Catalina Yachts
MORGAN DIVISION

CATALINA 400 MKII

OWNER'S MANUAL

Revised 6/5/00

FOREWORD

Congratulations on the acquisition of your new Catalina 400. All Catalina yachts are designed and built with care using quality materials to ensure that you have years of sailing enjoyment with a minimum of upkeep and maintenance.

Before attempting maintenance or operation of your Catalina 400, please read the Catalina Yachts Limited Warranty booklet and fill out the enclosed warranty registration card.

The registration card enables Catalina to inform you of developments and modifications to enhance the performance or comfort of your yacht. It is also important to be able to contact owners to comply with Coast Guard notification requirements.

The launching and rigging of the Catalina 400 should be handled by experienced boat yard personnel under the direction of your authorized dealer. After the boat is launched, the dealer will complete the last stages of rigging and mast tuning.

The index page lists the contents of this manual. Warranties and information regarding installed optional equipment have been included when available and applicable.

Maintaining your yacht properly can become a satisfying part of your sailing activities. A regular inspection is the best preventive maintenance. It will help keep your boat safe and in good condition while in use, and ensure peace of mind when the boat is left unattended.
Take good care of your boat and take the time to learn and practice good seamanship.

PREFACE

This manual is intended and supplied to help owners of Catalina 400's understand their boats and answer common questions about maintenance and systems design specific to the Catalina 400.

This manual is not intended to provide sailing instructions. It is recommended that the operator consult books written for that purpose, or take sailing lessons or courses to gain the knowledge necessary for the safe operation of the vessel.

The systems descriptions and illustrations in this manual apply to boats built at the time of publication. Our policy of constant improvement necessitates that changes have been made to the Catalina 400 since its introduction. Therefore, these illustrations and descriptions may not apply to boats built before the time of publication.

Owners of earlier hulls, who have questions not answered herein should consult their local Catalina dealers, or write to Catalina Yachts. Please include your hull number in all correspondence.

The maintenance check lists contained within this manual are intended as guidelines for boats in private service under typical conditions.

Climate and use will vary and may require additional or special maintenance. Consult with your local boat yard or Catalina dealer for specific maintenance and precautions recommended for your purposes and climate.

Caution: The aluminum and other metal parts conduct electricity. Coming in contact with or near an electrical power line or lightning can cause severe injury or death. Stay away from overhead electrical power lines when sailing and/or launching the boat.

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Catalina 400 Mk II Specifications
Rev: 5/5/03

PRINCIPAL DIMENSIONS

Length Over All	41' 6"	(12.65 m)
Length of Hull	40' 6"	(12.34 m)
L.W.L.	36' 6"	(11.13 m)
BEAM	13' 6"	(4.11 m)
Distance from W/L to masthead:	58' 0"	(17.68 m)
Theoretical hull speed	8.1 knots	

WING KEEL

Draft	5' 4"	(1.63 m)
Ballast	8000 lbs.	(3629 kg)
Designed weight	20500 lbs.	(9299 kg)
Disp/Length	188.2	
Sail Area/displacement:	17.26	

FIN KEEL

Draft	6' 11"	(2.11 m)
Ballast	7200 lbs.	(3266 kg)
Designed weight	19700 lbs.	(8936 kg)
Disp/Length	180.9	
Sail Area/displacement:	17.72	

RIG MEASURES

Mainsail, Rated:	400 ft^2	(37.16 m^2)
Total w/100% Foretriangle:	808 ft^2	(75.06 m^2)
I =	52'- 8"	(16.05 m)
J =	15'- 6"	(4.72 m)
P =	47'- 0"	(14.33 m)
E =	17'- 0"	(5.18 m)

ICE BOX

(1) 3 ft^3 (0.08 m^3) ,
(1) 2.5 ft^3 (0.07 m^3)

RATINGS

PHRF (May vary by area)
IMCI (CE) Boat design category: "A"

TANKAGE AND CAPACITIES

Water: Fwd.	55 Gal.	(208 lt.),
Aft.	32 Gal.	(121 lt.),
Water heater, electric & engine heat exchanger,	20 Gal.	(75 lt.)
Total Water:	107 Gal.	(405 lt.)
Holding Tank: Fwd.	20 Gal.	(75 lt.),
Aft	18 Gal.	(68 lt.)
Fuel:	44 Gal.	(167 lt.)

L.P.G., 10 lb. (4.54 kg) Aluminum tank W/ Solenoid
Berths: 2 Cabin: (1) Double, fwd. & aft; (1) convertible double stbd., main salon.
3 Cabin: Same as 2 cabin except the aft cabin has been converted to (2) doubles.

HEAD ROOM

Max: 6' 11" (2.11 m)

ENGINE AND CONTROLS

Yanmar 4JH3BE, 56 HP (41.8 kW) Diesel, 4 cyl., 121.74 in^3 (2.0 lt.) , fresh water cooled.
Approx fuel consumption:
1.25 GPH (4.7 LPH) @ 2800 RPM.
Twin Pedestal steering W/ 32" (81.28 cm) Destroyer wheel.
Compass: Ritchie FN-201.

PROPELLER

3 Blade 18x12 (45.72 cm x 30.48 cm)

RIGGING

Double Spreaders in line.
Shrouds:

Intermediate	1/4" (0.64 cm) wire 1x19
Upper	3/8" (0.95 cm) wire 1x19
Fwd. & Aft Lowers	5/16" (0.79 cm) wire 1x19
Forestay	3/8" (0.95 cm) wire 1x19
Backstay	5/16" (0.79 cm) wire 1x19

Rope Halyards, Low Stretch, led aft.
Solid Boom Vang, Spring Loaded.

WINCHES

Primaries: #54 Lewmar, Chr. Bronze, Self Tailing.
Halyard: #40 Lewmar, Chr. Bronze, Self Tailing.

ALL SPECIFICATIONS ARE APPROXIMATE

Note: Specifications And Or Equipment Subject To Change Without Notice.

EQUIPMENT LOG

1. Pedestal Steering
2. Headsail Roller Furling
3. Pressure Water Pump
4. Marine Toilet
5. Compass
6. Batteries
7. Winch Manuals
8. Engine Manual
9. Knot Meter and Log
10. Galley Stove and Oven
11. Fuel Filters
12. Bilge Pump
13. Galley Foot Pump
14. Running Lights
15. Anchor Windlass
16. Engine Tachometer Calibration Instructions
17. Anti-Fouling Bottom Paint
18. Gel Coat
19. Mainsail Flaking System
20. A.C./D.C. Power Inverter
21. Navigation and Communication Electronics
22. Stereo and Entertainment Electronics

NOTE: Some manufacturers enclosures may not be included with all manuals, depending upon optional equipment selection.

2.0 COMMISSIONING CHECK LIST

2.1 PRE-LAUNCH CHECK:

1.____ Shaft turns freely by hand, zinc collar installed if required.
2.____ Check intake hoses and clamps.
3.____ Check all through-hull fittings.
4.____ ___engine, muffler and exhaust line OK.
5.___ Bottom clean, paint OK.
6.____ Hull sides clean, gel coat OK.
7.____ Decks clean, gel coat OK.
8.____ Teak cleaned and oiled.
9.____ Interior finished, oiled, clean.
10.____ Cushions, carpeting, curtains, clean and in place.
11.____ Table converts to berth OK, dinette, traditional table stows OK.
12.____ Hatch lids present and fit OK.
13.____ Lifelines and pulpits rigged and OK.
14.____ Spreaders taped and drilled at base end, upper shroud wired to tip end and taped or boots installed.
15.____ Standing rigging pinned to mast.
16.____ Rigging lengths verified with check list in kit.
17.____ Mast and boom inspected; cotter pins, sheaves, tangs, spreaders OK.
18.____ Mast lights checked before mast stepped.
19.____ Check over head for electrical wires which may interfere with the space required to raise the mast to its full upright position. If there are wires of any kind, anywhere near the boat, DO NOT RAISE THE MAST. Move boat to another location away from any wires. Contact with wires can be fatal.
20.____ Masthead sheaves lubricated and rotate freely.

2.2 IN WATER CHECK:

2.2.1 ELECTRICAL:

1.____ Electrical equipment operational:
____Running ____Cabin ____Bow ____Anchor
____Spreaders ____Pressure Water
____Refrigeration
____Macerator Pump ____Master
2.____ Shore power outlet OK.
3.____ Check battery switch #1____ #2____ OK.
4.____ Check battery fluid level.
5.____ Check battery terminals for tightness.
6.____ Check battery tie-down straps.

2.2.2 PLUMBING:

1.____ No leaks at through hull fittings with seacocks open.
2.____ Fill all water tanks.
3.____ Check all water tanks at fittings, and vent for leaks.
4.____ Test all faucets and foot pumps for leaks.
5.____ Check for leaks at sink drain fittings, sink drains OK.
6.____ Put water in ice box and check for proper drainage.
7.____ Check bilge pump operation, handle present.
8.____ Check head by flushing and pumping.
9.____ Check shower sump drain line.
10.____ Check holding tank, pump vent and fitting.
11.____ Check head and pump handle for leaks.
12.____ Main hatch no leaks, slides freely, hatch boards fit OK.
13.____ Cabin windows hose tested for leaks.
14.____ Anchor locker drains OK, no leaks at bow lights.
15.____ Stove operates OK: Check tank, fuel line, burner and oven.

2.0 COMMISSIONING CHECK LIST - (Continued)

2.2.3 RIGGING AND HARDWARE:

1._____ Mast stepped.
2._____ Pin, tape and tune standing rigging.
3._____ Backstay adjuster, whisker pole, spinnaker gear, boom vang, OK.
4._____ Blocks, cars, cleats rigged OK.
5._____ Test all winches, winch handles present.

2.2.4 ENGINE:

1._____ No leaks: shaft, rudder, stuffing box, or shaft log.
2._____ Propeller shaft coupling bolts lockwired and coupling is secured.
3._____ With fuel tanks full, no leaks at fill pipes, overflow vent, or any fuel line connections.
4._____ With coupling disconnected, engine and shaft alignment OK -- Recheck alignment after rigging tuned.
5._____ Transmission oil level OK.
6._____ Crank case oil level OK.
7._____ Fuel valves open, bleed and prime lines for diesel engine.
8._____ Check that shaft is coupled and aligned to .003" maximum tolerance.
9._____ Engine wiring OK, connections tight.
10._____ Throttle control cable travel and brackets OK.
11._____ Clutch control cable travel and brackets OK.
12._____ Start engine.
13._____ Exhaust water flow OK.
14._____ No leaks in fuel lines at fittings, fuel filter, fuel pump or injectors.
15._____ No engine or oil leaks.
16._____ Idling speed set ____R.P.M.'s.
17._____ Shutoff cable for diesel engine OK.
18._____ Check forward and reverse shifting lever friction OK.
19._____ Check engine instruments for operation, tachometer for calibration.
20._____ Run in gear for ten (10) minutes minimum.
21._____ Recheck packing gland after engine stops for proper lubrication.
22._____ Bilge blower and vent system OK.
23._____ Exhaust system, check for leaks, insulation in place.

2.3 OPERATION CHECK LIST:

1._____ Emergency tiller trial fitted and operational.
2._____ Pedestal steering operation OK, Compass OK.
3._____ Sails and halyards OK.
4._____ Boat performance under power and sail OK.

2.3.1 FINAL CHECK:

1._____ All accessory equipment operates OK.
2._____ All boat, engine, and accessory literature, and/or manuals aboard.
3._____ Warranty cards completed and mailed, owner registration card attached, owner informed of warranty responsibilities.
4._____ Engine warranty card completed and mailed.

3.0 YACHT SYSTEMS

3.1 RIGGING:

3.1.1 STEPPING THE MAST:

1. Before stepping the mast check all standing rigging lengths against the checklist on Page 10.

2. Check all mast light wiring, be sure the masthead anchor light, steaming light and deck light function. The wires exiting at the base of the spar should be taped up to prevent damage when the spar is set on the step.

3. Prepare to step the mast in the following sequence:

   a) Check all rigging lengths and inspect all end fittings.
   b) Attach all shrouds, forestay and backstay. Tape clevis pins and spreader tips, check all halyards and secure to mast.
   c) Check mast wiring and mast light wiring at mast step.
   d) Before mast contacts maststep casting make electrical connections at base of mast for mast lights and check circuits.
   e) Tune rigging at dock and when under sail.

TUNING THE MAST

3.1.2 To optimize performance and minimize the chance of mast failure, your mast should be tuned properly. The aims of rig tuning are as follow:

A. Ensure a straight mast athwartship.
B. Control sail shape.
C. Achieve proper helm balance in a variety of conditions.
D. Spread loads appropriately on spars, rigging, and boat.

1. First, set mast rake at 0 degree rake to ensure proper performance of the spreaders in conjunction with the shrouds. Increasing the rake of the mast allows the spreaders to fall aft of the chainplates, which neutralizes their proper function. To determine the rake of the mast, hang a weight from the main halyard and adjust the headstay turnbuckle so that the weight falls just to the aft edge of the mast. Make sure that the boat is level and that there is no bend in the mast.

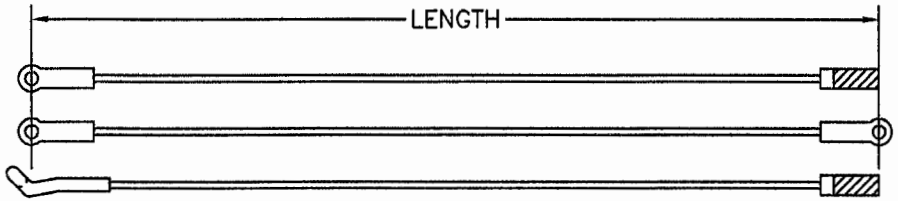
2. Since the boat is deck stepped, you need to induce prebend to achieve the greatest performance for your rig and sails. Inducing prebend in the mast will increase performance of your mainsail and stabilize the middle part of the mast and thus minimize rig pump in a seaway. Before tightening your lowers, induce prebend by putting a good amount of backstay, which should pull the mast forward. To also aid in this process you can attach your main halyard to the end of your boom and cleat off the halyard so that the boom is resting parallel to the water. You can then put tension onto your boom vang to help push the mast forward in its mid section. With the

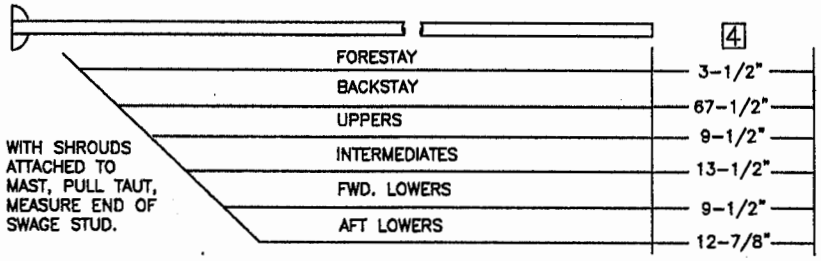
(Continue Page 17)

– RUNNING RIGGING –

ITEM	QTY.	LENGTH	MATERIAL	NOTES
SPINNAKER SHEETS	2	80'	1/2" DIA. Y.B.	LGE. SNAP SHACKLE W/ SPINN. OPTION
BOOM VANG	1	45'	3/8" DIA. Y.B.	W/ GARHAUER VANG
MAINSHEET	1	100'	1/2" DIA. Y.B.	WHITE
GENOA SHEETS	2	65'	1/2" DIA. Y.B.	WHITE
MAIN HALYARD	1	125'	1/2" DIA. ULS. Y.B.	BLUE, HEADBOARD, SHACKLE
GENOA HALYARD	2	125'	1/2" DIA. ULS. Y.B.	1 W/RED, 1 GRN., LGE. SNAP SHACKLE
TRAVELER	2	33'	5/16" DIA. Y.B.	WHITE
BOOM TOP. LIFT	1	125'	3/8" DIA. Y.B.	
SPINNAKER HALYARD	1	130'	1/2" DIA. ULS. Y.B.	BLUE, LGE. SNAP SHACKLE– OPTION
1st REEF LINE	1	60'	7/16" DIA. Y.B.	W/STD. MAST
2nd REEF LINE	1	90'	7/16" DIA. Y.B.	

NO.	REVISIONS	DATE
1	REVISED FURLER BACKSTAY LENGTH, WAS SAME AS STANDARD	06/15/01
2	REVISED BACKSTAY LENGTH, WAS TWO DIFFERENT LENGTHS FOR STANDARD AND FURLER.	05/08/02
3	SHORTENED FORESYAY FOR SS–12 3/4" AND AR–3/4" TURNBUCKLE TO ACCOMADATE 3/4" PIN CONNECTION FOR SHAFER FURLER.	09/25/03
4	CORRECTED OVERHANG LENGTHS. PREVIOUSLY SHOWN INCORRECT.	11/05/03
5	SHORTEN BRIDLES 1" TO ALLOW MORE ADJUSTMENT. FIRST HULL 297	01/23/04





– STANDING RIGGING –

SHROUD	QTY.	LENGTH	MATERIAL	TOP FITTING	BOTTOM FITTING
FORESTAY	1	[3] 51' 10–1/2"	3/8" 1X19 S.S.	5/8" MARINE EYE	SS 12–3/4"
BACKSTAY	1	[1][2] 2' 2–5/16"	3/8" 1X19 S.S.	MARINE EYE 5/8" PIN	5/8" MARINE EYE
UPPERS	2	51' 2–1/16"	3/8" 1X19 S.S.	GIBB SHROUD TERMINAL	5/8" X 18 STUD
INTERMED.	2	35' 1–3/8"	1/4" 1X19 S.S.	GIBB SHROUD TERMINAL	1/2" X 20 STUD
FWD. LOWERS	2	17' 7–3/4"	5/16" 1X19 S.S.	GIBB SHROUD TERMINAL	5/8" X 18 STUD
AFT LOWERS	2	18' 6–5/8"	5/16" 1X19 S.S.	GIBB SHROUD TERMINAL	5/8" X 18 STUD
BRIDLE	2	54' 9–7/16" [5]	5/16" 1X19 S.S.	MARINE EYE 5/8" PIN	5/8" X 18 STUD

NOTES:
1) ALL WIRE TO BE STAINLESS STEEL 1X19
2) USE WITH CHARLESTON SPARCRAFT F740–760 SECTIONS
3) FORESTAY INCLUDES ALLOWANCE FOR FURLING

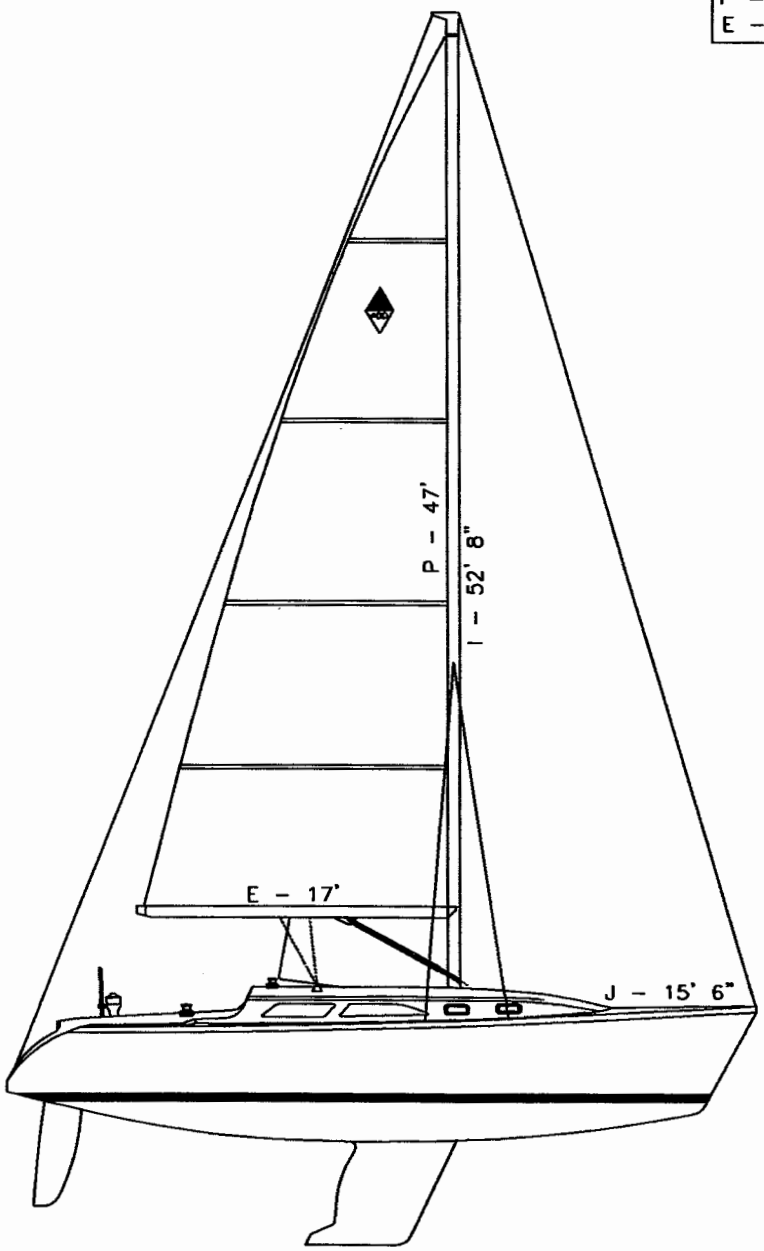
CHECK OVERHANG LENGTHS BEFORE STEPPING

CATALINA YACHTS/MORGAN DIVISION
7200 BRYAN DAIRY ROAD
LARGO,FLORIDA

RIGGING LENGTH SCHEDULE STD SPARCRAFT CHARLESTON

DESIGNED BY:	DATE: 1/22/99	DRAWING NO: 400–34052–5
DRAWN BY:		
CHECKED BY:	SCALE: N/A	
APPROVED BY:		

SAIL PLAN DIMENSIONS	
MAIL SAIL 400ft.	37.16mm
100% FORE A 408ft.	37.90mm
TOTAL SAIL AREA 808ft.	75.07mm
I – 52' 8" -----	16.05mm
J – 15' 6" -----	4.72mm
P – 47' -----	14.33mm
E – 17' -----	5.18mm



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
GENERAL TOLERANCES
ANGLES : ±0.5'
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63
DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727)544-6681

SCALE: NONE	APPROVED BY:	DRAWN BY: GTB
DATE: 8/28/02	FILE: 400350070	
TITLE: SAIL PLAN		SIZE:	SHEET: 1/1
BOAT: CATALINA 400		DRAWING NUMBER: 400-30001-0

NO	REVISIONS	DATE	BY
1	UPDATE TO SUIT NEW REQUIREMENTS.	05/12/01	C.D.

NOTES:

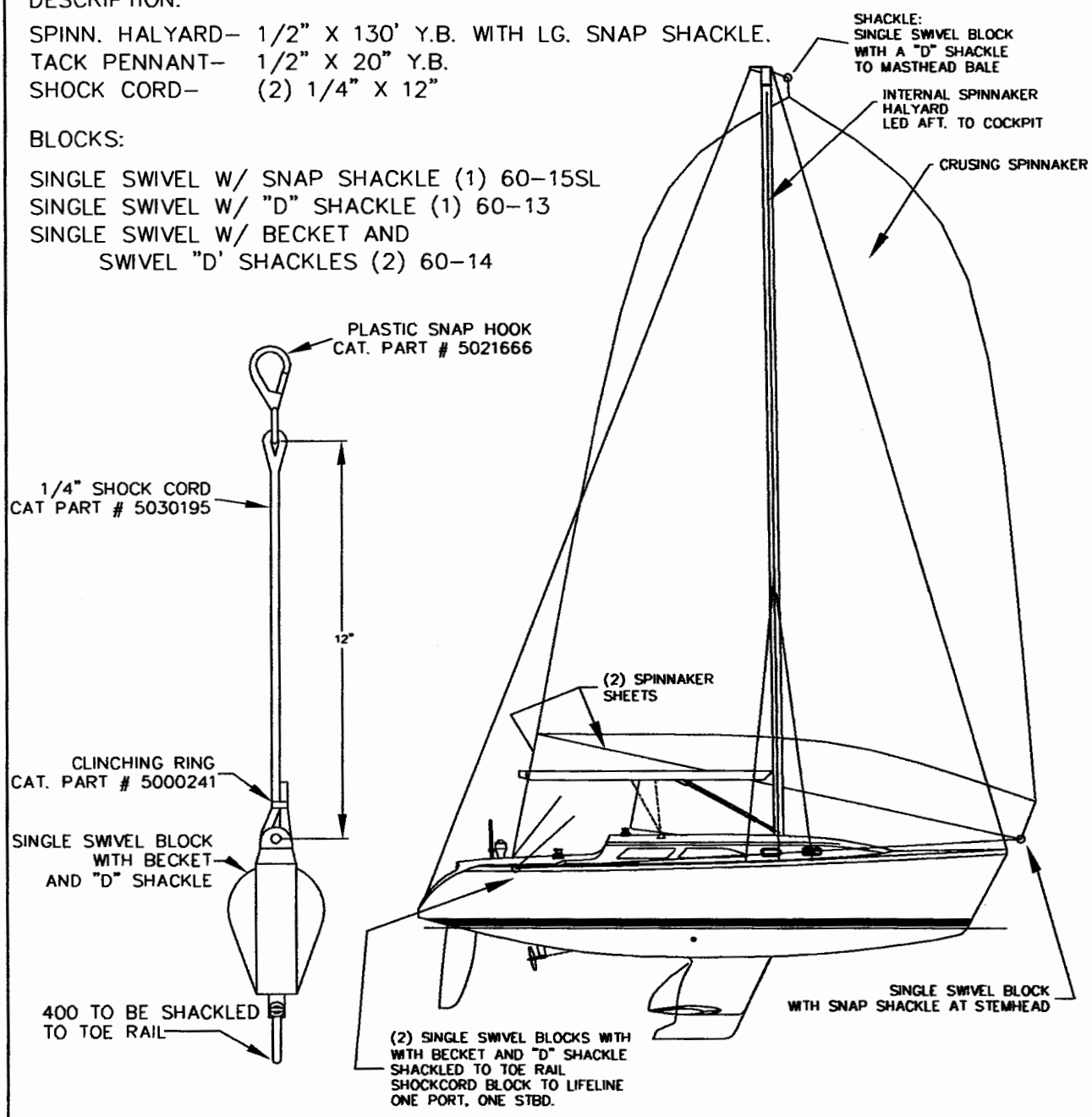
1) LEAD SPINNAKER TACK PENNANT THRU
   SINGLE SWIVEL BLOCK AND
   AFT TO MOORING CLEAT ON FORE DECK
2) SHOCK CORD AFT SHEET BLOCKS TO LIFE LINES
3) BLOCKS ARE GARHAUER SERIES 60

DESCRIPTION:

SPINN. HALYARD– 1/2" X 130' Y.B. WITH LG. SNAP SHACKLE.
TACK PENNANT– 1/2" X 20" Y.B.
SHOCK CORD– (2) 1/4" X 12"

BLOCKS:

SINGLE SWIVEL W/ SNAP SHACKLE (1) 60–15SL
SINGLE SWIVEL W/ "D" SHACKLE (1) 60–13
SINGLE SWIVEL W/ BECKET AND
SWIVEL "D' SHACKLES (2) 60–14



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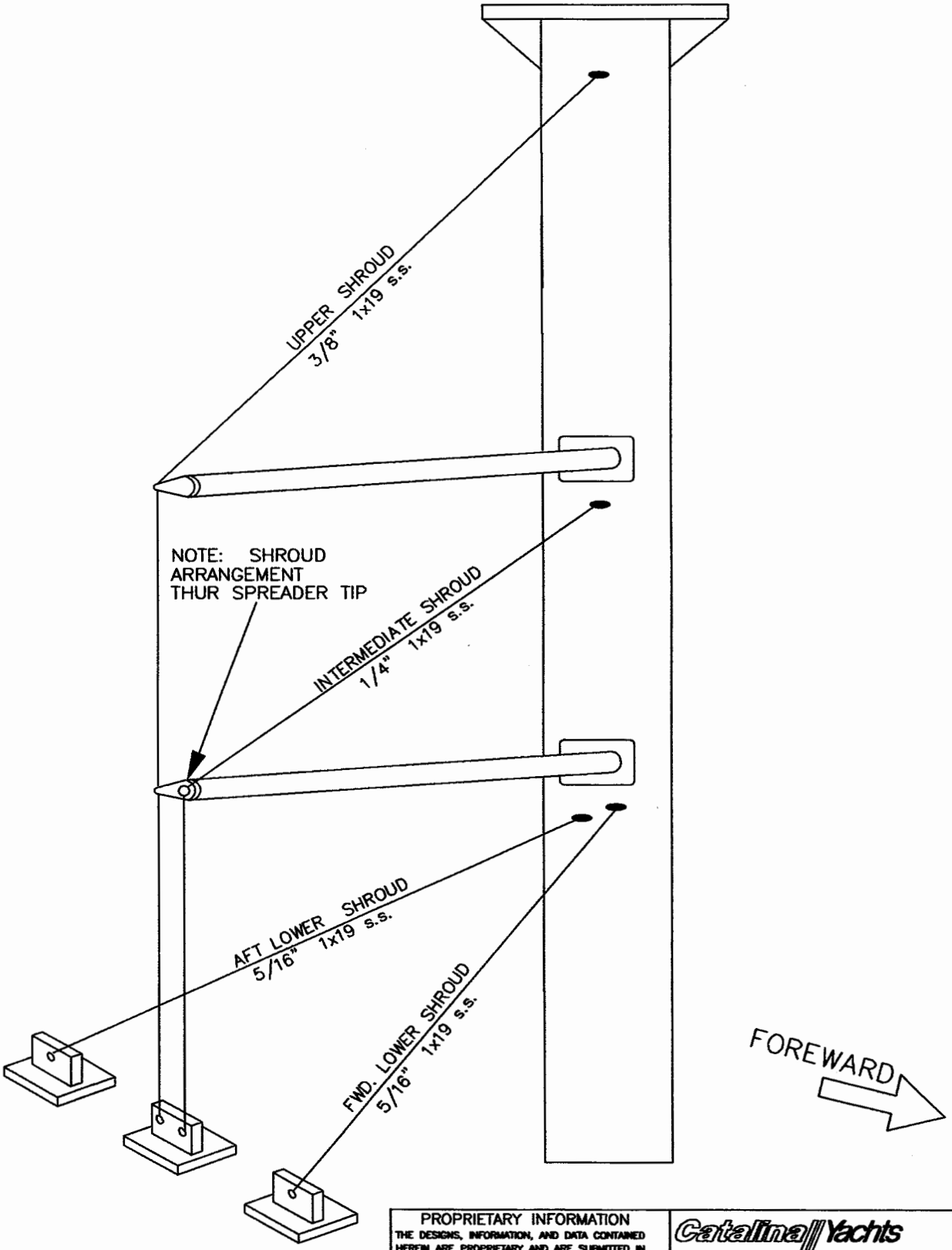
X.XXX : ±0.005
SURFACE FINISH: 63
DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DIARY RD.
LARGO, FL. 33777
(727) 544–6661

SCALE: N.T.S.	APPROVED BY:	DRAWN BY G.T.B.
DATE: 04/23/01		REVISED 07/07/03

SPINNAKER OPTION RIGGING

BOAT: CATALINA 400	DRAWING NUMBER 35050–1



Catalina Yachts
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LARGO, FL. 33777
(727)544-6681

SCALE: NONE	APPROVED BY:	DRAWN BY: GTB
DATE: 8/28/02	FILE: 400350070	

TITLE: SHROUD ARRANDEMENT — SIZE: | SHEET: 1/1

MODEL: CATALINA 400 — DRAWING NUMBER: 400-34006-0

combination of both backstay and vang tension you should be able to achieve the proper amount of pre bend in your mast. As you tighten the lower shrouds the degree of prebend can be taken out accordingly.

3. For shroud adjustments, make sure that there is enough backstay to give a slight aft bend in the mast. Next the shrouds should be adjusted. First tighten your cap shrouds and ensure that the mast is in the column by taking your main halyard and checking that the distance from the masthead to each chainplate is equidistant. Once this is achieved and the cap shrouds are tensioned, you can now adjust the lower shrouds. Follow the same procedure as you did with the cap shrouds and as you tighten the lower shrouds a slight amount of prebend will be taken out. At this stage the cap shrouds should be tighter than the lowers. The intermediate shrouds should be the last shrouds adjusted. The intermediates should be the least tensioned shroud on the rig. As a gauge, they should be slightly less tensioned than the lowers. Check for mast straightness by sighting up the sail track and adjust the shroud turnbuckles accordingly. Slightly ease the tension in the backstay to double check that you are happy with the fore, aft, and sideways bend of the mast, (there should be of course none of the latter).

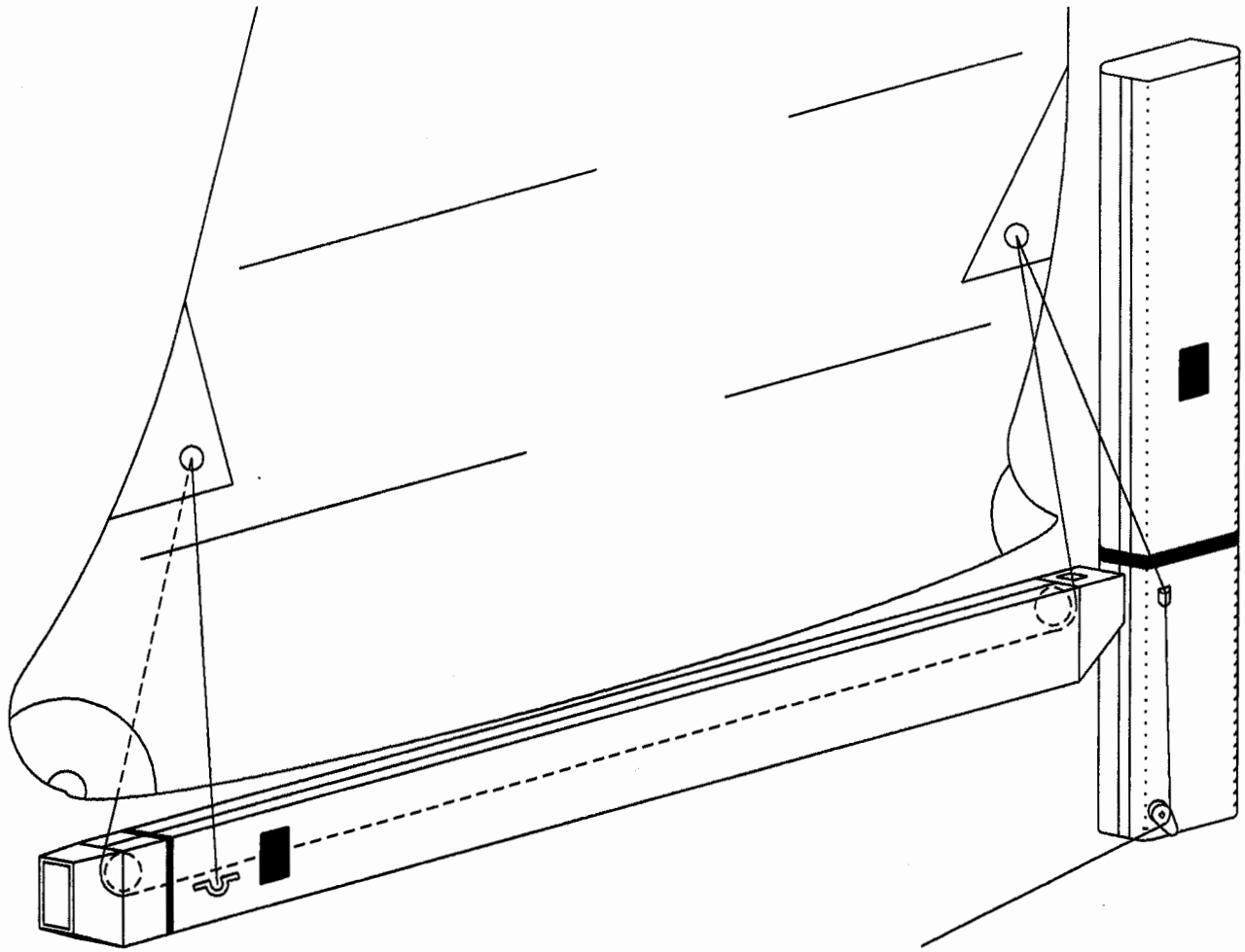
4. The shrouds should be fine tuned while sailing to weather in a moderate breeze. Always adjust the shrouds starting from the lowers and progressing up and be sure to check for mast straightness on both tracks. Check the leeward rigging tensions as follows:

A. Cap shrouds and lowers fairly tight with a slight decrease in tension.
B. Intermediates just about to go slack.
C. Continue tacking to ensure equal tension on all leeward shrouds on both tracks.
D. Back at the dock; check that the mast is still straight athwart ship.

3.1.9 MAIN SAIL REEFING

Reefing should always be done before it becomes necessary. Some sailors use the rule of thumb that if the thought of reefing occurs to you, it is time to reef. Sailing at extreme angles of heel, 20 degrees or more, is not efficient, fast or comfortable.

Your Catalina is equipped with single line reefing, for reefing the mainsail. The system consists of a line tied around the boom and reeved through the cringles, internal boom sheaves, and blocks as shown in the illustration. It is controlled through the port cabin top winch. A second reef line may be installed in a like manner, but to the opposite side of the boom, and led to the starboard side of the cockpit.



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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

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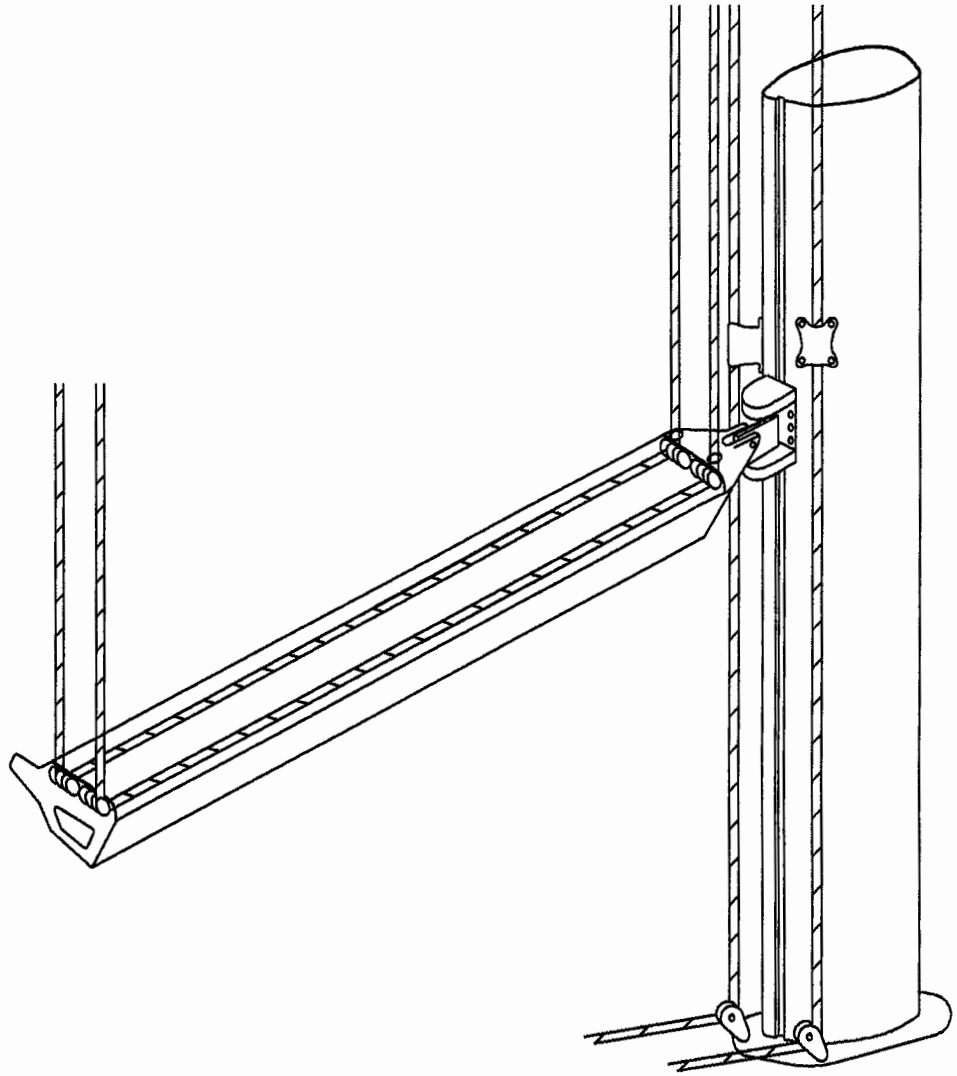
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63

DO NOT SCALE DRAWING

TITLE:
SINGLE LINE REEFING SYSTEM
CHARLSTON SPAR

BOAT: CATALINA 400			DRAWING NO: 400-35052-0		
DESIGNED BY: G.D.	CHECKED BY:		SCALE: NONE	SIZE A	SHEET 1/1
DRAWN BY: C.D.	APPROVED BY:		DATE: 6/23/00		



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

GENERAL TOLERANCES
ANGLES : ±0.5°
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X.XXX : ±0.005
SURFACE FINISH: 63

DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727)544-6681

TITLE:
DOUBLE LINE REEFING SYSTEM
CHARLSTON SPAR

BOAT: CATALINA 400			DRAWING NO: 400-35052-1		
DESIGNED BY: GTB	CHECKED BY:		SCALE: NONE	SIZE: A	SHEET: 1/1
DRAWN BY: GTB	APPROVED BY:		DATE: 09/04/02		

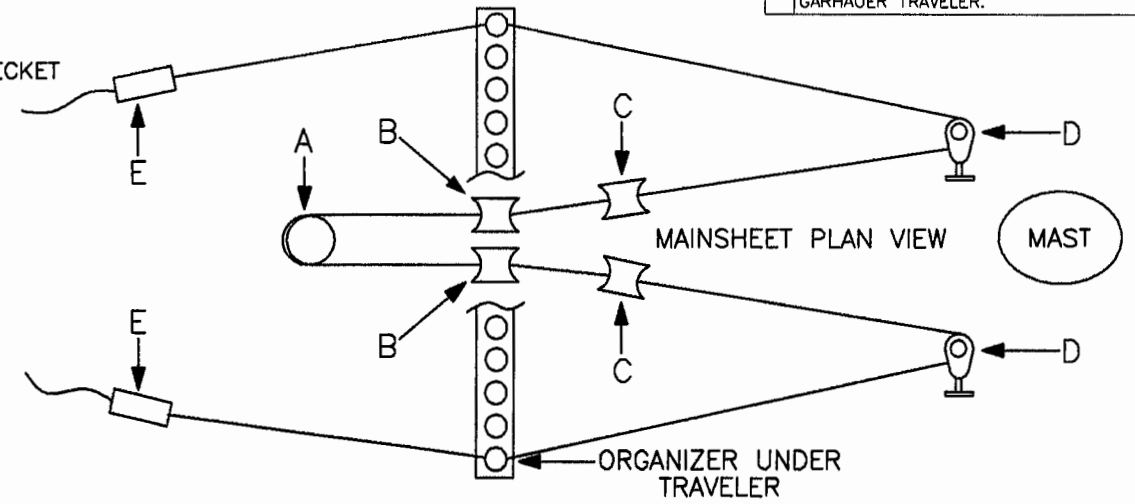
NO	REVISIONS	DATE	BY
1	STAND UP SWIVEL WAS PIVOT LOW LEAD	10/17/94	C.D.
2	ADD DETAIL F	05/17/96	C.D.
3	REVISED BLOCK-B TO SUIT NEW GARHAUER TRAVELER.	09/05/03	C.D.

