

*Columbia*  
**Owner's Manual**

**COLUMBIA 8.7**

(Model 299)

HULL No. \_\_\_\_\_



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## HISTORY OF COLUMBIA YACHT

Columbia Yacht was founded in 1960 in Costa Mesa, California. It started out as small company named Glas Laminates which produced camper tops for pickup trucks, shower stalls and portable chemical toilets. In 1961 the company's management decided to expand into the sailboat business with the relatively new building material, fiberglass. The company's new product was called the Islander 24, which immediately drew much interest and sold out production for the first year.

In 1962 a completely new model was born; the Columbia 29; A Sparkman & Stephens design, it was to become a highly successful model. This new boat was later to inspire the company to take on its name as its corporate title and establish the distinctive emblem that has become known throughout the world today.

In 1964 the success of Columbia and growth of consumer interest in the products manufactured by Columbia warranted an expansion to the East Coast of the United States. The move allowed Columbia to reduce the distance and delivery time of the product to eastern customers. The new eastern plant was located on a nine-acre site in Portsmouth, Virginia where soon all products of the company were in full production.

In 1965 Columbia was credited with the manufacture of the largest production fiberglass sailboat in existence. The new William Tripp designed Columbia 50 was a phenomenal success in design and racing wins and the overwhelming demand for the product helped to boost Columbia into the leadership position in the sailboat industry.

In 1967 Columbia became a subsidiary of the California based conglomerate, the Whittaker Corporation.

With the addition of managerial expertise and financial support coupled with the technical and engineering resources of its new parent company, Columbia further strengthened its position of innovation and growth in the sailboat industry. The company's headquarters and West Coast plant was moved to a new location in a new modern facility located on a 10 acre site in southern California's Irvine Industrial complex. In 1968 Whittaker acquired Coronado Yachts and merged it with the Columbia operation under separate marketing policies.

In 1971 Columbia embarked on a new program of building kit-boats, Salilcrafter Custom Yachts, to appeal to a group of owner/builder customers. This continued through 1974 when it was decided that the kit-boat business was interfering with the overall new boat production operation.

In 1972 Columbia became a division of Whittaker Corporation.

## HISTORY OF COLUMBIA YACHT (CONTINUED)

In August 1975 Columbia re-established its headquarters in the new 50 acre. 5 building site on the Intercoastal Waterway in Chesapeake, Virginia. This huge, new, modern facility resulted in the consolidation of Columbia's production operations on the east coast and the sale of its other two plants. At this time Coronado products have been blended into the Columbia product line and the brand name discontinued.

Today, Columbia has become a "grand old name" in the sailboat industry. Columbia products are produced in Australia, Japan, and Spain under license agreements and Columbia products are being sold throughout the world through a growing strong network of Columbia dealers.

The Columbia family of satisfied and enthusiastic owners, over the years, whether in racing, cruising or just enjoying the thrill of sailing, are constantly changing and adding to the continued growth and new product development of an industry innovator and leader, Columbia Yacht.

# **COLUMBIA 8.7 OWNERS MANUAL**

## **CONTENTS**

**TITLE PAGE**  
**WELCOME TO COLUMBIA YACHT**  
**HISTORY OF COLUMBIA YACHT**  
**FORWARD**

### **1. PRE-DELIVERY AND WARRANTY PROGRAM**

- 1.1 Columbia Warranty Coverage**
- 1.2 Columbia Warranty Certificate**
- 1.3 Pre-Delivery Service Record and Form**

### **2. SPECIFICATIONS**

- 2.1 General Specifications**
- 2.2 Technical Specifications**
- 2.3 Light Bulb List**
- 2.4 Thru-Hull Penetrations**

### **3. SPARS RIGGING AND HARDWARE**

- 3.1 Mast Tune on Commissioning**
- 3.2 Mainsail Gear**
- 3.3 Genoa Gear**
- 3.4 Optional Spinnaker Gear**
- 3.5 Optional Boom Vang**
- 3.6 Optional Reefing Gear**

### **4. ELECTRICAL SYSTEMS**

- 4.1 Basic Electrical System**
  - 4.1.1 Bonding System**
  - 4.1.2 Battery Condition Indicator**
  - 4.1.3 Battery Maintenance**
- 4.2 Operation of 12 Volt D. C. System**
  - 4.2.1 Standard 12 Volt D.C. System**
  - 4.2.2 Optional 12 Volt D.C. System**
- 4.3 Optional 110 Volt A.C. Electrical System**
  - 4.3.1 Optional Hot Water Heater**
  - 4.3.2 Optional Battery charger**

## **5. ENGINE OPERATION**

- 5.1 Fuel System**
  - 5.1.1 Fuel Tank**
  - 5.1.2 Fuel Filters**
  - 5.1.3 Safe Fueling Practices**
- 5.2 Propeller**
- 5.3 Propeller Shaft**
  - 5.3.1 Coupling and Alignment**
  - 5.3.2 Stuffing Box**
- 5.4 Reverse and Reduction gear**
- 5.5 Controls and Instruments**
  - 5.5.1 Engine Controls**
  - 5.5.2 Instruments**
- 5.6 Operating the Engine**
  - 5.6.1 Break-in Procedures**
  - 5.6.2 Starting**
  - 5.6.3 Running**
  - 5.6.4 Stopping**
- 5.7 Winterization**
- 5.8 Optional Diesel**
  - 5.8.1 Bleeding**
  - 5.8.2 Engine Control**
  - 5.8.3 Instruments**
  - 5.8.4 Break-in Procedures**
  - 5.8.5 Running the Engine**

## **6. PLUMBING SYSTEMS**

- 6.1 Thru-Hulls**
- 6.2 Fresh Water System**
  - 6.2.1 Sinks**
  - 6.2.2 Optional Hot and Cold Pressure Water System**
  - 6.2.3 Optional Shower**
- 6.3 Manual Bilge Pump**
- 6.4 Marine Toilet**
  - 6.4.1 Optional Holding Tank, Dockside**
  - 6.4.2 Optional Holding Tank, Dockside and Overboard Discharge**

## **7. MAINTENANCE TIPS**

- 7.1 Rudders, Keels and Bottom Paints**
- 7.2 Spars, Rigging and Hardware**
- 7.3 Fiberglass Surfaces**
- 7.4 Woodwork**
- 7.5 Sails**

## **8. INTERIOR APPOINTMENTS**

- 8.1 General**
- 8.2 Ice Box**
- 8.3 Alcohol Stove**
- 8.4 Miscellaneous**

## **9. SAILING TIPS**

- 9.1 Basic Keelboat Sailors Library**
- 9.2 Miscellaneous Publications**

## **10. DIAGRAMS**

- 10.1 Interior Arrangements**
- 10.2 Sailplan and Sail Data**
- 10.3 Deck Hardware**
- 10.4 Rigging List**
- 10.5 Electrical Schematic**
- 10.6 Fuel System**
- 10.7 Engine Installation**
- 10.8 Plumbing**

## **2. SPECIFICATIONS**

### **2.1 GENERAL SPECIFICATIONS**

<b>Model Name</b>	<b>Columbia 8.7</b>	
<b>Model Number</b>	<b>299</b>	
<b>Length Overall</b>	<b>28' 7"</b>	<b>8.7 m</b>
<b>Designed. Load Waterline Length</b>	<b>23' 2"</b>	<b>7.1 m</b>
<b>Beam</b>	<b>10' 0"</b>	<b>3.0 m</b>
<b>Draft</b>	<b>4' 8"</b>	<b>1.4 m</b>
<b>Displacement</b>	<b>8,500 lbs.</b>	<b>3,900 kg</b>
<b>Ballast</b>	<b>3,500 lbs.</b>	<b>1,600 kg</b>
<b>Rig</b>	<b>Sloop</b>	
<b>Maximum Cabin Headroom</b>	<b>6' 1"</b>	<b>1.85 m</b>
<b>Sleeping Capacity</b>	<b>5</b>	
<b>Vertical Clearance</b>	<b>41' 3"</b>	<b>12.6 m</b>
<b>Designer</b>	<b>Alan Payne</b>	

## 2.2 TECHNICAL SPECIFICATIONS

a. Hull Number: \_\_\_\_\_

b. Engine	<u>Standard</u>	<u>Optional</u>
Manufacturer	Medalist Universal Motors	Volvo Penta
Model:	Atomic 2	MD6B
Power	10 H.P. @ 3000 RPM	10 H.P. @2,400 RPM
Serial Number:	_____	_____
Gear Model:		MS
Gear Ratio:	2.5:1	1.91:1

c. Batteries 105 amp-hr (one standard, one optional )

d. Propeller Shaft

Material: Stainless Steel  
Diameter: ¾ Inches  
Length: 48.75 inches

e. Propeller

Material: Bronze  
Style: Solid 2 Blade  
Rotation: Right hand ( Left Hand with Diesel Option )

f. Fuel Capacity: 20 Gallons

g. Water Capacity

Port: 30 Gall

g. Sail Area

100% Foretriangle	231 sq. ft.
Main	185 sq. ft.
Total (100% Foretriangle )	416 sq. ft.

## 2.3 LIGHT BULB LIST

<u>Lamp Description</u>	<u>Type</u>
Port and Starboard Running	90
Bow	1416
Stern	1416
Masthead (Anchor )	90
Foredeck	212
Master Control Panel	1815
Cabin Dome Lights	W-1141
Cabin Swivel Lights	W-1141
Instrument Panel	2W

## 2.4 THRU-HULL PENETRATIONS

<u>Description</u>	<u>Seal</u>	<u>Access</u>
Toilet Intake – Sink Discharge	Seacock	Sink Cabinet Lower Locker Door
Toilet Discharge	Seacock	Sink Cabinet Lower Locker Door
Engine Cooling Intake	Seacock	Locker Bin Below Galley Sink
Galley Sink Discharge	Seacock	Locker Bin Below Galley Sink
Engine Exhaust	Seacock	Cockpit Seat and Lazarette Locker
Bilge Pumps	None (Above LWL)	Cockpit Seat and Lazarette Locker
Scuppers	None (Above LWL)	Cockpit Seat and Lazarette Locker
Rudder Stock	Stuffing Box	Companionway Ladder Aft Engine Room
Propeller Shaft	Stuffing Box	Bulkhead Panel

### 3. SPARS RIGGING AND HARDWARE

One of the most rewarding activities connected with sailing is tinkering with your boat's rigging and hardware. The best skippers always seem to be looking aloft at the sails and then thinking about new fittings, or new ways to improving old ones. In this way a person acquires a thorough understanding of how and why every piece of sailing equipment works, plus how to repair and maintain it. As sailors, we too, are constantly trying to achieve better and easier boat performance; thus the gear that we install is constantly being improved. What we hope to accomplish in this section is to give you the background information for setting up your boat in the beginning for normal sailing conditions.

When you need more help and information, please consult your local dealer.

#### 3.1 MAST TUNE ON COMMISSIONING

When the boat is commissioned it is important that the rigging be set up so as to support the mast in a vertical position athwartship. With the backstay and headstay only snug and all lower shrouds loose, tighten the upper shrouds so as to position the masthead directly over the centerline or the yacht. At this point both upper shrouds should have equal tension. A person should be able to deflect the shrouds a couple of inches with a light pull or push at about chest height. The rigging should not be set up exceptionally tight. The backstay can then be adjusted to a position that would be used in light air sailing. Next adjust the forward lowers so that they have about one inch more play than the uppers. Finally adjust the aft lowers so that they have several inches more play than the forward lowers.

Additional preliminary tuning of the mast should take place while sailing to windward in a medium breeze or 8 to 10 knots. Sighting along the backside of the mast from deck level will indicate what further turnbuckle adjustment needs to be made to the windward side of the mast. The top of the mast should be straight. If the upper shroud tension is correct, adjustment should be made with the forward lower shroud. If the middle of the mast is falling off to leeward, tighten the mast to windward. In this breeze the, aft lower should just be starting to get snug but should not be carrying any appreciable load. Always tack, and then make the turnbuckle adjustments on the now lee or slack side of the mast and sight the mast on the new windward side for further corrections. After a few tacks, the mast should be straight! Secure the rigging by inserting cotter keys into the turnbuckles; spread them open and cover with tape to prevent any snags.

### 3.1 CONTINUED

Special attention should be given to the initial stretch of the rigging, especially after the first sail in a strong breeze. In windy conditions it is actually desirable to have the mast head "fall-off" slightly to leeward, giving the mast a smooth, even curve from head to deck. After a few more sails in strong breezes, the rigging should be checked again for tune, as additional stretch will occur.

### 3.2 MAINSAIL GEAR

In addition to spars, the mainsail gear consists of a stainless steel braided tail halyard, cunningham line, topping lift, internal outhaul, mainsheet, and ball bearing traveller. The cleat and an optional winch, if ordered, are mounted on the starboard side of the mast. After hoisting the main, insert a pre-sprung, cotter pin in the hole located in the luff groove just above the gate so that the head of the pin prevents the slides from leaving the luff groove when the sail is lowered.

The outhaul consists of an internal tackle with a purchase of 5:i giving ample power to adjust foot tension when under sail. The outhaul is controlled from the bottom of the boom near the gooseneck to allow adjustment even when the boom is eased such as on a broad reach.

The mainsheet consists of a six-part tackle terminating at a cam cleat on the traveller car. The ball bearing traveller is conveniently located on the bridge deck. Athwartship control is achieved by pushing the blocks and car to the desired position on the traveller and securing it there with one or both of the spring loaded traveller stops.

The main cunningham dead ends on an eye strap on the port side of the mast. It is passed through the cunningham cringle then down to a clam cleat on the opposite side of the mast. As the wind freshens the cunningham can be taken in to help control draft and keep it forward in the sail.

After hoisting sail, remember to ease the topping lift at the aft end of the boom so that the mainsail can be properly sheeted.

### 3.3 GENOA GEAR

The trend in modern yacht design has been to smaller mainsails and larger jibs or "Genoas". Usually any sail that overlaps the mast is considered a Genoa and is identified by the amount of the overlap.

### 3.3 CONTINUED

Example: If the distance from the face of the mast to the bow ("J" on the sail plan) is 10 feet and a line 15 feet distant (LP) was drawn parallel to the headstay then any Genoa with a clew (aft lower corner of sail) on that line would be a "150% Genoa".

It is extremely important to realize that these large sails can concentrate very high loads over a very small area, hence the gear must have high safe working loads.

All of the Genoa Gear has been designed and prepared to accept those extreme loads. The track is thru bolted and all blocks have ample safety factors. All other fittings are of the best possible design and strength for the job intended.

Most fitting failures occur from improper usage, usually by trying to use an under designed fitting instead of the proper factory recommendation. If loads are expected to come close to the safe working load of the block, then the next size larger must be used. Please remember that if a line turns back on itself, like all halyards, spinnaker sheets and guys, then the load on that block is almost doubled.

Genoa Gear consists of a braided tail stainless steel halyard with halyard winch, sheets, inboard adjustable fairlead blocks, two speed primary winches and related cleats. Snatch blocks can be added as outboard fairleads by attachment to the perforated toe rail. Due to the large loads imposed on Genoa sheets, it is important that the angle from a sheet fairlead block does not impart a twisting movement on the block that could lead to failure. The primary winches are located towards the after end of the cockpit coamings to provide a fair lead for a large range of genoas without the need for a footblock. If an oversized Genoa is used that twists the fairlead block, then a footblock should be added for turning the sheet.

When the Genoa is hanked on, one will notice two tack hooks on the stemhead. The tack cringle of the headsail should be placed directly on this hook doing away with the need of a shackle. The halyard leads to a winch and cleat on the port side of the mast that provides sufficient power to tension the luff. Increasing tension on the halyard will tend to pull the draft forward in the sail. Angle of twist as well as relative foot and leech tension can be adjusted by fairlead position and sheet tension.

### 3.4 OPTIONAL SPINNAKER GEAR

With the trend to larger genoas, the spinnakers also get larger and need larger and stronger gear to handle them. As with the Genoa Gear, our Spinnaker Gear has been designed and fabricated to meet extreme loads that this beautiful sail can produce.

Spinnaker Gear is complete consisting of a spinnaker pole, reaching strut, mast car with control line, spinnaker halyard, topping lift, foreguy, afterguy, and two sheet snatch blocks. If the boat is equipped with the optional winch package consisting of two secondary and main halyard winches, then the secondaries may be used for sheeting. When not in use the spinnaker pole and reaching strut are conveniently stored forward in the deck chocks on the port and starboard sides respectively.

When rigging the spinnaker the snatch blocks may be attached to the transom quarter castings or an aft section of the perforated toe rail. The foreguy is led through a block shackled to the stemhead and secured to one of the forward mooring cleats. The bails which are an integral part of the bow pulpit are a convenient place to secure halyards, sheets and guys when one is in the process of setting up for a spinnaker hoist. Height of the inboard end of the pole can be adjusted with a control line, which secures on a mast cleat. A thumbscrew is also provided on the pole car as an auxiliary means of locking the pole in position. The spinnaker halyard leads to a cleat on the port side of the mast. In beam reaching conditions, when the pole is eased forward near the headstay, very high compression stresses may be exerted upon the pole. The reaching strut allows for a better angle of pull for the afterguy, thus reducing the loads to a safer point. This also eliminates chafe of the afterguy on the upper shroud.

If you are not familiar with spinnakers, it is recommended that you learn the required techniques before trying to hoist and set one yourself. Have a few experienced friends join you for the first couple of spinnaker drills so that you can enjoy the pleasures of this sail without the complications that can accompany incorrect procedures.

### 3.5 OPTIONAL BOOM VANG

The boom vang permits control of the twist in the mainsail when off the wind. It has also been used as a preventer against gybes and to prevent the boom, from bouncing around in light wind and/or a chop. The vang consists of a tackle with a purchase of 4:1, which is self-cleating. There are snap shackles on each end. It may be rigged from the welded bail on the boom down to a swivel bail, near the base of the mast.

### 3.5 CONTINUED

This allows one to play with the sheet without constant vang readjustment. Also, in this position, a gybe may be accomplished without down rigging the vang. Alternately the vang may be led to the rail where a greater downward force can be exerted on the boom. The vang should be slack when going to weather. When the sail is eased to the point where the traveller cannot be used to control leech tension, the vang should be employed. A good starting point for setting the vang is to tighten the leach so that the top batten is parallel to the boom.

### 3.6 OPTIONAL REEFING GEAR

The 8.7 may be equipped with three Quick Reefing systems (also known as California Reefing, Slab Reefing or Jiffy Reefing) intended for use with a flattening reef and two sets of reef points. This system provides rapid reefing ability with a minimum loss of speed as well as permitting excellent control of mainsail shape. The short reef line attaches with a shackle to the fixed eye on the end of the boom. It is reeved through the flattening cringle in the sail, back to the fixed eye on the opposite side of the boom, then forward through the adjustable eyes to a clam cleat on the boom. The medium reef line attaches to the aft adjustable eye and the long reef line to the forward adjustable eye on the boom. They are then reeved through the first and second reef cringles in the same manner as the flattening reef.

To operate the flattening reef, ease the sheet slightly and pull the reef line till the boom is drawn up to the flattening cringle and then resheet. The main cunningham should be adjusted in conjunction to optimize sail shape. To put in the first reef start by removing the cotter pin sail stop. Make sure the topping lift adjustment will prevent the boom from drooping. Ease the mainsheet and main halyard. Tighten the reef line till the reef clew cringle and boom are brought together. Slip the reef tack cringle over the tack hook on the gooseneck in such a manner that the luff leads upwards without a twist from the hook, not downwards. Rehoist and tension the halyard then resheet the main and continue sailing. The reef is shook out by reversing this procedure. The second reef can be taken in using the same procedure.

The boom reef eyes are adjustable to accommodate the reef cringle locations in your sails. They should be set up at the dock or in a practice session to provide an appropriate amount of tension in both the leach and foot of the sail.

If the genoa is equipped with a reef cringle for tack and clew, it may be reefed as follows. First, tie in an auxiliary sheet to the reef clew cringle.

