

BERTRAM 46 YACHT

A WORD OF WELCOME

We are pleased that you have chosen a Bertram, and know that her unique design will give you outstanding performance and many years of boating pleasure.

Your Bertram is built of the finest, most modern materials and is manufactured under rigid quality controls. Her hull is of high-impact, multi-laminate fiberglass. High pressure laminates and vinyl throughout further reduce maintenance. She comes to you as the most thoroughly tested and trouble-free boat on the market today.

As durable as her construction is, your Bertram will benefit by reasonable care. And, as is always true with things mechanical, maintenance, adjustments, or repairs may be required from time to time for certain components. Thus, this Owner's Manual, containing a wealth of detailed information, has been specially prepared for your particular model to guide you in keeping her in yacht condition.

To fully enjoy your Bertram, you should understand her completely. To this end, we suggest that you read this manual thoroughly. If any points arise that you do not completely understand, your Bertram dealer will be glad to assist you.

Included are warranties, ours plus those of manufacturers of engines and accessories.

When your boat requires service, contact your Bertram dealer. He has been factory trained to help you and our factory service representatives are available to help him if need be.

We wish you many years of pleasurable yachting on your new Bertram.

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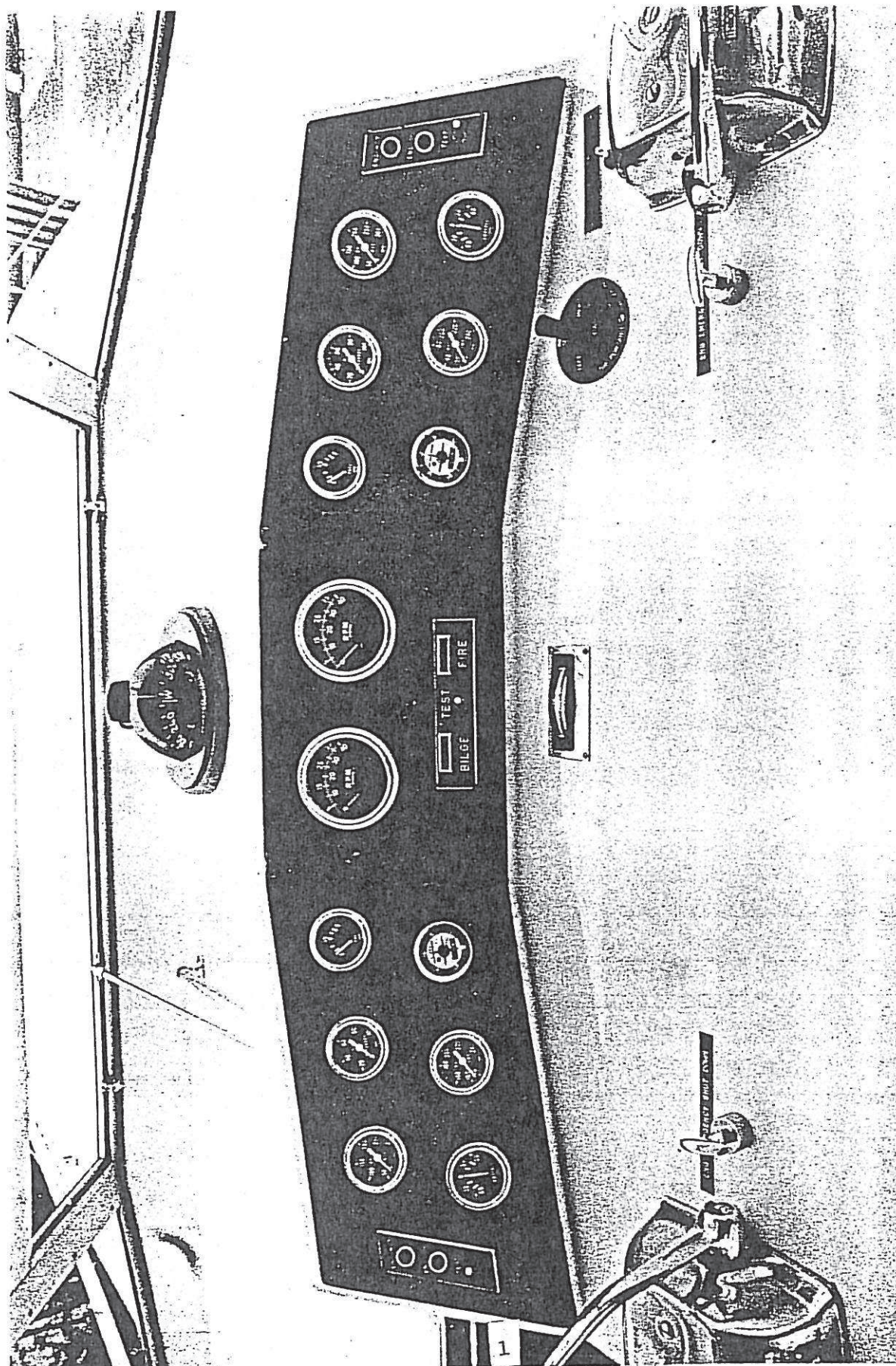
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CONTROLS AND INSTRUMENTS

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

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. If your boat has more than one station, all the engine switches must be "on". The pilot light will indicate when circuit is energized. 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. 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 get their power from the engine starting batteries through the 32 V.D.C. Panel. Excessive use when engine is not charging the battery could make engine starting difficult.

Battery Paralleling Switch

The battery paralleling switch may be held in the starboard or port position when operating the starter switch. The paralleling switch will enable you to use either battery bank to assist the other when starting.

Gauges

Mechanical gauges are: Engine oil pressure, Gear oil pressure and Engine cooling temperature.

Electrical gauges are: Tachometer, Ammeter and Fuel. At cruising speed the gauges should read:

Oil Pressure - GM8V71 50 to 70 psi @ 2100 rpm

Gear Oil Pressure - GM8V71 90 to 150 psi in forward
60 to 125 psi in reverse

Ammeter - 0 or "charging" or "discharging"

Cooling Water Temperature - GM8V71 160° - 185°F

Safety Alarm System

This system gets its power through its circuit breaker at top of 32 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 deck-house.

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

The fire alarm has three detectors, one over each engine and another near the generator.

It is normal to have the engine 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 about 320 usable gallons (U.S.) aft tank about 293 usable 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. Dual control boat will have gauge at bridge control only.

Hour Meter

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

Water Gauges

The water level gauges are located in the galley. They are electrically operated by a sender in each tank. The respective water pump circuit breakers must be turned "on" before gauges will operate. Two fresh water tanks hold about 100 gallons each, 200 gallon total. Drinking water tank about 30 gallons. The remote restart switches are used to start the pumps after tanks have been emptied (and refilled) or if pressure drops too low (for additional information see Water Systems).

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, blower switches, navigation light switches, fuel gauge, compass light, horn switch and bilge pump switch.

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-Governor 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 travel from the controls to the engine clutch 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. On the Bertram 46', the reservoirs will have 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 dresser in aft stateroom.

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.)

Trim Tabs (Boat Leveler)

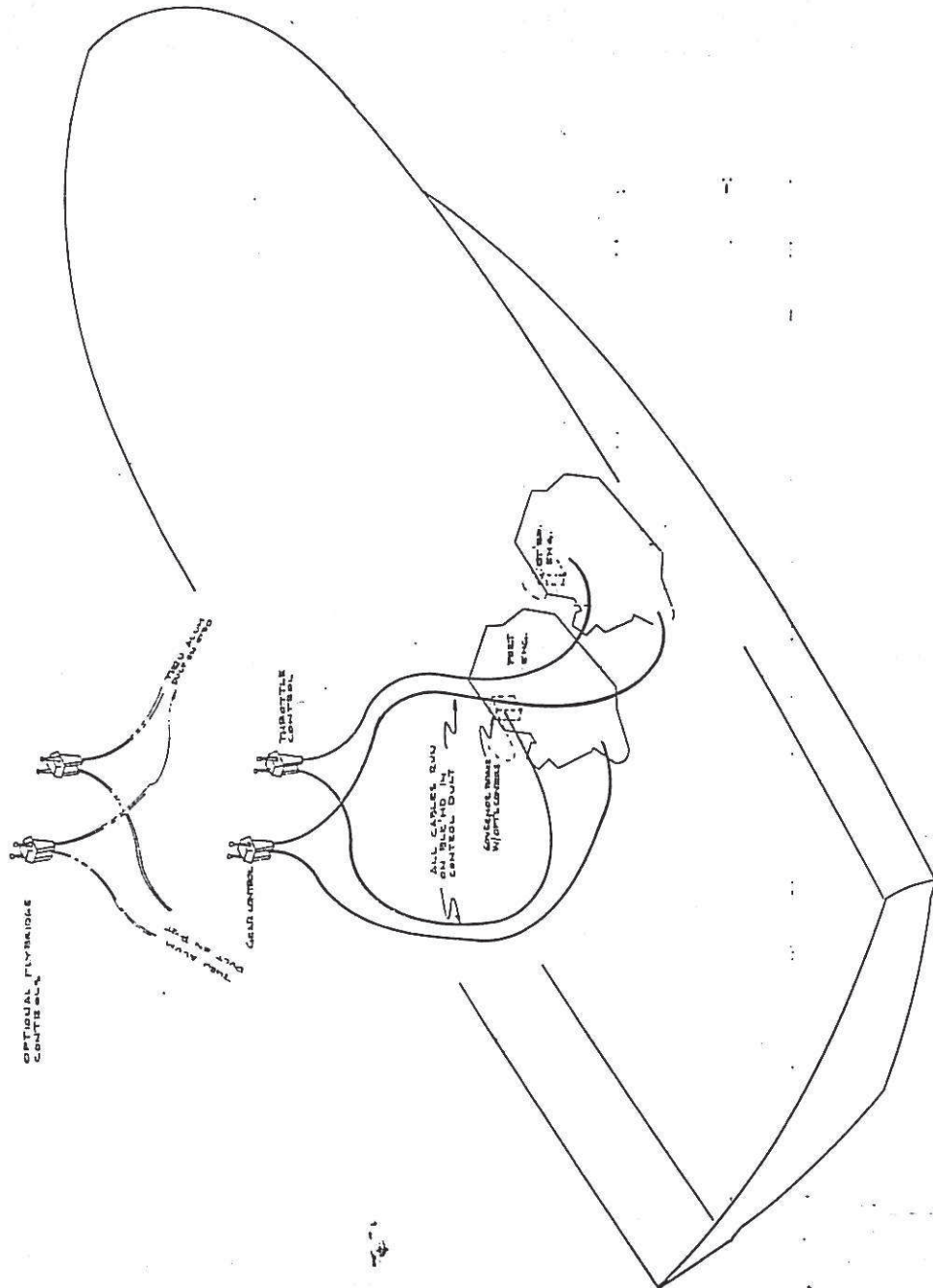
Power is supplied by trim tab circuit breaker on 32 V.D.C. Panel. When you push "bow up", the tabs move to upper position. This is "normal" position and should be best for most slow and medium cruising speeds. When running an inlet or before a following sea have "bow up".

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 way down. Learn to judge running attitude of boat in relation to the horizon, the best way in any case. (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 32 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.



REV	DESCRIPTION	DATE	BY
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BERTRAM YACHT			
MIAMI, FLORIDA, U.S.A.			
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POWER PLANT AND TRANSMISSION OF POWER

Engines

All necessary data and information about the engines are contained in the enclosed Engine Operators 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 (Allison)

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.

Shaft Alignment

At the factory, your propeller shafts were aligned properly, but it should be checked periodically to insure continued proper alignment and performance. To check alignment, first remove the bolts in the coupling flanges at the end of marine gear. Using a .010 feeler gauge, press the flanges together by hand. The feeler gauge should be inserted at 90° intervals to assure equal clearance at all faces. If the alignment is correct, the .010 or .013 feeler gauge will be tightly gripped at all points around the edges of the coupling.

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 $\frac{1}{4}$ " x $\frac{1}{4}$ " rings of new packing. Slide packing gland aft and tighten to a point where there is a slight drop 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 that your boat was tested with. 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,

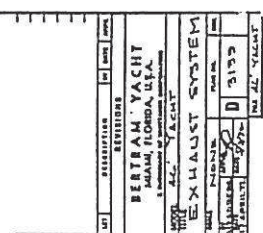
the keyways must be free from burrs and corrosion. Insert the key with its round end forward on the shaft then place the propeller on the shaft aligning the keyway. The key should fit snugly on each side of the keyway, but clearance at the top is essential so as not to pull the propeller off center and 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.

EXHAUST SYSTEM

Your exhaust system is designed to keep water out of the engines, in most conditions. It operates with a special check valve, or flapper valve, that protects the engine from backwash. 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 many 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 too 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. Check these clamps periodically and (check the flapper to see if it is operating properly). This can be done by looking down the exhaust tube when the boat is out of the water; flap should be closed.



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 1500 pounds extra.

II. Condition II (Heavy): Same as Condition I with the addition of 2000 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 kept 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.

mpm

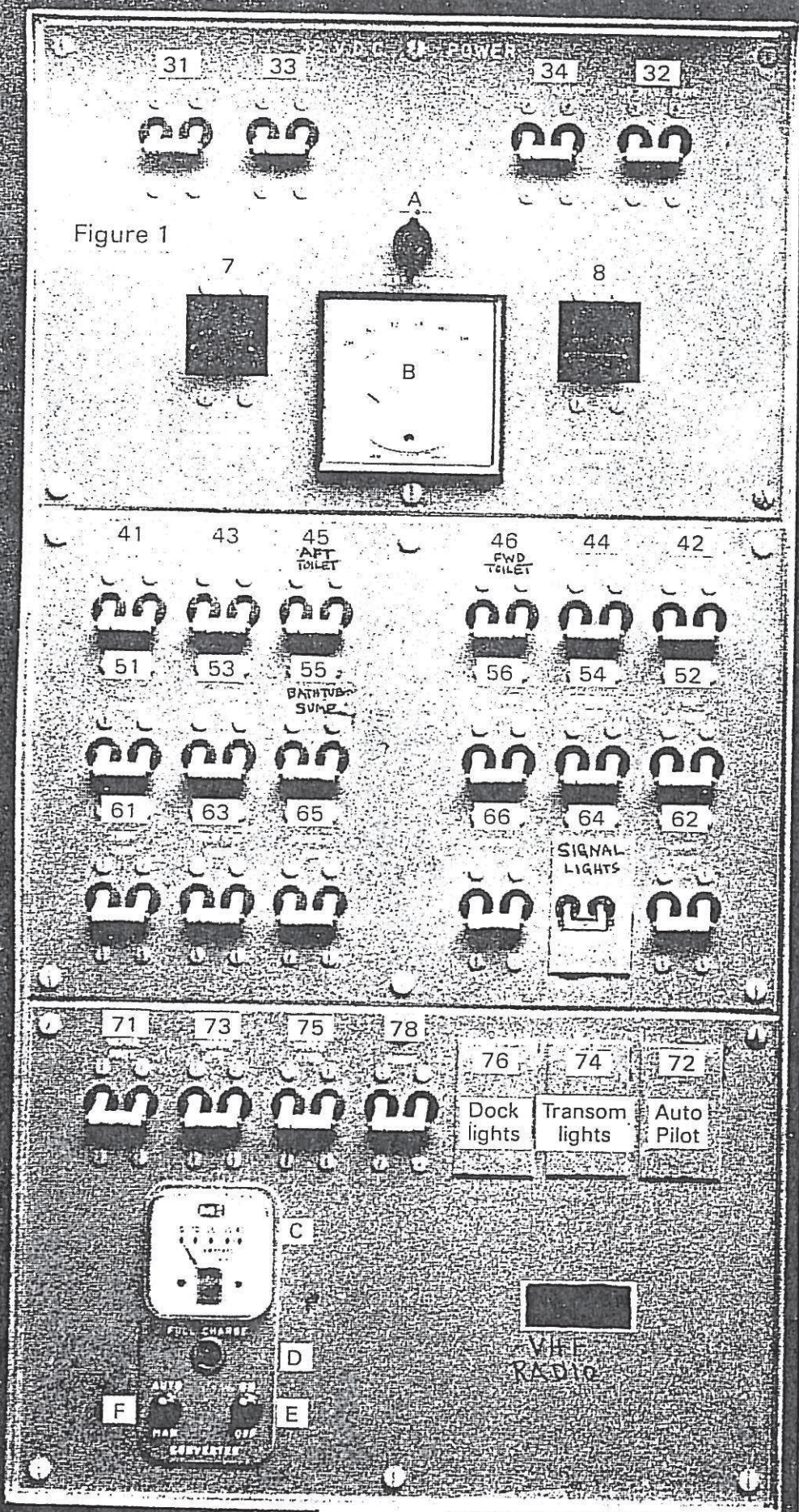
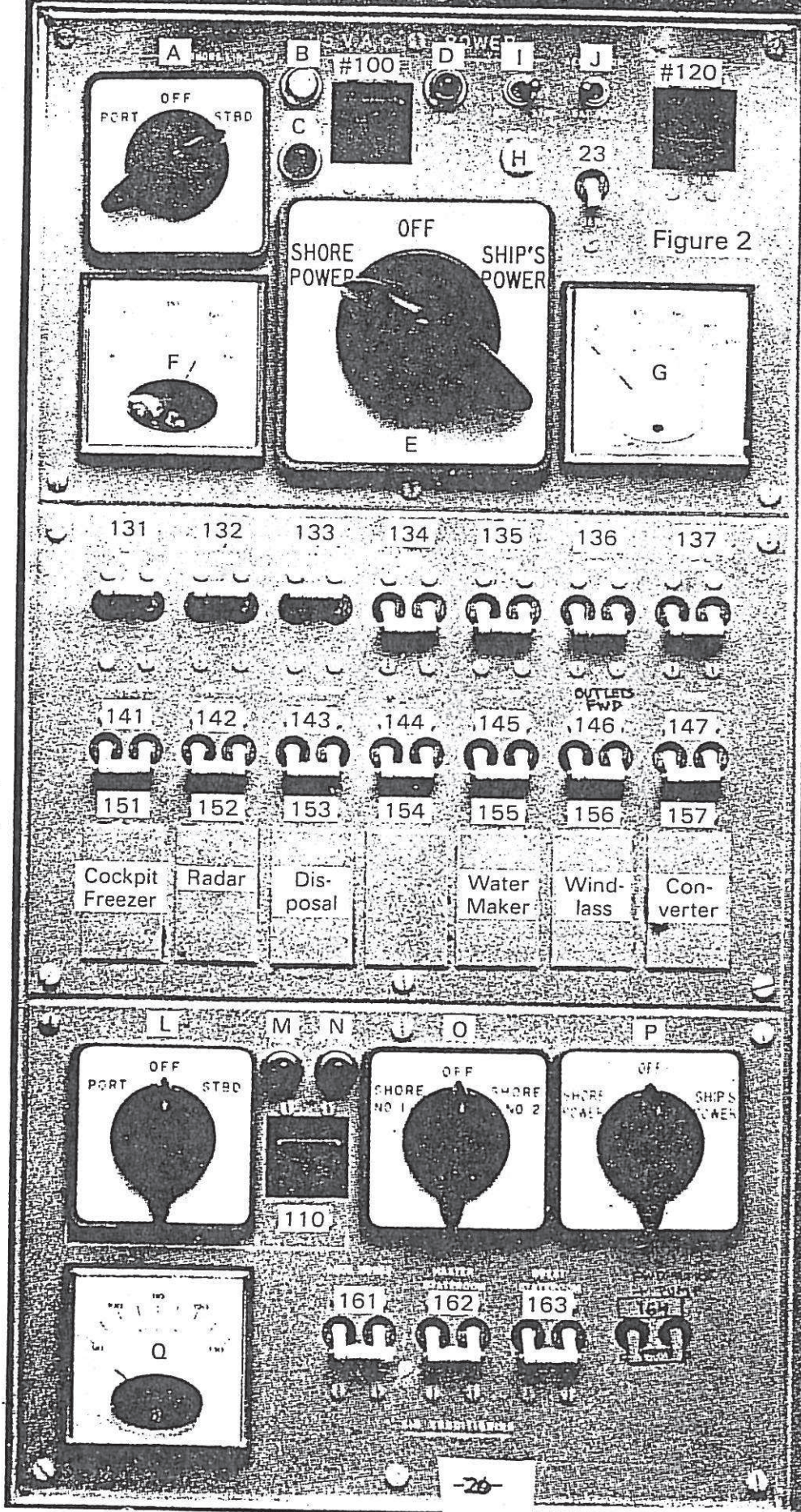


Figure 1



ELECTRICAL

General Description

Your Bertram Yacht is equipped with two basic electrical systems. They are unique in many ways.

The 32 volt DC system is powered by the engine starting batteries and engine alternators. It is an ungrounded system and both positive and negative conductors are protected by circuit breakers or fuses. The 115 volt AC system is supplied by two shore lines and a ships' generator. A converter is provided to keep the batteries charged when the engines are not running.

In addition, a 12 volt battery is used for starting the ships' generator.

The Electrical Distribution Panel is the heart of your DC and AC systems. On the photographs, Figure 1 and Figure 2, we have super-imposed letters (A, B, C etc.) to help you identify each item as you read through the instructions that follow. Also, each circuit breaker is identified with the same number (7, 31, 100, etc.) that is used throughout the instructions, diagrams and circuit markings.

32 Volt DC System

This boat has an ungrounded system, neither the negative or positive sides of batteries are grounded. It is called an "isolated system" and provides maximum protection from electrolysis. It is most important that this isolated condition be maintained and that your boat yard, marine and service people are so advised.

32 Volt Wiring Diagram

The basic wiring diagram shows Battery, Starting and Charging Circuits.

32 Volt Batteries

Each engine has a bank of four 8 volt batteries. The forward bank is for the port engine and aft bank for starboard. Each bank has a capacity of 196 amp/hours (20 hour rate). These can be put in parallel by actuating the battery parallel switch on the console when starting the engines. This closes a relay (contactor) that is located between the starting relays at forward end of battery room.

Water in all batteries should be kept about $\frac{1}{4}$ " above top of the plates to insure maximum service.

Starter Relays

Between the positive battery cable and the engine starter is a relay (contactor) that is actuated by the Start Switch on the console. Thus, the starter cables in the engine room are "hot" only while the engines are being cranked.

