BOAT INFORMATION BOOK
FOR
UNITED STATES NAVAL ACADEMY
NAVY 44
SAIL TRAINING CRAFT

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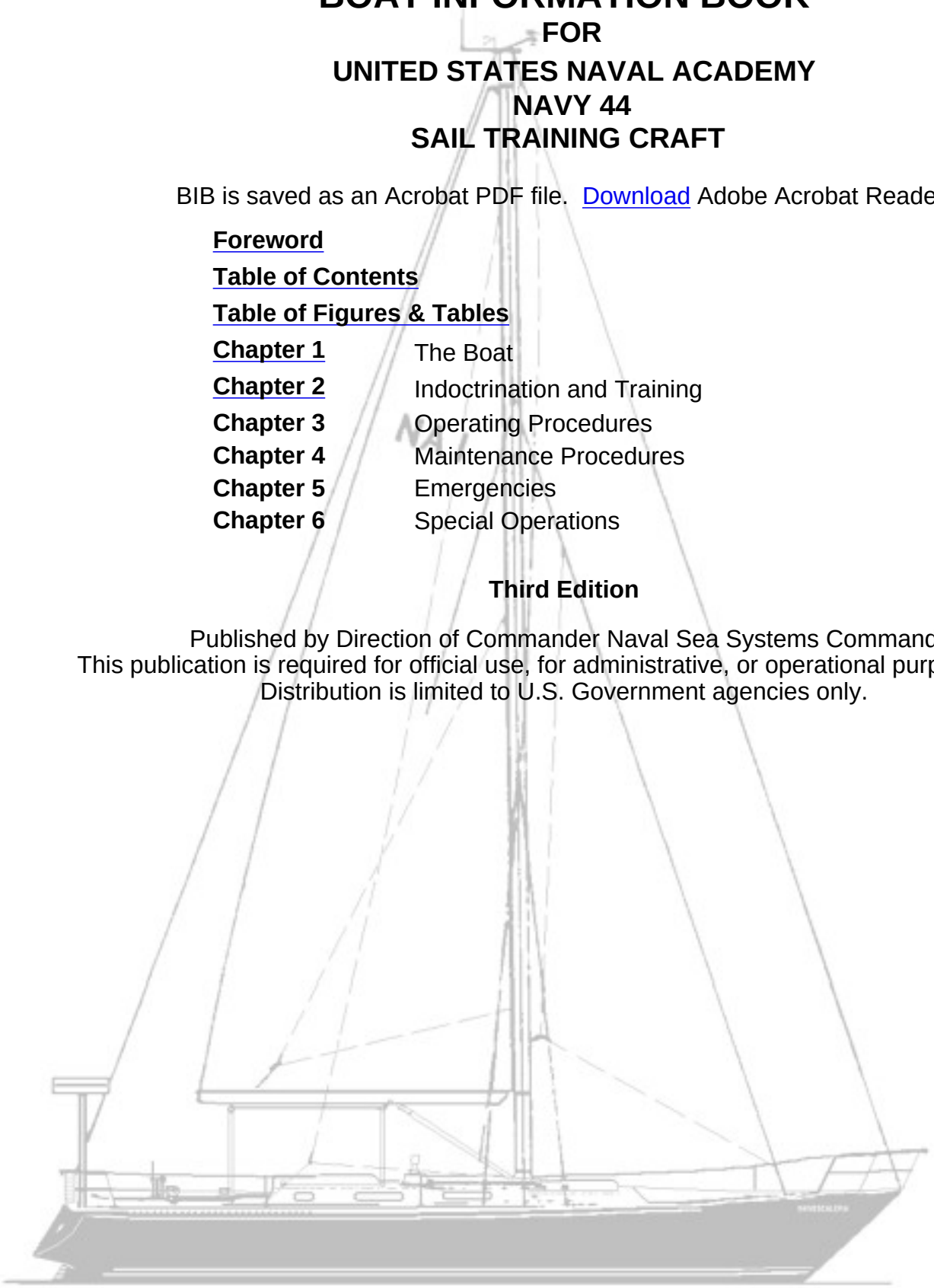
Third Edition

Published by Direction of Commander Naval Sea Systems Command



FOREWORD

SCOPE

The Director of Naval Academy Sailing, as the model manager for this boat, issues the Boat Information Book (BIB) for the NAVY 44. This BIB contains information on all of the boat systems, performance data, and operating procedures required for safe and effective operations. However, it is not a substitute for sound judgment. Compound emergencies, available facilities, adverse weather or sea conditions, or considerations affecting the lives and property of others may require modification of the procedures contained herein. Read this BIB from cover to cover. It's your responsibility to have a complete knowledge of its contents. The bottom line, however, is using good "HEADWORK"; THINK as you employ this BIB.

HOW TO GET COPIES

Each supervisor and crewmember is entitled to access to this BIB. Supervisors should direct their inquires to the Director of Naval Academy Sailing, Robert Crown Center, US Naval Academy, Annapolis, MD 21402. Midshipmen training in this vessel will be provided access to copies as applicable.

UPDATING THE BIB

This is the THIRD EDITION of the BIB for the NAVY 44 using the format of the NATOPS program that has proven so successful in Naval Aviation. Omissions, additions, and/or consideration during the periodic review that is ongoing, which has produced this THIRD EDITION, and which will continue to improve this product.

CHANGE SYMBOLS

A black vertical line in the margin adjacent to the affected text indicates text revisions contained in this edition. A "margin bar" like the one next to this paragraph will identify the addition or either new information, a changed procedure, the correction of an error, or a rephrasing of the previously included material. The text of this BIB is formatted in two columns; therefore the margin bar will be in the adjacent margin.

WARNINGS, CAUTIONS, AND NOTES

These annotations shall be inserted immediately preceding the procedure to which they apply to eliminate confusion. The following definitions apply to **"WARNINGS"**, "CAUTIONS", and "NOTES" found throughout the BIB.

WARNING

An operating procedure, practice or condition that may result in injury or death to personnel, if not carefully observed or followed.

CAUTION

An operating procedure, practice or condition that may result in damage to equipment if not carefully observed or followed.

NOTE

An operating procedure, practice or condition that is essential to emphasize.

WORDING

The concept of word usage and intended meaning which has been adhered to in preparing this BIB is as follows:

"Shall" has been used only when application of the procedure is mandatory.
"Should" has been used only when application of a procedure is recommended.
"May" and "Need Not" have been used only when application of a procedure is optional.
"Will" has been used only to indicate futurity, never to indicate any degree of requirement or application or procedure.

BIB DEVELOPMENT

This BIB was prepared using a concept that provides the crewmember with information for operation of the boat, but detailed operation and interaction is not provided. This concept was adopted so as not to stifle individual initiative in situations that do not violate the precepts of the rational for **"WARNINGS"**, "CAUTIONS", and "NOTES". Nor the intent or wording as defined above. The BIB has been kept as simple and direct as possible to encourage readability on the part of the crewmember.

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THE BOAT

1-1 INTRODUCTION

The Navy 44 is the latest of three generations of one-design offshore cruiser/racers to be authorized by the Congress for training midshipmen. The end of World War II brought the first fleet of 12 matched 44' wooden yawls to the Naval Academy, designed by Naval Architect Bill Luders. After 25 years of hard service they were replaced by 12 fiberglass Luders 44' Yawls, designed with the same exterior lines as the original boats, but with an interior that accommodated an auxiliary engine and a navigation space with chart table. After 25 years of offshore and Chesapeake Bay sailing, these boats were ready for replacement.

The lessons learned in over 40 years of sailing and maintaining these and other boats in the Naval Academy fleet were translated by Captain John Bonds, USN, Commodore Naval Academy Sailing Squadron, into specifications for a design competition paid for by the Naval Academy Sailing Advisory Committee (Fales Committee) under the chairmanship of Mr. Charles L. Ill.

The firm of McCurdy & Rhodes, Inc. of Cold Spring Harbor, New York, won the competition for the designer. The construction contract was awarded to Tillotson-Pearson, Inc. of Warren, Rhode Island. The first boat was delivered in 1987. The Fales committee and Capt. Bonds carried out testing of the prototype and subsequent design modifications.

The Navy 44 has proven to be a very successful design, being seaworthy, strong and stable in the worst weather, fast and comfortable and with the rig and interior arrangement planned to meet the single-minded objective of midshipman training.

The Navy 44 was acquired in two incremental buys; NA-1 thru NA-8, NA-9 thru NA-20. The configuration of each increment reflected “state of the art” modification to the basic boat available at the time of procurement. The fleet of 20 NA 44’s exhibits the following characteristics:

NA-1 is the prototype. The most obvious peculiarity is that the cabin has a teak sole. Cabin layout is peculiar to this boat only.

NA-2 is the test bed for the Naval Academy. Before modifications to the fleet of the Navy 44 are made they are proven on this boat. Peculiarities include:

- A LECTRASAN treatment system for the marine head to sanitize feces prior to discharge from the boat overboard.

- A unique charging system for the galley refrigeration system.

NA-1 thru NA-8 are fitted with the Brooks and Gatehouse HYDRA depth sounder and the HORNET sailing instrument systems. The location of components for the plumbing system is peculiar to this series.

NA-9 thru NA-12 are configured with a foil headstay for the jib. The jib lead trim system has a shock chord/control line assist for running the car forward thus providing an infinite positioning of the car lead. This series is fitted with the HECTA series sailing and depth sounding equipment.

NA-9 thru NA-20 reflect the newest systems. They are also fitted with the HECTA series. The location of components for the plumbing system is peculiar to this series.

Characteristics of each series are identified in Figure 1-2 PRINCIPAL CHARACTERISTICS.

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1-2 PRINCIPAL CHARACTERISTICS.

Length, Overall	44 ft. 0 in. (13.42 meters)
Length, Waterline	34 ft. 7 ½ in. (10.56 meters)
Beam, Maximum	12 ft. 4-3/4 in. (3.78 meters)
Draft	7 ft. 3 in. (2.21 meters)
Height, from Waterline	65 ft. (20 meters)
Displacement, Measured Trim	27,654 pounds
Ballast	12,310 pounds
Sail Area, Maximum	956.37 square feet
Engine, Diesel Auxiliary	Westerbeke Model 4ONA, 37 H.P. @ 3000 RPM w/1.88:1 HBW 150 Hurth Gear, with Max Prop 19 inch diameter, 18 degree pitch, feathering prop.
	50 Gallons (45 useable)
Fuel Capacity	1.5 GPH @ 3000 RPM (maximum power)
Consumption (approx)	.8 GPH @ 1800 RPM (cruise power)
	12 volts D.C., 120 VAC, 30 Amp.
ELECTRICAL	2 - 51 Amps ea. provide 12 volts D.C.
Alternators	
Batteries	4-Rolls 12 Volt, 136 Amp Hr batteries in 2 banks:
Ship's Service Batteries	Ship Service #1
	(2 batteries), Ship Service # 2, (2 batteries).
Engine Start Battery	1- M27 high amperage cranking battery.
COMMUNICATIONS	
VHF	Icom M100 (NA1-NA8)
	Icom M120 (NA9-NA20)
HF/SSB	Stephens SEA 222
ELECTRONIC EQUIPMENT	
Depth Sounder	Brooks & Gatehouse HECTA (NA1-NA8)
	Brooks & Gatehouse HYDRA (NA9-NA20)
Sailing Instrument	Brooks & Gatehouse HORNET (NA1-NA8)
	Brooks & Gatehouse HYDRA (NA9-NA20)
Loran	Northstar 800
Radar	Raytheon R-20 (NA1-NA8)
	Raytheon R-20X (NA9-NA20)
GPS	Northstar Mod (GPS) NA-9 - NA-12
	Trimble (NA2 & NA5)
Weather Facsimile	Furuno FAX 208A (every fourth boat)
Potable Water	163 Gallons in 3 tanks, 23 gal keel,
	2-70 gals each under settee berths.
Refrigeration - Original	Gruner Caribbean Model 75 Holding Plate, dual
New system installed in NA-2,	charging; Engine driven mechanical, 115 VAC.
NA-8, and NA-15 thru NA-20.	New - Technautics Coastal 12. 12 VDC
MSD Holding Tank	10 Gallon approximate, PVC
Crew	10

1-3 HULL CONFIGURATION & LAYOUT

The Navy 44 has a trimmed waterline length of only 34 feet, 7-1/2 inches, due to a moderate overhang at the bow. A fixed hydrodynamic keel is arranged amidships, which compliments the wine-glass mid-body. Ballast fitted to the keel is 12,310 pounds of cast lead. The rudder is attached to a skeg under the reversed transom. The skeg is molded integrally with the hull. The Navy 44 has a continuous main deck around the raised cabin top and cockpit. Cockpit combing and cabin top are fitted with an array of winches, blocks, cleats and fittings sufficient for offshore training. Deck surfaces are covered with Treadmaster non-skid. The main deck perimeter is fitted with fore and aft stainless steel pulpits, with stanchions that have double life lines port and starboard.

1-3.1 CONSTRUCTION INFORMATION

Basic lay-up of hull is an inner and outer skin of biaxial glass matting and vinylester resin over Airex and Termanto cores. The deck is laid up in a similar fashion as the hull, using a separate mold and joined to the top of the hull at the deck edges. Sufficient biaxial/matting reinforcing is overlapped to assure proper bonding at the joint. See Figure 1-1. Hull and Deck Lay-ups.

The bottom of the hull is constructed to provide a stepped seat for bolting on the 12,310-pound cast lead keel with ten (10) stainless steel bolts. The inner bottom of the hull (below cabin sole) incorporates a hollow fiberglass grid pattern of longitudinal and transverse members bonded to the inner skin that provides the necessary hull stiffness as well as support for the cabin sole. Aft of the keel is a fiberglass skeg, molded integrally with the hull, which supports the rudder with a cast bronze bearing housing. See Figure 1-2. Bottom Grid.

1-3.2 HULL & EXTERIOR ARRANGEMENTS

The Navy 44 is basically divided into three sections:

Deck - Supports the mast at the partners and is arranged with winches, cleats, lifelines, navigation lights, hatches, and fittings suitable for offshore sailing. See Figure 1-3. Deck, (Top View), and Figure 1-4. Deck, (Side View).

Cockpit - A large well on the afterdeck accommodating the crew that will steer, and work the sails. See Figure 1-5. Cockpit.

Cabin - The cabin is the interior of the boat consisting of habitable spaces, storage, electronics, and auxiliaries. Habitable spaces include berths, head, shower, galley, refrigerator, and folding mess table. Below the cabin sole is the mast step, (day) water tank, fuel tank, bilge pumps, and thru-hull fittings. Water tanks under settee berths. Engine compartment is below the companionway. See Figure 1-6. Cabin.

1-4 SPARS

The Navy 44 is a masthead sloop rig whose spars include a single mast, a boom and while sailing with a spinnaker, a spinnaker pole and reaching strut.

1-4.1 THE MAST

The aluminum mast is a total of 64 feet, 3 inches from step to masthead and 62 feet, 4 inches above the waterline. The mast is a Hall Spars section 240 aluminum alloy tube, oval cross-section with an internal track running along the aft side to hold the mainsail's luff slides, with a welded taper at the masthead. A Hall Spars masthead with internal halyard sheaves is welded to the mast top. Aluminum spreaders with airfoil sections and thru-mast mounting are fitted at about the middle and the top quarter of the mast. A separate track is located adjacent to the mainsail track, port side, for the storm trysail. A 12-foot spinnaker pole track with single toggle car is fitted on the forward side of the mast. The mast is internally wired in conduit for navigation lights, deck light, box light, wind instruments and antennas, with wires exiting at the base of the mast.

Figure 1-1. Hull and Deck Lay-ups

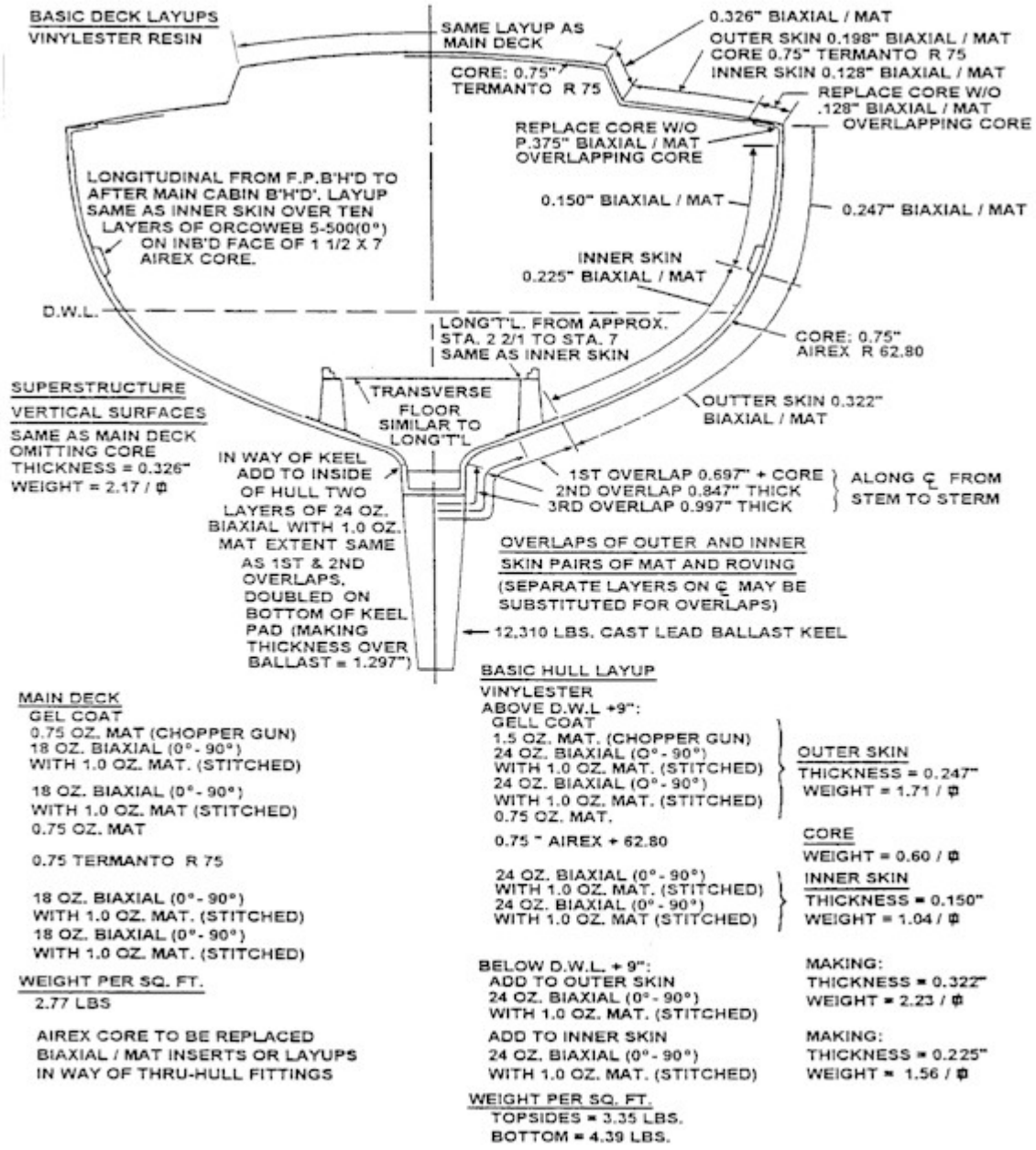


Figure 1-2. Bottom Grid

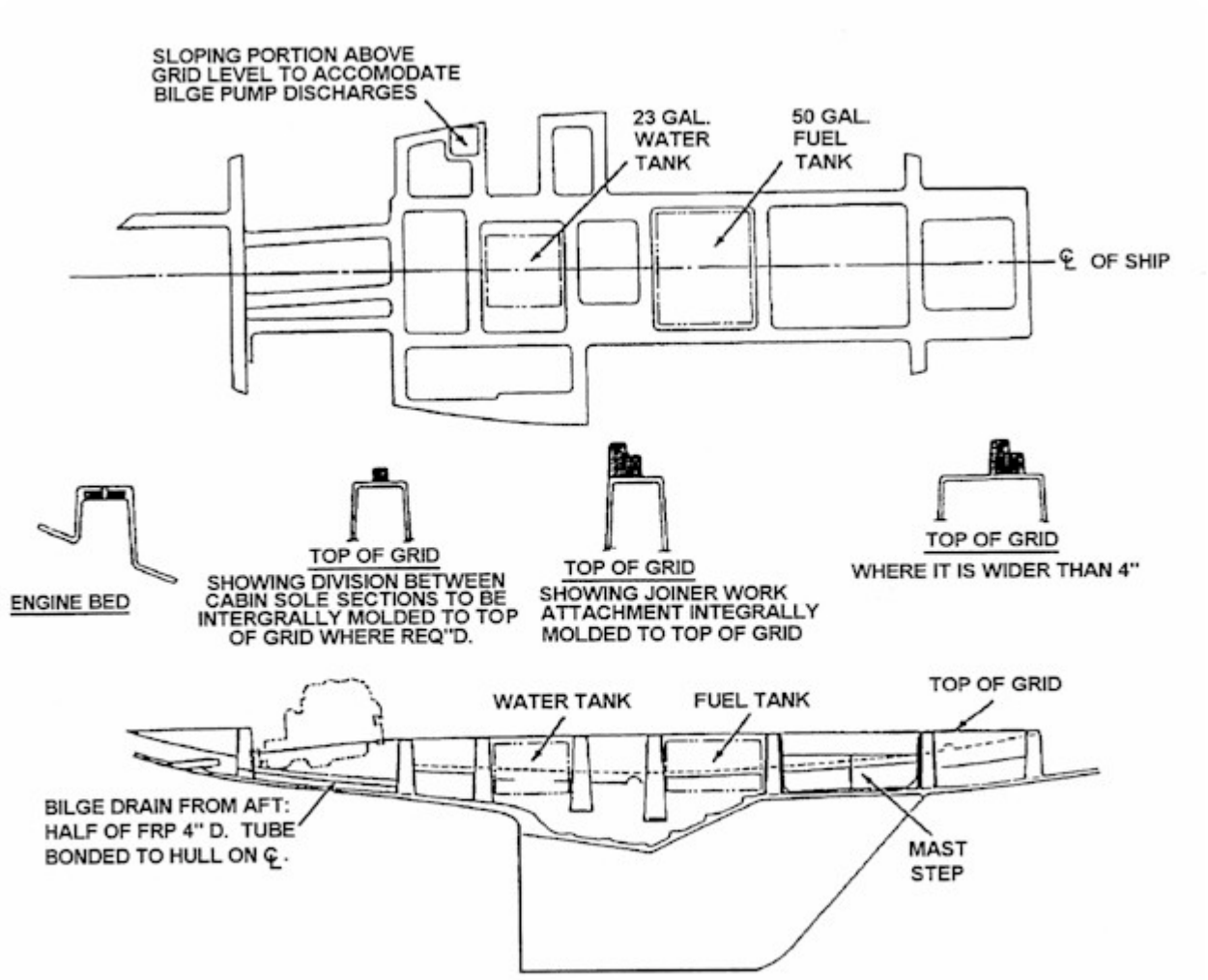


Figure 1-3. Deck Top

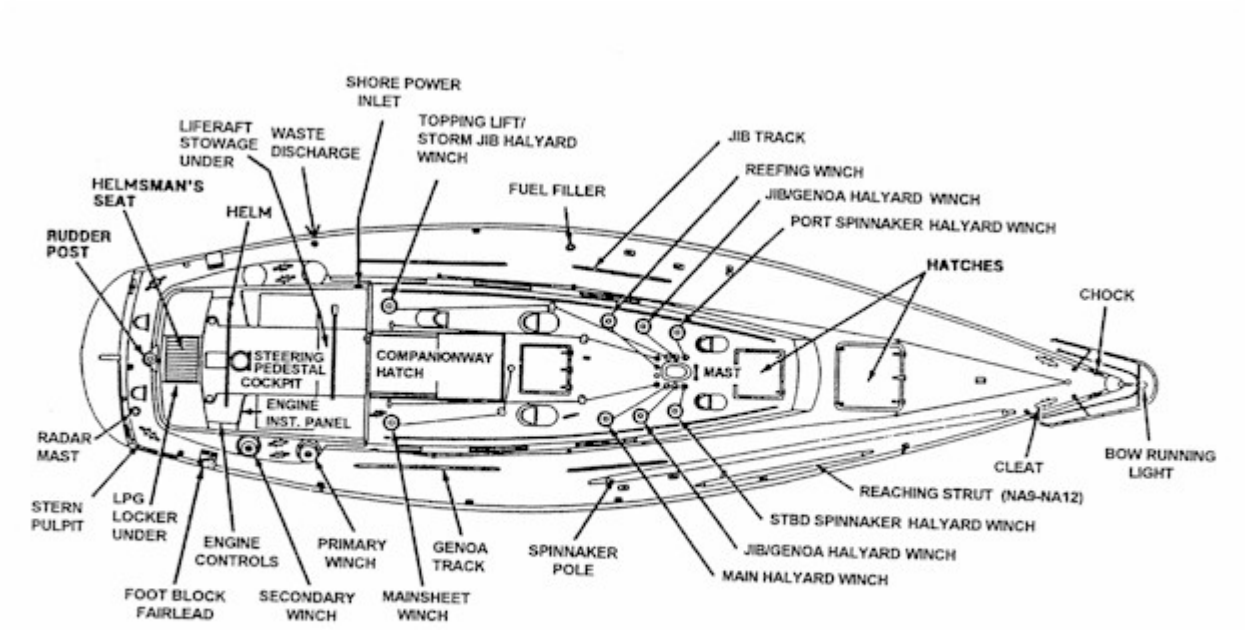


Figure 1-4. Deck Side

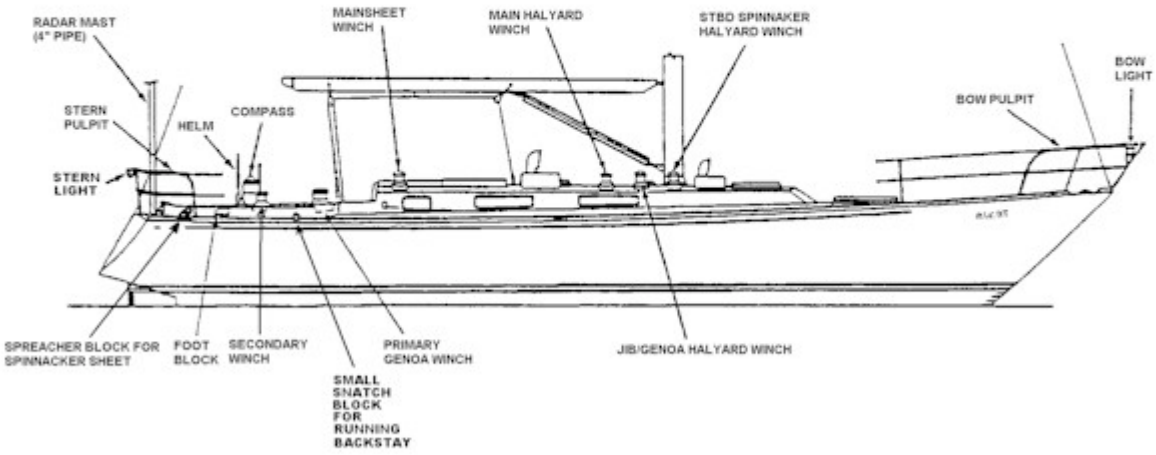


Figure 1-5. Cockpit

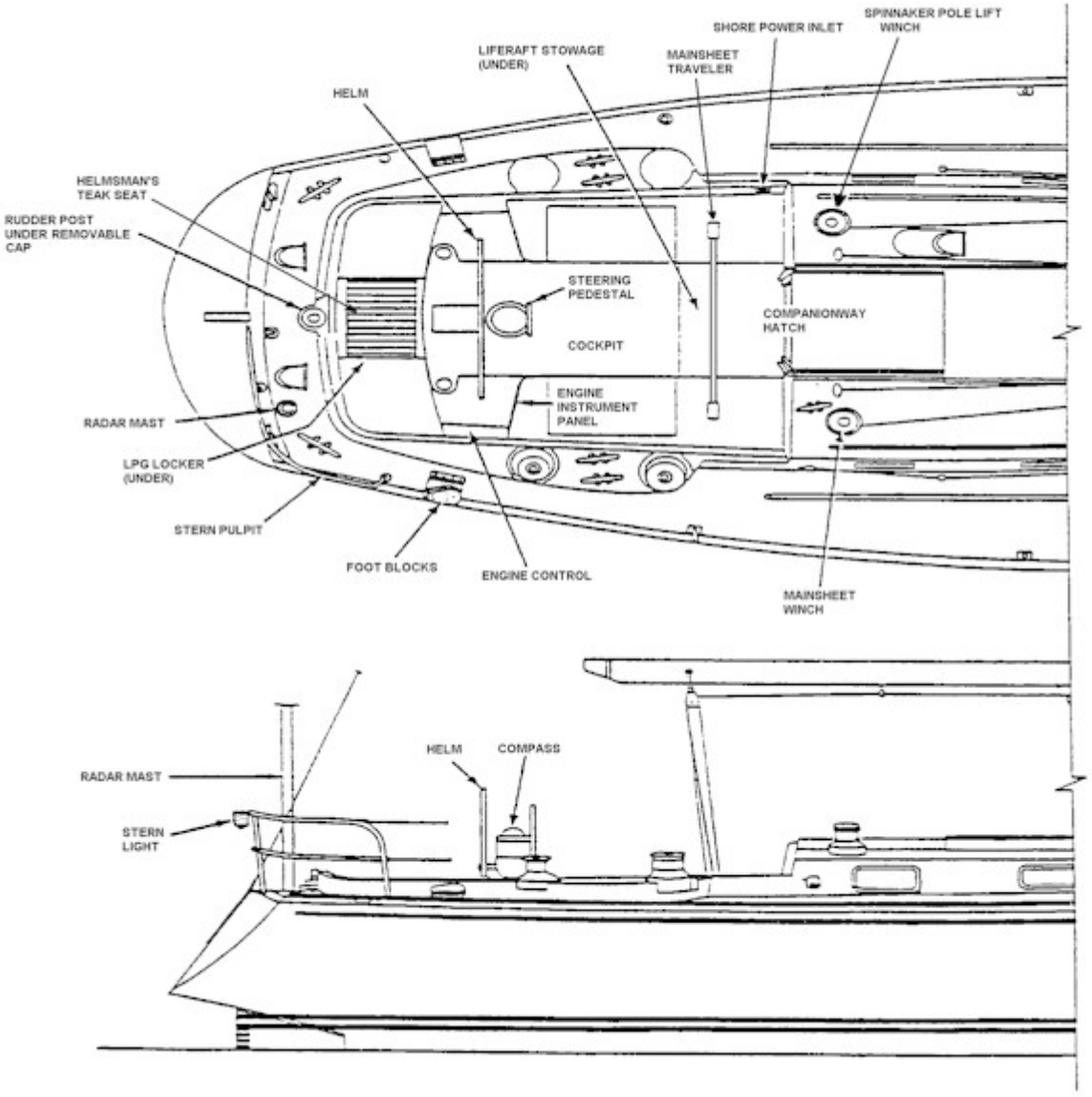
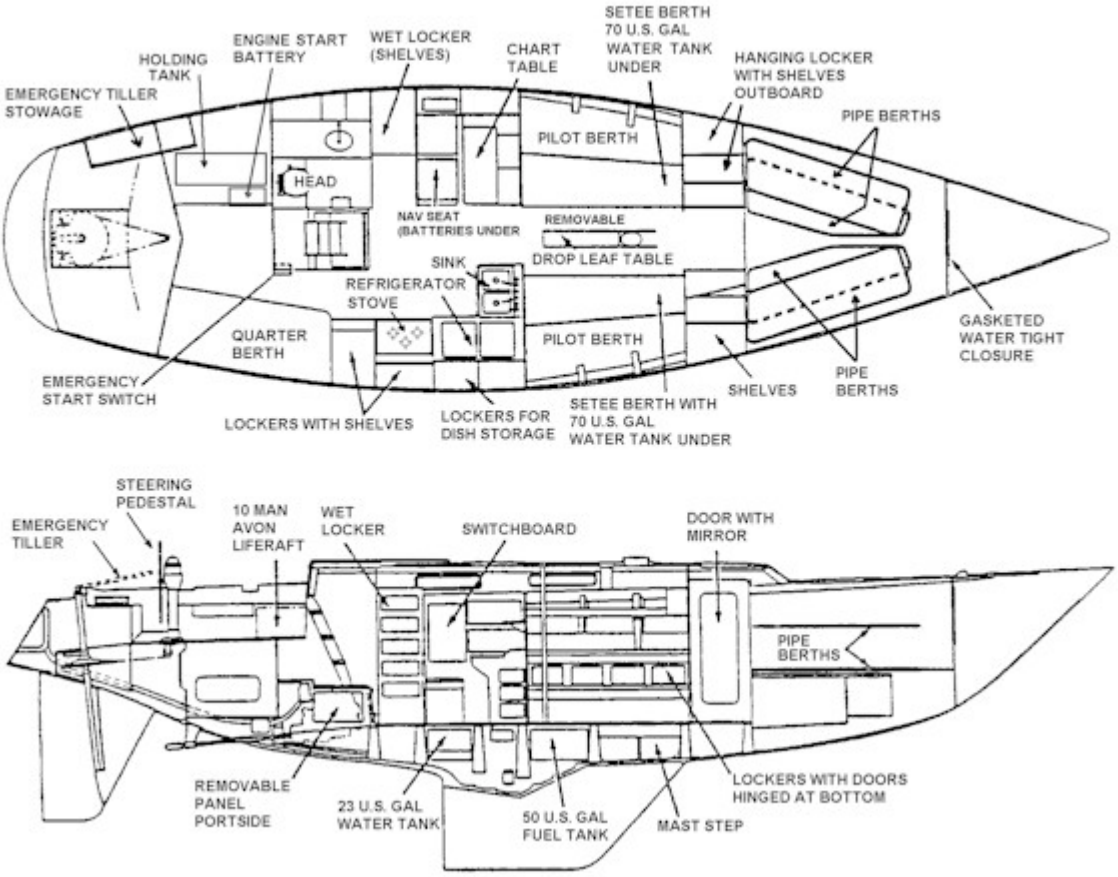


Figure 1-6 Cabin



The mast goes through the deck, is fitted with a mast collar, wedges and a boot for water tight integrity, and is stepped on the keel.

NOTE

Controlling height of the mast for bridge clearance is 65 ft due to the electronic wind instrument and VHF antenna at the masthead.

1-4.2 THE BOOM.

The boom is a Hall Spars section 185 aluminum alloy tubing with internal outhaul tackle with two slab reefing sheaves on the aft end and sheaves and cam cleats on the gooseneck end. Two reef locks at the forward end will hold the reef line when set to free the reefing winch for the next evolution. The boom is fastened to the mast with a gooseneck approximately 5 feet above the cabin top and is fitted with a boom vang (Hall Spars Quik Vang, size D40).

1-4.3 THE SPINNAKER POLE

The spinnaker pole is a 4-inch diameter aluminum alloy tubing 18 feet, 4 inches long. Each end is provided with a fitting; the inboard end, a socket, Sparcraft PO114, attaches to the toggle car on the forward side of the mast, and the outboard end of the pole, Sparcraft PO128, is fixed to the outboard end of the pole for the guy of the spinnaker. When not in use, the spinnaker pole is stowed in starboard deck chocks forward of the mast.

1-4.4 THE REACHING STRUT.

The reaching strut is an 8 foot, 3-inch, aluminum alloy tubing, Forespar RS-300-T, with Forespar Model RSO outboard end and Model RST inboard end fittings. The reaching strut can be used when the apparent wind angle is forward of the beam. This reduces chafe on the afterguy, and increases the mechanical advantage of the load on the afterguy to help keep the spinnaker pole from touching the headstay, especially in a seaway. The reaching strut is primarily used while racing.

An alternative method of controlling the afterguy without the use of the reaching strut is to employ a snatch block at the toe rail two holes aft of the lifeline stanchion adjacent to the aft lower shroud.

NOTE

Only NA9 thru NA12 are normally fitted with the reaching strut.

1-4.5 THE STANDING RIGGING

The standing rigging on the NAVY 44 is discontinuous NAVTEC nitronic 90 rod rigging with cold-headed ends in stemball mast wall terminals. See Table 1-1. Rod Rigging.

The mast is held vertical by a combination of stays and shrouds that collectively make up the standing rigging. It consists of a permanent rod headstay, a permanent backstay fitted with a hydraulic tensioner, shrouds and spreaders.

The Navy 44 is a masthead rig. The headstay meets the mast hounds at the masthead. An upper shroud, which is attached with a stemball fitting fastened to the masthead, passes through the end of the upper spreaders and attaches to the end of the lower spreader.

The lower vertical shroud attaches to the end of the lower spreader and leads to a chainplate on the deck. This lower vertical shroud also supports the load on the upper diagonal shroud.

The forward lower shroud attaches to the mast below the lower spreader with a stemball fitting and leads to a chainplate on the deck approximately two feet forward of the vertical shroud. An aft lower shroud that attaches to the lower spreader root with a fatigue indicating stemball fitting at the lower spreader leads to a chainplate on the deck approximately two feet aft of the vertical shroud. Each lower stay and upper diagonal stay is fitted with a turnbuckle to adjust tension when "tuning" the mast.

Table 1-1, Rod Rigging

ITEM	SIZE	MATERIAL	QUANTITY.
Upper Shroud	-17	NAVTEC 22-13-5	2
Vertical Shroud	-30	NAVTEC 22-13-5	2
Middle Shroud	-12	NAVTEC 22-13-5	2
Lower Shroud	-17	NAVTEC 22-13-5	4
Forestay	-22	NAVTEC 22-13-5	1
Backstay	-22	NAVTEC 22-13-5	1
Inner Forestay (Collapsible)	1/4" Dia	1x19 Stainless Steel Rod	1
Running Backstay Collapsible)	1/4" Dia	1x19 Stainless Steel Rod	2

Tuning is the process by which the standing rigging is adjusted so that the mast remains in column, directly on centerline when exposed to typical operating loads. The mast has been tuned by Small Craft Support and is not to be tuned by using personnel. See Figure 1-7, Typical Turnbuckle, and Figure 1-8, Standing Rigging Front View.

1-4.5.1 STEM BALL FITTINGS

The aft lower shrouds have been retrofitted with a stem ball fitting at the upper end where they join to the mast**.** This allows the rod end to rotate within a machined stemball seat, thus accommodating small amounts of lateral and fore-aft play in the shroud as the mast is subjected to load. The indicator band will break loose when subjected to inordinate loads and will slide to the lower end of the shroud adjacent to the turnbuckle. This is an indication of inordinate fatigue and potential shroud failure.
See Figure 1-9, Stem Ball Fitting.

1-4.6 SPREADERS

The Navy 44 Mast has two sets of aluminum spreaders that extend with a small dihedral angle from the mast at 22 feet and 40 feet above the deck for the lowers and upper sets respectively, thus the rig is referred to as a "double spreader rig". The spreaders assist the shrouds in keeping the mast in column within the fore and aft plane. See Figure 1-8.

1-4.7 THE COLLAPSIBLE INNER FORESTAY.

A collapsible inner forestay, of 1/4"- 1X19 stainless steel wire, is attached to the front of the mast with an aluminum welded tang at a point 18 feet, 9 inches below the masthead. The running backstays are attached to the back of the mast at the same location. The lower end is attached to high field lever. When set up it will lessen the flexing of the mast due to strong winds and seas. It also serves as the stay to which the Genoa staysail or the storm jibs are attached. When not is use the lower end can be led through the fairlead at the base of the mast, port side, and attached to the shock chord at the padeye on the cabin top aft of the mast.

1-4.8 THE HYDRAULIC BACKSTAY TENSIONING DEVICE

The hydraulic backstay tensioning device is used to adjust masthead position and indirectly controls the shape of the leading edge of the jib. The headstay is adjusted to compensate for wind pressure. Light winds may require no more than the 50-psi static pressure. In stronger winds more backstay pressure will be needed.

NOTE

Maximum headstay pressure should not exceed 4000 psi.

The tensioning device is a manually actuated hydraulic pump that applies tension to the backstay. Each of the two types of tensioners used in the Navy 44 fleet have indicator gauges, and pressure relief valves that prevent accidental application of extreme backstay pressure or the dynamic loads in excess of safe limits. Two types are used. NA1-NA8 have KRUEGER tensioners while NA9-NA20 have NAVTEC tensioners.

1-4.8.1 THE KRUEGER TENSIONER

The Krueger backstay tensioner has a sight gauge to aid in controlling the amount of tension taken on the system. It measures load exerted on the system in thousands of pounds. See Figure 1-10. Krueger Tensioner.

1-4.8.2 NAVTEC BACKSTAY TENSIONER

The NAVTEC tensioner has two scales. One end of the pointer reads pounds per square inch of pressure in the cylinder, the other end indicates the equivalent pressure exerted on the backstay in pounds X1000. See Figure 1-11. NAVTEC Tensioner.

Figure 1-7. Typical Turnbuckle

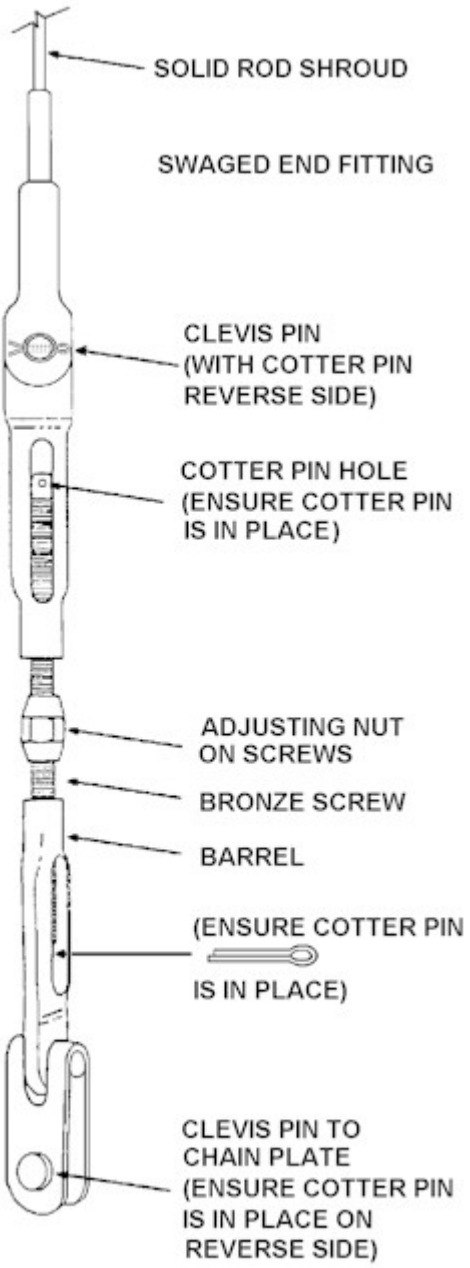


Figure 1-8. Standing Rigging Front View

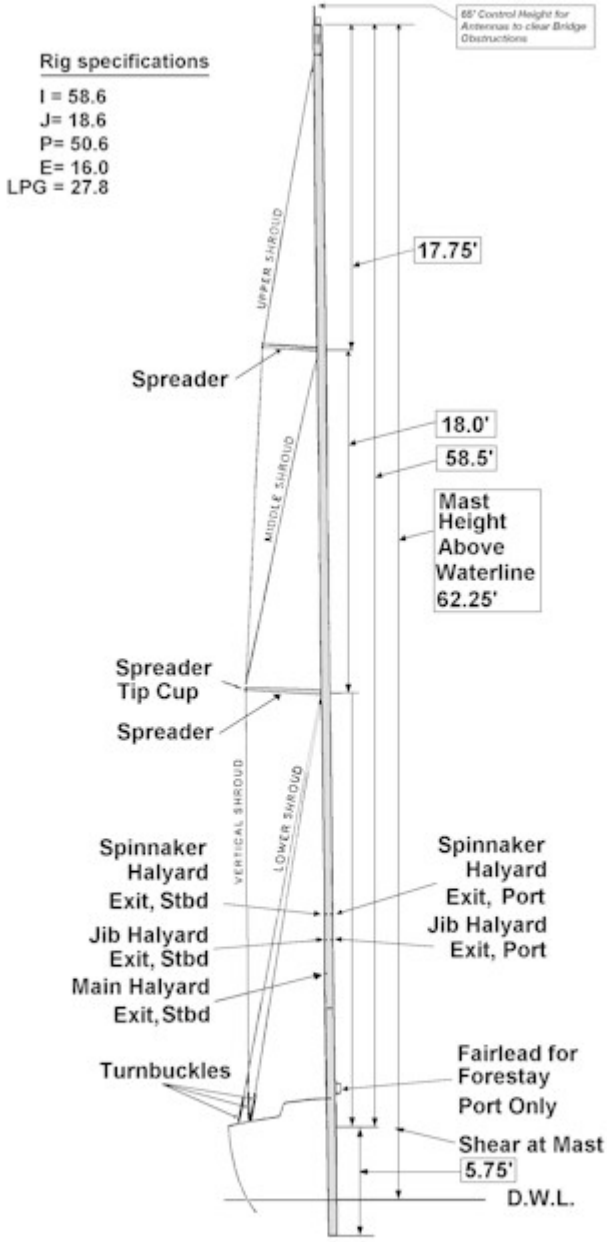


Figure 1-9 Stemball Anti-fatigue Fitting

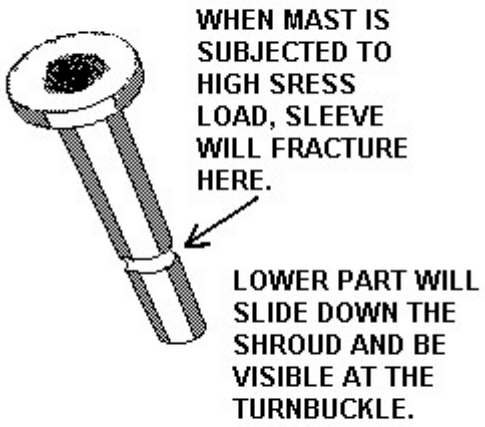


Figure 1- 10. Krueger Tensioner

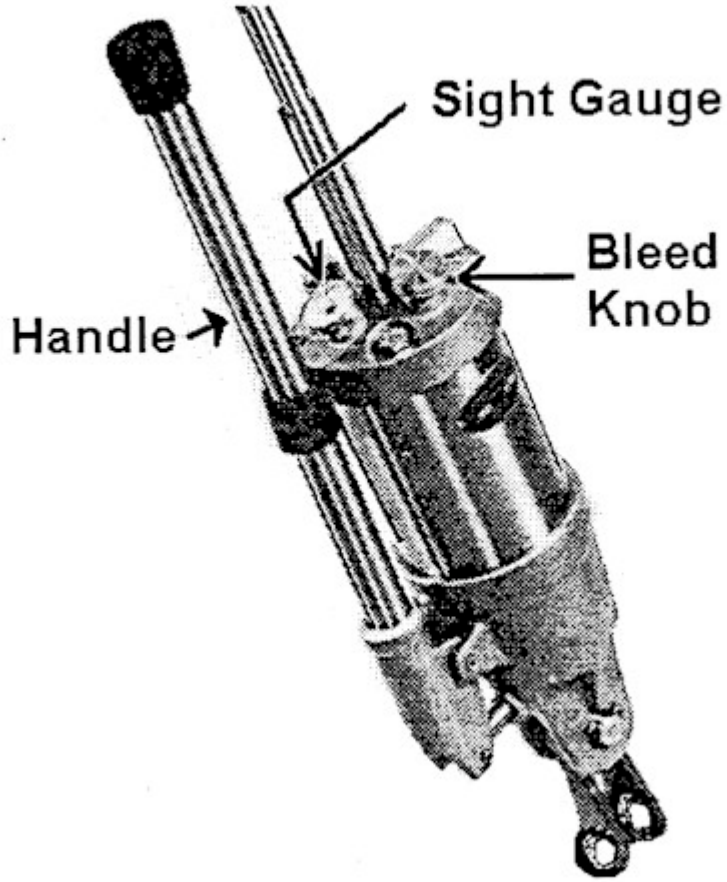
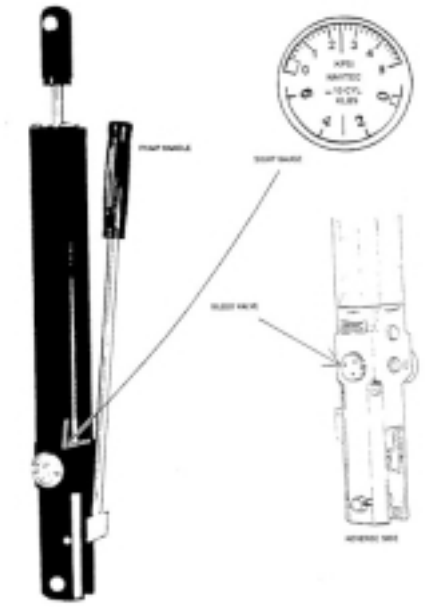


Figure 1-11. NAVTEC Tensioner



1-4.9 WINCHES

To handle the adjustments to the various working lines, the Navy 44 is outfitted with twelve (12) Barient 2 speed winches located on the cabin top on either side of the cockpit. See Figure 1-12, Typical Winch, and Table 1-2 for a complete listing of the winches installed.

1-5. RUNNING RIGGING

The running rigging consists of the halyards to raise and lower sails; sheets for headsails; traveler and mainsheet for the mainsail, sheets and guys plus spinnaker pole, topping lift, and foreguy (down haul or down guy) for the spinnakers, cunningham, outhaul, reefing lines and running backstays.

1-5.1 THE HALYARDS.

The masthead is fitted with four (4) aluminum sheaves upon which the halyards ride; one for the mainsail, one for the Port jib/Genoa; one for the Stbd jib/Genoa; and one spare. The halyards are rigged internally. These halyards are 3/8-inch Spectra line spliced to ½-inch braided Dacron rope tail covers.

There are two spinnaker halyards, that pass through blocks attached to welded cranes on each side of the forward face of the masthead, lead down the inside of the mast and after exiting the mast, are led through turning blocks at the base of the mast, then to winches on the port or starboard cabin top. The spinnaker halyards are ½-inch braided Dacron line.

A Spinnaker Topping Lift (T-Lift)/Staysail halyard, is used to provide a lifting force for the outboard end of the spinnaker pole and as a halyard for a staysail. The outboard end is fitted with a swivel snap shackle and lanyard. The line is 3/8-inch Spectra core/Dacron cover line. It is led to a sheave located on the front of the mast just below the Masthead/Deck combination light and forestay attachment where it then proceeds down the inside of the mast, exiting on the lower left side to a deck- mounted swivel turning block. The line is then led to a port side cabin top winch.

1-5.2 THE RUNNING BACKSTAYS

The are two running backstay, one on each side, attached to the sides of the mast with a GIBB T-BAR terminal, at the same height as the collapsible inner forestay. They help to keep the mast from pumping in a rough seaway. The windward running backstay is set when the Genoa Staysail is used. Both running backstays are set when the storm jib is used. Each running backstay has a detachable “tail” normally stowed in the port cockpit locker. The tail is a ½ inch double braided polyester line fitted with a 5/16" SS shackle for attachment to the running backstay. See Chapter 3 for using the Running Backstays with the Genoa Staysail, or Chapter 6 for use with the Storm Jib.

1-5.3 THE TRAVELER.

A traveler is fitted to the bridge deck of the forward end of the cockpit. The car is controlled by a tag line, dead-end spliced to the double cheek blocks at the ends of the traveler track. It is reeved as a 4-part block and tackle to the car, and exits through a cam cleat at the end of the traveler. A similar tag line is attached to the other end of the traveler.

1-5.4 THE MAIN SHEET

The main sheet is attached to the becket of a single block mounted on the car of the traveler, leads to a fiddle block on the aft bale of the boom through a three part purchase, then forward thru a ring fair lead to a single block on the forward boom bale. It then leads down to a single turning block forward of the main companionway hatch cover, to a deck mounted cheek block and to the Cabin Top Self-Tailing winch on the stbd side aft. See Figure 1-5.

Figure 1-12. Typical Winch

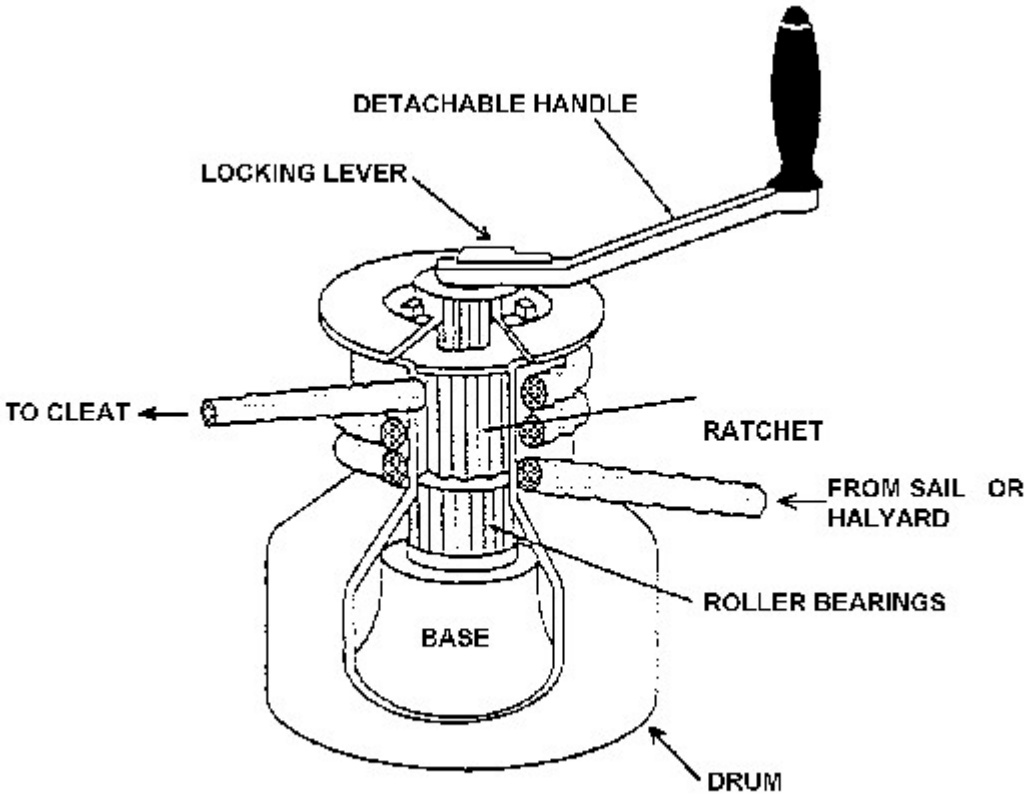


Table 1-2. Winches

DESCRIPTION	QUANTITY	MODEL	LOCATION
SPINNAKER HALYARDS	2	BARIENT 28 ST + SS	CABIN TOP PORT & STBD
GENOA / JIB HALYARDS	2	BARIENT 28 ST+ SS	CABIN TOP PORT & STBD
REEFING LINES	1	BARIENT 28 ST+ SS	CABIN TOP PORT
MAIN HALYARD*	1	BARIENT 28+ SS SOME ARE 28 ST + SS	CABIN TOP STBD
T-LIFT/STAYSAIL HALYARD	1	BARIENT 28 ST+ SS	CABIN TOP PORT AFT
MAINSHEET	1	BARIENT 28 ST + SS	CABIN TOP STBD AFT
PRIMARY GENOAS	2	BARIENT 736 SS/A	COCKPIT COMBING PORT & STBD
SECONDARY GENOAS	2	BARIENT 32 SS	COCKPIT COMBING PORT & STBD

1-5.5 THE PREVENTER SYSTEM.