### 3.6 CONTINUED

A genny reef line with an eye splice in one end may be slipped over one tack hook, passed through the tack cringle and led to a forward mooring cleat. After easing the halyard the tack reef cringle is hauled down to the stemhead and secured, and then the halyard is retighten and the sail sheeted in. Alternately, although there is less control on the sail during the reefing process, the halyard may be eased and the tack reef cringle slipped over the opposite tack hook to secure it.

## 4. ELECTRICAL SYSTEMS

### 4.1 BASIC ELECTRICAL SYSTEM

The Master Power and Auxiliary Control Panels feature integrated simplified controls and circuit breaker protection to permit safe and efficient operation of your boat's electrical equipment. All panel components have been carefully selected for their proven performance in marine applications. The basic panel is of a metal alloy, which is inherently corrosion resistant and is doubly protected to optimize resistance to reduce the effects of the marine environment.

Electrical current is directed from a 12 volt battery (a second optional 12 volt battery is available) through the Master Power Control Panel for engine starting, battery charging and accessory loads. Panel selection of "BAT 1" Or "BAT 2" determines which of the two batteries if so equipped will be utilized for engine starting and subsequent charging. The standard single battery circuit is connected through the "BAT 1" position. Before activating the electrical system, use the Battery Condition Indicator to ascertain the condition of your batteries.

The boat is completely wired when it leaves the factory with the exception of the mast harness hookup. When the mast is stepped, the polarized connector in the mast should be joined with the mating connector protruding from the deck mast step. When the mast is unstepped the mast harness should be disconnected at this connector.

#### 4.1.1 BONDING SYSTEM

The entire yacht is electrically bonded. Basically this means that major isolated metallic objects have been electrically connected with a common bonding conductor which is attached to the keel. This in turn acts as a ground plate. This system minimizes electrolytic corrosion due to stray currents, minimizes radio interference and provides a low resistance path for high voltages such as those that can occur when lightning strikes. The rig, including mast, stays, and shrouds have been bonded for lightning protection of personnel and vessel. Nonetheless, as far as practical, one should remain inside a closed boat and avoid making contact with metallic masses" during a lightning storm.

#### 4.1.2 BATTERY CONDITION INDICATOR

This type of "indicator" or "meter" is technically referred to as a "Suppressed Zero Voltmeter". Note that calibrations do not start at zero but provide a full-scale reading from 8 or 10 to 16 volts, depending on the meter. Below 8 or 10 volts the battery charge is so low that terminal voltage readings are meaningless. Approximate voltage range interpretations are as follows:

Engine Not	)	Bellow 11	-----	Very low battery charge
Running or	)	11-12	-----	Low battery charge
At idle	)	12-13	-----	Well charged battery
Engine	)	13 to 13 1/2	-----	Low charge rate
Running	)	13 1/2 to 15 1/2	-	Alternator & Voltage
Above	)			Regulator OK
Idle	)	15 1/2 or above	-	Voltage. Regulator out of Adjustment

It is important for you to understand that the reading on the Battery Condition Indicator Dial is indexed from the toggle test switch position regardless of the master switch position unless it is in the "BOTH" position. When the Master Switch is in the "BOTH" position, the Battery Condition Indicator Dial will indicate the potential or the highest charged battery no matter which way the toggle test switch is indexed. When the Master Switch is in either the "OFF", "BAT 1" or "BAT 2" positions, the meter will read the condition of the battery towards which you index the Toggle Test Switch. Note that panel and meter illumination, is also provided by this same Toggle Test switch.

Before activating the electrical system, check the condition of both batteries and then select the strongest battery for engine starting. Index the Master Switch to the strong battery and then start your engine. It will usually require about 15 or 30 minutes of engine running time to bring the starting battery back up to normal charge. Check the Battery Condition Indicator to assure that charging is normal and when the selected starting battery has been restored it may be placed on reserve by switching to the other battery so subsequent charging and accessory loads will be confined to this second "battery". It is a good practice to bring the first selected battery up to full charge before putting it on reserve and changing to the second battery.

Use the Master switch in "BOTH" position only for emergency starting when both batteries are low, or for "top off" charging when both batteries are near full charge. When both batteries are completely charged, transfer to either battery, keeping one battery in reserve.

Never move the Master Switch to "OFF" while the engine is running or the alternator diodes may be burned out.

#### 4.1.2 CONTINUED

The engine alternator is the normal source for battery charging. Functioning through a voltage regulator the current output is automatically adjusted to the needs of the battery and the demand on the system. The rate of battery charging or discharging is indicated on the Battery Condition Indicator. If the amp light on the engine instrument panel is on or the amp meter indicates a discharge condition with the engine running and all accessories off, then the alternator circuit is not functioning properly.

#### 4.1.3 BATTERY MAINTENANCE

When charging, the lead-acid storage battery converts electrical energy to chemical energy. This energy is stored and released when needed by discharging, i.e. converting the chemical energy back into electrical energy. A potential for electrical energy is set up between the positive and negative battery plates which are interconnected by an electrolyte of sulfuric acid and water. The nature of this electrolyte corresponds to the state of battery charge in such a manner that when discharged the electrolyte is mainly water. Since the density or specific gravity of water and sulfuric acid are different, a measure of the specific gravity obtained by a hydrometer gives an accurate indication of the state of charge. Therefore, it is recommended that specific gravity measurements be made periodically. As a general guide the normal range for full charge is between 1.220 and 1.280. For maximum battery life the following care is recommended. First, maintain a constant level of charge (checking with the hydrometer) rather than allowing it to run down repeatedly with the need for excessive recharges. This can be accomplished by normal operation or the use of a battery charger if the battery will remain idle for extended periods. Maintain the electrolyte above the plates by adding water to replace that which has been lost through evaporation. Keep the battery clean, particularly the terminals. After scraping corroded areas away from the terminals and battery posts, wipe them clean with a baking soda water solution. After reconnecting terminals protect them with a light layer of grease or gasket compound such as "Permatex".

The batteries are located under the forward end of the quarter berth, and can be serviced by lifting the access hatch in this berth.

#### 4.2 OPERATION OF 12 VOLT D.C. ELECTRICAL SYSTEM

Accessory loads may be selected as desired by indexing the appropriate panel breakers to ON" so current may flow from the

## 4.2 CONTINUED

selected battery to the desired accessory. A circuit overload will cause the accessory circuit breaker to "trip", i.e. the breaker will automatically open the circuit and its handle will flip to the "OFF" position. After correction of the fault, the breaker may be manually indexed "ON".

### 4.2.1 STANDARD 12 VOLT D.C. SYSTEM

The Cabin Light switch activates power to the light branch circuit. After it is energized the individual cabin lights, can be turned on and off with their own switches. There are two lights in the forward cabin, one in the head, one over the folding table, two in the main cabin over the settee berths, one in the, galley and one at the navigators station.

If the cabin lights start getting dim, this is fair warning that the battery needs a charge or is getting old., Remember that you have a battery whose charge and water level must be checked at least once a month. If your boat is to be unused or stored for extended periods or time, it is advisable to remove the batteries and store them in a warm, dry location.

The Running Lights switch activates the red and green lensed lights forward, and the white 12 point stern light aft. When under sail at night, these are the only navigation lights that should be shown, except for the shining of a white light on the sails if you feel there is a real need for greater recognition.

The Bow Light switch is for the 20 point white light on the mast and is to be used in conjunction with the running lights when under power or when motor sailing

The MastHead Light is a 32-point white light located on top of the masthead that meets the international and inland rules for a light to be used at anchor.

The Foredeck Light is mounted on the forward side of the mast with the bow light on top and the single foredeck light shining downward and forward. It illuminates the foredeck without getting light into the skipper's eyes and is more "streamlined than lights hanging down from the spreaders

### 4.2.2 OPTIONAL 12 VOLT D. C. ELECTRICAL ACCESSORIES

There is room in the optional 12 volt D.C. control panel for six additional branch circuit breakers. Matching breakers are available through your local Columbia dealer. Recommended

#### 4.2.2 CONTINUED

color coding is indicated on the electrical schematic for navigation instruments, compass light, radio, Optional bilge Pump, and an optional pressure water system. Additions should be made to your schematic for any optional electrical equipment installed. Do not install any electrical equipment without proper circuit breakers or fuses.

#### 4.3 OPTIONAL 110 VOLT A. C. ELECTRICAL SYSTEM

The optional A. C. electrical systems consists of shore power receptacle, A. C. control panel with main breakers, port and starboard branch circuits and duplex outlets. After activating the branch circuits, appliances may be utilized in the same manner, as they would be ashore. In the interest of safety, only three wire grounded portable appliances should be used on board.

Shore Power is brought to the boat by making use of a Shore Power cord plugged into a suitable 30 amp AC receptacle on the dock and the Shore Power receptacle on the boat located aft in the cockpit. The recommended procedure for making this connection is as follows:

1. Set the two A. C. Main Breakers to "OFF".
2. If the receptacle on the dock includes a disconnect switch, set it to "OFF".
3. Connect the Cable, first to the yacht, then to the dock, particularly in this order if there is no disconnect switch on the dock, to minimize the danger of immersing a "live" power line, Avoid unnecessary contact with the cable in wet weather.
4. Dress the cable so that there is no strain on the connectors and in such a manner that it cannot be damaged by chafe. Allow more slack than in the mooring lines.
5. Set the shore power switch "ON".
6. Turn the A. C. Main Breakers "ON".

The following is the recommended procedure for disconnecting the shore power.

1. Turn the A. C. Breakers to "OFF"
2. Set the dock disconnect switch to "OFF"

### 4.3 CONTINUED

3. Disconnect the cable first from the dock, then the yacht.
4. Replace the protective caps on the shore and yacht receptacles.

Warning. The 110 volt A. C. systems used on Columbia yacht are the finest quality and safest obtainable. We have complied with good electrical, practices and requirements of ABYC and other regulatory agencies in effect at time of manufacture. The user must be constantly aware however that the current carried by this equipment can be lethal if allowed to get out of control. Always follow recommended procedures exactly, and also:

Avoid contact with a "live" cable, especially in wet weather.

2. Never attempt to connect to a "live" shore outlet in wet weather.
3. Avoid wetting the cable, inputs or any electrical equipment when washing down decks.
4. Keep children away from cables, inputs, and electrical equipment.
5. Use only 3-wire grounded portable appliances on board.
6. Make frequent inspections of cables, appliance cords and outlets and have them repaired or replaced immediately if any signs of wear deterioration or overheating appear. Do not use any electrical equipment that is known or suspected to be defective.

#### 4.3.1 OPTIONAL HOT WATER HEATER

The Hot Water Heater options will be more fully discussed in section 6.2.3.

#### 4.3.2 OPTIONAL BATTERY CHARGER

Details on the operation or the optional Battery Charger will be found in the manufacturer's instruction manual. The battery Charger is wired in accordance with the manufacturer's recommendation. Battery No.1 is connected to the control circuit. An ignition connection has been made to the cut-of circuit so as to de-energize the Battery Charger when the engine is operated.

#### 4.3.2 CONTINUED

This minimizes the possibility of damage to the alternator that could occur if the battery charger is left on when the engine is operated.

## 5. ENGINE OPERATION

A Medalist Universal Atomic 2 two cylinder, four stroke, 10H.P. gasoline engine with adjustable flex mounts is the standard Columbia 8.7 engine. A gasoline fuel matched reduction gear and propeller completes the propulsion system. Review the engine manufacturer's instruction manual before starting the engine and carefully follow the recommendations and service Procedures.

### 5.1 FUEL SYSTEM

The fuel system consists of one 20gallon capacity tank, valves hoses combination fuel-water separator and electric fuel pump. At the, time or manufacture the fuel system was pressure and leak tested and found to be safe to use. The owner has the responsibility to maintain it in that condition by avoiding storage or handling of gear that might damage or obstruct the tanks, fuel lines, valves and fittings and by frequently inspecting to assure that no deterioration or loosening of joints has resulted from vibration and root traffic. The prudent skipper can relax and enjoy his yacht taking comfort in the knowledge that his fuel and electric systems are maintained in excellent condition.

#### 5.1.1 FUEL TANK

The aluminum fuel tank is mounted under the forward end of the cockpit sole with the fill cap on deck and vent located high on the transom near the centerline. All fuel tanks bear an attached label which states the following:

1. Manufacturer name or trademark.
2. Date of manufacture - month and year.
3. Capacity in gallons.
4. Material of construction and thickness.
5. Fuel for which tank is approved or manufactured.
6. Maximum hydrostatic test pressure.

A shut-off valve accessible through the starboard cockpit seat hatch is mounted directly on the tank. When the ball valve handle is parallel to the valve body it is open. When the handle is at right angles it is closed. This tank valve should be closed when the boat is left unattended.

### 5.1.1 CONTINUED

An, electric fuel gauge registers the amount of fuel in the tank. The fuel tank should never be allowed to run low, both for safety reasons and to prevent water condensation, which is enhanced in a partially filled tank.

### 5.1.2 FUEL FILTERS

One of the major causes of engine failure is fuel contaminated with sediment dirt or water. The use of a good grade of clean fuel purchased from a reliable source is mandatory.

In order to protect your engine a primary fuel-water separator filter is placed in the suction fuel line of each engine ahead of the filters supplied by the engine manufacturer. This filter should be replaced every 100 hours or once a season, whichever comes first. Presence of water should be checked on a daily operating basis and draining should be done as required. Refer to the engine instruction manual for maintenance of the engine filters.

### 5.1.2 SAFE FUELING PRACTICES

The following fueling procedure is recommended:

1. Avoid fueling a boat at night or in rough waters except in an emergency.
2. Before opening the fuel fill deck plate:
  - a. Extinguish all open flames aboard including galley equipment.
  - b. Forbid all smoking on board or on the fuel dock. Drown all butts.
  - c. Stop the engine.
  - d. Turn the Battery Selection Switch to "OFF" to be sure there is no live electrical circuit on board during fueling. (Do not turn the switch "OFF" until the engine is stopped to avoid damage to the alternator.)
  - e. Tightly close all hatches.

### 5.1.3 CONTINUED

4. Watch the fueling closely, Be sure that only a non-automatic, latch-open type of nozzle is used, compelling the operators continuous hand pressure to keep fuel flowing, and that only the ordered quantity of fuel is put aboard. Insure that the operator maintains constant contact of nozzle to fill pipe.
5. When the desired quantity of fuel has been put aboard make sure that the deck plate is tightly closed. Wash down any spills. Check the vent opening to be sure that no fuel is being discharged at this point.
6. Open all hatches.
7. Turn on the master switch and bilge blower branch circuit. Operate the bilge blower for at least five minutes and check the ventilation cowls for the odor of gasoline vapors.
8. When your personal inspection and observations assure you that there are no fumes in the boat, the engine may be started and full electric service restored as desired.

### 5.2 PROPELLER

The solid propeller has been selected to efficiently transmit engine power through the reduction gear when powering. The type and size have been determined by calculations and verified by actual sea trials. The first number in a propeller designation refers to the diameter and the second to the pitch. If a propeller must be replaced, it is important to use the same type diameter and pitch as the original. Note that the shaft turns clockwise when viewed from astern and uses a right hand propeller.

To reduce the drag of the solid propeller while sailing the prop should have its blades vertically aligned with the deadwood. You should mark the propeller shaft for its proper sailing position. Upon stopping the engine the shaft can then be rotated to this position and locked in place by shifting into forward.

If the need arises to reinstall the solid propeller be sure the shaft key and both keyways are clean and free of burrs. The key should have a slight clearance at the top and fit the keyways freely but without side play. Fit the propeller hub

## 5.2 CONTINUED

on the shaft without the key and note how far it goes on by hand. Remove the propeller, insert the key in the shaft so it will engage the propeller hub and slide the propeller hub over it, making sure that it goes on by hand to the same location as before, without binding on the key. Be sure the key does not slide forward and ride up on the keyway fillet, which will throw the propeller of balance and cause vibration. The key should not extend beyond the forward edge of the hub. Install the shaft nut and pull it up tight against the hub, but do not use an extension or hammer on the wrench. Line up the cotter pin holes thru the hub and nut. Install the cotter pins and spread inside the nut.

## 5.3 PROPELLER SHAFT

### 5.3.1 COUPLING AND ALIGNMENT

All shafts and couplings were checked for accuracy before they were installed on the yacht. The shaft and engine were carefully aligned at the factory, but loading, transporting, off loading, and the final set taken by the hull when water borne may alter this alignment. The commissioning dealer is responsible for rechecking the alignment before starting the engine.

Engine alignment should be rechecked after the yacht is water borne for a few days and periodically thereafter, particularly if any signs of misalignment appear-such as noise or vibration. Alignment is comparatively simple and may be accomplished as follows:

1. Remove the bolts holding the shaft and engine transmission flanges together.
2. Press and hold the flanges together by hand while trying to insert a five thousandths of an inch (.005") feeler gauge at the top, bottom and sides.
3. Turn each flange 1/4 turn at a time and recheck at each position.
4. The feeler gauge should not enter at any position, If it does enter, but the gap remains at the same location regardless of the flange positions, the engine is out of line. If it moves around with the flange, the flange is out, or the shaft is bent.

### 5.3.1 CONTINUED

5. If the engine is out and there is a difference in gap between the top and bottom of the flanges, alignment can be corrected by raising or lowering the ends of the engine using the adjustable motor mounts.
6. If the engine is out and there is a difference in gap between the sides of the flanges, alignment can be corrected by loosening the engine mount lag bolts and prying the engine to one side or the other, then re tightening the bolts.
7. When the alignment is within the .005" tolerance, the flanges and flexible coupling may be re bolted.

### 5.3.2. STUFFING BOX

The stuffing box is a thru-hull seal for the rotating propeller shaft. It is connected on the inside of the yacht to the molded shaft log by means of a flexible rubber hose which is held in place by hose clamps. This allows for a slight misalignment without causing undue wear on the packing gland. A square impregnated braided flax packing is used as the packing material, which serves to minimize the leakage. When the yacht is running it is normal to have a slight leakage from the stuffing box. This water serves both as a lubricant and cooling medium between the packing and the shaft. If the leakage is excessive back off the lock nut, support the stuffing box, slowly tighten the packing nut till only a slight drip remains, then finally retighten the lock nut. Do not over tighten, as this may glaze the packing and score the shaft.

To replace the packing when required, remove the yacht from the water, back off the lock nut and slide the packing gland forward on the shaft. Remove all of the old packing and replace it with three (3) rings of 1/4 by 1/4 inch square wax impregnated flax packing. Stagger the cuts on successive rings by 180°. Do not use spiral wound packing in lieu of rings. Slide the packing gland aft and tighten so as to just lock the shaft, which will seat the packing. Next back off the packing nut till the shaft is quite free. Run the shaft for a while, making sure there is leakage then reset the packing nut for only slight drippage. Finally, secure the lock nut.

### 5.4 REVERSE AND REDUCTION GEAR

Engine power is transmitted to the propeller shaft through a mechanically operated forward and reverse transmission and

## 5.4 CONTINUE

reduction gear. A mechanical push-pull cable couples the transmission to the gear lever in the cockpit. Cables are adjustable at both ends as follows. Place the gear lever in the neutral detent position. Remove the cable end from the ball joint on the transmission lever and adjust until it is also in the neutral detent position. Be sure the lever has full travel to the forward and reverse detent position. The sliding sleeves at both ends of the cable should be periodically greased with a light coating.

## 5.5 CONTROLS AND INSTRUMENTATION

All engine controls and instrumentation (with exception of Battery Selector Switch) are located within the cockpit in easy reach of the helmsman. Instruments should be frequently checked when running, particularly when first starting the engine, to avoid mechanical damage.

