

**BERTRAM 30**  
**MODEL 303 EXPRESS**  
**AND**  
**MODEL 304 FLYBRIDGE CRUISER**

**OPERATOR'S MANUAL**

**P/N 18A8440**

QUALITY CONTROL CERTIFICATION

I Certify that Hull \_\_\_\_\_ has been manufactured and equipped in accordance with all applicable specifications and that all work has been completed, in accordance with good building practice and workmanship.

\_\_\_\_\_  
INSPECTOR

\_\_\_\_\_  
QUALITY CONTROL MANAGER

\_\_\_\_\_  
DATE

## A WORD OF WELCOME

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

Your Bertram is built with fine, modern materials and is manufactured to Bertram's demanding quality standards. It comes to you as a factory-tested and inspected boat.

As durable as its 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 Operator's Manual, containing a wealth of detailed information, has been prepared for your particular model as a guide for keeping it in good operating condition.

To fully enjoy your Bertram, you should understand it 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.

In addition to this manual you will find the following packets of information: (These are normally stowed with this manual in the galley area.)

1. Wiring Diagrams.
2. Manuals and Instructions supplied by the various Equipment Manufacturers.

The above information will not only help you to better understand your boat's systems but will be indispensable to service people when servicing your Bertram.

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.

## GETTING ACQUAINTED WITH YOUR BERTRAM 30

### GENERAL

The Bertram 30 is offered in two basic styles, Model 303 Express has the control station in the cockpit, while Model 304 Flybridge Cruiser has the control station on the flybridge.

Otherwise, the arrangement of cockpit, cabin spaces and machinery spaces are identical. Mechanical and electrical systems are the same on both models.

### COCKPIT

Upon boarding your boat, you will notice the spaciousness of the cockpit. Two hatches aft provide access to the lazarette space which contains the rudder equipment and the hydraulic steering cylinder. The aft bilge pump and filters are accessible through the starboard hatch. The trim tab pump assembly can be reached through the hatch.

A small centerline hatch provides access to the fuel tank fittings and the fuel gauge sender. A fixed hatch is provided over the optional generator which can be removed if necessary.

The engine boxes are hinged for access to the top and outboard side of each engine. On the Express Model the forward end of each engine box can be lifted off after the aft hinged portion is opened.

On each side of the cockpit is a storage locker. The standard shore power inlet panel is located at forward end of the starboard locker with a notch at aft end of locker door for the shore power cable. If your boat is equipped with air conditioning, a No. 2 inlet and shore cord is installed in the port locker.

### ENGINE ROOM

Access to the engine room is provided by a hatch between the engine boxes.

The optional auxiliary generator is located at aft end of engine room. If generator is not installed an optional fuel tank can be installed to provide extended cruising range (Gasoline models only).



The following equipment is located in the engine room:

Exhaust Blowers (2) with Gasoline Generator (3)  
Bilge Flood Switch  
Garboard Drain Plug  
Batteries for engine starting and ship service  
Bilge Pumps (2) with Automatic Float Switches  
Steering System Reservalve  
Battery Disconnect Switches (2) with Generator (3)  
Main Fuses for Distribution System  
Fresh Water System Pressure Pump  
Fixed Halon Fire Extinguisher (Optional)  
Optional Toilet Treatment System  
Optional Air Conditioning Seawater Strainer, Seawater Pump  
and Compressor  
Optional Converter (Battery Charger)  
Optional Washdown Pump

#### CABIN INTERIOR

Now that you have identified the principle equipment in the engine room, let's get acquainted with the cabin area.

The fresh water tank is located below the cabin sole at the aft end. The companionway step is hinged to provide access to the tank fittings and the direct-reading water level gauge.

The water heater for the fresh water system is located below the aft dinette seat.

The 12VDC and 120VAC Distribution Panels are concealed by a door under the forward dinette seat.

Hatches in the cabin sole are provided for access to the Shower Sump and its Automatic Float Switch, the Forward Bilge Pump and its Automatic Float Switch and the Float Switch for the Bilge Flood Alarm System. Toilet System Discharge equipment is also located below the cabin sole.

The dinette converts to a double berth. The table is supported by a pneumatic cylinder which has a handle that permits clamping the table at various heights. For sleeping, the table should be at the lowest level, the forward and aft seat cushions should be turned over to make them level and the outboard seat backs placed on the table top.

## CONTROL STATION

The Flybridge Cruiser has all operating controls on the flybridge.  
The Express has them in the cockpit.

Complete details for starting, engine controls, instruments, switches and steering will be found in Section C of this manual.

## WARNINGS & CAUTIONS

Throughout this manual you will find special information that will alert you to possible dangers. Observe them carefully. "WARNING" (outlined in a border) and "CAUTION" labels do not alone, eliminate the dangers that they signal. Your close attention to the label instructions, plus "common sense" operation, are major accident prevention measures.

### WARNING

Failure to follow a WARNING may result in bodily injury.

### CAUTION

Non-compliance with CAUTION instructions may result in failure or damage to the product and/or equipment.

### SAFE BOATING

If this is your first boat or you feel you need to be brought up-to-date on Rules of the Road and safe boat handling, we suggest you take the course offered by the U.S. Coast Guard Auxiliary which is available in most areas.

Also recommended is the course offered by the United States Power Squadron.

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BOAT DATA SHEET

MODEL 30

\_\_\_\_\_  
NAME OF BOAT

\_\_\_\_\_  
OWNER'S NAME

\_\_\_\_\_  
OWNER'S ADDRESS

\_\_\_\_\_  
HAILING PORT

\_\_\_\_\_  
HULL NUMBER

\_\_\_\_\_  
REGISTRATION NUMBER

30'-7"  
LENGTH OVERALL

11'-4"  
BEAM

3' (Approx.)  
DRAFT

274 U.S. Gal. (Usable)  
FUEL CAPACITY

61 U.S. Gal.  
WATER CAPACITY

\_\_\_\_\_  
DOOR KEY NUMBER

MEASUREMENT TONNAGE

WEIGHT

GASOLINE

DIESEL

GROSS 12.53

LIGHT

14,500

15,200

NET 10.03

HEAVY

16,000

16,800

TECHNICAL DATA

ENGINES

Manufacturer:

Model:

Fuel Filter:

Make & Element No.:

1.

2.

3.

Lube Oil Filter:

Make:

Element No.:

PORT ENGINE

Serial No.:

Gear Serial No.:

ENGINE BATTERIES

Manufacturer:

Voltage:

AUXILIARY GEN. No. 1

Manufacturer:

Serial No.:

Fuel Filter:

Make:

Element No.:

AUXILIARY GEN. NO. 2

Manufacturer:

Serial No.:

Fuel Filter:

Make:

Element No.:

AUXILIARY GEN. BATTERIES

Manufacturer:

Voltage:

Gear Manufacturer:

Gear Model:

Gear Ratio:

Gear Oil Filter:

Make:

Element No.:

STARBOARD ENGINE

Serial No.:

Gear Serial No.:

Model:

Capacity:

Model:

Lube Oil Filter:

Make:

Element No.:

Model:

Lube Oil Filter:

Make:

Element No.:

Model:

Capacity:

PROPELLERS

Manufacturer:

Number:

No. of Blades:

Port Rotation: LH

Bertram P/N Port:

Style:

Pitch:

Material:

Starboard Rotation: R.H.

Bertram P/N Stbd:

PROPELLER SHAFTS

Material:

Length:

Diameter:

Bertram P/N Each:

## CONTROLS AND INSTRUMENTS

### SWITCHES

#### BATTERY POWER

Check first to see that both Main Battery Switches are on. These feed power to the 12 Volt Distribution Panel in the main cabin. Turn on the Port and Starboard Engine circuit breakers. These breakers being inside the cabin, which can be locked, prevent unauthorized use of the boat. Also turn on the Horn and Blower breakers and any others that may be needed.

#### BEFORE STARTING ENGINE

Turn on Blower switch at helm station, allow blowers to run at least 4 minutes before starting engines.

#### WARNING

GASOLINE VAPORS CAN EXPLODE  
BEFORE STARTING ENGINE OPERATE BLOWER FOR 4 MINUTES  
CHECK ENGINE COMPARTMENT BILGE FOR GASOLINE VAPORS

#### STARTING ENGINE

Place clutch controls in Neutral position. Throttle levers should be advanced slightly above idle (aft) position.

The ignition switch is marked "ON-Stop". Turn on, the alarm bell should ring and the alarm lights, Oil Pres and Exhaust Temp should light.

Activate the Start switch. Alarm bell should continue to ring and the alarm lights, Engine Temp and Gear Temp should light. Hold switch until engine starts, then release Start switch. Alarm bell should stop ringing and all alarm lights should be off.

If engine fails to start within 20 seconds, release the Start switch, as excessive cranking will result in unnecessary wear on the starter motor and drain on the battery. Wait 2 or 3 minutes and try again. With a gasoline engine, it may help to pump throttle while cranking engine.

## BATTERY PARALLELING SWITCH

In the event that starting is difficult because of weak batteries, this switch can be held in either "ON" position while using the Start switch. With diesel engines we recommend that the Batt Parallel switch be used each time an engine is started.

## AFTER ENGINE STARTS

Visually check the flow of water from the exhaust outlet on transom. This will indicate if the cooling system is operating properly.

## STOPPING ENGINE

Move On-Stop switch to Stop position.

## ACCESSORY SWITCHES

At the helm station are switches for the Horn, Instruments, Wipers, Blower, Bilge Pump(s) and Navigation/Anchor Lights.

The Instrument switch controls the instrument lights and the compass light.

The Fwd. Bilge Pump switch controls the pump under the main cabin sole. The Mid Bilge Pump controls the dual pumps in the engine room. The Aft Bilge Pump switch controls the pump at the stern. All pumps can be operated manually, but normally the switches are kept in the automatic position. All these pump systems are connected directly to the batteries and are protected by in-line fuses inside the control station. The Main Battery switches, when off, do not turn off power to the bilge pumps.

NAVIGATION AND ANCHOR LIGHTS - Your boat is equipped with international navigation lights for night running. These lights must be used between sunset and sunrise. The "running lights" consist of red and green lights in the forward bow chock. Their visibility is one mile. The 20 point white masthead light (facing forward) has a visibility of two miles. The 12 point white stern light, visibility two miles, is located on center of the transom. The anchor light has a visibility of two miles.

NOTE: On the Express Model when the switch is placed in "Anchor" position both sections of the mast light are lit forming a 32 point light.

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## INSTRUMENTS

### The Importance of Instruments

Your Bertram is equipped with complete instruments or gauges for each engine and Fuel System. The engine gauges are as follows: Oil Pressure, Tachometer, Voltmeter and Water Temperature. To avoid mechanical damage, become familiar with the function of each of your Bertram's instruments and accustom yourself to checking your instruments frequently when running and particularly when first starting the engine. Note what constitutes the "normal" readings or ranges of operation of the instruments. All the instruments operate on the boat's 12V system and all gauges do not register to a particular position when the ignition is off.

### Oil Pressure Gauge

Almost all serious engine trouble will be reflected on the oil pressure gauge. Therefore, if any radical change in pressure should occur, turn the engine off immediately. During operation, there may be some slight fluctuations in the gauge reading. This is normal due to the nature of the lubricating oil and temperature variation. The operating range is 40 to 60 pounds at normal operating temperature at mid-RPM range. When the engine is first started, the oil pressure will have a higher reading but will decrease in pressure as the engine warms to normal temperature. Your Bertram is equipped with a warning alarm that should sound if the oil pressure becomes dangerously low.

### 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 gauges should be observed simultaneously and most malfunctions will be reflected in both gauges. Consult the engine manual for the proper operating temperature ranges for your engines. The alarm system should warn you if engine temperature is excessive.

NOTE: AS THE ENGINE TEMPERATURE RISES, OIL PRESSURE WILL DROP  
SO THE OIL PRESSURE GAUGE SHOULD BE USED IN CONJUNCTION  
WITH THE WATER TEMPERATURE GAUGE.



### Tachometer

This instrument registers the revolutions per minute of the engine. There is no correlation of RPM's to speed of the boat due to slippage at the propeller. A substantial increase or decrease in the boat's maximum RPM's is an indication that something is wrong and a check should be made of the boat's engines and/or running gear.

### Hour Meter

This instrument registers the number of hours that the engines have been operating, regardless of engine speed (RPM). The engine hour meters are energized by the ignition switch and are located in the engine room.

### Voltmeter

The level of charge in each of the main engine batteries is indicated by the voltmeter. A reading of 12.8 volts is normal for a fully charged battery when the ignition is switched "On." There is little chance that the engine will start without paralleling batteries when the voltmeter reads below 11 volts. When the engine is running, a reading of 13 to 15 volts indicates a normal charging rate.

### Fuel Gauge

Because of the configuration of the standard fuel tank, the fuel gauge does not register as gallonage. The tank is much larger at the top portion so there are actually more gallons in the upper half of the tank than the lower half. This should be considered during long range trips to avoid running too low on fuel or the possibility of running out of fuel.

Fuel gauge readings indicate the approximate amount of usable fuel as follows:

	<u>Standard Tank</u>	<u>Extra Tank</u>
Full	220 gal.	56 gal.
3/4	141 gal.	42 gal.
1/2	74 gal.	28 gal.
1/4	21 gal.	14 gal.
Empty	0 gal.	0 gal.

If your boat is equipped with the optional second fuel tank a switch is provided on the instrument panel to change the fuel gauge reading from one tank to the other. (See Fuel System in the Mechanical Section of this manual for changing the fuel supply from one tank to the other.)

