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## CONTROLS AND INSTRUMENTS

### The Importance of Instruments

To avoid mechanical damage, become accustomed to checking your instruments frequently when running and particularly when first starting the engine.

### On-Stop and Starter Switches

NOTE: If your boat has more than one station, ALL the engine switches must be in the "ON" position.

After the corresponding engine circuit breaker is turned on, the engines are started by first turning the engine on-stop switch to the "On" position, thereby energizing the electrical system. Press engine "Start" switch until the engine starts; as soon as the engine starts, release the starter. This starter should not be operated for prolonged periods which may result in draining the battery or overheating the starter motor or solenoid.

To stop the diesel engine, the on-stop switch should be pushed and held in the "Stop" position until the engine is stopped. This shutdown cuts off the fuel supply to the engine. General Motors diesel installations are also equipped with an "emergency air shutdown" handle for each engine, located near the clutch and throttle controls on the bridge. These handles should be pulled only to stop engines in an emergency situation.

Before attempting to restart the engine, after an emergency shutdown, it is necessary to manually reset the air shut-off valve located at the aft end of the engine on the blower-inlet air silencer case. (See Engine Operating Manual).

### Accessory Switches

Each of these toggle switches operates lights or electrical accessories as marked and gets its power from the engine starting batteries through

the 12 V.D.C. Panel. Excessive use when engine or converter is not charging the battery could make engine starting difficult.

#### Battery Paralleling

This boat uses a battery paralleling system that can use all four batteries for starting each engine. Depress parallel switch on panel while depressing start switch.

#### Gauges

Mechanical gauges are: Located in engine room for clutch pressure only (GM).

Electrical gauges are: Tachometer, Engine Oil Pressure, Engine Cooling Temperature, Ammeter, Fuel, and Hour Meters.

#### Safety Alarm System

This system gets its power through its circuit breaker (#32) at top of 12 V.D.C. Panel. This breaker should be "on" at all times.

The engine section of the alarm has red warning lights to indicate excessive engine water temperature or insufficient oil pressure. Test switches are provided to check operation of light and bells; test should be made prior to starting engines. Have an assistant observe lights in deckhouse.

The bilge alarm has a float switch in the aft end of the engine room. This should be checked periodically to be sure that it is free of debris.

The fire alarm has three detectors, one between the engines, another near the generator and the third in forward fuel tank compartment.

It is normal to have the engine oil signal light and bells sound for a short period when engine is started or shutdown.

#### Ammeter

This is an indicator which measures the rate of electrical current charging

or discharging the storage battery. The ability of the alternator to maintain a charge depends on the ratio of current generated and the rate of consumption by the electrical equipment. A low charging rate indicates the batteries are at full charge and the accessory demand is low.

#### Fuel Gauge

The electric fuel gauges are located on the instrument console. The port gauge is for the aft tank and starboard is for the forward tank. The forward tank has a capacity of 205 gallons (U.S.) and the aft tank 319 gallons (U.S.).

#### Lube Oil Pressure Gauge

Almost all serious engine trouble will be reflected on the oil pressure gauge. Therefore, if a radical change in pressure should occur, turn the engine off immediately. During operation, there may be some slight fluctuation in gauge reading. This is normal due to the nature of the lubricating oil and the temperature variation. Consult your engine manual for operating pressure.

#### Temperature Gauge

The temperature gauge records the water temperature circulating through the engine. All engines are equipped with a thermostat that controls the water flow, thus determining the temperature. The Temperature and Oil Pressure Gauge should be observed simultaneously as most malfunctions will be reflected in both gauges. Consult engine manual for further information. Note, if water temperature rises oil pressure will drop.

#### Tachometer

This instrument registers the revolutions per minute of the engine. There is no direct correlation of RPM's to speed of the boat due to reduction gear and propeller slippage.

### Gear Oil Pressure

This gauge records only transmission oil pressure applicable to the reverse gear in the transmission. Consult your engine manual for operating pressure. These gauges are on the aft bulkhead in the engine room.

### Hour Meter

This instrument records the number of hours that the engines have been operating, regardless of engine's speed (RPM). Meters are energized by on-stop circuit.

### Water Gauge

The water level gauge is located in the galley. It is electrically operated by a sender in the tank. The fresh water pump circuit breaker (#63) must be turned "On" before gauge will operate. The two fresh water tanks hold a combined capacity of 150 gallons. The remote restart switch is used to start the pump after tank has been emptied (and refilled) or if pressure drops too low (for additional information see Water System).

## CONTROLS

### Bridge Control

The bridge control panel contains all controls, gauges, and switches necessary for the control of the boat. Included on the controls are engine throttle control, marine gear control, and switches for: blowers, navigation lights, horn, instrument lights, and bilge pumps.

### Engine and Marine Gear

Clutches are installed on the control panel within easy reach of the helmsman's left hand. They are the Morse Push-Pull Cable controls directly connected to the marine gear. The clutch control is marked Forward, Neutral and Reverse.

### Throttle Control

These controls are at helmsman's right hand. Moving the control lever transmits motion from this control head to the control unit in the engine room.

All movement from the controls to the engine is by means of heavy duty push-pull control cables.

Additional controls may be added without appreciable increase in control effort.

### Steering Control (Hynautic-Hydraulic)

The steering system consists of a hydraulic pump and pilot check valve, to which the steering wheel is attached. When the wheel is turned hydraulic fluid is pumped to the steering cylinder attached to the rudder arm. There is a hydraulic fluid reservoir installed in the system. The reservoir contains 2 quarts of fluid under 30 psi air pressure. This will prevent any outside air from entering the system. The reservoir has a sight glass

indicating the fluid level. The air pressure can be recharged by using an ordinary tire pump. There is a valve on top of the reservoir to which the pump can be attached. The reservoir is located under the cockpit deck on the starboard side of the transom and is accessible through the aft section of the generator hatch.

The steering cylinder is a double acting type with direct mechanical linkage to tiller arm. The system gives instant rudder response and will provide a hydraulic lock against any rudder forces.

Additional steering controls or automatic pilot may be added without adding additional steering effort.

The rudder indicator gets its power from the port engine circuit breaker. (Indicator should be adjusted to read full scale, each side of center calibration box is located on underside of bridge panel and can be reached through removable portion of head liner in salon.

#### Trim Tabs (Boat Leveler)

Power is supplied by trim tab circuit breaker on 12 V.D.C. Panel. When you push "bow up," the tabs move to upper position. This is "normal" position and should be best for most slow and medium cruising speeds. When running an inlet or before a following sea, have "bow up."

When pushed "bow down," tabs will lower to down position. At fast cruising or top speed, tabs should be about 1/3 to 1/2 down. Learn to judge running attitude of boat in relation to the horizon. (Note: The tabs have a special short stroke of 1-3/4" length.)

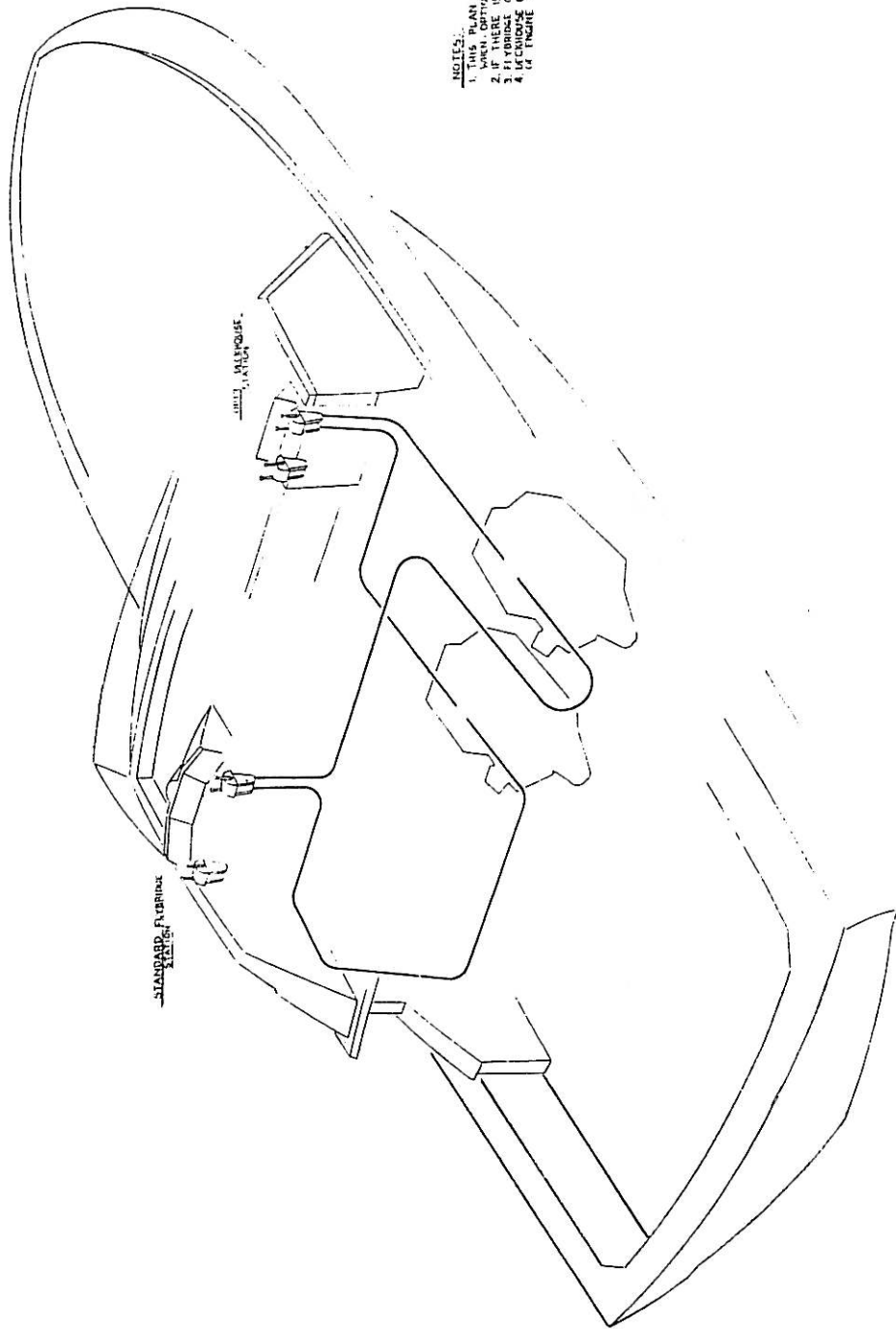
Tabs can be used to correct for adverse load, seas, and wind conditions.

Never press one switch "bow down" at the same time as other is pressed "bow up." This will trip circuit breaker on 12 V.D.C. Panel. Prolonged holding of either switch at either end of travel will also cause breaker to

trip. Circuit breaker will have to be reset to "On" position to make tabs operative again.

Important: Never back down while the tabs are in down position. Because of force from water in reverse, it is possible to damage both trim tab cylinders and/or internal seals of cylinders.

REV.	DESCRIPTION	BY	DATE

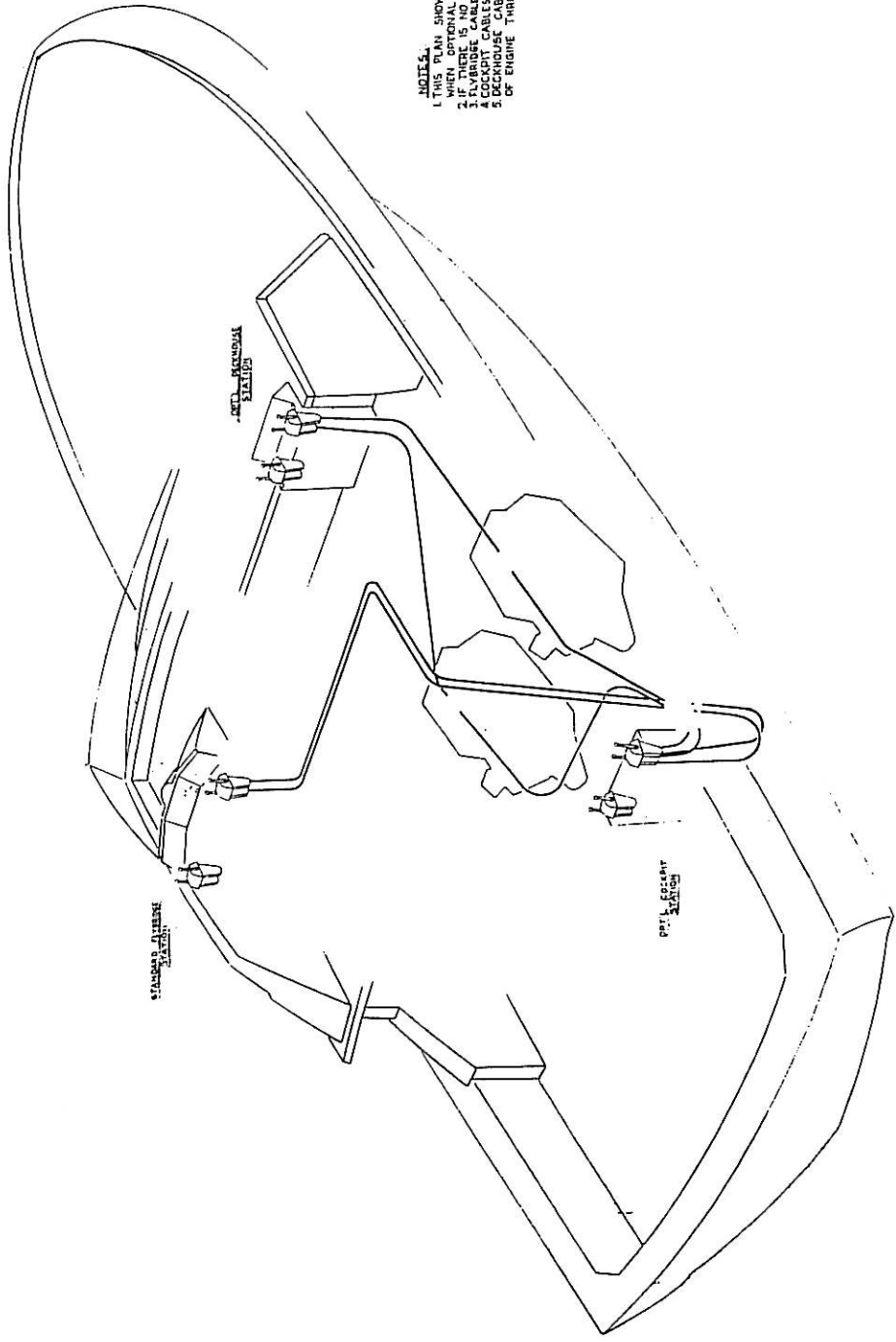


**NOTES:**

1. THIS PLAN SHOWS ROUTING OF CABLES - ONLY. ALL CABLES TO BE INSTALLED IN COCKPIT.
2. IF THERE IS COCKPIT STATION SET PLAN IN COCKPIT.
3. FIBER OPTIC CABLES RUN TO AFT SIDE OF ENGINE THROTTLES.
4. WIRE MOUNTING CABLES (IF INSTALLED) RUN TO FWD SIDE OF ENGINE THROTTLES.

<b>BERTRAM YACHT</b>	
MIAMI, FLORIDA, U.S.A.	
A DIVISION OF BERTRAM CORPORATION	
PROJECT NO.	15012
DATE	1/1/76
BY	GALVEDA





- NOTES.**
1. THIS PLAN SHOWS ROUTING OF CABLES-ONLY. THE COCKPIT STATION IS INSTALLED IN THE PORT COCKPIT.
  2. IF THERE IS NO COCKPIT STATION, THE CABLES SHOULD BE RUN TO THE AFT THROTTLE STATION.
  3. FLYBRIDGE CABLES RUN TO COCKPIT CONTROLS.
  4. COCKPIT CABLES RUN TO AFT SIDE OF ENGINE THROTTLES.
  5. FLYBRIDGE CABLES (IF INSTALLED) RUN TO FWD SIDE OF ENGINE THROTTLES.



## POWER PLANT AND TRANSMISSION OF POWER

### Engines

All necessary data and information about the engines are contained in the Engine Manual, so they are not repeated here. Just a reminder, the life and performance of the engines are dependent on the way they are cared for, so follow the manufacturer's instructions and watch the instruments carefully to obtain many hours of pleasurable boating.

### Marine Gears

A gear unit, affixed to the after end of your engine, is a hydraulically operated forward and reverse transmission and reduction gear. Information and maintenance procedures can be found in the Engine Manual.

### Propeller Shafts

Information as to size, length and material of shaft will be found on the Ship's Information page at the front of this book.

### Engine - Shaft Alignment

At the factory, your engines were aligned properly, but they should be checked periodically to insure proper alignment and performance. It is especially important to check alignment when the boat has been launched after a haul-out or dry storage. Let boat settle in the water for a day or two before making final alignment adjustments.

We recommend the following procedure:

1. Remove all bolts in the coupling flanges at the end of the marine gear. Slide shaft aft until the flanges are about  $\frac{1}{4}$ " apart.
2. The flexible hose on the shaft log does not give the shaft full support. Move the shaft up and down and from side to side to determine, as close as possible, the central position where shaft should be normally located. At this point the boss

on shaft coupling should enter recess on engine coupling without moving shaft to either side nor raising it more than 1/8".

3. If such is not the case, move engine as indicated.
4. When you are assured that engine is roughly aligned with shaft, bring the flanges of the couplings together until they touch lightly.
5. Check for an opening between the flanges with a feeler gauge. If the opening is greater than .003" at any point, engine should be realigned by adding or removing shims under those engine mounts that will correct the situation.
6. If a feeler gauge is not available, use 4 strips of paper about 1/2" wide and space them equally around and between the flanges. By gently pulling on each, the relative amount and direction of misalignment can be determined.

#### Shaft Log and Stuffing Box

The shaft log is the tunnel that the propeller shaft turns in and is of fiberglass construction. On the inside end of the shaft log, there is a stuffing box attached by a flexible rubber hose and held in place by hose clamps. This flexible hose allows for a misalignment of .010 inch without undue wear of the packing gland itself. The stuffing box is packed with braided flax packing. This is kept tight to keep it from leaking by the packing gland. It is normal to have a slight drip of water from the stuffing box as this serves as a lubricant but if the leaking is excessive, the packing gland should be tightened. Be careful not to tighten too much as this will glaze the packing and score the shaft. If necessary to repack the gland, remove boat from water, back off both lock nuts and slide the packing gland forward on the shaft. Be sure that the old packing is removed and install five 1/4" x 1/4" rings of new packing. Slide packing gland aft

and tighten to a point where there is a slight drip of water. Tighten so shaft will not move. This will seat packing. Back off until shaft is free. Run shaft for awhile and reset. Always use tallow flax packing. Do not spiral around shaft, each ring must be separate.

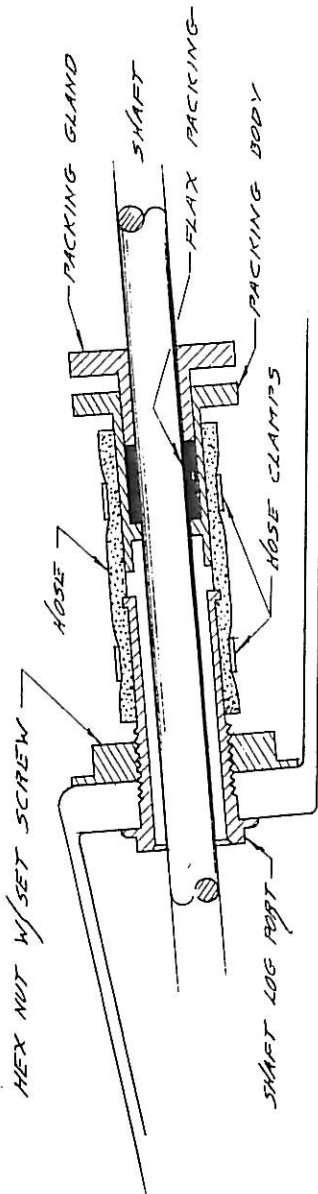
Caution: Always tighten packing gland evenly. One turn on each nut at a time will avoid any problems.

### Propellers

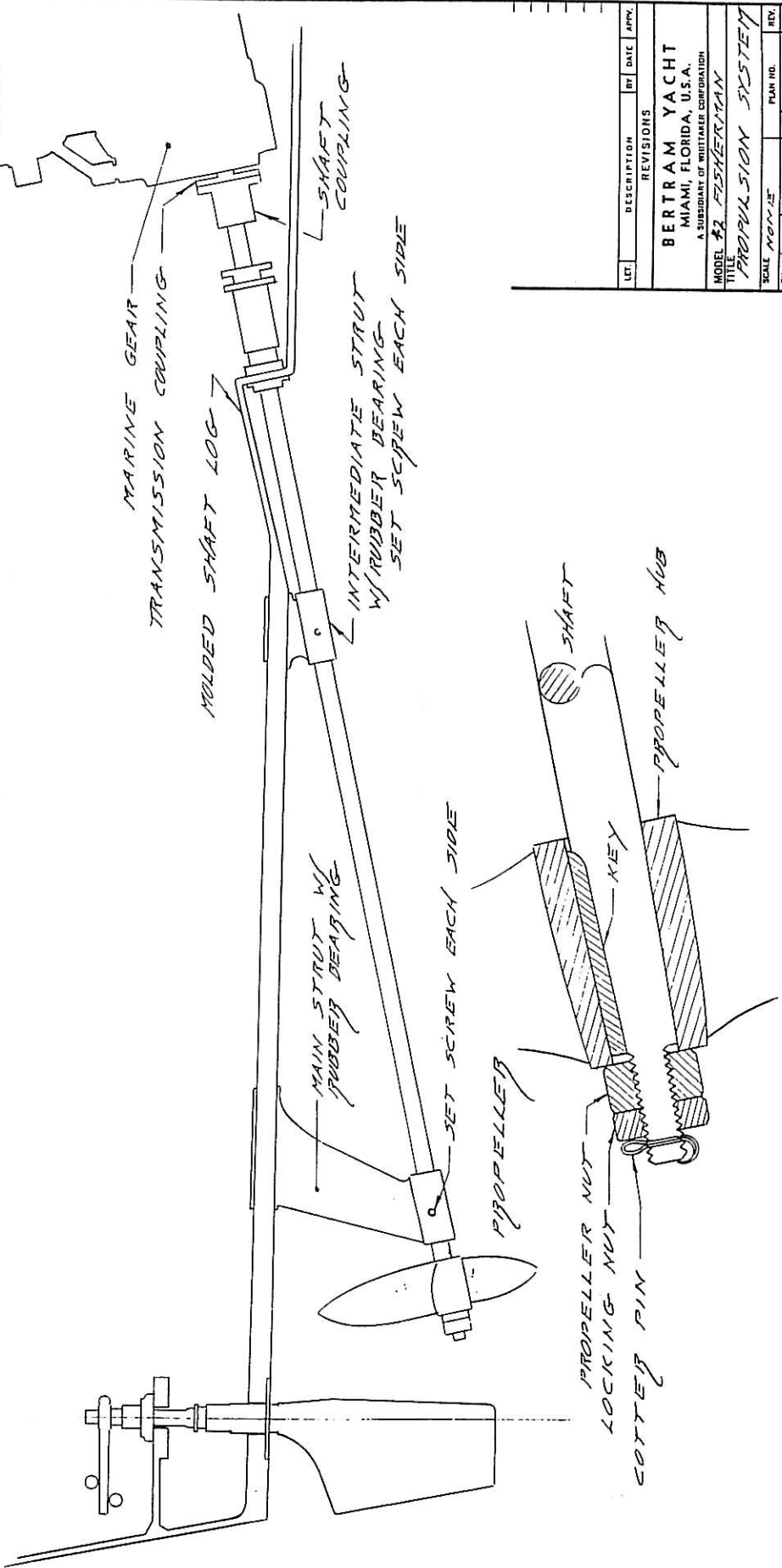
Information on propellers will be found on the Ship's Information page of this book. The propellers recommended are those with which your boat was tested. If weight has been added or the operating characteristics have been changed due to addition of special equipment, it may be necessary to change the pitch to suit existing conditions.

### Installation of Propellers

Propeller bore and the end taper of the shaft must be clean and free of any obstructions. In order that the propeller seats securely on the shaft, the keyways must be free from burrs and corrosion. Insert the key with its round end forward on the shaft then place the propeller on the shaft aligning the keyway. The key should fit snugly on each side of the keyway, but clearance at the top is essential so as not to pull the propeller off center and thereby cause vibration. After proper fitting, assemble the propeller nut, locking nut and cotter pin on the shaft. The key must go on the shaft first.



SHAFT LOG ASSEMBLY



REV.	DATE	BY	APP.	DESCRIPTION
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

SCALE	NON-2"
BY	APPROVED
DATE	DATE
3-15-71	1/11/71
PLAN NO.	C
REV.	

BERTRAM YACHT  
 MIAMI, FLORIDA, U.S.A.  
 A SUBSIDIARY OF WHITTAKER CORPORATION  
 MODEL #2 FISHMATEAN  
 TITLE PROPULSION SYSTEM

## EXHAUST SYSTEM

Your exhaust system is designed to keep water out of the engines, in most conditions. The engines are protected from Backwash by check valves that are built into the mufflers. However, care should be taken not to anchor stern to sea. When a boat is anchored in this unseamanshiplike manner, or if engines are turned off under some sea conditions, the wave action could force water into the engines, causing major damage upon re-starting. The engines should not be shut off if the seas are to high. Always use good seamanship and consider the seas before anchoring or shutting off the engines.

### Maintenance

Check all of the hose clamps the first 20 hours. After this check the clamps periodically.

## BOAT SPEED

Boat speed is dependent on many variable factors, so no catalogue or advertised speed can be guaranteed. A short discussion of some of the more important factors affecting boat speed are presented below.

### Engine Efficiency

With normal care and maintenance the engines will maintain peak efficiency; however, if they are neglected, the power will fall off and expensive repairs could become necessary. Take care of the engines!

### Atmospheric Conditions

Engines will develop more power when the ambient air and water temperatures are cool, in fact the power variations due to temperature can be as much as ten percent. For this reason greater speeds are generally obtained in the spring and fall, rather than in the summer.

### Personal Equipment and Accessories

All personal equipment and accessories added to the boat will tend to decrease the speed, just as adding passengers will. Often the effect of this added weight is not taken into consideration on the performance of the boat.

### Testing

All new models when first launched undergo an extensive testing program to test systems reliability, boat performance and optimum propeller size. All testing is carried out with the boat in two conditions of displacement and trim.

- I. Condition I (Normal): Two-thirds fuel and water, all optional equipment, provision for a crew of six and approximately 1,000 pounds extra.



II. Condition II (Heavy): Same as Condition I with the addition of 1400 pounds to represent full fuel and water.

Propeller selection is usually determined with the boat in normal condition, providing the selection will allow for the additional weight as found in condition heavy.

#### Marine Growth

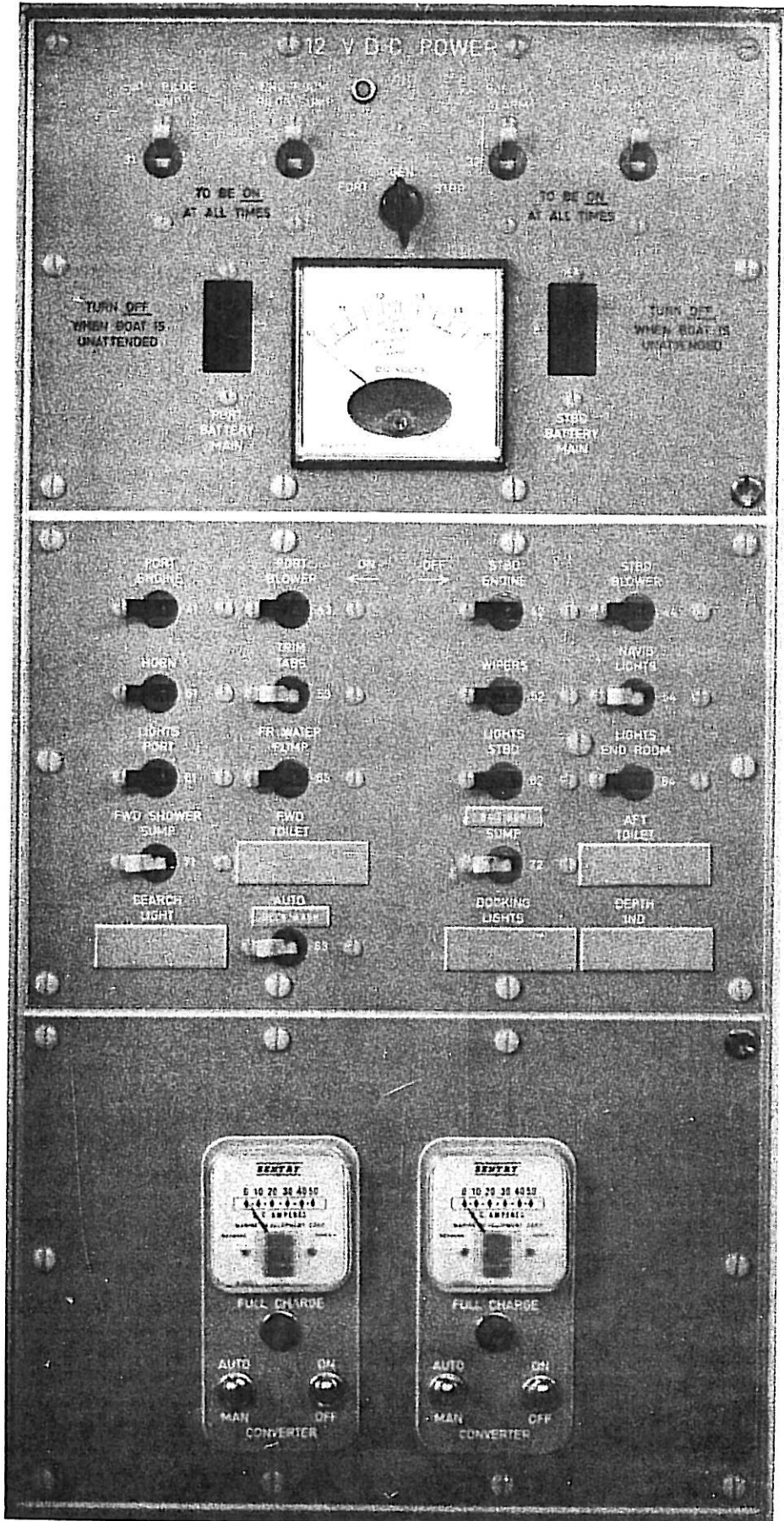
In order to obtain maximum speed, the bottom of the boat must be kept free of marine growth, including moss. Any growth on the boat's bottom will increase the resistance of the boat as it moves through the water, thus decreasing speed by as much as 20%.