### 5.5.1 ENGINE CONTROLS

The gear and throttle controls, both of which are mechanical push-pull cable types, are located at the forward end of the starboard cockpit well. The small and large handles for the throttle and clutch controls, respectively, are both removable. Pushing the throttle forward advances engine speed. When the throttle is in the aft position, speed is reduced to idle. The clutch lever has a neutral detent position approximately corresponding to its midway travel position. Pulling the clutch lever all the way aft engages reverse gear and pushing forward engages forward gear.

### 5.5.2 INSTRUMENTS

The instrument panel contains gauges for oil pressure, fuel, engine operating temperature, and an ammeter. In addition, there is the key switch, choke, instrument panel light switch and a blower switch. The key switch is used to start the engine. The manual choke control can be used as an aid in starting a cold engine and must be adjusted accordingly. The blower switch activates a transom mounted blower motor providing ventilation of the engine compartment and should be activated approximately 5 minutes prior to starting the engine. The panel gauges will indicate near or exact operating conditions of the engine and alternator. In addition the actual degree of charging can also be ascertained from the Battery Condition Meter as described in Section 4.1.2.

## 5.5.2 CONTINUED

The ammeter is wired to indicate the net flow of current to or from the battery. To determine alternator output, all electrical accessories should be turned off.

## 5.6 OPERATING THE ENGINE

### 5.6.1 BREAK IN PROCEDURE

The way an engine is run during its early hours of service will have an important affect on the life of the engine and its components. To obtain best results, it should be operated within reasonable limits. The first 10 hours of service can be considered as a running in period, during which the following mode of operation is recommended:

1. Operate in the half to three quarter throttle range as much as possible.

Avoid long periods of operation at engine idle speeds or at maximum power levels in excess of five minutes.

Observe engine instruments frequently during operation and ease the throttle if the temperature gets excessive.

Accelerate slowly enough to allow the engine to achieve governed speed under any condition.

Check oil level frequently (daily before running and at least every 10 hours) during the running in period.

After the first 10 hours of engine operation the oil and oil filter should be changed. In addition a competent mechanic should check the torque on the cylinder head nuts and the valve clearances. Consult the operation and maintenance manual for further specific information.

### 5.6.2 STARTING

A routine procedure should be developed to include the following items prior to starting the engine.

## 5.6.2 CONTINUED

1. Check for adequate fuel supply.
2. Open the fuel valve at the tank.
3. Check the engine and reverse gear oil proper levels.
4. Open the engine raw water intake seacock.
5. Check the electrolyte level in the batteries and add distilled water if required.
6. Use the Battery Condition Indicator to check the condition of the battery or batteries if so equipped.
7. Index the Battery Selector Switch to the strongest or starting battery. Batteries can be paralleled if required by selecting the "BOTH" position.
8. Run the Blower for five minutes prior to starting the engine.

After completing this preliminary check the engine may be started as follows:

9. Check the gear lever to insure that it is in the neutral position.
10. Advance the throttle about 1/8 or its travel.
11. Pull out the choke. If the engine is warm this may not be required.
12. Turn the key switch to the "Start" position till the engine starts, but not longer than 20 seconds or the starter motor may be damaged. Prolonged use of the starter will also quickly discharge the batteries. After the engine starts, release the key to the "Accessory" position.
13. Gradually adjust the throttle back to the slow idle position and push the choke control in.
14. Check the oil pressure (10 to 25 psi.). If the pressure is low, stop the engine and check for the source of the problem.

### 5.6.2 CONTINUED

15. Check the exhaust outlet at the transom to see that cooling water is being discharged.
16. The blower may now be turned off.

### 5.6.3 RUNNING THE ENGINE

Allow the engine to warm up before casting off. This engine is thermostatically controlled and will therefore indicate a low operating temperature in cold water.

After the engine warms up to its normal operating temperature the throttle can be advanced. Throttle changes for both accelerating and de accelerating should be gradual allowing the engine to come to its full speed or the appropriate setting.

Although the Atomic 2 engine can be run at a full speed of about 3,000 RPM, this mode of operation should be restricted. The recommended continuous cruising speed is about 2,000 RPM. Extended idle periods should be avoided whenever possible. In cases where the engine must idle for long periods of time, it is recommended that cruising speed be obtained for a five minute period once each hour if at all possible.

When running, the operator should maintain a periodic check of engine temperature and oil pressure. Immediately stop the engine if there is a drop in oil pressure. An overheating condition may sometimes be alleviated by continuing at a reduced speed. In the latter case, maintain a continuous temperature surveillance and do not hesitate to shut the engine off if the temperature does not quickly return to normal.

### 5.6.4 STOPPING THE ENGINE

Prior to stopping the engine, reduce the speed to idle (approximately 600 RPM) and allow it to run for several minutes at this speed. To stop, do the following:

1. Disengage the gears to the neutral position.
1. Turn the engine key switch to the "OFF" position.
2. Close the fuel valve at the tank.
3. Close the engine raw intake seacock.

#### 5.6.4 CONTINUED

5. Index the Battery Selector Switch to "OFF". This switch must never be turned to OFF till the engine is stopped.

#### 5.7 WINTERIZATION

In all boats with inboard engines that are shipped to areas that have below freezing temperatures, the cooling system has been winterized by utilizing an approved antifreeze. There have been some cases of the water pump impellers being damaged by certain coolants so we recommend the following brands:

Dowguard	Permaguard	Smith Blue Co.	Pyro-Permanent
Perm-Sta	Hubbard Hall	Telar	Zerex Peak

Refer to the engine manufacturer's instruction manual for complete lay up instructions.

Also, remember that the water tanks, head and water lines must be drained or water if below freezing temperatures are anticipated.

#### 5.8 OPTIONAL DIESEL ENGINE

The optional engine for the Columbia 8.7 is the Volvo Penta MD6B; a two cylinder, four stroke, 10 H.P. diesel. The following should be noted relative to the standard gasoline engine.

##### 5.8.1 BLEEDING

When the fuel system is first filled, when filters are cleaned or changed, if the engine runs out of fuel, if air leaks develop in the suction side of the fuel system or if air in any way gets into the fuel system, it will then be necessary to bleed the system to prevent starting failures and/or erratic operation. Refer to the engine manufacturer's handbook for the recommended bleeding procedure. Since the fuel water separator is the first filter in the line it should be bled before attempting to bleed the remainder of the fuel system per the manufacturer's instruction.

##### 5.8.2 ENGIN CONTROLS

In addition to the clutch and throttle controls described in section 5.5.1, there is a "T" shaped handle that activates the

## 5.8.2 CONTINUED

stop control. To stop the engine the stop control is pulled out a couple of inches and held in that position till the engine ceases to run. It is then pushed back to the retracted position. to run.

## 5.8.3 INSTRUMENTS

Engine instruments for the diesel consist of warning lamps for low oil pressure and no-charging condition, temperature gauge, tachometer, key switch, switch for instrument lighting, fuel gauge and a spare switch. The key switch is used to start the engine. Glowing of the oil or amp lights indicates low oil pressure and a no charge condition respectively. To check the lamps, turn the key to the accessory position where the lamps should glow. The actual degree of charging can also be ascertained from the Battery Condition Meter as described in Section 4.1.2. Temperature of the Volvo Penta MD6B is thermostatically controlled. Under normal operating conditions the temperature gauge should indicate in the green region. The tachometer indicates the speed of the engine in revolutions per minute. Due to slippage, loading, wind and sea conditions, there is no exact correlation of the engine RPM's to the yacht's speed. However, general correlation can be established for normal operating conditions. The spare switch is connected through a fuse block located behind the instrument panel accessible through the main cabin behind the companionway ladder.

## 5.8.4 BREAK IN PROCEDURE

The break in procedure is the same as for the gasoline engine, except that the break in and oil change period is 20 hours instead of 10 hours.

## 5.8.5 RUNNING THE ENGINE

When starting the engine turn the key to the accessory position. The "Amp" and "Oil" lights should glow, then continue to turn the key to the start position.

Although the Volvo Penta MD6B engine can be run at a full speed of about 2,400 RPM, this mode of operation should be restricted to periods of no longer than 15 minutes of each hour. The recommended continuous cruising speed is about 2,100 RPM. Extended idle periods should be avoided whenever possible. In cases where the engine must idle for long periods of time is recommended that cruising speed be obtained for a five minute period once each hour if at all possible.

#### 5.8.5 CONTINUED

Prior to stopping the engine reduce the speed to idle (approximately 600 RPM) and allow it to several minutes at this speed. To stop use the following procedure:

1. Disengage the gears to the neutral position.
1. Pull the stop lever and hold till the engine stops. After stopping push the stop lever back to the run position.
2. Turn the engine key switch to the "OFF" position.
3. Close the fuel valve at the
4. Close the engine raw intake seacock.
5. Index the Battery Selector Switch to "OFF". This switch must never be turned to "OFF" till the engine is stopped.

## 6. PLUMBING SYSTEMS

We have attempted to keep Jour plumbing system as simple as possible especially where thru-hull fittings are concerned. Wherever possible water discharge is above the waterline and - where two items can use a common below waterline thru-hull, this has been accomplished. Flush type thru-hulls have been used throughout the yacht to minimize turbulence and maximize speed. Following is a general description of the plumbing system. You should familiarize yourself with this system and maintain it so as to keep fresh water in your tanks and seawater outside of your hull.

### 6.1 THRU-HULLS

A thru-hull list and accessibility chart is presented in Section 2.4. You should familiarize yourself with these hull penetrations as preparation for an unforeseen emergency. All below water thru-hull penetrations are protected with either a stuffingbox or seacock, depending upon their function.

To operate the seacocks first unscrew the small "T" handle completely counter clockwise. Next rotate the lever handle to a position perpendicular to the base of the seacock to open, or parallel to the base to close. Finally screw in the "T" handle clockwise. When the "T" handle is backed off it relieves the seal and pressure on the tapered plug in the seacock. In this position the seacock will leak and it is therefore normal to experience some leakage when turning the seacock handle. It is mandatory that the seal be reestablished by tightening the "T" handle as soon as the seacock is rotated from one position to the other. These seacocks should be serviced and lubricated with waterproof grease at least annually. When operated as described above they should give satisfactory service for many years. When leaving your boat, safe practice dictates closing all of the seacocks.

### 6.2 FRESH WATER SYSTEM

One 30 gallon aluminum water tank is located to port under the settee berth. The tank is vented, in the head locker and this vent tube opening must be kept clear in order to pump water from the tank. The deck fill plate for this tank is located on the port side deck near the upper chainplate.

A foot pump is utilized to supply water to the galley and a hand pump for the head sink. When filling the system for the

## 6.2 CONTINUED

first time or refilling an empty system, you will have to bleed the air out of all water lines. This is accomplished in the following manner:

1. Fill the tank and deck fill line to within about one foot of deck level.
2. Open the galley sink spigot by turning the tip counter clockwise and pump the foot pedal.
3. As the lines fill, water will start to pop and spurt from the spigot. Pump a few more strokes to remove the remaining air from the line.
4. Pump the hand pump in the head till a solid stream of water flows from the spigot.
5. The system is now completely primed. Top off the water tanks to replace the water that is now in the system.

### 6.2.2 OPTIONAL HOT AND COLD PRESSURE WATER SYSTEM

On boats equipped with the optional hot and cold pressure water system a pressure pump is utilized to supply water to the galley and head sink. When filling the system for the first time or refilling an empty system, you will have to bleed the air out of all water lines. Use the following procedure for pressure water system.

1. Fill the tank and deck fill line to within about one foot of deck level.
2. Turn "ON" the yacht's electrical system and the Water Pressure system by activating the switches on the Electrical Control Panels.
3. Open the galley sink faucet to provide cold water. Expect nothing but air for a short while, as the water lines must be filled before water will flow from the faucet
4. As the lines fill, water will start to pop and spurt from the faucet. Turn the faucet off.
5. Now turn the faucet on and off slowly, with one hand under the spout. This will keep water from splashing about while the last bit of air is being removed from the waterlines.

### 6.2.3 CONTINUED

The head sink drains to the toilet intake and has a common seacock located below the sink cabinet. When the boat is being driven hard in strong winds, some light seepage may occur, in which case the seacock to this sink should be closed.

### 6.2.4 OPTIONAL SHOWER

When the boat is equipped with the optional shower, a telescoping head is employed as a faucet in the head. When it is retracted and stored in the sink cabinet it serves as a sink faucet. To use it for showering it may be pulled out of the sink cabinet and placed in the multiposition shower hook located forward of the head window. Alternately, it may be hand held and the water stream directed as desired. The shower pan drains through a hose directly to the bilge sump so as not to contaminate the remainder of the bilge with wash waters. After each shower, the sump should be pumped out with the bilge pump.

## 6.3 MANUAL BILGE PUMP

A manual bilge pump is included as standard equipment. The manual pump is operable from the cockpit with seat hatches and companionways closed. Thus in an emergency when one wishes to keep the boat closed, the pump can still be operated. To pump, simply open the cover in the cockpit with your finger or the end of the pump handle, insert the handle and stroke up and down. Although the manual diaphragm pump can pass large objects, the pump is protected by an intake strainer. The strainer located, in the bilge sump should be cleaned periodically.

### 6.3.1 OPTIONAL BILGE PUMP

The electric bilge pump, like the manual pump, picks up in the bilge sump and discharges through a thru-hull in the counter. The pump is manually activated by turning "ON" the bilge pump switch in the electric control panel. When the bilge has been pumped dry the pump should be turned off.

## 6.4 MARINE TOILET

Marine toilet operating instructions are mounted in the head locker above the toilet. For your convenience these instructions are repeated here with the first paragraph modified to describe the Columbia 8.7 seacock locations.

## 6.4 CONTINUED

### Head Operating Instructions

#### Before Using

Make sure both seacocks under the sink cabinet are open.  
Raise lever forward of pump handle and pump slowly to partly  
Fill and wet inside of bowl.

#### After Using

Raise lever and pump until bowl is cleaned. Continue with at  
least 15 more full strokes to flush discharge anti-syphon loop.  
Depress lever and pump slowly until bowl is empty.

#### Important

When not in use, lever on head forward of pump handle must be  
left in depressed position to prevent flooding of boat. When  
leaving the boat for an extended period it is advisable to close  
both thru-hull valves. Do not put anything but toilet paper in  
the bowl as the valves can be easily plugged.

The smaller valve is the water intake and head sink drain while  
the larger serves for discharge.

It is possible to leave the two seacocks open while sailing,  
provided the internal "Joker" rubber check valve is not held  
open by refuse, and not have any water siphon back into the  
bowl. In extremely heavy sailing conditions it would be prudent  
to keep the seacocks closed.

Periodically add a small amount of liquid detergent and pump it  
through the system to lubricate the internal valve mechanism.

#### 6.4.1 OPTIONAL HOLDING TANK, DOCKSIDE DISCHARGE

This system utilizes a 20 gallon holding tank located forward  
under the V-berths. The tank is vented overboard, contains an  
access and sight plate and has a deck plate for dockside  
discharge at a pumpout station. To operate the toilet the intake  
seacock should be opened and the toilet operated in the normal  
manner. The volume of water pumped into the tank should be  
minimized so as to extend the holding capacity. Although this is  
not a recirculating system, it is recommended that a commercial  
chemical toilet treatment and deodorizer be added to the waste  
system. This can be introduced through the toilet or the deck  
discharge plate. After discharging the tank with a dockside pump  
it is recommended that the system be rinsed and repumped out.  
Again, this can be done with a hose through the deckplate or by  
pumping a clean toilet into the tank.

#### 6.4.2        OPTIONAL HOLDING TANK, DOCKSIDE AND OVERBOARD DISCHARGE

This system utilize the same tank and hardware as the Dock-side Discharge system with the addition of an overboard discharge seacock and thru-hull and an in line valve for overboard discharge close the in line valve (handle perpendicular to the line) located under the V-berth, open the toilet inlet and discharge seacocks and operate as a normal marine toilet. To utilize the holding tank, close the discharge seacock, open the in line valve (handle parallel to the line) and operate as described under Optional Holding Tank, Dockside Discharge. Pumpout is the same as for the dockside discharge option. Both the in line valve and discharge seacock should not be open at the same time since under certain heeling conditions it may be possible to back siphon salt water or dump some of the tank wastes overboard.

## 7. MAINTENANCE TIPS

Maintenance of today's fiberglass sailboat is extremely simple when compared with the upkeep necessary to keep boats of other materials in "shipshape and Bristol Fashion". Nevertheless certain basic maintenance practices must be followed if the bright sparkling appearance of your boat at delivery is to be retained through the years. Much of the maintenance information has been found in the foregoing sections where it related to specific items. In this section we will try to pickup any "loose ends" and try to answer any remaining questions on keeping your boat in a yacht-like condition.

### 7.1 RUDDERS, KEELS AND BOTTOM PAINTS

When your boat is not in use the tiller or wheel should be snugly secured to prevent the rudder from moving. The constant movement of the rudder shaft in the shaft bearings and packing box will result in unnecessary wear and, consequently, in excessive play or "slop". Also, a tiller banging around in the cockpit from wave and water action on the rudder could cause considerable damage. If the rudder action is stiff, a light grease should be used. Each time the assembly is lubricated, check for play at the upper and lower ends.

Drag-producing-Slime and bottom growth can accumulate on the underwater surfaces if proper care is not exercised. During regular haul-outs the bottom, keel and rudder should be thoroughly cleaned and sanded as required. The original factory bottom paint is International Tri-Lux, a T.B.T.O. (Tri-Butyl Tin Oxide) vinyl base paint. Other bottom paints may not be compatible with the vinyl base T.B.T.O. and should not be applied. If it is necessary to use another bottom paint or to completely strip the original paint, the paint manufacturer instructions should be adhered to. Ballast is external lead. If bare metal is exposed, it should be primed according to the paint manufacturer's instructions.

### 7.2 SPARS, RIGGING AND HARDWARE

The surfaces of your aluminum spars are protected, from corrosion by natural films of aluminum oxide. Unfortunately, in time, dirt, salt, and, chemical contaminants will break through this natural

Protective film, causing it to appear grimy and unsightly. To prevent adherence of these materials, coat the surface of your spars with a good automotive paste wax or a commercial protective coating. A good hosing with fresh water

helps, as does keeping the halyards tied away from the mast. The pulpit bales and lifelines are convenient places to attach the halyards.

Periodically, take a trip aloft to check the entire rig. Look for signs of chafe and check all nuts, bolts, screws, cotter keys, blocks, and masthead sheaves. Make sure the spreader tips are well covered with tape, leather or commercial boot to protect the sails from chafe and tearing. Take along a rag and bucket of fresh water to clean the rigging and mast on your way up. A clean rig means clean sails. On your way down, re-apply whatever protective coating you have decided to use on the mast and your work aloft is done till the next.

The halyards, sheets, and guys along with all rope and wire Splices should be carefully checked before and after each sail for wear. Wire rigging must be examined for broken strands and signs of frayed sections. Particularly close scrutiny should be given to those sections which rest on sheaves. The lines supplied with your boat are braid construction, have little stretch and wear very well if not abused. Sheets and vang often lead where they will rub together or chafe on lifelines.

By adjusting leads or by applying inexpensive chafing gear, expensive damage may be prevented. When not in use, running rigging should be tied away from the mast or neatly coiled and hung in regular locations where it can readily be found. Frayed ends should be burned and whipped and chafed eye splices should be re spliced. All blocks, sheaves, turnbuckles and winches used in conjunction with running rigging should be lubricated periodically with a light grease.

If you keep the stainless hardware on your boat free of marine growth and polished, it will last longer and look better. Saltwater sailors must hose off with fresh water after a hard wet sail, and a rub down with a chamois helps.

### 7.3 FIBERGLAS SURFACES

The glossy outer surface of your laminated fiberglass boat is known as gelcoat, a polyester resin, into which coloring pigments and weathering, retardants have been incorporated. It should be hosed with fresh water after every outing and routinely washed, with a good detergent. Use a sponge on the smooth surfaces, while a stiff deck brush will be helpful on the non-skid surfaces, followed by more fresh water to avoid streaking the topsides. Do not use abrasive cleaners as they will rapidly dull the gelcoat surface.

