Owner’s Manual

25’ C-Dory Cruiser

The information in this manual is based on the current model in production. Parts and equipment may vary.

Built by C-Dory Marine Inc., Auburn WA

Forward

Congratulations on becoming the owner of a new 25' C-DORY Cruiser—one of the finest, safest, most sea-worthy and most economical boats of its size built in the United States. Your new boat contains numerous features normally found only on much larger and more expensive boats – such as hot and cold running water, a fully-enclosed stand-up head, hot-water shower, ample galley space with a dinette that seats four, a refrigerator, generous cabin space, comfortable sleeping accommodations, highest quality construction, and a host of other fine features not normally found in boats of comparable size.

This manual is intended to provide you, the new owner, with all of the operational, safety, and maintenance information that you will need to enjoy your new 25' C-DORY for years to come. It is strongly recommended that you take the time to read this manual from cover-to-cover to familiarize yourself with all of the systems and features of your new boat. By learning everything there is to know about your C-DORY, you can be assured that you, your family, and your friends will enjoy countless hours of safe and worry-free recreational boating.

C-Dory Marine, Inc.

25' Cruiser

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THIS MANUAL IS FOR THE 25' CRUISER- USE FOR REFERENCE ONLY

Date of sale & Registration for Warranty of the Hull _____
Date of Sale & Registration for Warranty of the Motor(s) _____
Date of Sale & Registration for Warranty on the Trailer _____
Vessel Registration Number _____

Gel Coat Manufacturer COOK

Color	**White**	**Accent**	_____	**Deck**	_____
	953WA441		_____		_____
Upholstery (Sunbrella) Color			_____		_____
Canvas (Sunbrella) Color			_____		_____

Dealer or Broker

_____
_____
_____
_____

Original Owner

_____
_____
_____
Phone # _____

Hull Serial Number _____ **Year** _____
Motor Make _____
(1) Model _____ **Ser#** _____ **Year** _____
(2) Model _____ **Ser#** _____ **Year** _____

Trailer Make _____
(1) Model _____ **Ser#** _____ **Year** _____

Specifications: *Custom modifications by the factory, dealer and others may alter original specifications.*

Hull Weight, Dry, less motor		**3602**	**LBS**
Motor(s) weight, including batteries and controls			**LBS**
Trailer Weight			**LBS**
Fuel Weight	**Gallons ~ 100 x 6.0 #**	**642**	**LBS**
Water weight	**Gallons ~ 24 x 8.3 #**		**LBS**

Special Notes:

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Boating safety is everyone's responsibility.

As a boater, you are responsible for having all required safety equipment, for operating your boat safely and for ensuring the safety of those on board your vessel as well as those sharing the water ways. Boaters exercising courtesy and common sense will not create a hazard, threat, stress or an irritant to themselves, to others, to the environment, or to wildlife.

1. Wear an approved Personal Floating Device (PFD)
2. Read your owners manual.
3. Respect the speed limits and other boating restrictions.
4. Be cautious and courteous.
5. Navigate with care.
6. Understand the behavior characteristics of your vessel that might result from unexpected maneuvers, such as sudden deceleration, high-speed obstacle avoidance, and other speed related issues.
7. It is good boating practice to rinse down your boat and exposed steering equipment with clean, fresh water after each use. DO NOT use corrosive materials on your vessel.

Become informed and stay informed!

Take an accredited boating safety course.

Safety Precautions

The lawyers would have us point out to you that you should NOT put your finger in an open flame and should NOT forget to untie the boat from the dock before pulling away, and a list of other equally profound safety precautions. If you were so feeble as to need such warnings you would not have the money to buy such a great boat. So we are going to just ask that you exercise reasonable care and caution when you are on or about the boat. If you have any questions or concerns, we are just a phone call away and ready to help you. If you are new to boating or feel a little rusty it would not be a bad idea to take a boating course.

Familiarize yourself with the boat and its equipment. Read the manual that came with the various equipment installed on your boat, and read the rest of this Owner's Manual. Acquaint yourself, your crew and your guests with the location of all safety equipment such as life jackets, fire bottles, and the radio and instruct these people in the use of them.

YOU are responsible for the condition of your vessel and the safety of everyone aboard. Have your boat inspected at least once a year by a professional (not the Coast Guard Auxiliary), and make the recommended repairs. Accidents can be easily avoided with good maintenance and a little common sense.

Model Description for **2006 C-Dory 25' Cruiser**

The 25' C-Dory is longer wider and taller than the 22' Cruiser. With the added size we were able to incorporate many of the features that so many C-Dory 22' owners have asked for in a larger boat. The additional features include; enclosed head, self bailing cockpit, larger galley and a forward viewing companion seat.

The 25’ Cruiser provides a spacious self bailing aft cockpit. Welded Stainless steel railings along the sides assure safety even in rough water and provide a feeling of security.

The cabin with over 6’10” of headroom provides roomy shelter. It features a comfortable dinette, galley, sleeping area and a stand up head as well as the pilot station.

The dinette is located along the port side of the cabin, it has lots of storage under its seats, and it makes into a 6’4” berth. Aft of the dinette is the stand up head with a marine toilet.

The pilot’s station and galley are located along the starboard side. The galley consists of a two burner alcohol stove (diesel stove/heater upgrade available) a plastic 23 gallon water supply and a 6 gallon hot water tank, an ice box or refrigerator (located under the pilot’s seat) and a teak dish rack that holds four plates and four glasses.

The forward section of the cabin features a 6’4” “V” berth, two reading lights, a large deck hatch.

The interior trim is neat and utilitarian, with emphasis on easy maintenance and durability. All cabinetry is removable and built from ¾” decragaurd marine grade plywood with a laminate overlay. The exterior door and windows are made by Diamond Sea Glaze of powder coated aluminum.

Cushions are made of high quality foam covered with durable ‘Sunbrella’ boat canvas. The colors coordinate with the exterior trim. All of the cushions can be removed so the interior can be hosed out.

The electrical system provides spare switches fuse holders and ground terminals for additional accessories. A 30 amp shore power with cord and a battery charger are standard as well.

Electric windshield wipers with pantographic arms are standard.. Side windows slide open and have screens, together with the large forward deck hatch and the standard center opening window the cabin is amply ventilated.

All deck hardware is stainless steel and through bolted. The top deck is a very healthy 3/4” thick. Deck

hardware includes (5) through bolted SS cleats. Downriggers or other equipment requiring a sturdy mount base can be bolted on any top-walking surface. The bow and stern rails and handholds on the top and rear of the cabin are also through bolted.

Both the cockpit sole and the top walk decks have a very aggressive nonskid. The cockpit's deck lid is removable and the nonskid is a molded in diamond pattern

The 25’ C-Dory Cruiser comes standard with a 100 gallon fuel system located under the aft cockpit deck.

The motor well can accommodate a matched pair of twin motors or a large main & small auxiliary motor package. C-Dory is a strong promoter of the 4 stroke outboards. Honda has been and continues to be the leader in this technology but they are no longer alone. Most all motor brands now offer 4 stroke motors that are suitable for the 25' C-Dory Cruiser.

Maximum power is 200Hp. Twin 90s or a single 150 are typical motor installation.

Construction

The fiberglass hull, decks, and house are entirely hand laid with use of balsa core composite construction. The use of cored sandwich construction in the bottom, decks and bulkheads, in combination with the deeply molded plank lines, give the boat incredible strength and stiffness. It also does away with the need for interior bracing and floor boards, eliminating bilge cleaning and potential maintenance problems. At the same time this design maximizes interior space, making the C-Dory 25’ Cruiser a very roomy boat for its weight and size.

The hull and deck are molded separately and then fiber glassed together while still in the molds to assure perfect alignment. This construction method joins the hull and decks into one very strong and rigid unit without joints to fatigue and leak. All color accents and top deck nonskid patterns are molded-in.

Specifications

Length	25' 5" (center line)
Beam	8'6"
Weight (less motor & Battery).....	3,602 Lb.
Material	Composite core, Fiberglass
Power	Outboard (up to 200 Hp.)
Fuel Capacity.....	100 gal. built in
Warranty.....	Five year hull warranty

Standard Equipment for 2006 C-Dory 25' Cruiser

Bilge pump system: Two 1100 G.P.H. Rule Platinum bilge pumps with automatic float switches

Bow Eye: 1/2" S.S. bow eye mounted through heavy stem. *(backed)*

Bow rail: Welded 1" S. S. Bow rail *(through bolted)*

Bow roller: BRM4 bow roller (for use with Bruce and Delta anchors)

Cleats: Large S.S. cleats *(4ea 8" & 1ea 10")*

Color: Accents & Stripes on the cabin top, hull sides & bottom are molded in.

Door lock: Cabin door key lock.

Electrical system: Seven circuit switch panel, color coded wiring, 12 volt outlet, and extra ground bar and fuse holders provided. Shore power 110V 30Amp with power cord and battery charger.

Fuel tank: 100 Gallon

Galley stove: Origo two burner Alcohol stove

Hand rails: Heavy duty hand rails, 1" S.S. *(through bolted)*

Hatch: Bomar 22" aluminum frame hatch with tinted lens.

Horn: Electric twin horn

Nav. lights: Side & Stern lights & removable Mast/Anchor light

Non skid, Top decks have a deep molded in non skid surface. Two toned in mold.

Marine toilet

Rub rails: Custom extruded heavy duty aluminum rub rail with vinyl insert.

Steering: Hydraulic.

Stem guard: A brass stem guard protects the bow from just under the bow eye to six feet back from bow.

Transom cap: Heavy vinyl protective cover over transom top edge.

Upholstery: High grade foam with Sunbrella boat top canvas covers.

Water system: A 23 gallon water tank, fed to a S.S. sink, and a 6 gallon hot water tank.

Windows: Quality Diamond Sea Glaze windows with powder coated aluminum frames and tempered safety glass.

Windshield wipers: Port and starboard electric wipers with pantographic arms. Standard (2006)

Daily Inspection & Checklist

- The boat and its systems should all be in good repair and properly serviced.
- Inspect the steering system for visible damage.
- With the motor tilted down, rotate the helm from full right to full left several times to check for stiffness or poor response and that the motor can travel without restriction.
- Open battery compartment(s) and check for fumes, loose wires. Check water level in battery(s).
- Cycle the bilge pump switch to test pump. Leave in the on position.
- Test navigation light system, radio and other navigation equipment.
- Inspect safety equipment and insure that they are adequate and in good order.
- If everything checked out “OK” then proceed to the next step. If not, correct problem(s) before proceeding.
- If boat is to be launched from trailer, close all below-water line drains (if any) and close all through-hull valves (if any). Observe trailer manufacturer’s precautions and recommendations and launch boat.
- Load passengers & gear; balance load appropriately and safely.
- Follow the motor manufacturer’s manual for pre-start-inspections and procedures for startup.
  Observe all precautions and safety issues listed. Then start and warm the motors.
- If you have plenty of gas and the motor(s) is running will, you are ready to go. Don’t forget to untie the boat and bring your fenders aboard before pulling away from the dock!

- The forward deck hatch should be used with caution when under way. If opened for ventilation make certain that both support rods are locked. Do not open forward hatch if operating boat at speeds above 25 knots. *Secure hatch and lock latches before towing on trailer.*
- Do not operate the boat at high speed with passengers on forward deck. Anchoring can be accomplished safely while standing up through the forward hatch.

Safe Loading

- Loads must be evenly placed about the boat.
- Secure all loads; nothing should be tossed about.
- No loads or passengers should be carried on the forward deck.

Maximum Gross Wight=4500 Lbs The maximum gross weight is the total weight of the boat, motors, fuel, gear and passengers. Operating the boat at maximum gross weight requires special care in loading. The boat must be loaded so as to maintain the correct attitude fore and aft, and it must be kept level from side to side. Expect the boat to feel heavy (it is).

Normal Running Weight=3800 Lbs The normal running weight is the total weight of the boat, motors, fuel, gear and passengers. This is the design weight of the hull. If properly balanced this weight will give the best average for speed, comfort and economy.

Note: Many people ask why the C-Dory 25' does not have a Coast Guard capacity label like the 16' C-Dory -

- The Coast Guard requires that all boats under the length of 20', except canoes, kayaks and inflatables, meet the requirements of the Boat Safety Act of 1973. These standards deal with powering, flotation and stability. The label that is attached to these boats certifies that the boat complies with the Coast Guard's regulations for boats under 20'.

- Boats over 20', except those used for passenger hire, are subject to very limited Coast Guard supervision. HP limits are placed on these boats by the manufacturers (based on Coast Guard guidelines) and are stated on a label near the helm. ***(Federal regulations prohibit overpowering the boat beyond the limit set by the manufacturer).*** Capacity in weight and the number of people that can be carried safely are largely up to the discretion of the boat's captain. The Manufacturer's Load Guidelines are listed above.

- ***If you have any questions about the safe loading of your boat, please give your C-Dory Dealer a call.***

Fueling

It is unlawful to dump or discharge oil or gasoline into the water. It is advisable to keep special materials on board to disperse or clean up small spills.

No Smoking! During refueling the motors should not be running. Shut down ALL electrical equipment. Put out alcohol stove. If equipped with a Wallas Stove turn off stove at least 15 minutes before refueling. Make certain that no one is smoking. Open either deck fill plate, located on both sides of boat. Insert the nozzle into the deck fill plate, making certain that the

nozzle and deck fill plates have metal to metal contact. Your boat's fuel system is now grounded to the gas pump. Begin refueling, holding a rag or towel lightly over the fuel vent. When the tank is nearly full you will hear the air noise escaping from the vent increase in pitch, slow down pumping and when you get your first gurgle from the vent stop filling the tank. Close the deck fill plate.

Fuel System

One 100 gallon aluminum fuel tank is installed under the deck. Gasoline Deck fills are 1 ½". Vents are 5/8". Fuel pickup hoses are sized to match requirements of installed motors. *(The fuel pickup hose, filters, primers, valves etc. are installed by the rigging dealer.)* All hoses and hose connections should be inspected at least once each season for deterioration. Replace deteriorated, cracked, worn or hardened hose. An access hatch to the fuel tank hose connections is located near the center of the deck.

Custom made tanks by Coastline Equipment 2235 E Bakerview Rd, Bellingham, WA 98226 360.734.8059.

Water System

The water system has a plastic 23-gallon fresh water tank mounted under the motor well near the transom. The tank is filled through a 1 ½" stainless water deck fill. Water is pumped from the tank to the sink, shower and water heater with a 12 Volt water pressure pump (see Appendix A). The tank should NOT have water in it during prolonged storage, especially during the winter. To empty the water tank open the water heater drain valve and allow the cabin water drain system to pump out all of the water. For tank cleaning products see an R.V. supplier; they are cheaper than marine stores. Ordinary bleach mixed with water can be used to clean a stale water tank. Be sure to flush the tank thoroughly afterward.

Cabin Water Drain System (See Picture Below)

The Cabin Water Drain System **i**s located in the rear port side cabinet under the pull out shelf. This is a compact, full capacity water drain system. The bilge pump within the box automatically turns on after the water starts, and shuts off when the water is removed. It is activated by a Rule-A-Matic® float switch and is available in two pump capacities - 500 gph and 800 gph. The 500 model has one 1- 1/2" inlet port. The 800 models have three inlet ports which offer varying combinations of inlet hose. With this pump there **is no cycling and battery drain.**

Other features include a clear screw down, cover, removable strainer for easy cleaning, and in internal check valve to prevent back siphoning. We have attached the shower and water heater drains to this water drain system. The sink drains out on the starboard side of the boat.

With this pump there **is no cycling and battery drain.**

Stem Guard

Brass Stem Guard ~ C-Dory 25’ ~ Cruiser

The 25' C-Dory with its shallow draft is made to be beached.

The hulls composite core construction allows it to take enormous blows without structural damage. The hardest area to protect from damage is sharp cornered areas like the bow. To protect this delicate area a metal guard is used.

The brass stem guard protects against abrasion from beaching or that accidental nudge against the trailer. This guard runs from just below the bow eye, down about 6'.

Stainless Steel Rails

As to the care of stainless rails and deck hardware, fresh water rinse, mild non abrasive cleansers, and paste wax. If stain does appear, rub off with a rag and re-apply wax. If stain is difficult, rub off with a fine polish such as sea-power, and then re-apply wax. Do not use any abrasive wiping pads or aggressive chemicals.

Teak Wood Trim

Teak is recognized for its durability and stability under severe climatic conditions. These qualities, plus high quality construction guarantee long life even when left permanently outdoors. It is for these reasons that teakwood has endured for well over 150 years as the first timber of choice in marine applications and ship building. London has parks with teak benches that are over 80 years old. No other wood can claim to possess the qualities of teak. So don't be mislead by claims from other products

Teak wood products are usually categorized into outdoor and indoor uses. Both interior and exterior teak wood are finished in several ways, including totally natural, oiled, sealed, and varnished. Since interior teak gets less abuse than exterior, maintenance is generally is less demanding.

There are many way to take care of them, we have compile several articles here in this site to help you to do just that. Like any other material, wood requires the proper maintenance to retain is beauty. The maintenance of teak is relatively simple, providing that it's done on a very regular basis. Let your maintenance slide and the task can become a nightmare.

Teak is an extremely durable hardwood. It requires little care and no preservatives or treatment of any kind to protect it from the elements. Natural teak will gradually weather to a handsome silver gray color if left outdoors. You will begin to notice the "graying" after 3 month or so, depending upon the amount of sun and rain the furniture is subject to. Total weathering will take about 6 to 9 months. This silvery gray 'patina' which develops over time gives teak furniture a distinctive appearance. The color resulting from this natural aging process is considered to be very attractive, and allows teak furniture to blend in well with many outdoor environments. Teak left in this state is easily maintained, and needs no treatment whatsoever to give many years of service. This is about as easy as a maintenance plan as it is possible to get!

If your teak wood products or furniture is to be used indoors, and away from a lot of natural sunlight, over a period of time -perhaps six months to a year - the wood will gradually become a darker shade of brown.

If you wish to maintain the original tawny color of your furniture, you may consider a light application of Teak Oil. Furniture intended for interior use exclusively should be oiled or given a light application of a clear furniture wax such as "Johnson's" paste wax.

Outboard Motors

The C-Dory 25' Cruiser takes 25" (Long) shaft motors. Maximum total horsepower is 200 HP. The issue is not the strength of the transom, but rather the balance of the boat. An over-heavy transom will cause the boat to plane slowly and ride hard, and, of course will reduce the overall capacity of the boat. When selecting motors, physical size must be considered. The motor-well will accommodate either matched twins or a main & auxiliary motor. For the latest in what will fit and what props will work best contact your local C-Dory Dealer.

Propellers

What prop is the right size? A short precise question; the answer however is rather messy. To be short and blunt, any prop that allows the motor to run flat out within the operating ceiling specified by the motor's manufacturer is OK. But what is BEST?

Example: *The prop sizes listed in these examples are not meant as recommendations for your boat's motors.*

- A large diameter prop with a low pitch (14" X 13") is generally better handling weight but at expense of speed.

- A small diameter prop with a large pitch (13 ¾" X 15") generally gives better speed at the expense of handling weight.

If the boat in the first example were indeed rather heavy, and if the boat in the second example were rather light, either of these props would load the motor about equally. This is the speed prop-load prop scenario. Simply putting the 13 ¾" X 15" prop on the example boat does not make the boat faster; it only makes it possible to go faster if the boat is also lightly loaded. If you select a prop that is too small, the motor will turn it too easily and it will overspend (like driving your car one gear too low, the motor makes a lot of noise but you don't go anywhere).

Your boat's motors cannot shift gears; you have to select the correct gear (select the right prop) in advance.

The number of blades and prop design all will play a part in the performance of your motors and your boat. Factors such as ambient temperature and altitude will also play a role in prop selection. Different props will affect the boats steering system, idle or trolling speed. Acceleration and performance in turning fuel economy are all affected.

The shop that rigs your boat with motors should be able to help you select the prop that is best for you.

If you use your boat for several different purposes you may need to have more than one size prop. Ultimately it is trial and error on your boat under your conditions that will arrive at what prop is best for your use. Local C-Dory dealer recommendations are good starting points. If you really want to fine tune your boat, make friends with a good prop shop and have them tweak your best props a little.
Hold off on buying stainless props until you are sure that you know what sizes work best on your boat. It's much cheaper to purchase and modify an aluminum prop. Oh, by the way, some props can be balanced for even more efficiency.

Steering System (See Appendix B)

The standard steering system is a "Teleflex Helm-SeaStar 1.7" Hydraulic system. SeaStar hydraulic steering is a total commitment to quality, performance and simplicity. Steering is the single most important system on the boat. A qualified marine mechanic should do all service of the steering system.

The SeaStar Hydraulic Steering System is designed to provide that extra margin of muscle when needed. The SeaStar system easily handles Outboards, Stern drive and Inboard boats.

Note: Single motor installations require a 26' cable; twin motor installations require two 26' cables.

- **The operator should inspect the steering system for cracks or other damage to the cable before each use** or any time you experience difficulty in turning the helm. The system should be inspected by a professional at least once a year.

- **At frequent intervals** check all fasteners and the complete steering system for security and integrity. Loosening or loss of one or more fasteners may cause failure of the steering system and resulting loss of steering control and could cause personal injury or property damage.

