NEUTRAL** to reduce speed.

Neutral

The **NEUTRAL** position places the engines at **IDLE** and the transmission in **NEUTRAL**.

Reverse Motion

Pull the levers aft of **NEUTRAL** to put the transmissions in **REVERSE**. Engine speeds -- and vessel speed in reverse -- will increase as you move the lever further back. Move the lever forward toward **NEUTRAL** to reduce speed in reverse.

Before shifting gears to the opposite direction, it is vital that you always throttle back your engines, let them to slow to an idle, and pause with the transmissions in idle. This pause lets the hydraulic pressure within your transmissions drop to a lower level, with three positive results:

1) it reduces transmission wear and tear;
2) it allows easier shifting;
3) it allows you to be sure you have fully engaged the transmission(s) in forward or reverse.

Maneuvering at speeds above **IDLE** should almost always be done with the rudders only and should not normally involve reversing either transmission.

Trolling Valve Controls

Trolling valves allow slippage in the marine hydraulic transmission. This allows low-speed vessel operations at higher (and cleaner-operating) engine speeds.

With the trolling valves disengaged (that is, pushed all the way forward), the throttles operate as if there were no trolling valve: push the throttle levers forward to increase engine speed, and pull back to reduce speed. The farthest aft is the IDLE position.

To engage the trolling valves, throttle the engines back to idle, and pull the trolling valve levers all the way aft.

Throttle movement is now restricted to a significantly lower maximum engine rpm. and slippage in the transmission allows very low-speed vessel operations with the engines operating at above idle rpm.

To disengage the trolling valves, simply push the trolling valve levers all the way forward.

Engine Synchronizer (Optional) Controls

⚠ CAUTION

Do NOT use your synchronizer when maneuvering or when in confined waters. A failure of this device could cause your vessel to make sudden, unplanned maneuvers.

The engine synchronizer compares the rpm of the "slave" engine to that of the "lead" engine. When the rpm do not match, the synchronizer makes the necessary correction to the slave engine throttle.

In your Bertram, the port engine is the "lead" or master engine and the starboard engine is the "slave".

You should use the synchronizer only when you are in open waters, not in confined areas or when maneuvering.

Maintenance

Make sure the fluid level is correct. There is a sight glass indicator at the unit located in front of the starboard engine on the outboard side.

For operating instructions and maintenance information on this device, see the manufacturer's Operator's Manual included with your vessel's documentation.

Trim Tab Controls

Maintaining Original Trim

Your Bertram is designed to carry comparatively heavy loads without appreciably reducing performance; however, for the best performance results, you should maintain original trim. This is with a slight (about 5 degrees) bow up attitude.

Therefore, we suggest that you spend at least a few minutes becoming familiar with the way the vessel behaves at this trim and to just get the feel of your vessel, especially the visual relationship of the bow to the horizon when she is first launched, and before any extra equipment is put on board.

From the first, you will find that your Bertram handles easily and creates little wake at idle speed. However, as you increase speed, she will initially increase her bow-up attitude. As your speed increases further, she will level off and assume a planing attitude. This is her most efficient attitude: about 5 degrees bow up.

When you first operate your Bertram, or if you have made any significant load change to her, such as adding a fishing tower, note your engines' rpm at the maximum bow-up attitude. Plan to cruise either under or over that speed.

NOTE:
Do not hold your Bertram at maximum bow-up attitude any longer than absolutely necessary. For the most fuel efficient operation and the smoothest ride, the sooner she is up on plane, the better.

As a rule, Diesel cruising rpm should be about 10% less than wide open rpm. Gasoline engine cruising rpm should be about 15 to 20% less than wide open rpm.

You will learn to judge the best running trim of your vessel (about 5° bow up) by watching the bow's relationship to the horizon.

Trim Tab System

Your trim tab system is electro-hydraulic and is powered from the flybridge 24Vdc distribution panel (Figure 10B-3).

The two trim tabs (one on each side of the transom) can adjust your Bertram's underway trim. They can also adjust list if you are navigating adverse seas or wind conditions or if you have unusual load conditions.

You operate each trim tab with a rocker-type switch mounted on the lower starboard side of the flybridge instrument panel (Figure 1A-1). The top of the trim tab switch panel is marked **BOW DOWN**.

When you depress and hold the lower part of a trim tab rocker switch (**BOW UP**), the trim tab raises to its top position. **UP** is the normal operating position and is the best for most cruising conditions and speeds.

When you depress the upper part of a trim tab switch (**BOW DOWN**), the hydraulic cylinder extends, pushing the trim tab down. If you hold the switch **BOW DOWN**, you will lower the trim tab to its maximum down position.

Under some sea and operating conditions, some **BOW DOWN** trim tab can adjust your vessel's trim to a smoother riding, more fuel efficient attitude of approximately 5° bow up.