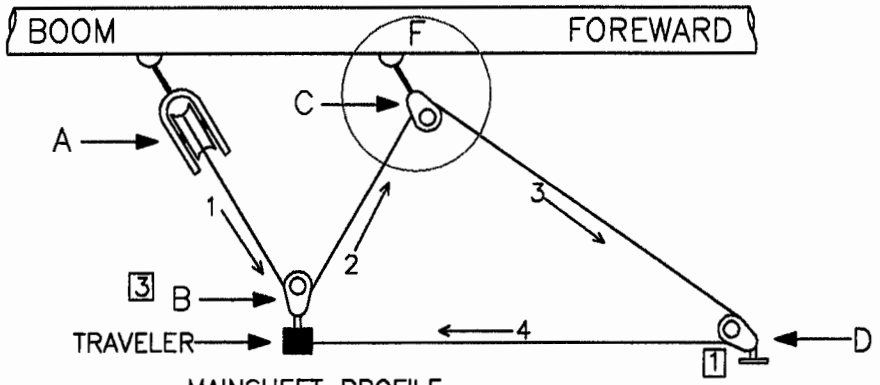
MAINSHEET PLAN

A – SINGLE FIXED DRIVE (QTY.–1)
B – SINGLE FIXED BLOCK (QTY.–2)
C – TWO SINGLE SWIVEL BLOCKS ON BECKET
D – SINGLE STAND–UP BLOCK
E – CLAM CLEAT W/SPRING GATE

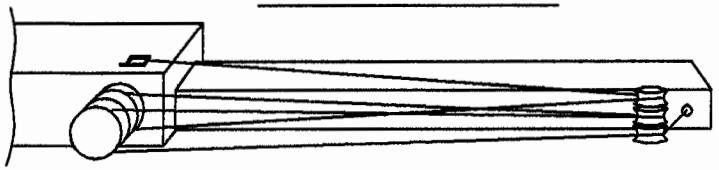
NOTE

DO NOT LEAD MAINSHEET THROUGH LOCK–OUT BALE ON CLAM.
THIS BALE IS USED TO PREVENT THE MAINSHEET FROM ACCIDENTLY ENGAGING IN CLEAT DURING NORMAL USE
USE CLEAT WHEN REEFING OR WHEN WINCH IS IN USE.





MAINSHEET PROFILE



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63
DO NOT SCALE DRAWING

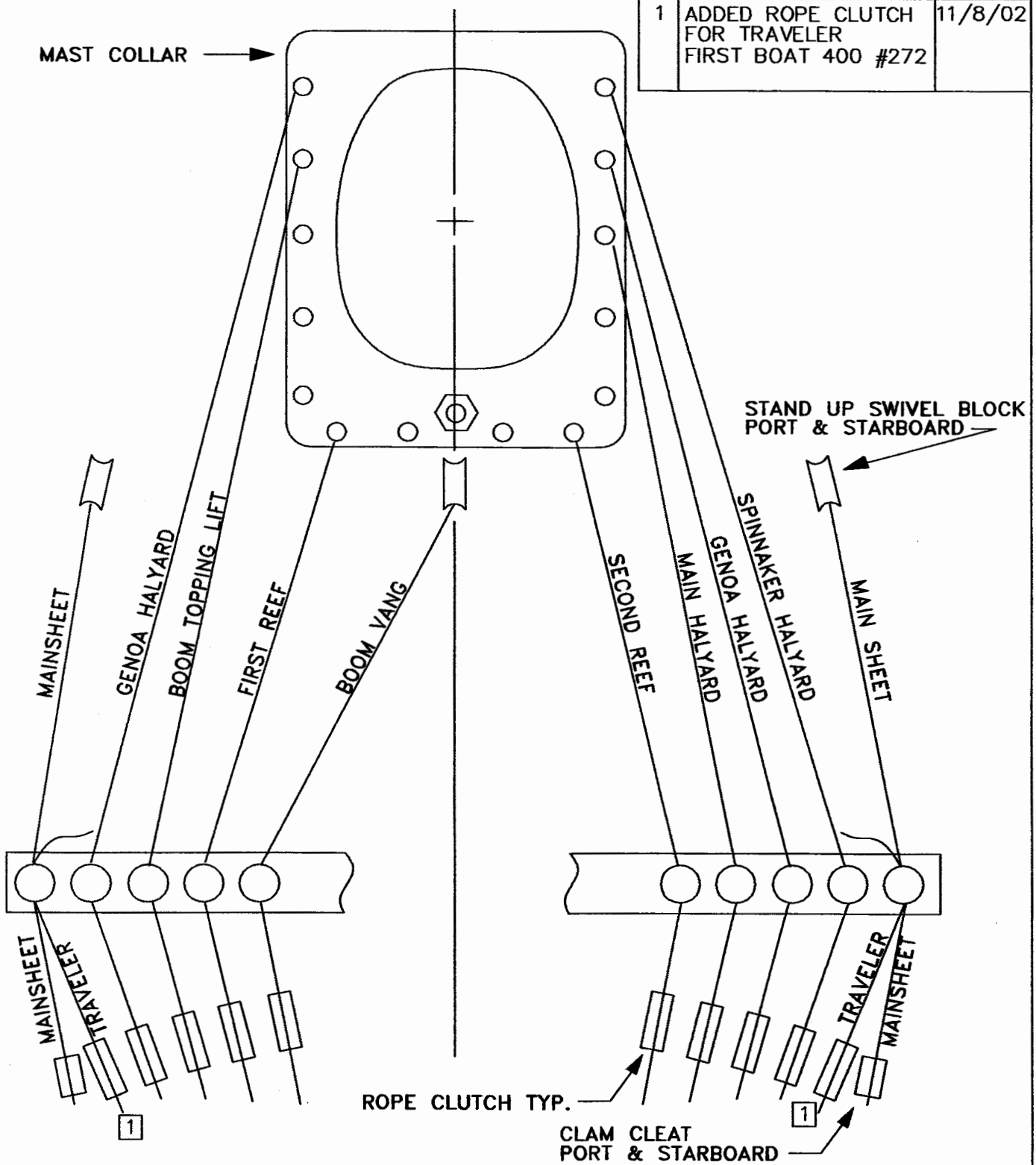
Catalina Yachts
7200 BRYAN DIARY RD.
LARGO, FL. 33777
(727) 544-6681

SCALE: N.T.S.	APPROVED BY:	DRAWN BY G.T.B.
DATE: 06/15/94		REVISED 07/07/03

MAINSHEET / TRAVELER ASSEMBLY

BOAT: CATALINA 400	DRAWING NUMBER 35001–3

NO.	REVISIONS	DATE
1	ADDED ROPE CLUTCH FOR TRAVELER FIRST BOAT 400 #272	11/8/02



NOTES

USE WITH CHARESTON SPAR NG 70 MAST SECTION

Catalina Yachts

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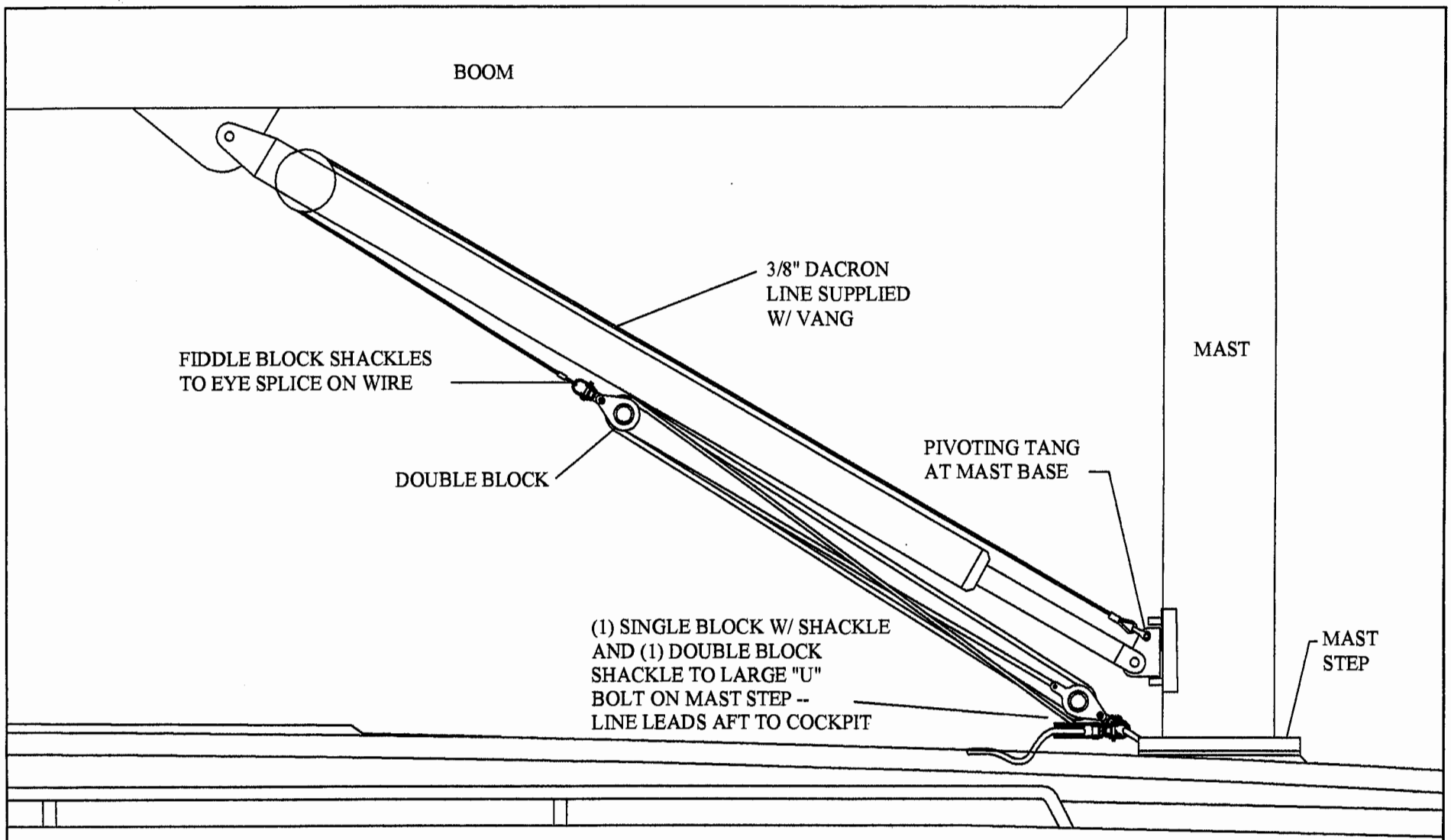
SCALE: NONE	APPROVED BY:	DRAWN BY: GTB	
DATE: 12/28/95	FILE: 400-35010-0		
TITLE: CABIN TOP HALYARD ARRANGEMENT		SIZE:	SHEET: 1/1
MODEL: CATALINA 400		DRAWING NUMBER: 400-35010-1	



NOTES:

LINE TIED OFF ON SINGLE BLOCK BECKET AND LED TO DOUBLE BLOCK. THE LINE IS LED BACK DOWN TO THE SINGLE BLOCK W/ BECKET AND RETURNED TO THE DOUBLE BLOCK. THE LINE IS THEN LED TO THE SINGLE BLOCK AND BACK THROUGH DECK ORGANIZER TO A STOPPER.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH:

DO NOT SCALE DRAWING

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7200 BRYAN DAIRY RD.
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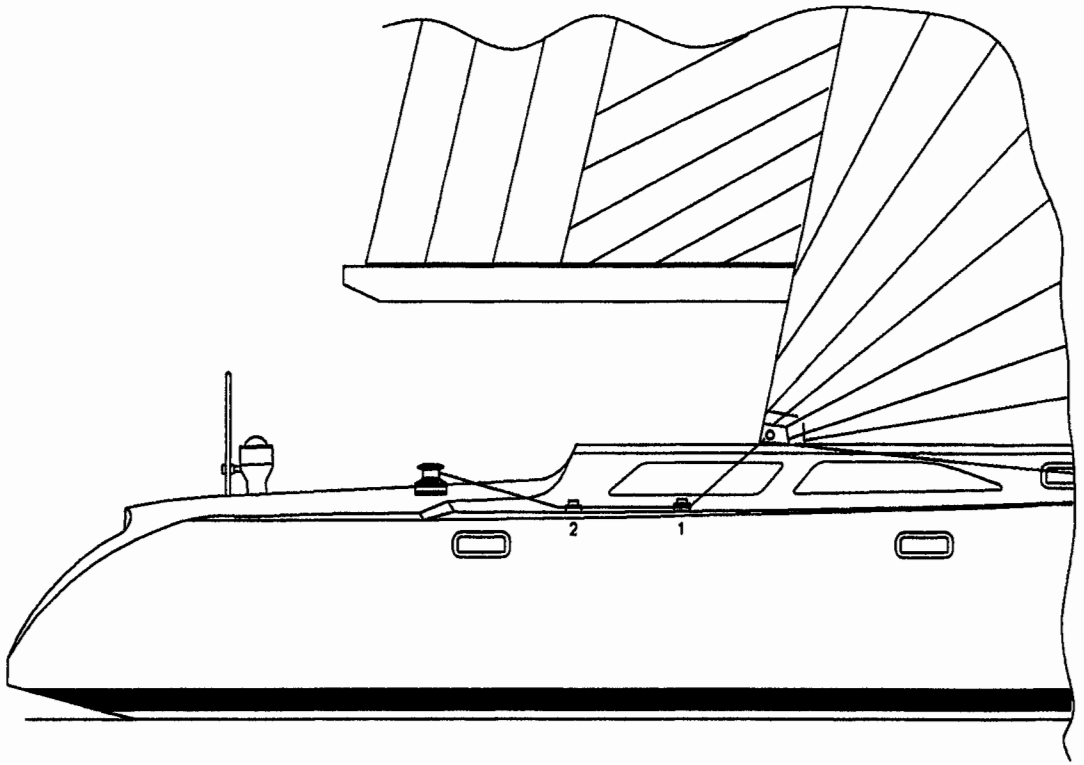
SCALE: NONE	APPROVED BY:	DRAWN BY: GTB
DATE: 09/09/02		REVISED

BOOM VANG- STANDARD GARHAUER

BOAT:	DRAWING NUMBER
CATALINA 400	400-35054-0

REV	DESCRIPTION	DATE	APPROVAL



NOTE

1. POSITION GENOA CAR NUMBER ONE FOR PROPER LEAD
2. POSITION GENOA CAR NUMBER TWO FOR PROPER LEAD TO WINCH

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63

DO NOT SCALE DRAWING

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SCALE: NONE	APPROVED BY:	DRAWN BY: C.D.
DATE: 7/28/94	FILE: 400350070	

TITLE: GENOA SHEET LEADS

SIZE: B | SHEET: 1/1

BOAT: CATALINA 400

DRAWING NUMBER: 400-35004-0

3.0 YACHT SYSTEMS - (Continued)

Tie a loop of line around the main boom with a bowline, through the cringles at the first reef and into the boom on the starboard sheave. The line exits the starboard forward sheave and through the cringle in the sail at the first reef. Lead the line to the turning block at the base of the mast, through the organizer on deck and through the sheet stopper to the winch on the port side.

REEFING PROCEDURE:

1. Ease the mainsheet.

2. Release the main halyard on the starboard side of the cockpit, to a predetermined point. (Marking the halyard with ink or a colored thread into the line is helpful.) Recleat the halyard after lowering.

3. Pull the luff and leech cringles down to the boom by pulling the reefing line through the blocks with the port cockpit winch and cleat off.

4. Trim in the mainsheet.

5. Tie off remaining reef points with lines around boom.

6. Snug up the main halyard as required to flatten out the mainsail.

7. Ease the topping lift.

3.2 ELECTRICAL:

3.2.1 BATTERIES:

The standard electrical system is powered by 2 marine grade 12 volt, deep cycle 4D batteries. It may be equipt with an optional separate engine starting battery. Battery schematics for the standard and optional batterys are included in this manual. Attention should be given to maintaining the proper level of distilled water. Do not overfill. The batteries are located under the sole beneath the companion way opening.

The batteries are provided with a tie down to prevent tipping over at extreme angles of heel. Be sure these tie downs are fastened securely.

With proper care, the battery installed in your Catalina 400 will provide long and satisfactory service. Proper care is not difficult if a few basic points are kept in mind, as follows.

Your battery should be checked periodically for any cracks or breaks in the case or cover, and any cracks in the sealing compound. If there is any damage, the battery should be repaired at once.

WARNING: The electrolyte in a battery is a solution of sulfuric acid. If any should enter the eyes, rinse immediately with large amounts of fresh water, and seek medical attention. Electrolyte spilled on skin should be rinsed well with fresh water also. Even a small amount of electrolyte spilled on clothing will destroy the clothing.

ELECTROLYTE LEVEL:

The electrolyte level in a battery should never be allowed to fall low enough to expose the plates. This not only results in a loss of battery capacity while the battery is low, but will cause hardening of the active material on the battery plates. This will result in a permanent loss of battery capacity.

CAUTION: Use only pure distilled water to replenish electrolyte levels. The water from many city water supply systems is unsatisfactory for battery use.

CHARGING THE BATTERY:

Before adding water, a hydrometer reading of the battery should be taken. If the reading shows the battery to be above 1.225 specific gravity, the battery has a sufficient charge. If the reading is below 1.225, the battery should be removed for bench charge.

IMPORTANT: Do not leave your batteries on charge for more than forty-eight (48) hours. If there is no rise in voltage or specific gravity in a period of two hours, further charging is useless and may damage the battery beyond repair.

Once charged, the battery should have a specific gravity of at least 1.260. If this cannot be reached, the battery should be inspected by a battery supplier.

The batteries should be checked often to ensure that they do not run down. Check that all battery cells keep an even fluid level and that the fluid is about 3/8" above the top of the separators.

If one or two cells have lower fluid levels, it is a good indicator that something is wrong with the battery, and it should be checked.

DISCHARGED STATE:

Leaving a battery in a discharged state for any length of time can also result in a permanent loss of capacity for the battery. Since it will freeze at relatively low temperatures, leaving it in the cold weather can destroy the battery.

CLEAN CONNECTIONS:

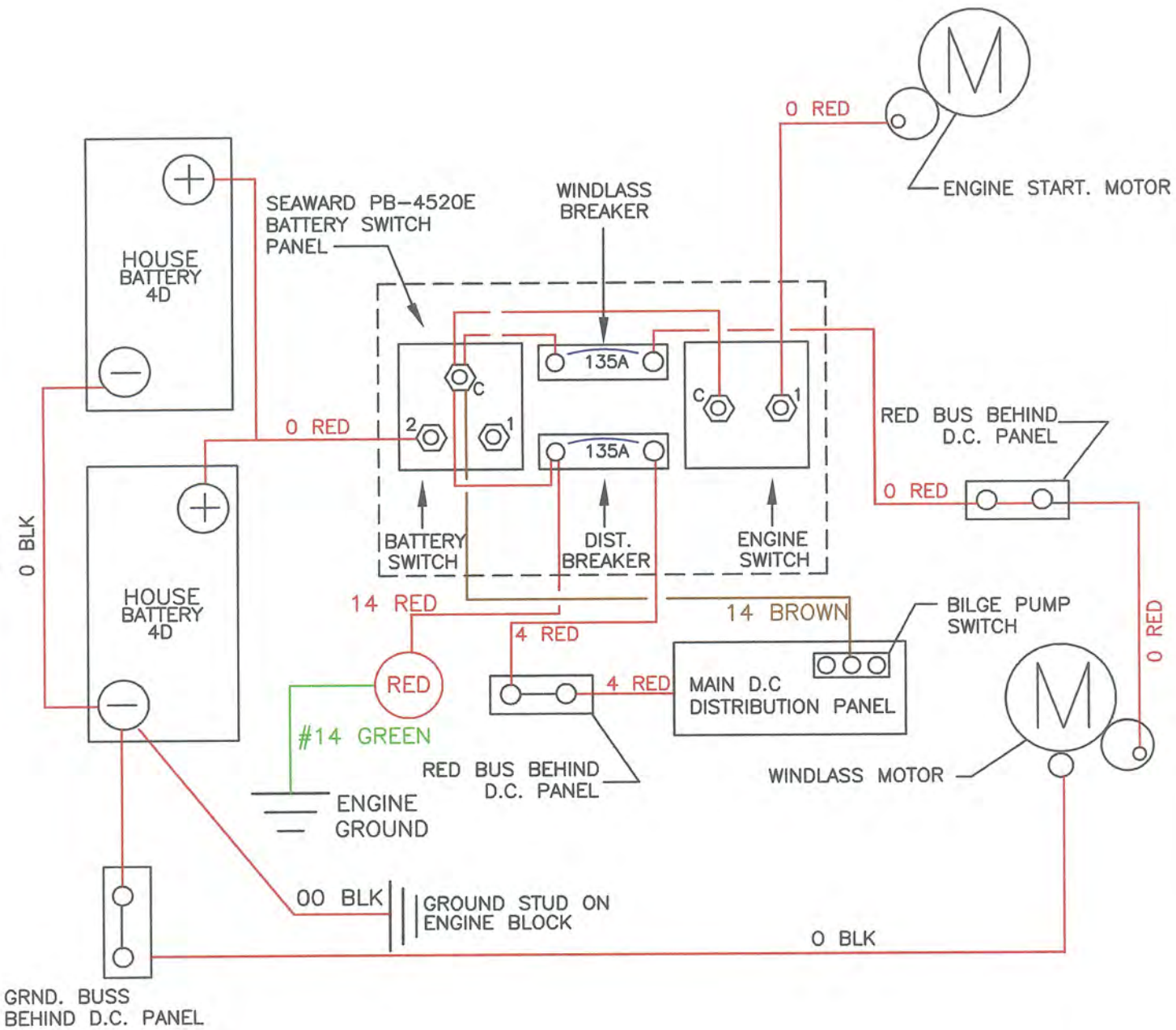
Keep battery connections clean and tight. A cupful of strong baking soda solution and a toothbrush will clean corrosion from the terminals and neutralize any spilled acid (do not allow any of the solution to enter the battery cells). A coating of petroleum jelly on the battery terminals will inhibit corrosion.

3.2.2 MAIN BATTERY SWITCH:

Electrical circuits are protected by breakers. The system is also controlled by a master switch. You should be sure that your boat is free of gasoline fumes before using the electrical system. Always run the blower for at least five minutes before starting the engine.

The circular battery switch has the markings 1, 2, and "ALL" as well as "OFF". You can selectively charge the batteries with the engine alternator. Many experienced sailors use battery #1 for electrical lighting needs and keep #2 in reserve for starting the engine.

When the engine is running, never pass through the "OFF" position to charge from one battery to the other or the alternator diodes will be burned out. Switching from one battery to another should only be done when the engine is stopped. If both batteries are of equal charge, keep the selector switch on "ALL" position, and use "ALL" to start the engine if both batteries are low.



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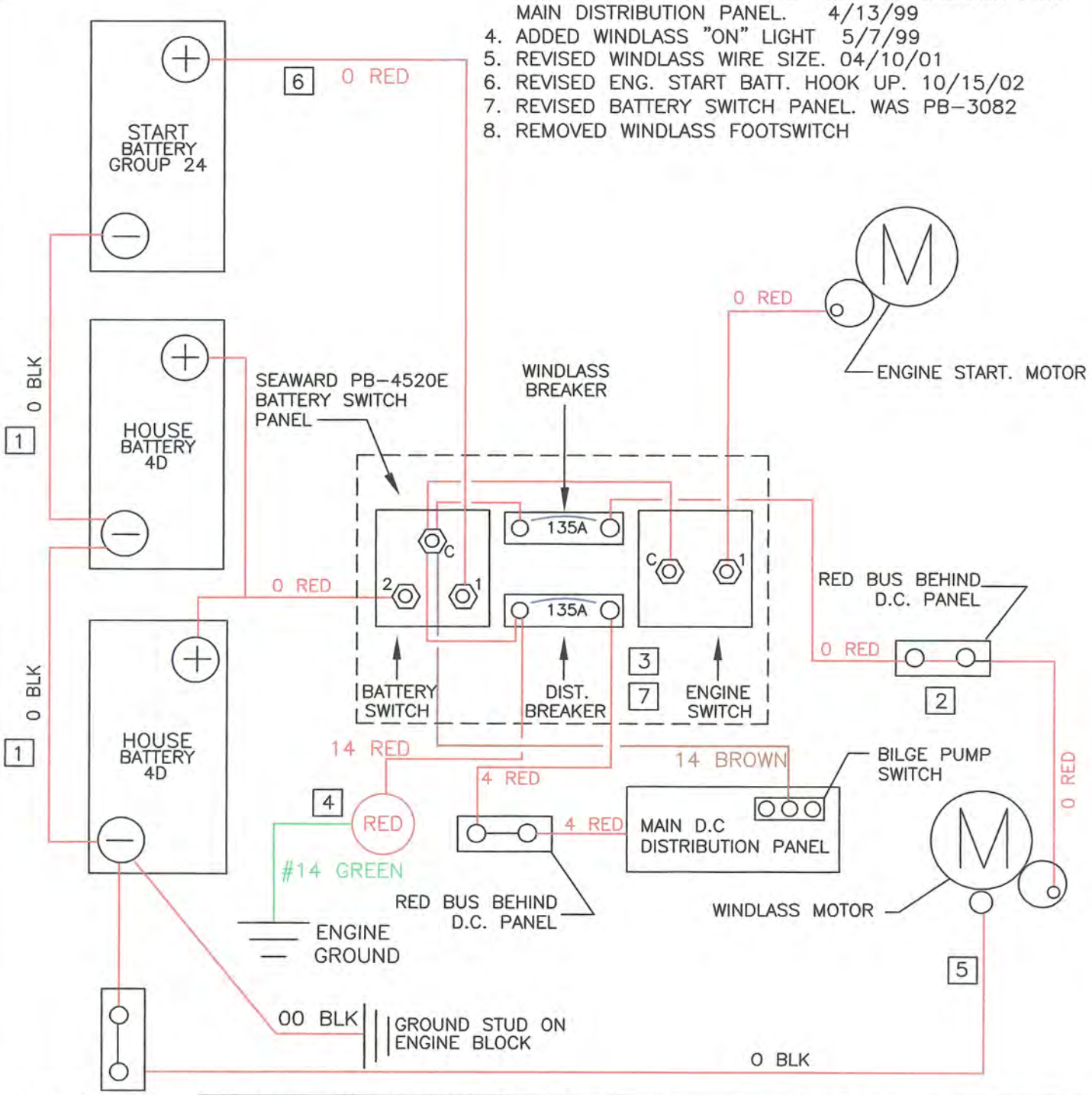
7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727)544-6681

SCALE: NONE	APPROVED BY:	DRAWN BY GTB	
DATE: 12/3/96	FILE: 72002-6		
TITLE: BATTERY SCHEMATIC		SIZE	SHEET: 1/1
BOAT: CATALINA 400		DRAWING NUMBER 400-72002-6	

1. 00 BLK. WAS 0: NO. CABLES 10/17/98
2. ADDED SEPARATE BUSS TO ANCHOR WINDLESS 10/14/97
3. REVISED BATTERY SWITCH PANEL. WAS PB-2712
   ADDED ENGINE SWITCH AND 135 AMP BREAKER FOR
   MAIN DISTRIBUTION PANEL. 4/13/99
4. ADDED WINDLASS "ON" LIGHT 5/7/99
5. REVISED WINDLASS WIRE SIZE. 04/10/01
6. REVISED ENG. START BATT. HOOK UP. 10/15/02
7. REVISED BATTERY SWITCH PANEL. WAS PB-3082
8. REMOVED WINDLASS FOOTSWITCH



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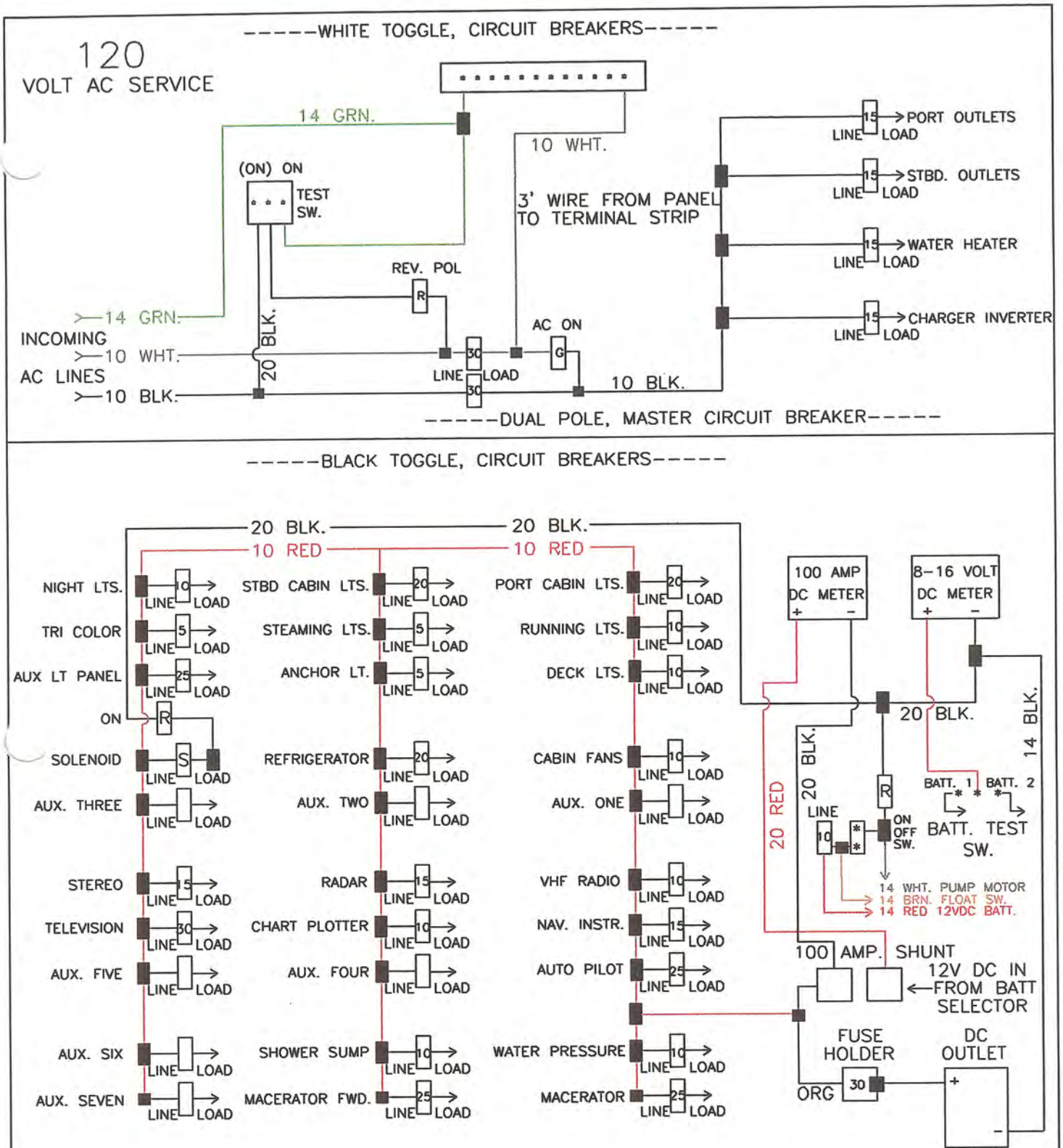
(727)544-6681

SCALE: NONE	APPROVED BY:	DRAWN BY GTB	
DATE: 12/3/96	FILE: 72002-7	REVISED 01/28/04	
TITLE: BATTERY SCHEMATIC WITH OPTIONAL START BATTERY		SIZE	SHEET: 1/1
BOAT: CATALINA 400		DRAWING NUMBER 400-72003-8	

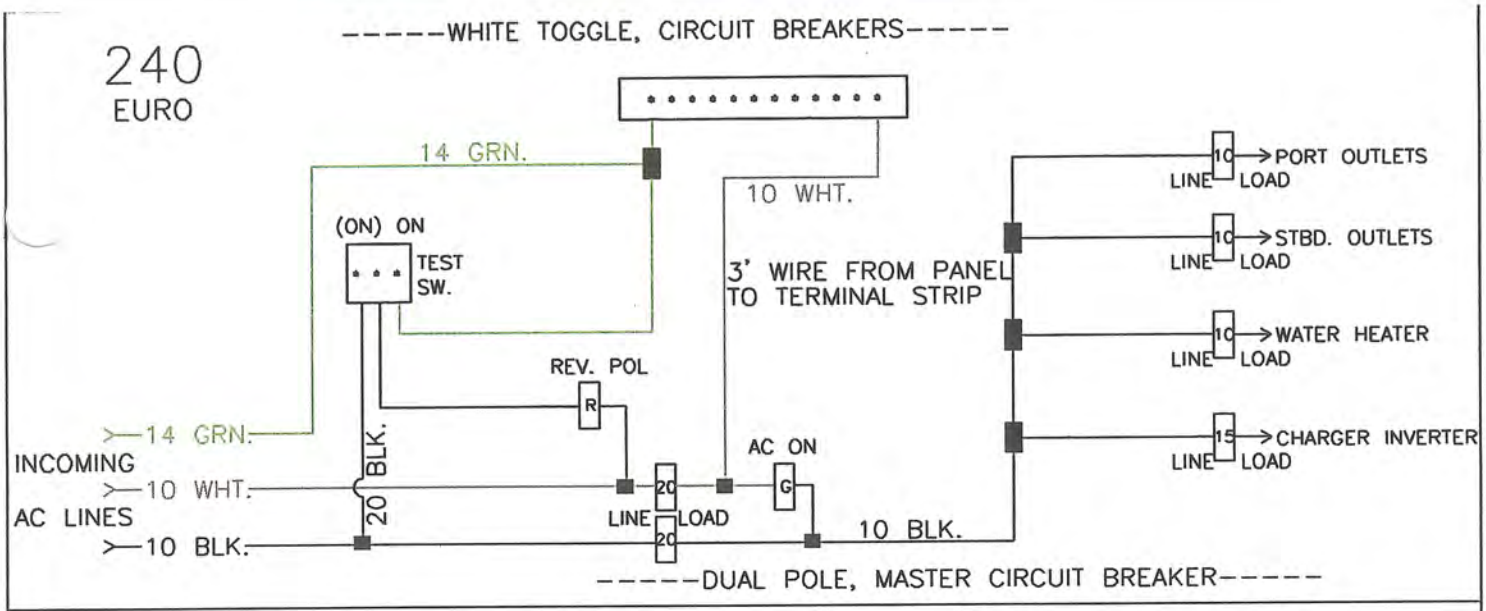


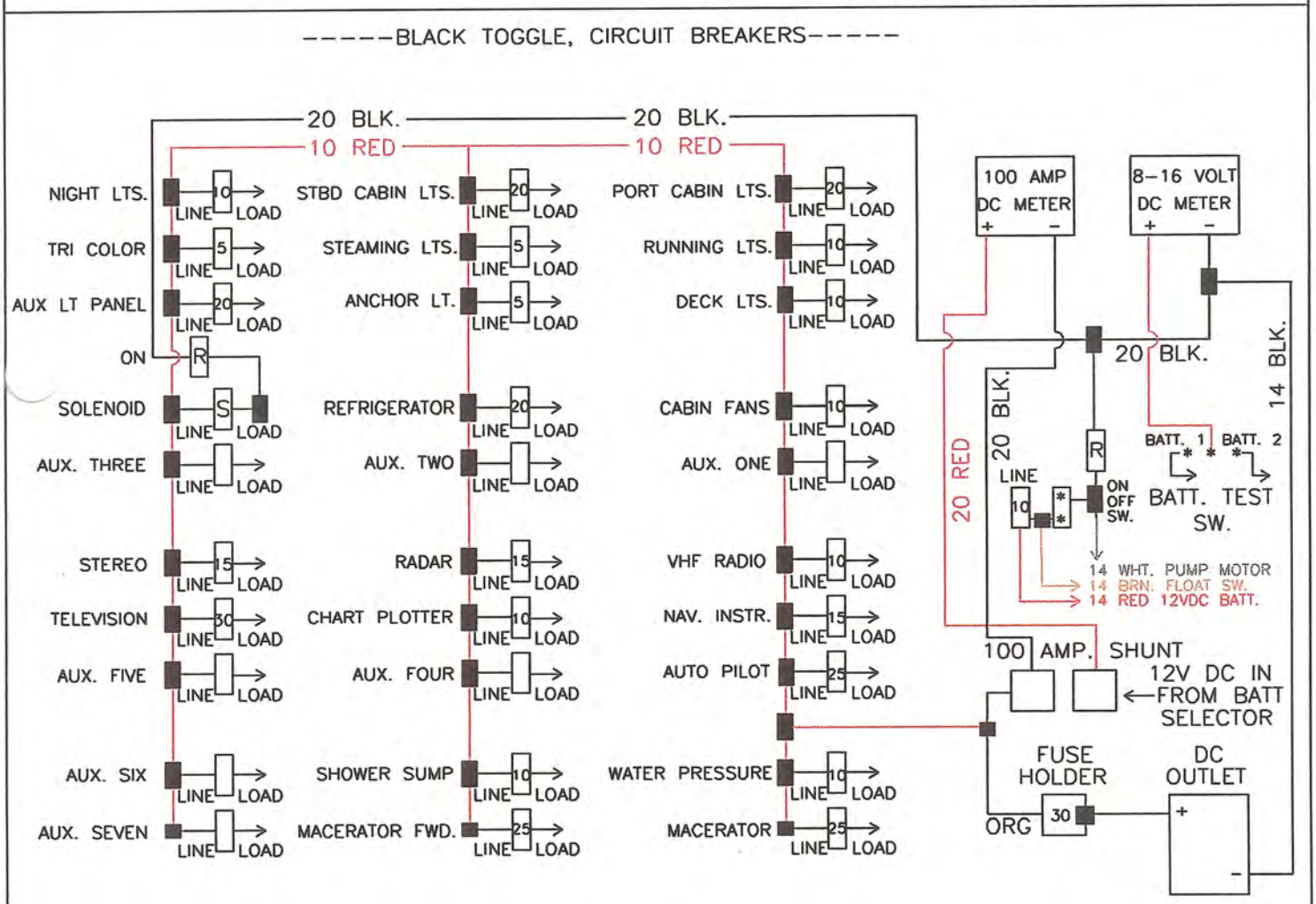
12
OLT DC SERVICE

Catalina Yachts
7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727)544-6581

SCALE: NONE	APPROVED BY:	DRAWN BY: GTB
DATE: 12/3/96	FILE: 75050-1	
TITLE: AC-DC HORIZ CONTROL PANEL 120 VAC/12 VDC		SIZE: SHEET: 1/1
BOAT: CATALINA 400		DRAWING NUMBER: 400-75050-1

240
EURO





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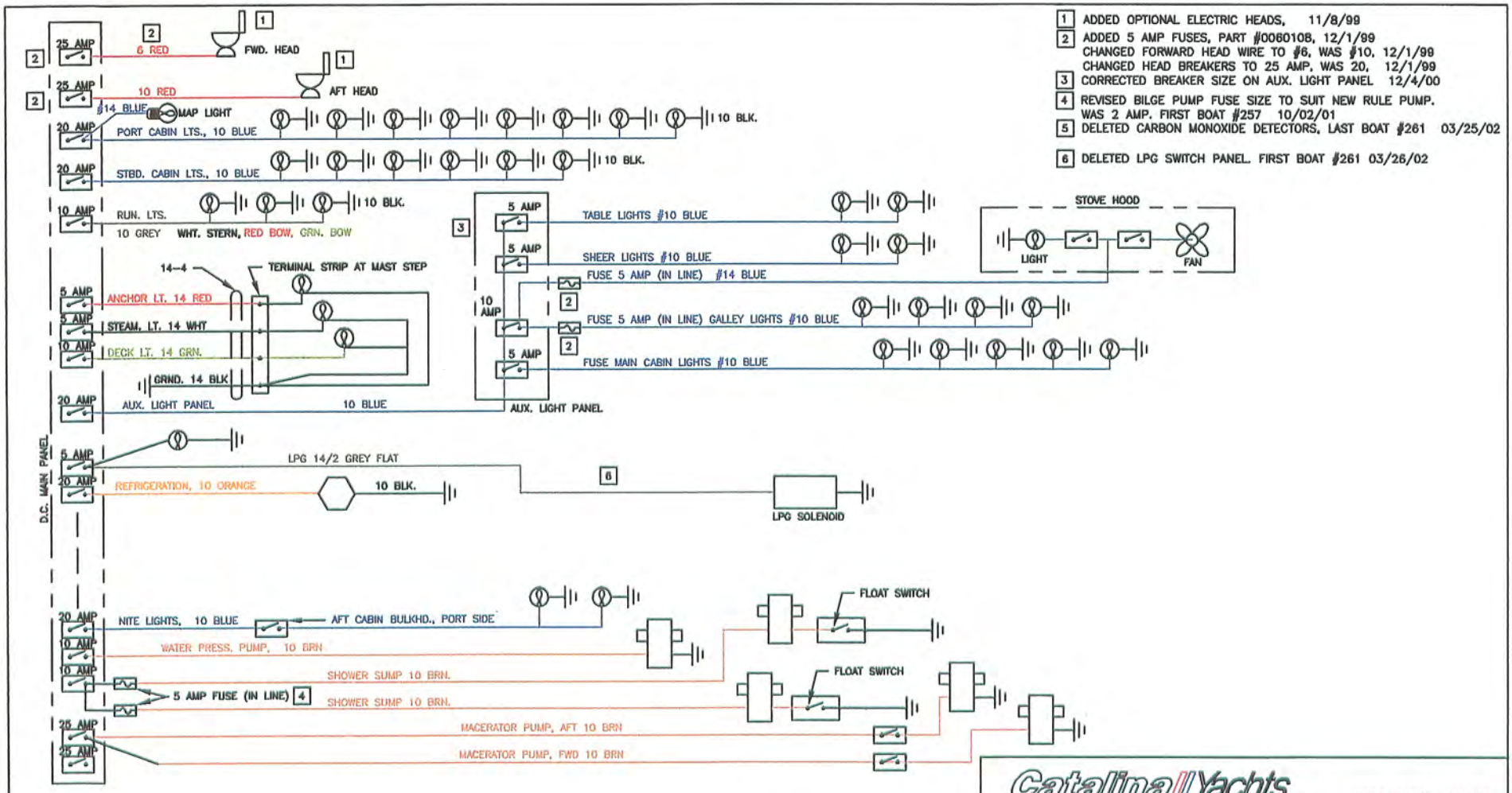
(727)544-6681