Main Fuses

There are four 60 amp cartridge fuses at forward end of battery room that protect the main feed lines to the electrical panel. These fuses, when removed, kill all 32 volt power to the panel and other equipment.

Ammeter Shunts & Fuses

On the load side of each positive 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 ammeter. Never allow anyone to connect any accessory or light to one of the ammeters.

32 V.D.C. Distribution Panel (See Figure #1, Electrical)

On your left hand side of the electrical panel is the 32 V.D.C. section. Power from the batteries comes through the main fuses and shunts (in battery room) to the Port and Starboard battery main circuit breakers #7 & 8, on each side of battery condition meter.

These breakers (50 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, 33, 34, and 32. 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, B, reads the voltage of either engine battery by using the selector switch, A. The meter consumes so little current that it can be left permanently connected. It can thus monitor the converter, even though the main breakers may be "off".

The remaining circuit breakers, #41 to 78, are controlled by the main breakers.

Notice that all the 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 32 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. Check Figure 1 on 32 V.D.C. Panel.

All 32 V.D.C. circuit breakers on this boat are of the two pole common trip type that disconnect both current carrying conductors (usually red and brown wires). The brown wire (except on certain switch legs) is the negative wire and like the positive red wire is 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.

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 32 V.D.C. Panel

After having read the complete description of the 32 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 (letters and numbers refer to Figure No. 1).

- 1 - Be sure the four main fuses are in place.
- 2 - Turn "on" Main Port & Starboard Breakers (7 & 8).
- 3 - Turn "on" breakers for Bilge Pumps (31, 33, 32) and safety alarm (34). 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 all breakers control equipment used only when the boat is underway are turned off.

Example

5 - To run engines. Turn "on" Mains 7 & 8. Turn "on" Port and Starboard engines 41 & 42. Go to each station and turn ON-STOP Switch to "on" position. Signal next to switch only at bridge station will light when circuit is energized. (Press START switch until engine cranks.)

6 - Remote converter control(s) at bottom of panel

- a. Turn switch (E) to "on" position
- b. Turn switch (F) 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) Figure 2 #141 (& 157) must be "on".
- e. The Full Charge Indicator (Figure 1-D) will light when batteries are fully charged. The converter will then automatically shut itself off completely.

115 VOLT AC SYSTEM

Introduction

The 115 VAC Panel (Figure 2) is simple and logical once you have studied the description that follows.

Work with this panel for awhile and you will be able to operate and make the desired selections with speed and precision.

If you are hesitant to start with a "hot" panel, we suggest you make a few "dry runs" with all power disconnected.

We also suggest that you study the POWER SUPPLY-BLOCK DIAGRAM in the Air Conditioning Instructions. This will help you visualize the "flow" of AC power to all parts of the 115 VAC Panel.

115 Volt AC System Shore Lines

Your Bertram has two shore connections on the port side and two on the starboard. Each has 50 amp capacity.

The two 50' cord sets are made to fit 50 amp outlets and inlets. The two adapters (pigtails) are furnished to permit the use of cord sets with 30 amp shore outlets.

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, Figure 2, has a pair of polarity lights for each

shore line. If the amber light "SAFE" (B or M) is lit, the polarity is correct and you may safely turn on the shore circuit breaker (100 or 110).

If the red light "rev. pol." (C or N) is lit, 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 157) 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 Section. If possible, connect this to a different dock outlet than that used for Shore No. 1.

Auxiliary Generator

The generator is used to supply all 115 V.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, Figure 2.

Circuit Breakers

Under normal conditions all of the branch circuit breakers (131 to 164) may be left "on". Any of them should be turned "off" when servicing an individual piece of AC equipment.

The Main Shore Line Breakers (100 & 110) may be left "on", if the Port and Starboard Switches (A & L) are turned "off" when not in use.

Transfer (Selector) Switches

The Port-Starboard Shore Line Switch (A) is used to permit use of the desired Shore Connection.

The Shore-Ship Switch (E) is used to supply the desired power to all branch circuit breakers (131 to 157).

In the Air Conditioning Section (bottom), the Port-Starboard Shore Line Switch, L is used to select the desired Shore Connection.

The Shore 1 - Shore 2 Switch O permits use of either Shore Line. No. 2 is always the preferable choice for air conditioning.

The Shore-Ship Switch (P) permits using either Shore or Generator for power to the branch circuit breakers. (161-164).

Meters

The AC Voltmeter (F) and AC Ammeter (G), at top of Panel, measure only the power that is in use for breakers #131 to 157.

The AC Voltmeter (Q) at bottom of Panel measures only the power that is in use for the breakers #161, 162 and 164.

Operation

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

GENERATOR

AIR CONDITIONING

115 VAC SYSTEM

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".

Other AC Equipment (Optional)

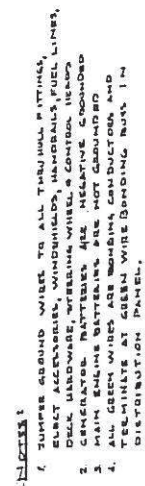
Optional equipment that is not installed by the factory may be added by the dealer or by the owner.

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

All AC circuit breakers on this boat are of 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.

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 AC 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.

31

115 V.A.C. GENERATOR OPERATION

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

Mechanical

Cooling System - Be sure the sea water valve is open. The sea water strainer is mounted under the small hatch in forward part of engine room. 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.

Fuel Supply - The generator gets its fuel from the forward fuel tank. Be sure that the valve at generator inside the sound cover is open and that smaller valve on top of tank is open. Remove drawer under aft dinette seat to reach generator and main engine valves.

Electrical

Battery - The generator starting system is 12 Volt DC and uses two 6 volt batteries in series. These batteries are kept charged by the generator. Unlike the main engine batteries, the generator battery is grounded (negative). However, it is isolated from the main engine batteries.

Battery Parallel - Two solenoids, one in negative lead and one in positive lead are used to parallel with a 16 volt section of the main forward port battery bank. This is used only when the 12 volt battery is too weak to start the generator. The solenoids are closed by holding the Battery Parallel Switch "on" (Figure 2-J) while starting the generator manually at the 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 (Figure 2-I) on the AC Distribution Panel.

Generator Battery Circuit Breaker - This breaker (#23) is also located on the AC 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 at the generator battery 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.

Manual Start Models - 12KW Onan or Optional 15 KW Onan to start generator from Panel in deckhouse see instructions given in Operation of 115 V.A.C. Panel.

Because of the unique Bertram remote control, the generator cannot be started in the engine room. It can be stopped, however, at the generator. To stop, hold in "stop" position until engine quits running. If it fails to stop, shut off fuel valve.

Optional 15KW Generator - When this equipment is installed, a supplemental generator distribution panel is installed in the locker below the television receiver. This panel has a 50 amp main breaker and provision for up to 4 branch circuits.

Any equipment connected to this panel will be powered only while the generator is running. It cannot be connected to shore power.

For the above reason, only items such as anchor windlass or seawater converter (fresh water maker) should be used on this panel.

Maintenance and Service

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

Converter (Battery Charger) Operation (Sentry Model D330-3N-M152)

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 VAC Panel (Figure 2 #141 for Port or 157 for Starboard). There are also input breakers on the side of the converter. These should be pressed in. On the opposite side of converter is the 32 volt output breaker. This should be "on".

All other controls are on the lower section of 32 VDC Panel (Figure 1, C,D,E & F).

The converter(s) will automatically keep both banks of batteries charged, however, if you have only the standard converter (one), the battery that is connected to the lowest output terminal (within the converter) is used as the Control battery. As long as this battery is fully charged the converter will not turn itself on, even if the other battery is partly or completely discharged. Our standard practice on this boat is to connect the Port battery to the Control Terminal. If the owner finds in practice, through his selection of optional equipment and usage of the boat, that the starboard battery carries 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 Battery acts as Control for the Port Converter and

the Starboard Battery as Control for the Starboard Converter. Both converters should be used simultaneously for best results.

Operation

Automatic (Switch F)

- a. This is the normal operating position.
- b. When both 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 (Switch F)

The switch should never be placed in this position unless:

- a. You need to charge other battery when the control battery is fully charged. Switch back to Automatic as soon as the converter starts. The converter will then shut itself off when other battery is fully charged.
- b. If either battery 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 battery is 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 DC is required, Switch F should be in manual position.

Sentry Owner's Manual

For service and adjusting internal controls see the manufacturers manual.

Operation of the 115 V.A.C. Panel

Read the complete description of the 115 VAC System and study the actual parts and arrangement on the boat. The following step-by-step procedure will place your Panel in operation (letters and numbers refer to Figure No. 2).

1. Shore-Ship Switches (E & P) should be "off".
2. Connect the Shore lines to the desired inlets on side of boat.

Both don't have to be on the same side, but in the following example we will assume that both are on port side.

3. Connect Shore lines to dock outlets.
4. Turn Port-Starboard Switches (A & L) to "port".
5. Check Polarity Lights to see that only the "safe" amber light (B & M) are lit.

6. Turn Shore line 1 & 2 Main Breakers (100 & 110) to "on" position.
7. Turn shore-ship switch (E) to "shore".
8. The Voltmeter (F) will now indicate the Shore line 1 voltage.
9. The Breakers (131 to 157) now are energized by Shore #1 power and may be turned "on" as required. Normally, all of these breakers are left "on" most of the time.

10. The Breakers (161 to 163) are for the designated A/C units left on for A/C operation.

11. Generator - For more details see Generator Instructions.
 - a. Shore-Ship Switch (E) should be placed in "ship" position.
 - b. Generator Main Breaker (120) should be "on".
 - c. Generator Battery Breaker (23) should be "on".
 - d. For a "cold" start hold the warm-up switch (H) in "on" position for about 30 to 60 seconds prior to starting.

Cold Cathode

Cold Cathode lighting has been installed behind the curtain cornice. This system operates on 9000 volts, so care should be taken not to touch them unless the system is off and the breaker is off in the Panel.

The system operates as follows: 110 volts go to the transformer located behind the Panel outboard of the sofa. This gives the 9000 volts needed to operate the Cold Cathode lighting. The system is fused by a screw fuse located behind the sofa.

Note, this system is similar to Neon lighting, except we use Argon Gas. Any Neon repair station will repair it, if necessary.

Additional Equipment

1. If additional equipment is desired, check Picture Figure 1 or Figure 2, this will tell you which plate to remove for the desired engraved position for the breaker.
2. For location of spare wires check systems wiring diagram in this sections.
3. Make sure that the wiring you add is of a quality consistent with Bertrams standards.
4. If equipment is added by the factory not covered by the manual, please check the additional equipment literature that accompanies your boat.

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ABBREVIATIONS & SYMBOLS

A	Ampere, Automatic
(A)	Amber pilot light
(A) (B) (C)	• etc. Terminals for engine looms, see Engine & Alarm
A.C.	Alternating Current
AMM.	Ammeter
AMP.	Ampere
B, BLK.	Black
BLU	Blue
BR	Brown
C.B.	Circuit Breaker
EL-P	Engine Loom, Port
EL-S	Engine Loom, Stbd.
G, GRN.	Green
KW	Kilowatt
M	Manual
MOM.	Momentary
N.C.	Normally Closed
N.O.	Normally Open
OPT.	Optional Equipment
P	Port
R	Red
(R) R	Red pilot light
S, STBD	Starboard
SW	Switch

TB/A Terminal Block, Alarm
 TB/D-P " " , Distribution, Port
 TB/D-S " " , " , Stbd.
 TB/E-P " " , Engine, Port
 TB/E-S " " , " , Stbd.

V Volts

V.A.C. " , Alternating Current

V.D.C. " , Direct "

W Watts

W, WHT. White

Y, YEL. Yellow

14/2 Duplex Wire, #14, 2- Cond.

14/3 Triplex " , #14, 3- Cond.

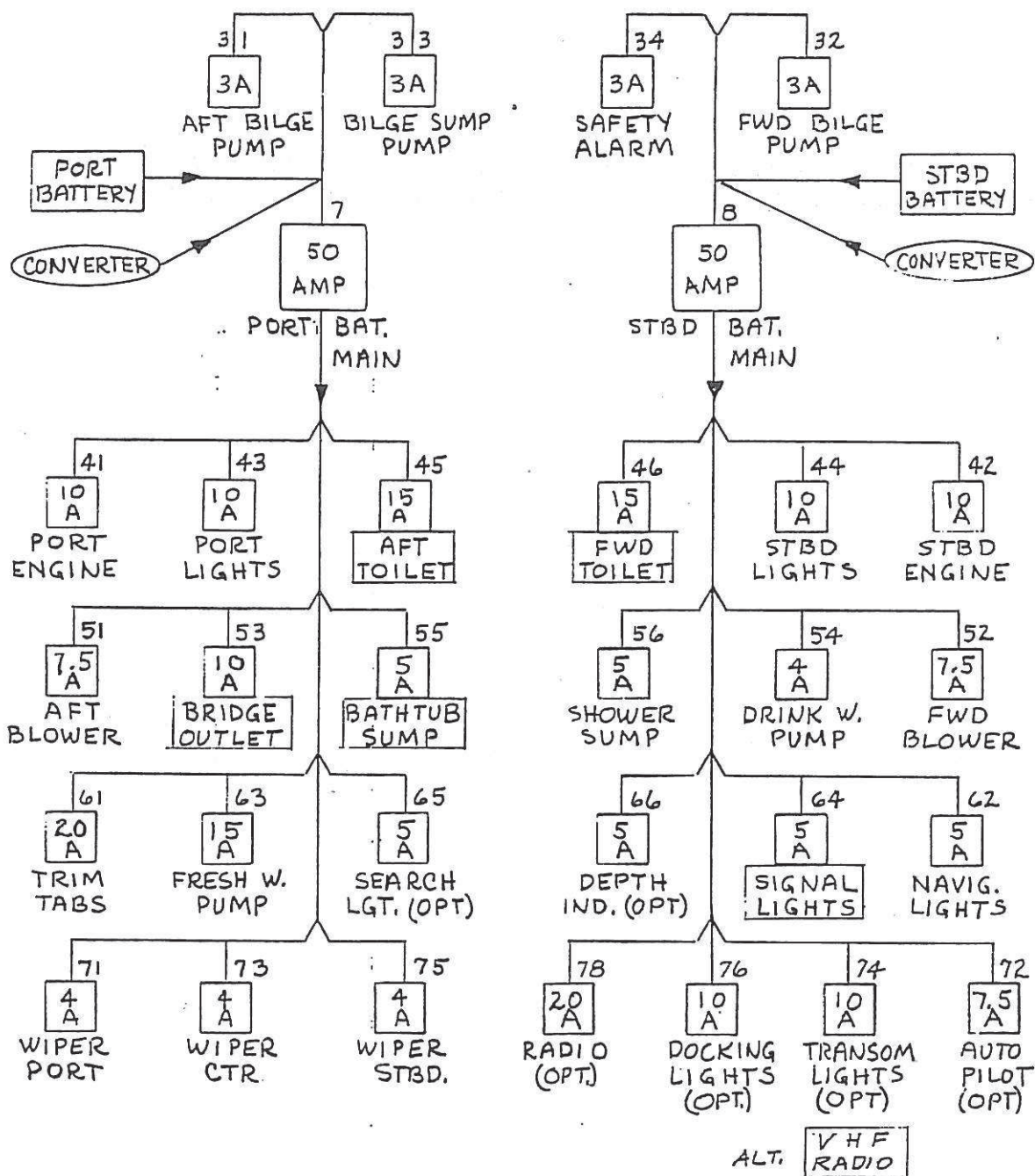
6/3 " " , # 6, 3- Cond.

 Ohm

 Resistor

 Fuse

 Terminal



32 V.D.C. DISTRIBUTION PANEL
FLOW DIAGRAM

PA 33 43 63

BILGE PORT F.W.
SUMP LIGHTS PUMP

34

SA

SAFETY
ALARM

PB 45

AFT TOILET
F.W. PUMP

46 44 54

SB

FWD TOIL. STBD DRINK
F OVERBD. LTS W. PUMP
PUMP(OPT)

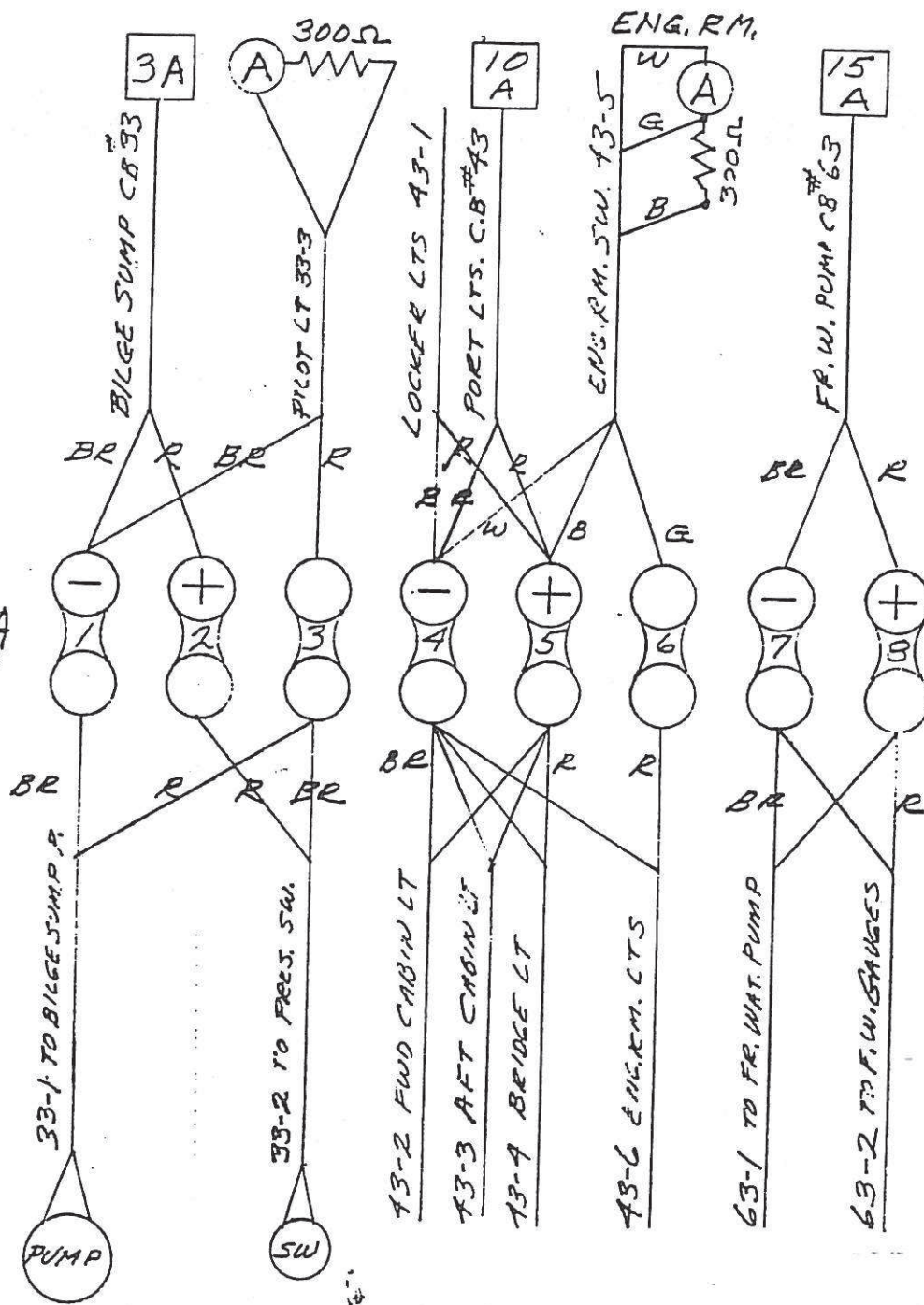
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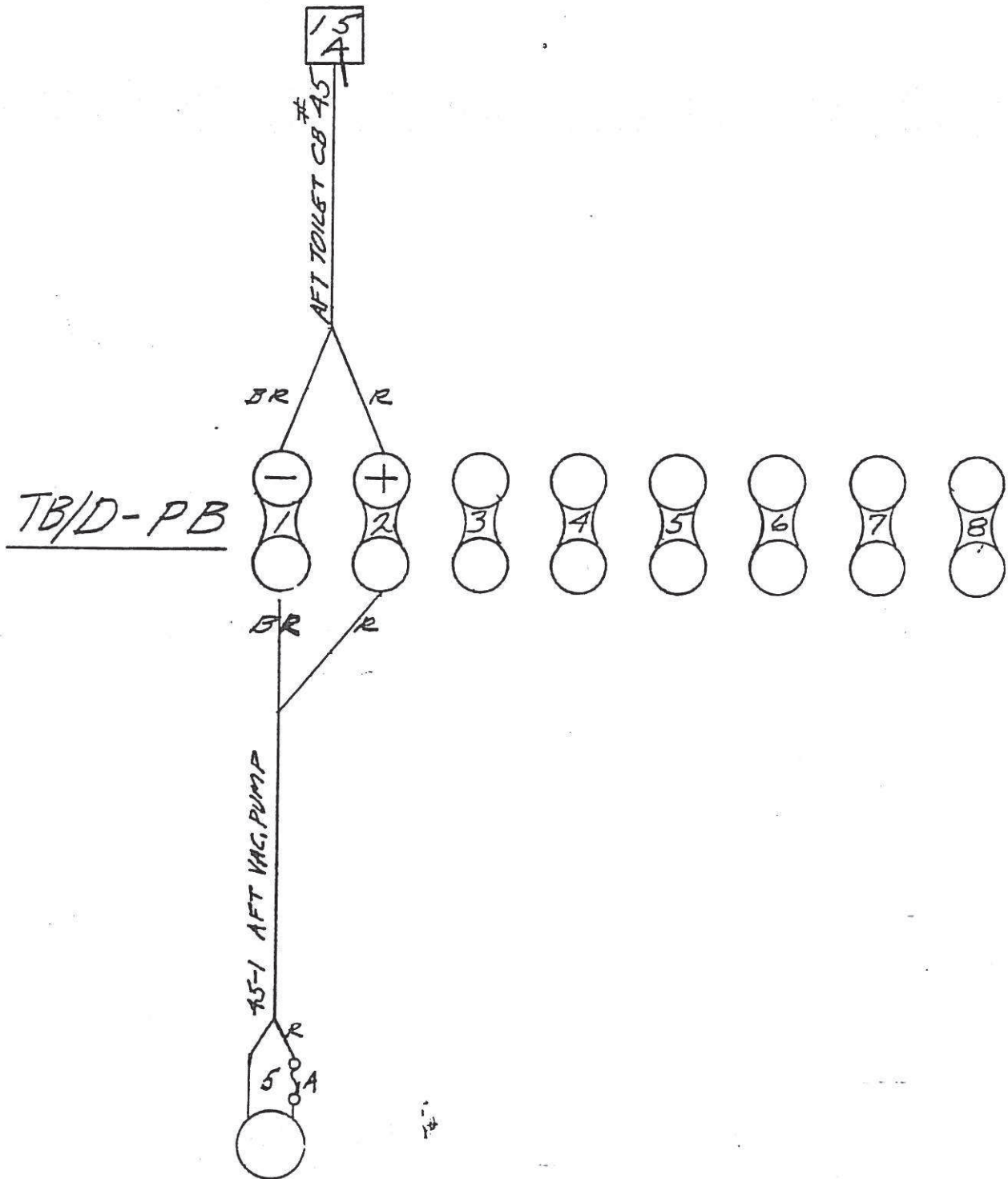
SC

DOCK'LTS TRANS LTS
(OPT.) (OPT.)