#### ALARM SYSTEM

Each engine is equipped with an alarm system that warns the operator if lube oil pressure is too low or if engine coolant temperature or transmission temperature or exhaust temperature is too high.

If alarm should sound, immediately check the gauges to determine the problem and shut down the affected engine. Note: Gear oil temperature and exhaust temperature are not monitored by gauges.

If low oil pressure is the problem check the following:

- a. Low lube oil in crankcase
- b. Leak in oil system
- c. Defective alarm switch

If engine temperature gauge indicated a problem check the following:

- a. Low coolant in (optional) heat exchanger
- b. Loose or worn belt
- c. Restricted seawater strainer
- d. Closed or partially closed seacock
- e. Defective water pump
- f. Defective thermostat
- g. Defective alarm switch
- h. Collapsed water suction hose (check with engine running)

If gear temperature alarm indicates a problem check the following:

- a. Low transmission fluid
- b. Clutch slipping (check control cable adjustment)
- c. Transmission Cooling System
- d. Defective alarm switch

If exhaust temperature alarm indicates a problem check the following:

- a. Flow of water from exhaust outlet at transom
- b. Restricted seawater strainer
- c. Closed or partially closed seacock
- d. Defective sea water pump
- e. Collapsed water suction hose
- f. Defective sea water flow switch (located in sea water system)

### Bilge Alarm Switches

There are two bilge alarm switches, one in the forward bilge and one in the engine compartment bilge. Bilge alarm switches are installed several inches above the bottom of the boat. Do not confuse them with the bilge pump switches, which are the same type, but located down in the bilge.

It is recommended that the bilge alarm switches be tested occasionally. There is a cover on each switch with a red test button. When button is pressed, the float is raised and the alarm bell should ring and the "bilge" lamp on alarm panel should light.

### Fire Alarm Switches

There are three fire alarm switches (heat detectors) in the engine compartment. Two on the forward bulkhead and one on aft bulkhead.

These switches will activate at approximately 200°F. Switches can be tested by applying sufficient heat to the metal disc. Do not use an open flame. When tested, bell should ring and "fire" lamp on alarm panel should light. Switch will reset itself after heat dissipates.

### Fire and Bilge Alarm Lights

Lights can be tested by using test switch on bridge instrument panel.

## MECHANICAL CONTROLS

### ENGINE SPEED AND MARINE GEAR CONTROLS

Clutch and throttle controls are installed on side of the steering wheel. These twin lever controls are directly connected to the engine throttles and the marine gears by push-pull cables thus providing positive action from steering station to engine.

The clutch controls are located to the port of the steering wheel and have black knobs. There are detent positions which allow you to "feel" the neutral position. The throttle control levers are to the starboard of the steering wheel and have red knobs. Engine speed is increased by pushing the levers forward and decreased by pulling the levers back.

### CAUTION

#### DO NOT SHIFT ABOVE 1000 RPM WHILE MAENUVERING

It is advisable to allow the engines to come to idle and pause in neutral before shifting gears to the opposite direction. This pause allows the hydraulic pressure within the marine gear to decrease and helps facilitate shifting.

### STEERING SYSTEM

The Bertram 30 is equipped with a hydraulic steering system. The basic system is composed of three working parts: The steering station pump, the slave or steering cylinder; and the reserve valve.

When the steering wheel is turned, hydraulic fluid is pumped to the steering cylinder attached to the rudder arms. The hydraulic fluid reservoir contains 2 quarts of fluid under 30 PSI air pressure. The system is designed to prevent any outside air from entering the reservoir. The reservoir has a sight glass indicating the fluid level. The air pressure can be recharged by using an ordinary bicycle tire pump attached to the valve on top of the reservoir. The reservoir is located in the engine room, on the starboard hull-side.

## BOAT OPERATION

### FUELING INSTRUCTIONS

For maximum safety the following steps should be followed each time your Bertram is fueled.

#### BEFORE FUELING

1. Close all hatches, door and engine boxes.
2. Do not operate any equipment, such as engines, stove, pumps, bilge blowers or generator.
3. Make sure the filling hose nozzle is touching the deck fill plate before any fuel is pumped.
4. Top the tank until fuel is sighted at the vent fitting on hull side below the fuel fill.

**WARNING:** The first time the tank is filled a thorough check should be made to insure that fuel does overflow through the vent. If it does NOT occur, do not start engines. Immediately notify your dealer and the Bertram Service Department.

#### AFTER FUELING

5. Open hatches, cabin door and engine boxes. Then visually and by smell, check for fuel leaks or fuel fumes.
6. Operate bilge blowers for at least four minutes and leave running until engines are started.
7. Close hatches and boxes after engines have run for a while.

**NOTE:** On gas powered boats, it is recommended that blowers be kept running during any low speed operation.

#### TRIP PREPARATION

We suggest that you have a written check-off list to review each time you use your boat. The following items should be included:

1. Pump bilges as required.
2. Check engine (and generator) lube oil levels.
3. Check engine (and generator) coolant levels (if fresh water cooled)
4. Check fuel, water and oil systems for leaks.
5. Check sea water strainers, clean if necessary.
6. Check to see if all sea valves are open.

## MANEUVERING

Your Bertram has twin propellers rotating in opposite directions in order to balance the torque. When you engage one engine in forward gear, and the other in reverse gear, the boat will turn 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 clockwise. Starboard engine forward and port engine in reverse spins you counter-clockwise. You can accentuate the spin by applying rudder in the spin's direction. When docking parallel to a dock or pier, approach at a slow speed and at a 30° angle and if possible, against tide flow or wind, whichever is greater. When your bow is about 5 feet from the dock, put the dock-side engine in neutral and the far side engine in reverse. This will reduce your forward movement and bring your stern alongside the dock. Docking can usually be accomplished with the clutches alone. No steering or use of the throttle is required.

## SINGLE ENGINE RUNNING

There may be a time when only one engine is operating, so before such a situation occurs it is wise to practice with one engine to learn how the boat handles. You will see that the boat must be moving fairly fast after a dead stop before the rudders will make the correction to the desired course. You will also notice that with only one engine, steering while in reverse is very poor.

## CRUISING SPEEDS

You'll find your Bertram handles easily and creates little wake at slow speeds. As you increase speed, the boat will initially increase its angle of trim. That is, the bow rises. It will then start to level off, and assume a planing attitude. Do not hold the boat at its maximum angle of trim any longer than necessary. Take note of your engine RPM's at maximum trim angle. Then cruise either under that speed or over it. As a rule, top cruising speed RPM should be 20% to 30% less than the top RPM. For diesel engines, maximum cruising RPM should be 10% less than the wide open RPM.

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. If you are cruising regularly in waters well above sea level, you will want to have a certified mechanic make engine adjustments to get a better air/fuel mixture.

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. While your Bertram will withstand far greater punishment than you will probably ever subject her to, speed should be reduced under adverse sea conditions in the interest of your comfort, and to reduce needless strain on the engines and boat structure.

Your Bertram has an inherent ability to carry comparatively heavy loads without appreciably reducing performance; however, for the best results maintain the original trim of the boat. This can be done by noticing the trim carefully when the boat is first launched, before extra equipment is placed aboard. Of course, all gear and equipment this should be properly stored while cruising.

#### 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 in the performance of the boat.

#### WATER IN THE BILGE

The bilges must be kept pumped dry in order to keep excess weight to a minimum. As mentioned before, added weight will reduce boat speed.

#### DAMAGED UNDERWATER EQUIPMENT

Loss of speed and excessive vibration can result from damaged propellers, shafts, struts or misaligned rudders. The rudders on your Bertram should not be "toed" in or out.

UNDER NO CIRCUMSTANCES SHOULD THE BOAT BE  
OPERATED WITH VIBRATION CAUSED BY DAMAGED  
PROPELLERS OR RUNNING GEAR. SEEK A TOW OR  
PROCEED WITH EXTREME CAUTION AT IDLE SPEED.

If you should run aground there are several things to remember:  
Assess the situation - check the boat for physical damage.

Determine if the tide is rising or falling. On what type of material (sand, rock, coral, etc.) is the boat resting.

Running the engines while aground could result in foreign matter (sand or grass) being drawn into cooling system and causing damage.

Wait for high tide, if possible, when being towed or pulled free, to minimize damage.

#### TOWING

Whether your boat is being towed or you are towing another boat, there are certain precautions that should be taken to minimize danger to either boat occupants.

Do not fasten tow line to deck cleats - they are not designed or fastened for that purpose.

Rather, use a long enough tow line to form a bridle around the hull of each boat.

#### 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.



## SAFETY EQUIPMENT

### LIFE PRESERVERS

U.S. Coast Guard requires that at least one approved Personal Flotation Device (PFD) of suitable size be provided for each adult and each child on board.

Further, it is required that the PFD's must be READILY ACCESSIBLE when people are on board.

PFD's may be of Type I, II, or III, of suitable size, if boat is not used commercially. PFD's must be Type I if used commercially and carrying 6 or fewer passengers for hire.

Bertram has supplied the boat with 4 Type II adult Size PFD's.

### RING BUOY

In accordance with Coast Guard requirements, a throwable Type IV device must be carried and placed where it is IMMEDIATELY AVAILABLE.

Bertram has supplied an approved 20" diameter ring buoy and 3 ring buoy brackets for the operator to mount in a suitable location. It is recommended that about 60 feet of line be attached to the ring buoy.

### PORTABLE FIRE EXTINGUISHER

Bertram has supplied three 2-3/4 pound dry chemical extinguishers with brackets. They are mounted in strategic locations.

Class ABC extinguishers are effective on the following types of fires:

Class A Fire - Paper, wood, fabric, rubber, and certain plastics.

Class B Fire - Flammable liquids, such as gasoline, oil, paint, and cooking fat.

Class C Fire - Energized electrical equipment, such as motors, appliances, and switches.

These extinguishers are U.S.C.G. approved Type BC-1.

### EXTINGUISHMENT OF FIRES

- a. Class "A" Fires - Water is the best means of extinguishment and should be applied as soon as possible. Drench the fire, open up the material to expose all burning embers and drench them again, or throw smoldering embers overboard.

- b. Class "B" Fires - Carbon dioxide, dry chemical and Halon are suitable for Class "B" fires. In general the extinguishing agent should be directed at the base of the fire working in a horizontal sweeping motion from the front to the back of the fire.
- c. Class "C" Fires - Extinguishment of Class "C" fires may be accomplished with carbon dioxide, dry chemical and Halon. Water based extinguishing agents should not be used because of the potential danger of electrical shock to the fire fighter and the possibility of short circuiting the electrical circuits.

#### FIXED FIRE EXTINGUISHING SYSTEM (Optional)

Bertram offers an Automatic/Manual Halon System for protecting the engine room space. See Section F of this manual for details.

#### VISUAL DISTRESS SIGNALS

A regulation became effective January 1, 1981, requiring Coast Guard approved visual distress signals be on board when operating in most U.S. waters and on the high seas.

Bertram does not supply such equipment. The operator should study the Coast Guard pamphlet "Visual Distress Signals for Recreational Boats" which has been placed aboard and then purchase such equipment as may be required or desired.

## SAFETY PRECAUTIONS

### CAUTIONS

#### ALCOHOL STOVE

FLARE-UP may occur during preheating, particularly if burner valve is opened before preheating is completed. If flare-up occurs, shut off burner and re-start as per manufacturer's Operation Instructions. Note: An alcohol flame may not be visible under certain light conditions.

#### FISHING TOWER

If a fishing tower has been added to your boat, keep in mind that its height, weight and occupants will increase the vertical center of gravity of your boat which may result in excessive heeling and slower recovery to an upright condition.

Under adverse sea and wind conditions the tower should not be occupied.

#### SWIM PLATFORM

If you have a swim platform be sure that engines are turned off before allowing anyone on the platform or to enter the water. Also, keep in mind that propellers have very sharp edges that can inflict injury even when not turning.

#### WHEN UNDERWAY

Do not allow passengers on the side or forward decks because of the danger of falling overboard.

## ELECTRICAL SYSTEMS

NOTE: Wiring Diagrams for the 12 Volt D.C. and 120 Volt A.C. Systems are in a separate package.

### GENERAL

Your boat has two circuit breaker protected electrical systems - a 12 volt DC system which operates on power from the engine starting batteries and a 120 volt AC system that is powered from a shore connection or the optional AC generator. In addition to circuit breakers, the 12 volt DC system engine battery switches and fuses for the main port and starboard feeds, the alarm system and the bilge pump circuits.

### ELECTRICAL DISTRIBUTION PANELS

The distribution panels are located under the forward dinette seat. The 12 VDC panel is at the top and the 120 VAC panel is below.

### GROUND AND BONDING SYSTEM

Your Bertram is fitted with a bonding system which is designed to minimize stray current corrosion. Two copper strips run fore and aft through the bilge area. All underwater fittings and hardware as well as the negative terminals of batteries are connected with wire jumpers to these straps.

The AC equipment is bonded with a green wire to this system. This is done to improve protection against electrical shock.

## 12 VOLT D.C. SYSTEM

### BATTERIES

There are two batteries: one for the starboard engine and one for the port engine, which are charged by the engine alternators or by an optional AC converter. These batteries are always independent and momentary paralleling of both batteries is for assistance in starting only.

The port battery is also used for starting the optional generator. An additional main switch is provided to permit disconnecting all D.C. power to the generator.

### BATTERY LOCATIONS

In the Flybridge Cruiser Model the port and starboard batteries are on the flat between the engines.

In the Express Model the port battery is located aft of the port engine and the starboard battery is on the flat between engines.

### BATTERY SWITCHES

To activate the boat's 12 VDC system the main battery switches must be "on". These switches should be turned off when the boat is left unattended, especially if for long periods of time. The battery switches do not control power to the alarm system or bilge pumps. These circuits are continually energized for the protection of the boats.