#### Water in the Bilge

Since a barrel of water weighs over 400 pounds, the bilges must be pumped dry in order to keep excess weight down. As mentioned before, added weight will reduce boat speed.

#### Damaged Underwater Equipment

Loss of speed and excessive vibration can result from damaged propellers, shafts, or struts.



## 12 VOLT D.C. SYSTEM

### Wiring Diagrams

In the separate Electrical Systems section of this manual you will find, in detail, the entire 12 volt system. It includes diagrams for the engines, accessories and control stations. Such diagrams are helpful to the owner who wants to be completely familiar with his boat. They are indispensable to the serviceman that has to add new equipment or trouble-shoot any failure or malfunction.

### Description

The paragraphs that follow outline the design and purpose of the system and are normally sufficient for the operation of all electrical equipment.

### Batteries

There are four heavy duty marine batteries in the engine room between the engines that supply all the 12 volt power for starting main engines and operating the boat's direct current equipment and accessories.

Two of the batteries are permanently connected in parallel and are on the port circuit. The other two batteries connected in parallel are on the starboard circuit. When starting either of the main engines, all four batteries should be connected in parallel. The two 6 volt batteries for the generator are located to the port side of the generator. The batteries are negative grounded.

### Fuse Box on Aft Bulkhead

On the bulkhead just aft of the engines is a large metal box that contains main fuses and ammeter shunts. All battery power passes through this box before going to the 12 V.D.C. distribution panel.

1. Battery paralleling solenoid - Between the main engine is the

battery paralleling relay that is actuated by the paralleling switches on console.

2. Main fuses - A 60 amp. fuse protects each of the main feed lines (port and starboard) to the 12 V.D.C. Distribution Panel. These fuses supply the 12 volt power to the panel and other equipment.

3. Ammeter shunts and fuses - On the load side of each main fuse is an ammeter shunt. On each side of each shunt is a 10 amp. in-line fuse that protects the leads to the ammeters. Do not allow anyone to connect any accessory or light to one of the ammeters.

#### 12 V.D.C. Distribution Panel

On the port side of salon cabin is the 12 V.D.C. Distribution Panel. Power from the batteries comes through the main fuses and shunts (in engine room) to the Port and Starboard battery main circuit breakers #7 & 8, on each side of battery condition meter.

These breakers (60 amp) not only protect the battery feed from overload, but replace the "master switches" usually located in the engine room. They should be turned "off" when the boat is left unattended.

At the top of the panel are the bilge pump and safety alarm breakers #31, 32, 33, and 34. These are normally left "on" at all times and since they are connected to the battery side of the main breakers they are still "hot" even when main breakers are "off". See Electrical Accessories for operational details.

The battery condition meter reads the voltage of either engine battery bank or generator batteries by using the selector switch. The switch measures the condition of the batteries for the associated position indicated. The meter consumes so little current that it is permanently connected. It can thus monitor the converter, even though the main breakers may be "off".

The remaining circuit breakers, #41 to 84, are controlled by the main breakers.

Notice that all circuits on the Port Battery are Red and have Odd Numbers. Starboard Battery circuits are Green and Even Numbered. These numbers correspond to the numbers in wiring diagrams and wire markings.

At the bottom of the 12 V.D.C. Panel is the Remote Control for the Converter and space for the optional extra converter. See Converter Operation for details.

#### Other D.C. Equipment (Options not installed at Factory)

Optional equipment that is not installed by the factory may be added by the dealer or by the owner.

Blank covers are used to conceal the holes and engraved names for unused optional circuits.

Note, if equipment is added by the factory and not covered by the manual, please check additional equipment literature that comes with your boat.

#### Operation of 12 V.D.C. Panel

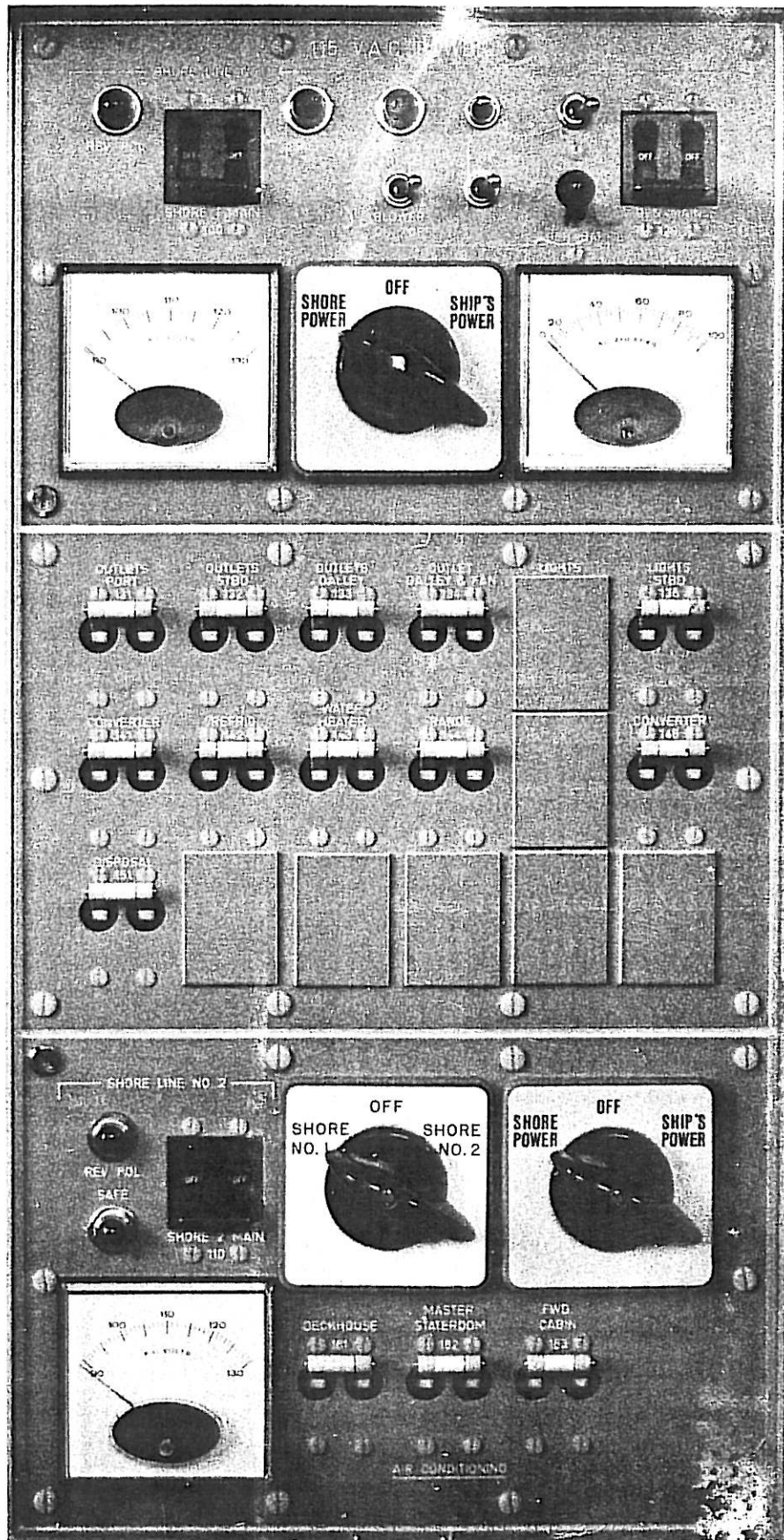
After having read the complete description of the 12 V.D.C. System and compared it with all the actual parts, you will find the following step by step procedure helpful in the actual operation.

1. Be sure the two main fuses are in place.
2. Turn "on" port and starboard battery main breakers (7 & 8).
3. Turn "on" breakers for Bilge Pumps (31,33,34) and Safety Alarm (32).

These are always left "on" while the boat is in service.

4. Turn "on" the breaker that controls the unit or circuit you desire to use (each is clearly labeled). You may find it helpful when at the dock with guests aboard, to be sure that all breakers controlling equipment used only when the boat is underway are turned off.

5. Remove converter control(s) at bottom panel
  - a. Turn "on-off" switch to "on" position
  - b. Turn "auto-man" switch to "auto" position
  - c. It is best to leave both switches in these positions at all times. (See Converter Instructions for exceptions and complete details.)
  - d. The 115 V.A.C. power must be available and the Converter Circuit Breaker(s) #141 (& 146) must be "on".
  - e. The Full Charge Indicator will light when batteries are fully charged. The converter will then automatically shut itself off completely.



## 115 VOLT A.C. SYSTEM

### Introduction

The 115 V.A.C. Panel is simple and logical once you have studied the description that follows.

After examining this panel you should be able to operate and make the desired selections with speed and precision. We suggest you make a few "dry runs" initially with all power disconnected.

It is also suggested that you study the Flow Diagram in this section. This will help you visualize the "flow" of A.C. power to all parts of the 115 V.A.C. Panel.

### Wiring Diagrams

In the separate Electrical Systems manual you will find a section dealing with the 115 V.A.C. System, including shore lines, distribution panel, generator controls, telephone circuits and the optional air conditioning and stereo systems.

### Shore Power Supply

There is a 30 amp shore connection on the starboard side (two if your boat has the optional air conditioning or electric heaters).

The 35 foot shore line set is made to fit 30 amp outlet and inlet. The adapter (pigtail) is furnished to permit use of cord set in a 15 amp shore outlet. When adapter is used special attention is required to prevent overloading the outlet.

Bertram Shore Lines are wired in accordance with current industry standards, however, you may find some dock outlets improperly wired.

Always attach the cord set to the boat first, twist-locking it carefully, then attach other end to the shore outlet. This will prevent



the accidental dropping of a "hot" cord into the water. For the same reason when disconnecting the Shore Line, remove the end at the dock outlet first.

#### Polarity Lights

The 115 V.A.C. Panel, has a pair of polarity lights for each Shore Line. If the amber light "SAFE" is on, the polarity is correct and you may safely turn on the shore circuit breaker (100 or 110).

If the red light "rev. pol" is on, the polarity is reversed and corrections must be made on the dock before turning on the circuit breakers.

If a pair of lights (red and amber) should light, this indicates an extremely dangerous situation: that the "hot" shore wire (usually black or red) has been connected to the ground connection. If this should happen, remove the cord from the shore outlet immediately and have the outlet corrected.

#### Shore No. 1

This Shore Line may be used to supply the A.C. Distribution Section (circuit breakers 131 to 156) if it is desired to keep generator idle or it may be used to power the air conditioners if the generator is used for the Distribution Section. It may be used to power the entire boat, but, this is definitely not recommended as an overload will cause low voltage and overheating, with possible damage to the electric motors (110 volts is considered the safe minimum).

#### Shore No.2

This can be used only for the Air Conditioner or Heater Section. If possible, connect this to a different dock outlet than that used for Shore No.1, so full power will be available.

### Auxiliary Generator

The generator is used to supply all 115V.A.C. power when shore current is not available, or part of the requirements, if shore power is limited (below 110 V.A.C.).

The remote controls for the generator are located in the top section of the 115 V.A.C. Panel. See Generator Section for operating instructions.

### Circuit Breakers

Under normal conditions all of the branch circuit breakers (131 to 163) may be left "on" (except Windlass #145 and Baitwell #72--they should be "off" when not in use). When servicing an individual piece of A.C. equipment, the corresponding circuit breaker should be turned "off".

### Transfer (Selector) Switches

The Shore-Ship Switch (top panel) is used to supply the desired power to all branch circuit breakers (131 to 156).

In the Air Conditioning Section (bottom), the Shore 1 - Shore 2 Switch permits use of either Shore Line. Shore Line 2 is always the preferable choice for air conditioning.

The Shore-Ship Switch (bottom) permits using either Shore or Generator for power to the branch circuit breakers. (161-163).

### Meters

The A.C. Voltmeter and A.C. Ammeter, at top of Panel, measure only the power that is in use for breakers #131 to 156.

The A.C. Voltmeter at bottom of Panel measures only the power that is in use for the breakers #161, 162 and 163.

### Operation

Specific step-by-step instructions are in following sections for:

GENERATOR

AIR CONDITIONING

CONVERTER(S)

### Safety Precaution

If for any reason it should be necessary to open the 115 V.A.C. Panel, the No. 1 and No. 2 Shore Lines should be disconnected at the dock. The Generator should be stopped and the Generator Main Breaker (120) be turned "off".

### Bonding System

Your Bertram is fitted with a bonding system to minimize electrolysis. This system consists of copper strips running fore and aft through the bilge area. All underwater fittings and hardware are connected with wire jumpers to these strips. All A.C. equipment and devices (other than lights) are connected with a green wire to the bonding system. This is done to reduce danger of an electrical shock from high voltage equipment.

### Additional Equipment

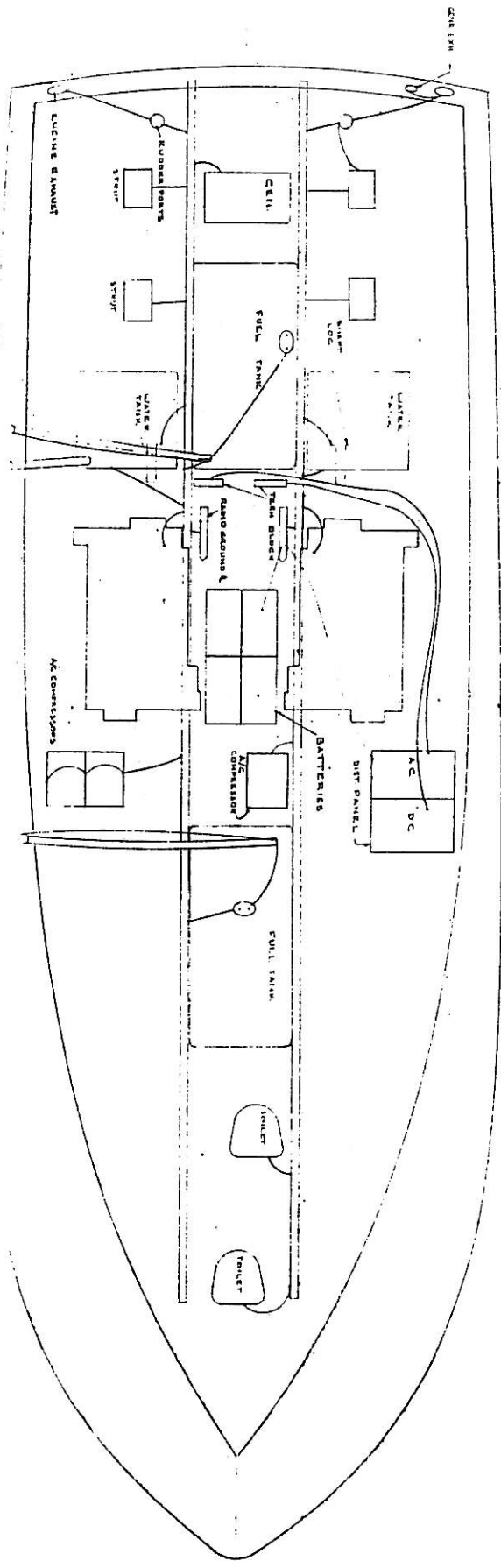
1. If additional equipment is desired, check Flow Diagram. This will tell you which plate to remove for the desired engraved position for the breaker.

All A.C. circuit breakers on this boat are the two-pole, common trip type that disconnect both current carrying conductors (black and white wires). The white wires (ground potential) are isolated from the boat ground. It is mandatory that any breakers added to the panel be installed in the same manner and be of the proper size and type.

2. For location of spare wires check wiring diagrams in Electrical systems manual.

3. Make sure that the wiring you add is of a quality consistent with Bertram's standards.

4. If equipment, added by the factory is not covered by the manual, please check the additional equipment literature that accompanies your boat.



- NOTES
1. JUMPER GROUND WIRES TO ALL THROUGH FITTINGS, ELECTRICAL ACCESSORIES, WINDSHIELDS, HANDBAILS, FUEL LINES, DECK BURE, STEEL RING WHITE LIGHTS/HEADS
  2. BATTERIES ARE NEGATIVE GROUND

BERTAM YACHT	
MADE IN FLORIDA, U.S.A.	
* Licensed by American Boat & Yacht Council	
NO. 4725	
Design & Construction	
DATE	
BY	
NO. 4889	
DATE	

DATE	
DESCRIPTION	
NO.	
DATE	

## 115 V.A.C. GENERATOR OPERATION

The auxiliary generator and its accessories are located in the forward part of engine room on starboard side.

### Cooling System

Be sure the sea water valve is open. The sea water strainer is mounted just aft on the port side of generator. Be sure it is clean and sealed. Check the fresh water expansion tank to see that it is filled.

When engine is started, be sure that the sea water pump is working, check to see that strainer fills and that water is being discharged with the exhaust (on port side of boat.)

### Fuel Supply

The generator gets its fuel from either forward or aft fuel tanks. Surplus fuel is returned only to the aft tank. There is a small valve at the top of each tank in the supply lines which lead to a selector valve under the step leading into the cabin. This valve is used to determine which tank shall supply the generator. There is a shut-off valve at the generator. All valves should normally be open.

### Battery

The generator starting system is 12 Volt D.C. battery and is located under the port cockpit deck. These batteries are kept charged by the generator charging circuit.

### Battery Parallel

A solenoid is used to parallel the two port batteries with the generator battery. This is used only when the generator batteries are too weak to start the generator. The solenoid is closed by holding the Battery Parallel Switch "on" while starting the generator manually at the 115 V.A.C. Distribution Panel.

### Starter Relay

Between the positive battery cable and the generator starter is a relay (contactor) that is operated by the ON-STOP Switch on the A.C. Distribution Panel.

### Generator Battery Circuit Breaker

This breaker is also located on the A.C. Distribution Panel and must be turned "on" before generator can be started. We recommend it be "off" only when generator is out of service. A 15 amp in-line fuse in the Relay Box also protects this circuit.

### Hour Meter

This will be found at the generator and it records the total hours of operation. It will help you service the generator properly if recorded in Log Book.

Standard Manual Start Diesel Models (7½ KW Onan or Optional 12 KW Onan)

### Starting Load

There is no danger in starting the generator regardless of whether the shore lines are connected or in use. However, it is not a good practice to start generator when there is a heavy load on the line. Therefore, turn the generator main circuit breaker (#120) "OFF" until generator is running and warmed up. Then if most of the branch circuit breakers are "ON", turn some of them "OFF" before turning the generator main breaker "ON". Then when the transfer switch(s) is in "Ship Power" position the branch breakers can be turned back "ON".

### Blower

A separate blower is provided for exhausting fuel fumes from the generator sound cover enclosure. Turn blower switch "ON" at least two minutes before starting generator. It may be turned "OFF" after generator is running.

### Starting Generator

1. Turn Generator Battery circuit breaker "ON".
2. If generator is "cold" hold Warm-up switch in "ON" position for about 30-60 seconds.
3. Hold "On-Stop" switch in "ON" position until generator starts. When running the generator run indicator light will come on.

4. Because of the unique Bertram remote control system, the generator cannot be started in the engine room.

#### Stopping Generator

1. To stop engine hold "On-Stop" switch in "Stop" position until Generator Run light stops shining.
2. Generator can be stopped in engine room (if front of sound cover is removed) by using switch on generator. If engine fails to stop from either location, shut off the fuel supply at generator.

#### Optional Automatic Demand Starting - Diesel Models

1. The switch on Auto Demand Control box (in engine room) must be in "Automatic" position at all times.
2. The Generator Battery circuit breaker must be "on".
3. To start the generator manually, place "Auto-Off-Manual" switch in "Manual" position. In about 20 seconds generator should start. If battery seems weak, hold "Battery Par." switch while starter is cranking.
4. To stop generator turn switch to "off" position.
5. To use generator automatically the following conditions are required:
  - a. "Shore Power-Ship's Power" transfer switch at top of panel must be on "Ship's Power".
  - b. "Generator Main" circuit breaker (#120) must be "on".
  - c. Generator Battery circuit breaker must be on "Auto".
  - d. "Auto-Off-Manual" switch must be on "Auto".
  - e. A load of at least 60 watts should be applied. For example turn on the Water Heater circuit breaker.
  - f. Generator will start in about 20 seconds.
6. To stop generator when running on Automatic, remove all electric load or turn "Auto-Off-Manual" switch to "off".



7. Because of our unique Bertram system the following conditions must be avoided:

a. Never leave Auto Demand Control box on "Manual".

b. Do not try to start generator at the engine room controls - to do so may trip the "Generator-Battery" circuit breaker or blow the 15 amp. in-line fuse in the engine room Relay Box.

c. Generator cannot be stopped in engine room by turning generator switch to "stop" position. It will stop momentarily, but start again in about 20 seconds.

8. In an emergency generator can be stopped in engine room by turning fuel valve off.

#### Maintenance and Service

We suggest that you study the manufacturer's handbook and instructions for further details. Also refer to Maintenance Section of this Bertram Manual.

## CONVERTER (BATTERY CHARGER) OPERATION (SENTRY MODEL C140-3NR)

The converter(s) is located in the engine room near forward end of port engine.

Power for the converter(s) is supplied through converter breaker(s) on 115 V.A.C. Panel #141 for Port or 146 for Starboard. There are also input and output fuses on the front of the converter.

All other controls are on the lower section of 12 V.D.C. Panel.

The converter(s) will automatically keep both banks of batteries charged, however, if you have only the standard converter (one), the pair of batteries that are connected to the lowest output terminal (within the converter) are used as the Control batteries. As long as these batteries are fully charged, the converter will not turn itself on, even if the other batteries are partly or completely discharged. Our standard practice on this boat is to connect the starboard batteries to the Control Terminal. If the owner finds in practice, through his selection of optional equipment and usage of the boat, that the port batteries carry the biggest loads, he should reverse the position of battery leads in the converter (both terminals are marked Bat).

If you have two converters, they are hooked in parallel (for double output), but, the Port Batteries act as Control for the Port Converter and the Starboard Batteries as Control for the Starboard Converter. Both converters should be used simultaneously for best results.

### Automatic Operation

- a. The normal operating position is on "auto".
- b. When all batteries are fully charged the converter(s) will shut itself off completely. (There is no "trickle" charge.)
- c. When either engine is started, the converter(s) will shut itself off.

### Manual Operation

The switch should never be placed in "manual" position unless:

a. You need to charge other batteries when the control batteries are fully charged. Switch back to Automatic as soon as the converter starts. The converter will then shut itself off when other batteries are fully charged.

b. If either pair of batteries is weak and you need the help of the converter to start your engine, placing switch in "manual" position will override the ignition shut-off feature. After starting, switch back to "automatic" within one minute to prevent damage to the regulators.

c. If the Control batteries are completely dead, the "manual" position will have to be used to start the converter operation, not required if you use two converters.

d. If batteries are removed and D.C. is required, switch should be in manual position.

### Sentry Owner's Manual

For service and adjusting internal controls see the manufacturers manual.

## OPERATION OF OPTIONAL AIR CONDITIONING SYSTEM

### Power Sources

You will find complete details of how the 115 V.A.C. power is supplied in previous instructions covering the 115 V.A.C. System. Refer also to the 115 V.A.C. Distribution Panel Flow Diagram that accompanies that section.

When the air condition unit(s) is operated on shore power it should always be operated on the #2 Shore Line. If, for some reason, the unit(s) must be operated on #1 Shore Line no other piece of equipment should be operated on the #1 Shore Line at the same time. If this is done the circuits will be overloaded in most cases and will cause the breaker to kick out and interrupt power. Never use 15 amp Shore Line adapter (pigtail) for operating more than one air conditioning unit. Never operate air conditioner when voltage drops below 110 volts - use generator instead.

### Special Adapter

If voltage is too low when connected to a 30 amp shore outlet, we recommend the use of a special adapter (Hubbell #61CM55) that will permit connecting your 30 amp shore cord to a 50 amp shore outlet.

### 115 V.A.C. Panel

The following explains the "normal" set-up of distribution panel before any of the units are turned "ON" at the thermostat controls.

#### Shore Line No. 2 - Supply

- a. Turn "ON" Shore Line No. 2 Circuit Breaker (#110).
- b. Check "Safe" light.
- c. Turn "Shore 1-Shore 2" transfer switch to Shore No. 2 position.
- d. Turn "Shore Power-Ship's Power" transfer switch (lower Panel) to "Shore Power" position. (Position of switch on upper panel is immaterial.)

e. Voltmeter on lower panel should now show the voltage available for air conditioner operation. However, voltage will drop when full air conditioner load is applied. It should then be no less than 110 volts.

f. Turn "ON" Deckhouse, Master Stateroom and Forward Cabin breakers (161, 162 and 163).

g. To operate the various units, follow the air conditioner instructions which follow.

#### Generator - Supply

a. Start generator and turn on Generator Main Breaker (120).

b. Turn lower "Shore Power-Ship's Power" transfer switch to "Ship's Power" position. (Position of other transfer switches is immaterial.)

c. Voltmeter on lower panel should now show voltage available for air conditioner operation.

d. Turn on breakers 161, 162, and 163.

e. For operation of the various units see instructions which follow.

#### Mechanical

The three condensers that supply the deckhouse, master stateroom, and forward cabin are in the tank space forward of the engine room on the port side.

The seacock strainer and sea water pump are located at the forward end of the starboard engine. The seacock must be open before starting system. The sea water strainer should be clean and sealed. The pump supplies all three condensers and is turned on automatically by the pump relay whenever any unit control is turned to "start" or "run".

#### Initial Control Check (Usually done by Dealer)

a. The three air conditioner circuit breakers (Figure 2 #161,162 and 163) must be "OFF".

b. The start-run switch on each control, in deckhouse, master stateroom and guest stateroom must be in "OFF" position.

c. Turn the thermostat control from right-to-left and listen very closely to the control by putting your ear close to it as you turn the knob. While turning the knob, two clicks should be heard about midway through the travel of the knob. If this is heard, you will know that the thermostat bellows has not been ruptured and that you may proceed further. If no clicks are heard, contact your nearest service man for Cruisair equipment.

Check the other two thermostat controls in the same manner.

#### Initial Start-Up

a. With 115 V.A.C. Panel set up as explained previously, turn on the three air conditioner circuit breakers.

b. Turn deckhouse control to "start" and check overboard discharge outlet (port side of boat) to be sure that the pump is circulating the sea water through the condenser/compressor unit. When a good-sized stream is flowing, you can be sure that the pumping system is okay. Power for the pump is obtained from the "line" side of the air conditioner circuit breakers. There are two in-line glass fuses, inside the 115 V.A.C. Distribution Panel that protect the wiring to pump and another fuse at the pump relay.

c. With fan set at midpoint (medium speed), check airflow from discharge grill. Adjust louvers if necessary, to get more flow. Fan must be working properly, before turning control to "run", otherwise, evaporator may freeze (the unit on starboard side of deckhouse is automatically controlled by the port unit).

d. Repeat operations (b & c) with master stateroom control and then with forward cabin.

e. You are now ready to test each unit fully. Start with deckhouse control.

f. How to test operation:

1. Turn control to "start".
  2. For cool, turn thermostat knob to far right (clockwise).
  3. Fan control may be at any setting, but for testing, set at midpoint (medium speed).
  4. Now turn control to "run".
  5. Check air flow from discharge grill(s). In about 3 to 5 minutes, according to the temperature, the unit should be discharging cold air.
  6. Turn control "off" and wait 10 or 15 minutes before turning thermostat to far left (counter clockwise) for maximum heat. Never make quick changes from Cool to Heat or Heat to Cool.
  7. Turn control to "start" and then to "run". Check discharge(s) for warm air after it has been running for a few minutes.
- g. Repeat these operations (1 to 7) with the other controls.

Temperature Adjustment

After the unit has been in operation for about 1 hour, the thermostat knob may be moved, a little at a time, until the desired room temperature is obtained. Then the unit will automatically maintain the temperature, adjusting itself to heat or cool as required.

Power Interruption

If, for any reason, the 115 V.A.C. power is shut-off momentarily, the unit should be turned "off" for about 10 to 15 minutes before putting it back in operation. Then the knob should be left in "start" for about five minutes to allow the water to circulate fully, it can then be turned to "run".

How to Stop Unit

Always use the local control to stop each unit. Never leave the control on "run" and use the circuit breakers or Electric Panel switches to stop units.

If you do change the 115 V.A.C Electric Panel, after air conditioner is stopped, be sure power is restored before turning any of the local controls to "start" or "run".

## FUEL SYSTEM

### Fueling Instructions

These steps should be followed in this order each time you fuel your Bertram:

1. Close windows and hatches.
2. Do not operate any equipment. This means engines, power plant, galley stove, or bilge blower.
3. Make sure the filling hose nozzle is touching the yacht's fill pipe fitting before any fuel is pumped.
4. Top the tanks until fuel overflows through the vent fitting on hull side below fill pipe.
5. After fueling is completed, open windows, hatches, and engine hatch. Then visually and by the smell check to make sure there are no fuel leaks or fuel fumes present. At the same time, open the fuel feed lines located close to the tank and inspect all fuel lines and fittings. (See fuel system diagram.)
6. Operate the bilge blowers and leave them running for at least two minutes before and during starting of engines.
7. Close engine hatch and other hatches after main engines auxiliary generator have been running for some time.