- **Keep all moving parts clean** and free from build up of salt and other foreign material. This will affect their operation and create steering problems. Pay particular attention to the hinge tube of the outboard. Periodically remove the cable from the tube and clean and re-lubricate it with waterproof grease.

- **Inspect periodically for corrosion.** Any parts affected by corrosion must be replaced. When replacing hardware, self-locking nuts must be used.

- **Inspect cable periodically for cracks or other damage.** If any are found the cable must be replaced. **DANGER:** ***Do not cover over cracks with tape or other sealant; this will create a hazard in which the cable can fail suddenly without warning.***

- If the boat has twin motors the operator should inspect the tie bar before each use for damage and loose or missing fasteners.

Electrical Systems (See Appendix C For Wire Diagrams)

Each motor has an independent electrical system for Ignition & Starting, Charging, Trim & Tilt, Alarms and Instrumentation. The motor's electrical system should not be tied into the boat's system except as noted (*Note that instrument lights ARE connected to the "Nav Light" circuit of the boats electrical system.)* Crossing of the two electrical systems can result in problems with the motor's alternator and its voltage regulator and over-loading the motor's wiring. **DO NOT take power from the motor's electrical system to run accessories.** Accessories should draw their power directly from the battery(s) (a fuse is required within 50 inches of the battery) or from the Positive buss or fuse block provided behind the dash. ***See wiring diagram for amperage capacities. Do not overload the boat's electrical system.***

The boat's electrical system is comprised of a Positive power feed from battery(s), and a common Negative ground feed from the battery(s) common ground, to a Positive & Negative Buss located behind the dash. A fuse located near the battery(s) protects this buss. The battery switch (if installed) does not affect un-switched circuits like the bilge pump (don't want to turn those babies off by mistake). Consult the wiring diagram for recommended battery and battery switch systems. The rigging dealer normally installs the Battery(s) system as a part of the motor package. There are a number of good ways to setup a battery system. Several systems are shown in the diagrams that follow.

The boat's standard electrical system is simple. Addition of accessories, electronics and upgrades to standard features will add to the complexity of the electrical system. Most common add-ons are covered in this manual and are illustrated on the wiring diagram. Each C-Dory ultimately ends up with a unique system.

Before installing additional electrical equipment, consider the size of your alternator(s) and the time your spend cruising (Charging), idling, (Not charging) and parked using power. If you spend 10 hours drawing power and only three hours actually running at speed you will ultimately have a dead battery. Length of time depends on the capacity of your batteries, the average rate of draw, and the amount replaced by the motor alternator(s). Just adding capacity (more or larger batteries) may not by itself cure the problem. The only real cure is additional charging of the battery dockside. Adding a battery in parallel (Pos. to Pos. / Neg. to Neg.) to main battery is recommended as the simplest way to increase your capacity where it will do the most good. The connecting leads should be equal to the cables running to the motor.

Notes:

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Batteries

WHAT IS A MARINE BATTERY? The small boat Marine battery differs from an automotive battery only in the type of terminals with which it is equipped. It will have threaded ¼" or 5/16" studs for terminals. It may come equipped with automotive terminals as well.

The two types of batteries commonly used in small boats are Cranking and Deep Cycle.

Cranking Batteries, designed to withstand very heavy amperage draws for short periods of time, (turning a cranking electric starting motor), must be kept fully charged at all times for their good health. Deep cycling, or bringing the charge down to near zero and then recharging it, will shorten its life. With each cycle the battery becomes weaker than the time before. The voltage in a Cranking Battery will drop off quickly as the battery is discharged.

Deep Cycle Batteries deliver low amperage draws for a prolonged period of time. They can be run down almost completely and recharged without damage and will maintain voltage until the battery is nearly dead. They are great for voltage sensitive electronics, fans, radar, electric down-riggers, lights at night or any prolonged use of current when the motor is not running. Deep cycle Batteries should not be used to start large outboard motors. A prolonged heavy amperage draw will overheat the battery and the starter motor, possibly damaging both. See your motor manual for starter motor requirements to determine if you may safely use a Deep Cycle Battery to start your motor.

In most cases you can use a marine Deep cycle Battery rather than a Cranking Battery. When using a Deep Cycle Battery, be careful not to crank a hard starting motor for more than 30 seconds without giving the starter and the battery a minute to cool and rest.

Servicing Batteries

- Keep batteries charged at all times. Replenish water as required.
- Use only distilled water. Never put salt water in your battery, it will produce chlorine gas.
- Keep the terminals clean and tight at both ends.
- Be very careful about removing and reinstalling batteries. Many electrical components can be severely damaged by reverse current.
- As there may be many connections to the battery, carefully label each wire do you can be certain of being able to reconnect everything the way it was.

- Never disconnect the battery from the motor when the motor is running. The motor's electrical system may be severely damaged.
- Do not smoke around the battery compartments. Batteries produce hydrogen gas.
- Battery acid will damage metal and fabrics (like your clothing).

Charging your batteries with a trickle charger once in a while will help keep them in top shape. A trickle charge may take up to 24 hours. Charge your batteries before going on a trip or if you have not used the boat in the last 30 days. Check the water levels in your batteries often, especially the Deep Cycle battery. If you use a boost charger, do not exceed 50 amps, nor boost for more than 20 minutes. Most battery problems are the result of neglect or the battery has exceeded its service life. Consider a built in battery charger for convenience.

Battery Chargers & 110 Volt AC

See inset on wiring diagram for details on typical wiring for battery chargers. Installation of a battery charger requires an 110V 15Amp service to the boat. The simple system shown on the insert does not provide circuit protection, except for a ground fault outlet. This system must be connected to a circuit protected 110V power source (such as any household duplex outlet). When using a battery charger, pay close attention to the water level in the batteries.

Note:

- All Power feeds from the batteries must have fuse protection installed in-line within 50" of the battery.
- If a master shutoff switch is installed to disconnect the batteries, the bilge pumps must be rewired around the switch so that the pumps can stay on even if all other power is shut down.

GUEST 2610 Battery Charger

Description: Guest 2610 A - battery charger for the charging of 2 battery 12V systems only. Water-resistant, fully encapsulated electronics. Lifetime warranty against internal water damage. Comes with hard-wire AC and DC pocket.

Guest 2610A Features

- Ignition Protected
- Reverse Polarity Protected
- Short Circuit Protected
- 3-Stage Switching Electronic Circuit
- Maintenance Mode protects batteries during storage
- Fully Potted to Waterproof Electronics
- Vibration and Shock Protected
- Self-Protecting under extreme ambient conditions
- For Flooded, Gel and AGM Batteries
- 2 - Year Limited Warranty
- Lifetime Warranty Against Water Damage
- Meets all Guest Harsh Environment Guidelines
- Charges two independent 12 volt batteries
- Input Voltage: 100-130VDC/60Hz
- Dimensions: 7.75" x 5.50" x 2.42"
- Weight: 5.6 Lbs.

Picture of Pilot Station Electrical Panel

The Pilot Station Electrical Panel is located near and to the right of the helm. It contains circuit reset breakers, switches and 12 Volt Plug. The circuit reset breakers are white and round and are used to reset the circuit if needed. If a circuit breaker trips investigate the situation before pressing in the reset breaker.

Switches on Pilot Station Electrical Panel

HORN switch is used to honk or toot the horn when needed.

NAV LIGHTS switch is used to turn on the navigation lights. See Appendix G for requirements.

CABIN LIGHTS switch provides power to all cabin lights. Individual lights can be turned on where needed.

COCKPIT LIGHTS switch turns on the cockpit lights.

WIPER STBD switch turns on the starboard windshield wiper.

WIPER PORT switch turns on the port windshield wiper.

WATER PRESSURE switch turns on the water pump to supply pressured water to sink, water heater and shower.

HEAD DISCHARGE switch turns on the macerator pump, if present, to pump out the head. This pump can only be used where boating laws allow. The waste deck fill can be used at pump out stations in most marinas. Follow the instructions provided at the pump out station.

ACCESSORY switches provide power to any electrical equipment attached to these switches.

CABIN DRAIN PUMP switch supplies power to the bilge pump for the Cabin which is located under the step inside the cabin. This bilge pump will operate when water level rises by the pump when this switch is on. It is a good idea to leave this switch on. With this pump there **is no cycling and battery drain.**

BILGE PUMP switch provides power to the bilge pump in the bottom of the hull near the transom. This bilge pump will operate when water level rises by the pump when this switch is on. It is a good idea to leave this switch on. With this pump there **is no cycling and battery drain.** There is an access hatch to the pump on the deck near the transom.

12 Volt Plug

Use this plug for any electrical equipment that has a standard 12 volt male adapter.

Picture of Electric Wiper

Picture of foam cap. There are many foam caps under the upholstery in the V-Berth. The area underneath the fiber glass is filled with foam through drilled holes and capped.

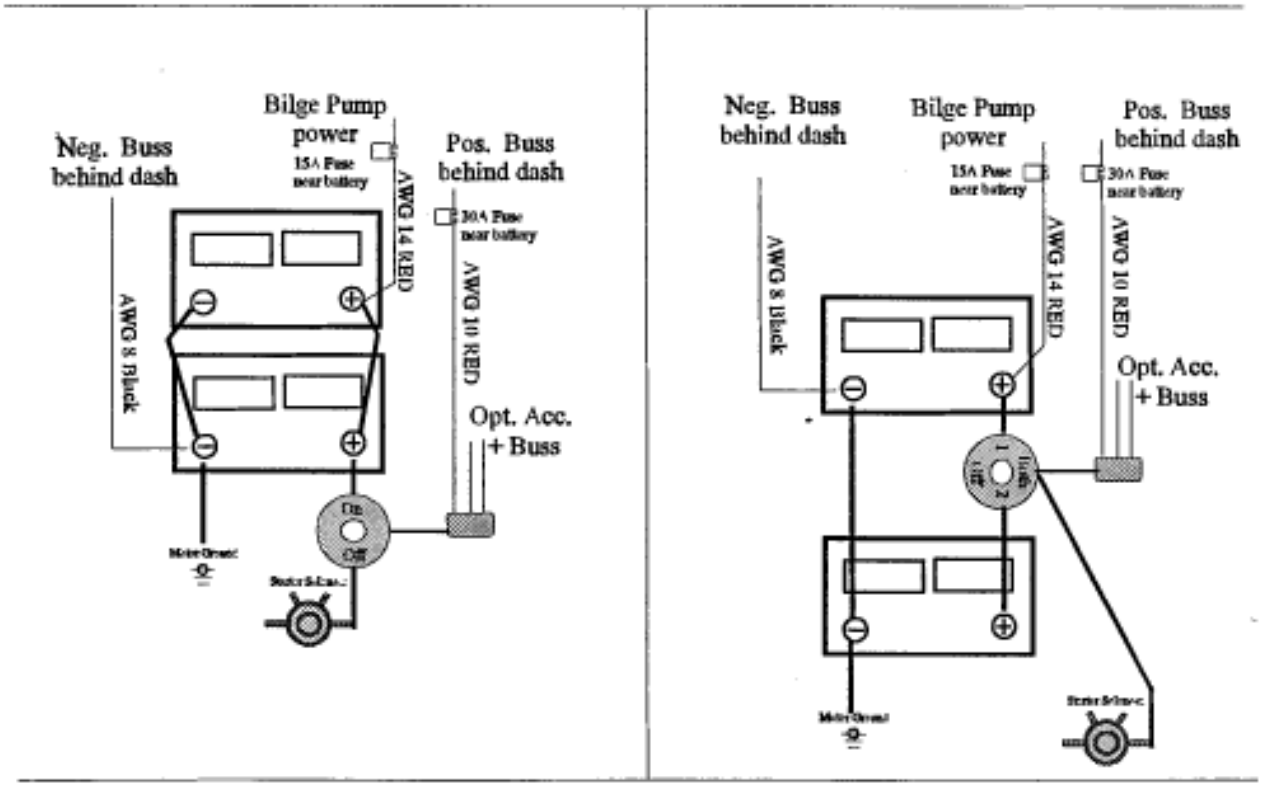
Fuse Panel

Fuse Panel behind Helm **Cover for Fuse Panel**

Fuse size may vary. If a replacement fuse is needed replace with same size fuse present. Fuse Panel Cover with labels reveal what each fuse is used for.

Picture of Fuse Panel in Boat

Two Battery Systems



These are typical dual battery arrangements:

The system on the left can simply be added to a single battery system creating a larger capacity battery. Both batteries charge at once; if one battery is damaged, neither will charge properly. This system MUST have identical batteries.

The system on the right shows a typical dual battery system with on On/Off (Both) switch. Only the battery that is selected will receive a charge while the motor is running on this system. Batteries can be of mixed type and size. Note: it is recommended that you have a battery charger installed if you are going to have a dual battery system.

- **Bilge Pump** (Factory Installed 2 RM-1100)

rule-mate™
Fully Automated Bilge Pumps

Rule introduces the **rule-mate™** series of bilge pumps. The **rule-mate** consists of a powerful rule bilge pump and a new non-mercury float switch in a single housing. The pumps are available in three capacities - 500 GPH, 750 GPH, and 1100 GPH. While fully automated, the pump will only turn on when the water level rises. **There is no cycling and battery drain. The pump remains off until the internal float switch rises.** The pump then stays on until the water is evacuated. The pump's internal computer senses no load (water) against the impeller and then shuts off. A detachable strainer provides easy access to the impeller area for removal of debris. Each pump is easily installed with the pump and switch internally wired. A third wire allows the pump to be connected to a manual override switch if so desired. The **rule-mate** bilge pump is thoughtfully designed, and due to its compact profile, can be used in practically all bilge pumping applications.

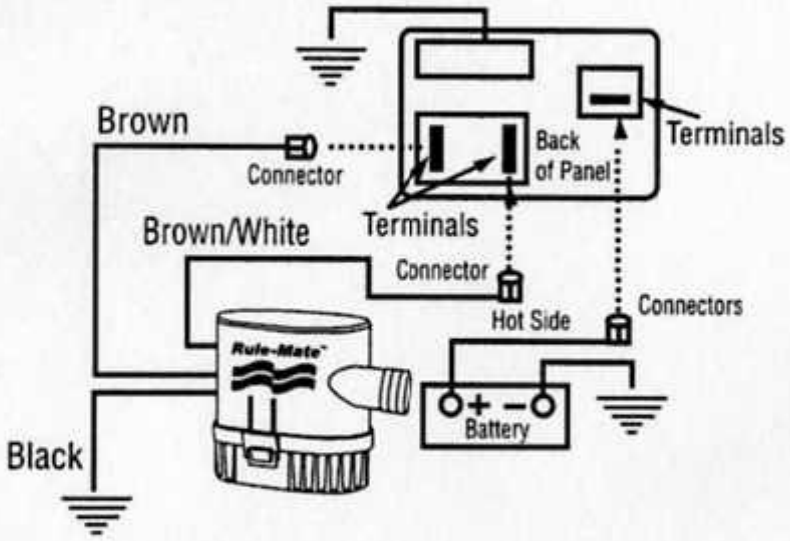
Model	RM-500	RM-750	RM-1100
GPH - Open Flow	500	750	1100
GPH - 3.35'	360	570	860
GPH - 6.7'	260	400	600
Motor	12 volts	12 volts	12 volts
Amp Draw	2.5 amps	4.0 amps	5.0 amps
Fuse Size	2.5 amps	5.0 amps	6.0 amps
Discharge	3/4"	3/4"	1-1/8"
Wire (3) Length	29"	29"	29"
Wire Gauge	16	16	16
Height	4"	4"	4"
Width	5"	5"	5"
Depth	2-3/16"	2-3/16"	2-3/16"
Footprint (Oval)	4x2-3/16"	4x2-3/16"	4x2-3/16"
Weight	1 lb.	1 lb. 5 oz.	1 lb. 8 oz.
UPC Code 0-42237-	08477-6	08484-4	08478-1

Note from C-Dory:

Some have asked how deep does the water have to be to turn on the pump. When the rising water level reaches the approximate depth of 2 inches, the pump will continue to run until the water level drops to approximately 3/4". With this pump there **is no cycling and battery drain.**

TYPICAL THREE WIRE INSTALLATIONS

WIRING WITH RULE MODEL 41
THREE-WAY LIGHTED PANEL SWITCH



Note:
The brown wire is the automatic lead.
The brown/white wire is the manual lead.

Note: ***Inspect and clean pump screens often and always have the pumps turned on whenever the boat is in the water.***

Cockpit Drain System

The cockpit contains two self-bailing drains located aft port and starboard. The drain hoses contain internal one way check valves to prevent back siphoning (see Photo below) and exit both sides of the boat. Under the deck there is the normal 1" drain hole in the transom. The boat is supplied with a standard drain plug. Use the standard plug if you are keeping the boat in the water. When removing the boat from the water you can remove the 1" plug to remove any excess water if any. **Always remember to replace the plug before putting the boat back into the water.**

In front of the motor well on the floor of the cockpit there is an access hatch for the below-the-deck bilge pump in case water enters in that area.

Picture of Self Bailing Thru-Hull, Hose and One-Way Check Valve

This system is in some of the 2006 models.

Windows

The windows are a high quality, repairable Laminated Safety Glass with aluminum frames, painted to resist corrosion. Most window repair can be done without removing the frames. An exact template of the window opening in the fiberglass and a tracing of the opposite window's outside outline are required for replacement. Every batch of windows has variations, and we make changes to the original design every so often. Patterns are a must for a proper fit.

WINDOW MAINTENANCE INSTRUCTIONS

GENERAL

1. Painted frames and surfaces do not require any preventative maintenance to maintain the finish. If there are any marks or blemishes, a careful application of cut-polish can be applied using a "medium-cut" polish.
2. For general cleaning do not use detergents as they will dull the finish over time.
3. Ensure drain holes in bottom tracks of both sliding windows and sliding doors are not obstructed.
4. Ensure bottom tracks of both sliding windows and sliding doors are kept relatively clean to ensure a smooth sliding surface.

DOORS

It is important to lubricate the locksets on a regular basis (monthly is recommended). Using a basic lubricant (WD-40 or other) insert straw into the port in the lock cylinder and spray for 3-5 seconds. ***See figure A***.

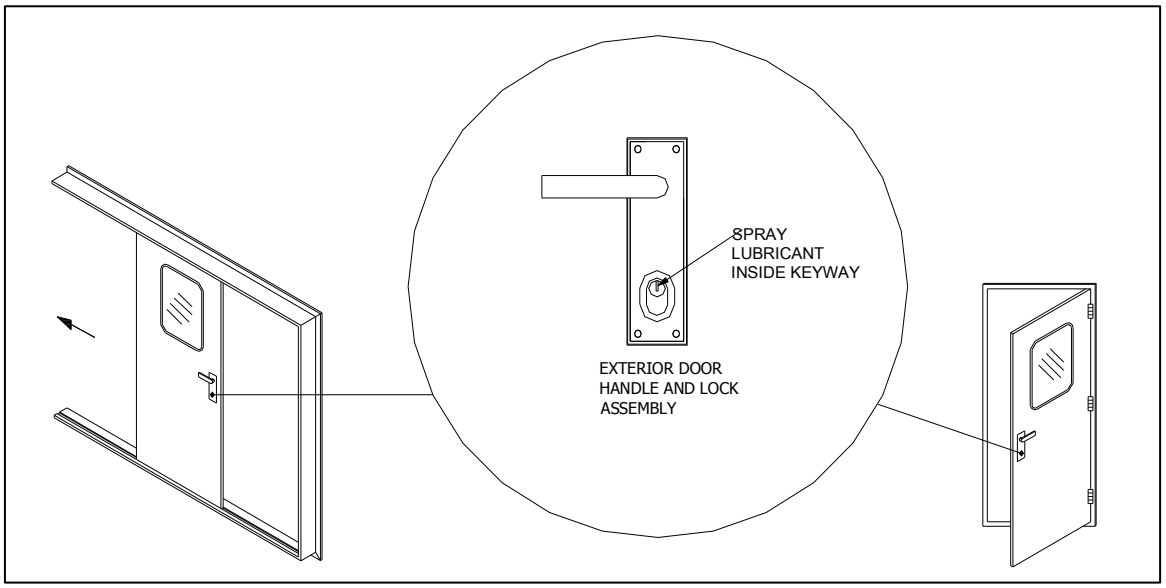


Figure A

Locksets must be lubricated to displace salt crystals which form on the moving parts in the key cylinder. While all materials used in the construction of the locks are of the highest quality available, regular maintenance is required to ensure ease of operation.

Windows by Diamond Sea-Glaze, 19372 94th Ave Surrey BC Canada V4N4E4 604.882.9339

Fabrics

Standard cushions are covered with Sunbrella boat canvas. Fabric should be cleaned regularly before dirt and grime accumulates and becomes imbedded. Canvas tops can be cleaned without being removed. Simply brush off, hose down, and clean with a mild solution of natural soap in lukewarm (under 100°) water. Rinse thoroughly to remove soap. So not use detergents. Allow to air dry. For more stubborn cases, soak the fabric for approximately twenty minutes in a solution of no more than ½ cup of a non-chlorine bleach and ¼ cup of a natural soap per gallon of water at approximately 100°. Rinse thoroughly in cold water to remove all of the soap. Note: excessive soaking in non-chlorine bleach can deteriorate the sewing threads. This method of cleaning may remove part of the water repellence and the fabric should receive an application of an air-curing fluorocarbon water repellent treatment, if water repellence is a factor.