It must be stated that the most effective preventer of an accidental gybe is an alert helmsman; however, recognizing that even an alert helmsman needs assistance, a two part preventer system has been installed on the Navy 44. One part is mounted on the boom, the second is crew deployed on the deck.

Equipment permanently mounted to the Boom.

A pad eye has been installed on the side of the boom at the aft end. A ½-inch high modulus, (aramid), preventer line is attached with a shackle, (exploded view A on Figure 1-13), that leads forward along the outside of the boom to a mid-boom exit box, (exploded view B). Shock chord attached inside the boom at the forward end**,** (exploded view C), is led aft to the exit box, and out, to attach to the loop spliced on the forward end of the preventer. This holds the preventer close to the boom in the non-deployed configuration. This installation is repeated on the other side of the boom.

Deck deployed preventer line.

A color-coded aramid core/Dacron covered line has a snap shackle fitted to one end. The snap shackle end is rigged to pass out of the cockpit down the deck inside the shrouds to a snatch block attached to the toe rail just aft of the bow pulpit, (exploded view D). The line goes thru the snatch block, passed outside the toe rail, then led aft, outside the shrouds. At rest the snap shackle is attached to the lower lifeline aft of the stanchion located just aft of the aft lower shroud, (exploded view E). The bitter end is led aft to a winch on the cockpit combing, (exploded view F)**.**

To use the preventer, the snap shackle is disconnected from the lifeline and attached to the forward end of the boom mounted aramid line. The shock chord is then disconnected from the aramid line. A companion line is rigged to the opposite side of the deck. See Figure 1-13, Preventer.

1-5.6 THE JIB / SPINNAKER SHEETS AND GUYS.

Sheets and guys are color-coded as follows:

Jib/Genoa Sheets - Color fleck (5/8"x65' Braided Dacron)

Spinnaker Sheets - Color fleck (½"x88' Braided Dacron with snap shackle)

Spinnaker Guys - Color fleck (½"x88' Braided Kevlar fitted to a snap shackle).

1-5.7 REEFING LINES

The Navy 44 is equipped with a double reefing system internal to the boom. The first reefing line leads to a deck mounted swivel block at the base of the mast, up to a sheave in forward end of the boom, into the boom through a rope clutch, exiting to a sheave at the aft end of the boom. The second reefing line has the same run pattern but is rigged on the port inside of boom. When not in use the reefing lines secured at the aft end of the boom with a figure eight knot to keep it from running out through the sheave.

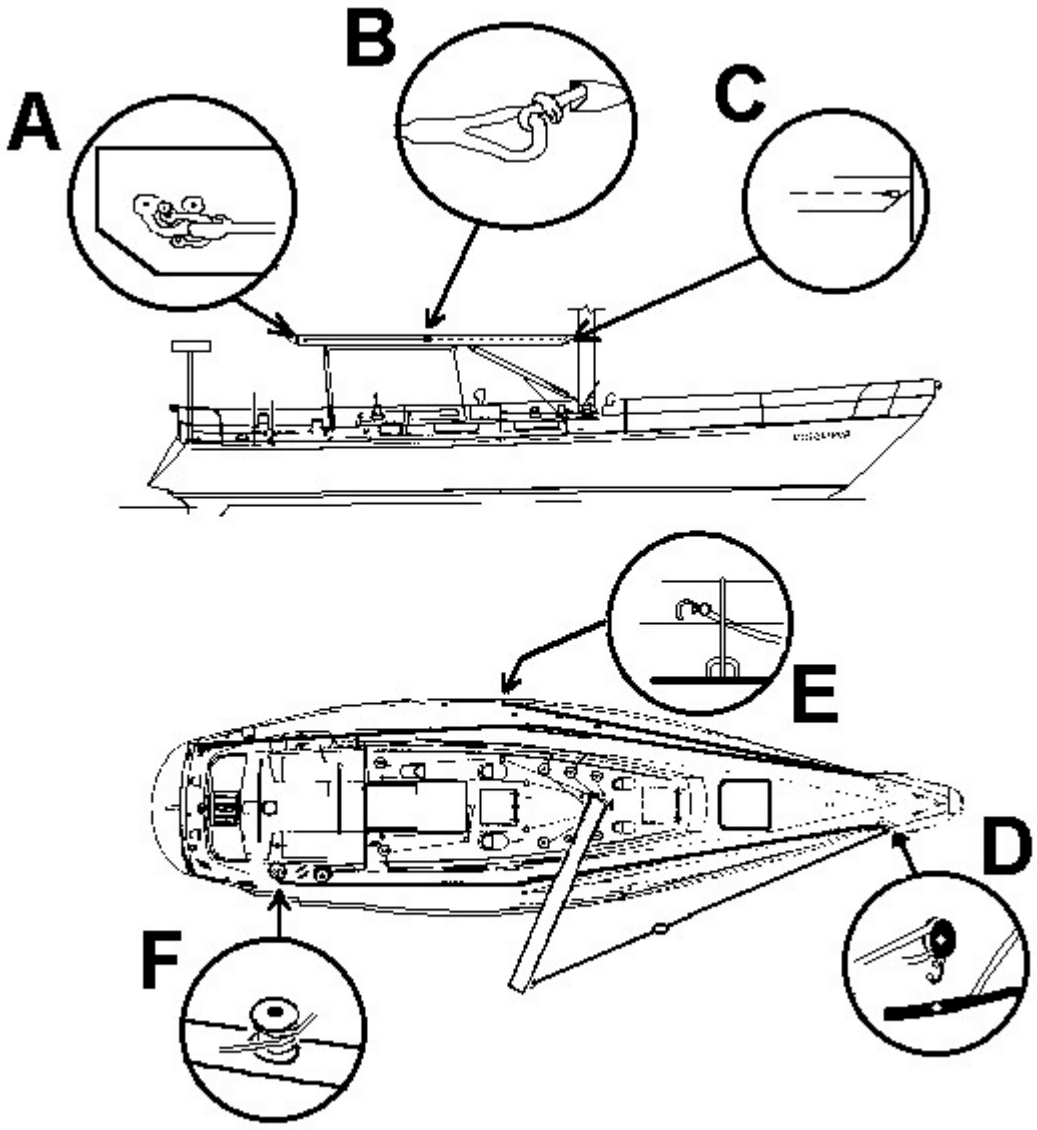
See section 3-5.5.10, REEFING THE MAINSAIL.

1-6 SAILS.

The mainsail is "cut" to the maximum sail area allowed by the mast "P" dimension, (hoist), of 50.58 ft and the "E" dimension (boom), of 16 ft. A new mainsail has been introduced in 2000 for NA 5 thru NA 8, and NA 13 thru NA 20.

The Jibs/Genoas are loose-footed headsails attached to the headstay, hoisted on aramid/rope halyards, and controlled with sheets led to adjustable sheet lead blocks on a pair of tracks inboard of the toe rail on each side of the deck, then led to the primary winch in the cockpit. When sailing on a reach the sheet may be led outside the life lines to the toe rail, through a snatch block, and aft.

Figure 1-13 Preventer System



Spinnakers are symmetrical full-bellied sails of nylon fabric hoisted on Dacron halyards. The leeward clew is controlled with a sheet led to the Spreacher block at the aft pulpit, then to a secondary winch in the cockpit. A small snatch block on the toe rail may also be used to prevent the spinnaker sheet from chaffing on the boom while on a run. The windward clew is controlled with a ½" spectra afterguy snap shackled to the sail, led through the end of the spinnaker pole, and back to a snatch block located at the widest part of the deck, then to the primary cockpit winch. The spinnaker pole is attached to the mast on an adjustable track. A topping lift holds up the outer end of the pole. The outboard end is controlled with a foreguy that leads down to a block on the foredeck, then aft to a cleat on the aft side of the cabin. See Figure 1-14, Sail Plan.

1-6.1 MAINSAIL

The new mainsail (year 2000) for NA 5 thru NA 8 and NA 13 thru NA 20 is made of 9 oz. cloth with a total sail area of 406 square feet. The first reef can reduce sail area to 302 square feet (75%) and the second reef to 205 square feet (50%). The mainsail is not an exact triangle. The mainsail is constructed of multiple panels so that it form an airfoil. The curve of the airfoil is the camber of the sail. When air flows across it, lift is created. Lift is the aerodynamic principal that makes it possible for the sail to propel the boat, even in a vector toward the wind. This is a key concept in sailing. The extra material along the trailing edge (leech) of the sail that extends beyond a straight line between the head and clew of the sail is called "roach" and serves to slightly increases the sail area. The mainsail has four battens to support the roach of the sail. The top two are "full length battens", (battens extend from luff to leech, support the roach, and give the draft definition. The luff end of the batten is supported by a batten car. The two lower battens support only the aft portion of the sail. The edges of the sail are seamed with extra layers of material to prevent chafe. This is called tabling. The aft ends of the batten pocket have a velcro closure to retain the batten. The sail is loose footed, and is attached to the boom only at the tack and clew.

The three corners of the sail (head, tack and clew) are heavily reinforced with extra fabric to withstand strain. Once the mainsail has been "bent on" it is normally left attached to the mast and flaked on the boom. It is secured with sail ties, and covered with an acrylic sail cover to prevent ultra violet light deterioration. The mainsail is fitted with a cunningham cringle to help control draft. Foot tension is controlled with an internal outhaul system.
See Figure 1-15, Sail Nomenclature.

1-6.2 JIBS/GENOAS

A Genoa is a headsail that overlaps the mast, (and the mainsail) providing greater power.
A jib is the forward most headsail. Its maximum size will fill the fore triangle (area forward of the mast) or can be any portion thereof.

The Navy 44 is provided with two (2) Dacron Genoa headsails. The #1 Genoa is the larger (819 sq. ft.), filling approximately 150% of the fore triangle, and is the lighter weight cloth (6.3 oz. per sq yd).

The #2 Genoa fills approximately 130% of the fore triangle and has been designed with a high clew to allow for better visibility of the forward leeward bow area. The Genoa sheets are led outboard of the shrouds to fair leads on the aft headsail tracks.

The #3 jib is approximately 100% of the fore triangle while the #4 is approximately 85%. For beating or close reaching, the jib sheets are lead outside of the forward lower shrouds and inboard of both the upper shrouds and the aft lower shrouds to the forward headsail tracks. For reaching, the jib sheets may be led outside the lifelines to a snatch block on the toe rail.

Figure 1-14 Sail Plan

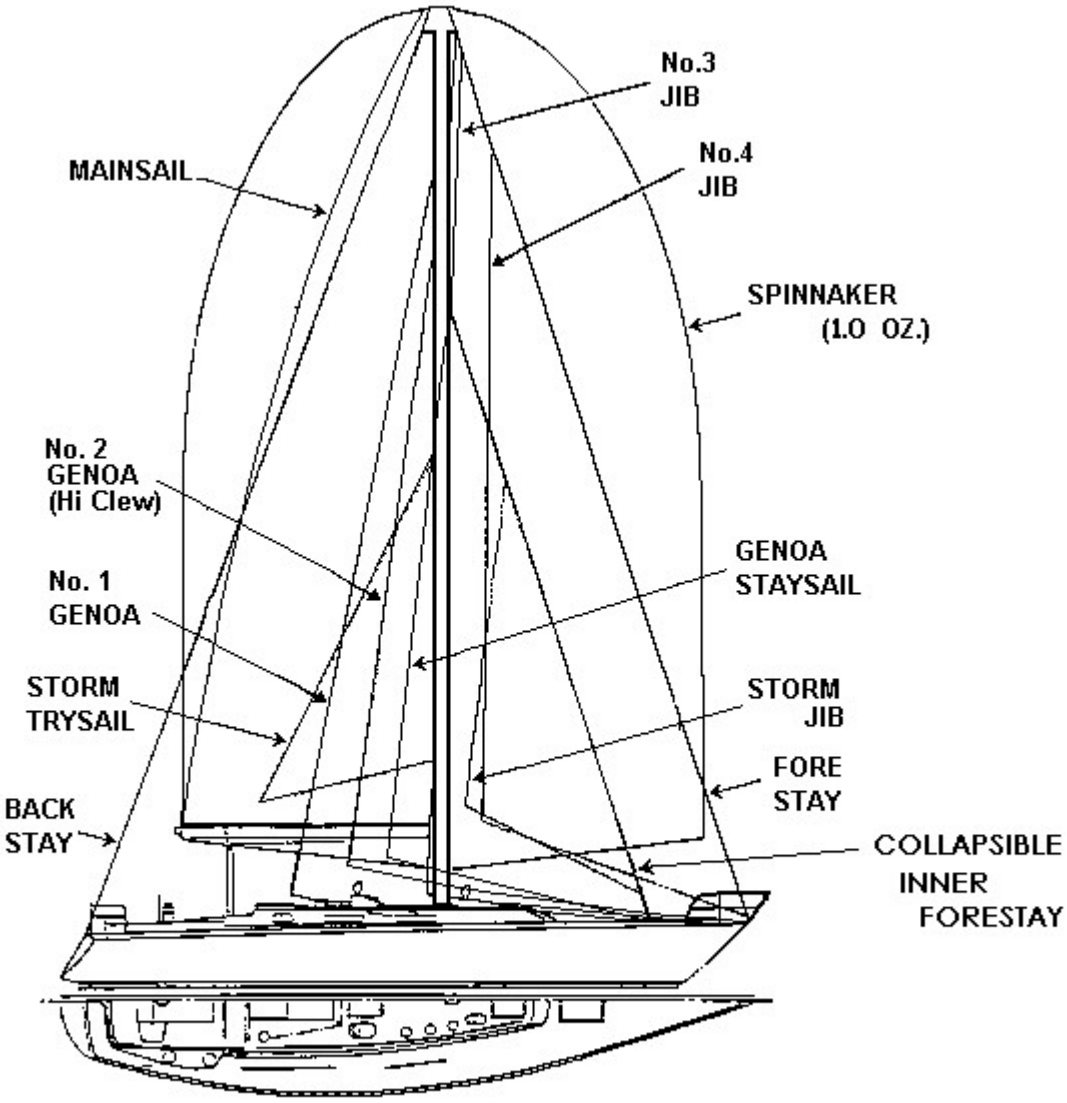
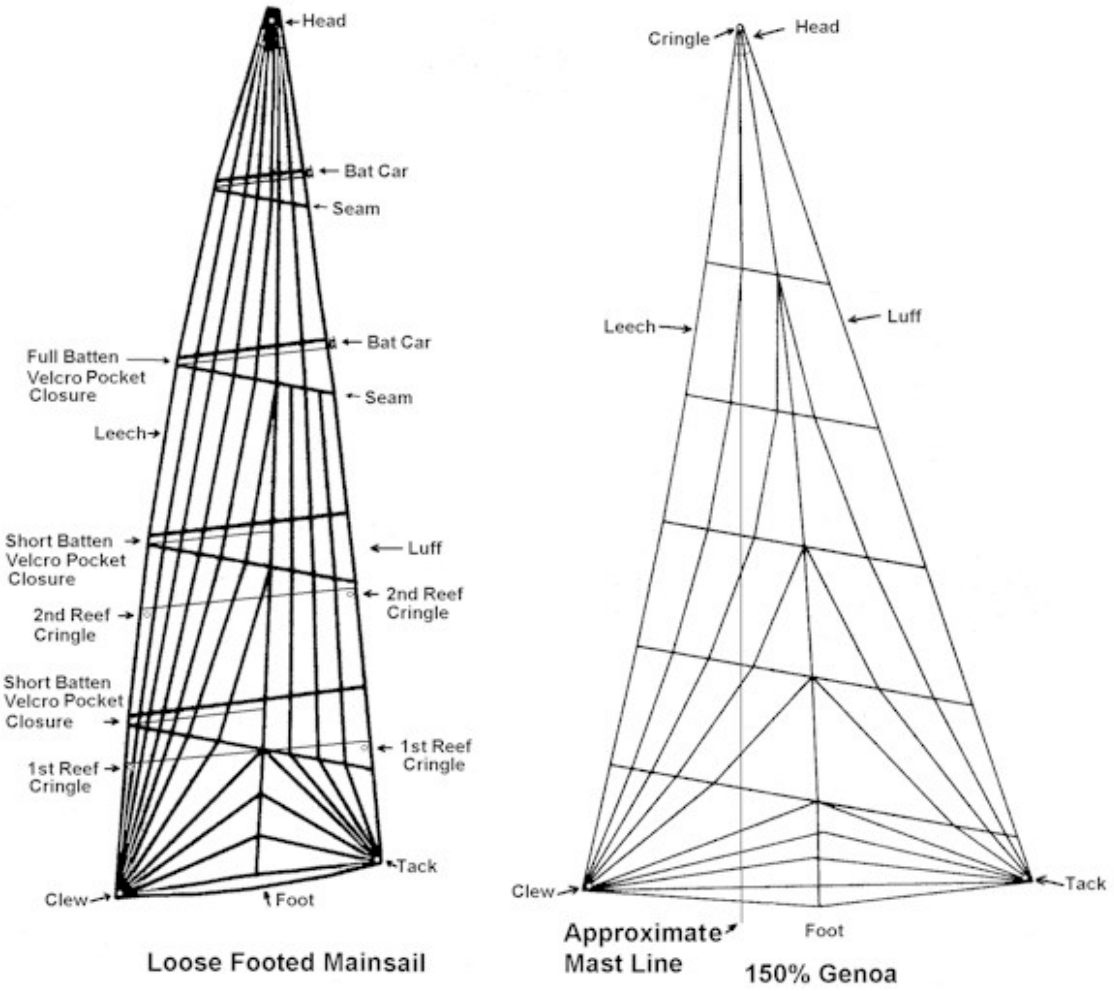


Figure 1-15 Sail Nomenclature



The tail of the jib sheet should be led to the foot block on the toe rail to control the unsupported length of this portion of the jib sheet and prevent winch override.

Jibs/Genoas are attached to the rod headstay either with #3 piston hanks, (NA1 thru NA8, NA13 thru NA20), or with luff tape sewn on the sail to a slotted headstay, (NA9 thru NA12). The fairlead cars for the piston hanked headsails are either pull-pin or screw-pin controlled to their respective tracks. Luff groove headsails sheets are led to a Harken system. A control line is used to move the car forward. The pull on the sheet caused by wind pressure in the sail moves the car aft. Sail shape can be changed by adjusting sheet lead position, halyard tension, and backstay tension. See Figure 1-15.

See Chapter 3, Table 3-1 Sail Management, for sail selection for a given wind condition, and recommended starting sheet lead positions.

1-6.3 SPINNAKER

The spinnaker is used for sailing "off the wind" e.g. with the wind on or abaft the beam. Spinnakers are made of nylon cloth of a weight to match the wind condition. The standard spinnaker for the Navy 44 is 1.0 oz cloth. The 1.0 oz spinnaker included in the Navy 44 sail plan is used for winds up to 15 knots apparent wind.

1-6.4 STORM SAILS

Two storm sails are provided on the Navy 44, a storm jib and a storm trysail. These are small sails, made of heavy Dacron, and are reinforced to withstand high winds. The storm jib is hanked to the collapsible inner forestay. The sheets lead outside the lifelines to a snatch block on the toe rail, one (1) hole aft of the midship lifeline stanchion. The running backstays must be used with the storm jib.

The storm trysail is used in lieu of the mainsail and is hoisted on its own track on the port, aft sector of the mast. The tack of the sail has a Dacron line spliced through the cringle. This pennant allows the sail to be hoisted above the boom and secured with the tack above the gooseneck. The permanently attached sheets lead to the Spreacher blocks. Both sheets are set at the same time to make the storm trysail self-tending. See Chapter 6, heavy weather sailing for a more complete discussion on storm sails.

1- 7 SYSTEMS

Systems on the Navy 44 listed herein are:

Steering.	Bilge
Propulsion.	Alarms.
Electrical.	Galley
Electronic.	MSD (sanitation)
Sea Water.	

1-7.1 THE STEERING SYSTEM

The Navy 44 has a 48-inch Edson 644S stainless steel wheel mounted on an Edson Pedestal Steering Gear Model 400S, Size 6-211. Internally, the pedestal mounted gears drive a bronze, 5/8-inch pitch, sprocket and stainless steel roller chain attached to 1/4-inch stainless steel wire rope through 6" idler sheave that activate an Edson Model 777, 12-inch Radial Drive fitted to the rudder stock. The wire tension is adjustable and is led to the quadrant through 6-inch idler sheaves. Affixed to the rudder stock is a stop arm that limits the maximum rudder angle.

The rudder stock is 2-1/2 inch diameter Aquamet 22 shafting that extends up from the rudder through the hull to the main deck aft. The rudder stuffing box is an Edson Fig. 697B with a delrin bearing inserted and bored out. The base of the rudder stock rides on a bearing bolted to the bottom of the fiberglass skeg. A bronze skeg tip is bolted to the bottom of the fiberglass skeg to provide streamlined water flow around the rudder. The top of the rudder stock rides in a delrin carried bearing, and extending through the afterdeck. The rudder stock is squared off to provide an attachment for the aluminum emergency tiller. A fiberglass cap protects the rudder stock during normal operations.

This cap must be removed to attach the

emergency tiller. The emergency tiller is stowed in the port lazarette. See Figure 1-16, Steering System, Figure 1-17, Steering Side View.

1-7.2 THE PROPULSION SYSTEM.

The primary means of propulsion is sail power. Auxiliary power is provided by a diesel engine and associated systems. This section describes the engine and related sub-components:

- Auxiliary Diesel Engine
- Fuel System
- Cooling System
- Exhaust System
- Engine Controls
- Propulsion Shafting
- Fire Detection System

1-7.2.1 AUXILIARY DIESEL ENGINE

Auxiliary propulsion on the Navy 44 is a diesel engine located below the companionway to the cabin. The engine is a Westerbeke Model W-40-NA. It produces rated power of 37 H.P. at 3,000 rpm. The 4-cylinder diesel engine has a total displacement of 107.4 cubic inches with a cylinder bore diameter of 3.25 inches and piston stroke of 3.5 inches.

The engine drives a Hurth Model HBW 150-2R, 1. 88:1 Marine Gear mounted directly on the flywheel housing. The marine gear is activated by a hydraulic clutch that allows propeller rotation in a forward, neutral or reverse mode. The diesel engine also drives two 51 ampere, 12-volt dc alternators. The original refrigeration system has a York compressor with a multiple belt pulley on the forward end of the crankshaft. This system is being replaced with a 12-volt dc charging system on NA 2, NA 8, and NA 15 thru NA 20.
Figure 1-18, Engine (Side Views), and
Figure 1-19, Engine (Front and Top Views).

1-7.2.2 FUEL SYSTEM

The fuel system is a closed loop return system, intended for #2 diesel fuel supplied from a 50-gallon aluminum tank, located amidships under the cabin sole. Because of the asymmetric design, fuel remaining is not a linear function of measurement up from the bottom of the tank. There are approximately 45 gals of useable fuel. For dipstick equivalents and to interpret readings on the gauge, see Figure 1-20, Fuel Gauge Readings.

The tank has two 6-inch diameter inspection plates for cleaning. One plate is fitted with a Rochester Gauge Inc., Type 8600 spiral action float level indicator. The tank fill line is 1-1/2 inch I.D. Shields hose connected to a Perko 520, 1-1/2 inch, chrome plated bronze fill plate marked "DIESEL" on deck amidships to port. Venting is via a 3/8-inch soft copper tubing that rises to the level of the lower lifeline inside of the lifeline stanchion to the left of the companionway. Packless Anderson bronze shut-off valves are fitted at tank connections for supply and return lines. Fuel supply and return lines are Aeroquip flexible hoses, equipped with shut-off valves located under the midships cabin floorboard deckplate. Closing the valve will cut off fuel to the engine. A primary Racor filter, 460RP30 mounted outside of the aft engine compartment bulkhead port side, has an electrical water detector alarm mounted on the electrical switchboard panel which will sound a buzzer upon electrical power-up, (approximately 5 seconds), and when water is detected in the fuel. The 10-micron filter should trap sediment in the element cartridge upstream of the sediment bowl. If sediment is ever observed in the bowl, the filter element should be changed. The sediment bowl incorporates a contaminant drain petcock. The Racor filter then passes fuel to the lift pump then to the engine mounted

Figure 1-16 Steering System

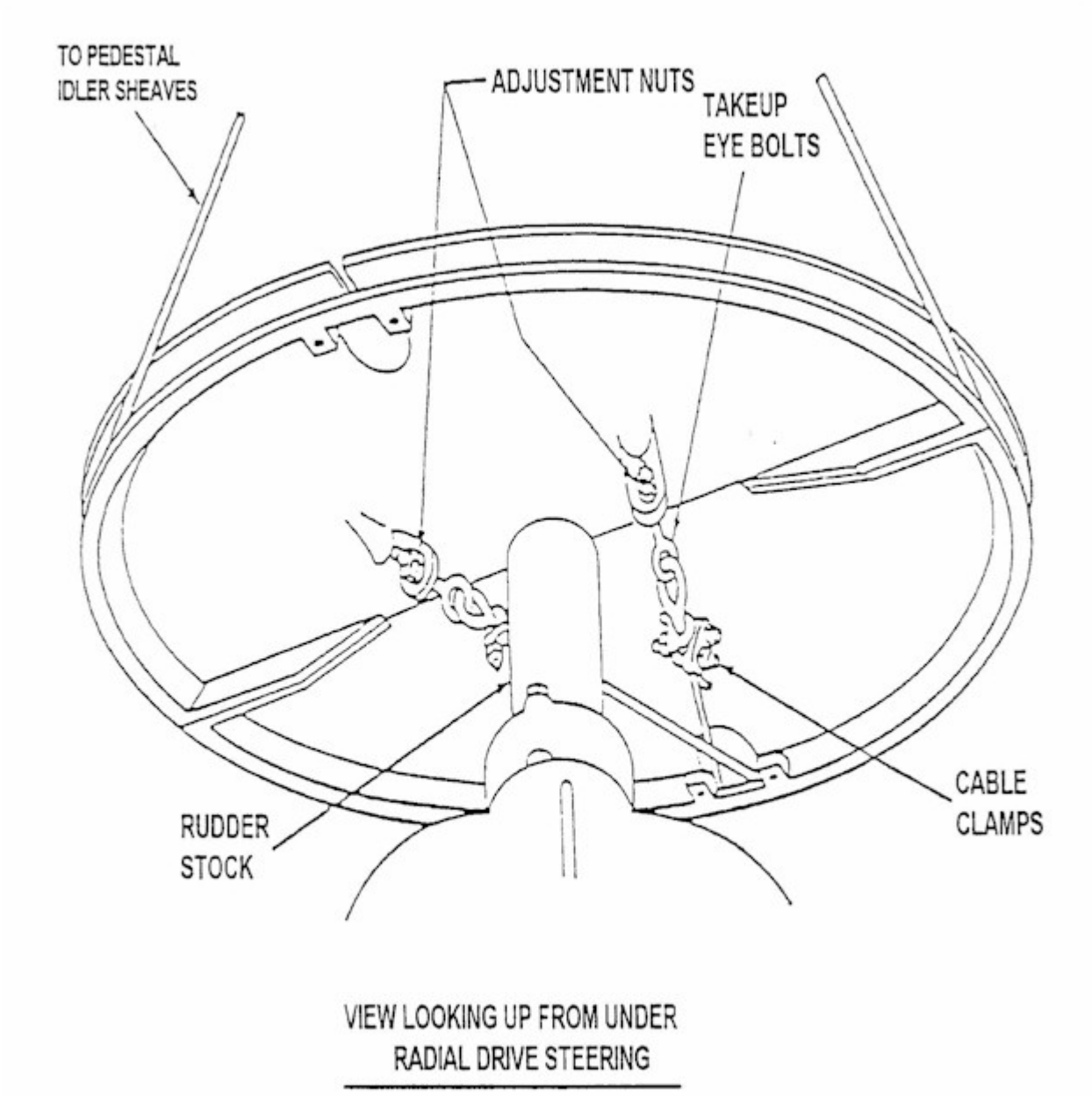


Figure 1-17 Steering Side View

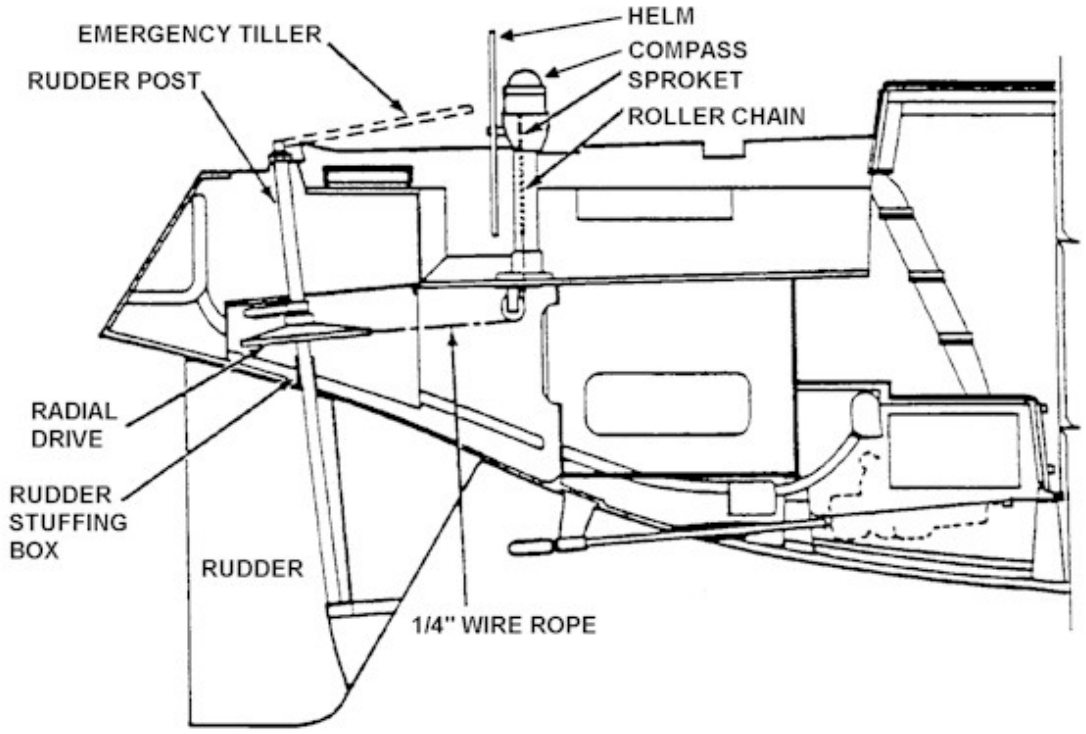
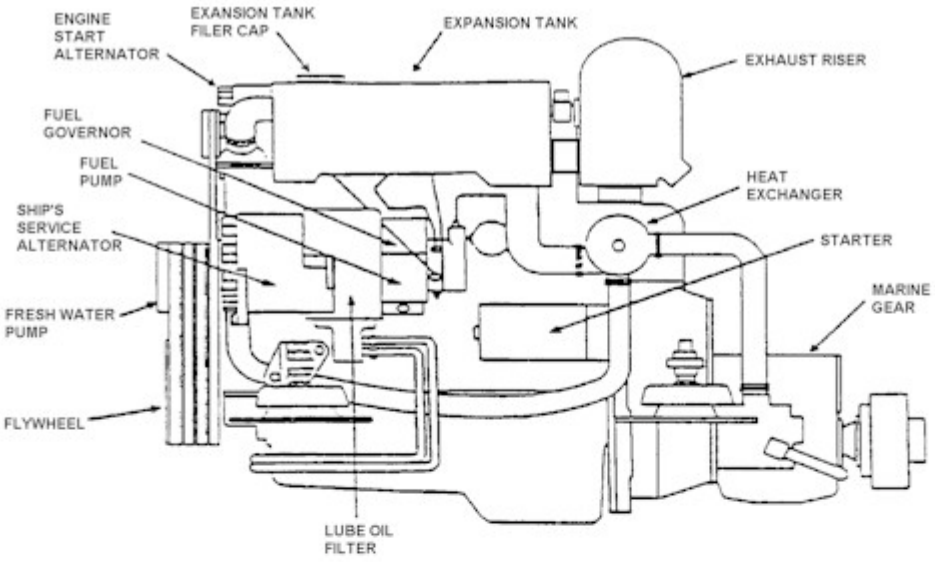
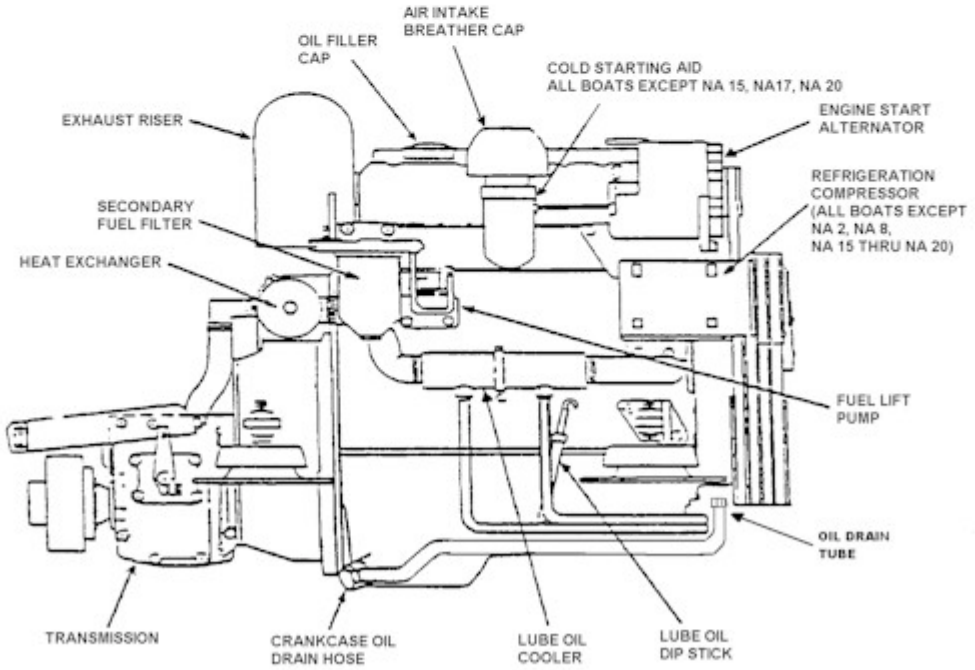


Figure 1-18 Engine Side View



PORT VIEW



STARBOARD VIEW

Figure 1-19 Engine Front and Top View

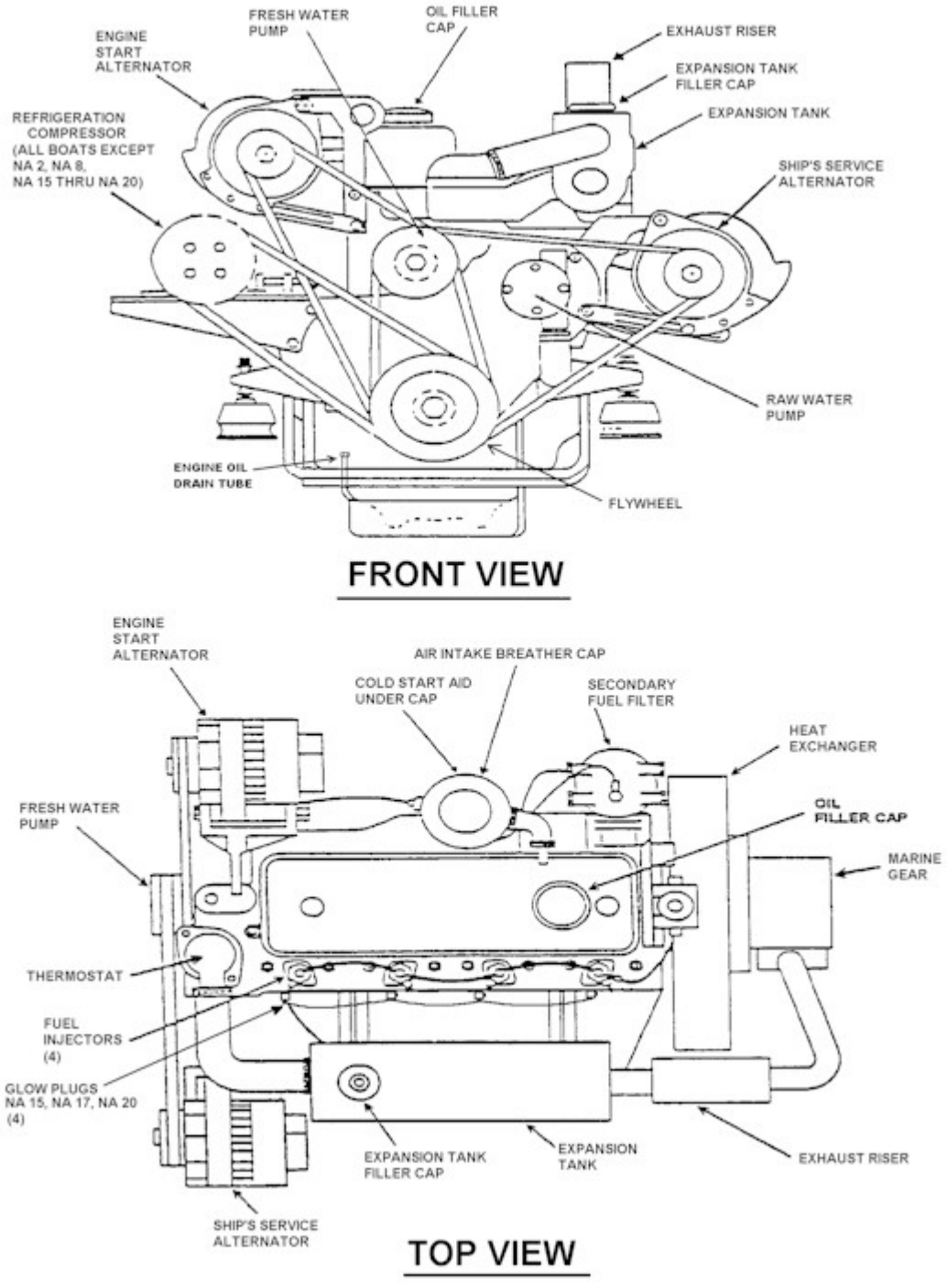
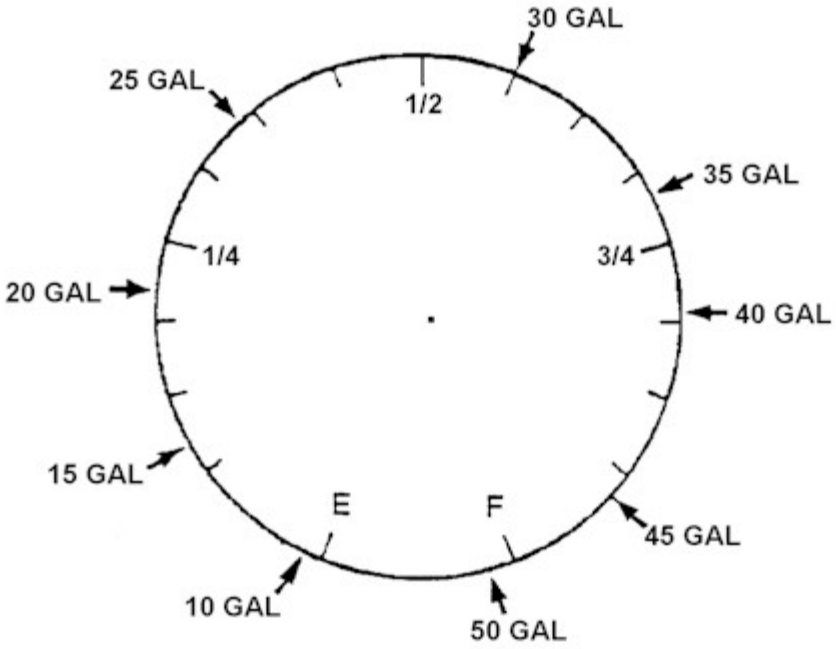


Figure 1-20 Fuel Gauge

FUEL QUANTITY GAUGE



DIP STICK READINGS

GALLONS	INCHES UP FROM BOTTOM
45	13 1/2
40	12 1/4
35	1O 3/4
30	9 3/4
25	8 1/2
20	7
15	5 3/4
10	4 1/4
5	3

secondary filter. After the secondary filter, low-pressure fuel flows to the injector pump which puts the fuel under extremely high pressure. More fuel than the engine can use is provided to the injectors. Surplus fuel is returned to the tank. See Figure 1-21, Racor Filter.

1-7.2.3 COOLING SYSTEM

Raw water enters the boat through a seacock located at the aft portion of the engine compartment into a glass enclosed Perko strainer. The strainer has a removable top with butterfly nuts to access the strainer for cleaning. The raw water is then routed to the water pump mounted on the front of the engine. Cooling water under pressure is then routed to the heat exchanger. A captive anti freeze system cools the auxiliary diesel engine. Raw seawater is used to cool the anti freeze through a heat exchanger. In the older system water is picked off to the refrigeration system condenser. Raw water is then routed to the oil cooler. A sacrificial anode in the oil cooler prevents salt water corrosion. Raw water is then routed out of the boat through the exhaust system. See Figure 1-22, Raw Water Strainer, and Figure 1-23, Cooling System.

1-7.2.4 EXHAUST SYSTEM

The exhaust system for the diesel engine consists of a water jacket cooled exhaust riser, with raw sea water anti-siphon, and a muffler with a drain plug is located under the after deck-plate A 1-7/8 inch I.D. nautical rubber exhaust hose leads to a Hydro Hush exhaust silencer. A 2 inch I.D. Nautical Rubber No. 252 hose with a loop above the waterline leads aft to an above water transom discharge. See Figure 1-24, Exhaust System.

1-7.2.5 ENGINE CONTROL/INSTRUMENT PANEL

Engine controls and instrumentation are located at the after end of the cockpit to starboard of the helmsman's seat. A plexiglass door protects this panel. The Instrument panel is equipped with lights for night operations. Lighting is activated through a switch on the Electrical Switchboard. The Panel includes:

Preheat Button
Start Button
Tachometer/ Engine Hour Meter
Water Temperature
Oil Pressure Gauge
Voltmeter
Ammeter (reads Start Battery Charging)

See Figure 1-25, Engine Instrument Panel.

1-7.2.5.1 PRE-HEAT and START BUTTONS. These two buttons are wired in series. The pre-heat button must be depressed to activate the start button. The preheat button, lower left on the panel is pushed in to activate a glow plug in the engine for cold engine starting. There are two locations for the glow plug. In the intake manifold just below the oil breather cap for all boats except NA-15, NA-17 and NA-20. These boats have a glow plug for each cylinder located on the port side of the engine head just below the injectors. See Figure 1-26, Glow Plug. The second button is the start button. After pre-heating the engine, pushing both buttons simultaneously will crank the engine.

There is an emergency power panel on the outside of the starboard corner of the engine compartment. One item is the Emergency battery power button which when depressed will parallel all the batteries so that a start can be attempted with low engine battery power. The other is the Emergency Start button. There is an Alternator Failure switch that makes it possible to provide Ships Service to each bank from the good alternator in the event of an alternator failure.

1-7.2.5.2 TACHOMETER

The tachometer is located in the upper left hand corner of the panel. It measures engine revolutions per minute (RPM) on an analog display. The signal is generated by the engine start alternator and is functional only when the