NOTE:
Do not depress one Trim Tab switch BOW DOWN and the other BOW UP or hold a switch in BOW DOWN or BOW UP for an extended period. Either action will trip the TRIM TABS circuit breaker on the flybridge 24Vdc distribution panel, which you must manually reset to reactivate the trim tab system.

Trim Tab Use

⚠ WARNING

Before you run an inlet or if you have a following sea, move trim tabs to full UP position to reduce the risk of broaching or pitchpoling.

After starting your engines, always depress both **BOW UP** trim tab switches ensuring that you leave dockside with trim tabs in the full up position.

Once underway and clear of the harbor, as sea conditions permit, you can put your Bertram "on plane." If you want to lower her bow, lightly depress the **BOW DOWN** switches to extend the trim tabs slightly. Continue to depress and release the **BOW DOWN** switches to gradually lower your bow until you are at the optimum 5° bow up attitude. Your speed and the sea will determine the extent to which you will want to lower the trim tabs to adjust your trim.

Your trim tabs are mounted on the hull where the transom meets the bottom, and are vulnerable to damage if used improperly.

NOTE:
Too much BOW DOWN trim at any speed will reduce the vessel's speed and may also degrade the handling characteristics of your vessel.

NOTE:
Except in an emergency situation, never go into reverse or back down quickly from any speed above idle while either or both of your trim tabs are in any position except the full up position. If you do reverse or back down suddenly, it is possible that the reverse pressure of the water pushing against the trim tabs could damage the trim tab hydraulic cylinders and/or the cylinders' internal seals.

NOTE:
Always return both trim tabs to the full up by depressing and holding the BOW UP rocker switches prior to trolling just in case it is necessary to "back down" on a fish. Again, this is to prevent damage to the trim tab hydraulic cylinders and/or the cylinders' internal seals.

NOTE:
Check your running attitude each time you make a speed change. Normally, the faster you are going, the less trim tab is required to maintain the desired attitude.

Always raise both trim tabs to the full up position prior to docking. This helps prevent marine growth from developing on the exposed hydraulic rams.

Side-To-Side Leveling with Trim Tabs

While under way, you may find that your vessel lists to one side or the other. This is usually due to improper loading of gear or passengers, or due to a beam wind. Underway, your Bertram can be leveled by changing the relative positions of the trim tabs. For instance, if your vessel lists to port:

a) depress the starboard **BOW UP** switch momentarily.
b) then depress the port **BOW DOWN** switch momentarily.
c) if your first attempt at trim adjustment does not completely correct the list, repeat

operations (a) and (b) until you achieve a satisfactory adjustment.

d) for a list to starboard, reverse this procedure.

Battery Parallel Switch

The momentary-contact **BATTERY PARALLEL** toggle switch, used when starting the main engines, is located on the lower port corner of the instrument panel.

Windshield Wiper/Washer Controls

The wiper-washer controls are located on the face of the control console, port of the helm.

Power Window Controls

The power window controls are located on the lower port corner of the instrument panel. Push the bottom of the switches to lower the windows; push the top of the switches to raise them.

Horn Switch

The momentary-contact **HORN** toggle switch is located on the lower port corner of the instrument panel. Push the toggle switch up to sound the horns.

Propulsion System Performance Instruments

The flybridge instrument panel is shown in Figure 1A-1.

Refer to the MTU Engine Operator's Manual for engine operating instructions.

Estimating Speeds Using the Tachometer

You can use your tachometer to make a series of timed test runs back and forth over a measured course at different rpm readings. These will give you a good tool for estimating speed, but there is no direct correlation of rpm to the speed of the boat across the bottom. Several factors affect the accuracy of your calculations:

- slippage of the propellers;
- the effect of wind on the vessel's superstructure;
- the effect of tides or currents;
- the condition of the vessel's bottom;
- variations in load.

Magnetic Compass

Your Bertram is equipped with a lighted, compensating marine compass mounted on the forward section of the instrument panel console.

CAUTION

The compass aboard this vessel is not compensated by Bertram Yacht. Compass compensation is the responsibility of the boat owner. It should be performed by a competent compass technician.

This is a magnetic card compass and, like all magnetic compasses, it is affected by:

- nearby ferrous metal (iron and steel) objects including tools, some beverage cans, etc.
- magnetic fields generated by nearby electrical or electronic equipment, including other compasses
- variations in the earth's magnetic field.

Any time any electronic equipment, gauge, or instrument is added, removed, or replaced on or near the instrument panel, compass deviation should be checked by a competent compass technician.

CAUTION

Any time any electronic equipment, gauge, or instrument is added, removed, or replaced on the instrument panel or in its immediate area, Compass Deviation should be checked by a competent compass technician.