Sunbrella, Glen Raven Mills, Inc., Custom Fabrics Div, Glen Raven, NC 27217 910.227.6211

Gelcoat

Exposure to sunlight, water dust and chemicals can be detrimental to the gelcoat surface of the boat, causing chalking, discoloration yellowing or loss of gloss. Simple periodic maintenance procedures will minimize these changes.

Basic Maintenance of Gel Coat

When not is use keep the gelcoat surface out of the sun or covered with a canvas (*see winterizing section, Covering Boat)* tarpaulin.

Wash gelcoat surface with mild detergent. For best results, use cleaner recommended for fiberglass and follow label instructions. **DO NOT *use automatic dishwater detergent, abrasives, bleaches, strong chemicals with acids/basis or ammonia.***

Waxing at least twice a year restores glosses and protects the finish. Use only wax recommended for fiberglass and follow instructions carefully. **NEVER *wax a gelcoat surface in direct sun.***

Corrective Procedures for Gel Coat

Chalking: A fine rubbing compound as well as a mild detergent will reduce weathering and chalking of the surface. Use only a fine grit compound and follow label instructions carefully. For best results, wax after compounding. **NEVER** apply rubbing compound in direct sunlight.

Scratches and Nicks: Most light scratches will be removed by using a rubbing compound followed by waxing described above. Deep marks or gouges should be professionally repaired.

Most do-it-yourself repairs look worse, and make a good repair harder to do and more expensive later.

Stains: Most will be removed by washing with mild detergent. For stubborn stains, use a fine abrasive household cleaner followed by waxing to restore original luster. Non water-soluble stains such as grease and oil, rubber heel marks, etc. can often be removed by using a solvent such as acetone, rubbing alcohol, toluene or xylene, followed by mild detergent. If these solvents are not effective, try a rubbing compound or fine sanding followed by waxing.

Alcohol Stove (See Appendix D)

Consult original installation and operation instructions below for complete details.

Fuel Safety

- The standard stove burns denatured alcohol. Do not use gasoline, kerosene, propane, charcoal lighter, diesel or other flammable substances or fuels. Uncontrollable operation and flare-ups can result and cause serious personal injury.
- Store fuel in an approved container away from the stove, the motors or other heat source.
- Eliminate all sources of sparks or flames in the area where fuel is poured or stored.
- Do not smoke while working with fuel.
- Immediately wipe up any spilled fuel.

Filling Fuel Tanks

- Do not attempt to fill fuel tanks while they are still in the stove. Overfilling, spillage, or hot surfaces can cause serious burns and fires.
- Never pour fuel through burner openings in top of stove.
- Remove fuel tanks from stove by carefully following instruction.
- Move fuel tanks to a safe area away from sparks, flames, or other heat sources before filling with fuel.
- Make sure tanks are cool enough to be held in your bare hand before filling with fuel.
- Make sure that flame and heat-glow are extinguished before filling the tanks. Flame or heat-glow will cause alcohol to explode resulting in serious personal injury.
- Do not overfill tanks. Filling instructions must be followed closely. Check the fuel level by tilting (see instructions on side of tank for illustration) the tank vertically. In this position, maximum fuel level occurs when fuel just begins to show in recess inside the tank opening. Alcohol expands when heated. If tank is overfilled, the surplus will overflow into the stove cavity and cause uncontrollable burning.
- Wipe tanks to remove any excess fuel before replacing tanks in the stove.

Lighting

- An extended stove lighter or a long wooden match is recommended for lighting the stove.
- Slide control lever on top of stove to wide open. Reach down into opening with match or lighter and light. If stove lights and then goes out, blow down into the burner to dissipate alcohol vapor and re-light.
- Use slide control to regulate heat.

Extinguishing

- Slide control lever to closed position.
- Wait a minute, then slide the control lever back to wide open to make sure flame is out.
- Slide control lever to closed position again.
- Wait until stove has completely cooled down before replacing the cutting board.

Storage

- The stove is equipped with a rubber gasket for each burner. Use when stove will not be operated for a period of time to protect against alcohol evaporation.
- To install gasket, open stovetop and place gasket over the tank openings and close the stove.

Origo 1121 Lewis Ave Sarasota, FL 34237 813.365.3660

Marine Toilet

Traveler® 711-M28 Marine Sanitation System

Complete freshwater system in one self-contained package.

Freshwater operation eliminates odors. Vitreous china bowl is rinsed with fresh water from on-board demand system, so there's none of the unpleasant odors associated with a saltwater flushing toilet. Integral anti-siphon vacuum breaker protects potable water supply.

Efficient. Effective rim wash uses about a pint (.5 liter) of fresh water per flush. Requires no electricity.

Ideal replacement for recirculating toilets. No recirculating chemical smell.

Easy to use. Water level and flushing action controlled by single pedal control.

Proven reliability. Halfball seal keeps tank odors in tank. Holding tank is molded of durable linear low-density polyethylene with 9.5-gallon (36-liter) capacity. Discharge connection is 1-1/2" (38 mm) hose insert. Vent connection is for 5/8" (16 mm) hose. Water connection is 1/2" (13 mm) MPT.

ORDERING INFORMATION

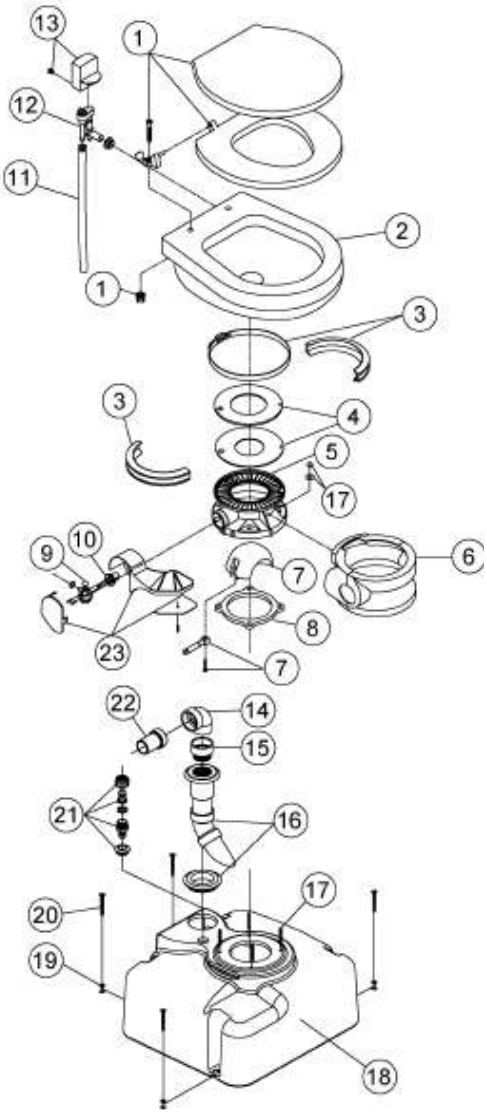
Model	Item Number	Color	Description	Product Weight
711-M28	371103	Bone	Traveler 711-M28 Marine Toilet. Vitreous china bowl. 9.5-gallon (36-liter) holding tank.	41.0 lbs. [18.6 kg]

Photo

Line Art

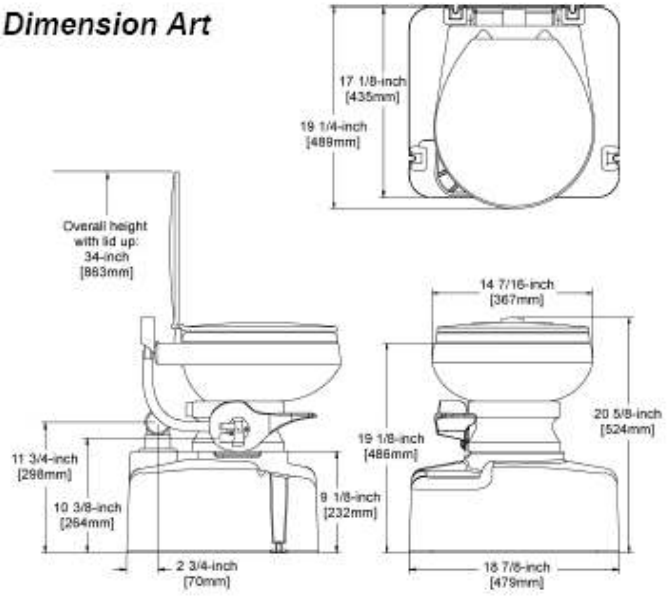
711-M28 Parts List

Item	Part No.	Description
1	340591	Seat Assembly, Bone
2	310781	China Bowl, Bone
3	310048	Half Clamp Kit, Bone
4	316140	Teflon® & Rubber Seal Kit
5	310891	Base Kit, Bone
6	310109	Pedestal Cover Kit, Bone
7	310681	Flush Ball, Shaft & Cartridge Kit (includes item 10)
8	341549	Floor Flange Seal
9	314349	Water Valve Kit
10	310683	Spring Cartridge Kit
11	340177	Water Supply Hose
12	316906	Vacuum Breaker Kit
13	310782	Vacuum Breaker Cover Kit
14	341161	90° Ell, 1½" Hub
15	341425	Adapter, 1½" Hub x MPT
16	310532	Diptube Assembly
17	310534	Toilet Mounting Kit
18	310085	Tank Kit, Bone (includes items 16 & 21)
19	342798	Mounting Spindle (optional)
20	342704	Screw, #14 x 2" Pan Phil. Head SS
21	314362	Vent Fitting Kit
22	341513	Hose Adapter Fitting
23	310786	Flush Pedal, Bone (includes item 10)



711-M28exp
(exploded view)

Dimension Art



Cleaning the Toilet

Use the Thetford Aqua-Bowl cleaner to clean the plastic seat, tanks and bowl. The seat is removable for cleaning. ***Do not use scouring powders, acids or concentrated cleaners, which can damage parts and rubber seals.*** Aside from simple cleaning Thetford marine heads require no routine maintenance. If after extended use the holding tank valve blade starts to stick, merely apply a light film of silicone lubricant to the blade.

Thetford Marine 800.521.3032 Customer Relations Department

Stainless Steel Sinks

Stainless steel sinks aren't "perfect"; no material is perfect for all conditions/situations. But we are not aware of ANY material that is more durable and more "ideal" for sinks than quality stainless steel.

Stainless steel sinks are made from nickel bearing stainless steel. The mellow satin surface is compatible with any décor and color scheme. It is timeless and elegant, and like fine silver, its beautiful finish becomes lovelier with use and age. A quality stainless steel sink purchased from us, with proper care and maintenance, will give you a lifetime of service.

6 Reasons Why We Like Stainless Steel Sinks

- Tough - Stainless steel is more durable than porcelain and cast iron, and more forgiving than composites. Stainless steel sinks won't chip, nick or crack. Thin stainless sinks can get dented, but "cheap" sinks of any other materials tend to have less life (longevity) than a "cheap" stainless steel sink.
- Luster - Stainless steel will not rust, stain or fade, and the finish resists scratches. It keeps its luster longer while other materials will show their age.
- Absorbs Shock - Stainless steel sinks on impact will "give" to cushion glasses and dishes against breakage.
- Easier to Clean - Stainless steel retains its luster when cleaned with household cleanser and a soft towel. Healthcare facilities trust stainless steel sinks due in part to their sanitary surface.
- Greater Capacity - Stainless steel has strength and flexibility that allows for deeper sink bowls. It has more overall usable space than porcelain or cast iron.
- Compliments Any Décor - Stainless steel sinks have clean lines and a cool texture that reflect surrounding colors and patterns. Also, it compliments any décor long after trendy colors are out-of-style.

Chlorides - Today, chlorides are found in most soap, detergents, bleaches and cleansers; chlorides can be aggressive to stainless steel. However, chlorides are very water-soluble. Therefore, THOROUGH RINSING of your sink after each use to remove any chloride residue and a weekly scouring is all that is required to keep your sink looking bright and shiny.

Scratches - Like many metallic surfaces, your stainless steel sink will scratch. These are merely usage scratches and over time will blend into the overall finish of your sink.

Water Quality - The quality of your water can affect your sink's appearance. If your water has high iron content, a brown surface stain can form on the sink giving the appearance of rust. Additionally, in areas with a high concentration of minerals, or with over-softened water, a

white film may develop on the sink. To combat these problems, we suggest that the sink be towel dried after use, and again, on a weekly basis, the sink should be cleaned.

Food - Heavy salt concentration or foods containing high levels of salt should not be allowed to dry on the sink surface. Rinse your sink thoroughly after use.

Cutting - Your sink is designed to serve as many things, but should not be used as a cutting board or chopping block. This type of use will lead to deep scratches in the sink finish and will dull your knives.

Routine Care for:

- **Most dirt & stains:** Use soapy water or ammonia-based cleaner.
- **Watermarks:** Wipe with damp cloth then towel dry.
- **Disinfecting:** Occasionally wipe surface with diluted household bleach (1 part water /1 part bleach).
- **Maintenance:** Occasionally clean by filling the sink one-quarter full with a 50/50 water/bleach solution. Let soak for 15 minutes, then wash sides and bottom as solution drains and thoroughly rinse.

Precautions - the Dos and Don'ts of Cleaning Your Stainless Steel Sink

- Do...It is best to rinse sinks thoroughly after each use. Thorough rinsing can be done by running the water for a few minutes and rubbing the cleaned area with a sponge.
- Do...Avoid exposing sink to strong chemicals, such as paint removers, oven cleaners, etc. If contact occurs, quickly flush the surface with water.
- Do...Run cold water when pouring boiling water into sinks to try to minimize temperature shock. With stainless it isn't as important to remember that compared to other materials though.
- Do...Towel dry after each use to prevent mineral deposits from building up on the surface of the sink (although with a good quality stainless sink you can buff it back to the original "new" finish even after many years of scale and mineral build-up.
- Do...Scour the sink once a week, being sure to rub in the direction of the satin finish lines (best not to purchase a "mirror" finish).
- Do...Remove nail polish with a non-acetone based nail polish remover and flush with water.
- Don't...Allow food or beverage residue, or metal canned products to remain on sink surface.
- Don't...Cut directly on sink surfaces.
- Don't...Set hot pans directly into sinks.
- Don't...Scour the sink across the satin finish lines. Scouring across the satin finish lines can damage the original sink finish.
- Don't...Allow liquid soap or other household cleansers to dry on the surface of the sink. Most brands contain chemical additives, which will affect the finish.
- Don't...Leave standing solutions of chlorine bleach and water in the sink for extended periods of time. Chlorides, which are found in most soaps, detergents, bleaches, and cleansers, are very aggressive to stainless steel. If left on the sink too long they can cause surface pitting.
- Don't...Use a steel wool pad to clean your sink. Steel wool pads have a tendency to break apart and small particles of steel can become embedded in the surface of the

sink. The steel particles will rust and will give the appearance that the sink itself is rusting.

- Don't...Use rubber mats or dishpans in the sink to protect the finish. Leaving rubber mats or dishpans in the sink can lead to surface rust or possible pitting. However, if you do use mats or dishpans please remove them after each use.
- Don't...Leave wet sponges, cloths, or cleaning pads on the sink. This can lead to surface rust.

Following these recommendations for the care and cleaning of your stainless steel sink will help to insure that your stainless steel sink will provide you with many years of service.

Water Heater

Seaward Water Heaters Feature:

- Combination electric/heat exchanger or electric only
- Inner tanks made from *Alcoa Alclad* aluminum alloy
- Hold down brackets welded to inner tank
- UL (120 V models) or CE (240 V models) approved
- Temperature pressure relief valve
- Magnesium anodes available
- Large 1/2-inch drain valve
- Exteriors are marine galvanized steel
- Optional stainless steel or painted aluminum exteriors
- Ignition protected
- T & P drain tube included
- Tempering valves available

Water Heater

Galvanic Isolator and Charger on wall by Water Heater

Photo Gallery

30 Amp Galvanic Isolator

Part No. 2433

Description

Continuous Amps: 30 amps

Operation: 115/230VAC/50-60Hz

Dimensions: 4.6"W x 5.0"L x 2.6"H

Weight: 3.0 Lbs.

Product Features

Guest Galvanic Isolators protect your boat from galvanic erosion and metal loss

Prevents the electroplating action that occurs on boats with AC power feeds

Blocks up to 0.030amps of invisible DC galvanic current flowing between neighboring boats

Passes necessary AC ground current for shore power safety

One Year warranty

Galvanic Series of Metals in Sea Water

(Progression of metals from Least to Most Noble)

Anodic or Least Nobel (Active)

Magnesium & magnesium alloys
CB75 aluminum anode alloy
Zinc
B605 aluminum anode alloy
Aluminum 7072
Aluminum 5456, 5058, 5052
Aluminum 3003, 1100, 6061, 356
Cadmium
2117 aluminum alloy
Mild steel
Wrought iron
Ni-Resist
13% chromium stainless steel (410)
50-50 lead-tin-solder
18-8 stainless steel (304) Active
18-8 3% NO stainless steel (316) Active
Lead
Tin

Muntz metal
Manganese bronze
Navel brass (60% copper 15% zinc)
Nickel
Yellow brass
Admiralty brass
Aluminum bronze
Red brass (85% copper 15% zinc)
Copper
Silicone bronze
Nickel
18-8 stainless steel (304) Passive
18-8 3% NO stainless steel (316) Passive
Hastelloy C
Titanium
Platin

Cathodic or Most Nobel (Passive)

"Electrolysis" or Electrolytic Corrosion"

When two metals of different nobility come in contact (or close proximity) with each other in wet environments (especially salty ones) corrosion will happen. *An electric potential is created between the two metals causing the "**less noble"** metal to corrode away. Sacrificial anodes are meant to help reduce damage and are usually located on the shaft of the motor. Replace your motor anodes as needed to maintain your protection **Keep motors tilted up when not in use.***

Trim Tabs

Trim Tabs are standard equipment. (See Appendix F)

Opening Front Center Window

The center front window is an opening unit. The window swings up and out, providing excellent ventilation and improved visibility in foggy conditions.

Shore Power Plug Port Side Cockpit

Picture Underneath Dinette

Shore Power Switch Panel **12 Volt Power Plug**

Ground Fault Circuit Interrupter/ 120 Volt Receptacle (GFCI)

Shore Power Switch Panel

To connect to shore power, use the supplied yellow 50' shore power cable and plug one end to the on shore receptacle and the other end to the shore power receptacle (pictured above) on the boat. The following switches are available for use when connected to shore power.

AC MAIN 30A AND REVERSE POLARITY SWITCHES

Turn these switches to "on" position when connected to shore power to use AC 120 Volt appliances and household receptacles within the boat. Turn these switches "off" when not connected to shore power. Please notice the AC MAIN 30A and REVERSE POLARITY switches are connected for the purpose to continually sense for any reverse polarity within the electrical system. If reverse polarity is found both switches will trip to "off" or will not turn on.

OUTLETS SWITCH

Turn this switch to "on" when you want to use the 120 Volt receptacles within the boat.

REFRIGERATOR SWITCH

Turn this switch to “on” when you want the refrigerator to operate using 120 Volt shore power. The refrigerator operates with either 120 Volt AC power or 12 Volt DC power. By operating the refrigerator with 120 Volt power, the refrigerator will not drain the batteries.

WATER HEATER SWITCH

Turn this switch to “on” when you want to heat water. The water heater operates using 120 Volt AC power only, and does not operate from the 12 Volt batteries.

BATTERY CHARGER SWITCH

Turn this switch to “on” when you want to charge the batteries. We highly recommend charging the batteries whenever connected to shore power.

12 Volt Power Plug

Use this plug for any electrical equipment that has a standard 12 volt male adapter.

Ground Fault Circuit Interrupter / 120 Volt Receptacle (GFCI)

Did You Know?

Did you know that on average, 1,800 college dormitory fires occur each year, often as a result of electrical shorts and overloads? Extension cords/multiple outlets with circuit breaker protection are on the list of "what to bring" to most colleges across America today. **Just having a surge protection device is not the solution to safety!**

Here are some interesting facts:

1) The U.S. Consumer Products Safety Commission (CPSC) estimates that thousands of injuries and burns from electrical shocks occur each year.

2) Properly used ground fault circuit interrupters (GFCI), can prevent up to 70% of the electrocutions and injuries that occur each year.

3) Each year, thousands of power tools and appliances are ruined as a result of overloading outlets. Over-Load Guard products eliminate this problem.

Testing the GFCIs

All GFCIs should be tested once a month to make sure they are working properly and are protecting you from fatal shock. GFCIs should be tested after installation to make sure they are working properly and protecting the circuit.