### 7.3 CONTINUED

The smooth gelcoat surfaces should be wiped and polished with a good automotive wax or a boat wax that is especially formulated for fiberglass surfaces at least once a year. A power buffer will make work on the large areas, like the hull easier, but care must be taken not to cut through the gelcoat surface, particularly at corners and edges. Color in gelcoat, as any material exposed to direct sunlight tends to fade, dull or chalk and will require heavier buffing to bring back the original luster. For power cleaning use a fine abrasive cleaner.

### 7.4 WOODWORK

The exterior and interior trim is teak, one of the most durable and decorative of all hardwoods, but it must be maintained to keep it from splitting and discoloring. Teak may be maintained in these ways:

1. Leaving the teak untreated and allowing it to weather naturally can cause splitting and poor appearance. Bronze wool or fine sandpaper should be used periodically to clean the surface and a commercially available preparation such as TeakBrite should be applied to combat the dull gray appearance of naturally weathered wood and help eliminate splitting.

#### Caution

Never use steel wool. Small filaments of steel break off and cause rust spots that are very difficult to remove. The cockpit seat and main companionway hatch horizontal surfaces are constructed of teak veneer plywood. Sanding should be minimized on these surfaces. Chemical cleaner may be used instead. These surfaces in particular should be kept well oiled or varnished.

2. Varnishing is an alternative for maintaining your exterior teak and imparts the last word in a yacht finish, but requires the most maintenance. However, for those who wish a "Bristol" condition yacht, it is the only way to go. If you decide to varnish, be prepared to add at least one additional coat approximately every four months. If the teak has been "oiled" it must be cleaned by scraping and/or heavy sanding with #80 or #100 paper before sealing and varnishing.

## 7.4 CONTINUED

3. While the teak still has its original color and texture, smooth with medium grit sandpaper (#120), dust the surface carefully and seal with a good sealer. Make sure you select a dry, warm day and Do not seal or varnish much after noon as after noon dampness will prevent proper drying and cause your varnish job to look discolored and uneven. Allow the sealer to dry at least overnight, then smooth the raised grain with #120 paper, dust carefully and apply the first coat of a good quality spar varnish. Apply second and third coats allowing at least one day drying and sanding with #120 or #180 paper between coats. This will provide a minimum varnish covering while four or five coats will produce a more durable finish. Several thin coats will provide a superior finish to a lesser number of thicker coats. A good rub with a chamois after hosing down will keep the gloss and also lengthen varnish life

## 7.5 SAILS

Sails should be folded for storage whenever possible. If you leave the mainsail on the boom, always remove the battens and then flake it down carefully with one person at each end of the sail so that the flakes are smooth and wrinkle free. Protect the sail with a cover. Proper folding will help keep wrinkles out of sails and will prolong the life of the chemical fillers in the cloth which hold stretch to a minimum. Windows, if present, should always lie entirely within one fold to eliminate creases.

In a long race it is sometimes difficult to fold large headsails, so just stuff them loosely into their sail bags. After the race, one of the first jobs is to wash off any salt water dry and then fold the headsails by flaking them down in alternate folds, starting with the foot, with creases running parallel to the foot. If you remove the mainsail from the boom, fold the first flake so that the bolt rope is on the outside. The sail can then be put back on the boom more easily next time you sail.

Hosing down-sails with fresh water to remove salt is a good idea. Also, perhaps once each year, spread the sail on a soft surface, such as a good lawn, and go over it lightly with a very mild detergent and a very soft brush. Alternately, you may wish to have your sailmaker clean and service your sails. Both practices comprise good maintenance. Pay attention to your sails, and if any tears, rips or worn spots appear on the corners, slides or

## 7.5 CONTINUED

headboard or stitching begins to chafe or has been caught and pulled to pucker the sail, make a note of the damage and its location. Many small tears and worn spots can be covered with tape if it is convenient to take the sail to a sailmaker to for a professional repair job. Any rip at the edge of the sail, such as at the leech or foot of a genoa must be fixed immediately. Tears here can spread quickly through the entire sail.

## 8. INTERIOR APPOINTMENTS

### 8.1 GENERAL

You can treat everything below decks, just like a home. Your interior teak, should be oiled, occasionally with a quality teak oil to maintain its "yacht like" appearance. For a more permanent finish, teak may be varnished with a semi-gloss or rubbed-effect varnish. Keep the boat well ventilated, especially the bilges and lockers, and watch out for dampness. Leaving a couple of 100 watt light bulbs burning below will usually take care of any sweating and reduce the "clammy" feeling, especially during the winter months, or during times of damp fog. It's a good idea to leave the bunk cushions on their sides and open lockers if you plan to be away for a while. It might not look very neat, but it increases ventilation and allows everything to air out. Any items which get wet with salt water should be rinsed off with fresh water as soon as possible, and allowed to dry thoroughly. The salt crystals retain moisture and the material will always remain damp until cleaned with fresh water. Air and sunlight are wonderful cleaners. Use a vacuum cleaner below and place the cushions, blankets, sleeping bags, etc. on deck in the sunshine while the vacuum picks up below. Spring cleaning should take place periodically, not annually, to keep the interior clean and bright.

Maintenance for most of the equipment below deck is covered in, other sections or the manual, with the exception of stove, ice-box and any other optional accessories that you have installed

The windows are made of tinted Plexiglas acrylic. Simply wash with soap and water and let dry, or wipe with a soft cloth or chamois. Diamond rings, sand-paper and sharp tools will mar the finish.

### 8.2 ICEBOX

Your icebox is insulated with a three inch, foamed-in-place, layer of polyurethane foam and should retain low temperatures over extended periods or time. It contains a shelf to keep items dry and physically separated from the ice.

In order to build the ice box as large as possible, the lower portion and the drain are below the waterline. Thus, since it is not possible to drain to a thru-hull, the drain routed thru a hose to the bilge sump. Since a 25 pound block of ice when melted creates about three gallons of water in the bilge, it is advisable to check and pump the bilge before and after all outings.

## 8.2 CONTINUED

Dirt and food spills should not be allowed to accumulate in the icebox. If they should clog the drain, the blockage can usually be blown clean with the alcohol stove pump.

## 8.3 ALCOHOL STOVE

An alcohol stove is the most common installation on boats because it burns clean, has minimal fumes and an alcohol flame can be put out with water.

The combination alcohol stove and oven is mounted on gimbals. When cooking in a seaway it is recommended that the barrel bolt securing the stove be retracted to enable the cooking surface to remain level. Even when not cooking it is sometimes found that free gimbaling prevents the oven door from opening when the yacht is rolling. The alcohol tank, equipped with a pressure gauge and shut off valve is located under the starboard settee berth. An auxiliary pump is supplied to pressurize the tank. Do not place the stove cover over the stove when a burner is lit.

An alcohol stove is as safe as a gas stove, but be sure to follow the instructions on the plaque mounted under the stove cover.

For your convenience, we will repeat these instructions here.

1. Close container valve immediately in any emergency.
2. Keep container valve closed whenever appliance is not in use and when leaving boat unattended.
3. Be certain that all appliance valves are closed before opening container valve.
4. To light burners: with fuel container valve closed pressurize container to 15 pounds, making certain that appliance valves are closed. Open container valve. Fill priming cup three-quarters full by opening one burner valve. Shut off burner. Light the priming alcohol and wait until consumed. Open the burner valve and light the burner. If burner will not burn like a gas burner repeat priming.
5. Do not leave burner with low flame unattended.
6. Test system for leakage at least twice a month and after any emergency in accordance with the following procedure.

### 8.3 CONTINUED

With appliance valves closed and with container valve open note pressure reading on the gauge. Close container valve. The pressure should remain constant for at least 10 minutes. If pressure drops, locate leakage by application of liquid detergent or soapy water solution at all connections. Repeat test for each container in multi-container system. Never use flame to check for leaks.

7. Burning alcohol is readily extinguished by water. About 90% of all galley fires from alcohol stoves come from priming the stove. Fortunately alcohol is the only fuel whose flame can be put out with water. The trouble is that if the stove is over primed - too much fuel in the pan at the beginning - or under primed - turning on the stove before it is fully primed - fires can result.

If you train yourself and others right from the beginning as to the proper sequence of steps and timing involved, most of the potential troubles will be eliminated. The remaining problems come about from improper maintenance of the stove, which are eliminated by regular checks following manufacturer's instructions.

### 8.4 MISCELLANEOUS

There are two small holes in the cabin sole in the vicinity of the extended dining table. When the dining table is lowered, the pins on the table legs should be indexed in these holes, preventing leg from being accidentally kicked out from under the table.

Mounting of electronics and navigation equipment is often determined by personal preference. The following is recommended for consideration. Compasses, anemometers and wind and boat speed indicators can be mounted port and starboard in the aft cabin bulkhead so that the back of the instruments are concealed in the lockers in the bulkheads. So mounted, they are easily visible to the helmsman as well as maintaining accessibility for service. Cables for mast mounted electronics should be routed in the same manner as the mast light; that is, exit at the bottom of the mast then route between the dining table and aft head bulkhead then aft through the wooden conduit boxes near the hull-deck joint of the instruments, instrument electronic controls and master control panel. Panel mounted electronic control boxes can often be mounted below the companionway, behind the ladder so that they back up to the instrument panel.

#### 8.4 CONTINUED

There is a shelf above and one behind the fold up chart table which provides ample room for radios and other navigation equipment.

Port and starboard settee berth seat backs are hinged to provide extra wide berths for sleeping comfort. If desired the seat backs can be left in their normal seating position and the velcro attached cushions can be removed to provide a narrow berth. When the seat backs are placed in the raised position caution should be exercised to insure that both barrel bolts are engaged and secured so as to prevent the berth back from falling.

## 9. SAILING TIPS

With the large number of books about sailing readily available, it may seem strange that we would also want to venture into this area. We would like to recommend those books that deal primarily with the handling of the keel type sailboat you now own. We would also like to recommend that each owner attend the United States Power Squadron Courses given in his community. Don't let the title fool you, there is a lot on sailing, and remember that when you are using the engine you become a powerboat. Even the experienced boatman can learn something new, but even more important is the opportunity to teach. Take this opportunity to learn or pass your knowledge on to others. Write to:

U.S. Power Squadrons  
Box 345  
Montvale, New Jersey 07645

This course could add a whole new dimension to your enjoyment of the water.

There appears to be no ready reference to the myriad of laws, regulations, requirements, and other pertinent items that affect the owner of a large sailboat. To partially fill this gap, or at least to make you aware of this potentially useful material, we have included a recommended "Basic Keelboat Sailor's Library", followed by a listing of pamphlets and thoughts for your perusal.

### 9.1 BASIC KEELBOAT SAILOR'S LIBRARY

If you cannot obtain any of these books locally, you may send a mail order to Sailing Book Department, 38 Commercial Wharf, Boston, Massachusetts 02110.

The Adventures of Sail, Macintyre  
The American Practical Navigator, Bowditch  
Around the World in Wanderer III, Hiscock  
The Best of Sail Trim, Coles  
Celestial Navigation for Yachtsmen, Blewitt  
The Complete Book of Boat Maintenance and Repair, Kendall  
Cruising Under Sail, 2nd Edition, Hiscock  
Deep Sea Sailing, Bruce  
Dutton's Navigation & Piloting, 12<sup>th</sup> Edition, Dutton  
Elvstrom Speaks on Yacht Racing, Elvstrom  
Encyclopedia of Nautical Knowledge, McEwin & Lewis  
Further Offshore, Illingworth  
The Giants of Sail, Becken of Cowes  
Hand, Reef & Steer, Henderson  
Handbook of Knots, Graumot

## 9.1 CONTINUED

Handbook of Knots & Splices, Gibson  
Heavy Weather Sailing, Coles  
History of American Sailing Ships, Chapelle  
The Illustrated History of Ships and Boats, Casson  
An Introduction to Yachting, Herreshoff  
My Lively Lady, Rose  
Navigation the Easy Way, Lane & Montgomery  
The New Cruising Cookbook, Jones & Norton  
Ocean Racing & Offshore Yachts, Johnson  
Piloting, Seamanship & small Boat Handling, Chapman  
Practical Sailing, Gibbs  
Racing Cruiser, Henderson  
Sailing Illustrated, Royce  
Sailing to Win, Bavier  
A Short Course in Navigation, Gardner  
Simplified Rules of the Road, Will  
Story of American Yachting, Rosenfeld  
A View From the Cockpit, Bayier  
Voyaging Under Sail, Hiscock  
Weather Water & Boating, Whelpley  
Wind & Sailing Boats, Watts  
A Woman's Guide to Boating & Cooking, Morgan  
Your Boat and the Law, Norris

## 9.2 MISCELLANEOUS PUBLICATIONS

The following lists several publications that are available and recommended for your reading.

### "FEDERAL REQUIREMENTS FOR PLEASURE CRAFT" CG-290

January 1970, deals mainly with requirements for a motor boat, but when under power a sailboat becomes a "motor boat". Numbering Requirements, Coast Guard Approved Equipment required. Lights and Safety Suggestions form a major part of this leaflet.

### "COAST GUARD AUXILIARY COURTESY EXAM" AUX-204

January 1971, leaflet covers most of the above, but also explains one of the several services performed by members or the Coast Guard Auxiliary. It contains a directory of the Auxiliary so you can communicate with the Flotilla nearest you.

### "BASIC FACTS ABOUT MARINE FIRE EXTINGUISHERS" DNOD-2

is printed by the State of California, but the information will apply to any area or the United States.

## 9.2 CONTINUED

### Navigation and Piloting

#### "RULES OF THE ROAD" CG-169

Contains the International and inland Rules and Regulations for the primary purpose of preventing collisions between vessels. To insure the safety of your boat and passengers, it is imperative that all persons operating your boat be familiar with them and conform strictly to them at all times.

In order to obtain accurate information, the United States Coast and Geodetic Survey has been supplying nautical charts and books on the U. S. coastal waters since 1839. Three major areas are covered: Atlantic and Gulf Coast; Pacific Coast and Hawaii. A free catalog for each area may be obtained from Distribution Division (C44), Coast and Geodetic Survey 4200 Connecticut Avenue, N.W., Washington D.C. 20235

#### "MARINE AIDS TO NAVIGATION" CG-193

Is a publication dealing with the basic principles underlying the marking of coasts and waterways of the U.S. with lights, day beacons, fog signals, radio beacons, loran and bouys.

#### "COAST GUARD ASSISTANCE"

Is a form that must be obtained from your local Coast Guard District Office and contains important information explaining "How you can help us to help you." The material contained on this form could really get you out of a serious situation, and its importance to you can not be overlooked

#### "EMERGENCY REPAIRS AFLOAT" CG-151

Deal mainly with engine trouble shooting, but also contains some good tips on emergency repairs and staying afloat, along with basic tools and parts to have on board.

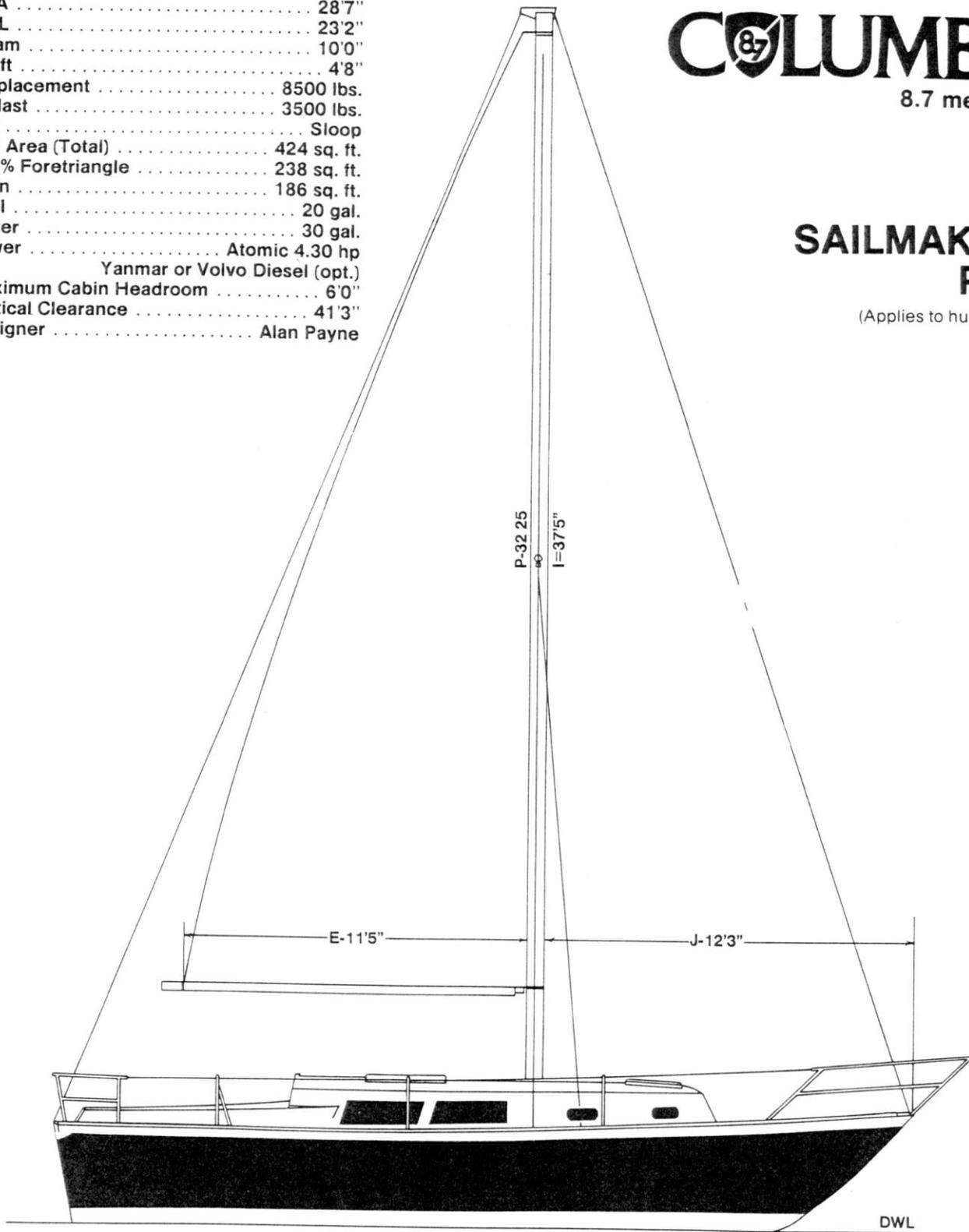


LOA ..... 28'7"  
 LWL ..... 23'2"  
 Beam ..... 10'0"  
 Draft ..... 4'8"  
 Displacement ..... 8500 lbs.  
 Ballast ..... 3500 lbs.  
 Rig ..... Sloop  
 Sail Area (Total) ..... 424 sq. ft.  
 100% Foretriangle ..... 238 sq. ft.  
 Main ..... 186 sq. ft.  
 Fuel ..... 20 gal.  
 Water ..... 30 gal.  
 Power ..... Atomic 4.30 hp  
                   Yanmar or Volvo Diesel (opt.)  
 Maximum Cabin Headroom ..... 6'0"  
 Vertical Clearance ..... 41'3"  
 Designer ..... Alan Payne

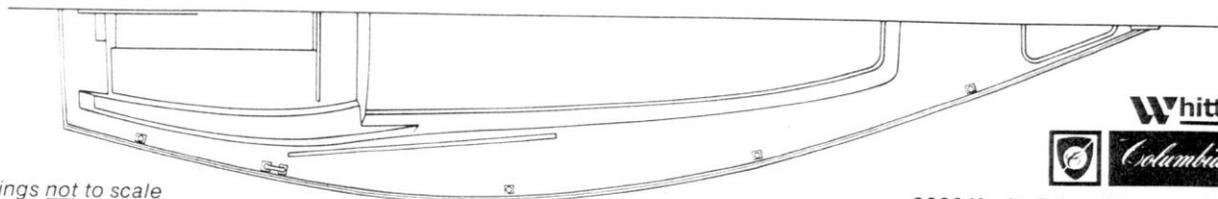
**COLUMBIA**  
 8.7 meter (29')