Figure 1-21 Racor Filter

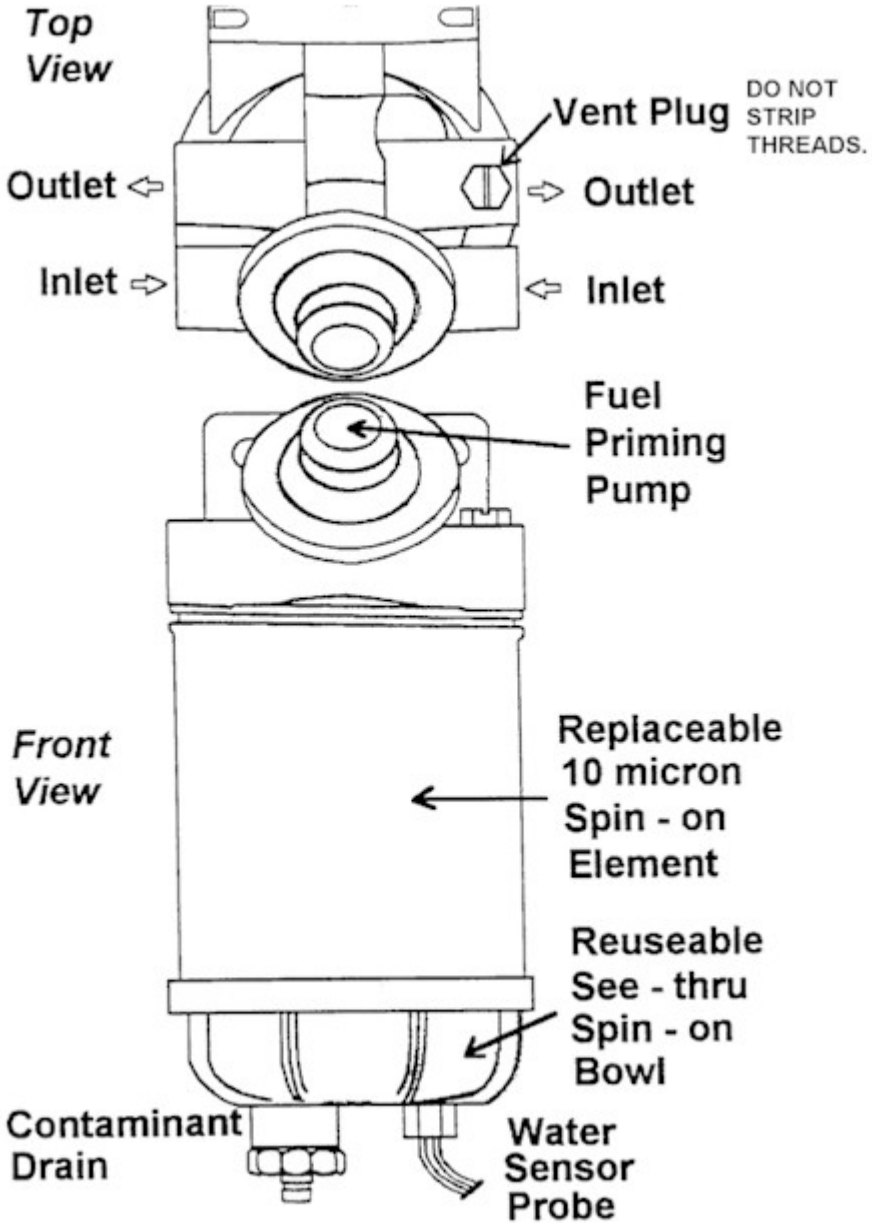


Figure 1-22 Raw Water Strainer

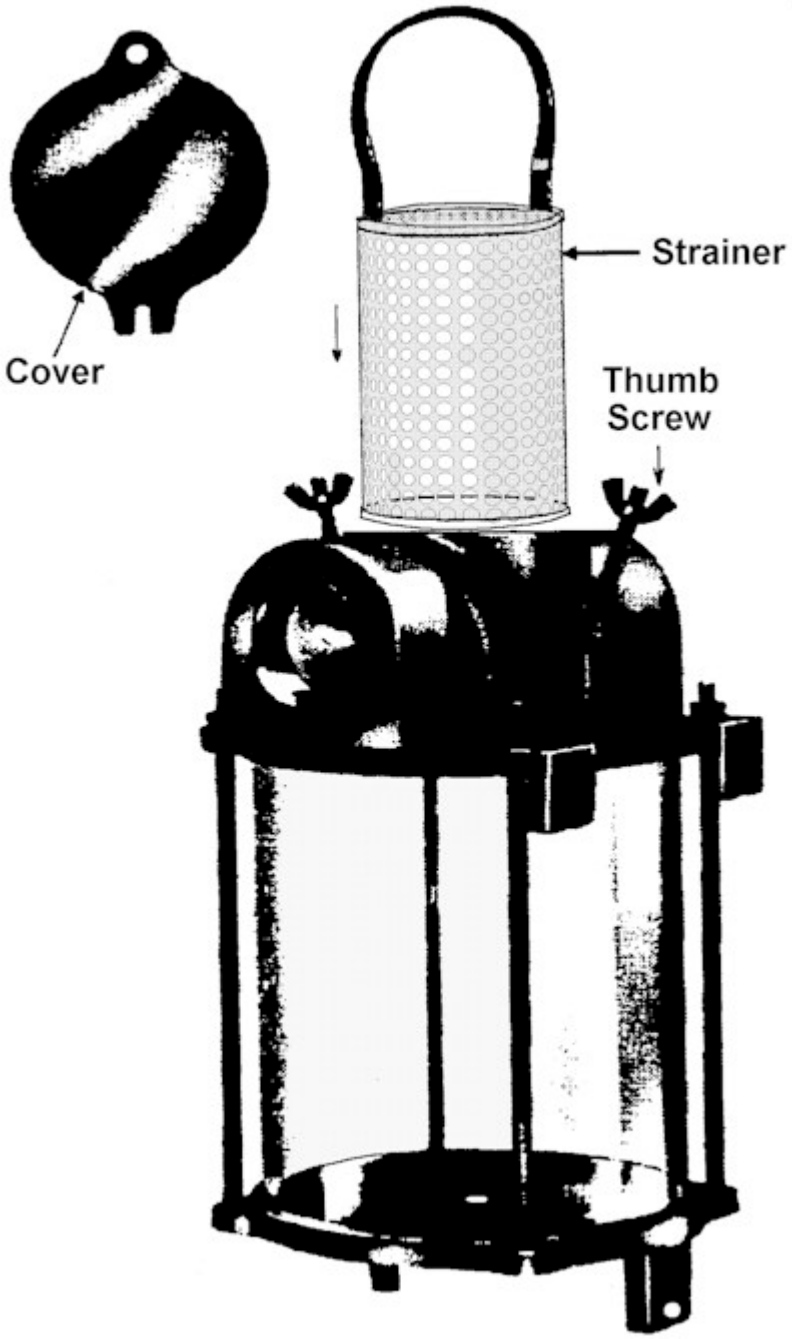


Figure 1-23 Cooling System

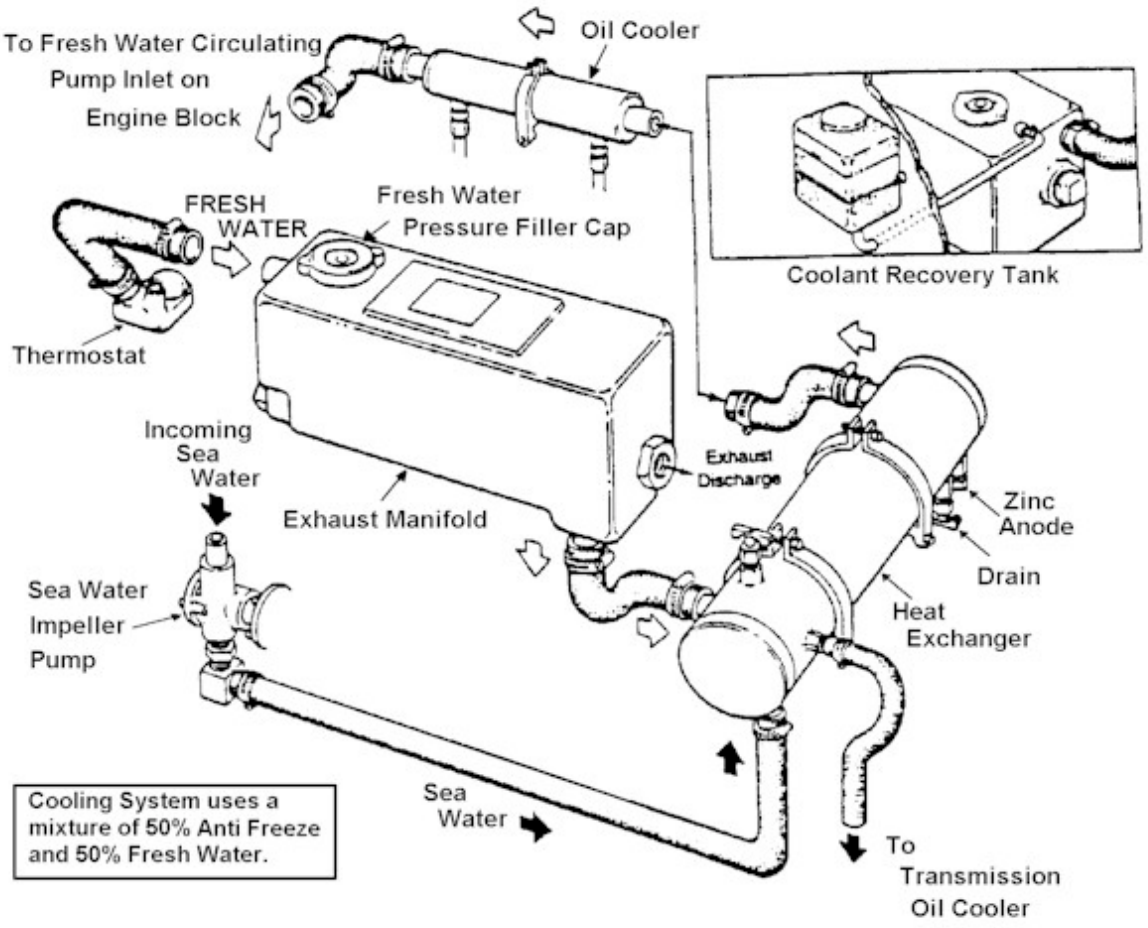


Figure 1-24 Exhaust System

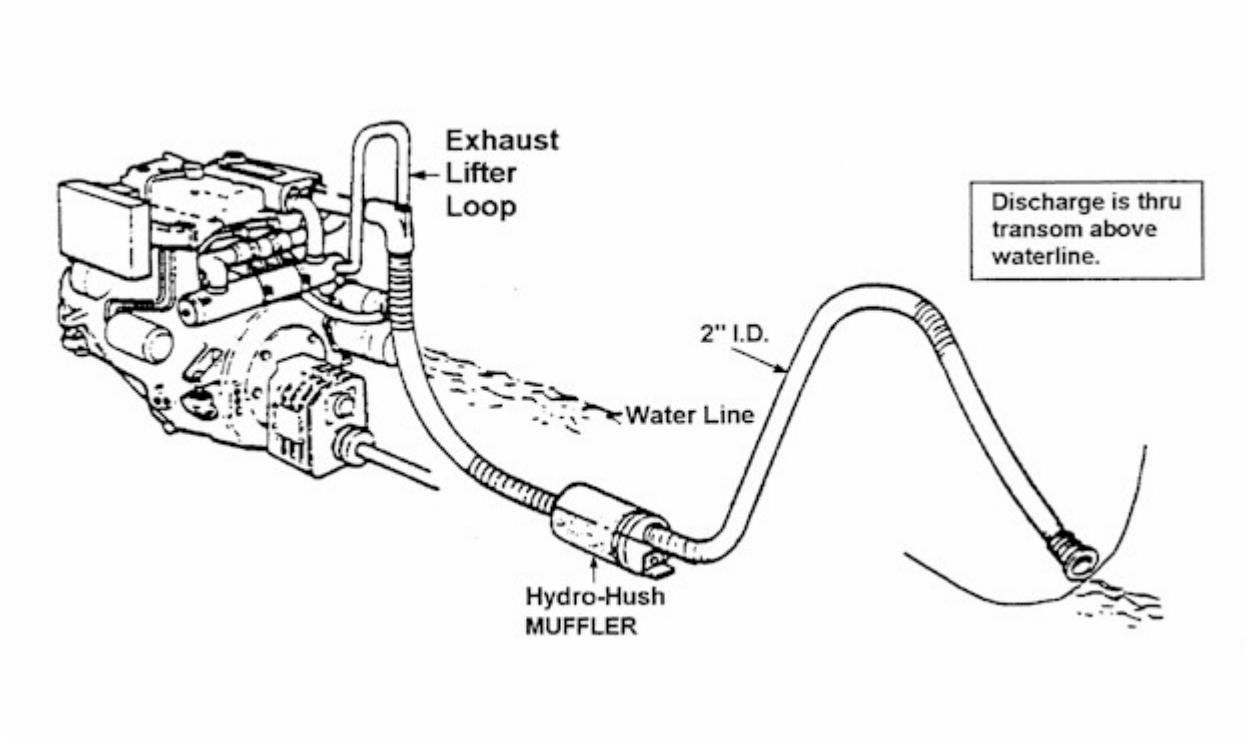


Figure 1-25 Engine Instruments

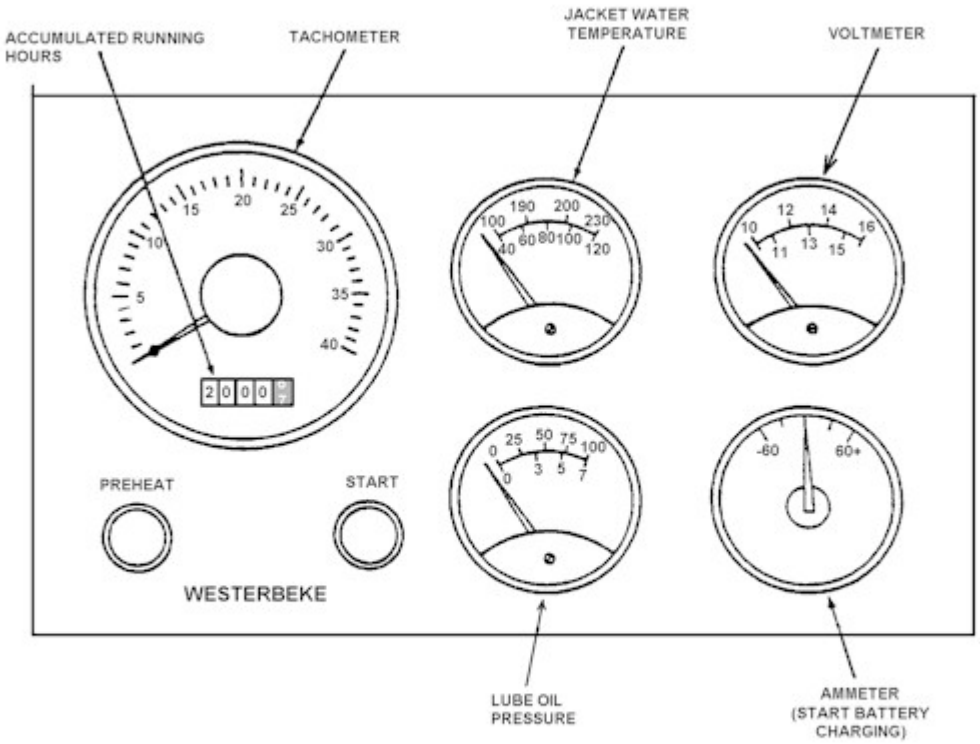
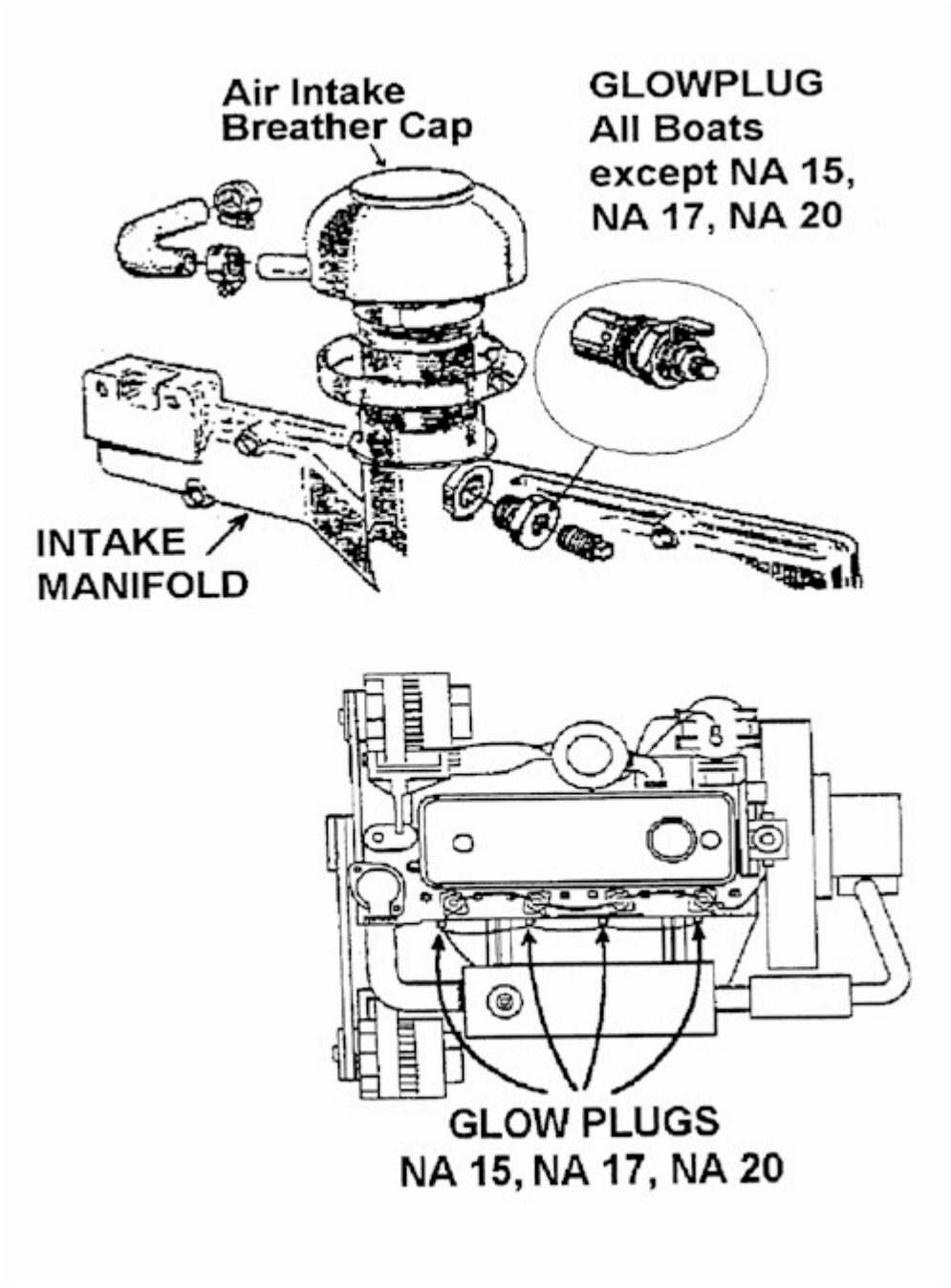


Figure 1-26 Glow Plug



engine oil pressure sensing switch detects oil pressure equivalent to that of a running engine. This normally occurs at about 1500 RPM. A digital window in the tachometer displays Engine Hours in hours and tenths.

1-7.2.5.3 WATER TEMPERATURE

The water temperature gauge upper row, center, measures from 100 to 250 degrees Fahrenheit (40 to 120 degrees centigrade). A thermostat regulates engine temperature at 180 degrees Fahrenheit.

1-7.2.5.4 OIL PRESSURE

The oil pressure gauge located in the lower row, center, registers from 0 to 100 psi. A cold engine can register as high as 75 psi while a warm engine can be as low as 15 psi without damage. Normal oil pressure should be between 30 and 60 psi.

1-7.2.5.5 VOLTMETER

The voltmeter upper row right gauge, registers from 10 to 16 volts. An indication of 13.5 volts or higher is normal when the engine is running, because the Engine Alternator is charging the engine start battery

1-7.2.5.6 AMMETER

The ammeter, bottom right, measures rate of charging with the engine running. 30 amps is normal for a severely discharged battery. Amps will decrease to reach zero when the battery is fully charged.

1-7.2.6 ENGINE CONTROLS.

Propulsion from the auxiliary diesel engine is controlled by a single-lever Morse MV control, mounted aft on the starboard side of the cockpit. The transmission is engaged by pushing IN on the clutch button adjacent to the throttle.

Engine throttle lever.

NA-1, 2, 3, 4 and 6 are equipped with the old style throttle lever, (without idle detent latch release). To move the engine out of the idle range, just move the throttle forward or backward to increase engine RPM.

ALL OTHER NA 44's.

To move the throttle out of the idle position, the throttle must be unlocked by pulling up on the idle detent latch release at the base of the throttle knob. The throttle lever can then be rotated forward to advance engine speed and increases thrust in a forward direction. Rearward movement of the throttle will increase engine speed and propulsion to the rear. Engaging the transmission at too high an RPM causes damage to the internal gears and will lead to transmission failure. See Figure 1-27, Throttle Control.

1-7.2.6.1 ENGINE SHUTDOWN T- HANDLE.

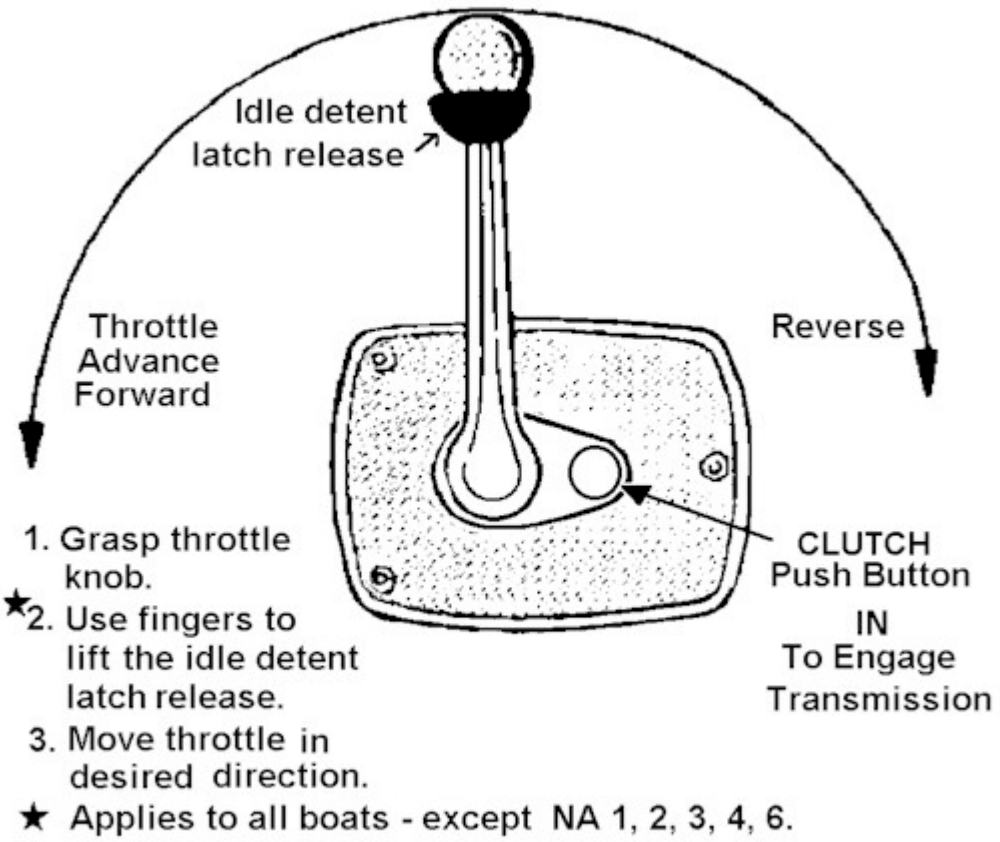
The ENGINE SHUTDOWN T-handle is located on the forward lower side of the helmsman's seat to starboard. Pulling UP on the T-handle shuts off fuel to the engine. The T-handle must be returned to it's normal position, (pushed DOWN), for subsequent starts. If the engine does not start, check this first.

1-7.2.7 PROPULSION SHAFTING AND PROPELLER

The propulsion shafting is 1-1/4 inch O.D. Aquamet 22 and is attached to the marine gear with a Federal Model 43A flexible coupling. The stern tube is a 2-1/4 inch O.D. by 1-1/2 inch I.D. fiberglass tube molded onto the hull.

The inboard end of the stern tube is fitted with a Spartan No. B164 Rubber Neck stuffing box. A cast manganese bronze strut, housing a 1-3/4- inch O.D. by 5-inch Cutlass bearing, supports the outboard end of the shafting. The shaft is fitted with a streamlined zinc anode collar forward of the shaft strut. The Navy 44 is equipped with a Max Prop, 19-inch diameter by 18degree pitch, right hand, feathering propeller. This drives the Navy 44 at approximately 6 knots in calm seas.

Figure 1-27 Throttle



The entire propulsion train alignment, from the engine mounts to the propeller, is skewed about 3 degrees to starboard (from center line) to allow the shaft to be drawn out without interference from the rudder skeg.
See Figure 1-28, Stern Tube Details. See Chapter 3 for instructions for feathering and aligning the propeller.

1-7.2.8 FIRE DETECTION AND EXTINGUISHING SYSTEM

The auxiliary diesel engine compartment is fitted with a Fireboy Model 15 C.G. automatic fire extinguishing system. An indicator light is located on the main electrical distribution panel. Excessive heat in the engine compartment will automatically activate the Fireboy system.

The Navy 44 is also equipped with one (1) 5-pound CO2 and three (3) 2-1/2 pound dry chemical portable fire extinguishers. The 5-pound CO2 fire extinguisher is located by the wet locker between the head and the navigation station seat. The 2 ½ pound dry chemical fire extinguishers are bracket mounted inside the port hanging locker forward, above the galley sink, and inside the port cockpit locker.

1-7.3 THE ELECTRICAL SYSTEM

The electrical system generates, stores, and distributes 12 volts D.C. power through the battery selector switches. The system consists of two engine-driven alternators, three battery banks, a power distribution switchboard, shore power connection and junction boxes. Electrical distribution is a two-wire, negative ground, unswitched return system.

A 120 VAC, 30 amps, 60 Hz shore power connection provides power to the 120 VAC converter/battery charger located in the head compartment under the sink. This provides power to the battery banks for charging while dockside. For boats with the original refrigerator system, power is also directed to the AC motor driven refrigeration compressor located in the starboard side of the steerage compartment.
See Figure 1-29, Electrical System.

1-7.3.1 ALTERNATORS

Two 12 volt d.c. 51 amp alternators are mounted on, and driven by, the auxiliary diesel engine. The alternator field circuits are energized by lubricating oil pressure switches located on the engine. Alternators are controlled by circuit breakers mounted on the switchboard panel. The alternators supply charging current to the battery banks and are capable of operating individually or in parallel.

In the event of an alternator failure a switching circuit will make electrical output from the remaining good alternator available to the other bank providing that the battery selector switches are energized. The emergency alternator switch is located on the stbd, outside face of the engine box.

1-7.3.2 BATTERY BANKS

D.C. electric power is supplied from five batteries configured in three banks. Two banks are "house banks" labeled Ship Service (SS). Bank #1, (2 batteries in parallel), and Bank #2, (2 batteries in parallel). These two banks located beneath the navigation station seat are equipped with 12 volt D.C. 136 ampere hour Rolls, lead-acid type deep cycle marine batteries.

The third bank, located in the supply bin aft and to port of the engine compartment, is isolated for engine start. This battery is an M 27 high cranking amperage battery.

Both battery boxes are designed to keep the batteries from shifting in a 360-degree roll.

1-7.3.3 BATTERY BANK SELECTOR SWITCHES

Two rotary master disconnect and transfer switches are located on the front face of the navigation station seat. The lower switch is the engine start switch. It has two positions, OFF with the switch pointing down, and ON with

Figure 1-28 Stern Tube

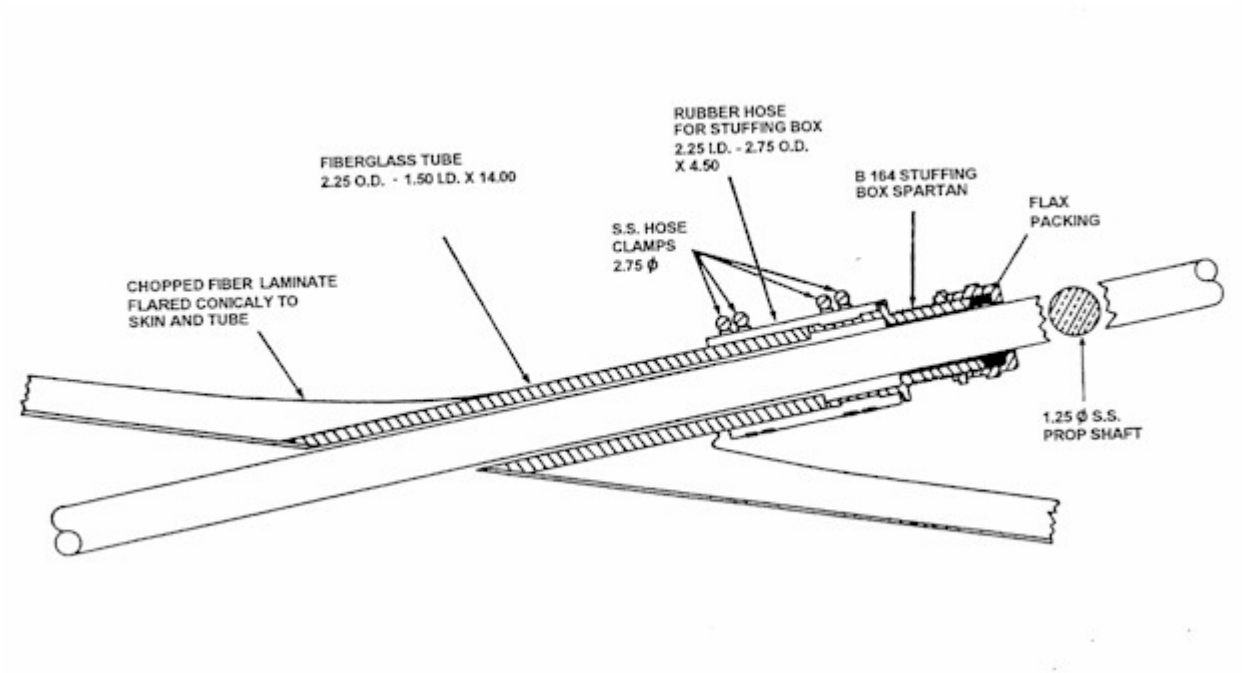
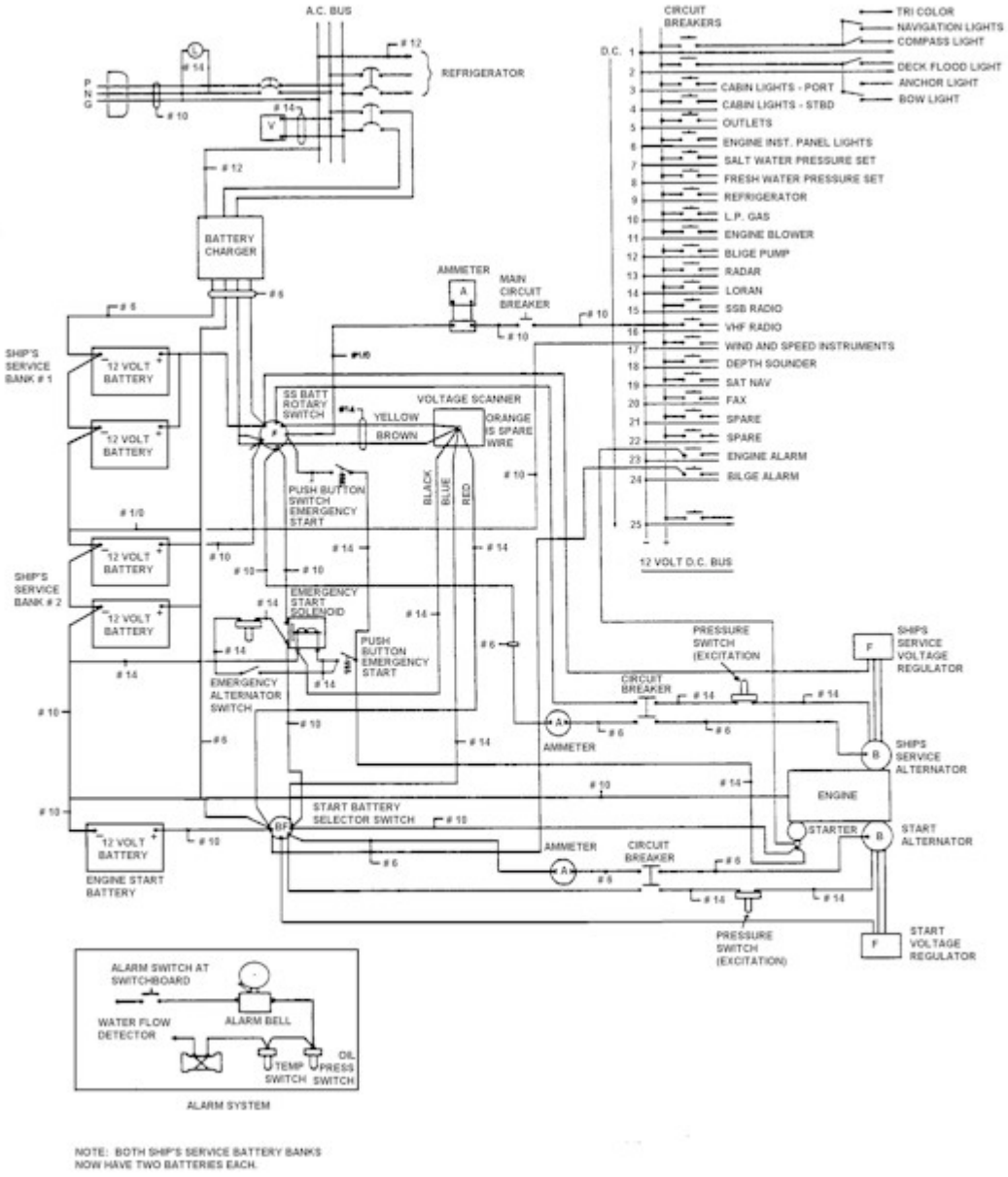


Figure 1-29 Electrical System



the switch pointing up. The upper switch is the Ships Service Selector Switch. This is a four-position switch. OFF is the down position. The position marked 1 selects SS Bank #1. BOTH, (switch pointing UP), selects both Ships Service banks. Position 2 selects SS Bank #2. See Figure 1-30, Ship's Batteries, and Figure 1-31, Rotary Switch Schematic.

1-7.3.4 ELECTRICAL SWITCHBOARD

Internal electrical power distribution is controlled by the switchboard, which is located on the port bulkhead of the navigation station. The switchboard wiring compartment is divided into two sections separated by an insulating barrier. The top section is for D.C. power distribution. The bottom section is for A.C. shore power distribution. The switchboard is hinged to allow access to the back of the panel. A 1/4-inch clear plexiglass door covers the front. The switchboard has Heineman circuit breakers and Cole Hersee toggle switches. Every circuit on the Navy 44 is protected by these breakers and can be isolated for trouble-shooting or secured in case electrical fire.

A Racor /Fuel Filter Gauge, with an integral alarm, mounted on the switchboard, monitors water content in the fuel.
See Figure 1-32, Electrical Switchboard Panel.

1-7.3.5 SHORE POWER

A Hubbel 60 CM61 male inlet connection for 120 VAC, 60 Hz shore electric power is located on the inside of the port cockpit combing. Shore power is distributed to a Guest 2540, three-circuit, 40-ampere battery charger/converter, to the Gruner refrigeration system, and to outlet plugs. The shore power on-off switch is located on the A.C. section of the switchboard panel. See Figure 1-32.

1-7.3.6 BONDING AND GROUNDING

The Navy 44 is constructed with bonding and grounding conductors incorporated integrally under the hull's inner skin to provide a path for current flow from all metallic components and fittings to ground (sea water) via the propeller shafting strut and keel bolts. Radio frequency (RF) grounding is provided by a 24 foot long by 4 foot wide copper screen installed aft and bonded to the hull's inner skin. It is essential that the grounding system is always maintained intact to prevent electrical shock hazards, minimize corrosion due to electrolysis, and avoid electromagnetic interference. See Figure 1-33, Bonding and Grounding.

1-7.3.7 LIGHTING

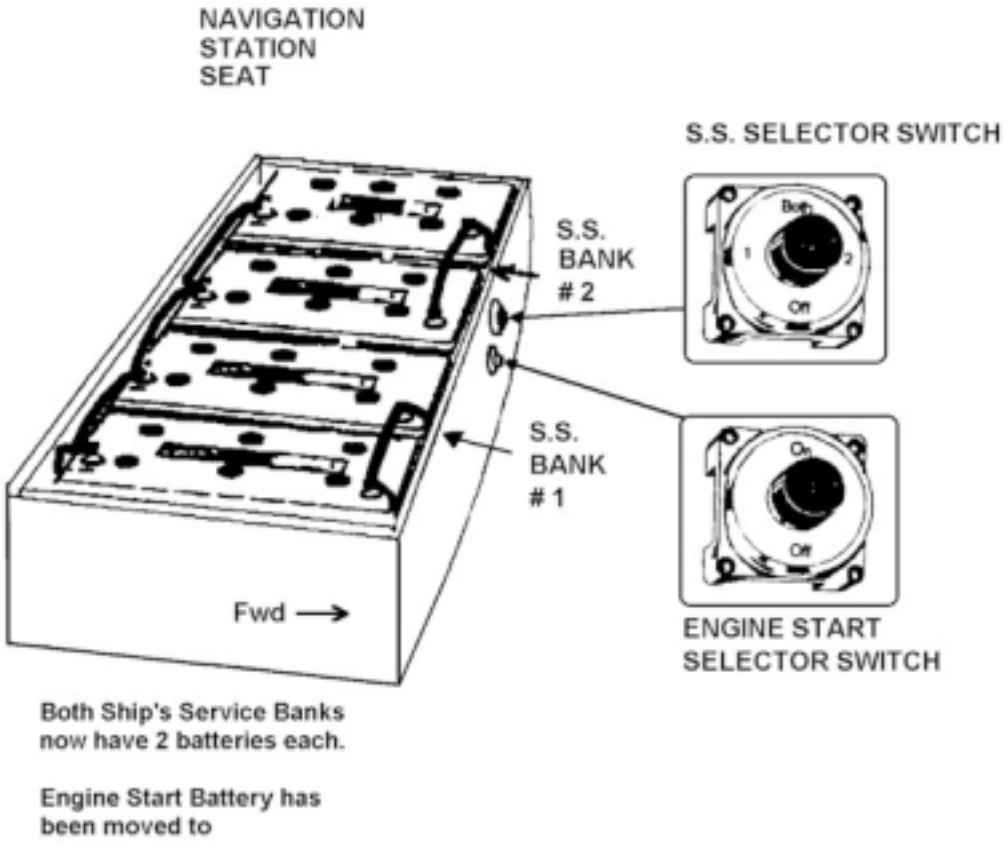
The Navy 44 is outfitted with a 12 volt D.C. lighting system throughout the boat for navigation, deck floodlight, and cabin lights. The cabin overhead of the Navy 44 is fitted with five (5) Night Vision red and white fluorescent fixtures and six (6) Night Vision red and white incandescent dome lights. Each light can be individually controlled with its own switch. The cabin light system is energized with switches for Cabin Lights Port, and Cabin Lights Stbd in the switchboard panel. See Figure 1-32.

1-7.3.8 NAVIGATION LIGHTS

There are two sets of navigation lights:

- Aqua Signal Model AQS 3503302 combination red/green light on the bow pulpit is part of the "Nav Lo" set.
- Aqua Signal Model AQS 3502002 stern light on the stern pulpit, "Nav Lo" set.
- Aqua Signal Model AQS 3514912 combination Tricolor light and anchor light on top of the mast. The Tricolor, with red, green, white sectors, is designated "Nav Hi" on the switchboard panel. The "Nav Lights" circuit breaker must be selected to operate either set. The all around white anchor light, is located immediately beneath the Tricolor and is activated by a switch on the switchboard panel marked "anchor".

Figure 1-30. Ship's Batteries



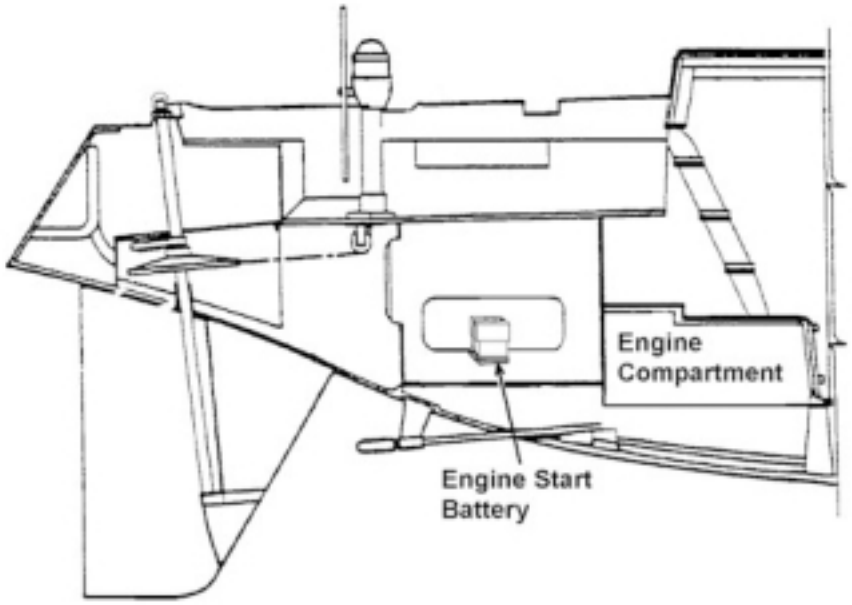


Figure 1-31. Rotary Switch Schematic

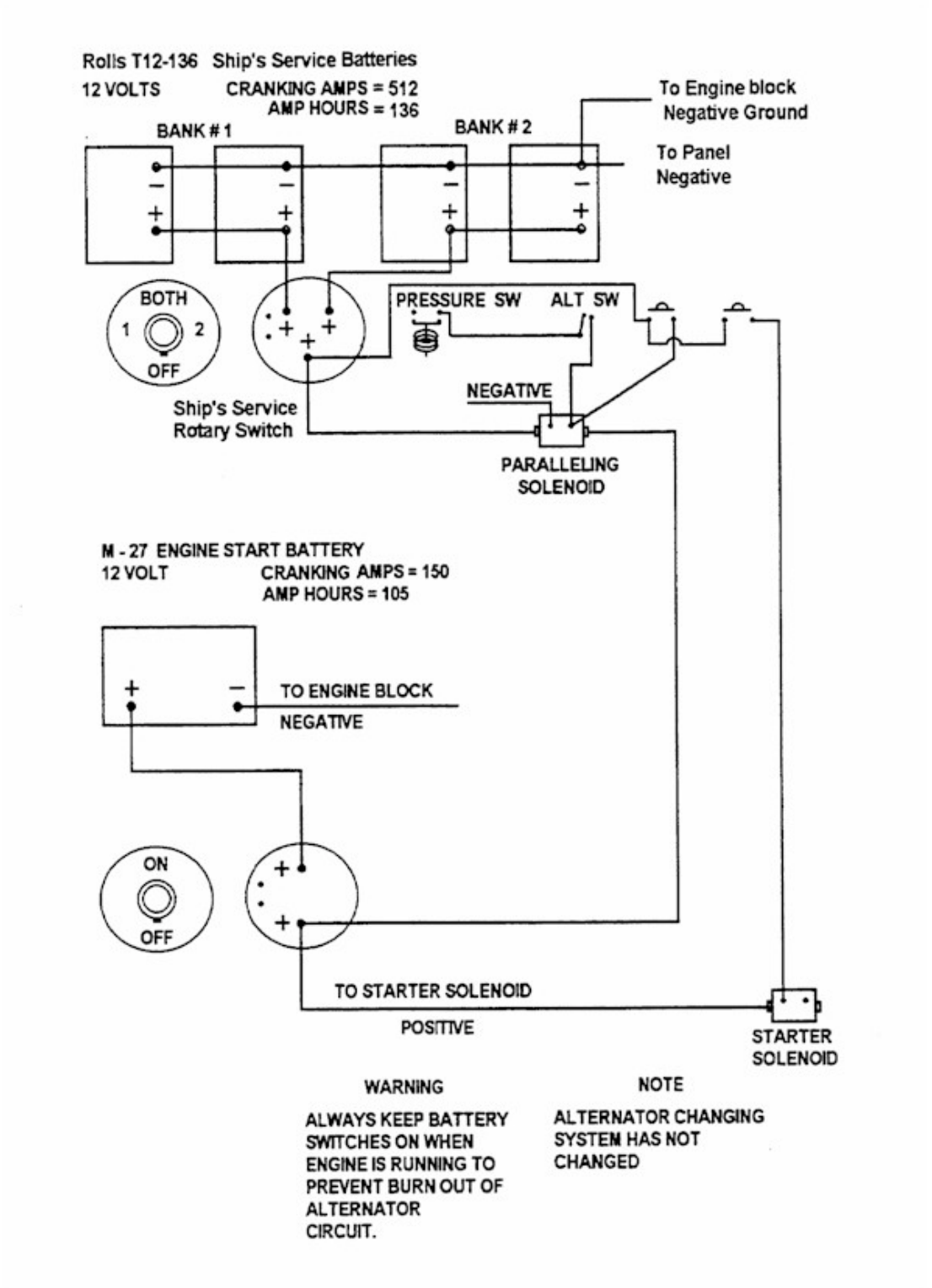


Figure 1-32. Switchboard

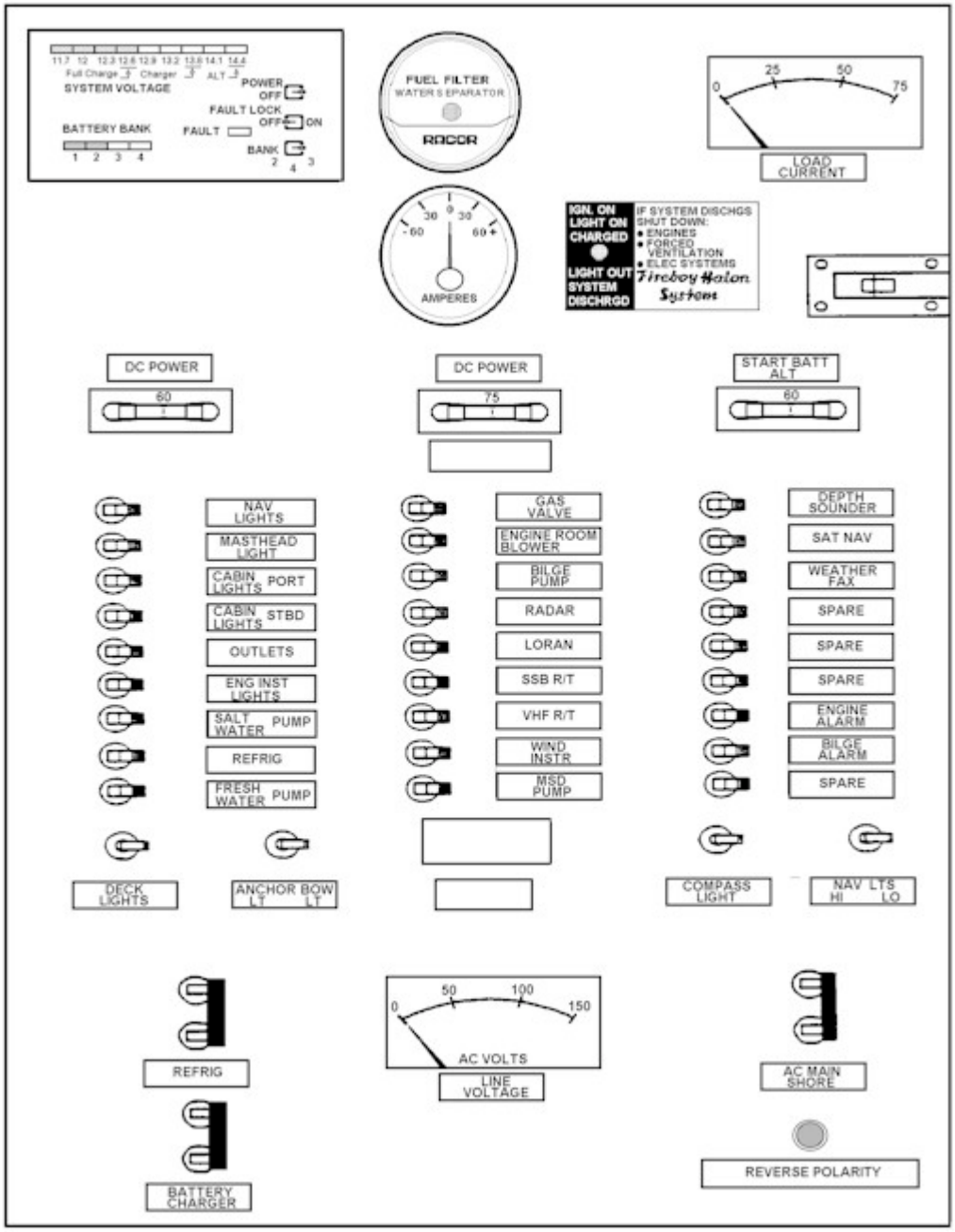
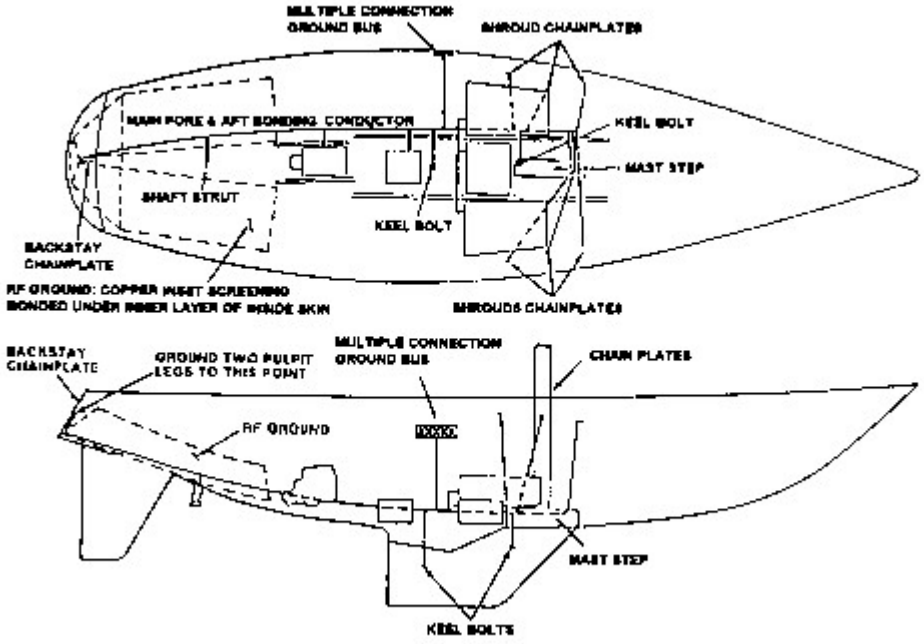


Figure 1-33. Bonding.



- Aqua Signal combination masthead light and deck flood light is mounted on the forward side of the mast above the lower spreader and activated by switches on the switchboard panel "masthead" and "deck" respectively.

1-7.4 THE COMMUNICATIONS AND NAVIGATION SYSTEMS

Communications and Navigation systems are located at the navigation station inside the cabin to port and consists of a chart table, a cushioned seat, and the communications and electronic navigation systems. The navigation station includes a chart table for the storage of charts, navigation tools and publications. Communications and Electronic Arrangement are listed in Table 1-3, COMMUNICATIONS AND ELECTRONIC SYSTEMS

1-7.4.1 NAVIGATION STATION AND CHART TABLE

The chart table is approximately 3 feet, 7 inches long by 2 feet, 2 inches wide with a hinged top to provide chart stowage underneath. The navigation station seat is used for battery stowage. Guest master switches are mounted on the forward vertical surface such that they are easily reached by a crewmember sitting at the navigation station. The switchboard panel, communications, electronic and navigation equipment are located on the port and forward bulkheads of the navigation station. The bilge alarm and thru-hull gravity switches for the depth sounder and speed log transducers are located below the chart table. See Figure 1-34, Communications and Electronics Arrangement.

1-7.4.2 VOICE COMMUNICATIONS.

The voice communications systems installed on the Navy 44 consist of:

- A Very High Frequency (VHF) Radio for primary communication.
- High Frequency/Single Sideband (HF/SSB)

The VHF radio has all marine and weather channels pre-programmed. It can store up to 16 user-selected channels. A dual watch mode is provided for monitoring Channel 16 while listening on a different channel. Four different channel scanning patterns are also provided. There are two speakers associated with the VHF radio. One located at the NAV Station, and one in the cockpit on the vertical face of the helmsman's seat. A speaker selector switch is mounted on the bulkhead above the radio with three positions: local, remote, both. See Figure 1-35. VHF Speaker Selector Switch.

The HF/SSB radio is a Stephens SEA 222 mounted above the overhead shelf to port. It can store operator-entered channels for easy access. The insulated backstay is used as the HF/SSB long wire antenna. This dual purpose antenna also services the Facsimile Receiver (FAX). A switch in the navigation station selects either the HF radio or FAX.

CAUTION

The SSB transceiver can be damaged if transmission on HF is attempted with the antenna in the FAX position.

1-7.4.3 NAVIGATION SYSTEMS.

There are multiple models and types for each item of navigation equipment on the Navy 44. Each boat is provided with a technical publications package that contains the operating instructions for the particular units installed. This includes the:

Depth Sounder
LORAN-C
Radar
Global Positioning System (GPS/TRANSIT)
Satellite Navigation System (SATNAV)
Weather Facsimile
Sailing Instrument

Table 1-3. COMMUNICATIONS AND ELECTRONIC SYSTEMS

ITEM	SYSTEM	MODEL
1.	Depth Sounder	Brooks & Gatehouse HECTA, (NA1-NA8) Brooks & Gatehouse HYDRA, (NA9-NA20)
2.	LORAN - C	Northstar 800
3.	Radar	Raytheon R20 (NA1-NA8) Raytheon R20X (NA9-NA20)
4.	HF/SSB	Stephens SEA 222
5.	VHF Radio	Icom M-100 (NA1-NA8) Icom M-120 (NA9-NA20)
6.	GPS	Northstar 941x (NA-11) Trimble Navtrac NA-2, NA-7, NA-17)
7.	Weather Facsimile	Furuno FAX 208A (every fourth boat)
8.	Sailing Instrument	Brooks & Gatehouse HORNET 4, (NA1-NA8) Brooks & Gatehouse HYDRA, (NA9-NA20)

Figure 1-34 Com/Elec

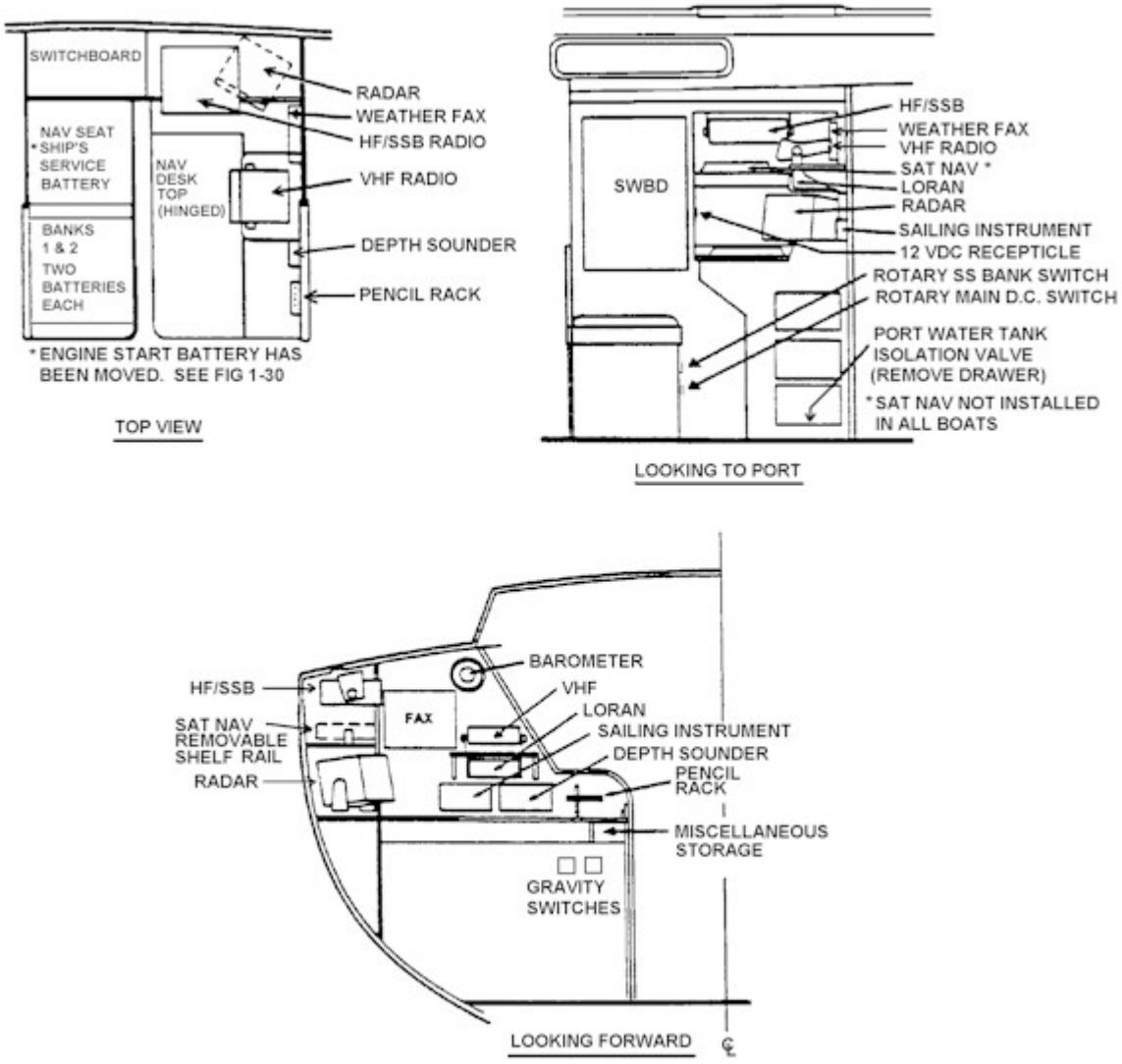
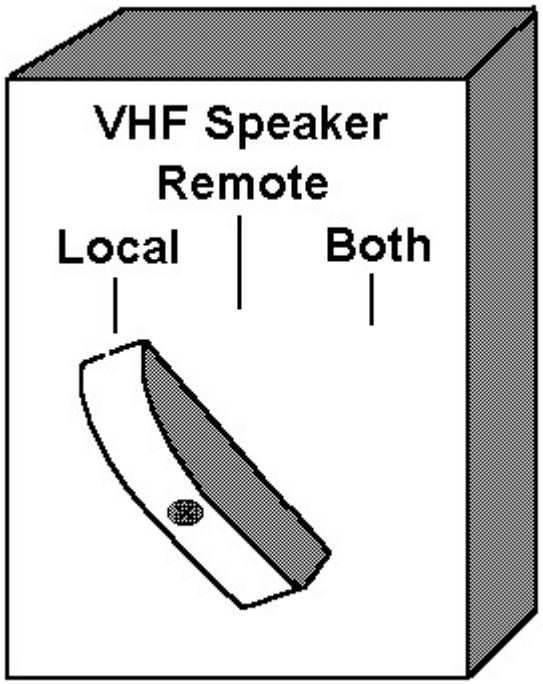


Figure 1-35 VHF Volume Switch



1-7.4.3.1 DEPTH FINDER

The Navy 44 is equipped with one of two models of Depth Finders: the Brooks & Gatehouse HECTA depth sounder monitor on (NA1 thru NA8) or the Brooks & Gatehouse HYDRA 330 (NA9 thru NA20). The installed unit is mounted on the forward bulkhead of the navigation station. Both systems have a depth repeater located on the forward bulkhead of the cockpit. The depth sounder can display depth from the surface or under the keel, as set by the operator. The monitor has both shallow water and deepwater alarm features. The depth sounder is connected to two transducers forward of the keel. Gravity switches located under the Nav desk select the appropriate unit depending on the heel of the hull. These switches can be set to manually select the desired transducer independent of the gravity switch.

1-7.4.3.2 LORAN-C

A Northstar 800 LORAN-C receiver is mounted on a shelf on the navigation station bulkhead above the depth sounder. The compact LORAN-C unit provides position readouts in LORAN-C TD's or latitude-longitude. It can display course, speed, time-of-day and way point readouts. The LORAN-C antenna is located on the stern pulpit.

1-7.4.3.3 RADAR

The Navy 44 is equipped with one of two radar systems: the Raytheon R20 on (NA1-NA8) or the Raytheon R20X on (NA9-NA20). The 7-inch diagonal TV-type display is mounted on a shelf to port of the chart table. The R20 radar has a maximum range of 16 miles, (R20X max range of 24 mi.), which provides a 360 degree radar picture of other vessels, buoys, and landfalls surrounding the boat. A unique feature allows picture "freeze" for bearing and range measurements. The Electronic Bearing Line "EBL" and Variable Range Marker "VRM" controls allow for accurate measurement of bearing and range, and the "Seaguard Alarm" alerts the operator of an object entering a safety zone. The R20X receives inputs from the LORAN-C receiver and HYDRA 330 to provide bearings to contacts and bearing/distance to waypoints on the radar scope. The encased radar scanner/antenna is deck mounted on a 6 foot, 5-inch aluminum pipe aft of the cockpit to starboard.

1-7.4.3.4 NORTHSTAR GPS UPGRADE

NA-9 thru NA-12 have a GPS upgrade chip that provides for display of position. Selected Navy 44's are equipped with a GPS source. The display shows “GLAT” and “GLON”.

1-7.4.3.5 FACSIMILE RECEIVER

Selected Navy 44's are equipped with the Furuno FAX 208A Weather facsimile receiver is mounted on the port bulkhead just forward of the navigation station in the main cabin. The facsimile is preprogrammed with all existing facsimile stations and frequencies that may be updated by the user. Fully automatic reception is provided with built-in on/off/sleep schedule timer and auto speed/IOC selection. The FAX receiver uses a dual-purpose antenna shared with the HF/SSB transceiver.

CAUTION

The SSB transceiver can be damaged if HF transmission is attempted with the antenna in the FAX position. Ensure that the switch is in the HF position prior to keying the mike.

1-7.4.3.6 SAILING PERFORMANCE INSTRUMENT

A Brooks & Gatehouse Hornet 4 (NA1-NA8) or HYDRA 330 (NA9-NA20) Sailing Monitor system provides navigation information. The Hornet 4 has boat speed, wind speed and wind direction displays mounted on the forward bulkhead of the navigation station and digital repeaters on the forward cockpit bulkhead to starboard. Both systems have analog repeaters on the forward cockpit bulkhead to port. The

HYDRA 330 has an additional repeater on the cockpit bulkhead to stbd and reads water temperature from the “speedo” transducer. The wind direction and speed sensors are mounted on the masthead. Two boat speed underwater paddlewheel transducers are installed forward of the keel, port and starboard, either of which provides continuous activation by a gravity changeover switch. A “dummy” plug can be substituted so that the thru-hull paddlewheel sensors can be removed for cleaning.