SCALE: NONE	APPROVED BY:	DRAWN BY: GTB
DATE: 12/3/96	FILE: 75050-1	
TITLE: EURO AC-DC HORIZ CTRL, 240 VAC/12 VDC		SIZE:	SHEET: 1/1
BOAT: CATALINA 400		DRAWING NUMBER: 400-75050-2

12
LT DC SERVICE



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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63

DO NOT SCALE DRAWING

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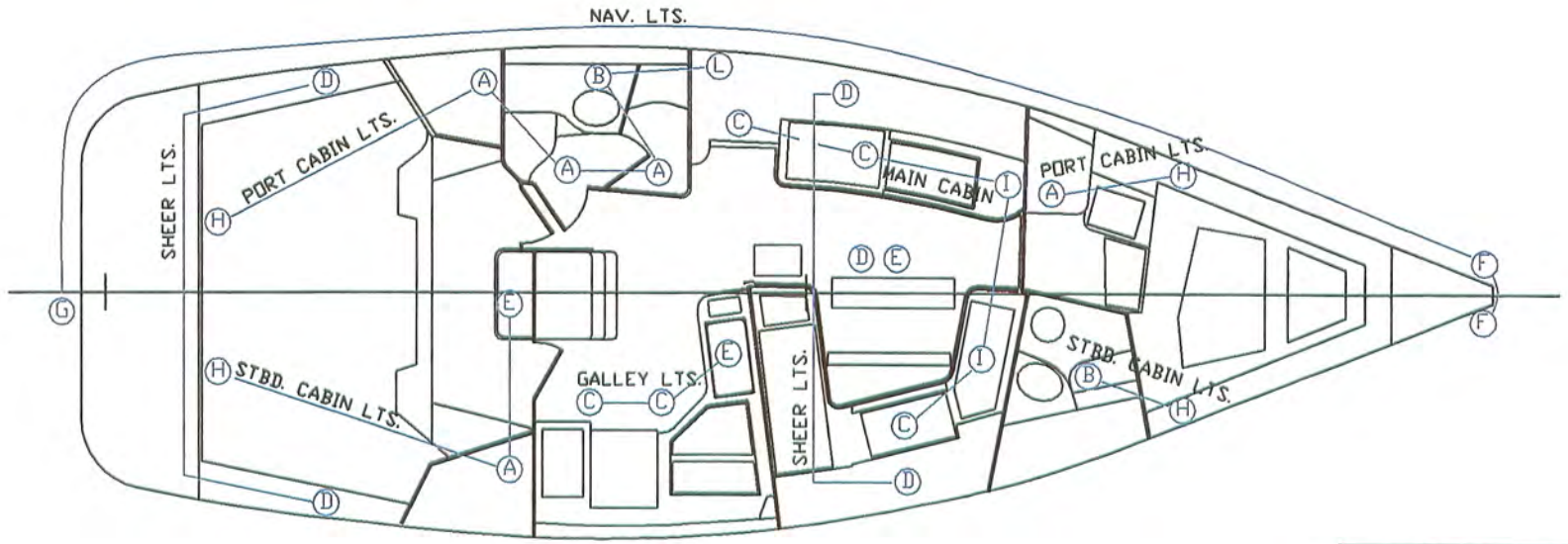
TITLE: C400– 12 VOLT D.C. WIRING SCHEMATIC

BOAT: CATALINA 400			DRAWING NO: 400-72050-6		
DESIGNED BY:	CHECKED BY:		SCALE: N/A	SIZE: B	SHEET: 1/1
DRAWN BY: C.D.	APPROVED BY:		DATE: 6/10/99		



LIGHT FIXTURE SCHEDULE		
LTR.	MAKE	LAMP
A	RAMCO NO. 105460	NO. 906/12V
B	RAMCO NO. 105520	NO. 211-2 12V
C	COMPONENT CONCEPT NO. 87072	NO. 44860 WFL 20W/12V
D	RAMCO TAC LIGHTS	
E	RAMCO NO. 24011	NO. 1003 12V
F	AQUA SIGNAL 41	AQUA SIGNAL NO. 90400 002 25W/12V
G	AQUA SIGNAL 41	AQUA SIGNAL 41
H	WHITE WATER NO. 2110B	WHITE WATER NO. 2110B
I	HELLA NO. 62717	LAMP NO. 64425 20W/12V
J	PERKO 170 BMD DECK/STEAM LT.	STEAM NO. 70-1 13W/12V DECK NO. 64115 20W/12V
K	PERKO 200 SWB ANCHOR LT.	1303 10W/12V
L	HELLA NO. 87141 12V	HELLA NO. 78166 SW

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TITLE: 12V LIGHTING PLAN

BOAT: CATALINA 400		DRAWING NO: 400-74000-0		
DESIGNED BY:	CHECKED BY:	SCALE: N/A	SIZE	SHEET
DRAWN BY: GTB	APPROVED BY:	DATE: 08/29/02	B	1/1

3.0 YACHT SYSTEMS - (Continued)

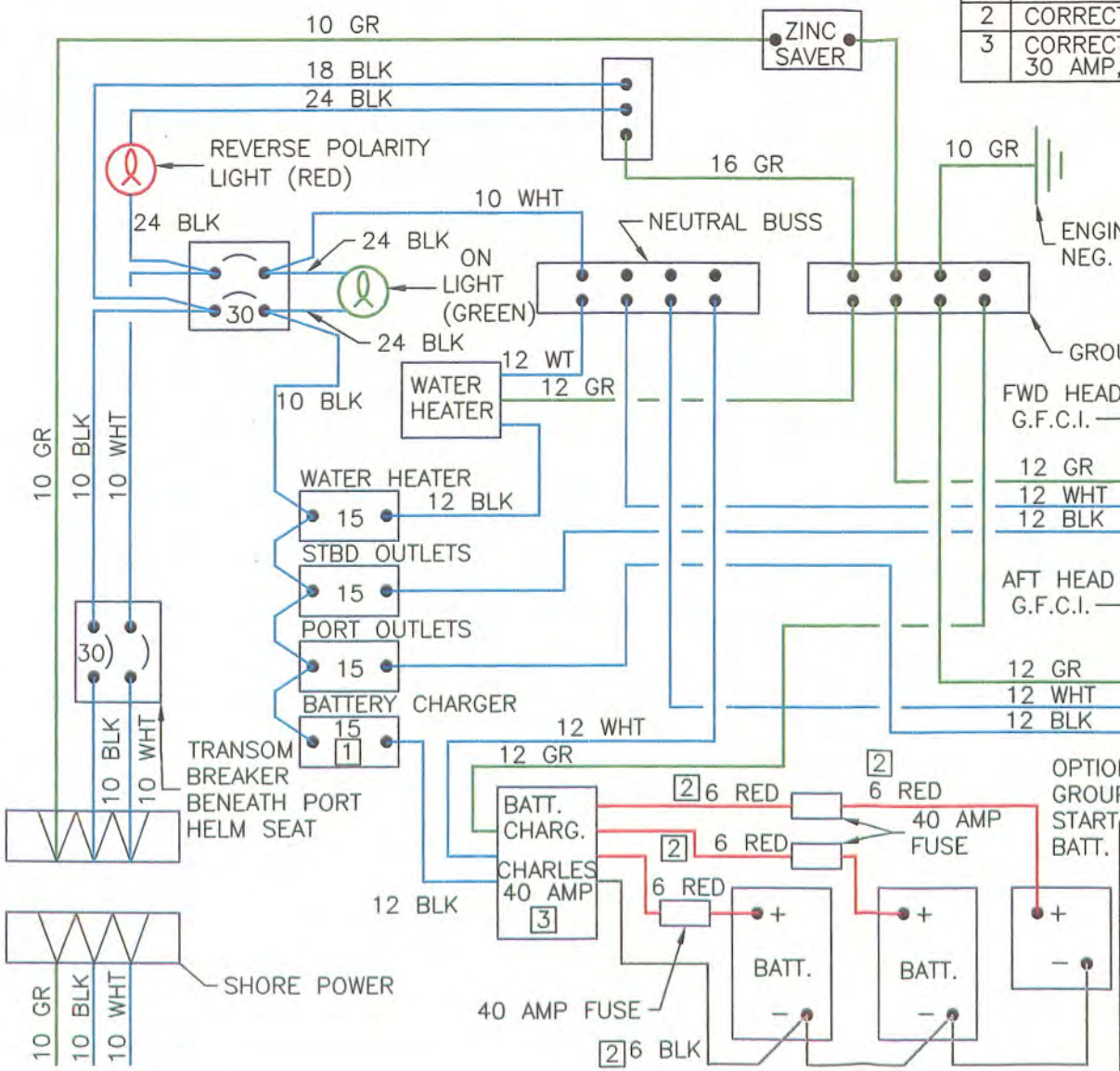
3.2.8 120 VOLT SYSTEM:

The 120 volt AC system is connected to shore power by a grounded twist-lock connector mounted on the port side of the transom.

A thirty (30) amp two pole circuit breaker is located on the main panel, as well as under the port helm seat. Ten (10) duplex outlets for the 120 volt system are located in the cabin. Be certain that all 120 volt appliances, other than lamps, have an adequate grounding connector. Wet feet or moist atmosphere increases the potential shock hazard.

IMPORTANT: Do not open the electrical panel for any purpose with the 120 volt shore power connected to the dock. 120 volt wiring is exposed when the panel is open. Contact with 120 volt wiring can cause shock and death.

NO	REVISION	DATE
1	CORRECTED BREAKER SIZE, WAS 30 AMP.	10/7/99
2	CORRECTED BATT. CHARGER WIRES, WAS 8 GA.	2/24/00
3	CORRECTED BATT. CHARGER, WAS PRO-MARINER 30 AMP, FIRST BOAT #216	8/17/00



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63
DO NOT SCALE DRAWING

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LARGO, FL. 33777
(727) 544-6681

TITLE: C400- 110 VOLT AC SCHEMATIC

BOAT: CATALINA 400		DRAWING NO: 400-73001-3			
DESIGNED BY:	CHECKED BY:	SCALE: N/A	SIZE	SHEET	
DRAWN BY: C.D.	APPROVED BY:	DATE: 9/5/99	B	1/1	

33

3.0 **YACHT SYSTEMS** - (Continued)

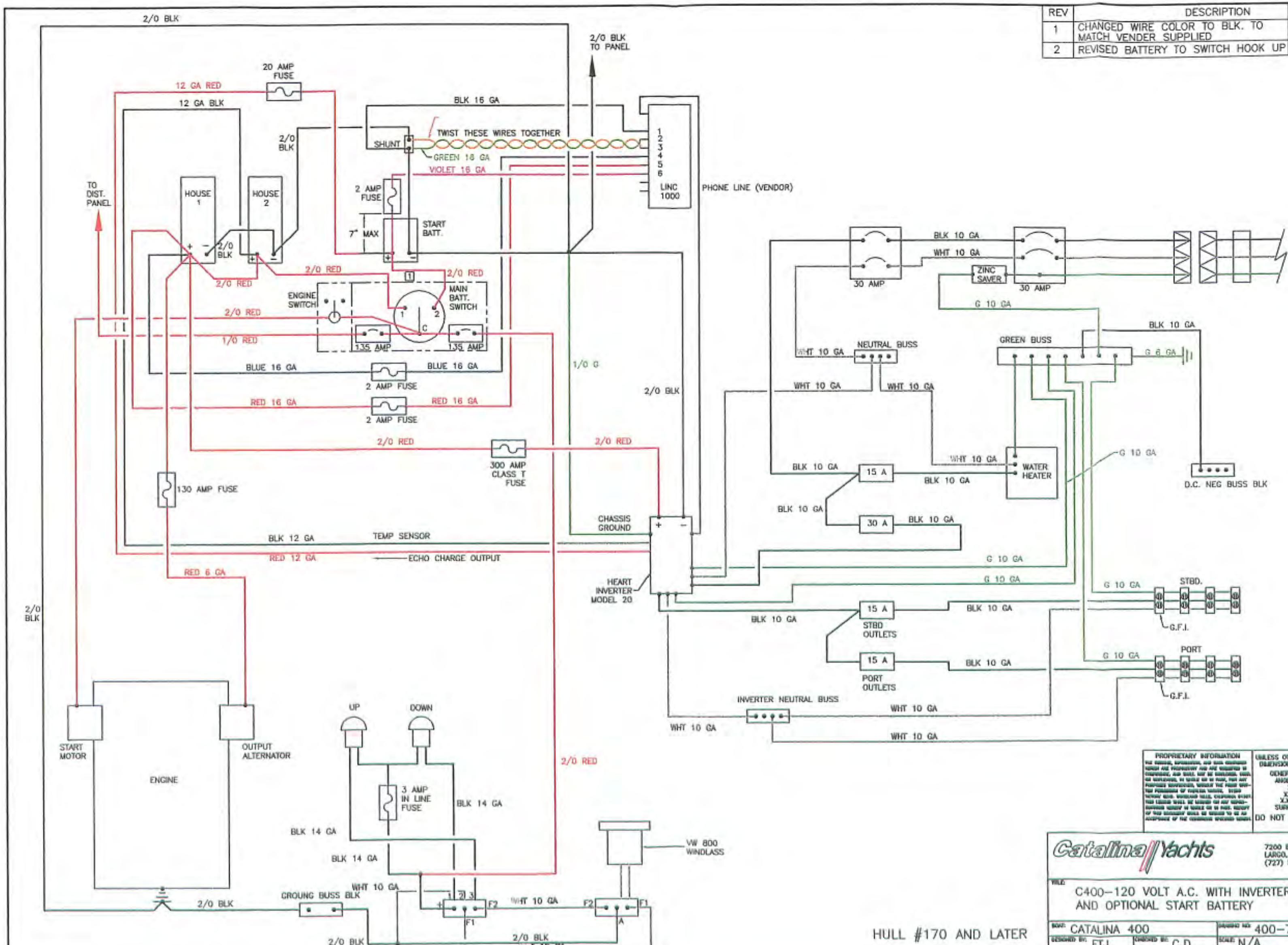
3.2

3.2.10 **HEART INTERFACE INVERTER/CHARGER**

The Heart Interface Freedom 20 is a DC to AC power inverter and battery charger combination unit. It acts as power inverter, trainsforming DC power from the house batteries into AC power for household appliances when you are offshore. When the boat is plugged into shore power the inverter is automatically switch off and the battery charger is activated.

For more detailed information on the care and use of the Heart Freedom 20 please read the Heart Interface owners manual that accompanies the Catalina 400 owners manual.

REV	DESCRIPTION	DATE
1	CHANGED WIRE COLOR TO BLK. TO MATCH VENDER SUPPLIED	11/5/99
2	REVISED BATTERY TO SWITCH HOOK UP	12/20/02



PROPRIETARY INFORMATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63

DO NOT SCALE DRAWING

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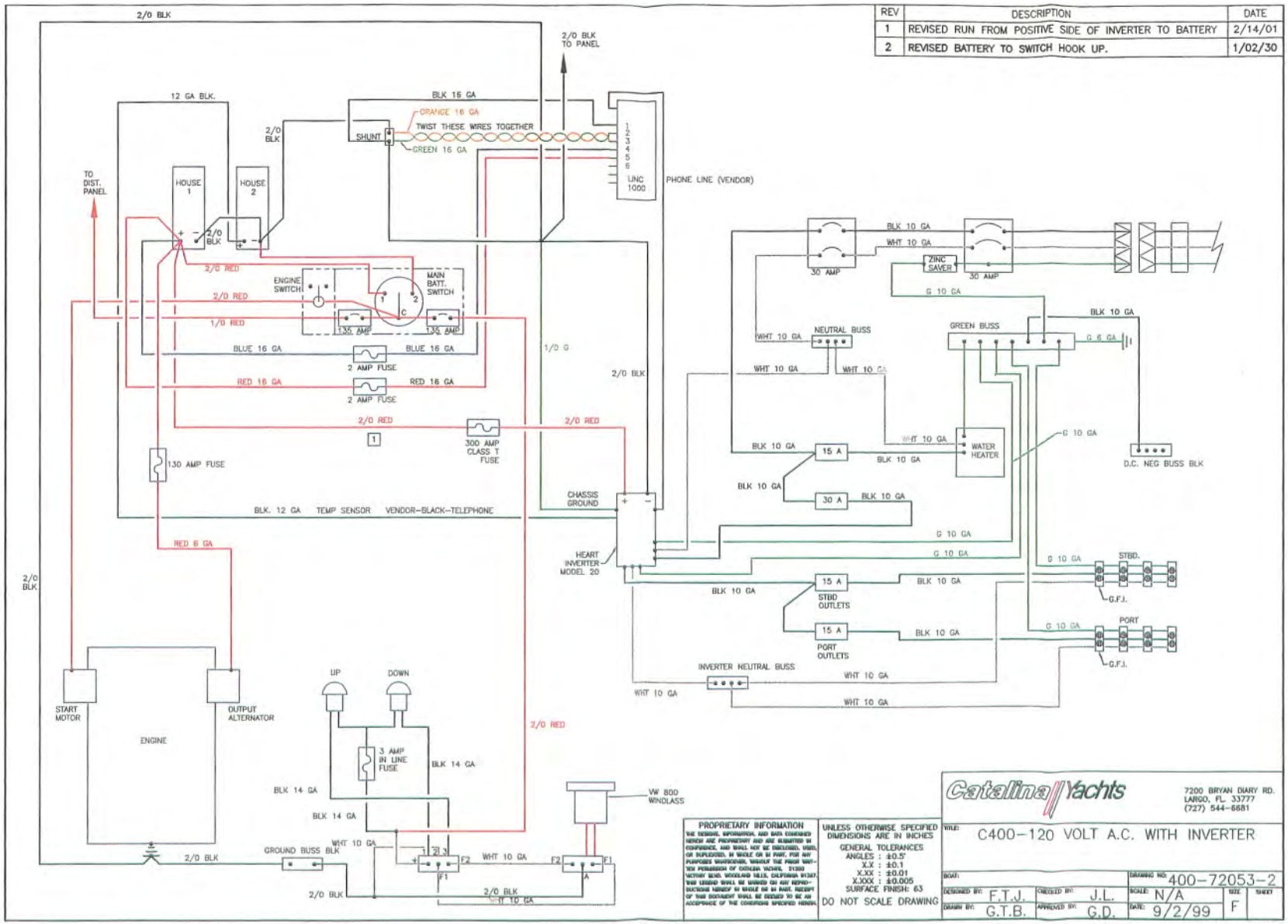
LARGO, FL. 33777
(727) 544-6681

HULL #170 AND LATER

TITLE: C400–120 VOLT A.C. WITH INVERTER AND OPTIONAL START BATTERY

BOAT: CATALINA 400		DRAWING NO: 400-72052-1			
DESIGNED BY: FTJ	CHECKED BY: C.D.	SCALE: N/A		SIZE	SHEET
DRAWN BY: G.T.B	APPROVED BY: GD	DATE: 06/28/99		B	1/1



REV	DESCRIPTION	DATE
1	REVISED RUN FROM POSITIVE SIDE OF INVERTER TO BATTERY	2/14/01
2	REVISED BATTERY TO SWITCH HOOK UP.	1/02/30

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63
DO NOT SCALE DRAWING

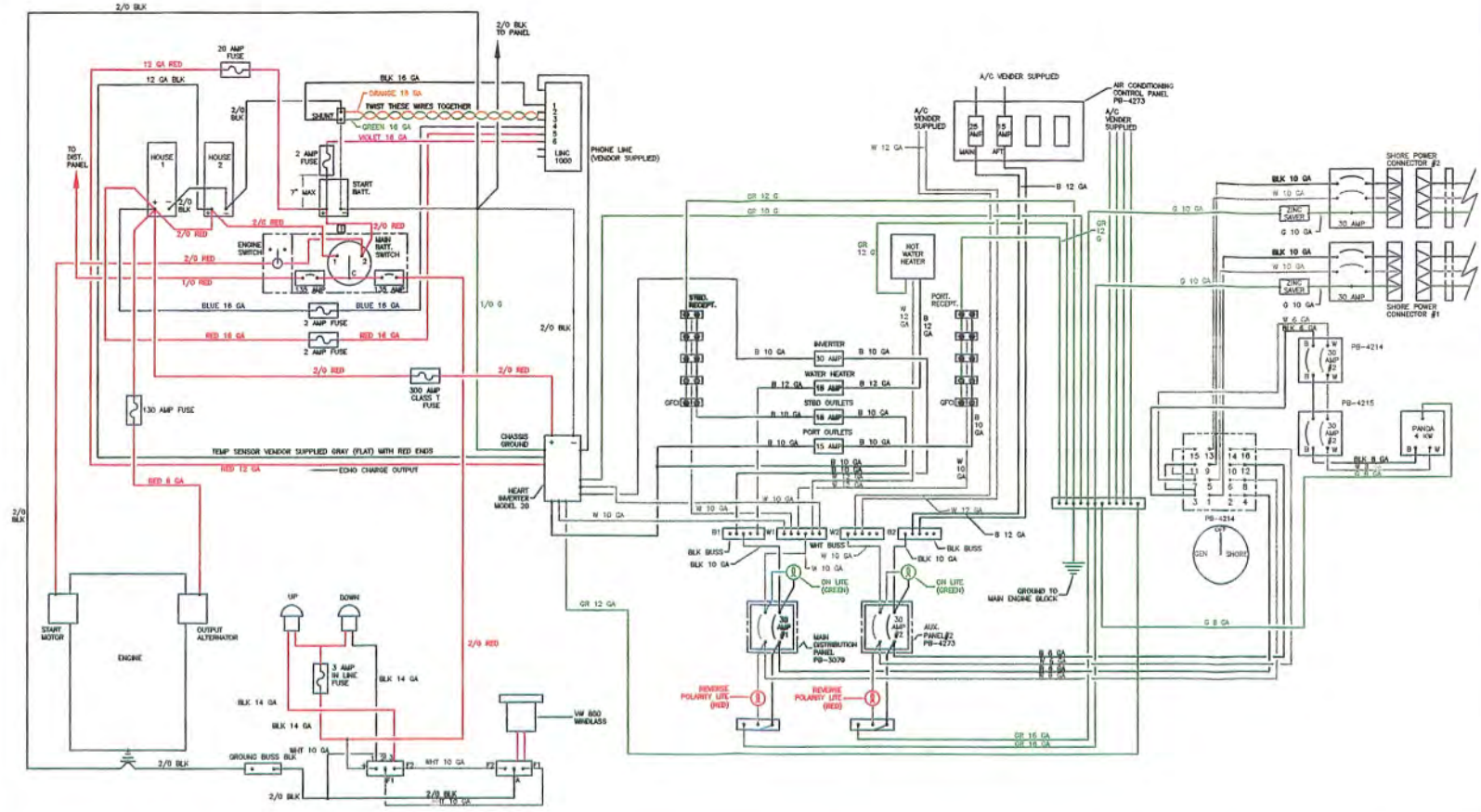
Catalina Yachts
7200 BRYAN DIARY RD.
LARGO, FL. 33777
(727) 544-6681

TITLE: C400-120 VOLT A.C. WITH INVERTER

BOAT:

DRAWING NO: 400-72053-2

DESIGNED BY:	CHECKED BY:	SCALE:	SIZE:	SHEET
F.T.J.	J.L.	N/A	F	
DRAWN BY: G.T.B.	APPROVED BY: G.D.	DATE: 9/2/99		



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X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63

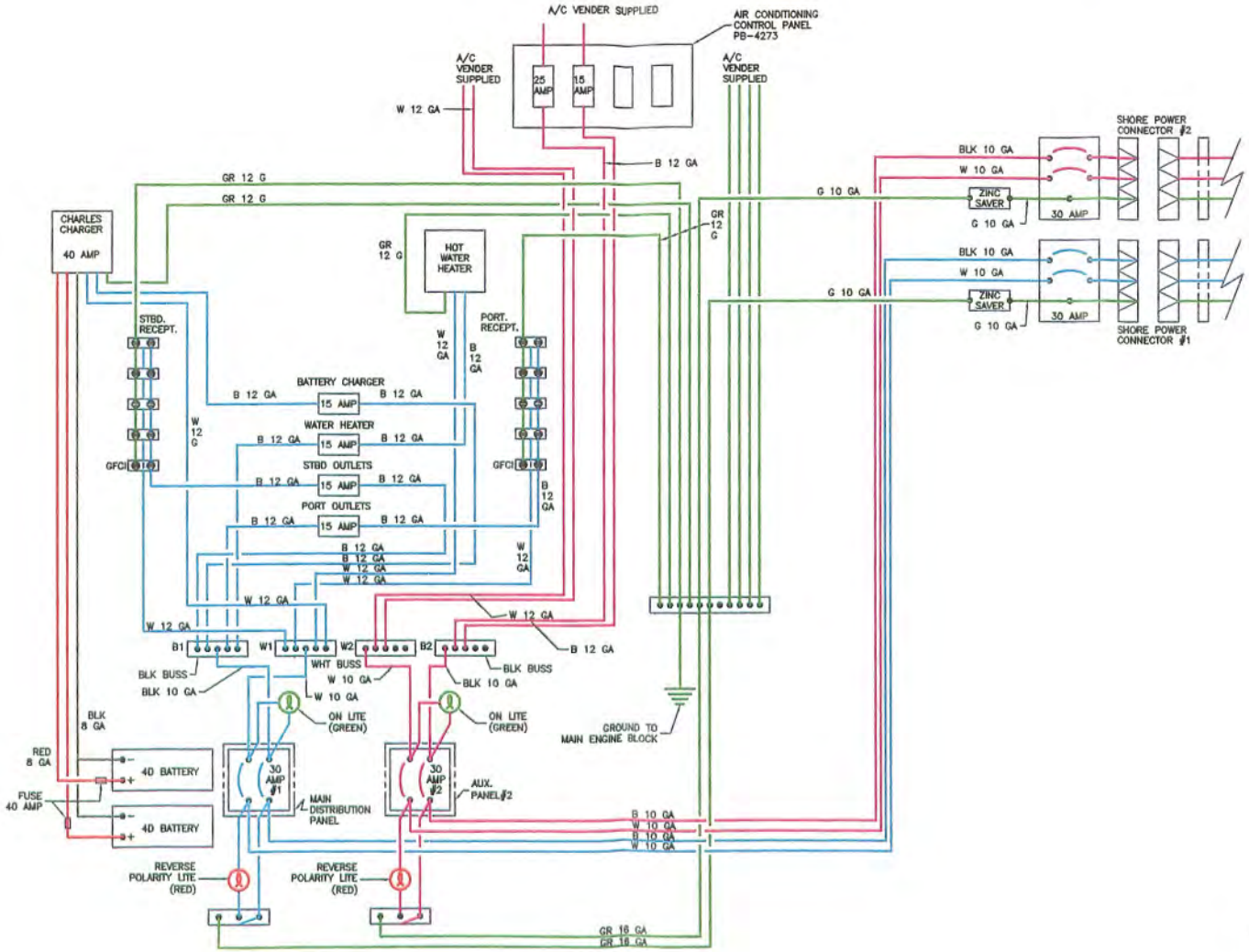
DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727) 544-6681

TITLE: C400- AC SERVICE, 2- 30 AMP SHORE SUPPLIES, 4 KW. PANDA GENERATOR, AIR CONDITIONING, INVERTER, OPTIONAL START BATTERY

BOAT: CATALINA 400		DRAWING NO: 400-73053-0	
DESIGNED BY:	CHECKED BY:	SCALE: N/A	SIZE: F / SHEET: 1/1
DRAWN BY: C.D.	APPROVED BY:	DATE: 12/8/00	

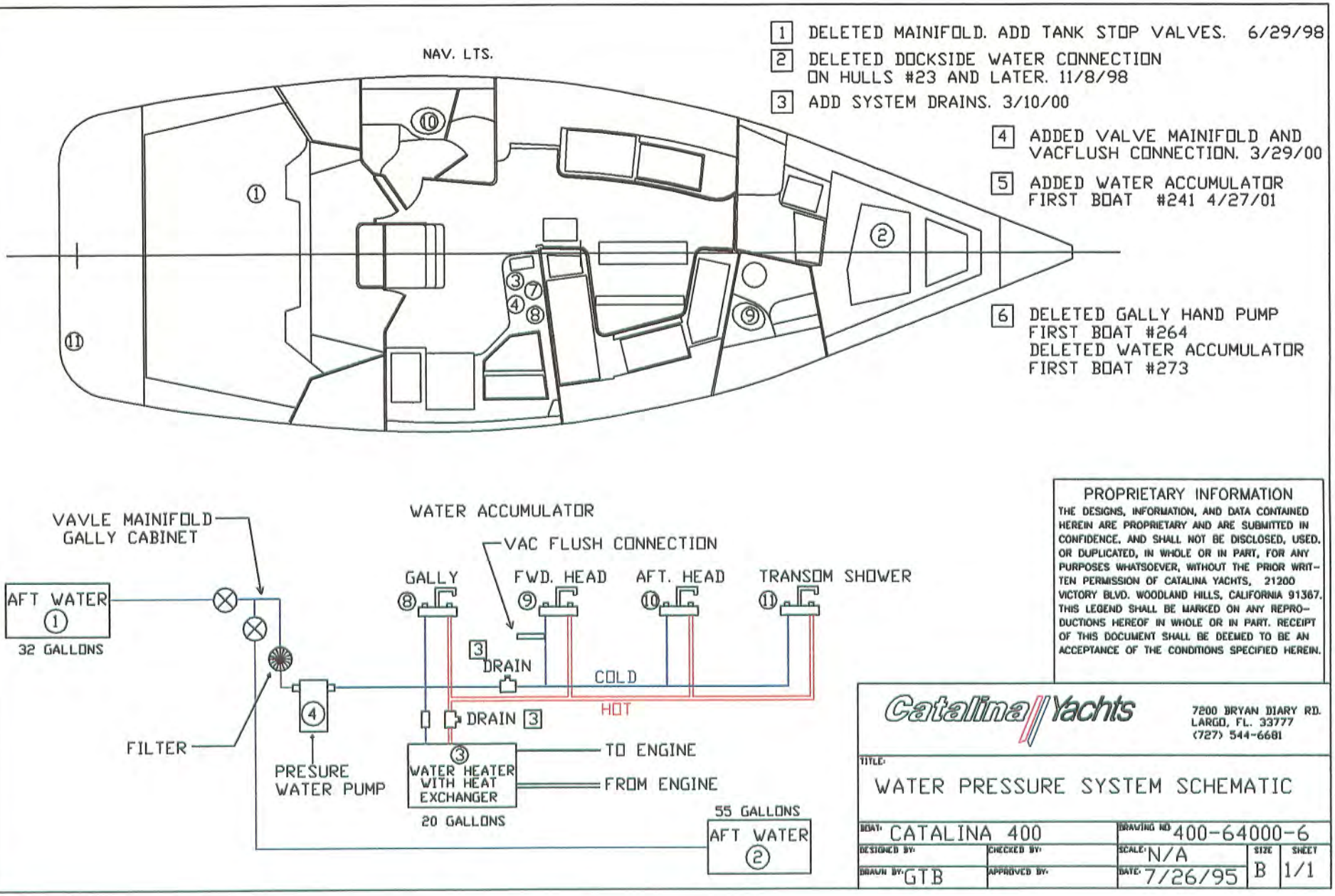
NO.	REVISION	DATE	BY
1	REVISED BATTERY CHARGER, WAS PRO-MARINER 30 AMP. REVISED A/C PANEL	10/19/00	C.D.



CATALINA YACHTS/MORGAN DIVISION
7200 BRYAN DAIRY ROAD
LARGO, FL. 33777

C400- AC SERVICE, 2-30 AMP SHORE SUPPLIES, AIR CONDITIONING

DESIGNED BY: F.T.J.	DATE: 10/7/99	DRAWING NO: 400 73051-1
DRAWN BY: C.D.		
CHECKED BY: J.L.	SCALE: N/A	
APPROVED BY: G.D.		SIZE: F



Catalina Yachts
7200 BRYAN DIARY RD.
LARGO, FL. 33777
(727) 544-6681

TITLE: WATER PRESSURE SYSTEM SCHEMATIC

BOAT: CATALINA 400		DRAWING NO: 400-64000-6		
DESIGNED BY:	CHECKED BY:	SCALE: N/A	SIZE: B	SHEET: 1/1
DRAWN BY: GTB	APPROVED BY:	DATE: 7/26/95		

3.0 YACHT SYSTEMS - (Continued)

3.3.2 MANUAL BILGE PUMP:

The manual bilge pump is located outboard of the port side helm. Insert the handle through the water tight fitting in the cockpit to operate the pump.

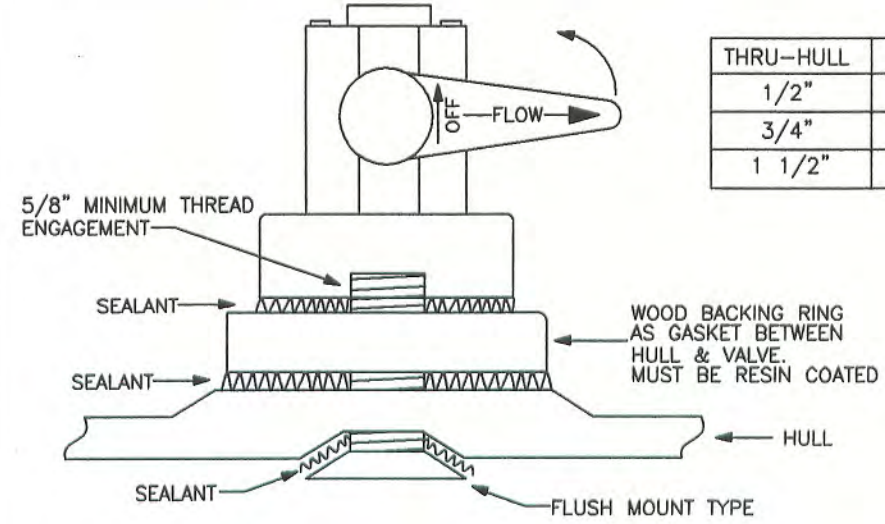
The pump intake hose is in the keel stub under the main cabin sole.

3.3.3 SEACOCKS:

All underwater through hull fittings are equipped with Marelon® valves. It is good practice to close all valves when leaving the boat, especially for long periods of time.

To close seacocks, turn clockwise: To open, turn counterclockwise.

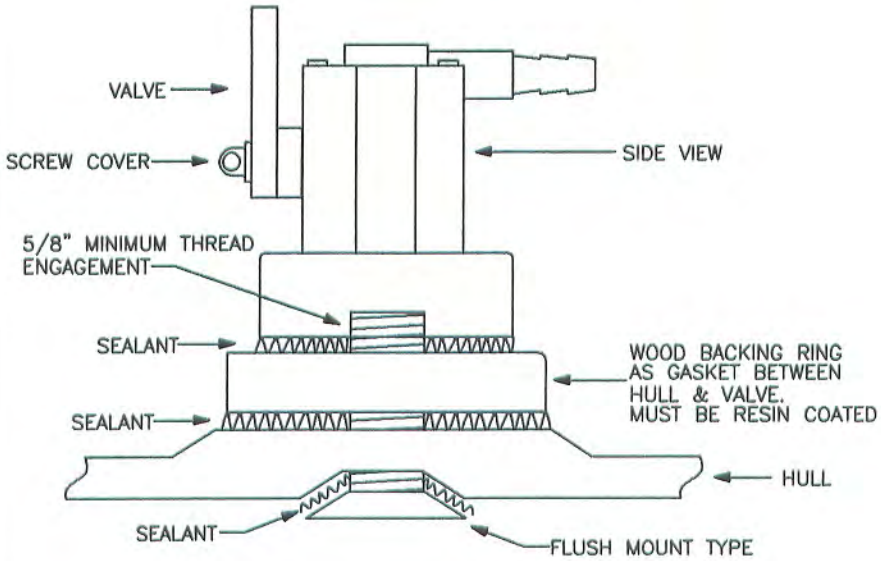
It is good practice to operate the valves at least once a month to keep then in good working order.



THRU-HULL	HOLE SIZE
1/2"	1 1/8"
3/4"	1 1/8"
1 1/2"	2"

THUR - HULL INSTALLATION

1. FIND CENTER RECESS AND DRILL PROPER HOLE FOR THRU-HULL.
2. CLEAN OFF WAX AND DUST FROM INSIDE AND OUTSIDE OF HULL.
3. DRY FIT-CHECK THREAD ENGAGEMENT. CUT END OF THRU-HULL THREADS AS REQUIRED.
4. APPLY SEALANT TO BACK OF THRU-HULL, AROUND THREADS, INSIDE OF HULL, AND BACK OF RESIN COATED BACKING RING.
5. SCREW SEACOCK DOWN TIGHT ONTO BACKING RING. DO NOT BOTTOM OUT BODY ON THRU-HULL THREADS.



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH:

DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DIARY RD.
LARGO, FL. 33777
(727) 544-6681

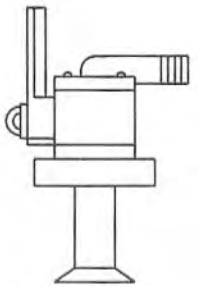
TITLE:

RUDDER BEARING ASSEMBLY

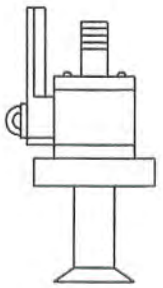
BOAT: 400		DRAWING NO: 400-22022-0		
DESIGNED BY:	CHECKED BY:	SCALE: NONE	SIZE	SHEET
DRAWN BY: GTB	APPROVED BY:	DATE: 9/10/02	B	1/1

PARTS LIST		
ITEM	DISCRIPTION	EX.
1	VALVE 3/4" FWD. HEAD INTAKE	A
2	VALVE 3/4" FWD. HEAD SINK DRAIN	B
3	VALVE 3/4" FWD. SHOWER SUMP DISCHARGE	A
4	VALVE 3/4" AFT SHOWER SUMP DISCHARGE	A
5	VALVE 1-1/2" AFT HEAD DISCHARGE (OPTIONAL)	C
6	VALVE 1" MACERATOR DISCHARGE, AFT HOLDING TANK	B
7	VALVE 1-1/2" GALLEY SINK DRAIN	A
8	VALVE 3/4" ICE BOX DRAIN	A
9	VALVE 3/4" AFT HEAD SINK DRAIN	B
10	VALVE 1" ENGINE INTAKE	B
11	VALVE 3/4" AFT HEAD INTAKE	A
12	VALVE 1-1/2" FWD. HEAD DISCHARGE (OPTIONAL)	A
13	VALVE 1" MACERATOR DISCHARGE, FWD. HOLDING TANK	A

REV.	DISCRIPTION	DATE
1	REVISED ITEM 7, WAS VALVE B, ECN. #099 HULLS # 206 AND LATER	4/24/00

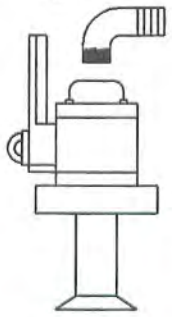


VALVE - A
90°
3/4" 932153 (#0050910) FLUSH
1" 932154 (#0050904) FLUSH
1-1/2" 931156 (#0050905) MUSHROOM

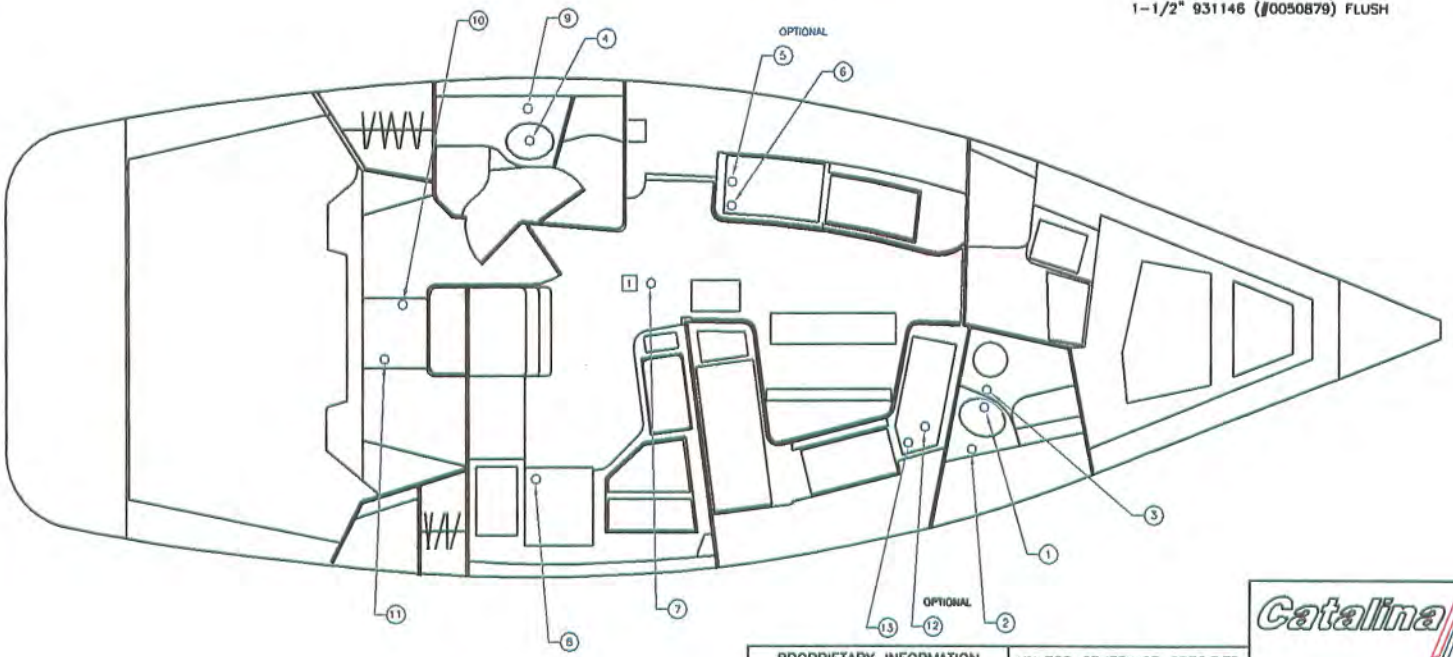


VALVE - B
STRAIGHT
3/4" 932143 (#0050909) FLUSH
1" 932144 (#0050875) FLUSH
1-1/2" 931146 (#0050879) FLUSH

ADD 90° PLASTIC ELBOW
1-1/2" NPT MALE X 1-1/2" HOSE BARB
(#0050708-FA220)



VALVE - C
SPECIAL
1-1/2" 931136 (#0650899)
FEMALE THREADS, MUSHROOM



PROPRIETARY INFORMATION

THE DESIGNS, INFORMATION, AND DATA CONTAINED HEREIN ARE PROPRIETARY AND ARE SUBMITTED IN CONFIDENCE, AND SHALL NOT BE DISCLOSED, USED, OR DUPLICATED, IN WHOLE OR IN PART, FOR ANY PURPOSES WHATSOEVER, WITHOUT THE PRIOR WRITTEN PERMISSION OF CATALINA YACHTS, 21200 VICTORY BLVD. WOODLAND HILLS, CALIFORNIA 91367. THIS LEGEND SHALL BE MARKED ON ANY REPRODUCTIONS HEREOF IN WHOLE OR IN PART. RECEIPT OF THIS DOCUMENT SHALL BE DEEMED TO BE AN ACCEPTANCE OF THE CONDITIONS SPECIFIED HEREIN.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63
DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727)544-6681

TITLE: C400- THRU HULL VALVE LOCATION

BOAT: CATALINA 400		DRAWING NO: 400-22050-1		
DESIGNED BY:	CHECKED BY:	SCALE: NONE	SIZE: B	SHEET: 1/1
DRAWN BY: C.D.	APPROVED BY:	DATE: 1/18/00		

3.0 YACHT SYSTEMS - (Continued)

3.3.5 MARINE TOILET OPERATION:

USING THE HEAD:

1. Read the instructions for operation of the toilet supplied with the marine head by the manufacturer. These instructions are also printed on the toilet pump housing. Be sure everyone who will be using the head is familiar with these instructions.