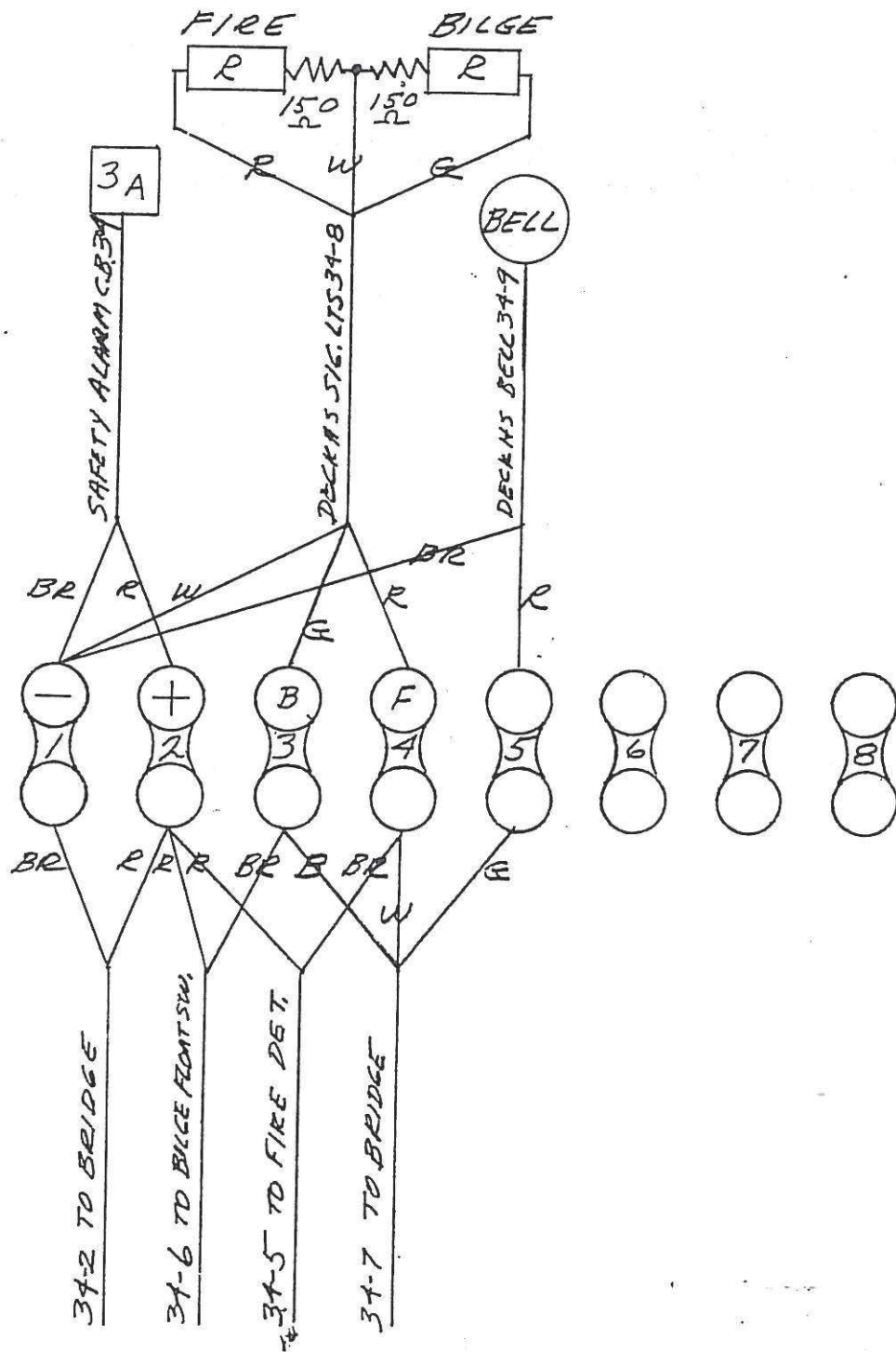
TERMINAL BLOCK (TB/D) ARRANGEMENT
WITHIN 32VDC DISTR. BOX

TB/D-PA

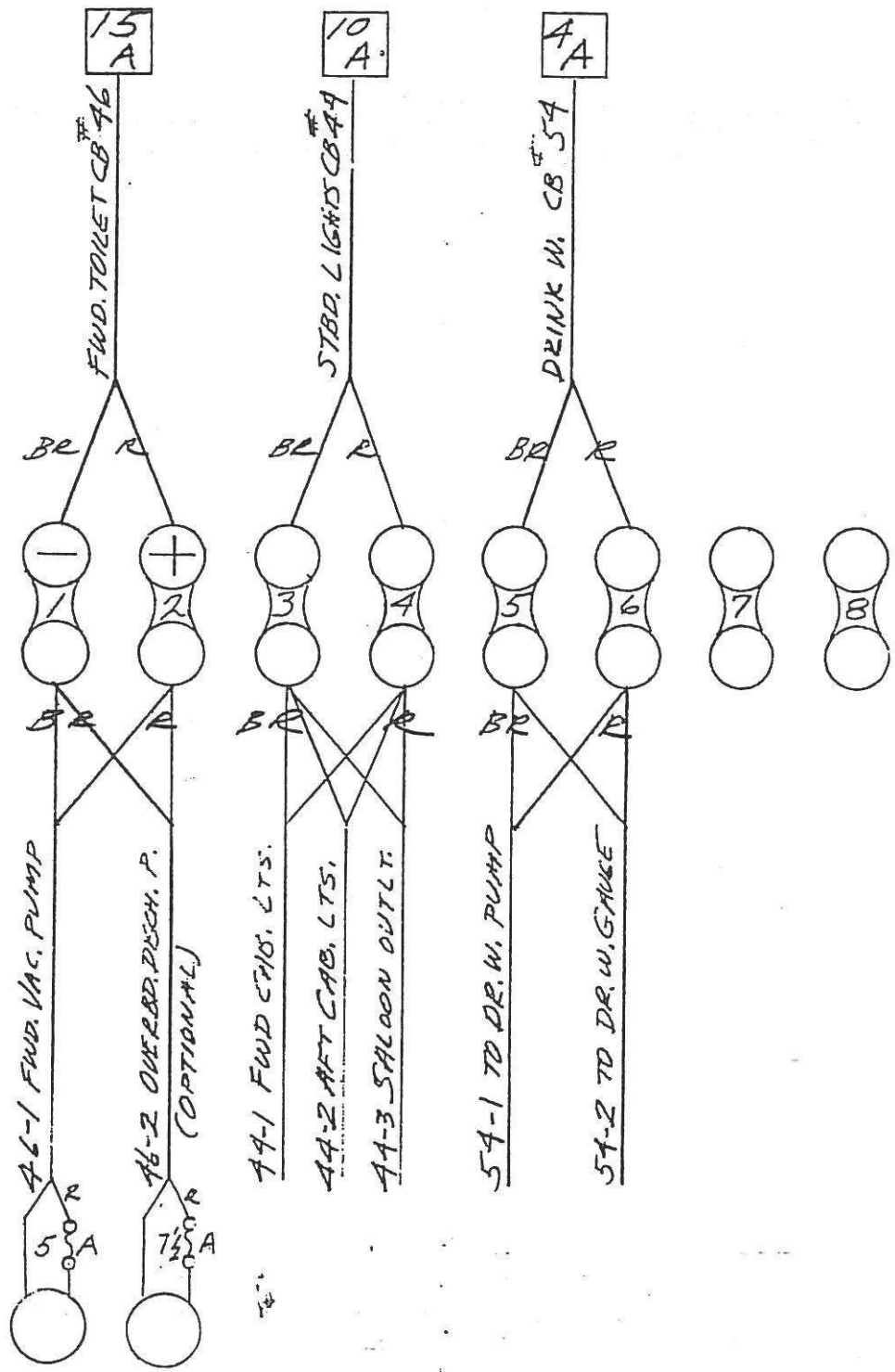


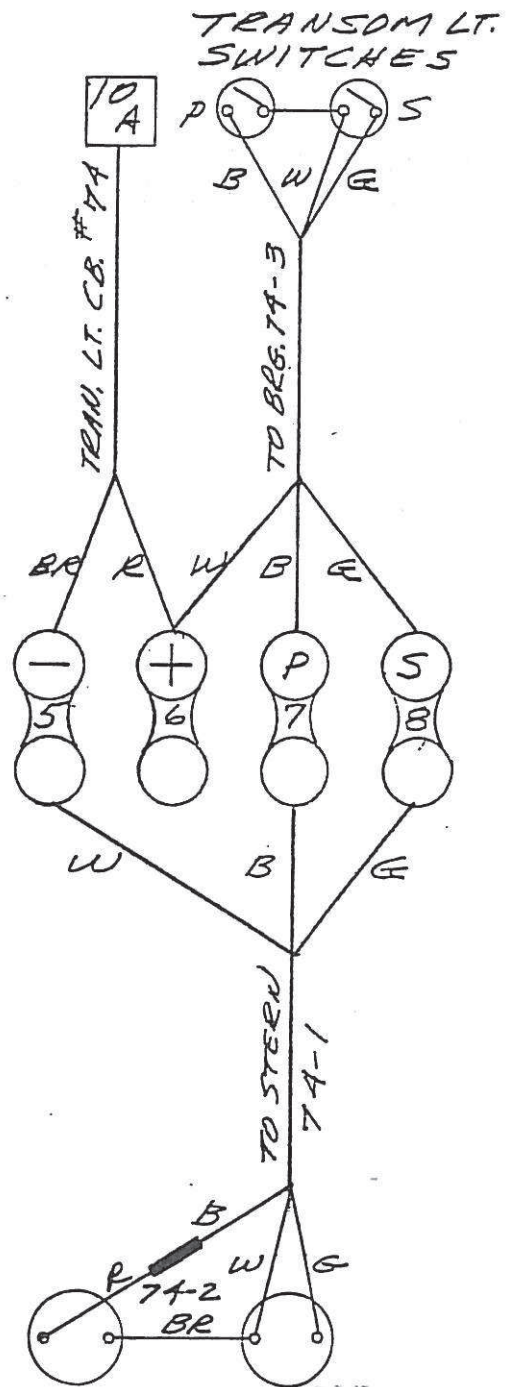
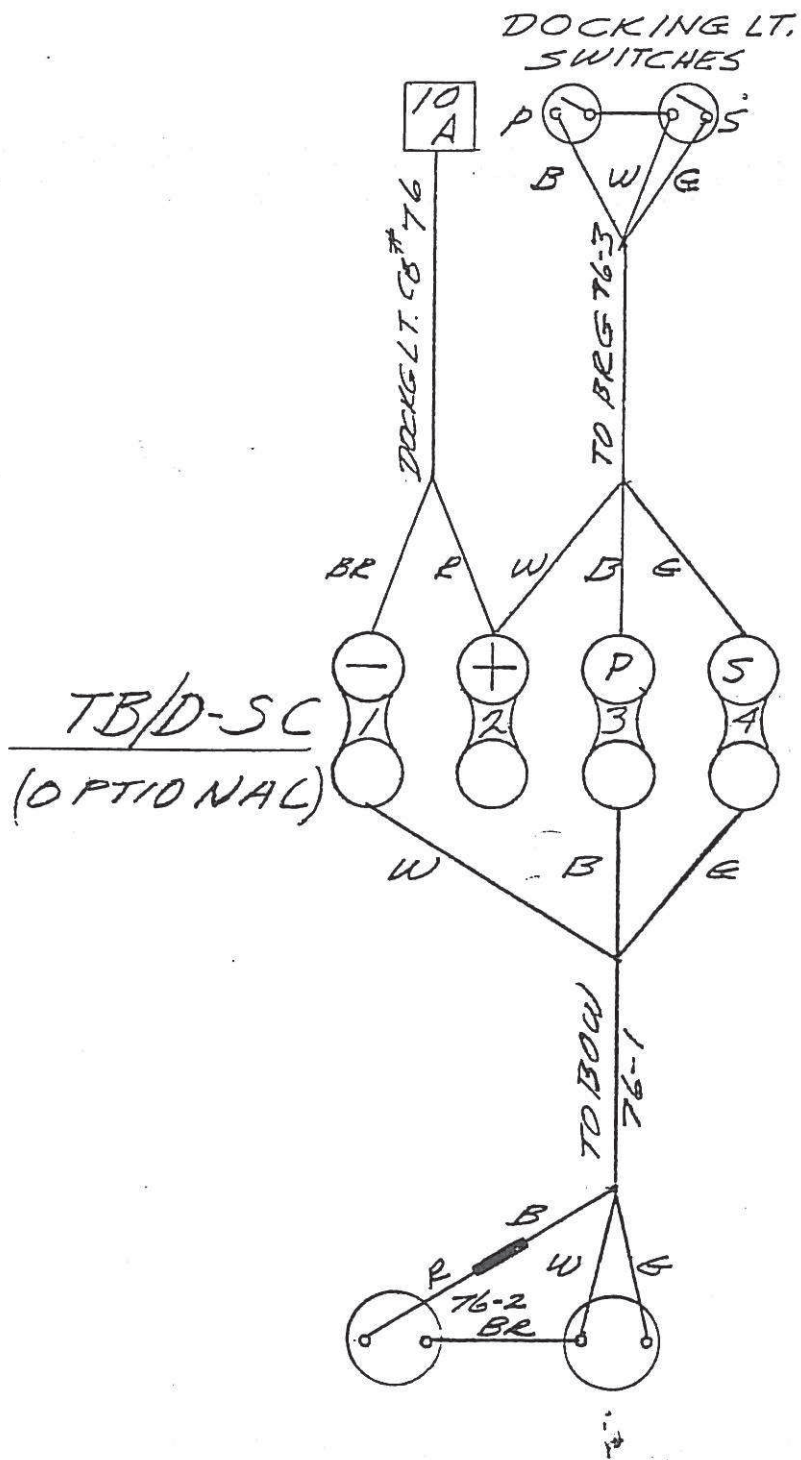


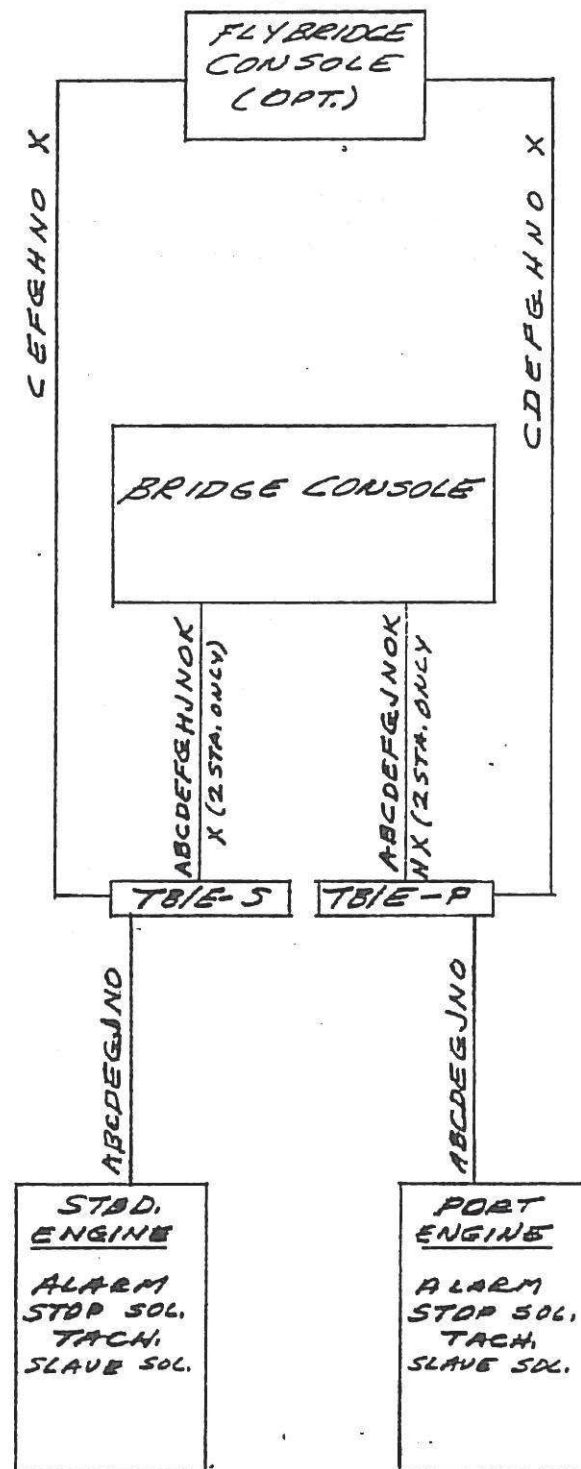
TB/D-SA



TB/D-SB

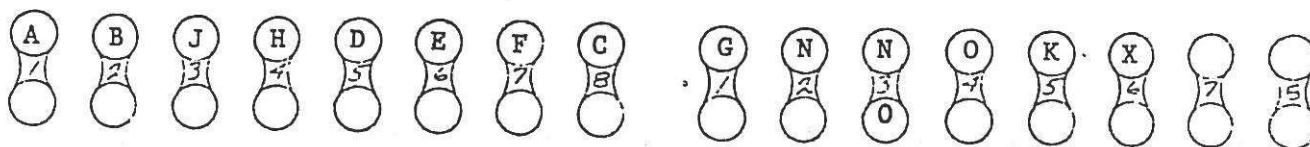






ENGINE LOOMS
SHOWING WIRES USED

ENGINE TERMINAL BLOCKS TB/E PORT & STARBOARD
UNDER BRIDGE CONSOLE



Terminals are not marked, identify by position and wire color.

STANDARD BERTRAM ENGINE LOOM

<u>SYM</u>	<u>SIZE=</u>	<u>COLOR</u>	<u>USE</u>
A	14	Wh - Yel	Alarm - Water Temperature
B	14	Wh - Bl	Alarm - Lube Oil Pressure
J	14	Red	Alarm - Power
H	14	Wh - Red - Bl	Battery Parallel (Stbd. only)
H	14	Wh - Red - Bl	Horn (Port Only) with flybridge station
D	10	White	Negative Common
F	10	Wh - Blk - Orn	Ignition Switch Feed
E	10	Wh - Orn	Ignition
C	10	Wh - Grn	Stop
G	14	Wh - Red	Start
I	14	Red - Wh	
N	16	White	Tachometer
O	16	Wh - Blk	Tachometer
L	16	Yellow	
M	16	Black	
K	16	Blue	Fuel

EXTRA WIRES (NOT INSIDE BERTRAM LOOM)

X	10	Wh - Blk - Grn	Ignition Switch Return (2 Sta. Only)
---	----	----------------	--------------------------------------

TB/E-S STBD ENG.

ABJHDFEC	GN ^N OKX
----------	---------------------

TB/E-P PORT ENG.