Neither do the battery switches control output from the optional converter which is normally used to keep the batteries charged when the engines are not running or when the boat is unattended, providing the 120 VAC shoreline is plugged in and operating.

The main engine battery switches are extra heavy-duty and rated at 500 amps continuous and 1000 amps momentary. The generator battery switch is rated at 230 amps continuous and 345 amps momentary.

### BATTERY SWITCH CAUTION

CAUTION: This product is designed for use under normal conditions. If the switch is used to open the circuit during engine cranking, the SWITCH SHOULD BE REPLACED to avoid possible future failure.

CAUTION: Battery switch should not be opened while engine is running. To do so may damage diodes in the engine driven alternator.

### FUSES

The main and other heavy-duty fuses are located above the main battery switches and are protected by a removable plastic cover which also identified each fuse.

In addition, there are two 30 amp cartridge fuses and four in-line fuses behind the control console for the alarm and bilge pump circuits.

### 12 VDC DISTRIBUTION PANEL

At the left side of the panel is the Port Main breaker and adjacent to it are all the branch breakers on that circuit. Below them are the Starboard Main and its branch breakers. It is recommended that these Main breakers be "off" when the boat is unattended.

### AUTOMATIC CONVERTER (OPTIONAL)

The converter is used to charge the main engine batteries when the engines are not running. It operates on 120 Volt power.

When the batteries are fully charged it maintains a "trickle charge" condition.

It is recommended that the converter always be left on, with either shore power or generator supplying the power.

## 120 VOLT A.C. SYSTEM

### SHORE POWER

The standard shore power inlet and main circuit breaker are located in the forward end of the starboard cockpit locker. If your boat is equipped with the optional air conditioning system, a shore power inlet, No. 2, and its main breakers are similarly located on the port side. Each shore line has a capacity of 30 amps.

### CAUTION

WHEN CONNECTING SHORE CORD, ALWAYS PLUG CORD TO THE BOAT FIRST, THEN CONNECT TO THE OUTLET ON SHORE. WHEN DISCONNECTING SHORE CORD, ALWAYS REMOVE THE SHORE END FIRST, THEN THE BOAT END. THIS IS THE SAFE WAY, AS IT PREVENTS ACCIDENTLY DROPPING A "HOT" SHORE CORD INTO THE WATER. WHEN CONNECTING OR DISCONNECTING SHORE CORDS, BE SURE THAT ALL A.C. PANEL BREAKERS ARE OFF. THIS WILL PREVENT ANY ARCING AT THE SHORE CORD CONNECTIONS.

SHORE CORDS HAVE TWIST-LOCK FITTINGS ON EACH END. BE SURE THEY ARE LOCKED PROPERLY, THIS WILL PREVENT ARCING AND DAMAGE TO THE FITTINGS.

### WARNING

DO NOT CUT OR DISCONNECT THE GREEN WIRE IN SHORE CORD OR AT DOCK OUTLET OR BOAT INLET.

THIS SAFETY WIRE IS REQUIRED TO PROVIDE THE SAME EARTH POTENTIAL BETWEEN SHORE GROUND AND BOAT GROUND.

IT'S PURPOSE IS TO MINIMIZE SHOCK HAZARD TO PERSONS ON THE BOAT OR IN THE WATER.

Bertram shore lines are wired in accordance with current industry standards; however, you may occasionally find some dock outlets improperly wired. For your protection, lights are mounted on the 120 volt AC distribution panel to indicate normal or reversed polarity. Check the polarity lights for each shore circuit on the supply section of the 120 volt AC electrical panel. If the amber light is lit, the

polarity is correct and you may safely turn on the panel circuit breakers. If the red light is lit, the polarity is reversed and a correction must be made on the dock before turning on the circuit breakers.

WARNING

IF BOTH "SAFE" AND "REV. POL" LIGHTS ARE LIT, IT INDICATES A HAZARDOUS CONDITION WHERE THE HOT (BLACK) WIRE AND GROUNDING (GREEN) HAVE BEEN REVERSED.

IMMEDIATELY DISCONNECT THE SHORE CORD AT THE DOCK AND CHECK THE DOCK A.C. CONNECTION AND IF NECESSARY, ALL A.C. CONNECTIONS ON THE BOAT. DO NOT USE UNTIL FAULT HAS BEEN CORRECTED.

120 VAC DISTRIBUTION PANEL

This panel is located below the 12 VDC distribution panel. The A.C. panel is divided into three sections. The left hand section is standard for Shore Line No. 1 and has an A.C. voltmeter, polarity lights and branch breakers for the A.C. equipment and outlets.

The center section is covered with a blank panel unless the optional generator is installed. In which case the generator remote controls and Ship-Shore transfer switch are placed there.

The right hand section is also covered with a blank panel unless the optional air conditioning is installed.

WARNING

BEFORE OPENING 120 VAC DISTRIBUTION PANEL OR SERVICING ANY 120 VAC EQUIPMENT, BE SURE TO DISCONNECT SHORE POWER CORDS AND STOP GENERATOR.

GENERATOR POWER (OPTIONAL)

The Ship-Shore transfer switch prevents the accidental use of both shore and generator current on any piece of equipment.



Before Starting Generator:

1. Check seawater valve to be sure it is open.
2. See that seawater strainer is clean and sealed.
3. (Diesel Only) - Check heat exchanger expansion tank on top of generator. It should be full of the proper coolant.
4. Generator main battery switch should be "on".
5. Generator fuel valve should be open.
6. Check lube oil level.

Starting Generator:

1. On the remote panel of the 120 VAC distribution panel, switch the generator blower to "on". The small amber light below switch indicates that the generator blower as well as the two engine room blowers are operating.

WARNING

GASOLINE VAPORS CAN EXPLODE  
BEFORE STARTING ENGINE OPERATE BLOWER FOR  
4 MINUTES. CHECK ENGINE COMPARTMENT BILGE  
FOR GASOLINE VAPORS.

2. The Ship-Shore transfer switch may be in any position. Caution: If shore power is being used, all loads should be turned off at the equipment controls. Also, if generator is being used, turn off all loads before switching to Shore Power.
3. On diesel powered Bertrams, hold the Warm-Up switch for 10 to 30 seconds, depending on temperature. Do not exceed 30 seconds. Release Warm-Up switch before starting.
4. Hold the On-Stop switch in the "On" position until generator starts. Do not exceed 30 seconds of continuous starting. If the battery is weak, also use the battery parallel ("Bat.Par.") switch. The "Gen Run" lamp will light when the generator is running.

### CAUTION

If generator fails to start after a few attempts, the generator's waterlift muffler may be filled with water. Use the drain plug on muffler to empty muffler before running the boat. This will help keep seawater from entering the generator's exhaust manifold.

5. After starting generator, be sure water is flowing from the exhaust outlet on the transom.
6. To use the generator, turn Ship-Shore transfer switch to "Ship's Power" and turn on the required circuit breakers for the desired appliances and equipment.
7. To stop the generator, hold the On-Stop switch in "Stop" position.
8. The generator is provided with an automatic shut-down system that stops the engine for the following faults:
  - a. Low Oil Pressure
  - b. High Exhaust Temperature
  - c. High Water Temperature

### AIR CONDITIONING POWER (OPTIONAL)

On the right hand section of the 120 AC distribution panel, you will find the Air Conditioning Power Selector. In this section are the polarity lights for Shore Line Number 2. This shore line can be used only for the air conditioning system.

A rotary switch allows the selection of Shore Line Number 1, Shore Line Number 2 or Generator. If you wish to use the generator to power the air conditioner, have the air conditioning power selector switch in the generator position. Shore Line Number 2 should be used whenever possible at dockside. With careful electricity management, Shore Line Number 1 can be used for the 120 volt AC equipment and the air conditioning; however, the total ampere draw cannot exceed 30 amps. When necessary, Shore Line Number 1 can be used for the 120 volt AC equipment and the generator can supply power for the air conditioner.

AIR CONDITIONING OPERATION

For complete details see the Mechanical Section of this manual.

## EUROPEAN SHORE POWER

Bertrams equipped with the optional 240/120 VAC European Shore Power have no polarity indicator lights but use an isolation transformer to correctly polarize the AC system.

1. If this boat is to be operated in foreign ports that have shore power that is 220 to 250 VAC and 50 HZ, instead of 120 VAC 60 HZ, the European system must be installed on the boat.
2. Such a system uses transformers built into the boat that will provide both 120 VAC and 50 HZ when using Shore Line No. 1 and No. 2.
3. The generator remains unchanged. Its output is 120 VAC, 60 HZ. The standard AC equipment also remains unchanged as it was selected to be able to work on either 50 or 60 HZ current. Motor driven equipment will be only slightly less efficient on 50 HZ. Exception: The Norcold Refrigerator cannot be operated on 50 HZ power.
4. The Wiring Diagrams include a plan that shows how these transformers are included.
5. When using a boat equipped with the optional European system in American or similar ports where 125/250 VAC 60 HZ shore outlets are available, it will be necessary to remove the 125 VAC male connector on shore end of shore cord and replace with a 125/250 VAC Hubbell #63CM65 male connector. The black and white wires of the shore cord should be connected to the "x" and "y" terminals (either way is OK) and the green wire to the green terminal. No neutral wire to the "w" terminal is required.

If the outlet on the dock is a 125/250 VAC 50 amp "crowfoot type", then a Hubbell #61CM59 adapter will be required in addition to the new plug on the shore end of the cord.

6. When the boat is in foreign ports, it will be necessary to make special adaptors or to replace the shore end fittings with suitable connectors. In either case the green wire should be matched to the on-shore grounding wire. The white wire should

be connected to the neutral source, and the black wire should be connected to the "hot" wire.

7. The operation of the European System is identical to that described for use with the standard system.

## ELECTRICAL EQUIPMENT

### A.C. EQUIPMENT

All AC circuit breakers on the Bertram 30 are of the two pole common trip type that disconnect both current carrying conductors (black wire and white wire). The white wires (ground potential) are isolated from the boat ground. IT IS RECOMMENDED THAT ANY FUTURE AC EQUIPMENT BE INSTALLED IN THE SAME MANNER USING PROPER CIRCUIT BREAKERS AND WIRE SIZE.

The Norcold refrigerator operates from either 12 volt battery power or from 120 VAC power. When turned on it operates on battery power until 120 VAC power from either shore or generator is applied. It then automatically switches to 120 VAC power thus preventing further drain on the battery. When refrigerator is in use both the "Refrigerator" breakers on 12 VDC panel and 120 VAC panel should be "on".

As mentioned previously, the Norcold can not be operated on 50 HZ shore power if your boat has the European Shore Power System.

### D.C. EQUIPMENT

Like the AC equipment, each item requiring DC power is protected by its own circuit breaker. A tripped breaker indicates a problem in the circuit or in the equipment being controlled by that breaker. The cause of the problem must be found and corrected to avoid further inconvenience. Provisions have been made on the DC distribution panel for additional DC equipment that you may wish to add to your Bertram. IT IS RECOMMENDED THAT ANY FUTURE DC EQUIPMENT BE INSTALLED IN THE SAME MANNER USING PROPER CIRCUIT BREAKER AND WIRE SIZE.

If your boat has the optional Electronic Power Supply, a four circuit fuse panel is mounted behind the control station available for electronics, radio and navigational equipment. 12 VDC power is supplied by a 30 amp breaker on the D.C. distribution panel.

### A.C. & D.C. CIRCUIT BREAKERS

If a breaker trips repeatedly the problem should be corrected. In no circumstance should the breaker be replaced with one having a higher trip value in any of the boat's standard circuits.

## MECHANICAL SYSTEMS SECTION

### FUEL SYSTEM

#### FUEL TANK

The fuel tank is of molded fiberglass with a total capacity of 225 gallons, 220 gallons being considered usable. The tank is constructed in accordance with accepted standards, made of fire retardant resins and is not part of the hull, but laminated to it.

A small centerline hatch provides access to the tank fittings. The fuel gauge sender, with sight gauge is located there. The remote gauge is located at the control station. On gasoline models there are sealed anti-syphon valves in each supply line to main engine and to the optional generator. On diesel models a manual shut-off valve is used on each supply line.

Both types of valves are connected directly to the hexagon shaped head of the suction tube which extends to the bottom of the tank. The lower end of this tube is fitted with a strainer.

#### TANK FILL & VENT

The fuel fill fitting is installed on starboard side of boat above the sheer fender, the vent fitting is directly below it.

#### FUEL SUPPLY LINES - GASOLINE

Fuel hose leads to each engine and a shut-off valve is provided at each main engine for servicing.

#### FUEL FILTERS - GASOLINE

A filter is mounted on the starboard side of each main engine. On the filter is an important label which is very difficult to read. It states as follows:

#### WARNING NOTICE

The regular inspection of the fuel filter canister every 25 hours of operation or twice per season is mandatory to remove all sediment and water which may be within. Close inspection of the canister for possible deterioration due to corrosion or otherwise is required and replacement of canister is required if such signs are evident.

Complete inspection of entire engine fuel system for any possible leaks or damage should be performed at the same time.

WARNING

SHUT OFF FUEL VALVES

BE CAREFUL WHEN OPENING FUEL FILTER OR ANY OTHER FUEL FITTING; GASOLINE IS EXTREMELY FLAMMABLE AND HIGHLY EXPLOSIVE UNDER CERTAIN CONDITIONS.

ALWAYS STOP ENGINES AND DO NOT SMOKE OR ALLOW OPEN FLAMES IN THE AREA WHEN FUEL FITTINGS ARE OPEN.