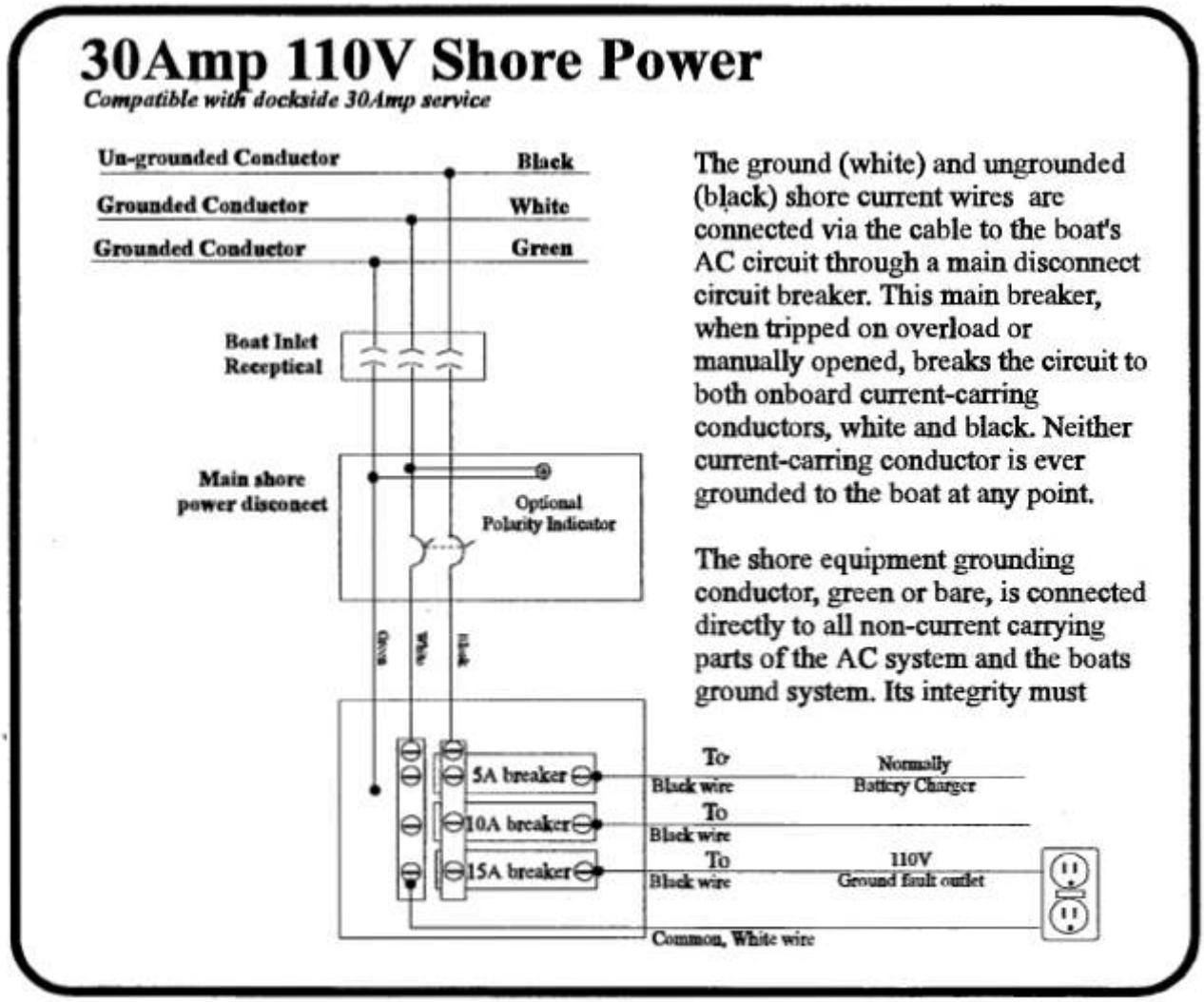
To test the receptacle GFCI, first plug a night light or lamp into the outlet. The light should be on then, press the "TEST" button on the GFCI. The GFCI's "RESET" button should pop out, and the light should go out.

If the "RESET" button pops out but the light does not go out, the GFCI has been improperly wired. Contact an electrician to correct the wiring errors.

If the "RESET" button does not pop out, the GFCI is defective and should be replaced.

If the GFCI is functioning properly, and the lamp goes out, press the "RESET" button to restore power to the outlet.

Shore Power



Picture of Shower Box ABS W/Hot Controls

Model: 101513-MR

Material: Brass mixer with chromed knob and plastic shower handle. ABS housing.
Hose: 6′ Nylon.
Thread type: 3/8″ male BSP. 100819 adapter included 3/8" BSP to 1/2" NPT male.
Shipping weight: 5 lbs.
Cut out dimensions: W 9 7/8" x H 6 7/16" x D 4".

Picture of Dryroll (For Toilet Paper)

Picture of Water Deck Fill (Requires Marine Key)

Gas Fill Located Both Sides of Cockpit (Requires Marine Key)

Picture of Waste Pumping Access (Requires Marine Key)

Optional Equipment

Optional equipment may have been installed by the factory, the dealer or by an owner. Installations may vary. The purpose of this section of the Owner's Manual is to give the owner a quick reference to daily operation and care of some of the more popular options.

Information provided here concerning optional equipment has been taken in part directly from the original installation and operation guides provided with the product. All materials supplied by the original manufacturer of optional equipment have been provided to the original purchaser. For complete information, consult original installation and operation instructions provided by original manufacturer.

Picture Under the Sink and Stove on TomCat (Pictured here to show waste system on the 25' Cruiser)

The two pipes on the left drain water out starboard side of cabin. The leftmost pipe is from the shower/water heater drain system. The pipe next to it drains the sink. The Macerator Pump (on/off switch is ACC 1) on the right side near the bottom will pump waste from the toilet tank out the side when gray ball valve switch in center of picture is turned as pictured. Use only in areas where laws permit. Turn the gray switch to the right, to **use the pump at pumping stations. Remove the waste plate cover on top of gunnel and use the pipe and pump at the marine pumping stations.** Do not use the Macerator Pump to pump out waste at a marine pumping station. Notice the white pipe above the macerator pump is where the system pumps outside of the boat.

Federal law **prohibits the discharge of untreated sewage from vessels within navigable waters of the United States,** which include territorial seas within three miles of shore and most bays and estuaries. Some boats are equipped with a "Y" -valve that allows for the direct discharge of raw sewage. This valve can only be used outside the three-mile limit. **Coast Guard regulations require that the "Y"-valve must be secured in the closed position (by padlock, non-resealable tie, removal of handle or other physical barrier) when the boat is within three miles of shore. Boaters can be fined for non-compliance.**

Macerator Pump for Toilet (See Appendix F)

Picture of Washdown Switch, Hose Connection and Door Catch

Swim Step

The swim step option is a custom hand-laid fiberglass feature. A two step ladder if folded under the platform.

Use extreme caution when using the swim step platform. The motor(s) must be turned OFF when people are standing on the platform or are in the water near the stern of the boat.

Make certain that the ladder is retrieved and properly stored before starting the motor(s), or the ladder and platform will be severely damaged.

Wallas Diesel Stove

Consult original installation and operation instructions for complete details.
The Wallas Safe flame Ceramic is a closed combustion diesel cooker without open flames. The combustion gasses and the water vapors produced by combustion are exhausted outside the house. The oil is drawn from a separate tank below the cooker. No fuel pressure exists wither in the cooker or the fuel tank. The cooker draws air from the cabin into the combustion chamber of the cooker and is then vented overboard.

Safety

- Use correct fuel. **Use #1 or #2 diesel fuel.**
- Read the original installation and operation manuals included with stove.
- Follow startup and shutdown instructions carefully.
- Open a window a little when using the stove to allow the cooker to vent easily.

- Do not leave the cooker running unattended.
- Do not use pots or pans that extend beyond the cooking surface of the cooker.

Note: If the red light starts blinking at times other than shutdown, the stove is over-heating and has shut itself down automatically. Correct the problem before restarting.

Operation

Starting – with the hood in the up position, turn the control knob to its maximum setting. Turn the control switch to ON position; in one to two minutes the red light should come on to indicate that the stove has started up. Rotate the control knob (*turn the knob slowly* to prevent sooting) to set heat output to desired level. *If* the stove does not start in about one to three minutes turn control switch to OFF and wait for the cooker to cool down, and try to re-start.

A carbonized burner normally causes failure to startup. Low voltage can also cause hard starting. Starting the starboard motor and idling it at about 1800 RPM will give you the voltage to startup the cooker if it's a weak battery.

To shut down the cooker, rotate the knob to the lowest setting and turn the control switch to OFF. The red light will blink for about ten minutes until the stove has cooled down.

The stove, if properly installed, is wired directly to the starboard battery with the wire provided with the stove. This is to insure that the cooker cannot be shut down without power to cool itself down. If you interrupt the power to the stove, you will cause damage to it.
The heating zones are marked on the ceramic surface of the stove. The temperature can be adjusted by tuning the control knob. The left zone is twice as hot as the right zone at all settings.

Cabin Heater: With the stove started up, close the hood to the down position. A fan will start to move the air in the cabin across the hot cooker top and return it to the cabin.

Maintenance: The ceramic surface requires careful maintenance to keep it in nice condition. The surface must be wiped clean with a moist cloth and dried after each use. Normal liquid cleaning agents can be used or the special cleaner for ceramic surfaces. Scrape burned on food carefully with a spatula. Stains may be removed with vinegar or lemon. It is important that the surface be dried after cleaning.

BOAT PRODUCTS / DIESEL

Basic maintenance:

Procedure	*Interval*	*Performed by*
The first inspection of basic functions	*After the first 500 hours of use or after the first season of use*	*Authorised Wallas service firm*
Cleaning of the burner	*The service firm shall recommend a suitable interval after the first basic inspection*	*The owner according to the service instructions, or authorised Wallas service firm*

Winter storage:

In case the device uses the same fuel tank as the engine:

- Change the fuel hose filter.
- Carry out the measures for winter storage of the tank as recommended by the manufacturer of the boat/engine.

In case the device has a separate tank:

- The fuel tank is emptied in the autumn.
- The fuel tank is cleaned and the fuel hose filter is changed.
- In spring, the fuel tank is filled with new, clean fuel.

Special recommendations:

In case the device uses the same fuel tank as the engine:

- Recommendations by the engine manufacturer shall be followed in choosing the fuel. Diesel oil and light fuel oil can be used in Wallas diesel products.
- Anti-freeze agent suitable for the engine can be added to the fuel, if the engine requires binding of water from the fuel. Portioning according to the engine requirements.
- Anti-freeze agent intended for use in diesel cars can increase the formation of crust at the bottom of the burner, thus shortening the maintenance interval.

In case the device has a separate tank:

- Remember to take the operating temperature limits of fuel into account while choosing the fuel. Diesel oil, light fuel oil and paraffin oil are suitable for use in Wallas diesel products
- Iso Propanol based anti-freeze agent intended for use in petrol cars is added to the fuel during the season of use in order to bind any water in the fuel.
- The anti-freeze agent is portioned according to the manufacturer's instructions.

The most common spare parts:

Item	*Spare part*	*Use*
301150	*Fuel feed pipe, Cu (30D*, 40D**, 96D*, 95D*)*	*During cleaning, if necessary*
36313	*Fuel feed pipe with plastic hose (95D*)*	*During cleaning, if necessary*
36303	*Fuel feeding pipe with plastic hose (3000D*, 3000DX*)*	*During cleaning, if necessary*
602098	*Burner bottom carpet (30D, 40D, 3000D, 3000DX, 96D, 95D)*	*During cleaning, if necessary*
11160	*Fuel filter (sinter bronze). This filter is also changed inside the metal fuel filter 30016*	*Changed during winter storage*
30015	*External fuel filter (standard)*	*Changed during winter storage*
38317	*15 A main fuse (original)*	*In case of malfunction*
-	*Fuse for self-installed main fuse*	*In case of malfunction*

** In these devices, the fuel feed pipe is always bent upwards.*
*** In the Nautic 40D heater, the fuel feed pipe is always bent downwards.*

Picture of Anchor Windlass Switch

Winterizing & Storage

The season's over, winter's on its way and it's time to get your C-Dory ready for storage and ready for next year. ***Repair all deficiencies.***

That's right, now may be the best time to take care of preparing your boat for the next season of fun on the water. If you store your boat for the winter, there are some things you should take care of to make sure your boat and motor make it through the winter in good shape. Just parking the boat on its trailer in the back yard with a tarp over the top is not correct winter storage procedure. Protect your investment by putting your boat and motors up properly.

The Motors

- To have the job done properly, take it to an authorized dealer who specializes in your brand of motor. Many boat owners have discovered that it pays to have the dealer give the motor a complete check-up in the fall. During the winter months his mechanics aren't as busy. Come around the shop in the spring, and you'll be waiting in line. Get your boat ready now, and you'll be the first on the water in spring.

The Fuel System

- If your boat is equipped with an accessory fuel filter, clean or replace filter as recommended by filter manufacturer.
- Motor mounted filter should be cleaned or replaced, according to the instructions for your motor. Ask the dealer to check all fuel lines and fittings for leaks or cracks. This is especially important today as refineries and retailers add alcohol to gasoline. Some types of alcohol may adversely affect marine fuel fittings and hoses.

- Inspect all hoses for deterioration, hardening, cracking or leaks.
- Inspect fuel tank bonding system with a continuity tester; all metal components are grounded to each other and the motors.
- If boat is to be stored more than three months, it is best to drain the tanks. Today's fuel goes stale very quickly. If you cannot drain the tanks, use a fuel stabilizer. Old gas will make starting your motors in the spring very difficult. The motors will run ragged until better quality fuel is added to the tank.

The Electrical System

- Inspect the electrical terminals for corrosion and test circuits for proper operation. Remove batteries. Have dealer fully charge them and clean the terminals. Store them in a cool, dry place. If you do not cover your boat while in storage leave one battery installed on the starboard side to run bilge pumps. The pumps are equipped with automatic overload protection, which will protect the pump from damage if ever they become embedded in ice or the impeller becomes jammed by debris. This safety feature allows the pumps to remain in service even in the winter.

The Water System

- Inspect the system for leaks, deterioration of hose, pump and fittings. Drain as per instructions given in the *Water System* section of this document.

Canvas

- The canvas should be cleaned and well dried. Inspect for tears or other damage. Store in a dry, well ventilated area.

Electronics

- Test all electronics for proper function. Inspect terminals, antenna, and transducers for damage or corrosion. Electronics should, if possible, be stored inside in a warm dry place.

Ice Box / Refrigerator

- Inspect for damage. Inspect the electrical terminals and test correct operation of refrigerators.
- Clean and leave door open.

The Bottom of Boat

- Clean bottom and inspect for damage and repair.
- If your boat has bottom paint, re-touch or re-do the anti-fouling paint.
- **Caution!** Do not mix different systems together; remove old anti-fouling paints before using a new system.

General Repair

- Now is also the time to check out and repair all those little things you've been meaning to attend to during the summer; loose screws, cracked windows, torn seats, etc.
- Clean the boat inside and out and give your poor baby a good wax job.
- ***Repair all deficiencies.***

The Toilet

- Inspect the chemical toilet for leaks, cracks. Empty and clean as per instructions given in the *Chemical Toilet* section of this document.
- Inspect the marine toilet for leaks, deterioration of hose, pump and fittings. Cycle the pump with water supply valve open to flush out and clean the bowl, macerator pump and lines. Close the water supply valve and cycle the pump again to drain the bowl and clear all of the hoses of water. Pump out the holding tank.

Trailer

- Check your wheel bearings and repack them with grease if necessary. Remove a brake drum and inspect brakes. Check oil reservoir on break actuator for contamination and service level. Also check the trailer lights. Inspect all rollers and or bunks for deterioration. Inspect for loose hardware, broken parts and corrosion.

Repair all deficiencies. It's worth repeating – Repair all deficiencies.

Covering the Boat

The boat should be kept covered when not is use, especially during long lay-ups. Besides protecting the boat's finish it keeps debris out that will clog the deck drains and cause the cockpit to fill up and overflow the bilge. Water in your boat during freezing weather can cause severe damage. When covering the boat use a canvas tarpaulin; **DO NOT** use sheet plastic or other non-porous material that can trap moisture between the cover and the surface of the boat. This will cause a milking of the gelcoat. Make certain that the canvas will allow the cabin to ventilate. Open a window or hatch a little to vent the house, and open the battery locker hatches to help vent the bilge. A Sunbrella canvas cover made to fit the boat is a good way to protect your investment.

C-Dory

C-Dory Marine, Inc. 25 37th St NE. Auburn, WA. 98002. 253.839.0222

LIMITED FIVE-YEAR WARRANTY

Construction and sale of this boat to buyer shall be subject to the terms set forth in C-dory Marine's limited liability warranty as follows:

1) C-Dory Marine, Inc., selling any boat, warrants that it will, without charge, replace or repair at its option, any part (except as hereinafter provided) which is shown to its satisfaction, to be defective in factory material or workmanship within five years from the date of delivery to the original buyer, provided that the original buyer returns the boat free and clear of all lien and encumbrances and with all transportation prepaid to C-Dory Marine's factory or to the closest marina capable of doing the repair (pre-approved by C-Dory Marine, Inc.) within thirty (30) days of the discovery of the defect.

2) This warranty shall not apply to:

    - Products not manufactured by C-Dory Marine, Inc. Any warranty provided by the manufacturer of the engine(s) out-drives, controls, or other equipment and accessories installed by C-Dory Marine will be passed on to the original buyer if possible.
    - The effects of installation of any engine(s), accessories, or equipment installed by anyone other than C-Dory Marine, Inc.
    - Glass breakage, color fastness, leakage, gelcoat, upholstery, paint chromium or galvanized finishes.
    - Boat damage due to transportation, accident or neglect including failure to provide reasonable and necessary maintenance.
    - Water damage, dry rot, wet rot, absorption and/or condensation damage.
    - Speed (speeds are estimated and not guaranteed.)

3) There are no warranties, expressed or implied, (including any implied warranties or merchantability and fitness), by C-Dory Marine, Inc. which extend beyond the five (5) year term of this warranty. The only remedy under the warranty is the repair of the boat; losses of time, inconvenience, commercial loss or consequential damages are not covered.

Boating Information Sources

United States Coast Guard Auxiliary
Commandant (G-BAU) Washington, D.C. 20593

United States Power Squadrons
P.O. Box 30423, Raleigh, NC 27622

United States Coast Guard, (Headquarters)
400 7th Street NW, Washington, D.C. 20591

American Red Cross
17th and D Streets NW, Washington, D.C. 20006

Coast Guard Info Line 1-800-368-5647

- Registering a Boat
- documenting a Boat
- Operator Equipment Carriage Requirements
- Coast Guard Approved Life Jackets
- Visual signals
- Navigation Lights
- Boating Safety Courses
- USCGAUX Courtesy Marine Examinations.

Useful Stuff

Weight of Fresh Water

- Cubic foot = 62.55 lb
- Cubic inch = .0362 lb
- Gallon = 8.340 lb

Weight of Fuel by Gallon

- Diesel = 7.1
- Gas = 6.0
- Oil = 7.6

Weight of Salt Water

- Cubic foot = 64.1 lb
- Cubic inch = 0371 lb
- Gallon = 8.561 lb

Distance & Speed

- 1 nautical mile = 6076 ft
- 1 statute mile = 5280 ft
- 1 statute mile = 0.869 nautical mile

A split second is the time interval between:
A traffic light turning green and the guy behind you honking his horn.

Clean Boating – How To Do Your Part

Environmental Concerns

Petroleum in or on the water is harmful and, in some cases, fatal to aquatic life. Benzene, a carcinogen, is in gasoline. Oil contains zinc, sulfur, and phosphorous.

Once petroleum is introduced into the water, it may float at the surface, evaporate into the air, become suspended in the water column or settle to the sea floor. Floating petroleum is particularly noxious because it reduces light penetration and the exchange of oxygen at the water's surface. Floating oil also contaminates the micro layer, the uppermost portion of the water column. It is home to thousands of species of plants, animals, and microbes. The abundance of life in the micro layer attracts predators; seabirds from above and fish from below. Thus, pollution in the micro layer has the potential to poison much of the aquatic food web. Also worth noting – a single pint of oil released onto the water can cover one acre of water surface area.

The Law

Because of the harm associated with petroleum, the discharge of oil is absolutely prohibited. The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon the navigable waters of the United States or the waters of the contiguous zone is such discharge causes a film or sheen upon, or discoloration of, the surface of the water, or causes a sludge or emulsion beneath the surface of the water. The Clean Water Act also prohibits the use of soaps or other dispersing agents to dissipate oil on the water or in the bilge without the permission of the Coast Guard. Soaps, emulsifiers and dispersants cause the petroleum to sink in the water column and mix with sediments where they will remain for years. Also, the soaps themselves are pollutants.

Fueling Practices

Gas or diesel may be spilled during the act of fueling as backsplash out the fuel intake or as overflow out the vent fitting. Spills of this sort harm aquatic life, waste money, and can result in stains on the hull and damage to the gel coat and striping. Follow these tips to avoid problems: Fill tanks to no more than 90 percent capacity – gas that is drawn from cool storage tanks will expand as it warms up onboard your vessel. To determine when the tank is 90 percent full, listen to the filler pipe, use a sounding stick (if possible), and be aware of your tank's volume. Rather than filling your tank upon your return to port, wait and fill it just before leaving on your next trip. This practice will reduce spills due to thermal expansion because the fuel will be used before it has a chance to warm up. Fill portable tanks ashore where spills are less likely to occur and are easier to clean up. Use oil absorbent pads to catch all drips. Slow down at the beginning and end of fueling.