### Fuel Tanks and Valves

Bertram fuel tanks are molded fiberglass. They are made of fire retardant resins. One is located below the galley (205 Gal. U.S.) and the other (319 Gal. U.S.) under the aft deck sole. Fuel is supplied to engines through a fuel manifold under step in cockpit leading in main cabin. This allows the engines to be supplied from either tank, or both tanks and simultaneously switches return line so that fuel is always returned to the

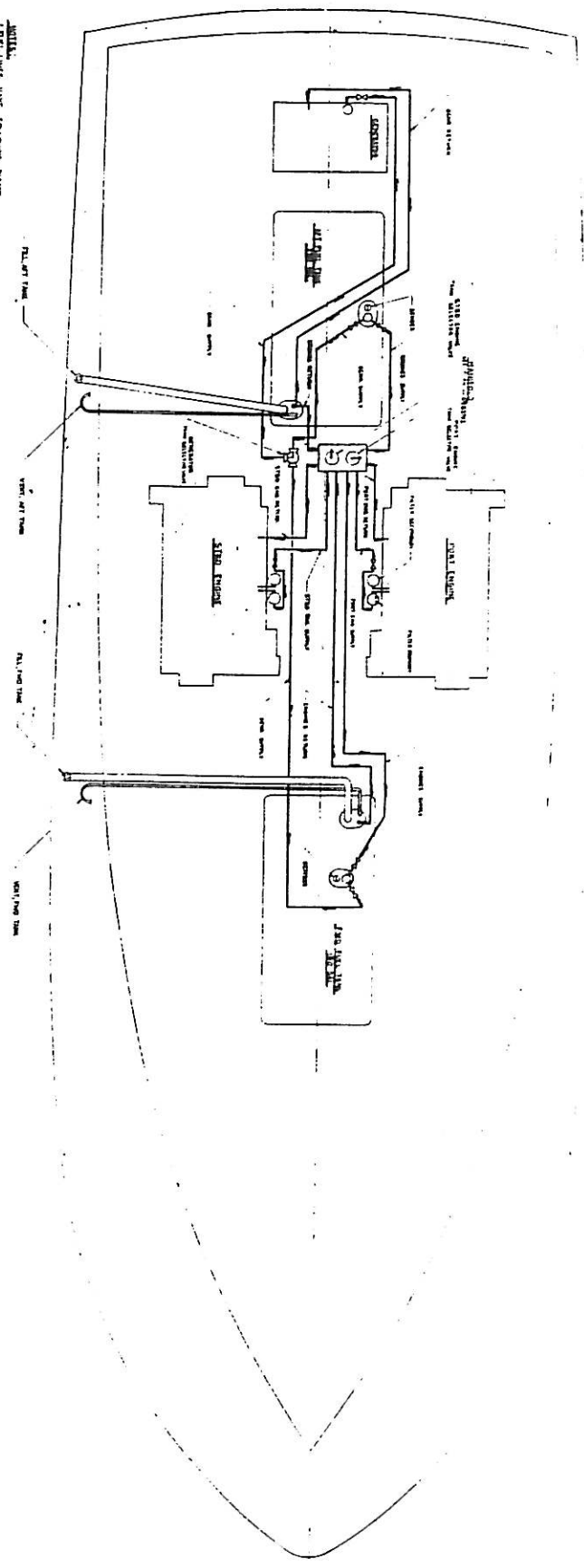


tank from which it is drawing. Auxiliary generator is supplied from either tank by means of another selector valve under step next to main engine selector switches.

Note: The fuel returns only to the aft tank regardless of what tank the selector valve is positioned to pull from.

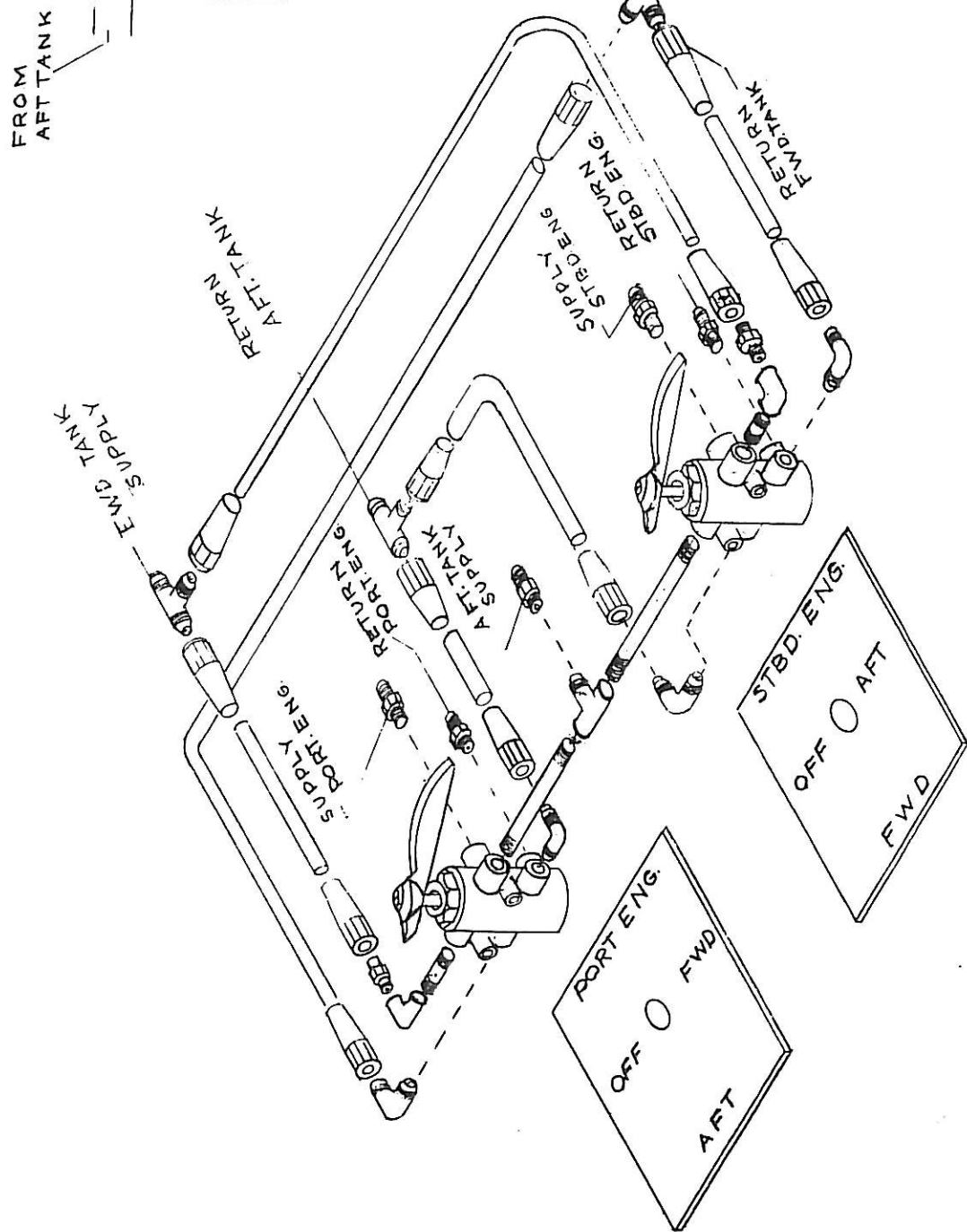
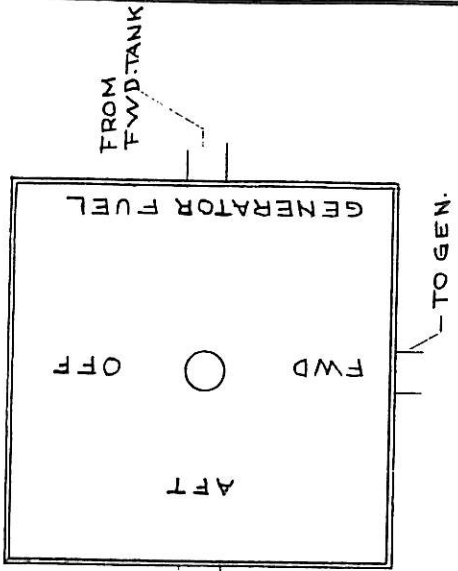
#### Constant Trim

Under normal conditions, one engine should use after tank and the other engine should use forward tank. This will keep the center of gravity in its designed location.



**NOTES:**  
 1. FUEL TANKS HAVE FOLLOWING CAPACITIES:  
 2. FUEL TANKS ARE TO BE KEPT FULL AT ALL TIMES.  
 3. FUEL TANKS ARE TO BE KEPT CLEAN AND FREE OF DEBRIS.  
 4. FUEL TANKS ARE TO BE KEPT COVERED AT ALL TIMES.  
 5. FUEL TANKS ARE TO BE KEPT VENTED AT ALL TIMES.  
 6. FUEL TANKS ARE TO BE KEPT FRESH AT ALL TIMES.

BERIBAH YACHT	
MIAMI, FLORIDA, U.S.A.	
A. J. B. & S. CO. INC.	
FUEL SYSTEM, DIESEL	
DATE	NOV 1954
BY	4874
NO.	41 8



LET.	DESCRIPTION	BY	DATE	APPLY.
REVISIONS				
<b>BERTRAM YACHT</b> MIAMI, FLORIDA, U.S.A. A SUBSIDIARY OF WHITTAKER CORPORATION				
MODEL	TITLE			
	427			
FUEL MANIFOLD SYSTEM				
SCALE	NONE			
BY	PLAN NO.			REV.
1/13/73	09 B			
DATE	1/13/73			
				FILE 127

## WATER SYSTEM

### Tank

The two aluminum water tanks holding 75 gallons apiece are located under the cockpit deck, port and starboard of the aft fuel tank.

### Deckfill

Tank fill deck plate is located on starboard side deck. Tank vent is on side of hull below the fill. Caution: When filling tank, do not use the full amount of city water pressure. It is possible to use more pressure and volume than the vent can discharge, thereby causing the tank to rupture. It is best to have the hose attended all the while tank is being filled.

### Tank Gauge

Tank gauge is located in the galley. It will not register unless the Fresh Water Pump breaker (#63) on 12 V.D.C. Panel is "on". The gauge is not accurate while the tank is being filled.

### Water Pump

The PAR water pressure pump (located near water heater) is equipped with a dry tank switch which automatically shuts the pumps off when tank runs dry. This switch has a red button on the pump itself that should be depressed or you may use the momentary toggle switch that is located by the tank gauge in galley.

To Start Pump Fill tank, turn on circuit breaker (#63), open all faucets and then hold dry tank switch until pump primes itself and all air is cleared from the lines. Close all faucets and release dry tank switch. System should now be ready to use.

Restarting Pump If tank runs dry or if a faucet is opened when there is no power at the pump and the pressure drops below 2 psi. the dry tank switch

will open. To restart, fill tank or restore power to the pump and hold dry tank switch until pressure is built up again.

Faulty Operation If pump does not operate properly, check the PAR instruction sheet for suggestions.

Caution Never leave boat unattended without turning off the Fresh Water Pump circuit breaker (#63). This will prevent unnecessary pump running and waste of water should there be a leak anywhere in the system or if a faucet is partially open.

#### Winterizing Water System

Follow suggestions given in PAR Pump instructions and in Maintenance section of this manual.

To drain tank, remove supply connection at bottom of aft end of tank. Water will drain into bilge where it can be pumped out with bilge pump.

#### Water Heater

The water heater is located under galley and gets its power from circuit breaker #143 on the 115 V.A.C. Distribution Panel. Do Not turn power on until you have made sure that heater is full of water. (It could have been drained for winterization.)

Filling Heater With the water system fully pressurized, open one of the hot water faucets. When water flows, you will know the tank is filled. You may then turn on electrical power.

#### Water Temperature Adjustment

Before any work is done on heater, turn circuit breaker off. Remove the access panel on heater, fold the insulation outward away from the controls. Set the thermostat to the desired water temperature (it is preset at factory to 150 degrees F) using a screwdriver to move the thermostat pointer.

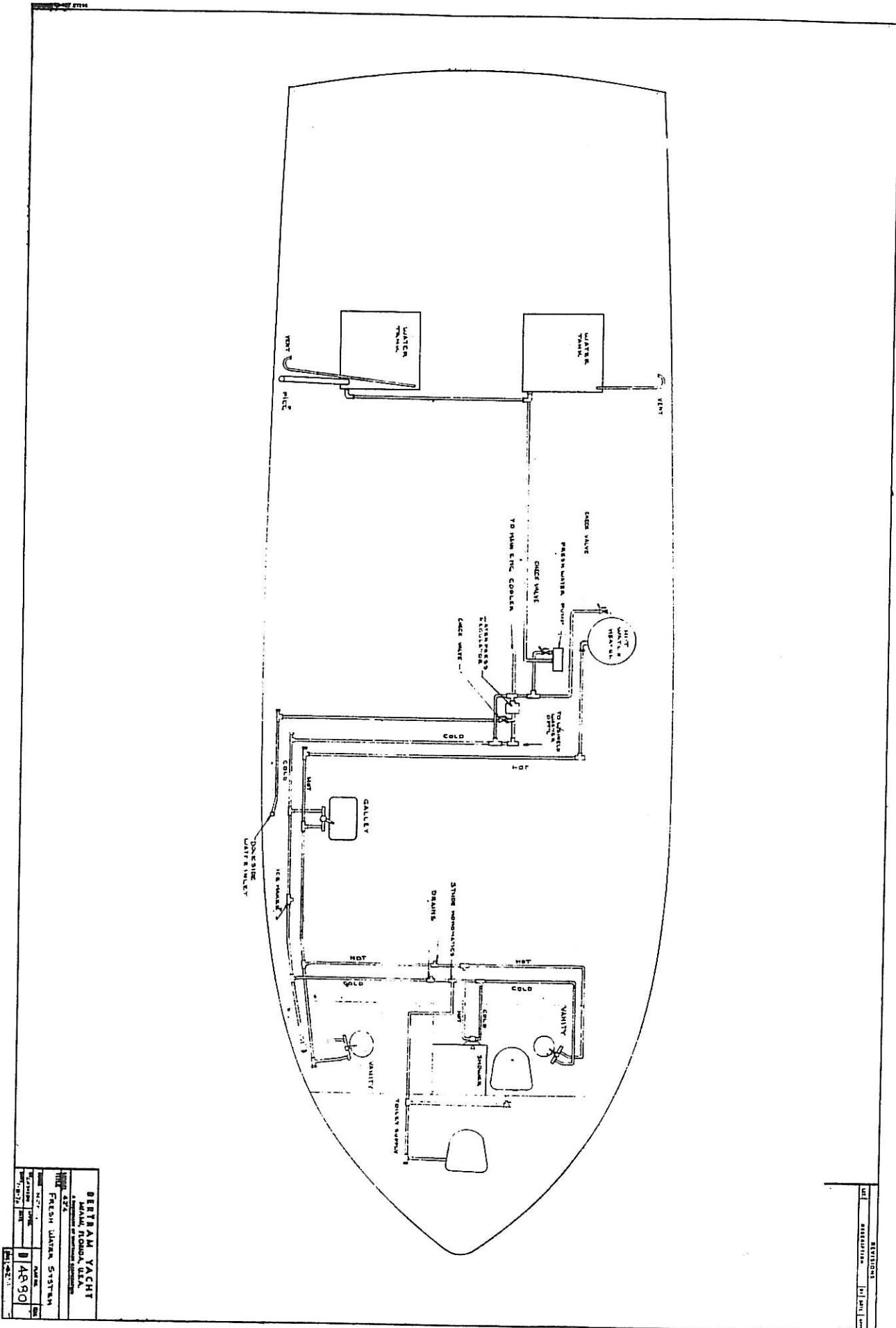
Replace insulation, making sure controls are well covered and that the plastic terminal shield has not been displaced, then replace the access panel. There is a manual reset button that will require pressing if water temperature exceeds 190 degrees F.

#### Dockside Water Supply

Near the 115 V.A.C Shore Inlets, you will find a Dockside Water Connection. This is connected through a pressure regulator to the Fresh Water System, on the discharge side of the pump. When dock water is available, it is not necessary to use water in tanks or operate the pump. Turn Fresh Water Pump circuit breaker "off". This connection cannot be used to fill water tank.

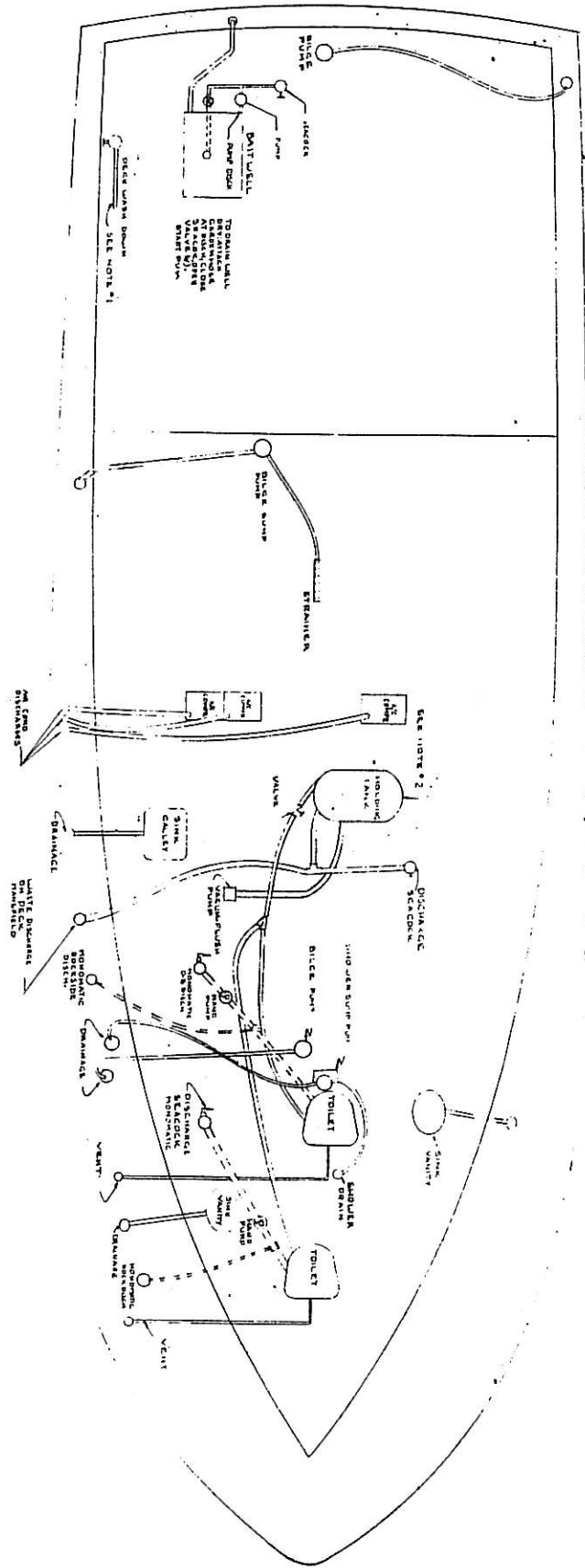
#### Automatic Ice Maker - Water

In case of a failure of the Ice Maker, a valve is located on the forward side end of the locker over the stove. Off is in a down position.



BERTAM YACHT	
MIAMI, FLORIDA, U.S.A.	
FRESH WATER SYSTEM	
NO. 14890	DATE: 10/27/72

NO.	REVISIONS	DATE
1	14890	10/27/72



- NOTES:
1. DECK WASH DOWN IS OTEIL
  2. HOLDING TANK WITH VACUUM-FLUSH SYSTEM IS OTEIL

REVISED		DATE	
1	ASSEMBLED	1/1	1982
BERTRAM YACHT MIAMI, FLORIDA, U.S.A. A DIVISION OF BERTRAM CORPORATION			
SHIP NO.		DRAWING NO.	
454		DECK WASH SYSTEM	
SHIP NO.		DATE	
14882		1982	
REVISED		DATE	
14882		1982	



## TOILETS

### Electric Groco Toilet - V-Berth Cabin (Standard Equipment)

Power for this toilet is supplied by the forward toilet (73) circuit breaker on 12 V.D.C. Panel. Intake and discharge seacocks are under deck floor, just aft of the toilet. Be sure both are open.

To fill bowl with water, press push-button switch. To flush toilet, step on foot pedal and press switch at the same time.

### Electric Groco Toilet-Forward Cabin (Standard Equipment)

Operation is similar to forward toilet. Seacocks are below toilet floor.

### Mansfield Vacu-Flush Toilets (Optional Equipment)

The 20 gallon vacuum-holding tank, vacuum pump and optional overboard discharge pump for the toilets are located at the forward end of the engine room under the floor board.

## MANSFIELD VACU-FLUSH SYSTEM

### Operating Instructions

Mansfield's Vacu-Flush System is an electrically operated Sanitation System for Marine applications. A complete System includes a toilet assembly, a tank assembly, and a pump assembly.

Mansfield's Vacu-Flush System operates completely different from other Marine Sanitation Systems. Instead of gravity drop or forcing sewage with water pressure, odors and sewage are pulled forceably from the toilet to a remote holding tank by vacuum. Its positive, quick, clean action virtually eliminates clogging, toilet overflow, odors, and other annoying conditions.

When properly installed with provision for dockside discharge of waste, the Vacuum Flush System meets requirements of current anti-pollution laws in effect or soon to become effective in most states. The installation or use of overboard discharge equipment may be forbidden in some areas.

#### Electrical Power

The circuit breaker #73 for aft and forward toilet, in addition to fresh water #63, must be on and the water system pressurized. Additionally, there is a protective 15 amp, in-line fuse for the vacuum pump that should be checked if pump fails to run.

#### Starting Pump

Push start switch and release -- green light will come on in about 30 seconds and toilet is ready to flush.

#### Adding Water

Extra water in bowl is recommended for flushing of solid waste -- lift foot pedal or press level toward rear of toilet.

#### Flushing

When the green light is on, press foot pedal down or press lever toward front of toilet. Hold 2 to 3 seconds after all waste is gone, then release. BE SURE BALL VALVE IS COMPLETELY CLOSED AND WATER HAS STOPPED RUNNING.

Note: Flushing the toilet shuts off the vacuum pump. Anytime sewage fails to clear toilet, it will be necessary to re-press the push button marked "Push to Start". This allows more vacuum to build in the holding tank.

Also, letting the flush pedal up too soon will cause toilet contents to remain in the toilet bowl or vacuum hose, possibly causing system to plug. Waste cannot be pulled into the tank if the ball seal is allowed to close before cycle is completed.

#### Caution

Never attempt to flush solid waste when there is no vacuum or only partial vacuum. To do so will permit small throat in base of bowl (below ball valve) to plug quickly.

### Tank Full

When red light comes on, only room for four or five flushes remain. Be sure to notify captain so tank can be pumped out at the earliest opportunity.

### Caution

DO NOT USE FOR DISPOSAL OF PAPER TOWELS, FACIAL TISSUE, SANITARY NAPKINS, CIGARETTE BUTTS, OR ANY NON-DISSOLVING ITEMS.

### Tank Pump-Out (Overboard Discharge System) (Optional)

Refer to the diagram and step-by-step instructions on the following page (also posted near the four-way valve) for pump-out procedure of vacuum holding tank.

### Caution

Always be sure that seacock (Valve #2) is fully closed -- be certain that handle is parallel to the hull. If seacock is even open a little, the vacuum pump will fill the tank with seawater.

### Dockside Pump-Out

In areas where overboard discharge is prohibited, the dockside discharge should be used. When the vacuum-holding tank is full, it should be emptied as follows:

1. Close fresh water supply valve at toilet.
2. Open ball valve in toilet bowl and block securely.
3. Remove deck pump-out cover.
4. Pump tank out with dock pump (approval pump-out station).
5. Make sure waste fittings on deck are sealed tightly.
6. Close toilet ball valve and open fresh water valve.

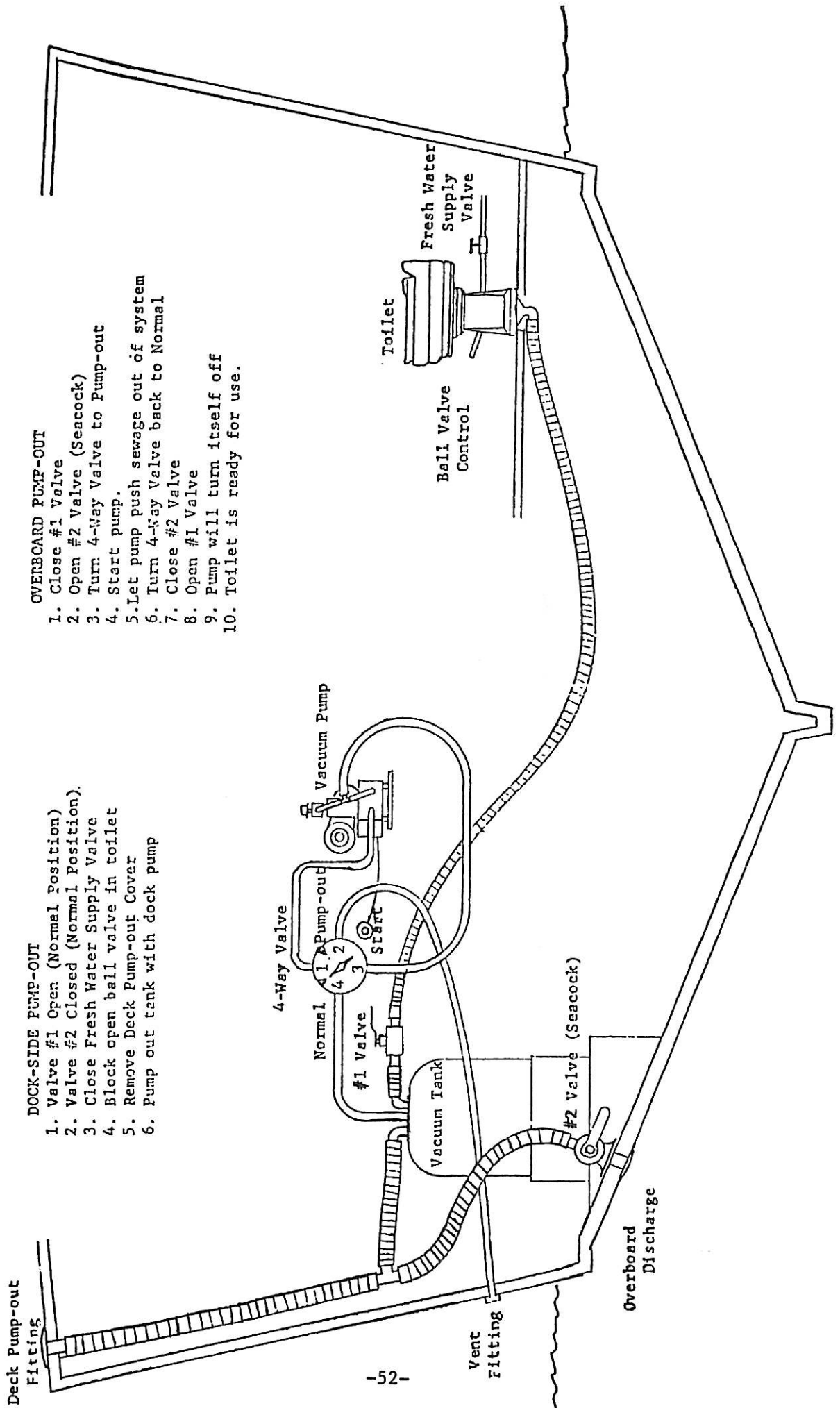
OPERATION OF TYPICAL VACU-FLUSH SYSTEM INSTALLATION

**DOCK-SIDE PUMP-OUT**

1. Valve #1 Open (Normal Position)
2. Valve #2 Closed (Normal Position).
3. Close Fresh Water Supply Valve
4. Block open ball valve in toilet
5. Remove Deck Pump-out Cover
6. Pump out tank with dock pump

**OVERBOARD PUMP-OUT**

1. Close #1 Valve
2. Open #2 Valve (Seacock)
3. Turn 4-Way Valve to Pump-out
4. Start pump.
5. Let pump push sewage out of system
6. Turn 4-Kay Valve back to Normal
7. Close #2 Valve
8. Open #1 Valve
9. Pump will turn itself off
10. Toilet is ready for use.



### Recharging System After Pump-Out

1. Close ball valve in toilet.
2. Turn on water supply.
3. Pour  $\frac{1}{2}$  gallon of Clorox in one of the toilets.
4. Push start button - when green light comes on, flush toilet.
5. Make sure water has stopped flowing and ball is sealed tight with a small amount of water remaining in bowl.

### Cold Weather Use

The addition of permanent type anti-freeze in amounts specified for capacity of holding tank will provide protection for holding tank. Toilet must be kept above freezing and drained after each trip.

### Caution

DO NOT USE ALCOHOL OR ALCOHOL PRODUCTS

### Winter Storage

1. Pump out holding tank at dockside station.
2. Flush out toilet and tank as described under "Cleaning the Vacu-Flush System".
3. Add two gallons of fresh water and one gallon of Ethylene Glycol anti-freeze to system and flush into holding tank.
4. Shut off water supply to toilet.
5. Remove drain cap at bottom of flush valve on toilet base.
6. Depress flush lever until all water drains from toilet system.

### Level Indicating Probe and Light

The Vacu-Flush holding tank is equipped with a level indicating probe assembly which will turn on the light marked "TANK FULL", when holding tank reaches  $\frac{3}{4}$  tank capacity.

When this light goes ON the holding tank should be emptied at your earliest

convenience. Only capacity for a very limited number of flushes remain.

### Tank Vent

The holding tank vent to which the vacuum pump suction is connected is equipped with a float valve which prevents sewage from being drawn into the vacuum pump when the tank is full or when rolling in heavy seas.

Occasionally, when the tank level nears the top and you are rolling in heavy seas, the float valve will be forced against its seat. If the vacuum pump is in operation, the vacuum will hold the float in position and cause the system to short cycle or shut off prematurely.

The control should be recycled to obtain adequate vacuum for flushing.

When the tank reaches full capacity, the float will permanently seal the vacuum line and the toilet will not flush. NO ADDITIONAL ATTEMPTS MUST BE MADE TO FLUSH THE TOILET WHEN THIS CONDITION EXISTS. Pump the holding tank immediately.

### INITIAL SYSTEM CHECK-OUT

When Vacu-Flush installation has been completed, check the system for proper operation as follows.

1. Lift the flush pedal to see that water enters the toilet bowl. Allow pedal to return to the neutral position and note that the water stops running. (There will be a quantity of water in the rim cavity of the toilet at this point. This water will continue to flow for a brief period.)

2. Start the vacuum pump by pressing the "START" push switch. The pump should start at once and run with an even rhythm.

3. Press down on the flush pedal and the pump should stop at once.

4. With the system holding tank empty and no vacuum on the system, start the pump and check the time required for the green "Vacuum ready" light to come on. The lamp should light within 25 seconds on an empty 20 gallon tank.

(Note: With liquid in the tank, the light will come on quicker. There is less volume to evacuate.)