1-7.4.4 NON-ELECTRONIC NAVIGATION INSTRUMENTS

Non-electronic navigation instruments on board include magnetic compasses, a sextant and a barometer.

1-7.4.4.1 MAGNETIC COMPASS

The main magnetic compass is a 6-inch RITCHIE Globemaster, Model D-615EP mounted on the Edson steering pedestal in the cockpit and is used by the helmsman. The compass card is scribed in 5-degree increments, and is equipped with 45 degree and 90 degree offset lines. It is equipped with low level 12 volt D.C. lighting. A removable sliding door stainless steel hood helps to protect the face of the compass.

Another compass, C. Plath Merkur 4-3/4 inch, mounted on the forward starboard bulkhead of the cockpit has 12 volt D.C. night lighting, 5-degree card, and a clinometer.

1-7.4.4.2 BAROMETER

A barometer is mounted on the forward bulkhead of the navigation station.

1-7.4.4.3 SEXTANT

A sextant is brought aboard by the crew and stowed at the navigation station.

1-7.5 FRESH WATER SYSTEM

The fresh water system delivers fresh water by an electrically operated, pressurized pump and accumulator system and a manually operated foot-pump system. It consists of three stainless steel tanks with a total capacity of 163 gallons. A 70-gallon tank is located under each settee berth in the main cabin. Each tank is fitted with an ITT Jabsco Model 45570 shut off valve to isolate it from the 23-gallon “day” tank located below the cabin sole on centerline port of the galley. The 6-inch diameter access ports on each tank have a fill connection and a Rochester Gauge Inc., Type 8200 spiral action float level indicator. Tanks are vented with 1-1/2 inch plastic hoses that have a loop that rises higher than deck level in the hanging locker port side and in the storage locker starboard side. NA-1 has the isolation valve under the aft corner of the settee berth. All other boats have the isolation valve under the galley sink.

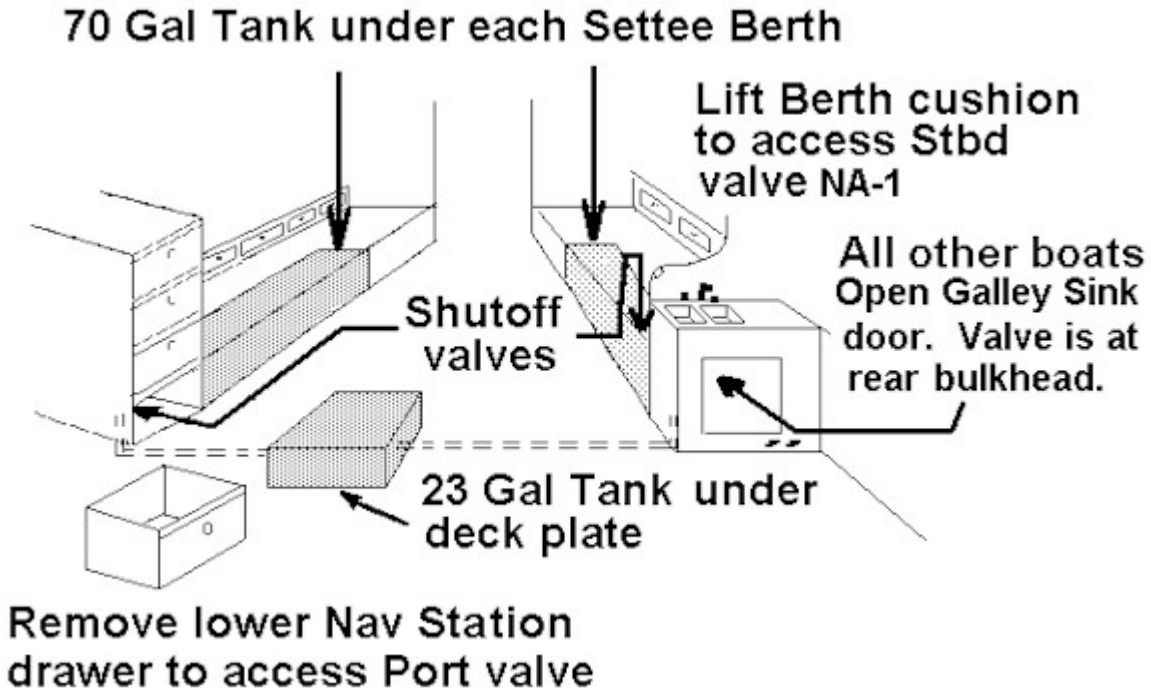
The pressurized system includes an automatic pressure switch, PAR Model 36900 1000, a 4.2 gallons per minute belt driven diaphragm pump, and a PAR 12573-2000 accumulator tank. As required the pump is being replaced with a PAR-MAX3 model JAB 306200012, 3.4 gallons per minute rotary diaphragm pump. The manually activated fresh water Whale Gusher MK III foot pumps supply fresh water: one to the galley sink, and one to the fresh water telephone shower/sink in the head.

Grey water from the head sink drains into the shower sump and must be pumped out using the manual shower sump pump located on the aft bulkhead in the head compartment. See Figure 1-36, Fresh Water System.

1-7.6 SEA WATER SYSTEM

A pressurized sea water system has an automatic pressure switch, PAR Model 36900 1000, a 4.2 gallons per minute belt driven diaphragm pump, and a PAR 12573-2000 accumulator tank. As required the pump is being

Figure 1-36. Fresh Water System



replaced with a PAR-MAX3 model JAB 306200012, 3.4 gallons per minute rotary diaphragm pump. All are located under the galley sink. The system is protected by a PAR 36200-0000 in-line strainer. This strainer required no tools to service. To open and remove the clear plastic housing, grasp the housing and turn counter clockwise. Remove the strainer screen for cleaning, replace the strainer and screw the plastic housing back on with firm hand pressure. Pressurized seawater is supplied to the galley sink and to the seawater shower unit in the head. Water from the galley sink is removed through the galley drain into the galley drain seacock. Water from the head sink drains into the shower sump and must be pumped out with the manual shower sump pump located on the aft bulkhead in the head compartment. See Figure 1-37, Sea Water System, and Figure 1-38 In-Line Strainers.

1-7.7 BILGE PUMPING SYSTEM

The Navy 44 is equipped with one electric bilge pump, and two manual pumps. A RULE 3500, located on centerline amidships in the bilge well, powers the electric system. The RULE 3500 pump has a 58-gallon per minute capacity and is activated by a switch on the switchboard panel. The bilge water outlet is a 1-1/2 inch flush mounted thru-hull fitting located on portside above the waterline amidships.

Two manual diaphragm bilge pumps are installed. One activated from inside the cabin, and the other from outside in the cockpit to comply with offshore racing requirements. An Edson Model 638A, 30 gallons per minute capacity is under the cabin sole midships. A Perko strainer screen, 722-00-PLB, has been added to the pickup fitting in the bilge well. The discharge line leads to a portside discharge thru-hull fitting above the waterline. Access for the pump handle is through a slot cut in the cabin sole deck plate. The handle for this pump in mounted on the front face, starboard side for the wet storage lockers aft of the navigation station.

An Edson Model 554, 30 gallons per minute capacity, is located under the portside cockpit seat, and leads to a discharge thru hull fitting on the transom. This discharge hose has also been fitted with a strainer screen. Due to the long run of the hose a check valve has been located at the pick up end in the bilge well. The handle for this pump is stowed in the port cockpit sheet locker.

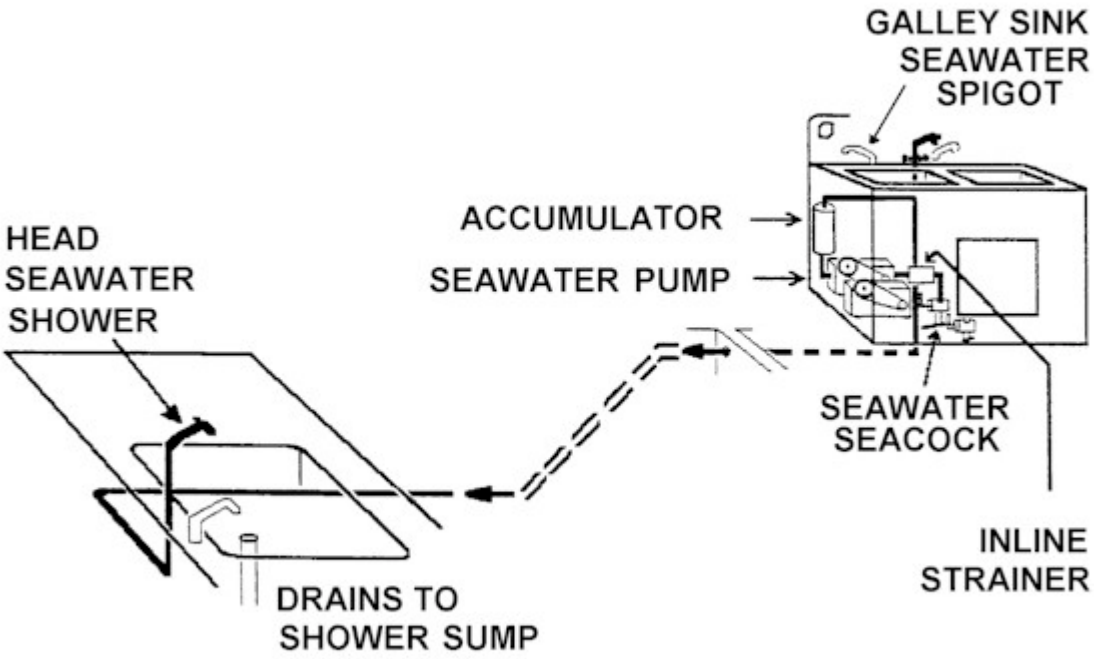
1-7.8 ALARM SYSTEM

The Navy 44 is equipped with four alarm systems. One is the high fluid alarm in the bilge. The second is an engine overheat alarm. The third is the engine low oil pressure alarm. These alarms are described in the paragraphs below. The fourth is the alarm in the RACOR fuel filter that warns of high water content in the sediment bowl. It has a self-test that will sound when d.c. power is applied to the boat. The alarms are powered by 12 VDC. See Chapter 5, Emergency Procedures, ALARMS, for actions to be taken in the event any of these alarm activate.

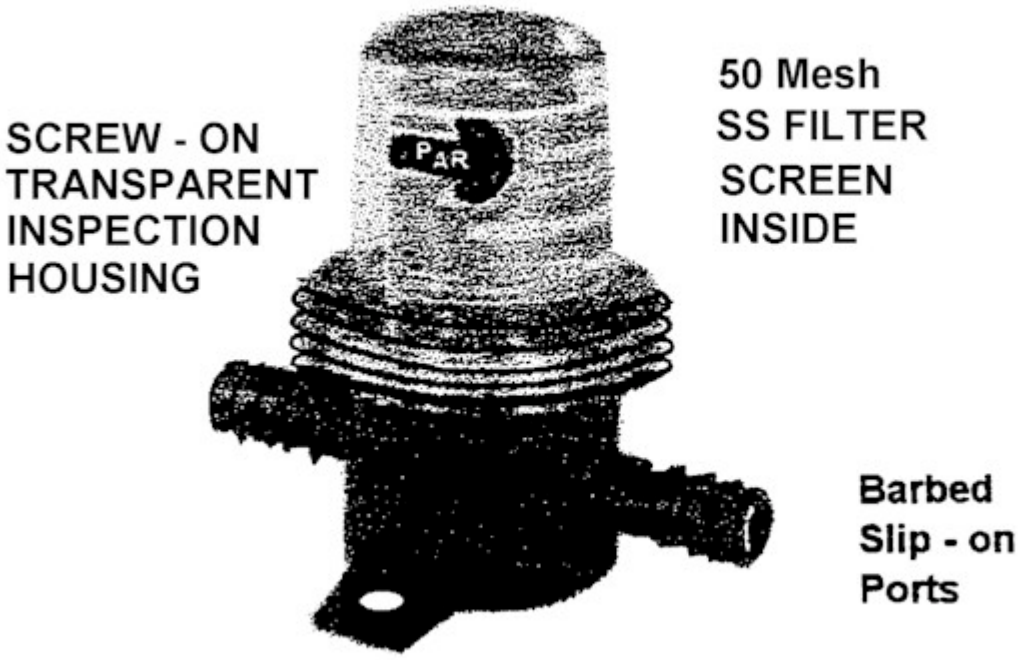
1-7.8.1 BILGE ALARM

The BILGE ALARM circuit breaker on the switchboard panel energizes the circuit. The bilge alarm float switch located half way up on the forward face of the bilge compartment under the deck plates near the Navigator's bench closes when enough water collects to raise the lever in the switch and triggers a 6" Bell mounted below the Chart Table in the Navigation Station. The BILGE ALARM circuit breaker, must be ON at the switchboard AT ALL TIMES to provide safety when the boat is not manned.

1-37 Sea Water System



1-38. In-Line Strainer



1-7.8.2 ENGINE HIGH TEMPERATURE ALARM

The Engine Alarm switch on the switchboard energizes the engine alarm circuit. There is a High Temperature Switch located in the water section of the engine that triggers a constant pitch continuous buzzer when the engine operating temperature exceeds the normal range. The ENGINE ALARM circuit breaker must be ON at the switchboard.

1-7.8.3 ENGINE LOW OIL PRESSURE ALARM

The same Engine Alarm Circuit breaker located on the switchboard panel that energizes the high temperature alarm energizes the engine low oil pressure alarm circuit. There is a Low Oil Pressure Switch located in the oil manifold across the rear of the engine. When engine oil pressure is below the threshold pressure the oil pressure alarm will activate. The ENGINE ALARM circuit breaker must be ON at the switchboard.

1-7.9 MOORING AND TOWING FITTINGS.

The Navy 44 deck has fittings for mooring, towing and anchoring lines. Four (4) Buck-Algonquin Model BCS-800-S open skene mooring chocks are fitted on deck; two (2) on the bow (P&S) and two (2) over the transom (P&S). Close to each skene chock is a corresponding mooring cleat, Buck Algonquin Model SOBS-1200.

There are four (4) closed rail chocks bolted on to the toe rail; two (2) amidships (P&S), and two (2) on the stern quarters (P&S). In addition to dockside mooring, these fittings may be used for anchoring, towing, and being towed. Five (5) 5/8-inch diameter, three strand twist nylon lines are stowed aboard for docking and mooring lines. See Figure 1-39, Mooring Arrangement.

1-7.10 ANCHOR STOWAGE AND HANDLING

There are two (2) anchors on board the Navy 44.

One (1) 35-pound Deepset Danforth anchor is stowed horizontally against the inside of the hull to starboard in the forward cabin compartment. Lashing eyes and chocks are provided for secure stowage. 6 feet of 3/8-inch chain and 250 feet of 5/8-inch diameter 3-strand nylon anchor line is stowed with the anchor.

One (1) 20-pound Hi-Tensile Danforth anchor is stowed under the radial drive aft with 6 feet of 3/8-inch chain and 250 feet of ½-inch 3-strand nylon anchor line. See Figure 1-40, Stowage, Top View, and Table 1-4 Stowage Plan.

1-7.11 GALLEY

The galley is located inside the cabin to starboard amidships and consists of a stove, refrigerator, sink and stowage compartments. The galley is fitted with Formica countertops, sea rails, and pantry locker with racks and shelves. See Figure 1-40.

1-7.11.1 STOVE

The stove is a Paul E. Luke, Inc. Model 5 Heritage gimbaled three top burner range with oven. The stove burns liquefied petroleum gas (LPG). Two (2) 10-pound vertical aluminum LPG bottles with a manifold valve, pressure regulator, and pressure gauge are stowed in a drained and vented gas-tight compartment to starboard of the helmsman's seat. The LPG line is fitted with a Marinetics Corporation Model 906/907 LPG control shut-off valve and a solenoid cutoff valve in the tank compartment. The solenoid cutoff valve is activated by a control shut-off switch mounted on the galley bulkhead. This switch is powered by a circuit breaker on the switchboard panel. See Figure 1-41. Solenoid Control.

Figure 1-39 Mooring

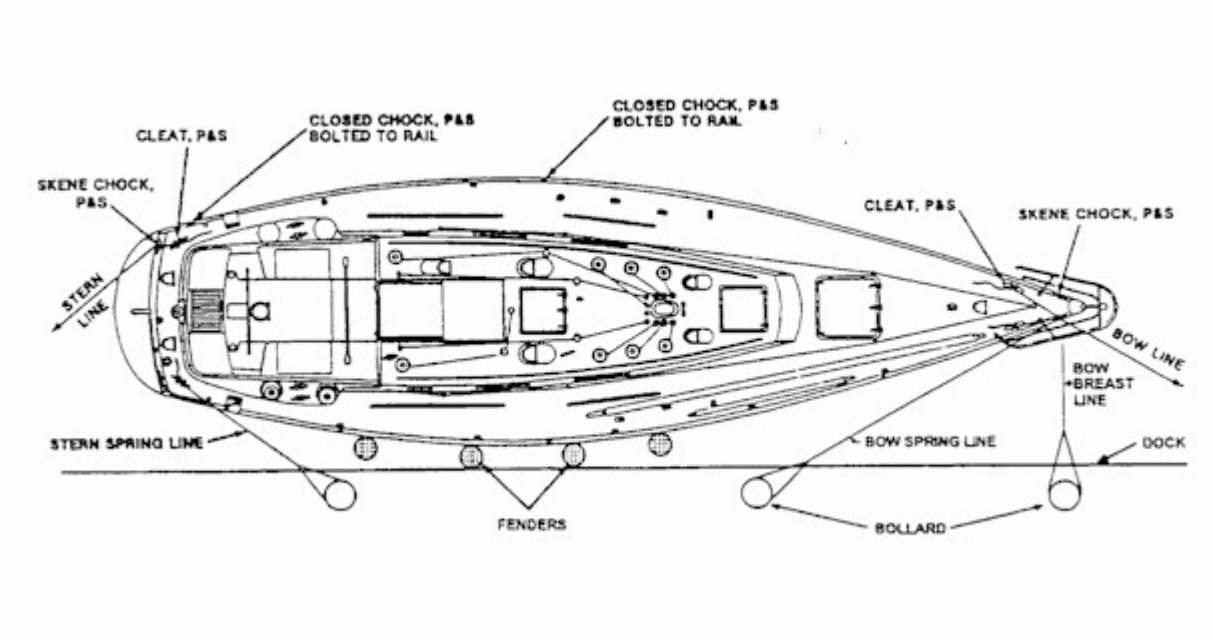


Figure 1-40. Stowage Top View

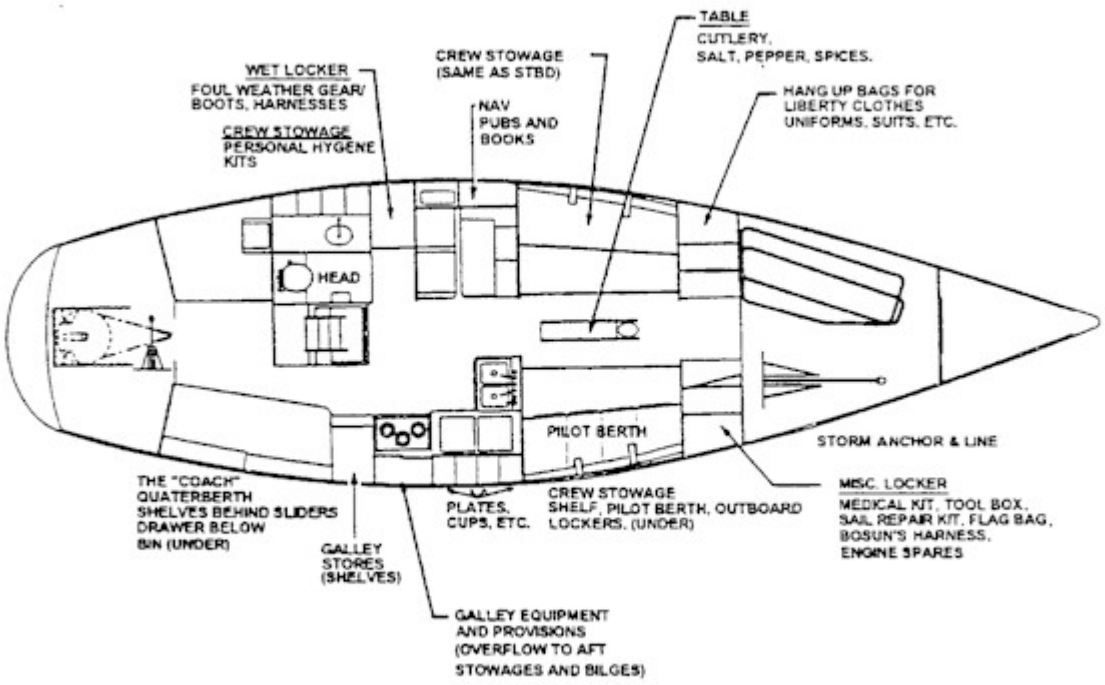


TABLE 1-4 STOWAGE PLAN

COCKPIT	
Port Forward Locker	Mooring lines and fenders, Sheets, Guys
Port Aft Locker	Emergency Tiller, Life Jackets
Starboard Forward Locker	Ready-use, Emergency, On-Watch equipment, Flashlights, Fog Horn, Hernia Box of spare deck hardware.
CABIN	
Fwd Stbd Stowage (behind mirror door)	Damage Control Kit. Electrical Kit. Bulky Provisions. Other Bulky Items. Tools/Repair Kit. International Flags. Bosun's Section containing Sail Repair Kit, Spare Shackles, Blocks, Splicing Gear, Reefing Lines, etc. Tool Box, Flare Kit
Fwd Port Miscellaneous Locker (behind mirror door)	Cleaning gear, misc. paper supply spares, hanging locker for crew liberty bags.
Wet Locker: (Port side Aft of Nav Station, Fwd of Head).	Crew Sailing Boots. Foul Weather Gear. Safety Harnesses.
FOC'SLE:	Stbd Upper pipe berth = # 1 Genoa Stbd Lower pipe berth = # 3 Jib Stbd under pipe berth =Storm Jib & Storm Trysail (same Bag). = 35 lb. Danforth Heavy weather anchor (w/rode attached under anchor) Port Upper pipe berth = # 2 Genoa Port Lower pipe berth = # 4 Jib & 1.0 Spinnaker Port Fwd under Pipe berth = Day Shapes
BEHIND ENGINE:	
Cubby, port side	Plastic jug with spare engine oil Plastic jug with spare anti-freeze coolant Plastic jug with spare battery water Bar-B-Que grill (optional)
Steering Compartment	20 lb. Hi Tensile Danforth (w/rode attached)

Figure 1-41. Solenoid

1-7.11.2 REFRIGERATOR

The NA 44 is equipped with a two door, top opening, 8.1 cubic foot refrigerator located in the galley starboard side. The original refrigeration equipment is installed on all NA 44's except NA 2, NA 8, and NA 15 thru NA 20. This is a Grunert Refrigeration dual coil holdover plate system. It is capable of being cooled with either mechanical or electrical cooling.

The mechanical cooling system consists of:

- a Caribbean Model 75, engine-driven rotary compressor mounted on the right front face of the engine and is belt driven.
- A flow-thru condenser mounted on the aft starboard corner of the engine compartment, is supplied with raw water for cooling.
- An accumulator/heat exchanger/receiver located under the countertop, starboard side in the galley.

The electrical cooling system consists of:

- A Gulfstream 25CD, 115 VAC, air cooled unit driven by the 120 VAC shore power connection, is mounted on the afterside of the bulkhead at the foot of the quarter berth.

Refrigerator temperature is controlled by one of two methods. A six-position thermostat selector switch located inside the aftermost door of the reefer functions when A.C. charging is being accomplished. A similar thermostat selector switch is located in the aft cubby locker under the stbd berth just forward of the sink and functions when D.C. charging is being accomplished. An electro-mechanical timer switch, mounted on the galley bulkhead is used to engage the engine driven compressor for 60 minutes of cooling time.

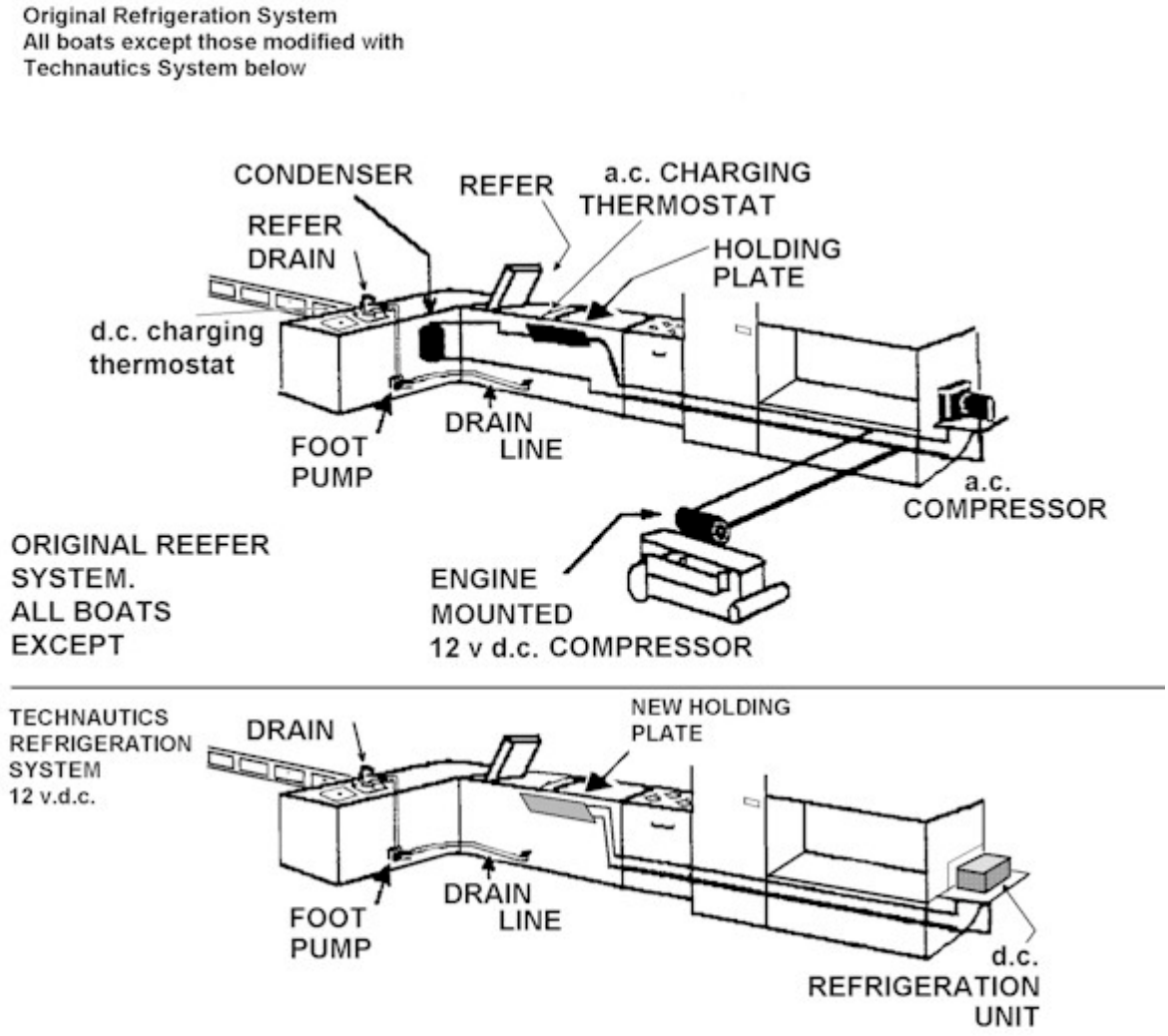
A new system is installed in NA 2, NA8, and NA 15 thru NA 20. This is a completely D.C. refrigeration system. It is a Technautics Coastal 12, 12 volt. D.C. system. The compressor unit is located on the afterside of the bulkhead at the foot of the quarter berth. The holding plate is the only other item of this system and is located in the refrigeration compartment. A thermostat located inside the aftermost door of the reefer controls the reefer temperature. This is a very low amperage system drawing power from whichever SS battery bank is selected by the SS rotary battery switch. At pier side, shore power can be applied to the boat and the A.C. battery charger energized to charge the battery while it is cooling the reefer. At sea the engine can be run to supply charging to the batteries through the SS alternator.

Both the old and the new reefer have Thaw Drain Lines leading to a Whale Gusher MK III foot pump located on the front face of the galley sink at floor level. This pumps grey reefer water to the galley sink exit spout on the right side of the sink. See Figure 1-42, Refrigeration System.

1-7.11.3 GALLEY SINK

A double stainless steel sink is mounted in the counter top of the galley and is fitted with two (2) Fynspray WS6 swiveling spouts**:** one for pressure seawater, and one for the refrigerator drain. A valve on the countertop activates the pressurized seawater spout. The starboard outlet tube in the sink is the refrigerator thaw drain line discharge supplied by a Whale Gusher MK III foot pump. The freshwater is dispensed through one Grohe G-1/2 31 634, combination spigot and telephone shower head. The left knob, (blue knob) controls pressure fresh water, and the other knob (red knob) controls fresh water supplied by a Whale Gusher MK III foot pump. This is a combination faucet/telephone shower spigot, which is integral to the sink, but connected to a flex hose that can be extended as a telephone type shower.

Figure 1-42. Refrigeration System.



1-7.12 LIFE SAVING EQUIPMENT

One (1) Avon 10-man YM-(E) life raft is stowed below the bridge deck in the cockpit.

One (1) yellow horseshoe-type life buoy is mounted on a stainless steel rack on the starboard stern pulpit which has a strobe light, whistle and small drogue attached and is connected to the man-overboard pole.

One (1) man overboard pole is stowed in a tube below deck to starboard, exiting through the transom.

One (1) life sling is mounted on the portside stern pulpit.

Ten (10) adult size Navy Standard Kapok Type I life jackets are furnished on board and are stowed in the aft port lazarette cockpit locker.

The SOLAS Pyrotechnics kit is two yellow plastic waterproof containers stowed in the port cabin locker behind the mirror door and consists of the following items:

12 Red Parachute Flares
4 Red Hand-held
4 White Hand-held
2 Smoke Canisters
2 USCG Red Hand-held (non-SOLAS)

NOTE

THE PYROTECHNICS MEET THE US SAILING REQUIREMENTS FOR CATEGORY 1 OFFSHORE RACING.

Inflatable personal flotation devices (PFD) with safety harness are available for issue from the cutter shed.

1-7.13 CABIN

Cabin spaces described here include:

Berthing spaces
Mess Table
Head Compartment

1-7.13.1 BERTHING

The Navy 44 is arranged with five (5) berths with mattresses in the main cabin as follows:

One (1) pilot berth and one (1) settee berth to Port.
One (1) pilot berth and one (1) settee berth to Starboard.
One (1) quarter berth aft of the galley on the starboard side.

Additionally four (4) hinged pipe berths in the forward compartment, two to each side. Berth dimensions are approximately 76 inches by 25 inches. The berths in the main cabin have 4-inch foam cushions and are fitted with adjusting block and tackle to allow for heeling and Acrilan lee cloths. The pipe berths have adjusting block and tackle and are usually used for sail storage. See Figure 1-6.

1-7.13.2 MESS TABLE

A Formica-topped mess table is available for mounting on centerline aft of the mast (between settee berths) and is fitted with hinged drop leaves, sea rails and lift-out panels for stowage. The table is normally removed so as to accommodate different space arrangements. See Figure 1-6.

1-7.14 HEAD COMPARTMENT

The head is located aft and to port inside the cabin and consists of the marine head, sink, shower units, mirror**,** and stowage shelves.

1-7.14.1 MARINE HEAD

The Wilcox-Crittenden "Skipper" marine head uses raw seawater for flushing. Pushing down on a foot lever opens the plumbing to incoming seawater. Fore and Aft action on the hand operated flushing lever brings in seawater and pumps out the water in the bowl. Releasing the foot lever closes a valve to shut off incoming seawater and aligns the pump to clear the bowl. Using the hand operated flushing lever pumps the bowl dry.

Effluent is discharged from the head through a 1-1/2 inch discharge line which is routed to a "Y" valve located in the storage area portside aft of the engine compartment.

The valve has a long shank that protrudes through the bulkhead and is operable from the head compartment. With the handle pointing to the placarded "Tank" position, effluent is directed to the Holding tank. With the handle pointing to the "OVBD" position, effluent is directed overboard.

A polypropylene holding tank with a capacity of approximately 10 gallons is fitted to the head system and makes the Navy 44 compatible with ZERO discharge laws for environmentally protected waters. Plumbing from the holding tank leads to a diverter valve located on the front face of the Port Forward Cockpit Locker. With the handle pointing inboard the effluent can be pumped overboard using the macerator pump. This procedure is authorized only when beyond the three mile limit in open ocean. With the handle pointing outboard the holding tank can be pumped out at a shore side pump out facility using the deck plate pump out receptacle. If removal of the toilet is necessary for servicing, remove the discharge hose fitting from the toilet body; do not remove the hose and hose clamps from the fitting. For components of the head system, See Figure 1-43. MSD Schematic and Figure 1-44. Holding Tank.

1-7.14.2 "Y" Valve

The Navy 44's are being fitted with a modified "Y" valve. This valve has an extended shank to allow for mounting of the "Y" valve in the storage area aft of the head, port side, and allowing the shank to protrude through the bulk head into the head compartment. The control handle is mounted in the head compartment on the aft bulkhead inboard of the head. Placards identify the position of the valve, "TANK" or "OVBD". See Figure 1-45 "Y" Valve installation.

1-7.14.3 HEAD LAVATORY SINK/SHOWER

The lavatory sink in the head compartment is fitted with one swiveling spout for Sea Water and two types of faucets:

- One Fynspray WS6 swiveling spout with two knobs.

- One knob (color coded blue), for pressure fresh water, and the other knob (color coded red), for fresh water supplied by a Whale Gusher MK III foot pump. Spigot is on an extension hose for use as a telephone shower.

7-15 THRU-HULLS

There are eleven under water thru-hulls and six above waterline openings to accommodate drainage requirements for the systems aboard the Navy 44. See Figure 1-47 Thru Hull Diagram. For tabulation see Table 1-5 Thru Hull Fittings.

There are two thru-hulls in the bow section port side as provisions for a second head that have been capped off. In NA-9 thru NA-12 fittings have been faired to eliminate a disturbance to the laminar flow of the water.

Not included on the list are the hull penetrations for the propeller shaft and rudder stock.

End of text for Chapter One.

Figure 1-43 MSD Schematic

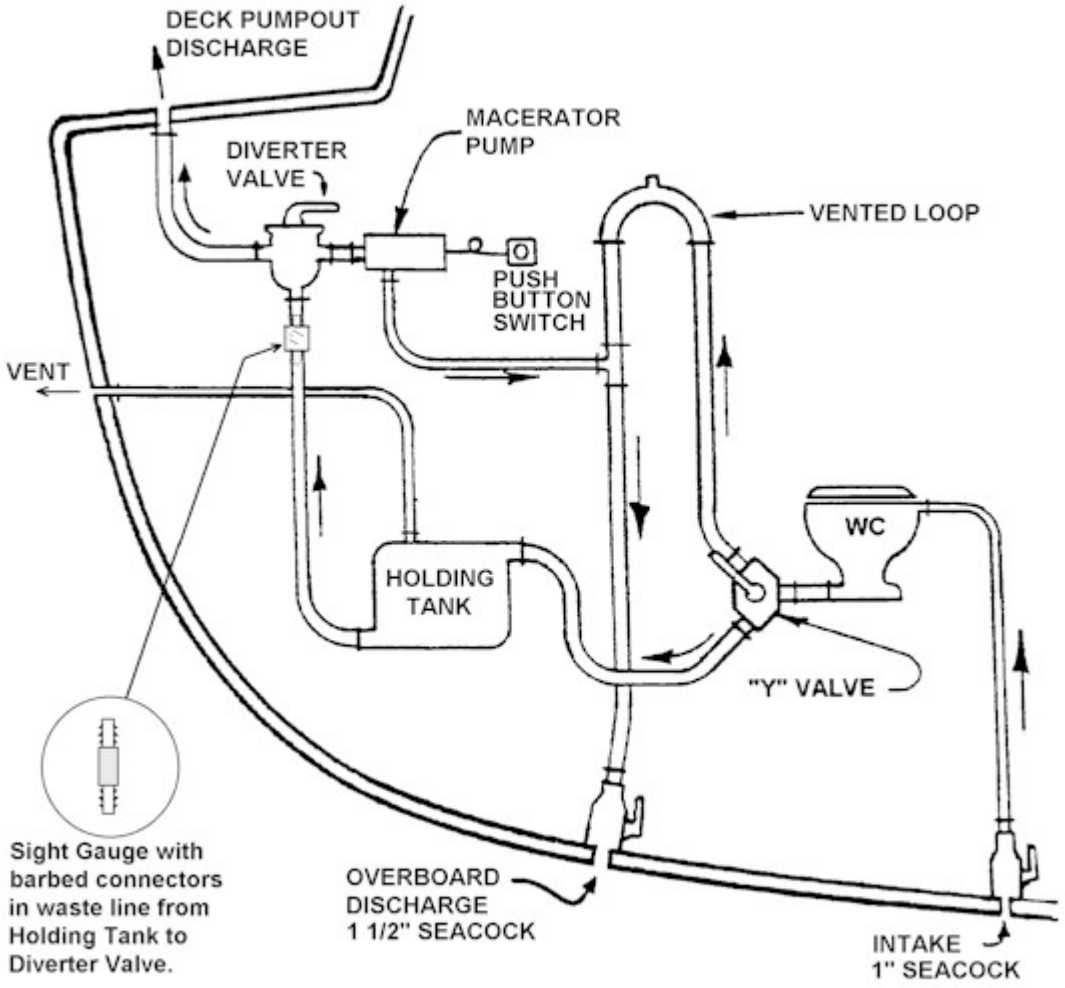


Figure 1-44 Holding Tank

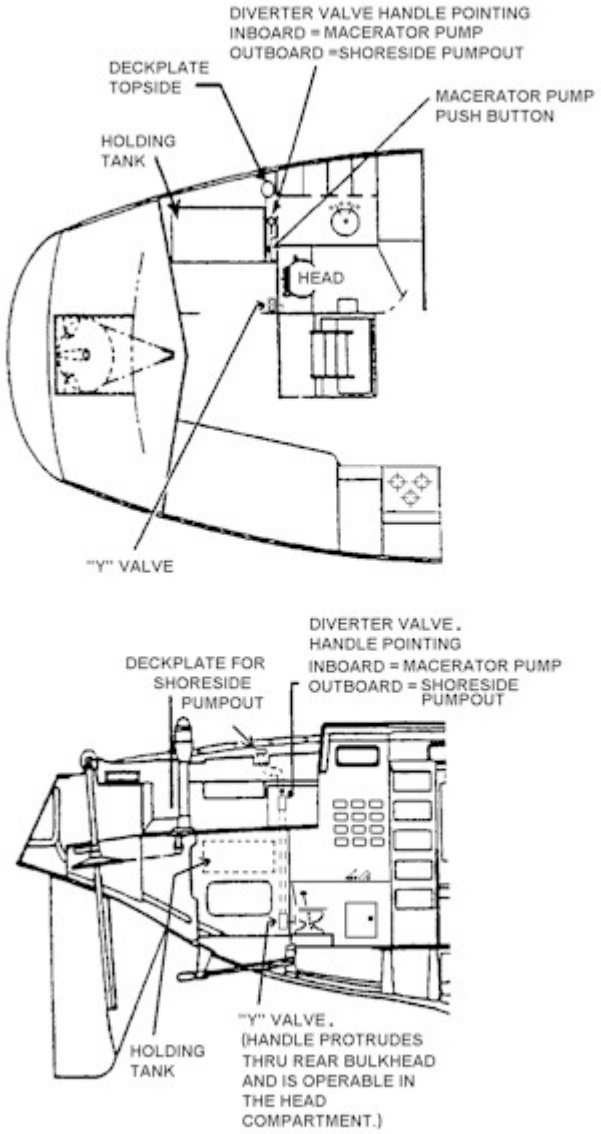


Figure 1-45 “Y” Valve + handle install

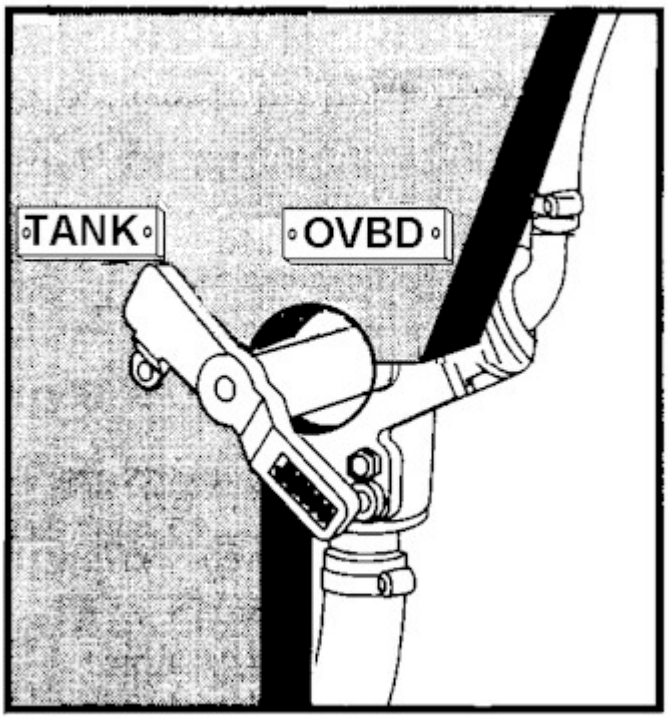


Figure 1-46 Thru Hull Diagram

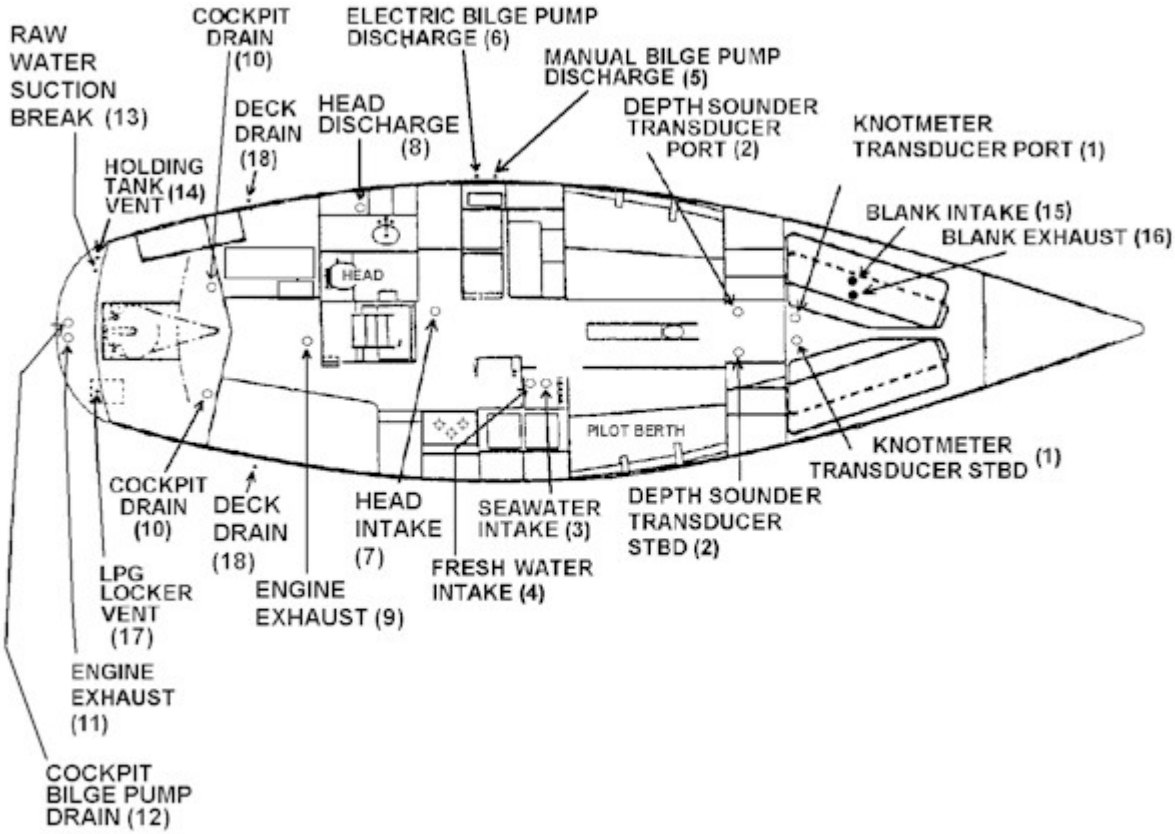


Table 1-5. THRU-HULL FITTINGS

REF	NO	SERVICE	SIZE	LOCATION
1	2	KNOTMETER PADDLEWHEEL TRANSDUCER	50 mm	FWD, PORT/STBD.
2	2	DEPTH SOUNDER TRANSDUCER	40 mm	FWD, PORT/STBD.
3	1	SEAWATER INTAKE	3/4 INCH	BELOW GALLEY SINK
4	1	GALLEY DRAIN	1 ½ INCH	BELOW GALLEY SINK
5	1	MANUAL BILGE PUMP DISCHARGE	1 ½ INCH	MIDSHIP, PORT, ABOVE WATERLINE
6	1	ELECTRIC BILGE PUMP DISCHARGE	1 ½ INCH	MIDSHIP, PORT, ABOVE WATERLINE
7	1	HEAD INTAKE & SHOWER SUMP DRAIN	3/4 INCH	GALLEY DECK FWD OF ENGINE COMPARTMENT
8	1	HEAD DISCHARGE	1 ½ INCH	UNDER SINK IN HEAD COMPARTMENT
9	1	ENGINE INTAKE	3/4 INCH	AFT OF ENGINE COMPARTMENT
10	2	COCKPIT DRAINS	2 INCH	RADIAL DRIVE COMPARTMENT AFT OF QUARTERBERTH
11	1	ENGINE EXHAUST	1 ½ INCH	TRANSOM, CENTER, ABOVE WATERLINE
12	1	COCKPIT BILGE PUMP DISCHARGE	1 ½ INCH	TRANSOM, PORT ABOVE WATERLINE
13	1	RAW WATER SUCTION BREAK	3/4 INCH	TRANSOM, PORT, ABOVE WATERLINE HIGH (CAPPED OFF)
14	1	MSD VENT	3/4 INCH	TRANSOM, PORT, ABOVE WATERLINE HIGH
15	1	PROVISIONAL HEAD INTAKE	3/4 INCH	BOW, PORT (CAPPED OFF)
16	1	PROVISIONAL HEAD EXIT	1 ½ INCH	BOW, PORT (CAPPED OFF)
17	1	LPG LOCKER VENT	3/4 INCH	STBD STERN UNDER COUNTER ABOVE WATERLINE
18	2	DECK DRAIN	3/4 INCH	HULL SIDES ABOVE WATERLINE

CHAPTER 2

INDOCTRINATION AND TRAINING

2-1. INTRODUCTION.

The NAVY 44 is the principal U.S. Naval Academy Sail Training craft. The fleet was designed for and is equipped to accomplish the missions of sail indoctrination, and command seamanship training for 3/C and 1/C midshipmen and its minor configuration changes, racing by varsity offshore team crews. The normal offshore training crew consists of an Officer-in-Charge (OINC), an Assistant Officer-in-Charge (AOINC), a midshipmen skipper and executive officer, and six crew for a total complement of ten. Crew qualifications for these training and racing missions at the Naval Academy are published by the Director, by separate notice or instruction. The minimum crew for safe operation of the Navy 44 may be as few as an OINC and two qualified crew depending upon sailing area, anticipated weather and experience of other participants embarked. Guidance concerning operating the Navy 44 with limited crew, introductory/indoctrination and proficiency sailing missions is contained in the STANDARD OPERATING PROCEDURES (SOP).

2-2. CREW DESIGNATIONS, QUALIFICATIONS & REQUIREMENTS.

Persons participating in the Naval Academy Sailing program of offshore training and assigned duties involving the operation of Navy 44's shall be designated in accordance with the Chief of Naval Education and Training, OFFSHORE SAIL TRAINING MANUAL standards. Although other designations may apply to certain individuals, the following categories define levels of experience, and mastery of sailing theory, systems knowledge and operational procedures of the Navy 44's offshore training role:

Non-crew - all participants not otherwise designated as offshore crew, watch-captain or senior skipper.

Offshore Crewman - individuals who through experience and training are familiar with sail theory, safety procedures, and basic engineering of cruising auxiliaries similar to the Navy 44.

Watch-Captain - individuals who through experience and training have mastered theory, boat systems, and demonstrated competence in all routine aspects of operating a large offshore cruising auxiliary.

Senior Skipper - individuals who through experience and training have demonstrated their ability to command a large offshore sail training craft (NAVY 44 or equivalent) over a wide range of weather conditions, in coastwise piloting waters as well as offshore passages.

NOTE

All personnel authorized to operate, or participate in the operation of U.S. Naval Academy Sail Training Craft (Navy 44's) should be familiar with and have recent experience using the systems, emergency procedures and safety equipment applicable to the Navy 44.

2-3. FAMILIARIZATION TRAINING.

Prior to participating in the operation of the Navy 44 it is advisable to complete a period of familiarization training or some other source of structured training designed to acquaint the operator with the systems, cautions, emergency procedures and practices which are unique to this fleet of boats. In addition, those individuals who have previously been assigned as Officers-in-Charge but who have no documented Navy 44 sailing experience within the past 12 months should complete a review and refresher program consisting of applicable topics listed in the following:

Shore-side Syllabus. Review crew responsibilities and tasks aboard the Navy 44 and demonstrate a capability in the following:

1. Including use of ship's bills and checklists.
2. Discuss and complete the "float plan", or "Naval Academy Boat Request Form" for operations in the local sailing area. Inventory, location and operation of all required safety equipment.
3. Knowledge of how to comply with Rules 32 through 38 of the COLREGS using

the sound signals aboard the Navy 44; and the location of lights and day shapes for compliance with Rules 20 through 31.

4. Discuss heavy weather techniques, emphasizing use of inner-forestay, running backstays and storm sails as provided to the Navy 44.
5. Discuss Quick-Stop and Lifesling type recovery procedures, noting location of applicable deck hardware, safety equipment and its location in the boat stowage plan, and materials available to effect victim recovery.
6. Discuss and demonstrate use of communications and navigation equipment. Discuss boat's fuel capacity, fuel consumption and cruising range under power.
7. Discuss the list of manuals, publications and documents included as standard load-out. Discuss the maintenance documentation system, the discrepancy report process and equipment tag-out steps.
8. Describe and discuss a plan of action for steering failure, engine failure, broken-through-hull fitting and other emergency procedures contained in Chapter 5. Underway Syllabus.
9. Demonstrate appropriate helmsman and crew coordination for departure under power: line handling, fending-off, and a recovery plan for an engine failure in a crowded basin or harbor.
10. Demonstrate ability to maneuver under sail in close quarters: short tacks and controlled jibes.
11. Demonstrate Crew Overboard procedure: evaluating ability to maintain visual contact with the victim, minimizing distance traveled away from victim, and ability to direct and deploy safety equipment.
12. Demonstrate use of check-sheets and lists for daily checks of engine, electrical, mechanical and water systems aboard the Navy 44.
13. Demonstrate safe use of galley equipment, stove, oven, and refrigeration systems.
14. Understand and demonstrate proper navigation doctrine, ensuring use of applicable tide tables, piloting and dead reckoning procedures.
15. Demonstrate the correct use of hand bearing compass, fixing boat position, estimating time/speed calculations, use of danger bearings, and other accepted plotting and labeling techniques.
16. Demonstrate heavy weather procedures: shortening sail, use of preventer, and sailing with storm sails.
17. Select an anchorage and demonstrate appropriate helmsman and crew coordination skills for anchoring under power and the ability to pick up a mooring.
18. Demonstrate correct operation of advanced electronics such as the sail instruments, SSB radio, Loran, GPS, radar and Weatherfax.
19. Demonstrate the correct hoisting, trimming, dousing and packing of the spinnaker.

To facilitate crew administration and preparations for summer training and race/cruise periods, it is recommended that crew members be assigned to primary billets such as navigator,

2-4. WAIVERS.

The Director of Naval Academy Sailing may waive certification, or participation in the syllabus training for special cases where an individual can demonstrate the requisite knowledge and proficiency of skills for Command at Sea. USCG licensing and personal logbooks are ways, but not the exclusive avenues upon which such waivers can be granted.

2-5. UNDERWAY WATCH ORGANIZATION.

A typical underway watch organization for each of the Navy 44 mission areas can be found in the Director's Standard Operating Procedures (SOP) manual. While underway, the prescribed on-deck crew should be assigned as follows:

1. consist of a minimum of two crew topside at any given time.
2. the functions of watch-captain, helmsman, lookout and navigation should be assigned or assumed by those on watch.
3. functions may be rotated among the on watch crew as directed by the OINC/Midshipman Skipper.

engineer, supply officer, and deck officer. The duties and responsibilities of these billets are detailed in the Standard Operating Procedures (SOP) manual.

2-6. RECORDS.

The United States Navy Sailing Association provides a special sailing log analogous to the Official Naval Aviator's Log Book that is intended for recording your sailing experience and qualifications. There are several other suitable sailing logs available for the same purpose. Regardless of which log book you may choose to use, ensure that your qualifications are noted in it as may become important for documentation.

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CHAPTER 3

NORMAL PROCEDURES

3-1 VOYAGE PLANNING.

3-1.1 LOCAL OPERATIONS

The NAVY 44 is well-suited for local sorties so a full complement of stores and crew may not be required. There are however, a number of things to check and consider prior to getting underway. For extended voyaging, detailed ships bills have been prepared and are contained in the Standard Operating Procedures and Regulations Manual ("SOP").