ABJHDFEC	GN ^N OKX
----------	---------------------

TB/BP

31	32
----	----

AFT BILGE FWD BILGE
PUMP PUMP

TB/BLR

51	52	
----	----	--

AFT FWD
BLOWER BLOWER
(STBD) (PORT)

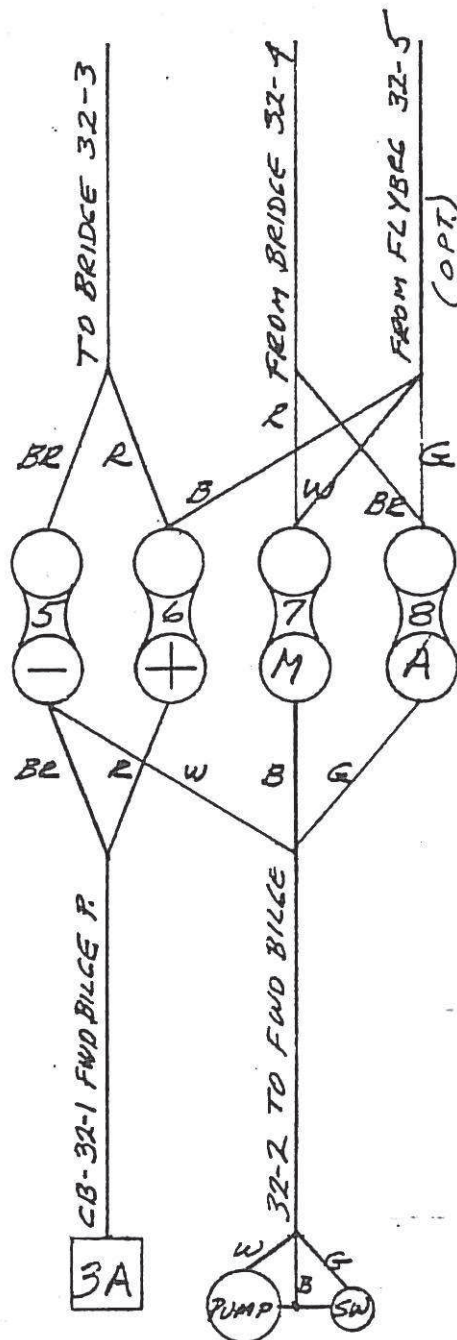
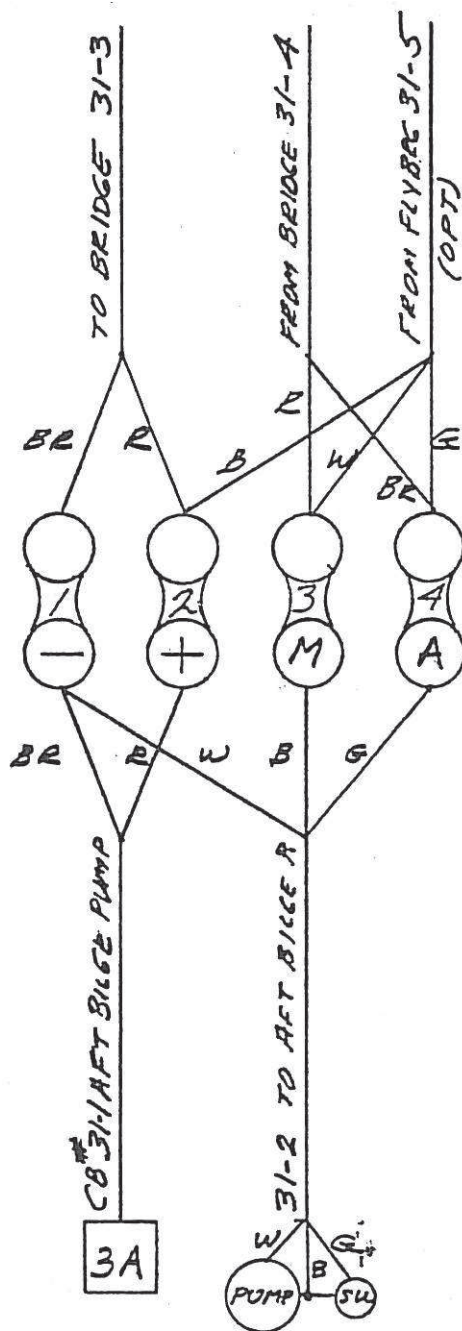
TB/NAV

62	64
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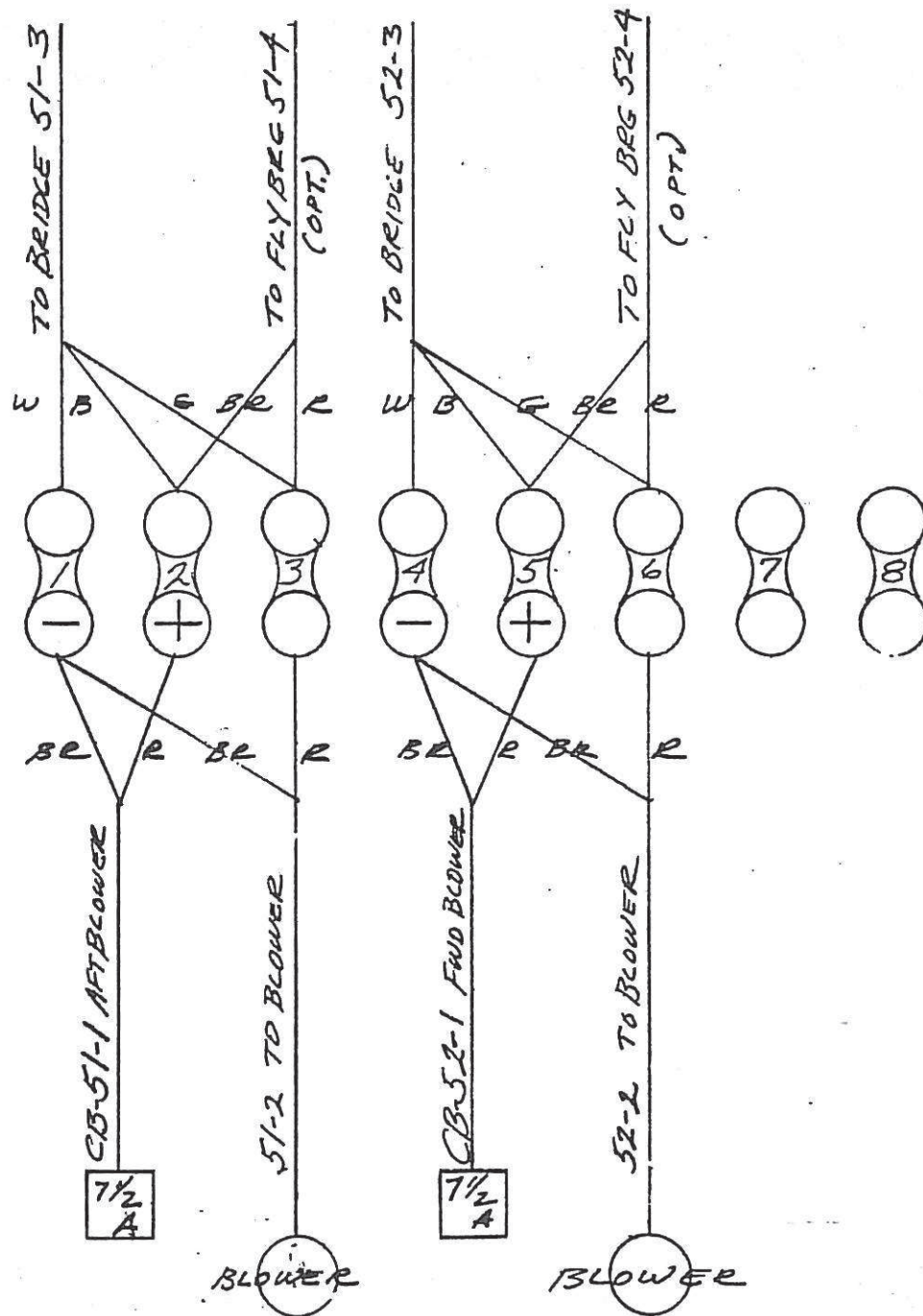
NAV. SIGNAL
LTS. LTS.