5. Continue to time the running pump. With the tank empty, the pump should shut off on its own accord, within one minute, thirty seconds.

Using the Vacu-Flush System

Mansfield's Vacu-Flush Systems flush on fresh water each time they are used. There is no need to pre-charge the toilet or system with water, however, a package of Mansfield Chemical or half gallon of Clorox should be added to the first flush operation following each pump-out of the holding tank. These chemicals help keep the sewage lines clear and reduce odors during succeeding pump-out operations.

During weekend cruising or periods of low frequency of use, the system's holding tank need not be pumped out unless desired as preparation for future cruising. Those periods of high frequency of use or extended cruising can be planned with the aid of the following chart. (Chart shows tank capacity vs. number of people using toilet and displays the number of days of cruise to be expected with normal toilet use.)

Holding Tank Capacity	<u>Number of People</u>									
	1	2	3	4	5	6	7	8	9	10
<u>20 Gallons</u>	30	15	10	8	6	5	5	4	4	3

Calculated on the basis of five flushes per day per person.

Plan your cruise. Be close to a pump-out station when your holding tank reaches 3/4 capacity. Tank level can be seen by holding a light on far side of the fiberglass tank.

### Approved Chemicals

Use only Mansfield Sanitary Hirotrol Chemical formulated specifically for the Vacu-Flush System or Clorox. These chemicals will protect against pump-out odor and will provide protection against bacterial growth of the sewage.

IMPORTANT, use of any chemical product other than Mansfield Hirotrol or Clorox may have detrimental effects on toilet components. Use of other chemicals voids all guarantees and warranties. Mansfield Vacu-Flush Chemical is available from all Mansfield distributors and Recreational Service Stations.

### Additional Operating Instructions

#### Cleaning the Vacu-Flush System

The Vacu-Flush System should be cleaned regularly for maximum sanitation and operational efficiency. The following procedure may be used.

1. Flush toilet several times with fresh water.
2. Turn off valve supplying water to the toilet.
3. Block flush pedal down on toilet so ball seal in bowl is fully open.
4. Pump out holding tanks at dockside service station.
5. Reflush entire system with fresh water and pump out holding tank.
6. Replace deck fitting cap and secure. Flush one package of Mansfield Chemical or  $\frac{1}{2}$  gallon of Clorox into holding tank.



## ELECTRICAL ACCESSORIES

### Engine Compartment Blowers

There are two engine compartment exhaust blowers, one on each side of the boat. These are connected with hoses that have intakes under the main engines and discharge through side of hull.

Switches for these blowers are at each control station.

A third exhaust blower is used to ventilate the generator enclosure. The switch for this blower is on top section of 115 V.A.C. Distribution Panel.

Blowers should be run at least two minutes before and during engine starting.

### Bilge Pumps, Automatic/Manual

There are two high capacity bilge pumps. The aft pump is below the aft section of the generator hatch. The other pump is located under the removable floor section in the companionway between the galley and V-berth. Each has a floating automatic switch which must be kept free of debris.

Power is obtained from circuit breakers #31 and 34, which are normally left "on" at all times. Switches at each control station should normally be left in "Automatic" position. Never leave any switch in "Manual" position unless discharge is being observed.

### Engine Room Sump Pump

This pump is located on aft bulkhead of the engine room and is connected by hose with a strainer located in the keel sump. On the end of the strainer is an airbell connected by air hose to a pressure switch under the hinged step, next to the fuel selector valves.

The airbell must be kept clean and upright -- it can be slipped off the end of strainer. Keep strainer clean, also. Pressure switch can be adjusted

to maintain the desired bilge water level and to shut off automatically.

This pump gets its power from circuit breaker #33 which should be "on" at all times. A signal light next to the breaker lights whenever pump is running.

#### Shower Sump Pumps

The shower has a sump and pump under the toilet floor. The automatic float switch in sump tank should be checked periodically. Be sure circuit breaker #61 is "on" before shower is used.

#### Windshield Wipers

All three wipers get their power from circuit breaker #52, however, each motor is protected by a 6 amp. in-line fuse at each wiper switch.

#### Range

The Princess Electric Range Model 33 has three burners, an oven and a rotisserie all powered by 115 volts from the 115 V.A.C. Distribution Panel. For the stove to operate, there must be 115 volt power to the panel and the Range breaker (#144) must be on. The stove itself has been wired to provide satisfactory operation with a minimum amount of power, the maximum being 3,000 watts. To accomplish this, the left front burner and the oven cannot be used simultaneously, the selection being made by the far left switch on the stove. There are pilot lights above and below the switch to indicate whether the oven or the left burner is energized. The two front burners are 1100 watt burners, whereas the rear burner is a 550 watt burner. No combination of burners and/or oven that can be used at any one time will consume more than 3,000 watts. It is recommended that the "Range" breaker on the electrical panel be kept off except when actually using the stove to prevent accidentally turning the stove on. An interlock switch prevents a burner being on when the cover is closed.

## COMMANDING YOUR BERTRAM

### Pre-Starting Instructions

The following are routine procedures that should be followed each time you take your Bertram out.

1. Always check fuel supply.
2. Make sure the seacock for the engine cooling water is open. The rubber impeller in the pump will not last long when run dry.
3. Make sure the fuel valves at the tanks and at the fuel manifold are open.
4. Check engine and reverse gear oil. Make sure they are at the proper level.
5. Check water level in expansion tank of fresh water engine cooling.
6. Check fluid level in batteries - add distilled water to bring level about  $\frac{1}{4}$ " above plates.
7. Turn on the following 12 V.D.C. circuit breakers:
  - a. Bilge Pumps and Safety Alarm, 31, 32, 33 and 34
  - b. Port & Starboard battery Main, 7 & 8
  - c. Port & Starboard Engine 41 & 42
  - d. Horn and Trim Tabs 51 & 53
  - e. The remaining breakers are not essential to the operation of the boat itself, but are usually turned on so lights and other equipment can be used.
8. Start generator (see Generator Section) and turn on desired 115 V.A.C. equipment.

### Starting Main Engines

1. Run engine blowers for at least two minutes before and during starting.

It is best to raise hatches and check bilge by smell for fuel fumes.

2. Check clutch control levers to insure clutches are in neutral (upright) position.
3. Turn On-Stop switches to "on" (at flybridge and bridge if you have both).
4. Hold Start switch on one engine until it starts. If engines turn over slow, it is advisable to use the battery paralleling switch. Do not hold longer than 20 seconds or damage will occur to starter motor. Prolonged use of starter will also quickly discharge all the batteries. If first engine fails to start after a couple of attempts, try the other engine.
5. With both engines running you can turn off blowers.
6. Check exhaust outlets to see that exhaust cooling water is being discharged. If in doubt, check flow of water through engine strainers and observe engine temperature gauges while engines warm-up.
7. Before loosening up dock lines and with engines at idle speed (500-600 r.p.m.) check each clutch control individually in both forward and reverse positions.

#### Caution

On General Motors diesels, do not run engines with On-Stop switch in "off" (upright) position.

#### Maneuvering

Your Bertram has twin propellers rotating in opposite directions in order to balance the torque. You can engage one engine in forward gear, and the other in reverse gear. This will turn the boat completely around in its own length if the rudder is left in the center position. You can, of course, make such a turn in either direction. Port engine forward and starboard engine in reverse spins you to starboard. Starboard engine forward and port engine in reverse spins you port. You can accentuate the spin by full rudder in the spin's direction.

In docking, approach at a slow speed, and a 30 degree angle. When your bow is about five (5) feet from the dock, put the dockside engine in neutral, and the far-side engine in reverse. This will reduce your forward movement and bring your stern alongside the dock. Usually the docking can be accomplished with the clutches alone. No steering or use of throttle is required.

### Stopping Engines

Simply hold "On-Stop" switch in position. On the General Motors diesel there is also an emergency shut down system. In case of electric failure or other emergency, simply pull handle marked "Emergency Shut Down". (Note, use emergency only as a last resort.) This can only be reset on top of the engine by turning a small projecting handle that reopens the air valve inside the blower inlet housing. For further details see G.M. Manual.

### Cruising Speeds

As you increase speed, the boat will increase her angle of trim. That is, the bow rises. Once at this maximum angle press trim tab rocker switches and lower the angle of trim to approximately  $4\frac{1}{2}$  degrees. As a rule, top cruising speed R.P.M. should be 10% to 15% less than the top R.P.M. Consult your engine manual.

Speed, R.P.M., and fuel consumption are indicated in the enclosed graph. These were obtained on actual tests of boats similar to yours under ideal conditions. The speeds and ranges indicated are not guaranteed. But, they will serve as a valuable guide for you. Some additional considerations: engine performance will be affected to a slight degree by atmospheric conditions. You will find your engines develop less power in warm air temp-

eratures. Similarly, dry air reduces power, as will high altitudes.

The famous Bertram V Hull cushions pounding by slicing rather than slapping waves. You'll be able to go out in weather that keeps ordinary boats at their moorings. But even Bertram can encounter extreme conditions that call for sensible seamanship, good common sense. While your Bertram will withstand far greater punishment than you will probably ever subject her to, speed should be reduced under severe conditions in the interest of your comfort, and to reduce needless strain on the engines.

### Cruising

In order to avoid going aground or damaging underwater gear, it is important to know the draft of your Bertram, or the amount of water you must have under you at all times. Draft will vary depending on how many people and how much equipment or personal effects you are carrying. What's more, your draft will be somewhat less in salt water than in fresh water.

You can determine maximum draft by measuring the freeboard from the sheer to the water line at the center of the transom. Subtract this freeboard from the hull depth at the transom (see docking plan in this manual) to get the hull draft at the transom. Add depth of underwater gear as indicated in Docking Plan, and you have the maximum draft. Record the figure where you can refer to it quickly.

If you plan to travel waterways crossed by bridges, you'll also want to know the height of your Bertram from the waterline. Take your measurement when your Bertram is lightened of its fuel, passengers and equipment. This will give you a small safety factor when boat is loaded.

For best results try to maintain the original trim of the boat. You can do this by noticing her trim carefully when she is first launched, before extra equipment has gone aboard. Of course, all gear and equipment should be

properly stored while cruising.

#### Calling at Foreign Ports

You are not likely to have trouble with shore current in the United States. (However, you should be somewhat careful when using 15 amp service with a pigtail adapter.) This is a low capacity adapter and should not be used when demand exceeds 1700-2000 watts. When cruising abroad, check shore power for 115 volt single phase, A.C. 60 cycles. See Electrical Systems Manual for specifics on connections for shore current. Shore power with A.C. 50 cycles can be used but a power loss will be experienced. If in question avoid damage, use your generator. Do not use converter on 50 cycle current unless it has been factory modified for 50/60 cycle operation.

Also, when cruising abroad, try to purchase fuel equal to American standards. (See fuel systems section for requirements in your engines.) Carry extra fuel filters with you, since replacement may be necessary.

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

#### Leaving your Bertram

The following are procedures to follow when leaving your boat overnight, or for a short period of time:

1. Lock all engine circuits (Turn off circuit breakers #41 and 42).
2. Lock all doors, windows and hatches.
3. Make sure mooring lines are well secured with adequate allowance for tide.
4. Bumper and spring lines set.
5. Leave bilge pumps in auto position.

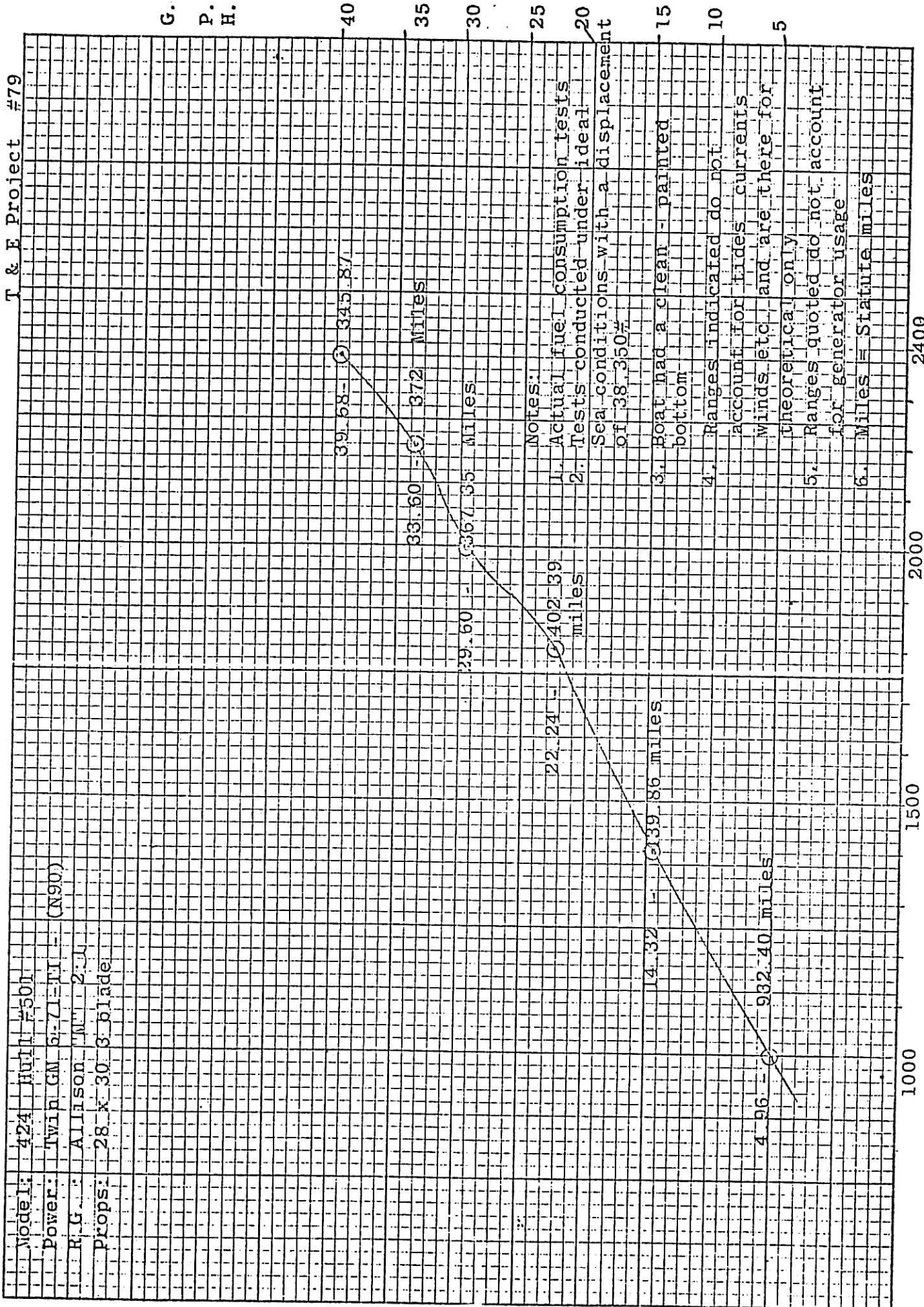
The following steps should be followed when leaving your boat for longer

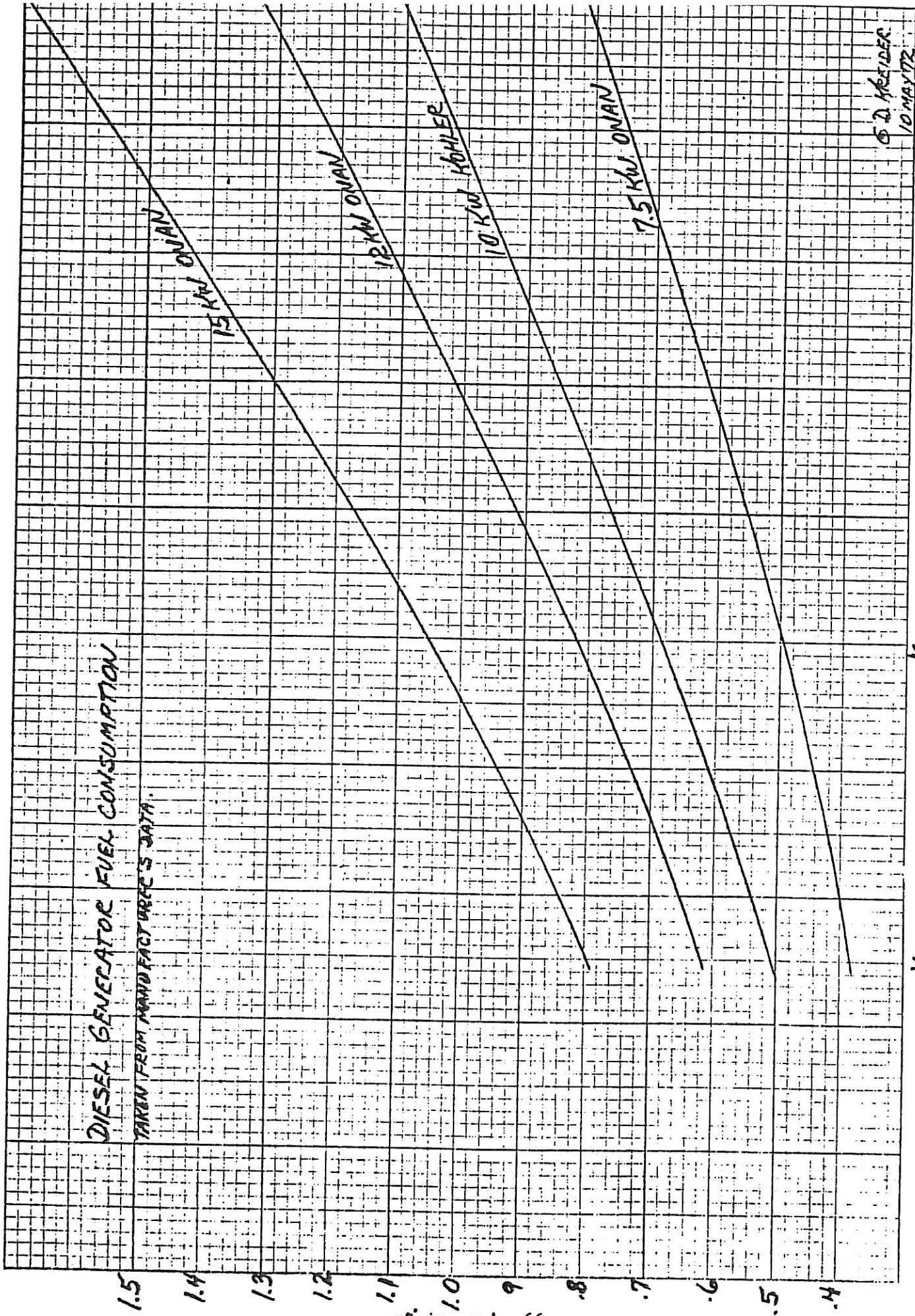
periods of time, such as a week or more:

1. Follow all of the above steps.
2. Turn master circuit breaker to "OFF" position.
3. Close all seacocks and valves.
4. Turn off all fuel valves.
5. Open vent in deck hatches.
6. You may wish to leave refrigerator or freezer running.
7. Return trim tabs to full up (Bow up) position to insure no growth can occur between the tabs and the hull that may prevent full operation of trim tabs.



T & E Project #79





F. D. BREIDER  
 10 MAY 1974

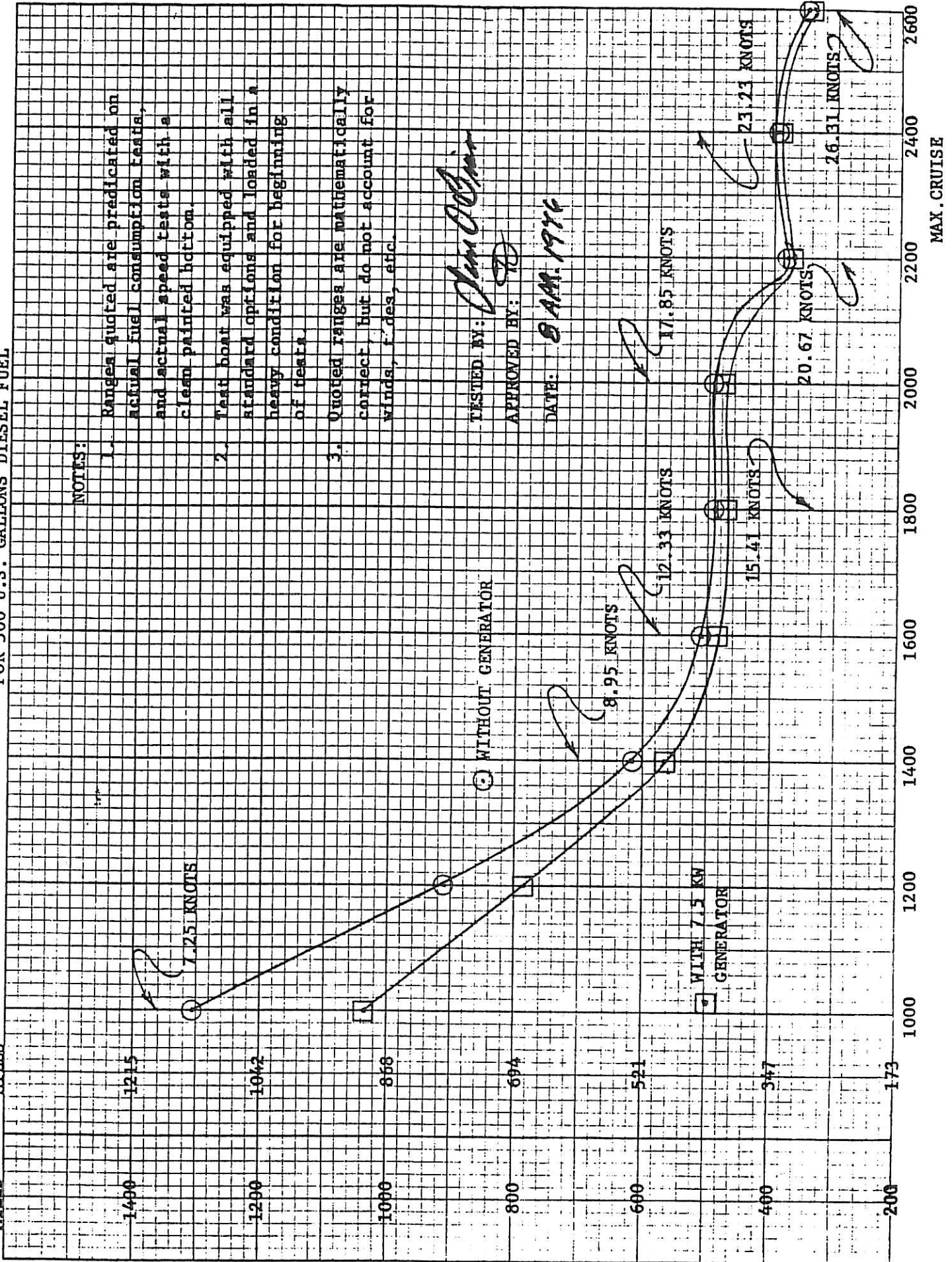
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RANGE GRAPH FOR 42' CONVERTIBLE  
FOR 500 U.S. GALLONS DIESEL FUEL

STATUTE MILES  
NAUTICAL MILES



NOTES:

1. Ranges quoted are predicated on actual fuel consumption tests, and actual speed tests with a clean painted bottom.
2. Test boat was equipped with all standard options and loaded in a heavy condition for beginning of tests.
3. Quoted ranges are mathematically correct, but do not account for winds, tides, etc.

TESTED BY: *Jim O'Brien*  
 APPROVED BY: *PO*  
 DATE: 8 APR. 1976

42' CONVERTIBLE - RANGE CHART  
 500 U.S. GALLONS OF FUEL  
 CUMMINS VTA 903 M ENGINES

RPM	Speed		G. P. H.	7.5 Generator KW Fuel	Operating Hours	Range w/Gen		Range w/o Gen	
	Both Eng's. MPH	Knots				Statute	Nautical	Statute	Nautical
			Total Both Eng's.	.82 GPH at Rated Load	w/Gen	Statute	Nautical	Statute	Nautical
1000	8.35	7.25	3.20	Rated Load	124.37	1038.48	901.85	1304.68	1133.03
1200	9.15	7.95	5.02	Equals	85.61	783.33	680.27	911.34	791.44
1400	10.30	8.95	8.32	7.5 K.W.	54.70	563.41	489.28	618.92	537.49
1600	14.20	12.33	13.92		33.92	481.66	418.29	509.92	442.83
1800	17.75	15.41	18.16		26.34	467.53	406.02	488.65	424.36
2000	20.55	17.85	20.80		23.12	475.11	412.60	493.81	428.84
2200	23.80	20.67	31.36		15.53	369.61	320.98	379.37	329.46
2400	26.75	23.23	33.68		14.49	387.60	336.60	396.97	344.74
2600	30.30	26.31	44.00		11.15	337.84	293.39	344.20	298.91

Notes:

1. Above figures are representative of a fully equipped boat with all standard options.
2. Numbers quoted are from actual fuel consumption and speed tests. But no accounting for winds, tides, etc., are considered.
3. This chart is to be used as a Reference Only.

Tested by:

Approved by:

## MAINTENANCE

### Periodic Maintenance

The maintenance of Bertrams depends to a great extent on the conditions under which the boat is used. Adequate ventilation of the cabin during periods of non-use will reduce the interior maintenance, and keeping the exterior waxed will minimize the exterior maintenance.

In this section a suggested preventive maintenance program is set forth for the boat under "average" conditions, and if this program is used it should be used in conjunction with the periodic maintenance recommended in the respective operating manuals for the engines and generator.

CAUTION, when washing and hosing down the deck area, make sure caps on the shore power receptacles are closed.

### Daily

1. Pump bilges as required.
2. Ventilate engine compartment (open hatches).
3. Check engine lubricating oil levels.
4. Check engine coolant levels.
5. Check generator lubricating oil level.
6. Check fuel, water, and oil systems for leaks.
7. Visually check raw water strainers for dirt accumulation. Clean as necessary.
8. With engines running, check engine circulating water by observing engine exhausts. Water should be exhausting along with the gases.
9. Check battery water.
10. Top off fuel tanks and water tanks at end of days operation.
11. Wash down boat with fresh water.

WHEN YOU FIRST TAKE COMMAND AND THEN EVERY 100 HOURS OR 60 DAYS (WHICHEVER COMES FIRST):

Exterior

1. Visually inspect exterior fiberglass finish; clean and wax.
2. Inspect all hardware and apply protective polish. Tighten any loose fittings. Lubricate locks and latches.
3. Inspect condition of varnished areas. WARNING: Do not let varnished areas deteriorate, otherwise wood will turn dark requiring complete stripping and refinishing. To properly maintain, light sand and revarnish with good grade of marine varnish.
4. Inspect all exterior seat cushions. If wet, remove covers and air dry in sunlight all polyfoam and covers. Clean covers with mild soap solution or light Clorox solution. Wash any cleaning materials off with fresh water. To prevent damaging the finish of the covers do not use any abrasive cleaners.

Interior

1. Completely air out the boat.
2. Inspect all life jackets.
3. If any mildew is found, thoroughly wash down area with Clorox solution.
4. Inspect and operate all drawers and doors. Slight adjustment may be necessary on doors and drawers due to expansion from moisture. Drawers can be made to slide easier by using wax under runners.
5. Check all port lights. Lubricate dog threads with Vaseline.
6. Check all fire extinguishers for full charge.
7. Check first aid kit.
8. Check Emergency provisions (food, water) etc.

Bow Stateroom

1. Check operation of lights.
2. Check 110 volt duplex plug-ins for operation.

3. Check bow hatch for operation and watertight fit.

#### Forward Head

1. Check operation of light.
2. Check 110 volt duplex plug-in for operation.
3. Inspect the toilet for proper operation.
4. Inspect hot and cold water faucets for leaks and operation.

Check drains for pluggage or leaks.

#### Galley

1. Check hot and cold water faucets for operation. Check drinking water outlet.
2. Inspect sink drain for pluggage and leaks.
3. Check lights and duplex plug-ins for operation.
4. Clean and check stove for operation.
5. Check refrigerator and freezer for operation. Defrost and clean refrigerator and freezer with a solution of baking soda. Leave door open.

#### Engine Compartment

1. Follow periodic preventive maintenance for engines and marine gears as specified in engine manual.
2. Inspect stuffing boxes.
3. Inspect exhaust hoses and hose clamps.
4. Check raw water pick-up gate valves. Lubricate with Vaseline (open and close).
5. Clean raw water strainers.
6. Check engine mounting bolts to see that they are tight. If bolts are found to be loose, realign engine. If coupling must be broken loose, lubricate coupling bolts with Vaseline and coupling face.

7. Check all hoses on engines, and hose clamps. Inspect for leaks (important). Check alternator belts.
8. Check fuel lines, flare nuts, and valves for leaks.
9. Check control cable brackets for tightness and lubricate as necessary.
10. Check electrical connections and clean if corroded. (Paint with liquid tape.)
11. Check exhaust blower for operation and hose for leaks.
12. Check all wiring to see that it is not rubbing or insulation worn off (also battery cable) .
13. Check all gauge senders and alarm system make-break switches.
14. Check all fresh water system lines and fittings for leaks.
15. Check both fresh water pumps for condition and operation.
16. Check hot water tank and all connections for leaks.
17. Check electrical connections for tightness and corrosion.
18. Lubricate control heads and sprocket and chain with Vaseline.
19. Test alarm system (lights and bell).

#### Haul-Out (As required)

Pull boat out of water, scrub, if necessary.

In painting anti-fouling make sure the trim tab assembly is covered. Including hydraulic cylinders, make sure the lower portion of cylinder, where the ram covers out of the cylinder has been covered well. Note, never paint on ground plates, depth sounder transducer, or electrolysis zincs.

#### Crevice Corrosion

It is advisable to rotate the shafts about every 30 days to prevent a condition called crevice corrosion occurring on the shafts in the area of the struts and shaft logs. This might occur if shafts remain in the same position over a long period of time when boat remains in water as in wet storage.