3-1.2. DAY SAILING CONSIDERATIONS.

Short sorties in daylight conditions are often performed with a boat not as fully-equipped as for long voyages. As a minimum, ensure that there is sufficient fuel for the planned duration of engine operation, sails for planned evolutions, and sufficient crew with necessary skills for the planned sortie.

3-2 PRE-SAILING BRIEFING.

Whether embarking on local operations or for an extended passage, a pre-sailing briefing ensures that the crew is familiar with planned evolutions, required equipment is onboard, and proper skill levels are represented in the crew. The briefing guide below is the minimum information to be disseminated to the crew before sailing.

3-2.1 BRIEFING GUIDE.

1. Mission
   Primary - be as specific as possible.
   Secondary - be specific.
   Operating Area - Define
   Departure and Return times.
   Where the boat will land.
2. Crew assignments for the sortie
3. Sail Configurations required or intended for the sortie depending on the weather.
4. Communications
   With whom
   Monitor Frequencies/channels
   Time
5. Weather for the operating area - route and for point to point sorties.
   existing
   forecast
   destination
6. Route
   check points
   potential problem areas
7. Navigation
8. Emergency procedures review.
   (brief at least one procedure at the beginning of each sortie).

3-3 SHORE SIDE PROCEDURES.

Shore side procedures, scheduling, maintenance records/reports, and Santee Basin operations are published separately by the Director of Naval Academy Sailing. Applicable references include:

DNASINST 3120.1A, SOP
DNAS OPORD 201, (current year).

3-4 PRE-UNDERWAY PROCEDURES.

Conduct the following pre-underway checks. The Officer-in-Charge ("OINC") or Skipper must verify that they have all been performed prior to sailing.

1. Prior to engine start:
   - Pre-Sortie "walk around" checks.
   - Hull Integrity checks.
   - Safety equipment checks.
   - Engine Pre-Start checks.
2. Checks to be accomplished prior to leaving the dock are:
   - Sail inventory to support planned evolutions.
   - Successful engine start.
   - Com/Nav checks
   - Stores quantities checks.
   - Crew brief.

3-4.1 PRE-SORTIE WALK AROUND CHECKS.

1. Check trim of boat at rest. Note any abnormalities, i.e. (bow down, list to either side, high/low in the water,

mast/ boom in proper condition, cockpit integrity).

2. Check docking lines for effectiveness and chafe. Check shore power cable for integrity.
3. Check that all lifelines, stanchions and pulpits are tight, securely fastened, pinned, and taped.
4. Check condition of standing rigging and turnbuckles.
5. Check the condition of halyards for defects on rope tails, splices, and shackles.
6. Spin all winches several turns to assure proper lubrication.
7. Check the steering wheel for free rotation and wire rope mechanisms on the steering system below the steering pedestal. (adjust wire rope tension for proper play). Ensure steering pedestal friction brake knob is in the unlocked position.

REPORT PRE-SORTIE WALK AROUND CHECKS COMPLETE TO THE OINC

3-4.2 HULL INTEGRITY CHECKS.

1. Check bilge area for dirt or debris which might clog the bilge pumps. Remove same. Check the bilge for oil. Environmental regulations prevent discharging oil in coastal waters. Both minor and major pump-out facilities are available to remove oil from the bilge. Test the RULE 3500 bilge pump by discharging any standing bilge water. Do not prolong test while in port.
2. Ensure all seacocks in the sea water system are open.
3. Check all seacocks and waterline integrity of the hull. Note signs of leakage from sea water, fresh water, and rain.
4. Check fresh water tank levels for adequate water. Fill 23 gal. day tank from one of the 70 gal tanks.

NOTE

Ensure that shut-off valves for the 70 gal tanks are closed after filling the day tank. Failure to do so may result in a loss of potable water from plumbing leaks or an open valve.

6. Check the thru-hulls for the head and the "Y" valve for the MSD system. Set for INSHORE operation.

REPORT HULL INTEGRITY CHECKS COMPLETE TO THE OINC.

3-4.3 SAFETY CHECKS.

1. Check that inflatable life raft is stowed under the bridge deck.
2. Inspect lifejackets for serviceability. Ensure that there is at least one for each crew member onboard.
3. Determine if personal flotation/harnesses are aboard for heavy weather or night operations.
4. Check pressure levels on all fire extinguishers.
5. Check state and stowage of safety equipment on deck (e.g., MOB gear).
6. Check flare kit for complete inventory.
7. Check that the Med Kit is complete and stowed properly.
8. Inspect all compartments and stow all loose gear.

REPORT SAFETY CHECKS COMPLETE TO SKIPPER.

3-4.4 PRE-START ENGINE CHECKS.

CAUTION

SHUT DOWN ALL 120 VAC. LOADS AT THE SWITCHBOARD BEFORE DISCONNECTING SHORE POWER.

1. Ensure that the engine log is onboard and that its checklist is in-hand for completion.
2. Ensure that the following A.C. components are in the OFF position.
   - o Main A.C. circuit breaker.
   - o A.C. battery charger.
   - o A.C. refrigeration circuit breaker. (Not Applicable for NA 2, NA 8, and NA 15 thru NA 20 which have been equipped with the new

TECHNAUTICS Coastal 12 refrigeration system).

3. Disconnect the shore power cable from the pier end first, then the boat. Leave the cable on the pier for local sorties. Coil the cable and stow it below for point-to-point sorties.
4. Check and record condition of battery banks using the System Voltage Scanner at the switchboard.
5. Ensure that the T-handle shut-down lever (to starboard below the helmsman's seat) is fully depressed and in the down position.
6. Check diesel fuel tank level to ensure an adequate supply of fuel for the sortie.
7. Check fuel supply and fuel return valves in the bilge to ensure they are open.
8. Check engine lubricating oil, transmission fluid, and fresh-water coolant for correct operating levels. Fill as necessary.
9. When checking transmission fluid level, unscrew the dipstick, wipe it clean, and replace (DO NOT SCREW IN). Remove again to check level, then replace and screw down lightly by hand. The threads should run in clean. See Figure 3-1. Transmission Fluid Level.
10. Check engine surfaces for significant accumulations of fuel, oil, and coolant and associated piping, fittings, filters, strainers, and valves for leakage.
11. Check tightness of all belt drives on the engine allowing approximately 1/2-inch play. Adjust as necessary.
12. Visually inspect the Racor filter/separator and drain accumulated moisture/sediment as necessary.
13. Inspect sea water strainer. Use a flashlight. If the strainer holes can be seen it is clean. Do not open the housing if not needed. This will save the seals, and retain a positive seal. Clean if necessary.
14. Check the sea water ENGINE INTAKE seacock located aft of the engine to ensure it is open.
15. Set the MORSE control in NEUTRAL (vertical) and disengage the transmission by pulling out the single knob on the control. Move the lever forward until resistance is felt indicating the throttle is engaged.
16. Observe engine hours from the engine hour meter on the cockpit engine panel. Record in engine log.

REPORT PRE-START ENGINE CHECKS COMPLETE TO SKIPPER.

3-4.5 ENGINE STARTING PROCEDURES.

1. Ensure that Engine Pre-Start Checks have been accomplished and recorded in the engine log.
2. Energize the engine electrical system by placing the Engine-Start Battery selector switch to the ON position. Place the Ship's Service (SS) Battery selector switch to either the "1" or "2" position. The selector switches are located on the forward vertical panel of the battery box under the navigator's seat at the navigation station.
3. Ensure the following switches are in the ON position at the switchboard:
   - D.C. MAIN CIRCUIT BREAKER.
   - ENGINE INSTRUMENT PANEL LIGHTS (as applicable).
   - START BATTERY ALT
   - SS BATTERY ALTERNATOR
   - ENGINE ALARMS

NOTE

The low oil pressure alarm will sound until the engine has started and oil pressure is established.

NOTE

The RACOR water alarm will sound for when electrical power is turned on. If the red light remains on there is water in the sediment bowl. Use the drain cock on the bottom of the bowl to drain water out. Use pump (black push button at the top of the filter), to repressurize the filter.

4. Ensure that the clutch is not engaged, (knob below throttle lever is OUT.
5. Advance the throttle to 3/4 throttle or greater.

CHECKING FLUID LEVEL: 1. UNSCREW HEX HEAD NUT ON DIP STICK BY HAND.
2. REMOVE AND WIPE DIP STICK.
3. PUT DIP STICK IN TO THE THREADS.
4. REMOVE DIP STICK AND CHECK FOR FLUID IN THE GROOVE.
5. REPLACE AND TIGHTEN DIP STICK BY HAND.

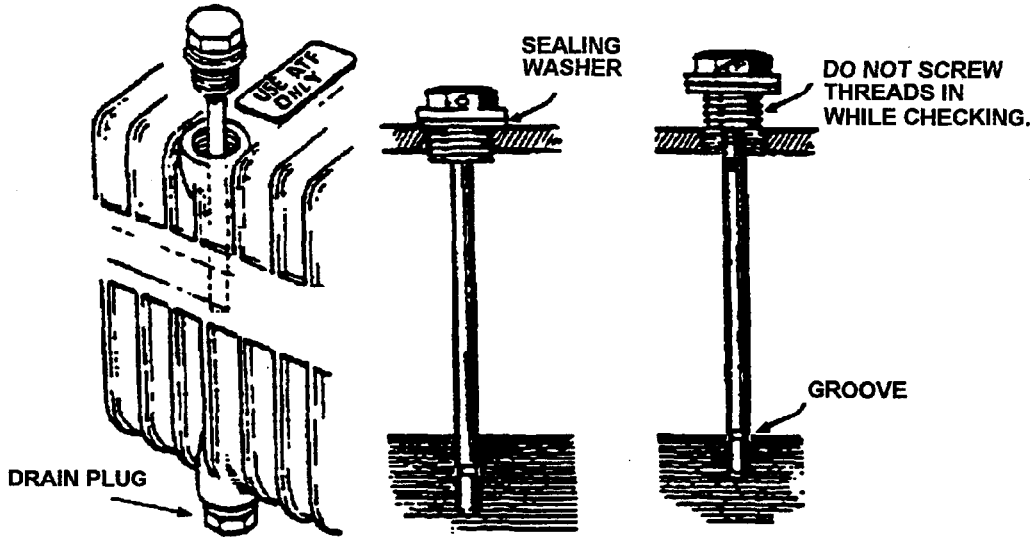


Figure 3-1. Transmission Fluid Level

6. Depress the Pre-heat button on the cockpit Engine Instrument Panel for approximately 15 seconds. See Figure 1-25, Engine Instrument Panel.

CAUTION

Oil pressure indication must be seen on the Oil Pressure gauge within 30 seconds of engine start. If not, SHUT THE ENGINE DOWN IMMEDIATELY BY PULLING UP ON THE ENGINE SHUT DOWN T-HANDLE.!

CAUTION

Water discharge must be seen from the transom discharge tube within 30 seconds of engine start. If not SHUT DOWN THE ENGINE IMMEDIATELY to prevent overheating the engine and damage to seals and lubricants.

7. Simultaneously depress the Pre-Heat and Start buttons until the engine starts. If the engine fails to start after 10-12 seconds of cranking, release both buttons and wait 30 seconds. Check that the engine shutdown T-handle is in the fully down position.
8. If oil pressure is not indicated within 30 seconds, SHUT THE ENGINE DOWN IMMEDIATELY! Local operations, call the Cutter Shed for assistance. Away from USNA, refer to the Westerbeke manual and begin diagnostic checks.
9. Check the transom exhaust outlet for discharge of water/exhaust. If water discharge is not evident within 30 seconds, SHUT THE ENGINE DOWN. Check the engine for any leaks. If no leaks are visible, the problem may be a damaged raw water pump impeller. Inspect and replace as necessary.

CAUTION

DO NOT ATTEMPT TO START THE ENGINE USING ETHER OR ANY OTHER STARTING AID FLUID.

NOTE

Do not attempt to restart engine until the starter has stopped rotating.

NOTE

Tachometer may not show RPM unless throttle is advanced above idle, increasing oil pressure so that the alternator field circuit is energized and charging to display engine RPM. Some unstable running may occur in a cold engine, but this condition should smooth out as an operating temperature of 170-190F (77-88 C) is attained.

10. Set throttle for normal idle (500-700 RPM).

CAUTION

DO NOT OPERATE ENGINE OVER 2500 RPM.

11. Advance the throttle to a fast idle position (1,200 to 1,500 rpm). Check instrumentation for proper engine operation.

	IDLE	FAST IDLE
Oil Pressure	20-30 psi	30-60 psi
Coolant Temp	170-190 F	170-190 F
Ammeter	+0-15 Amps	+30-50 Amps*

*Readings will vary depending on the condition of the battery and/or amperage demand. Record readings in Engine Log.

13. After operating engine temperatures have been achieved, return the throttle lever to the idle position. See 3-25. Engine Instrument Panel.
14. Check the operation of the prop by:
    - Retarding the throttle to idle.
    - Push the knob below the throttle IN.
    - Move the throttle forward and observe that forward propulsion occurs.
    - Retard throttle and pull into reverse to check for prop operating in reverse. Return throttle to idle.

REPORT SUCCESSFUL ENGINE START TO SKIPPER/OINC.

3-4.6 ENGINE SHUTDOWN PROCEDURE, PIER SIDE.

1. MOVE the throttle control to NEUTRAL and let the engine idle for approximately one minute.

2. PULL UP on the ENGINE SHUT DOWN T-HANDLE. After engine is shut down, return the T-Handle to the down position.

NOTE

The low oil pressure alarm will continue to sound until the engine alarm is switched OFF.

3. Turn Off Engine Alarm switch at the Electrical Switchboard Panel.
4. Check and record all applicable fluid levels, and update engineering and boat logs.

REPORT ENGINE SHUT DOWN COMPLETE TO THE SKIPPER/OINC.

3-4.7 SAIL INVENTORY.

1. Ensure that the sails required to support the planned sortie are on board. See Table 3-3 Sail Management.

REPORT SAIL INVENTORY COMPLETE TO SKIPPER/OINC.

3-4.8 COM/NAV EQUIPMENT CHECKS.

NOTE

Shore power may be maintained during electrical equipment warmup when the auxiliary diesel engine is not operating to avoid drawing down the selected SS battery bank prior to getting underway.

1. Turn on COM/NAV circuit breakers at the switchboard panel and check for proper operation. This can be accomplished while on Shore Power.
2. Operation of the following COM/NAV units for day/local sorties:
   - VHF radio.
   - Sailing Instruments.
   - Depth Sounder.
3. Ensure that Charts, Pubs, Schedules required for the sortie are onboard.
4. Shut down unnecessary COM/NAV equipment.

REPORT COM/NAV CHECKS COMPLETE TO SKIPPER/OINC.

3-4.9 STOWAGE PLAN.

The NAVY 44 Stowage Plan provides for uniformity in outfitting each boat. Table 1-4 details the items in each locker. Additional stowage information is contained in Figure 1-39. Stowage Plan. (Top View).

1. Ensure that sufficient stores for the planned sortie are onboard. Stow according to STOWAGE PLAN.

3-5 UNDERWAY PROCEDURES.

This section includes procedures for underway evolutions. They are presented in the order they most often occur during a sortie. Since the normal underway procedure includes the use of the engine, it is covered first.

3-5.1 OPERATING UNDER ENGINE.

1. Never exceed 2500 RPM.
2. Optimum cruise at 1800 RPM consumes approx .8 gal per hr.
3. Pause momentarily in neutral when shifting from forward to reverse and vice-versa.
4. Use throttle bursts when getting underway in reverse to minimize effect of prop torque.
5. Normal operating oil pressure is 30-60 PSI.
6. Normal engine coolant temperature is 180 degrees Fahrenheit.
7. Lift the "Idle Detent Latch Release" to move out of the idle position for each pass through neutral.
   Installed on all boats except NA 1, NA 2 NA 3, NA 4, NA 6.
8. Test reverse prior to any close maneuvering or mooring situation.

3-5.2 DEPARTURE.

These procedures will vary according to the configuration of the slip, dock, or mooring.

3-5.2.1 TYPICAL SLIP DEPARTURE.

1. Follow the A.C.disconnect procedures in 3-4.4
2. Ensure that all personnel are onboard.
3. SINGLE-UP all lines.
4. Order crew to "Take lines in hand" and bring vessel to windward side of slip if necessary.
5. Check for lines overboard.

6. At Santee Basin, request permission from Santee Basin Control via VHF 82A to exit the basin.

NOTE

Depending on number of crew, departure procedures under power call for crew to take lines in hand by leading lines outside the lifelines and preparing to cast off.

7. Selectively CAST OFF or TAKE IN LINES as necessary for departure.
8. Select REVERSE on the ENGINE, report "Backing".

NOTE

The NAVY 44 is typical of a single right hand screw vessel. It will back to port. The propeller shaft is offset to stbd to minimize this tendency.

9. Use throttle bursts, then idle down in gear to minimize twist of stern to port.
10. Hold the bow lines to control the boat orientation in the slip until no longer needed then toss them to the quay.
11. Walk the spring lines forward to the widest part of the boat to maintain control of boat orientation. Drape them on the pilings for access upon return.

3-5.2.2 TYPICAL DOCKSIDE DEPARTURE.

1. Follow the A.C. disconnect procedures found in 3-4.4.
2. Ensure that all personnel are onboard except for those required to cast off lines from the dock.
3. Single-up all lines.
4. Normal procedure is a departure under engine.
5. Make the appropriate signal.
6. Hold a spring line and operate the engine to work against this line. This will warp the boat out from the dock. (Aft spring, engine in reverse for warping the bow away from the dock. Forward spring, engine in forward to warp stern away from the dock.
7. Operate the engine in the direction required for the departure.

3-5.2.3 TYPICAL MOORING DEPARTURE.

Unless there is a strong current opposing the direction of the wind, the NAVY 44 is most likely to respond to the wind. Departing a mooring under sail is therefore an option

1. Ensure that all personnel are onboard.
2. Single-up the mooring pennant if applicable.
3. Normal procedure is a departure under engine. Hoist sails if a departure under sail is to be accomplished.
4. Make the appropriate signal.
5. Cast off the mooring.
6. Operate the engine in reverse to back off from the mooring. Back the jib to throw the bow to one side of the mooring to clear.
7. Operate the engine in forward to clear. Sheet the jib properly and sail away.

3-5.2.4 ENGINE SHUTDOWN PROCEDURE UNDER SAIL.

These procedures will ensure the MAX PROP is properly feathered..

NOTE

Ensure that the engine is operating in forward propulsion. The prop will not feather with the engine operating in reverse..

1. Operate engine to get 2 to 3 knots in forward gear.
2. Pull up on the T-handle to kill the engine while still in forward gear. Allow the engine to stop.

NOTE

If the propeller has been greased properly it will feather in a fraction of a second as soon as the shaft has stopped.

3. If the prop has feathered, go directly to step 7.
4. If the shaft is still spinning engage the transmission in reverse to stop the freewheeling.
5. Take the engine out of gear.
6. If the prop has not feathered, the shaft will continue to freewheel like with a

fixed blade propeller. In this case start the engine and repeat steps 1 through 3.

7. To align the prop so as to hide the maximum girth behind the keel, deploy a crewman to the deck plate aft of the engine.
8. He should grasp the prop shaft and call out, "Put the throttle in neutral and pull out the clutch button.".
9. Helm should accomplish this action and respond, "Clutch button is out".
10. Crewman should rotate the shaft until the key way is at the 10 o'clock position and call out, "Prop aligned".
11. The engine can be left either in or out of gear.
12. Push engine shut down T-Handle down to ready engine for subsequent start.

REPORT ENGINE SHUT DOWN COMPLETE TO SKIPPER

3-5.3 LOGS AND LOG KEEPING

Refer to applicable procedures. References include:

- DNAS INST 3120.1A - Standard Operating Procedures ("SOP")
- DNAS OPORD 201- Current year OpOrder

3-5.4 RUNNING RIGGING AND DECK HARDWARE.

Running rigging is the equipment used to hoist and trim the sails. It includes halyards, running backstays, cunningham, sheets, guys, snatch blocks, footblocks, fiddleblocks, spreacher blocks, preventer, and winch handles.

3-5.4.1 RUNNING BACKSTAYS.

The running backstays must be used to provide stability to the mid-mast region when the collapsible inner forestay is used for setting the storm jib or genoa staysail. They are also used with the collapsible inner forestay to minimize "mast pumping" when operating under engine in lumpy seas. They are stowed against the after lower diagonal shroud turnbuckles and tied off with shock chord. A plastic split tube is attached around the running backstay wire at the lower spreaders to eliminate wear against the back edge of the aluminum spreaders.

To use the running backstays:

1. Free up the running backstay.
2. Attach the rope tail (stowed in the line locker) with the D shackle that's on the runner tail.
3. Lead the rope tail to a snatch block rigged to the toe rail between the primary and secondary winches, then to the secondary winch.
4. Tie a stopper knot in the end of the rope tail.
5. Add reasonable tension, not heavy, to the windward running backstay with the winch and secure the line on a cleat.
6. When tacking, release the loaded running backstay as the boat comes through the wind.
7. Load the new windward running backstay before the sails fills and puts a load on the mast.

3-5.4.2 BACKSTAY CONTROL.

The NAVY 44 is equipped with one of two types of backstay tension control devices.– NA-1 thru NA-8 have Krueger tensioners while NA9 thru NA20 have the NAVTEC tensioner. Use the backstay tensioner to pull the head of the mast aft as the wind increases. The forestay will tighten to reduce forestay sag which will give the headsail better entry. The opposite force exerted at the mast is seen as a bending of the mid section of the mast forward. This will help to flatten the mid section of and control the draft in the mainsail.

3-5.4.3 KRUEGER BACKSTAY TENSIONER.

This tensioner is adjusted as follows:

1. To increase the load on the system close the load release valve (bleed valve) by turning clockwise until finger tight. The gauge is located on the top of the Krueger tensioner and reads in thousands of pounds of tension. Use the hand pump to increase pressure to the desired load.

2. To release pressure, turn the bleed valve counterclockwise approximately 1/4 turn. Close the bleed valve when the desired pressure is attained. Minimum pressure for a static system at rest is 500 pounds. See Figure 1-10.

3-5.4.4 NAVTEC BACKSTAY TENSIONER

This tensioner has a gauge that reads in pounds per square inch of cylinder pressure. Newer gauges have a double ended pointer. The reverse end of the pointer gives load on the system in thousands of pounds. In both models the gauge is located at the base of the cylinder on the stbd side.

1. To increase the load on the system turn the load release valve (bleed valve) clockwise until finger tight. The valve is located on the port side of the cylinder opposite to the pressure gauge. Use the hand pump to increase pressure to the desired load.
2. To release the load turn the bleed valve counterclockwise approximately 1/4 turn. Close the bleed valve when the desired load is attained. Minimum pressure for a static system at rest is 500 pounds. See Figure 1-11.

3-5.4.5 CUNNINGHAM.

The cunningham is a light duty block and tackle used to tension the luff of a fully hoisted mainsail. It is primarily used to keep the maximum draft of the mainsail forward as the wind increases. Increasing wind pressure in the sail tends to make the draft of the mainsail move aft. To relocate the draft to the proper position, to about the forward 1/3rd of the chord of the sail, increase tension on the cunningham.

1. Attach the hook of the cunningham to the lower cringle on the luff of the mainsail.
2. The tail of the cunningham is led aft to a cam cleat on the port side of the cabin top adjacent to the main companionway.

3-5.4.6 SNATCH BLOCKS.

Snatch blocks provide a lead block where needed. This is limited only by the imagination of the skipper and crew. Typical locations are:

1. On the toe rail two holes aft of the life line stanchion. Use as a lead block for spinnaker guys.
2. On the toe rail at the midship life line stanchion for outboard jib lead, staysail, and genoa sheet leads.
3. On the toe rail as a lead block for the spinnaker to keep the spinnaker sheet from rubbing on the boom.
4. On the padeye for the foreguy for the heavy gybe preventer.

3-5.4.7 SHEETS AND GUYS.

A sheet is a line that controls the clew of a sail. A guy is a line that is led to the spinnaker pole outboard jaw end to control the spinnaker to windward. The spinnaker guy, typically called the afterguy, is a low stretch spectra line. It includes a snap shackle attached to the sheet. A "donut" stopper is fitted to keep the snap shackle from running into and fouling on the spinnaker pole jaw.

3-5.4.8 SPREACHER BLOCKS.

Spreacher blocks are attached to the toe rail below the lower rail of the stern pulpit. They are used as turning blocks for the spinnaker sheets, and for leading other lines such as the storm trysail sheet, or a changing spinnaker sheet.

3-5.4.9 WINCH HANDLES.

Winch handles are used to control the rotation of the winches. All the handles on the NAVY 44 are "locking" type. A small spring loaded lever on the handle head engages and disengages the lock device. Winch handles are stowed in a "Hernia box" milk crate in the stbd cockpit locker. There are single handed handles, (short hand grip), and double handed handles, (long handgrip).

1. Deploy winch handles to the winch handle pockets in following locations:
   - The cowls in the middle of the cabin trunk for cabin top winches forward.
   - The cowl to the port side of the main companionway for the cabin top winches aft.
   - At the forward corners of the cockpit near the life raft stowage for the main and secondary cockpit winches. These are double handed winch handles.

3-5.5 SAIL MANAGEMENT.

It is not the purpose of this document to teach an individual how to sail. Basic sailing terms and maneuvers are covered from the view point of how they can be accomplished in the NAVY 44. The procedures listed here describe the requirements to execute a maneuver and are

not offered as the ONLY way to accomplish the action, rather are the result of many hours of training novice sailors, and represent a point of departure. Organization of this section is as follows:

- Procedures for "Bending On" sails.
  Mainsail.
  "Hank-On" Jib.
- Basic Terminology.
- Commands.
- Maneuvering under sail.
  Sail Trim.
  Jib.
  Main.
  Hoisting Sails
  Mainsail.
  "Hank-On" Jibs.
  Headsail changes - "Hank-On" jibs.
- Spinnaker
- Advanced Sail Management Headsail Changes - luff groove Heavy Weather Sails (Storm Jib and Storm Trysail) are contained in Chapter 6, Special Operations.

3-5.5.1 BENDING ON THE MAINSAIL.

The new mainsail introduced in year 2000 is loose footed. Steps 1 and 2 are not required for this sail. Since all NA 44s are not yet equipped with this sail the procedures are retained for using the older sails.

1. Place mainsail on the cabin top adjacent to the mast and remove from the sail bag. Stow the bag below.
2. Put the clew end foot slug into the boom cove at the front of the boom and unroll the sail on the deck as the clew is fed to the aft end of the boom.
3. Attach the tack cringle to the gooseneck with the clevis pin provided on the boom.

NOTE

See Figure 3-2. Outhaul, for proper attachment of the clew of the sail to the boom in steps 4 and 5.

4. Attach the clew to the outhaul car with a shackle.
5. Attach the wire outhaul control line directly to the clew of the sail.
6. Remove the sail slide stop on the mast and feed the sail slides of the luff into the mast track.
7. Replace the sail slide stop.
8. Rig the "first reef" line at the end of the boom through the "first reef" cringle on the leech of the sail.
9. Bring the line straight down, pass it between the foot of the sail and the boom, then down around the boom and back up.
10. Tie the end of the line around the standing part with either a Bowline or Timber Hitch. See figure 3-3. How to tie a reef line.
11. Flake the sail on the boom, secure it in place with sail ties, and put on the acrilan sail cover.

3-5.5.2 BENDING ON A JIB/GENOA- "HANK-ON" JIB.

1. Select the desired sail depending on the wind/sea conditions. See table 3-3. Sail Management.
2. Bring the sail up on the foredeck and place near the forward lower shrouds.
3. Roll the sail toward the forestay taking care not to let the sail blossom in the wind.
4. Attach the tack to the forward most snap shackle at the stem fitting. This will leave the second one open for a sail change.
5. Hank on the luff hanks, (all pistons to the same side), to the headstay taking care not to twist the sail.
6. Attach the desired, jib halyard to the head of the sail.
7. Attach the jib sheets to the clew cringle with a bowline. Lead the sheets to the proper track fairleads and to the corresponding winches at the cockpit. Genoas lead outside the shrouds. Jib sheets lead outside
   the forward lower shrouds and inside the upper and aft lower shrouds.
8. Lead the jib sheet to the foot block on the cockpit combing aft of the primary and secondary winches.
9. Tie a figure eight stopper knot in the tail of the sheet.

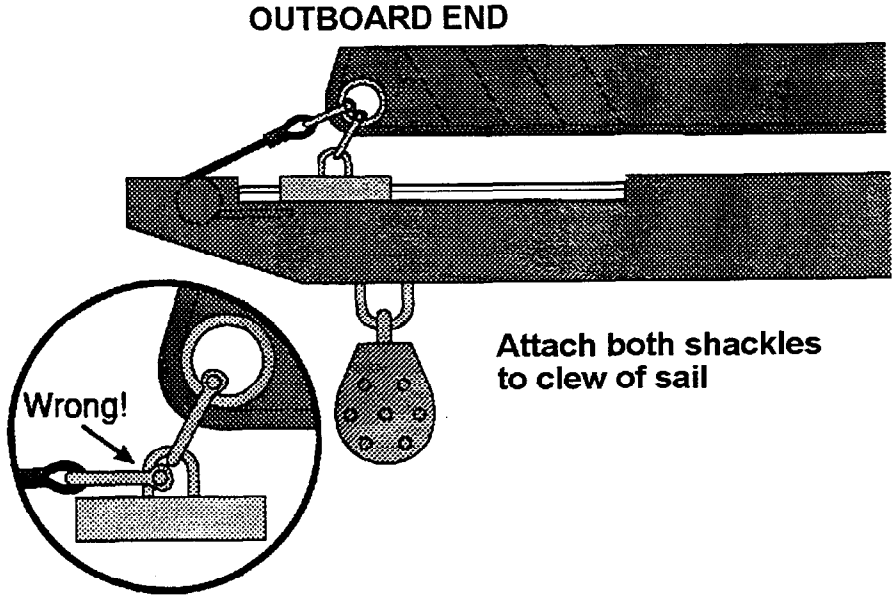
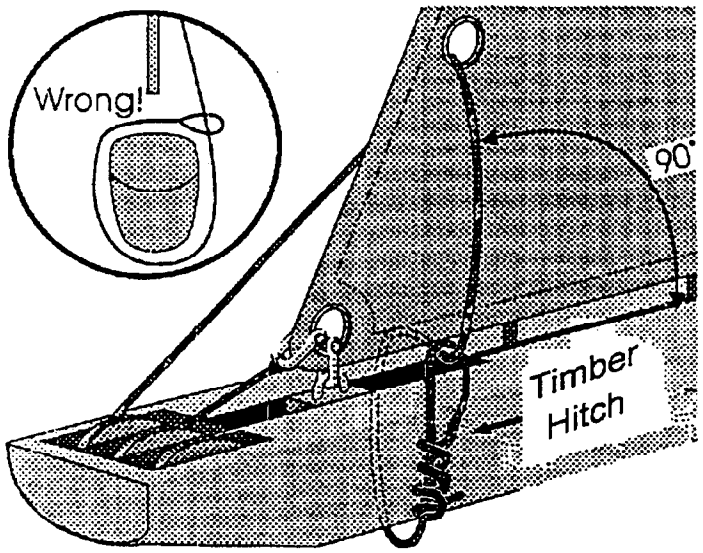


Figure 3-2. Outhaul



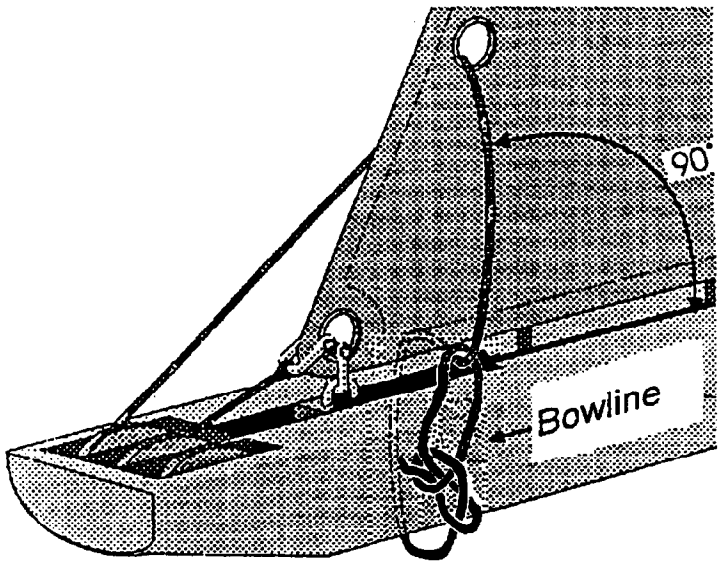


Figure 3-3 How to tie in a reef

5.5.3 BENDING ON THE GENOA STAYSAIL.

The genoa staysail is hanked on the collapsible inner forestay. The clew is secured to the swivel-snapshackle at the inner forestay location. The topping lift, (T-Lift), is used as the halyard. Sheets are led the same as for a #3 or #4 jib, outboard of the forward lower shroud, inboard of the upper shroud and the aft lower shroud.

1. Set up the collapsible inner forestay.
2. Bring the sail up on the foredeck and place near the forward lower shrouds. Remove the sail from the bag.
3. Roll the sail toward the collapsible inner forestay taking care not to let the sail blossom in the wind.
4. Attach the tack to the swivel snapshackle at the base of the collapsible inner forestay.
5. Hank on and work up the luff.
6. Attach the T-Lift to the head as the halyard. Make sure it is not wrapped around the forestay.
7. Run sheets as for a #3 headsail.
8. Hoist the sail.
9. Trim the sail.
10. Adjust the control blocks as necessary for the wind condition.

3-5.5.4 SAILING TERMINOLOGY.

TACKING. A turn moving the bow thru the wind line so that the mainsail boom passes from one side of the boat to the other.

HARDENING UP. A maneuver that moves the bow of the boat toward the wind-but does not cross the wind line.

CLOSE HAULED. Sailing the boat as close to the wind line as possible.

GYBING. A turn moving the stern thru the wind so that the mainsail boom passes from one side of the boat to the other.

BEARING AWAY. A maneuver that moves the bow away from the wind...but does not cross the wind line.

3-5.5.5 COMMANDS.

The following are "defined words" that specify a particular action. They have been chosen to avoid confusion.

TRIM- To trim a sail means to check its shape or angle to the wind and adjust as necessary.

EASE- To let out a sail, line or halyard; also to move the boat away from the wind. Hand signal is rotating the index finger pointing down.

TAKE- To take in on a sail, line. Hand signal for a halyard is rotating the index finger up

TENSION. Load, as on a halyard, sheet or backstay. This is preferred to, "take in the slack", because if only the last part of the command is heard, an improper action will be accomplished.

HOLD- Temporarily stop what your are doing, such as grinding on a winch, also a steering command as in "Hold your course". Hand signal is a fist.

MADE- Indicating a connection has been "made", as in a shackle or halyard is secured, the connection of the new guy has been "made" to the spinnaker pole when gybing.

3-5.5.6 SAIL TRIM

In order to derive full power potential from the sails, they should be trimmed to best advantage. The following is offered as helpful hints to approach optimum trim. Note the wind velocity and check the sail inventory guide for the correct sail. See Table 3-3, Sail Management.

3-5.5.6.1 JIB TRIM

1. Check the lower set of telltales in the luff of the sail. Both the inside and outside telltales should be streaming. The inside telltale will probably be at a higher angle than the outside telltale.
   - If the inside telltale is floating, you are "light", or "pinching", (not as much pressure in the sail as should be), sailing too close to the wind.

Bear off, away from the wind, until the telltale are parallel.

- If the outside telltale is floating you are "fat", (too far away from the wind for the trim of the jib). Either bring the boat up toward the wind until both telltales are streaming, or maintain heading and ease sails until the tail tales are in trim.

Table 3-1. Sail Management

SAIL	APPARENT WIND	SHEETING POSITION	MAIN SAIL
# 1 GENOA	0 - 12	AFT TRACK 3 HOLES FROM AFT END	FULL
# 2 GENOA HI CLEW	0 - 15 15 -18	SNATCH BLOCK ON TOE RAIL NEAR PRIMARY WINCH	FULL 1ST REEF
GENOA STAYSAIL	0 - 12 12- 18	FWD TRACK 5 HOLES FROM FRONT	FULL 1ST REEF
#3 WORKING JIB	16 - 22 22 - 25 25 - 30	FWD TRACK 5 HOLES FROM REAR	FULL 1ST REEF 2ND REEF
#4 HEAVY WX JIB	30 - 35	FWD TRACK 5 HOLES FROM FRONT	2ND REEF
STORM JIB	35+	SNATCH BLOCK AT MAX GIRTH TOE RAIL AFT OF STANCHION	2ND REEF OR STORM TRYSAIL
STORM TRYSAIL	35 +	SPREACHER BLOCKS	TRIM BOTH SHEETS SIMULTANEOUSLY

2. Check the higher set of telltales against the lower telltales. Slowly bring the boat toward the wind and note which set breaks first.
    - If the higher set breaks first, the sail needs more leech tension, (the upper portion of the sail is too loose and at a greater angle of attack than the lower portion). Move the lead block forward on the genoa track.
    - If the lower set breaks first, the sail needs more foot tension, (to close up the lower portion of the sail). Move the lead block aft on the genoa track.

3-5.5.6.2 MAINSAIL TRIM

The sail has been cut by the sailmaker to create an airfoil shape. Improper trim can effectively distort this airfoil. The most common tendency is to "over trim". Use the memory crutch - "When in doubt, let it out". This helps to ensure that the sail has not been over trimmed.

1. The two controls that are used to control the positioning of the mainsail are the sheet and the traveller. For gross adjustments the sheet is used to control all movement of the boom, (in and out, as well as up and down). When making the final fine adjustments the sheet is used to control the "up and down" movement of the boom. The boom vang can be used to "lock in" the desired position and ensure that it will be replicated when the boat is tacked. The traveller is used to control the "in and out" movement of the boom.
    1. Check the luff area of the sail. It should be firm. "When in doubt, let it out". The sail should be "let out" until the sail stalls, (a distortion of the sail shape will occur just aft of the luff called "luffing"). Trim to stop the "luff".
    2 There are telltales at the leech ends of the batten pockets. They give an indication of the wind flow where the windward and leeward airstream meet at the leech of the sail.
        - If the telltales are all falling way to leeward, the sail is over trimmed, (too close to the centerline of the boat). "When in doubt-let it out". Ease the sheet until the telltales stream straight aft from the leech.
        - If the telltales are floating, or hooking to windward, the sail is too far away from the centerline of the boat.
        - Bring in the sail until the telltales stream straight aft from the leech.
        - Fine adjustments can then be made. Trim in the sail until the top telltale does not stream anymore, then ease the sail out until the top telltale just starts to stream aft.
    3. Check the telltales in the draft of the sail.
        - If the inside telltale is floating, the draft is probably too far aft in the sail. Increase cunningham tension. The fattest part of the airfoil, (camber), should be between one quarter and one half of the length of the sail at that point, (chord). Check the draft stripes to observe the curvature of the airfoil.
    4. The mainsail effects the helm forces on the steering wheel. The center of effort of the mainsail is aft of the center of lateral resistance. If the mainsail is trimmed to tight this will cause the boat to heel excessively and "round up" toward the wind. This is called "weather helm". Helm will be required to steer a straight course. As the boat heels over, the center of lateral resistance moves forward due to the increased size of the leeward bow wave. The center of effort of the sail plan must also move forward to counter the shift in lateral resistance. A "heavy helm" can be trimmed out by easing the mainsail. Adjusting the mainsail in these ways can keep the boat's helm in balance.
    - Ease the mainsheet traveler control line.
    - Ease the mainsheet.
    - Ease the boom vang.
    - Reefing.

3-5.5.7 TACKING THE NAVY 44 - CLOSE HAULED TO CLOSE HAULED.

Safety Considerations:

1. Ensure jib/Genoa sheets are clear both in the cockpit and forward.
2. Ensure intended course is clear of other boats, shipping, and navigation hazards.

3. Ensure crew members are alerted to the maneuver and in "safe zones" for the maneuver.

General Situation:

Assume going upwind in moderate conditions.

Required Positions:

HELM (steers the boat).

GRINDER (grinds the winch to take in the new sheet).

TAILER (works the tail of the new sheet).

WORKING SHEET. This person can double as Grinder after casting off.

Sequence of Events:

1. HELM calls out "Ready About". Crew members take assigned positions. If known, HELM lets crew know what point of sail they should trim to on the new tack.
2. TAILER places sufficient turns for wind conditions on the windward winch, takes the slack out of the lazy sheet, and stands in the cockpit. Discusses with GRINDER whether they have all the turns needed or will be putting more on before the winch handle is inserted. Reports "Ready" to HELM.
3. GRINDER gets double handled winch handle, and stands forward of the windward winch facing aft with one foot against the toe rail and the other in the cockpit. Reports "Ready" to Helm.
4. WORKING SHEET uncleats the leeward sheet, removes excess turns from the leeward winch. Reports "Ready" to HELM.
5. After receiving "Ready" reports from crew, HELM calls out "Helm's-a-lee.
6. WORKING SHEET, as the boat comes into the wind, watches the luff of the jib or genoa and as it begins to luff, stands up on the seat and takes the turns off the winch, calling "Break". Once the turns are off, watches the sheet go through the turning block ensuring it does not foul.
7. TAILER at the call "Break" and as the old sheet is cast off , tails as hard and fast as possible, taking more turns on the winch as needed.
8. GRINDER watches to ensure TAILER has the required turns, inserts handle and commences grinding in the high speed direction. Switches to low speed when the load becomes great and completes the trim of the jib.
9. TAILER keeps tension on the sheet and once GRINDER switches to low speed, sits on the cockpit seat facing forward with outboard leg straight. Watches to see the trim of the genoa/jib and that the sail is clear of the spreader to tell GRINDER when to stop.
10. HELM communicates with Trimmers to determine exact trim and whether HELM wants to point or reach.

HELPFUL HINTS AND COORDINATION:

1. HELM can overshoot the desired new close hauled course slightly so that the boat will match the jib trim position and the jib will start to drive the boat sooner in the turn. As GRINDER brings in the jib trim, HELM can pace wheel movement to come up to new course. Calls "Course" when arrives at new course.
2. Communications is required between TAILER and HELM to determine exact trim and whether HELM wants to "point" or "foot".
3. Mainsheet trimmer trims to match the "overshoot" position and adjusts the main to "point" or "foot" as boat speed is gained on the new tack.
4. In light air it may not be necessary to put more turns on prior to grinding. TAILER and GRINDER should discuss whether all the turns required have been taken prior to inserting the winch handle.

3-5.5.8 GYBING.

WARNING

The gybe is a potentially dangerous maneuver. The mainsheet and boom can exert deadly forces. Crew coordination is vital. Mainsheet trimmer must take care, especially when gybing on to port tack because the mainsheet moves toward the mainsheet winch, and can trap him between the mainsheet and the cabin top.

Safety Considerations:

1. Ensure Jib/Genoa sheets are clear both in the cockpit and forward.
2. Ensure mainsheet tail is clear.
3. Check to ensure intended course is clear of other boats, shipping, and navigation hazards.
4. Ensure crew members are in safe zones for the maneuver. Specifically, they should stay off the "Bridge Deck" and be mindful of the mainsheet partners as the gybe is executed.
5. DO NOT allow boom to gybe without trimming to centerline, even in light wind.
6. HELM is in charge and in control of the evolution. HELM must be cognizant of the respective jobs and chronology. Specifically, that HELM should time the rate of turn. He should not cross the wind line until the mainsail is centerlined. He can slow down or speed up the gybe for a smooth, safe gybe. If the coordination is not going right, HELM should slow or stop the turn until everyone is in sync.

General Situation:
The description below starts with the boat on a broad reach aiming to arrive at a broad reach on the other tack.

Required Positions:

HELM.
GRINDER.(grinds the winch to take in the new sheet).
TAILER (works the tail of the new sheet).
WORKING SHEET This person can double as GRINDER.
MAINSHEET.

NOTE

A PREVENTER is a safety device used to guard against an accidental gybe. It will be used anytime the wind is at a greater angle than 120 degrees either side of the bow. It should be rigged prior to the gybe maneuver. For rigging procedures and crew deployment requirements see Chapter 1, 1-5.5 The Preventer System.

PREVENTER. This can be an added responsibility of GRINDER, TAILER, or WORKING SHEET. Depending on conditions, one person may be WORKING SHEET, TAILER, PREVENTER and GRINDER.

Sequence of Events:

1. HELM calls out "Prepare to gybe" and lets crew know what point of sail they should trim to upon completion of the gybe.
2. PREVENTER eases the loaded side of the preventer. and reports, "Preventer is clear" to HELM.
3. MAINSHEET takes sheet out of the self-tailing winch and removes excess turns from winch, checks the positions for the traveler, and that both ends of the traveler control line are cleated. He then reports "Ready Mainsheet" to HELM.
4. WORKING SHEET uncleats sheet, removes excess turns from the winch, ensures sheet is clear to run, stand in cockpit, and reports "Ready" to HELM.
5. TAILER places one or two turns on the winch, makes the sheet snug, and reports "Ready to HELM.
6. GRINDER gets double handled winch handle, stands by the lazy sheet winch, and reports "Ready" to HELM.
7. After receiving "Ready" reports from crew, HELM calls out "Bearing Away" and turns the stern toward the wind.
8. MAINSHEET and WORKING SHEET ease sail to maintain trim. TAILER keeps taking on the sheet to minimize slack.
9. When wind reaches 150-160 degrees apparent, MAINSHEET trims the mainsail, timing it so that the main is amidships before the boat is dead downwind. An extra crew member can sit on the cabin trunk and help with the trim by pulling down on the vertical part of the mainsheet. The designated crew for PREVENTER takes "line in hand" on the "new" side of the preventer.
10. HELM calls, "Gybe HO!" as the stern passes through the wind, and the boom is crossed to the other side of the boat.

11. WORKING SHEET eases, then casts off the sheet as the TAILER trims the new sheet to the expected point of sail.
12. MAINSHEET eases the main to the expected point of sail.
13. If sailing with wind abaft 120 degrees apparent, PREVENTER resets the preventer.

3-5.5.9 CHANGING A HEADSAIL - "HANK ON" JIB.

The "hank on" boat will be "Bald Headed" while the change is made. A change can be made by:

- Changing tacks.
- Maintaining the same point of sail.
- Bearing away to sail off the wind. (This is a smart consideration during heavy weather). There are three basic sail change situations that will vary the sequence and rapidity of the change. Each has its appropriate place.
- The "tack change" is typically used in restricted waters situations when there is an urgency to complete the evolution.
- Changing while remaining on the same tack is useful when on a long passage, when there is more time and/or, there is no room to tack.
- Finally, a change wherein the boat bears away until the wind is abaft the beam to reduce pitching and water coming on deck is best in more sever conditions at sea with plenty of sea room.

3-5.5.9.1 "HANK ON" JIB - TACK CHANGE.

Safety Considerations:

1. Depending on time of day and prevailing conditions, harnesses may be required.
2. Talk through the evolution so the crew understands each person's responsibilities.
3. Check the area for other boats, shipping, and navigation hazards which might impact the timing of the evolution.

General Situation:

Assume going upwind in moderate conditions and changing from a larger to a smaller headsail.

Required Positions:

HELM.
GENOA SHEET
FOREDECK #1 (boss of the foredeck).
FOREDECK #2
MAST

NOTE

A MAINSAIL TRIMMER may be assigned for the tack; however, it isn't imperative that the sheet and/or traveler be adjusted.

Sequence of Events:

1. HELM announces what type of change and what sail will be raised: "Standby to change to the #3, this will be a tack change". HELM also assigns crew positions and indicates whether the new sail will be brought on deck through the forward hatch (normal route), or through the companionway (taking weather into account).
2. GENOA SHEET using either the lazy sheet or a changing sheet sets the new lead position and leads the new sheet to the foredeck; reports "New Lead Made"
3. FOREDECK #1 and 2 bring new sail on deck, remove it from the bag, unroll it toward the forestay, and hank on the new sail on the weather side of the headstay below the first hank of the sail already set. Attach the new Genoa sheet ensuring it is properly led and that the sheet is clear. Report "Ready " to HELM.
4. MAST readies the working jib halyard for release by taking the halyard out of the self-tailer and checking for knots and tangles. Removes excess turns from the winch. Reports "Ready" to HELM.
5. After receiving "Ready" reports from crew, HELM calls out "Tacking, change to the #3" and turns the boat into and through the wind.
6. GENOA SHEET casts off when appropriate and stands by to trim the new sail.
7. MAST watches for the boat to come up, and for the genoa sheet to be eased, then begins to lower the halyard. Removes excess turns as the load decreases but leaves at least one turn on the winch.

8. FOREDECK #1 un-hanks the sail as it comes down the headstay. Once the sail is un-hanked, changes the halyard to the new sail and calls "Made" to MAST.
9. FOREDECK #2 gathers the sail as it comes down and pulls it aft and to weather. After sail is down, moves aft to help MAST hoist the new sail.
10. MAST when halyard is shifted to new sail, hoists the sail. When hoisted, calls "High" to GENOA SHEET. Makes up tail and secures it.
11. GENOA SHEET when "High" call is received trims to course.
12. FOREDECK 1 and 2 re-lead lazy sheet to new sail. Fold, bag, and stow old sail.

NOTE

Under most conditions it is not prudent to leave a sail on deck for a prolonged period (whether bagged, hanked, or lashed). Consider rolling smaller headsails from the "hanks to the clew" so that in heavy weather when the sail is brought on deck it can be taken out of the bag at the shrouds and unrolled forward. This becomes a single person job as opposed to a two person job.

3-5.5.9.2 CHANGING A HEADSAIL, SAME TACK - "HANK-ON" JIB.

The same procedures apply as for CHANGING ON A TACK. Omit the tack in Step 5.

3-5.5.9.3 CHANGING A HEADSAIL, BEARING AWAY - "HANK-ON" JIB.

The same procedures apply as for changing on SAME TACK. Amend step 5 to "Bear Away" to a comfortable point of sail as determined by wind and sea conditions.

3-5.5.10 REEFING THE MAINSAIL.

As the wind strength increases and the headsail is changed down to a smaller sail, the size of the mainsail can be reduced through reefing in order to keep from overpowering the boat.

Safety Considerations:

1. When wind/weather conditions require a reef, harnesses may also be required.
2. Avoid stepping in the bight of the main halyard.
3. Ensure personnel remain clear of the boom and mainsheet partners to prevent injuries from erratic movements.
4. This evolution required constant communications.

General Situation:

Assume sailing on a beam reach or closer to the wind in moderate to heavy conditions.

Required Positions:

HELM
MAST
MAIN HALYARD
MAINSHEET
REEFING LINE

Sequence of Events:

1. HELM calls out "Prepare to reef" and crew takes positions.
2. MAST checks mast ensuring sail slides are free to run and reefing hooks are free. Takes position on the windward side of the mast and reports"Ready Mast" to HELM.
3. MAIN HALYARD ensures halyard is clear to run, uncleats or removes halyard from the self tailer, removes excess turns from the winch, and reports "Ready Halyard" to HELM.

NOTE

If the second reef is being set, Ensure that the first reef rope clutch in the boom is set before the line for 1st reef is taken off the winch.

4. REEFING LINE ensures the correct reef line is led fair and places necessary wraps on winch. Ensures that the reef lines are tied in correctly at the correct places.
   Reports, "Ready" to HELM.
5. MAINSHEET ensures vang and sheet are clear to run, takes position facing the main and reports "Ready" to HELM.
6. Receiving "Ready" reports, HELM calls out "Take the reef" and maintains course, anticipating the boat's tendency to fall off once the main is eased.

7. MAINSHEET eases sheet until sail luffs and eases vang.
8. MAIN HALYARD eases halyard as the sheet is eased. DO NOT remove turns from the winch since the halyard will be tensioned again after the reef in made.
9. MAST assists sail slides down the track, puts reefing cringle onto the reefing hook, and calls out "Made". Communication with Main Halyard about whether halyard needs easing or trimmed is critical.
10. REEFING LINE takes in on reefing line as the halyard is eased. As soon as he hears "Made" from MAST, trims the reefing line, listening to MAINSHEET for when to stop.
11. MAST ensures that the cringle stays on the reefing hook..
12. MAIN HALYARD trims halyard after hearing "Made". Works with MAST to watch luff tension as halyard is ground in.
13. MAINSHEET directs REEFING LINE to grind until the clew is snug against the boom and under tension.
14. Once halyard and reefing line are trimmed, MAINSHEET trims sheet and vang.
15. MAIN HALYARD and REEFING LINE make off and coil respective lines.
16. Excess sail cloth is pulled to windward, rolled, and tied with sail ties reeved through the reef points and between the foot and the boom. (Use a slippery reef knot).

Helpful Hints:

1. If the reef will be in place for a while, tie a sail tie through the new clew and around the boom as a safety measure.
2. If conditions are worsening and a second reef is anticipated, put the stopper on the first reefing line and rig second reefing line.
3. The reefing lines are color coded. 1st reef has a GREEN TICK, (STBD side of mast). 2nd reef has a RED TICK, (PORT side of the mast).

3-5.5.10.1 SHAKING A REEF.

Safety Considerations:

1. Avoid stepping in the bight of the main halyard.
2. Ensure personnel remain clear of the boom and mainsheet partners to prevent injuries from erratic movements.
3. This evolution required constant communications.

General Situation: Assume sailing on a beam reach or closer to the wind in moderate to heavy conditions.

Required Positions:

HELM
MAST
MAIN HALYARD
MAINSHEET
REEFING LINE

Sequence of Events:

1. HELM calls out "Prepare to shake the reef". Crew removes sail ties from reef points and clew and takes positions.
2. MAST checks mast ensuring sail slides are free to run, takes position on the windward side of the mast, and reports "Ready Mast" to HELM.
3. MAIN HALYARD ensures halyard is clear to run, uncleats or removes halyard from the self tailer, removes excess turns from winch, and reports "Ready Halyard" to HELM.
4. REEFING LINE ensures that the rope clutch on the appropriate reefing line to be eased is open, ensures that all sail-ties are removed, removes line from self tailer ensuring it is clear to run, and removes excess turns from winch.

NOTE

If "Shake Both Reefs" is commanded, ensure that both rope clutches are open, and reef lines are free to run.