Emissions Control

Marine engines – especially 2-stroke outboard motors – produce the highest average level of hydrocarbon exhaust emissions after lawn and garden equipment. Hydrocarbon emissions contribute to ground level ozone, a known health risk. Follow these tips to help your engine operate as efficiently as possible: Use the gas to oil ratio recommended by the engine manufacturer. Too much oil can foul spark plugs and too little can lead to increased engine wear or even failure. Use premium two-cycle engine oil (TC-W3 or TC-W4). Premium oils improve engine performance and reduce pollution because they burn cleaner, contain more

detergents, and prevent formation of carbon deposits. Use gasoline with the octane level recommended by the engine manufacturer.

Bilge Maintenance and Oil Changes

Engine oil tends to accumulate in the bilges. If no precautions are taken, the oil is pumped overboard along with the bilge water. Discharging oily water is illegal. To avoid fines and to protect water quality, follow these tips:

- Keep your engine well tuned to minimize the amount of oil that is released. Be sure there are no leaking seals, gaskets or hoses.
- If you change your own oil, purchase a non-spill pump to draw crankcase oils out through the dipstick tube and slip a plastic bag over used oil filters prior to their removal to capture any drips. Hot drain the filter by punching a hole in the dome end and draining for 24 hours. Recycle the collected oil. Recycle the metal canister if practical. If not, dispose in your regular trash.
- Place oil absorbent materials or a bioremediating bilge boom in the bilge.
- Place an oil absorbent pad under the engine.
- Replace oil absorbent materials regularly.
- Look for contractors or marinas that offer a bilge pump-out service.
- Do not treat oily water with detergents. Soaps pollute and make clean-up impossible.

You may be fined up to $25,000 for using soaps to dissipate oil.

Disposal of Oil absorbent Materials

The disposal of used oil absorbent material depends on what type of product it is and how it was used:

- Standard absorbents that are saturated with gasoline may be dried and reused.
- Standard absorbents saturated with oil or diesel may be wrung out over oil recycling bins (if they are saturated with oil or diesel only!) and reused. Alternately, they should be double bagged with one plastic bag sealed inside of another and tossed in your regular trash.
- Bioremediation bilge booms may be disposed in your regular trash as long as they are not dripping any liquid. Because the microbes need oxygen to function, do no seal them in plastic bags.

General Information

A good web site:

Maintenance, Repairs and Troubleshooting

http://www.yachtsurvey.com/maitenance.htm

Appendicies

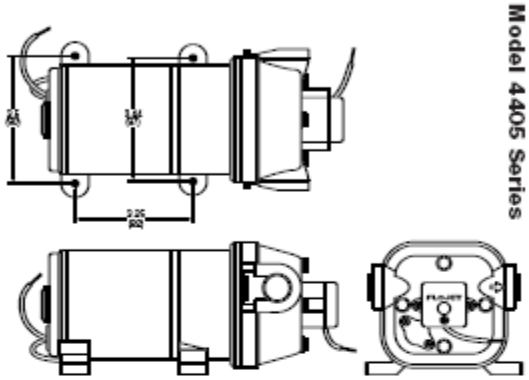
Appendix A Automatic Water System Pump

FLOJET

"Quad II Diaphragm" 4405 Series Automatic Water System Pump With Internal Bypass Valve

FEATURES

- Self-Priming
- Dry Running
- Soft, Noise Absorbing Mounts
- Corrosion Resistant Materials
- Models Meet U.S.C.G. Electric Standards
- Smooth Operation Without Accumulator Tank



Model 4405 Series

SPECIFICATIONS

Motor: Permanent Magnet, Ball Bearing. CE Models are fully suppressed.

Pump: Four chamber diaphragm design; Self-priming up to 6 ft. suction lift; Pump able to run dry without damage; Removable port to hose connectors.

Note: The built-in bypass valve eliminates the need for an accumulator tank. Do not install in a system with an accumulator tank. The tank will interfere with the internal bypass valve.

CE

(Available on 12 & 24V d.c. Models)

Pump Series	Dimensions - Inches (mm) Height	Width	Length	Weight lb. (kg)
4405-XXX	3.75 (95)	6.3 (160)	8.2 (208)	3.9 (1.8)

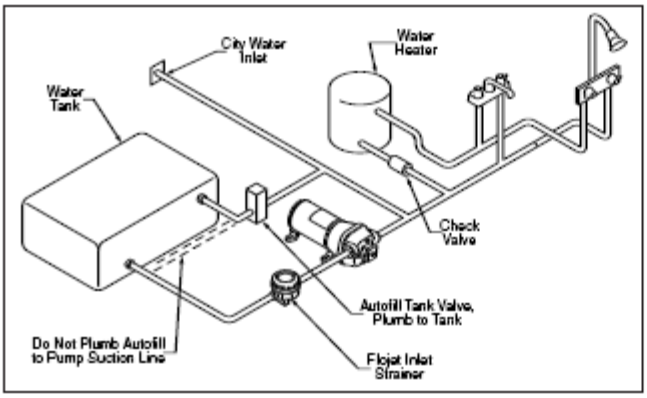
MODEL*	VOLTS	AMP DRAW @ 10 psi (0.7 bar)	FLOW GPM (l/min)	PRESSURE SWITCH MAX psi (bar)
4405-143	12V dc	3.9	3.3 (12.5)	35 (2.4)
4405-343	24V dc	2.0	3.3 (12.5)	35 (2.4)
4405-443	32V dc	1.3	3.3 (12.5)	35 (2.4)

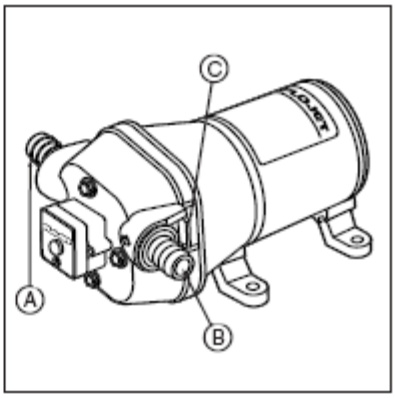
* CE fully suppressed models are identified by a prefix "R" and a CE mark on the label. (i.e. R4405-343).
Self Declaration Of Conformance (SDOC) is available upon request.

OPERATION

With pump switch off, and battery fully charged, fill water tank, open all faucets then turn pump switch on. Water will begin to flow, when water is free of air, turn faucets off, remember you are filling the water heater and the toilet and shower lines. When all valves are shut off pump will stop. Should pump fail to stop, turn switch off and see the trouble shooting guide.

Revised 8/21/2007





INSTALLATION

STEP I
Remove shipping plugs from Quad pump ports. Some water from factory testing may spill out.

STEP 2
Install inlet A and discharge B port connectors. Firmly push slide clips C forward to lock port connectors in place.

STEP 3
Slide rubber mounts fully into 4 mounting tracks.

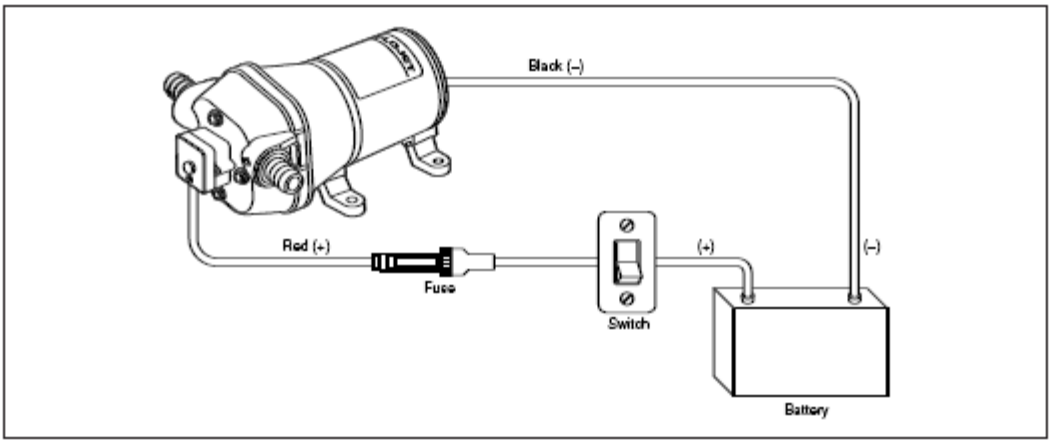
STEP 4
Mount pump vertically, with pump head down or horizontally in an accessible location. If mounting vertically, motor up, attach motor mounts first then pump head mounts, while supporting weight of pump.

STEP 5
Use 1/2" I.D. flexible hose (preferably braided or reinforced). Use hose clamps on the slip-on barb hose connectors.

STEP 6
Install a 3/8" I.D. hose for feed lines. Use high pressure hose on all city water lines.

STEP 7
Install a Flojet strainer in an accessible location (for inspection and cleaning) between the tank and pump inlet. This strainer or equivalent is required for pump warranty to be valid.

NOTE: Do not use with an accumulator tank.



WIRING

STEP I
Use 14 gauge stranded wire to 20', 12 gauge to 50', from power source.

STEP 2
Use a 10-15 amp rated on-off switch on the (+) positive (red) motor lead.

STEP 3
Install 10-15 amp fuse protection on the positive lead for the -143 model, use a 7 amp fuse for the -343 and a 5 amp fuse for -443 model.

TROUBLESHOOTING

WARNING: BEFORE SERVICING PUMP, TURN OFF PUMP AND DRAIN WATER FROM SYSTEM!!

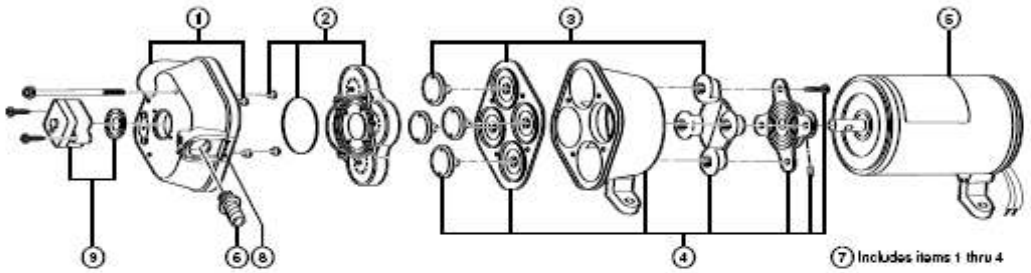
Failure to Prime - Motor operates, but no pump discharge
- Restricted intake or discharge line
- Air leak in intake line
- Debris in pump
- Punctured pump diaphragm (pump leaks)
- Crack in pump housing

Motor fails to turn on
- Loose wiring connection
- Pump circuit has no power
- Blown fuse
- Pressure switch failure
- Defective motor

Pulsating Flow
- Restricted pump delivery. Check discharge lines, fittings and valves for clogging or undersizing

Pump Fails to Turn Off After All Fixtures Are Closed
- Empty water tank
- Insufficient voltage to pump (low battery)
- Punctured pump diaphragm (pump leaks)
- Discharge line leak
- Defective pressure switch

Low Flow and Pressure
- Air leak at pump intake
- Accumulation of debris inside pump and plumbing
- Worn pump bearing (excessive noise)
- Punctured pump diaphragm (pump leaks)
- Defective motor



Quite often when a pump is worn or defective the one failed component has overburdened others. To avoid frequent aggravating repairs, Flojet offers service kit assemblies making repairs as quick and easy as possible.

DISASSEMBLE

Upper Housing
1. Remove switch (9). Disconnect switch wires.

Upper Housing
2. Loosen but do not remove four pump head screws and carefully remove upper housing assembly (1)
3. Inspect check valve (2) for debris
4. Reassemble new upper housing (1)

Check Valve Assembly
Follow steps 2 and 3
3. Replace check valve (2)
4. Reassemble upper housing (1)

Lower Housing, Diaphragm, Motor
Follow step 2, then slide rubber foot from mounting track.
3. Rotate lower housing (4) so mounting notch opening on lower housing exposes set screw which holds bearing housing to shaft.
4. Loosen this set screw by inserting wrench 1/8" Allen wrench into mounting notch opening. Then, slide lower housing (4) off motor shaft.

Diaphragm Cont'd
5. Loosen four cam piston screws with Phillips head screw driver and pull apart cam from inner pistons. (Pistons should always be replaced when a new diaphragm is installed.)

Motor Cont'd
5. Replace Motor

REASSEMBLE

Motor
1. Reassemble lower housing assembly (4) to motor. (Follow steps 4 to 10.)

Diaphragm
2. Lower housing is assembled with:
- Flat side of diaphragm and outer pistons facing motor
- Hex stem of inner pistons must be aligned into hex holes in outer pistons (4).
- Outer pistons must be aligned with alignment slots on cam assembly making sure screw holes align in cam assembly, otherwise diaphragm will leak.

3. Tighten cam piston screws partially, center piston in diaphragm, then tighten screws securely (18 in. lbs. torque)

Lower Housing
4. Reassemble lower housing assembly (4) to motor.
5. Retighten set screw securely. Set screw head must be positioned facing motor covering seam (indentation). (Positioning of this screw is critical to avoid misalignment and subsequent diaphragm damage.)

Upper Housing, Check Valve
6. Reassemble upper housing (1) and slide clips (8)
7. Properly seat O-Ring in check valve assembly (2) and check if ferrules and screen are in place on upper housing (1)
8. Install check valve (2) into upper housing (1) and push in.
9. Assemble on to lower housing (4), align 4 screws on to motor by rotating lower housing (4) if necessary to align feet.
10. Tighten screws evenly to 30 in. lbs. torque.

Pressure Switch
1. Place switch against front of pump (9), insert screws and take care not to cross thread or strip out threads in housing.
2. Reconnect wires.

AUTOMATIC WATER SYSTEM PUMP SERVICE PARTS

KEY#	DESCRIPTION	MODEL# 4405-143	4405-343	4405-443
0	Service Kit*	20409-043	20409-043	20409-043
1	Upper Housing With Clips	20404-002	20404-002	20404-002
2	Check Valve Assembly	20407-030	20407-030	20407-030
3	Diaphragm Assembly (includes screws)	20403-040	20403-040	20403-040
4	Lower Housing Assembly	20419-001	20419-001	20419-001
5	Motors	2009-073A	2019-023A	2049-025A
	Motors CE Models	R2009-073A	R2019-023A	—
6	Ports - 1/2 Barb (pair)	20381-002	20381-002	20381-002
	Ports - 1/2 Qest (pair)	.20381-000	20381-000	20381-000
	Ports - 3/4 Barb (pair)	20381-006	20381-006	20381-006
7	Pump Head Assembly	20406-003A	20406-003A	20406-003A
8	Side Clips (pair)	20408-000	20408-000	20408-000
9	Pressure Switch Assembly	02090-104	02090-104	02090-104

*Service Kit includes #2, #3, #8 and drive cam assembly.

ACCESSORIES

QUICK CONNECT PORT SYSTEM

20381-000	20381-002	20381-006	20381-007	20381-008	20381-009	20381-010
QUAD PORT x 1/2" MALE QEST. STRAIGHT	QUAD PORT x 1/2" HOSE BARB STRAIGHT	QUAD PORT x 3/4" HOSE BARB STRAIGHT	QUAD PORT x GARDEN HOSE STRAIGHT	QUAD PORT x 1/2" MALE QEST. 90° ELBOW	QUAD PORT x 1/2" HOSE BARB 90° ELBOW	QUAD PORT x 3/4" HOSE BARB 90° ELBOW

The above part numbers are packaged with 2 fittings per bag.

STRAINERS

Pump Series	Strainer Number	Inlet	Outlet	Screen
4405-XXX	1740-012	1/2 Barb	Quad Port	40 Mesh
	1740-002	1/2 Barb	1/2 Barb	40 Mesh
	1740-004	1/2 M Qest	1/2 M Qest	40 Mesh
	1740-014	1/2 M Qest	Quad Port	40 Mesh

WARRANTY

FLOJET warrants this product to be free of defects in material and/or workmanship for a period of two years after purchase by the customer from FLOJET. During this two year warranty period, FLOJET will at its option, at no charge to the customer, repair or replace this product if found defective in material or workmanship, with a new or reconditioned product, but not to include costs of removal or installation.

This is only an overview of our limited warranty. If you would like a copy of our warranty, please call or write FLOJET.

RETURN PROCEDURE

Prior to returning any product to FLOJET, call customer service for an authorization number. This number must be written on the outside of the shipping package. Place a note inside the package with an explanation regarding the reason for return as well as the authorization number. Include your name, address and phone number.

www.flojet.com

Flojet

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Engineered for life

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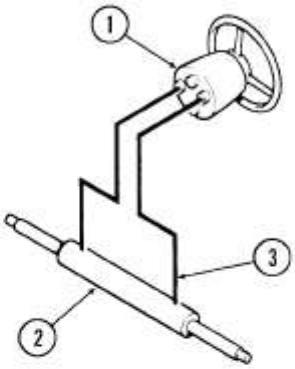
Form: 81000-224 REv. B 09/2005

Revised 8/21/2007

Teleflex Hydraulic Steering



Our manual hydraulic steering systems are simple and efficient. The basic system consists of three main components;

1) the helm pump, 2) the cylinder, and 3) the hose or tubing required to connect the cylinder to the helm pump.

These basic components are necessary in all applications. However as the system variables increase (ie: multiple engines, rudders, steering stations and autopilots), additional components may be required.

1. The Helm Unit.

The helm pump is an axial piston pump specifically designed for manual steering. It has a built-in lock valve to prevent the steering load from feeding back to the driver. The lock valve will not allow the rudder or drive unit to move until you move it with the steering wheel. The lock valve section of the helm also includes a relief valve. This relief valve provides over-pressure protection for mechanical components and hydraulic hoses and fittings.

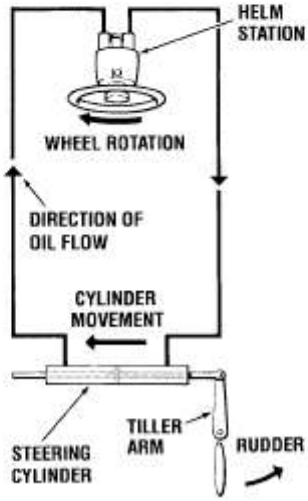
2. The Cylinder.

The most important differences between the variety of steering systems available is the cylinder selection. Both BayStar and SeaStar systems have a cylinder for most steering applications.

3. Hoses and Tubes.

Required to provide a path for the fluid to flow under pressure from the helm pump to the cylinder.

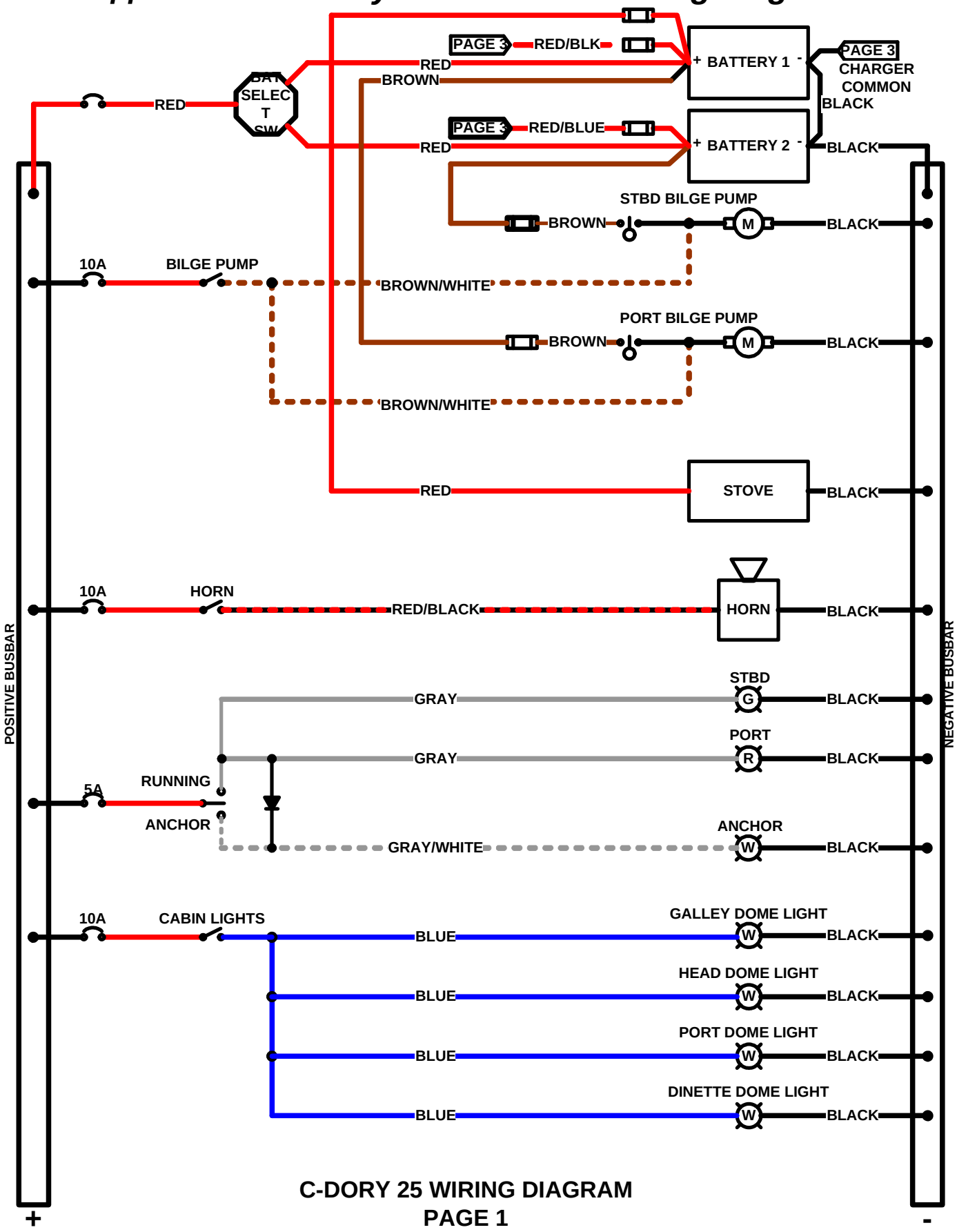
The System: How it works



The system is a two-line system. This makes operation very simple.