**SAILMAKER'S  
 PLAN**

(Applies to hull #'s 1-343)



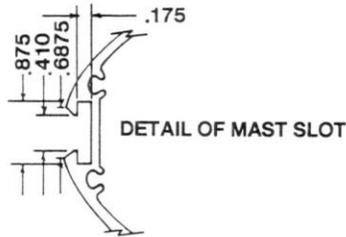
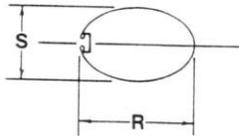
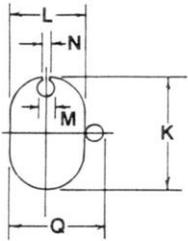
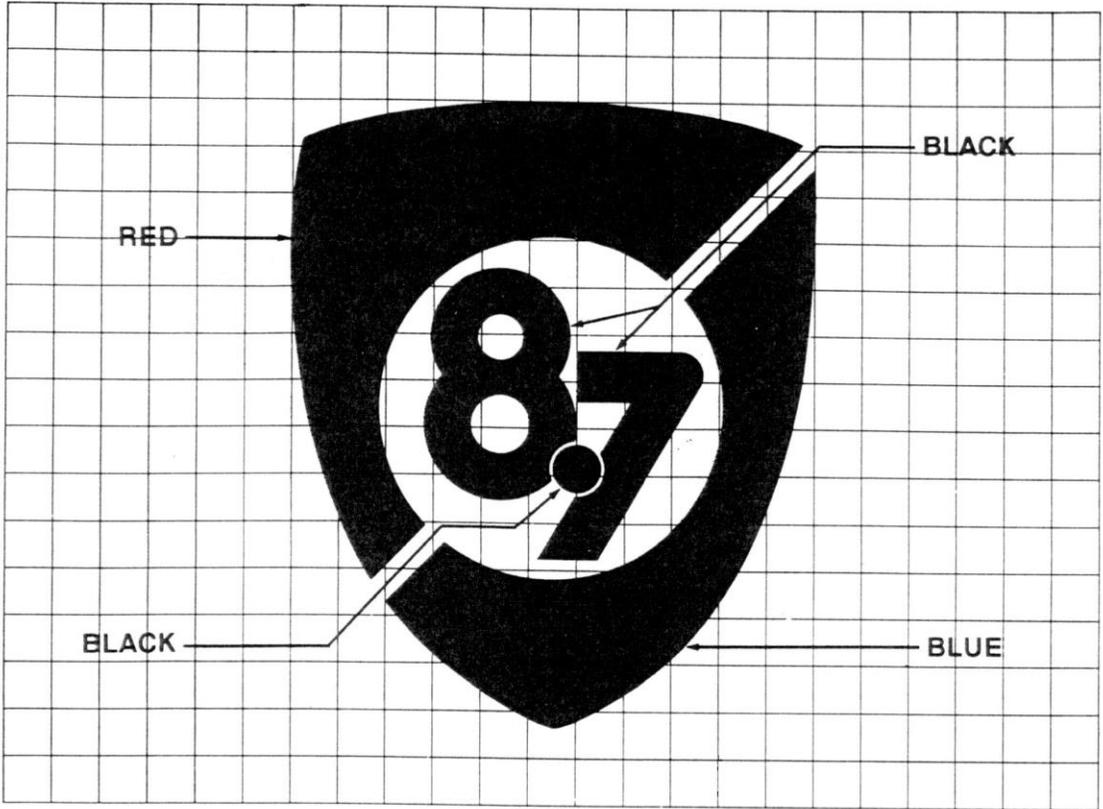
SAIL PROFILE



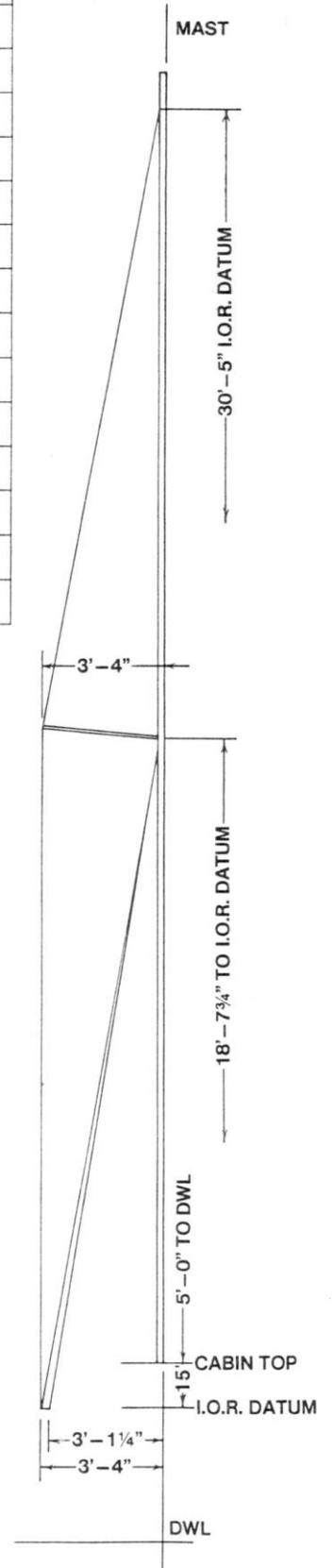
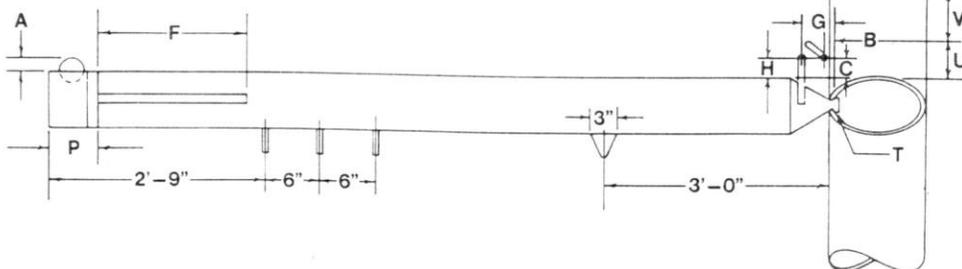
Drawings not to scale

**Whittaker**  
**Columbia Yacht**

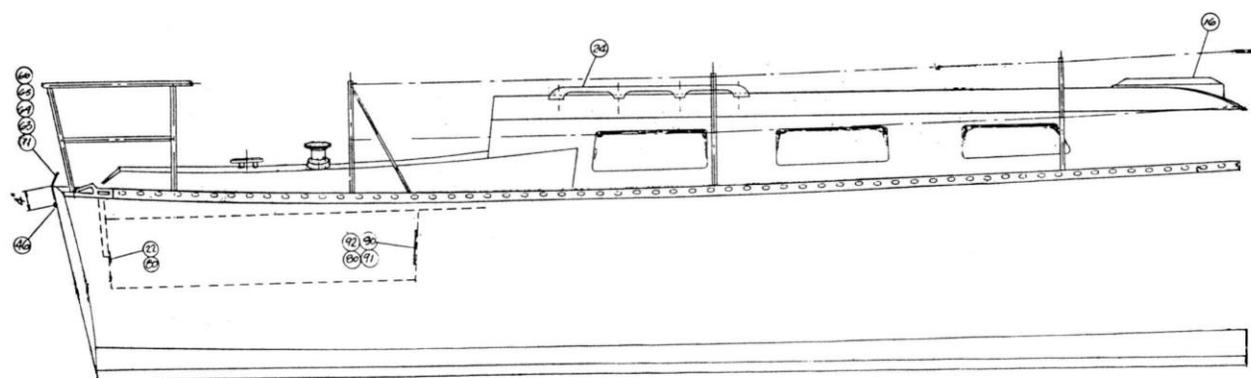
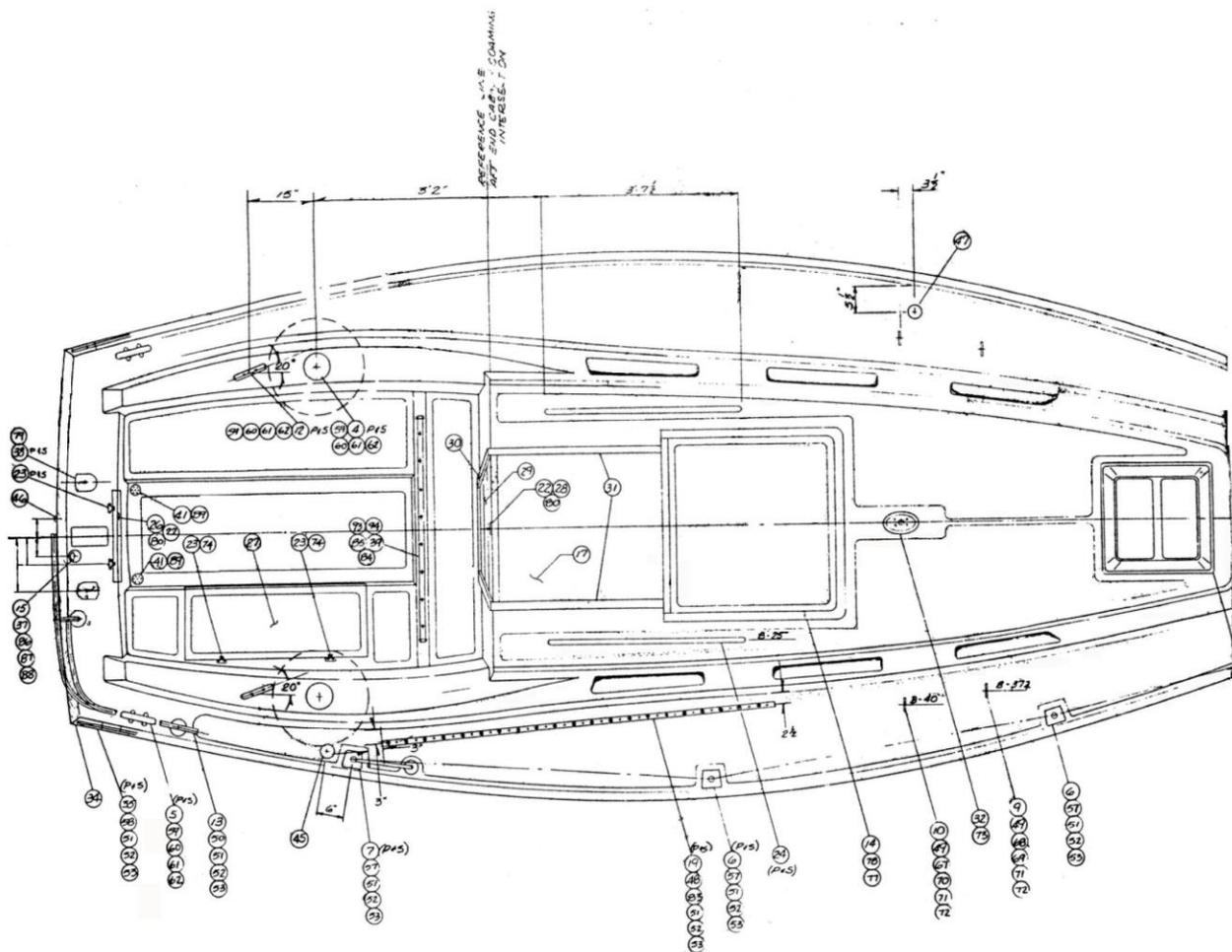
2600 Yacht Drive, Chesapeake, Va. 23320

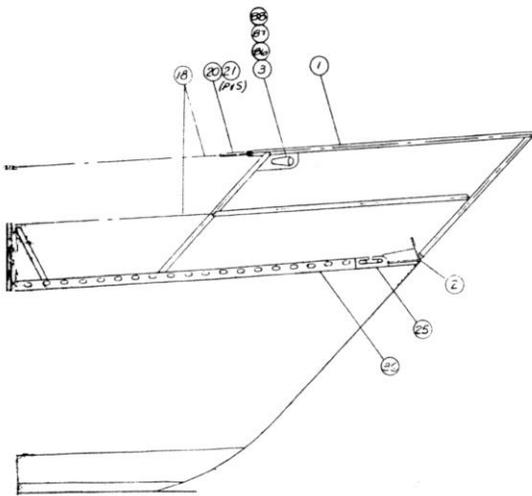
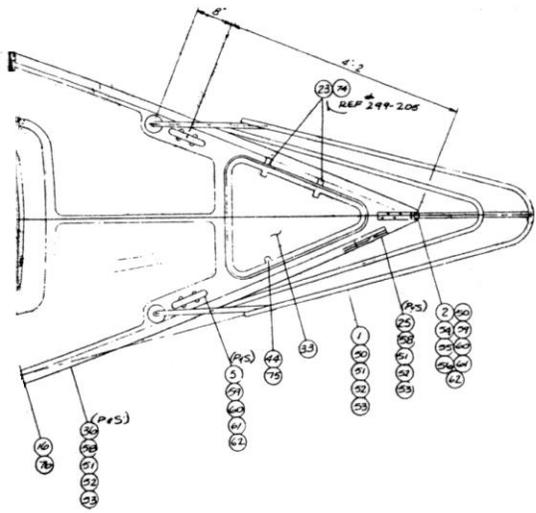


ITEM	DESCRIPTION	DIMENSION OF SIZE
A	OUTHHAUL SHEAVE ABOVE BOOM TOP	1 1/2"
B	TACK PIN TO MAST SLOT (W/LONG D SHACKLE)	2 7/8"
C	TACK PIN TO BOOM TOP	1 7/8"
F	REEFING CLEW ADJUSTMENT FWD BLACK BAND	23 1/2"
G	REEFING HOOK TO MAST SLOT	3 5/8"
H	REEFING HOOK ABOVE TOP OF BOOM	1/2"
K	BOOM DEPTH	4 1/2"
L	BOOM WIDTH	3"
M	BOOM SLOT DIA	3/4"
N	SLOT OPENING	.19"
P	LENGTH AFT BLACK BAND	9"
Q	BOOM WIDTH WITH REEFING GEAR	4 3/4"
R	MAST DEPTH (ELLIPTICAL)	7 3/8"
S	MAST WIDTH (ELLIPTICAL)	4 3/8"
T	INTERNAL MAST TRACK	METAL MAST #6
U	PAST GATE ABOVE BOOM	1 1/2"
V	GATE LENGTH	6"



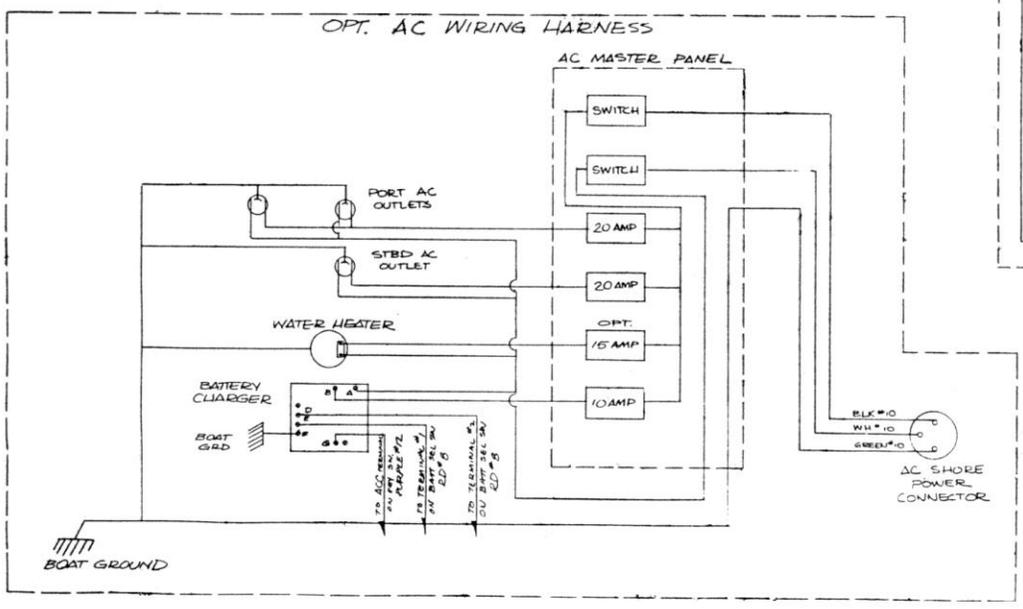
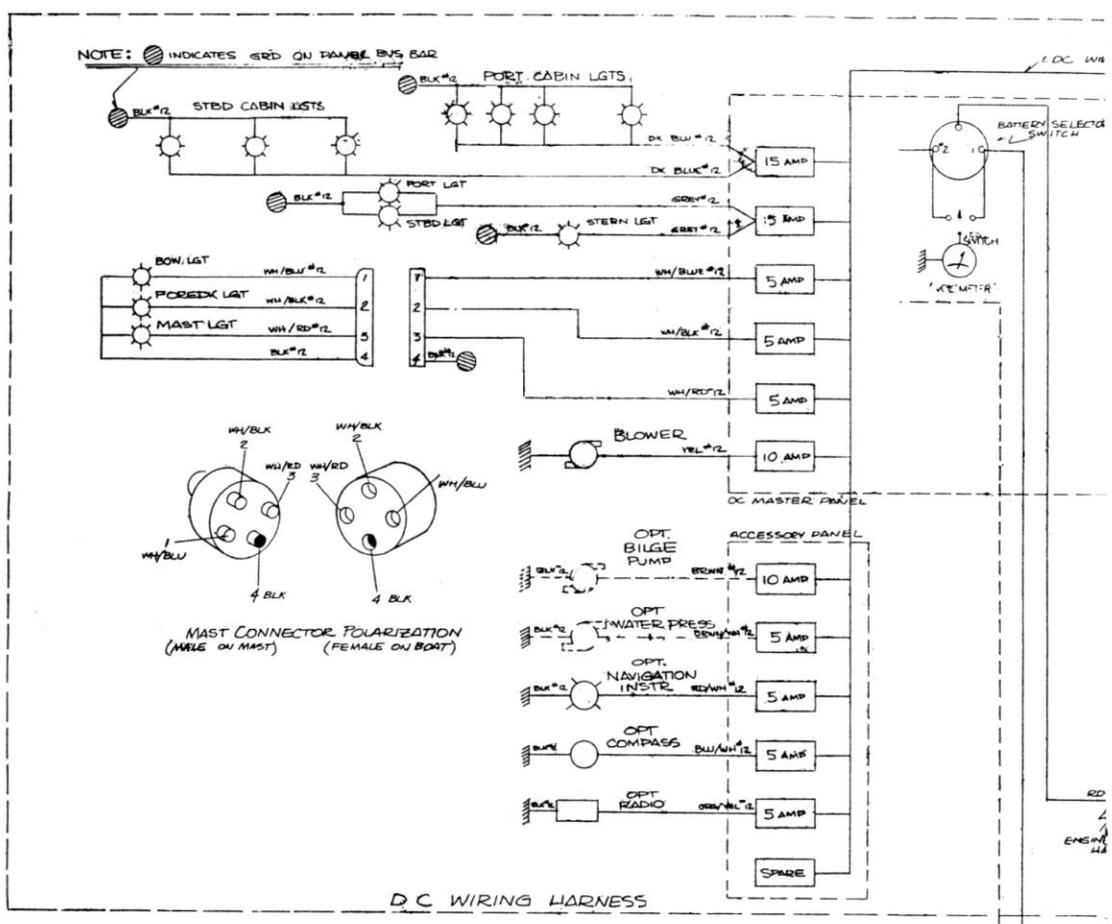
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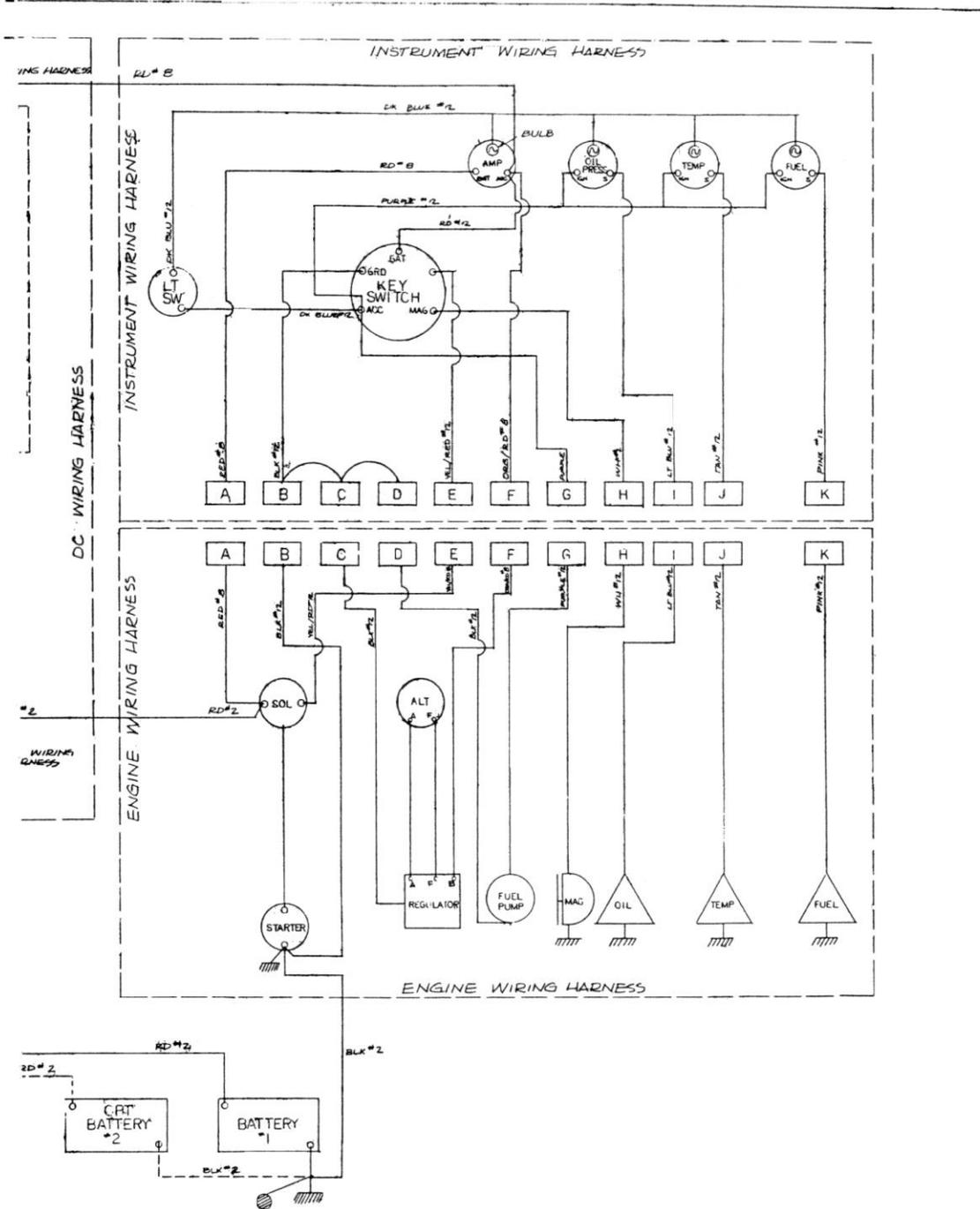