## STORING YOUR BERTRAM

### Dry Storage

1. Indoor storage is generally preferred, if there is good ventilation, and if the location is otherwise safe and dry. However, outdoor storage may be all that is available, or economically practical.
2. (For any special instructions for covering Bertram for outdoor storage, refer to Docking Plan.)
3. To keep bilge dry, remove bilge drain plug and open all valves and/or seacocks.
4. Drain all tanks, water lines and pumps of water to prevent damage from freezing. Add anti-freeze to any low position lines that can't be drained. In warm climates draining will prevent water stagnation. (See Winterizing procedure.)
5. Open windows, port lights and hatches sufficiently to allow air to circulate. Also leave locker doors and drawers open.
6. Defrost and dry out refrigerator and freezer, and prop doors open.
7. If possible, remove mattresses and cushions, clean and store in a dry place. If they must be left aboard, prop up on one edge for maximum ventilation.
8. Synthetic material lines need only proper handling and occasional cleaning. Natural fiber lines should be dried and kept in a well ventilated place.
9. With all toilets, water delivery and discharge lines drained, apply a light coat of oil to all metal parts. CAUTION: Do not oil any rubber or leather parts.

10. To protect chrome, stainless or aluminum deck hardware, first remove any salt deposits with water. Then clean with a good quality non-abrasive type metal cleaner. Finally, give items a light coat of grease.

11. Check propellers for nicks, dents and bent blades. Check struts and shafts also. Any replacement or repairs should be made at this time instead of during the spring rush.

12. Be sure all linkages of steering, engine and other controls are free and well lubricated.

13. Disconnect shafts from engines.

14. Remove batteries and make arrangements for storage and periodic recharging.

#### Wet Storage

All the above applies, except that valves and seacocks should remain closed, and the electrical master switch should be placed in the "off" position.

#### Fitting Out

In order to insure maximum pleasure and enjoyment for your Bertram Yacht, after an extended lay-up a thorough check of the boat and equipment is necessary with maintenance being done as indicated. The following list should serve as a guide for the more important items to be accomplished (not necessarily in the order to be done).

#### Pre-Launch

1. Thru-hull strainers clear and secure.
2. Shafts should turn freely.
3. Secure propeller nut, jam nut, cotter pin.
4. Do rudders fit well in rudder port?
5. Are set screws on struts in place?

### After Launch

1. Are seacocks or valves free and operable?
2. Are supply and discharge lines secure?
3. Are fittings tight?
4. Make sure stuffing boxes are adjusted and locked.
5. Check shaft alignment.
6. Make sure packing glands are adjusted and locked.
7. Are bilge pumps working?
8. Is bilge blower working?

### Electrical System Check

1. Batteries are properly charged at 1.260 sg. If below 1.220 sg., have charged.
2. Engine wire looms secure, away from exhaust manifold, connections tight.
3. Check the following standard and optional electrically operated equipment to make sure each is working properly.

Navigation Lights	Radio
Ships Lighting	Auto Pilot
Auxiliary Generator	Depth Finder
Converter	Radar
Horn	Shore Line and Polarity Light
Wipers	Shore Line Transfer Switch
Toilet	
Water Pressure System	Stove and other electrically operated galley equipment

### Engine Check

1. Fuel lines and cooling lines secure and tight fitting.

2. Exhaust fittings secure and tight.
3. Engine coupling, lock wire, lock washer, key in place.
4. Engine mount fastening tight, locked.
5. See engine manual for service.

Controls Check

1. Clutch adjusted, fittings secured.
2. Throttle adjusted, fittings secured.
3. Emergency shut down adjusted, fittings secured.
4. Steering is positive, linkage secure, rudder moves freely.
5. All gauges, water temperature, oil pressure, tachometer, ammeter, and full operating (after starting engines).

## FIBERGLASS MAINTENANCE

The fiberglass construction which makes up the entire hull and most of the superstructure, consists of several parts. The exterior layer gelcoat is a special polyester resin into which coloring pigments have been incorporated to give built-in color. Just beneath the gelcoat is a series of glass fabric laminations bonded together by a chemical action, and the part is a one-piece unit. The outside gelcoat - approximately 0.015 inch depth-- gives the fiberglass part its glossy finish. The following recommendations will help you keep this unique material in the same condition it was when it left the factory.

### Seasonal Care (At Fitting Out Time)

1. Clean surface with soap and water.
2. Treat with an automotive type rubbing compound. Use lightly.
3. Wax and polish the surface with an automotive type wax. Some modern products give you rubbing and waxing action in one. These are also acceptable.

### Loss of Gloss

To restore the glossy appearance of the gelcoat surfaces, a light buffing may be advisable. For hand buffing, use a slightly abrasive rubbing compound similar to DuPont No. 7. If a power buffer is used, Mirro-Glaze No. 1 or a similar product is recommended. After buffing, the surface should be waxed and polished as described above for Seasonal Care.

### Stains

The fiberglass gelcoat surface is non-porous and therefore highly resistant to stains. Most can be removed easily with household detergent.

Crayon, lipstick or shoe polish can be removed with plain alcohol. Ink spots will come off with Ajax or a similar detergent. While penetrating stains are very uncommon, some products with unusual chemical contents may go too deep for ordinary methods of removal. In such cases, weak solutions of acids or alkalies, such as hydrochloric acid or ammonia can be tried. These may, however, produce a slight discoloration in the gelcoat. If none of the above methods are successful, it may be necessary to sand down through the gelcoat to remove the stain. This will require refinishing. (See below.)

#### Scratches and Abrasions

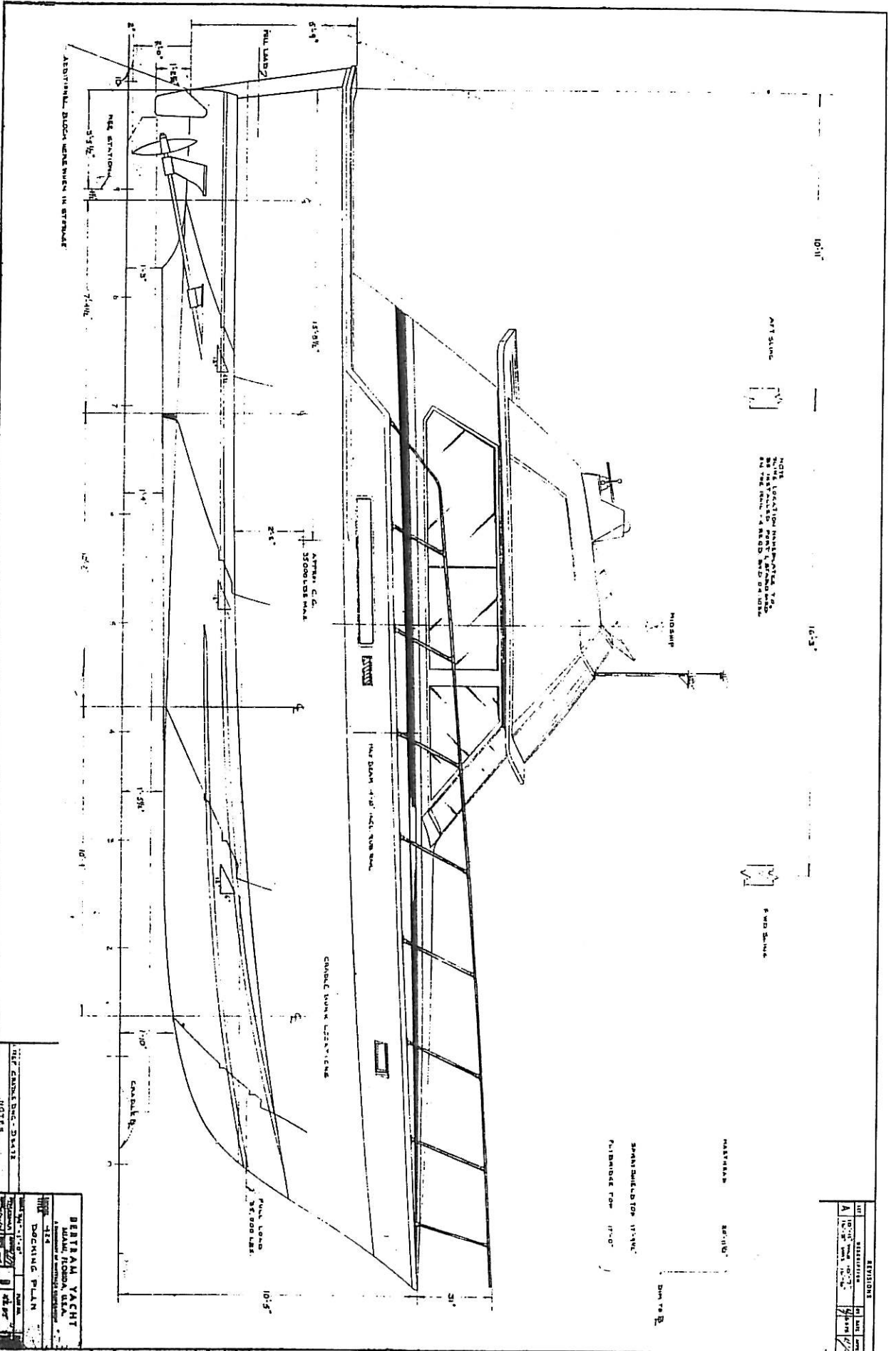
Those that do not penetrate the full thickness of the gelcoat, but do not go deeply into the fiberglass or weaken the structure, can also be repaired, as follows:

1. Clean damaged area, first with mineral spirits or turpentine to remove dirt and wax. Follow with detergent and rinse. Allow to dry completely.
2. Secure a small amount of pigmented gelcoat resin matching the color of the area to be repaired. This is available from your Bertram dealer.
3. Add two drops of catalyst per cubic inch of gelcoat and mix thoroughly. The mixture will gel in 15 minutes.
4. Fill scratch with the mixture before it hardens, and round off about 1/16" to 1/18" above surrounding surface.
5. Lay a piece of wax paper or cellophane on top of the patch and press lightly to remove air. Take off wax paper after 20 minutes, and allow patch to cure overnight.
6. Sand down patch with 600 grit wet sandpaper. Finish by rubbing and buffing with regular buffing compound.

Any repairs to fiberglass that are more extensive than those described here should be made only with the help and advice of your Bertram dealer.

#### Painting Fiberglass Surfaces

1. Thoroughly clean fiberglass part to be painted, removing any wax with mineral spirits, turpentine or other commercial solvents. Then wash with detergent and rinse.
2. After surface is dry, sand lightly with garnet paper, fine oxide paper or #220 sandpaper. Wipe clean of all dust.
3. Apply two thin coats of primer as recommended by marine paint manufacturer.
4. Apply regular coat of epoxy paint of good quality as manufacturer directs. While the fiberglass bottom of your Bertram is inherently anti-fouling, you may find your cruising waters make an anti-fouling paint application worthwhile. Follow the above directions (and those of the manufacturer) in applying such a paint to your hull.



REVISIONS

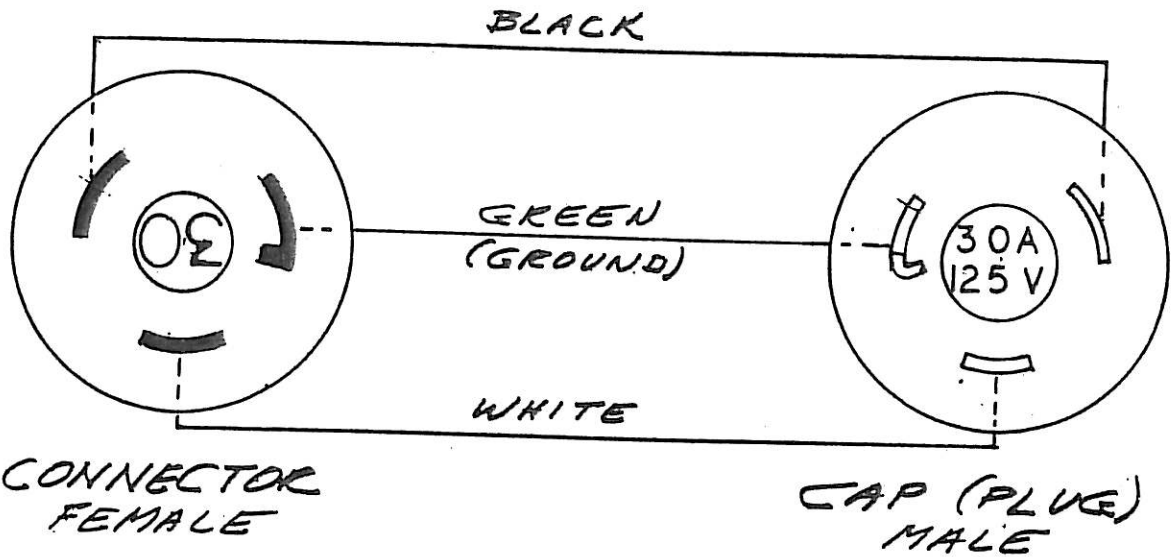
NO.	DATE	BY	DESCRIPTION
1	10-22-68	WJ	AS SHOWN

SHIP PARTICULARS		
SHIP NAME	BERTRAM YACHT	
REGISTRATION NO.	MIA 128	
OWNER	MIA YACHTS, INC.	
DESIGNED BY	W. J. WILSON	
DATE	10-22-68	

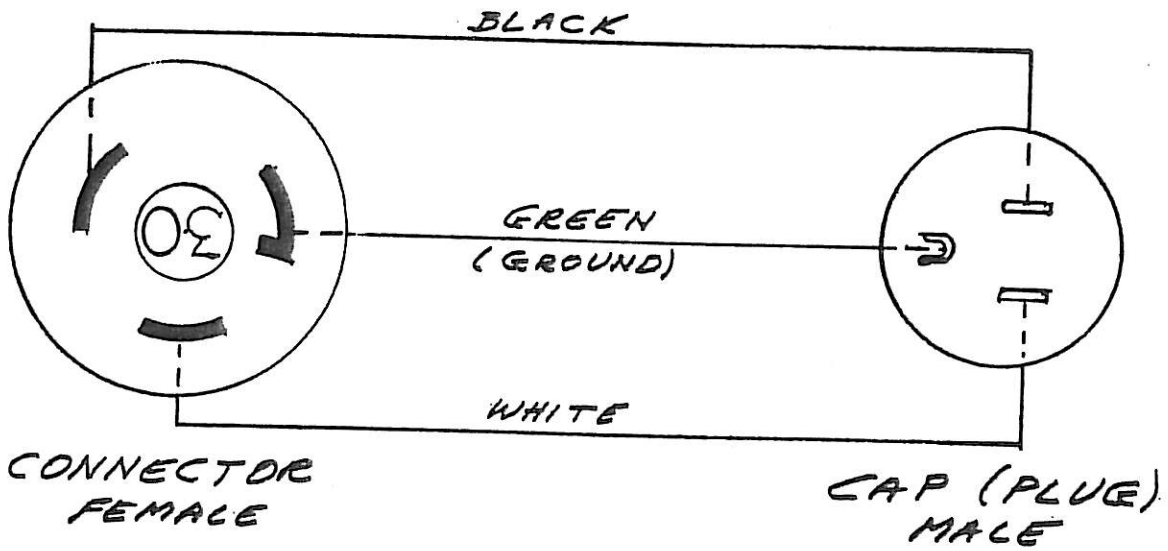
SHIP CANALS Div. - 21413  
NO. 14

DRAWING PARTICULARS		
TITLE	DECKING PLAN	
SCALE	AS SHOWN	
SHEET NO.	1 OF 2	
DATE	10-22-68	

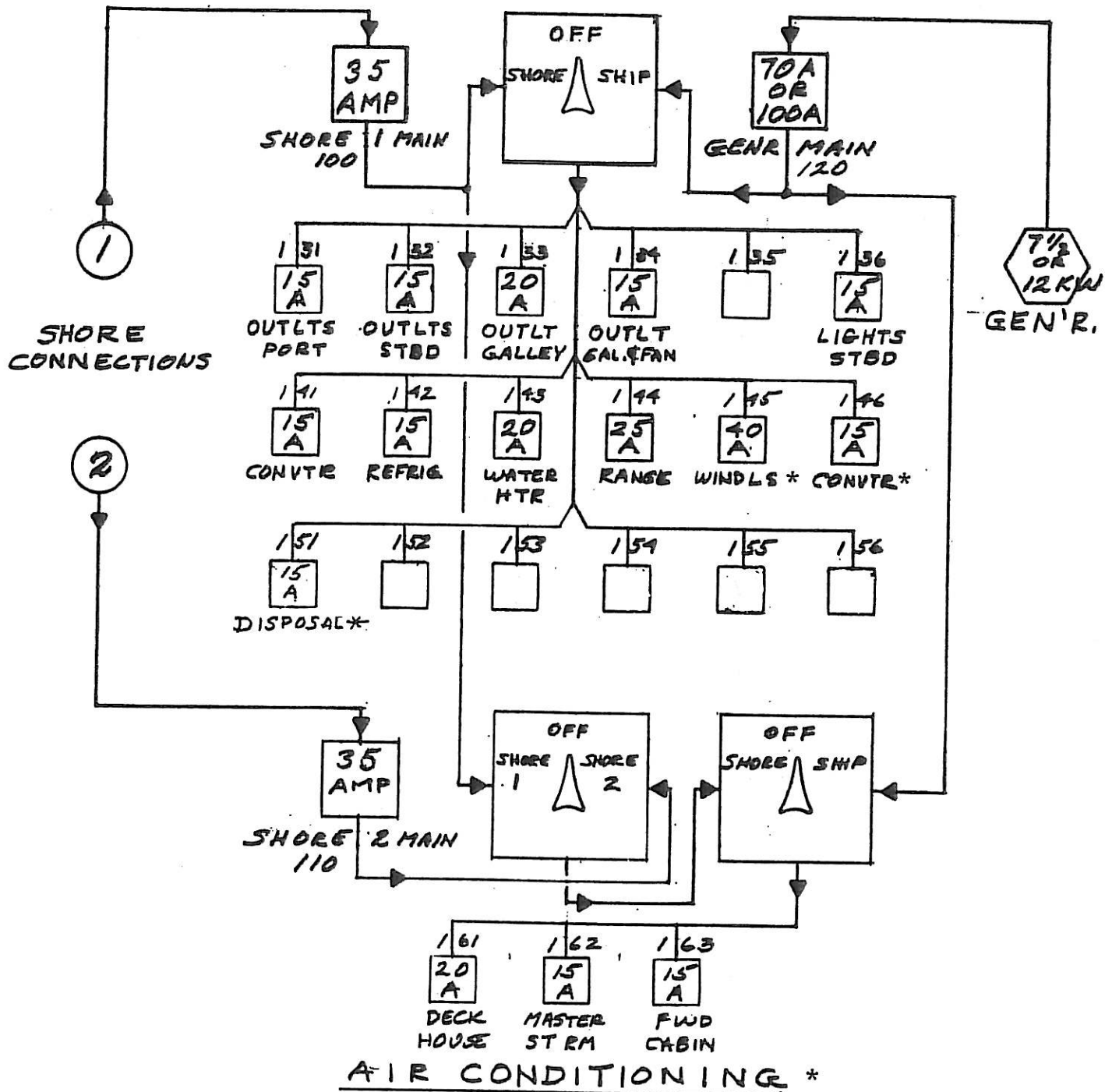




SHORE CORD (35 FT-#10) 30AMP 125VOLT  
 2 POLE - 3 WIRE

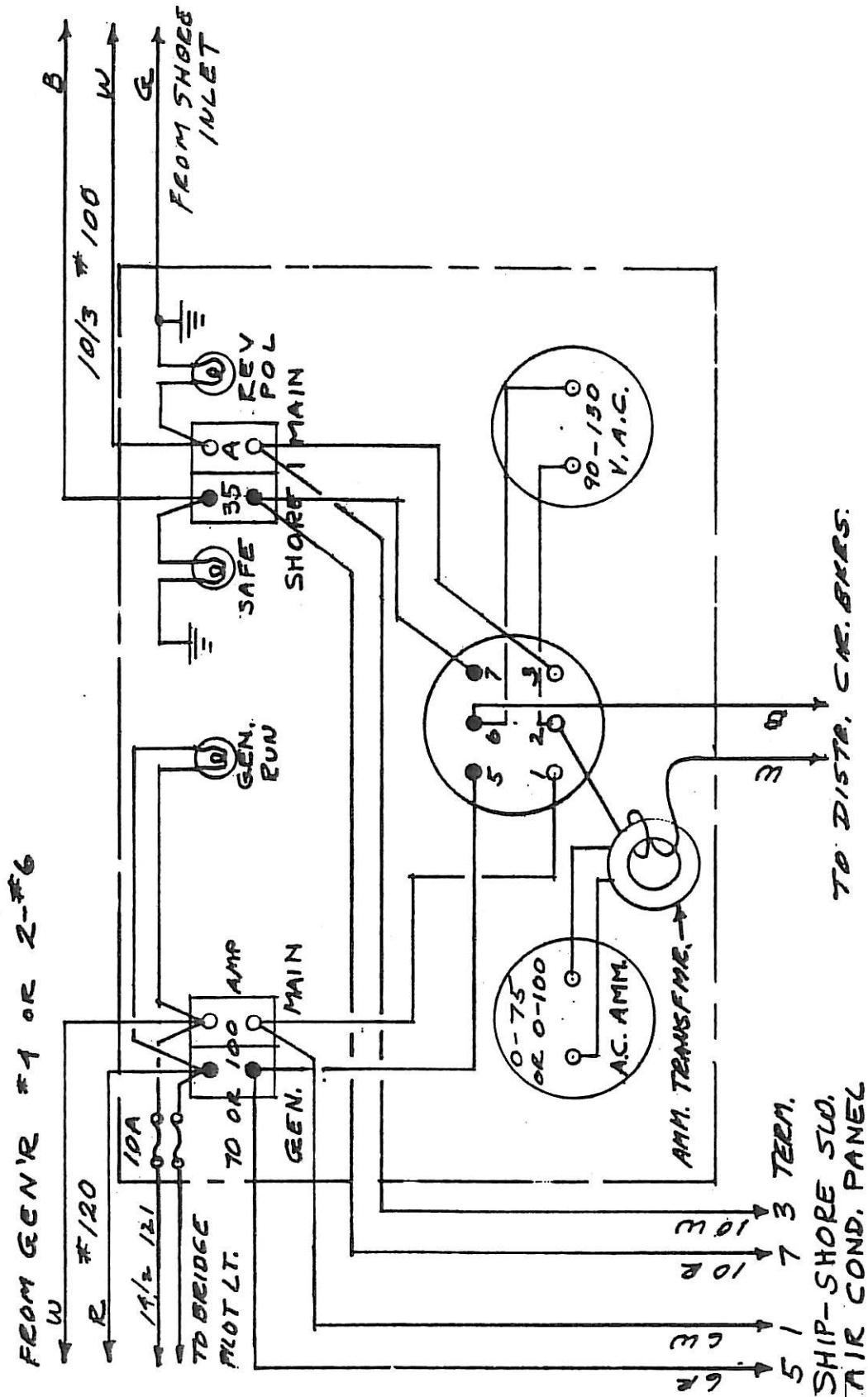


ADAPTER (PIGTAIL) - 1 FT - #14 - 15 AMP MAX. CAPY  
 2 POLE - 3 WIRE TO CONNECT 30AMP SHORE  
 CORD TO 15AMP SHORE OUTLET