If only the second reef is commanded to be shaken, REEFING LINE ensures that the first reef line is set correctly .

Reports "Ready Reef Line" to HELM.

5. MAINSHEET ensures vang and sheet are clear to run, ensures that all sail-ties are removed from the mainsail, takes position facing the main and reports "Ready MAINSHEET" to HELM.
6. After receiving "Ready" reports from crew, HELM calls out "Shake the reef" and maintains course, anticipating the boat's tendency to fall off once the main is eased.
7. MAINSHEET eases sheet until sail luffs and eases vang and is ready to trim as needed to prevent excess luffing as the reefing line is eased.
8. REEFING LINE eases reefing line simultaneously with sheet and halyard easing; continues easing as halyard is trimmed, ensuring reefing line is slack.
9. MAIN HALYARD eases halyard as the sheet is eased; halyard is eased only enough to remove the cringle from reefing hook.
10. MAST unhooks the cringle as soon as the halyard is eased then jumps halyard once the cringle is freed.
11. MAIN HALYARD trims halyard after cringle is freed, putting on extra turns as the halyard comes under tension. Works with MAST to watch luff tension as halyard is ground in; person watching sail tension calls "High".
12. Once halyard is "High", MAINSHEET trims sheet and vang.
13. MAIN HALYARD and REEFING LINE make off and coil respective lines.

3-5.5.11 ADVANCED SAIL MANAGEMENT

The primary mode of power for the NAVY 44 is sail. Harnessing the power of the wind is an esoteric endeavor. The U.S. Sailing Association has prepared performance models for the NAVY 44. As an aid to maximizing boat performance see 3-5.6.12, BOAT PERFORMANCE later in this section.

A series of the NAVY 44 are rigged with a foil headstay for more efficient sail changing, NA-9 thru NA-12). The advantage is that a new sail can be set and trimmed before the old sail is dropped, thus the need to make a "Bald Headed" change is eliminated.

3-5.5.11.1 BENDING ON A JIB/GENOA - LUFF GROOVE.

Many of these sails are in sausage bags, and a sail tie lives around the luff of the headsail in the bag.

1. Select the desired sail depending on the wind/sea conditions.
2. Bring the sail up on the foredeck and place near the headstay. Tie the bag down.
3.. Attach the jib sheets to the clew cringle with a bowline. Lead the sheets to the proper track fairleads and to the corresponding winches at the cockpit. Genoas lead outside the shrouds. Jibs lead outside the forward lower shroud and inside the upper and aft lower shrouds.

4. Attach the track cringle to the horn or snap shackle at the stem fitting and secure it in place with the shock cord on the stem fitting.
5. Foredeck takes off the sail tie and taking care not to twist the sail, feed luff tape into the pre-feeder on the forestay, then into the luff grove on the forestay that corresponds to the horn or shackle used for the tack, (port horn, Port groove).
6. Attach the jib halyard that corresponds to the horn/groove used.
7. Take tension on the jib halyard to keep the head in the groove.
8. Tie stopper knots in the tail of the sheets according to skipper preference.

NOTE

The run of the jib sheet from the block that determines the sheeting angle of the sail, to the winch needs to be controlled. When this distance is great the sheet will whip as it is being sheeted in and may cause a winch over ride.

10. Lead the jib sheet to a turning block near the winch that will control sheet whipping, This can be a snatch block attached to the toe rail in the vicinity of the winch, or to the foot blocks mounted on the rail. Skipper preference.

11. Control the Genoa fairlead position with the fairlead adjuster system at the forward end of the cockpit port and starboard, outboard of the cabin top .

3-5.5.11.2 CHANGING A HEADSAIL - "LUFF GROOVE".

The advantage is that with two luff grooves in the forestay a new sail can be hoisted on the second groove while the old sail is still flying and providing power. The boat does not have to be sailed "Bald Headed" while the new sail is raised. This is an important consideration while racing. The Genoa sails are usually stowed in a "Sausage" bag with a breakaway zipper to facilitate the sail change.

With the "Peel Away" system a new thought logic is introduced. Four methods can be employed depending on which side the free luff groove is located: Easiest to most difficult:

- Inside set Inside peel.
- OUTSIDE set INSIDE peel away (same tack)
- INSIDE set OUTSIDE peel away (same tack)
- OUTSIDE set OUTSIDE peel away (tack while changing) The importance of "Bearing Away" to change is diminished because sailing with a headsail continuously flying contributes to boat stability.

3-5.5.11.3 INSIDE SET, INSIDE PEEL, THE PREP and SEQUENCE.

Crew positions involved:

HELM.
FOREDECK.
FREECREW.
CAST OFF.
TAILER. (works the tail of the new sheet).
GRINDER (grinds the winch to take in the new sheet).
MAST
HALYARD WINCH(works halyard winches)

1. HELM Calls for the sail change, announces the type of change, On a Tack, While tacking, or Bearing Off. Directs FOREDECK in what headsail to use. This case- Inside tack set.
2. FOREDECK goes below and gets the new sail ready to bring up on deck. Normally the new sail is brought up on deck through the fore hatch.
3. FREECREW stands by on deck until FOREDECK gives signal that new sail ready.
   - FOREDECK opens forehatch and starts new sail up.
   - FREECREW pulls sail on deck.
   - FOREDECK comes up through the hatch and closes the hatch.
4. FOREDECK and FREECREW take the sail bag to the windward or leeward side decks with the head of the bag facing forward.
5. FOREDECK opens the front of the sausage bag and attaches the jib halyard to the head of the headsail, ensuring that it is clear of fouling other halyards or rigging.
6. FREECREW unties the lazy sheet from the working sail.
   - Re-leads the sheet through the proper turning block and ties it to the new clew.
7. HALYARD WINCH takes up slack in new halyard with one wrap on the winch drum and readies the working halyard to be eased.
8. MAST take the headsail forward while FOREDECK holds onto the halyard.
   - HALYARD WINCH eases the halyard while watching the bowman to ensure that FOREDECK can engage the feeders.
   - FOREDECK takes the sail tie off the front of the headsail, then feeds head of the sail into the pre-feeder.
   - HALYARD WINCH takes up on the halyard at each successful entry into the prefeeder and headfoil feeder.
   - FOREDECK starts the head of the sail into the free groove and calls "Ready Hoist, Ready Tack Set"
   - MAST is back at the new halyard to "Jumps" the halyard and sail up while HALYARD WINCH tails the halyard. Mast and HALYARD WINCH hesitate for final approval from HELM
   - FOREDECK watches the prefeeder to ensure that there are no snags in the lufftape.
   - FOREDECK calls "High" when sufficient halyard tension is set

9. HELM calls for the tack "Ready About" and listens for response from CAST OFF TAILER, FOREDECK/MAST and TRIMMER checks the area the boat will be sailing into after the tack.
10. CAST OFF TAILER prepares the winch for tacking and calls "Ready (port/stbd)"
11. TAILER adds two wraps of the new headsail sheet on the new winch and calls "Ready port/stbd Sheet"
12. HELM calls "Tacking" or some understood command as he turns the wheel.
13. MAST goes to the working halyard winch and eases off that halyard quickly as the boat comes about.
14 CAST OFF may just ease the old headsail sheet enough so that the sail "backs" against the wind a bit remembering that the sail is usually collected on the windward side of the boat.
15 FOREDECK pulls the luff tape down with force to expedite the old headsail to the deck, then unlashes the sail tie and secures the head of the sail.
16. TRIMMER & GRINDER take in on new sheet as the boat tacks and trims to course.
17. FOREDECK skirts the new headsail.
18. FOREDECK, MAST & FREECREW take the old headsail to windward and put it into the bag.
With practice, this method of inside tack set takes 30 seconds from the time the new headsail enters the feeder until the old sail exits the feeder.

HELPFUL HINTS AND COORDINATION:

1. Crew communication will assist in making the evolution smooth.
2. A "changing sheet" can be used. This allows for the new sheet to be run and tied to the new sail without disconnecting the lazy sheet from the loaded sail. The boat can continue to sail, AND TACK while the boat is being prepared for the sail change.
3. Under most circumstances it is not prudent to leave a headsail on deck for a prolonged period. Consider lashing the old sail to the toe rail, or bag the sail and tie the bag down.
4. Consider not releasing the old sail from the tack fitting until it has been bagged. This will prevent losing the sail over the side.

3-5.5.11.4 OUTSIDE SET, INSIDE PEEL (STRAIGHT-AWAY)

This procedure differs from the easiest; inside set, inside take down, in the following manner:

1. The new sail must be led outside the working jib before the head is fed into the Pre-feeder and the luff groove.
2. The new halyard must be led forward and attach it to the new jib outside the working sail.
3. A changing sheet must be employed since the load will continue to be on the same side.
4. The possibility for fouled lines is increased.

3-5.5.11.5 INSIDE SET, OUTSIDE PEEL

In this procedure setting the sail is identical to the easiest case. The differences are that:

1. Care must be exercised on the take down to ensure that the sail is hauled in under the new sail that is already flying to keep it from falling overboard. Positioning FREECREW
mid-way down the foot to haul in the sail from under the working jib is helpful.
2. The old halyard will have to be led aft and around to the leech of the new sail before being brought in and stowed at the base of the mast.
3. A changing sheet is required since the load will not be changed to a lazy sheet.

3-5.5.11.6 OUTSIDE SET, OUTSIDE PEEL.

This is the most difficult of the four maneuvers since both the set and peel away are on the outside. Positions involved:

HELM.
FOREDECK.
FREECREW.
CAST OFF.
TAILER. (works the tail of the new sheet).
GRINDER (grinds the winch to take in the new sheet).
MAST
HALYARD WINCH

1. HELM announces the type of change, On a Tack, While tacking, Bearing Off. Directs FOREDECK in what headsail is to be used.
2. FOREDECK goes below and gets the new sail ready to bring up on deck.
3. FREECREW stands by on deck until FOREDECK gives signal that new sail is ready.
   - FOREDECK opens foredeck hatch and starts bringing the new headsail up.
     starts new sail up.
   - FREECREW pulls sail on deck to the toe rail with the head near the tack fitting.
   - FOREDECK comes up through the hatch and latches the hatch.
4. FOREDECK and FREECREW tie the bag to the toe rail.
5. FOREDECK ensures that the new halyard is clear, leads the new headsail halyard around the leech of the old headsail, pulling ample slack, brings the shackle end of the halyard below the foot of the headsail to attach the halyard to the new headsail that is on the side deck.
6. FREECREW, MAST AND FOREDECK unzip the bag. FOREDECK attaches the CHANGING SHEET(an alternate procedure is to remove the WINDWARD SHEET). Traces the path of the sheet to keep it clear, (from the appropriate lead block, around and underneath the old headsail), and attaches it to the clew of the new headsail.
7. FOREDECK calls "READY FOR CHANGE" and awaits response from HELM.
8. HELM responds with "CHANGE HEADSAIL".
9. FREECREW take the headsail forward.
10. HALYARD WINCH takes up slack as the FOREDECK works forward with the halyard as directed by FOREDECK.
11. When FOREDECK is at the headstay, he reaches around the front of the headstay and pulls up on the halyard to bring the head of the new headsail up to the feeders. FOREDECK inserts the lufftape into the feeders, pulls up the head to secure the lufftape into the headfoil and calls "READY HOIST"
12. HELM calls "HOIST"
13. MAST jumps the halyard as HALYARD WINCH tails.
14. As the headsail is being hoisted, FOREDECK attaches the tack of the new headsail to the appropriate tack shackle and calls "TACK MADE"
15. HALYARD WINCH takes final tension on new headsail halyard as directed by FOREDECK calls "HALYARD MADE"
16. TAILER has been taking up slack and trims new headsail when the "HALYARD MADE" call is announced, makes final adjustments with adjustable lead system (if genoa).
17. HALYARD WINCH moves to old headsail halyard winch and eases halyard down at a rate dictated by FOREDECK.
18. FOREDECK, MAST AND FREECREW take in old headsail and bring that sail to the side deck as-soon-as-possible for flaking, bagging and stowage below. FOREDECK removes old halyard and places it in the clear position secured at the mast. MAST removes the old sheet and attaches the re-lead WINDWARD SHEET to the new headsail clew.
19. FOREDECK calls "CLEAR TO TACK" as soon as this ability is ensured.

3-5.5.11.6.1 OUTSIDE SET, OUTSIDE PEEL THE SEQUENCE.

1. HELM deploys the crew for the sail change.
   - FOREDECK wedges into the pulpit to ensure that the new sail feeds fairly into the luff groove.
   - MAST takes halyard in hand and prepares to hoist the jib.
   - HALYARD WINCH takes halyard in hand and reports, "Ready Halyard", to HELM.
   - TAILER takes the lazy sheet in hand, loads two turns on the winch and reports, "Ready CLEW, to HELM.
2. HELM orders, "Set the Jib". The remainder of this step is simultaneous and coordinated.
   - MAST "Jumps" the halyard.

- FOREDECK feeds the sail out under the standing jib and to the pre-feeder.
- HALYARD WINCH takes in the halyard.
- When resistance is felt, HALYARD WINCH loads the tail into the self tending groove and starts grinding the winch with a winch handle.
- FOREDECK calls the tension.
- FOREDECK surveys the foredeck to be sure it is clear and reports, "Clear to tack", and stays in the pulpit.

3. HELM orders , "Ready About" and checks the area the boat will be sailing into after the tack to be sure it is clear.
4. HELM orders, "Helm's a-Lee", and tacks.
   - CAST OFF takes the jib sheet of the old sail in hand and casts off the old sail sheet.
   - TAILER takes in on the new jib sheet. When resistance is met, loads two ore turns on the winch then feeds the sheet into the self tailer.
   - GRINDER puts winch handle in the winch and grinds on the winch. Changes to low gear to finishes the trim.
   - TAILER calls the trim.

3-5.5.11.6.2 THE TAKE DOWN.

1. MAST carefully removes the coils from the halyard of the old jib winch.
   - Lays them down so they can run with out fouling when the halyard is released.
   - Controls the release of the old sail halyard. Ensures that the coils do not foul.
   - HALYARD WINCH coils the tail of the new sail halyard..
   - FOREDECK wedges himself in the bow pulpit and pulls sail down and keeps it from going over the side.
   - CAST OFF releases sheet tension.
   - FOREDECK removes the halyard from the old sail and passes it to MAST.
   - MAST stows the old halyard taking care not to foul it.
   - FREECREW unties the sheet from the old sail. Ties it to the new sail, releads it and Reports, "Ready to tack", to HELM.
2. FOREDECK surveys the foredeck and when satisfied that it is clear, reports "Foredeck is clear to tack".
3. FOREDECK directs FREECREW and MAST in the bagging of the old sail.
   o The sail is bagged.

CAUTION

Do not release the tack of a sail from the tack fitting until it has been bagged.

4. The tack is released from the tack fitting.
5. FOREDECK, directs FREECREW, and MAST in stowing the old sail below.

HELPFUL HINTS AND COORDINATION:

1. Crew communication will assist in making the evolution smooth.
2. A changing sheet can be used. This allows for the new sheet to be run and tied to the new sail without disconnecting the lazy sheet from the loaded sail. The boat can continue to sail, AND TACK while the boat is being prepared for the sail change.
3. Under most circumstances it is not prudent to leave a headsail on deck for a prolonged period. For short periods, particularly when it is anticipated that the sail will be re-hoisted in short order. Lash old sail to the toe rail. Bag the sail and tie the bag down.
4. The old sail is not released from the tack fitting until it is in the bag. This will prevent losing the sail over the side.

3-5.5.11.7 SETTING THE GENOA STAYSAIL

A good sail combination for sailing to windward, particularly when the angle on the wind is a close reach or greater is with the new #2 Genoa (high clew for better visibility to leeward), and the Genoa Staysail. The Staysail will give back more power than what is lost from using the high clew #2 because it creates a second slot, (between the two head sails).

1. Rig the inner forestay keeping the halyards clear, and the genoa sheets forward of the forestay.

2. Set the #2 Genoa with any of the methods previously discussed.
3. Bring the Genoa staysail up on the FOREDECK and place it near the forward lower shrouds. Tie the bag down.
4. Unroll the sail toward the inner Forestay taking care not to let the sail blossom in the wind.
5. Attach the tack to the tack shackle at the base of the inner forestay.
6. Hank the staysail to the inner forestay.
7. Lead the permanently attached sheets to the sail, (with a cow hitch), outside the forward lower shrouds, and to the front car on the forward jib track, (See Table 3-3, Sail Management for initial positioning of the car). Lead the sheet aft to the foot block, (if one is available), or rig a snatch block to the toe rail in the vicinity of the secondary winch. Tie a figure eight knot in the end of the sheet.
8. Attach the Topping Lift (T-Lift) to the head of the staysail as the halyard ensuring it is not fouled on the forestay.
9. Hoist the sail on command from the Helmsman. Trim the sheet so as to create a "slot" between the #2 Genoa and the staysail. Read the tell tails on both head sails for this procedure.

3-5.5.11.7.1 TACKING WITH THE GENOA STAYSAIL.

Tack the boat as with a single headsail remembering that the lazy genoa sheet is forward of the forestay thus hindering the passing of the #2 reacher across the foredeck. The staysail in place keeping the staysail trimmed in the initial phase of the tack will give the #2 Genoa a surface upon which to slide as it crosses from one side to the other, thus alleviating the problem of sheet hangup on the forward lower shroud. When the #2 Genoa has crossed and is in the process of being trimmed, release the Genoa Staysail and tack the sail. It has been found that the use of the Genoa Staysail on close reaching or greater angle off the wind will yield an increase of at least ½ knot of boat speed.

3-5.5.11.7.2 "POORMAN'S SPINNAKER.

This #2 Genoa and Genoa Staysail combination has proven to be good as a "poorman's spinnaker" for sailing with the wind abaft the beam.

1. Lead the #2 genoa windward sheet through the end of the spinnaker pole before setting the pole.
2. Rig the spinnaker pole with an extra line attached to the pole outboard end bale as a trimming line. (see the procedure given in 3-5.5.12.3). Set Pre-set the pole height so that the pole will be horizontal and even with the clew of the staysail to weather of the boat.
3. Establish the desired course for the boat, trim the Mainsail and the #2 Genoa.
4. Control the genoa staysail with a snatch-block on the toe rail with the appropriate fair leads.
5. Trim the Genoa Staysail windward sheet, (rigged through the end of the pole), to expose it to the wind on the windward side. Trim it to blossom and to feed wind to the #2 Genoa. This will keep both the headsails full and drawing. To strike this sail combination, start by collapsing the reaching staysail against the #2 Genoa and dropping the staysail.

3-5.5.12 SPINNAKER

The Spinnaker is a special purpose sail used to augment speed when the boat is "Off the Wind".

3-5.5.12.1 RIGGING FOR SPINNAKER.

The evolution described herein is for a "BEAR-AWAY" set.

Gear required:

- Spinnaker (packed)
- Spinnaker pole
- Spinnaker foreguy
- Spinnaker halyard
- Topping Lift
- Two Spinnaker Sheets
- Two Spinnaker Guys
- Two large snatch blocks

Positions required:

HELM
GENOA TRIMMER

MAIN TRIMMER
SPINNAKER SHEET TRIMMER(COULD BE THE GENOA TRIMMER)
SPINNAKER GUY TRIMMER(trims the spinnaker guy)
GRINDER
FOREDECK
BOW (works the functions on the bow. Can be the foredeck in a simple organization, Foredeck could be a distinct position to allow for overall supervision.)
MAST(works the halyards, pole height at the mast)
PREVENTER (tends the foreguy periodically, set and tend preventer, tends the topping lift).

3-5.5.12.2 GETTING READY.

This procedure can be done ahead of time in anticipation of using the spinnaker.

1. Rig one snatch block to the port toe rail just aft of the midship lifeline stanchion.
   - Rig the other snatch block to the corresponding STBD side.
2. Attach the PORT spinnaker sheet at the port side of the bow pulpit, lead it outboard of everything to the larger sheave in the Spreecher Block attached to the base of the stern pulpit at the end of the toe rail, then to the cockpit.
   - Rig the STBD spinnaker sheet to match.

NOTE

The guy is attached to the sheet bale so that in light air it can be disconnected to reduce the weight hanging on the clew of the spinnaker and the spinnaker can be controlled with a single sheet arrangement.

3. Attach the PORT afterguy snap shackle to the port spinnaker sheet at the port side of the bow pulpit, lead the guy outside of everything to the snatch block, to the cockpit.
   - Rig the STBD afterguy to match.

NOTE

The foreguy is a continuous line that starts at a cam cleat on the outboard face of the cabin top, goes forward to a single block at a pad eye on the foredeck, to a bale on the bottom of the outboard end of the pole.

4. This is as far as GETTING READY normally goes until it is time to use the spinnaker.

3-5.5.12.3 THE SPINNAKER PREP.

The spinnaker pole is set to the windward side. Think ahead and decide which jibe the boat will be on to determine to what side the pole will be rigged.

1. Take the pole out of the deck chocks, pass the lazy jib sheet over pole and install the socket end of the pole to the "bayonet" on the track on the forward face of the mast. The outboard end the pole is on the foredeck. In this configuration the boat can continue to be tacked, the jib passing over the pole.
2. Attach the spinnaker bag (turtle) to the lower and upper lifeline on what will be the leeward side of the boat for the set. Use the snap hooks on the bag.
3. Take the windward spinnaker sheet/guy, around the forestay, then back to the spinnaker. Open the jaw, lay the GUY in the jaw and close the jaw. (Make sure the sheet stays on top of the pole. Attach the guy snap shackle to the forward clew of the spinnaker.
4. Take the leeward spinnaker sheet/guy to the spinnaker and attach it to the after clew.
5. The deck line for the preventer on what will be the leeward side can be rigged to the boom mounted pennant. Disconnect the shock cord from the pennant.
6. Attach the topping lift to the outboard end of the pole.
7. Take the spinnaker halyard corresponding to the leeward side of the boat at the set and lead it aft to the clew of the jib, pass it outboard above the trimmed headsail sheet, lead it down, under the foot of the

jib, and attach it to the swivel at the head of the spinnaker.

8. Re-check that the sheets, halyard, and topping lift are clear. Look Up. The spinnaker is ready to be hoisted.
9. This is as far as the rigging for spinnaker can go until the boat is on the last point of sail before setting the spinnaker.

3-5.5.12.4 SETTING THE POLE.

1. Helm announces what jibe the spinnaker will be set on, what kind of set, (bear away set or gybe set), and when to start rigging. Typically "Standby to set the spinnaker".
2. BOW goes forward to pulpit, lifts the outboard end of the pole while PREVENTER takes in the topping lift. Mast can "Jump" the topping lift at the mast to assist.
3. BOW Re-checks to make sure the lazy sheet is on top of the pole. Re-check that lines are clear to run without fouling, particularly on lifeline stanchions. Report "Ready forward"
4. MAST lays out the working jib halyard tail so it is free to run. Readies the spinnaker halyard for hoist.
5. MAST pre-sets a likely height for the spinnaker car on the mast track. Reports "Ready Mast".
6. SPINNAKER GUY puts appropriate number of wraps on the winch. Pre-set the foreguy for the anticipated angle of the pole and cleat the foreguy. Snug the topping lift. Report "Ready Guy".
7. SPINNAKER SHEET puts several wraps on the secondary winch in the cockpit. Make sure the lazy guy is clear. If this position is doubling as the GENOA TRIMMER, be prepared to ease the genoa slightly when the spinnaker is hoisted. Cleat the Genoa sheet. Standby to trim the spinnaker sheet when hoisted. Report "Ready Spinnaker sheet".
8. One SPINNAKER GRINDER is normally required. Two for higher wind strengths.
9. MAINSHEET TRIMMER ensure the sheet is clear, take the sheet in hand and report "Ready Mainsheet".

3-5.5.12.5 PRE-TRIM.

1. Just prior to the set, SPINNAKER GUY takes on the guy to bring the clew out of the bag and up to the pole. The spinnaker pole should be about 3 feet off the headstay for hank-on headsail boats. The after guy (primary) winch must have 4 to 6 wraps on the drum at this point.

3-5.5.12.6 THE SPINNAKER SET.

1. HELM gives command, "Set the Spinnaker".
   - HELM " bears off" to the appropriate course.
   - MAST tails while BOW hoists, hand over hand until spinnaker is all the way up. Call "HIGH" so the trimmers can begin to trim the sail. MAST moves to Jib halyard.
2. SPINNAKER GUY takes on the guy to expose the spinnaker to the apparent wind. Pole will eventually be trimmed to be perpendicular to the apparent wind.
3. SPINNAKER SHEET takes on the sheet to fill the spinnaker.
4. BOW (FOREDECK on a simple crew assignment) goes to the pulpit to take in the jib. FOREDECK (PREVENTER) can go to the mid-girth of the foot to help with the drop.
5. MAST keeps at least one turn on the winch, and lowers the jib quickly.
6. BOW disconnects the genoa halyard and leads it back to the bale at the base of the mast taking care not to foul it with the lines already attached at the bale. Depending on the length of time the spinnaker is expected to stay in the air, BOW can either bag the jib or lash it to the toe rail.
7. MAST makes up the spinnaker halyard tail.
8. MAINSAIL TRIMMER eases main to square it to the wind. Can assist with topping lift, foreguy and preventer when the apparent wind is > 120 degrees.

9. SPINNAKER GUY adjusts pole to be at right angles to the apparent wind. Respond to call from SPINNAKER SHEET for pole adjustments.
10. SPINNAKER SHEET .
    - Keep spinnaker full. Ease sheet until the spinnaker luff curls, but pops out. Calls adjustments for pole up and down at mast and at outboard end, as well as fore and aft.
11. PREVENTER works the preventer line for the appropriate side. Ensures that all lines are lead fair.

HELPFUL HINTS AND COORDINATION.

1. Communication is the key to successful spinnaker work.
2. It is sometimes helpful to say "Pole to Port [STBD]" when announcing the preparation for spinnaker.
3. Basic tenets for spinnaker trim.
    - Pole perpendicular to the apparent wind.
    - Pole parallel to the water.
    - Clew heights equal.
    - Keep position of pole as constant as possible.
    - Ease spinnaker sheet.
    - Call for course change (to include gybe) if wind shift is major.
    - Ensure that the cleats for the spinnaker pole car adjustment line are well secured.

3-5.5.12.7 GYBING THE SPINNAKER.

Safety Considerations:

1. Ensure sheets and guys are clear forward and in the cockpit.
2. Visually check that the intended course is clear of other boats, shipping, and navigation hazards.
3. Ensure crew members are in "safe zones" for the maneuver. STAY OFF THE BRIDGE DECK. BE MINDFUL OF THE MAINSHEET PARTNERS AS THE GYBE IS EXECUTED.

WARNING

TRIM THE BOOM TO CENTERLINE BEFORE "GYBE HO!" AN OUT OF CONTROL BOOM CAN CAUSE SERIOUS INJURY TO PERSONNEL.

4. Trim the boom to centerline before the boom is crossed to the other side of the boat.
5. HELM is in control of the maneuver.
6. Communications is the key to a safe Gybe.

General Situation:

Assume sailing on a broad reach in moderate conditions.

Positions Required:

HELM
SPINNAKER SHEET
SPINNAKER GUY
GRINDER/PREVENTER
TOPPING LIFT
MAINSHEET
FOREDECK
BOW
MAST

Sequence of Events:

1. HELM calls "Prepare to Gybe". When possible include what point of sail the boat will be on upon completion of the maneuver.
    - FOREDECK checks to see that the windward spinnaker sheet is not fouled on the spinnaker pole end. Procedure must be stopped and remedied before continuing.
2. SPINNAKER SHEET ensures both sheets are clear, places sufficient turns on the new secondary winch, stands in cockpit with back against binnacle, continues to trim, and reports "Ready Spin Sheet" to HELM.
3. SPINNAKER GUY ensures both guys are clear; places sufficient turns on the new primary winch, stands in cockpit forward of SPINNAKER SHEET, continues to

trim, and reports, "Ready SPIN GUY" to HELM.
GRINDER breaks the preventer

4. MAINSHEET removes sheet from the self tailer, ensures sheet is clear, and reports, "Ready Main" to HELM.
5. TOPPING LIFT ensures topping lift and foreguy are clear, takes topping lift out of self tailer, and reports, "Ready Topping Lift", to HELM.
6. MAST ensures inboard end of pole is at the proper height for dipping outboard end and tripping line is clear. Reports, "Ready mast", to HELM.
7. BOW (FOREDECK) takes bight of lazy guy to pulpit, positions himself forward of the headstay facing aft with lazy guy in hand, and reports, "Ready bow", to HELM.
8. After receiving ready reports from the crew, HELM, calls "Bearing away" and turns the boat away from the wind. MAINSHEET, SPINNAKER SHEET ease, and SPINNAKER GUY trims to the apparent wind. Basically the pole should *be as far aft as possible before tripping. Care is required to avoid forcing the spinnaker pole against the forward lower shroud.
9. When wind reaches 150-160 degrees apparent, MAINSHEET trims the mainsail, timing it so that the boom is amidships before the boat is dead down wind. An extra crew member can sit on the cabin top and help with the trim.
10. HELM calls "Trip and Dip" with the stern to the wind. HELM should momentarily delay with the boat DOWNWIND until steps 11 through 16 are completed.
11. At the "trip and dip" MAST trips outboard end to release the afterguy, TOPPING LIFT eases the pole smartly to pre determined position so that pole end will clear inside forestay, and above lifeline. SPINNAKER GUY casts off the old guy.
12. As the pole dips and swings through the fore triangle, BOW/FOREDECK snaps new after guy into open jaw at the end of the pole ensuring that the shackle is on the trailing edge of the pole. Once the jaw closes, ensures pole has cleared the headstay to the new side and calls out, "Made".
13. At the call "Made".
    - MAST jumps topping lift and adjusts inboard end as necessary.
    - TOPPING LIFT trims topping lift to proper height and stands by to adjust foreguy as necessary.
    - SPINNAKER GUY begins to trim new guy at "Made" and eases/casts off old guy. Positions pole to apparent wind.
    - SPINNAKER SHEET begins trimming on new sheet, eases off old sheet as new guy approaches the outboard pole end.
14. TOPPING LIFT trims topping lift to proper height and stands by to adjust foreguy as necessary.
15. SPINNAKER GUY begins to trim new guy at "Made". Positions pole to apparent wind.
16. At the call "Made", SPINNAKER SHEET begins trimming on new sheet, eases off old sheet as new guy approaches the outboard pole end.
17. HELM calls out "GYBE HO!" and turns the boat where the wind is about 160 degrees on the new gybe.
18. MAINSHEET causes the boom to cross to the other side of the boat and EASES THE MAINSHEET to the expected point of sail.
19. HELM continues the turn.
20. GRINDER sets the new preventer line and assists as necessary. (Usually the new spinnaker Sheet winch needs grinding first).

HELPFUL HINTS:

1. Mark the topping lift with a whipping at the position where it is in contact with the winch when the pole is able to clear above the lifelines and pulpit, yet low enough to pass inside the headstay.
2. Holding the boat downwind until the spinnaker guy is "made" on the new side, and while the mainsheet is trimmed in close, places the boom on or

near the centerline of the boat. Wind is channeled from "dead aft" to the spinnaker on both sides so that it can continue to fly without the aid of the pole.

3-5.5.12.8 DOUSING THE SPINNAKER.

The genoa is usually hoisted before the spinnaker is douses. This aids in two ways:

- Maximum power is kept on the boat through the maneuver.
- The genoa creates a "LEE" for the controlled collapse of the spinnaker.

Safety Considerations:

1. Ensure sheets and halyards are clear to run and not tangled.
2. DO NOT STAND IN ANY BIGHTS!.
3. Always keep at least one turn on the spinnaker halyard winch while dousing...even in light winds.
4. Communication is the key to a safe take down.

General Situation:

Assume beam to broad reaching in moderate conditions. In order to keep two sails flying, the jib should be raised before the spinnaker is doused. This sequence of events assumes the spinnaker will be tripped with a fid. There are other methods of dousing the spinnaker.

Required Positions:

HELM
BOW
MAST
MAINSHEET
TOPPING LIFT
SPINNAKER GUY
SPINNAKER SHEET
GENOA SHEET. (this may be covered by Spinnaker Sheet).
GATHERERS

3-5.5.12.8.1 PRE- SPINNAKER DOUSING PROCEDURE.

Sequence of Events:

1. HELM calls out "Stand by to raise the Jib".
2. BOW ensures the genoa is ready to hoist on the proper side; that the genoa sheets are clear; has fid accessible, stands by to jump genoa halyard and reports "Ready to Hoist the Genoa", to HELM.
3. MAST ensures the genoa halyard is clear to hoist, reports "Ready genoa halyard" to HELM.
4. GENOA SHEET ensures at least two turns on the primary winch on the new leeward side, and report, "Ready Genoa Sheet", to HELM.
5. GATHERERS are deployed forward of the leeward shrouds, take the lazy guy in hand, and report, "Ready Gatherers", to HELM.
6. HELM calls "Numbers in the pulpit".
7. BOW jumps Genoa Halyard while MAST takes on the genoa halyard winch to get the numbers at the top of the pulpit.
8. This completes the pre-dousing procedure.

3-5.5.12.8.2 THE SPINNAKER TAKE DOWN.

1. HELM calls out, "Hoist the Genoa".
2. BOW jumps Genoa Halyard.
3. MAST tails on the genoa halyard winch.
4. BOW assists by taking winch handle and grinds for MAST.
5. MAST calls, "High", when the genoa is fully hoisted, and shifts to spinnaker halyard. Takes it from the self tailer, assumes position to be able to see gatherers and reports, "Ready spinnaker halyard", to HELM.
6. BOW goes to pulpit with fid in hand, reports ready to trip the spinnaker" to HELM.
7. GENOA SHEET trims the genoa for the expected point of sail.
8. After receiving "ready" from BOW and MAST, HELM calls out, "Douse the Spinnaker".
9. TOPPING LIFT eases so that BOW can reach the pole.
10. SPINNAKER GUY eases the guy so the pole goes forward and BOW can

reach the clew while standing within the pulpit.

NOTE

Care must be taken so to keep the spinnaker pole from hitting the headstay!

11. BOW uses the fid to trip the sheet shackle.
12. Spinnaker will fly to leeward and be hidden from the wind behind the genoa and mainsail.
13. GATHERERS take in on the lazy afterguy to gather as much of the foot as possible, then start taking in on the spinnaker itself.
14. SPINNAKER SHEET must ease the spinnaker sheet to allow the GATHERERS to bring the lazy guy clew to the foredeck.
15. MAST watches the gatherers and eases the halyard so as to feed the spinnaker to the gatherers as they are able to take it in.
16. TRY TO KEEP THE SPINNAKER OUT OF THE WATER.
17. Spinnaker can be gathered at the rail, or can be passed to MAINSHEET who sends it down the main companionway as it is doused.
18. Once the spinnaker is doused, TOPPING LIFT lowers the outboard end of the pole so that BOW can handle it.
19. MAST lowers the Inboard end.
20. All hands ensure all lines are onboard and not trailing in the water.
21. The spinnaker halyard is returned to the stowed position ensuring that it is clear of the headstay and all other halyards and rigging.
22. The spinnaker is re-packed, and all lines are either re-led for the next spinnaker hoist, or the spinnaker, lines and pole are stowed.

3-5.5.13 BOAT PERFORMANCE.

Think of the NAVY44 as a weapons system. The goal is to maximize the potential of this weapons system. Whether racing or just sailing a measure of boat performance is the speed the boat achieves through the efforts of the crew. Factors that will affect performance are:

- Trim sails for maximum efficiency so as to harness the power of the wind.
- Fore and Aft Trim. Avoid putting heavy gear in the extremities of the boat to reduce hobby horsing.
- Lateral trim. Keep the boat on its feet. Use crew weight to windward to help control the amount of heel.
- The NAVY 44 is a masthead rig. Reef the main first to keep as large a headsail as possible, then change down to a smaller jib. A boat performance model has been prepared for the NAVY 44 by the United States Sailing Association. This provides target speeds that should be attained if conditions are optimum and crew performance is flawless. See Table 3-2, Optimum Targets; Table 3-3, Speed as a Function of Sail Performance; Figure 3-4, Polar Diagram, True Wind, and Figure 3 -5, Polar Diagram, Apparent Wind.

3-5.6 FUEL MANAGEMENT.

Past performance of the NAVY 44 has revealed an abundance of engine problems that can be traced to contaminated fuel. In an effort to arrest this source problem the fuel tanks of each boat have been purged to eliminate "dirty fuel" as a source.

To eliminate the "biological contamination" problem a "BIOBORE" type additive has been authorized for use each time the boat is fueled.

The 50 gal. diesel fuel tank is located in the bilge under the cabin sole. Due to the shape of the tank, only 45 gallons are useable. Because of its irregular shape to conform to the dimensions of the bilge area the readings from the fuel gauge will not give a true indications of fuel quantity, rather are a measurement of relative fullness bottom to top. Figure 1-20 has been prepared from usage data to give a better appreciation of fuel quantity, both from readings on the gauge, and from using a dip stick.

3-5.7 ELECTRICAL POWER MANAGEMENT.

The NAVY 44 has a 12 v.d.c. electrical system. It is provided through three banks of batteries. The battery banks are: Engine Start Bank, Ship's Service Bank #1, Ships Service (SS) Bank #2. The Engine Start Bank is one battery. Both SS Bank #1 and SS Bank #2 have two batteries each, wired in parallel.

NOTE

Electrical power should be drawn selectively from either of the SS Banks while underway. Operating with the SS Bank selector in the BOTH position IS NOT RECOMMENDED. This will allow the stronger of the two banks to be drawn down to the level of the weaker one. With one fully charged bank, and the other fully depleted, operating in the BOTH position will result in two banks with half charge.

Battery power is a limited resource that requires close management. While the batteries can be recharged using the engine mounted alternators, frugal management of electrical power will ensure that power is available for necessary usage. When operating under sail the batteries are not being charged, only depleted. Table 3-4 is a D.C. System Load Analysis to aid in proper management. A good rule of thumb is "If you don't need it, turn it off".

3-5.7.1 ELECTRICAL SYSTEM LINEUP.

1. Place the ENGINE START bank rotary switch to the ON position. This energizes the engine starting system.
2. Place the SS bank rotary switch to either #1 or #2 position. This energizes the ships service electrical system. Individual selection of ships service battery banks provides for selective management. This makes it more efficient when it comes time to charge batteries.

NOTE

The NORMAL position for the alternator switches on the Electrical Switchboard is the ON position. They only need to be turned off in an emergency.

3. Ensure that the SS ALT and START BATTERY ALT circuit breakers located at the ELECTRICAL SWITCHBOARD are in the ON position.

3-5.7.2 BATTERY POWER SOURCE AND CHARGING PROCEDURE.

Battery power source and charging capability is determined by the position of the master rotary battery switch for the ENGINE START bank and the master rotary battery switch for the SS banks. The batteries can be charged either using shoreside 120 VAC power or by running the engine and charging with the two alternators installed. Table 3-5 contains the procedures for drawing electrical power or charging either the ENGINE START bank or the SS banks with the source as indicated. Use the System Voltage Scanner to monitor charging. See Figure 3-6. System Voltage Scanner.

3-5.8 FRESH WATER MANAGEMENT.

With only 163 gallons of fresh water this limited resource must be managed frugally on long passages. Water is stored in two 70 gal. tanks, one under each settee berth in the main cabin, and one 23 gal tank (day tank) located beneath the floorboard in the galley.

3-5.8.1 WATER TANKS.

Ensure that the selector valves for both the port and stbd 70 gal tanks are in the CLOSED position. Water will now be drawn from the 23 gallon day tank. When the spigot spits air, the day tank is empty.

1. Open the gate valve for one of the 70 gallon tanks.
2. Fill the day tank.

Table 3-2, OPTIMUM TARGETS

This table has been prepared with the following variables as inputs:
VTW = TRUE WIND VELOCITY
BTW = TRUE WIND ANGLE
VAW = APPARENT WIND VELOCITY BAW = APPARENT WIND ANGLE
V = BOAT SPEED
VMG = VELOCITY MADE GOOD
HEEL = HEEL ANGLE IN DEGREES
REEF= % OF SAIL AREA REMAINING
FLAT = % OF FULL DRAFT REMAINING
CL = COEFFICIENT OF LIFT

VTW	BTW	VAW	BAW	V	VMG	HEEL	REEF	FLAT	CL
8.0	45.7	12.30	26.2	5.617	3.923	12.7	1.0	1.0	1.978
	52.0	12.53	28.7	6.171	3.799	13.0	1.0	1.0	1.981
	80.0	11.15	41.7	6.974	1.211	15.5	1.0	1.0	2.344
	110.0	8.51	59.1	7.060	-2.414	8.2	1.0	1.0	3.684
	143.4	4.76	100.4	5.446	-4.375	1.6	1.0	1.0	2.109
10.0	44.9	14.72	26.3	6.300	4.461	18.7	1.0	.9370	1.853
	52.0	14.74	29.2	6.879	4.235	20.3	1.0	1.0	1.962
	80.0	13.13	45.6	7.491	1.301	13.1	1.0	1.0	1.946
	110.0	9.94	64.6	7.612	-2.603	12.4	1.0	1.0	2.665
	145.7	5.81	107.6	6.348	-5.241	2.0	1.0	1.0	1.904
12.0	42.8	16.81	25.9	6.567	4.818	21.9	1.0	.806	1.594
	52.0	16.60	30.0	7.214	4.441	24.8	1.0	.916	1.816
	80.0	14.77	48.1	7.834	1.360	17.5	1.0	1.0	1.918
	110.0	11.25	69.2	8.001	-2.736	17.0	1.0	1.0	2.641
	157.8	6.28	134.8	6.489	-6.008	1.2	1.0	1.0	1.115
14.0	41.4	18.77	25.8	6.724	5.047	24.4	1.0	.700	1.384
	52.0	18.34	30.9	7.414	4.565	27.7	1.0	.816	1.619
	80.0	16.23	49.9	8.090	1.405	22.0	1.0	1.0	1.892
	110.0	12.42	72.9	8.304	-2.840	21.7	1.0	1.0	2.614
	165.8	7.24	152.3	6.921	-6.711	.9	1.0	1.0	.664
16.0	40.5	20.65	25.8	6.829	5.194	26.5	1.0	.614	1.214
	52.0	20.00	31.6	7.549	4.647	30.1	1.0	.730	1.449
	80.0	17.50	51.2	8.284	1.439	26.5	1.0	1.0	1.870
	110.0	13.44	76.0	8.545	-2.923	26.2	1.0	1.0	2.585
	170.9	8.55	163.1	7.339	-7.246	.7	1.0	1.0	.379
20.0	39.9	24.19	26.2	6.957	5.339	30.0	.993	.495	.966
	52.0	23.21	33.1	7.707	4.745	32.4	.955	.649	1.176
	80.0	19.58	52.8	8.530	1.481	34.1	.990	1.0	1.803
	110.0	15.09	81.0	8.902	-3.045	34.0	1.0	1.0	2.521
	174.0	11.64	169.8	8.084	-8.040	.9	1.0	1.0	.205

Table 3-3. SPEED AS A FUNCTION OF SAILING CONDITIONS

	OPTIMUM BEAT				OPTIMUM RUN		
VTW	BTW	V	VMG	HEEL	BTW	V	VMG
8	46	5.617	3.923	13	143	5.448	4.375
10	45	6.300	4.461	19	146	6.348	5.241
12	43	6.567	4.818	22	158	6.489	6.008
14	41	6.724	5.047	24	166	6.921	6.711
16	40	6.829	5.194	27	171	7.339	7.246
20	40	6.957	5.339	30	174	8.084	8.084

		REACH	REACH		REACH		RUN
		BTW=80	BTW=110		BTW=135		BTW=180
VTW	V	HEEL	V	HEEL	V	HEEL	V
8	6.974	16	7.060	8	6.021	3	3.988
10	7.491	13	7.612	12	6.997	4	4.912
12	7.834	17	8.991	17	7.557	5	5.771
14	8.090	22	8.304	22	7.980	6	6.583
16	8.284	26	8.545	26	8.968	8	7.192
20	8.902	34	8.902	34	8.968	13	6.010

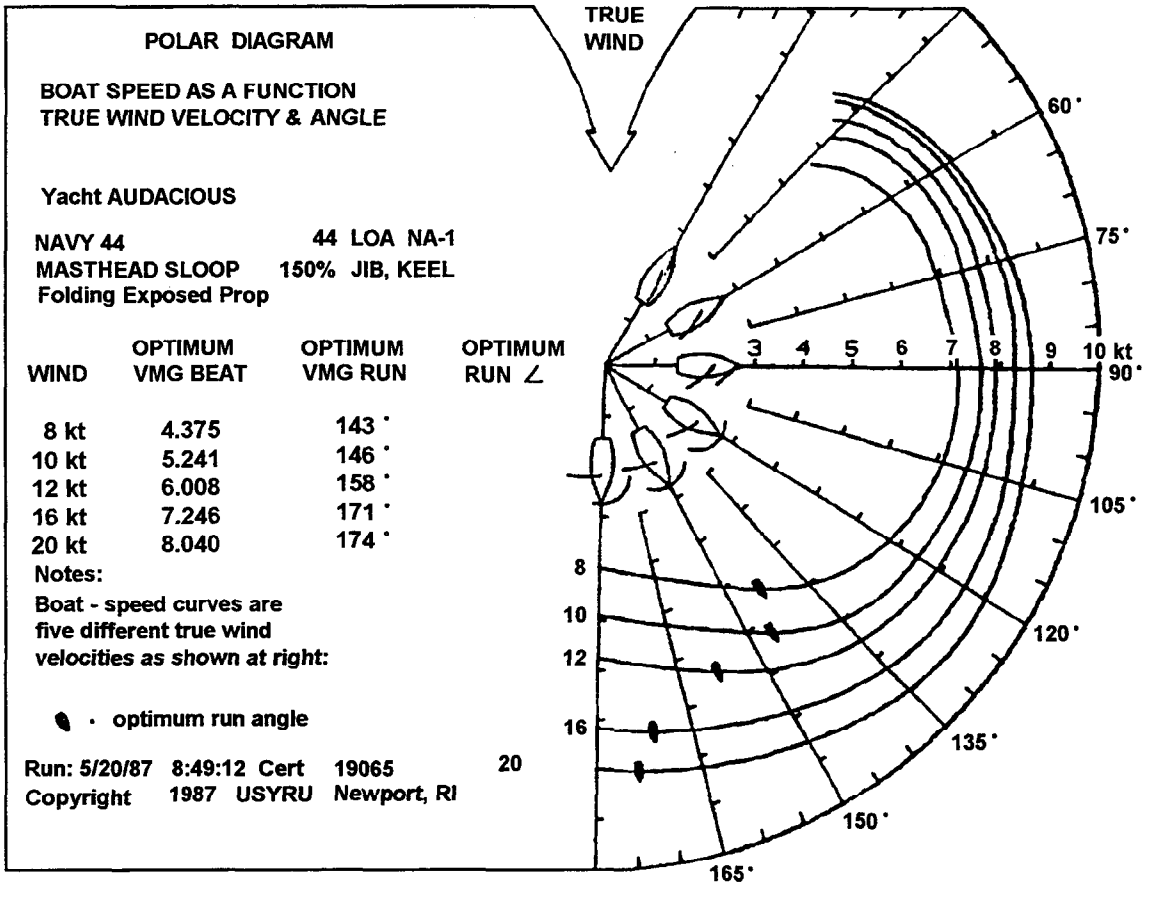


Figure 3-4. Polar Diagram - True Wind

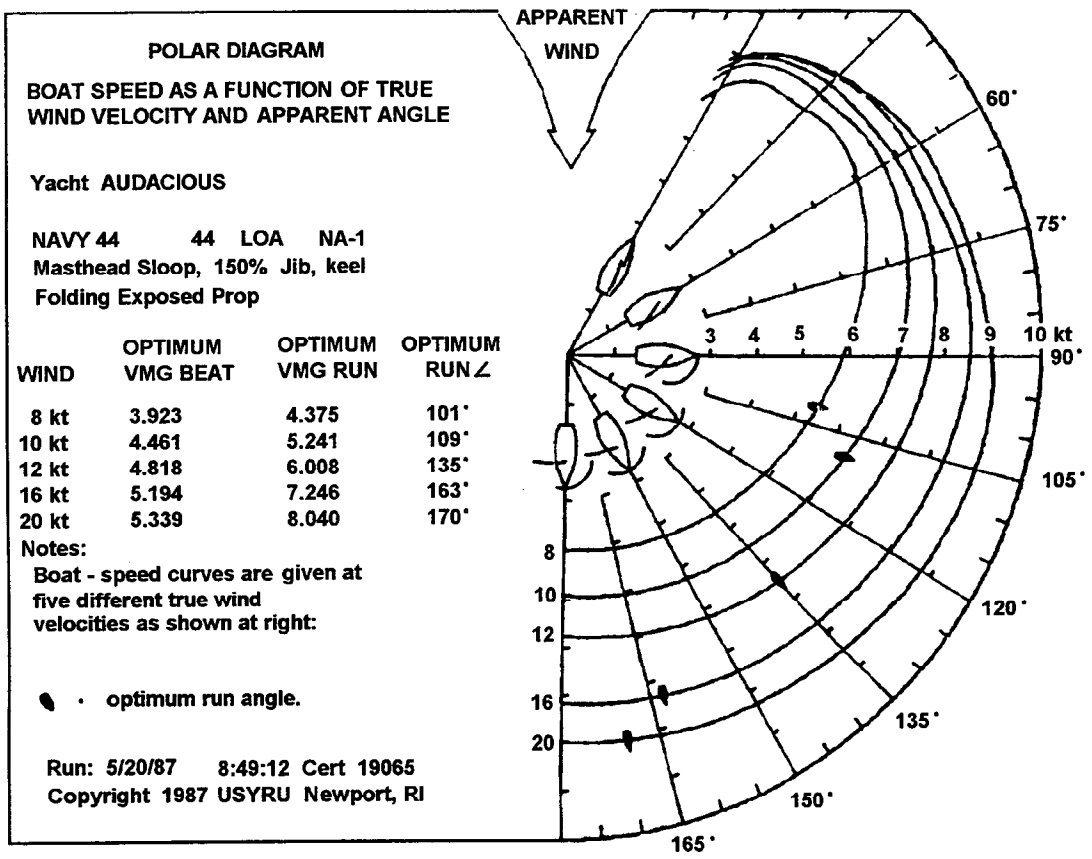


Figure 3-5. Polar Diagram - Apparent Wind

3. Close the selector valve of the tank from which the water was drawn.
4. Make a log entry that 23 gallons was transferred to the day tank. This makes it possible to know how many gallons of fresh water remain in the system.

3-5.8.2 FILLING THE TANKS.

1. Ensure that the STBD tank isolation valve is "closed".
2. Port Tank.
   - Open the selector valve located behind the lower drawer of the navigation table. Remove the drawer to gain access. This will allow water to flow into the 23 gallon day tank while the port tank is filling.
   - Fill the tank through the filler pipe located under the Port Settee berth, aft end. When water level reaches the top, stop filling. Do not cap off. This tank will have to be "topped off" to compensate for the water that has filled the day tank.
2. Stbd tank.
   - Fill the tank through the filler pipe located under the STBD Settee Berth, aft end. Cap off the tank when full.
3. Go back and top up the port tank now that the water has had time to flow into the day tank. Cap off the tank.
4. Close the port tank selector valve.

3-5.8.3 PRESSURE WATER.

1. Ensure that the Master D.C. power switch at the ELECTRIC SWITCHBOARD is ON.
2. Turn on the FRESH WATER PUMP circuit breaker at the ELECTRIC SWITCHBOARD.
3. Operate the blue faucet at the galley sink or the vanity sink in the head to draw water, (red faucet will open the line to the manual pump for foot pump operation).
4. Turn OFF the FRESH WATER PUMP circuit breaker at the ELECTRIC SWITCHBOARD when through.

3-5.8.4 MANUAL WATER.

1. Open the red faucet at the sink. Pump the foot pump.
2. Close the red faucet. Otherwise, when the next user wants pressure water and turns on the fresh water switch at the electric switchboard, water will start to flow.

3-5.9 MARINE HEAD, SINK AND SHOWER MANAGEMENT.

The NAVY 44 head compartment has a marine head, sink, and two shower facilities, one for Fresh Water, the other for Sea water. All water drainage is routed to the shower sump. To drain the sump:

- Ensure that the intake seacock for the head is open(the sump drain is routed to this seacock).
- Use the manual pump on the bulkhead above the head to pump the sump dry.

3-5.9.1 MARINE HEAD.

The Wilcox-Crittenden "Skipper" marine head uses raw Sea Water for flushing. A 10 gallon polypropelene holding tank makes the NAVY 44 compatible with ZERO discharge laws for environmentally protected waters. A "Y" valve selects either holding tank or overboard as the discharge path. OVERBOARD directs discharge to the 2-1/2" discharge seacock under the head compartment sink. TANK directs discharge into the holding tank.

Plumbing from the holding tank leads to a diverter valve located on the front face of the Port Forward Cockpit Locker. With the handle pointing inboard the effluent can be pumped overboard using the macerator pump. This procedure is authorized only when beyond the 3 mile limit in open ocean. With the handle pointing outboard the holding tank can be pumped out at a shoreside pumpout facility using the deck plate pumpout receptacle. For components of the head system, see Figure 1-42. MSD Schematic and Figure 1-43. Holding Tank.

The head is a standard commercially available item. Should repair/replacement of components be required See Figure 3-7. Marine Head, Parts Breakdown.