FUEL-GASOLINE

Use only leaded gasoline with a minimum rating of 89 octane.

FUEL SUPPLY LINES - DIESEL

Hoses lead directly to the Racor fuel filters. Shut-off valves are at top of fuel tank as mentioned previously.

RETURN LINES - DIESEL

Since diesel engine does not use all of the fuel pumped into the engine a return line is used to take any surplus back to the tank. There are no valves in such lines.

FUEL FILTERS - DIESEL

Each main engine supply line has a Racor Fuel/Water Separator. Each assembly has a drain plug at the bottom that allows removal of water. Visual inspection should be made periodically and water removed if required. The make and element numbers for main engines and generator filters are listed on the Technical Data page in Section B of this manual as well as in the manufacturers manuals.

DIESEL FUEL

Use only the type of fuel specified by the engine manufacturer. See their manual for details.



## AUXILIARY GASOLINE FUEL TANK (OPTIONAL)

On gasoline powered boats that do not have a 120 VAC generator an extra fuel tank is available which is installed in the space where the generator would otherwise be located. This tank has a capacity of 60 gallons, 56 gallons being considered as usable.

### FUEL GAUGE

Tank has its own fuel gauge sender, but uses the same gauge as standard fuel tank at the control station. See Instrument and Control Section of this manual for further information.

### FUEL FILL & VENT

This tank has its own fill and vent fittings. They are located just forward of the standard tank fill and vent fittings.

### VALVE MANIFOLDS

Each engine will have a two-valve manifold aft of the engines. The valve connected to the branch of the manifold tee controls flow from the extra tank while the other valve, on the run of the tee, controls flow from the standard tank.

### USE OF BOTH TANKS

How the operator chooses to use flow from each tank is a matter of personal preference. However, keep in mind that gasoline stored for long periods will go stale and could cause faulty engine running.

### IMPORTANT

Make sure if either tank is empty (or nearly empty) that the supply valves from that tank are closed to prevent air being supplied to the engines.

## PROPULSION SYSTEM

### ENGINES

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

Check the engine oil level each time the engines are to be run. If they are fresh water cooled also check the coolant level.

### MARINE GEARS

The reverse gear is hydraulically operated. Information and maintenance procedures can be found in the Engine Manual. Check gear fluid level frequently.

Gasoline engine gears use Type "A" Transmission fluid. To check fluid level run engine at slow speed, in neutral, for a short time. Stop engine and immediately check level on the gear's dipstick.

Diesel engine gears use SAE 30 class CD engine oil. To check oil level, run engine at low idle speed with gear in neutral. Fill to "full" mark on gear's dipstick.

### PROPELLER SHAFTS

Information as to size, length and material of shaft will be found on the "Technical Data" page at the front of this manual.

### PROPELLERS

Information on the propellers shipped with your Bertram will be found on the the "Technical Data" page of this manual. The propellers recommended are those with which your boat was tested. If weight has been added or the operating characteristics have been changed due to the pitch to suit existing conditions.

The combination of propeller diameter and pitch has been selected to give maximum efficiency based on engine power, its rated RPM, hull design and the weight of the boat. The propeller is one part of a balanced propulsion system. Any changes in its size or pitch could reduce engine life or performance and place undue stress on other components of the running gear. When you find it necessary to replace

a propeller, it is important to use the same type, diameter and pitch as the original.

#### CAUTION

UNDER NO CIRCUMSTANCES SHOULD THE BOAT BE OPERATED WITH VIBRATION CAUSED BY DAMAGED PROPELLERS OR RUNNING GEAR. SEEK A TOW OR PROCEED WITH EXTREME CAUTION AT IDLE SPEED.

#### ENGINE SHAFT ALIGNMENT

At the factory your engines were aligned properly but they should be checked periodically to insure proper alignment and performance. The initial alignment check is considered part of the pre-delivery preparation. After delivery, alignment is an owner maintenance responsibility. It is good practice to open the coupling before haul-out and then check alignment after launching. Let the boat settle in the water for a day or two before making final alignment adjustments. We recommend the following:

1. Remove all bolts in the coupling flanges at the end of the marine gear. Slide shaft aft until the flanges are about 1/4" apart.
2. Press the flanges together by hand with a .010 feeler gauge between them.
3. Insert the feeler gauge at 90° intervals around the flanges to assure equal clearance at all faces. If alignment is correct, the .010 or .013 feeler gauge will be tightly gripped at all points around the edges of the coupling. In other words, the faces when touching, should be no more than .003" apart at any other point.
4. If a feeler gauge is not available, use 4 strips of paper about 1/2" wide and space them equally around and between the flanges. By gently pulling on each, the relative amount and direction of misalignment can be determined. Engine alignment is best accomplished by an experienced mechanic working with the proper tools. Keep this in

mind before attempting to move a marine engine on its foundation.

#### SHAFT LOG AND STUFFING BOX

The shaft log is the tunnel in which the propeller shaft turns. In your Bertram the shaft log is of fiberglass construction. Inside the boat, a stuffing box is attached to the shaft log by a flexible hose held in place by hose clamps. The flexible hose serves to absorb any normal shaft vibration.

The stuffing box prevents water from leaking around the shaft into the boat. The key components of the stuffing box are the braided flax packing and the packing gland. Keeping the packing gland tight keeps the stuffing box from leaking. It is normal to have a slight drip 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 packing is too tight, the gland will get too hot to hold with your hand. When running at full speed, the gland will be warm.

If it becomes necessary to repack the stuffing box, remove the boat from the water, remove sprayshield, unbolt and slide the packing gland forward on the shaft. Be sure that the old packing is removed and install five 1/4" x 1/4" rings of new packing. Slide the packing gland aft and tighten it to a point where the shaft will not turn. This will seat the packing. Back the gland off until shaft is free and there is a slight drip. Run the shaft for a while and reset if necessary. Replace sprayshield. Remember that a slight drip of water is necessary for proper lubrication. Always use tallow flax packing and do not spiral the packing around the shaft; each ring must be separate.

#### SHAFT LOG SPRAYSHIELD

A rubber hose sprayshield is installed over the stuffing box to prevent any dripping water from being sprayed around the engine compartment.

#### RUDDER STUFFING BOX

The rudder stuffing boxes are packed in the same manner and with the same material as the propeller stuffing boxes, except it is not necessary to have them drip. Just be sure the rudders turn freely.

## INSTALLATION OF PROPELLERS

The installation of the propeller completes the propulsion system of the boat. With the amount of power being transmitted at this point, it is important that the fitting of shaft to propeller be done properly in order to provide maximum shaft and propeller life. If necessary to replace either propeller or shaft, follow these guidelines:

1. Inspect the keyway in the shaft and key for proper radii (see Fig. No. 1). Check the key and the shaft keyway for the fit of the key in the shaft keyway. With the retaining pin in key tight against recess in shaft (see Fig. No. 2); the aft end of the key should not extend past the shoulder of the shaft. The forward end of the key should not extend up to the ramp of the shaft keyway (see Fig. No. 3).
2. Check the fit of the key in propeller keyway. Dress propeller keyway carefully, if required, making sure the file cuts evenly along the entire keyway.
3. Place the propeller on the shaft, without the key, and seat on the shaft taper. The fit should be tight with no wobble and no space between the shaft and forward and aft ends of the propeller hub. Mark the shaft at the forward end of the hub with a sharp pencil.
4. Remove the propeller, insert key in shaft keyway and reinstall the propeller. Make sure the propeller is fully seated with the forward end of the hub meeting the previously marked line on the shaft. Check clearance between the top of the key and the bottom of the keyway in the propeller hub with a feeler gauge, it should be between .006" and .01".
5. Remove the propeller and coat with any non-graphite, waterproof grease. Reinstall the propeller.
6. Install the jam (half) nut, allowing nut to push key into position. Torque nut with a wrench to seat propeller. Remove jam nut and install plain (full) nut. Tighten plain nut slightly more than finger tight. Install jam nut to lock both nuts together, holding plain nut with wrench to keep it from turning. Install cotter pin.

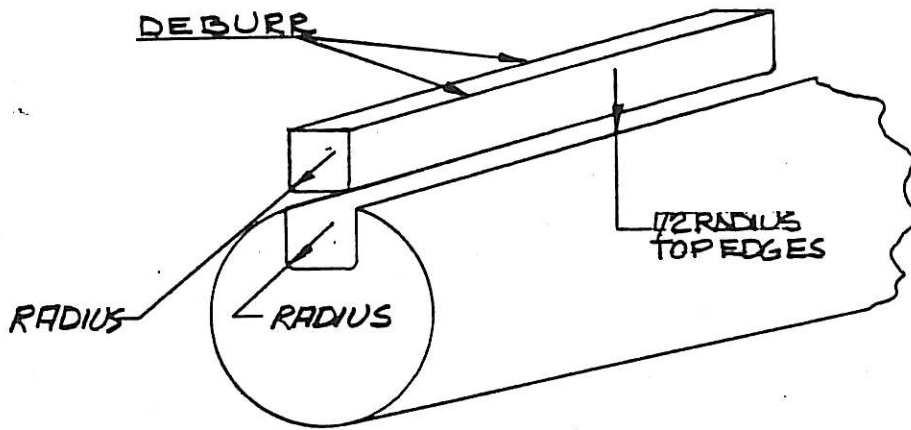


Fig. #1

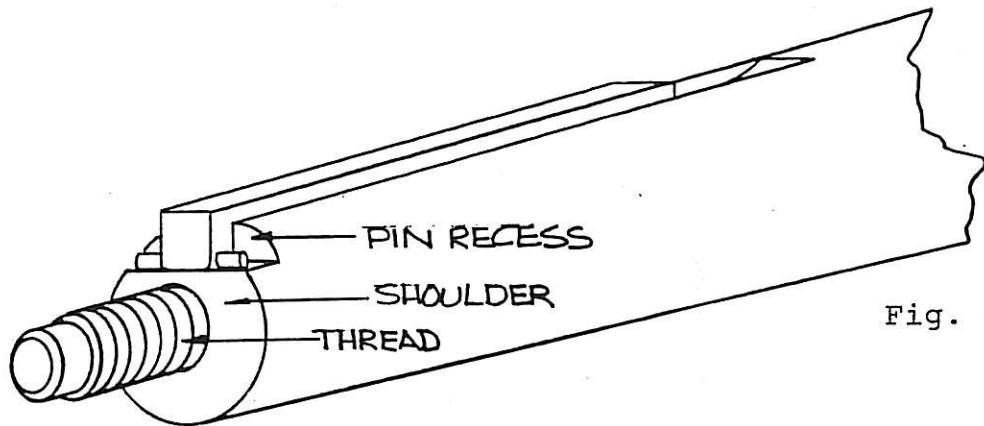


Fig. #2

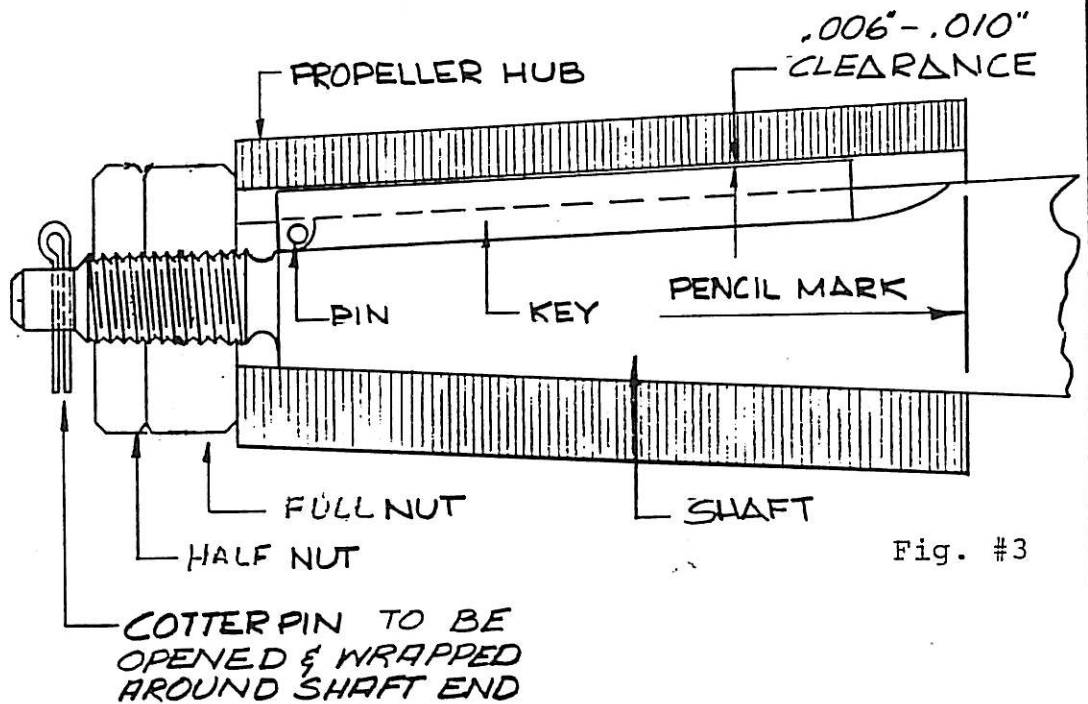


Fig. #3

## TOILET SYSTEMS

Because of Bertram's worldwide sales, various marine sanitation devices (toilets) are offered. We have listed below some of the systems available. Detailed instructions concerning the use of the particular toilet on your boat can be found in the manufacturer's operating manual. Before operating the toilet system be sure you are familiar with its operation and any governmental regulations that might affect its use in your boating area.