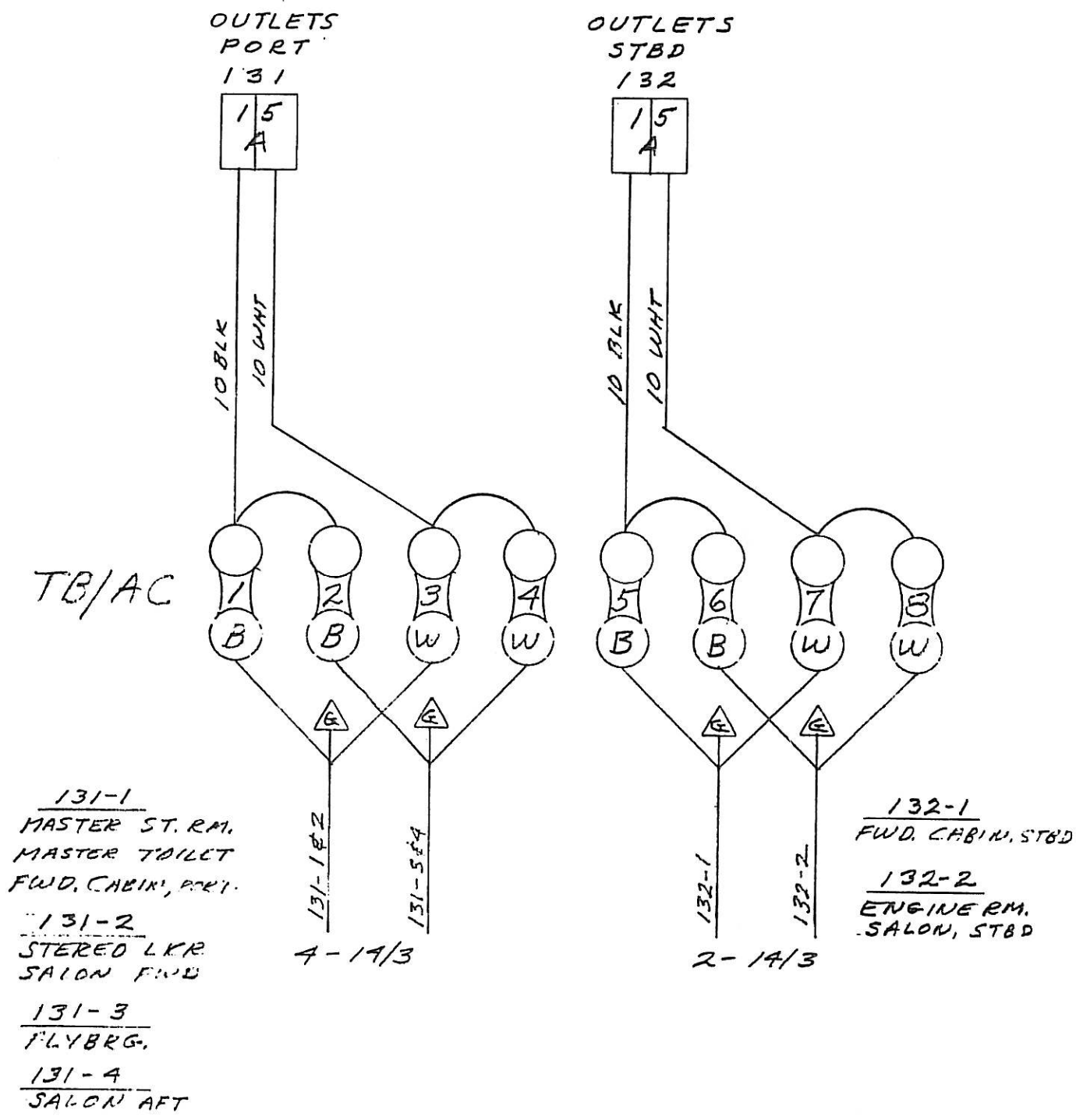
\* Optional Equipment

## 115 VAC DISTRIBUTION PANEL "FLOW" DIAGRAM

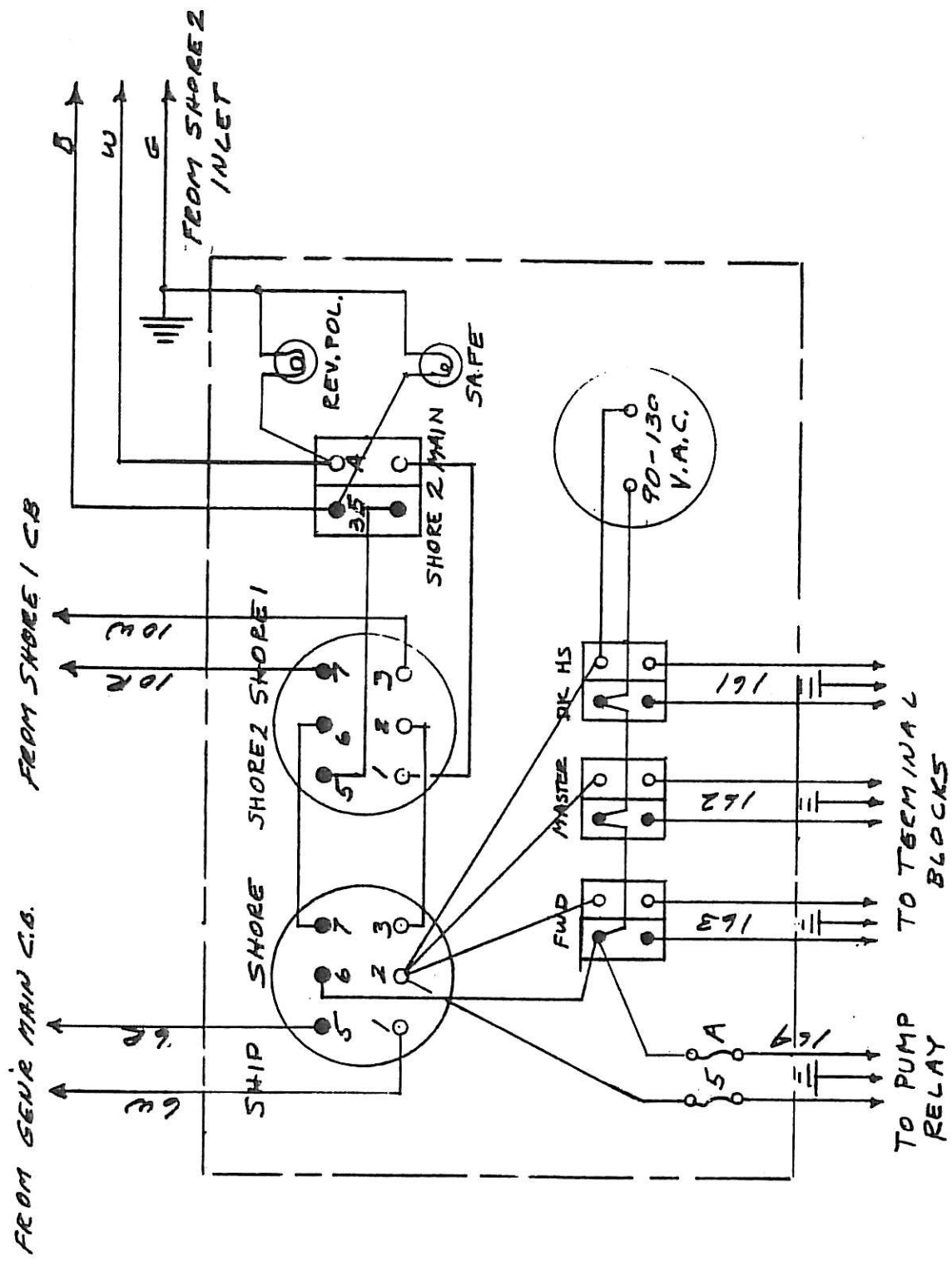


115 V.A.C. POWER PANEL  
WIRING DIAGRAM

115 V.A.C. POWER PANEL  
WIRING DIAGRAM  
(BACK VIEW)



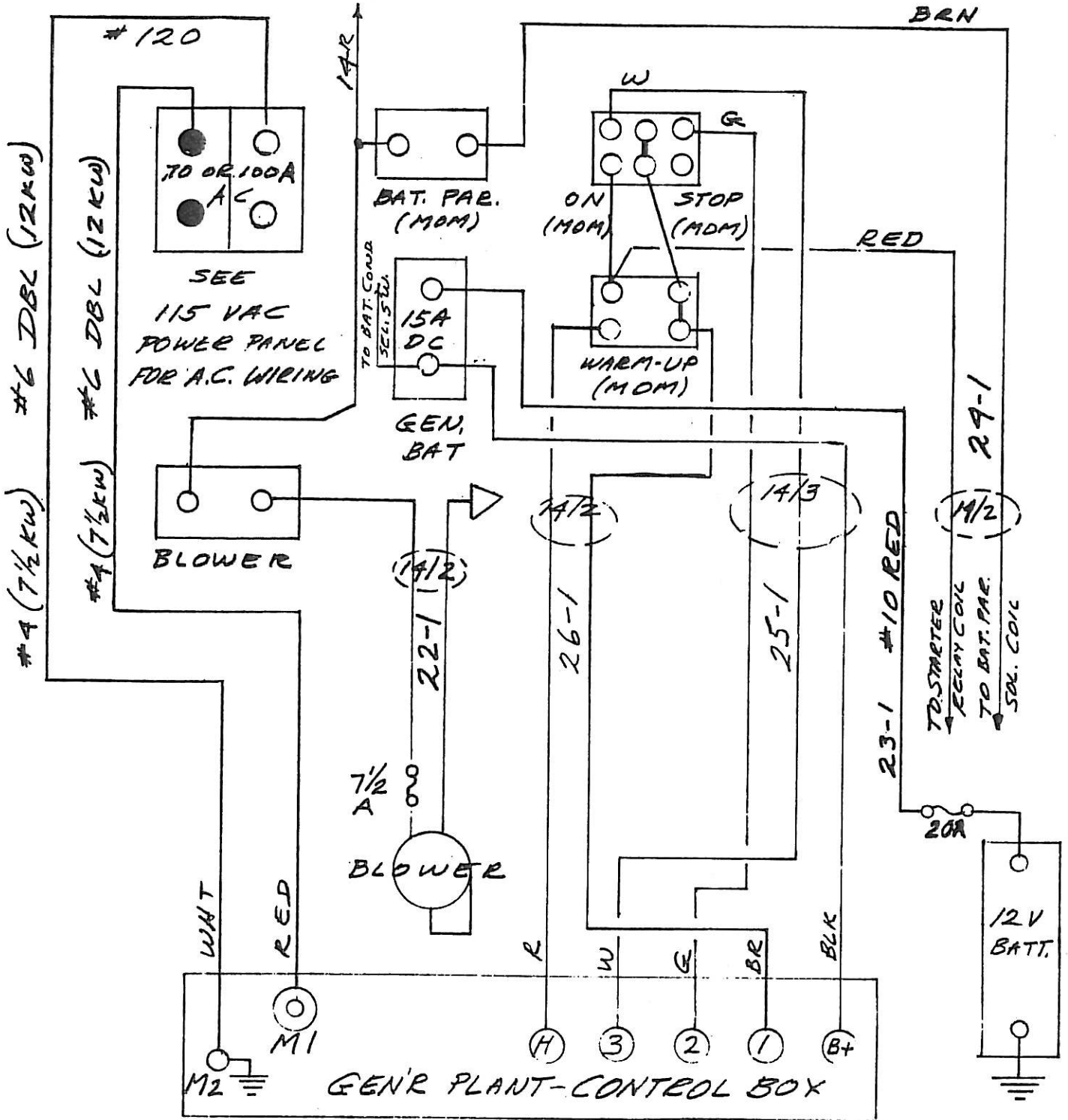
TERMINAL BLOCK - 115 VAC DISTR.  
TB/AC PORT & STBD OUTLETS



AIR CONDITIONING PANEL  
WIRING DIAGRAM  
BACK VIEW

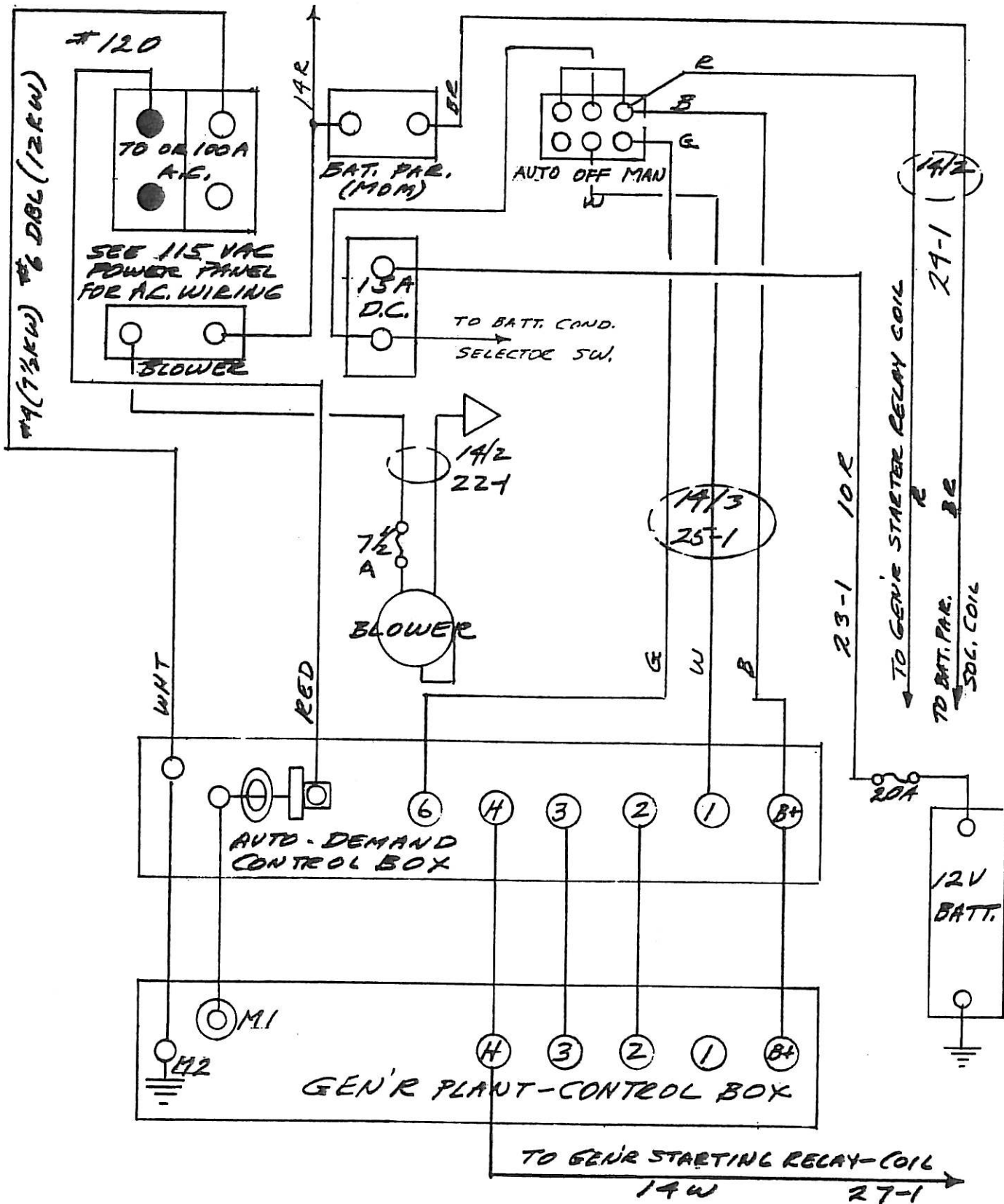
AIR CONDITIONING PANEL  
WIRING DIAGRAM

FROM PORT MAIN  
BREAKER - #7-15A FUSE

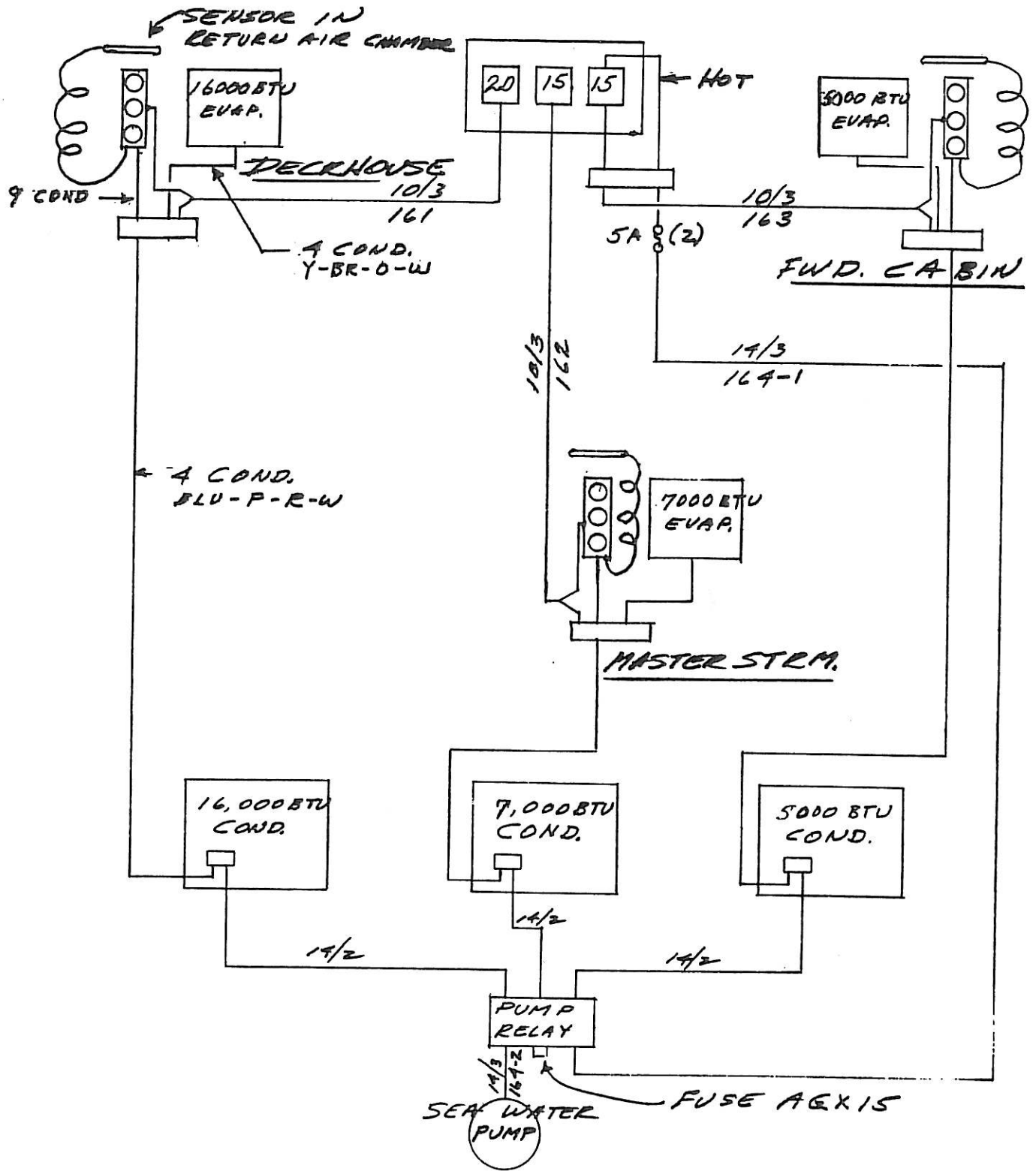


# GENERATOR CONTROLS ONAN DIESEL-MANUAL (STD)

FROM PORT MAIN  
BREAKER #7-15A FUSE



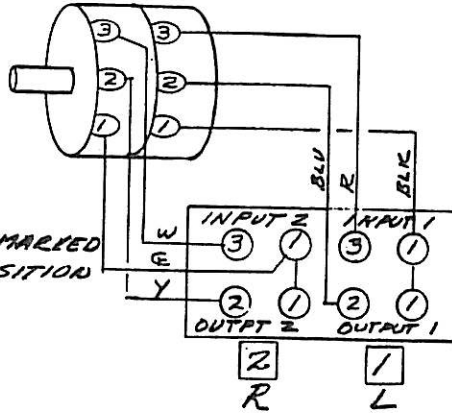
GENERATOR CONTROLS - OPTIONAL  
AUTOMATIC DEMAND - ONAN DIESEL



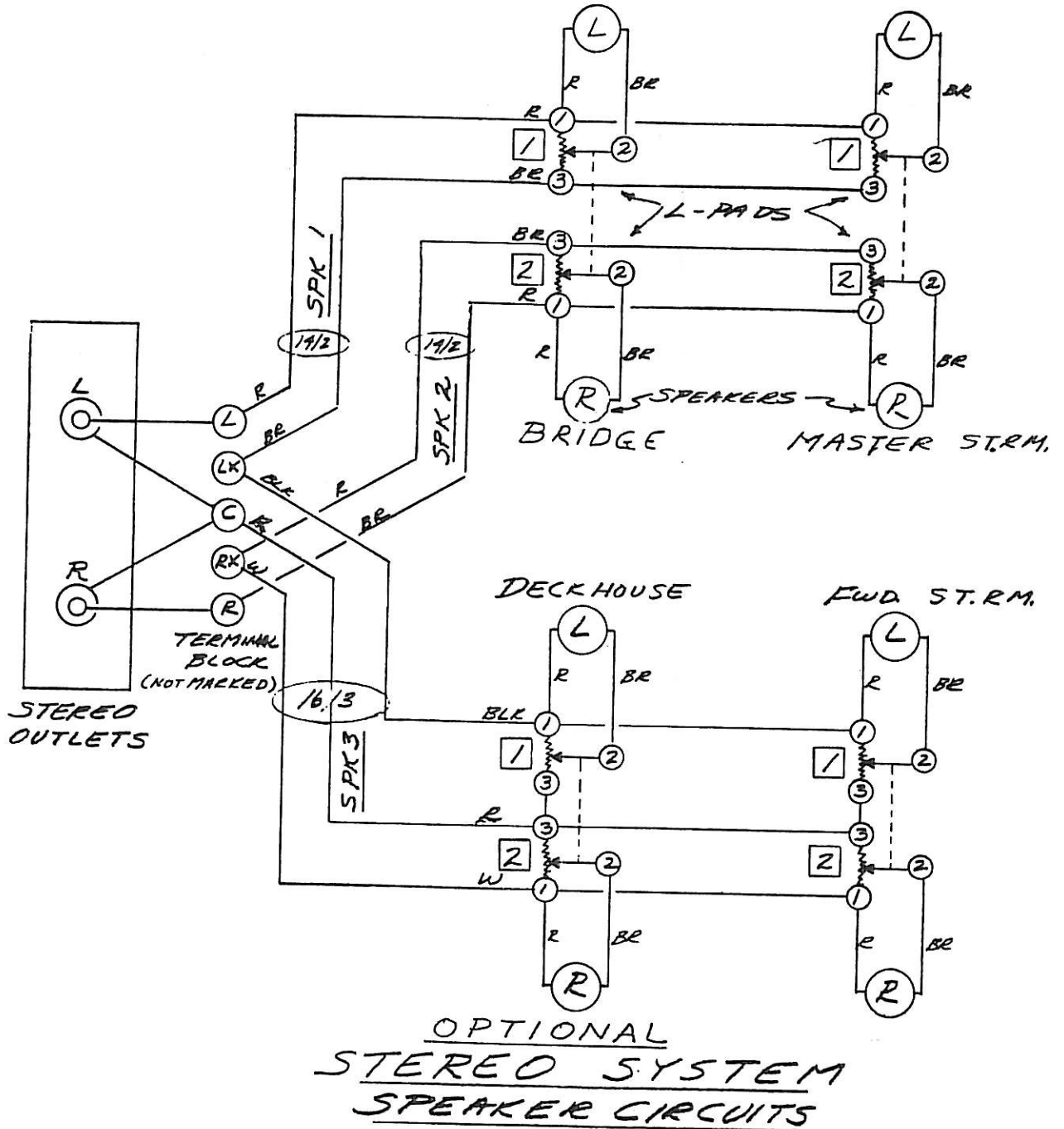
AIR CONDITIONER SYSTEM  
ELECTRICAL DISTRIBUTION-BLOCK DIAGRAM



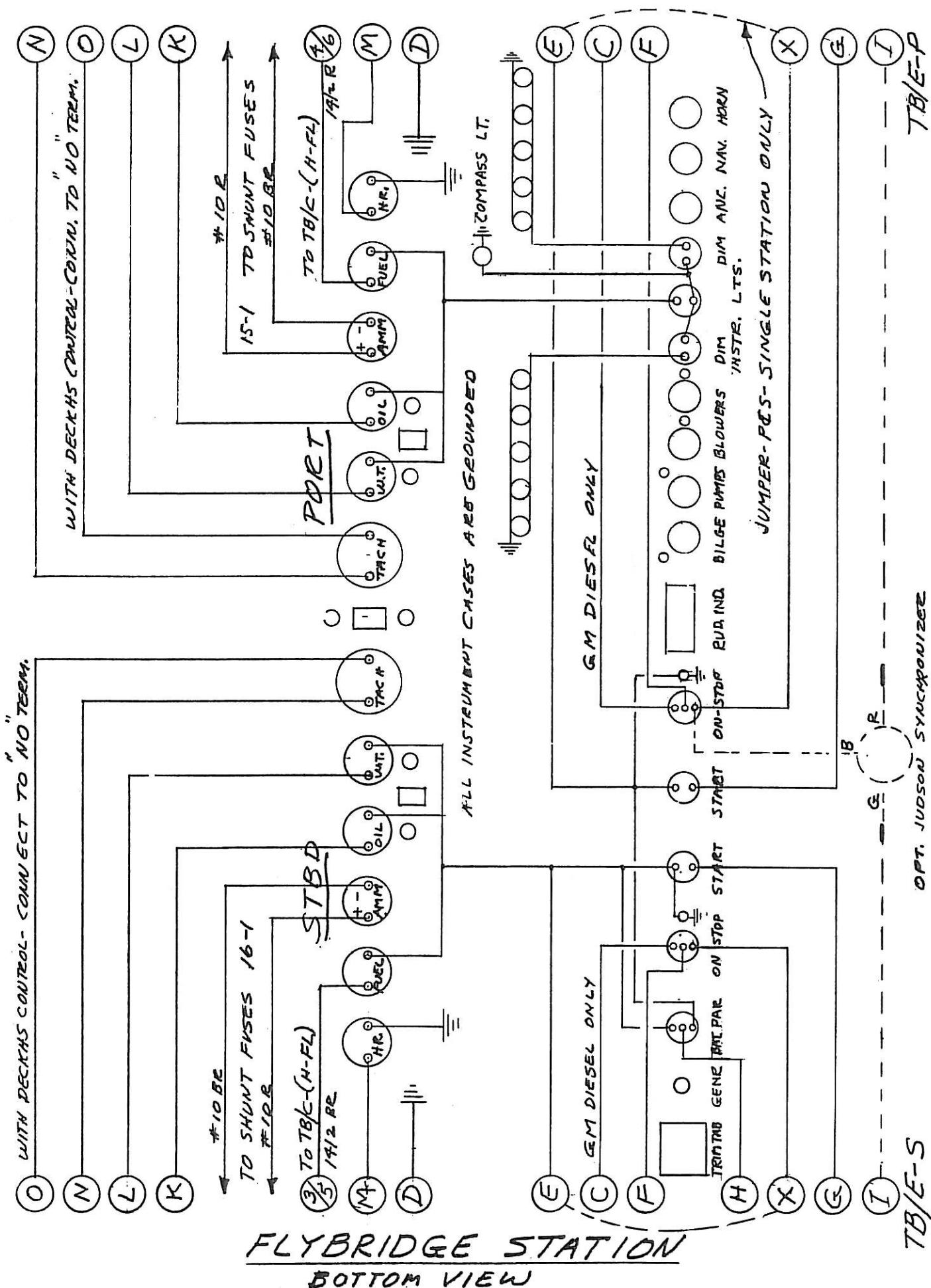
STEREO L-PAD  
(RADIO SHACK 40-979)



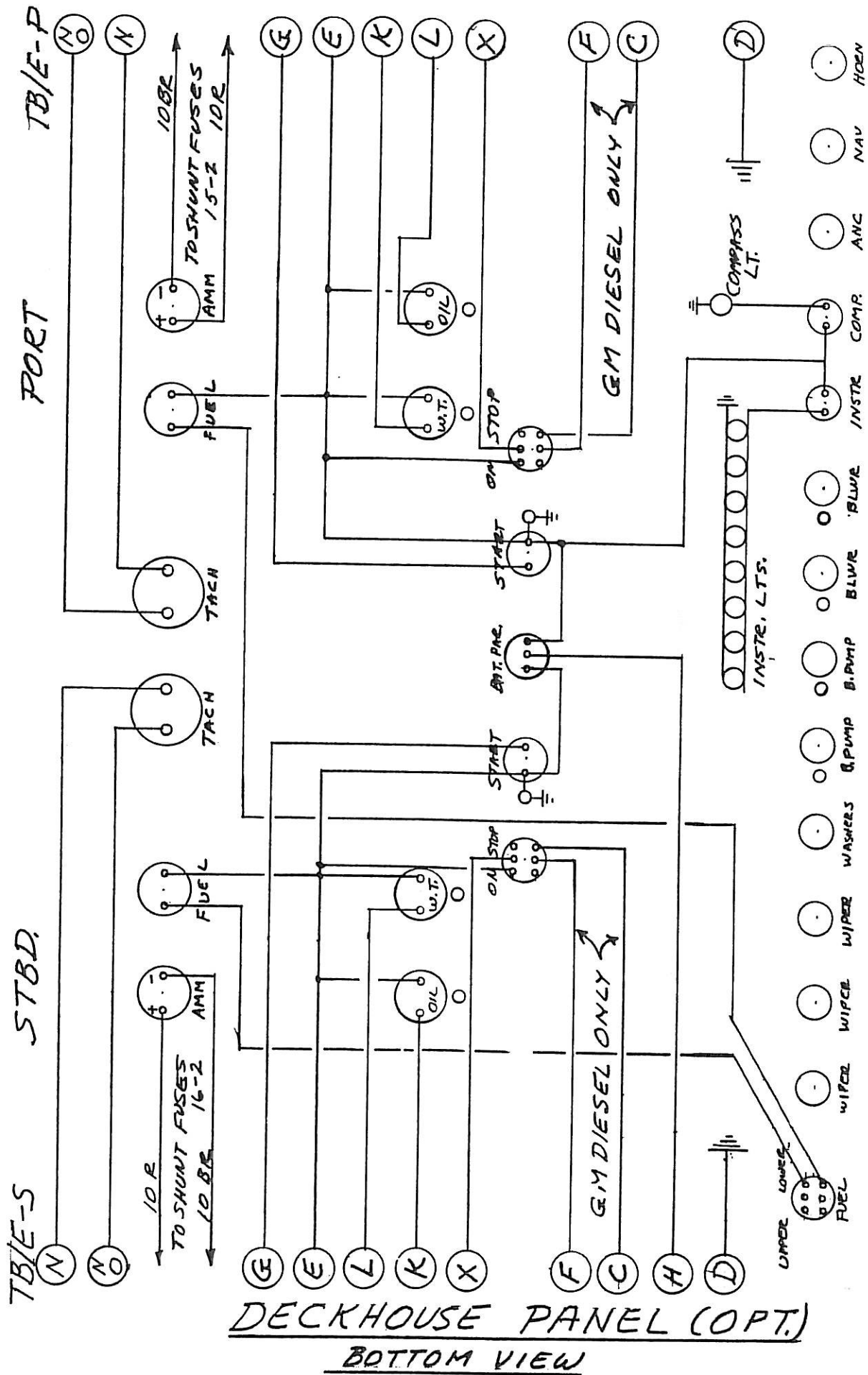
TERMINALS NOT MARKED  
IDENTIFY BY POSITION



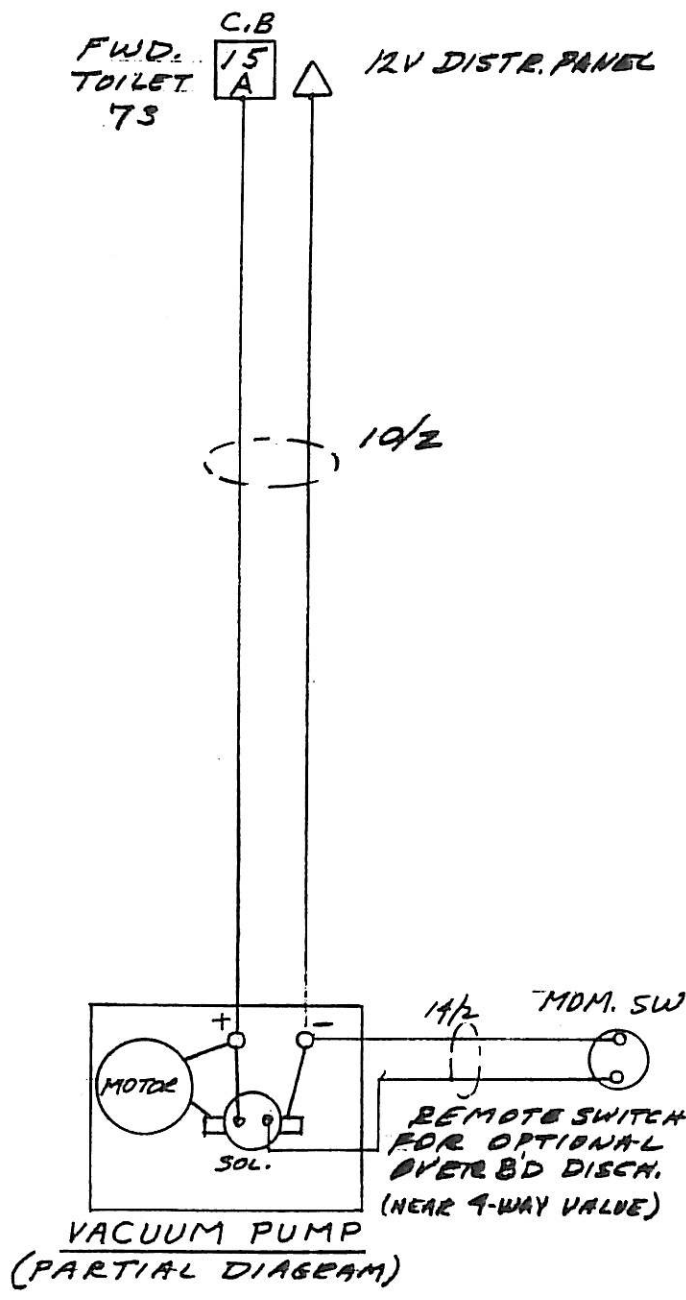
OPTIONAL  
STEREO SYSTEM  
SPEAKER CIRCUITS



**FLYBRIDGE STATION**  
**BOTTOM VIEW**

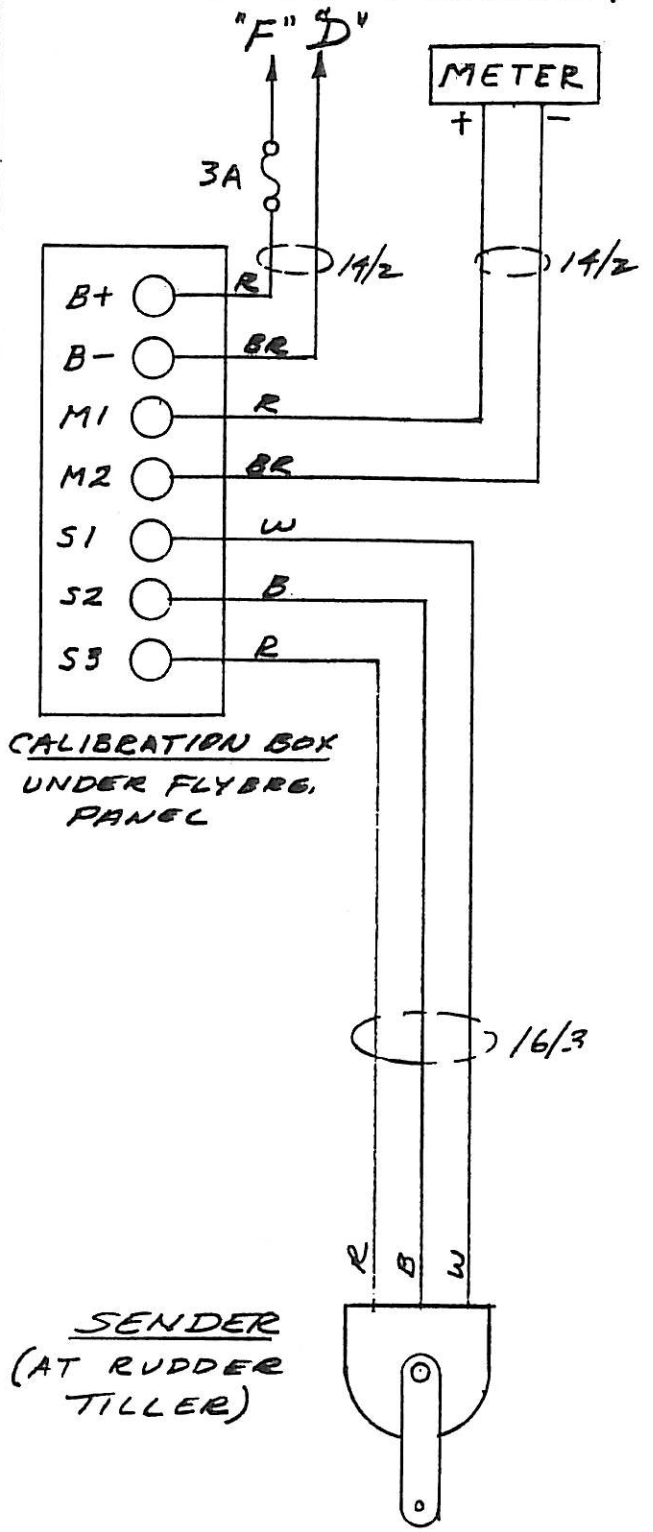


DECKHOUSE PANEL (OPT.)  
 BOTTOM VIEW



VACU-FLUSH TOILET SYSTEM  
OPTIONAL

FLYBRIDGE STATION  
PORT ENGINE CIRCUIT



RUDDER INDICATOR  
CIRCUIT

WIPERS  
 52  
 TB/C-W  
 (OPT)