TERMINAL BLOCK ARRANGEMENT BRIDGE CONSOLE

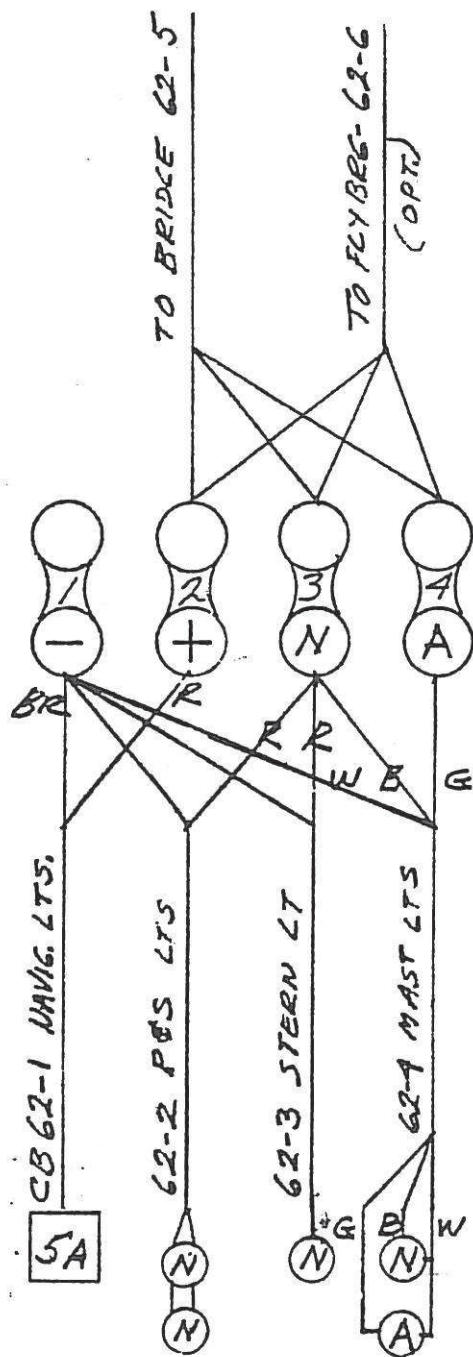
TB/BP



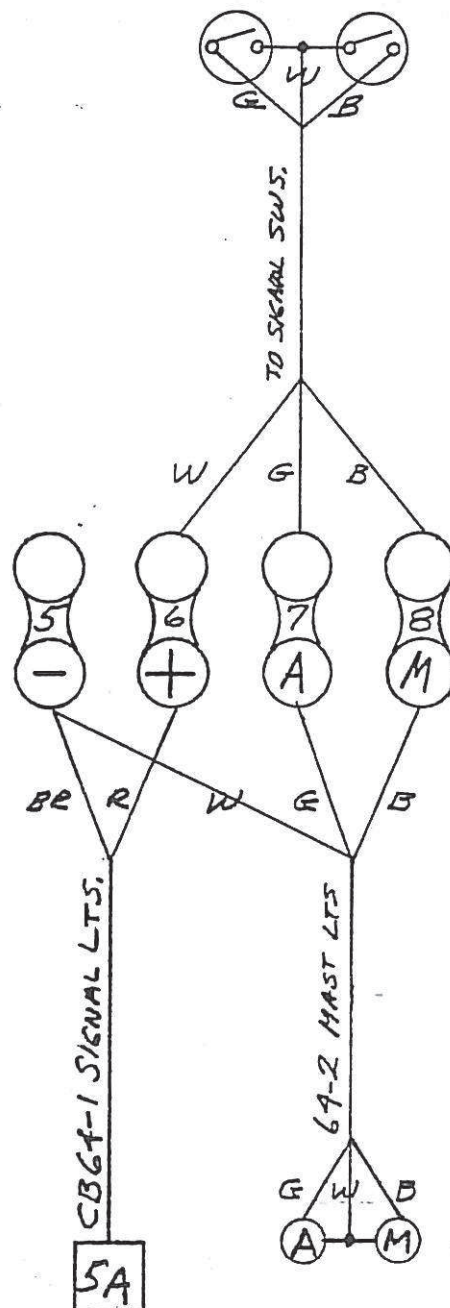
TB/BLR

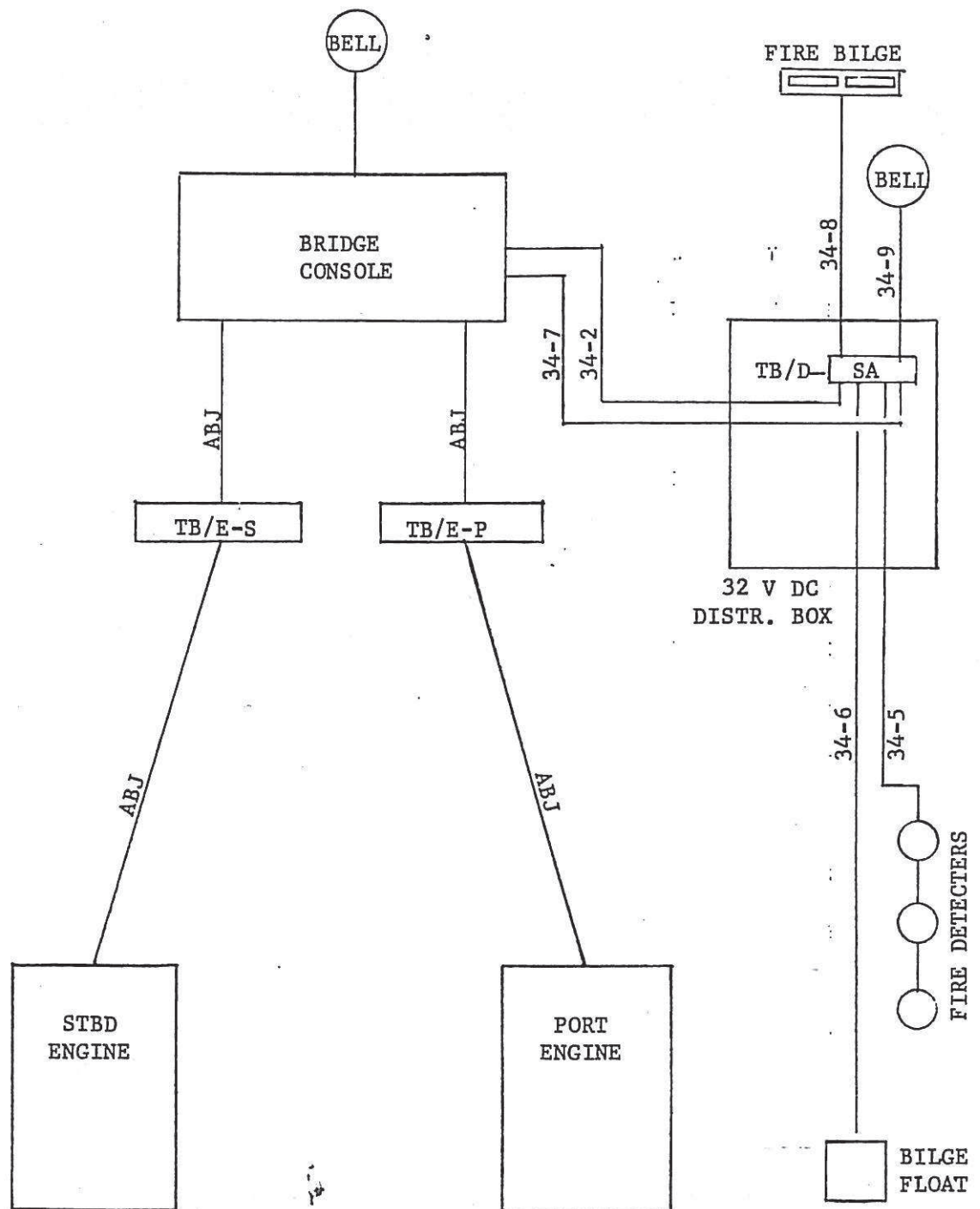


TB/NAV

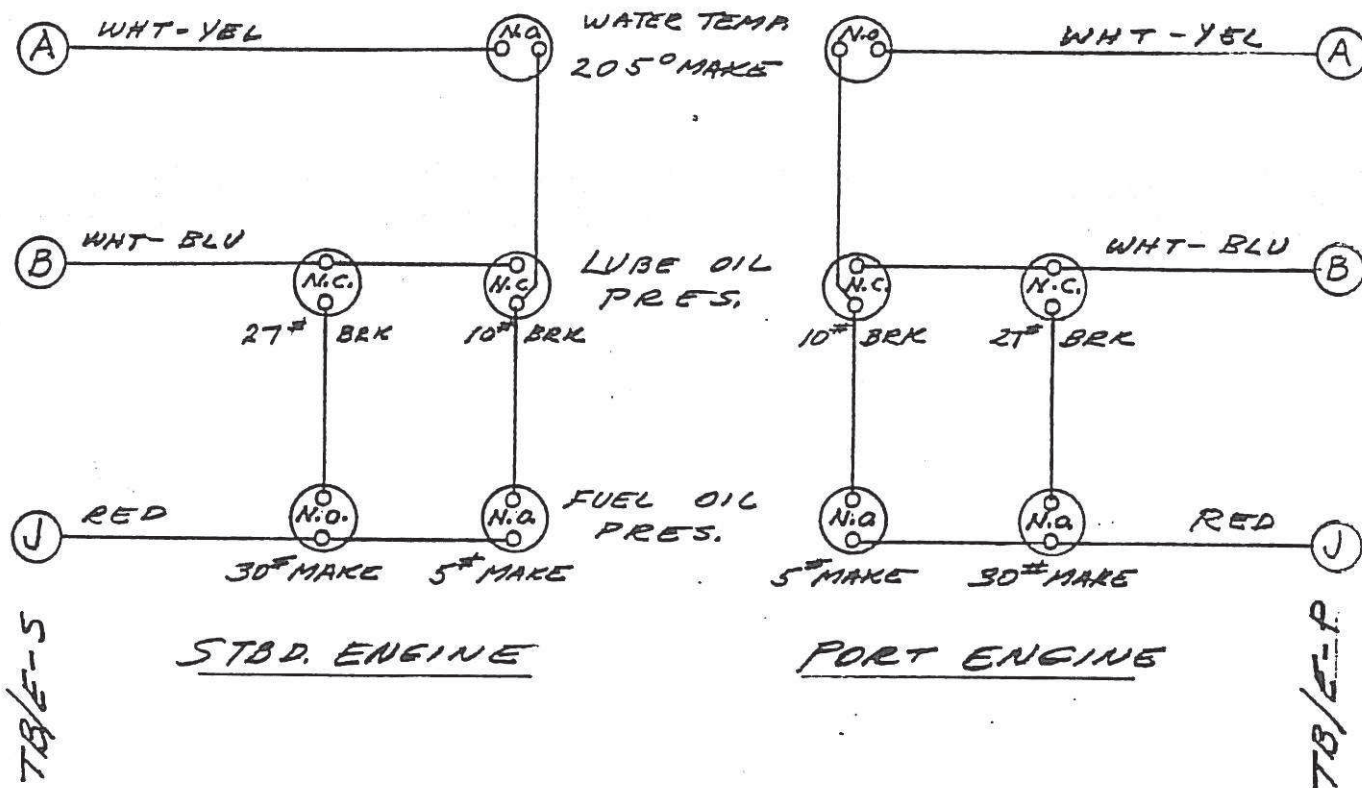


ABSENT MEAL

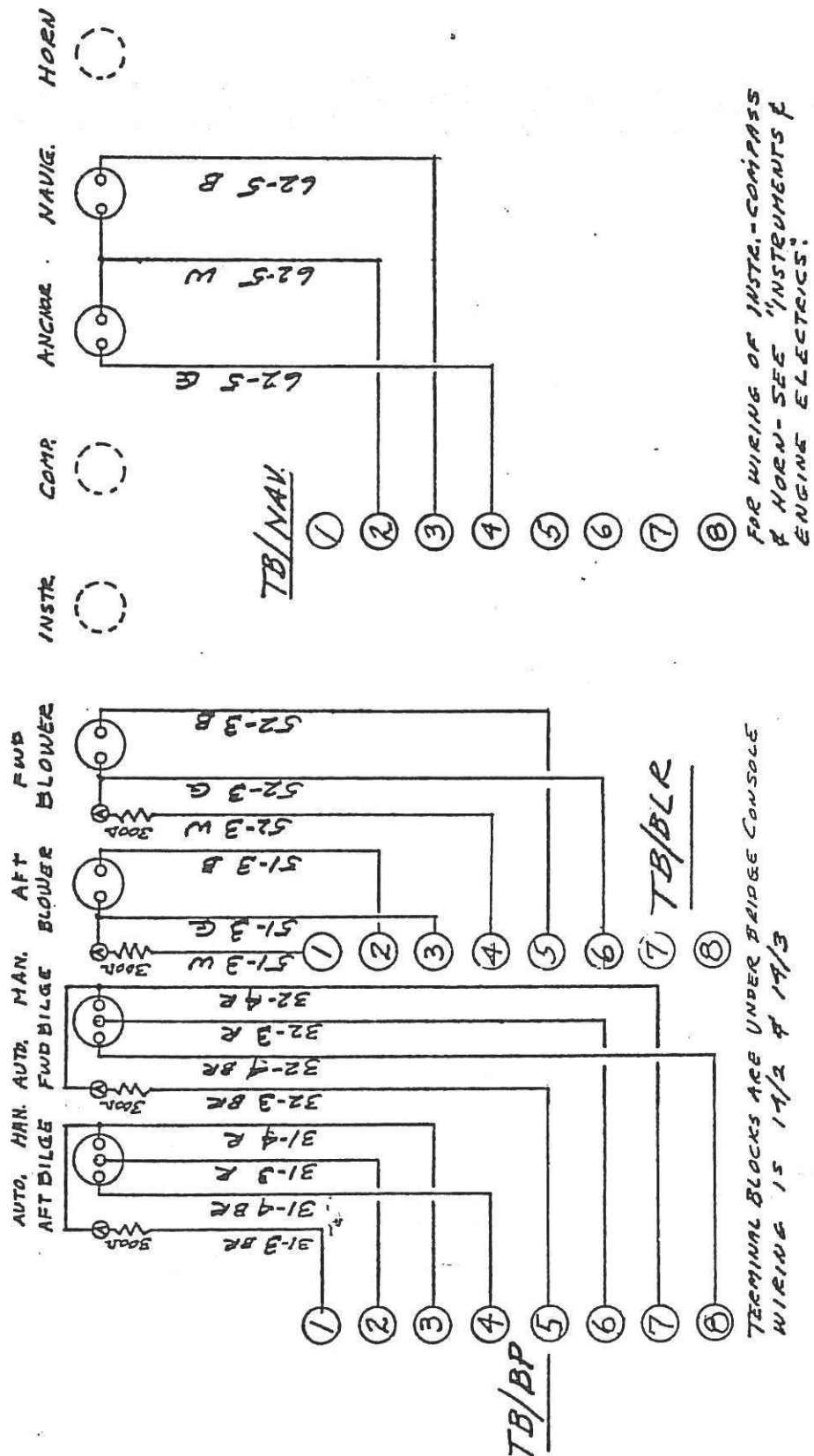




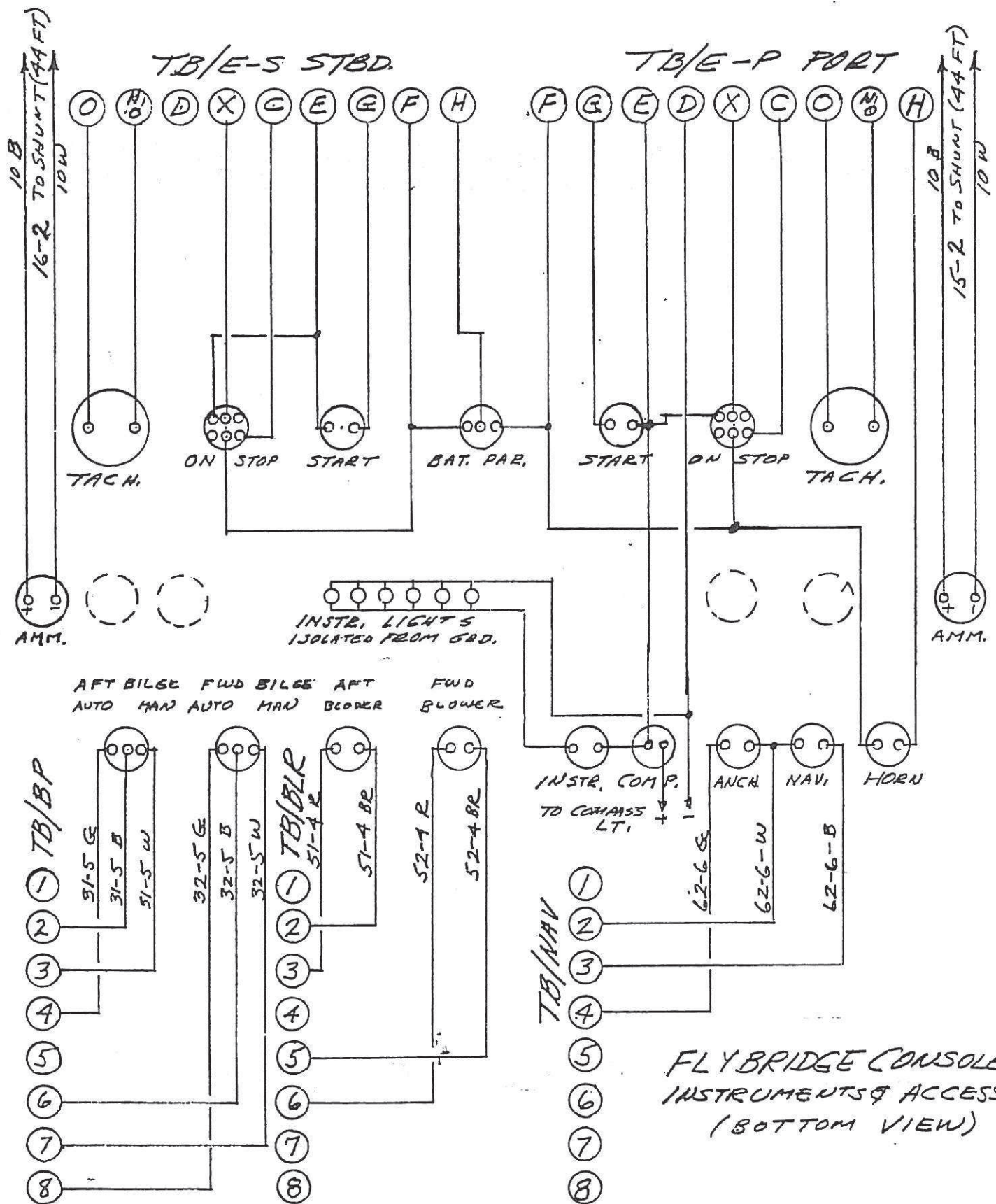
SAFETY ALARM SYSTEM
BLOCK DIAGRAM

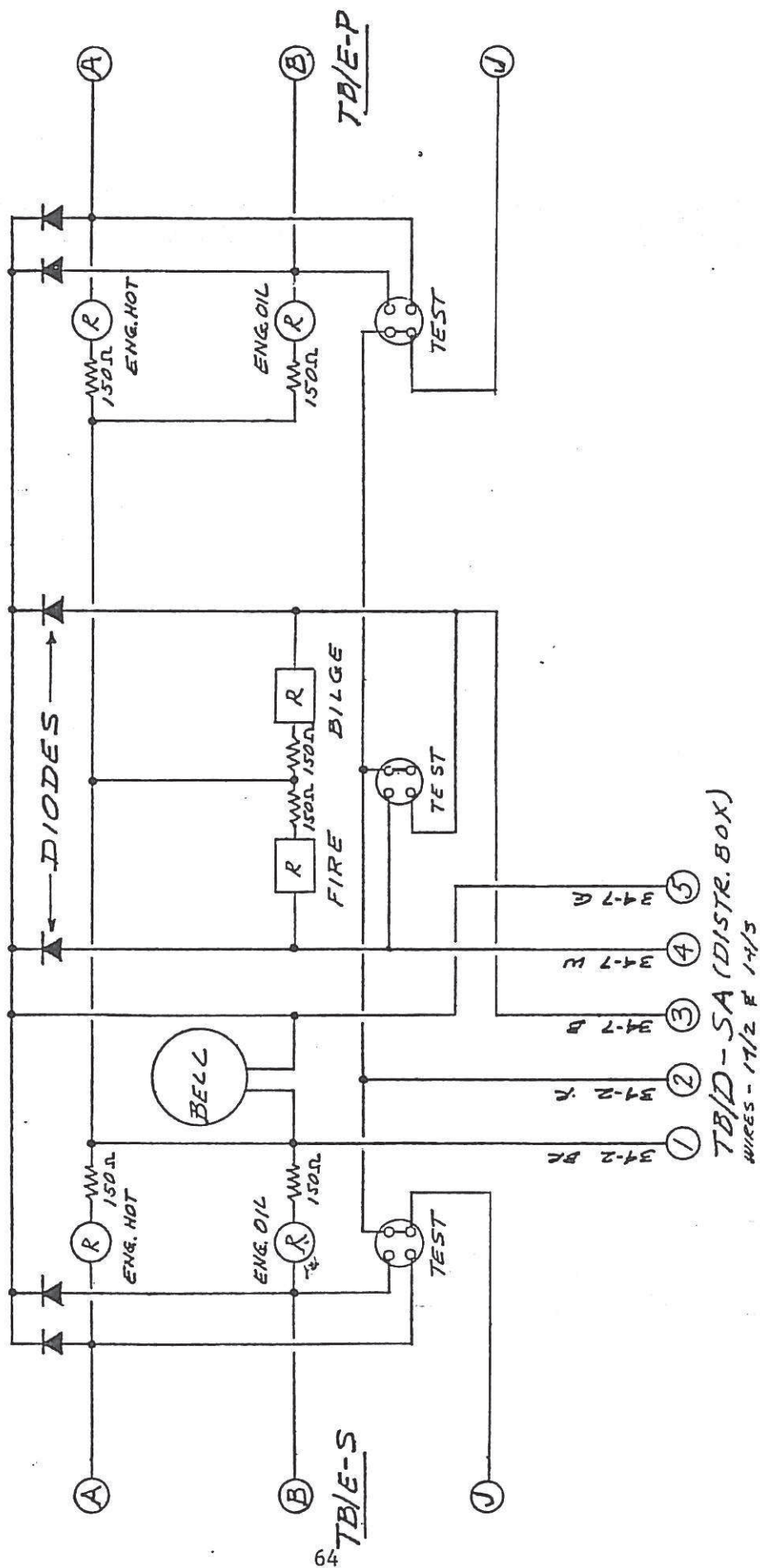


SAFETY ALARM-ENGINE CIRCUITS



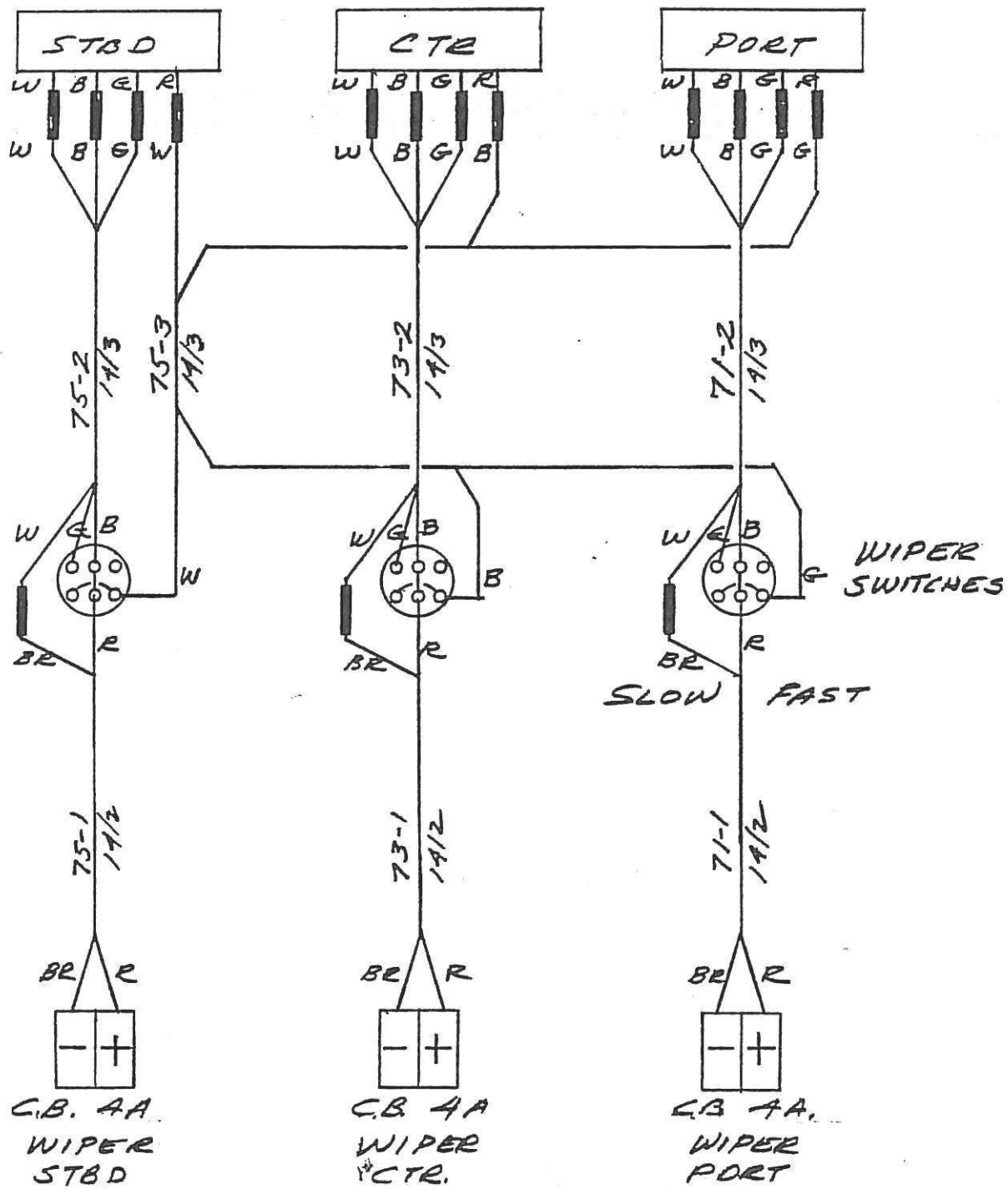
BRIDGE CONSOLE ACCESSORY SWITCHES (BOTTOM VIEW)



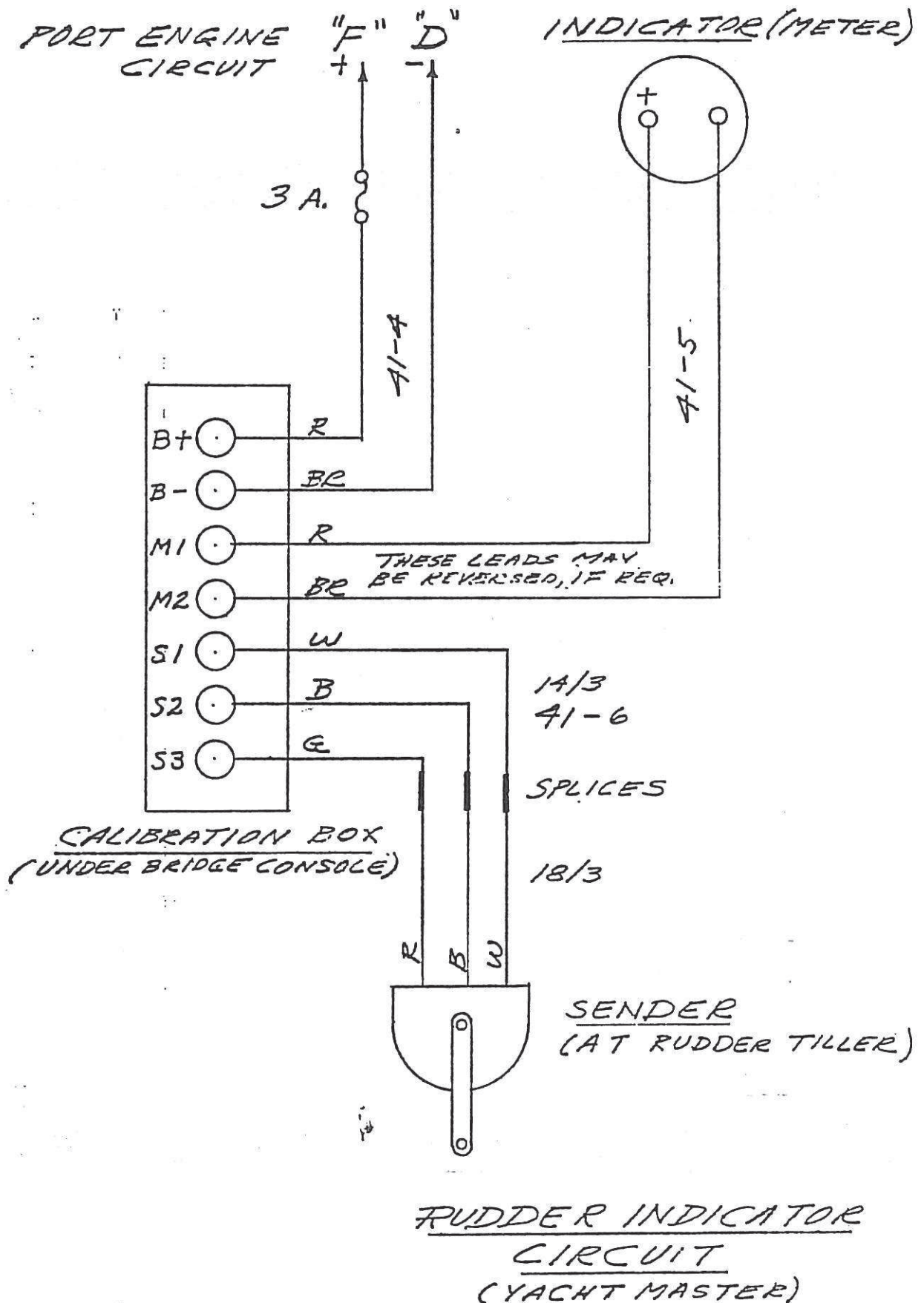


BRIDGE CONSOLE
SAFETY ALARM
 (BOTTOM VIEW)

WIPER MOTORS

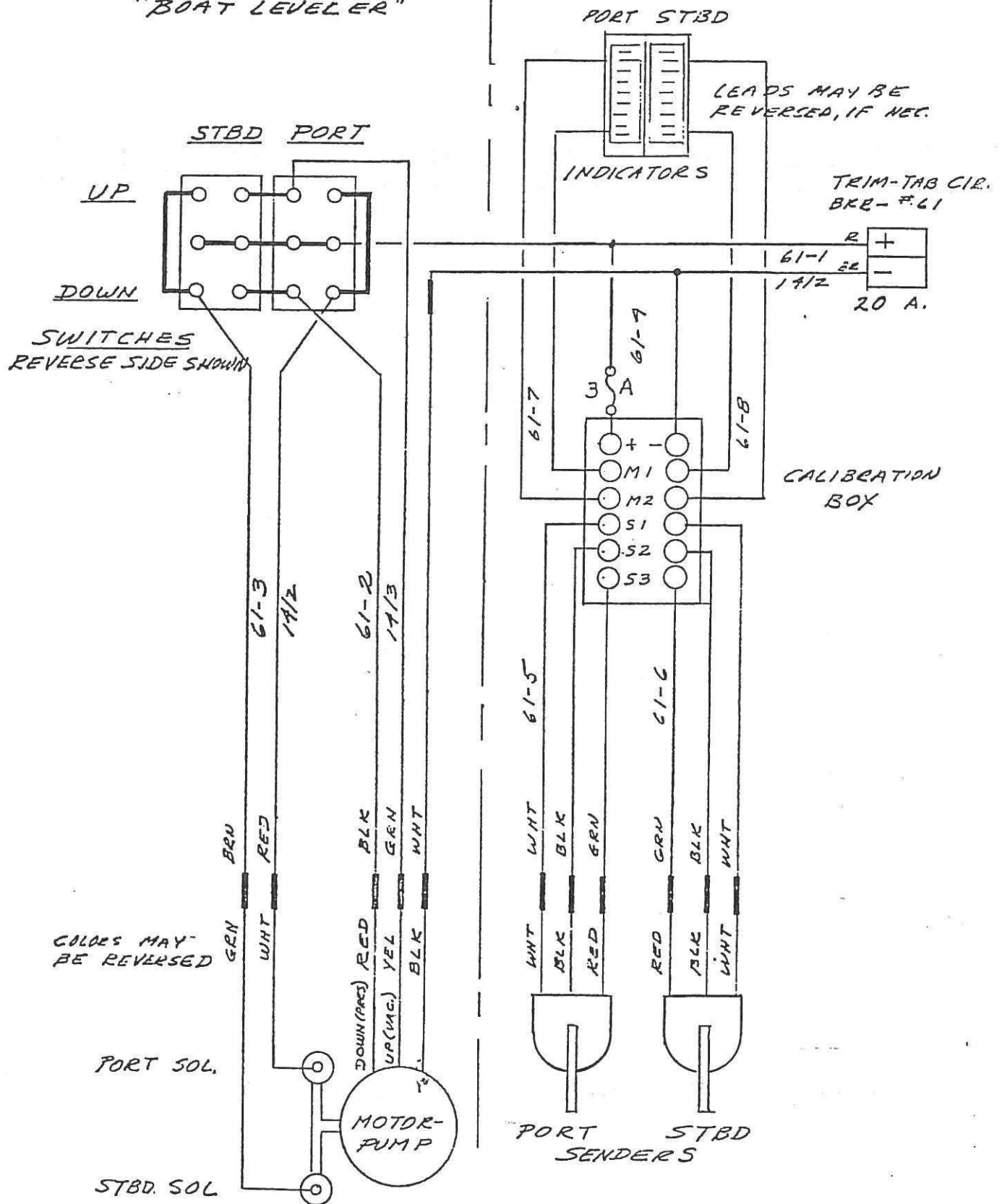


WINDSHIELD WIPER CIRCUITS

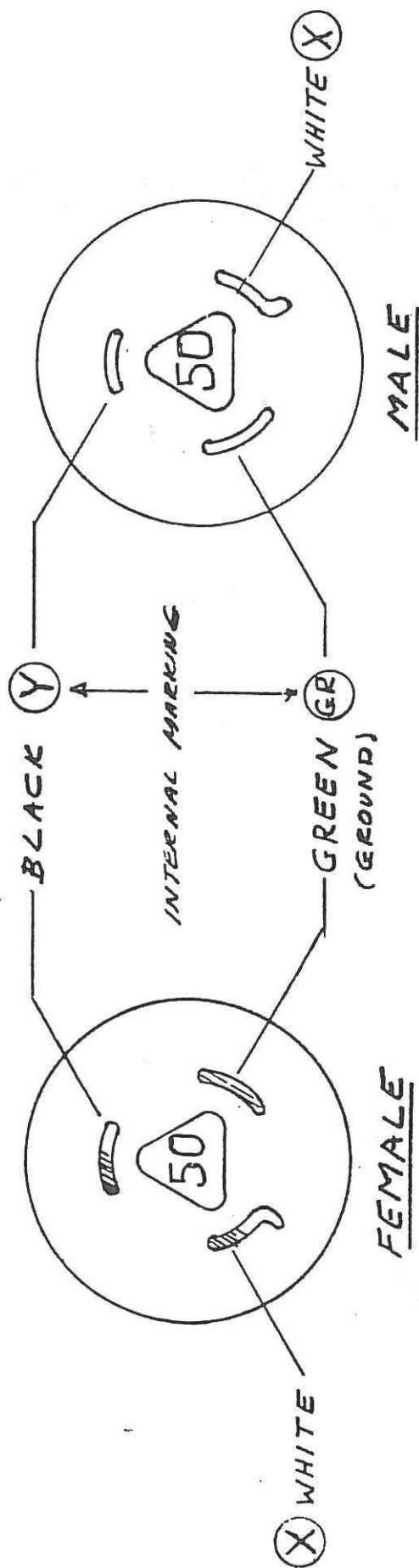


TRIM-TAB CONTROL
(STANDARD)
"BOAT LEVELER"

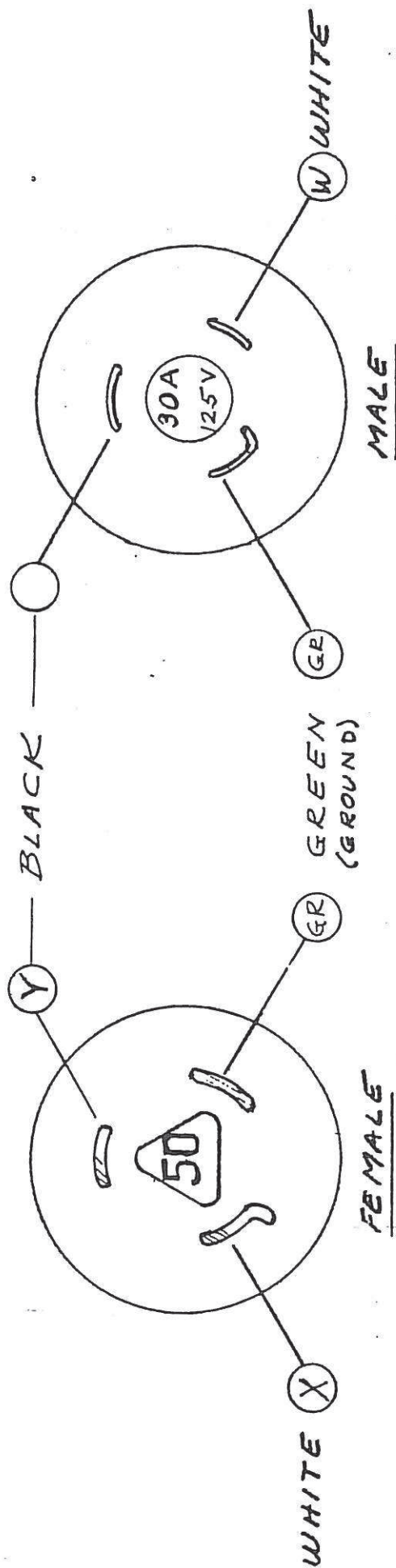
TRIM-TAB INDICATOR
(OPTIONAL) "YACHTMASTER"