### MONOMATIC SYSTEM

Most boats are equipped with the Monomatic Model 342. This is a recirculating device that retains the chemically treated waste in a self contained holding tank, which requires periodic pump out through the "waste" fitting on deck.

The Monomatic is connected to the boat's fresh water system. It requires about four gallons of water to fill. It is necessary to listen to the water flow when filling. A noticeable change in sound will occur when the precharge level is reached and the water should be shut off.

The required amount of liquid or powder Monomatic chemical should then be added. These chemicals are available at most marinas and marine or other vehicle supply stores.

It is important that you become familiar with all the instructions in the Monomatic Operating Manual.

Electrical power is supplied by a circuit breaker on the 12 volt DC Distribution Panel.

### MONOMATIC OVERBOARD DISCHARGE

If your toilet is so equipped, a hand operated pump is installed that permits discharge through a seacock.

#### WARNING

Overboard discharge of waste from this type of toilet system is prohibited by federal and local laws in restricted waters, in addition, it is required that the seacock be locked in a closed position. This may be accomplished by using a padlock, a non-releasable wire-tie or by removing the seacock handle.



## MARINE TOILET WITH LECTRA/SAN

The toilet is flushed with seawater that is supplied from a seacock in the bilge area. Electrical power for the toilet is supplied through a circuit breaker on 12 VDC distribution panel.

A small tank in the toilet room is connected to the toilet to supply a salt-water solution to the system when the boat is operating in fresh or brackish waters.

The Lecta/San treatment unit is located under cabin sole and discharges overboard through a seacock. Electrical power is from a fuse in the engine compartment and connected to the port battery switch.

The optional Lectra/San unit provides flow-thru treatment of the waste water from a marine toilet by maceration and chlorination. The treatment process destroys bacteria and odors and reduces solids and lowers the biochemical oxygen demand of the waste water. The disinfecting agent, hypochlorous acid, is produced during the treatment cycle by electrolyzing the seawater used to flush the toilet. On brackish or fresh water a salt solution is metered into the flush water.

### WARNING

This system is classified by U.S. government as Type I and can be used legally in certain specified areas. It cannot be used in waters where "no discharge" is required.

Instructions for operating the Lectra/San are given below:

1. Before flushing toilet, start the Lectra/San system with a clockwise turn of the knob on the control unit until it clicks. A full (240°) turn of the knob is required to engage the timer and turn on the flush/pretreat light.
2. Flush the toilet WITH THE MINIMUM AMOUNT OF WATER REQUIRED TO CLEAR THE BOWL. This will normally take six to ten seconds.
3. After about two and on-half minutes, the operating cycle will be complete and the system will automatically shut down.



4. The toilet is now ready for the next use.
5. The toilet can be used during the treatment cycle, but the flush must be deferred until the operating lights are off and the system is activated again by a clockwise turn of the knob on the control unit.

#### CAUTION

If toilet bowl is cleaned with anything except water the toilet should be flushed (without activating Lectra/San) 8 times (20 seconds on and 60 seconds off) to remove the cleaning agent from the Lectra/San unit before the treatment system is used. Otherwise the Lectra/San unit may be damaged.

#### MARINE TOILET WITH HOLDING TANK (OPTIONAL)

The toilet is flushed with seawater that is supplied from a seacock in the bilge area. Electric power for the toilet is from a circuit breaker on the 12 VDC distribution panel.

An 11 gallon fiberglass tank is installed under the cabin sole. Below the hatch near the toilet door is a "Y" valve, a hand pump, a supply seacock and a discharge seacock.

The "Y" valve is labeled "Holding Tank" and the "Overboard Discharge".

To by-pass the holding tank, place the "Y" valve handle in the "Overboard Discharge" position and open the large discharge seacock. The electric pump on the toilet will then pump directly overboard.

To pump into the holding tank, place "Y" valve handle in the indicated position and close the discharge seacock. Since the holding tank has limited capacity, care must be taken not to overflow the holding tank. If this should happen, the toilet bowl will overflow.

To pump out the holding tank two methods may be used. In areas where overboard discharge is prohibited the deck mounted Waste fitting must be used. In this case a pump on the dock is used to pump out waste and transfer it to an approved disposal system. The discharge seacock must be closed to prevent filling the tank with seawater.

In areas that permit overboard discharge, open the discharge seacock, and use the manual pump to empty the holding tank.

**WARNING**

Overboard discharge of waste from this type of toilet system is prohibited by federal and local laws in restricted waters, in addition, it is required that the seacock be locked in a closed position. This may be accomplished by using a padlock, a non-releasable wire-tie or by removing the seacock handle.

## BILGE PUMPS

Operation of the bilge pumps is described under "Accessory Switches" in the Controls and Instrument Section of this manual.

### WARNING

The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon the navigable waters and contiguous zone of the United States if such discharge causes a film or sheen, or discoloration of, the surface of the water, or causes a sludge or emulsion beneath the surface of the water. Violators are subject to a penalty of \$5000.

## FRESH WATER SYSTEM

### TANK

The fresh water tank is located below the cabin sole at aft end. A direct reading gauge can be seen by lifting the top of the companion-way step.

### FILLING TANK

The water fill fitting is on starboard side of the boat:

### CAUTION

When filling tank do not use full city water pressure. To do so, it is possible to use more pressure and volume than the vent line can discharge, thereby causing the tank to rupture. It is suggested to have the hose attended while filling the tank.

### WATER HEATER

The automatic water heater is located below the aft dinette seat. In addition to the 120 VAC power for the heater, a built-in heat exchanger connected to the port engine cooling system, heats the water when engine is running.

### CAUTION

Turning on the electricity with no water in the heater, or with the water level beneath the immersion heating element, will burn out the element in a very short time.

The heater's thermostat is pre-set by the manufacturer at 140 to 145°F which we recommend as maximum.

### WATER PUMP

The pump is automatic and maintains static pressure at 30 PSI. Pump is self-priming. The fresh water system circuit breaker must be turned off when tank is empty.

### SHOWER

Showers can take a little or a lot of water. A suggestion would be to take a "sailor's shower". After adjusting water temperature, wet

yourself thoroughly, turn the shower off by using the push-button on shower head, soap up and then turn the shower back on to rinse off.

#### SHOWER SUMP PUMP

There is a shower sump below the cabin sole. It has a pump and automatic float switch to discharge the water overboard. The filter screen between pump and float switch should have routine inspection to insure that screen remains clean.

## DOCKSIDE WATER SUPPLY (OPTIONAL)

An optional dockside water hose connection is located inside cockpit. This feature is a convenience to use at dockside which allows the use of available water. A pressure regulator in the supply line reduces the normal city water pressure. This system cannot be used to fill the water tank.

When leaving the boat unattended the dockside hose should be disconnected.

## SEAWATER WASHDOWN SYSTEM (OPTIONAL)

A centrifugal pump provides seawater to a hose connection in cockpit.

A switch and indicator light is located near the hose connection. Do not turn on pump if cap is on outlet and do not use a closable nozzle on hose; the build-up pressure could cause damage to the pump.

When not in use or boat is unattended it is best to turn off circuit breaker on the 12 VDC distribution panel.

## FIRE EXTINGUISHING SYSTEM (OPTIONAL)

In addition to the standard portable fire extinguishers provided by Bertram your boat may be equipped with a Fireboy Automatic/Manual Halon system to protect the engine room space,

For both gasoline and diesel powered boats a Model 70CGMA system is installed with a 7 pound cylinder installed in the engine room. A manual release cable and panel is installed in the side of the cockpit. Also, a fire alarm panel is installed at the helm station.

### MANUAL DISCHARGE

If there is evidence of a fire in the engine room before the Fire Extinguisher Alarm sounds, immediately shut down engines, generator and blowers. You should then activate the extinguisher system manually before waiting for the automatic feature to operate.

### AFTER DISCHARGE

There is a possibility that after the system has been discharged, either manually or automatically, that the fire may re-flash and burn again.

Since opening an engine hatch or motor box may feed fresh oxygen to the engine space it is best to wait a few minutes to allow the Halon to take effect and to allow the fire zone to cool. Have a portable fire distribution in hand and then cautiously open the hatch (not the motor box) to see if fire is completely extinguished.

Turn main battery switches to "off" and disconnect shore power if in use, check out electrical circuits before re-activating them.

There is a difference between the gasoline and diesel alarm systems which are detailed as follows:

### GASOLINE ALARM SYSTEM

The Model DA 1001-01-H Alarm is always activated as it gets its 12 volt power through the Alarm fuse behind the console which in turn is connected directly to the port engine battery.

It can be tested at any time whether engines are running or not and even if the Port Main Battery Switch is "off".



If the cylinder has not been discharged the light on the alarm panel should remain unlit and the audible unit should be silent.

Note: In low ambient light levels the red indicator may glow dimly, this is normal and does not indicate a system fault.

Moving the test switch to the "Test" position will cause the red "Discharge" light to illuminate and cause the audible alarm to sound, thus determining the readiness of the system to respond in the event of a fire.

In the event of a fire and subsequent discharge of the Halon cylinder, the red "Discharge" light will illuminate and the audible alarm will sound as long as the 12 volt power remains applied. To turn off horn, remove alarm fuse behind console.

If the alarm is activated while the engines are running, stop engines, generator and turn off blowers immediately.

#### DIESEL ALARM SYSTEM

This system gets its electrical power only from the engine ignition circuits. To check the alarm, either or both port and starboard On-Stop switches must be "on". If the system is discharged manually or automatically when both the On-Stop switches are at "stop" position the alarm will not operate until either of the switches is turned to "on".

The alarm panel has a green light, "Charged" that is lit when either On-Stop switch is "on" and indicates that the system is ready to respond in case of a fire.

If the system has been discharged and either On-Stop switch is "on" the red light "Discharged" will be lit and the main engines will automatically shut down and cannot be started until the switch on alarm panel is placed in "Override" position.

If generator and blower are running they should be stopped immediately.

#### CAUTION

The switch on Fireboy alarm panel should always be in the "Normal" position.

While the system will automatically or manually operate with the above switch in "Override" position, its only

purpose is to bypass the automatic engine shutdown.  
If the generator and/or blowers are running when a  
fire occurs they should be shut off immediately.

REPLACEMENT OF A DISCHARGED CYLINDER

Immediately contact the manufacturer for instructions.

## AIR CONDITIONING SYSTEM (OPTIONAL)

### BASIC INSTRUCTIONS

Before operating the air conditioning system for the first time, make sure the seawave is open and that the sea strainer is clean and sealed. The sea strainer should be re-checked periodically.

### OPERATING INSTRUCTIONS

Before using system be sure to read and follow the Operation Manual provided by the manufacturer.

### CAUTION

When starting system always check the seawater discharge on hullside to be sure that pump is operating normally.

To operate system, proceed as follows:

1. Corresponding circuit breaker on distribution panel should be "On".
2. Mode Switch should be "Off".
3. Turn Thermostat control fully counter-clockwise for heating or fully clockwise for cooling.
4. Set Fan Speed to "High".
5. Set Mode Switch to "Fan". This energizes the fan and the seawater pump. Check the overboard discharge to be sure water is flowing through the condensing unit.
6. Set Mode Switch to "Run". The compressor will start to cool or heat according to setting of the thermostat.
7. To set the thermostat allow sufficient time for the unit to cool or heat the room to the desired temperature. When the room temperature is comfortable, turn the thermostat knob slowly toward the center position until it "clicks" once. The thermostat is now set to maintain a constant temperature.

8. Select the fan speed desired. When operating on the heat cycle, allow the unit to run on low fan for 5 to 15 minutes until it begins to heat well. Then, increase fan to medium setting and run system in this position for most efficient output.

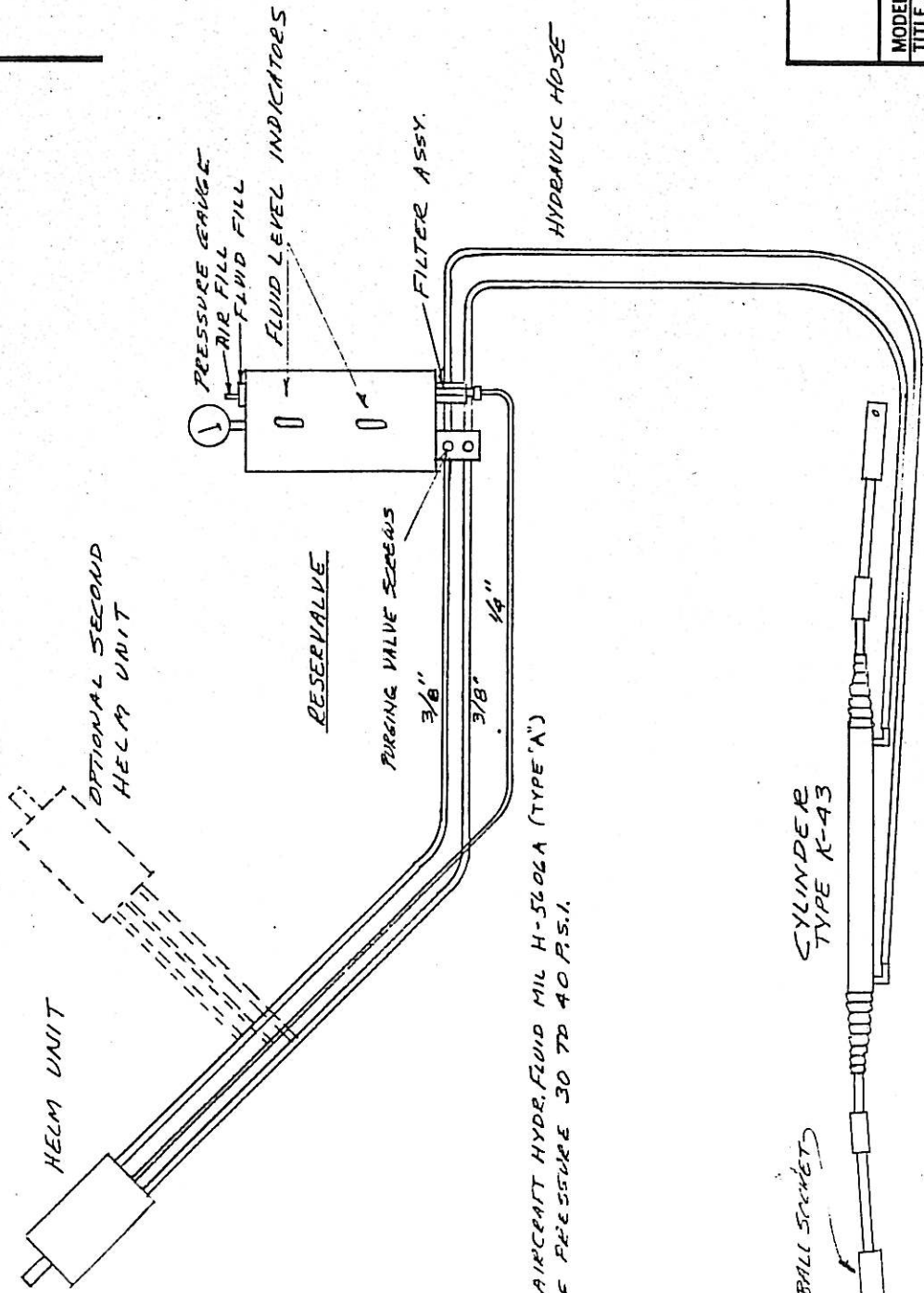
On the cooling cycle, use any fan speed desired. Keep in mind, however, that the lower the fan speed, the less capacity the system has.