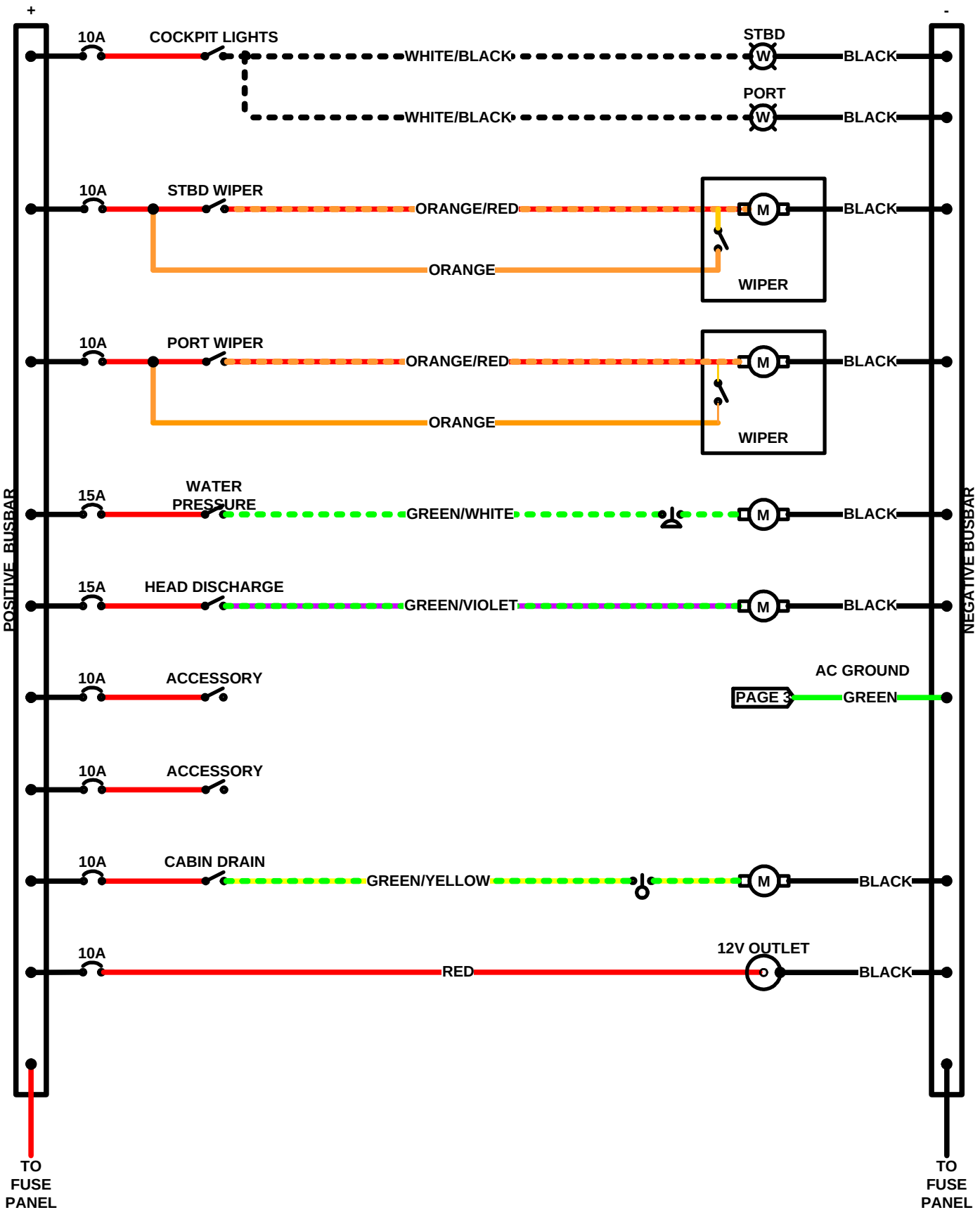
1) The steering wheel, which is attached to the helm pump, is rotated in the desired direction (ie: a turn to starboard or clockwise rotation).
2) Oil is pumped out the corresponding port from the rear of the helm into the starboard line and then into the cylinder.
3) This causes the cylinder rod, which is attached to the vessels rudder or drive unit, to move (ie: rod moves to port) thus causing the vessel to alter course.
4) Oil displaced from the opposite end (ie: the port end) of the cylinder flows (ie: into the port line) back to the helm pump.
5) For steering in the opposite direction, simply turn the helm the other way.
6) When no course corrections are required, the integral lock valve holds the rudder or drive unit stationary.

Appendix C C-Dory's 25' Cruiser Wiring diagram



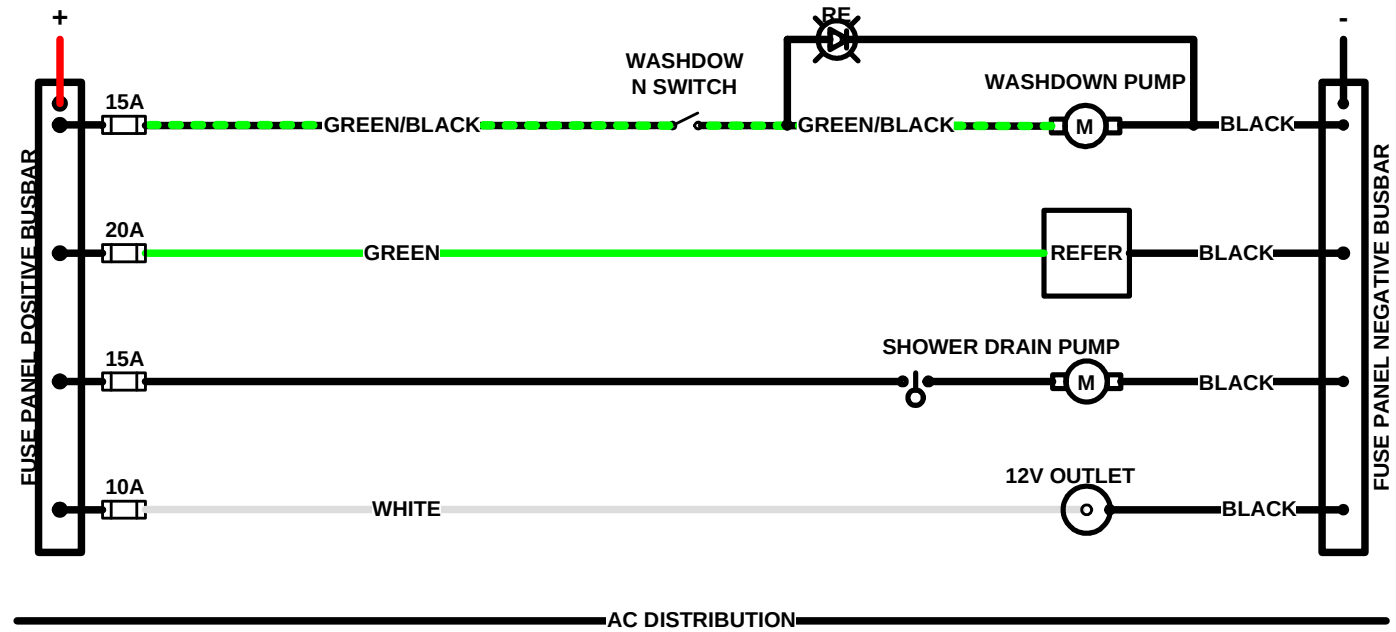
C-DORY 25 WIRING DIAGRAM
PAGE 1

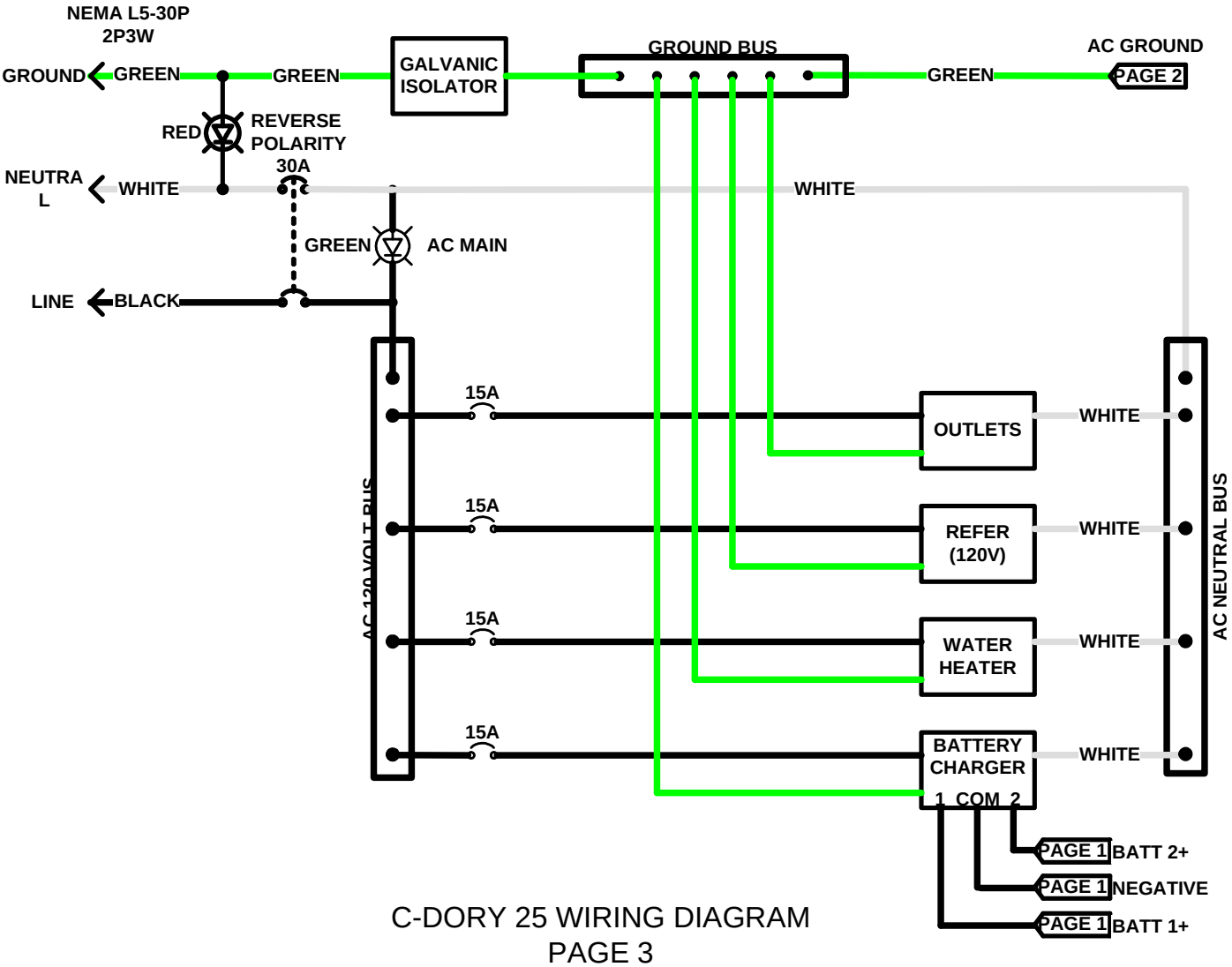
Revised 8/21/2007



C-DORY 25 WIRING DIAGRAM
PAGE 2

Revised 8/21/2007





C-DORY 25 WIRING DIAGRAM
PAGE 3

Appendix D Origo Alcohol Stove

OPERATOR'S MANUAL
SAFETY INSTRUCTIONS

for ORIGO Alcohol and Alcohol/Electric Stoves models 2000, 2500, 4000, 4100, 4300.

WARNING!

WATER OR A CLASS A FIRE EXTINGUISHER WILL PUT OUT AN ALCOHOL FIRE. USE A CLASS B1 FIRE EXTINGUISHER FOR ELECTRIC FIRES.

SPECIAL SAFETY SECTION

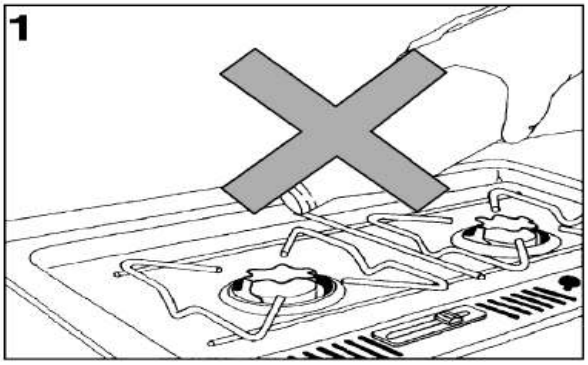
Carefully read and understand these instructions before operating your ORIGO stove. Save these instructions and review them periodically.

Fuel Safety.

1. Use only denatured alcohol. Never use gasoline, kerosene, methanol, propane, charcoal lighter, diesel or other flammable substances or fuels. Uncontrollable operation and flare-ups can result and cause serious burns or personal injury.
2. Store fuel in an approved container away from the stove, the engine or other heat source.
3. Eliminate all sources of sparks or flames in the area where fuel is poured or stored.
4. Do not smoke while working with fuel.
5. Wipe up immediately any spilled fuel.

Filling and Lighting Safety.

1. Do not attempt to fill fuel tanks while they are still in stove. Overfilling, spillage, or hot surfaces can cause serious burns and fires.
2. Never pour fuel through burner openings in top of stove. (Picture 1)
3. Remove fuel tanks from stove by carefully following instructions.
4. Move fuel tanks to a safe area away from all sparks, flames, or other heat sources before filling with fuel.
5. Make sure tanks are cool enough to be held in your bare hand before filling with fuel.
6. Fuel may burn with almost invisible flame. Make sure that flame and heat-glow are extinguished before filling the tanks. Flame or heat-glow can cause alcohol fire, resulting in serious burns and personal injury.
7. Do not overfill tanks. Filling instructions must be followed closely. Check the fuel by tilting the tank vertically (Picture5). In this position, maximum fuel level occurs when fuel just begins to show in the recess inside the tank opening. Alcohol expands when heated. If the tank is overfilled, the surplus will overflow into the stove cavity and can cause uncontrollable burning.
8. Wipe tanks to remove any excess fuel before replacing tanks in the stove.
9. Light burners by holding a lit match or long lighter at the tank opening through the burner opening in the stovetop. As soon as the burner ignites, quickly remove hand to avoid burning your fingers. Long fireplace matches or an ORIGO lighter is recommended.



Installation and Maintenance Safety.

1. Place stove in a well-ventilated area away from all combustible material. Excessive draft must be avoided.
2. Do not hang or place towels, papers, curtains or other combustibles near an installed stove.
3. Keep all surfaces and interior parts free of grease, alcohol or other flammable substances.
4. To be sure of safe function of your ORIGO stove, do not use an oversize pot. Max. recommended pot diameter: 9"(230mm)
5. Make sure the appliance is securely in position when in operation as well as when not in use.

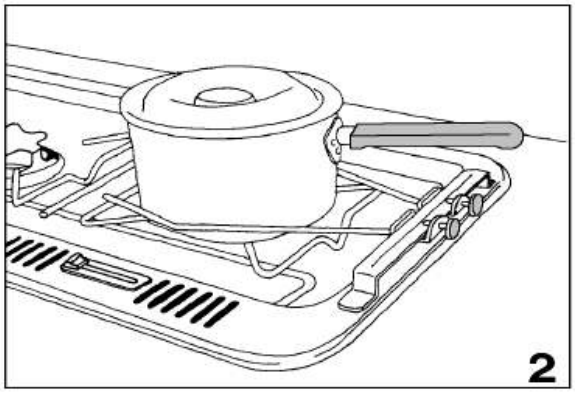
General Safety.

WARNING!

BE EXTREMELY SAFETY CONSCIOUS AS WITH ANY APPLIANCE THAT OPERATES WITH AN OPEN FLAME. INSTRUCTIONS MUST BE FOLLOWED CLOSELY TO AVOID SEVERE BURNS OR CREATING A FIRE HAZARD.

1. Make sure the stove is installed correctly. If electrically equipped, the stove must be installed by a qualified electrician and grounded in accordance with local codes. Installation instructions are included with the product. Repairs must be made by qualified service personnel. Ask your dealer to recommend qualified personnel.
2. If electrically equipped, know how to disconnect power to the appliance at the circuit breaker or fuse boxes in the event of an emergency or if service is required. Ask the installer to show you the proper switch or fuse at the electrical connection box and label the switch or fuse accordingly.
3. Wear proper clothing when operating the stove. Never wear loose fitting or hanging garments as such can catch on fire.

4. Use ORIGO potholders to clamp pots to grate on the stove if there is any risk of motion while the stove is in use. Unsecured pots can shift or fall resulting in dangerous spills, which can cause serious burns. (Picture 2)



5. Allow all stove parts to cool to room temperature before touching or removing from the stove. When the burners are turned off, parts are still hot enough to cause serious burns for some time.
6. Know which knob controls which burner. Always turn to the full open position when igniting the burners. Then adjust the flame so it does not extend beyond the edge of the pot. Turn burner to "0" before removing the pot.
7. Never allow pot handles to extend beyond the edge of the stove. Turn pot handles inward, but not extending over other burners or so they are tilted when the stove moves, if gimbals are used. These precautions will help minimize the possibility of spillage, ignition of flammable materials, and/or serious burns.
8. Watch closely when heating fat or grease. Fat or grease will catch on fire if allowed to become too hot.
9. Avoid grease fires by cleaning after each use to keep all parts free of grease, particularly the area around the burners.
10. Never leave children alone or unattended in the area where the stove is in use. Never allow a child to sit or stand on or play with any part of the stove. As children grow, teach the proper, safe use of all appliances.
11. Do not store items of interest to children in cabinets above or to the side of a stove. Children climbing on or around the stove to reach such items can be seriously injured.
12. Never use the stove to heat or warm the cabin. Operating electric burners at a high setting without a filled pot over it can damage the stove.
13. Use dry potholders only when handling a pot. Wet or damp potholders used on hot surfaces can result in steam burns. Do not allow the potholder to touch heating areas. A towel or bulky cloth used instead of a potholder can catch on fire.
14. Never leave the stove unattended while the burners are in operation. Boilovers can cause excessive smoke; greasy spill-overs can cause fires; and a pan, which has boiled dry, can melt or crack.
15. Do not allow clothing or other flammable materials to come close to areas near the burners, or to the interior surfaces of the oven until they have had sufficient time to cool.
16. Do not place plastic items such as salt and peppershakers, spoon holders, wrappings or other utensils on top of the stove when it is in use as these can melt or ignite. Potholders, towels, or wooden spoons will catch on fire if allowed to come too close to a flame.
17. Do not store flammable materials in the oven or near the burners. Keep the stove free of all flammable materials.
18. Never modify or alter the construction of the stove including removal of panels, wire covers, or any other permanent part of the product.

WARNING!

**OPEN FLAME COOKING APPLIANCES CONSUME OXYGEN, THIS CAN CAUSE ASPHYXIATION OR DEATH.
MAINTAIN OPEN VENTILATION.**

INSTRUCTIONS

These instructions apply to the following stoves:
Model: 2000 - Alcohol only
2500 - Combination alcohol/electric
4000,4100 - Alcohol only
4300 - Combination alcohol/electric

These models of ORIGO stoves are equipped with non-pressurized alcohol burners.
Alcohol is absorbed into the tanks in a non-flammable material. These units are not equipped with valves, which can develop leaks, or with other components requiring regular service, making safer and easier to maintain units.

WARNING!

SAFETY PRECAUTIONS ARE REQUIRED AS ALWAYS WHEN WORKING WITH AN EXPOSED FLAME. CAREFULLY READ AND UNDER-STAND ALL INSTRUCTIONS BEFORE USING YOUR NEW ORIGO STOVE.

Location of your ORIGO Stove.

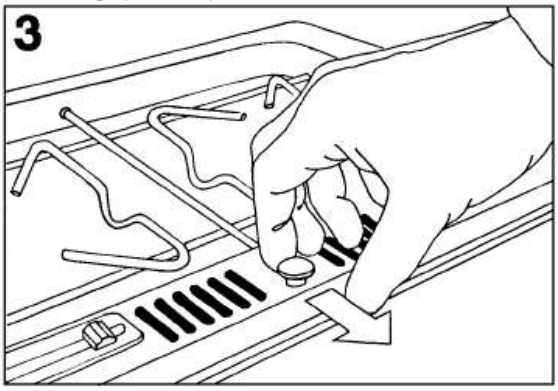
Your stove must be located in a well-ventilated space.

- Avoid excessive draft.
- Locate so that maximum protection against wind is obtained if the stove is to be used in an open cockpit or other open area.
- Mount the stove as far away from combustible materials as possible.

Filling the Fuel Tanks.