TRIM TABS
CONTROLS - STANDARD - INDICATOR (OPTIONAL)

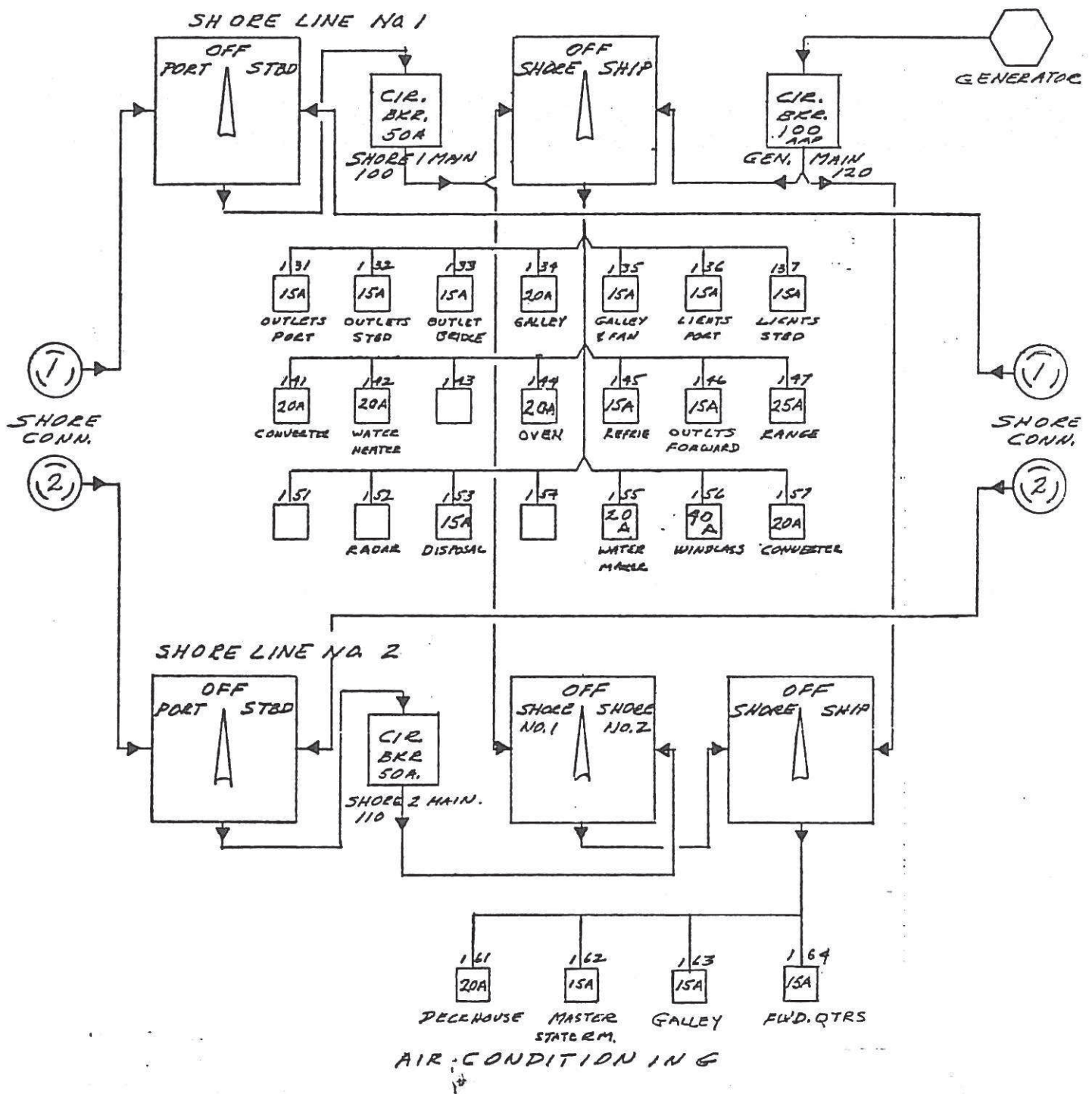


SHORE CORD (50FT) ϕ INLET - 50 AMP - 125 V
2 POLE - 3 WIRE

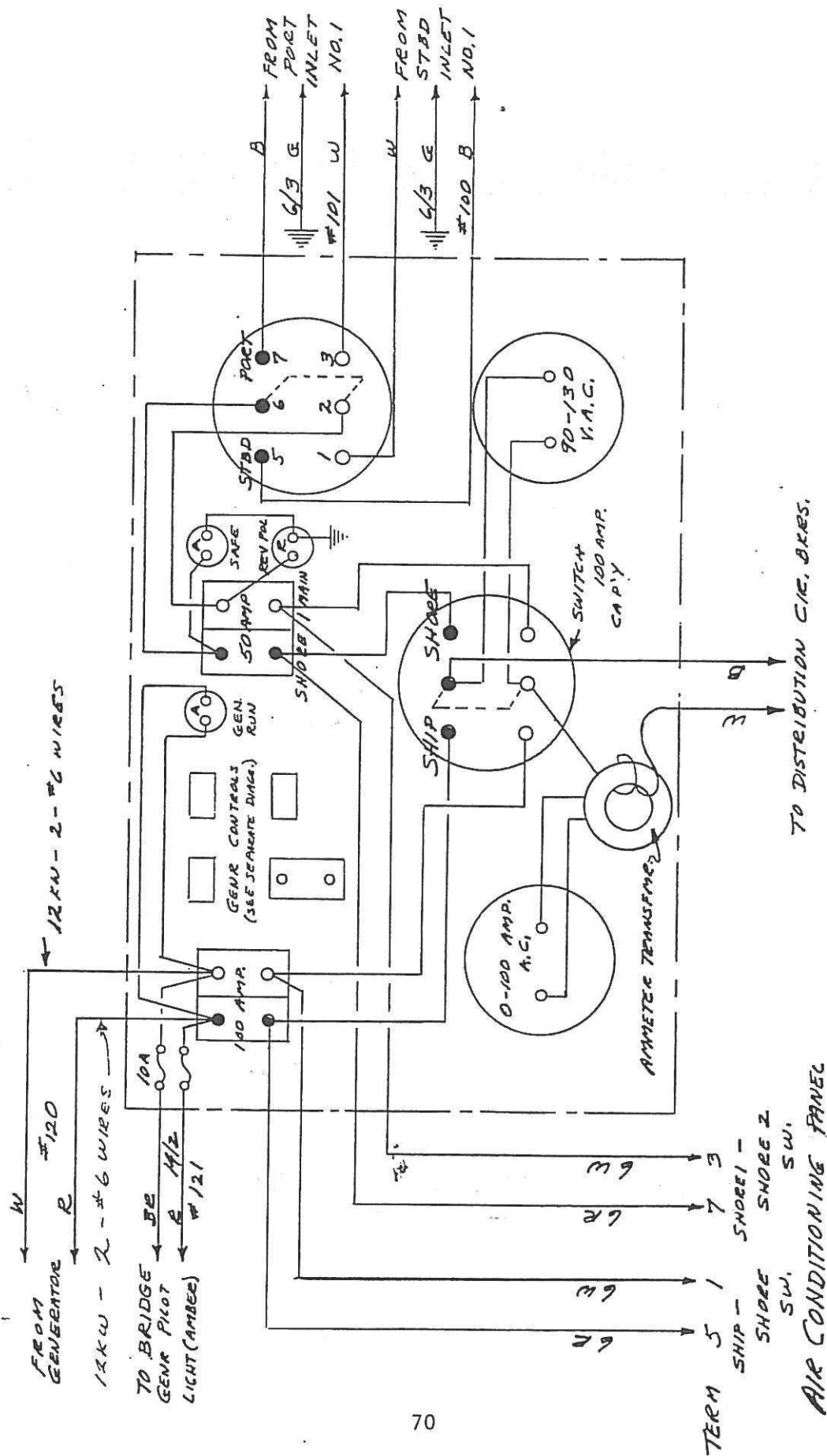


ADAPTER (PIGTAIL) 30 AMP - 125V - 2 POLE - 3 WIRE
TO CONNECT 50A SHORE CORD TO 30A SHORE OUTLET

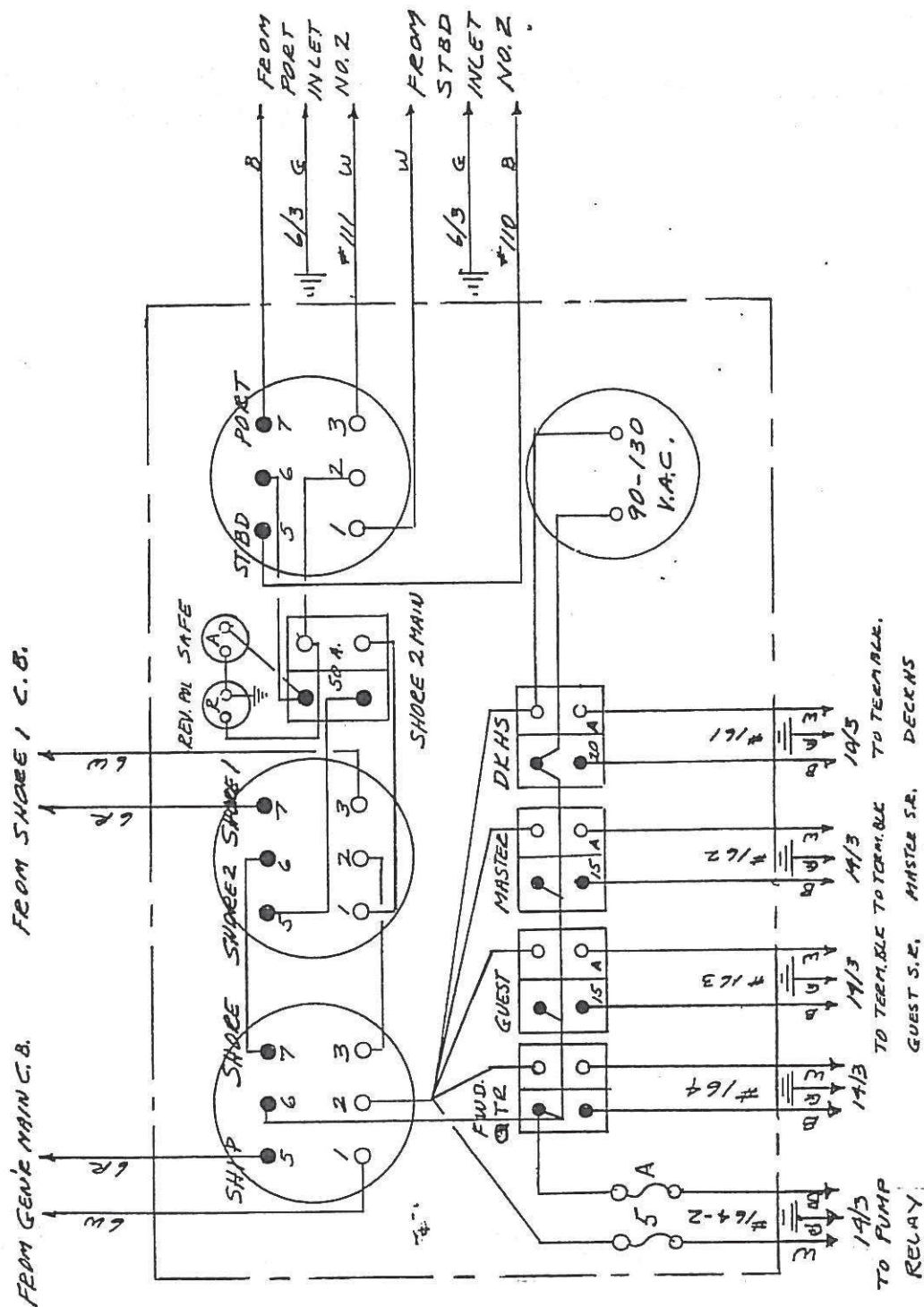
SHORE LINES



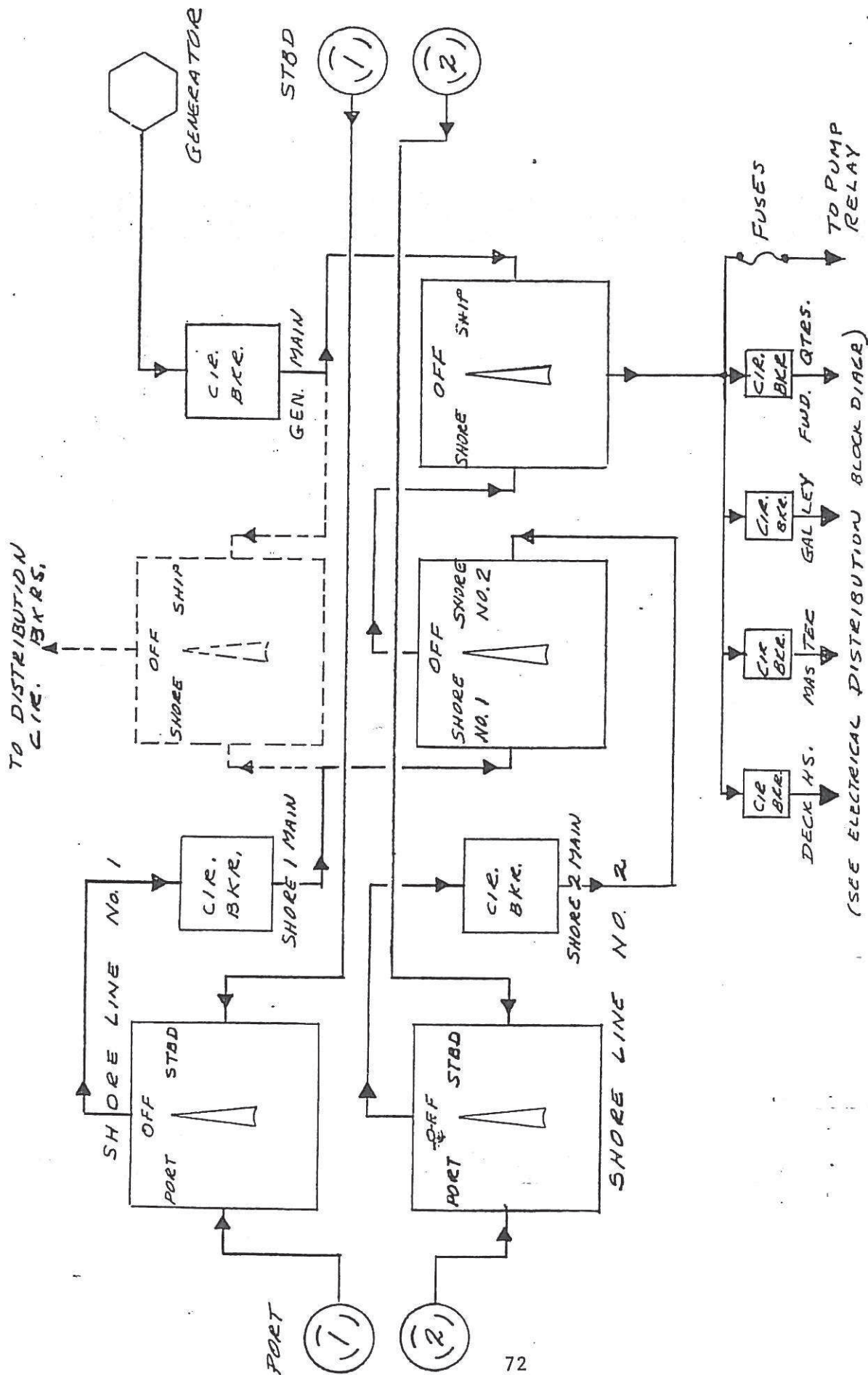
115 V.A.C. DISTRIBUTION PANEL
"FLOW" DIAGRAM



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



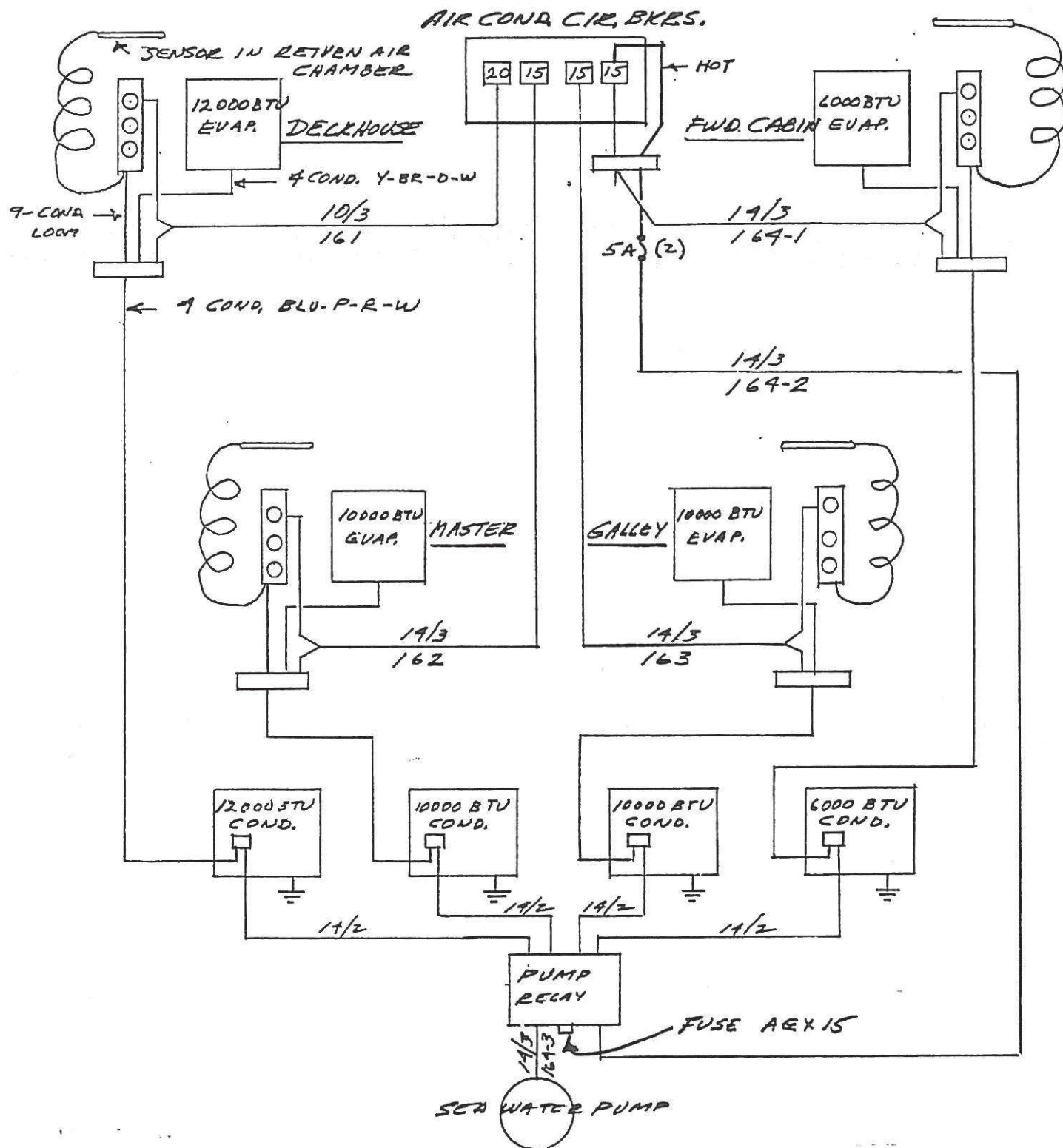
AIR CONDITIONING PANEL
WIRING DIAGRAM
 (BACK VIEW)



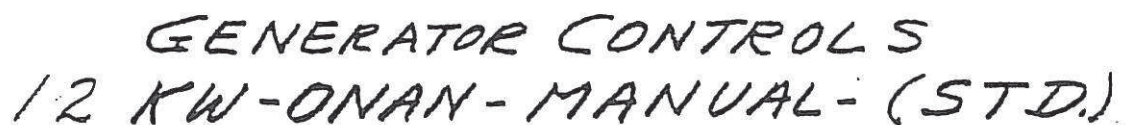
96 FT. YACHT

C.C. HUMPHREY

AIR CONDITIONING
POWER SUPPLY-BLOCK DIAG.