9. To turn the system off, turn the Mode Switch to "Off".
10. CAUTION: Do not use a circuit breaker or Main Distribution Panel transfer switch (ship-shore) to turn the air conditioning on or off. To do so may trip a breaker or overload the transfer switch.

#### THERMOSTAT

The thermostat serves to cycle the compressor on and off. The thermostat on the cooling and heating system provides an automatic change-over from cooling to heating with a  $3\frac{1}{2}^{\circ}\text{F}$  differential. Rotating the thermostat to the left after it has been set for cooling will cause the unit to heat. If you rotate the thermostat to the right, the unit will cool. If the thermostat is left stationary after being set, the unit will cycle from neutral to cooling if cooling is needed, or it will cycle from neutral to heating if heating is needed.

REVISIONS		
LET.	DESCRIPTION	BY DATE APPV.



OPTIONAL SECOND HELM UNIT

HELM UNIT

RESERVOIR

PURGING VALVE SCREENS

3/8"

3/8" 1/4"

FILTER ASSY.

HYDRAULIC HOSE

CYLINDER TYPE K-43

TILLER BALL SOCKET

GREASE FIT.

NOTES:

1. USE ONLY AIRCRAFT HYDR. FLUID MIL H-5606A (TYPE "A")
2. OPERATING PRESSURE 30 TO 40 P.S.I.

**BERTRAM YACHT**  
 MIAMI, FLORIDA, U.S.A.  
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MODEL *GENERAL*

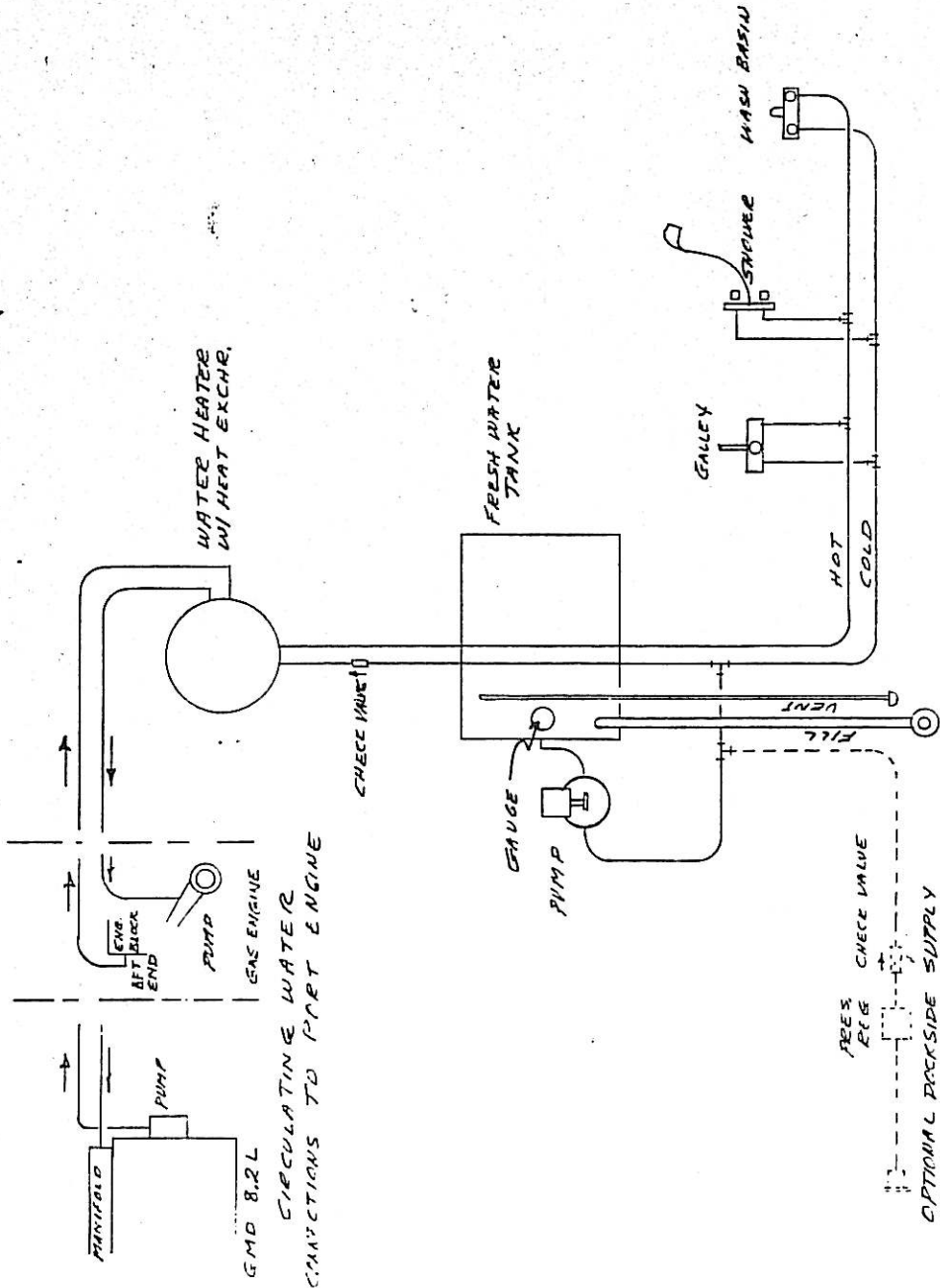
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BY	<i>L.C.A.</i>	APPROV.	
DATE	<i>2/13/84</i>	DATE	<i>2/29/84</i>
	<b>B</b>	<b>8531</b>	

FILE *ME 3111*

REVISIONS

LET.	DESCRIPTION	BY	DATE	APPV.



**BERTRAM YACHT**  
 MIAMI, FLORIDA, U.S.A.  
 A SUBSIDIARY OF WHITTAKER CORPORATION

MODEL 303 & 304

TITLE  
**FRESH WATER SYSTEM**

SCALE NONE

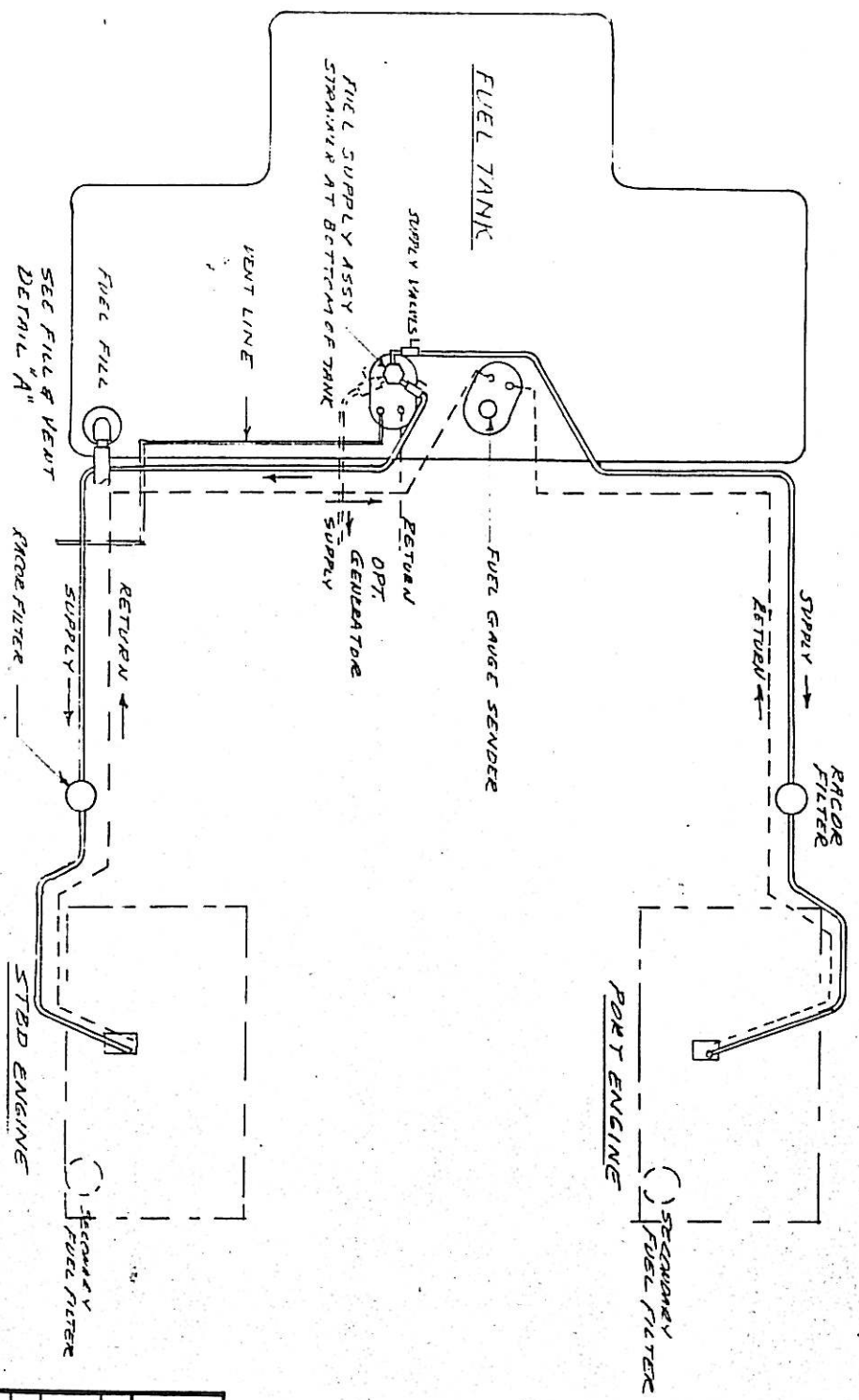
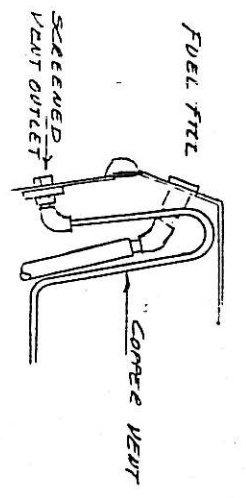
BY L.C.H. APPV. [Signature]

DATE 2/13/54 DAY 2/25/54

PLAN NO. **B 8534**

REV.