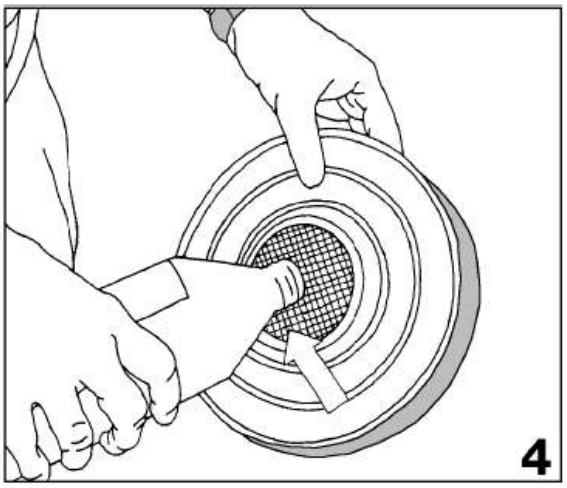
The fuel tanks must be lifted out of the stove and moved away from open flames or hot objects before filling with fuel.

- Make sure all burners are turned off. (Alcohol burners must be closed and electric burners - if so equipped - must be turned to the "off" position.)
- Allow the stove to cool to room temperature.
- Remove the cutting board or raise the glass lid slightly as appropriate to your unit.
- Pull the latch forward (located at the front center of the cooktop. (Picture 3)



Make sure that flames are completely extinguished and that there is no heat-glow on top of the tanks, and then lift out fuel tanks.

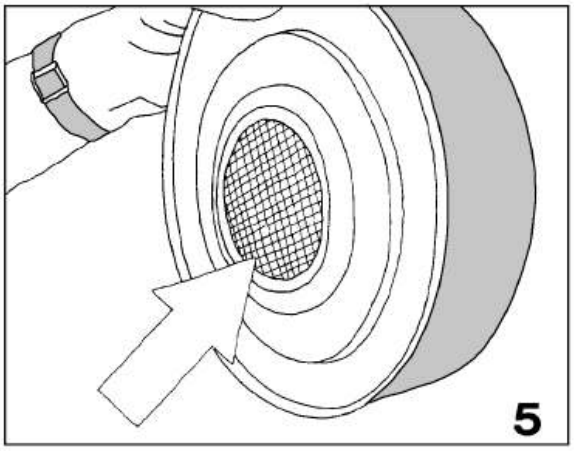
- Hold each tank (one at a time) as shown (Picture 4), then pour alcohol directly into the opening covered by wire mesh. Maximum capacity from empty to full is 1 quart.



- Check fuel level by tilting the tank on its side vertically as shown. (Picture 5)
- Hold in this position a few moments. When fuel is visible in recess, tank is filled to maximum recommended level. **Do not overfill.**

NOTE: It is not necessary to fill tank completely to operate. Stove will operate with less than maximum capacity of fuel.

- Wipe tank dry and replace tank in stove making sure it is fitted properly in the mounting.
- Close the stovetop by reversing the opening procedure. Make sure the latch secures the stovetop and that the top is level.

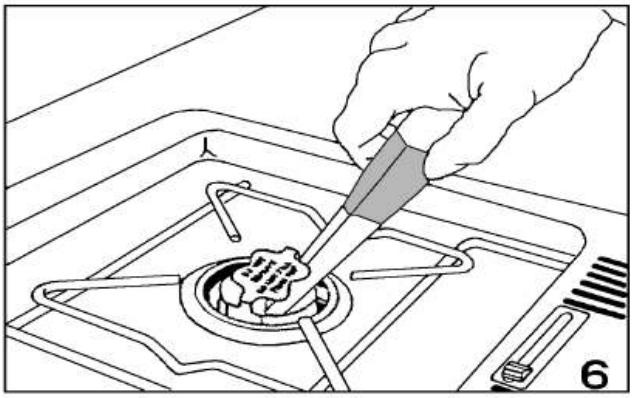


To Light the Alcohol Burner.

An ORIGO lighter is recommended for lighting purposes.

- Turn knob A to the maximum position to open the burner.
- Place a long match or long butane lighter at tank opening. (Picture 6)

NOTE: If stove is warm from previous use, burner may ignite, then immediately go out. In this event, blow down into the burner opening to dissipate vapor and relight as above.



To Extinguish the Alcohol Burner.

- Turn knob all the way to "0".
- Wait a moment, then turn burner back towards "Max" to make sure flame is out.
- Turn knob to "0" again.
- Wait until the stove has completely cooled before closing the glass top or replacing the cutting board.

Gaskets.

The stove is equipped with a rubber gasket for each fuel tank. Gaskets are to be installed when the stove will not be operated for a period of time and will protect against alcohol evaporation.

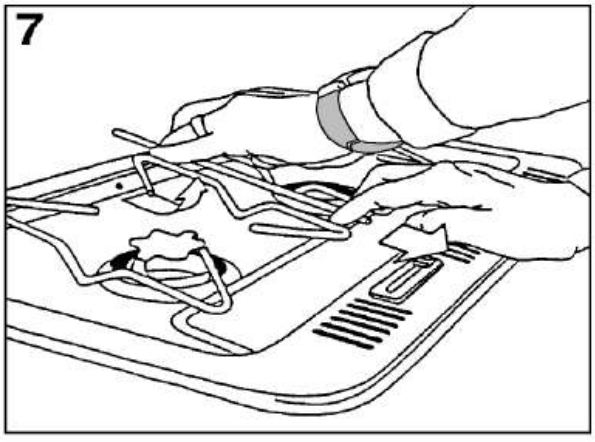
To install:

- Open stovetop and make sure all parts are cool and place the gaskets over the tank openings.
- Close the stovetop making sure it is level and that the latch is properly secured.

Cleaning.

WARNING!
REGARDING CLEANING FLUIDS AND ELECTRICAL COMPONENTS.
SWITCH BREAKER OFF!

- **Electrically equipped models:** The coil elements can be lifted slightly from the top to gain access underneath. Do not force the coils beyond the feel of resistance. To do so can damage the element.
- **All other models:** Remove the grate. Note the hole at the back of the cooktop into which the grate retainer fits. To remove the grate, slide the retainer out of the hole and lift grate. (Picture 7)



Instructions for Electric Burners

Never attempt to use electric and alcohol burners simultaneously. To do so will cause overheating, which can destroy the electric elements.

- Move cutting board away or open the glass top as applicable to your unit.
- Turn switch on to desired setting (symbol on the stove indicates which switch to use).
- Turn switch off when cooking is complete.
- Make sure that the elements have cooled down completely before replacing the cutting board or glass top.
- Disconnect switch should be in off position when stove is not in use.

Electronic Burner Control

The power is varied in 5 steps. There is also a zero/off position and a key button. Shutting the lid or the cutting board will shut off electric power, as a safety only. Turn off burner and allow it to cool before closing glass lid or replacing cutting board. Glass lid is not a cooking surface. The selection of the desired power level is done by push buttons for each burner (one burner at ORIGO 2500 E) labeled (+) = "step up" and (-) = "step down" respectively.

The present power level is indicated by 3 light emitting diodes (LEDS) for each burner in a combination fashion. The indications are as follows in the ascending order:

Off Position	=	No LED	=	Power level 0%
Position 1	=	LED1	=	Power level 20%
Position 2	=	LED1 + LED2	=	Power level 40%
Position 3	=	LED2	=	Power level 60%
Position 4	=	LED2 + LED3	=	Power level 80%
Position 5	=	LED3	=	Power level 100%

Please notice.
To start the stove, you have to push the key button and within 10 seconds the (+) button.
After using the off button, you have to use the key button to restart the stove again.

Holding the buttons (+) or (-) down will repeatedly step the power up or down respectively until hitting the end position i. e. full power and off positions respectively. A single brief push will change only one step in the desired direction. The off button operated by the lid will shut both electric burners off.

INSTALLATION.

Fitting of the Stove.

Your stove should be located in a well-ventilated space. Avoid excessive draft. If you fit in an open cockpit, or other open area, wind protection must be provided.

Cut a rectangular hole (see measurements below). Place the stove (with the top open and tanks removed) in the middle of the hole. When in proper position, use the fastening holes in the rim as a template to mark and drill for B-10 screws with low heads to clear the stovetop. Install the screws and fasten securely.

WARNING!
PLACE UNIT IN A WELL-VENTILATED AREA AWAY FROM ALL COMBUSTIBLE MATERIALS. INSTALL A CLASS B-1 FIRE EXTINGUISHER IMMEDIATELY AT HAND.

The stove shall be installed in accordance with national regulations. In USA it is advisable to follow the ABYC recommendations.

Cutout for Model No:

2000 and 2500:	13 5/8" x 12 13/16" (345 x 325 mm)
4000:	20 1/2" x 12 1/4" (520 x 310 mm)
4100 and 4300:	22 5/8" x 12 13/16" (575 x 325 mm)

The appliance must be connected only to the current marked on the stove.

Use No. 12, three-wire tp. SO rubber insulated cable. Black L1 wire to be ungrounded conductor. Secure the cable with the clamp.
(See applicable USCG or ABYC requirements)

Technical Data.

For Model No. 2000 and 2500:

Height:	approx. 6 " (150 mm)
Depth:	approx. 14 7/8" (377 mm)
Length:	approx. 15 5/8" (396 mm)

For Model No. 4000:

Height:	approx. 6" (150 mm)
Depth:	approx. 14 3/16" (360 mm)
Length:	approx. 22 1/2" (620 mm)

For Model No. 4100 and 4300:

Height:	approx. 6" (150 mm)
Depth:	approx. 14 7/8" (377 mm)
Length:	approx. 24 1/2" (623 mm)
Tank Volumes:	approx. 2,5 pints each (1,2 L)
Fuel:	Denatured alcohol, Methylated spirit
Coil elements:	1100 W each

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1855 A, Boul. Industriel
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CANADA
Phone (450) 668 3111
Fax (450) 668 6270

JABSCO®

Model 18590-Series

SELF-PRIMING MACERATOR PUMP WITH RUN-DRY PROTECTION

FEATURES

Pump:	Self-Priming Flexible Impeller with Stainless Steel Wearplate
Impeller:	Jabsco Nitrile compound
Macerator:	Stainless Steel Cutter reduces particle size to 1/8" (3mm) maximum
Seal:	Lip Type
Ports:	Inlet - 1-1/2" (38mm) Hose Barb and 1-1/2" N.P.T. (Male) Outlet - 1" (19mm) Hose Barb
Motor:	Permanent Magnet Type, Fully Enclosed, with Stainless Steel Shaft Includes Run-Dry Protection Device that shuts-off pump. Powder coated housing with sealed end-bells and bearings. **Complies with USCG Regulation 183.410 and ISO 8846 MARINE for Ignition Protection.**
Weight:	5 lb (2.3 kg) Approx.

VARIATIONS AVAILABLE

MODEL NO.	DESCRIPTION
18590-1000	12 Volt
18590-1090	12 Volt EMC CE
18590-1001	24 Volt
18590-1091	24 Volt EMC CE

APPLICATION

The JABSCO 18590 series dc macerator pump unit is the ideal solution for emptying marine holding tanks when not in a discharge restricted area. The JABSCO macerator is self-priming to a five foot lift when impeller is wet, four foot when dry, and may be mounted in any convenient point in the waste discharge system. The macerator section grinds waste down to a particle size of 1/8" (3mm) maximum so it can easily by pumped through a 1" (19mm) ID discharge hose. The pump section is self-priming, permitting the unit to be mounted above the tank in a convenient location. (For optimal efficiency, locate pump as close to holding tank as possible.)

The macerator has an approximate flow rate of 12 GPM (45 LPM) and will empty a typical 30 gallon (115 litre) holding tank in less than 3 minutes.

The 18590 series waste pump will macerate and pump all waste and tissue normally found in marine and recreational vehicle waste systems.

Model 18590-Series

The pumps should be used in accordance with EPA, USCG Marine Sanitation Regulations, and any regional or local ordinances.

The Jabsco Macerator is equipped with an exclusive (patent pending) Run-Dry Protection Device that shuts-off the pump to protect the flexible impeller from serious damage. The Run-Dry Protection Device can be reset by interrupting power to the pump (switching it off). The device will automatically be reactivated the next time the pump is switched on. While this unique feature protects the impeller from catastrophic damage, the impeller life will be maximized if the pump is shut-off just moments after the tank is empty. Repeated reliance on the Run-Dry Protection Device to shut-off the pump will shorten impeller life, which eventually will lessen the pump's ability to self-prime.

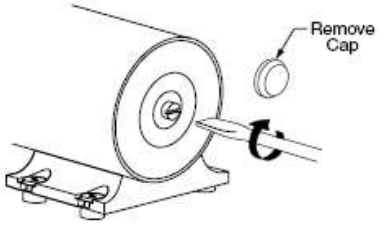
The macerator should be controlled by a switch that is positioned close enough to the pump so it can be heard while operating. When the tank is empty there will be a change in pump noise (louder, higher frequency) at which time the macerator should immediately be switched off.

The macerator pump unit has been designed to handle waste, toilet tissue, and facial tissue. It will also handle solids such as cigarettes, cigars and chunks of soft fruits or vegetables less than 1" size. It will not pump solid objects like fruit pits, rags, wet strength kitchen towels, tampons or sanitary napkins. The holding tank and pump should be flushed with several gallons of water after each pumpout. Make sure the battery is fully charged. The dc motor is suitable only for intermittent duty and should not be run for more than 15 minutes continuously. At maximum flow

of 12 GPM (45 LPM) the macerator can empty a 180 gallon (680 liter) holding tank in a single operation.

After long periods of nonuse, the flexible impeller may stick to the pump body preventing the macerator pump from turning freely. If this occurs, the impeller can be broken free by removing the rubber cap on the shaft at the rear end of the motor, inserting a screwdriver in the slot and rotating the shaft clockwise a quarter turn or more. When impeller is broken free, reinstall the plastic cap on the motor shaft.

MOTOR ILLUSTRATION



HEAD CAPACITY TABLE†

Head Ft	Metres	GPM	Litres	AMPS 12 Volt	AMPS 24 Volt
0	0	12.5	47	14.0	7.6
5	1.5	11.5	44	14.5	7.8
10	3	10.5	40	15.0	8.1
15	4.5	9.0	34	16.0	8.6
20	6	7.5	28	16.5	8.9

† Flow rates and amperage will vary slightly depending on pump loading (sanitation system design).

INSTALLATION INSTRUCTIONS

Locating the Pump: The JABSCO macerator is self-priming to a five foot lift when impeller is wet, four foot when dry, and may be mounted in any convenient point in the waste discharge system. It may be mounted in any position or angle without affecting performance. If mounted vertically the motor should be above the pumphead. Use the rubber grommets provided to absorb vibration. Do not over tighten mounting screws. For optimal performance, mount the pump as close to tank as possible.

Plumbing Connections: Use 1-1/2" (38mm) ID, noncollapsible waste type suction hose. Slip the hose over the inlet hose barb and secure it with two stainless steel hose clamps.

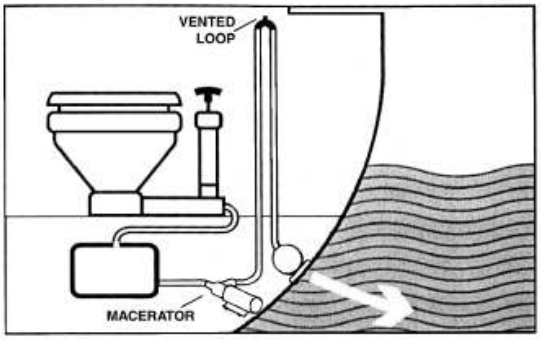
The macerator may also be screwed directly into a 1-1/2" N.P.T. tank flange or female pipe fitting. If attaching the inlet port to a pipe fitting it may require removing the hose barb portion of the port with a hack-saw. If this is necessary, cut across the hose barb portion of the port about 1/8" (3mm) away from the end of the pipe threads. Wrap port threads with a couple wraps of Teflon* tape and screw the pump assembly into the pipe fitting. Tighten hand tight, do not over tighten.

NOTICE: An air leak anywhere in the suction side of the plumbing system can cause extended dry running which will cause pump to shut-off after about 20 seconds of run time.

All suction connections must be airtight and free of sharp bends or restrictions. If a waste deck fitting is installed for dockside pump-out and connected to the suction hose of the macerator by means of a tee fitting (without a y-valve), it too must be airtight to ensure proper priming. Make certain there are no air leaks around the deck plate cap or hose tail. Use minimum 1" (19mm) ID hose for discharge and connect to thru-hull fitting located approximately 4-6 inches above waterline.

NOTICE: The discharge thru-hull may be positioned below the waterline only if the discharge hose has a vented loop fitting installed at least 8" above the waterline at all angles of heel or trim. Consult with a qualified marine plumber.

* Teflon is a registered trademark of E.I. DuPont de Nemours and Company.



WIRING

NOTICE: Correct motor polarity (orange to positive, black to negative) is important. Reverse polarity can damage motor and void warranty.

Full voltage at the motor is required to properly operate the macerator. It must be wired in a circuit independent of all other accessories.

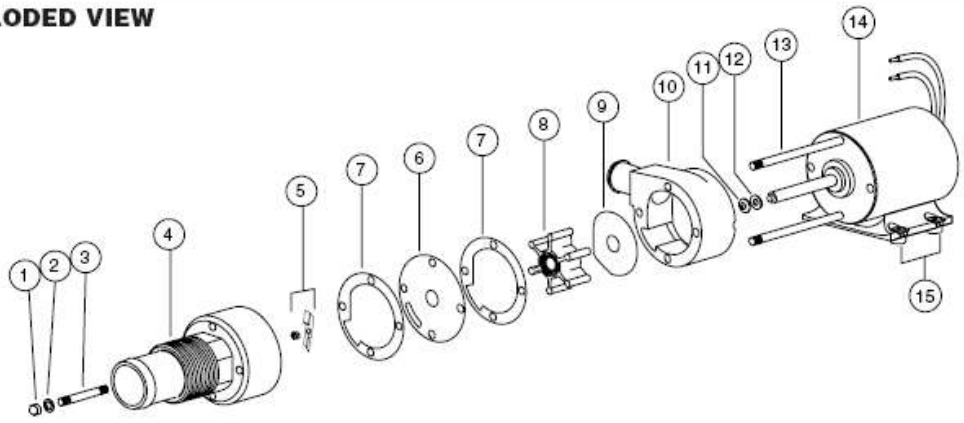
Use stranded copper wire of the correct size (determined from the electrical specifications chart) to connect the macerator to the power source. Undersized wire will cause a reduction of voltage that may cause the pump to seize or damage the motor. An appropriate size fuse or equivalent circuit breaker (determined from electrical specifications chart) must be Installed in the positive power lead within seven inches of the power source. Alternatively the macerator may be wired to a properly installed over-current protecting electrical distribution panel. Connect the positive lead to a heavy-duty switch (see required switch amperage rating in electrical specifications chart) positioned close enough to the macerator so the operator can hear the macerator while it is running. Continue the positive lead from the switch to the macerator and connect it to the orange (positive) motor lead. Connect the black (negative) motor lead to the negative side of the battery or grounded buss bar.

ELECTRICAL SPECIFICATIONS

VOLTAGE	AMP DRAW	FUSE / SWITCH SIZE / RATING	WIRE SIZE PER FEET OF RUN* 0'-10'	10'-15'	15'-25'	25'-40'	40'-60'
12 Vdc	16	20	#12 (4)	#10 (6)	#10 (6)	#8 (10)	#6 (16)
24 Vdc	8	15	#16 (1.5)	#14 (2.5)	#12 (4)	#10 (6)	#10 (6)

* Length of run is total length of the circuit from the power source to product and back to ground.

EXPLODED VIEW



PARTS LIST

Key	Description	Qty.	Part Number
1	Acorn Nut	4	91085-0340
2	Fiber Washer*	4	91613-0140
3	Stud*	2	17288-0010
4	Macerator Housing	1	18594-1000
5	Chopper Plate with Locknut	1	37056-1000
6	Wearplate, Large	1	18597-1000
7	Gaskets (2 each per kit)*	1	18596-1000
8	Impeller*	1	6303-0003
9	Wearplate, Small	1	12316-1002
10	Body*	1	18593-1000
11	Seal*	1	1040-0000
12	Slinger	1	6342-0000
13	Stud	2	17288-0000
14	Motor 12 Volt	1	17246-0000
	Motor 24 Volt	1	17246-0001
15	Grommets (Set of 4)	1	92900-0120
	Service Kit	1	18598-1000

*These parts are supplied in 18598-1000 Service Kit.

DISASSEMBLY

Notice: Before performing any service, disconnect the electrical power to the macerator and take precaution to ensure that it is not restored until service is complete.

Remove the four acorn nuts (Key 1) and fiber washers (Key 2) from the pump studs (Key 3). Slide the macerator housing (Key 4) off the studs. Insert a thin bladed 9/32" (7mm) ignition wrench behind the chopper plate (Key 5) and onto the flat of the motor shaft to prevent it from turning. Unscrew (counter-clockwise) the locknut on the end of the motor shaft and remove the stainless steel chopper blade.†† On new model macerators the shaft can be prevented from turning by inserting a screwdriver in the slot of the motor shaft extending from the motor's rear end bell. Remove the pump wearplate (Key 6) and two paper gaskets (Key 7). Now slide the pump body (Key 10) with impeller (Key 8), small wearplate (Key 9), two studs and shaft seal as an assembly off the motor shaft and remaining two mounting studs. Remove the starlock retaining washer on the seal and push the seal out of the seal bore.