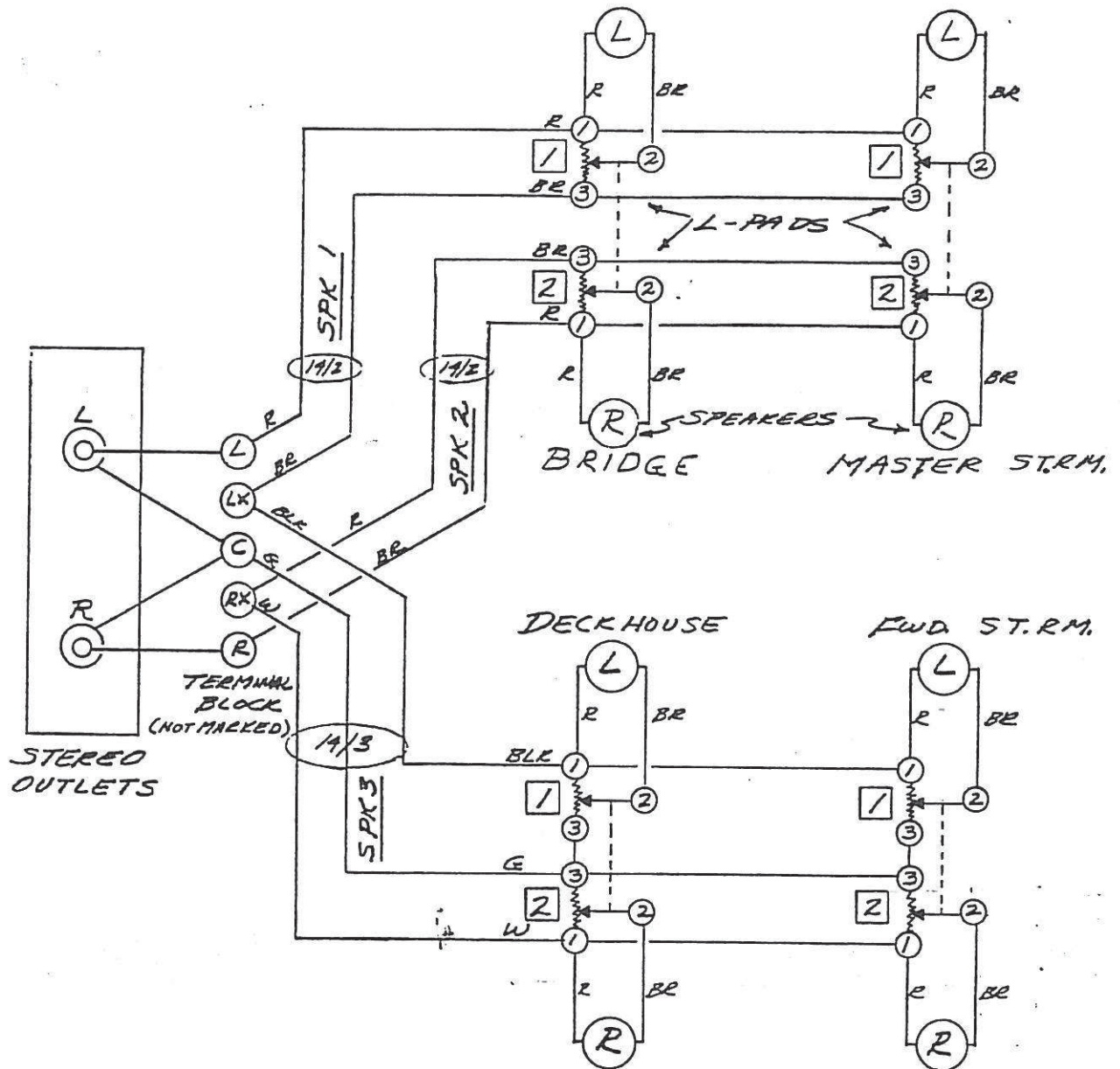
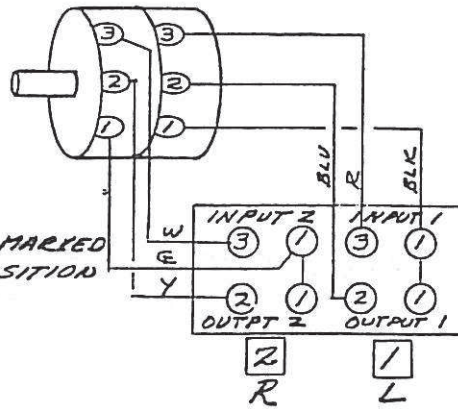


AIR CONDITIONER SYSTEM
ELECTRICAL DISTRIBUTION-BLOCK DIAGRAM



STEREO L-PAD
(AUDIO SHACK 10-979)

TERMINALS NOT MARKED
IDENTIFY BY POSITION



STEREO SYSTEM
SPEAKER CIRCUITS

OPERATION OF AIR CONDITIONING SYSTEMS

Power Sources

You will find complete details of how the 115 VAC power is supplied in previous instructions covering the 115 VAC System. Refer also to the Power Supply Block Diagram and Electrical Distribution Block Diagram that accompany this text.

115 VAC Panel

See Air Conditioning (Item 11) in the instructions, Operation of 115 VAC Panel. This will explain the normal set-up necessary before any of the units can be turned "on" at the thermostat controls.

Mechanical

The four condensers that supply the deckhouse master stateroom, dinette, galley, optional guest stateroom and forward quarters are in the engine room, in the forward starboard corner.

The thru hull valve, strainer and sea water pump are below floor next to drinking water tank. The valve must be open before starting system. The sea water strainer should be clean and sealed. The pump supplies all four 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 four air conditioner circuit breakers (Figure 2 #161, 162, 163 and 164 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 VAC Panel set up as explained previously, turn on the four air conditioner circuit breakers.

B. Turn deckhouse control to "start" and check overboard discharge outlet 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 VAC 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.

D. Repeat operations (b & c) with master stateroom control and then with galley and forward quarters.

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 VAC 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 VAC Electric Panel, after air conditioner is stopped, be sure power is restored before turning any of the local controls to "start" or "run".

Instructions for Operating Reverse Cycle Air Conditioning Units

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.

To put the air conditioner in operation the following steps must be followed and - In the Sequence Given.

(a) All switches and breakers on the distribution panel must be in OFF position; also, the Start-Run switch on the thermostat panel for the air conditioner must be in the OFF position. The fan switch should be in the middle or medium position. When this step has been complied with proceed to the next step. DO NOT PROCEED UNTIL THIS HAS BEEN COMPLIED WITH.

(b) 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 approximately midway through the travel of the knob, if this is heard the thermostat may be set for Heat or Cool according to the individuals own desire. If no clicks are heard, please contact your nearest service man for Crusair equipment. To set the air conditioner for Cooling, turn the thermostat knob all the way to the right; to set the air conditioner for Heat, turn the thermostat knob all the way to the left. If the boat is equipped with two units, both thermostat knobs should be set in the same position. When this step is completed you are ready to proceed to the next step.

(c) Connect the proper pigtail on the shore end of the shore line to match the fittings available on shore, and lock the pigtail on the shore line by turning a quarter turn to the right after the fittings have been pushed together properly. Insert the other end of the shore line into the receptacle on the boat marked "Shore #2", or "Shore Line #1". Then go ashore and connect the shore line to the outlet on the dock. Now return to the boat and check the polarity light marked "Shore #2", or "Shore Line #1" according to which receptacle you are using. If the AMBER light is lit the shore line is connected properly. If the RED light is lit, then the polarity is reversed and the Dock Master should be notified since all lines are checked before they leave the plant to accept standards of the industry. When the shore line is properly connected you are ready to proceed with the start-up of your air conditioning unit.

To use the air conditioner on the ships power the switch marked "Ship" "Off" "Shore" in the air condition section of the electrical panel is put in the "Ship" position, then follow the balance of this procedure leaving the shore line breakers in the "Off" position.

With the Stop-Start-Run knob on each air condition control panel in the "Stop" position, put the main breakers marked "Shore", located on the main electrical control panel, in the "on" position. Then put the switch marked "Shore #1" "Off" "Shore #2" in the "Shore #2" position. Then put the switch marked "Shore" "Off" "Aux" in the "Shore" position. Then put the two (2) breakers marked "Fwd" and "Aft" in the "on" position. You are now ready to start the air conditioning system.

First you go to the engine room bilge and make sure the seacock is open to allow water to flow thru the air condition cooling coil on the compressor. Then you put the deckhouse "Stop" "Start" "Run" control knob on the thermostat panel in the "Start" position and check overboard to be sure that the pump is circulating the sea water thru the air condition compressor/condenser unit. When a good stream of water is coming out of the thru hull put the "Stop" "Start" "Run" knob on the deckhouse unit back in the "Stop" position, then make the same check on the forward unit. When a good stream of water is being discharged from the thru hull, turn the thermostat control on the forward unit to the maximum cool or heat - as desired. Put the fan control knob in the medium position, a good amount of air should be coming out of the discharge grills for the forward unit, if not, check to see that the louvers are open in the discharge grills and the intake grill when the blower is running -- the unit is ready to operate. Now turn the "Stop" "Start" "Run" knob to the "Run" position, in approximately 3 to 5 minutes, according to the temperature, the unit should start discharging hot or cold air, depending on the thermostat knob setting.

Now to complete the start up of the deckhouse unit first set the thermostat control knob to the maximum heat or cool, as desired. Then set the fan control knob in the center (medium) position and turn the "Stop" "Start" "Run" control knob to the "Start" position. Now check to see that a good amount of air is being discharged from the vent(s), if not, check the louvers to see if they are open properly and that the blower is running with the air being discharged then turn the "Stop" "Start" "Run" knob to the "Run" position and in approximately 3 to 5 minutes hot or cold air should be discharged, depending on the thermostat setting.

NEVER turn the thermostat control knob from Hot to Cold with a fast movement of the knob when the unit is in operation as this will cause the unit to malfunction and can damage the unit. The unit will, when the thermostat is set properly, automatically change from heat to cool and back. But if it is to be done manually, the unit should be turned Off for approximately 10 to 15 minutes when changing from heat to cool.

After the unit has been in operation for approximately one hour the thermostat control knob may be moved a little at a time until the desired temperature is obtained, then the unit will automatically maintain the temperature.

If, for any reason, the power is interrupted to the air conditioner momentarily the unit should be turned Off for approximately 10 to 15 minutes before it is put back in operation. It should be turned Off with the "Stop" "Start" "Run" control knob and when the unit is restarted, the knob should be turned to "Start" and circulate the water for approximately 5 minutes. Then turn the knob to "Run" position.

When the air condition units are to be turned Off they should always be turned Off with the "Stop" "Start" "Run" knob by turning the knob slowly to the "Stop" position, then putting the two breakers marked "Air Condition Forward and Aft" in the "Off" position; put the switch marked "Ship" "Off" "Shore" in the "Off" position, then put the breaker Shore #1 or Shore #2, whichever was in use, in the "off" position.

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 over flows 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 blower and leave it running until you start the engines. Start engines after a minimum of five minutes of operating the blower.
7. Close engine hatch and other hatches after main engines and auxiliary generator have been running for some time.

Fuel System

Bertram fuel tanks are molded fiberglass. They are made of fire retardant resins. One is located below the dinette (or optional stateroom), another under the aft cabin sole. Fuel is supplied to engines through a fuel

manifold under step to aft cabin. This allows the engines to be supplied from either tank, or both tanks. Simultaneously, switches return line so that fuel is always returned to the tank from which it is drawing. Auxiliary generator is supplied from forward tank only.

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 where it was designed to be. When fuel level in forward tank reaches about one quarter full, both main engines should be shifted to draw from aft tank. This will retain a reserve amount of fuel in the forward tank for generator operation.

Fuel Priming System

Main Engines

After fuel filters have been changed (be sure they are tight), or dry tank condition has been experienced, the following steps should be taken:

1. Select tank which has fuel. Be sure fuel valve is connected.
2. Return to main control console and turn on both engine on-stop switches.
3. Hold fuel priming switch (located behind throttle controls) for two minutes in direction of engine which you are trying to start.
4. Release prime control.
5. Open throttle control one half on engine which has been primed.
6. Again hold prime switch in direction of engine being started. Start engine as normal, then release prime switch and start switch when engine starts. If engine does not start after one half minute of cranking, stop and repeat step 3 above with on-stop switches on, then follow through with step 6 again. If engine fails to start, double check fuel control valves

for selection of tank which you know has fuel.

Auxiliary Generator

If forward tank has been run dry and generator will not start after filling tank, refer to priming instructions in Onan Operator's Manual.

Main engine priming system will not prime generator.

WATER SYSTEMS

Your boat has two water systems, completely independent of each other. The Fresh Water System supplies all the normal needs for cooking, washing, showers and etc. The Drinking Water System is especially designed to preserve the clarity and untainted taste of the water you prefer for drinking and for ice cubes.

Fresh Water System

Tanks

Two fiberglass tanks, 100 gallons each, 200 gallon total are used. One is under starboard berth in aft cabin, the other is under the dinette sole.

Deckfills

Each tank has its own fill on deck and vent on hull side. 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 Gauges

Fresh Water tank gauges are located in the galley. They will not register unless the Fresh Water Pump circuit breaker on 32 V.D.C. Panel is "on".

The gauge is not accurate while the tank is being filled.

Water Pressure Pump (Galley Maid)

Pump is self-priming after initial start. However, after a long storage period or after winter lay-up, priming may be necessary. If pump does not operate properly after 15 seconds running, stop pump and prime as follows:

How to Prime

1. Disconnect the suction hose from pump inlet. Fill hose to check valve with water. It may be necessary to open petcock at check valve to allow air to escape. Remove plug on pump and fill pump body with water and then connect hose to pump.

How to Start

1. Start pump with switch (switch on pump should not be raised fully unless you wish to stop pump). Automatic pressure switch will take over after pressure builds up to 10 or 11 pounds. One of the faucets should be kept open until water begins to flow, then it should be closed. Bleed air from all other faucets.

Normal Pressures

1. When system is operating properly, pump will shut off at about 32 pounds. When pressure drops below 20 - 21 pounds, pump will start again.

Dry Tank Cut-Off

1. When water pressure drops below 10 pounds, pump will stop (or will not start). This can be caused by a dry tank or by too many faucets being open.

Restart

1. With the dry tank refilled (and faucets closed), use either the start switch on pump or the "restart" switch under Fresh Water Tank gauge. Hold either switch until pressure exceeds 10 pounds, then it may be released. You can judge when 10 psi is, if faucet is open and the water will run after switch is released.

Water Heater

115 VAC Power, CAUTION, 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 water system fully pressurized, open one of the hot water faucets (use the guest shower, if you are not perfectly familiar with the others). When water flows, you will know it is filled. Heater holds 17 gallons.

Heater Controls

When ready to use, be sure circuit breaker is "on" and that switch on heater is "on". Inside this switch box is a thermostat that is pre-set at 150°. There is also a "reset" button that will require pressing if heater overheats. There is also a relief valve at top of heater that will open if pressure exceeds 125 pounds or if hotter than 212°. NOTE, you may also wish to purge the cold system at the same time. Just duplicate the hot system side.

Dockside Water Supply

Near the 115 VAC Shore Inlets, you will find a Dockside Water connection, one on each side of the boat. These are 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".

Drinking Water System

Tank

The 30 gallon stainless steel tank is under sole at extreme forward end of engine room.

Deckfill

Tank has its own fill on deck labeled "Drinking Water" and vent on hull side. Use same caution in filling as described for Fresh Water.

Tank Gauge

Drinking Water Gauge is also located in galley. It will not register unless

the Drinking Water circuit breaker on 32 VDC Panel is "on".

Water Pressure Pump (PAR)

How to Start

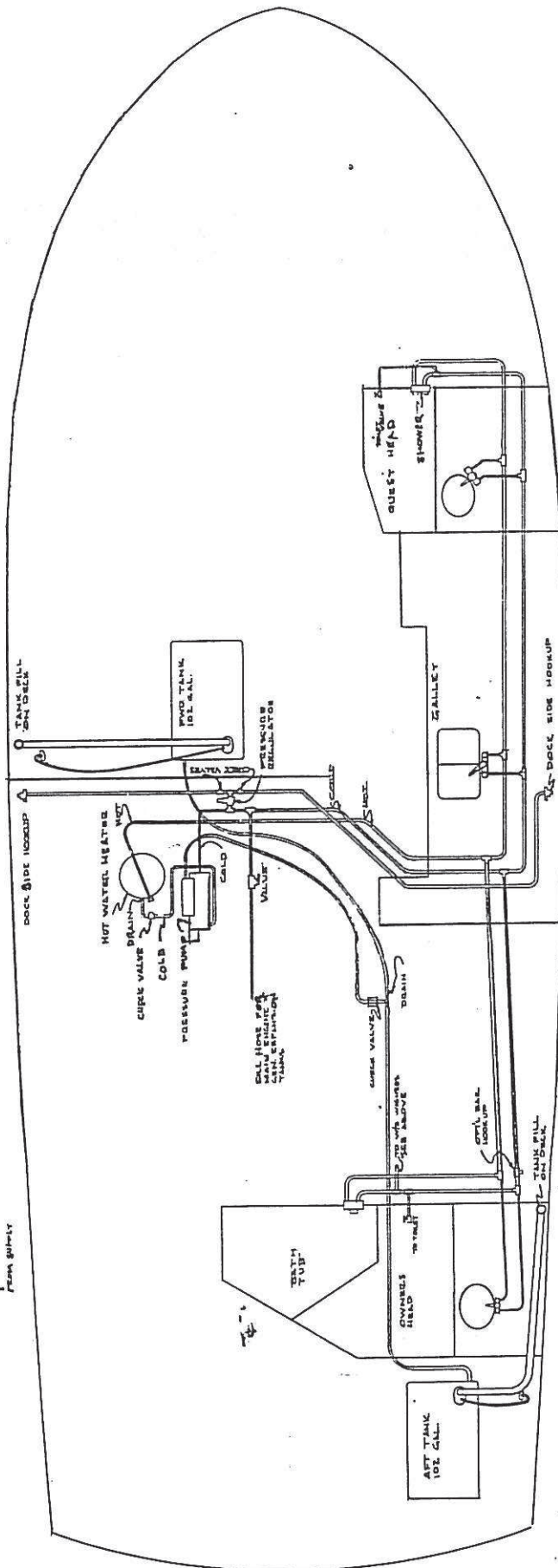
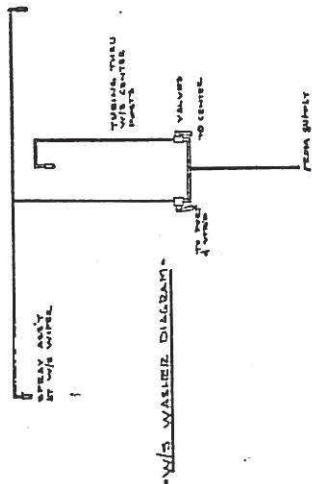
With tank full and circuit breaker "on", open all 3 faucets (4 with optional bar) and hold red button down on dry tank switch (or hold "restart" switch on gauge panel) until all air is cleared from lines. Close faucets, then release button (or switch). This will set contacts in Dry Tank Switch. These will remain closed until tank is dry or pressure drops below 2 psi.

Faulty Operation

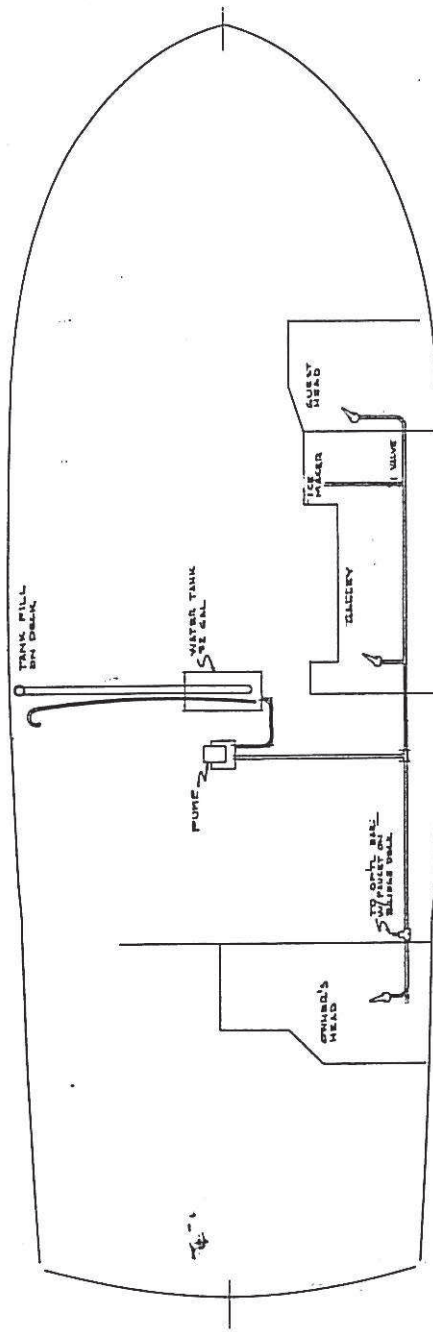
If pump does not operate properly, check PAR Instruction sheet for suggestions.

Winterizing Water Systems

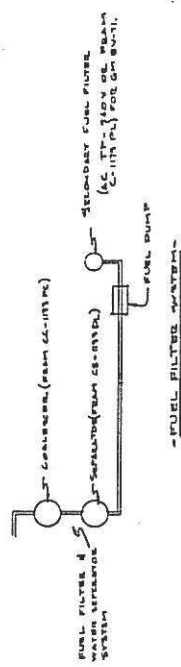
Follow suggestion given in Pump Instruction Sheets and in maintenance section of this manual. If it is desired to drain the 100 gallon tanks, just remove the plug below check valve under engine. Water will drain into the bilge, where it can be pumped out with the Bilge Pump. Also, open drain petcock at check valve. On the 30 gallon tanks, just remove the plug from the bottom and allow the water to drain out and it will be pumped out by the bilge pump.