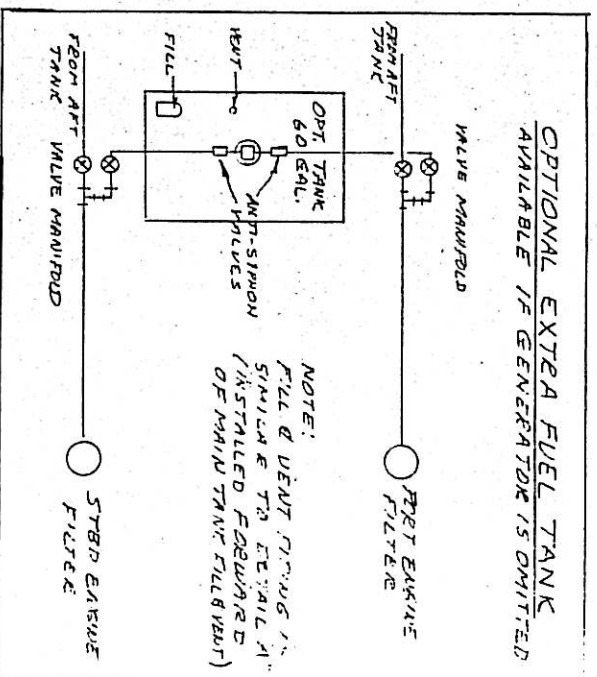
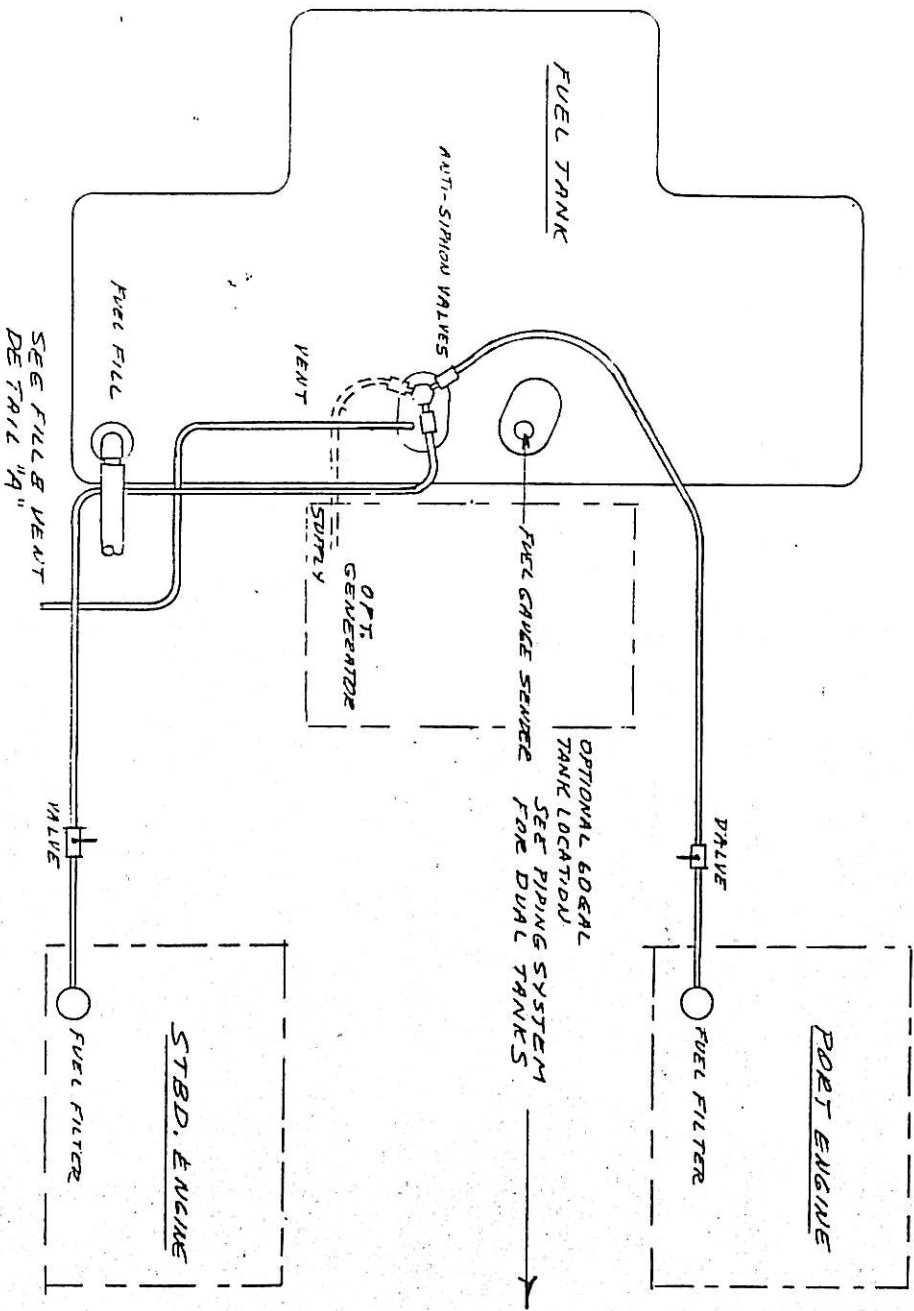
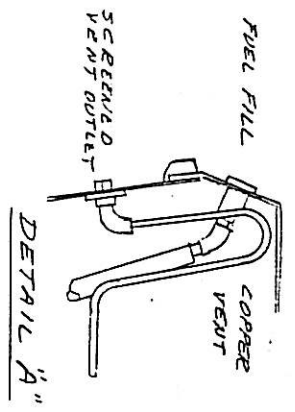
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REVISIONS			
LET.	DESCRIPTION	BY	DATE

<p><b>BERTRAM YACHT</b> MIAMI, FLORIDA, U.S.A. A SUBSIDIARY OF WHITTAKER CORPORATION</p>			
MODEL	303 & 304		
TITLE	FUEL SYS.-GM 82L DSL		
SCALE	NONE		
BY	LCM	APP'D	
DATE	2/10/64	02/15/64	
	B	8533	
FILE	ME 91000 AL 1		





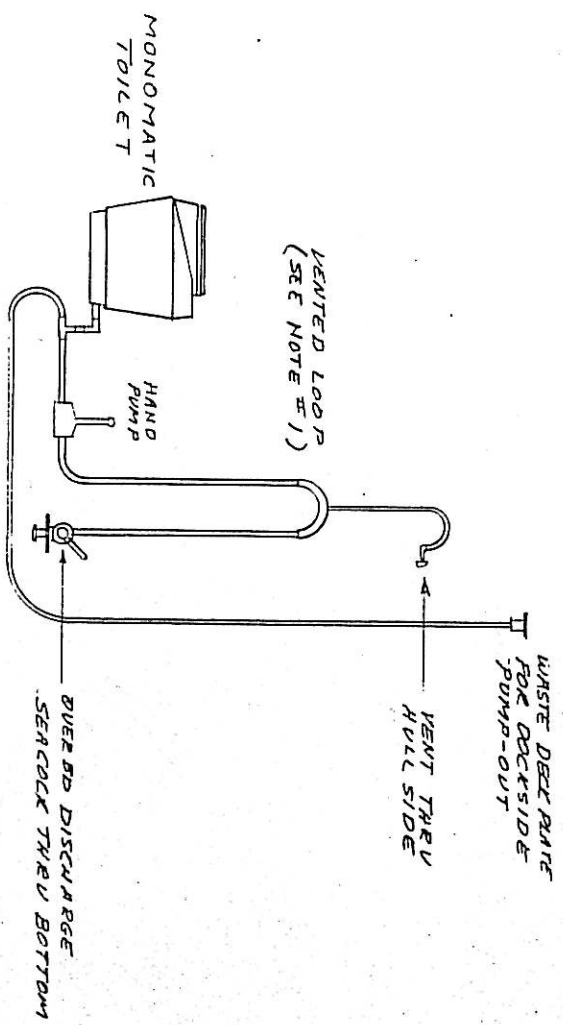
NOTE:  
FILL & VENT TUBING IS  
STAINLESS TO PREVENT  
INSTALLATION FORWARD  
OF MAIN TANK FILL VENT

<b>BERTRAM YACHT</b> MIAMI, FLORIDA, U.S.A. A SUBSIDIARY OF WHITAKER CORPORATION			
MODEL	303 & 304		
TITLE	FUEL SYS. GASOLINE ENGINES		
SCALE	SCALE	PLAN NO.	REV.
BY	L.C.H.	APPROVED	
DATE	2/10/54	DATE	2/23/54
		<b>B</b>	<b>8532</b>
FILE	H.C.W.H.V.A.1		

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LET.	DESCRIPTION	BY	DATE



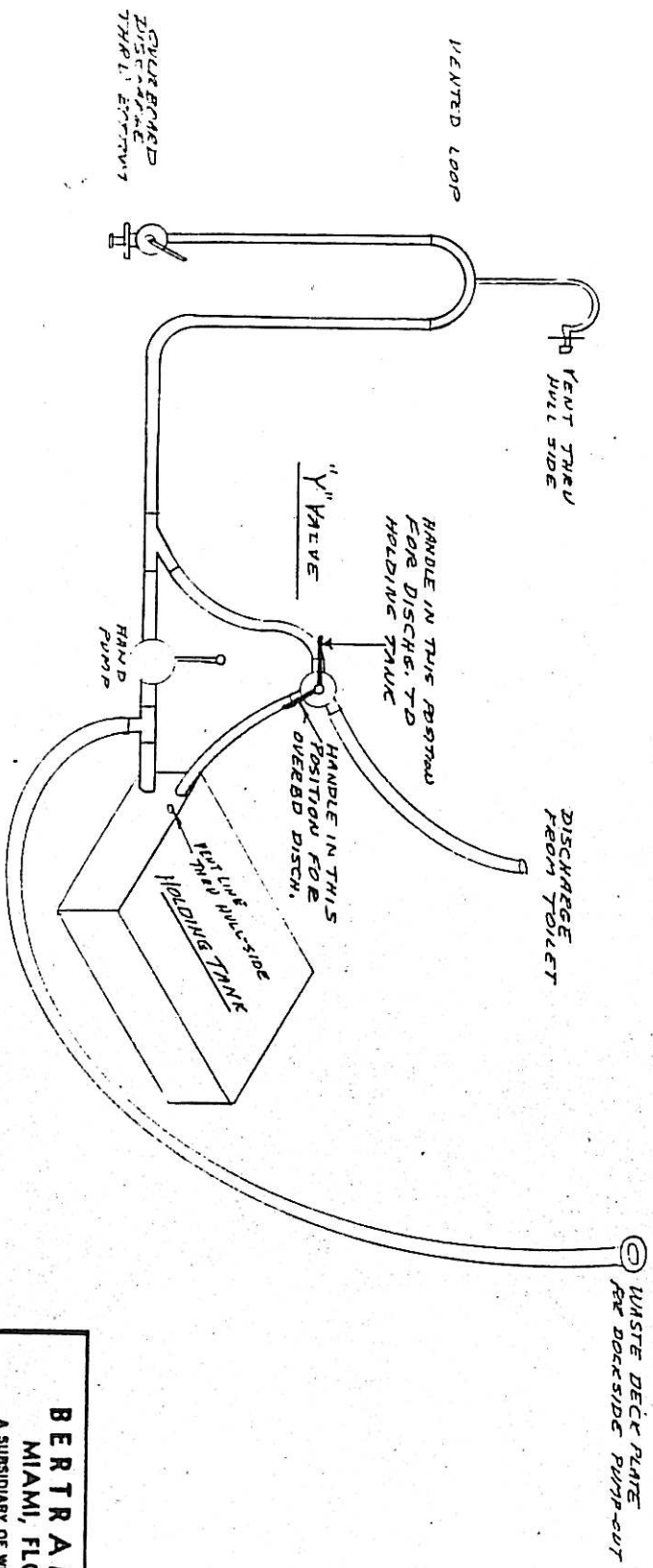
REVISIONS			
LET.	DESCRIPTION	BY	DATE



NOTE:  
 1. VENTED LOOP IS REQUIRED  
 IF HAND PUMP IS BELOW  
 LOAD WATER LINE.

<b>BERTRAM YACHT</b>			
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A SUBSIDIARY OF WHITTAKER CORPORATION			
MODEL GENERAL			
TITLE MONOMATIC TOILET SYST.			
W/ DECKSIDE & OVERBOARD DISCHARGE			
SCALE	NONE		
BY	L.C.H.	APPROV.	PLAN NO.
DATE	2/13/54	DN/S/54	B 8535
REV.	FILE ME 199404151		

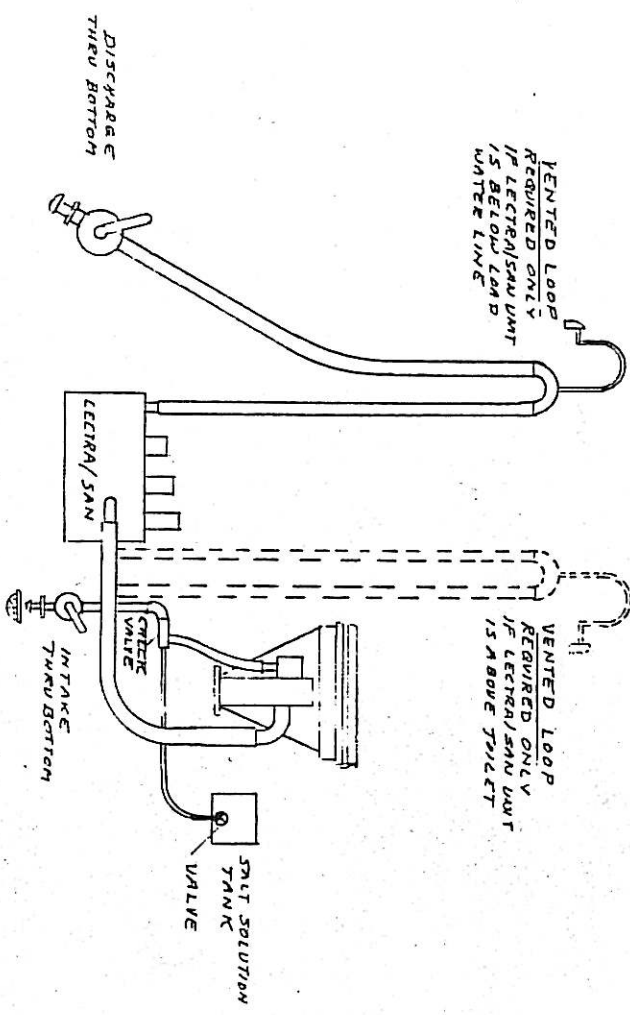
REVISIONS		
LET.	DESCRIPTION	BY DATE APPV.



<b>BERTRAM YACHT</b>			
MIAMI, FLORIDA, U.S.A.			
A SUBSIDIARY OF WHITTAKER CORPORATION			
MODEL	GENERAL		
TITLE MARINE TOILET WITH			
HOLDING TANK, DOCKSIDE & OVERBOARD DISCH.			
SCALE	NONE		
BY	L.C.H.	APPV.	
DATE	2/5/54	DATE	2/25/54
PLAN NO.	B 8536		
REV.			
FILE	M, E, P, W, V, N, S		

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LET.	DESCRIPTION	BY	DATE	APPV.