QTY	DASH	PART	NAME	MAT.	STOCK SIZE	FINISH SIZE	REMARKS
100							
99							
98							
97							
96							
6	95	84-553	OISMS		#8	1 1/4"	
13	94	89-157	WASH FLAT		#10		
13	93	89-323	WASH LOCK		#10		
1	92	52-202	SNAP JM 'HEDLOK'				
1	91	52-147	FLEXIGLAS CLR		1/4"	.875"	
1	90	53-111	HINGE CONT		1 1/2"	1 FT	
8	89	84-466	PHSMS		#6	3/4"	
6	88	89-287	WASH LOCK		#4		
6	87	88-522	NUT CAP.		#4-40		
6	86	84-590	OISMS		#4-40	3/4"	
13	85	88-307	NUT HEX		#10-24		
13	84	84-322	PHMS		#10-24	1 1/2"	
42	83	84-028	PHMS		1/4-20	1 1/2"	
6	82	89-322	WASH LOCK		#8		
6	81	89-411	WASH FLAT		#8		
20	80	84-360	OISMS		#6	1/2"	
6	79	84-321	PHMS		#10	1 1/4"	
30	78	89-362	WASH FIN		#10		
30	77	84-381	OISMS		#10	1"	
18	76	84-334	OISMS		#14	3/4"	
6	75	84-310	PHMS		#6	1/2"	
30	74	84-808	OISMS		#8	1/2"	
4	73	87-000	PHMS		1/4-20	1/2"	
20	72	89-326	WASH LOCK				
20	71	89-158	WASH FLAT		3/8"-16		
10	70	88-522	WASH FLAT		3/8"-16		
30	69	88-324	NUT HEX		3/8"-16	2"	
10	68	87-038	BOLT IH		3/8"-16	2"	
10	67	85-438	BOLT CGE		1/2"		
3	66	89-327	WASH LOCK		1/2"		
3	65	89-416	WASH FLAT		1/2"-13		
3	64	88-326	NUT HEX		1/2"-13	1 1/2"	
3	63	85-444	BOLT CGE		5/16"		
31	62	89-414	WASH FLAT		5/16"		
31	61	89-325	WASH LOCK		5/16"-18		
31	60	88-322	NUT		5/16"-18	1 3/4"	
31	59	84-041	PHMS		1/4-20	1 3/4"	
171	58	85-100	BOLT CGE		1/4"-20	2"	
30	57	84-322	PHMS		1/4"-20		
7	56	89-322	WASH LOCK				
7	55	88-320	NUT HEX		#8	1 1/2"	
1	54	84-474	PHMS		#8		
272	53	89-324	WASH LOCK		1/4"		
272	52	85-156	WASHER FLAT		1/4"-20		
279	51	88-306	NUT HEX		1/4"-20	2"	
36	50	84-029	PHMS	SS			
2	49	50-277	COVER, CHAINPLATE	SS			
1	48	50-618	SPACER, TRACK, GENOA, PR		1 1/16"x1/4"	86"	REFERENCE
1	47	50-200	PLATE, DR., WATER FILL				REFERENCE
1	46	46-176	VENT, TANK, FUEL	BZ-CR			REFERENCE
1	45	50-204	PLATE, DR., FUEL FILL		1 1/4"		REFERENCE
1	44	52-226	LATCH, LIFT RING				GEM H-103
1	43						
1	42	50-479	CHAINPLATE, BACKSTAY				
2	41	46-175	PLATE, SCUPPER, CRPT.	SS			
2	40	50-191	COVER, CHAINPLATE				
1	39	50-620	TRAVELER, MAINSHEET/STOP SPRING		48"		NICO FICO 583-600
2	38	46-154	VENT, DECK				
1	37	513-720	PAD, BASE, LIGHT, STERN				
1	36	60-146	TOE RAIL, GENOA TRK., PR.			27'-6 5/8"	
1	35	54-284	CASTING, STERN FR.	ALANO			
1	34	530-840	RAIL, CAP, TRANSOM				
1	33		HATCH ASSY., FORE DECK				
1	32	50-616	MAST STEP				
31	31	513-670	RAIL, MAIN HATCH				
30	30	530-820	RAIL, CRIBBOARDS				
1	29	530-810	CRIBBOARDS, SET				
1	28	525-410	BLOCK, SUPPORT, HASP				
1	27	A514-372	HATCH ASSY., COCK, SEAT				
1	26	A850-723	HATCH ASSY., LAR.				
1	25	50-481	CASTING, CHOCK, PR.	ALANO			
6	24	513-730	HANDRAIL, TEAK, 4 1/2"				
6	23	53-109	HINGE, TEE				PERKO 197
2	22	52-174	HASP, HATCH, MAIN				WILCOX-CRITTI FIG 4740
4	21	51-232	FORK, SWAGE, LIFELINE				
4	20	51-233	TURNBUCKLE, LIFELINE				
1	19	50-619	TRACK, GENOA, PR.	SS	1 1/4"x3/16"	86"	
946LF	18	51-321	LIFELINE, VINYL COVER		1/16" WIRE		
1	17	A513-752	HATCH, MAIN				BOMAR #139 MED. PERKO #965
1	16	35-920	HATCH, FWD. W/HARDWARE				
1	15	24-101	LIGHT, STERN				
1	14	A850-503	SEAROOD				
1	13	50-614	PULFIT, STERN				SCH #70-97
2	12	50-465	CLEAT, 7" 2 HOLE, OP. BSE.				
1	11	50-479	CHAINPLATE, BKSTY.				
2	10	50-190	CHAINPLATE, MAIN				
2	9	50-480	CHAINPLATE, LOWER				
3	8	50-299	BLOCK, GENOA, SLIDE				GGHP-402-94 PR (P45)
1	7	50-025	STANCHION, GATE, 24"0"				
4	6	50-026	STANCHION, 24"X0", DBL.				
4	5	50-466	CLEAT, 8", 4 HOLE, OP. BSE				SCHF. #70-08
2	4	51-621	WINCH, LEMAR #25				
1	3	24-253	LIGHTS, RUNNING, PR.				PERKO #955
1	2	50-615	FITTING, STEAMHEAD				
1	1	50-613	PULFIT BOW S.S., DBL.				

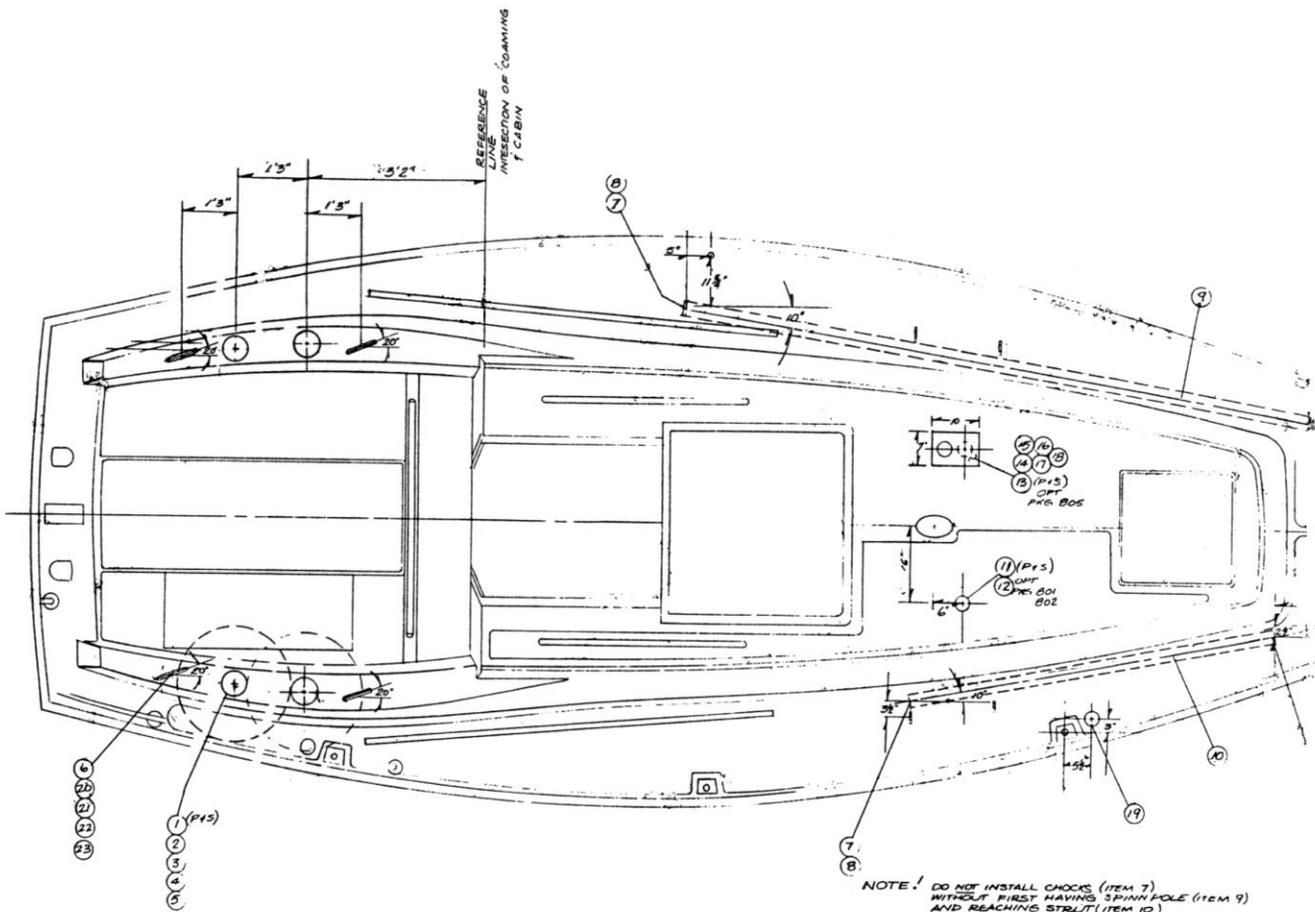
PRELIM. REV. - FINAL  
 TITLE: DECK HARDWARE  
 DESIGN: 11-24-75  
 DRN.: DRN  
 APPD.: E. G.  
 SCALE: 1" = 12"  
 DWG. NO. 299-701  
 REV.: B



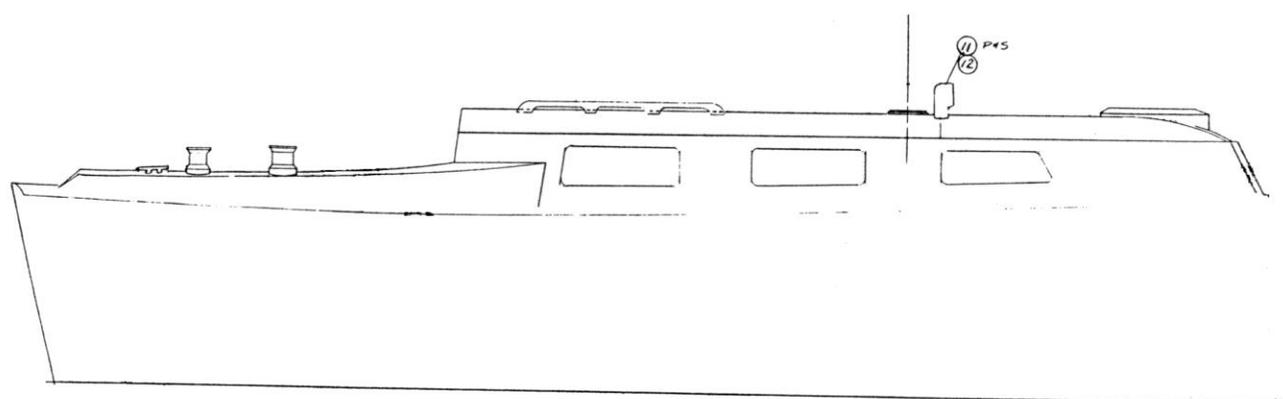


299-501

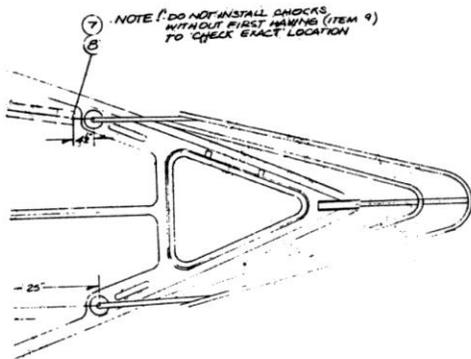
ITEM NO.	NAME	MAT.	STOCK SIZE	FINISH SIZE	REMARKS
1	FINAL				
<p>CAUTION:</p> <p>1. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.</p> <p>2. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.</p> <p>3. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.</p> <p>4. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.</p> <p>5. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.</p>					
<p>DESIGN: DDA P. ROY</p> <p>DATE: 11-11-75</p> <p>SCALE: 1:1</p> <p>APP'D: [Signature]</p> <p>CHECK: [Signature]</p> <p>299-501</p>					



NOTE! DO NOT INSTALL CHOCKS (ITEM 7) WITHOUT FIRST HAVING SPINN HOLE (ITEM 9) AND REACHING STRUT (ITEM 10) TO CHECK EXACT CHOCK LOCATION



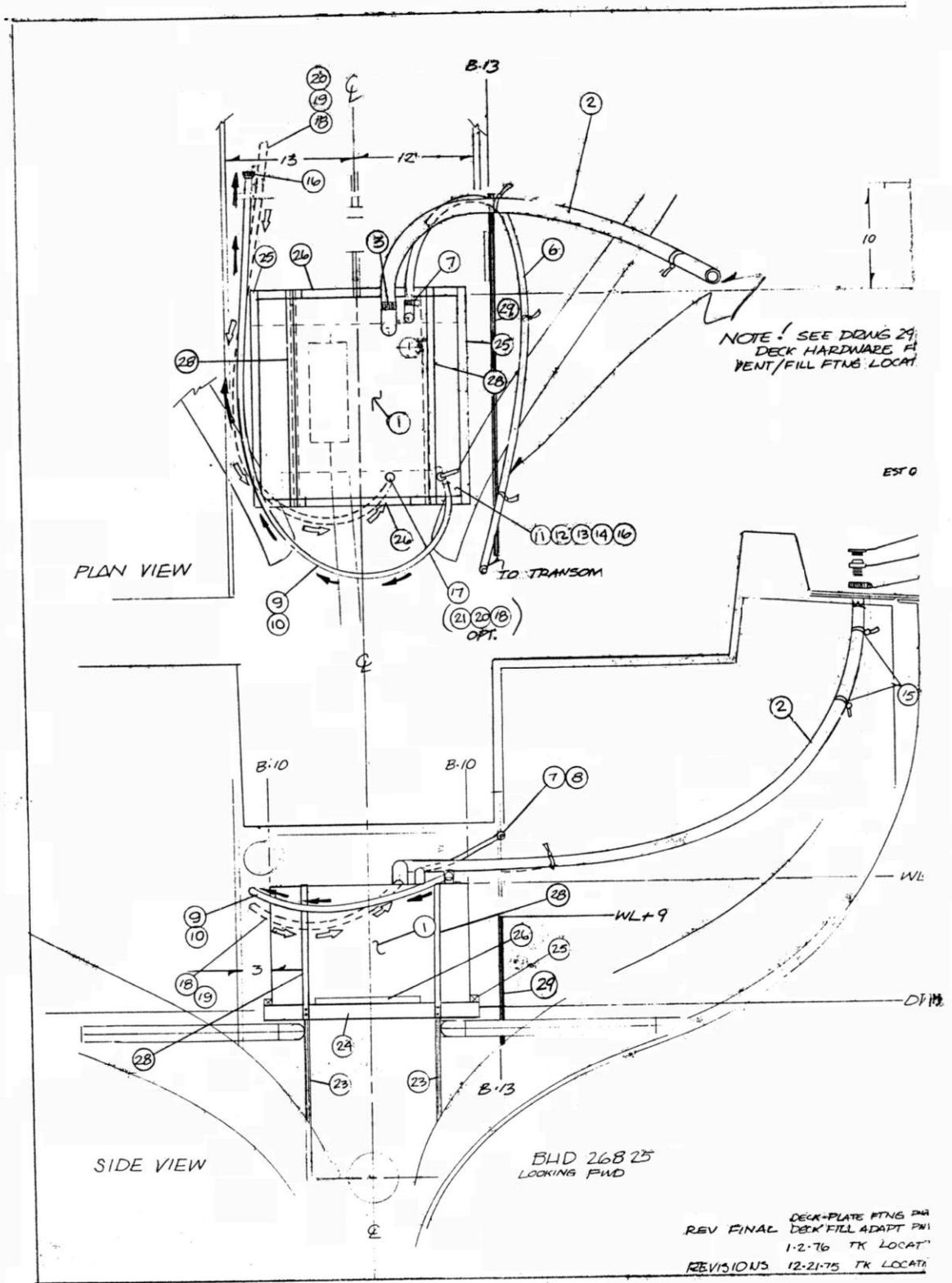
REV A ITEM 1 : WINCH BARLOW 76 TO LHMALD  
 3-30-76 ITEM 2,3,5 : BOSTONERAL WERE 50-18