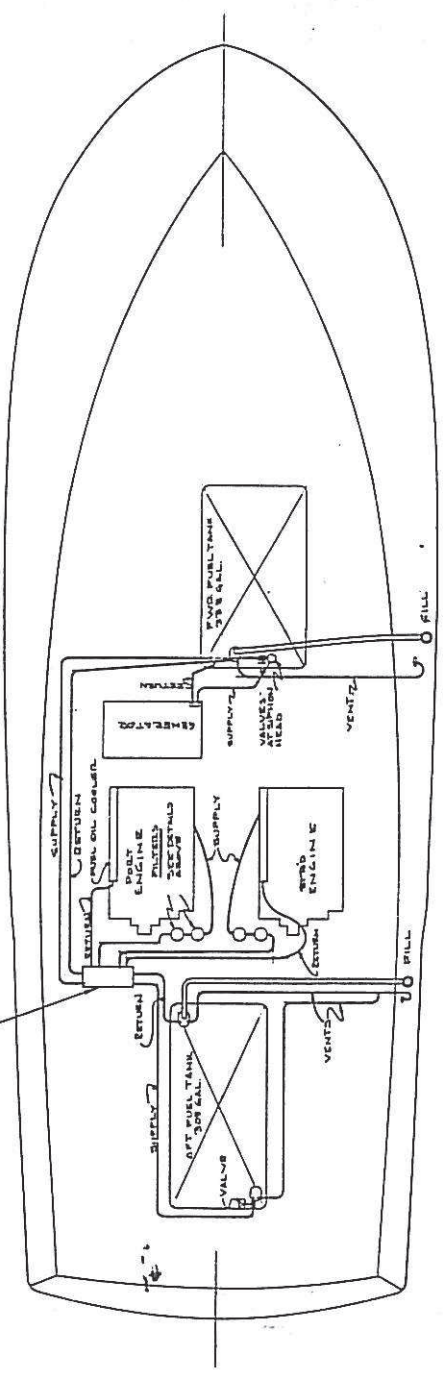
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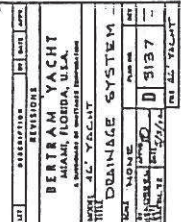


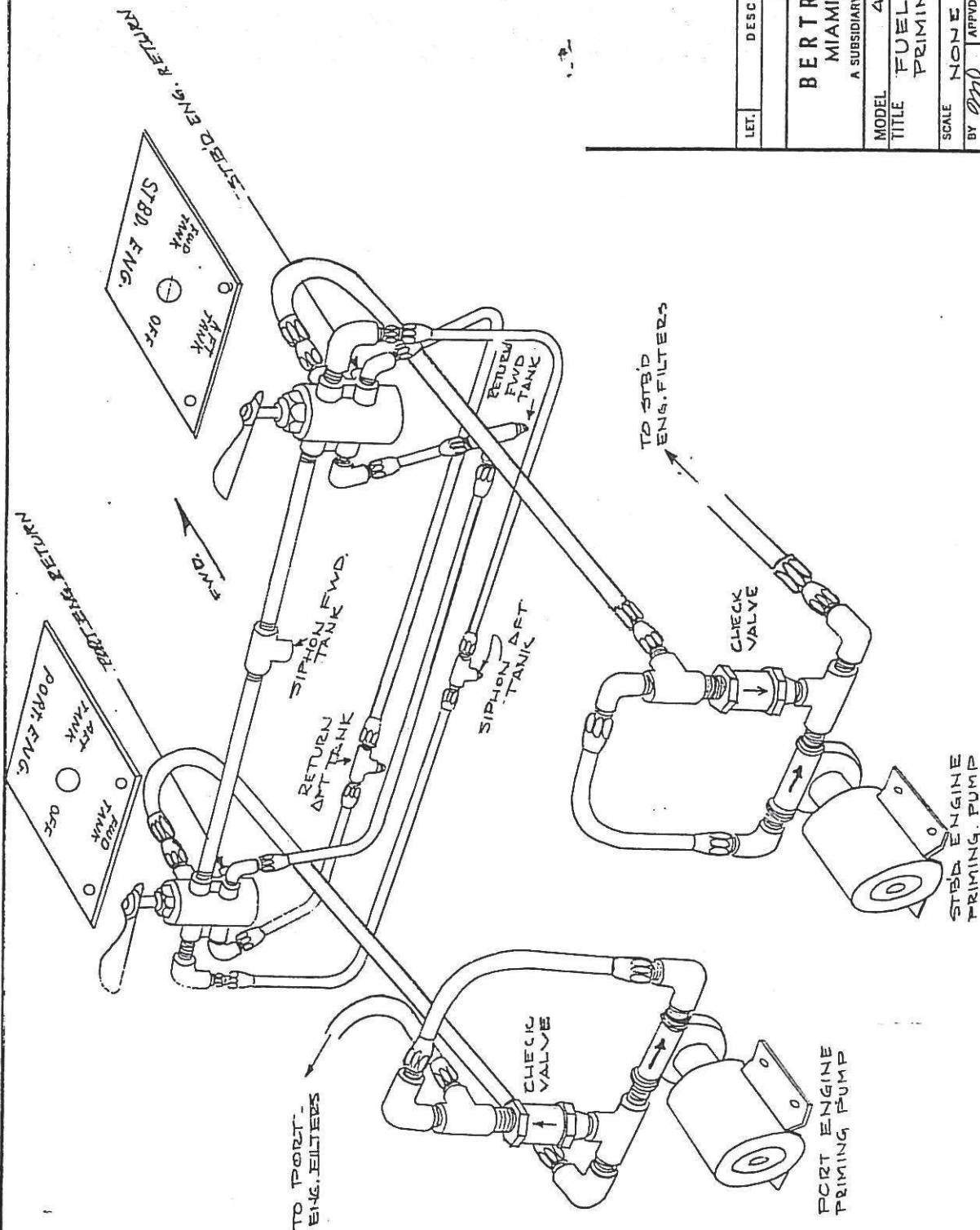
FUEL MANIFOLD
SEE DWG. A-



NOTES:
FUEL TANK FILL LINE - 2" ID HOSE
FUEL TANK VENT LINE - 1/2" ID HOSE
FUEL TANK TO FUEL MANIFOLD (SUPPLY) - 1/2" ID HOSE
FUEL MANIFOLD TO ENGINE (RETURN) - 1/2" ID HOSE
FUEL MANIFOLD TO ENGINE (SUPPLY) - 1/2" ID HOSE
FUEL TANK TO GENERATOR (SUPPLY) - 1/2" ID HOSE

REV	DESCRIPTION	BY	DATE
1	REVISIONS		
BERTAM YACHT MIAMI, FLORIDA, U.S.A. A DIVISION OF BERTAM CORPORATION			
DIESEL FUEL SYSTEM			
REV	NO	DATE	BY
1	1	3/3/8	
100 22' YACHT			





LET.	DESCRIPTION	BY	DATE	APPV.
REVISIONS				
BERTRAM YACHT				
MIAMI, FLORIDA, U.S.A.				
A SUBSIDIARY OF WHITTAKER CORPORATION				
MODEL	46' YACHT			
TITLE	FUEL MANIFOLD & PRIMING SYSTEM			
SCALE	NONE	PLAN NO.	B 3144	REV.
BY	920	APPV.	5/6/72	
DATE	4 MAY 72	DATE	5/7/72	
FILE 46' YACHT				

TOILET OPERATION

Electricity

Aft toilet, forward toilet, and Fresh Water Pump DC circuit breakers should be "on".

Starting Pump

Push start switch and release - green light will come on in about 30 seconds.

Adding Water

Extra water in bowl is recommended for defection - Lift foot pedal or press lever toward back of toilet.

Flushing

Press foot pedal down or press lever toward front of toilet. Hold until all waste is gone - then release. Be sure ball valve is completely closed and water has stopped running.

Tank Full

When red light comes on, only room for 4 or 5 flushes remain. Be sure to notify captain so tank can be pumped out at the earliest opportunity.

Pump Out

When pumping out the holding tank ball valve in bowl must be kept open.

Caution

Do not use for disposal of paper towels, facial tissues, sanitary napkins or cigarette butts.

Toilet Pump-Out (Overboard Discharge System)

Each toilet and its vacuum-holding tank must be pumped out separately.

1. Keep ball valve open in toilet bowl while pumping-out.

2. Water supply to toilet may be shut off - to conserve fresh water or to prevent toilet overflow. Before pump out is finished, water should be added to rinse out system.

3. To pump overboard -

- A. Open thru-hull seacock
- B. Open valve between pump and one tank
- C. Turn on discharge pump
- D. When empty - open valve to other tank and close first valve
- E. When both tanks are empty - turn off pump, close tank valve and close seacock.

4. To recharge system -

- A. Close ball valve in toilet
- B. Turn on water supply
- C. Pour 1/2 gallon of clorox in each toilet
- D. Push start button - when green light comes on flush toilet
- E. Make sure water has stopped flowing and ball is sealed tight

Deck Pump-Out

In Prohibited areas overboard discharge should not be used.

- A. Open waste fitting on deck and attach to pump out station.
- B. Repeat operations 1, 2, and 4 as listed for overboard discharge
- C. Make sure waste fittings on deck are sealed tight

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, a pump assembly, and a complimentary set of wiring cables.

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 such annoying conditions. When properly installed with provision for dockside discharge of waste, the Vacu-Flush System meets requirements of current anti-pollution laws in effect or soon to become effective in most states.

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 should be added to the first flush operation following pump-out of the holding tank. This Chemical helps keep the sewage lines clear and reduces 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.)

<u>Holding Tank Capacity</u>	<u>Number of People</u>									
	1	2	3	4	5	6	7	8	9	10
<u>12 Gallons</u>	20	10	6	5	4	3	3	2	2	2
<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.

1. Place the System Master Switch in the ON position.
2. Before using the toilet, press the push button marked "Push to Start". (This starts pump to build vacuum for flushing toilet.)
3. With toe, lift flush pedal on toilet base to admit approximately 2 inches of water into the bowl.
4. Use toilet.
5. When light marked "Vacuum Ready" comes on, the toilet is ready for flushing.
6. Flush toilet by pressing down on flush pedal with foot. Hold down flush pedal until sewage clears the toilet.

Note, flushing the toilet shuts off the vacuum pump. Anytime sewage fails to clear toilet, it will be necessary to repress 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 base. Contents cannot be pulled into the tank if the ball seal is allowed to close before cycle is completed.

Caution, do not deposit sanitary napkins or other non-desolving items in the Vacu-Flush toilet. Use only regular toilet tissue. Do not deposit facial tissue, wet strength tissue or paper towels.

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 seacock 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 into holding tank.

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.

CAUTION, use only Mansfield Sanitary Hiotrol Chemical formulated specifically for the Vacu-Flush System. This chemical will protect against pump-out odor and will provide protection against bacterial growth of the sewage.

IMPORTANT, use of any chemical product other than Mansifeld Hiotrol 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

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 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.

Vacuum Pump Master Switch

Should your Vacuum System develop a leak, the Master Switch should be turned to the OFF position.

With the Master Switch wired in accordance with installation instructions, the switch may be used to turn off the probe alarm light if the holding tank becomes full when away from a pumping station.

The Master Switch should also be turned off when you are away from the system for extended periods of time.

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.

VACU-FLUSH INSTALLATION 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 the 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 20 seconds on an empty 12 gallon tank and 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 of its own accord, within one minute, thirty seconds.

Engine Compartment Blowers

There are two engine compartment blowers, one located on the starboard side of the hull in the deckhouse and the other is near the generator. They are powered by the 32 volt section of the Bertram Electrical Panel. The switches to operate the blowers are located at the bridge control panel and the corresponding circuit breakers are on the Bertram Electrical Panel. The blowers should be run for at least five minutes before starting the engines and after the engines have stopped until no more fumes are present in the engine compartment.

Electric Bilge Pumps

There are three electric bilge pumps installed: one aft near transom; one in the engine room between the engines; and one under the hatch in the forward cabin. All pumps are powered by the 32 volt system, and are controlled from the 32 volt panel by a circuit breaker that operates separately from the main breakers. The aft bilge pump discharges through hull side on the starboard side aft and the forward bilge pump discharges through the hull side on the port side forward. Additionally, the engine room pump discharges through the starboard side of the hull.

Bilge Sump Pump

The center bilge pump is located forward of the starboard engine. It picks up water from a strainer in the keel near aft end of engine room. This is a PAR Pump. It will keep the bilges dry automatically (breaker 33 controls this pump). If the pump is running, the light over the breaker is "on". The automatic switch is located under the aft cabin steps. It is actuated by an air pressure valve located next to the strainer. Bell must be kept clean.

Shower Sump Pump

There is one shower sump pump installed. The pump is under the forward toilet sole. The discharge is in the hull side forward on the port side. The automatic float switch in sump tank should be checked periodically.

Bathtub Sump Pump

A similar sump pump is installed under the hatch in aft toilet floor. Discharge for the pump is on starboard side of hull.

Windshield Wipers

The windshield wipers on the bridge windshield are powered from the 32 volt section of the Bertram Electrical Panel. The "Master" and "Wiper" breakers must be on to operate. The wiper is turned on and off at the control console. Each wiper has a separate switch.

Horn

The horn is installed on the starboard side of the bridge and is electrically energized by 32 volt power from the battery. It opens an elect valve that allows CO 2 to flow to the horn. The horn is controlled by a switch on the bridge control panel and the 32 volt section of the circuit breaker panel marked starboard engine circuit. The CO 2 tank should last about six months, however, keep a check on the gauge pressure.

Galley Freezer and Refrigerator

The freezer refrigerator is an 18 cu. ft. GE with automatic ice maker. Power is obtained from the 115 VAC section of the distribution panel.

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. Never start engines without first running bilge blower and checking the bilge by smell for fuel vapor.
3. Make sure the seacock or valve for the engine cooling water is open. The rubber impellers in the pump will not last long when run dry.
4. Make sure the fuel valves at the tanks and at the engines are open.
5. Check engine and reverse gear oil. Make sure they are at the proper level.
6. Check water level in expansion tank of fresh water engine cooling.

Starting Instructions

1. Main or master breaker must be in "on" position. (Port battery main and starboard battery main.)
2. Circuit breaker marked ENGINE must be in "on" position. (Port engine and starboard engine.)
3. Check clutch control lever to insure that clutch is in neutral.
4. On-Stop switch to "on" position.
5. Actuate start switch till engine starts. Note, do not hold starter switch down for more than 20 seconds, or damage will occur to the starter motor.

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 to 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 turn On-Stop switch to STOP. There is, in addition, 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 from the after end of the engine blower, by turning a small projecting handle that re-opens the air valve inside the blower inlet housing. For further details see GM 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 switch and lower the angle of trim to approximately $4\frac{1}{2}^{\circ}$. Take note of your engine RPM's at maximum angle of trim. Then cruise either under that speed or over it. As a rule, top cruising speed RPM should be 10% to 15% less than the top RPM. Consult your engine manual included in the back.

Speed, RPM, and fuel consumption are indicated in the enclosed graph. These were obtained on actual tests of boats similar to yours under ideal

MODEL: 467

POWER: TWIN 5M 8V-71T I (N-90)

P.G.: 2.1

PROP: 28X32 (9040)

DISPLACEMENT: NORMAL CRUISE - 42,600 #
INCLUDES FLYBRIDGE, SWIM PLATFORM, FURTER BAR
AS OPTIONS. LOAD: 2/3 FUEL, 2/3 WATER,
6 PEOPLE & 1500 # GEAR AND/OR ADDITIONAL
OPTIONAL EQUIPMENT.

DISPLACEMENT

42,600 # W.O.T. - 28.4 MPH
CRUISE - 23.9 MPH
45,600 # W.O.T. - 27.4 MPH
CRUISE - 24.2 MPH
47,400 # W.O.T. - 26.2 MPH
CRUISE - 23.9 MPH
49,200 # W.O.T. - 25.1 MPH
CRUISE - 22.0 MPH

RANGE AT 2100 RPM IN CRUISE WINDT:
429 STATUTE MILES. DOES NOT INCLUDE
GENERATOR USAGE.

NOTE: TESTS CONDUCTED
UNDER IDEAL SEA
CONDITIONS WITH
A CLEAN BOTTOM.

TESTED BY: A. HUNES
G. KREIDER

APPROVED BY: *[Signature]*

DATE: 15 JUNE 72

30

25

M P H

20

15

1500

2000

RPM

2500

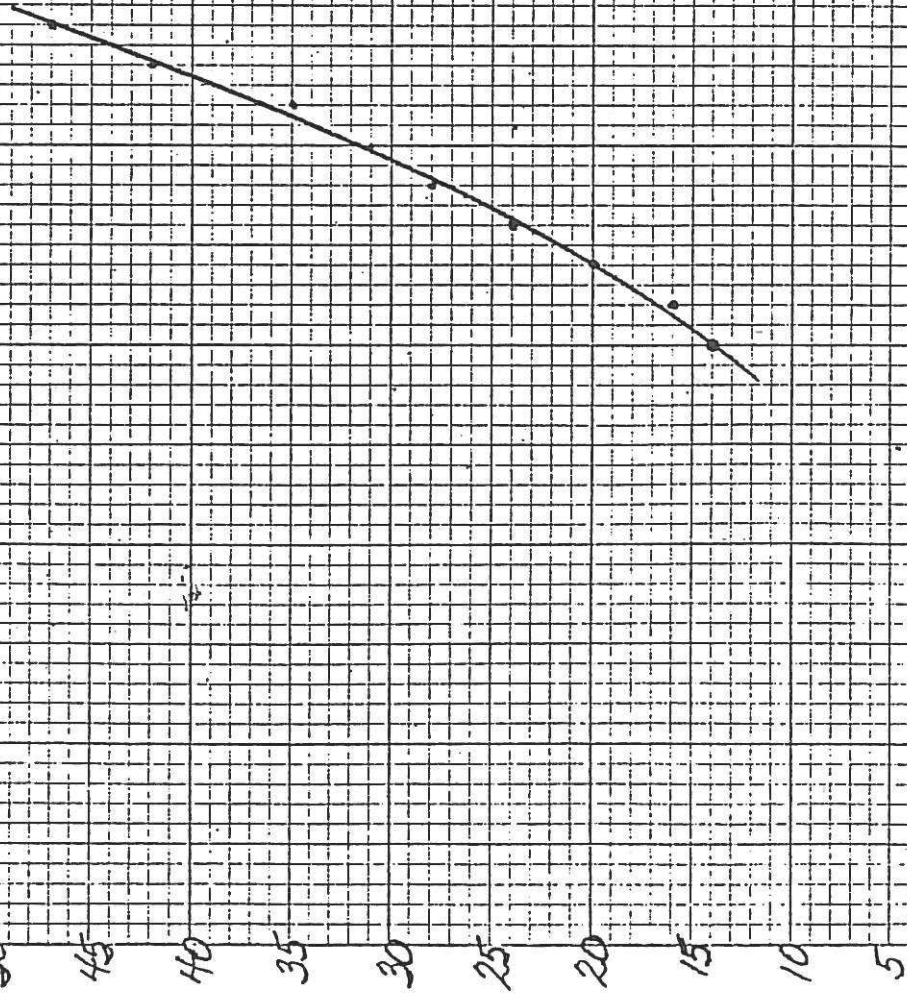
3000

GM DIESEL 8V-71TT (N-90)

TWIN SCREW

435 BHP - 425 SHP PER ENGINE

NOTE: FUEL CURVE FOR TYPICAL PROPELLOR
DEMAND. TAKEN FROM ENGINE MANUFACTURER'S
FUEL CURVES, NOT FROM ACTUAL BOAT TESTS.

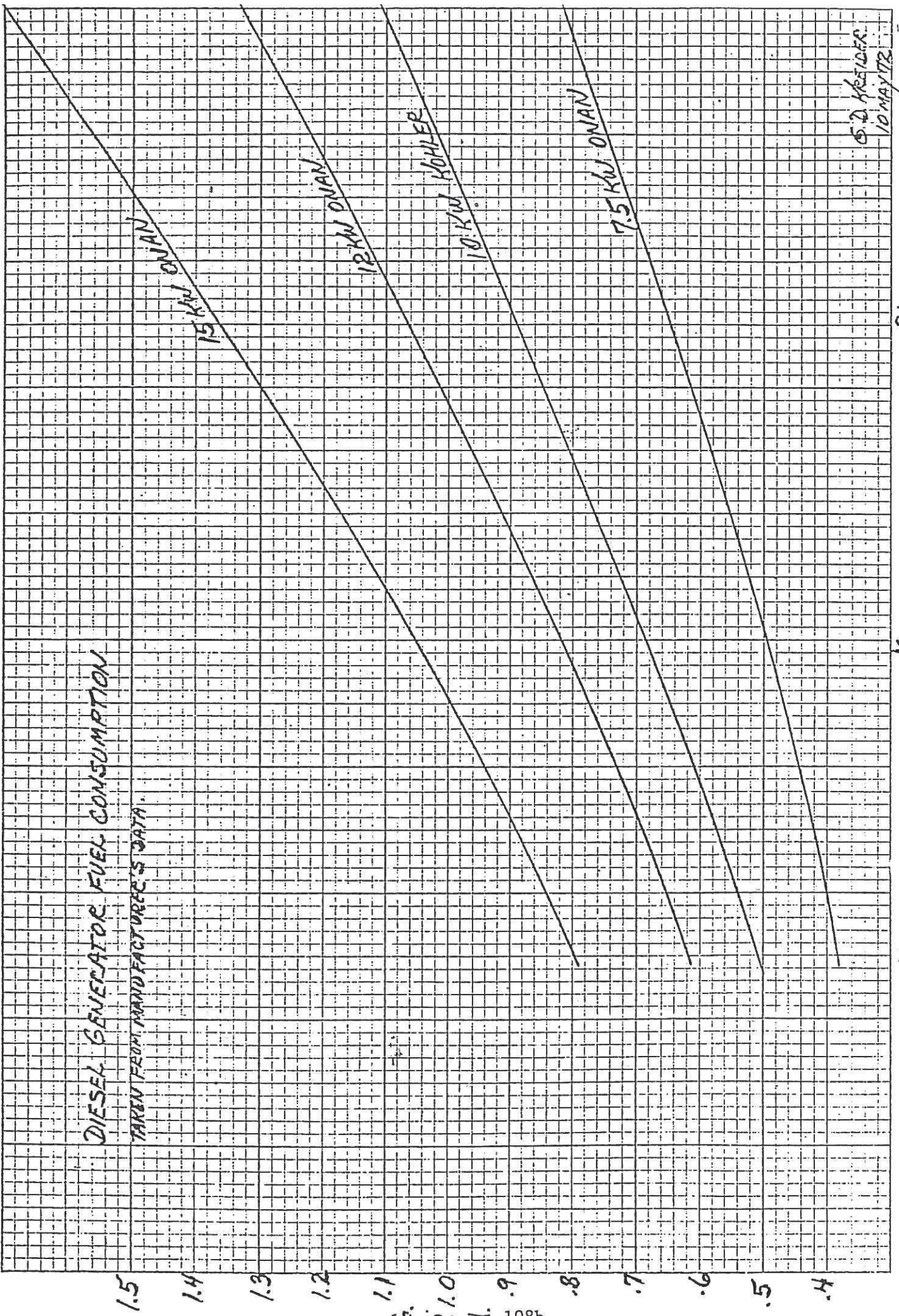


G.D. KREIDER
12 MAY 72

500 1000 1500 2000 2500 3000 3500 4000
RPM

DIESEL GENERATOR FUEL CONSUMPTION

TAKEN FROM MANUFACTURER'S DATA.



S.D. KREIDER
10 MAY 72

3/4

1/2
1.000

1/4

FULL

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 temperatures. 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 Ports Away from Home

You are not likely to have trouble with shore current in the United States. (However, you should be somewhat careful when using 30 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 section on Electrical Systems 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.

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. When living dockside, be sure any water hookup bypasses your own system, unless you have fitted it with a pressure valve.

(See section on Water System for your boat.)

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.
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 pump 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 or valves.
4. Turn off all fuel valves.
5. Open vent in deck hatches.
6. Crack window in deckhouse for ventilation.
7. You may wish to leave refrigerator or freezer running.

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.

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).

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 plate or transducer.

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 from your Bertram 46 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).

MAINTAINING YOUR BERTRAM

Care of Fiberglass Construction

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 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.