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MIAMI, FLORIDA, U.S.A.			
A SUBSIDIARY OF WHITTAKER CORPORATION			
MODEL <b>GENEERAL</b>			
TITLE <b>MARINE TOILET WITH</b>			
<b>LECTRA/SAN TREATMENT SYSTEM</b>			
SCALE	<b>NONE</b>	PLAN NO.	REV.
BY	<b>C.C.H. APR 64</b>		
DATE	<b>3/26/64</b>		
		<b>B</b>	<b>8555</b>
FILE <b>M E HANV 4 L 1</b>			

MAINTENANCE SECTION  
PREVENTATIVE MAINTENANCE

PERIODIC MAINTENANCE

The required maintenance of your Bertram during the boating season 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 preventative maintenance program is set for the boat under "average" conditions. 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.

DAILY

1. Pump bilges as required.
2. Ventilate engine compartment (open engine boxes).
3. Check engine lubricating oil levels, and transmission levels.
4. Check engine coolant levels (if fresh water cooled). (Including generator if installed).
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 at the transom outlet.
9. Check battery water level.
10. Check for slow drip at shaft stuffing boxes.
11. Top off fuel tanks and water tanks at end of day's operation.
12. Wash down boat with fresh water.

EVERY 100 HOURS OR 60 DAYS

The following is the breakdown of items to check and inspect associated with the area indicated.

### Exterior

1. Exterior fiberglass finish - clean and wax.
2. Clean all hardware and apply protective polish.  
Tighten any loose fittings.
3. Clean all exterior seat cushions. 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. Air out all life jackets.
3. If any mildew is found, thoroughly wash down the area with Clorox solution.
4. Operate all drawers and doors. Slight adjustment may be necessary on the doors and drawers due to expansion from moisture. Drawers can be made to slide easier by using wax or lubricant.
5. Check all hand fire extinguishers for full charge.
6. Check operation of bilge alarm float switch.

### V-Berth

1. Check operation of lights.
2. 120V duplex outlet for operation.
3. Check bow hatch for operation and water tight fit.

### Head

1. Check operation of lights.
2. 120V duplex outlet for operation. Test GFI.
3. Check hot and cold water faucets for operation.
4. Check shower sump pump for operation and clean filter.

### Galley

1. Check hot and cold water faucets for operation.
2. Check sink drain for pluggage and leaks.
3. Check lights and duplex outlet for operation. Test GFI.
4. Clean and check stove for operation.
5. Check refrigerator for operation. Defrost and clean refrigerator with a solution of baking soda.
6. Check forward bilge pump and float switch.

## Engine Compartment

1. Follow periodic preventative maintenance for engines and marine gears as specified in the engine manual.
2. Check stuffing boxes. A slight drip is desirable as it lubricates the packing. If the stuffing box is leaking excessively, tighten the nuts slightly to draw down the gland on the packing.
3. Check exhaust hoses and hose clamps.
4. Check the raw water strainers. The raw water strainers should be free of any foreign matter. If they require cleaning, loosen the wing nuts on the top of the strainer body after closing the appropriate seacock. Swing the top to one side and remove the basket for cleaning. Replace the basket, secure the top, reopen the seacock and check for leaks.
5. Check engine mounting bolts to see that they are tight. If bolts are found to be loose, realign the engine. If coupling must be broken loose, lubricate coupling bolts.
6. Check all hoses on engines and hose clamps.
7. Check fuel lines, flare nuts and valves for leaks.
8. Check control cable brackets for tightness. Lubricate threaded cable ends and check cotter pins.
9. Check electrical connections. Clean if corroded.
10. Check exhaust blowers for operation and hoses for leaks.
11. Check wiring to see that it is not rubbing or insulation worn off.
12. Check gauge senders and alarm system make-break switches.
13. Check fresh water system lines and fittings for leaks.
14. Check fresh water pump for condition and operation.
15. Check air conditioning (if installed).
  - a. Condensing unit
  - b. Hose and hose clamps
  - c. Clean raw water strainer
  - d. Operation of pump
16. Check operation of bilge alarm float switch.
17. Check all battery cells with hydrometer. They should be between 1.250 and 1.265. Add water if necessary.

18. Check battery terminals, remove, scrape and coat with Vaseline.  
See Warning in Battery Care Instructions of this section
19. Follow periodic preventative maintenance for generator as specified in generator operator's manual.
20. Check generator mounting bolts for tightness.
21. Check generator for oil leaks. If leaks are found, have generator manufacturer's service representative inspect and correct.
22. Clean generator raw water strainer if required.
23. Clean out stringer limber holes.
24. Remove and clean screen on bilge pump and check operation of pump.
25. Check operation of bilge alarm float.

#### Lazarette

1. Inspect all fuel lines, flare nuts and valves for leaks.
2. Inspect rudder ports for leaks. The rudders use a packing gland similar to the propeller shaft stuffing box. The same procedure is followed to stop excessive leaking.
3. Check all fittings for steering system; clevis bolts, rudder arms, lock nuts and lock bolts for tightness and smooth operation. Lubricate tie rod end fittings.
4. Check operation of bilge pump and float switch.

#### Console

1. Check operation of all switches, gauges and controls.
2. Check electrical connections for tightness and corrosion.
3. Lubricate control heads.

#### AS REQUIRED

Haul boat out of the water, scrub bottom if necessary, and repaint with anti-fouling paint.

#### CREVICE CORROSION

It is advisable to rotate the shafts about every 7 days to prevent condition called crevice corrosion, occurring on the shafts in the area of the struts and shaft logs. This might occur if shafts remain

in the same position over a long period of time when the boat remains in water, as in wet storage.

#### ELECTROLYSIS

When the boat remains idle for extended periods of time, it is suggested a zinc "fish" be placed over the side by means of a heavy wire with a clip attached at the other end. The clip should be attached to an engine or gear with the "fish" remaining in the water. This will control electrolytic action affecting the components mounted in or on the hull. When the "fish" has greatly disintegrated, it should be replaced as it will no longer be effective. These items can be purchased from marine stores or made up if desired. Remove from the water before any attempt is made to move the boat under power.



## STORING YOUR BERTRAM

### DRY STORAGE

Indoor storage is generally preferred if there is good ventilation and the location is otherwise safe and dry. For any special instructions on covering for outdoor storage, refer to "Docking Plan" drawing. To keep the bilge dry, remove the bilge drain plug and open all valves and/or seacocks. Drain all tanks, water lines and pumps of water to prevent damage from freezing. Add antifreeze to any low position lines that can't be drained. In warm climates, draining will prevent water stagnation.

It is always best to store electrical equipment in a warm, dry place over the winter. If possible, remove the fresh water pump and motor assembly for storage. If the pump is to be left on the boat through the winter, it must be thoroughly drained. Remove the inlet and outlet connections from the pump.

Open windows and hatches sufficiently to allow air to circulate. Also, leave locker doors and drawers open. Dry out ice chests and refrigerator. If possible, remove mattresses and cushions, clean and store in a dry place. If they must be left aboard, prop up on one end for maximum ventilation.

Synthetic material lines need only proper handling and occasional cleaning. Natural fiber lines should be dried and kept in a well ventilated place.

With any toilet, after water supply and discharge lines are drained, apply a light coat of oil to all metal parts. CAUTION: Do not oil any rubber or leather parts.

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.

## WET STORAGE

All the preceding applies except, of course, valves and seacocks should remain closed and the main battery switches placed in the "Off" position. Also recommended is the using of zinc "fish" as pointed out previously under "Electrolysis". Bilge pumps should be in Automatic mode. Batteries should be kept charged.

## FITTING OUT

In order to ensure maximum pleasure and enjoyment 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 and Post Launch Checks

In all likelihood, your Bertram has been delivered to you in the water with these checks made by your Bertram dealer. However, when hauled, and you are fitting out for a new season, be sure these checks are made.

### Pre Launch

1. Thru-hull strainers clean and secure. Bilge drain plug should be in place and secure.
2. Shafts should turn freely.
3. Secure propeller nut, jam nut and cotter pin.
4. Do rudders fit well in rudder port?
5. Are set screws holding bearing shell on struts in place?
6. Are seacocks or valves free and operable? Not overly free which would allow them to accidentally close.

### After Launch

1. Are supply and discharge lines secure?
2. Are fittings tight?
3. Make sure propeller shaft stuffing boxes are properly adjusted.
4. Check shaft alignment. (Procedure outlined in "Mechanical Systems Section").
5. Make sure rudder packing glands are properly adjusted.
6. Are bilge pumps working?
7. Are bilge blowers working?

### Electrical System Check

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

### Engine Check

1. Fuel lines, cooling lines secure and fittings tight.
2. Exhaust fittings secure and tight.
3. Check engine/shaft alignment. See Section F of this manual.
4. Engine mount fastening tight, locked.
5. See engine manual for service instructions.

### Controls Check

1. Clutch adjusted, fittings secured. See that shift lever on transmission has full engagement when control lever on bridge is moved to full ahead or astern.
2. Throttle adjusted, fittings secured.
3. Steering positive, linkage secure, rudder moves freely.
4. All gauges, water temperature, oil pressure, tachometer, voltmeter fully operating (after starting engines).

## APPEARANCE AND CARE

### CARE OF FIBERGLASS

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 with polyester resin. The complete lamination and gelcoat are 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 white automotive type polishing 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 products are 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 Number 7. If a power buffer is used, Mirro-Glaze Number 1 or a similar product is recommended. After buffing, the surface should be waxed and polished as described above for "Seasonal Care".

### STAINS

The fiberglass gelcoat surface is highly resistant to stains, most of which 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 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 can be treated by lightly sanding and buffing the area. Larger scratches that penetrate the gelcoat but do not go deeply into the fiberglass or weaken the structure can also be repaired as follows:

- a. Clean the damaged area first with mineral spirits or turpentine to remove dirt and wax then follow with detergent and rinse. Allow to dry completely.
- b. Secure a small amount of pigmented gelcoat resin matching the color of the area to be repaired. This is available to you from your Bertram dealer.
- c. Add two drops of catalyst per cubic inch of gelcoat and mix thoroughly; the mixture will gel in 15 minutes.
- d. Fill scratch with the mixture before it hardens and round off about 1/16" to 1/8" above surrounding surface.
- e. 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.
- f. 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.

### BOTTOM BLISTERS

Prolonged and continuous contact with water, in some cases, causes blister formation in the fiberglass laminates.

These blisters occur immediately behind the gelcoat or behind the surface layer of mat.

Osmosis causes the blister to expand which will separate the glass fiber from the resin in the surface mat. When the blister is removed the remaining mat fibers will give the appearance of having little or no resin. This "dry" appearance is a normal result and can be restored to a smooth surface with fine sandpaper.

Repairs should be made by a yard having experience with this type of problem. Contact an authorized Bertram dealer or the Bertram Service Department.

### PAINTING FIBERGLASS SURFACES

1. Thoroughly clean the 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, fine oxide or #220 sandpaper. Wipe clean of all dust.
3. Apply two thin coats of primer as recommended by marine paint manufacturer.
4. Apply a marine paint of good quality as the manufacturer recommends.
5. Bottom anti-fouling paint should be applied per the manufacturer's instructions. Bertram's usual procedure is to apply Pettit Trinidad "75" anti-fouling paint, unless an owner requests a different brand. Before repainting the bottom, a check should be made to insure that the brand and type is compatible with the type presently on the bottom.

NOTE: Some types of bottom paint are not compatible with Pettit unless a primer is used first.

In painting anti-fouling, make sure the trim tab assembly is covered, including the hydraulic cylinders. Make sure the lower portion of the cylinder where the ram comes out of the cylinder has been well covered.

NOTE: Never paint on ground plates, depth sounder transducer or electrolysis zincs.

## BATTERY CARE

for adding to the electrolyte; however, a good  
can be used if it is free of minerals, particu-

will temporarily lower the specific gravity of  
this does not mean that the cell has lost any of

ed; the top of plate separators should never be  
ter until liquid level is about 3/8 inches above

Do not overfill. Excessive liquid level will  
the vents when battery is charging and will cause  
nals and to the battery cables.

### ID

conditions, batteries should require only a  
every few weeks. If an excessive amount of  
is usually a sign that the battery is being  
gine alternators and converter should be checked.

ion Meter on the 12V DC distribution panel to

em Maximum Charge Rate: 14.1 Volts

are on tight, then clean battery top with a stiff  
being careful not to scatter corrosion products.  
wetted with ammonia or baking soda in water.  
cloth with clear water.

ninals and cable terminals to a bright metal finish  
re removed. Coat the contact surfaces with pe-  
ne) before the terminals are reconnected.



## BATTERY GASES - EXPLOSIVE

### WARNING

The gases issuing from a charging battery are a mixture of hydrogen and oxygen gases and will explode with great violence and spraying of acid if a spark or flame is brought too near them.

To avoid sparks, do not disturb connections at batteries while charging. Be sure engines are not running and that converter has been turned off when working on battery terminals.

### SPILLED BATTERY ACID

If battery acid is spilled, immediate action is required to check or eliminate its damaging effects:

1. Acid splashed in the eye should be washed out immediately and thoroughly with plenty of cold, fresh water, then, play it safe and see a doctor.
2. Acid on other parts of the body should be removed immediately by washing thoroughly with cold water.
3. Acid on clothing or parts of the boat should be washed immediately with cold water and the area neutralized with a solution of baking soda or household ammonia.

If a considerable amount of acid is spilled from the battery, it should be replaced by a qualified battery repairman.