2. Immediately before using the head, the inlet valve "A" must be opened. This provides flushing water to the toilet. The valve should be kept closed when the head is not in use. This will prevent water from flooding the boat if the valve in the toilet pump should fail.

3. Waste will be pumped directly into the holding tank when the bowl is emptied, unless the Y-valve is positioned to pump waste directly overboard. A minimum amount of water for every flush should be used in order to take best advantage of the tank's capacity between pump-outs.

4. The condition of the holding tank should be checked from time to time. Overfilling can cause the tank to burst.

5. To clean the head, use hot water and soap. High strength cleaners may cause damage to the valves and seals in your pump system. If there is any problem with the head, it should be corrected immediately.

EMPTYING THE TANK THROUGH THE DECK DISCHARGE PLATE:

1. The holding tank should be emptied via the deck discharge plate only at approved shore-based pump-out stations.
2. Remove the cap from the deck discharge plate. The threads on the plate cap should be periodically coated with silicone spray or petroleum jelly to ensure a good seal.
3. The pump-out station suction hose should form a seal at the deck plate.
4. Be sure inlet valves "A", "B", and "C" are closed when the tank is being emptied.
5. After the tank is empty, you may wish to open valve "A" and pump some water through the toilet and into the tank to dilute residual sludge and rinse the tank and lines.
6. Close all valves after the tank is emptied and recap the deck plate.

EMPTYING THE TANK USING THE MACERATOR PUMP:

1. Read the macerator pump operating instructions supplied by the pump manufacturer.

2. Close the inlet valves "A" and "C".

3. Open the through hull valve "B".

4. Turn on the pump with the switch on the 12 volt panel.

5. The pump will change tone after it becomes primed. It will resume the higher pitched tone after the tank is emptied.

6. You may wish to rinse the tank, hose lines, and macerator pump by pumping clear water through the head, then repeating the procedure for emptying the tank.

7. Close valve "B" immediately after emptying the holding tank.

3.3.6 MACERATOR PUMP AND TROUBLESHOOTING:

PROBLEM 1: The macerator pump motor starts then stops.

A. Check the breaker: Identify problem and reset as required.

B. Check the valves: "B" valve must be open.

C. Check the vent line. If the boat has been sailed at extreme angles of heel, fluid may be clogging the vent line. Disconnect the vent at the tank and empty the hose into a disposable container. Holding tank vents through hull near sheer line.

D. Sludge may have formed in the bottom of the tank. This should be emptied regularly to prevent sludge build up.

PROBLEM 2: The head toilet pump has excessive back pressure and will not evacuate the bowl.

A. Refer to the toilet manufacturer's specifications and operating instructions.

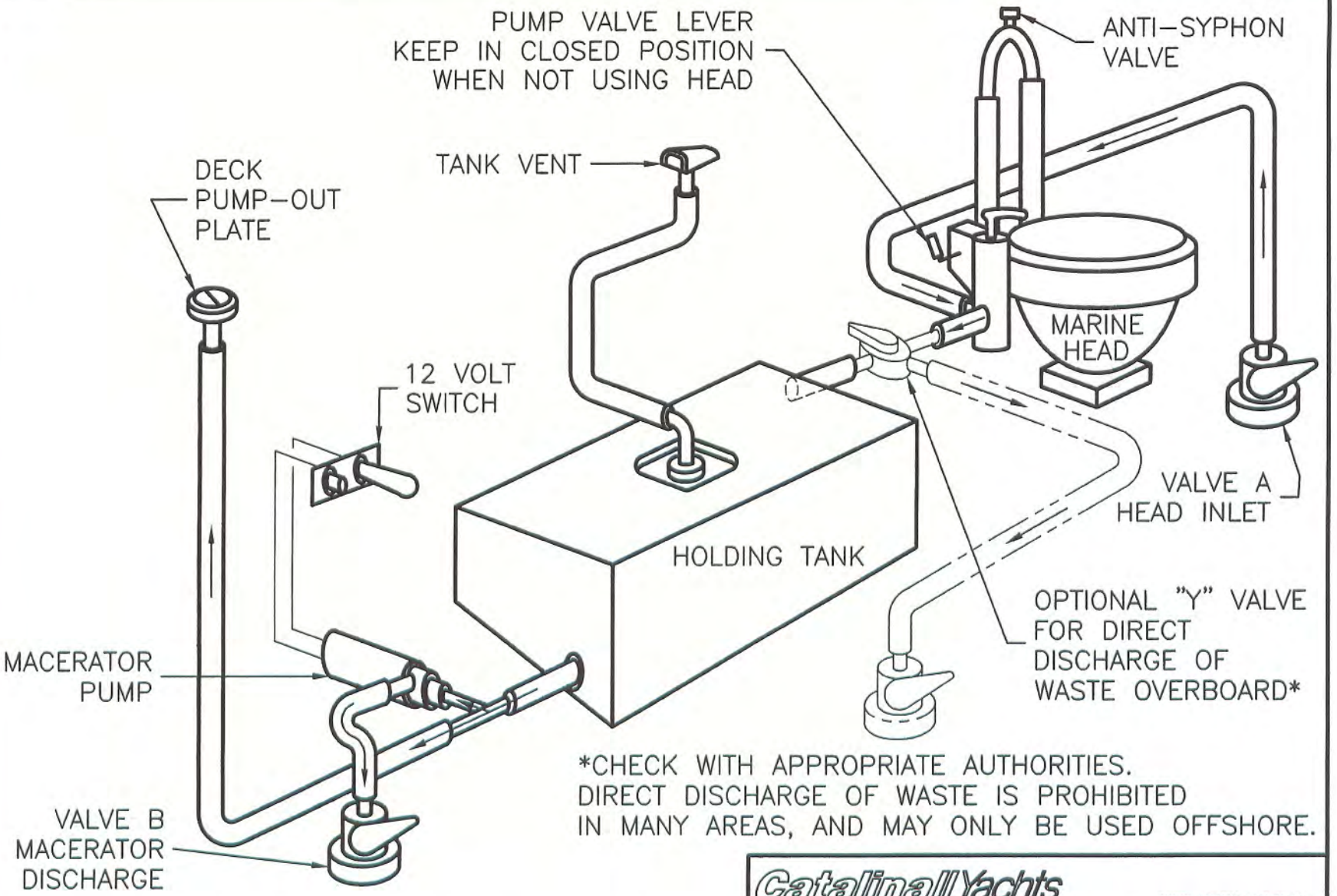
PROBLEM 3: The macerator pump, when on, makes a high pitched sound but does not empty the tank.

A. Impeller in macerator pump is faulty and must be replaced.

B. The vent is clogged and the pump cannot pull a prime against the vacuum in the tank.

C. The hose into the pump may be clogged.

D. The pump may be drawing air through the deck plate preventing a prime. Check seal at deck plate marked "WASTE", and lubricate threads.



*CHECK WITH APPROPRIATE AUTHORITIES.
DIRECT DISCHARGE OF WASTE IS PROHIBITED
IN MANY AREAS, AND MAY ONLY BE USED OFFSHORE.

NOTE: THE CATALINA 400 HAS TWO HEADS WITH TOTALLY INDEPENDANT HOLDING TANKS AND MACERATOR PUMP STSTEMS.
THE ARRANGEMENT FOR EACH INSTALLATION IS SIMILAR.

Catalina Yachts
7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727) 544–6681

TITLE: C400–HOLDING TANK AND MACERATOR SCHEMATIC

BOAT: CATALINA 400			DRAWING NO: 400–67050–0		
DESIGNED BY: G.D.	CHECKED BY:		SCALE: NONE	SIZE: A	SHEET: 1/1
DRAWN BY: C.D.	APPROVED BY:		DATE: 6/23/00		

3.0 YACHT SYSTEMS - (Continued)

3.4 AUXILIARY POWER:

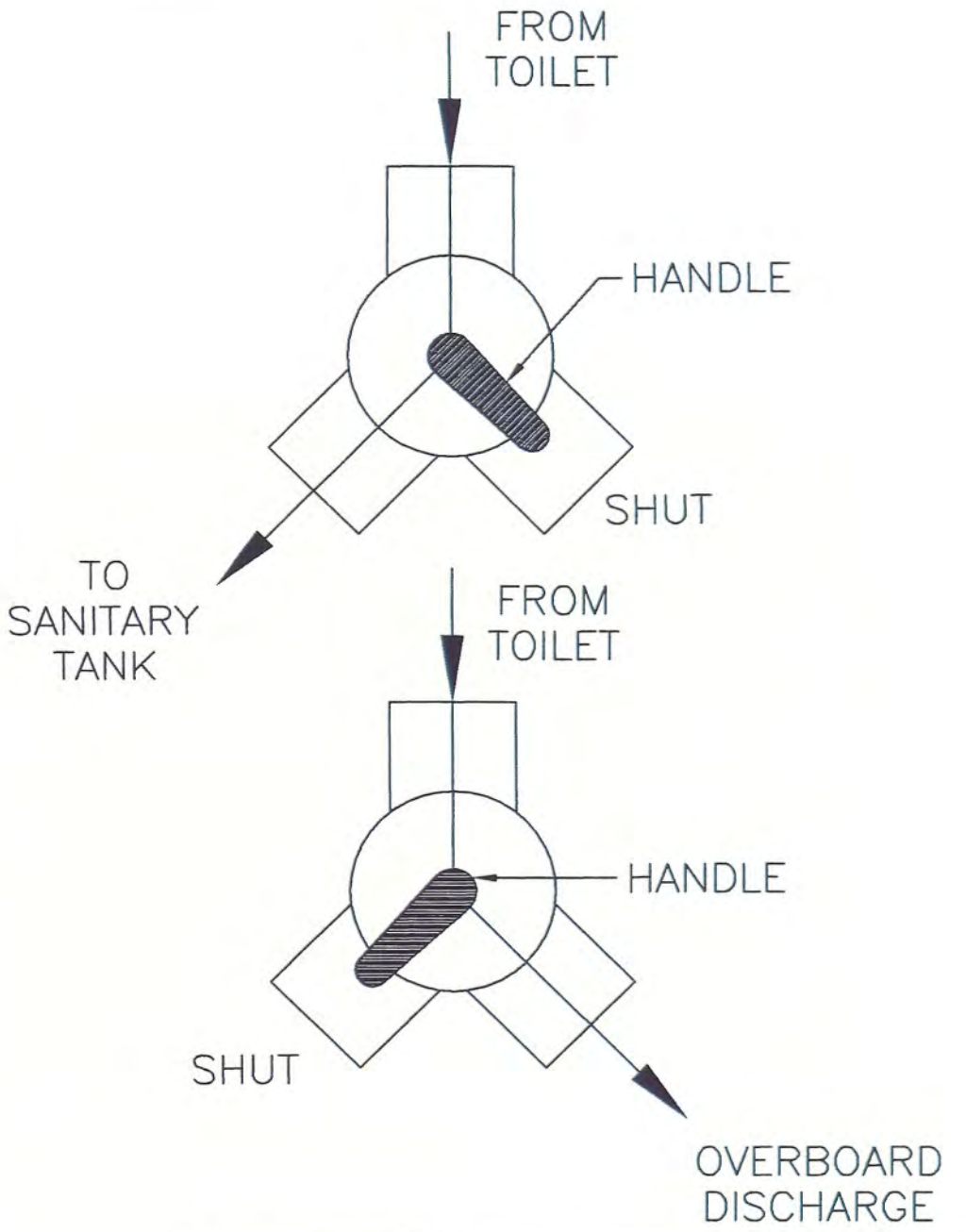
3.4.1 GENERAL ENGINE INFORMATION:

For a complete description of your engine, please consult the guide supplied by the engine manufacturer. This can be found in your owner's manual enclosure.

Two points are worth special attention. Firstly, marine engines work under conditions tougher than those of automotive engines. Your marine engine faces constant torquing not encountered in other applications. For this reason, you must change your engine's crank oil as recommended in the engine manufacturer's guide. Secondly, before using your engine, the shaft coupling must be adjusted within a tolerance of .003" (thousandths of an inch) T.I.R. after launching. This is done during commissioning of the yacht. Be sure that your dealer has made this adjustment before using your engine.

Change the oil regularly. Keep spare parts and alternator belts on hand and use only 3/4 throttle on long passages. Keep your fuel tank full whenever possible to prevent water condensation in your fuel tank.

To retard electrolysis, we recommend installing a zinc collar immediately on the propeller shaft when the boat is to be used in salt water.



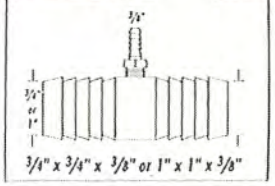
Catalina Yachts

7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727)544-6681

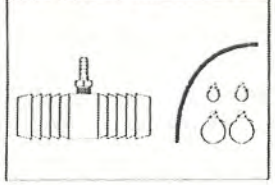
TITLE: C400- 3-WAY VALVE OPERATION

BOAT: CATALINA 400		DRAWING NO: 400-61050-0		
DESIGNED BY:	CHECKED BY:	SCALE: NONE	SIZE	SHEET
DRAWN BY: C.D.	APPROVED BY:	DATE: 8/10/00	A	1/1

T-ADAPT



T-KIT



Note: *P.Y.I. T-adapter fittings or T-adapter kits (T-adapter, 6' reinforced hose, 4 hose clamps) are available for 3/4" or 1" internal hose diameters.*

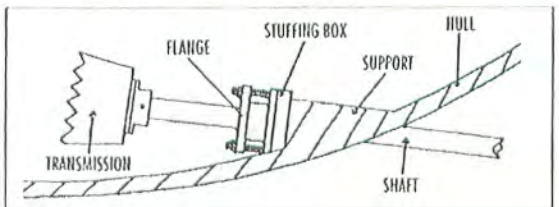
3. For keel cooled or in-line systems, water can be plumbed into the seal from an underwater scoop.

11-B. Standard speed seals. When a boat with a watertight (P.S.S.) Seal goes back in the water, there will be an air pocket trapped in the shaft log (stern tube). This air pocket must be vented when the boat is launched, so water can reach the face of the seal to help cool and lubricate it. To vent the air pocket, simply compress the bellow (push the carbon away from the stainless steel rotor with your hand) so that water fills the shaft log (stern tube). A small amount of water will enter the boat at this time and will stop as soon as you release the bellow, allowing the two faces to come back in contact.

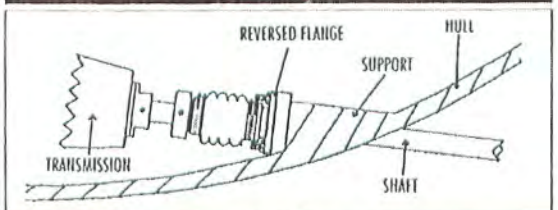
This procedure should be done every time the boat goes back in the water and is not required with high speed seals.

BOLT-ON OR RIGID STUFFING BOXES:

If your stuffing box is a bolt-on or rigid type, you will need to reverse the flange that was used to compress the packing. This flange will be bolted to the face of the bolt-on stuffing box and sealed with a gasket so no water can leak through. Once reversed, the bellow can be fit over the tube that was used to compress the packing. When completed, proceed with step #4 of instructions.



BEFORE



AFTER

THREADED ST[illegible]G BOXES:

If your old stuffing box was threaded directly into the hull, you will need to cover the threads with a liquid gasket material like "form-a gasket" to prevent the threads from cutting into the bellow. When completed, proceed with step #4 of instructions.

BREAK-IN PERIOD:

There is, on average, a 10 minute break-in period when the carbon graphite flange will polish the face of the stainless steel rotor. During this break-in period there will be a very fine black mist being emitted when shaft is turning at high R.P.M.'s.

TROUBLESHOOTING:

1. Spray or mist during operation:

Dimensions provided in the bellow compression chart are an average and should act as a guide. If you should experience any spray or misting during high speed operation (after break-in period), add an additional 1/8" compression to the bellow with the rotor and repeat until the spray has stopped.

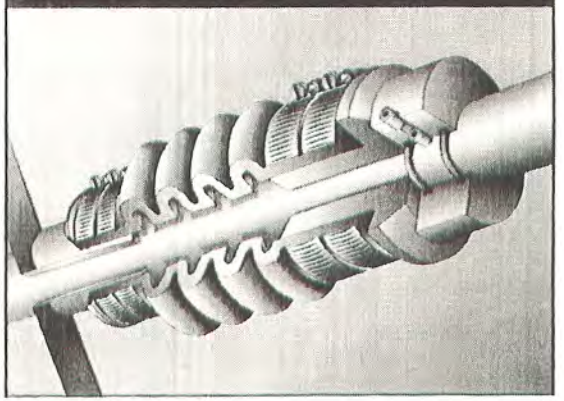
2. Dripping while not operational:

If the seal leaks when the shaft is not turning, some foreign material such as grease or oil may be prohibiting the two faces from seating properly. To clean this foreign material from the two faces, insert a clean cloth rag between the carbon graphite and stainless steel rotor and rotate it around the shaft vigorously. As you do this, water will flush both faces of any impurities. Remove the rag from the seal and the leak should stop.

PYI INC.

P.O. Box 536 • Edmonds, WA 98020
7831 196th Street S.W. • Edmonds, WA 98026
Phone: (425) 670-8915 • Fax: (425) 670-8918
E-Mail: pyi@pyiinc.com • Website: www.pyiinc.com

PACKLESS SEALING SYSTEM



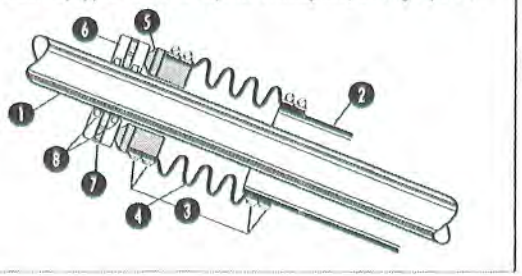
SHAFT SEAL

INSTALLATION INSTRUCTIONS

For Shafts:
3/4" to 3 3/4"
(22mm to 90mm)

STANDARD SPEED P.S.S SHAFT SEAL:

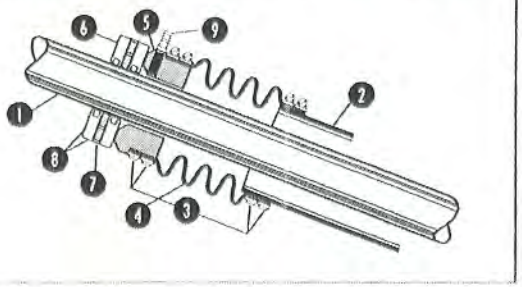
Hull Speed Under 12 Knots.
(Boats equipped with water injected stuffing box, use high speed.)



1. Propeller Shaft
2. Shaft Log (Stern Tube)
3. Stainless Steel Hose Clamps (4)
4. Reinforced Bellow (1)
5. Carbon Graphite Flange (1)
6. Stainless Steel Rotor (1)
7. Stainless Steel Set Screws (5 total / 4 for Rotor, 1 Spare)
8. Nitrile O-Rings (2 in Rotor / 2 Spare)

HIGH SPEED P.S.S. SHAFT SEAL:

Hull speed over 12 knots and boats with water injected stuffing box.



1. Propeller Shaft
2. Shaft Log (Stern Tube)
3. Stainless Steel Hose Clamps (4)
4. Reinforced Bellow (1)
5. Carbon Graphite Flange (1)
6. Stainless Steel Rotor (1)
7. Stainless Steel Set Screws (5 total / 4 for Rotor, 1 Spare)
8. Nitrile O-Rings (2 in Rotor / 2 Spare)
9. Nylon Hose Barb Fitting

READ INSTRUCTIONS THOROUGHLY

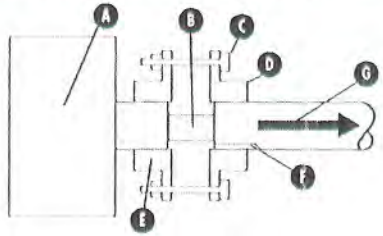
- **Do not use grease or oil to slide the stainless steel rotor down the shaft.**
- Do not allow petroleum based antifreeze to come in contact with face of the seal when winterizing engine.
- Install the P.S.S. **Only** when the boat is out of the water.
- Do not damage the carbon flange or stainless steel rotor while unpacking and handling.
- Do not tighten nylon hose barb fitting or replace with stainless or brass.
- Do not re-use cupped point set screws. If the cupped point has been

INSTALLATION INSTRUCTIONS:

1. Unbolt the shaft coupling from the transmission coupling.
2. Remove the shaft coupling from the shaft. (On most installations the coupling is fixed to the shaft by two set screws that are wired together).

   Helpful hint: Removing the shaft from the shaft coupling may be difficult. The drawing below shows the use of a spacer as a press between the propeller shaft and the transmission coupling.

REMOVING THE SHAFT COUPLING:



A. Transmission
B. Spacer
C. Bolts
D. Shaft Coupling
E. Transmission Coupling
F. Key
G. Shaft

   A. Insert a spacer (with a diameter smaller than the shaft) between the shaft and transmission coupling.

   B. Bolt the transmission coupling and shaft coupling back together with the spacer fit between (note: this may require longer bolts). The spacer will act as a press to drive the shaft from the shaft coupling as the bolts are tightened.

3. Remove the old stuffing box and rubber hose to expose the shaft log (stern tube).

   * *If your boat is equipped with a bolt-on or rigid stuffing box, please refer to heading: Bolt-on or rigid stuffing boxes.*

   ** *If your boat is equipped with a threaded stuffing box, please refer to heading: Threaded stuffing boxes.*

4. Slide the open end of the bellow and two hose clamps over the shaft log. The carbon flange (5) should already be securely attached to the bellow.
5. Clean the shaft (1) with very fine sand paper or emery paper (400 to 600 grit), paying particular attention to the shaft keyway to make certain there are no burrs or sharp edges that could tear the O-rings.
6. Make sure the O-rings (8) are positioned in the grooves of the rotor (spare O-rings are provided) and that the set screws (7) are backed out so that they do not extend into the inside bore of the rotor. Slide the stainless steel rotor (6) onto the shaft using a **water soluble lubricant like dish soap** to help the rotor slide easily. **Do not use grease or oil!**
7. Attach the shaft and shaft coupling. Do not forget to secure coupling with set screws. Wire set screws together to avoid loosening).
8. Position the bellow on the stern tube so the carbon is centered around shaft (the carbon graphite flange is bored larger than the shaft to compensate for vibration or misalignment). Clamp the cuff of the bellow to the shaft log (2) with the two stainless steel hose clamps (3).
9. Slide the stainless steel rotor (6) down the shaft so it just comes in contact with the carbon graphite flange (1). Mark this "neutral" position on the shaft just in front of the stainless steel rotor with a marker or tape.
10. Using the stainless steel rotor (6), compress the bellow (4) the amount indicated on the bellow compression chart (the "neutral" mark on the shaft is used as a reference to measure the amount of compression). While keeping the bellow compressed, tighten the two set screws to secure the rotor to the shaft. Once these set screws are secured, a second pair of screws are stacked on top of the first to act as locking screws to prevent the lower screws from possibly backing away from the shaft.

BELLOW COMPRESSION CHART:

Shaft diameter	*Compression amount*
3/4" to 1 1/8" (22mm to 30mm)	3/4" (20mm)
1 1/4" to 2" (32mm to 55mm)	1" (25mm)
2 1/4" to 3 3/4" (60mm to 95mm)	1" (25mm)

Note: *amount of compression may vary depending on motor mounts and shaft misalignment.*

11. **High speed seals with nylon hose barb fitting reference 11-A; Standard speed seals reference 11-B.**

    11-A. High speed seals with a nylon hose barb fitting require that water be plumbed into the seal to cool and lubricate the seal. There are three methods for plumbing water into the seal:

    1. Remove the plug from heat exchanger and replace plug with a hose barb fitting (this plug would normally be used to drain water from the engine).Run a reinforced hose to the shaft seals nylon hose barb (3/8"). Secure both with hose clamps.

    2. Cut into the exhaust line of the cooling system before hot water is discharged overboard. Fit t-adapter into line and plumb water into shaft seal nylon hose barb (3/8"), using reinforced hose. Secure all connections with hose clamps.

3.4.4 SHAFT ALIGNMENT:

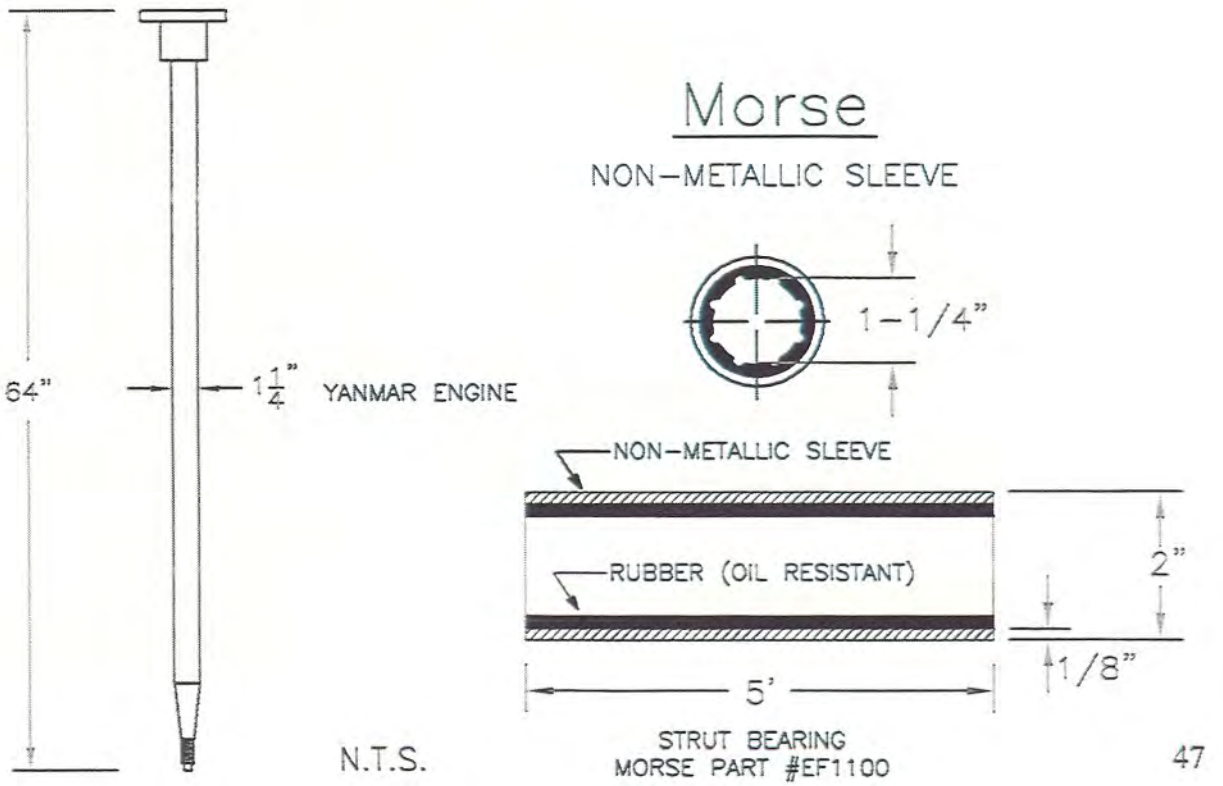
For proper operation of the engine, the propeller shaft and engine must be aligned.

Alignment is gauged at the engine and shaft coupling. Alignment procedures must be done with the boat in the water after the mast is stepped and the rig is tuned.

1. The propeller shaft is dimpled (1/8" deep) for two (2) coupling set screws. The set screws must be safety wired, using the stainless steel wire provided, as illustrated. Check key in keyway, as it must be in place between shaft and coupling.

2. Remove coupling flange bolts and check propeller shaft for clearance. Adjust stuffing box so that excessive seepage is prevented, yet the shaft is allowed to spin freely.

3. Slide shaft away from engine and check coupling mating surfaces. These must be clean.



4. Slide shaft forward to connect coupling surfaces. Pilot on transmission flange must align with pilot on shaft coupling flange. This is an indication of correct axial alignment.

5. With coupling flanges in contact, measure gap around edge of coupling flanges with .003" feeler gauge. Maximum allowable gap at any point is three thousandths of an inch. Take this measurement several times ... rotating shaft 1/4 turn each time. Any gap in excess of .003" must be corrected by changing engine position, especially fore/aft tilt.

   For example, excessive gap at the bottom of the coupling (see drawing) indicates engine is tilted too far aft (front too high). With a wrench, loosen lock nuts on forward motor mount(s). Lower front of engine by clockwise rotation of motor mount nuts. Remeasure gap at coupling. A gap at the top of the coupling would require the exact reverse procedure.

6. Pull shaft aft as in step 3. Again slide shaft forward, rechecking axial alignment as in step 4.

7. Repeat steps 5 and 6 until alignment within tolerance is achieved.

8. Tighten motor mount lock nuts and install coupling.

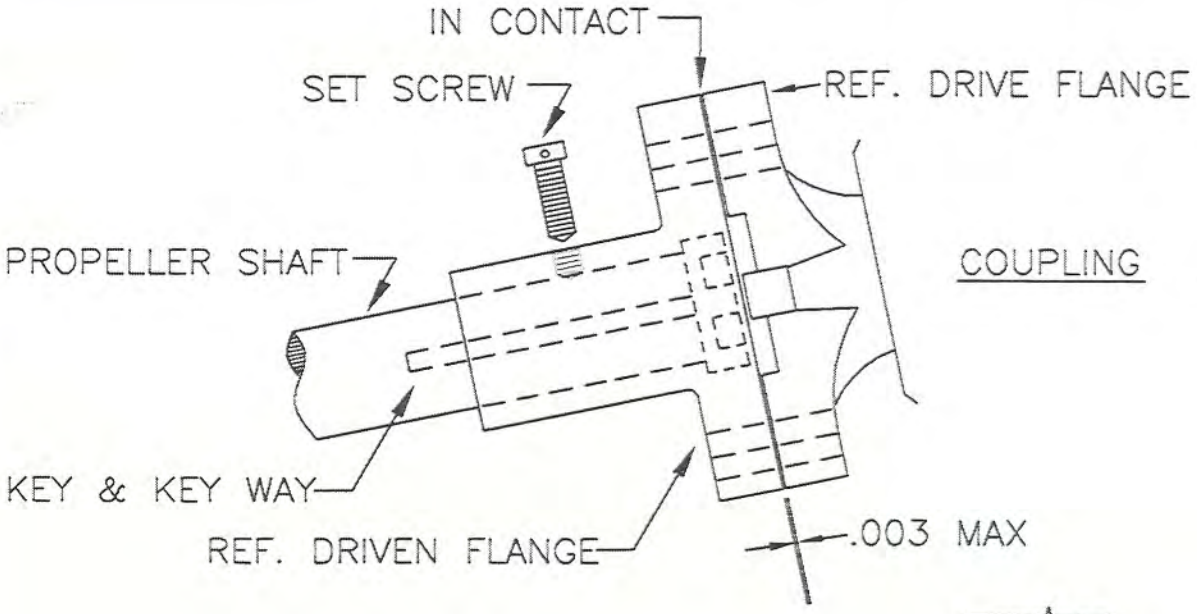
NOTE: Alignment should be checked yearly, or whenever any excess vibration is noticed. The alignment can also be affected by changes in rigging tension.

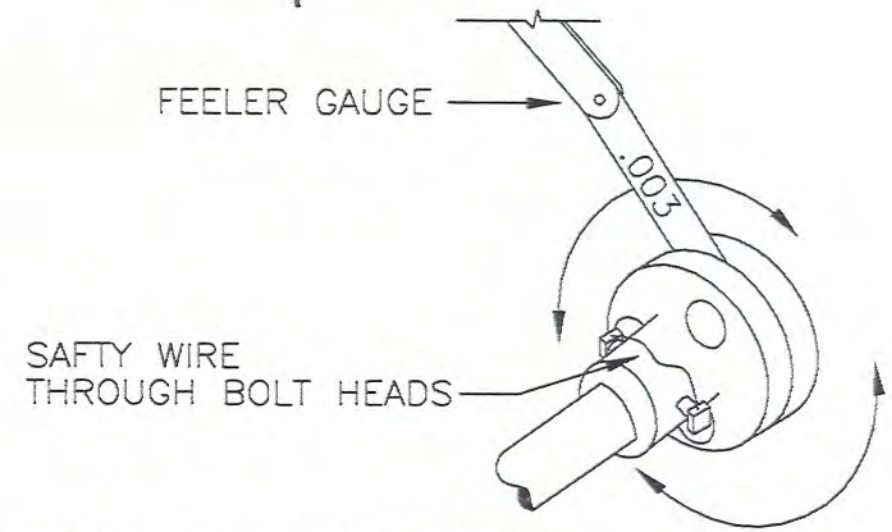
Canada Metal – Martyr Anodes

Boat Type	Prop Shaft Dia	Threads	West Marine Part # Full Kit	Replacement
Cat 270 - 36	1"	3/4" - 10	132581	132656
Cat 387 - 42	1-1/4"	7/8" - 9	132599	132664
Cat 470 - 504	1- 1/2"	1-1/8" - 8	132615	132680

Limited Clearance Collar Anodes

Boat Type	Prop Shaft Dia	Threads	West Marine Part # Full Kit
Cat 270 - 36	1"	3/4" - 10	485078
Cat 387 - 42	1-1/4"	7/8" - 9	485086
Cat 470 - 504	1- 1/2"	1-1/8" - 8	485268





MEASURE GAP BETWEEN MATING FACES OF COUPLING FLANGES.
MAXIMUM ALLOWABLE GAP AT ANY POINT IS .003 WHEN
ANY POINT OF COUPLING FACES ARE IN CONTACT.
TAKE THIS MEASUREMENT SEVERAL TIMES. ROTATING SHAFT 1/4 TURN EACH TIME.
THIS MEASUREMENT MUST BE MADE WITH COUPLING BOLTS REMOVED.

Catalina Yachts

7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727)544-6681

TITLE: SHAFT ALIGNMENT

BOAT: CATALINA 400		DRAWING NO: 400-38000-0		
DESIGNED BY:	CHECKED BY:	SCALE: NONE	SIZE	SHEET
DRAWN BY: C.D.	APPROVED BY:	DATE: 8/9/94	A	1/1

3.0 YACHT SYSTEMS - (Continued)

3.4.6 FUELING:

The fuel system of the Catalina 400 is illustrated and consists of an 44 gallon aluminum fuel tank, fuel suction and return lines, a secondary fuel filter on the engine and primary remote filter and water separator, and an electric fuel pump controlled by the engine key switch, a deck fill plate, and an overboard vent through the starboard hullside. Refer to the engine manual provided for recommended fuel type. A diesel engine does not require an ignition system and is superior to a gasoline engine in dependability. This depends on the clean fuel being supplied to the engine since the close tolerances required by the engine's fuel delivery system make it intolerant of dirt or water contamination. The engine is supplied with primary and secondary filters that prevent contaminants from reaching the engine where they could cause damage. However, a clogged filter, although providing this protection, can also stop an engine. Keeping the filters free of dirt and water is critical.

BEFORE FUELING:

1. Extinguish all smoking materials and check the fueling area for other sources of spark or flame. Remove if found.

2. Shut off the engine and any electrical accessories or devices.

3. De-energize all electrical equipment by turning the selector switch to the off position.

4. Close all hatches and ports.

5. Ensure that a fire extinguisher is readily available.

6. Ensure that the proper (diesel, not gasoline) hose is about to be used.

WARNING: Do not fuel during an electrical storm. Besides the obvious hazard of lightning, the possibility of static discharge is greatly increased at this time.

FUELING PROCEDURE:

1. Remove fill pipe cover using a proper tool.

2. Place nozzle of fuel hose in the fill pipe. Keep the nozzle in contact with the deck plate rim during fueling to avoid the possibility of a static spark.

3. Fill slowly, do not overfill. If it is not possible to see the meter on the fuel pump, the attendant or a crew member should call out the gallonage from the fuel dock. Filling the tank to only 95% of capacity will avoid overflow problems on a hot day.

4. Replace cover, clean up any spilled fuel. If any rags, etc., were used for this purpose, dispose of them ashore.

3.0 YACHT SYSTEMS - (Continued)

5. Check below decks for presence of fumes or fuel leakage. Check bilge, engine space, and main cabin. If fumes or evidence of leakage are found, determine the cause, correct it, and clean up any spillage before proceeding.

6. Open all hatches and ports to ventilate the boat.

7. Switch on battery.

8. The engine should be started only when it is certain that no potentially hazardous conditions exist.

3.4.7 FUEL SANITATION:

BACTERIAL CONTAMINATION:

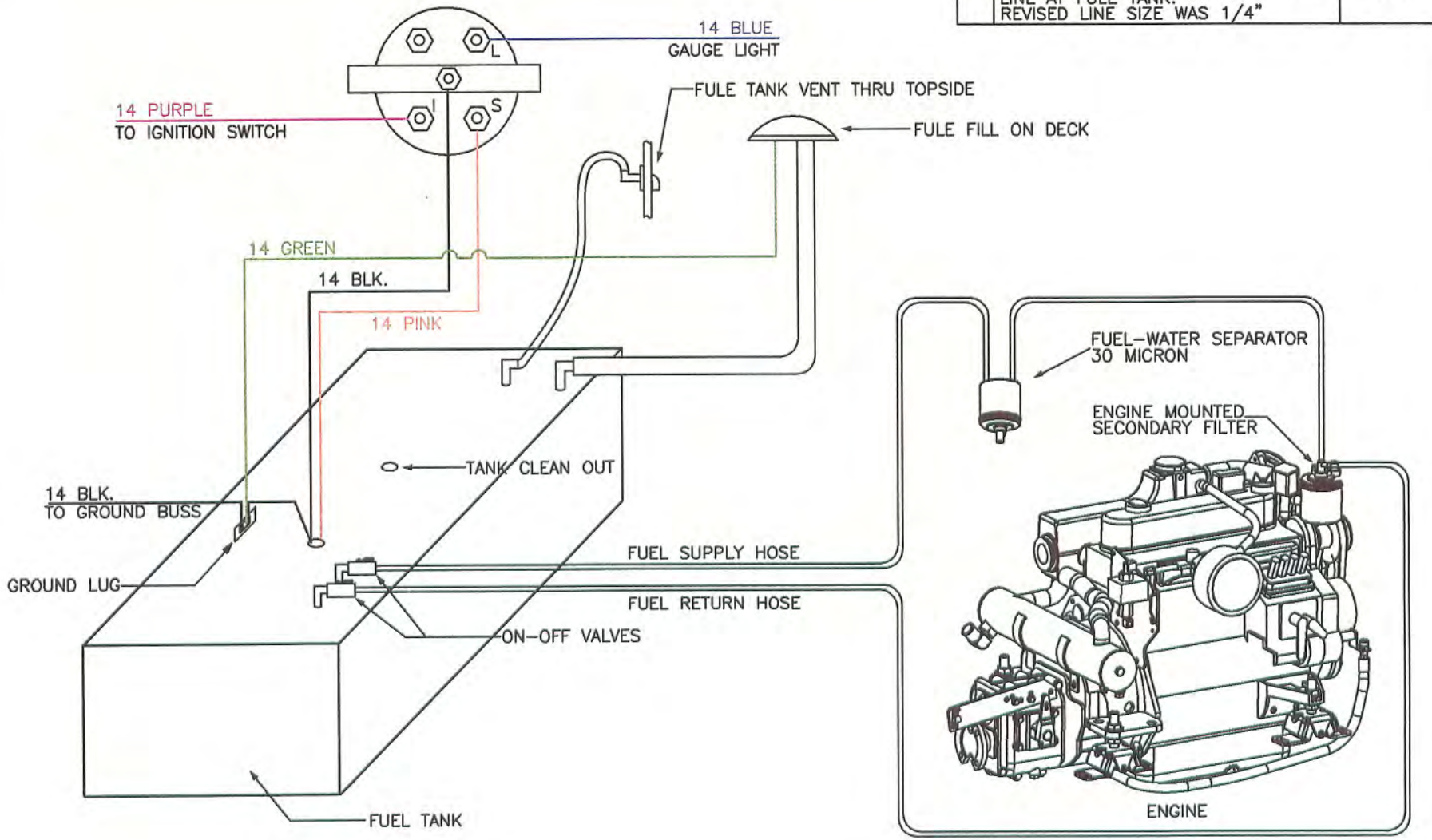
Bacterial contamination of the diesel fuel can cause problems. The bacteria needs both water and fuel to exist, and thrive at the fuel/water interface in a fuel tank. As they multiply, they form more water and a filter choking brown slime. Their presence will not be known until rough weather churns up the fuel tank causing clogged filters at the worst possible time.