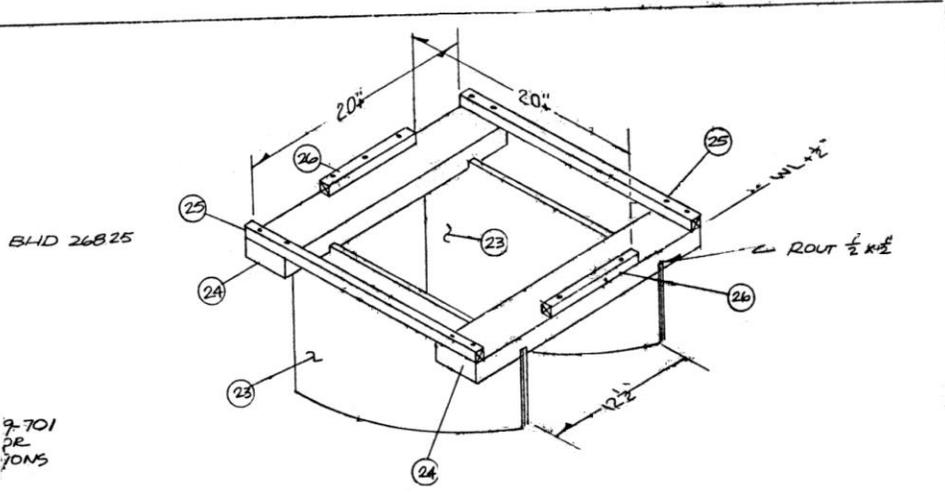


01/11

QY	DASH	PART	NAME	MAT.	STOCK SIZE	FINISH SIZE	REMARKS
4	23	89-325	WASHER LOCK		5/16		
4	22	89-414	WASHER FLAT		5/16		
4	21	88-322	NUT		5/16-18		
4	20	84-041	SCR PHMS		5/16x18	1 3/4"	
1	19	50-206	DK PLATE 'WASTE' CHR				
12	18	84-472	PHSMS		#8x1"		
12	17	84-808	OHSMS		#8x1/2"		
8	16	84-380	OHSMS		#10x3/4"		
1	15		DORADE BOX ASSY	90-50			
2	14	46-117	DK PLATE W/COVER		3" D		
2	13	46-197	VENT, COWL W/CHR PL		3" D		
12	12	84-808	SCR OHSM		#8x1/2"		
2	11	46-197	VENT, COWL P & S		3" D		
1	10	51-306	STRUT REACHING		6'-6"		
1	9	51-619	SPINPOLE SING BRID-ALUM		12'-3 5/8"		
8	8	84-482	SCR PHSM		#10x1"		
4	7	50-286	CHOCK SPINN POLE ALUM				SCH-70-97
2	6	50-465	CLASP 7" 2 HOLE OP BSE		1/4		
16	5	89-324	WASH LOCK		1/4		
16	4	89-156	WASH FLAT		1/4-20		
16	3	88-306	NUT HEX		1/4-20x2"		
16	2	84-029	PHMS				
2	1	51-623	WINCH LEMAR #8	ALUM			

PRELIM. REV. - FINAL  
 TITLE: DECK HARDWARE, OPTIONAL  
 DESIGN: 1-28-76  
 DRN: A.G. ROY  
 APPD: E. G.  
 SCALE: 1" = 1'-0"  
 DWG. NO. 299-703



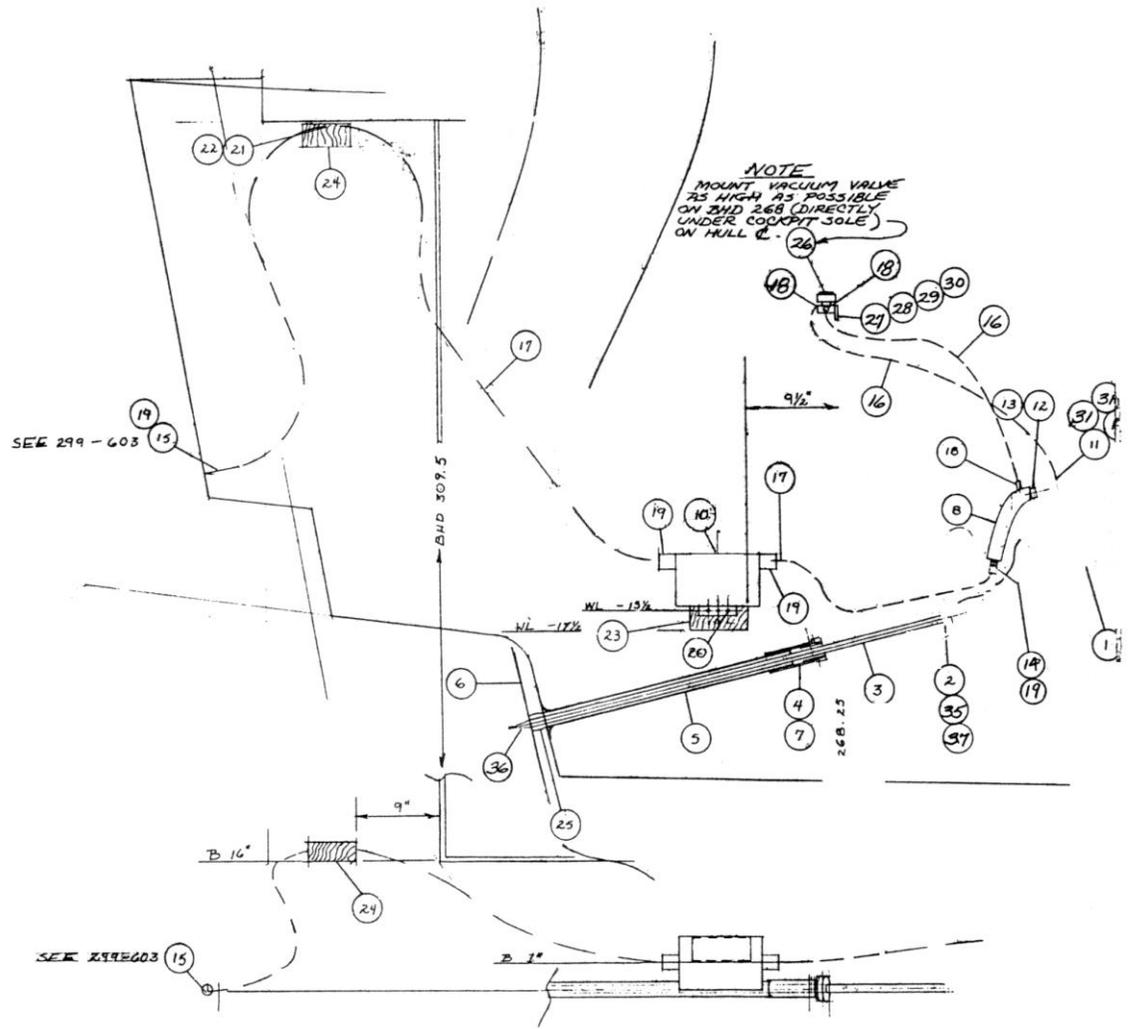


1	29	518-24	0	DAM		
2	28	41-102		STRAP		
25	27	84-482	0	SCR. PHISM		
12	26	010-120	0	BTN. STD		
2	25	010-214	0	BTN. STD		

2	24	531-43	0	TANK SUPT TRAVSE	99-410		
2	23	531-42	0	TANK SADDLE VERT SUPT ASSY	97-396		3/4 X
X	1	22					
1	21	44-239		ELBOW 90° SS		5/16 TUBE 1/4 IPS	OPT
1	20	44-210		COUPLING AEROQUIP			OPT
1	19	62-328		SLEEVE FIRE			OPT
1	18	40-041		HOSE RETURN		2651-5	OPT
1	17	44-425		PLUG PIPE SS			
1	16	45-118		UNION HALF		1/4 X 5/16	
5	15	41-119		STRAP W/ HOLE		NLON	
2	14	44-210		COUPLING FLARE			
1	13	43-100		1/4 NIPPLE CLOSE BRS			
+ 12 1/2	12	47-257		1/4 BALL VALVE BRS			
1	11	44-244		1/4 ST ELL 90° SS			
1	10	62-328		SLEEVE FIRE			
1	9	40-041		HOSE SUPPLY		2651-5	5 1/2 FT
1	8	46-176		VENT FTNG			
2	7	41-005		HOSE CLAMP #12			
1	6	40-057		HOSE VENT RD NEOPRENE		5/8 ID	7 FT
VL	5	44-127		DECK FILL ADAPTER		1/4	
1	4	50-204		DECK FILL FTNG		1/4	
2	3	41-007		HOSE CLAMP #28			
1	2	40-037		HOSE FILL NEOPRENE		1/4 ID	6 1/2 FT
1	1	15-559	0	FUEL TANK			12x20x20

PRELIM. REV. FINAL	MAT.	STOCK SIZE	FINISH SIZE	REMARKS
TOLERANCES UNLESS OTHERWISE SPECIFIED				
DECIMALS FRACTIONS ANGLES				
<p>CAUTION - UNLESS THIS DRAWING BEARS THE NAME OF DOD AUTO-PARTS ENGINEERING CORPORATION, IT IS RECOMMENDED THAT IT BE USED FOR MANUFACTURING PURPOSES.</p>				
<p>TITLE: FUEL SYSTEM OUTSIDE ENGINE COMPN</p> <p>DESIGN: DVA KC</p> <p>10 29 75</p> <p>SCALE: 1/2" = 1'-0"</p> <p>DWG. NO: 299-601</p> <p>REV.:</p>				

30-205 to 50-204  
44-703 to 44-127  
W/ SADDLE ②  
W/ SADDLE ①



NOTES:  
 1. TEMP SENDER RED BUSHING SCREEN INTO EXHAUST MANIFOLD "I"  
 2. TRP SMART FLANGE COUPLING FOR 3/8-16 SET SCREW PER SAE J156 STD

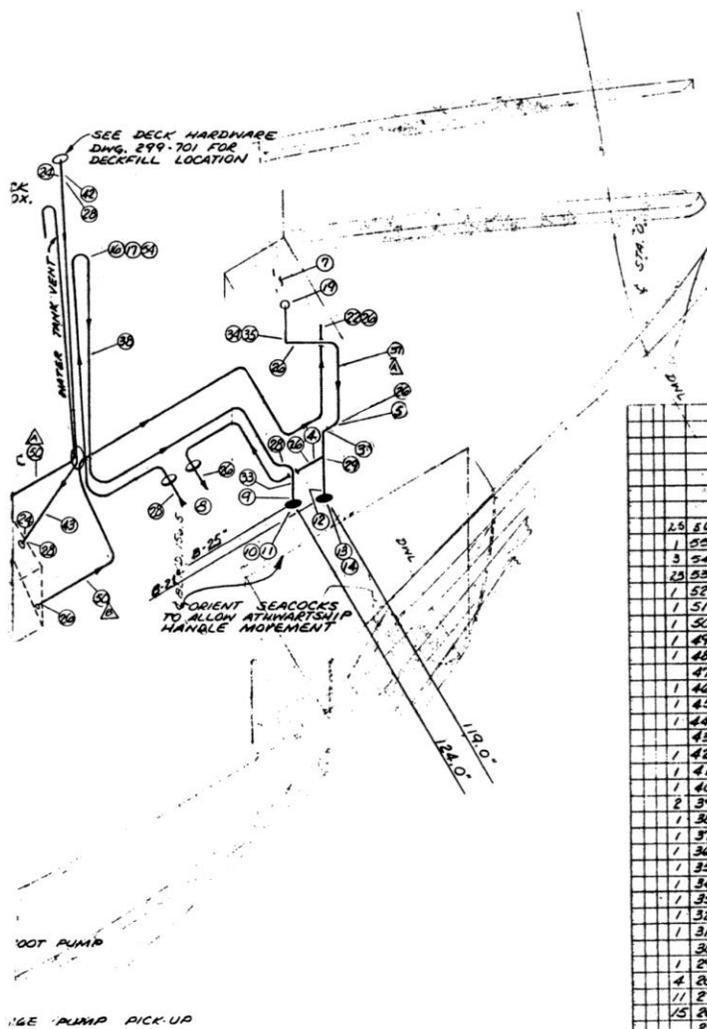
33 32  
 31  
 3 INDEX

REV	QTY	PART NO	DESCRIPTION	SIZE	LENGTH	OTHER
FINAL REV B	1	37-57-33	LOCKWIRE 5.5	5.5	0.032"	12" LENGTH
FINAL REV B	1	36-20-07	PIN, CUTTER	5.5	1/8 X 1"	
FINAL REV A	2	35-84-761	SCREW SET	5.5	3/8-16 X 1"	
	1	34		BR3	3/8 TO 1/2"	3W
	1	33-44-309	REDUCER BELL			2362 AN
	1	32-25-048	SENDER TEMP	BR3	3/8"	
	3	31-43-200	NIPPLE CLOSE	5.5	3/8"	
	2	30-82-326	WASHER LOCK	5.5	3/8"	
	2	29-89-158	WASHER FLAT	5.5	3/8-16	
	2	28-88-324	NUT HEX	5.5	3/8-16 X 1/2"	
	2	27-84-140	SCREW RHM	5.5	3/8-16 X 1/2"	VALVE TRP 827952
	1	26-47-145	VALVE VACUUM ENG.			
	1	25-11-400	ZINC COLLAR			
	1	24-530-860	EXHAUST HOSE BRACKET	12/4	2 1/2" X 5 1/2" X 6"	
	1	23-530-850	WATERLOCK BRACKET	11-400	12/4	2 1/2" X 3" X 6"
	1	22-54-171	STRAP, PIPE HGR	3/4"	WIDE	
	2	21-84-747	R.H. S.M.S.	# 6		
	3	20-84-860	N.H. LAG SCREWS	1/4"		
	4	19-41-045	CLAMP, HOSE # 28			
	4	18-41-004	CLAMP, HOSE # 16			
	11'	17-40-081	HOSE, EXHAUST	1 3/8"	I.D.	
	6'	16-40-057	HOSE, RED NEOP	3/8"	I.D.	
	1	15-46-009	THRUHULL, BRZ	1 1/4"		
	1	14-42-316	NIPPLE, GALV	1 1/4"		X 4"
	1	13-44-347	RED, BELL, GAL	1 1/2" X 1"	NPT.	
	1	12-42-401	CLOSE NIPPLE, GAL	1"	NPT.	
	1	11-44-105	T, BRZ	3/8 X 3/8 X 1/2" NPT		
	1	10-4-233	WATERLOCK			VEEPS LON #2.
FINAL REV S	1	9-4-026	ELBOW 5.5 60°	1 5/8"	DIA	10390 833606
	1	8-4-236	ELBOW EXHAUST			
	5'	7-13-025	PACKING, FLAX			
	1	6-12-019	PROP, SOLID, R BLD, BRZ.	1 1/2" DIA X RH	3/4" DIA BORE	
	1	5-13-223	STEEL TUBE - W/ BEARINGS	1 1/2" DIA X 18" O.D.	BEARING 1 1/2"	
	1	4-13-016	STUFFING BOX	1 1/2" WALL	O.D. FOR 1 1/2"	BUCK-AL
	1	3-11-063	SHAFT W/ NUTS & KEYS	FOR 3/4"	DIA SHAFT	AQUAMET
	1	2-WCL-10-907	COUPLING, ATOMIC 2	3/4" X 18 3/4"		FURU 19 BOLTS 10 S.A. 2.5.1
	1	1-10-907	ENGINE, ATOMIC 2	3/4" DIA BORE		

299-307 B

FINAL B  
 CAUTION  
 ENGINE DRIVE TRAIN EXHAUST SYSTEM - ATOMIC 2  
 NONE  
 11-22-75  
 299-307 4



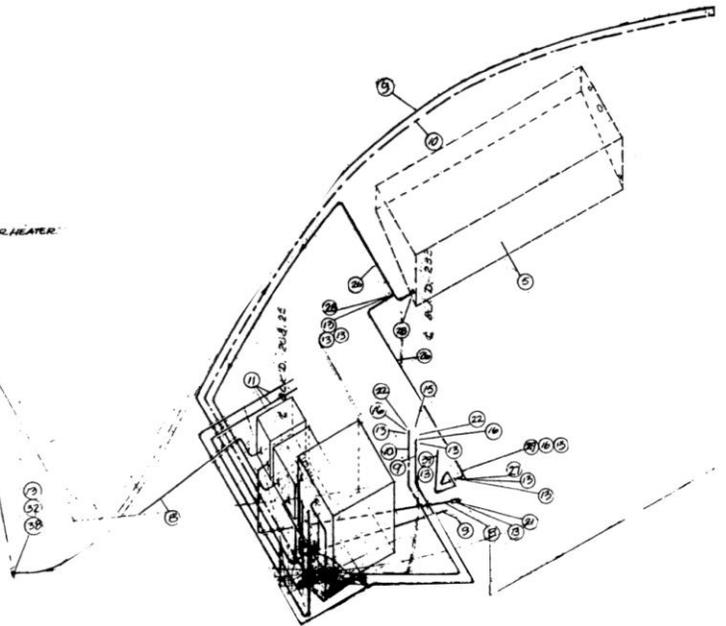
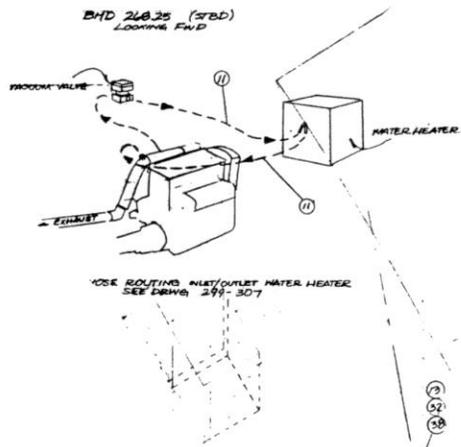
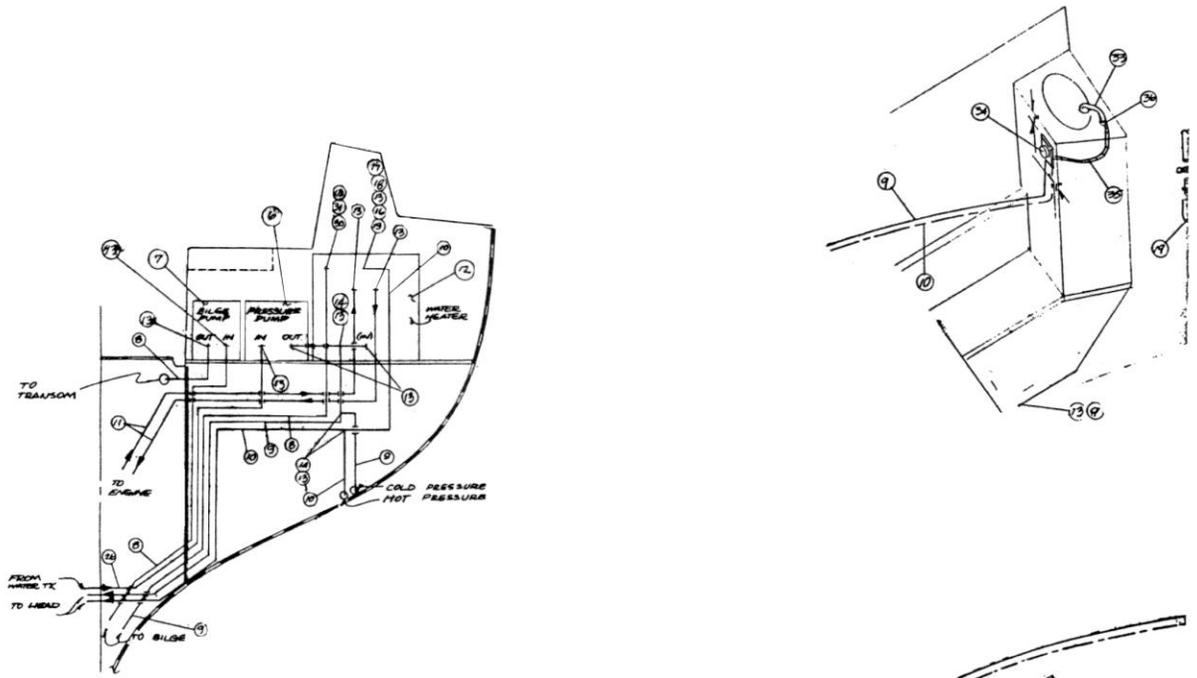