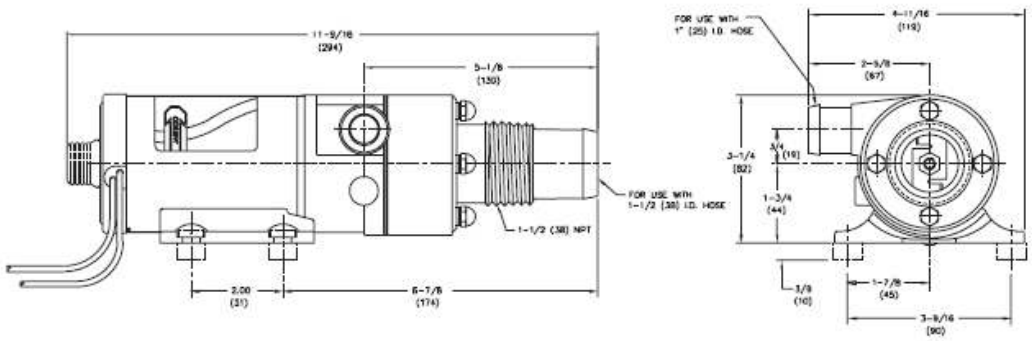
Notice: If reconditioning pump with a service kit (Part No. 18598-1000), it is not necessary to remove the seal because the new seal is pre-installed in the new body. It is also generally not necessary to remove the slinger or brass studs screwed into the motor end bell.

ASSEMBLY

If installing a new seal, push it into the seal bore of the body with the lip pointing toward the impeller bore. Press the starlock washer into the seal bore with the concave side up to secure the seal in the bore. Install the two shorter studs in the two holes with threaded inserts in the new pump body and tighten finger tight. If required, screw two longer studs into the tapped holes in the motor end bell. Slide the new pump body with the shaft seal installed onto the motor shaft and two long mounting studs in the motor. Slide the small wearplate over the motor shaft and position it in the bottom of the impeller bore. Slide the new impeller onto the motor shaft and, with a counter-clockwise motion, push it into the pump impeller bore. Position one new gasket on the studs and against the pump body assuring the cut-out aligns with the inlet groove in the body. Reposition the large wearplate and second gasket on the studs and against the body; again, aligning the hole in the wearplate and gasket cut-out with the pump inlet. Position the chopper on the end of the motor shaft with drive tab aligned with flat of shaft and pointing toward the motor. Hold the shaft to prevent it from turning and secure the chopper to the shaft with the locknut. Position the macerator housing on the four studs ensuring the cut-out in the inner wall aligns with pump body inlet port and hole in the wearplate. Position a new fiber washer on each of the studs and secure the macerator housing in place with the four acorn nuts.

†† On pumps manufactured prior to April of 1998, position a screwdriver between the prongs of the chopper and unscrew it (counter-clockwise) to remove it and its lock washer from the motor shaft.

DIMENSIONAL DRAWING
Inches (Millimeters)



TROUBLESHOOTING

PUMP DOES NOT START:

Impeller bound-up - Insert screwdriver in slot of shaft at motor's rear end bell and rotate clockwise.

No electrical power to pump or low voltage - With a voltage tester, check power to pump. The pump must have full voltage *checked while pump is running*. If it hasn't started, see wire size recommendations and check for poor or corroded electrical connections.

PUMP RUNS BUT DOES NOT PUMP:

Lack of priming - Check all plumbing connections to ensure they are *airtight*. If a waste deck plate is connected to pump suction hose by a "Tee" fitting, the deck plate must also be *airtight*.

Worn impeller* - Replace flexible impeller.

*A worn impeller may be a likely cause if the Run-Dry Protection Device has often been allowed to shut-off the pump.

Revised 8/21/2007

Appendix F Trim Tabs

Superior by Design

Congratulations, you are the owner of the finest trim tabs available. Bennett Trim Tabs provide you with control never thought possible. Properly sized trim tabs get you up on plane quickly and correct listing at nearly any speed, regardless of weight distribution or sea conditions. These benefits add up to less drag on the hull, reduced engine stress, increased speed and decreased fuel consumption. If you have any questions not answered in this manual please feel free to contact us!

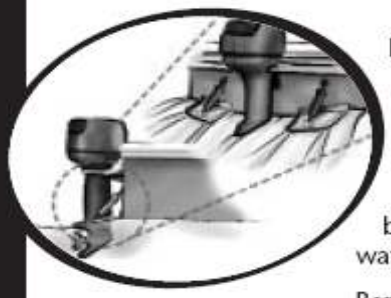
www.BennettTrimTabs.com

BENNETT Marine

Visit the Bennett Marine Web Site! It has a wealth of advice and information about owning & operating your trim tabs.

Installation Video – How Trim Tabs Work & How to Use Them – Bennett Trim Tab Accessories – Parts and Pricing – Trouble Shooting Guide – Rapid e-mail Response to Questions

How Trim Tabs Work



Bennett Trim Tabs are attached to the bottom edge of the transom. When the helm control is pressed, the trim tabs move into position. Water-force on the trim tab surface creates upward pressure, raising the stern and lowering the bow. Properly sized Trim Tabs improve the performance of your boat in a much wider range of weight, weather and water conditions.

Bennett Trim Tabs operate the reverse of what you might think. The port trim tab lowers the starboard bow. Conversely, the starboard trim tab lowers the port bow. The control is wired so that all you have to do is press the control in the direction you want the bow to move. Don't worry about which trim tab is moving. The proper use of Bennett Trim Tabs becomes second nature after a short time.

How to Use Your Trim Tabs

GETTING AND STAYING TRIMMED

Most boats "break over" (get on plane) at a particular speed. This speed is determined by weight distribution, water conditions, etc. Bennett Trim Tabs enable your boat to plane at speeds lower than natural planing speed. By pressing the control to the "Bow Down" position, your trim tabs move down. This will raise your stern and lower your bow, getting you up on plane faster and increasing your speed.

YOUR BOAT'S OPTIMUM ATTITUDE

A good way to find your boat's optimum attitude is to conduct this test. Get out and run it lightly loaded, at full speed on flat water. Notice the bow in relation to the horizon. This should be your boat's best running attitude. You can use your trim tabs to recreate this "perfect attitude" regardless of weight distribution, speed or water conditions.

GETTING USED TO THE "FEEL" OF YOUR TABS

When learning to use your tabs, begin by pressing the helm control in half second bursts for gradual trimming. A momentary delay occurs from the time you press the control to the time the boat reacts. This is normal, and varies with boat speed. Be careful not to over-trim your boat. An over-trimmed boat will "plow" or "bow-steer". If you over-trim the boat, simply press "Bow Up" and the bow of the boat will rise.

TRIMMING FROM A BRIDGE OR TOWER

When steering from a bridge or tower, a good trimming method is to watch the bow spray, stern wake, or the rooster tail. An untrimmed boat will produce more spray aft of the bow and it will produce a larger wake. When trimmed, the bow spray is farther forward, the wake is reduced, and the rooster tail is smaller and farther behind the boat. You'll also notice that the engine RPM will increase when the boat is properly trimmed.

Revised 8/21/2007

How to Use Your Trim Tabs (continued)

RUNNING IN ROUGH WATER

When running in a chop or heavier seas, press "Bow Down". This will bring the "V" of the hull in contact with the waves rather than having the waves pound the hull and your passengers. In a following sea or when running an inlet, the trim tabs should be fully retracted for maximum rudder response.

CORRECTING FOR A LIST

Bennett Trim Tabs are operated individually so that you can correct for listing. Your control is designed so that you can use it "intuitively". Do not think about what the trim tabs are doing, just concentrate on the bow. If the port bow is high, push the port-side "Bow Down" direction.
If the starboard bow is high, push the starboard side "Bow Down" direction until the boat is level.

TRIM TABS WITH POWER TRIM – GETTING OPTIMUM SPEED AND POWER

Using your trim tabs in conjunction with your power trim will give you increased speed and power.

1. Adjust the trim tabs to achieve a planning attitude.
2. Use the power trim to position the prop path parallel to the water flow.
3. If necessary, re-adjust the trim tabs to "fine tune" your tabs. In other words, use your trim tabs to trim the boat and your power trim to trim your prop.

CORRECTING FOR PORPOISING

Porpoising is a condition more common in faster, performance boats. As speed increases, the bow repeatedly rises out of the water until gravity overcomes lift and the bow bounces down. Press "Bow Down" in half second bursts. As the trim tabs deflect, the porpoising subsides and your speed should remain the same or increase. Only a slight amount of trim tab deflection should be necessary.

SAFETY PRECAUTIONS

- Do not overtrim, particularly at high speeds as the bow will dig in and wave action may cause the boat to veer.
- While underway, do not move one trim tab significantly farther down than the other as undesirable listing could occur.
- Use your trim tab helm control with caution.
- For best maneuverability, trim tabs should be fully retracted in a following sea, or when running an inlet.
- Improper use of trim tabs can cause an accident or injury.

Bennett Trim Tabs have a significant effect on the operation and versatility of your boat. No one knows your boat better than you, the best learning method is to spend time getting familiar with your boat's reaction to the trim tabs. As your experience with Bennett Trim Tabs increases, so will your enjoyment. Always operate your boat with safety first in mind.

System Specifications

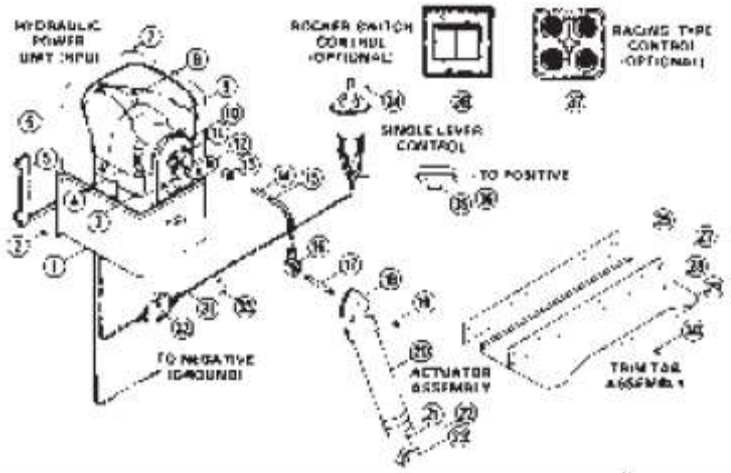


Diagram #	Description	Part #
1	Fluid reservoir	VP1139
2	#10 x 1" screw	H1180
3	Filler stack	——
4	Filler plug	VP1140
5	Mounting bracket for HPU	H1179
6	Lexan cover	VP1138
7	Type 25 thread cutting screw	VP1154
8	Motor strap	VP1142
9	Solenoid valve	VP1135-R (red) VP1135-G (green)
10	Faceplate for HPU	VP1144
11	1/8" Pipe to 1/4" tube connector	VP1146
12	Hex retainer	VP1141
13	Nut with ferrule	T1127
14	Hydraulic tubing (20' unless otherwise specified)	T112520
15	Tube bending clip	H1173
16	Female elbow	H1172
17	Pipe nipple (3" unless otherwise specified)	H11713
18	Upper hinge	A1103
19	#14 x 1-1/2" screw	H1174
20	Cylinder body	A1105
21	Piston with o-ring	A1109
22	Lower hinge pin	A1115
23	Lower hinge	A1113
25	Backing plate	varies with size
27	Hinge plate	varies with size
28	#10 x 1-1/4" screw	EH1071
29	Trim tab only	varies with size
30	1/4 - 20 x 3/4" machine screw	H1175
31	Wire harness (22' unless otherwise specified)	WH1000
32	Quick-disconnect plug	VP1143
33	Nylon hanger	H1177
34	Single lever control	VC1000
35	20 amp fuse (12 volt system)	H1176
36	Fuse holder	H1178
37	Racing type control	RT1000
38	Rocker switch control	RS1000

System Specifications (continued)

SYSTEM COMPONENT SPECIFICATIONS

Trim Tabs:	Stainless steel
Actuators:	Upper hinge material (Part #A1103) made of flexible nylon. Remainder of actuator made of high impact fiberglass-filled nylon.
Hydraulic Power Unit (HPU):	HPU draws approximately 18 amps (broken-in) and operates on 12 volts DC (except 24 & 32 volt HPU's). Approximately 22 ounces of ANY TYPE AUTOMATIC TRANSMISSION FLUID (ATF) is required to fill reservoir to proper level for single actuator installations. With trim tabs fully retracted, proper fluid level is about 2" from bottom of reservoir. The HPU forces both trim tabs full-up to full-down in 9-10 seconds, individually in 4-5 seconds. (Trim tab travel on dual actuator systems takes twice as long).
Helm Control:	Controls on 12 volt systems use 20 amp in-line fuse (24V & 32V use proportionally smaller).
Hydraulic Tubing:	Tubing has 1/4" outside diameter and 1800 lb. maximum pressure.
Wire Harness:	Wire colors and their functions:

Red	Port valve
Green	Starboard valve
Blue	Motor forward (pump pressure)
Yellow	Motor reverse (pump retract)
Black on HPU	Ground
Orange on helm control	Positive

System Information

Bennett Trim Tabs are built to rigid quality standards. However, the marine environment is harsh. So, in the unlikely event a malfunction occurs, here is some helpful information:

1. If trim tabs do nothing . . . no movement . . . no sound from HPU:
- Inspect for blown 20 amp in-line fuse in helm control's orange wire.
- Inspect for disconnected or corroded connections on HPU ground wire, orange positive wire from helm control, and quick-disconnect plug.

2. If HPU runs but trim tabs do not move:
- Inspect for disconnected or corroded red and green wire connections at helm control and quick-disconnect plug.
- The following test can be used to help isolate malfunction. Remove wires from helm control and touch together as follows:

Operation	Reaction
Orange (+), blue, red	Port trim tab down
Orange (+), blue, green	Starboard trim tab down
Orange (+), blue, red, green	Both trim tabs down
Orange (+), yellow, red	Port trim tab up
Orange (+), yellow, green	Starboard trim tab up
Orange (+), yellow, red, green	Both trim tabs up

If trim tabs function in each of the above combinations, check helm control. If during this test trim tabs continue to malfunction, inspect HPU.

3. If one trim tab operates and the other one does not:
- Inspect for disconnected or corroded red or green valve wire connections at helm control and quick-disconnect plug. (Red wire operates port trim tab; green wire operates starboard trim tab).
- Reverse hydraulic lines at front of HPU to determine if malfunction is in HPU or actuator / hydraulic connections. If after reversing lines, symptom shifts to other trim tab, malfunction may exist in HPU. If symptom remains on the same side, malfunction may exist with the actuator/hydraulic connections.

4. If trim tabs go down but will not retract:
- Inspect for low voltage of the battery. Check battery for voltage while HPU (or another accessory) is running. If voltage is less than 10 volts, valves may not open.
- Inspect for disconnected or corroded connections on helm control, and quick-disconnect plug.

This general information is not intended to be complete. Please feel free to call Bennett Marine to assist in solving situations not clarified or addressed above. Bennett Marine customer service is available to help Monday through Friday, 8am to 5pm Eastern time. (954) 427-1400.

System Information (continued)

MAINTENANCE

- Periodically, check fluid level in HPU. With trim tabs completely retracted, fluid level should be about 2" from bottom of reservoir (approximately 22 ounces). To refill, remove lexan cover and filler plug located at the front left hand corner of the reservoir. FILL WITH ANY TYPE AUTOMATIC TRANSMISSION FLUID (ATF) ONLY. Brands or types of ATF can be mixed. Running HPU with an excess or lack of fluid will not cause damage.
- Periodically, check for clean electrical connections on back of control, HPU ground wire, and quick-disconnect plug.
- Cold temperatures do not affect the trim tab system. No winterization is necessary.
- (SALTWATER ONLY) To deter electrolysis, a zinc anode should be attached to the top of each trim tab. Zinc must make direct contact with stainless steel. Do not paint zinc. Do not ground trim tabs to other underwater appendages.
- Paint trim tabs to discourage marine growth.
  1. Clean surface of all grease, oil, dirt.
  2. Apply two coats of epoxy metal primer.
  3. Apply two coats of anti-fouling paint.
     Actuator, including the piston, may be painted.
- Unpainted trim tabs may acquire an orange discoloration. THIS OXIDATION OF SURFACE CARBON MOLECULES IS NORMAL. The integrity of the stainless steel is not affected. Orange coating can be cleaned off, but may eventually return. **Note:** This discoloration should not be confused with the pitting and corrosion of electrolysis.

SAFETY INFORMATION

- Take immediate action to correct any malfunction or failure of your trim tabs.
- Occasionally, check for loose or corroded wiring connections.
- Stepping on the trim tab may cause damage to the unit, or injury.
- Make sure the HPU is mounted in a dry location to avoid drenching and consequent failure.
- Leaving the actuator extended when boat is not in use will not cause seal damage.
- Occasionally, inspect HPU fluid level.
- REFER TO SAFETY PRECAUTIONS ON PAGE 4.

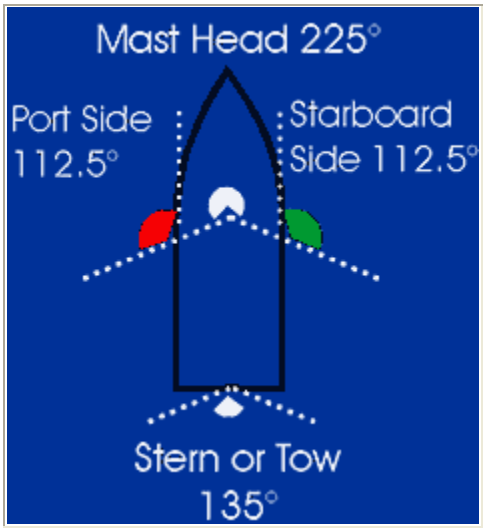
Appendix G Check Your Navigation Lights

Will You Be Seen In Time?
Check Your Navigation Lights

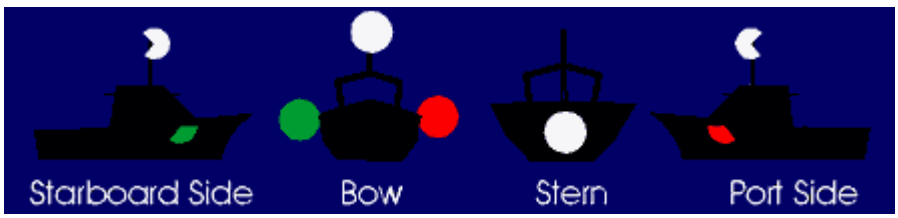
Operating at night can present some special challenges. Not only is your depth perception lessened, bright lights on the shore can cast misleading reflections on the water and if you wear glasses, or worse yet bifocals, you simply don't see as well at night as you do during the day. It is not only important that you be able to identify other vessels operating in your proximity, it is equally important that other vessels see you.

Most recreational vessels are less than 30 feet in length and, according to the Rules of the Road, shall be equipped with navigation lights. These lights not only have a certain arc through which they can be seen but must be seen from a minimum distance. The following lighting requirements are for recreational vessels less than 12 meters in length. (approximately 39.4')

Light	Arc	Color	Visible Range
Masthead Light	225º	White	2
Starboard Sidelight	112.5º	Green	1
Port Sidelight	112.5º	Red	1
Stern light	135º	White	2



The arc of the lights and color allows you to determine the direction a vessel is moving. How good are your lights? You should test them to see how visible you might be at night. Whether on a trailer or at the marina switch on your lights and see how well they can be seen. Walk away from the boat or row away, if you are at anchor or at a mooring, and see how visible the lights are as you move further away. How easy are they to see against the background of lights on shore?



Does your stern light shine dead astern over the required 135º arc or does it shine to one side or up or down. Can it be seen from the required 2 miles and

why is that important? As an example, let's say that your stern light for some reason can only be seen for 1/2 mile. You are underway at 8 knots and a large ship is approaching at 15 knots. The ship is only 4 minutes away from collision with you. By the time the ship "might" see you, identify the light and decide on the reaction that should be taken, it is too late. A ship traveling at 15 knots may take miles to stop.

Look at the stern light again, as you move from the stern toward the bow, does the stern light "disappear" as the sidelight "appears"? The stern light should disappear and sidelight appear at 22.5º abaft the beam. If you don't see the green starboard sidelight or the red port sidelight when the stern light disappears there is a problem with the arc of one or all these lights. This means that if another boat were approaching you at the angle where no lights are seen there is increase risk of collision.

If both the stern light and sidelights are seen brightly at the same time you still have a problem. A vessel approaching won't know whether they are overtaking or crossing and whether they should give-way or stand-on.

You should also check to make sure that your masthead light disappears at the same time each sidelight disappears and they both disappear when the stern light appears.

Check your sidelights from dead ahead. You should see both red and green. However, by moving toward one side just 1-3º you should then see only one light. If you still see two lights, an approaching vessel won't be able to tell which direction your are going.

It is very important to be seen from a distance but also for an approaching vessel to be able to determine your direction of travel.

When boating at night remember the following: "When two lights you see ahead turn your helm and show your red".