Keeping water out of the fuel will prevent the problem entirely. However, a certain amount of water due to normal condensation in the tank is to be expected.

FUEL ADDITIVES:

Fuel additives or fungicides provide another means of combating contamination. Additives break the water down to a molecular level, dispersing it throughout the fuel and allowing it to pass harmlessly through the fuel system. Several brands of this product are available at marine stores.

NO	REV	DATE
1	ADDED SHUT OFF VALVE TO RETURN LINE AT FULE TANK. REVISED LINE SIZE WAS 1/4"	4/9/99



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH:

DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DIARY RD.
LARGO, FL. 33777
(727) 544-6681

TITLE: C400- FULE SYSTEM SCHEMATIC

BOAT: CATALINA 400		DRAWING NO: 400-53000-1	
DESIGNED BY:	CHECKED BY:	SCALE: FULL	SIZE: C / SHEET: 1/1
DRAWN BY: C.D.	APPROVED BY:	DATE: 9/29/98	

3.0 YACHT SYSTEMS - (Continued)

3.4.9 EXHAUST SYSTEM MAINTENANCE:

In-board engine installations on sailboats differ from the engine installations on power boats. The primary difference is that the engine is usually installed below the waterline of the vessel.

The benefits of these locations are that the weight of the engine is where it will not adversely effect trim and that the shaft is at an efficient angle for powering and minimum drag when sailing.

Engine installations below the waterline require special attention to the design of the exhaust system. The discharged cooling water must be looped well above the waterline to avoid sea water from traveling up the exhaust line and entering the engine.

To exhaust the engine, the discharged cooling water and exhaust gas must be "lifted" to a level above the through hull fitting on the hull.

In the Catalina 400, the exhaust cooling water and exhaust gas are lifted above the waterline by an "Aqua-lift" type muffler. The Aqua-lift muffler performs three jobs:

1. It mixes engine gas and water to cool the gas and lower exhaust line temperature.

2. It baffles and deadens engine exhaust noise.

3. It creates pressure required to lift and expel cooling water.

The inlet tube into the "Aqua-lift" type muffler is short and the outlet tube is long, near the bottom of the tank.

As water accumulates in the bottom of the tank, exhaust gas pressure builds in the top of the tank. This forces the cooling water up the exit tube and through exhaust line overboard.

The system requires exhaust pressure in the tank to function. When the starter motor is turning over, before the engine fires, water is being pumped through the cooling system by the belt driven cooling water pump. It is very important not to operate the starter motor for more than 30 seconds if the engine does not fire. Should it be necessary to operate the starter motor more than 30 seconds, water must be drained from the Aqua-lift by opening the drain at the base of the Aqua-lift. The drain valve may be opened until the engine fires, if desired. All Catalina 400's are equipped with anti-siphon valves as an additional precaution to prevent cooling water from entering the engine.

The function of the anti-siphon valve is to prevent cooling water from being siphoned through the through hull valve, through the engine cooling system and into the Aqua-lift muffler when the engine is not operating.
If the muffler were to fill completely with water, water would travel up the inlet tube and enter the engine block.

The Catalina 400 exhaust system is basically simple and will provide trouble free service if you perform regular maintenance and inspection. The important points to remember are:

1. Close the engine cooling water through hull valve when you are not operating the engine.

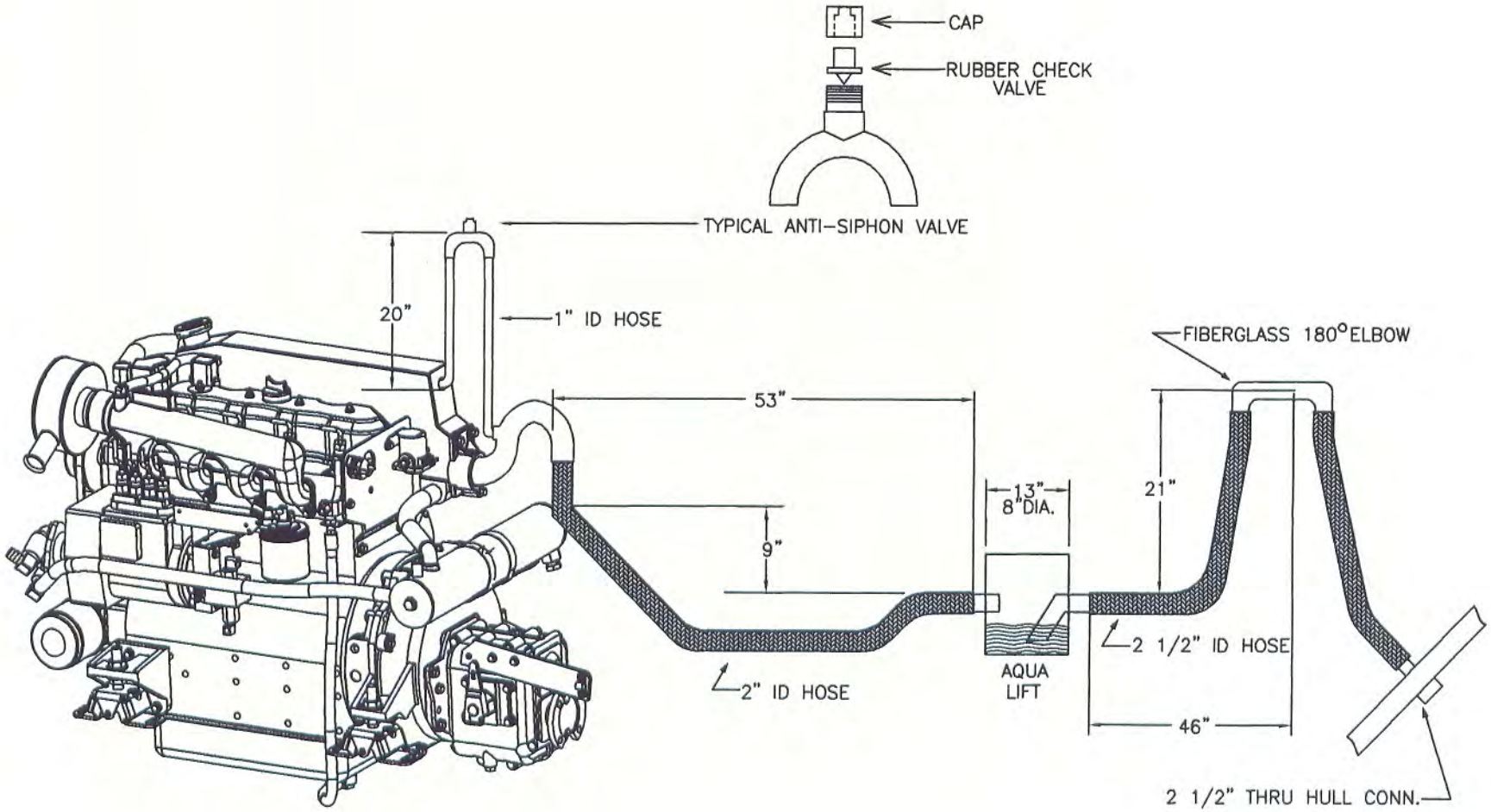
2. Do not operate the starter motor for more than 30 seconds without draining the Aqua-lift muffler.

3. Periodically disassemble the anti-siphon valve. Be sure the valve is not fouled with salt deposits and that it opens freely under the cap.

4. Check the operation by removing the valve:

   A. Put a finger over one large hole and blow through the other. Air should not escape through the cap.

   B. If you suck through one large hole with a finger over the other, air should enter the valve through the cap.



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

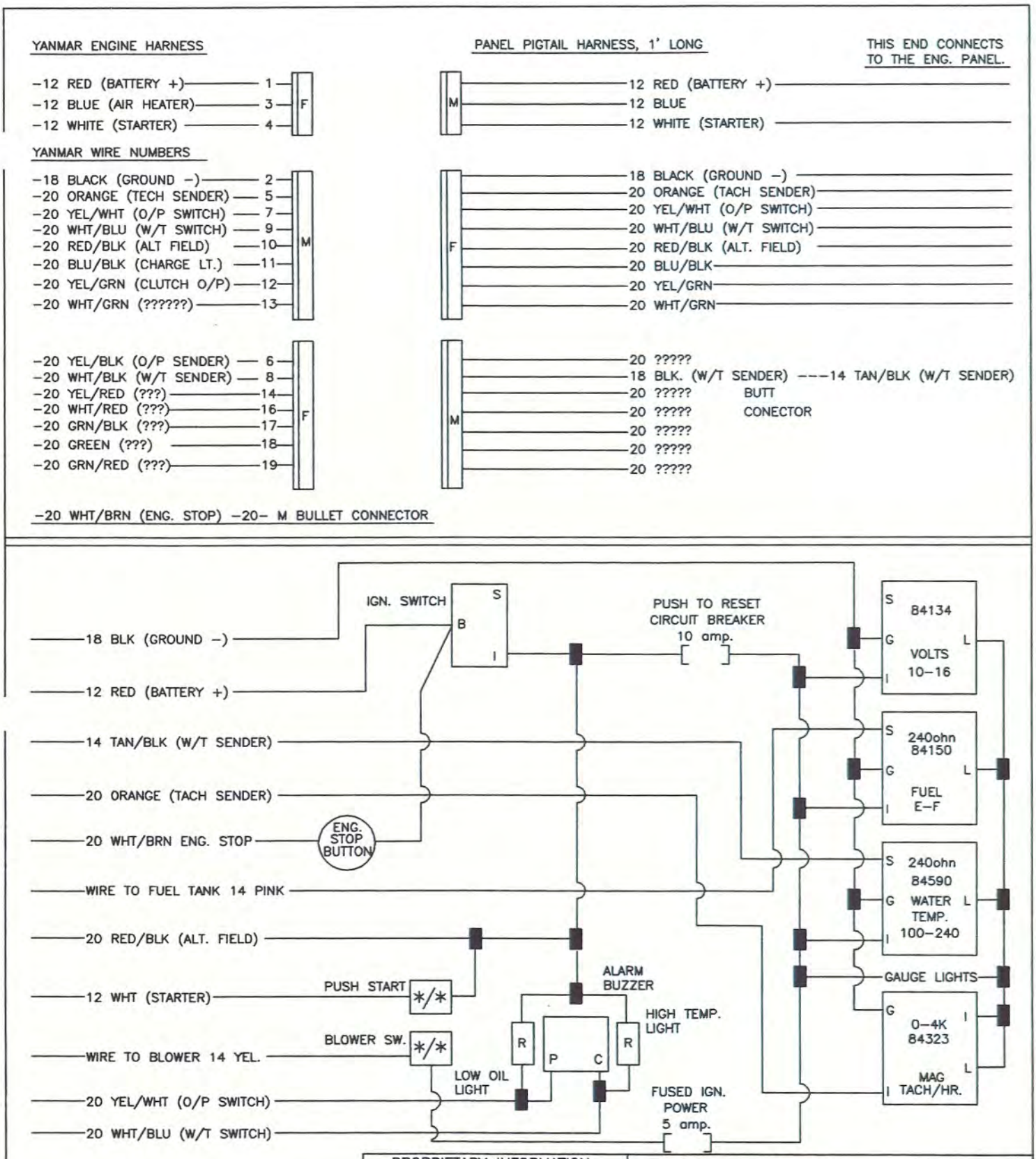
GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH:

DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DIARY RD.
LARGO, FL. 33777
(727) 544-6881

TITLE: ENGINE EXHAUST SYSTEM

BOAT: CATALINA 400		DRAWING NO: 400-53001-0	
DESIGNED BY:	CHECKED BY:	SCALE: FULL	SIZE: C / SHEET: 1/1
DRAWN BY: C.D.	APPROVED BY:	DATE: 6/7/00	



FACTORY TACH. CALIBRATION
FOR 4JH (127 TEETH)
SET TESTER SWITCH TO 3200,
AND ADJUST THE TACH CAL.
SCREW TO INDICATE 1500 RPM.

Catalina Yachts
7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727)544-6681

SCALE: NONE	APPROVED BY:	DRAWN BY: GTB
DATE: 12/9/97	FILE: 75050-1	

TITLE: ENGINE EXTENSION HARNESS PANEL WIRING FOR YANMAR DIESEL ENGINES

SIZE | SHEET: 1/1

BOAT: CATALINA 400

DRAWING NUMBER: 400-75051-0

3.0 YACHT SYSTEMS - (Continued)

3.5 STEERING:

3.5.1 EMERGENCY TILLER

It is recommended that the skipper and crew become familiar with the emergency tiller and its use.

The emergency tiller is stored in a blue bag in the aft lazarette.

A dry run of the system will minimize confusion in an emergency:

1. Locate the emergency tiller.
2. Remove inspection port cover.
3. Insert the emergency steering tiller in the top of the rudder post.

NOTE: The emergency tiller moves the whole steering assembly, including cables quadrant. These components must be free to move in order to steer the boat.

Edson INTERNATIONAL

Marine Steering Inspection

As with all mechanical systems used in the harsh marine environment, proper inspection and maintenance is required of an Edson Steering System for long life and years of proper service. Systems which have not been maintained and lubricated properly show signs of wear early and perform less than satisfactory. Therefore, it is important that all boats fitted with Edson Steering Systems get an annual inspection of the critical system parts and that routine maintenance guidelines are followed. This inspection can be done by an Authorized Edson Service Center, or can be done by the boat owner.

After each item is inspected , check the appropriate box on the left-hand side of the checklist. If a replacement part is required, or an upgrade part is needed, make a check in the appropriate box on the right-hand side of the checklist next to the Part#. After the Inspection is complete, copy those Part#'s needed onto the order page attached. This order form can then be taken to your Edson Dealer or Service Center for fulfillment.

Note: Some parts need size designations - refer to your Edson Catalog, Price Page or Specific Boat Data Sheet for sizing information. If you have any questions during the Inspection or while filling out the order form, please contact the Edson Customer Service Department between 8am - 5pm Eastern Time.

Edson Steering Inspection Checklist

Please Fill Out This Section Completely.

Owners Name: _____ **Boat Name:** _____

Address: _____

City: _____ **State:** _____ **ZIP:** _____ **Phone: ( )** _____

Boat Type/Mfr: _____ **Length:** _____ **Year:** _____

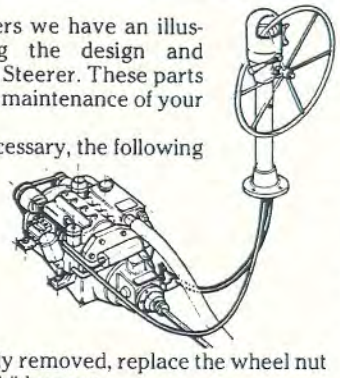
Engine Mfr. and Type: _____ **Transmission Mfr. and Type:** _____

☑	Inspection Area	Action	Parts Needed	☑
	Steering Wheel/Shaft	**Remove** Steering Wheel for room to work		
		Inspect Wheel, Key and Snap Ring		
		Replace Key if loose in keyway	#684-250W	
		Replace Snap Ring if there are signs of corrosion	#960-A-660	
		Remove compass and cylinder (follow mfr. rec.)		
		Replace Compass Bolts if corroded	3 1/2" - #817-3.5	
		Coat Compass Bolts with Tef-Gel before re-installing.	1" - #817-1	
	Engine Control	**Inspect** handles, levers, shafts, bushings		
		Upgrade plastic handles to stainless	Throttle -#963SB-55	
			Clutch -#963PT-55	
		Replace Delrin Bushings if deteriorated or stiff	#960-A-125	
		Inspect Engine Cables		
		Replace cables if deteriorating or stiff	#734-33-*spec length*	
			#735-64-*spec length*	
	Wheel Brake	**Inspect** Brake. Tighten to determine if working properly		
		Visually inspect pads. Clean grease off of knurling.		
		Replace Pads if worn or ineffective	Brake Kit - #316-689	
		Upgrade plastic knob to stainless	#960-A-91ST	
	Steering Chain/Sprocket	**Inspect** chain for proper lubrication and free-movement		
		Replace if dry, corroded, or does not "roll"	#886-*spec size*	
		Inspect sprocket for broken, worn or bent teeth		
		Replace sprocket if broken or bent	#855-*spec size*	
	Steering Shaft Bearings	**Inspect** condition of bearings by turning shaft and checking		
		for play or resistance while chain is disconnected.		
		Replace bearings if stiff or excessive play	#314-335	
	Steering Cables	Oil tissue and run along wire. **Inspect** Steering Cable for		
		signs of wear such as "meat-hooks" or kinks.		
		Replace wires if there are any signs of wear	#885-*spec size*	
		Check cable tension. Cable should deflect 1" per foot.		
		Tighten cables at the quadrant take-up eyes if loose.		
		Inspect Conduit (if used) for worn areas or tight bends.		
		Replace if worn through	#797-250	
		Lubricate conduit with Teflon Grease if dry.	#827-3	
		Continued		

PEDESTAL STEERING ASSEMBLY

As a further service to our customers we have an illustrated parts breakdown showing the design and construction of your Edson Pedestal Steerer. These parts ings will assist you in the proper maintenance of your ng system.

If disassembly should become necessary, the following instructions will provide a simple but precise method of removing and replacing the steering shaft and its components.



DISASSEMBLY

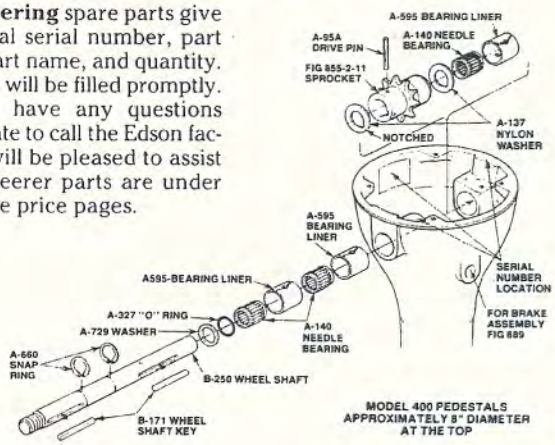
1. With the wheel and brake assembly removed, replace the wheel nut with any standard thread ¾" or 1" hex nut.
2. Loosen the steering cables and chain by backing off the take-up eyes at the Quadrant or Radial Driver, lift the chain off the sprocket and tie to the forward part of the bowl.
3. Put a cloth just under the sprocket so no parts drop down.
4. Align the notch in the aft nylon washer with the "V" stamped on the sprocket.
5. Carefully drive the pin out of the sprocket (drive from the round end toward the grooved end).
6. With a piece of wood against the ¾" or 1" hex nut, gently tape the wheel shaft from the housing (see illustration); be careful not to drop the shaft components into the pedestal.
7. Remove the sprocket, two nylon washers and forward needle bearing.
8. Remove aft needle bearing and washers.
9. Wipe out any dirt or old grease before reassembly.

To reassemble, reverse the above procedure; do not grease the bearings until reassembly is completed.

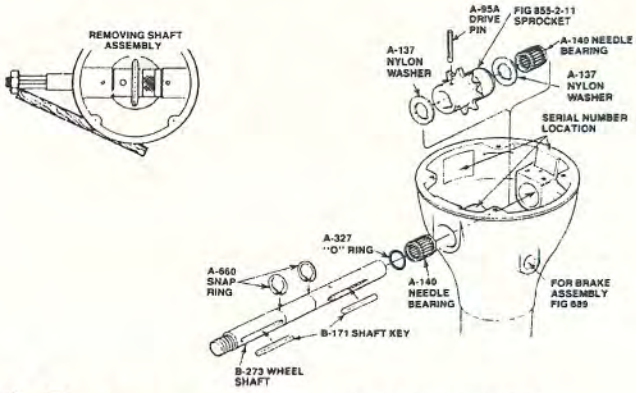
NOTE: Check your compass for possible readjustment.

ordering spare parts give t. :destal serial number, part number, part name, and quantity. Your order will be filled promptly.

If you have any questions don't hesitate to call the Edson factory. We will be pleased to assist you. All steerer parts are under Fig 960; see price pages.



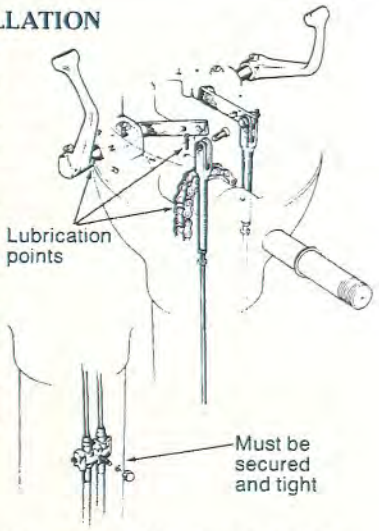
MODEL 400 PEDESTALS
APPROXIMATELY 8" DIAMETER AT THE TOP



MODEL 334 OR 335 PEDESTALS
APPROXIMATELY 7" DIAMETER AT TOP

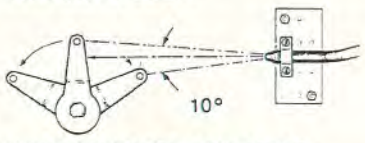
ENGINE CONTROLS INSTALLATION

Great care must be taken to assure ease and safety of engine controls operation. Components must be installed and adjusted so the engine goes into gear smoothly and completely, and the throttle operates easily. Cables must be installed straight or in broad curves. Refer to the Engine Connections illustrations (opposite) for installation procedures. Don't force engine controls when operating above idle. Force-shifting can result in broken cables and loss of boat control. Familiarize yourself with the operation of the engine controls. Caution and train all those on board.

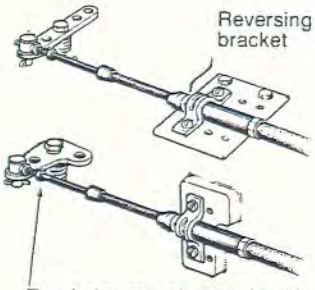


ENGINE CONNECTIONS

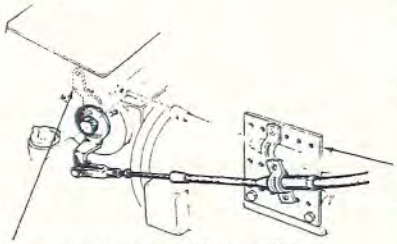
NOTE: Use the information below as a guideline. Most engine and control cable manufacturers furnish instructions for installing their products. Use their instructions if there is any variance with the instructions shown below.



When aligning the cable anchor point with the control lever, the centerline of the cable must be aimed to the mid point of the lever to allow an equal amount of swivel to each other. No more than 10° total cable bend is allowed.

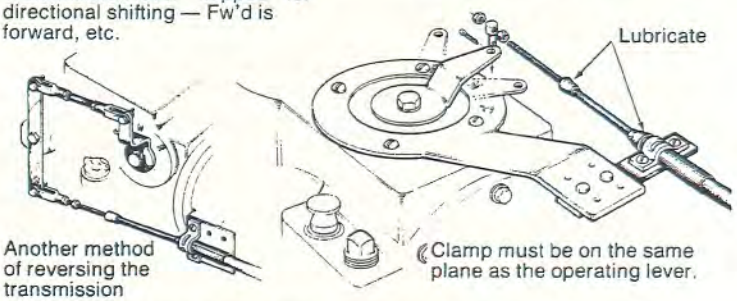


Two holes must be provided in the engine throttle lever to optionally select the proper travel. Holes, both 1¾" R or 2¾" R. Inner hole will provide increased throttle travel control handle pressure.



Transmission lever "flopped" for directional shifting — Fw'd is forward, etc.

Typical working end clamping brackets with extra holes for centering and reverse if required. Straight lead is very important.



Another method of reversing the transmission

Clamp must be on the same plane as the operating lever.

ENGINE CONTROLS MAINTENANCE

Oil the control handle shaft bearings with #30 motor oil. Use a good grade of Teflon spray with an extender nozzle for the pedestal end of the engine control push/pull cables.

At the engine, clean off the control cable metal ends and spray with Teflon grease. This will increase cable life and make operation easier. Engine cables are subject to high heat from the transmission, and salty bilge water, both very hard on moving parts. If stiff, replace.

PEDESTAL STEERING MAINTENANCE

To properly maintain the moving parts in the top of the pedestal, it is necessary to remove the compass and its cylinder. For proper alignment when re-installing the compass, we recommend placing three or four lengths of tape on the pedestal and compass as shown below. Slit the tape when removing compass, align the strips of tape when re-installing the compass for visual realignment. Your compass MUST then be checked out for accuracy. Lubrication of needle bearings should be done by squeezing Edson Fig 827 Teflon Lubricant into the holes located on top of the bearing housings inside the pedestal bowl. Spin the wheel when squeeezing the lubricant in to make sure the entire bearing is serviced. Winch grease or water pump grease can be used as an alternative, but don't let the bearings run dry. Do not over grease as it will run onto the brake pads. Oil the chain with #30 weight motor oil. Do NOT grease chain as it does not penetrate the links.

Inspect the condition of the wire, tension of the wire and lightly oil. Edson recommends placing about five layers of "Kleenex" on the palm of your hand, squirt oil on the tissues and lightly oil the wire. This will lubricate the strands but will also "flag" a broken or hooked strand by tearing off a small section of tissue. If you do have a wire break, replace the wire immediately. See Edson Fig 775 Wire and Chain Replacement Kits. (**Caution:** Wire splinters can cause painful cuts.) Replace the wire after 5 years. If still good, keep the old wire on board as a spare.

STEERING WIRE TENSION

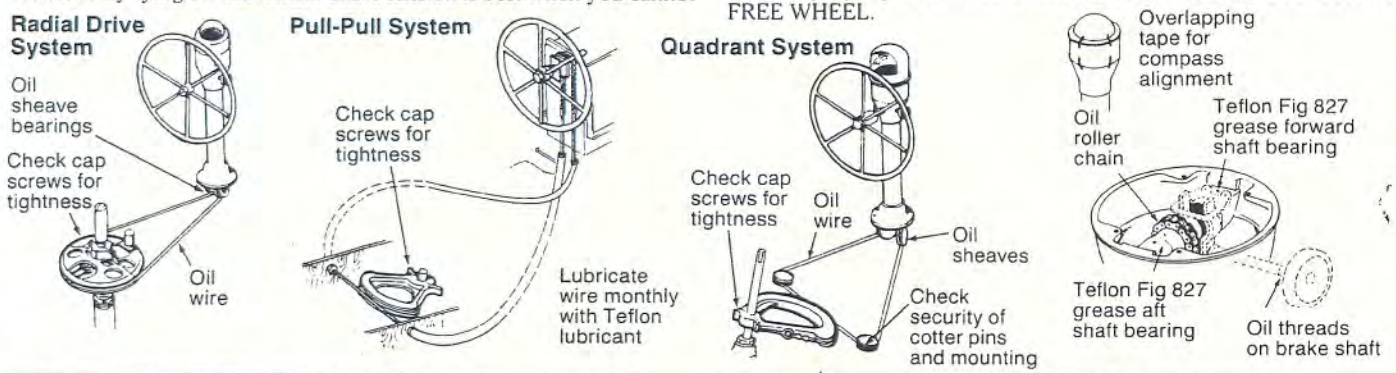
A top quality roller chain to wire steering system can be kept in "as new" sensitivity by keeping the wire at a correct tension. To check for proper wire tension, lock the wheel in position by using the pedestal brake, or by tying off the wheel. Cable tension is best when you cannot move the quadrant or drive wheel by hand with the wheel locked in place. Over tightening will greatly reduce the sensitivity of the system.

It must be emphasized that all on board must be familiar with the care and operation of the Steering System and engine controls. One person must be assigned the job of maintenance and must be thoroughly familiar with the operation and intent of all the equipment. If at any time your Steering System makes strange noises or reacts differently than it has previously, you must find the causes immediately and correct the problem.

Screws, nuts, bolts, as well as clevis and cotter pins that are part of the steering system, engine controls or pedestal accessories, must be checked regularly for tightness and wear. Failure to inspect all steering parts, engine controls and pedestal accessories may cause loss of control or failure of the engine or steering system. *All boats must have an emergency tiller or its equivalent and all on board must be familiar with its location and operation. An emergency tiller drill is just as important as a man-overboard drill and must be regularly conducted.*

On a new boat and at least once a year, inspect the system when under a strong load. On a calm day and under power, go away from the other boats and with the person who is assigned the maintenance watching from below, put the wheel hard over at full throttle. The maintenance man should watch carefully for all parts of the system bending, distorting, creaking, or giving any indication of failing if placed under a heavy load for a period of time. If, for any reason something did fail or needs adjusting, the day is early and you will have plenty of time.

When leaving your boat at her mooring or slip, make sure that your wheel is properly tied off. DO NOT LEAVE THE STEERING SYSTEM TO FREE WHEEL.



CLEANING STAINLESS STEEL

Pedestal guards, steering wheels and shafts are all made from top quality stainless steel. The implication of its name "stainless steel" does not mean it is totally rustproof. All stainless steel will rust to a certain degree due to chemical reaction to air and saltwater. This is mainly cosmetic and will require an occasional polishing with an abrasive type cleaner such as "Brasso" or equivalent.

CLEANING PEDESTAL AND ACCESSORIES

Clean them with soap and water; don't use chemicals such as MEK or acetone as they break down the super finish on your Edson pedestal system, compasses and instruments. Most manufacturers of compasses and electronic instruments suggest that they all be removed during winter storage and kept in a warm dry area. Compasses are normally held in place by two or three slotted-head screws, placed near the top of the compass. A Fig 672 Rubber Connector will assist in removing the compass. Instruments can be removed by the screws in the Edson faceplate. Just unplug the instrument and you are all set.

CAUTION: When the equipment is in the tropics or in charter service, the maintenance schedule must be speeded up. Or, to put it in a few words: clean it up, oil it, inspect it, cover it. The effects of sun, saltwater and inexperienced operators can be severe.

LUBRICATION RECORD

component	lubricant	schedule	1st year 19____	2nd year 19____	3rd year 19____	4th year 20____	5th year 20____	6th year 20____	7th year 20____
sheave bearings	#30 oil*	check and oil monthly							
pull-pull cables	Teflon Fig 827	check and grease monthly							
wire rope	#30 oil*	check and oil annually							
roller chain	#30 oil*	check and oil annually							
pedestal shaft bearings	Teflon Fig 827	check and grease annually							

*Any light oil is suitable. We recommend #30 weight motor oil since most boat owners have it aboard.

CAUTION: 1.) On extended voyages your steering system should be inspected each day and lubricated weekly. Carefully inspect your steering system at least one week before a vacation cruise to avoid last minute maintenance.
2.) When the boat is unattended secure the wheel with the brake or a line. In rough weather the rudder can swing violently from stop to stop causing damage.

Edson INTERNATIONAL
146 DUCHAINE BLVD, NEW BEDFORD, MA 02745-1292 • TEL (508) 995-9711 • FAX (508) 995-5021

☑	Inspection Area	Action	Parts Needed	☑
	Cable Sheaves/Idler	**Inspect** Idler Plate and Sheaves for corrosion or wear		
		from misaligned cables. Look for metal dust under sheave.		
		Inspect Sheave Pins for excessive wear.		
		Replace Idler, Sheaves or Pins if corroded or worn.	See Data Sheet	
	Steering Cable Alignment	Correct cable alignment within the sheave system is		
		required to insure longevity of the system. **Check** that Cables		
		are centered in the groove of the sheaves and quadrant.		
		Adjust sheave placement to insure a fair wire lead.		
	Quadrant / Radial Wheel	**Inspect** Quadrant or Radial for signs of wear or corrosion.		
		Inspect for cable wear along wire groove.		
		Inspect connection at rudderpost for tightness.		
		Inspect Rudderstop. Is it hitting supports on both sides?		
		Replace Quadrant if weakened by corrosion.	See Data Sheet	
		Replace Rubber Bumper on Stop if missing.	#960-A-534	
		Tighten all bolts clamping Quadrant on rudderpost.		
		Align Quadrant or Sheaves for fair wire runs.		
	Overall Inspection	**Tighten** all fasteners including pedestal bolts, wire rope		
		clamps, and quadrant rudderpost/connections.		
		Inspect Pedestal base for water leakage.		
		Seal with bedding compound if leaking.		
	Lubrication	***For longevity of the steering system, proper***		
		lubrication is required.		
		Lubricate Shaft Roller Bearings with Teflon Grease	#827-3	
		Lubricate Cable Conduit with Teflon Grease		
		Oil Wire Rope, Chain and Sheave Pins w/ #30 Motor Oil		
	Upgrades	Many parts that Edson used to make in plastic are now		
		built of Stainless Steel. Upgradeable items include:		
		Stainless Shift Handle	#963SB-55	
		Stainless Throttle Handle	#963PT-55	
		Stainless Wheel Nut	#673ST 1" or 3/4"	
		Stainless Quick-Release Wheel Nut	#826ST 1" or 3/4"	
		Stainless Brake Knob	#960-A-91ST	
		These items are easily replaced during an inspection.		
	Customer information	**Give** your customer a copy of Edson's Pedestal	Edson Catalog	
		Maintenance Guide and Catalog. Periodic Maintenance is	EB-204-2	
		very important in keeping the Steering System in like-new		
		condition - Kits are available for routine maintenance:		
		Brake Maintenance Kit	#316-689	
		Pedestal Maintenance Kit	#314-335	

If during the steering inspection you find that the Steering Pedestal needs repainting, please request the Edson Pedestal Repainting Guide (EB-95-345). This Engineering Bulletin will outline the steps required to properly repaint or replace the pedestal as well as areas to check for possible electrolysis. Contact Edson Customer Service for this and other Engineering Bulletins.

Many of these parts are available in kit form. If you are replacing several items, you may consider purchasing the Brake Maintenance Kit (#316), the Pedestal Maintenance Kit (#312), or the Pedestal R[illegible]d Kit (#314). These are available through Edson Dealers or Factory Direct.

When the Steering Inspection is completed, copy the Part #'s of the required replacement and upgrade parts onto the attached order form.

Steering Inspection Order Form

Please attach a copy of the completed inspection form.

COMPANY NAME:

HIPPING
DDRESS_____

TY_____STATE_____ZIP_____

HONE ( )_____

X ( )_____

ONTACT NAME_____

ll Shipments are made by UPS or truck. Deliveries cannot be ade to a post office box. Please include your street address.

DATE: _____

CUSTOMER NUMBER: _____

PO NUMBER: _____
(open accounts only)

IMPORTANT!

Boat Mfg._____ Length_____ Year_____

uantity	Part No./Size	Description	Price	

Check or Money Order ☐ Open Account (PO#_____)

☐ Visa or Mastercard
Please Print Card Number Here

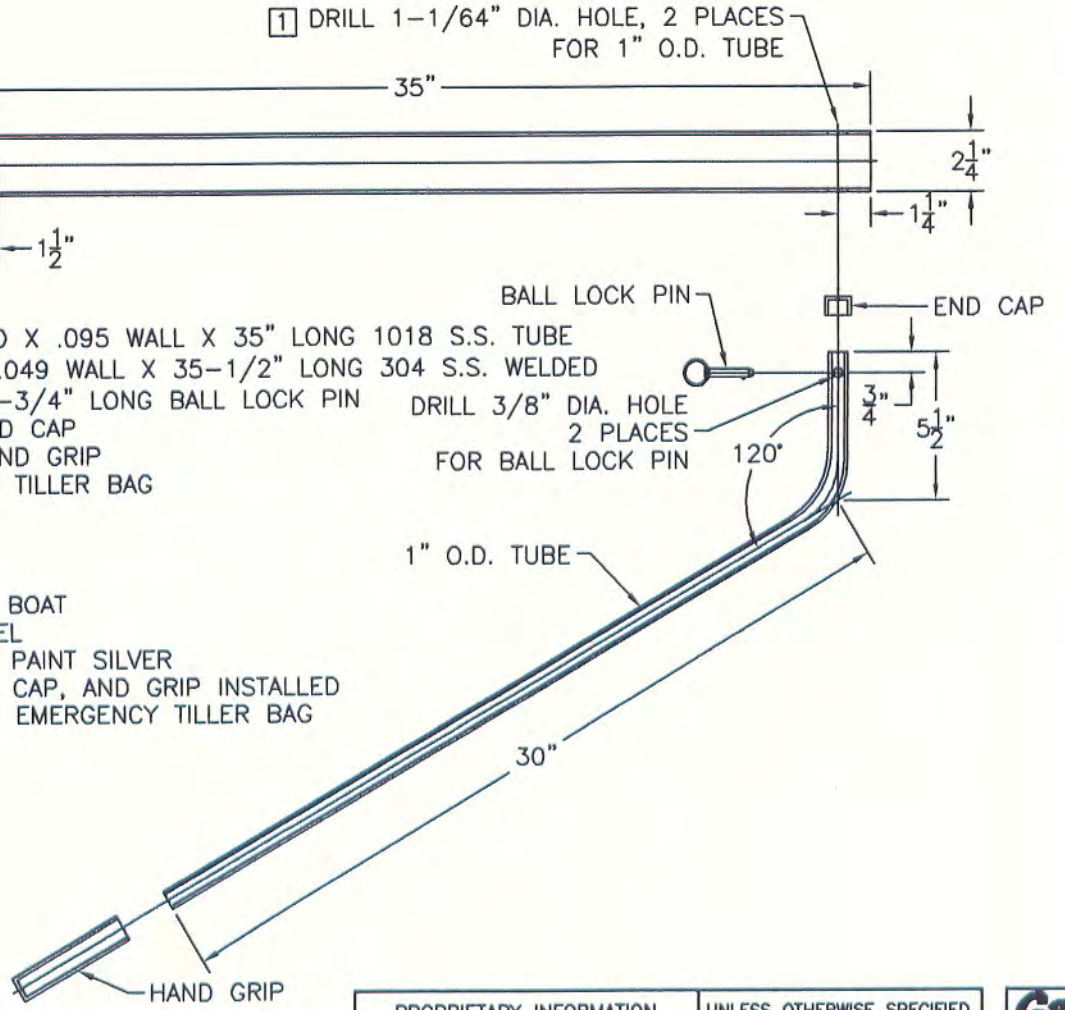
iration Date_____

ature Required_____ Date_____

Merchandise Total		
Mass. Residents Add 5% Sales Tax		
Shipping Charge *See Ordering Instructions*		
TOTAL		

son International 146 Duchaine Blvd., New Bedford, MA 02745-1292 Tel: (508) 995-9711 Fax: (508) 995-5021 E-Mail: sales@edsonintl.com

NO	REVISION	DATE
1	CHANGES TO SUIT MANUFACTURING PER GERRY DOUGLAS.	08/05/99



PARTS LIST:

[1] 1- 2-1/4" O.D X .095 WALL X 35" LONG 1018 S.S. TUBE
[1] 1- 1" O.D. X .049 WALL X 35-1/2" LONG 304 S.S. WELDED
1- 5/16" X 1-3/4" LONG BALL LOCK PIN
1- PLASTIC END CAP
1- PLASTIC HAND GRIP
1- EMERGENCY TILLER BAG

NOTE:
ONE REQ. PER BOAT
MATERIAL- STEEL
[1] FINISH- SPRAY PAINT SILVER
SHIP WITH PIN, CAP, AND GRIP INSTALLED
BOTH PARTS IN EMERGENCY TILLER BAG

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63

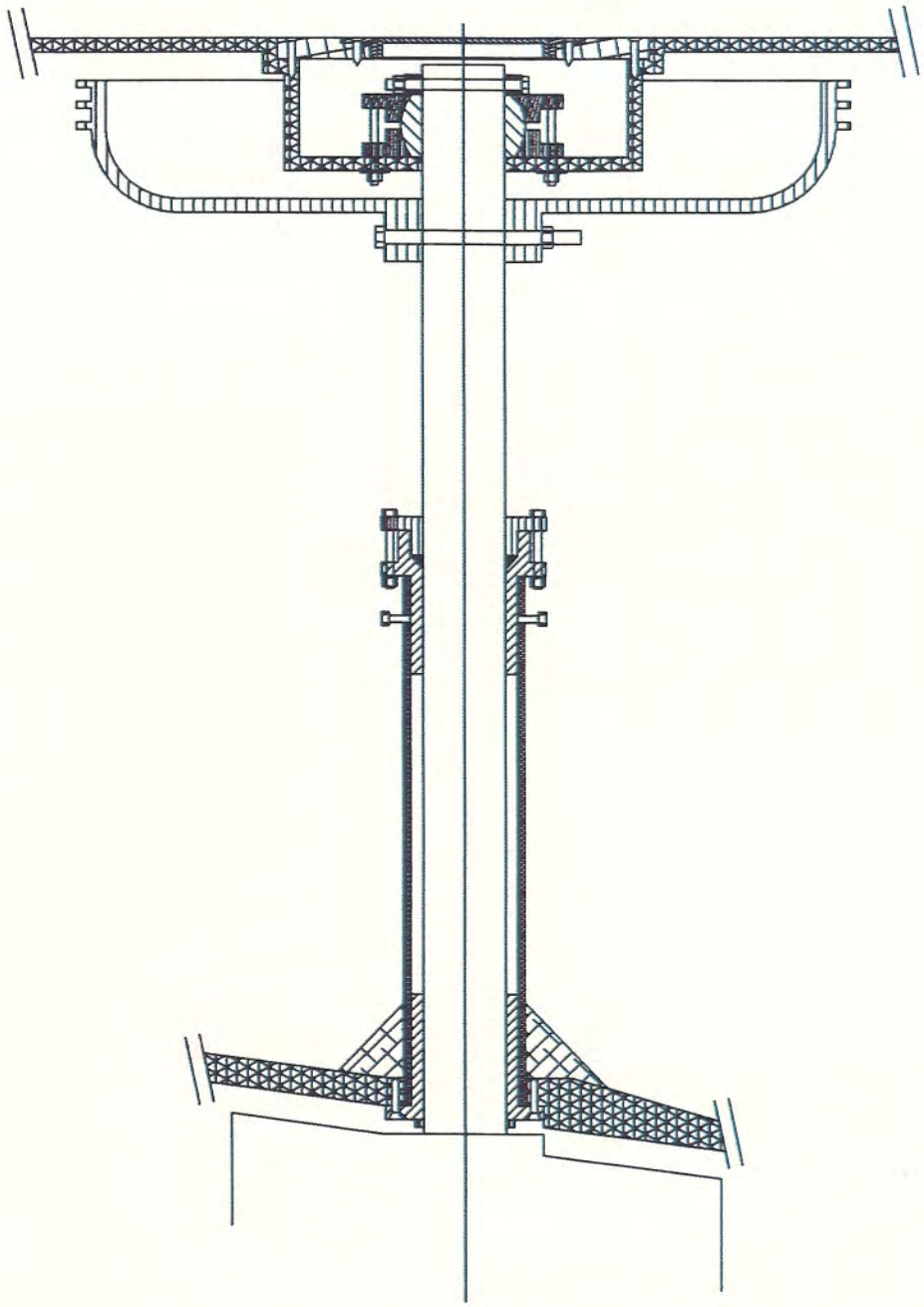
DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DIARY RD.
LARGO, FL. 33777
(727) 544-6681