STBD. ENGINE  
 ABCDEFGHIJKL MN. BOX  
 TB/E-S

STBD FWD AFT  
 BLW, BILGE BILGE  
 44 34 31  
 TB/C-(BL-BP)

PORT ENGINE  
 ABCDEFGHIJKL MN. BOX  
 TB/E-P

DOCKG LTS  
 EDW STEER  
 82 82  
 TB/C-DL  
 (OPT)  
 SPLENDIDS

GROUND BUS  
 0 0  
 ALARM NAV.  
 32 57  
 TB/C-(AL-NAV)

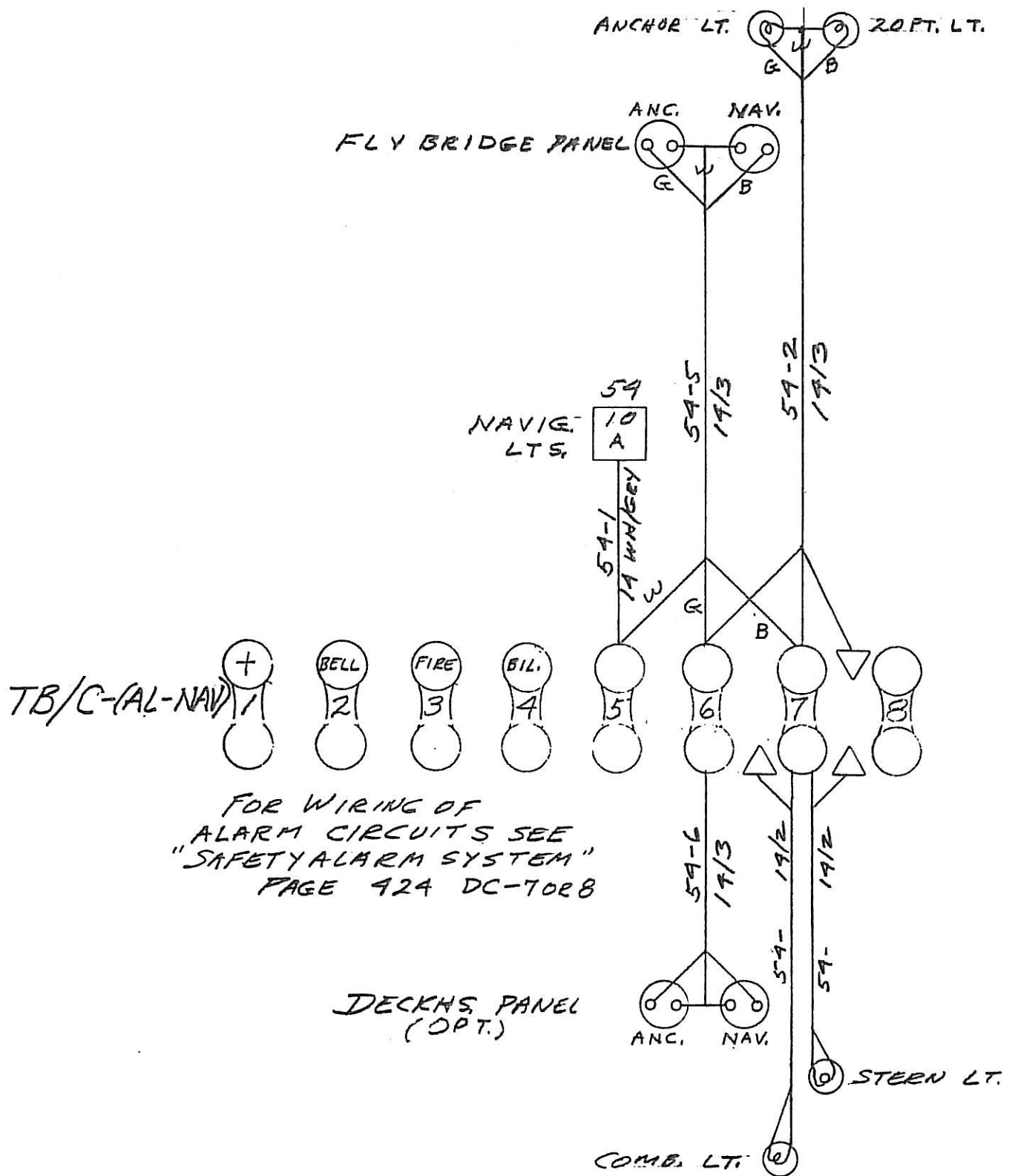
FUSE AND  
 SHUNT  
 BOX

FUEL  
 HORN GA.  
 51 FL  
 TB/C-(H-FL)

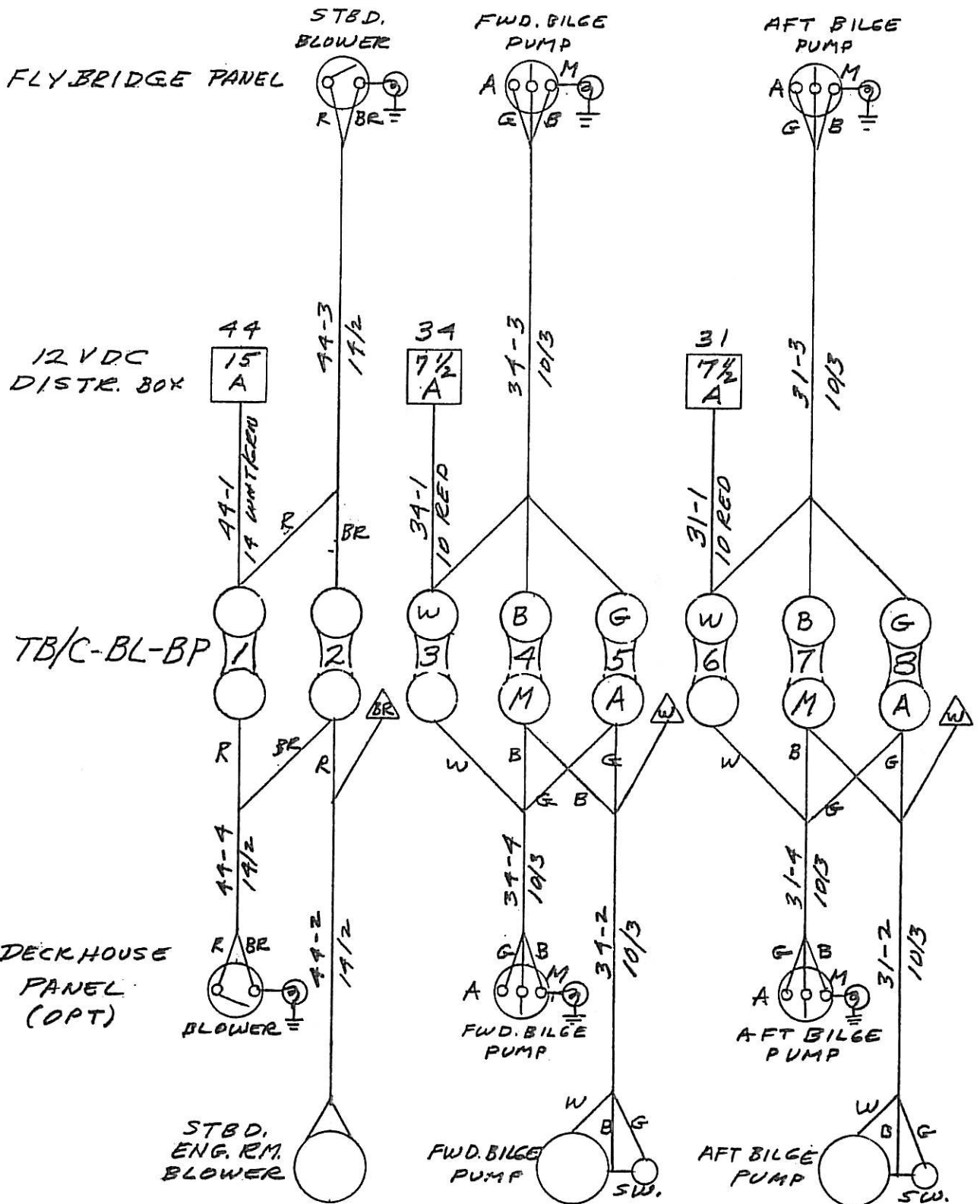
GROUND BUS  
 0 0

PORT TRIM  
 BLW. TRGS  
 43 53  
 TB/C-(BL-TT)

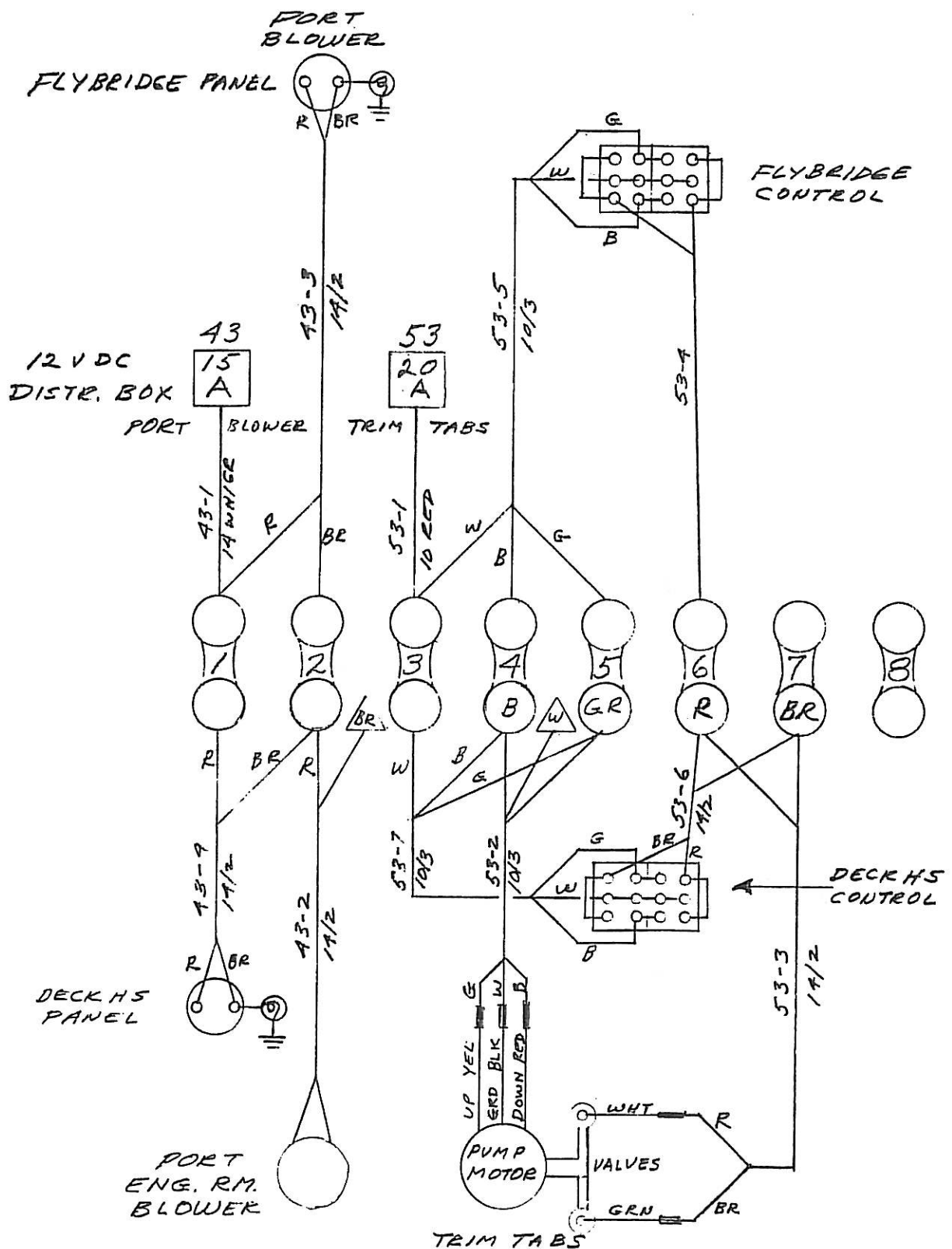
TERMINAL BLOCK ARRANGEMENT  
AFT ENGINE ROOM BULKHEAD



TERMINAL BLOCK TB/C-(AL-NAV)  
ALARM & NAVIGATION LIGHTS

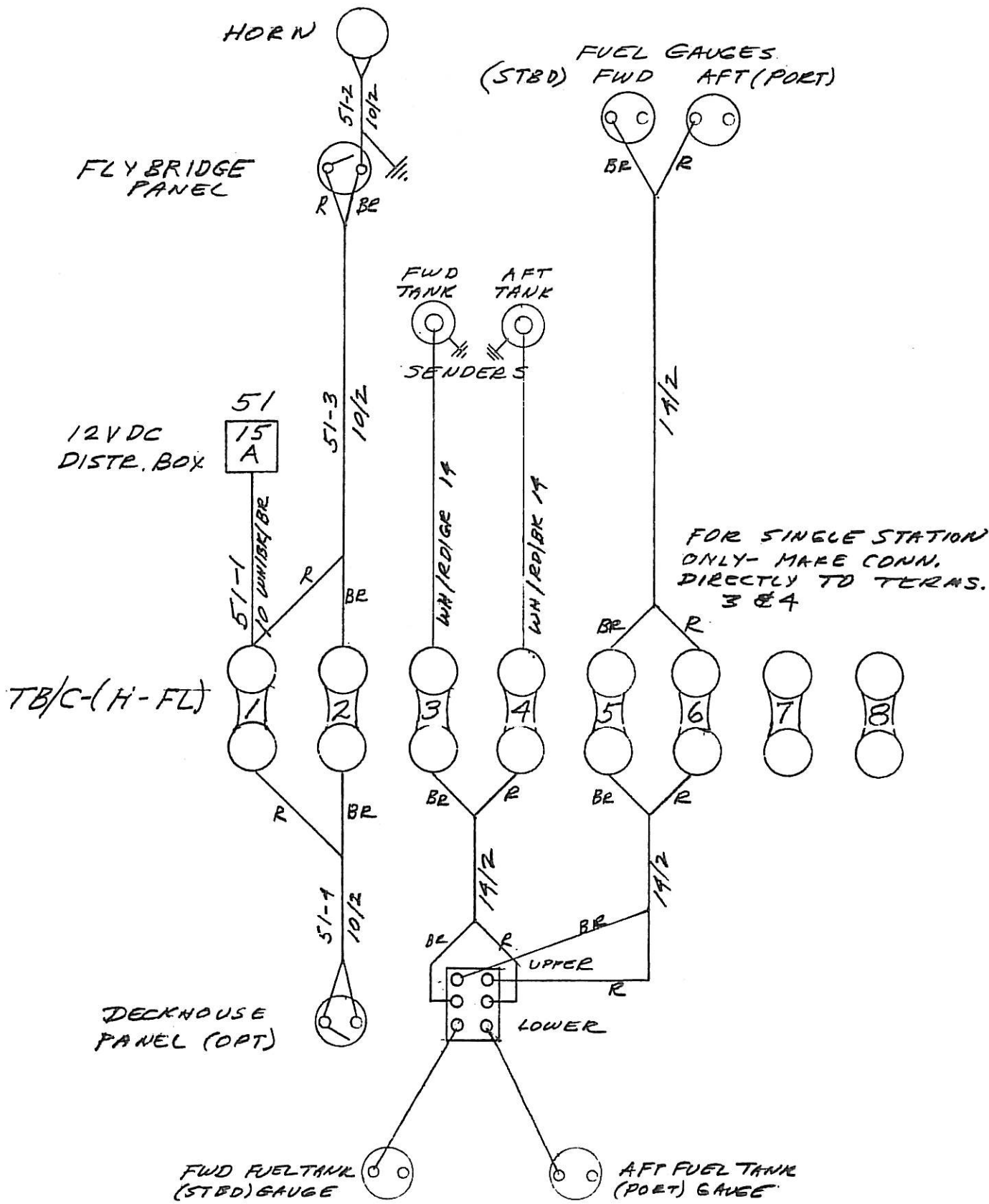


TERMINAL BLOCK-TB/C-BL-BP  
BLOWER & BILGE PUMPS



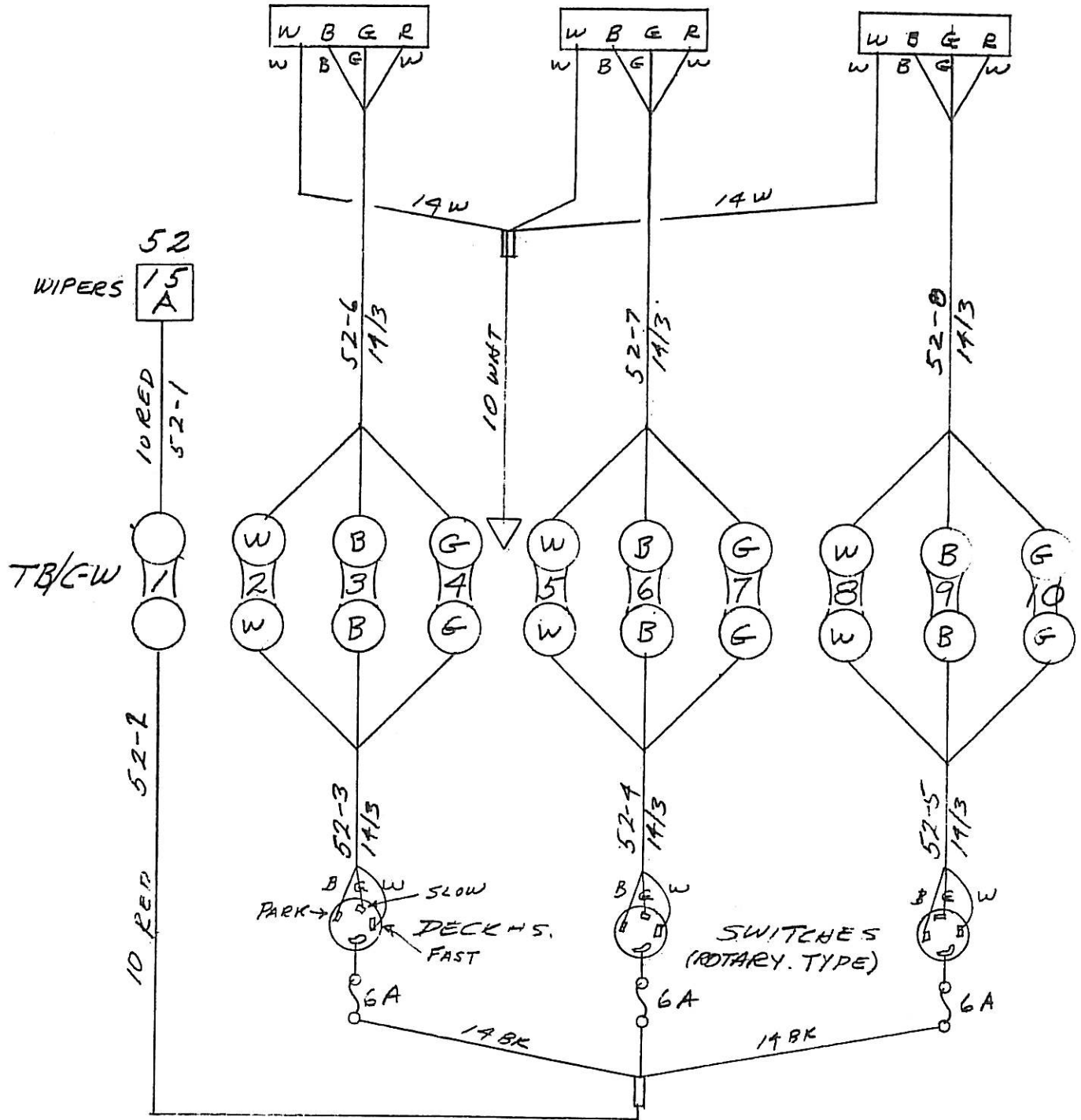
TERMINAL BLOCK - TB/C (BL-TT)  
PORT BLOWER & TRIM TABS





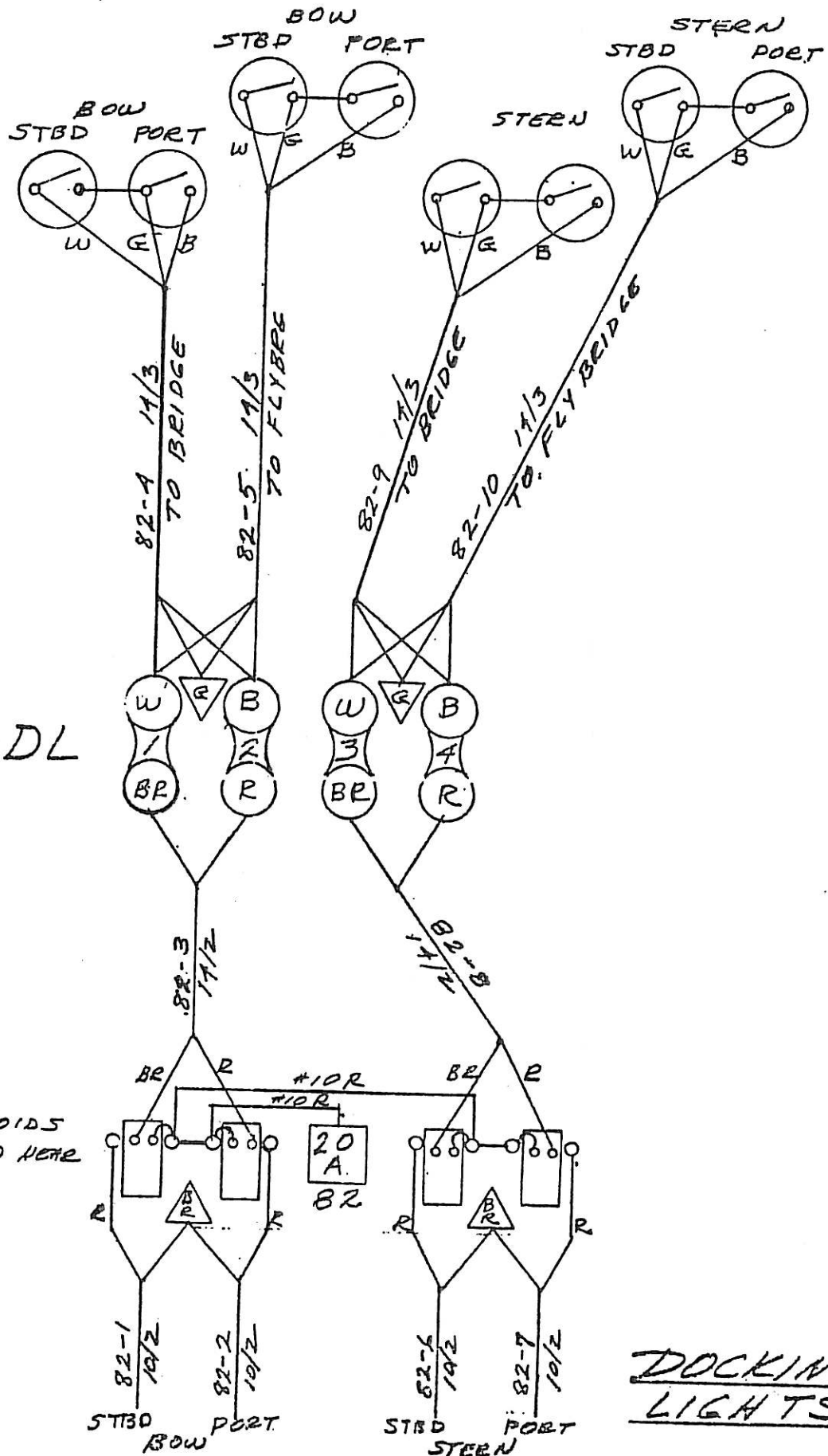
TERMINAL BLOCK - TB/C (H-FL)  
HORN & FUEL GAUGES

# WIPER MOTORS



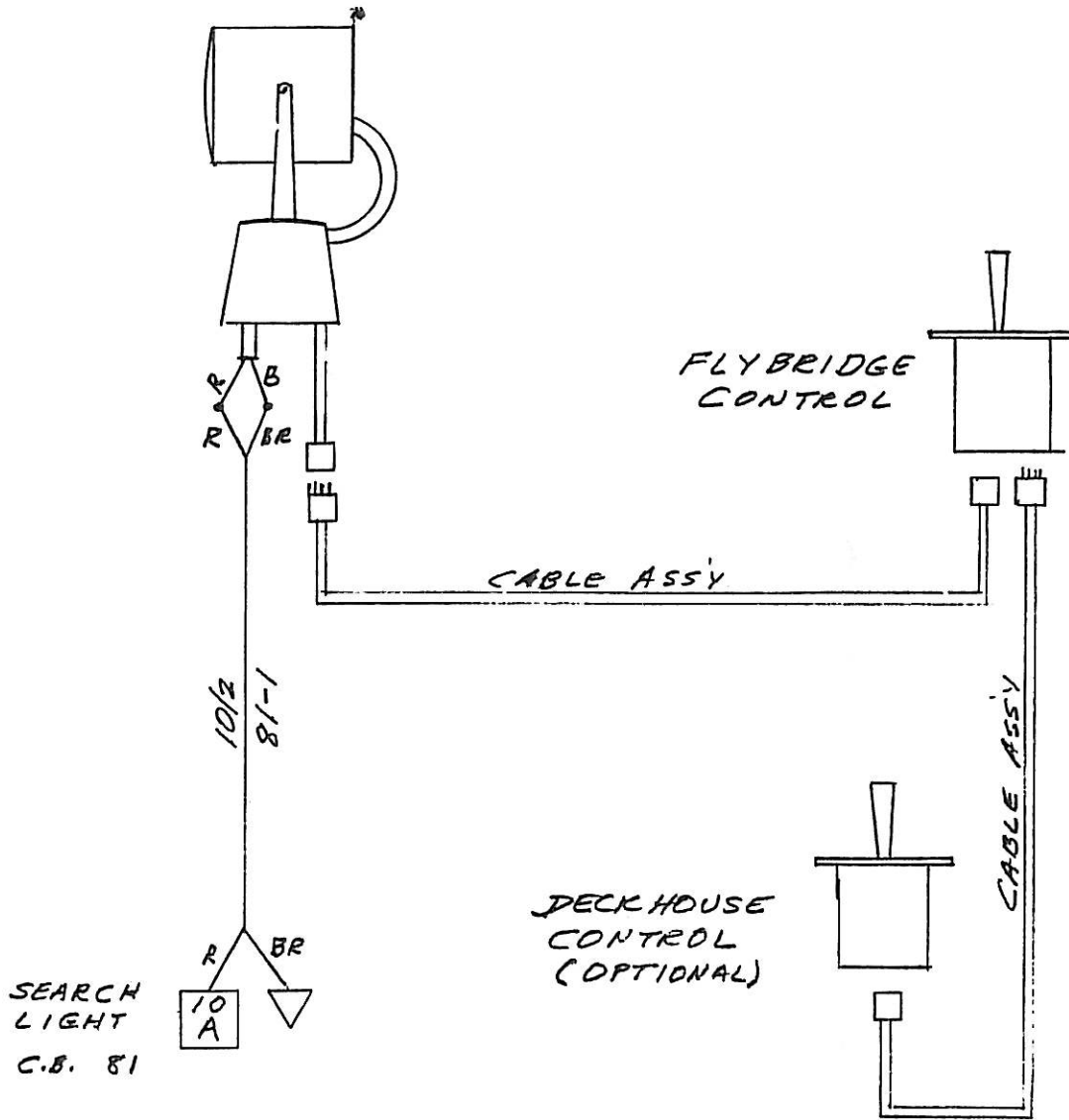
TERMINAL BLOCK TB/C-W (OPT.)  
WINDSHIELD WIPERS