Except for the night navigation light, the marine magnetic compass installed on your vessel does not need electrical power to function, and therefore it is not disabled in case of shipboard electrical difficulties.

CAUTION

Read the information in ***Part II, Section 1B*** on ***Compass Basics.***

Flybridge Overhead Panel

The flybridge overhead panel is shown in Figure 1A-2.

Light Switches and Indicators

The light switches are located in the port section of the flybridge overhead panel. They include:

- a two-position toggle switch turns the 120V **A.C. ENGINE ROOM LIGHTS** on or off;
- two toggle switches turn the optional **FWD** and **AFT DOCKING LIGHTS** on or off;

NOTE:
The docking lights are to be used only for docking. When underway, only your navigation lights may be showing.

- a toggle switch turns the instrument **PANEL AND GAGE LIGHTS** on or off;
- a toggle switch turns the **COMPASS LIGHT** on or off.
- two three-position toggle switches control the **ANCHOR** and **NAVIGATION** lights: up is **ON**, down is **TEST**, and the center position is **OFF**.

Testing the Lights

To the starboard side of these switches are three-position **TEST LIGHTS** indicators. You can test the **ANCHOR** or **NAVIGATION** light systems by pushing either switch to **TEST**. The corresponding lights in the **TEST LIGHTS** indicator block should illuminate: when you

On the starboard side of the flybridge overhead panel is a digital readout marked **ENGINE ROOM TEMPERATURE**. This unit indicates engine room temperature in °F. To starboard of this readout is an indicator marked **HIGH E/R TEMP**. The alarm horn sounds and the indicator illuminates when the engine room temperature exceeds approximately 120°F.

You can silence the alarm horn by pressing the **SILENCE** button. To test the alarm horn and indicator, press the **TEST** button; the horn should sound and the indicator should illuminate.

Air Pressure Indicator and Alarm

On the starboard side of the flybridge overhead panel is a digital readout marked **COMPRESSED AIR SYSTEM**. This unit indicates air pressure in the pneumatic system in psi (pounds per square inch). To starboard of this readout is an indicator marked **LOW AIR PRESSURE**. The alarm horn sounds and the indicator illuminates when pressure in the pneumatic system falls below 60psi..

You can silence the alarm horn by pressing the **SILENCE** button. You can turn off the light by simultaneously pressing the buttons on either side of the display. To test the alarm horn and indicator, press the **TEST** button; the horn should sound and the indicator should illuminate.

Generator Running Indicators

On the starboard side of the flybridge overhead panel are two indicators marked **A.C. GENERATORS**. The **20 KVA** indicator illuminates when the port 20kW generator is running, and the **30 KVA** indicator illuminates when the starboard 30kW generator is running.

Gauges and Meters Not on the Flybridge

Engine Room Electrical Panels

Your Bertram has electrical distribution and control panels in the engine room. Refer to

- **Part II, Section 10A**
- **Part II, Section 10B**
- **Part II, Section 11.**

Generator Hour Meters

Mounted on each generator (on the control panel) is a non-resettable hour meter. These meters accumulate the generators' running time and are intended to help you schedule preventive maintenance.

Fuel Vent Tank Monitor

The fuel tank vent monitor is on the Monitor Panel located in the cockpit in the engine room entrance well. The warning horn indicates that fuel is overflowing into the vent tank.

If the horn sounds, you can silence it by pressing the **SILENCE** button on the monitor panel.

You can test the horn by pressing the **TEST** button on the monitor panel.

--- See Part III for Maintenance Information ---

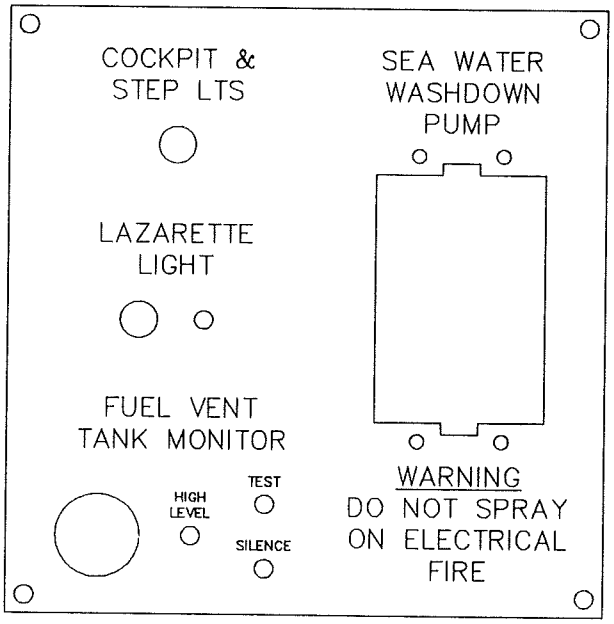


Figure 1A-3: Monitor Panel

--- See Part III for Maintenance Information ---