SCALE: N.T.S.	APPROVED BY:	DRAWN BY G.T.B.
DATE: 08/03/99		REVISED 08/05/99

EMERGENCY TILLER

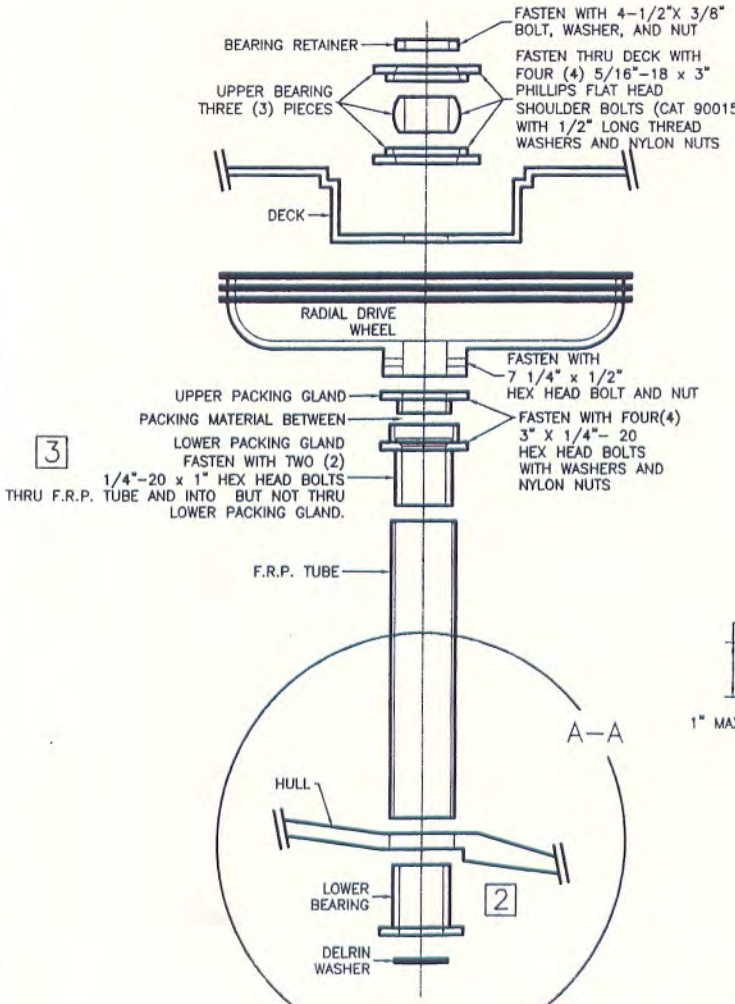
BOAT: CATALINA 400	DRAWING NUMBER 28054-1

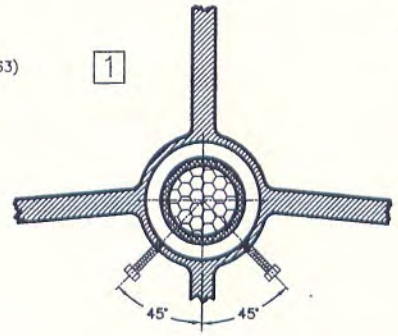


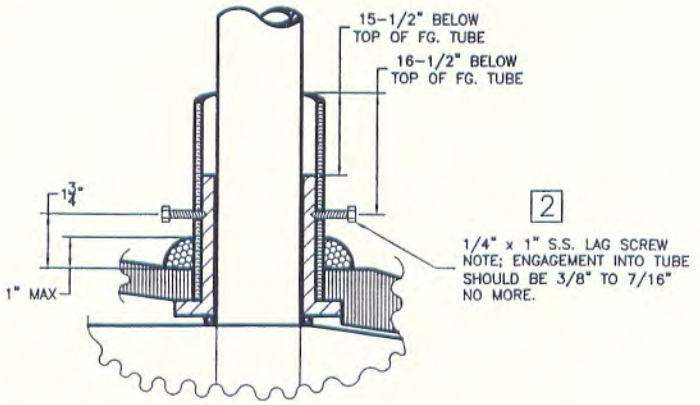
Catalina Yachts
7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727)544-6881

SCALE: NONE	APPROVED BY:	DRAWN BY: GTB
DATE: 5/5/99	FILE: 400 28052-0	
TITLE: RUDDER ARRANGEMENT	SIZE:	SHEET: 1/1
BOAT: CATALINA 400	DRAWING NUMBER: 400-28052-0	

NO	REVISION	DATE
1	REVISED BOLTS	3/3/01
2	DELETED FLAT HEAD SCREWS IN LOWER BEARING. ADDED LAG SCREWS IN LOWER BEARING.	3/16/01
3	CORRECTED NONCLAMATURE FOR FASTENERS FOR LOWER PACKING GLAND.	10/31/01







DETAIL: A-A

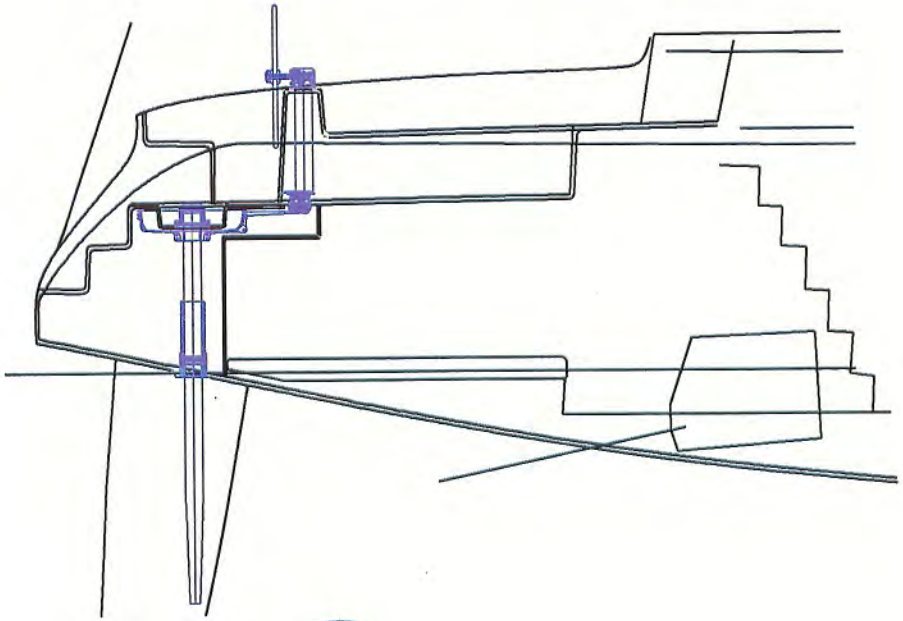
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63
DO NOT SCALE DRAWING

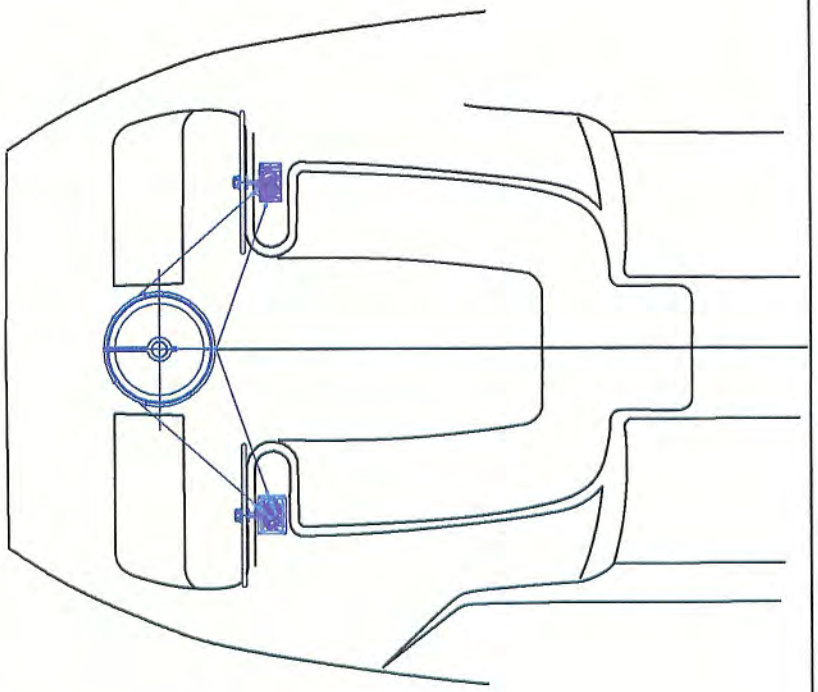
Catalina Yachts
7200 BRYAN DIARY RD.
LARGO, FL. 33777
(727) 544-6681

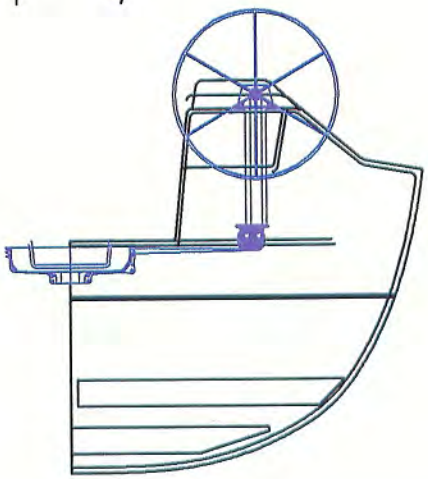
TITLE:
C310, C380, C400
RUDDER BEARING ASSEMBLY

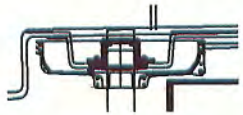
BOAT: C310- C380- C400		DRAWING NO: 400-28051-3		
DESIGNED BY:	CHECKED BY:	SCALE: NONE	SIZE B	SHEET 1/1
DRAWN BY: C.D.	APPROVED BY:	DATE: 5/4/99		

REV	DESCRIPTION	DATE	APPROVAL
1	UPDATED TO SUIT NEW REQUIREMENTS	5/12/01	









New Bearing Plan

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH:

DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DAIRY RD.
LARGO, FL. 33777
(727)544-6881

SCALE: NONE	APPROVED BY:	DRAWN BY: GTB	
DATE: 3/12/98	FILE: 40038001-0		
TITLE: STEERING SYSTEM		SIZE: B	SHEET: 1/1
BOAT: CATALINA 400		DRAWING NUMBER: 400-38001-0	

Forespar

DATE: 5/19/99

SUBJ: CATALINA SAILBOATS WITH MARELON RUDDER BEARINGS AND PACKING GLAND

This non-metalic bearing system is designed to operate with no lubrication other than water.

* Specifically no lubricants such as: petroleum grease, WD-40 aerosol or paste, silicone gel, Teflon gel or Lanolin paste. ONLY WATER.

In the event that leakage occurs around the rudder shaft at the packing gland, and it becomes necessary to take up on the packing, observe the following precautions:

1. Overtightening the take-up will result in stiffening the steering system
2. The take-up must be equal at the bolt locations around the shaft. If not, stiffening will occur.
3. The proper amount of take-up should permit an occasional drop or two of water to weep out when the shaft is being turned.

rdrbrng5.doc

Forespar Products Corp.
22022 Gilberto
Rancho Santa Margarita, CA 92688
Tel: (714) 858-3820 Fax: (714) 858-0605

3.0 YACHT SYSTEMS - (Continued)

3.6.2 GALLEY STOVE:

There is provision for a Gimballed stove with oven on the starboard side of the galley area. A three-burner LPG stove is the factory standard installation. It comes with an operation and maintenance booklet provided by the stove manufacturer. The standard LPG gas bottle is in the starboard side transom locker. The locker is fitted with a drain and vent fitting on the transom. Keep these clear at all times.

Follow the stove operation instructions located on the stove and on the tank compartment carefully.

A few additional points of operation for the standard LPG stove are:

It is recommended that every time the LPG tank valve is opened for use, the operator close the valve and watch that the gauge needle remains constant. The gauge should read approximately 110 PSI. If you can detect a failing in pressure over a 15-minute period of time, there is a leak. LEAKS CAN BE DANGEROUS.

a. If a leak occurs, check all appliance burners to see if they are in the "OFF" position.
b. Make sure the oven control is in the "OFF" position.
c. Check all fittings with a soap and water solution. NEVER USE FLAME TO CHECK FOR LEAKS.

If you cannot find the leak, contact the stove manufacturer promptly.

To light the oven: Light the right front burner to bleed air from the system for at least one (1) minute. Turn the temperature control knob from the "OFF" position to the "PILOT ON" position. After this has been done, light the pilot in the oven (constant pilot).

After the oven pilot is lit, turn the oven temperature control knob to the desired temperature.

Notes on the Solenoid: The solenoid must be turned on to test gauge for leaks. Both the solenoid and the tank valve must be turned on to receive fuel. The solenoid is an electrical device for turning on or off the fuel from inside the cabin at the galley.

"It is important to check out your LPG appliance system each time you fill the tank, but certainly at least once per year. As a reminder please follow the enclosed operating and test procedures."

3.0 YACHT SYSTEMS - (Continued)

CAUTION

1. This system is designed for use with liquified petroleum gas (LPG) only. Do not connect compressed natural gas (CNG) to this system.

2. Keep cylinder valves closed when boat is unattended. Close them immediately in any emergency. When on board, cylinder valves or solenoid valves shall be closed when appliances are not in use.

3. Be sure all appliance valves are closed before opening cylinder valve.

4. Test for system leakage each time the cylinder supply valve is opened for appliance use. Close all appliance valves. Open, then close cylinder supply valve. Observe pressure gauge at the regulating device and see that it remains constant for not less than five minutes before any appliance is used. If any leakage is evidenced by a pressure drop check system with a soapy water or detergent solution and repair before operating system.

5. Test system for leakage at least every two weeks and after any emergency in accordance with paragraph (4) above. Repeat the test for a multi-cylinder system.

Never use flame to check for leaks.

LPG CONTROL PANEL AND SOLENOID VALVE.

GENERAL INFORMATION

1. Liquified petroleum gas (LPG) tanks should be installed in a sealed compartment and vented overboard.

2. The LPG solenoid should be mounted in the fuel tank compartment

3. All component parts of the LPG system should be carefully installed and tested for leaks.

WARNING: LPG IS HEAVIER THAN AIR AND WILL ACCUMULATE IN LOW AREAS SUCH AS ENGINE ROOMS AND BILGES POSING A FIRE HAZARD.

INSTALLATION GUIDELINES

1. Locate a flat surface that will accommodate the entire length of the solenoid bracket. The valve body becomes secure when the bracket is tightened into position. The valve may be mounted in any position.

2. Connect piping to valve according to marking on valve body. Apply pipe compound sparingly to pipe threads only; if applied to valve threads, it may enter valve and cause opperational difficulty. Pipe strain should be avoided by proper alignment of the piping. DO NOT use valve as a lever when tightening. Both "in" and "out" parts of the valve require 1/4 NPT fittings.

3. Wire solenoid to control panel as shown on diagram using 14 ga. wire.

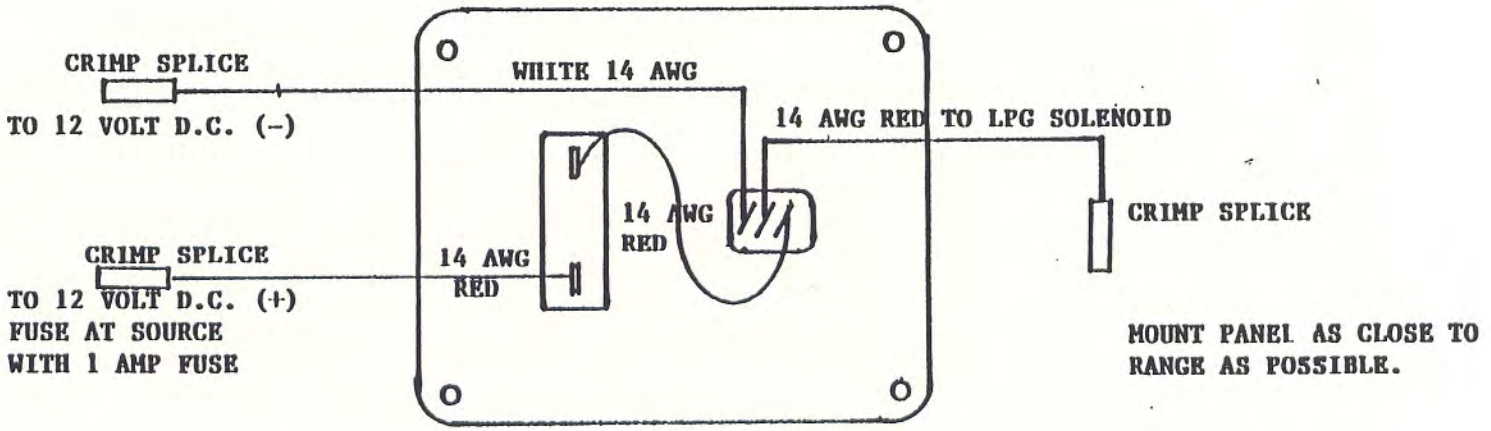
4. The LPG control panel should be located close to the stove where it is visible and easily accessible in the event of any emergency.

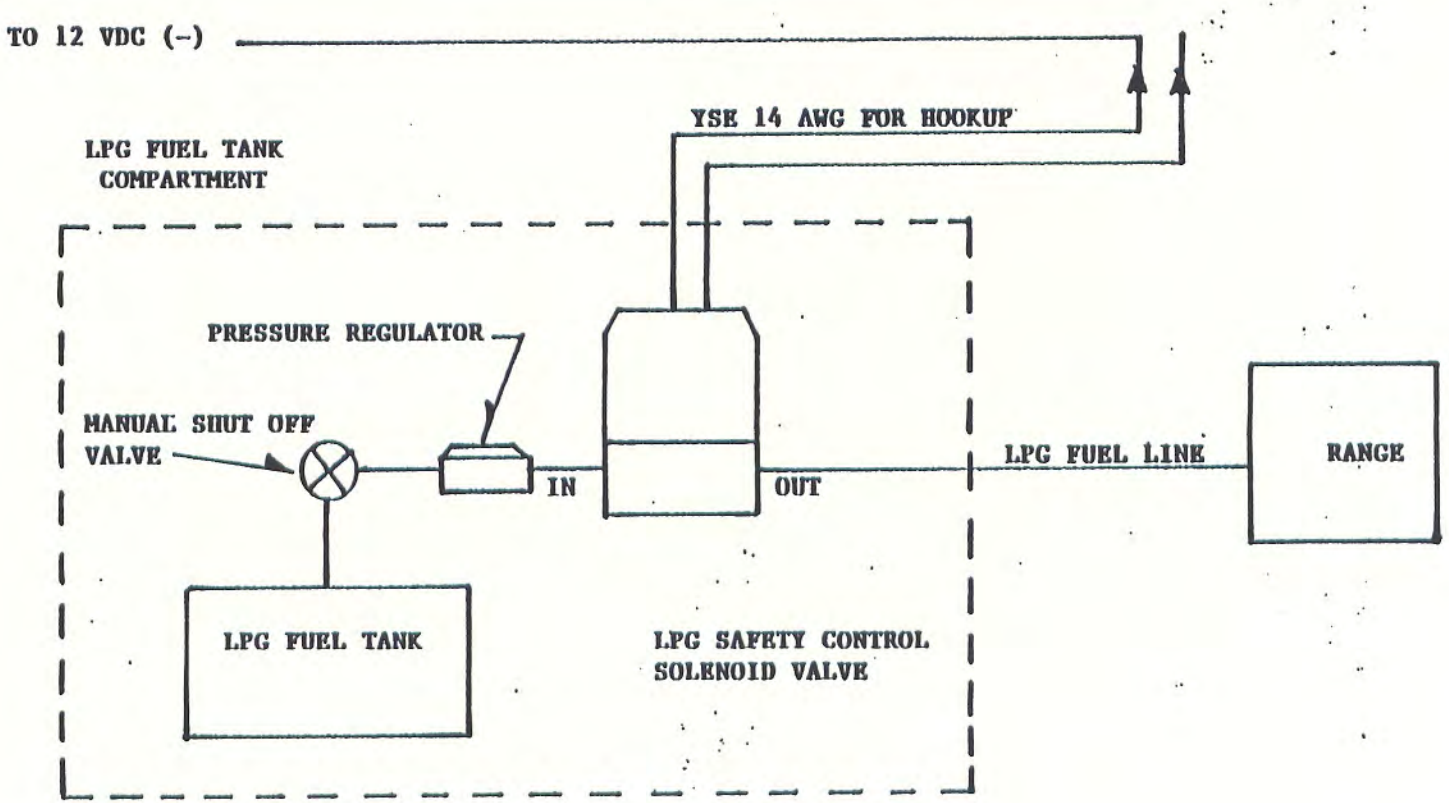
5. When the installation is complete, check the entire system for leaks.

OPERATION

When the control switch is turned on, the solenoid should make an audible click and the red indicator light will illuminate the switch signaling that gas is being supplied to the stove.

When use of the stove has been completed, turn off the solenoid control switch and wait for the flame to burn out, then close the burner valve. The LP tank has a manual valve which can be left open when the boat is occupied, however, the valve should be closed when the boat is left unattanded.


CRIMP SPLICE
TO 12 VOLT D.C. (-)
WHITE 14 AWG
14 AWG RED TO LPG SOLENOID
CRIMP SPLICE
14 AWG
RED
CRIMP SPLICE
TO 12 VOLT D.C. (+)
FUSE AT SOURCE
WITH 1 AMP FUSE
14 AWG
RED
MOUNT PANEL AS CLOSE TO
RANGE AS POSSIBLE.


TO 12 VDC (-)
YSE 14 AWG FOR HOOKUP
LPG FUEL TANK
COMPARTMENT
PRESSURE REGULATOR
MANUAL SHUT OFF
VALVE
IN
OUT
LPG FUEL LINE
RANGE
LPG FUEL TANK
LPG SAFETY CONTROL
SOLENOID VALVE

4.0 MAINTENANCE GUIDE

4.1 PRE-USES MAINTENANCE:

RIGGING:

1. Inspect turnbuckles - tighten if necessary, inspect safety wires.
2. Inspect clevis pins and cotter pins.
3. Visually inspect spreader tips and other areas where sails may chafe during sailing, replace tape as necessary.
4. Halyards free and not tangled.
5. Inspect mast hardware attachment bolts, tighten as required.

HULL AND DECK INSPECTION:

1. Tiller moves freely, pedestal steering OK, rudder post packing gland.
2. Bilges and compartments are dry.
3. Through hull valves, hoses, and clamps, OK.
4. Check running lights.

ENGINE:

1. Check engine oil and fuel levels.
2. Packing gland OK, cooling water intake valve opens and closes OK.
3. Throttle shift OK.
4. Blower system OK.
5. Check bilge areas for fuel before starting engine.

4.2 MONTHLY MAINTENANCE:

RIGGING:

1. Inspect chain plates, fastenings, and bolts, tighten as necessary.
2. Inspect blocks, shackles, cotter pins.
3. Check rigging tune, rigging wire condition.
4. Check turnbuckles and locking pins.

HULL AND DECK:

1. Check cockpit drains, clear debris.
2. Inspect hull valves, open and close freely.
3. Winches turn freely, lubricate as per manufacturer's recommendations.
4. Clean and oil exterior teak as necessary.
5. Clean and wax gel coat surfaces as necessary.

ENGINE:

1. Check oil and fluid levels.
2. Battery: Check fluid levels and tie-downs.
3. Tighten all bolts and nuts to proper torque.
4. Check fuel tank fittings, and hose clamps.
5. Disassemble and inspect cooling system anti-siphon (located under galley counter near sink).
6. Check bolts.
7. Check filters.

4.3 SEASONAL MAINTENANCE:

RIGGING:

1. Mast head pins and sheaves turn freely.
2. Halyards and fittings are in good condition.
3. Spreader tips and bases, and mast fittings, OK.
4. All shroud terminations and swedged fittings, check for cracks or corrosion.
5. Gooseneck assembly and boom assembly.
6. Mast, boom, and spreaders cleaned and waxed.

4.0 MAINTENANCE GUIDE - (Continued)

7. Lifelines and stanchions all OK. All pins and fittings are secure, cotter rings taped. Turnbuckles, pelican hooks and connector loops OK. Screw fittings check for thread wear.

HULL, DECK AND CABIN:

1. All chainplates and through bolts tight.
2. Disassemble winches and lubricate bearings and pawls.
3. Inspect and coat electrical system connections, battery tie downs and terminal connectors to prevent corrosion.
4. Drain and flush fresh water system.
5. Check head and anti-siphon valve in toilet.
6. Hatch gaskets, and hold-down fasteners.
7. Bottom, keel, and rudder condition of anti-fouling paint.
8. Lifelines, stanchions, and pelican hooks.

ENGINE:

1. Check shaft alignment, repack stuffing box if necessary.
2. Clean motor thoroughly.
3. Inspect fuel system.
4. Tune engine as per manufacturers recommendations.
5. Exhaust system, check for leaks or deterioration, insulation in place.

4.4 FIBERGLASS MAINTENANCE AND REPAIR:

One of the major benefits of a fiberglass boat is the elimination of maintenance chores required by other materials. You have only three relatively easy maintenance rules to follow to keep your boat looking like new.

1. Each year clean, buff and wax the exterior of the boat.
2. Touch up and patch scratches, scars and small breaks.
3. Repair any major damage as soon as possible to avoid additional damage to the hull or deck.

Most fiberglass boats are manufactured of two types of material, permanently bonded together by a chemical reaction. The outside surface is formed by a colored gel coat. This is a special resin material containing concentrated color. It provides a smooth, finished surface.

The second type is made up of polyester and/or vinylester resin reinforced with laminations of fiberglass mat, cloth, or woven roving. Both the gel coat and polyester resin are cured by a chemical catalyst which causes them to form a hard, strong mass that is highly resistant to impact and damage.

After sailing, a good hosing down with fresh water and a mild detergent will keep your boat sparkling fresh and clean. The non-skid surfaces may need to be scrubbed with detergent. Smooth glass areas may be polished with liquid wax or any good fiberglass wax to add extra luster. In the case of older boats, where some fading or the gel coat has occurred, the surface should be buffed with polishing compound and then wax finished.

When buffing the boat to restore its finish, care should be taken not to cut through the gel coat surface. This is especially true on corners and edges of the hull. A power buffer may be used or the work may be done by hand, using a lightly abrasive rubbing compound such as Mirro Glaze No. 1 for power buffers, or Dupont No. 7 for hand buffing. Any high quality paste wax may be used after buffing.

3.4.1 TOUCH UP AND REPAIR INSTRUCTIONS

Scratches, Shallow Nicks, Gouges, Small Holes
(That do not penetrate through the hull)

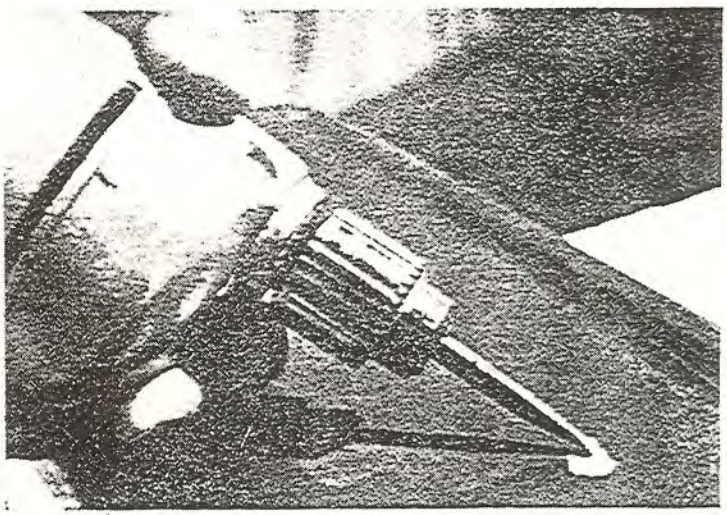
These repairs are easy because only the surface of the boat is damaged. They fall into two categories: (1) damage to the gel coat colored outer surface, and (2) holes or gouges that are deep enough to penetrate the fiber glass reinforced area of the boat. The repair operations are similar.

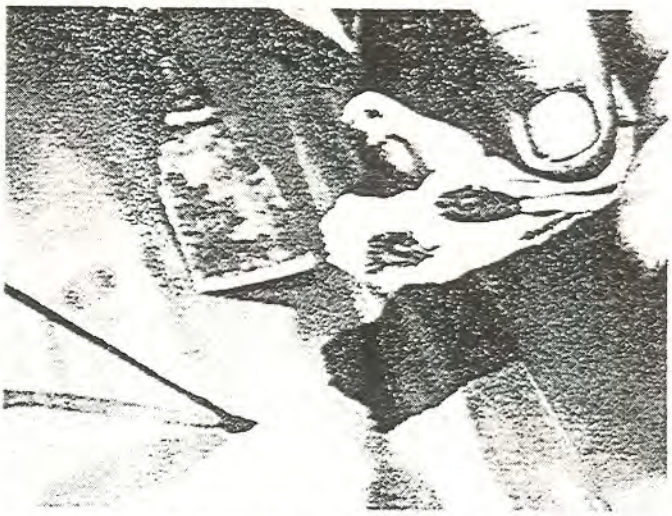
For damage to the gel coat surface, you will need a small can of gel coat, of the same color as your boat, and a small amount of catalyst. For deeper holes or gouges (1/8" or more) you will also need some short strands of fiber glass which can be trimmed from fiber glass mat or purchased in the form of "milled fibers." These materials can be purchased from your dealer.

(1) Be sure the area around the damage is wiped clean and dry. Remove any wax or oil from the inside of the hole or scratch.

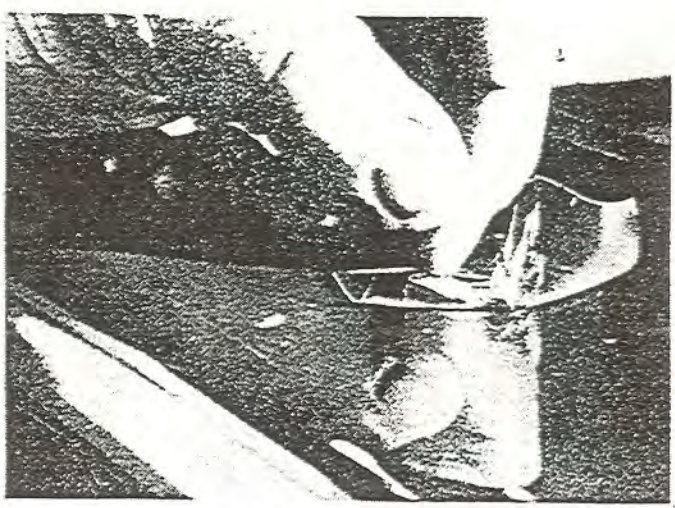
(2) Using a power drill with a burr attachment, roughen the bottom and sides of the damaged area and feather the edge surrounding the scratch or gouge. Do not "undercut" this edge. (If the scratch or hole is shallow and penetrates only the color gel coat, skip to step No. 8.)

(3) Into a jar lid or on a piece of cardboard, pour a small amount of gel coat . . . just enough to fill the area being worked on. Mix an equal amount of milled fibers with this gel coat, using a putty knife or small flat stick. Then add two drops of catalyst, using an eyedropper for accurate measurement. For a half-dollar-size pile of gel coat, this amount of catalyst will give you 15 to 20 minutes working time before it begins to "gel". Carefully cut the catalyst into the gel coat and mix thoroughly.

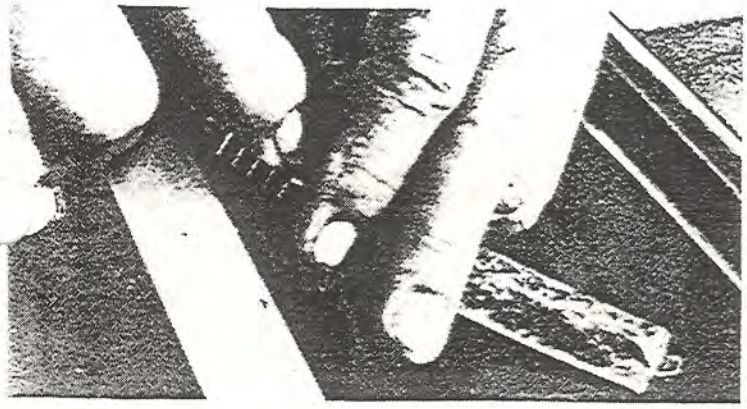




(4) Work this mixture of gel coat, fibers and catalyst into the damaged area, using the sharp point of a putty knife or knife blade to press it into the bottom of the hole and to puncture any air bubble which may occur. Fill the scratch or hole above the surrounding undamaged area about 1/16".

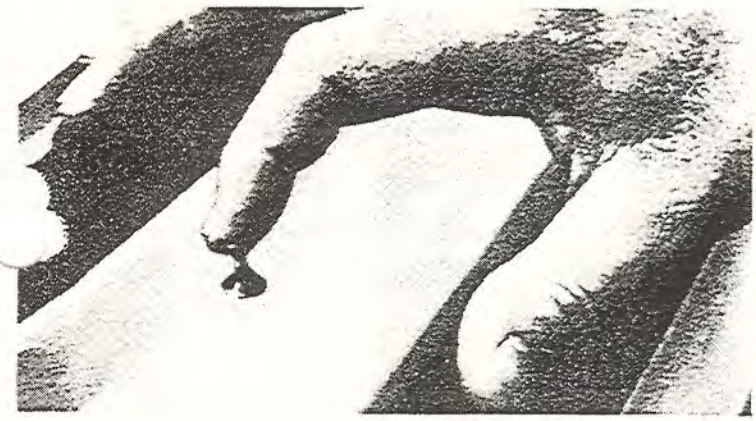


(5) Lay a piece of cellophane or waxed paper over the repair to cut off the air and start the "cure".



(6) After 10 or 15 minutes the patch will be partially cured. When it feels rubbery to the touch, remove the cellophane and trim flush with the surface, using a sharp razor blade or knife. Replace the cellophane and allow to cure completely (30 minutes to an hour). The patch will shrink slightly below the surface as it cures.

(7) Again use the electric drill with burr attachment to rough up the bottom and edges of the hole. Feather hole into surrounding gel coat, do not undercut.

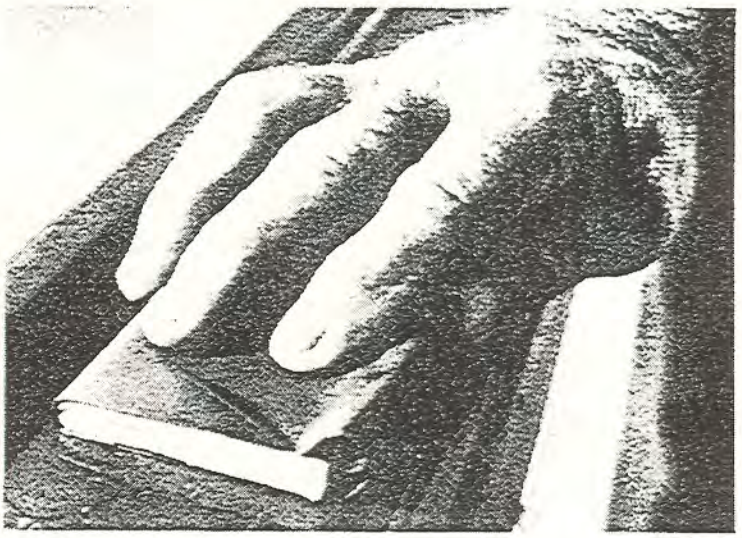


(8) Pour out a small amount of gel coat into a jar lid or on cardboard. Add a drop or two of catalyst and mix thoroughly, using a cutting motion rather than stirring. Use no fibers.

(9) Using your finger tip or the tip of a putty knife, fill the hole about 1/16" above the surrounding surface with the gel coat mixture.

10. Lay a piece of cellophane over the patch to start the curing process. Repeat step 6, trimming patch when partially cured.

11. Immediately after trimming, place another small amount of gel coat on one edge of the patch and cover with cellophane. Then, using a rubber squeegee or back of the razor blade, squeegee level with area surrounding the patch. Leave cellophane on patch for 1 to 2 hours, or overnight, for a complete cure.



12. USING A SANDING BLOCK, sand the patched area with 600 grit WET sandpaper. Finish by rubbing or buffing with a fine rubbing compound. Some slight color difference may be observed. Weathering will blend touch-up, if properly applied.

4.0 MAINTENANCE GUIDE - (Continued)

4.5 BOTTOM PAINT PREPARATION:

Anti-fouling paint should be applied to the bottom of your Catalina 400 if it is to be moored in either fresh or salt water for any length of time. There are many brands available. Anti-fouling paint prevents the growth of algae, barnacles, and other fouling organisms on underwater surfaces.

Catalina 400 models are manufactured with an integrally molded blister protection system in the hull laminate. This water absorption barrier material is between the gel coat surface layer and the laminates of the hull.

The bottom may be prepared for painting using conventional dewaxing solvents. Then sanding the gel coat surface or using a chemical etching type primer. The keel has been painted using epoxy primer, filler-fairing compound and finished with epoxy paint. This material is a suitable substrate for most anti-fouling systems. However a "test patch" of the intended anti-fouling paint should be tried on a small area to insure compatibility before coating the entire keel area.

Should you be uncertain about the type of paint on your boat, check with your dealer first to determine if your boat was painted at the factory or after delivery to the dealer and ask what type of paint was used. Not all paints are compatible and can have reactions which will result in a poor finish surface. If you cannot determine what paint is now on your boat, try a test patch of the paint you intend to use, let it dry and check for a reaction before proceeding. Your dealer or local paint suppler will often be able to make some specific recommendations for anti-fouling paint to be used over a paint of unknown composition.

DO NOT REDUCE THE GEL COAT FILM THICKNESS. IMPROPER BOTTOM

PREPARATION WILL VOID YOUR CATALINA YACHTS GEL COAT FIVE YEAR LIMITED WARRANTY.

4.6 INTERIOR TEAK MAINTENANCE:

The interior joiner work of the Catalina 400 is coated with a clear, non-yellowing, aliphatic, water-based polyurethane to provide a durable finish. Normal household fine furniture cleaners can be used to help protect and keep the finish looking new. Do not use any harsh solvents such as lacquer thinner or acetone as these will destroy the fine finish. If in doubt about a particular cleaner try the cleaner on a small inconspicuous spot first before doing a large area.

IMPORTANT: Always be sure to have adequate ventilation when working with varnishes, cleaners, oils or paints.

TARGET COATINGS™
WATERBASED FINISHES AND SPECIALTY CHEMICALS
P.O. BOX 1582 • RUTHERFORD, NJ 07070 • USA • 1-800-752-9922 • 1-201-804-0993 • Fax: 1-201-939-0518

TECHNICAL INFORMATION

OXFORD II HYBRID VARNISH SERIES

Oxford II Hybrid Varnish is the most chemically advanced waterborne wood finish to be manufactured for fine woodworking applications. By bringing together the best features of oil-based varnishes and waterborne urethanes, the Oxford II Hybrid technology offers the discriminating finisher a beautiful alternative. This oil/water emulsion is formulated to provide a durable, interior and exterior grade coating for marine and architectural applications. Oxford II Hybrid Varnish will create the warm glow of long-oil varnish with the speed and safety of a water-based system.

Oxford Hybrid Spar contains a high level of UV filters and absorbers that help to protect the wood substrate from the damaging effects of the sun. Our Hybrid Spar Varnish builds quickly due to the highest percentage of solids available in any water-based coating formula. The high gloss and depth-of-clarity of Oxford Hybrid Spar Varnish is exceptional.

Oxford Hybrid Satin Varnish is designed for new interior construction and restoration applications. An exceptionally hard finish when cured, Oxford Hybrid Satin Varnish exhibits a beautiful hand rubbed, satin sheen and silky feel. We recommend it for custom yacht interiors, fine furniture and custom architectural applications.

Oxford Hybrid Gloss Varnish builds quickly due to the high solids content, and develops a brilliant gloss when cured. For use on all interior applications that require a deep, rich gloss finish. Oxford Hybrid Gloss responds well to post-cure buffing and machine polishing.

FEATURES AND BENEFITS

- *Extremely Low VOC Content*
- *Water Clean-Up*
- *Fast Recoat Time*
- *Exotic Color Tones*
- *Spray or Brush Friendly*
- *UV Stable*

OXFORD HYBRID VARNISH
ASTM TEST RESULTS

This test was performed to determine the fluid resistance of **Oxford Hybrid Gloss Varnish** under ASTM D3023-88. This test was performed after a cure cycle of 150 hours at 70F/50%. Tests were performed on horizontal Mahogany veneer panels with 4 coats applied.