TB/C-DL



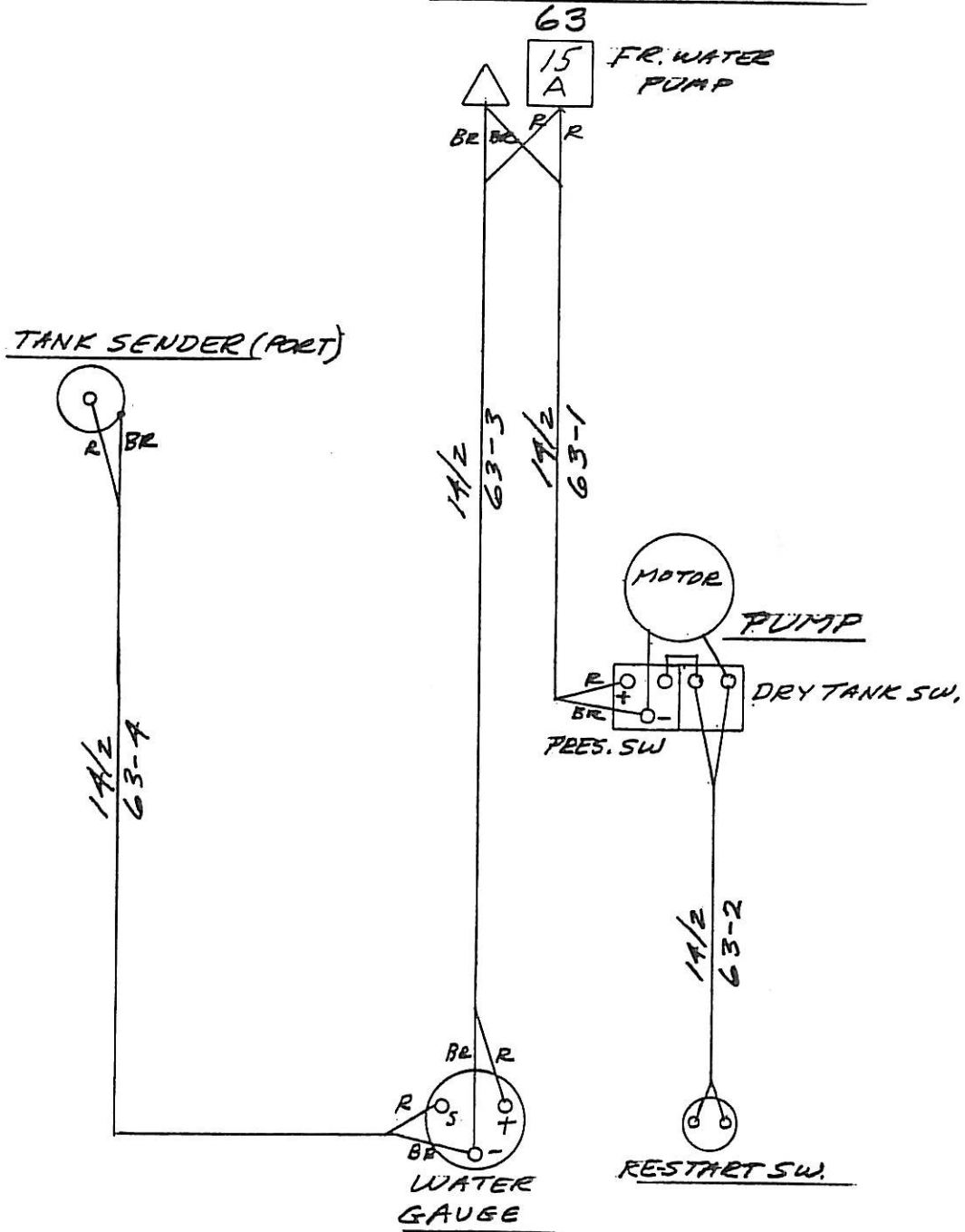
DOCKING LIGHTS

TERMINAL BLOCK/CONSOLE TB/C-DL

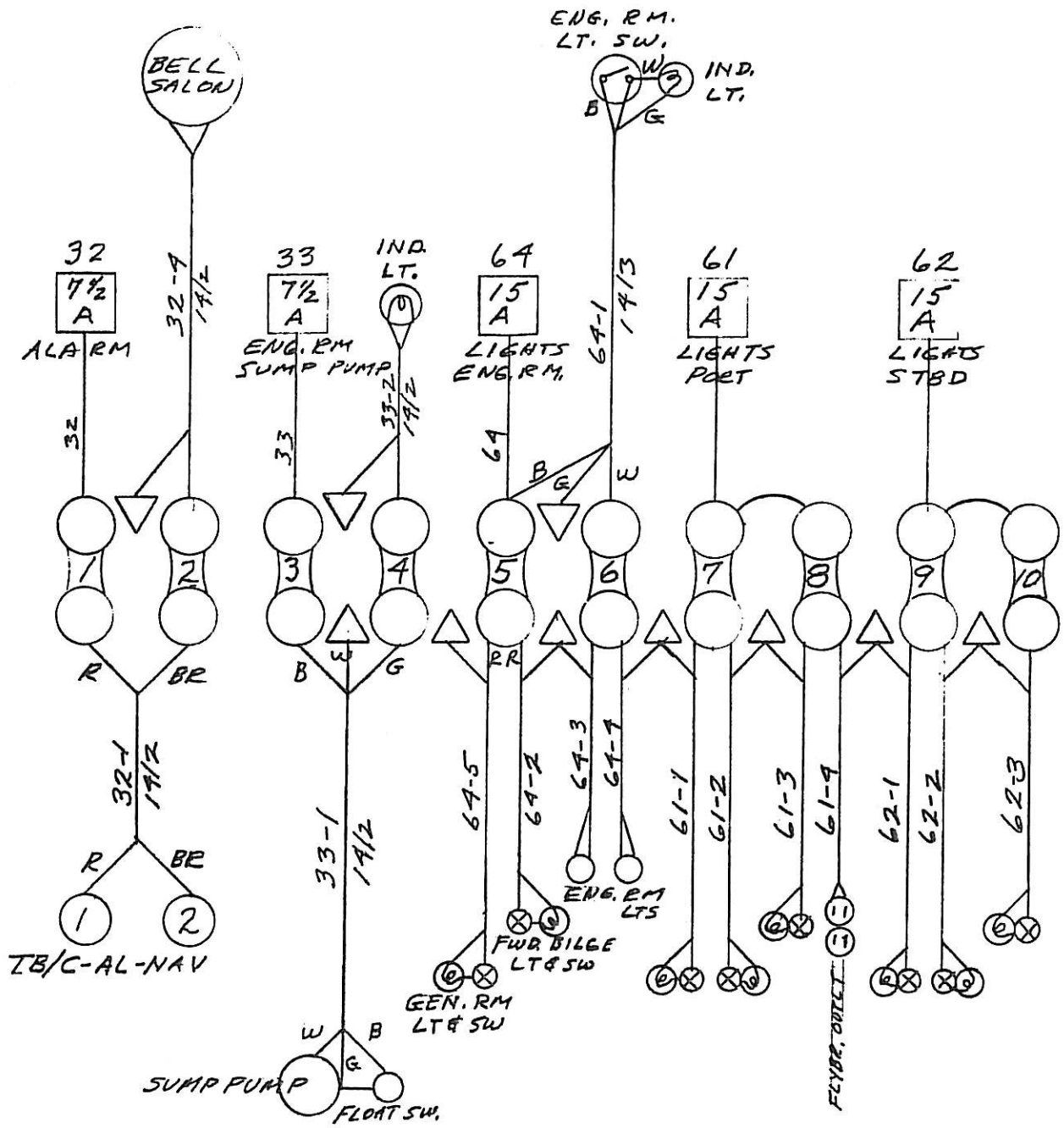


SEARCH LIGHT  
OPTIONAL

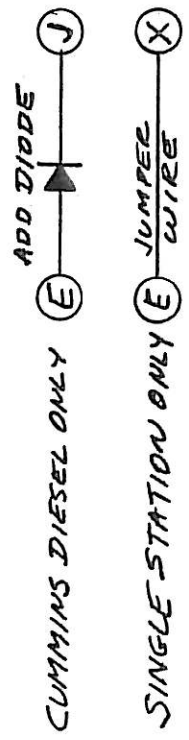
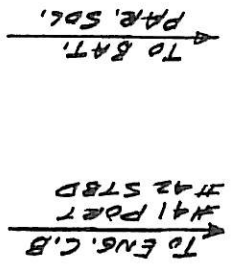
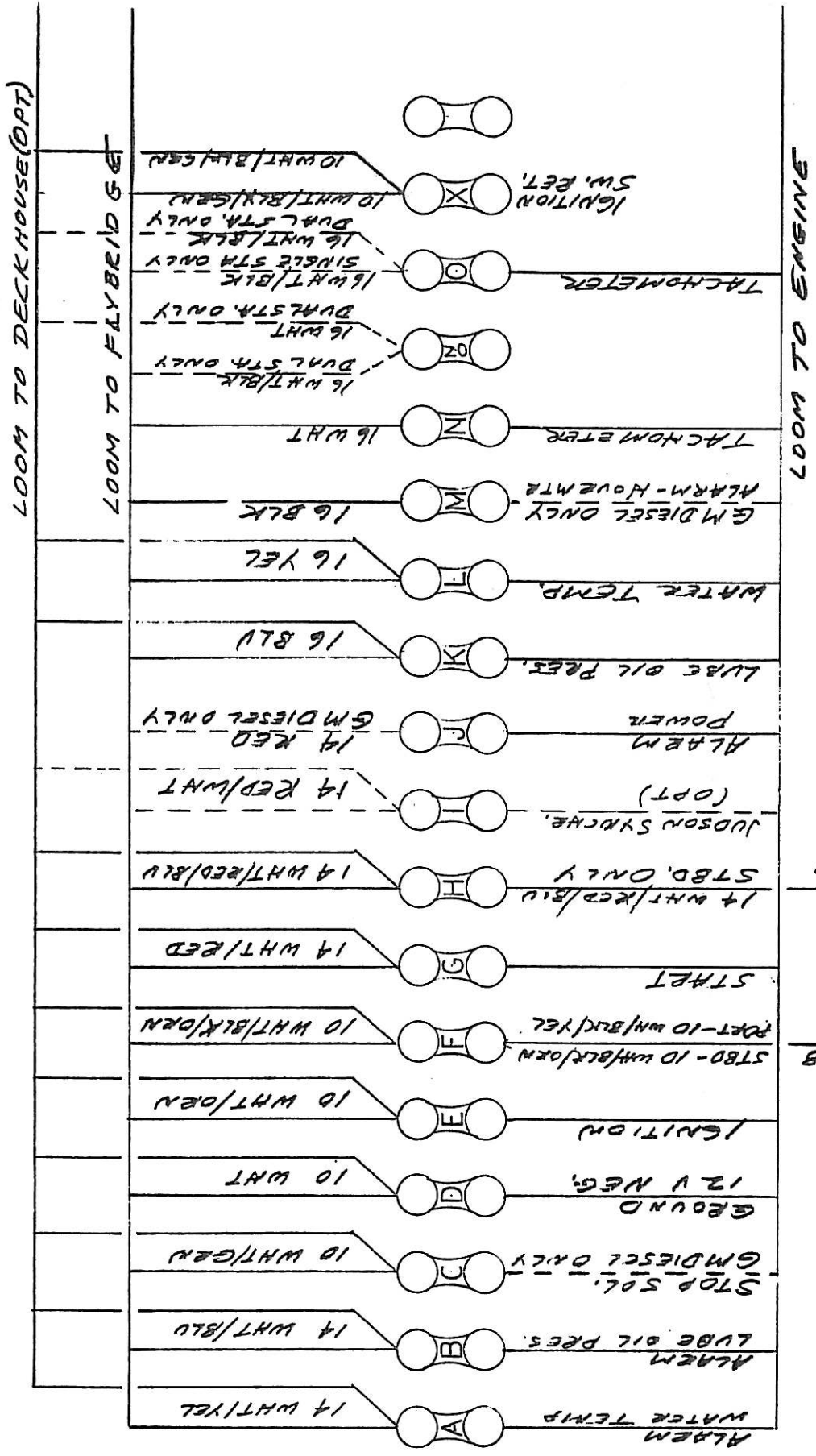
12VDC DISTE. PANEL



FRESH WATER SYSTEM

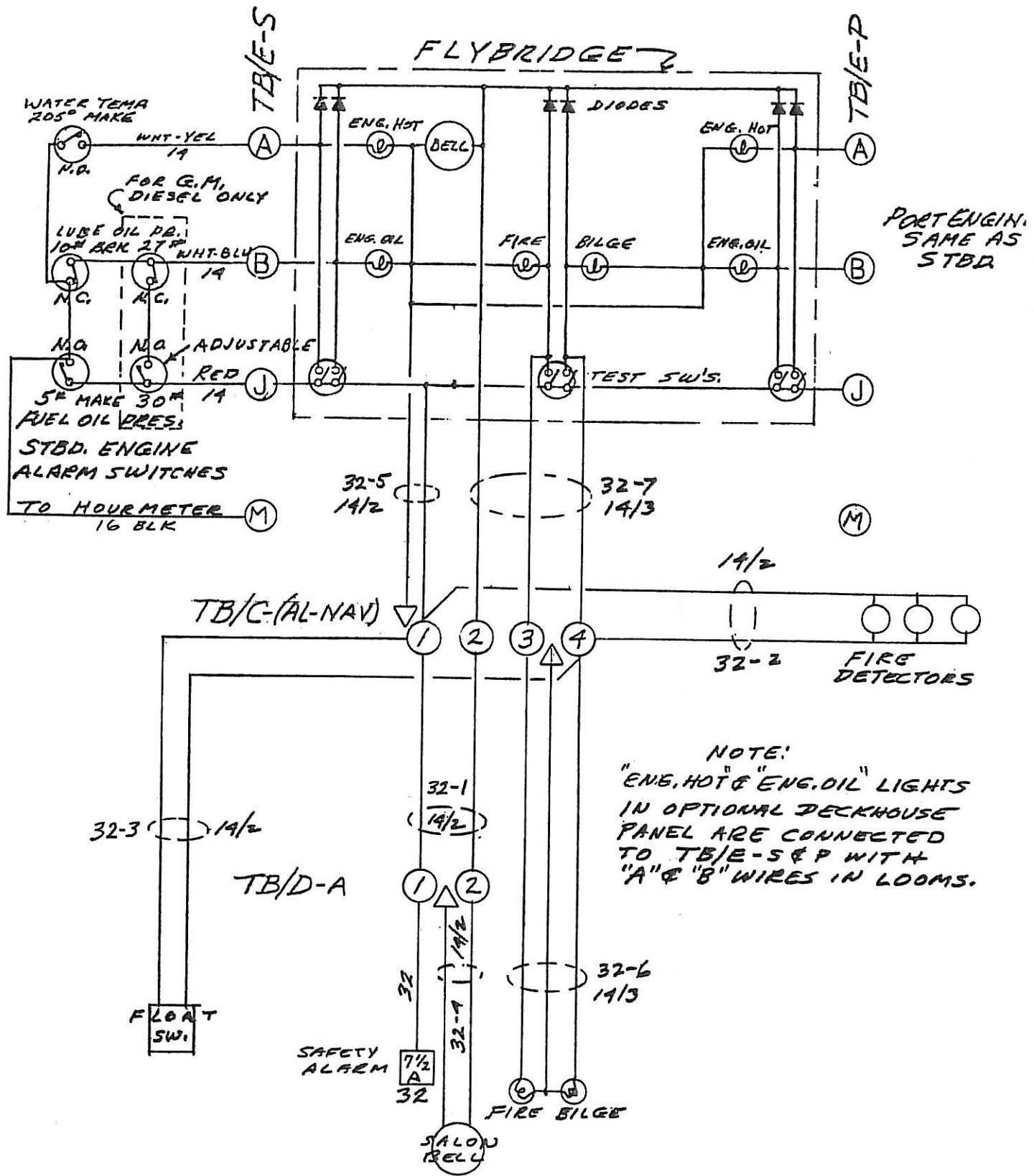


TERMINAL BLOCK/DISTRIBUTION  
 TB/D-A ALARM, ENG. RM. SUMP, LIGHTING



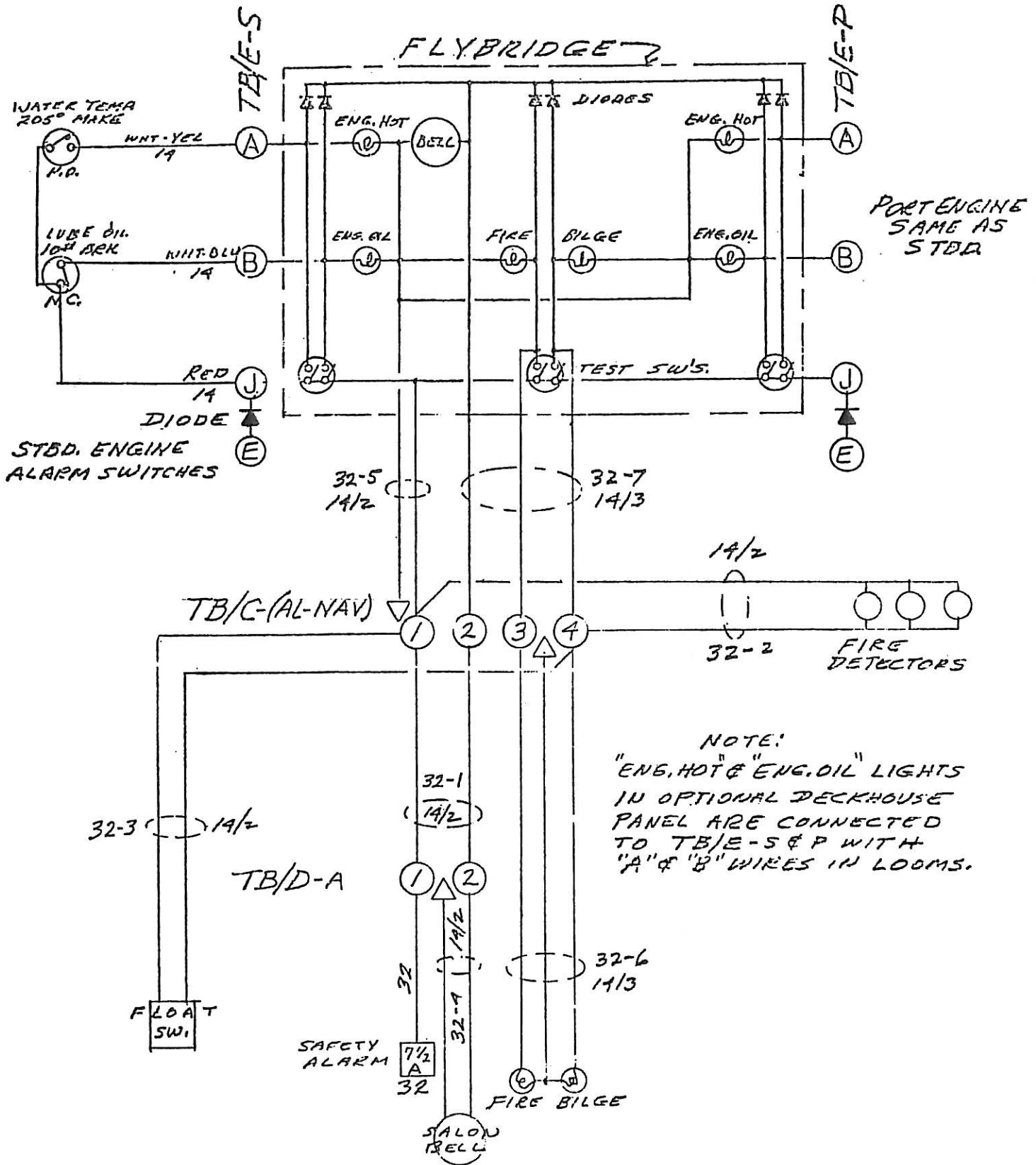
### ENGINE TERMINAL BLOCKS

TB/E-P & S PORT & STBD.



SAFETY ALARM SYSTEM  
G.M. DIESELS ONLY

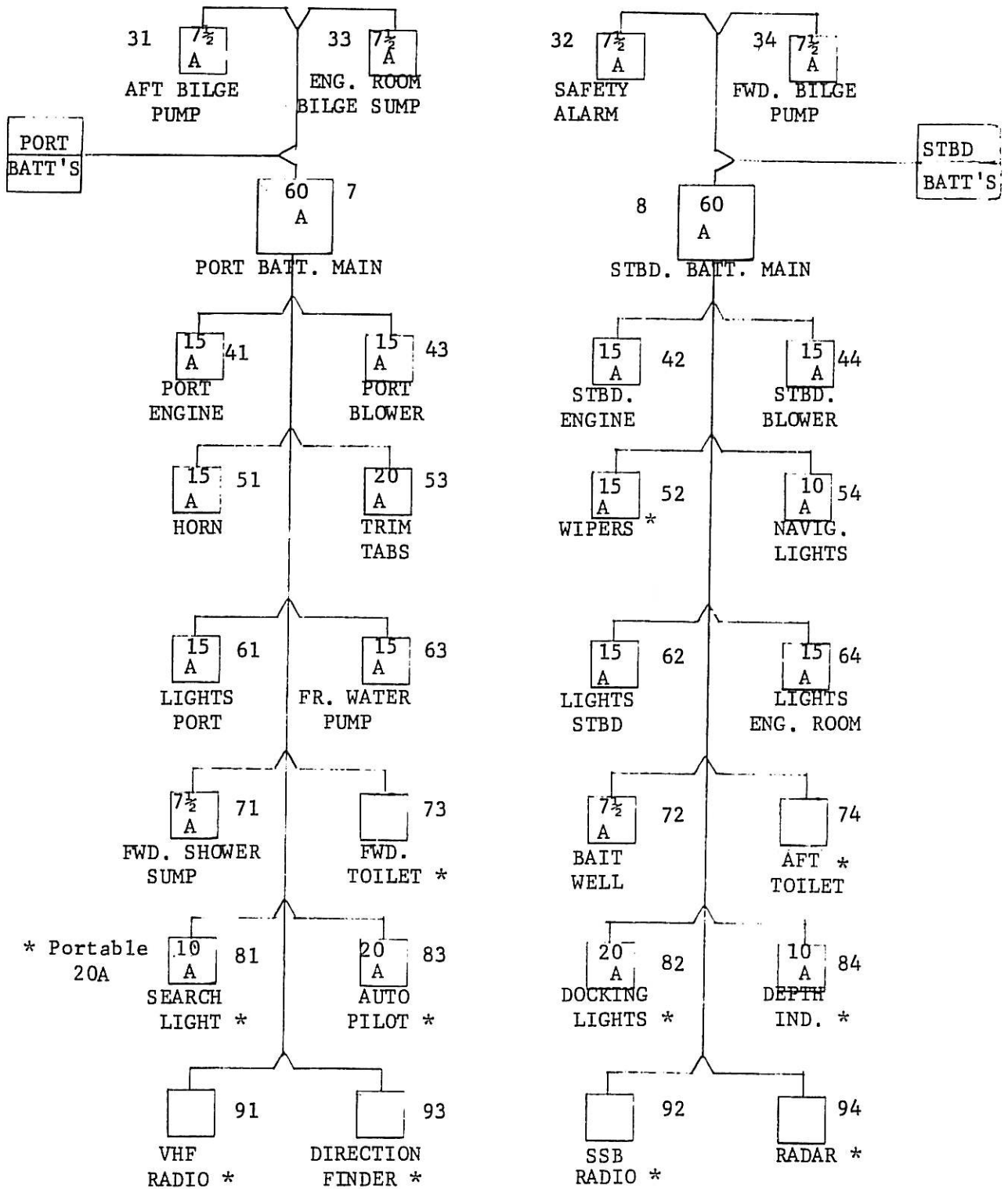




**SAFETY ALARM SYSTEM**  
**CUMMINS DIESEL ONLY**

BASIC WIRING DIAGRAM  
BATTERY - STARTING - CHARGING

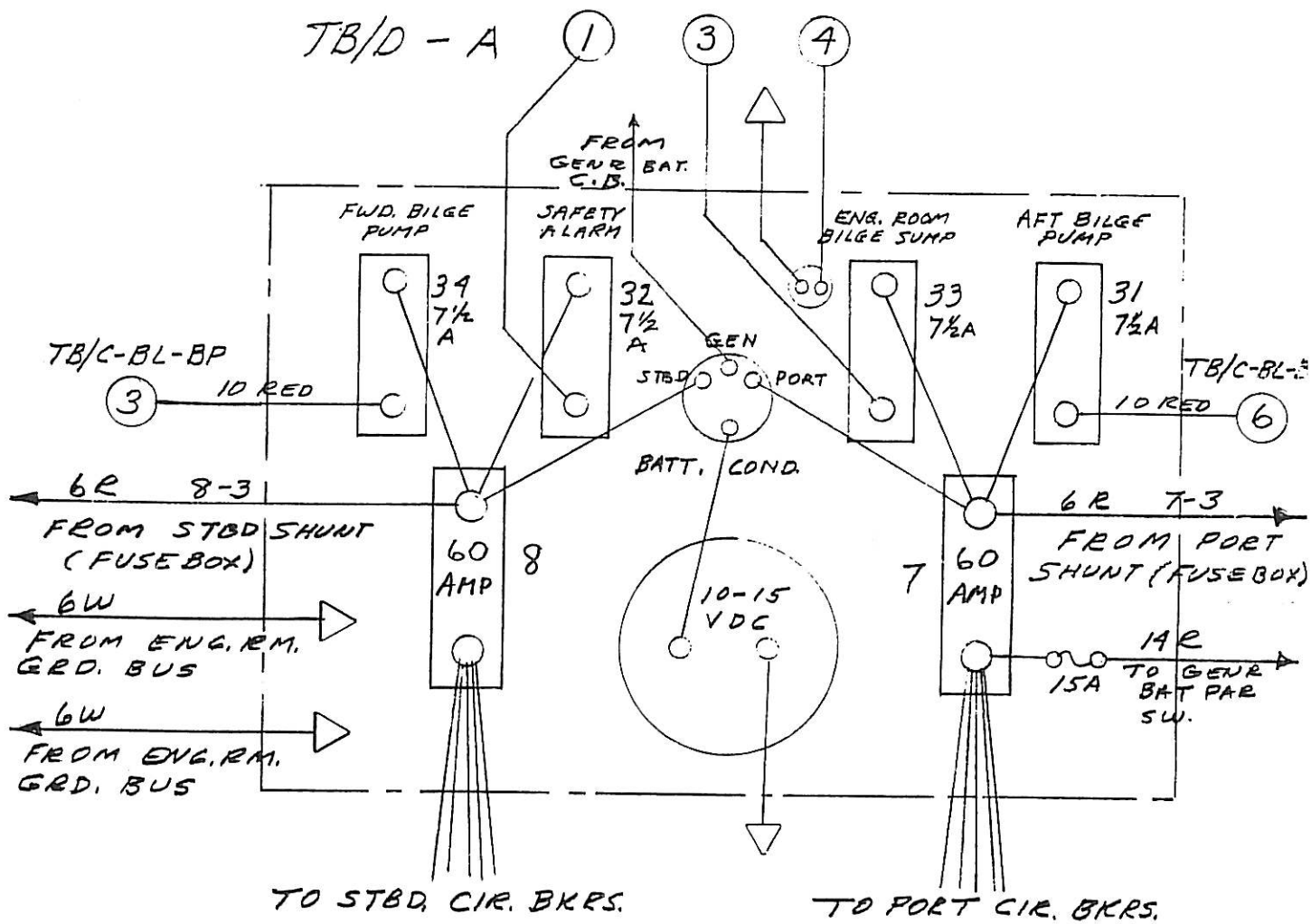
See Plan D 4692



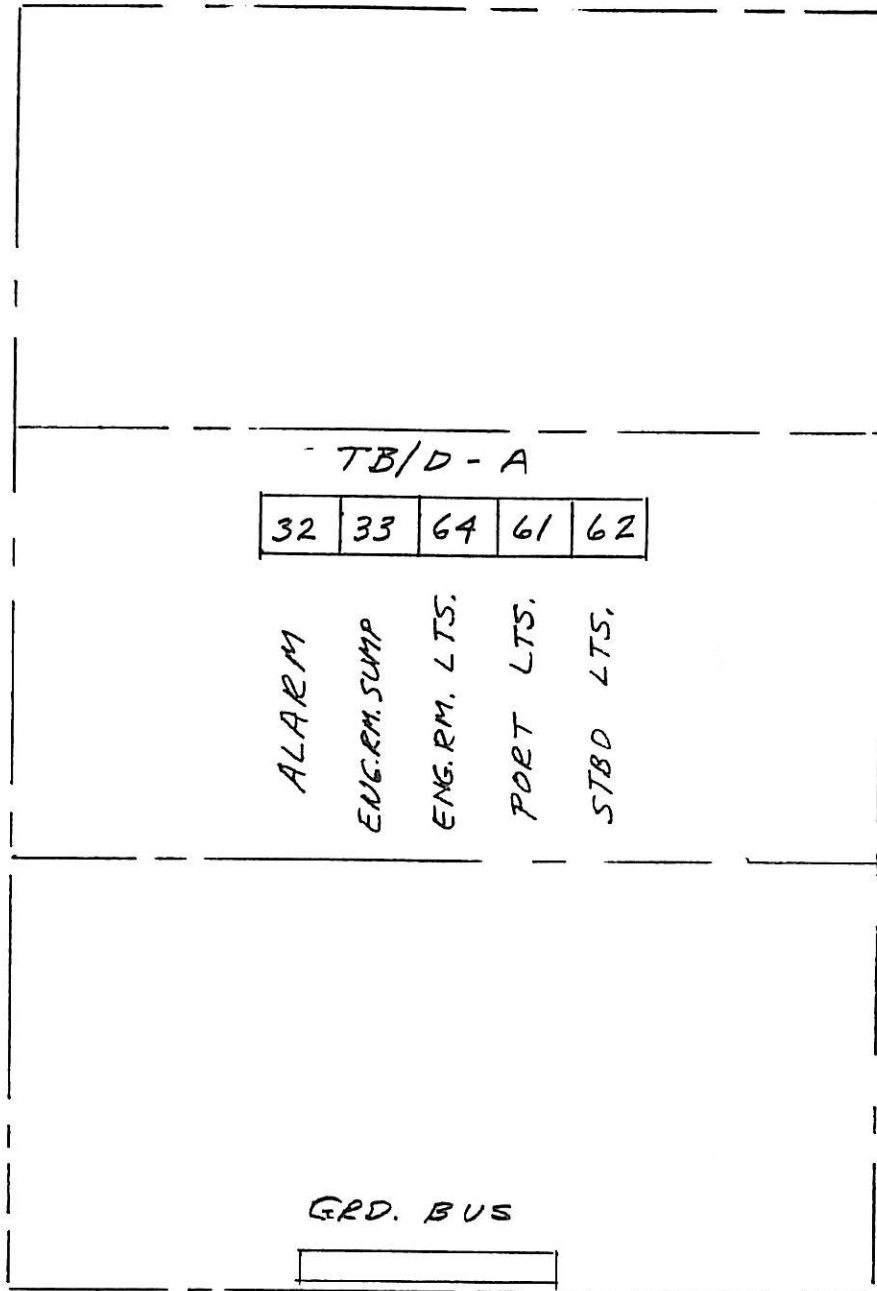
\* - OPTIONAL EQUIPMENT  
 Deck Wash (opt) 7½ A location opt.

Toilet Systems  
 Monomatic (std) no cir. bkr.  
 Vacu Flush (opt) 1- 15A #73  
 Groco (opt) 2- 20A #73 & 74  
 Raritan " 2-40A #73 & 74

12 VDC DISTRIBUTION PANEL  
 FLOW DIAGRAM



12 V.D.C. POWER PANEL  
 WIRING DIAGRAM  
 (BACK VIEW)



TERMINAL BLOCK ARRANGEMENT  
WITHIN 12VDC DISTR. BOX