TABLE 3-4. D.C. LOAD ANALYSIS

Item			AMPS	
1. NAV (lo) deck level lights with Compass light on			6	
2. Mast mounted light				
Deck light			4	
Bow light			4	
Tricolor		3		
Anchor			3	
3. Cabin lights Port - 7 lights + 1 fan			8	
4. Cabin lights Stbd - 7 lights + 3 fans			11	
5. Spotlight (outlet)			5	
6. Instrument lights			1	
7. Fresh water pump			6	
8. Salt water pump			6	
9. D.C. Refer			3	6.8**
10. LP Gas control panel			1	
11. Bilge pump			15	
12. Engine blower			5	
13. MSD pump			20	
14. Engine Alarms			.25	
15. Bilge Alarm			.25	
Total			101.15*	104.95**

*NAV Lo and NAV Hi may not be used simultaneously, therefore max load is with NAV Lo = 98.15
** New reefer draws 6.8 amps, max load with NAV Lo =101.95

ELECTRONICS

1. ICOM VHF Stby	1.2	TRANSMITTING	6.3	
2. SEA 222 HF	2.5		17	
3. FURUNO fax	1.2	RECORDING	2.2	
4. NORTHSTAR LORAN			.8	
5. B&G HYDRA 330 SYSTEM			.66	
6. RADAR R20X			4.2	
7. NORTHSTAR BPS RECEIVER			.32	
SUB-TOTAL ELECTRONICS			31.48	
ALL ELECTRIC/ELECTRONIC SYSTEMS			========	
GRAND TOTAL			132.63*	
* MAX CONSUMPTION				* 98.15+31.48=129.63
**MAX CONSUMPTION WITH NEW REEFER				**101.95+31.48=133.43

BATTERY INFORMATION

SHIP'S SERVICE BANKS		ENGINE START BATTERY		High Amperage draw	
TYPE - Rolls 12 V Series 4000		M - 27 12 V.		MSD PUMP	20
Part No.- T-12-136		CRANKING AMPS	150	HF/SSB in TX	17
136 Amp Hour at 20 HR rate		AMP HOURS	106	BILGE PUMP	15
6-7 AMP per hour for 20 Hr.					

Table 3-5. Electrical Charging Procedures

(a) **SHIPS SERVICE - Sailing** **With Out Engine Running**

1. When the SS battery selector switch is in position "1", bank #1 is on line. ***CHARGING IS NOT POSSIBLE.*** Engine must be started to charge.
2. When the SS battery selector switch is in position "2", bank #2 is on line. ***CHARGING IS NOT POSSIBLE.*** Engine must be started to charge.

NOTE

The BOTH position should only be used in an emergency due to low battery voltage in both banks. Operating in the BOTH position allows the stronger battery to be drawn down to the level of the weaker one.

3. When the SS battery rotary selector switch is in BOTH or ALL, bank #1 and bank #2 are on line because they are now in parallel. **Engine must be started to charge.**
4. When the SS battery rotary selector switch is in **OFF** there is no power being delivered by the SS system. **Even with the engine running charging would not occur.**

(b) **SHIPS SERVICE** **With Engine Running**

1. When the SS battery switch is in position #1, SS banks #1 is providing power.
2. When the SS battery switch is in position #2, SS banks #2 is providing power.
3. Do not operate in the BOTH or ALL position while Sailing or running the Engine because this has the effect of drawing down the higher charged battery to match the level of the lower charged battery.
4. Using the SYSTEM VOLTAGE SCANNER feature of the Electrical Switchboard, see Fig 3-6.
   a. Set the POWER switch to ON. This activates the SYSTEM VOLTAGE monitor panel.
   b. Set the BANK switch to either "2" or "3". "2" monitors the SS banks, "3" adds the Engine Start Battery to the cycle. Selecting "4" will cause fault light to illuminate, (there is no bank 4).
   c. Note the voltage indication as the BATTERY BANK light cycles from 1 to 4. The voltage shown will be the condition of that bank.
   d. When charging with the engine, 14.4 V(output voltage from the alternator),should be displayed.
   e. When charging with the a.c. charger, 13.8 (output voltage from the a.c. charger), should be displayed.
   f. If a fault should occur, the "FAULT" light on the panel will illuminate. Place the "FAULT LOCK" switch to the "ON" position. The "BATTERY BANK" light will cease to cycle through all banks and will lock onto the faulty bank.
   g. When charging is terminated, a minimum of 12.6V should be indicated for the bank charged. A reading of 13.8 is max capacity.

(c) **START BATTERY - Sailing** **With Out Engine Running**

1. When the START BATTERY master rotary selector switch is in the **OFF** position, the ENGINE START battery is neither on line to provide power, **nor can it be charged.**
2. When the START BATTERY master rotary selector switch is in the ON position the engine can be started, and can be charged.

(d) **START BATTERY** **With Engine Running**

1. When the START BATTERY master rotary selector switch is in the ON position the START BATTERY is on line to provide power and be charged. Power is also available to the engine alarm circuit breakers on the switchboard panel, however the engine alarm switch on the main switchboard must also be in the "ON" position.

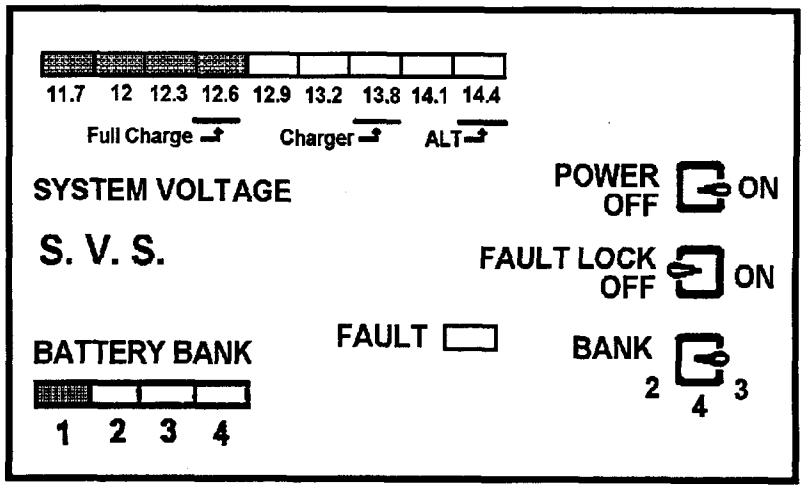


Figure 3-6. System Voltage Scanner

CAUTION

DO NOT PUT PAPER TOWELS, MATCHES, RAGS, ETC. INTO THE BOWL. THEY WILL PLUG THE VALVES - USE WASTE BASKET.

3-5.9.1.1 OPERATING THE HEAD IN U.S. TERRITORIAL WATERS.

1. Ensure that the "Y" valve selects "TANK".
2. Ensure that the Sea Water intake Sea Cock is open, (located under the floor boards just forward of the Engine Compartment. See Figure 1-43. And Table 1-5.THRU HULL FITTINGS.
3. Depress the foot lever and pump water to wet the bowl.
4. Release the foot lever and use the head as you would a conventional toilet.
5. Depress the foot lever and pump water. This will pump water into bowl to flush and will pump effluent out of the head.
6. Release the foot pump and pump until the bowl is dry.
7. Leave the lid in the down position so lid does not slam down when the boat tacks.
8. Ensure that the foot pedal is left in the full UP position to preclude the bowl from overflowing thru siphoning action when not in use. This should happen automatically, however some of the return springs are worn.

3-5.9.1.2 OPERATING THE HEAD IN OPEN OCEAN.

1. Rotate the "Y" valve for "OVBD".
2. Use the remaining procedures from 5-9.1.2
3. When the bowl has been vacated, continue pumping 10 additional strokes to clear the drain hose.

NOTE

Rotate the "Y" valve for HOLDING TANK operation when returning to U.S. Territorial Waters or restricted discharge .

3-5.9.1.3 CLEARING THE HOLDING TANK.

The holding tank can be emptied in one of two ways:

- It can be pumped overboard.
- It can be pumped out at a shoreside pump out station.

3-5.9.1.3.1 PUMPING THE HOLDING TANK OVERBOARD.

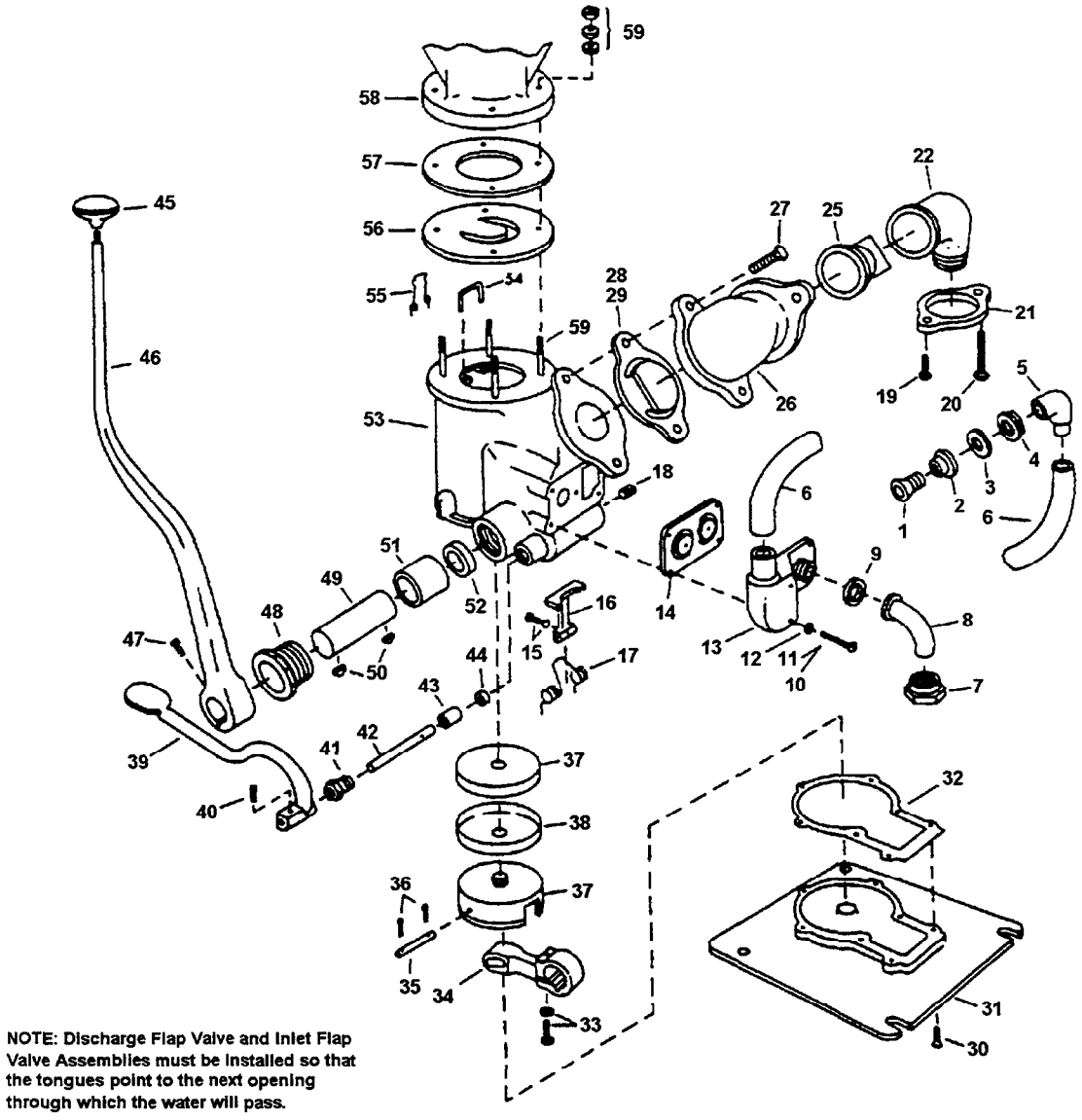
NOTE

When the holding tank is full, continued pumping will become very difficult due to over pressurization of the holding tank.

CAUTION

Continued attempts to flush the marine head when directing effluent into the HOLDING TANK can cause oozing at the hose connections AND/OR RUPTURING THE HOLDING TANK. The following procedures should be used to empty the holding tank overboard.

1. Select 'Holding tank" at the "Y" valve.
2. ENSURE that the overboard discharge under the sink in the head compartment is in the OPEN position.
3. Ensure that the macerator pump handle located on the front face of the port forward cockpit locker is pointing inboard. This directs the flow to the overboard seacock.
4. Turn the engine ON. Running the macerator pump is the highest current draw of the electrical system.
5. Turn ON the MSD PUMP circuit breaker on the Switchboard panel.
6. Depress and hold the button at the macerator pump selector valve.
7. The pump will change from a high pitch whine to a lower pitch when it starts pumping effluent overboard.
8. Look over the port side of the transom for a tell tale brown trail.
9. The pump will alternately change pitch as it nears emptying the tank.
10. Look at the inspection gauge in the port cockpit line locker. When the tank is empty the discharge should be clear.



NOTE: Discharge Flap Valve and Inlet Flap Valve Assemblies must be installed so that the tongues point to the next opening through which the water will pass.

Figure 3-7. Marine Head, Parts Breakdown

Table 3-6. Head Parts List
1550 SKIPPER (TYPES 7 & 8) PARTS LIST

PART NO.	REF NO.	DESCRIPTION	QUANTITY
015016	1	Bowl Spud	1
015065	2	Bowl Spud Rubber Gasket	1
015479	3	Bowl Spud Friction Washer	1
015024	4	Bowl Spud Lock Nut	1
015032	5	Bowl Spud Elbow	1
015339	6	Inlet Flush Tubing, Vinylite	1
015883	7	Inlet Valve tailpiece Coupling Nut	1
015875	8	Inlet Valve Tailpiece, 3/4". 90-degree	1
011155	9	Inlet Valve Tailpiece Gasket*	1
017194	10	Inlet Valve Cover Screw 1/4 -20 x 1 3/4	2
		Inlet Valve Cover Screw Washer	2
017816	11	Inlet Valve Cover Screw 1/4"-20x 5/8	3
		Inlet Valve Cover Screw Washer	3
017244	12	Inlet Valve Cover Screw Washer	5
017178	13	Inlet Valve Cover	1
017251	14	Inlet Flap Valve Assembly*	1
017160	15	Inlet Control Lever Screw and Washer*	1
017152	16	Inlet Control Lever	1
017004	17	Flush Control Lever Spring	1
016535	18	Base Drain Plug	1
015842	19	Coupling Flange Bolt (used with 90-degree Tailpiece)	2
017145	21	Discharge Tailpiece Coulping Flange	1
017111	22	Discharge Tailpiece, 1 1/2", 90-Degree	1
013300	25	Backwater Check Valve (Joker)	1
017129	26	Rising Main	1
015842	27	Rising Main Bolt	2
017137	28	Discharge Flap Valve Assembly* (for 90-degree Tailpiece)	1
017301	30	Base Plate Screw	7
		Base Plate	1
017020	31	Base Plate Screw	7
		Base Plate Gasket	1
016899	32	Base Plate Gasket*	1
016816	33	Piston Lever Clamp Screw	1
		Clamp Screw Lock Washer	1
016840	34	Piston Lever	1
016881	35	Piston Pin	1
		Piston Pin Cotter Pins	2
016949	36	Piston Pin Cotter Pins	2
016832	37	Piston Head	1
		Piston Pin	1
		Piston Pin Cotter Pins	2
016824	38	Piston Cup Leather*	1
016857	39	Foot Pedal	1
		Foot Pedal Screw	1
016220	40	Foot Pedal Screw*	1
017319	41	Inlet Control Shaft Packing Nut	1

Table 3-6. 1550 Skipper (Type 7 & 8) Parts List - Continued

PART NO.	REF NO.	DESCRIPTION	QUANTITY
016873	42	Inlet Control Shaft	1
017277	43	Inlet Control Shaft Packing Gland	1
016980	44	Flush Control Shaft Packing*	1
017103	45	Punp Handle Knob	1
017053	46	Pump Handle Knob	1
		Pump Handle	1
		Pump Handle Set Screw	1
017061	47	Pump Handle Set Screw	1
017038	48	Pump Shaft Packing Cap	1
016865	49	Pump Shaft	1
016923	50	Pump Shaft Key	2
017046	51	Pump Shaft Packing Gland	1
016998	52	Pump Shaft Packing*	1
017012	53	Base Casting	1
015925	54	Waste Valve Spring Pin	1
015933	55	Waste Flap Vavle Spring	1
015917	56	Wast Flap Valve Assembly	1
015909	57	Bowl Gasket	1
015453	58	Bowl Complete with Bowl Spud Assembly	1
016196	59	Bowl Hold-Down Spud	4
		Bowl Hold-Down Spud Washer,ss	4
		Bowl Hold-Down Spud Washer, Rubber	4
		Bowl Hold-Down Spud Nut	4
015305		Seat and Cover (Not Illustrated)	

*Parts supplied in Repair Kit Fig 1539

11. Depress the foot lever and use the handle at the marine head to pump clean sea water into the head to help flush out the holding tank.
12. Pump until the pump holds a steady high pitch whine, and the brown trail at the transom disappears.
13. Shut down the engine. See Figure 1-43 Holding Tank.

3-5.9.1.3.2 PUMPING OUT THE HOLDING TANK AT A SHORESIDE PUMP OUT STATION.

1. Ensure that the macerator pump handle located on the front face of the port forward cockpit locker is pointing OUTBOARD.
2. Open the DECK CAP for the pumpout fitting on the port side deck outboard of the primary winch.
3. Attach the pump out adapter from the shoreside pump out station. (Some shoreside facilities do not have this adapter, in this case, insert the pumpout hose into the pumpout outlet).
4. Start the shoreside suction pump.
   - Pump the toilet with freshwater (hose) or clean seawater while pumping out..
5. Pump until discharge is clear.
6. Disconnect the shoreside adapter or remove the hose as applicable..
7. Replace the deck cap.
8. Wash down the adjacent deck with soapy water.
9. Return the macerator pump handle to the INWARD position. See Figure 1-43. This is to set up the plumbing for self contained operations.

3-5.9.2 SINK/SHOWER.

The lavatory sink in the head compartment is fitted with two spigots. One is for Fresh Water, the other for Sea Water. Both are combination faucet/shower spigots, which are integral to the sink, but connected to a flex hose that can be extended as a telephone type shower. Both units can be operated as a pressurized water source. The Fresh Water spigot can also be operated with a foot pump.

3-5.9.2.1 PRESSURE FRESH WATER.

1. TURN ON the FRESH WATER PUMP circuit breaker at the ELECTRICAL SWITCHBOARD panel.
2. Open the Blue Fresh Water faucet. Water will be delivered in proportion to the amount the faucet is opened.
3. Use the facility as a lavatory sink, or pull the spigot from its cradle and use it as a shower.
4. Be frugal in operating this facility for two important considerations:
   - You are consuming electrical energy from the batteries.
   - You are consuming fresh water from a limited water source.

3-5.9.2.2 MANUAL FRESH WATER.

1. Open the Red water spigot.
2. Depress the foot pump and use the facility frugally.
3. Close the water spigot.
4. Frugality is encouraged to conserve the Fresh Water supply.

3-5.9.2.3 PRESSURIZED SEA WATER.

1. Open the Sea Water Intake Thru-Hull under the Galley Sink, (3/4" diameter hose), See Figure 1-45, Thru-Hull Diagram, and Table 1-5. THRU-HULL FITTINGS.
2. TURN ON the SEA WATER PUMP circuit breaker at the ELECTRICAL SWITCHBOARD.
3. Open the Sea Water faucet. Water will be delivered in proportion to the amount the faucet is opened.
4. Use the facility as a lavatory sink, or pull the spigot from its cradle and use it as a shower.
5. Frugality is encouraged to conserve Electrical Energy.
6. Close the Sea Water Intake Thru-Hull.
7. Use the Shower Sump Pump to drain the grey water from the shower sump.

3-5.10 REFRIGERATION SYSTEM MANAGEMENT.

The NA 44 is equipped with a two door, top opening, 8.1 cubic foot refrigerator located in the galley starboard side. The original refrigeration system is still on all boats except NA2, NA8, and NA15 thru NA20. This is a Grunert Refrigeration dual coil holdover plate system. It is capable of being cooled with either mechanical or electrical cooling.

For shoreside charging:

- Connect shoreside power.
- Turn on the circuit breaker for Charging on the A.C. part of SWBD.
- Set the A.C. rheostat in the reefer to #4.
- Turn on the circuit breaker for Reefer on the A.C. part of the Swbd.

For Charging using the engine:

- Turn on the Reefer Circuit Breaker on the D.C. portion of the Swbd.
- Start the engine and stabilize at idle.
- Set the D.C. rheostat in the cubby forward of the sink under the pilot berth to #4.
- Turn the reefer timer rotary switch located on the side of the pantry to 60 minutes.
- Advance throttle to obtain 1200-1500 RPM.
- Monitor cooling of the box with the thermometer on the face of the sink board, or frost on the holding plate.
- Charge as necessary, but not to exceed closer than every four hours.

The new Refrigeration system installed in NA2 NA8 and NA 15 thru NA20 is a Technautics Coastal 12 system. It is ONLY a 12 v.d.c. system.

To charge the system at shoreside:

- Connect shoreside A.C. power.
- Turn on the Reefer charging Circuit breaker on the D.C. part of the Swbd.

To charge the reefer while underway:

- Start the engine so that the alternators will be charging the batteries.
- Turn on the Reefer Circuit Breaker on the D.C. part of the Swbd.

NOTE

One rheostat located inside the reefer controls rate of charge for either shoreside or underway charging of the new system.

3-5.11 STOVE.

The Paul E. Luke Stove aboard the NAVY 44 is a three burner propane stove with an oven. The temperature of the burners are adjusted manually with the control knobs on the front face of the stove which regulate LPG flow to the burner. If the oven pilot flame goes out, the oven is shutdown completely to make it safe.

NOTE

LPG tanks have Standard Gas fittings with LEFT-HANDED THREADS. This is to preclude accidentally hooking up incorrect tanks to the Gas system. Check connections for leaks with a soap and water mixture each time a tank is connected to the system.

3-5.11.1 LIGHTING THE STOVE.

CAUTION

OPERATE BILGE BLOWER FOR 5 MINUTES PRIOR TO LIGHTING STOVE TO REMOVE ANY GAS FUMES THAT MAY HAVE SETTLED TO THE BILGE.

1. Two Propane tanks are located on deck in a compartment on the starboard quarter aft. Open the valve on the tank being used.
2. Turn the flow director to the bottle selected.
3. Turn ON the "GAS VALVE" switch at the ELECTRIC SWITCHBOARD PANEL.
4. Turn ON the Marinetic switch at the galley bulkhead.
5. Open a burner valve and apply a lighted match.

3-5.11.2 SHUTTING OFF THE STOVE.

The procedure listed below will ensure that gas in the lines will be consumed thus leaving a safe system. The stove must be secured after

each session of use in order to vacate the lines of propane.

1. Leave the stove lighted.
2. Close the valve at the tank. When the burner flame goes out all the gas in the lines has been consumed.
3. Turn OFF the Marinetic switch at the galley bulkhead.
4. Turn of the GAS VALVE at the Switchboard Panel.
5. Turn OFF the burner gently to avoid damaging the needle valve.

3-5.11.3 OPERATING THE OVEN.

1. Light a burner using procedures in section 3-5-11.2 to bleed air from the system prior to lighting the oven.
2. To ignite the pilot light, turn the oven control valve counter clockwise about 90 degrees. Access the pilot by turning the stainless steel cover plate located beneath the sliding rack out of the way.
3. Hold a flame, (match or flame gun) to the pilot and press the red button below the door. Continue to hold in the red button for 15-20 seconds after the pilot has a flame to heat the pilot light thermocouple.
4. Control the oven temperature with the selector knob. The oven will cycle to maintain the selected temperature.

NOTE

If the oven pilot goes out for any reason, the thermocouple cools off and shuts off the gas to the oven.

3-5.11.4 SHUTTING DOWN THE OVEN.

1. Shut down the stove using the procedures of 3-11.3 above.
2. Rotate the Oven Temperature Selector Knob to OFF. Look to see that the oven pilot flame extinguishes.

3-6 POST OPERATIONS PROCEDURES.

After a sortie has been completed the following post operations check should be made to leave the boat ready for the next sortie.

1. Stand jib and spinnaker halyards away from the mast. The jibs to the tack fittings on the bow. The spinnaker halyards to the base of the foredeck lifeline stanchions.
2. Release outhaul tension on the mainsail. Ensure that the sail has been flaked so that the battens are on top of the boom so avoid bending them. Put on sail ties, and put on the sail cover.
3. Coil reefing lines.
4. Leave the collapsible inner forestay rigged.
5. Tighten the Steering Wheel friction knob, (not a true lock). This keeps the rudder from turning due to wave action.
6. Engine Shutdown T-Handle in the down position.
7. Backstay at 500 psi.
8. Coil topside lines. DO NOT Flemish any lines. This induces a permanent twist to the line and increases their tendency to kink.
9. Secure all communications and electronics equipment.

NOTE

All fluid levels should be topped up to ready the boat for the next sortie.

10. Check and record fluid levels on the fresh water tanks, diesel fuel tank, and engine oil.
11. Flush out water closet until bowl is clean and empty. (Pump 10 additional strokes after bowl is empty to ensure the system is flushed completely.
12. Close all seawater system seacocks (OIC discretion).
13. Close Propane valve at the tank and the burner/oven controls at the stove.
14. Secure all running rigging through designated blocks, fairleads, and cleats. Secure boom in level position, off center away from the boarding side.
15. Jibs/Genoas used during the sortie should be brought on deck, laid out flat, pleat folded along the luff, and rolled up for stowage in the corresponding sail bag.

At the end of a series or cruise the sails should be washed and dried prior to stowing aboard.

16. Spinnakers should be dry before stowing.
17. Hose down entire deck, cockpit, winches, coiled sheets, lines, and rigging with fresh water from dockside.
18. Cleat and coil halyard tails. Hang sheets so they can dry.
19. Allow all washed areas to dry prior to final lock up.
20. Rinse all winch handles and snatch blocks with fresh water and stow in the "hernia box".
21. Inspect winches for proper lubrication and functioning.
22. If anchor(s) was used, put anchor, chain, and rode on deck for fresh water wash down. Stow below when dry.
23. Turn OFF all circuit breakers on the switchboard panel except for the main D.C. breaker, Eng. Alt, SS Alt, and the bilge alarm.
24. Connect shore power. Connect the cable to the boat. Run the cable up the port deck, pass under the lifelines on the fore deck to the piling with the shore power station. Wrap two turns of the cable around the piling to keep the cable from draping into the water. Plug into the shore receptacle.
25. Leave the following A.C. circuit breakers-switches at the Switchboard panel in the ON position:
    Shore power switch
    Battery Charger
    SS Battery rotary switch to charge the depleted battery.
26. Secure the refrigerator.
27. Inspect bilge after fresh water washing. If there is oil in the bilge, soak it up with "oilsorbs" or rags. Pump bilge dry.
28. Check air vents and secure hatches.
29. Cover the helm and other equipment provided with covers.
30. After final lock-up, ensure mooring lines, chafing gear and fenders are secure. Report and note any boat discrepancies to maintenance.

End of Chapter 3.

CHAPTER 4

MAINTENANCE

4-0 INTRODUCTION.

This chapter contains the maintenance and repair procedures that can be accomplished by the crew while the boat is in their custody, in port or underway, with the limited tools and repair parts/ supplies on board. This is the first level of regular Preventive Maintenance Schedules (PMS) administered and supervised by the U.S. Naval Academy. Included are actions that serve to alert the crew of certain safety related maintenance and repair actions that should be attended to periodically. The tool kit provided on each NAVY 44 has a limited assortment of tools, but has the necessary tools to accomplish the simple, part replacements listed in this chapter.

4-1 CARE OF SAILS AND RIGGING.

1. Every time a sail is hoisted or an item of equipment is used it should be inspected for condition. A torn sail should not be hoisted, rather the next best suitable alternate should be used, i.e., use the #2 Genoa if the #1 is in need of repair.
2. Simple repairs can be accomplished onboard with the sail repair kit.
3. Tape sharp objects that may cause chafe.

4-2 AUXILIARY DIESEL ENGINE.

The following maintenance and corrective procedures are to be used in conjunction with the equipment manuals and as necessary in accordance with scheduled preventive maintenance on the following systems:

- fuel system
- cooling system
- starter
- lubricating oil
- alternators
- refrigeration compressor.

4-2.1 FUEL SYSTEM.

All diesel fuel supplied to the engine is passed through a primary filter/separator and a secondary engine mounted filter.

WARNING

WORK ON THE FUEL SYSTEM ONLY WHEN THE ENGINE IS COOL.

NOTE

Contaminated fuel removed from the system or used in the cleaning of fuel system components should be delivered to a contaminated fuel disposal station. Do not dump it at sea.

4-2.1.1 PRIMARY FUEL FILTER/SEPARATOR CLEANING AND/OR REPLACEMENT.

The primary Racor 500MA filter/separator is mounted behind the engine compartment on the bulkhead to port. Replace the filter cartridge if water or debris is identified in the sight bowl on the bottom of the filter assembly.

Before starting this procedure ensure that the following are on hand:

- RACOR replacement filter element, Part No. RACOR R60T w/gasket.
- Clean lint-free rags.
- A spill container, (bucket).
- A container with clean diesel fuel.

1. Isolate the unit by securing the fuel supply and return shut-off valves.
2. Place a suitable spill container directly under the filter/separator.
3. Open the bottom drain petcock and drain sediment and/or moisture.
4. SPIN OF the filter element from the housing assembly.
5. SPIN OFF and separate the sediment bowl from the filter element.
6. Clean the sediment bowl.
7. Clean the exterior of the assembly.

8. If a new filter element is available, moisten the new top gasket with clean diesel fuel and place into the race on the top of the filter element, with the beveled surface facing the filter element.
9. If a new filter element is not available SPIN ON the old filter element and go to step 11.
10. SPIN ON the filter to the Assemble.
11. SPIN ON the sediment bowl.
12. Open the fuel supply and fuel return valves located in the bilge.
13. Use the fuel priming pump (black button) on the top of the filter assembly to draw fuel into the filter, or fill directly with clean diesel fuel..
14. Start the engine and let run at a fast idle to ensure the positive fuel continues to flow.
15. If engine does not start or if it dies after starting bleed the fuel system. (See 4-2.1.3 Bleeding the Fuel System procedures below).

4-2.1.2 SECONDARY FUEL FILTER.

Before starting this procedure ensure that the following are on hand:

- Replacement fuel filter, Fram C1191A, NSN 2910000571421.
- 7/16-inch open-end wrench.
- Clean lint-free rags.
- A spill container, (bucket).
- A container with clean diesel fuel.

The secondary filter is an engine mounted unit located on the starboard side of the engine, aft of the manual fuel lift pump. This is not a cleaning item. Replace it when the primary fuel filter is replaced.

1. Isolate the filter assembly by securing the fuel supply and return shut off valves.
2. Use a 7/16-inch open-end wrench to unscrew the retaining bolt from the center of the top cover.
3. Remove the filter element and bottom cover. Discard the element.
4. Clean the seating surfaces, visually inspect the gasket sealing rings, and center in position. Replace the gasket if necessary.
5. Clean the exterior of the filter assembly.
6. Fit a new filter element to the bottom cover. Place squarely against top cover and tighten the retaining bolt.
7. Open the fuel supply and return shut-off valves.
8. Start the engine and let run at a fast idle to ensure the positive fuel continues to flow.
9. If engine does not start or if it dies after starting bleed the fuel system. (See 4-2.1.3 Bleeding the Fuel System procedures below).

4-2.1.3 BLEEDING THE FUEL SYSTEM.

When any component of the fuel system is opened to the atmosphere, it must be bled of any trapped air. See Figure 4-1 Engine Bleed Points.

Before starting this procedure ensure that the following are on hand:

- Clean lint-free rags.
- 5/16-inch box wrench.
- 5/8- inch open-end wrench.

1. Ensure that the fuel supply and return valves are OPEN.
2. Ensure the ENGINE-SHUTDOWN T-Handle in the cockpit is PUSHED IN (i.e., normal running position).
3. Disengage the transmission by pulling out the Morse control clutch disengage button.
4. Push the throttle to the fully open position.
5. Use a 5/16-inch box wrench to crack open the fuel injector pump vent screw. (bleed point #1).
6. Manually work the fuel lift pump lever until a solid stream of fuel flows from the bleed screw. Close the fuel injector pump vent screw.
7. Use a 5/16-inch box wrench to crack open the fuel governor vent screw (bleed point #2).
8. Manually work the fuel lift pump lever until a solid stream of fuel flows from the bleed screw. Close the fuel governor vent screw.
9. Use a 5/8-inch open end wrench to crack open the fuel injector supply lines for each injector, (bleed points #3).

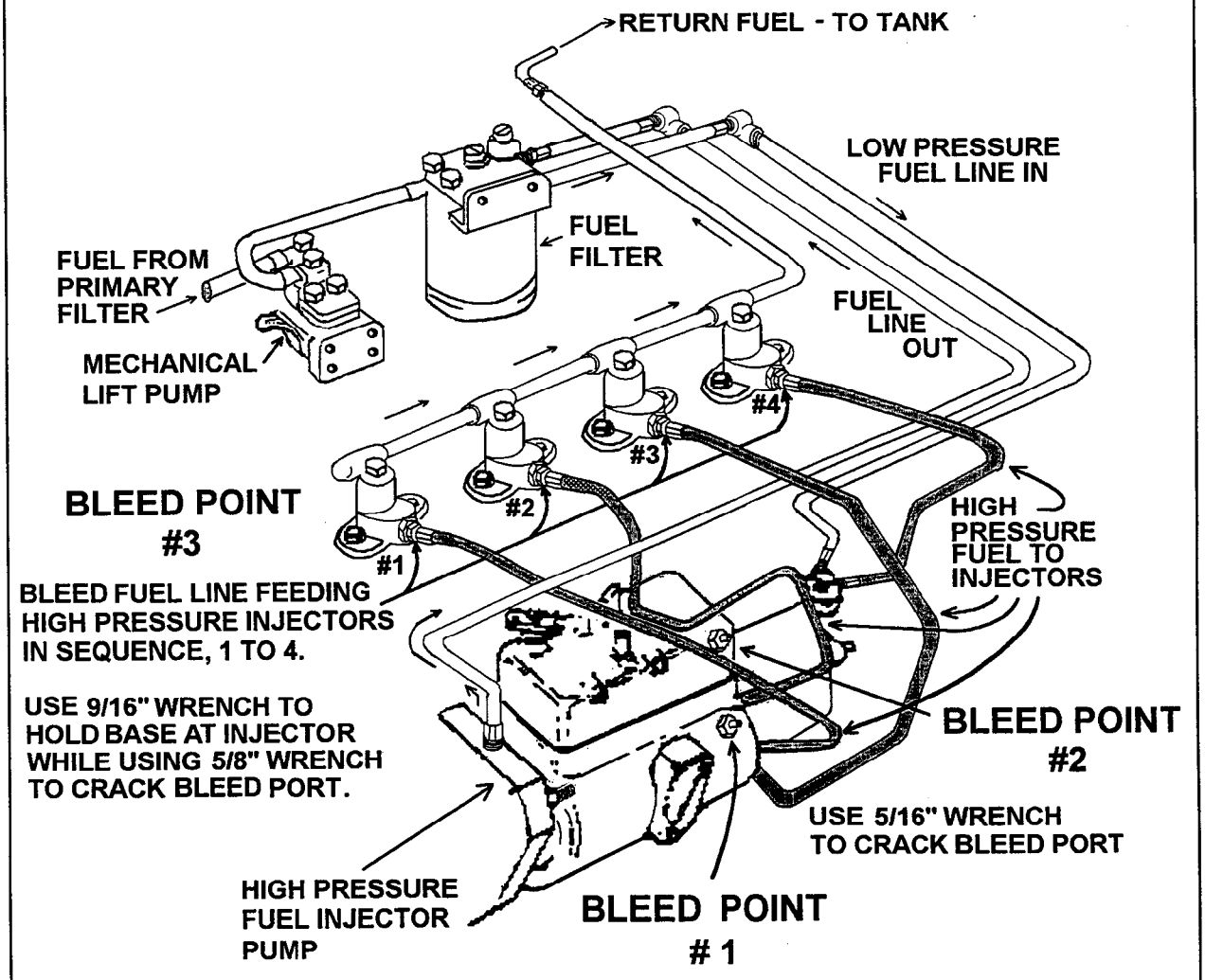


Figure 4-1. Engine Bleed Points

WARNING

STAND CLEAR OF MOVING ENGINE PARTS.

10. Energize the system by placing the ENGINE BATTERY SWITCH in the ON position.
11. Place the throttle nearly fully OPEN.
12. Push the engine PREHEAT and START buttons simultaneously to crank the engine several revolutions (this will pump up the fuel system) and bleed the fuel injectors.
13. Crank the engine until each injector emits a solid spurt of fuel.
14. Tighten each injector supply line sequentially starting at #1.
15. As injector supply line #4 is tightened the engine should kick over. Run at a fast idle to ensure the fuel system is properly bled.

4.2.2 CRANKCASE OIL AND FILTER CHANGE.

Before starting this procedure ensure that the following are on hand:

- Clean lint-free rags.
- Dirty oil container.
- Transfer pump.
- Replacement Oil Filter, either of the following:

Purolator	L10017
AC	PF-13
FRAM	PH16
Motorcraft	FL-300
WIX	51084

- 6-inch crescent wrench.
- Oil Filter wrench.
- 4-quarts, engine oil, either of the following:
  Standard Navy Stock, Type 9250,
  SAE 30 HD
  NSN 9150-00-181-8229
  Mil Spec 9250601L
  Code 54161
  or
  Chevron, Delo 400, SAE 30
  Union 76, Truck motor oil SAE 30
  Any good grade SAE 30
  Multi Vis oils SAE 10W30
  API Service Grade CC or CD

1. Engine must be warm, at least 150 degrees for oil to flow freely.
2. Ensure BATTERY SWITCHES are OFF.
3. Remove oil fill cap on valve cover and pull dipstick.
4. Remove pipe cap from crankcase drain hose fitting (drain hose is located to starboard near front of engine) and attach hand transfer pump suction hose to drain hose. Place pump discharge hose in two gallon bucket and operate pump until suction is broken.
5. Replace drain hose cap and tighten firmly with 6-inch crescent wrench.
6. Place oil absorbent pad or rags under installed filter to catch oil which will spill as soon as filter is loosened.
7. Use oil filter wrench to turn filter counterclockwise for removal.
8. Clean filter gasket mating surface on engine block of any foreign matter or lint from the cleaning rag.
9. Apply a light film of engine oil to new filter.

NOTE

Never use a filter wrench or any mechanical aid in tightening.

10. Carefully start new filter onto mounting stud to avoid cross threading and turn clockwise until filter gasket is snug against block. Tighten as much as possible by hand.
11. Add four (4) quarts of new oil through oil fill opening in the valve cover. Check crankcase oil level with dipstick and continue to add oil until oil level reaches dipstick FULL mark. Do not bring oil level above FULL mark. Excess oil in crankcase can cause oil seal and lubrication failures. Replace oil fill cap and dipstick.
12. Start engine and operate at fast idle (1200 rpm) for five (5) minutes. Check oil filter, crankcase drain hose, and engine block for oil leaks. Check oil pressure gauge for reading between 30

and 60 psi. Shut down engine immediately if oil pressure is above or below this range.

13. Shut down engine and switch off batteries. Wait five (5) minutes for oil to drain from block passages into oil pan and check oil level with dipstick. If necessary, add oil to bring level to "full" mark. If crankcase has been overfilled, use hand transfer pump to remove excess oil via crankcase drain hose.

4-2.3 COOLING SYSTEM.

The engine has a captive anti freeze/water internal cooling system. The coolant plumbing is run through a heat exchanger that uses raw sea water to cool the internal coolant.
The heat exchanger is mounted across the back of the engine.

NOTE

The engine must not be running to perform the following procedures.

4-2.3.1 RAW WATER COOLING SYSTEM.

Maintenance items in this system are:

- Raw water strainer.
- Replacement of the zinc anode.
- Replacement of the pump impeller.

4-2.3.1.1 CLEANING THE RAW WATER STRAINER.

No tools or supplies are required for this procedure.

1. Close the ENGINE INTAKE seacock.
2. Loosen the two wing nuts (without removing) on the top access cover.
3. Open the cover by lifting to starboard (the starboard mounting lug will act as a hinge).
4. Remove the internal strainer, clean and put it back .
5. Clean the top access cover mating surfaces.

NOTE

Flat washers must be in place below the wing nuts.

6. Return top access cover to original position and hand tighten.
7. OPEN ENGINE INTAKE Seacock.

4-2.3.1.2 CHECKING/REPLACING THE HEAT EXCHANGER ZINC ANODE.

Before starting this procedure ensure that the following are on hand:

- 3/8-inch box wrench.
- Replacement Zinc, part no. Westerbeke 011885.
- Suitable spill container.

1. Close the ENGINE INTAKE seacock.
2. Place spill container under the zinc bolt-head located to starboard of the Fresh Water drain petcock.
3. Remove the zinc anode using a 3/8-inch box wrench.
4. Inspect the zinc. Replace if 50 percent wasted away, otherwise, clean zinc surface and return to the heat exchanger using anti-seize compound or teflon tape on the bolt thread and tighten with 3/8-inch box wrench. See Figure 4-2 Cooling System Zinc.
5. Open the ENGINE INTAKE seacock.

4-2.3.1.3 REPLACE RAW WATER PUMP IMPELLER.

Before starting this procedure ensure that the following are on hand:

- Blade screwdriver.
- Replacement Impeller, part no. Westerbeke 033104.

1. Close the ENGINE INTAKE seacock.
2. Use a blade screwdriver to remove the four retaining screws and front access cover plate.
3. Observe the direction that the impeller blades are bent and pull out the damaged impeller from the splined shaft, making sure all loose, damaged parts are removed. Note the woodruff key/groove for alignment.
4. Remove the old gasket around the cover plate periphery. If necessary, scrape the inside of the cover place to remove gasket residue without marring the mating surfaces.
5. Align the woodruff key/groove and Insert the new impeller onto the shaft making

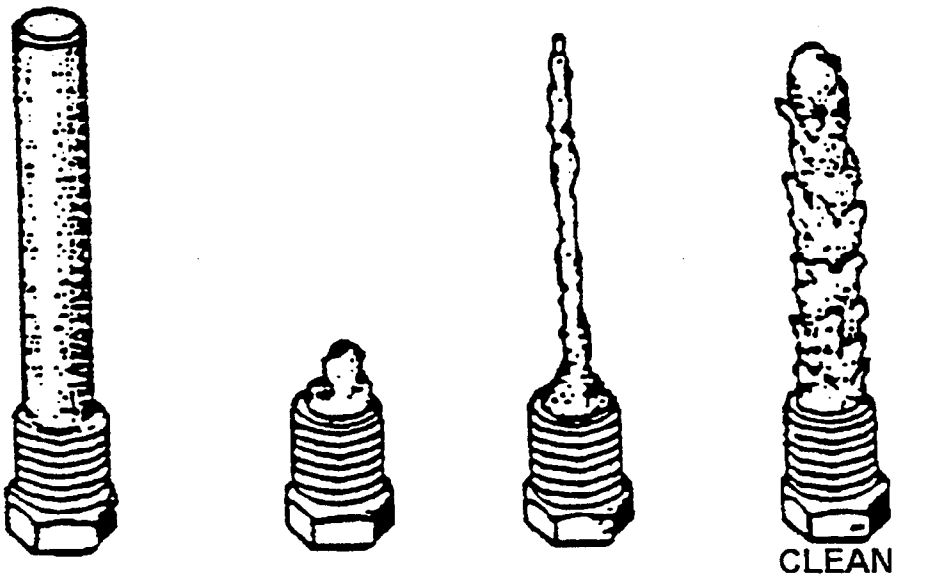


Figure 4-2. Cooling System Zinc

sure the impeller blades are bent in the same direction as they were before they were removed. This will allow the impeller to turn clockwise without distorting the blades.

6. Apply a coating of non-hardening gasket sealant to the cover plate and gasket mating surfaces. Install cover plate with gasket, hand thread the four screws and use a blade screwdriver to tighten down evenly for a snug fit.
7. Open Engine Intake seacock.

4-2.3.2 ADDING COOLANT TO THE CAPTIVE SYSTEM.

WARNING

NEVER OPEN THE EXPANSION TANK WHEN ENGINE IS HOT, AS THERE IS DANGER OF BURNS FROM ESCAPING STEAM. FILL ONLY WHEN SYSTEM IS COOL.

Before starting this procedure ensure that the following are on hand:

- 50/50 mixture of antifreeze/water solution.

1. Open the fill cap on the expansion tank.
2. Fill the expansion tank with a 50/50 mixture of antifreeze and water.
3. Close the cap on the expansion tank and make sure the hose between the expansion tank and the recovery tank is properly connected.

4-2.3.3 ADJUSTING AND/OR **REPLACING** THE FRESH WATER PUMP DRIVE BELTS.

The fresh water pump has a double pulley attached to its drive shaft to accommodate two drive belts. One is the same drive belt that drives the port alternator. The other is the same drive belt that drives the starboard alternator. The procedure for **replacing** the belt is inserted in this procedure where applicable as annotated with **Replacing the drive belt (bold print).** Drive belts should have no more than 1/2-inch of play.

Before starting this procedure ensure that the following are on hand:

- 3/4-inch wrench.
- 1/2-inch wrench.
- Pry bar.
- Replacement Drive Belts.

NOTE

Drive Belt sizes may not be substituted, they must be:

a. FSN 3030-529-0350
b. WESTERBEKE PART #33361
c. COMMERCIAL AX46

1. Shutdown the engine.

NOTE

Access to the port alternator is provided through the removable panel in the head.

2. Loosen the top mounting bolt for the port alternator using a 3/4-inch wrench and a 1/2-inch wrench on the lower sliding bracket bolt. If only adjusting drive belt tension skip insert and go to step 4.

PROCEDURE FOR REPLACING A DRIVE BELT.

PORT DRIVE BELT.

P1. Disconnect the 3/4-inch raw water pump inlet hose placing the hose in an upward position to minimize spillage of raw water.
P2. Slide the alternator inboard and remove the defective belt.
P3. DO NOT replace the port drive belt now if the starboard belt also must be replaced. It will only be in the way. Wait until step S4.

STARBOARD DRIVE BELT.

S1. Remove the port alternator belt from the fresh water pump pulley to allow removal of the starboard drive belt.
S2. Slide the starboard alternator inboard and remove the defective starboard drive belt.
S3. **Replace the starboard drive belt.**
S4. **NOW replace the port drive belt if both belts are being replaced. Reconnect water pump inlet hose.**

NOTE

Use a large screw driver or a bilge pump handle as a pry bar.

4. Pull/pry the port alternator to slide outboard on the bottom sliding bracket until the proper belt tension is obtained.
5. Maintain pressure on the alternator and tighten the lower sliding bracket bolt and the top mounting bracket.
6. Check the belt tension and readjust as necessary.
7. Repeat the procedure for the starboard alternator.

4-2.3.4 REPLACEMENT OF THE FRESH WATER PUMP.

The fresh water pump requires loosening the dual purpose alternator/fresh water pump drive belts for both the port and starboard alternator.

Before starting this procedure ensure that the following are on hand:

- 3/4-inch open-end wrench.
- 1/2-inch open-end wrench.
- 1/2-inch socket wrench with extension.
- Replacement Water Pump, Part No. Westerbeke 016423.

NOTE

Inspect the replacement pump. If the double pulley is not mounted on the spare, contact a qualified mechanic.

1. Shutdown the Engine.

NOTE

Access to the port alternator is provided through the removable panel in the head.

2. Loosen the top mounting bolt for the port alternator using a 3/4-inch wrench on the top mounting bolt and a 1/2-inch wrench on the lower sliding bracket bolt. Remove the belt from the water pump pulley.
3. Loosen the top mounting bolt for the port alternator using a 3/4-inch wrench on the top mounting bolt and a 1/2-inch wrench on the lower sliding bracket bolt. Remove the belt from the water pump pulley.
4. Using a 1/2-inch socket wrench, remove the four retaining bolts on the pump housing and remove the pump and the end plate spacer (accounting for all missing parts and/or pieces).
5. Clean both sides of the spacer end plate and the gasket mating surface on the engine block removing all traces of the old gasket and gasket sealant.

NOTE

Carefully clean surfaces to ensure gouging or scarring does not occur to the engine block end plate, or pump housing.

NOTE

Gaskets on either side of the end plate are not identical. Inspect gaskets prior to application of gasket sealant.

6. Apply non-hardening gasket sealant to both sides of the gasket serving the end plate spacer and the mating surface on the engine block. Position the replacement pump assembly against the engine block.
7. Thread in the four retaining bolts until hand tight while holding the pump assembly in place.
8. Using a 1/2-inch socket with extension, evenly tighten down the four retaining bolts by tightening diagonal bolts. Check and re-tighten all bolts in a clockwise order. Do not over tighten.
9. Return the belts to the pulley and pull/pry the port alternator to slide outboard on the bottom sliding bracket until the proper belt tension is obtained.
10. Maintain pressure on the alternator and tighten the lower sliding bracket bolt and the top mounting bracket.
11. Check the belt tension and readjust as necessary.
12. Repeat the procedure for the starboard alternator.

13. Check engine coolant, (50/50 coolant/water mixture) and add if required.

4-2.3.5 REPLACING THE COOLING SYSTEM HEAT EXCHANGER.

Before starting this procedure ensure that the following are on hand:

- Replacement Cooling system heat exchanger, part no. Westerbeke 036896.

1. Drain the fresh water (captive anti-freeze side) of all coolant.
2. Close the ENGINE INTAKE valve and drain the raw water side of the heat exchanger.
3. Remove the two (2) lower retaining bolts and spacers.
4. Lift the electrical mounting plate (with switches attached) up and out of the way.
5. Remove the defective heat exchanger and replace.
6. Place electrical mounting plate against heat exchanger, insert retaining bolts and spacers and tighten.
7. Fill fresh water cooling system.
8. Open ENGINE INTAKE valve.
9. Vent the heat exchanger as necessary.

4-2.4 ALTERNATORS.

The auxiliary diesel engine is equipped with two belt driven alternators which are used to charge the two separate battery banks. The alternators are mounted on the forward part of the engine, Engine Start Battery Bank to starboard, the Ship's Service (HOUSE) Bank to port. The belts used to drive the alternators also drive the fresh water pump as previously described above. The procedures are one-in-the-same and are repeated here for continuity and eliminating the need to flip back and forth.

4-2.4.1 ADJUSTING AND/OR **REPLACING** THE ALTERNATOR DRIVE BELTS.

The fresh water pump has a double pulley attached to its drive shaft to accommodate two drive belts. One is the same drive belt that drives the port alternator. The other is the same drive belt that drives the starboard alternator. The procedure for **replacing** the belt is repeated in this procedure where applicable as annotated with **Replacing the drive belt (bolt print)**. Drive belts should have approximately 1/2-inch of play.

Before starting this procedure ensure that the following are on hand:

- 3/4-inch wrench.
- 1/2-inch wrench.
- Pry bar.
- Replacement Drive Belts.

NOTE

Drive Belt sizes may not be substituted, they must be:

a. FSN 3030-529-0350
b. WESTERBEKE PART #33361
c. COMMERCIAL AX46

1. Shutdown the engine.

NOTE

Access to the port alternator is provided through the removable panel in the head.

2. Loosen the top mounting bolt for the port alternator using a 3/4-inch wrench and a 1/2-inch wrench on the lower sliding bracket bolt. If only adjusting drive belt tension skip insert and go to step 4.

PROCEDURE FOR REPLACING A DRIVE BELT.

PORT DRIVE BELT.

P1. Disconnect the 3/4-inch raw water pump inlet hose placing the hose in an upward position to minimize spillage of raw water.
P2. Slide the alternator inboard and remove the defective belt.
P3. DO NOT replace the port drive belt now if the starboard belt also must be replaced. It will only be in the way. Wait until step S4.

STARBOARD DRIVE BELT.

S1. Remove the port alternator belt from the fresh water pump pulley to allow removal of the starboard drive belt
S2. Slide the starboard alternator inboard and remove the defective starboard drive belt.

S3. **Replace the starboard drive belt.**
S4. NOW replace the port drive belt if both belts are being replaced.
P4. Reconnect the 3/4-inch raw water pump inlet hose.

3. Pull/pry the port alternator to slide outboard on the bottom sliding bracket until the proper belt tension is obtained.
4. Maintain pressure on the alternator and tighten the lower sliding bracket bolt and the top mounting bracket.
5. Check the belt tension and readjust as necessary.
6. Repeat the procedure for the starboard alternator.

4-2.4.2 REPLACEMENT OF ALTERNATORS.

Before starting this procedure ensure that the following are on hand:

Part No. Westerbeke 24684

1. Loosen the alternator belt(s).
2. Tag all electrical wires and their respective terminals on the alternator and disconnect.
3. Remove the lower sliding bracket bolt and the top mounting bolt and lift out the alternator.
4. Position the replacement alternator, insert the top mounting bolt and the lower sliding bracket bolt, and place belt on the pulley.
5. Adjust to the proper belt tension.
6. Reconnect the tagged electrical connections onto the proper terminals.

4-2.5 STARTER.

The auxiliary diesel engine is provided with an engine mounted electric starter located on the port side of the engine. Access is provided through the removable panel in the head.

4-2.5.1 REPLACEMENT OF THE STARTER.

Before starting this procedure ensure that the following are on hand:

- Part No. Westerbeke 30593.

1. De-energize the electrical system by switching off the batteries.
2. Remove any cooling fresh/raw water hoses that would restrict access for removal of the starter.
3. Tag the electric wires and the respective starter terminals and disconnect.
4. Remove the two retaining bolts using a socket and extension. Remove defective Starter.
5. Install replacement starter into position, insert mounting bolts, and tighten.
6. Reconnect tagged electrical connections to proper terminals.
7. Reconnect any removed hoses and replenish the cooling water as necessary.

4-3 REFRIGERATION COMPRESSOR.

A mechanically driven refrigeration compressor is provided as an engine accessory in the original equipment Grunert Refrigeration System.

This procedure does not apply to NA 2, NA 8, NA 16-NA 20. The compressor is driven by a dual belt arrangement and is located on the forward part of the engine, starboard. Maintenance for the belt driven compressor consists of:

- Adjusting the belt tension
- Replacement of the belt(s).

4-3.1 ADJUSTING THE BELT(S) TENSION.

NOTE

There should be no more than 1/2-inch play in the belt tension.

1. Loosen the four 9/16-inch bolts on the compressor sliding plate foundation.
2. Back off the 9/16-inch lock nut on the jacking bolt. Tighten the jacking bolt until the desired belt tension is obtained.
3. Tighten the four bolts on the compressor sliding plate foundation.
4. Re-tighten the jacking bolt lock nut holding the jacking bolt head.
5. Recheck the belt tension and readjust if necessary.