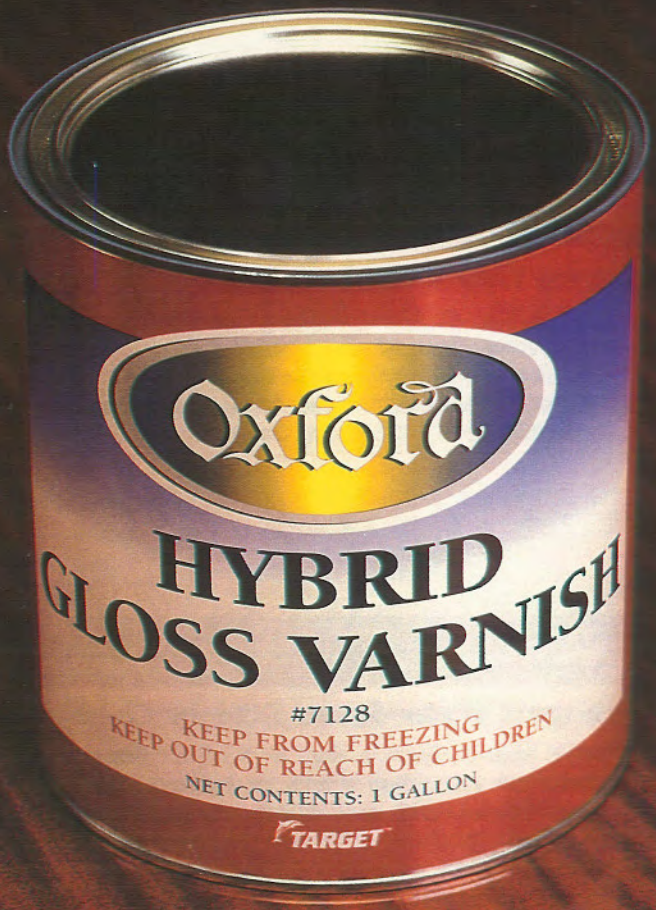
Reagent	Numerical Score
Black Marker	4
Ball Point Pen	4
Iodine	3
Lipstick	5
Water Soluble Food Dye	5
Coffee	5
Tea	5
Mustard	5
Water	5
Acetone	5*
5% Ammonia	5
409 Cleaner	5
Windex	5
Diesel Fuel	5
Mineral Spirits	5
Ethanol Double Rubs	100+
MEK Double Rubs	100+
Xylene Double Rubs	100+
Isopropyl Alcohol Double Rubs	100+

Legend
5- No Stain (or effect)
4- Very Slight Stain (or effect)
3- Slight Stain (or effect)
2- Moderate Stain (or effect)
1- Severe Stain (or effect)
0- Destruction of film

Date Test Performed: 5/97

A perfect gloss...

A perfect Oxford finish.



TARGET™

Oxford

Oxford Hybrid Varnish is the most chemically advanced waterborne wood finish to be manufactured for fine wood-working applications. By bringing together the best features of oil-based varnishes and waterborne urethanes, the Oxford Hybrid technology offers the discriminating finisher a beautiful alternative. This oil/water emulsion is formulated to provide a durable interior and exterior grade coating for furniture, architectural and marine applications. Oxford Hybrid Varnish will create the warm glow of tung-oil varnish with the speed and safety of a water-based system.

OXFORD HYBRID GLOSS VARNISH

Traditional Beauty, Depth and Clarity

Oxford Interior Gloss is an economical, easy-to-use water-based wood finish formulated to give the quality conscious craftsman the color and feel of a tung-oil varnish, but with all the benefits of a water-based finish. Its classic fine varnish hues bring out the bright color contrasts in cherry, teak, mahogany and light woods prized by fine furniture craftsmen. Oxford Interior Gloss dries to a hard, scuff resistant, easy-to-repair finish in 1 hour. Recoat in 1-1.5 hours for fast project completion time.

No.	7132	7128	7105
Size	32 oz.	Gal.	5 Gal.

OXFORD HYBRID SATIN VARNISH

Fast-Drying Classic Rubbed Effect

Oxford Satin is the standard coating for manufacturers who understand the labor savings and environmental advantages of water-based coatings. The natural, warm glow of this fine classic coating is virtually indistinguishable from the rubbed effect obtained with labor intensive and dangerous oil-based varnishes. Formulated for easy brush or spray applications, this economical, quick drying varnish is ready for recoating in 1-1.5 hours. Cleans up with water and is VOC compliant.

No.	7232	7228	7205
Size	32 oz.	Gal.	5 Gal.

OXFORD HYBRID SPAR VARNISH

The Strongest Water-Based Exterior Coating Available

Oxford Hybrid Spar contains a high level of UV filters and absorbers that help to protect the wood substrate from the damaging effects of the sun. Our Hybrid Spar Varnish builds quickly due to the highest percentage of solids available in any water-based coating formula. The high gloss and depth-of-clarity of Oxford Hybrid Spar Varnish is exceptional. It features a traditional amber varnish color, but with all the benefits of a water-based coating—fast-drying for reduced production time, low odor, non-flammable, water cleanup, and VOC compliance. Oxford Spar Varnish can be applied with a brush or spray. Recoat time is 1-1.5 hours.

No.	7032	7028	7005
Size	32 oz.	Gal.	5 Gal.

TARGET COATINGS

P.O. BOX 1582 • RUTHERFORD, NJ 07070 • **1-800-752-9922** • **1-201-804-0993**

www.targetcoatings.com

Dealer Inquiries Welcome!

4.0 MAINTENANCE GUIDE - (Continued)

4.7 SPAR AND RIGGING MAINTENANCE:

STANDING RIGGING:

Your boat is equipped with stainless steel standing rigging, and Dacron running rigging to give you years of trouble free service. However, due to normal wear and tear, it is recommended that a periodic inspection be made on all fittings and wire. Turnbuckles should never be neglected and should be unscrewed from time to time in order that they do not seize. Every three months should be about right for the average sailor. A slightly bent turnbuckle shaft or broken wire in your shrouds should be replaced immediately.

Under most conditions, 1 X 19 standing rigging has a safe "working" life span of approximately five years, seven years under ideal conditions. Factors which reduce the life of the wire are environmental factors such as high humidity (Florida, the Caribbean, and Gulf States), and high salinity (Great Salt Lake, Gulf States, or mooring near a sea wall with constant salt spray), extremes in temperature, and industrial pollution (pulp mills, generating plants, acid rain and smog). High loading of the rigging as required in most racing boats also induces stress in the rigging system.

Many of us have to deal with at least one of these conditions and should consider replacing standing rigging at the five year limit.

Unlike running rigging wire rope, which gives us clear signs that it is deteriorating by broken strands and "meat hooks", standing rigging may give no sign that failure is imminent. The usual point of failure of stay or shroud is approximately 1/4" inside the bottom swedged threaded stud fitting which threads into the turnbuckle barrel.

Although the stud is compressed around the wire during the swedging process, salt water and pollutants work down into the tiny cavities between the wire strands and the inevitable corrosive process starts in the crevice the first time the rigging becomes wet with salt water.

A common method of visually monitoring swedge fitting conditions, employed by distance racers and cruisers, is to dab a small ring of enamel paint around the joint between the wire and the swedge fitting. This will help provide a means to see if the wire is pulling out of the fitting.

Another technique used to check the condition of swedge fittings is a "dye penetrant" test. This simple test will detect any cracks which may develop in the fittings due to internal pressure from the corrosive process. Inexpensive dye test kits usually are available at most welding supply stores. Dye tests usually are not required by weekend sailors, but may be done before an extended cruise or ocean passage if any doubt about the integrity of the rigging exists.

All stainless steel wire rope rigging will develop some rust film when new. This is normal.

The rust is caused by two factors. When wire rope is manufactured, the wire strands are fed over steel rollers during the process of twisting or laying the wire. Trace amounts of the ferrous steel from the rollers and dies are transferred to the wire strands. As this small amount of steel rusts it causes a film on the new wire.

4.0 MAINTENANCE GUIDE - (Continued)

The second cause of the rust film on new wire rope is the microscopic veins of ferrous material which exist in stainless steel. After a period of time, as the surface material veins are depleted, and the stainless steel has been cleaned several times, new rust film development will slow to a minimum.

For the average sailor, the best insurance against a rigging failure is a periodic (every six months is recommended) inspection of all rigging parts, including turnbuckles, and replacement of standing rigging as required.

IMPORTANT: If any wear or sign of broken strands is found on the running or standing rigging, it is time to replace that part. Using your boat when the rigging is worn could cause the rigging to fail when you least expect it.

FITTINGS:

Marine fittings today usually need little maintenance. Deck hardware should be hosed down with fresh water after each sail in salt water. Stainless steel fittings such as pulpits and lifeline stanchions should be cleaned and waxed periodically to maintain their appearance. Winches require occasional cleaning and lubrication. Where possible, a maintenance brochure for your winches has been included in this manual. Masthead fittings, halyard sheaves, etc., should be inspected, cleaned, and lubricated periodically. Keep your equipment clean of dirt and salt.

SPARS:

Like all other fittings, mast and booms suffer from salt water, air and spray. These should be kept waxed where possible, and at least always hosed down with fresh water. Always see that the halyards are tied off away from the mast. This will eliminate slapping in the wind, and subsequent marking of the mast. Use a high pressure nozzle and shoot fresh water to the top of the mast and spreaders. This will help keep your sails clean too, as they rub on the mast and spreaders.

Inspect spreaders and spreader brackets for signs of fatigue. See that ends of spreaders are wired and well covered with tape to prevent wear on the sails.

Factory supplied masts are clear anodized, which should be touched up if damaged to prevent corrosion. Automotive touch-up paint of a like color can be utilized, if required.

4.8 SAIL MAINTENANCE:

Your sails should be protected from chafing. This can be done by either padding the areas that touch the sail or by having your sailmaker attach chafe patches to the sails themselves.

You should check your sails frequently for any signs of wear and have any tears or frayed stitches repaired immediately.

Sails should never be stored in the sun because they are susceptible to decay through exposure to too much ultraviolet light. Always keep your sails covered when they are not in use.
Sails should never be put away wet. If they are wet after sailing, leave them in loose bundles and dry them at your first opportunity.

4.0 MAINTENANCE GUIDE - (Continued)

For most problems such as common dirt, dried or caked salt, etc., try scrubbing the surface with a soft bristled brush and liquid detergent. Avoid harsh powder detergents and stiff brushes, as they may damage the finish or stitching. This approach should work nicely for most applications. More severe stains can be taken care of by the following:

IMPORTANT: FOR WHITE SAILS ONLY!

BLOOD: Soak the stained portion for 10-20 minutes in a solution of bleach (Clorox) and warm water. Generally 10 parts water to 1 part bleach. Scrub and repeat if necessary. Rinse thoroughly, particularly nylon, and dry completely.

OIL, GREASE, TAR AND WAX: Warm water, soap and elbow grease seem to be effective. On hard stains, propriety stain remover and dry cleaning fluids should do the trick. Be careful to remove all fluids, as they can soften the various resinated coatings on sailcloth.

RUST AND METALLIC STAINS: These types of stains are very often the most frustrating and difficult to remove. First scrub with soap and water and apply acetone, M.E.K., or alcohol. As a last resort, you might try a diluted mixture (5%) of oxalic soaked for 15-20 minutes. Hydrochloric acid, 2 parts to 100 in warm water will also work.

MILDEW: Hot soapy water with a little bleach will generally prevail. After scrubbing, leave the solution on the fabric for a few minutes and rinse thoroughly. When using a bleach, a residual chlorine smell may be present after rinsing. A 1% solution of Thiosulfate (photographers hypo) should remove all chlorine traces. Here again, rinse and dry well.

PAINT AND VARNISH: Acetone and M.E.K. should remove most common paint and stains. Varnish can be easily removed with alcohol.

Mylar sails are coated with a plastic film and are easily damaged. Avoid solvents, as they can destroy the film and fabric over a period of time. Soap and diluted bleaches should take care of most stains.

Generally speaking, use all solvents with care. Always rinse and dry thoroughly. It should be emphasized that nylon ripstop spinnaker fabrics are less durable and more sensitive than their polyester counterparts. Bleaches and solvents can ruin nylon if not used properly.

Follow the above guidelines, take your sails into your sailmaker for periodical inspection, and you will have many effective seasons of sailing and cruising pleasure.

4.9.1 INTERIOR CUSHION, FABRIC COVER:

CLEANING:

1. Regular vacuum cleaning or brushing in the direction of the pile with a soft brush.
2. Stains should, if possible, be removed at once with a damp cloth. Do not allow stains to harden and age.
3. Greasy stains can be removed with ordinary cleaning fluid.

4.0 MAINTENANCE GUIDE - (Continued)

4. For overall cleaning, use commercial types of upholstery shampoo using only the foam to protect the back padding from moisture. After a minute or so, remove foam, and when dry, vacuum or brush in the direction of the pile.
5. Do not use heat such as an iron or steam.
6. The use of some kind of fabric protector, such as "Scotch Guard" is strongly recommended when the cushions are new, and after each cleaning.

3.9 INTERIOR CUSHIONS, ULTRALEATHER COVER:

CLEANING:

1. Spot clean with mild soap and water.
2. Air dry or dry quickly with warm setting of a hair dryer.
3. For stubborn stains, use mild solvent.

Type of stain	Mild Detergent	Mild Cleaning Fluid
Coffee, Tea	X	
Red Wine, Liquor	X	
Coke, Soft Drink	X	
Milk	X	
Ketchup	X	
Steak Sauce, Soy Sauce	X	
Mayonnaise, Butter	X	X
Salad Oil	X	X
Chocolate	X	X
Cosmetic Foundation	X	X
Lipstick	X	X
Face Cream	X	X
Suntan Oil/ Lotion	X	X
Shoe Polish	X	X
Machine Oil	X	X
Urine	X	X

4.9.3. PLEATED SHADES

A regular vacuuming is all that's needed to keep the shades looking new. DO NOT hand, machine wash, or dry clean, for it will weaken the material. A good upholstery cleaner can be used to spot clean the shades as required.

LEWMAR

User Notes

Small "vent" hatches are restricted to 90 degree opening and should not be forced beyond their "stop" position, as damage to the lever mechanism may occur. Larger hatches are not self supporting beyond the vertical position and will fall fully open if unrestrained.

The locking ventilation position is used by closing the handles into the catch block center slot. Care should be taken not to stand on or load the hatch lid in this position, as damage could occur to the handle or catch block.

Always wash the hatch with soap, water and a soft cloth.

Never use abrasive or solvent cleaners on the acrylic lid, as this may at a later date damage the acrylic.

To avoid risk of injury care should be taken to keep hands and limbs clear of lever and lid pinch zones while operating and adjusting the hatch.

Always wash the Portlight or Fixedlight with soap, water and a soft cloth.
Never use abrasive or solvent cleaners on the window, as this may damage the acrylic.

Friction lever adjustment

The friction lever units installed on Ocean hatches are pre-set when manufactured to give e correct positioning with a minimum opening load. It may be necessary occasionally to adjust the lever setting to correct the operation of the hatch.

Adjustment is made by means of the socket head screws on either side of the lever assembly

Using a 4mm (5/32") hexagon key, turn the adjusting screw approximately 1/8th of a turn in a clockwise direction to increase the positioning force. This is most easilty carried out in the fully open or closed positions.

Do not over tighten the adjusting screws.
On* hatches *with multiple lever units, care must be taken to adjust all levers to a similar loading.

Open the hatch and check for correct operation.

Re-adjust if necessary until desired operation is achieved.

Lubricants should not be used on the friction lever assemblies as this will adversely affect the function of the units.

Caring for Main Cabin Fixed Ports

Washing

Wash ACRYLITE FF sheet with a solution of mild soap or detergent and lukewarm water. Use a clean soft cloth, applying only light pressure. Rinse with clean water and dry by blotting with a damp cloth or chamois.

Grease, oil or tar may be removed with a good grade of hexane, aliphatic naphtha, or kerosene. These solvents may be obtained at a paint or hardware store and should be used in accordance with manufacturer's recommendations.

DO NOT USE: Window cleaning sprays, kitchen scouring compounds, or solvents such as acetone, gasoline, benzene, alcohol, carbon tetrachloride or lacquer thinner. These can scratch the sheet's surface and/or weaken the sheet causing small surface cracks called "crazing."

Dusting

Dust with a soft, damp cloth or chamois. Dry or gritty cloths may cause surface scratches and create a static electric charge on the surface (see section on neutralizing static electricity).

Polishing

Protect ACRYLITE sheet and maintain its surface gloss by occasional polishing with a good plastic cleaner and polish. Apply a thin, even coat with a soft clean cloth and polish lightly with cotton flannel. Then, wipe with a damp cloth to help eliminate electrostatic charges, which can attract dust particles.

Neutralizing Static Electricity

Several anti-static cleaners for plastics are available which will reduce static electricity and dust attraction. Wiping with a soft damp cloth or chamois is all that is necessary to keep ACRYLITE sheet dust-free between applications of these cleaners.

Removing Scratches

Fine scratches can be removed by hand polishing. Apply a plastic scratch remover to a soft flannel pad and rub. When the scratches have disappeared, remove all residue and polish. For deeper scratches, first sand lightly, with 400-grit "wet or dry" sandpaper, using plenty of water and rinsing the sandpaper frequently. Follow by buffing with a clean muslin wheel and a good polishing compound. For the highest gloss, use a clean-up wheel made of soft cotton or flannel sections, and on which no compound is used. An electric drill with a buffing wheel is ideal.

LEWMAR

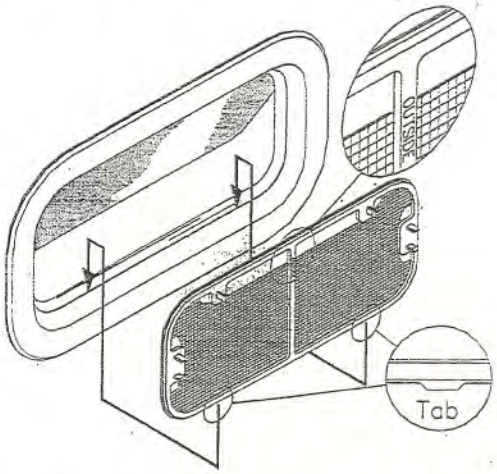
Flyscreen Fitting Instructions

B5961 Iss B

1

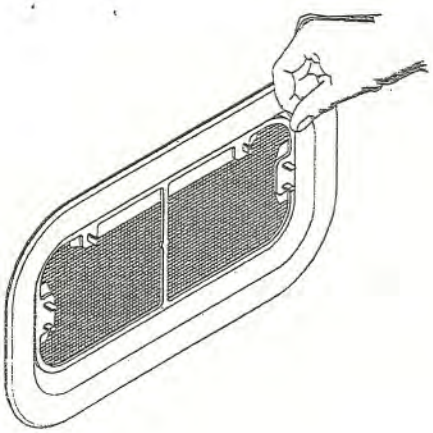
Outside Fitting - Preferred

If possible, fit the flyscreen from outside of the craft. With the portlight window open.



2

Insert tabs between the rubber seal and outer frame.
Note: The word OUTSIDE must be outside when correctly installed.



3

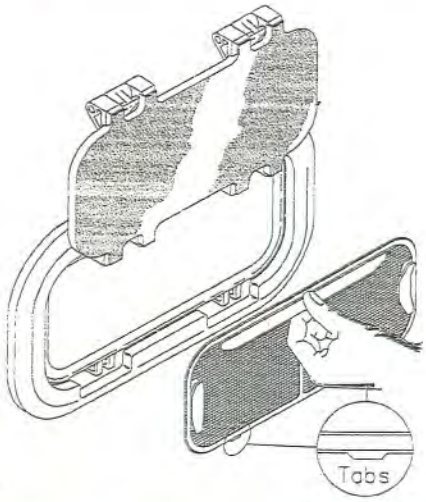
Gently press the flyscreen frame to locate the remainder of the screen between the seal and outer frame.

Once the flyscreen is correctly installed ensure that the straps are laying flat against the flyscreen frame, or they could obstruct closing the window.

4

Inside Fitting

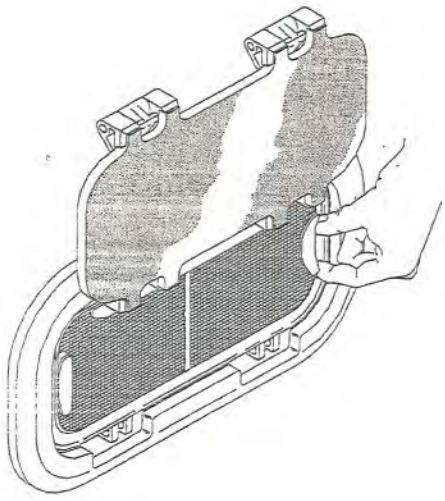
If you wish to fit the flyscreen from inside the boat, straps are fitted to the flyscreen frame to facilitate easier installation.



5

Holding the long strap, pass the flyscreen through the open portlight.

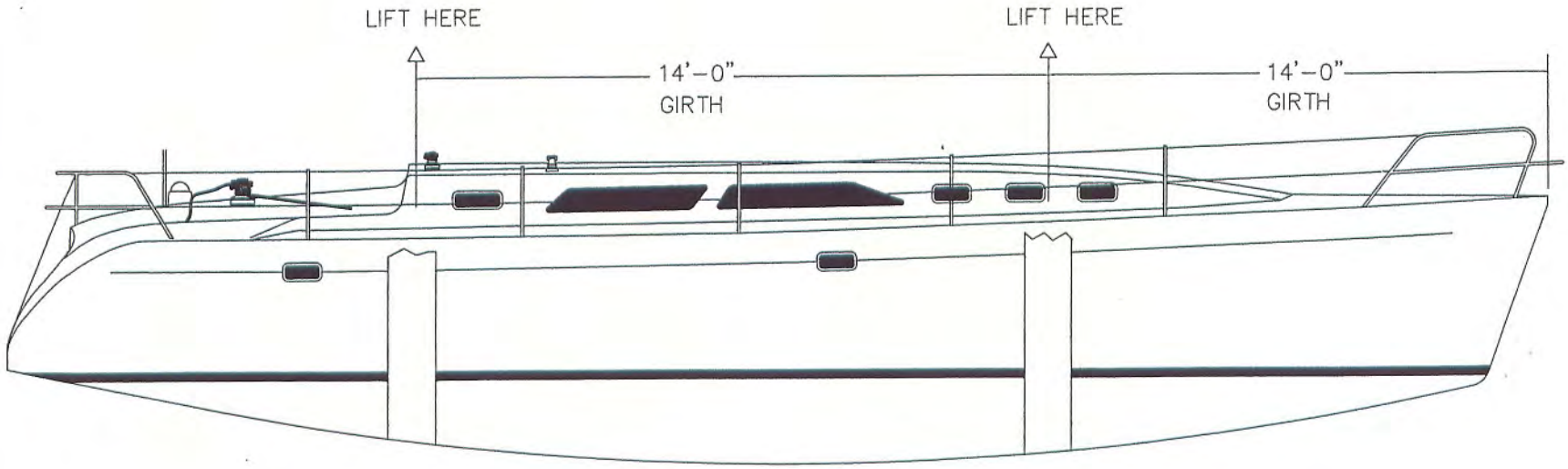
Insert tabs and bottom edge of the screen between the rubber seal and outer frame. Gently pull the flyscreen, easing the top edge into position, (excessive force might pull the screen past the seal).



6

Once satisfied that the top and bottom edges are correctly located, the ends can now be gently pulled into position with the aid of the small straps, (excessive force might pull the screen past the seal).

Once the flyscreen is correctly installed ensure that the straps are laying flat against the flyscreen frame, or they could obstruct closing the window.



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
GENERAL TOLERANCES
ANGLES : ±0.5°
X.X : ±0.1
X.XX : ±0.01
X.XXX : ±0.005
SURFACE FINISH: 63
DO NOT SCALE DRAWING

Catalina Yachts
7200 BRYAN DIARY RD.
LARGO, FL. 33777
(727) 544-6681

TITLE: C400- LIFT POINTS

BOAT: CATALINA 400			DRAWING NO: 400-91052-0	
DESIGNED BY:	CHECKED BY:		SCALE: NONE	SIZE: B / SHEET: 1/1
DRAWN BY: C.D.	APPROVED BY:		DATE: 2/6/01	

5.0 DECOMMISSIONING:

5.2 WINTERIZING YOUR ENGINE:

LAYING UP:

In cold climates where yachts are decommissioned during the winter, your Catalina 400 may be safely stored in the water provided adequate measures are taken to prevent ice damage to the hull. Check with your yard to determine the feasibility of storing in the water.

When the boat is to be stored on land, the mast may be left stepped on the deck. However, it is recommended that the mast be removed at the time of hauling for a thorough inspection and preparation for next season.

This allows plenty of time over the winter months to order and replace any shrouds or rigging parts avoiding any delays in the spring commissioning.

Following proper lay-up procedures will minimize the effort needed to recommission in the spring.

BEFORE HAULING:

1. Refer to engine manual instructions for winterizing the engine. Perform the appropriate in-water steps.

2. Consult the manufacturer's instructions for winterizing any optional or owner-installed equipment.

3. Inspect the cradle on which the boat will be stored. Check welds and padded poppits for condition and repair as required.

4. Lift the boat with straps at the locations illustrated.

AFTER HAULING:

1. Wash bottom, removing growth and loose paint.

2. Wash topsides, deck and all other exterior fiberglass surfaces. Wax all except the nonskid surfaces.

3. Remove all sails. Follow sailmaker's instructions, or instructions in section 4.8, with regard to cleaning. Schedule any repairs required and store in a dry place.

4. Remove all sheets and lines, clean and store in a dry place.

5. If the mast had been removed from the yacht, remove all stays and shrouds from the mast. Wash the entire stay or shroud assembly, using fresh water and a stiff brush. Dry thoroughly, and coil into large non-kinking coils. Store the coils in a dry place. Wash and wax all spars. Coil halyards into non-kinking coils and put in a dark-colored plastic bag to protect from sunlight if storing outdoors. Lash them to the mast. Store the mast either inside or outside with adequate support along its length.

6. If mast is to be left in place, remove the boom, clean and store as described before. Clean shroud/stay end fittings, toggles, etc. using fresh water and a stiff brush. Apply a light coat of silicone grease, paying particular attention to the end fittings where they connect to the stays/shrouds.

5.0 DECOMMISSIONING: - (Continued)

7. Clean and lubricate all deck hardware that contains moveable parts. Follow manufacturer's instructions on winches.

8. Remove all gear such as books, documents, bedding, PFD's, anything moveable that is subject to rust, corrosion or mildew.

9. Remove all food supplies from lockers and ice chest. Wash out ice chest's interior with a weak solution of Clorox. Leave ice chest lids open.

10. Stored batteries should be fully charged, and both positive and negative terminals should be disconnected. The batteries may be either left aboard or stored in a cool, dry place. Sub-zero temperatures will not harm a fully charged battery.

11. Close all manual shutoffs for the stove fuel system.

12. Winterize the head system in accordance with manufacturer's instructions.

13. Winterized the hot and cold water system, drain all tanks, hoses, pumps and valves. Open system drain valves. One hot supply and one cold supply. Located in bilge pump area.

14. Remove all electronic gear that may require servicing during the winter.

15. Remove fire extinguishers for weighing, checking, and any necessary recharging. If an automatic fire extinguisher system is installed, return the cylinders to the yacht and reinstall as soon as possible.

16. If cushions are left aboard, bring cockpit cushions below and place all cushions on edge to encourage ventilation.

17. Leave all interior lockers open to encourage ventilation.

18. Ensure that cockpit and deck scuppers are open and free.

19. If the boat is to be covered, ensure that the cover is installed in such a way as to provide adequate ventilation, and that the cover is not permitted to chafe against the hull or deck.

20. If the boat is not to be covered, ensure that mechanisms such as winches and steering pedestals are provided with adequate covers.

21. If the mast is to remain stepped, snug all shrouds and halyards to minimize noise and wear.

GENERAL NOTES:

We recommend the following procedures be followed when storing the yacht for prolonged winter months. Begin by consulting your authorized dealer about storing the boat in or out of water in freezing climates. If at all possible, the manufacturer recommends keeping the yacht in dry storage for severe winters.

All through hull fittings should be drained and closed off. Water in the sanitation system and other tanks should be pumped out. Fill the lines and fittings with antifreeze to prevent water from running in, freezing or expanding, and cracking the lines and fittings.

5.0 **DECOMMISSIONING:** - (Continued)

For diesel engines, consult the manufacturer's manual for special instructions.

Unless manufacturer's manual states otherwise, drain the raw cooling water from the block, disconnect the water intake hose from the through hull fittings, attach an additional length of hose and place the end of this hose in a bucket of antifreeze. Run the engine until straight antifreeze comes out the exhaust line. Stop the engine at this point, plug or cap the exhaust line, and remove the additional hose and bucket.

6.0 OWNER-USER RESPONSIBILITY:

6.1 GENERAL SAFETY TIPS:

1. Do not venture out when the weather conditions are unfavorable or are predicted to become so. Listen to weather forecasts, check with your Harbor Patrol Office, and look out for small craft storm warnings.

2. Be especially careful in areas where there may be commercial shipping traffic. Keep well away from shipping channels. Keep a sharp lookout when crossing the shipping channels.

3. Learn the rules of the road. All other sailors will expect that you know them and abide by them. The U.S. Coast Guard (BBE-2) 400 S. Eleventh Street, S.W. Washington, D.C. 20590, will supply free literature on this. Your local branch or Harbor Patrol Office may have it available.

4. If your boat has a Genoa sail that obscures the helmsman's vision, have a dependable person in the crew keep a sharp lookout under the Genoa sail for traffic.

5. When sailing at night, provide safety harnesses for yourself and your crew, and tie these lines to the boat. Use approved harnesses.

6. Purchase all Coast Guard required safety equipment and learn how to use it.

7. Enroll in a Coast Guard class or other certified boating and sailing class. You will learn a lot and enjoy sailing even more.

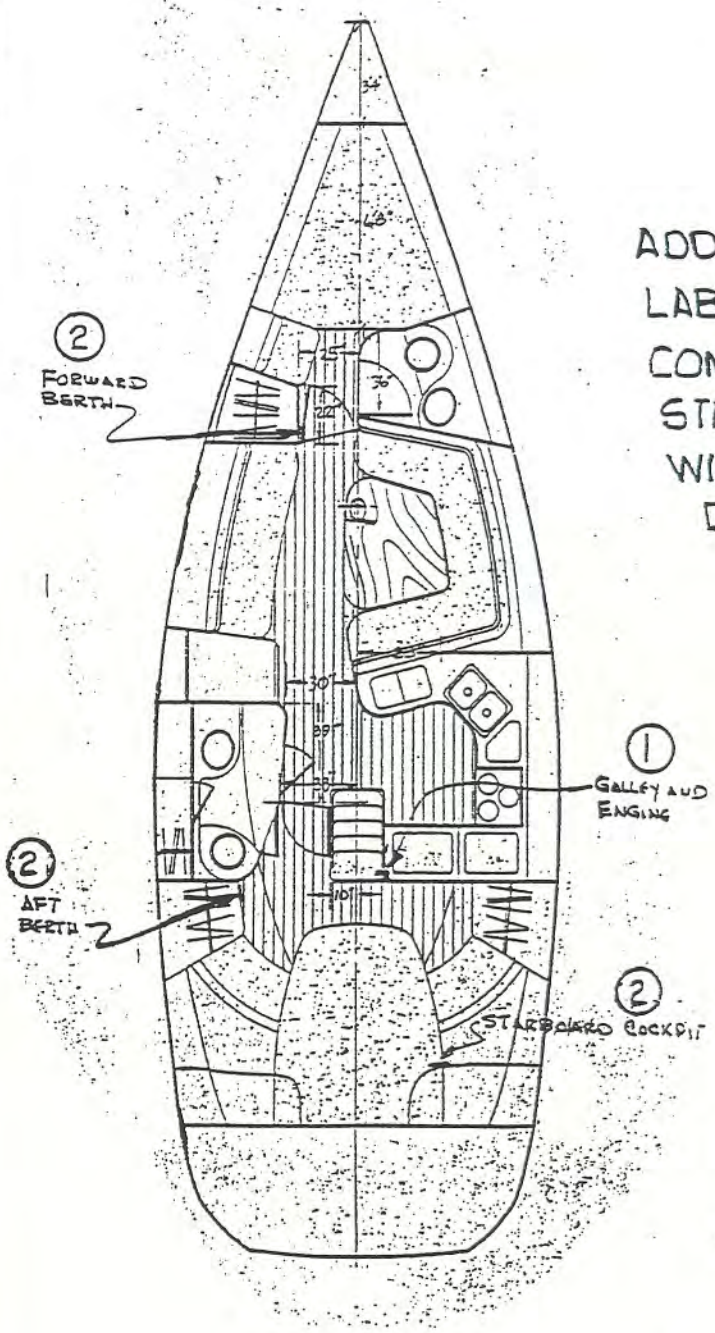
8. Do not take more than a safe number of persons aboard your boat when sailing.

9. Marine insurance is worth every penny you pay for it. Take out insurance from the start. See your dealer for a recommended marine agent if you do not have one.

10. Keep all seat hatches and main hatches closed during rough weather or gusty winds which could unexpectedly strike the boat and cause a knock down.

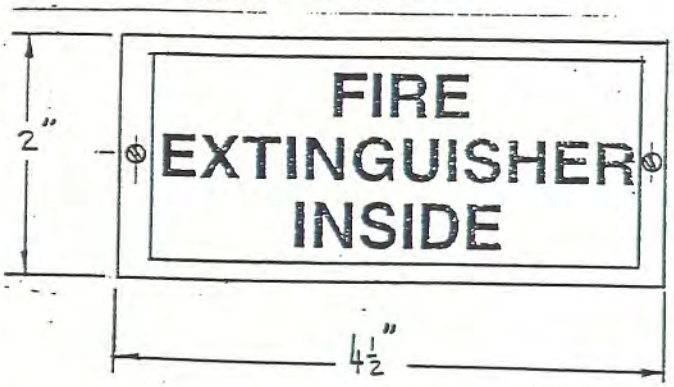
11. CAUTION: The aluminum mast, and the metal parts conduct electricity. Coming in contact with, or approaching an electrical power line can be fatal. Stay away from overhead power lines and wires of any kind, when launching, underway, or when stationary.

NO.	REVISION	DATE



ADD FIRE EXTINGUSHER LOCATION LABELS IN THE POSITIONS SHOWN TO COMPLY WITH EUROPEAN CERTIFICATION STANDARD 9094-1. EACH PLATE WILL BE ON FORMICA AS SHOWN IN DETAIL-A.

DETAIL-A



1

FIRE EXTINGUISHER

2

FIRE EXTINGUISHER INSIDE

CATALINA YACHTS/MORGAN DIVISION
7200 Bryan Dairy Road
Largo, Florida

C400 FIRE EXTINGUSHERS

DESIGNED BY	DATE	DRAWING NO.
DRAWN BY		
CHECKED BY	SCALE	
APPROVED BY		

6.0 OWNER-USER RESPONSIBILITY: - (Continued)

Dry chemical extinguishers should be inverted occasionally to prevent the contents from packing. Extinguishers should be recharged yearly or after each use, according to manufacturer's recommendations.

LIFE VESTS:

Keep a Coast Guard approved life vest on board for each crew member. Wear them during rough weather and night sailing. Children should wear vests at all times no matter how much they object.

HORN:

Your yacht should be equipped with a horn capable of producing a blast that can be heard for a distance of one mile.

FLARES:

The law requires that your yacht be equipped with a minimum of 3 day/night flares.

6.3 SUGGESTED SAFETY EQUIPMENT AND SAFETY PACKAGE:

MEDICAL KIT:

A basic medical kit is a wise investment for any boat owner. Suggested items include: Motion sickness pills, aspirin, bandages, etc. We recommend that you personalize your medical supplies for you and your crew's specific needs.

TOOL KIT:

A varied arrangement of tools is again, a wise investment to have on your boat. Tailor your tool box for the conditions that you sail. For local sailing, with professional help just a phone call away, you only need a small array of tools. However, for long range cruising, a more extensive supply of tools will be needed.

6.4 SAFETY PACKAGE, FACTORY OPTION:

(Contents subject to change without notice)

PACKAGE INCLUDES	DESCRIPTION	
1	CQR 40 lb Dan Forth Anchor	04/14/03
40'	5/16" Acco galvanized high test chain	
1	3/8" galvanized anchor shackle	
1	New England 5/8" x 250' anchor line	
4	Taylor 10 x 30 Superguard fenders	
28'	New England 3/8" fender line (4 x 7)	
8	Kent USCG app. (Type I) foam life vests	
1	Sterns USCG app. White throwable cushion	
1	Orion Alert/Locate flare kit	
1	Aluminum folding radar reflector	
1	Tempo "Nature Safe" signal horn	
1	AFI 8" Chrome Bell	
3	Kidde 10BC fire extinguisher	
1	Medical Sea Pack first aid kit	
2	Koel halogen flashlight w/batteries	
4	New England 5/8" x 25' dock lines	
1	Chapman's Piloting & Smallboat handling 63rd. Ed.	
2	Becson Yacht log book	

6.0 OWNER-USER RESPONSIBILITY: - (Continued)

6.5 ANCHORS, ANCHORING AND MOORING

The manufacturer suggests an anchor in the 30-40 pound range to be used as a bow anchor in ordinary conditions. This anchor will only be effective with at least 15 feet of 5/16 inch or heavier gauge chain and at least 5/8 inch or heavier nylon line.

Under adverse weather conditions, a heavier bow anchor could prove necessary, and possibly a plough type anchor might be required.

Inquire in your local area about anchoring procedures relative to the place you plan to visit. Get the opinions of several experienced people. And, always play it on the safe side in "making up" your anchor and in using it. Do not forget to wire all shackle pins so they cannot come loose under water.

REMEMBER: Lighter anchors are made more effective by increasing the scope, i.e., the ratio of length of line and chain to depth of water. A 7:1 ratio is recommended. This means using 7 feet of anchor line for each foot in water depth.

6.6 LIGHTNING PRECAUTIONS:

Your yacht was not provided with a lightning protection system during construction. The reasons are as follows:

1. There is not a procedure for lightning protection which is proven reliable under all conditions. Yachts with elaborate lightning protection systems have sustained serious damage from a direct lightning strike.

2. If the builder were to assert that the yacht was lightning protected it could instill a false sense of confidence in the owner or operator, leading to less-than-prudent actions when lightning threatens.

3. Lightning systems are "out of sight, out of mind", except when lightning threatens. Generally, they are not checked and maintained on a regular basis. A defect in the system (i.e., a break in a ground line) could, in some cases, increase the risk of personal harm, as well as damage to the yacht, as compared to a yacht with no protection. The reason for this is that many lightning protection systems distribute the high voltage throughout the yacht before allowing it to exit through the ground.

4. It is impossible for Catalina Yachts to control changes which you, the owner, may make to the yacht, which could affect lightning protection system.

You, the owner, must decide whether or not you wish to equip your yacht with lightning protection and, if so, the method of doing it. For your guidance, a copy of ABYC recommendations is attached. The following suggestions and comments are also offered:

1. Keep the system as simple as possible. This will facilitate both installation and inspection/maintenance. Perhaps a single oversize ground (battery cable) from the mast base to the engine, coupled with external shroud grounds (see 2 below), will maximize reliability.

6.0 OWNER-USER RESPONSIBILITY: - (Continued)

2. ABYC recommends straight-line wire runs, which is virtually impossible within the yacht. For grounding the shrouds: A battery cable, which clips to each shroud and extends outside the yacht to the water, can minimize the number of bends required. This method has the added advantages of keeping the power surge outside the boat, and allowing easy, routine inspection. The obvious disadvantage is that the clip on cables are not a permanent installation and may not be in place when an unexpected lightning strike occurs.

3. Use only top quality materials and go oversize wherever possible.

4. Keep all permanent attachment points and connections where they are readily available for inspection, yet protected from damage or inadvertent disconnection.

Factory installed metal tanks, 110 volt systems and major components are grounded to the engine. The engine is grounded via the shaft and propeller to the water. The purpose of internal grounding is for static charge control and accidental shorts in the internal systems - not to provide lightning protection. However, you can incorporate the ground lines present in a lightning protection system you may wish to add.

By far, the most important consideration regarding lightning is observing common sense safety precautions when lightning threatens. The key considerations are listed in the American Boat and Yacht Council (ABYC) publication, which is reprinted herein for your reference.

E-4 LIGHTNING PROTECTION

Based on ABYC's assessment of the existing technology, and the problems associated with achieving the goals of this standard, ABYC recommends compliance with this standard for all systems and associated equipment manufactured and/or installed after July 31, 1998.

4.1 *PURPOSE*

These standards and recommended practices are guides for the design, construction, and installation of lightning protection systems on boats.

*NOTE: **The probability of a lightning strike varies with geographic location and the time of the year, but, when the conditions that create an electrical charge between clouds and the earth exist, there is nothing that can be done to prevent the lightning discharge. A boat can be struck in open water or while tied to the dock.***

4.2 *SCOPE*

These standards and recommended practices apply to powerboats and sailboats if a lightning protection system is installed.

*NOTES: **1. Complete protection from equipment damage or personal injury is not implied.***

2. A lightning protection system offers no protection when the boat is out of water, and is not intended to afford protection if any part of the boat comes in contact with power lines while afloat or ashore.

3. Protection of persons and small craft from lightning is dependent on a combination of design and maintenance of equipment, and on personnel behavior. The basic guides contained in this standard shall be considered and used in designing and installing a lightning protection system. However, in view of the wide variation in structural design of boats, and the unpredictable nature of lightning, specific recommendations cannot be made to cover all cases.

4.3 *REFERENCED ORGANIZATIONS*

ABYC - American Boat and Yacht Council, 3069 Solomon's Island Road, Edgewater, MD 21037-1416. 410-956-1050

NFPA - National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101. 617-770-3000.

4.4 *DEFINITIONS*

Air terminal - A device at the upper most point of the lightning protection system to dissipate the charge or start the lightning ground process.

Equalization bus - A metallic strap, which may be installed on the interior of a boat, substantially parallel to the exterior lightning ground plate, and connected to the lightning ground plate at both ends. Secondary lightning conductors can be connected to the equilization bus. The equalization bus provides a low resistance path to the lightning ground plate.

Lightning bonding conductor - A conductor intended to be used for potential equalization between metal bodies, and the lightning protection system to eliminate the potential for side flashes.

Lightning ground plate (or strip) - A metallic plate, or strip on the hull exterior below the waterline, that serves to efficiently transfer the lightning current from the system of down conductors to the water.