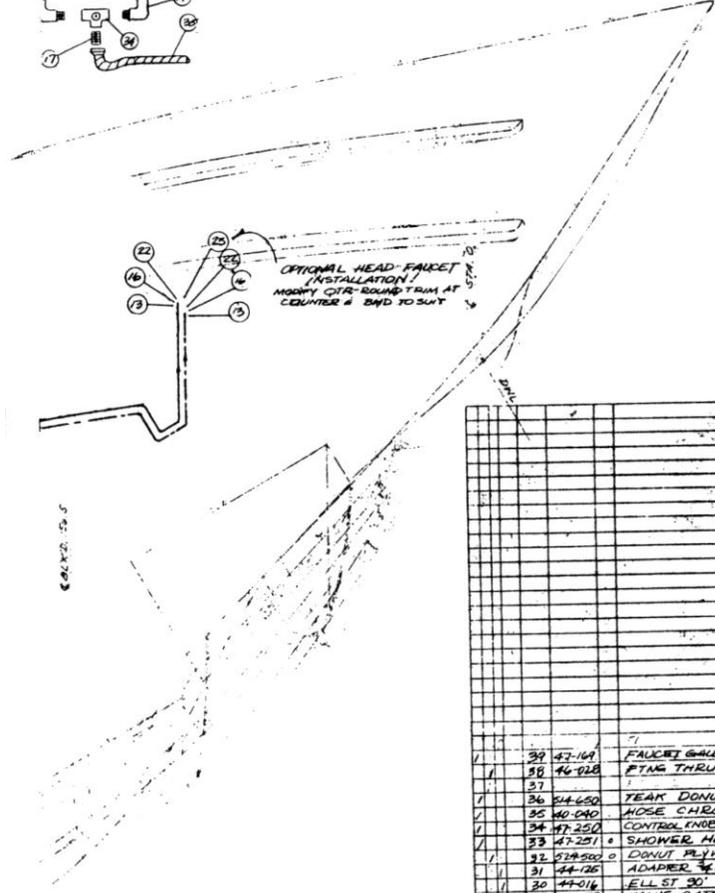
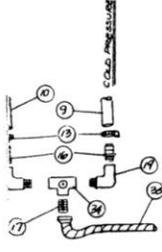
QTY	NO.	DESCRIPTION	UNIT	EST QTY
25	56	89-169	PLNSP'S	#0X 1/2"
1	55	44-177	ADAPTER, HOSE	NYLON 1 1/2"
3	54	83-205	SCR. FH WS	#10X 1/4"
25	53	41-119	TIE WRAP N/HOLE	
1	52	44-807	TEE, PVC, 1 1/2"	
1	51	46-009	FITTING, THRU HULL	
1	50	40-022	HOSE, CLEAR PVC 3/4"	NTX 1/2" 1/2" 1/2" SHIELDS
1	49	44-124	ADAPTER 3/4" NPT. 3/4" I.D. HOSE	
1	48	44-047	ELL BR 3/4" 90°	
1	47	40-047	HOSE, RED NEOPRENE	3/4" I.D. 1/2"
1	46	44-016	ELL ST. BR. 90° 3/4"	
1	45		SCREEN	
1	44	47-169	FAUCET, WHALE, TELESOP	
1	43	40-176	HOSE, NYLON REINFORCED	1 1/2" 1/2" 1/2" 1/2" SHIELDS
1	42	44-708	ADAPTOR, DECK FILL	
1	41	26-074	PUMP, GALLEY GPS	1/2"
1	40	47-245	SUCTION SCREEN	1 1/2"
2	39	40-011	FITTING, THRU-HULL	1 1/2"
1	38	40-066	HOSE, FLEX NYLON	1 1/2"
1	37	40-014	HOSE, RED NEOPRENE	1 1/2"
1	36	45-321	REDUCER, SWK, COPPER	1 1/2"
1	35	45-320	1" TO 3/4" REDUCER	
1	34	47-263	1" 90° COPPER ELL W/BRACE	
1	33	44-033	ELL 90° BRZ. ST.	
1	32	44-219	COUPLING 3/4"	
1	31	44-125	ADAPTER 3/4" NPT. 3/4" I.D. HOSE	
1	30			
1	29	44-115	TEE 3/4" x 3/4" x 3/4"	
1	28	41-007	CLAMP, HOSE #20	
1	27	41-005	CLAMP, HOSE #22	
1	26	41-004	CLAMP, HOSE #16	
1	25			
7	24	35-381	CUFF, VINYL HOSE	1 1/2"
1	23	43-216	NIPPLE, BR. 3/8" x 1/2"	
1	22	47-165	PUMP, HAND	
1	21	50-220	PLATE, GUSHER PUMP	
1	20	26-064	BILGE PUMP	
1	19	47-247	DRAIN, SINK 1 1/2" x 1 1/2"	
1	18	47-256	DRAIN, SINK	
3	17	59-352	STANDOFF PIPE	
1	16	35-370	LOOP, VENTED	
1	15	47-004	SINK, GALLEY	
3	14	508-420	DONUT, PLYWOOD	1/2"
2	13	46-044	FITTING, THRU HULL	3/4"
3	12	47-120	SEACOCK, GROCO	3/4"
1	11	508-180	DONUT, PLYWOOD	1 1/2"
1	10	46-043	FITTING, THRU HULL	1 1/2"
1	9	47-222	SEA COCK, GROCO	1 1/2"
1	8	35-111	SEA CLOSET HEADMATE	
1	7	47-088	SINK, OVAL	
1	6	47-077	TRINK, WATER	20 GAL.
2	5	47-272	ADAPTER 3/4" NPT. 3/4" HOSE	
1	4	47-269	ADAPTER 3/4" NPT. 3/4" HOSE	
1	3	44-016	ELL 90° BRZ. ST.	
1	2	46-120	THRU HULL 1 1/2" I.D.	3/4"

FINAL

PLUMBING

299-701





QTY	ITEM NO.	DESCRIPTION	SIZE	UNIT	REMARKS
1	39	42-104			FAUCET GALLEY TELES.
1	38	46-028			FLAG THRU HULL
1	37				
1	36	54-650			TEAR DONUT
1	35	40-040			HOSE CHROME FLEX
1	34	47-250			CONTROL INDS. SHRN. HANE
1	33	47-251			SHOWER HEAD, FINE
1	32	024-002			DONUT 1/2" HD
1	31	44-261			ADAPTER 1/4" NPT 3/16" DIA
1	30	44-016			ELL ST 90°
1	29	47-152			VALVE GATE
1	28	44-320			TEE PVC
1	27	26-079			PUMP GALLEY
1	26	40-022			HOSE CLEAR PVC 1/2"
5	25	04-465			SCR. 3M FH
3	24	41-118			TIE WRAP W/ HOLE
1	23	47-167			FAUCET LAV
1	22	44-218			COUPLING 1/2"
1	21	47-187			SUSTION SCREEN BR
1	20	47-272			ADAPTER 1/4" NPT 3/16" DIA
2	19	44-034			ELL ST 90° DR
1	18	47-102			VALVE CHECK
1	17	43-300			NIPPLE CLOSE
2	16	44-123			ADAPTER 1/4" NPT 3/16" DIA
1	15	47-466			FAUCET GALLEY
5	14	44-112			TEE PVC
3	13	41-004			CLEANING NOSE 1/4"
1	12	26-217			ADAPTER HEATER
1	11	40-047			HOSE RED HEATER
1	10				HOSE CLEAR PVC BEINF
1	9	40-082			HOSE CLEAR PVC
1	8	40-015			HOSE, GIGGS CLEAR
1	7	26-067			PUMP, BEINF
1	6	26-074			PUMP, BEINF
1	5	47-047			TRUNK, WATER
1	4				SHOWER
2	3	47-047			ELECTRICAL
2	2	47-047			ELECTRICAL
2	1	47-047			ELECTRICAL

FINAL

PLUMBING

SHEETS & LINES

SHEET OR LINE	BRAID					7 x 19 WIRE				WIRE ENDS		SHACKLE		REMARKS
	NAME	QUAN.	PART NO.	DIA.	LGTH	ENDS	PART NO.	DIA.	LGTH	PART NO.	TYPE	PART NO.	TYPE	
MAIN	1	51-302	3/8"	65'	Eye Splice Whip	---	---	---	---	---	---	---	NONE	
JIB OR GENOA	2			39'	Whip Both	---	---	---	---	---	---	---	---	
OPTIONAL SPINNAKER	2			47'	Eye Splice Whip	---	---	---	---	---	---	51-208	Snap 392-2, in Eyesplice	Supply Only When Prod. Order Calls for Spinnaker Gear Option
OPTIONAL FOREGUY	1			34'	↓	---	---	---	---	---	---	---	---	
OPTIONAL SPIN. CAR CONTROL	2			18'	Eye Splice Both	---	---	---	---	---	---	---	NONE	
OUTHHAUL	1	51-300	1/4"	17'	See Remk's Whip	51-320	1/8"	9'8"	51-256 51-264	Micropro's Sleeve Both	---	---	---	Eye Splice Braid to Becket On Schaefer-08-83 - See Misc. Hardware
CUNNINGHAM	1	51-302	3/8"	5'	Whip Both	---	---	---	---	---	---	---	---	
TRAVELLER CONTROL	NONE													
GENOA CUNNINGHAM														
GENOA REEF														
OPTIONAL ELAB REEFING	1 SHORT 1 MED. 1 LONG	51-302	3/8"	18' 31' 43'	Eye/Whip	---	---	---	---	---	---	---	NONE	SUPPLY ONLY WHEN PROD. ORDER CALLS FOR REEFING GEAR OPTION.

STANDING RIGGING

STAY OR SHROUD	QUAN.	1 x 19 S.S. WIRE					TURNBUCKLE			UPR. FITTING		LMR. FITTING		REMARKS
		PART NO.	DIA.	LGTH "RN"	LGTH "E-E"	LGTH "P-P"	PART NO.	SIZE	SWEGE SIZE	PART NO.	TYPE	PART NO.	TYPE	
HEADSTAY	1	51-315	7/32"	---	38' - 2 5/8"	28' - 10 3/8"	NONE	---	---	51-136	7/32" EYE	51-136	7/32" EYE	
BACKSTAY	1			39' - 2 1/8"	---	39' - 11 5/8"	51-372	3/8"	7/32"	↓	↓	51-372	TBK'L	
MIDSTAY	NONE													
UPPER SHROUD	2	51-315	7/32"	35' - 10 3/4"	---	36' - 8 1/2"	51-372	3/8"	7/32"	51-136	7/32" EYE	51-372	TBK'L	
FWD. LOWERS	2			17' 7/8"	---	18' 3/8"								
MID LOWERS	2			17' 3/4"	---	18' 1/4"								
SINGLE LOWERS	NONE													
INTERMED.														
SPRINGSTAY														
MIZZEN UPPER														
MIZZEN FWD. LOWERS														
MIZZEN AFT LOWERS														

REVISIONS:

PRELIM 2 IN "STD MISC HARDWARE" SLIDE BLOCK SCHAEFER 07-91 WAS INCORRECTLY IDENTIFIED AS PART NO. 50-235. LOWER LIFELINE AFT FITTING WAS FORT (51-232) & EYE (51-146) & CAPNUT (88-526) JRB 12-29-75

FINAL - 'SHEETS & LINES' - MAINSHEET LENGTH WAS 54'  
'STD MISC HARDWARE' - BLOCK SING. SWIVEL W BECKET PN 51-608  
BLOCK FOOT SCH #30-19

'SPIN. GEAR' - STRUT REACHING 6'6" LON PN 51-386  
HEADSTAY WAS 38'7/8" EE & 38' 5 1/4" PP  
JIB HALYARD WIRE LGTH WAS 35'6"  
MAIN HALYARD (OPTIONAL) WAS 70'10" WIRE  
12'0" BRAID  
HEADSTAY LGTH WAS EE 38'7/8" PP- 38'5 1/4"  
BACKSTAY LGTH WAS RN 39'3/8" PP-39'9 7/8"  
FWR LWRS LGTH RN 17'9" PP- 18'6 1/2"  
UPPR RN 35'10 7/8" PP- 37'1 3/8"  
AFT LWRS RN 17'10 1/8" PP 18'7 5/8"

REV A ADD T BAR (REF2990704) TO MISC HARDWARE ECN 123-76 JG 3-23-76

REV B MAIN HALYARD SHACKLE IS P/N 51-209 WAS 51-235 ECN #138-76 JG 4/15/76

# RIGGING LIST

HALYARDS

HALYARD		7 x 19 S.S. WIRE			WIRE ENDS		WIRE TO BRAID CONN.	BRAID			SHACKLE		REMARKS	
NAME	QUAN	PART NO.	DIA.	LGTH.	PART NO.	TYPE		PART NO.	DIA.	LGTH.	ENDS	PART NO.	TYPE	
MAIN STD.	1	51-323	3/16"	34'1"	51-113 51-182	NICROPS THIMBLE BOTH	EYESPLICE TO THIMBLE	51-302	3/8"	41'	EYESPLICE WHIP	51-209	HEAD'BD 390-J IN THIMBLE	SEE BELOW FOR MAIN HAL WINCH OPTION
JIB OR GENOA	1	↓	↓	37' - 10 5/8"	↓	↓	↓	↓	↓	42'10"	EYESPLICE	51-208	SNAP 392-2 IN EYESPL C	---
OPTIONAL SPINNAKER	1	---	---	---	---	---	---	---	---	76'	EYESPLICE WHIP	↓	↓	SUPPLY ONLY WHEN PROD. ORDER CALLS FOR SPIN. GEAR OPT.
SPIN TOP. LEFT	1	---	---	---	---	---	---	---	---	54'	↓	↓	↓	↓
OPTIONAL MAIN TOP. LEFT	1	51-323	3/16"	33'	51-113 51-182	NICROPS THIMBLE BOTH	EYESPLICE TO THIMBLE	↓	↓	5'	↓	NONE	---	---
STAYSAIL	NONE													
MIZZEN														
MIZZEN STAYSAIL	↓													
MAIN OPTIONAL	1	51-323	3/16"	38' - 4 5/8"	51-113 51-182	NICROPS THIMBLE BOTH	EYESPLICE TO THIMBLE	51-302	3/8"	41'	EYESPLICE WHIP	HEAD'BD 390-J IN THIMBLE	WHEN PROD ORDER CALLS FOR WINCH PKG (588) DELETE STD. HAL. ABV. & SUPPLY THIS ONE	

MISC. HARDWARE:

PART NO.	QUAN.	ITEM	USE
		STD. MISC. HARDWARE	
51-272	3	BLOCK, SINGLE, FR. OR SIDE SHACKLE SCH 05-03	MAINSHEET ON BOOM
51-269	1	BLOCK, FID'L, SWIVL, W/BECKET & CANS, SCH 22-55	MAINSHEET TRAVELLER
51-608	1	BLOCK, SING SWIVL, W/BECKET SCH 05-15	
50-290	2	BLOCK, SLIDE, SCHARFER 07-91	GENOA SHEET PAIRLEADS
51-581	1	BLOCK, DBL., W/BECKET SCH. 03-33	EYESPLICE IN OUTHAUL
51-587	1	TOGGLE, 7/16", W/CLEVIS PINS, NAVTEC	FORESTAY, LWR. END.
51-582	1	PIN, CLEVIS, 3/8" DIA X 2 1/8" GRIP, NAVTEC	
51-578	3	SHACKLE, "D", LONG, 1/4" DIA PIN, RONSTAN RF 623	MAINSAIL CLEW & TACK MAIN TOP. LIFT UPR. END
51-409	1	HANDLE, WINCH, 10", STD., BARLOW	---
		SPINNAKER GEAR - SUPPLY ONLY WHEN PRODUCTION ORDER CALLS FOR SPINNAKER GEAR OPTION	
51-272	3	BLOCK, SING'L, SWIVEL, SCHARFER 05-05	FOREGUY AT STEMHEAD, SPIN. HALYARD & TOP. LIFT
51-224	3	BLOCK, SING'L, FR. OR SIDE SH'KL, SCH 03-03	FOREGUY PAIRLEADS ON STANCHIONS
51-610	2	BLOCK, SNATCH, ARTICULATED, MERRIMAN 347 PT-3	SPIN TURNING
51-580	1	SHACKLE, "D" 1/4" DIA PIN, SCH 93-21	FOREGUY BLOCK TO STEMHEAD
51-619	1	POLE SPIN., SING'L BRIDLE, 12' 8 1/2" LOA (3.26 ID) (.120 WL)	
51-386	1	STRUT REACHING, 6'6" LOA	
50-286	4	CHOCKS SPIN. POLE ALUM	
		REEPING GEAR - SUPPLY ONLY WHEN PRODUCTION ORDER CALLS FOR REEPIG GEAR OPTION	
51-580	3	SHACKLE, "D", 1/4", SCH 93-21	REEP LINES TO BOOM
		BOOM VANG - SUPPLY ONLY WHEN PRODUCTION ORDER CALLS FOR VANG OPTION	PKG 544-299
51-132	1	VANG GOOSENECK	
51-578	1	SHACKLE, "D" LONG 1/4 DIA PIN RONSTAN RF 623	
51-611	1	VANG BOOM COMPLETE SCH 35-11	
REV A	1	T BAR RHP 299-704	

LIFELINES

LINE		7 x 19 S.S./PVC WIRE				FWD FITTING		AFT FITTING		REMARKS
NAME	QUAN.	PART NO.	DIA.	LGTH "P-P"	LGTH	PART NO.	TYPE	PART NO.	TYPE	
UPPER	2	51-321	3/16"			51-233	TBK'L	51-146	EYE	DRILL OUT TO 1/2"
LOWER	2	↓	↓			↓	TBK'L	51-232	FORK	
JPR. GATE	2	↓	↓			51-263	PELICAN HOOK	51-233	TBK'L	
LWR. GATE	NONE									

NOTES:

- LGTH "P-P" IS THE LGTH FROM UPPER TANG OR TOGGLE PIN Q. TO THE LOWER CHAINPLATE OR FITTING PIT Q. FOR LIFELINES IT IS THE LGTH FROM BOW PULPIT PIN Q. TO PIN Q. IN STERN PULPIT OR STANCHION.
- LGTH "RN" IS DEFINED IN CSP-00-9049.
- LGTH "E-E" IS EYE Q. TO EYE Q. FOR RIGGING WITHOUT TURNBUCKLES.
- WHERE NICROPRESS THIMBLES ARE USED, WIRE PART LGTH IS FROM THIMBLE TO THIMBLE ON COMPLETED WIRE PART.



*Columbia Yacht*

A DIVISION OF **Whittaker**  
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