4-3.2 REPLACING THE COMPRESSOR BELT(S).

1. Loosen the four 9/16-inch bolts on the compressor sliding plate foundation.

2. Back off the 9/16-inch lock nut on the jacking bolt. Unthread the jacking bolt until the compressor will slide enough to allow removal of the defective belt(s).
3. Replace the belt(s) and adjust tension.
4. Tighten the four bolts on the compressor sliding plate foundation and lock nut on the jacking bolt.

4-4 STEERING SYSTEM.

The steering system should be checked and maintained periodically to ensure proper operation at all times. Steering failure can be extremely hazardous particularly under heavy wind and sea conditions. In conjunction with pre-operation and post-operation procedures, the following should be performed on the steering system.

1. Check the tension of the wire rope from the pulleys to the radial drive. Adjustments for wire rope tightness is done on the eye bolts located below the radial drive using two 1/2-inch open end wrenches.

NOTE

Wire rope tension inspection is preferably done while another crew member slowly turns the steering wheel "hardover" in both directions. The non-tensioned wire rope should be barely slack.

WARNING

AN ACTIVE TEST ON THE STEERING SYSTEM CAN BE HAZARDOUS TO THE INSPECTING PARTY BELOW. KEEP HANDS CLEAR OF WIRE ROPE AND PULLEYS. IF LOOSENESS IS NOT READILY APPARENT, USE A LONG METAL OBJECT, SUCH AS A WRENCH OR HAMMER, TO PULL ON THE WIRE ROPE OBSERVING THE AMOUNT OF PLAY. DO NOT OVER TIGHTEN!

CAUTION

Do Not over-tighten the packing gland on the Stuffing Box. If tightening does not stop the leak, the packing gland needs to be replaced.

2. Inspect the rudder post for leaks at the stuffing box. If any leakage is noted, gradually tighten the packing gland bolts, ½ turn at a time, until leak stops. The stuffing box is located directly below the circular quadrant.
3. Check and lubricate the cross wire pulley bearings with light machine oil. Excessive wear on bearings should be reported immediately.

NOTE

The internal mechanisms of the steering pedestal (sprocket, chain, bearings) should be inspected and lubricated once a year. The wire rope should be replaced every five (5) years.

4. Check bolt tightness throughout the system, to include the pedestal base, steering wheel hub, pulley base, and rudder stops. Tighten as necessary.

4-4.1 REPLACING THE RUDDER POST PACKING GLAND.

Before starting this procedure ensure that the following are on hand:

- 2-1/2 feet of 3/8-inch packing gland material.
- ½-inch open end wrench.

NOTE

This procedure can be performed with the boat in the water since the rudder post stuffing box is normally above the water line.

1. Use the ½-inch open end wrench to loosen and remove the bolts holding the retaining ring in place.
2. Pry out the old packing gland. Note the direction of the turns on the overlap.
3. Use the old packing gland for an approximate measure for the length of the replacement.
4. Insert the new gland using the same rotation pattern as that observed in the removal of the old gland material.
5. Replace the retainer ring and tighten the retainer bolts evenly.

4-5 COMMUNICATIONS AND ELECTRONIC EQUIPMENT.

Continuous satisfactory operation of the communications and electronic equipment is dependent on the care and maintenance performed on each equipment. The following simple maintenance steps will help to avoid equipment failure.

1. Always keep the equipment as clean as possible. Wipe off dirt and dust during post-operation procedures.
2. Check all hardware and cable connections for tightness.
3. Check for evidence of any corrosion on the equipment, cable connections and connectors. Clean as required. If the equipment does not come on when the power is turned on, proceed as follows:
   - Ensure the breaker is not switched off at the switchboard panel.
   - Check for a blown fuse. Refer to Table 4-3 for the location and size of fuses for the communications and electronic equipment.
4. Ensure the power supply connection on the unit is tight. If the equipment is not working properly or the display gives inaccurate or faulty information, check all the connections at the unit and the antenna terminals.

NOTE

Only qualified technicians should perform repairs on communications and electronic equipment.

4-5.1 REPLACEMENT OF FACSIMILE RECORDING PAPER.

See Technical Manual for procedure.

4-5.2 SAILING PERFORMANCE INSTRUMENT, (SPEEDO).

WARNING

SEAWATER WILL FLOOD INTO THE BOAT WHEN THE UNDERWATER UNIT IS REMOVED. THE PLUG SHOULD BE PUT IN PLACE IMMEDIATELY. ADROIT HAND COORDINATION IS REQUIRED.

The sailing performance instrument requires no routine maintenance other than care of the underwater impeller unit. The impeller must be kept free from marine growth. A stiff nylon brush should be used to clean the impeller.

1. Unscrew the locking ring-nut and loosen the impeller unit for an easy withdrawl.
2. With the dummy plug in hand, draw out the impeller unit, and quickly replacing it with the dummy plug.
3. Screw in the locking ring-nut.
4. Clean the impeller paddlewheel.
5. Use the reverse procedure to replace the paddlewheel.

The sealing ring under the ring-nut should be kept liberally greased.

4-5.3 MAGNETIC COMPASS.

The magnetic compass is a delicate instrument which with some care requires little or no maintenance. The compass must be properly compensated at all times to ensure correct readings while underway. After having been underway on the craft, wipe off any sea spray or dirt from the compass and housing using a damp soft cloth.

CAUTION

Before leaving the boat, ensure that no Ferrous (magnetic) metal is near the compass as this will tend to deviate the compass and provide erroneous readings.

4-6 WINCHES.

The NAVY 44 has twelve (12) Barient two-speed winches which are thru-bolted to the deck. The winches on deck are exposed to salt spray and airborne pollutants and must be periodically cleaned and re-lubricated.

CAUTION

Never use grease on the pawls or pawl springs. The pawls should be lubricated with light machine oil.

Clean all parts with a petroleum solvent. Any parts showing damage or excessive wear must

be replaced. During the assembly process, all gears and bearings should be lightly greased.

4-7 MARINE HEAD.

General maintenance and overhaul on the head should be done periodically to insure proper operation. During normal use, the following preventive maintenance measures will ensure proper functioning of the head:

1. Make sure seacocks are open, turn freely and are free of leaks.
2. Apply light machine oil to the piston rod and bearings for easier pumping.
3. Ensure packing nut is just tight enough to prevent leakage.

CAUTION

Do Not use oil solvents and solutions or alcohol in the marine head - it will ruin valves.

4. If pumping action becomes stiff, pour a pint of water soluble lubricant or vegetable oil into the bowl and stroke twice to allow lubricant to enter the pump cylinder only and not overboard. If possible, allow the lubricant to stand for 24 hours before pumping out.
5. If the head fails to function properly, the valves may be restricted or damaged. Disassembly of the water closet may be necessary to inspect the cause of the malfunction. Figure 3-7 will assist in assembly and disassembly of the marine head.

4-8 WATER SYSTEM .

Water tanks should be regularly flushed and inspected by competent medical authority.

4-9 BILGE SYSTEM.

CAUTION

Visually inspect bilges for trash, oil, etc. Clean if necessary, and pump slowly.

4-10 ELECTRICAL SYSTEM.

Once the vessel is underway, the only available electrical power is provided by the SHIPS SERVICE banks and ENGINE START battery. Periodic inspection and maintenance is essential not only for maximum battery life, but for crew safety while underway.

WARNING

ALL SAFETY PROCEDURES MUST BE STRICTLY ADHERED TO WHILE WORKING ON THE BATTERIES.

Periodic inspection and maintenance includes, but is not limited to the following:

1. Check battery cell electrolyte levels.
2. Inspect battery box condition.
3. Inspect and clean battery casings.
4. Check and clean battery terminal connections.
5. Check wire condition at the terminal lugs.
6. Check that storage batteries maintain a charged condition.

4-11 REFRIGERATOR.

This procedure applies to both the original equipment Grunert Refrigeration System, and the new NAUTEC Coastal 12 Refrigeration System. The maintenance for the refrigerator box is limited to cleaning the box after use and pumping any standing water overboard. The box should be left clean and dry (with the doors open) when the boat is secured and the refrigerator is not in use.

4-11.1 CLEANING THE REFRIGERATOR BOX.

1. Using a solution of commercial liquid cleanser and warm fresh water, thoroughly wipe down all interior and exterior surfaces of the box.
2. Open the GALLEY SINK DRAIN seacock. Pump out the used cleaning solution using the refrigerator drain foot

NOTE

If the refrigerator drain foot pump should malfunction, see the Whale Gusher MK III foot pump maintenance procedures.

3. Using warm fresh water, rinse all surfaces again and pump as dry as possible.

NOTE

The refrigerator box should always be left clean and dry with doors open after shut down.

4. Using clean rags, dry all the box surfaces and leave the lid open to air and eliminate any standing odors.

4-12 LUBRICATION.

1. Lube oil, Standard Navy Stock.
   - Type 9250, SAE 30 HD
     NSN 9150-00-181-8229
     Mil Spec 9250601L
     Codes 54161.
   - Comparable commercial lube oil.
   - Chevron, Delo 400, SAE 30
   - Union 76, Truck motor oil SAE 30
   - Any good grade SAE
   - Multi Vis oils SAE 10W30 may be substituted.
   - API Service Grade CC or CD
2. Transmission fluid.
   - Dexron II NSN 9150-00-698-2382.
   - Comparable commercial transmission fluid.
   - Any ATF Type A - Suffix A.
3. Hydraulic oil (petroleum base).
   - Hydraulic oil type 2135
     NSN 9150-00-985-7236
     Mil Spec 11-17672.
   - Comparable commercial hydraulic oil.
   - Chevron 2135TH
   - Richfield Eagle oil, light
   - Gulf 2135H
   - Texaco MS2135H
   - Standard 2135TH
   - Sinclair MS2135TH
4. Winch grease, teflon, super lube PTFE (supplied by Sail Craft Support).

4-13 TROUBLESHOOTING.

1. Refer to equipment manufacturer's manuals for guidance in troubleshooting equipment. Each boat is provided with the manual for the particular make and model installed onboard.

End of Chapter 4.

CHAPTER 5

EMERGENCIES AND DAMAGE CONTROL

We must benefit from the mistakes of others...
we cannot hope to make them all ourselves.
Von Karmen

5-I INTRODUCTION.

A ship that goes to sea is traveling into harms way. While we train how to use our vessel in a safe manner to accomplish the mission and through good, thorough planning achieve success, there will come a time that even though not intended, events will occur that put us in extremis. In an emergency, a good team with sound judgement, logical thinking, determined effort, and a good plan, can minimize problems and prevent total disaster. The procedures contained in this chapter are the result of knowledge gained from situations that have occurred and the methods determined to best deal with them.

5-2 CREW OVERBOARD.

The most devastating experience a sailor can have is to fall overboard and from the vantage point of 10" above the water, watch his boat sail away.

5-2.1 PREVENTION

Prevention is the best solution to the crew overboard problem. In the event that a person does become separated from the boat, every effort must be made to get the victim back aboard in the absolute minimum amount of time.

5-2.1.1 SAFETY HARNESSES

Safety harnesses are the best preventive equipment available, however to be effective, they must be worn. Safety harnesses should be worn:

- Sunset to sunrise, before exiting the cabin into the cockpit.
- During inclement weather
- At the discretion of the OIC/skipper.

5-2.2 PREPARATION

At the beginning of each watch, do the following:

- Check all crew overboard gear and halyards to ensure that they are ready for immediate use.
- Brief the watch section on the particular details of the crew overboard recovery procedures that will be used, considering current conditions of wind, seas, and sails. A Personal Flotation Device, (PFD) shall be stored within easy reach of the helmsman to be thrown to the victim.
- A swimmer and backup shall be designated. Should crew be swept or fall overboard, particularly in heavy seas, quick action is necessary to accomplish a safe rescue. Accomplish the following procedures:

5-2.3 OSCAR.

A man-overboard is referred to as OSCAR, because of the flag atop the crew overboard pole. For whatever reason, a crew member that is now OSCAR has an awesome responsibility.

1. Make your situation known. Holler, scream, shout, and use your whistle so the crew can be alerted to the fact that you are overboard.
2. Try not to make a face down entry into the water in order to minimize shock to your body.
3. Make yourself a better target. Regardless of how tall a person is, being overboard is a common denominator. Only your head will be visible!

- If you are not incapacitated, wave an arm over your head.
- Use your whistle.

- At night, use the firefly light, (strobe light), on your techvest.
- As soon as the crew knows you are in the water they will start throwing floatable objects in the water. Try to make your way to them, particularly the man overboard pole. The flag is 12' above the water and is a better target. Put yourself next to this visible target.

4. Improve your flotation. Trying to stay afloat is tiresome.
   - If you're wearing a life jacket, make sure it is tied on.
   - Gather floatable objects to you to help support your weight, and to mark your position.
5. Do not panic.
6. Conserve your energy. Particularly in cold water.

5-2.3.1 PERSON SIGHTING OSCAR.

The person sighting OSCAR is the most valuable link with the overboard crew member..

1. The person sighting the man overboard should instantly shout
   "MAN OVERBOARD!"
   [_____] {direction to OSCAR}}
   [_____] {distance from the boat}
   "ALL HANDS ON DECK!"
2. Maintain sight of OSCAR. This is your primary function.
3. Relinquish what ever duty you were performing...even steering the boat.
4. Point to OSCAR to help draw other eyes onto OSCAR and to help you keep sight of OSCAR.
5. Move throughout the boat to maintain sight of OSCAR. .
6. Keep the victim in sight! This is the most important task. In rough seas, it may be impossible to see beyond the next wave. Assign a crew member this responsibility.

5-2.3.2 CREW ACTIVITY.

1. Second person on deck should man the wheel if it was given up by the person having sight of OSCAR.
2. Deploy the man-overboard pole and equipment, Throw a life ring or other buoyant device to the victim, even if the victim is an excellent swimmer. These items can aid in maintaining visual contact with the person in the water.
3. NAVIGATOR. Punch the MOB button on the Loran and GPS. Get a GPS, LORAN, and visual position as soon as possible.
4. HELM.
   - Keep the boat under control.
   - Use the "Quickstop" method to stop the boat as close to the victim as possible. "Heave to", by tacking the boat. Do not cast off the jib. The back winded jib will help slow the boat.
   - Starting the engine can assist in maneuvering the boat. Weigh the need for power against the possibility of catching the victim in the screw or fouling the screw with lines over the side. Conditions will determine whether to recover under sail or power.
   - Maneuver to return the boat to the victim. At night, in fog, or in choppy seas, an OSCAR may drift out of sight. Sail the boat up the path of buoyant gear tossed in the water.
   - Turn the boat downwind. Foredeck and mast lower headsail and secure it on deck.
   - Call "Gybing". Mainsheet works to centerline the main.
   - Call "Gybe Ho!, complete the gybe and sail the boat back upwind toward OSCAR.
5. Recovery team must establish contact with OSCAR. Use a throw rope, life sling, or horseshoe buoy. Recover OSCAR safely. The following are various methods of recovery: Use manpower. Use a halyard (spinnaker or jib). Use a sail. Use the boom itself. Use a sheet as a perch for OSCAR to stand on and winch OSCAR aboard.
6. It may be necessary to put a swimmer in the water to recover an incapacitated victim. The rescue swimmer should wear a safety harness, with a line attached to the tether line of the harness and tied to the boat before going in the water.
   Use the MOB life sling as a retrieving device, (follow the instructions printed on the container. Consider using a halyard, spinnaker pole, topping lift, block and tackle as means for recovery.

7. Recover the swimmer on board.

5-2.4 CREW OVERBOARD RECOVERY, SPINNAKER

Safety Considerations:

- Ensure lines are aboard before putting engine in gear.
- Tether the swimmer before entering the water.

Required Positions:

HELM
POINTER
MAINSHEET
MAST
FOREDECK
SPINNAKER GUY
SPINNAKER SHEET
SWIMMER
NAVIGATOR
RECOVERY TEAM

Sequence of Events:

1. Person having sight of OSCAR call out "MAN OVERBOARD".
2. HELM "Heave to".
3. SPINNAKER GUY ease the pole to the head stay, cleat the guy, stand by topping lift.
4. SPINNAKER SHEET prepares to ease the sheet to douse the spinnaker.
5. FOREDECK and MAST douse the spinnaker, HELM brings boat head to wind.
6. HELM maintains boat in "hove to" condition and starts engine.
7. SPINNAKER GUY AND FOREDECK lower pole to the deck.
8. SWIMMER prepares to enter the water.
9. HELM approaches OSCAR to put the boat to leeward of OSCAR and 45-60 degrees off the wind.
10. RECOVERY TEAM prepares to take oscar on board.
11. RECOVERY TEAM establishes contact with OSCAR and takes OSCAR on board.

5-3 DAMAGE CONTROL.

The three basic objectives of damage control are PREVENT, CONTAIN, REPAIR.

5-3.1 PREVENT.

Prior planning prevents poor performance. Take practical preliminary measures to prevent damage before danger occurs. Remove fire hazards, maintain damage control equipment in a ready condition for easy access and employment. Train the crew to work as a team. Knowledge of first-aid and damage control is vital.

5-3.2 CONTAIN.

Once a mishap has occurred, contain the damage to keep it from getting worse. Minimize and localize damage by controlling flooding, maintaining stability, combating fires and administering first-aid.

5-3.3 REPAIR.

Finally when the damage has been contained, repair the boat to achieve as good a situation as possible so as to be able to continue and get the vessel home, and out of harms way.

5-4 DAMAGE CONTROL EQUIPMENT.

Each NAVY 44 is provided with a Damage Control (D.C.) Kit and sufficient tools, supplies and equipment for use in emergency situations. The D.C. Kit is stowed in the forward starboard compartment in a heavy canvas bag. (See Table 5-1 Damage Control Kit for contents).

5-5 HULL DAMAGE AND EMERGENCY REPAIRS.

Should the water integrity of the hull be damaged, the first action is to stop the flow of water entering the boat.

1. Stop the boat to reduce ram pressure.
2. Heel the boat or tack in order to raise the damaged portion out of the water or as high as possible to reduce the pressure of the water coming in.
3. Heave To.
4. Plug any holes in the hull Immediately. Small holes may be plugged temporarily by stuffing them with cotton duck, rags or wooden plugs. Larger holes may be temporarily plugged with stuffing material such as life jackets, seat cushions, sleeping bags, sails and wedges. Stuffing material used to plug holes should be sufficiently braced or shored to prevent loosening or slipping away due to motions of the boat at sea.
5. Patch from outside in. Since the

pressure of the water is trying to force its way into the boat, it will expel what we try to stuff into the hole. Once the flow of water has been contained, and minimized thought should be given to putting a crash blanket over the hole from the outside. Water pressure will work in favor and try to force the patch into the hole.

5-6 ALARMS.

There are four alarm on the boat listed in order of severity. Determine which alarm is sounding and proceed with emergency procedures as listed below:

- HIGH WATER BILGE ALARM. A 6" classroom bell under the NAV desk indicating a possible flooding problem.
- ENGINE HIGH TEMPERATURE ALARM. A buzzer behind the throttle panel in the cockpit indicating a possible engine cooling system problem. Electric energy for this alarm come through the ENGINE ALARM circuit breaker at the switchboard panel.
- ENGINE LOW OIL PRESSURE ALARM. A constant squeal indicating a possible engine oil starvation problem. Electric energy for this alarm come through the ENGINE ALARM circuit breaker at the switchboard panel.
- RACOR ALARM. A constant tone indicating a water contamination problem in the fuel.

5-6.1 FLOODING and the HIGH WATER BILGE ALARM.

Probably the first indication of flooding will be the ALARM BELL. On a tack, bilge water may be spilling onto the cabin sole. Inspect the bilge for high water.

1. Lift the floor board next to the galley sink and check the water level. The high water float is located on the front face of the bilge cavity about halfway up. Water should be up to that level to trigger the bell.
2. TURN OFF the BILGE ALARM circuit breaker at the ELECTRICAL SWITCHBOARD PANEL.
3. Turn ON the electric BILGE PUMP, (center column, third circuit breaker down from the top).
4. Man the manual bilge pump in the cabin. Pump handle is on the right front face of the foul weather gear lockers behind the nav station .
5. Man the manual bilge pump in the cockpit. Pump handle is located in the line locker, port side in the cockpit, inboard and forward.
6. Check for other sources of water entering the boat. Refer to the Thru Hull diagram, and Thru Hull Table, LAST TWO PAGES in CHAPTER 1. If a broken or defective thru hull is found use the Damage Control PLUG,(DC plug), tied in the vicinity of each thru hull and drive it into the hole to try to stem the flow.
7. Check for water flow from the following sources:

- Galley faucets open.
- Head overflowing.
- Fresh water or Salt water faucets in the head open.
- 70 gal Water tank selector valves open. Close valves. Check hoses of the tanks for integrity

8. Check for water flow entering the boat from unusual locations. The hull may have been holed.
9. If a hole in the hull is located, stuff anything into the hole that will stop the flow. Life jackets, pillows, blankets et al.
10. A "CRASH PAD" from the damage control kit can be lowered outside the hull over the hole to stop the flow. Lower the "crash pad" well below the hole until in the proper position before attempting to bring it snug to the hull since the natural pressure of the water will try to pull it in toward the hole. Tie it into place with the lines provided.
11. HELM.

- Put the boat on a point of sail to get the damaged area as high out of the water as possible. Water pressure increases at an alarming rate for each foot of depth.
- Slow the speed of the boat to reduce the ram pressure caused by the boats way. Consider "Heaving to".

12. NAVIGATOR.
- Get a fix. Prepare a "Pan-Pan" or "MAYDAY" report to be transmitted on command of the skipper.

5-6.2 ENGINE HIGH TEMPERATURE ALARM.

1. The most probable causes are:
   - loss of raw water cooling.
   - loss of captive engine cooling.
2. Loss of raw water cooling. Check for raw water discharge over the transom. If no discharge, the most probable causes are:
   - a closed inlet seacock.
   - a clogged raw water strainer.
   - a defective water pump impeller.
3. Turn OFF the ENGINE ALARM Circuit breaker, (right column, 3rd from the bottom) at the switchboard panel.
4. Check the Engine water temperature gauge at the ENGINE INSTRUMENT PANEL for temperature over 180 degrees F. Secure the engine by PULLING UP on the ENGINE SHUTDOWN T-HANDLE.
4. Check that the raw water inlet seacock behind the engine is OPEN.
5. Inspect the raw water strainer. If contaminated, close the raw water inlet seacock. Open the strainer, remove the basket, clean and replace it. Open the raw water seacock.
6. Open engine compartment access. Check for water in the engine bilge. TASTE the WATER.
7. If the water tastes "salty", a leak in the raw water cooling system is possible. Check the inlet seacock, check hoses in this system for integrity, and tighten clamps. Restart the engine and see if water discharges over the transom.
8. If there is still no discharge over the transom, the water pump impeller could be defective. See Chapter 4 section 4-2.3.1.3 Replace raw water pump impeller.
9. If the water is NOT salty, a loss of anti freeze/water fluids is possible:

WARNING

OPENING THE CAPTIVE COOLANT TANK WHEN THE ENGINE IS HOT CAN RESULT IN SEVERE BURNS TO THE OPERATOR.

   - Place a rag over the Fresh water filler cap.
   - Use the "HOT MITT" from the galley.
   - SLOWLY, crack the filler cap to allow steam to escape.

10. LOOK to see that there is coolant visible in the top of the tank.
    - If there is, close filler cap go to step 11. If there is not the most probable cause is a loss of coolant.

A leak in the captive cooling, (anti freeze) system.

11. Check hoses and tighten clamps in this system. If integrity check is ok, suspect the water pump impeller. Disassemble and inspect the impeller. If defective, replace impeller.
12. Check fluid level in the overflow tank located on the cross member of the engine compartment.
13. Fill a quart size container with 50/50 fresh water/prestone mixture, (fresh water only if prestone is not available), FILL captive coolant tank with fresh water. REPLACE FILLER CAP.
14. TURN ON the ENGINE ALARM circuit breaker at the ELECTRICAL SWITCHBOARD PANEL.
15. RESTART engine.
16. CLOSE Engine Compartment.

5-6.3 ENGINE LOW OIL PRESSURE.

1. Check oil pressure on the oil pressure gauge on the Engine Instrument Panel. The alarm will sound when the threshold pressure of 15 psi is not achieved.
2. Ensure that oil filler cap is in place.
3. Ensure that oil dip stick is in place.
   - If there is oil in the bilge proceed with this procedure.
   - If there is no oil present in the bilge go to step 6.
3. CLEAN OIL from bilge.

4. INSPECT oil drain hose clamp is tight, and/or ruptured hose. Tighten clamp and/or replace hose.
5. INSPECT oil filter for signs of leakage. Tighten if loose.
6. Check dip stick for oil quantity. Prepare sufficient oil to bring level back to the "Full" mark.
7. Open oil filler cap.
8. Put engine oil in the engine.
9. Recheck oil level on the dip stick. ADD oil until dip stick shows "FULL".
10. REPLACE OIL FILLER CAP.
11. TURN ON the ENGINE ALARM circuit breaker at the ELECTRICAL SWITCHBOARD PANEL.
12. RESTART ENGINE.
13. CLOSE ENGINE COMPARTMENT.

5-6.4 RACOR ALARM

The alarm will sound when there is water contamination in the fuel at the RACOR filter.

1. Inspect sediment bowl for the presence of water/foreign particles. If present, get a small container in which to collect drain sample from the RACOR. Open pet cock on the bottom of the sediment bowl and push IN on the petcock to drain water/contaminant out of sediment bowl.
2. Close the pet cock.
3. Use the black pump button on the top of the RACOR FILTER. Pump to refill the RACOR.
4. Use the wobble pump to regain low fuel pressure to the engine.
5. Go through restart procedures to start the engine.

5-7 FIRE ON BOARD.

A fire can occur anywhere in the boat, but the most likely places are the engine, and the galley. Communicate! The person discovering the fire should get the word out.

1. Engine Fire.
   When a fire is detected by the sensor on the Fireboy Model 15CG Halon system in the engine compartment, the indicator light located on the electrical switchboard panel will go out indicating Halon is being released in the engine compartment.
   - shutdown the engine immediately.
   - Do not open the engine compartment since this will introduce oxygen to the area and support combustion.
   - Get a fire extinguisher ready in case the fire jumps the confines of the engine compartment.
   - Shut off the fuel at the fuel tank.
2. Galley Fire.
   - Shut off the propane at the switchboard panel, and at the bottle in the propane locker in the cockpit.

5-7.1 FIRE FIGHTING.

A general fire fighting plan should be established by the crew for combating fires. Crew members should be assigned to specific tasks so that fire fighting is expedited without confusion. Fires are divided into different classes depending on the type of combustible material.

CLASS "A" - wood, paper, cloth, etc.
CLASS "B" - combustible liquids, fuels, oils, etc.
CLASS "C" - electrical

NOTE

CO2 is the primary combative agent to use for an electrical fire.

CAUTION

When fighting a Class "C" fire, the power source
must be secured immediately.

5-7.1.1 ELECTRICAL FIRE.

1. Sniff test the air. Fumes will give an indication of the class of fire.
2. Secure all non-essential electrical equipment.
3. Check out the fire from the edges. In the absence of positive indicators, treat as a Class A/B fire.
4. Once the fire is out, selectively turn on electrical equipment until the faulty circuit is identified. Keep this circuit OFF.
5. Ventilate the boat.
6. Account for all the crew.

5-7.2 HALON EXTINGUISHING SYSTEM.

The Halon system is the primary means of extinguishing engine compartment fires. The Halon system can also be used to extinguish Class "B" and "C" fires. When the Halon extinguisher detects a fire and automatically discharges in the engine compartment, the indicator light at the switchboard will go out. Accomplish the following:

CAUTION

The engine must be shut down for the Halon system to be effective.

1. Shut down the engine immediately with the ENGINE SHUTDOWN T-handle. Do not open the engine compartment access panels.
2. Cutoff the engine electrical systems at the D.C. SWITCHBOARD PANEL.
3. Wait until the Halon cylinder has completely discharged in the engine compartment. Carefully observe the engine compartment through one of the removable panels to ensure that the fire is extinguished.

WARNING

OPENING THE ENGINE COMPARTMENT BEFORE THE FIRE IS COMPLETELY OUT WILL INTRODUCE OXYGEN AND MAY CAUSE A RE-FLASH. HAVE A FIRE EXTINGUISHER READY WHEN OPENING THE ENGINE COMPARTMENT.

4. Get crew not engaged in fighting the fire out of the cabin to minimize the possibility of asphyxiation when the engine compartment is opened.
5. Ventilate the engine compartment for 10 minutes.
6. After the Halon system has discharged in the engine compartment and the incident reported, the Halon extinguisher should be replaced or recharged and the indicator light tested to ensure proper operation.

5-7.3 DRY CHEMICAL FIRE EXTINGUISHERS.

Use these procedures when using the three (3) dry chemical fire extinguishes.

1. Keep extinguisher in upright position.
2. Pull ring pin.
3. Push on lever.
4. Squeeze nozzle.
5. Direct discharge at base of flames with side to side motion.

5-7.4 CO2 FIRE EXTINGUISHER.

WARNING

CO2 SNOW WILL BLISTER THE SKIN AND CAUSE PAINFUL BURNS IF ALLOWED TO REMAIN ON THE SKIN. DO NOT ALLOW THE HORN TO TOUCH ENERGIZED ELECTRICAL EQUIPMENT WHILE FIGHTING AN ELECTRICAL FIRE. AN ELECTRICAL SHOCK CAN BE TRANSMITTED TO THE FIRE FIGHTER.

CAUTION

AVOID SPRAYING A HOT ENGINE WITH CO2.

The 5-pound CO2 fire extinguisher has a squeeze grip type release valve.

1. Carry the extinguisher in upright position, and approach the fire as closely as heat permits.
2. Remove the locking pin from the valve.

WARNING

DO NOT GRASP THE HORN WHILE DISCHARGING CO2.

3. Grasp the handle and aim in direction of the fire.
4. Squeeze the release lever. The maximum range is five feet from the end of the horn.
5. Direct the discharge at the base of the fire.
6. Release the lever to close the valve as soon as conditions permit and continue to open and close it as necessary.
7. When fighting fire in electrical equipment or on a bulkhead, direct the discharge of the carbon dioxide at the bottom of the flame area. Sweep the horn slowly

from side to side and follow the flames upward as they recede.

8. When continuous operation is desired or when the valve is to remain open for discharge, slip the D-yoke ring on the carrying handle over the operating handle when the latter is depressed.

5-7.5 GALLEY FIRE.

The galley stove presents a potential fire hazard. Propane is heavier than air, settles to the bilge, and has a distinctive odor. Secure the source of fuel.

1. Turn off the propane switch at the switchboard panel and over the reefer..
2. Shut off gas knob in the propane locker.
3. Shut off burners and oven controls.
4. Put out the fire.
5. Clean up and account for crew.

5-8. EMERGENCY STEERING.

When the boat fails to respond to the wheel, balance the sails to keep the boat on a steady heading. This will facilitate the procedures to diagnose the problem.

5-8.1 WHEEL WILL NOT TURN.

Check for foreign object jamming the steering equipment.

1. Inspect the steering quadrant in the steerage compartment aft of the engine for jamming.
2. If a jam cannot be found, it may be necessary to remove the steering cable from the quadrant.

5-8.2 BOAT DOES NOT RESPOND TO WHEEL.

If the steering cable comes loose from the quadrant, or if the cable breaks, the wheel will spin freely with no apparent effect.

1. Control the boat under sail.
2. Remove the rudder cap and install the emergency tiller.
3. Control the boat.
4. Inspect quadrant and reinstall cable.
5. If cable has broken, the boat will have to continue to be sailed with the emergency tiller.

5-8.2.1 SETTING UP THE EMERGENCY TILLER.

1. Remove the hub nut of the wheel. This should give enough room for the emergency tiller to swing clear of the wheel.
2. Remove cover over the rudder stock.
3. Remove the emergency tiller from its stowage position in the port aft cockpit locker and install on the rudder stock.
4. Ensure that the tiller is fully seated on rudder post and that the retaining bolt and washer are secured.
5. Steer with the emergency tiller. Lines led to winches may be required.

NOTE

Block and tackle may be used.

6. Weigh the merits of releasing/cutting the wire rope leading to the radial drive. Do this only if the cable is jamming the movement of the rudder.

5-8.3 RUDDER JAM.

If the rudder is jammed and cannot be turned, rig an emergency rudder.

1. Use the spinnaker pole as an emergency steering oar.
2. Lash a floor board or a locker door to the end of the spinnaker pole.
3. Attach a safety line to the inboard end of the pole and deploy it out the stern pulpit.
4. Lash the pole so the make shift rudder can reach the water, yet has enough motion to be able to steer.

5-9 LOSS OF ALL ELECTRICAL POWER.

1. Check the Rotary Battery Switches for the engine bank and for the house banks to ensure they have not been inadvertently shut off. If they are off, turn them on.
2. Cut off power at the main breaker on the SWITCHBOARD PANEL.
3. Check the batteries for proper storage, charge, connections, and a proper grounding. Clean terminals as needed.
4. Cut off power at each individual circuit breaker on the switchboard panel. Selectively, turn on individual circuit breakers until the circuit causing the

electrical problem is located. Cut off power to that circuit.

5. Investigate why the system is malfunctioning.

5-10 DISMASTING PROCEDURES.

Expeditious action will minimize the danger and ensure the safety of the boat and crew.

1. Account for all crew members.

WARNING

SHROUDS AND LINES CAN BECOME ENTANGLED ON THE PROPELLER OR RUDDER. IF YOU CONSIDER PUTTING A CREW MEMBER IN THE WATER, SECURE A LINE TO THE CREW MEMBER AND TIE IT TO THE BOAT BEFORE ENTERING THE WATER.

2. Do not turn on the engine. Shrouds, halyards, and sails can foul the prop.
3. Control and lash the broken section of the mast on deck to prevent it from punching a hole in the boat. If the mast cannot be controlled, get rid of the mast by pulling the cotter pins and drift out the clevis pins, unfasten turnbuckles or cut off the shrouds with a hacksaw.
5. If the mast does not break cleanly, saw or shear off the mast at the stump.
6. Salvage as many sheets, halyards, sails and gear as possible for jury rigging.
7. In moderate seas, the mast can be lashed on deck. Pull all sails on board to prevent them from weighing down the mast. Pull the mast on board and lash it tightly to the lifeline stanchions.
8. Once the mast has been controlled, or cast off, then consider use of the engine. Jury rig a mast and sails. Consider using the broken mast section if available. Use the Spinnaker pole. This will conserve fuel supply if safety is a long distance away.

5 -11 ABANDON SHIP.

Abandoning the vessel is a last ditch maneuver. Most emergencies that result in having to abandon the vessel have provided time to organize and plan for the event. You should not go until you "Step up into the raft".

1. Transmit a "MAYDAY" call on VHF Channel 16 and HF 2182.0 kHz, the International Distress Channel and Frequency.
   "MAYDAY, MAYDAY, MAYDAY"
   "This is" Name of vessel and call sign (3 times)
   "My position is..."
   Nature of distress
   "I have_____(number) of persons on board"
   "My intentions are..."
   Assistance desired, "OVER".
2. Gather as many vital life support items, such as food and water, flares, EPIRB, handheld radios as possible.
3. Assemble your "GRAB BAG". These items should be stowed so that they are readily available in the event of having to abandon ship.
4. Shoot off two Visual distress signals in immediate succession to maximize the duration of the signal. Then wait. Conserve the remaining flares to use when potential rescue vessels come into view. If the emergency continues, repeat this process in 4 hours.
5. Take the EPIRB from its holder and turn it on. The EPIRB will broadcast a continuous distress signal on 406Mhz. Take the EPIRB into the life raft. Transmit continuously so that your position can be established for rescue agencies. Do not turn the EPIRB off!
6. Assemble "Grab Bag" of essential items.
7. Launch the life raft on the leeward side, keeping it clear of flares and smoke.
8. Board the life raft from the leeward side of the raft with the EPIRB and "Grab Bag". Have a knife at hand to free the life raft once all personnel are on board. A knife is provided in the raft.
9. The boat is your best visual distress signal and aid to survivability. Leave the boat only when it is certain that she is going down. Then leave the vicinity of the boat only when it is apparent that rescue is not imminent.

End of Chapter 5.

CHAPTER 6

SPECIAL OPERATIONS

6-1. INTRODUCTION.

The Navy 44 is well-suited for night operations, heavy weather, restricted visibility, and offshore passages. However, the time to investigate its sailing characteristics in these operating conditions is BEFORE they are encountered for the first time.

6-2. NIGHT OPERATIONS.

Prior to night operations, the crew should familiarize themselves with the light switches on the ELECTRICAL SWITCHBOARD PANEL, the physical location of the actual light units for RUNNING LIGHTS (lo), RUNNING LIGHTS (hi), cabin lights, deck lights, spot light plug-ins, and flashlight stowage locations.

Locate the NAV light switches.

See Figure 1-32, Switchboard Panel.

Essential switches are:

NAV LIGHTS - Top of left column.
MASTHEAD LIGHT - Below NAV LIGHTS.
DECK LIGHTS - Bottom of left column.
ANCHOR BOW LT - Next to DECK LIGHTS.
NAV LTS HI-LO - Bottom of right column.
COMPASS LIGHT - NEXT TO NAV HI-LO

NOTE

COLREGS require either set for night or reduced visibility, but state that both may not be used at the same time.

1. NAV LIGHTS. There are two sets of navigation lights. The NAV LO set is the bi-color combination light located on the bow pulpit and the stern light located on the stern pulpit. The NAV HI set is the tri-color light located on top of the mast. Select NAV LO for near shore operations and while motoring. For higher visibility select NAV HI.

NOTE

The "MASTHEAD LIGHT" switch must be turned ON to energize the ANCHOR/BOW LIGHT, and DECK LIGHT.

2. The MASTHEAD LIGHT BOW LT is required by COLREGS to be shown with the NAV LTS when operating under engine. To energize, turn the switch marked MASTHEAD LIGHT on and turn the ANCHOR BOW LT switch to BOW LT.
3. The ANCHOR LIGHT is the lower of the two lights on the top of the mast. It is a white light visible through 360 degrees. To energize, turn the ANCHOR LIGHT to ON.
4. The DECK LIGHT is the lower of two lights housed in the same unit as the MASTHEAD LIGHT BOW LT. It illuminates the deck. To energize, turn the DECK LIGHT to ON.
5. The COMPASS LIGHT is mounted in the binnacle to illuminate the compass. To energize it, turn the NAV LIGHTS switch on and turn the COMPASS LIGHT on.

6-3. HEAVY WEATHER OPERATIONS.

Prudence is required for heavy weather operations. The urgency of the mission must be considered. If there is no urgency to conduct the sortie, prudence would dictate that the vessel remain in port. Once committed to the sea, the decision to seek the safe haven of a secure port must be weighed against the hazards of making a landfall in adverse weather. Once committed to the sea, employment of these procedures will help to ensure a safe passage to the crew as well as the boat.

6-3.1 STORM SAILS.

The Navy 44 is a sailboat and is designed to sail. The stability of the boat under sail, even in heavy weather is preferred to that of proceeding under engine alone. Prudence is required in making the decision to use storm sails..

Safety Considerations:

1. DO NOT rig the inner forestay without rigging running backstays.
2. There will be enormous forces acting on the rig during conditions when these sails will be rigged.
3. Ensure the tackline of the trysail is secured to prevent the sail from being hoisted off the luff track.
4. Safety harnesses will be required.
5. Once the mainsail is lowered, ensure positive control of the boom is maintained at all times.

General Situation:
Assume high winds and heavy seas.

6-3.1.1 BENDING ON THE STORM JIB.

Sequence of Events:

1. Rig the inner forestay.
2. Rig one large snatch block on the toerail just aft of the midships stanchion and one small snatch block between the primary and secondary winches. Rig to both sides of the boat.

CAUTION

The spinnaker topping lift, (T-Lift), is used as the halyard for the storm jib to provide the same hoisting angle as the inner forestay.

3. Hank on the storm jib to the inner forestay and attach the topping lift to the head of the jib. Attach jib sheets.
4, Lead the sheets outboard of the shrouds, through the large snatch block, and through the turning block to the primary winches. Tie a stopper knot in the tail of the sheet.
5. Rig the running backstays. Lead running backstay tails on the inside of the life lines, through the small snatch blocks, and then to the secondary winches.

6-3.1.2 HOISTING THE STORM JIB.

Prudence dictates that the crew should be wearing safety harnesses in these conditions.

1. Untie restraints used to hold the jib in place prior to hoisting..
2. Hoist the jib using the T-LIFT.
3. "Take" on the SHEET and SET to desired TRIM.

6-3.1.3 BENDING ON THE STORM TRYSAIL.

The storm trysail is used in winds of 35+ in lieu of the mainsail. Procedures include lowering the mainsail and lashing it to the boom.

1. Bring the storm trysail up on deck. Tie the bag down in the vicinity of the mast.
2. Attach the pendant of the tack of the sail to a reefing horn.

WARNING

CARE MUST BE TAKEN TO CONTROL THE SAIL AS IT IS BEING HANKED ON TO PREVENT THE WIND FROM BLOSSOMING THE SAIL.

3. Open the mast track keeper.
4. Start the luff of the sail into the storm trysail track on the port side of the mast.
5. This completes the bend on procedures to this point because...
   - The halyard cannot be attached to the head of the trysail until the mainsail is lowered.
   - The sheets attached to the storm trysail cannot be led to the spreacher blocks in the quarter of the boat until the mainsail is lowered.

6-3.1.4 HOISTING THE STORM TRYSAIL.

1. Lower the mainsail, flaking it on the boom.
2. Lash the mainsail to the boom with four sail ties or more.
3. Tension the boom vang.

NOTE

The actions of steps 4 and 5 are intended to immobilize the boom in a position that presents the least obstruction.

4. Use the 4 part block and tackle from the aft bale on the boom to the toe rail, (downwind side is a consideration). Make the tackle "snug". This imparts a force vector down and to the rail of the boat.

5. Move the traveler to the same side, and tighten the mainsheet. This exerts a force vector down and toward midship, but also creates a monumental trip hazard.
6. Lead the attached sheets of the STORM TRYSAIL through the spreacher blocks to the secondary winches.
7. Remove the halyard from the mainsail. Attach it to head of the trysail and hoist.
8. Trim BOTH sheets to centerline. This will make the STORM TRYSAIL "self tending" when the boat is tacked.

The boat will make way to weather with these sails set enabling the boat to work its way off of a lee shore.

6-4 RESTRICTED VISIBILITY.

The caveat advanced for heavy weather sailing applies to operations in reduced visibility. The following procedures must be followed in addition to those employed for sailing in "fair weather".

1. COLREGS require that navigation lights be displayed when visibility is restricted.
2. COLREGS require that fog signals be sounded when the visibility is reduced.
3. Night operations are considered reduced visibility for the purposes of navigation lights.
4. A forward lookout is prudent in the bow for advance warning of ship traffic and obstacles.
5. Prudence must be used to decide whether to operate under engine to generate electrical power for the RADAR or to operate under sail for better hearing of sound signals.
6. Precise navigation is required. Use as many nav aids as possible to ascertain a positive position, LORAN, GPS, RADAR, hand bearing compass, piloting techniques.
7. Place the VHF radio on scan to include Channel 9 VHF, and Channel 13, Bridge to Bridge, for emergency radio traffic.
8. Plug-in the spotlight and have it ready in the fog to train in the direction of suspected targets. The intensity of the spotlight will penetrate fog and illuminate obstructions when visibility from the naked eye is limited.

6-5 OPERATIONS OFFSHORE.

Long distance passage-making is well within the capability of the NAVY 44. Items that require special considerations are:

1. Safety harnesses must be worn, and the crew member "snapped in" to hard points on the deck of the boat, prior to exiting the cabin at night or at any other time as may be required during rough weather.
2. Jacklines are rigged from the bow along each side deck inside the shrouds to the aft quarter of the boat. Secure the tether of the harness to a jackline for access forward of the cockpit.
3. Buddy system procedures are encouraged to account for topside personnel.
4. Awareness of changing weather conditions is imperative for early sail changes. The time to change a sail or to reef...is the first time the thought occurs.

6-6 TOWING OPERATIONS.

There may come a time when you will need to tow another Navy 44 or to be towed. Determine whether the tow will be astern or alongside. Generally towing astern is more convenient in open ocean. Towing alongside is recommended within the shelter of a harbor when preparing to deliver the towed vessel to a dock. Deck hardware applicable to towing is:

1. Four open mooring chocks, two on the bow, port and stbd; and two at the transom, port and stbd with the corresponding mooring cleat.
2. Four closed rail chocks bolted on to the toe rail; two amidships, port and stbd; and two at the stern quarters, port and stbd with a corresponding mooring cleat.

3. Four 45-foot and one 75-foot length of 5/8-inch diameter, laid nylon line for docking/mooring lines. See Figure 1-39.

6-6.1 TOWING ASTERN.

These procedures apply to you as the tow vessel.

WARNING

THE TOW BRIDLE MUST BE CLEAR OF ALL STERN COMPONENTS FROM THE CHOCK ON ONE QUARTER OF THE VESSEL TO THE CHOCK ON THE OPPOSITE SIDE.

1. Communicate with the OTHER vessel and determine who will provide the towing hawser. Remember that you know the condition of your hawser.
2. Rig a bridle that will be long enough. Attach a snatch block so the sheave will ride on the bridle.
3. Tie one end of the bridle to a stern cleat. Pass the bridle out through the skene chock on the transom. Allow enough slack to clear the stern components of your boat. Pass the bridle in through the skene chock on the other quarter. A loop can be tied into the end with a bowline to simplify engaging and disengaging the bridle.
4. Maneuver your vessel to pass close aboard.
5. If using the towed vessels hawser, skip to USING THE TOWED VESSELS HAWSER. If using your own hawser continue with this procedure.

USING YOUR HAWSER.

6. Tie the hawser to the snap shackle of the snatch block while the sheave rolls on the bridle.
7. Route the bridle to the other chock and secure it to a mooring cleat.
8. Pass the hawser to the other boat.
9. Go to TAKING THE TOW.

USING THE TOWED VESSELS HAWSER.

10. Take the towed vessel's hawser.
11. Tie the hawser to the snap shackle of the snatch block riding on the bridle. Use a bowline.
12. Route the bridle to the other chock and secure it to the cleat.

TAKING THE TOW.

13. Proceed forward slowly as the hawser is made ready.
14. After you receive a signal, (visual, audible or by VHF radio) that the hawser is ready, take tension on the hawser.
15. Establish a steady strain on the line.
16. Adjust speed through the water for sea conditions and compatibility of the tow line between the vessels.

6-6.2 BEING TOWED ASTERN.

1. Determine who will provide the hawser. Remember you know the condition of your hawser.
2. Ready the foredeck for the hawser. Clear a path from the bow chock to be used to the mast. The haswer will be tied to the mast, the most secure point on the boat, with a bowline.

USING YOUR OWN HAWSER.

3. Tie it to the mast, pass it through the intended chock, and make it ready to pass to the towing vessel when it passes alongside.
4. Pass it to the towing vessel.

USING THE OTHER VESSELS HAWSER.

5 When using the towing vessel's hawser, take it, work it to the bow, pass it through the bow pulpit, through the chock, and secure it to the mast with a bowline.

6. Before a strain develops on the line, place chaffing gear at the point where the line passes through the chock.

7 Tend the hawser and call out the amount of slack in the line.

8. As the line comes taut, call out the amount of strain.
9. Helm. Steer the boat to align the boat with the towing vessel and keep the boat in trail.

10. Use hand signals and/or VHF radio to communicate the desired boat speed. This is the responsibility of the vessel being towed.
11. Monitor the hawser for security and chafe.

6-6.3 TOWING ALONGSIDE.

NOTE

A likely sceanrio for this procedure is that of changing from towing astern in open ocean to towing alongside once the safety of a harbor has been achieved and in preparation for delivering the towed vessel to a dock.

1. Lines required are bow, stern, forward spring, and aft spring. Fenders are required.
2. Communicate with the towed vessel and determine who will provide the lines and who will provide fenders. It is recommended that the towing vessel provide lines and fenders. This leaves the towed boat with its lines and fenders available for dockage when released from the tow.

WARNING

USE FENDERS TO KEEP THE BOATS APART. DO NOT ALLOW HANDS OR FEET INTO THE AREA BETWEEN THE BOATS.

3. Fenders should be rigged on the side that will be between the boats.
4. Tow vessel reduces power and swings out of line and allows the towed vessel to creep up alongside. Tend the now "slack" towing hawser to keep it from fouling in the prop.
5. Establish a parallel course with the towed vessel.

CAUTION

Keep the towed vessel slightly aft of directly alongside to avoid the spreaders "locking horns" in the event the boats rock in close proximity.

6. Pass lines across to the towed vessel. Use power as necessary to maintain an 'alongside' position with the towed vessel that is slightly aft of directly amidship.
7. Slowly draw in the bow and aft spring line to make to boats converge. drawing lines in as the distance is reduced.
8. Towing vessel should arrive alongside close enough to pass lines, yet far enough to ensure a safe margin. Choppy water could swing masts together and "lock horns" with the spreaders.
9. Pass lines across from one vessel to the other.
10. Take a light strain on the bow line so that the boats will be drawn together as the tow vessel starts to make way.
11. Adjust the length of the bow line to ensure that the spreaders will not "Lock Horns."
12. Adjust spring lines and the stern line to keep the vessels snug.
13. Signal to the towing vessel when ready to be towed.
14. Helm should be amidships. Let the towing vessel maneuver both vessels.
15. For close maneuvering, be prepared to use the helm in response to any request from the towing vessel.
16. Communicate with the towing vessel as to speed compatibility with your vessel. This is the responsibility of the vessel being towed.
17. Ready lines and fenders for docking when appropriate.

6-6.4 BEING TOWED ALONGSIDE.

1. Use the same procedures as in 6-6.3. Use the towing vessels lines and fenders to secure the two boats together. This will leave your lines available for docking when tow is cast off.
2. Steer your vessel to follow the tow vessel in trail.
3. Communicate with the tow vessel the desirability of the towing speed. This is your responsibility.
4. Ready your docking lines and fenders to the free side of your vessel in

preparation for being cast off and making a dock.

6-7. ANCHORING.

The Navy 44 rides comfortably at anchor. It responds more to wind direction than to current. The following rules of thumb for the scope to be used apply.

- Lunch Hook. Length of anchor rode = 3X (water depth at high tide plus height of bow above the water).
- Overnight - personnel onboard. Length of anchor rode = 5X (water depth at high tide plus height of bow above the water).
- Unattended - all personnel going ashore. Length of anchor rode = 7X (water
- depth at high tide plus height of bow above the water).

There are two (2) anchors on board the Navy 44.

- A 20-pound Hi-Tensile Danforth anchor is stowed under the radial drive aft of the engine compartment, with 6 feet of 3/8 inch chain and rode. It is secured in chocks with a retaining pin. This is the anchor most often used.
- A 35-pound Deepset Danforth anchor is stowed in the forward cabin, stbd side under a pipe berth, with 6 feet of 3/8 inch chain and rode. This is the heaviest and most secure anchor.

6-7.1 PREPARATION.

1. Prior to getting to the anchorage, the navigator determines the approximate depth of the water in the intended anchorage.
2. Bring the anchor to be used to the foredeck.
3. Unlash the anchor rode to be used and take it to the foredeck.
4. Ensure that the rode is attached to the anchor .
5. Ensure that the shackled is "Moused".
6. Make the bitter end of the rode fast to the boat (a bowline around the mast works).
7. Select the side of the foredeck opposite to that side used to bring the jib down.
8. Lay out the rode from the anchor on the deck to the shrouds and back in switchbacks until the desired length of rode is acquired (the "J" measurement, 18.5', can be used to estimate rode length).

6-7.2 AT THE ANCHORAGE.

1. Visualize where the boat will be in the anchorage. Estimate a distance to windward equal to the amount of anchor rode to be used. This is where the anchor should be dropped.
2. Approach the anchor drop zone into the wind under engine.
3. As the boat approaches the drop point, put the engine in neutral.
4. Feed the anchor and rode out through the pulpit on the same side as it has been cleated until the anchor is AT THE WATER.
5. When way has been lost:
   - Lower the anchor hand over hand until it touches bottom.. Dropping the anchor with no control may foul it on its own chain or rode.
   - Pay out rode and note how much it took to reach the bottom. Compare this to what the navigator predicted so as to determine the accuracy of the amount of scope being used.
   - Put the engine in reverse and start the boat backing. Take the boat out of gear so as not to back in a circle.
6. When the anchor rode comes up taut, put the engine in reverse and place a strain on it to dig it in.
7. Take a "round of LOP's" to fix position on the chart. LORAN and GPS position can also be used.

6-7.3 AT ANCHOR.

1. Navigator can set the anchor alarm on the Loran for a swing circle plus an acceptable wander distance.
2. Check the boat's position according to boat routine as established by the skipper. Set an anchor watch if advisable.

6-7.4 DEPARTING FROM THE ANCHORAGE.

The preferred method is to have two crew on the bow. One to take in on the rode as it comes slack. The other to "spot" the anchor and relay signals to the helm. Foredeck personnel should be prepared to deal with a sloppy anchor. Keep the anchor and rode to the side opposite where the jib is being readied to hoist.

1. Ensure that the engine is operating.
2. Place the engine in forward and work the boat up to the anchor following the signals of the spotter.
3. Uncleat the anchor rode and hold it at the ready with a turn on the cleat to provide holding friction.
4. Take in on the rode as it becomes slack.
5. As the rode is coming up to a "short stay", cleat the rode.
6. Take the boat out of gear and let the momentum of the boat ride over the anchor.
7. Feel the "slack" as the anchor is dislodged. Take in on the anchor rapidly to avoid it
   setting itself again. When off the bottom, report "Anchors Aweigh" to the helm.
8. Helm can put the boat in gear and with moderate speed leave the anchorage.
9. As the anchor is brought up report, "In Sight", and whether it is 'clear or foul'. Hold the anchor at the waterline.
10. Inspect the anchor for debris. If it has mud etc. clinging to the anchor, hold the anchor in the water and let the wave action "wash" the anchor.
11. When it is clean bring it up on deck. Report "anchor on deck".
12. Return anchor and rode to their stowed location.

End of Chapter 6.