Lightning protective gap (air gap) - A form of lightning arrester wherein a small air space is provided between two metallic plates, with one connected directly to the vessel grounding plate or strip, and the other to an operating electrical system, such as a radio transmitter or receiver.

Lightning protective mast - A conductive structure, or if non-conductive, equipped with a conductive means, and an air terminal.

Parallel path - A path to ground that may be followed by a lightning strike. This path is separate from the path formed by the primary lightning conductor.

Primary lightning conductor - The main vertical electrical path in a lightning protection system formed by a metallic mast, metallic structure, electrical conductors, or other conducting means, to a ground plate, ground strip, or a metallic hull.

Secondary lightning conductor - A conductor used to connect potential parallel paths, such as the rigging on a sailboat, to the primary lightning conductor, or to the lightning ground plate, strip or equalization bus.

Side flash - An arc-over discharge that occurs from the lightning system to any metallic object.

Zone of protection - An essentially cone shaped space below a grounded air terminal, mast, or overhead ground wire, wherein the risk of a direct lightning strike is substantially reduced. See Appendix 1.

4.5 *REQUIREMENTS - IN GENERAL*

4.5.1 To provide a conductive path for the adequate discharge of lightning currents, from the air terminal at the top of a lightning mast to the water (ground), the system shall

4.5.1.1 be essentially vertical, and

4.5.1.2 be essentially straight, and

4.5.1.3 have a conductivity not less than that of a #4 AWG (21.2mm^2) copper conductor, and

4.5.1.3.1 where the system consists of multiple shrouds, stays and mast, they shall have an aggregate conductivity not less than a #4 AWG (21.2mm^2) copper conductor.

4.5.2 Every metallic shroud and stay shall be connected from the chain plate directly to the ground plate or ground strip with a conductor at least #6 AWG (13.3mm^2).

4.5.3 No bend of a conductor shall form an included angle of less than 90°, nor

4.5.3.1 shall it have a radius of bend less than eight inches (203mm).

4.5.4 Large metal objects such as tanks, engines, deck winches, stoves, etc., within six feet (1.8m) of any lightning conductor shall be interconnected by means of a lightning bonding conductor at least equal to #6 AWG (13.3mm^2) copper.

NOTES: 1. To minimize flow of lightning discharge current through engine bearings, it may be preferable to bond engine blocks directly to the ground plate rather than to an intermediate point on the lightning protection system.

2. Large metal bodies on boats include any large masses such as bow and stern pulpits, steering pedestals, horizontal guardrails, handrails on cabin tops, smokestacks from galley stoves, electric winches, davits, metallic hatches, metallic arches, towers, engines, water and fuel tanks, and control rods for steering gear or reversing gear.

3. It is not intended that small metal objects such as compasses, clocks, galley stoves, medicine chests, and other parts of the boat's hardware be grounded.

4. For illustration purposes see Appendix, Figure 1.

4.6 *REQUIREMENTS - MATERIALS*

4.6.1 Corrosion - The material used in a lightning protective system shall be resistant to corrosion.

NOTE: Where it is necessary to join dissimilar metals, the corrosion effects can be reduced by the use of suitable plating or by installing a metal fitting between the two dissimilar metals that is galvanically compatible with both metals.

4.6.2 Wire Conductors

4.6.2.1 Wire conductors shall be stranded copper.

4.6.2.2 Stranding of copper wire shall be Type II stranding in accordance with ABYC E-8, *AC Electrical Systems on Boats*, and/or ABYC E-9, *DC Electrical Systems under 50 Volts*.

4.6.3 Other Conductive Means

4.6.3.1 Conductivity shall be equal to, or greater than, #6 AWG (13.3mm^2) copper wire.

4.6.3.2 The thickness of metal ribbon or strip shall be at least 1/32 inch (0.8mm).

4.6.3.3. Copper braid shall not be used.

4.7 *REQUIREMENTS - INSTALLATIONS*

4.7.1 To minimize side flashes, and the induction of high voltage to the boat's wiring, lightning conductors in proximity to the boat's wiring shall not be routed in parallel to the boat's wiring.

EXCEPTION: ***The primary lightning conductor.***

4.7.2 Conductive Joints - Conductive joints shall be made and supported in accordance with ABYC E-9, *DC Electrical Systems Under 50 Volts*, and

4.7.2.1 shall have an electrical resistance not in excess of that of two feet (0.6m) of the smaller diameter conductor.

4.8 *LIGHTNING PROTECTIVE MAST*

4.8.1 The lightning protective mast shall be located so that the cone of protection will cover the entire boat. See Figure 1 and Figure 2.

4.8. 2 Additional lightning protective means shall be erected to form overlapping zones of protection, to protect a boat of the size that renders the use of a single mast impracticable.

NOTE: The zone of protection afforded by any configuration of masts, or other elevated, conductive, grounded objects, can readily be determined graphically. Increasing the height of a mast above the striking distance will not increase the zone of protection.

4.8.3 Lightning Protective Mast Alternatives

4.8.3.1 If the mast is composed of non-metallic material, the associated lightning or grounding conductor shall

4.8.3.1.1 be essentially straight, and

4.8.3.1.2 be securely fastened to the mast, and

4.8.3.1.3 extend at least six inches (150mm) above the mast, and

4.8.3.1.4 terminate in an air terminal, and

4.8.3.1.5 be led as directly as practicable to the grounding connection. See E-4.5.1.

NOTE: Although partially conductive, carbon fiber materials are regarded as non-conductive (non-metallic) for the purpose of this standard.

4.8.3.2 An outrigger that serves as a lightning protective mast shall have conductivity equivalent to #4 AWG ($21.2mm^2$) copper.

4.9 *LIGHTNING GROUND*

4.9.1 Primary and Secondary Lightning Ground - A lightning ground for a boat shall consist of any metal surface which is submerged in the water having an area of at least 1 square foot ($0.1m^2$) and consist of at least one of the following methods.

4.9.1.1 External Ground Plate or Equivalent - The external ground plate shall be located as close to the base of the primary conductor as possible to minimize any horizontal runs in the primary conductor.

NOTE: The boat's rudders, struts, external ballast keel, or other external metallic surfaces may provide an external ground plate equivalent.

4.9.1.1.1 If the rudder(s) is used as an external ground plate equivalent, the lightning conductor shall be connected directly to the rudder shaft.

4.9.1.2 Grounding strip - An external grounding strip of copper, copper alloy, stainless steel, or aluminum, shall be installed under water to be used as an earth ground connection for the lightning system. This strip shall have a minimum thickness of 3/16 inch (5mm), and a minimum width of 3/4 inch (19mm).

NOTES: 1. The edges of the external ground plate or grounding strip need to be sharp, exposed, and not caulked or faired into the adjoining area.

2. A strip approximately one inch (250mm) wide, and 12 feet (3.7m) long, has nearly six times the amount of edge area exposed to the water, which, compared to the ground plates, will improve the dissipation of charges.

4.9.1.2.1 The grounding strip, if used, shall extend from a point directly below the lightning protection mast, towards the aft end of the boat, where a direct connection can be made to the boat's engine.

NOTES: 1. The use of two thru-bolts at each end of the strip will help to prevent the strip from twisting.

2. An equalization bus on the inside of the boat, paralleling the grounding strip on the outside of the boat, may be used as the lightning ground conductor.

4.9.2 Seacocks and Thru-Hull Fittings - Seacocks and thru-hull fittings, if connected to the lightning ground system, shall not be connected to the main down conductor. They shall be connected to

4.9.2.1 the underwater grounding strip, or

4.9.2.2 the lightning ground plate, or

4.9.2.3 the internal equalization bus.

4.9.3 Multihull boats shall provide a lightning ground connection in accordance with 4.9.1 for each hull that has items to be grounded, attached, or fitted to it.

4.10 *REQUIREMENTS - VESSELS WITH METAL HULLS*

4.10.1 If there is electrical continuity between metal hulls and masts, or other metallic superstructures of adequate height in accordance with E-4.8, then no further protection against lightning is necessary.

4.11 *REQUIREMENTS - SMALL BOATS*

4.11.1 Small boats without a permanent mast shall be protected by means of a temporary lightning protective mast that may be erected when lightning conditions are observed.

4.11.1.1 The base of the temporary lightning protective mast shall be located as close to the geometric center of the boat as possible, but, if necessary, can be offset, providing the cone of protection will cover the entire boat when the mast is plugged in.

4.11.1.2 The location of the mast base shall be such that persons on the boat can avoid physical contact with the mast or the base.

4.11.1.3 The base should extend as high as possible, and provision shall be made to plug in the upper section of the lightning mast so that it will not be displaced by the rolling and pitching of the boat in rough water.

4.11.1.4 The temporary lightning protective mast shall be all metal, or other material if provided with a conductor, with a conductivity at least equal to a #4 AWG (21.2mm^2) conductor.

*NOTE: **A solid stainless steel whip antenna or equivalent, that has a conductivity less than a #4 AWG (21.2mm^2) conductor, may be used, because of its higher melting temperature, but it will not provide as low a resistance path for the lightning.***

4.11.1.5 The temporary lightning protective mast shall be connected to a submerged ground plate of at least one square foot (0.1 m^2) in area.

4.11.2 Open Daysailers - As stainless steel rigging may not provide an adequate conductive path for the discharge of lightning currents, protection will depend on the grounding of all rigging as well as the metal masts, or the continuous metallic tracks on nonmetallic masts. These shall be connected at the lower ends to a lightning grounding plate, or a lightning grounding strip located directly below the mast.

4.11.2.1 Metallic rudders at the aft end of the boat shall not be used as the lightning ground for the mast because of the need for a long horizontal conductor to the aft end of the boat.

4.11.2.2 The tiller, or other connections to metallic rudders that the operator will contact, shall be non-conductive materials.

4.11.2.3 Metallic keels or centerboards shall be directly connected to the lightning grounding plate or strip, and may serve as the lightning grounding means if they have the required one square foot (0.1 m^2) area in contact with the water. If a centerboard is used as the lightning grounding means, a warning sign shall be provided that clearly states that the centerboard must be in the down position to function as a lightning ground.

FIGURE 1 - BOAT WITH MAST NOT EXCEEDING 50 FEET (15M) ABOVE THE WATER

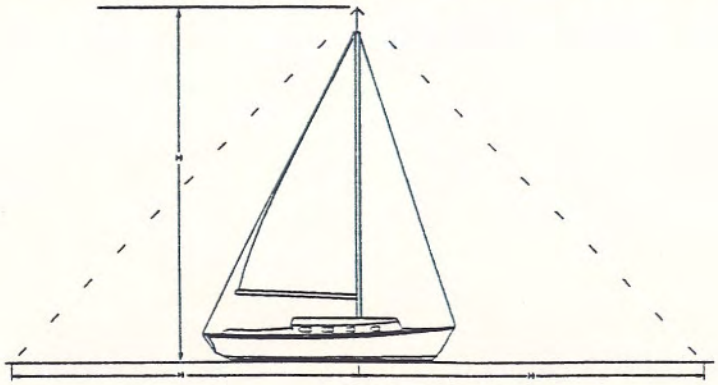


FIGURE 2 - BOAT WITH MAST NOT EXCEEDING 50 FEET (15M) ABOVE THE WATER

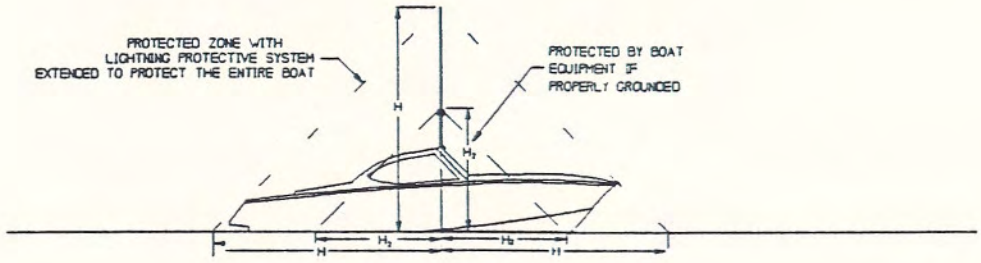
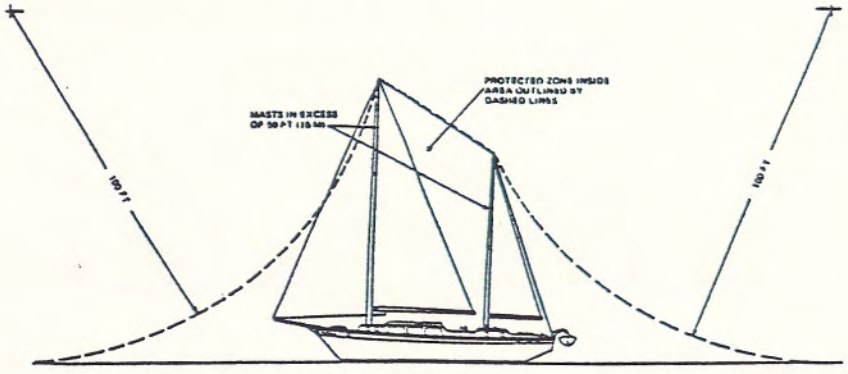


FIGURE 3 - BOAT WITH MASTS IN EXCESS OF 50 FEET (15M) ABOVE THE WATER - PROTECTION BASED ON LIGHTNING STRIKING DISTANCE OF 100 FEET (30M)



APPENDIX - LIGHTNING PROTECTION

This appendix contains additional descriptive information and recommendations pertaining to system maintenance and behavior of personnel.

Ap.1 Zone of Protection - A grounded conductor, or lightning protective mast, will generally divert to itself a direct strike that might otherwise fall within a cone-shaped space, the apex of which is the top of the conductor of a lightning protective mast, and the base of a circle at the surface of the water having a radius that is related to the height of the top of the conductor or lightning protective mast.

Ap.1.2 Boats with ungrounded or non-conductive objects projecting above the metal masts or superstructure may have these objects protected by a lightning ground conductor terminating in an air terminal above the object.

Ap.1.3 Whip type radio antennas should not be tied down during a lightning storm if they have been designed as a part of the lightning protection system.

Ap.2 Maintenance - Lightning protection provisions are likely to receive scant attention after installation. Therefore, their composition and assembly should be strong, and materials used should be highly resistant to corrosion.

Ap.2.1 Grounding of metallic objects for lightning protection may increase the possibility of harmful galvanic corrosion. See ABYC E-2, *Cathodic Protection of Boats.*

Ap.2.2 If a boat has been struck by lightning, compasses, electrical, and electronic gear should be checked to determine whether damage or changes in calibration have taken place.

Ap.2.3 If a boat has been struck by lightning, the lightning protection system should be inspected for physical damage, system integrity, and continuity to ground.

Ap.2.4 If a boat has been struck by lightning, it should be hauled for inspection of the hull, underwater structures and thru-hull fittings. Lightning can exit from one or numerous locations below the waterline. Subsequent flooding, sinking, or long term hull damage can result from undetected lightning damage.

Ap.3 Precautions for Personnel - The basic purpose of protection against lightning is to ensure the safety of personnel. It is therefore appropriate that during a lightning storm the following precautions be taken:

Ap.3.1 Personnel should remain inside a closed boat, as far as practical.

Ap.3.2 Arms and legs should NOT be dangled in the water.

Ap.3.3 Consistent with safe handling and navigation of the boat, personnel should avoid making contact with any items connected to a lightning protection system, and especially in such a way as to form a bridge between these items. For example, it is undesirable that an operator be in contact with reversing gear levers and a spotlight control handle at the same time.

Ap.3.4 Personnel should NOT be in the water.

Ap.3.5 Personnel should avoid contact with metal parts of a sailboat's rigging, spars, fittings, and railings.

Ap.4 For mast heights in excess of 50 feet (15m), the zone of protection is based on the striking distance of the lightning stroke. Since the lightning stroke may strike any object within the striking distance of the point from which final breakdown to earth ground (the water) occurs, the zone of protection is defined by a circular arc, concave upward. See Figure 2. The radius of the arc is the striking distance, and the arc passes through the tip of the mast, and is tangent to the water. Where more than one mast is used, the arc passes through the tips of adjacent masts. See Figure 3.

The striking distance is related to the peak stroke current, and thus to the severity of the lightning stroke. The greater the severity of the stroke, the greater the striking distance. In the vast majority of cases, the striking distance exceeds 100 feet (30m). Accordingly, the zone based on a striking distance of 100 feet (30m) is considered to be adequately protected.

The zone of protection afforded by any configuration of masts, or other elevated conductive grounded objects, can readily be determined graphically. Increasing the height of a mast above the striking distance will not increase the zone of protection.

Ap.5 Materials

Ap.5.1 The materials used in the lightning protection system should be resistant to corrosion. The use of combinations of metals that form detrimental galvanic couples should be avoided.

Ap.5.2 In those cases where it is impractical to avoid a junction of dissimilar metals, the corrosion effect can be reduced by the use of suitable plating or special connectors, such as stainless steel connectors used between aluminum and copper alloys. Except for the use of conducting materials that are part of the structure of the boat, such as aluminum masts, only copper should be used

as a lightning conductor system. Where copper is used, it should be of the grade ordinarily required for commercial electrical work, generally designated as being of 95 percent conductivity when annealed.

Ap.6 External Ground Plate - An exterior grounding plate of copper, copper alloys, stainless steel or aluminum may be provided by means of a plate which has an area of at least one square foot (0.1 m^2) area. The plate should be located as nearly as possible directly below the lightning protection mast. The boat's propeller(s), shaft(s), metallic rudder(s), and other metallic surfaces that have the required area, can be effectively used on small boats only where the lightning protective mast is located at the stern, above the in-water metallic objects to be used as the lightning system ground. The stern mast must be tall enough to provide a cone of protection that extends to the bow of the boat.

Ap.6.1 Boats that use a lightning grounding plate instead of the lightning grounding strip should ground backstays, or other objects aft, to the engine negative terminal, a metallic rudder, or other external ground at the aft end of the boat. The lightning ground shall not be routed through the boat to the lightning grounding plate forward under the lightning mast.

Ap.7 Grounding Strip - An external grounding strip of copper, copper alloys, stainless steel, or aluminum, installed under the boat in a fore and aft direction, may be used as the earth ground connection for the lightning system. Except for stainless steel, the strip should have a minimum thickness of 3/16 inch (4.8mm), and a minimum width of 3/4 inch (20mm). Stainless steel should have a minimum thickness of 1/8 inch (3.2mm). The length of the strip should extend from a point directly below the lightning protection mast, to the aft end of the boat, where a direct connection can be made to the boat's engine, but the total length of the strip shall not be less than four feet (1.22m). In a sailing vessel, the backstay and engine should be connected to the aft end of the strip. The strip should be secured to the hull with one, or preferably two, galvanically compatible through bolts at each end. The use of two bolts at each end, spaced one or two inches apart, will help prevent any tendency for the strip to rotate when the electrical connections are made inside the hull The strip must be located so that the external strip is submerged under all operating conditions. If the strip is not located so as to be submerged when a sailboat is heeled to port or starboard, then a strip will be required on both the port and starboard sides. All connections to the strip should be as short and direct as possible. Additional thru-hull bolts may be located along the length of the strip for additional connections, such as on a two masted sailboat. Because of the possibility of stray current corrosion of the securing bolts, the number of thru-hull bolts should be kept to a minimum. To minimize the number of thru-hull bolt connections, an equalization bus can be installed.

Ap.7.1 The aft end of the lightning grounding strip should be connected directly to the engine negative terminal. This will provide a path inside the hull for any DC stray currents that might be imposed on the thru-hull bolts that attach the lightning grounding strip where those bolts contact bilge water.

Ap.8 Protection of Equipment - Wherever possible, electronic equipment should be enclosed in metal cabinets that are connected to the lightning grounding system with a minimum #8 AWG (8.39mm^2) conductor. Surge suppression devices should be installed on all wiring entering or leaving electronic equipment.

Ap.8.1 The grounding of metal rod type radio antennas provides some protection for boats without masts and spars provided that

Ap.8.1.1 conductors in the grounding circuit of the antenna have a conductivity equivalent to #4 AWG (21.2mm^2) copper in accordance with E-4.5, and

Ap.8.1.2 the top of the antenna is not more than 50 feet (15m) above the water, and

Ap.8.1.3 a line drawn from the top of the antenna downward toward the water at an angle of 45 degrees to the vertical does not intercept any part of the boat (see E-4.8), and

Ap.8.1.4 the antenna loading coil is provided with a suitable protective device for bypassing the lightning current.

NOTES: 1. Because a loading coil presents a high impedance to the flow of lightning current, the portion of an antenna above the bottom of a loading coil is not as effective as a lightning protective mast.

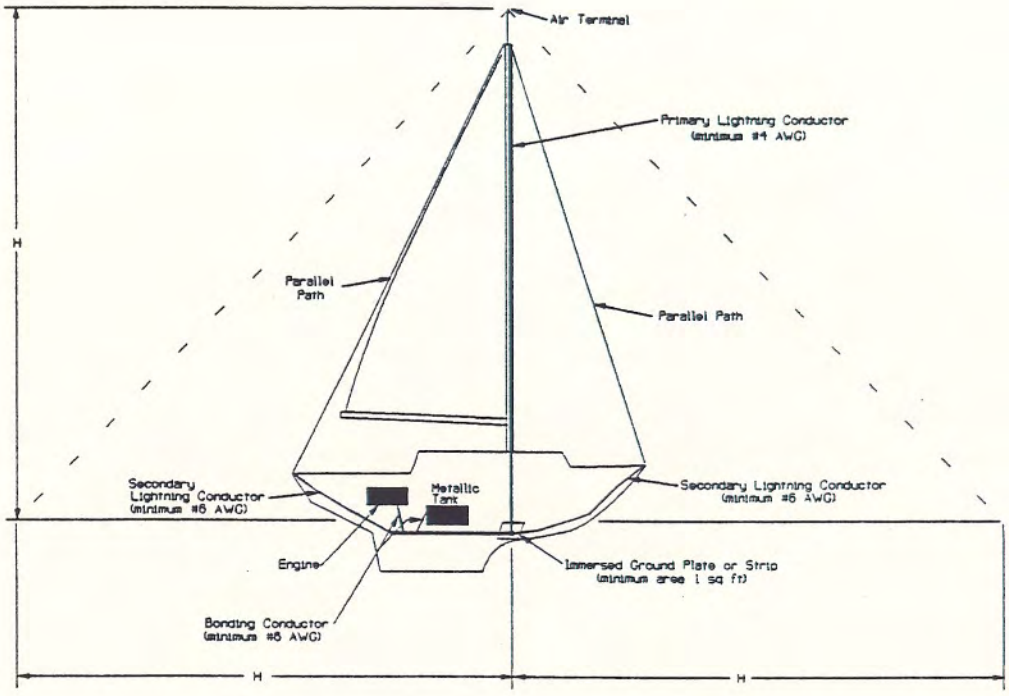
2. Non-conducting antenna masts with spiral wrapped conductors are not considered suitable for lightning protection purposes.

Ap.8.2 In order to protect the radio transmitter, antenna feed lines shall be

Ap.8.2.1 equipped with a means for grounding during electrical storms, or

Ap.8.2.2 protected by lightning arresters or lightning protective gaps.

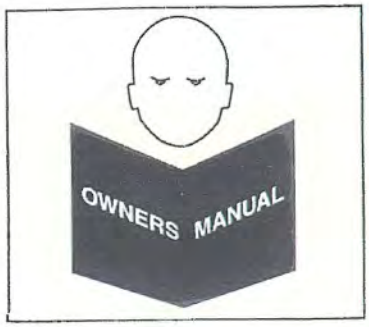
AP. FIGURE 1 - LIGHTNING PROTECTION SYSTEM



NOTES: 1. An equalization bus is used on the interior of the hull as the termination for secondary conductors and bonding conductors. The primary conductor is connected directly to the immersed ground plate or strip. See E-4.9.

2. All otherwise isolated bare metal objects within six feet (1.8m) of a lightning conductor shall be connected to the lightning protection system with a minimum #6 AWG (13.3mm^2) bonding conductor.

3. The probability of a lightning strike varies with geographic location and the time of the year. When the conditions that create an electrical charge between clouds and the earth exist, there is nothing that can be done to prevent the lightning discharge. A boat can be struck in open water or while tied to the dock.



WARNING

Read the Owners Manual before using this vessel

INSTALL NEXT TO ENGINE PANEL OR DIRECTLY BELOW HULL I.D. PLATE.

WARNING

Keep curtains away from stove when it is being used

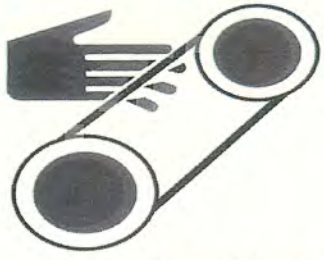
INSTALL ON DECK LINER UNDER WINDOW OVER GALLY STOVE.

WARNING

Close the through hull valves each time the head is used

ON VERTICAL SURFACE BEHIND EACH TOILET.

WARNING



Do Not open door to the engine compartment while engine is running

INSTALL ON ENGINE COVER.

DANGER

Keep hold of the wheel when backing up

INSTALL ON STEERING PEDESTAL ABOVE INSTRUMENT HOUSING.

FUEL SHUT OFF VALVES INSIDE

ADJACENT TO VALVE LOCATION ON BULKHEAD.

DANGER

- Watch for overhead wires
- Stay away from overhead power lines

EACH SIDE 2-REQUIRED ON MAST 12" FROM BOTTOM.

DANGER

- Provide ventilation while cooking appliance is in use.
- It is not safe to use stove or oven for comfort heating.

BELOW COUNTER LEVEL NEXT TO STOVE.

Catalina Yachts reminds you that is illegal for any vessel to dump plastic trash anywhere in the ocean or navigable waters or the United States, Annex V of the **Marpol Treaty** is an International Law for a cleaner, safer marine environment. Violation of these requirements may result in civil penalty up to $25,000. fine and imprisonment.

IT IS ILLEGAL TO DUMP THE FOLLOWING:

U.S. Lakes, Rivers, Bays, Sounds, and 3 Miles From Shore		3 to 12 Miles	12 to 25 Miles	Outside 25 Miles
Plastics	Garbage	Plastic, Dunnage, Linning and Packing Materials That Float, Also If Not Ground to Less Than One Inch: Paper Crockery Rags Metal Glass Food	Plastic, Dunnage, Linning and Packing Materials that Float.	Plastic
Paper	Metal			
Rags	Crockery			
Glass	Dunnage			
Food				

State and Local Regulations May Further Restrict the Disposal of Garbage

INSTALL IN COMPANIONWAY

- THE ENGINE MUST BE ALIGNED TO THE SHAFT WITHIN .003".
- THIS COUPLING WAS ATTACHED TO THE SHAFT AT THE FACTORY.
- THIS SHAFT IS DIMPLED FOR THE SET SCREWS. THE SET SCREWS ARE SAFETY WIRED TO PREVENT THEM FROM BACKING OUT.
- IF THE SAFETY WIRE IS BROKEN OR IS REMOVED, THE ENGAGEMENT OF THE SET SCREWS MUST BE VERIFIED AND THE SAFETY WIRE SECURED BEFORE OPERATION.

INSTALL ON SHAFT COUPLING AFTER POOL TEST.

WARNING

THESE TIE RODS SUPPORT THE MAST. THE LOCKING NUTS AT THE BOTTOM END MUST BE TIGHT AGAINST THE BEARING SURFACE. CHECK THE LOCKING NUTS, CLEVIS PINS AND COTTER PINS IN THIS ASSEMBLY BEFORE STEPPING THE MAST TO VERIFY THAT NO COMPONENTS HAVE LOOSENED DURING TRANSPORTATION
THIS BOAT HAS_____TIE RODS.

INSTALL ON ONE CHAIN ROD ONLY

DISCHARGE OF OIL PROHIBITED

THE FEDERAL WATER POLLUTION CONTROL ACT PROHIBITS THE DISCHARGE OF OIL OR OILY WASTE INTO OR UPON THE NAVIGABLE WATERS AND CONTIGUOUS ZONE OF THE UNITED STATES, IF SUCH DISCHARGE CAUSES A FILM OR SHEEN UPON, OR DISCOLORATION OF, THE SURFACE OF THE WATER, OR CAUSES A SLUDGE OR EMULSION BENEATH THE SURFACE OF THE WATER. VIOLATORS ARE SUBJECT TO A PENALTY OF $5,000.

INSTALL ON ENGINE COVER.

1. WHAT ARE SOME OF THE CHARACTERISTICS OF A MARINE BATTERY THAT MAKE IT DIFFERENT THAN AN AUTOMOBILE BATTERY?

Deep cycle batteries typically feature thick plates with a high density active material. The thick plates allow for reserve energy to be stored deep within the plate which is released during a typical slow discharge such as trolling or electronic instrument usage. The high density active material remains within the plate/grid structure longer resisting the normal degradation found in cycling conditions. Automotive batteries typically feature thin plates with low density active material. These batteries are designed to release a large amount of energy within a few seconds to provide engine starting. The low density active material plates are easily shedded away when exposed to deep cycling conditions.

2. WHAT ARE SOME OF THE COMMON MISTAKES PEOPLE MAKE WITH REGARDS TO MARINE BATTERY CARE?

The ultimate service life and capacity your batteries will deliver is in direct relationship to how and when you recharge your battery. First, prior to recharge, check the electrolyte levels in each cell. Carefully remove the vent caps and insure that the level is approximately 1/4" +/- 1/8" below the filler tube on the inside of the cover. Too low of a level will reduce the capacity of the battery and may inhibit proper recharge. Too high of a level may lead to the spilling of electrolyte through the vent caps. If you need to add water to the battery, distilled water is your best choice. You may get by with tap water, but the impurities such as iron, chlorine, etc. may reduce the service life substantially.

Charging the battery can be performed using a wide variety of 12 volt chargers, but generally a charger with a 10 or 12 Amp rating will allow you to recharge the battery overnight. Also, a charger with a deep cycle charge mode switch will allow you to increase the voltage slightly providing a more complete recharge. Charging the totally sealed maintenance free type batteries can be a bit complex. The manufacturers of these sealed batteries usually provide their own tailored method of recharging and recommend the chargers best suited for the job.

Recharging should only be performed in a well ventilated area since lead acid batteries produce an explosive hydrogen oxygen gas mixture which is especially prevalent during the recharge period.

Recharge your battery as soon as possible after you are through using it. The most detrimental time for the internal components of the battery is when the weaker electrolyte is exposed to the battery's plates. The corrosive effect of the electrolyte is much greater on the battery components at this state-of-charge.

EXIDE

3. HOW DO YOU DETERMINE THE CONDITION OR STATE-OF-CHARGE OF YOUR DEEP CYCLE BATTERY?

Prior to using or storing your deep cycle battery, the available capacity or state-of-charge should be checked. There are two methods of determining state-of-charge. The best method is by using a hydrometer. The hydrometer will show you the level of capacity better than any method short of a controlled laboratory time vs. discharge current test. A fully charged flooded electrolyte deep cycle battery will have a specific gravity range of 1.265 to 1.280. Hydrometers are available in various configurations, but the graduated float models provide the most accurate readings. The other method of determining state-of-charge is with a voltmeter. A fully charged lead-acid battery will have a voltage of 12.6 volts across the terminals. This voltage value is based on there being no discharge drain on the battery or leftover surface charge. If the battery is being discharged during the voltage check, chances are that you will read a much lower voltage than is actually available. On the other hand, during charging or up to 24 hours after charging, the surface charge affect will provide much higher voltage readings than the full charge volts of 12.6. If you are checking a sealed battery, you obviously will have to accept the voltage as your only indicator for state-of-charge.

The use of a voltmeter along with a hydrometer will provide you with all the information you should ever need about your battery's state-of-charge.

4. HOW LONG SHOULD A CONSUMER EXPECT TO RECEIVE MAXIMUM PERFORMANCE OUT OF DEEP CYCLE BATTERY?

The maximum performance and service life will be determined by maintenance, recharging and obviously the amount of usage. Batteries that are rated in cycle life should deliver that number of cycles. Cycles are defined, as one complete discharge and recharge. If your daily usage requirements are met by the capacity of the battery, you can assume you will get one day of use for each cycle the battery is rated at. This may not apply if the battery is stored for a long period of time or not properly maintained.

5. WHAT SPECIAL FEATURES SHOULD A BUYER LOOK FOR WHEN PURCHASING A DEEP CYCLE BATTERY?

Obviously, you should look for a battery with sufficient capacity to operate all your electrical equipment. Most manufacturers of trolling motors and electronics will post an amp requirement to operate these items. Add up the amps required along with the approximate usage time to determine your battery needs. Larger boats usually have more than one battery and almost all these manufacturers recommend your battery capacity requirements.

6. SHOULD A BUYER BE CAUTIOUS WHEN PURCHASING A DEEP CYCLE BATTERY AND IF SO, WHAT SPECIFICALLY SHOULD HE OR SHE WATCH OUT FOR?

Look for batteries with brands you are familiar with and make sure you are getting a true deep cycle and not an automotive battery. This can be difficult to determine, but a smart consumer will generally ask for a recommendation from a reputable dealer or manufacturer.

7. WHAT HAPPENS WHEN YOU "OVER-CHARGE" A DEEP CYCLE BATTERY?

Overcharging a battery occurs when the total capacity removed has been replaced by recharging and the battery remains on charge. This overcharging creates excessive heat which can cause the plates within the cells to buckle and shed their active material. Also, the battery will react to the overcharge by producing an excessive amount of hydrogen and oxygen gas. These gasses are the result of the breakdown of the water molecules within the electrolyte. The water that has been displaced by overcharging can be replaced in a serviceable (non-sealed) battery but in the maintenance free sealed batteries permanent capacity loss will result .

8. WHAT ARE YOUR RECOMMENDATIONS FOR BATTERY STORAGE OVER THE WINTER?

When storing the battery for any length of time, insure that it is at a full state-of-charge with the electrolyte levels properly adjusted. Store the battery in a cool place out of the reach of children and pets. A battery box is ideal for storage.

9. DEEP CYCLE BATTERIES ARE DIFFERENT THAN AUTOMOTIVE TYPE BATTERIES

Deep Cycle Batteries are used to power trolling motors or lights in a camper or a stereo in a van, and are designed differently than the battery you use to start your car.

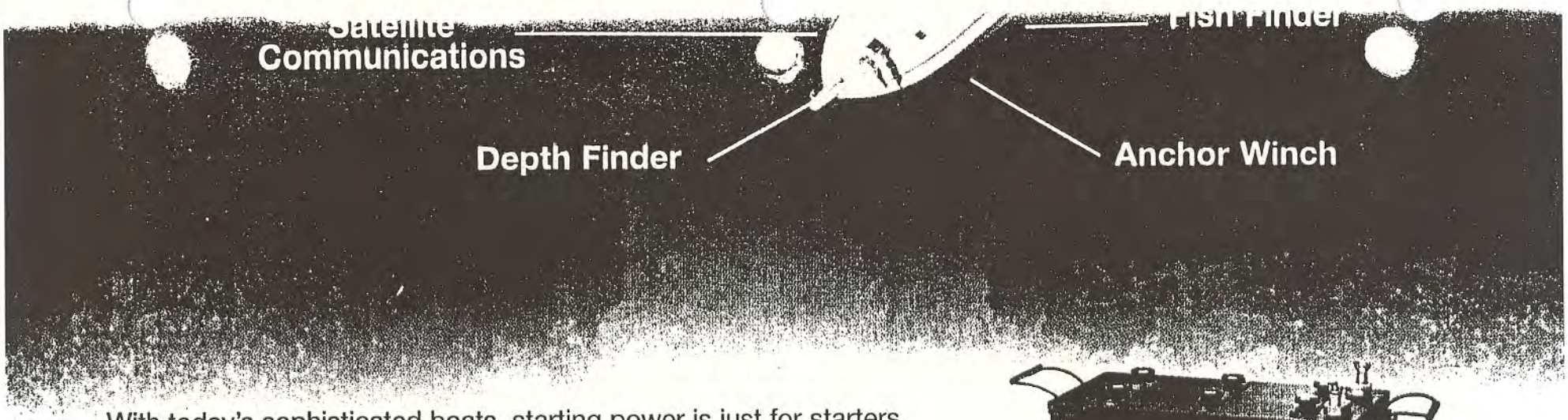
That Automotive battery in your car is only asked to deliver short bursts of energy and then the alternator takes over, providing the electricity to run the car and recharge the slightly discharged battery.

A marine battery/RV deep cycle, on the other hand, is asked to go through many deep discharges. Often, the battery is drained to nearly zero before it is recharged. This is called "deep cycling".

Deep Cycle batteries are specially designed to withstand hundreds of deep discharges. Even the best automotive type batteries won't last for more than about 75 deep cycles and of those, only the first 15 or so will recharge to a full 100%.

A marine starting battery functions in a manner similar to an automotive battery however it is specially engineered to stand up to wave pounding and engine vibration.

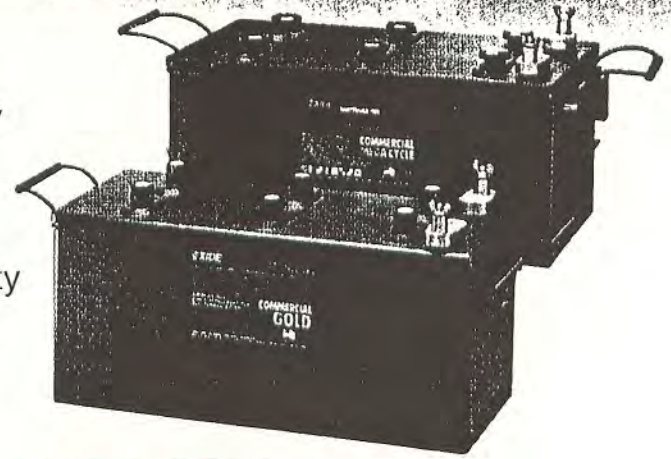
A thermal bond is used to seal the cover to the container for virtually leak-proof safety



With today's sophisticated boats, starting power is just for starters. Because all those optional, on-board accessories demand a battery with dependable, deep cycling reserve power.

With engineering innovations like glass mat separators, Pack-Tite™ construction and sealed "Gel Cell" technology, Exide Nautilus® has set a new standard of performance and reliability in the harshest of marine environments.

Why risk a power failure? Look for the full line of Exide Nautilus batteries at marinas and retail stores nationwide.



EXIDE® NAUTILUS®

America's Number One Brand of Marine Batteries

For the retailer nearest you call 1-800-542-1261. Or find us on the Internet: http://www.exideworld.com/

Exide Nautilus batteries are available at these following locations:

Academy Stores
Al's Auto Supply
Big A Auto Parts
Big Wheel/Rossi
BJ's Wholesale Club
Boat Owner's Warehouse
Boater's World
Cenex
Central Tractor Farm & Fleet
Champion Auto Stores
Checker Stores
Eastern Marine
Firestone
Forest City Auto Parts
Grand Auto Supply
Grandpa's
Hi/LO Auto Supply
John A. Biewer - Sporting Goods Distributor
Kmart
Kragen
Meijer Stores
Morgan Recreational Supply
Overton's
Pamida
Quality Farm & Fleet
Schuck's
Strauss Discount Auto
True Value Hardware Stores
Vita Plate Distributors
Exide Sales Branches - Coast to Coast
And hundreds of other stores and marinas nationwide.

1-800-542-1261

Night vision, running, strobe, & cabin lights.

my ship my castle

Background information for your safety at night/restricted visibility.

VISIBLE RADIATION (Light)

The incandescent - filament lamp common in home, car and boat is a 'Thermal radiator' emitting electromagnetic-energy. Only a small part of this energy is 'seen' by the eye as light.

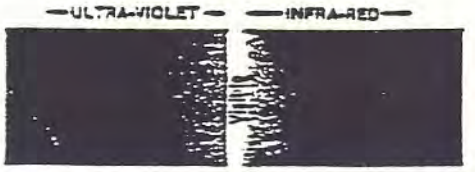


fig 1. The 'Optical' Spectrum

So called as the energy of the wave lengths obey the optical laws of reflection and refraction.

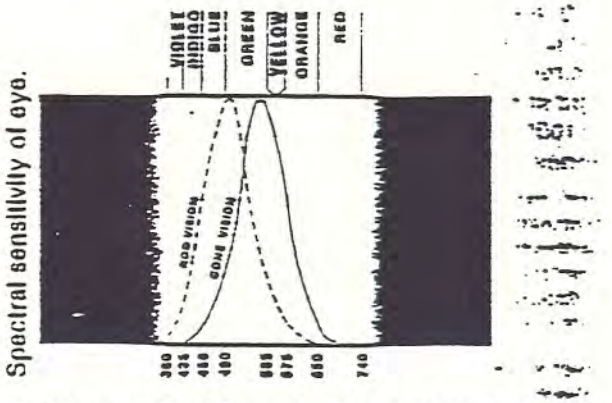


fig 2. The part of the 'Optical Spectrum' that can be 'seen' by the human eye.

EFFICIENCY OF LIGHT SOURCE

It is by heating a tungsten filament in a vacuum in excess of 1000° Kelvin (°K = °C + 273) that it becomes 'incandescent' i.e. it emits visible radiation. As the filament temperature is increased not only does the visible light become brighter but the color shifts to shorter wave lengths as the filament progresses from 'red' hot to 'white' hot.

The ratio of power radiated as a visible or luminous source as against the total power used in heating the filament is expressed as 'mean spherical candlepower per watt' (CPW) of electricity used. To convert CPW to lumens per watt multiply by 4 π (12.57).

It is possible to increase the lumens per watt by replacing the vacuum with an inert gas like halogen which allows the filament to be heated to a higher temperature and therebye emit more lumens per watt of electricity. This has to be traded against the higher cost of a halogen lamp coupled with its shorter life. The same and sometimes greater efficiency can be obtained by the use of 'optical' enhancement without the cost trade off disadvantages of Halogen and this is covered in the section on running lights.

DAY AND NIGHT VISION

The retina at the back of the eye is composed of 'cones' and 'rods'. The cones distinguish color and are mainly concentrated in the center, the reason your eyes are 'scanning' these lines in order to read. Rods are distributed across the retina; they cannot distinguish color.

An iris at the front of the eye acts as a variable disphram, small for bright light, wide open in low light. The cones are used and can respond within minutes to changes in light intensity down to the equivalent of moonlight. With the iris fully open and illumination below that of a full moon, the rods are used. Their response is slow, their initial sensitivity improves 1,000 times after ten minutes and one million times for full dark adaption/night vision after thirty or forty minutes. This dark adaption can be maintained by illuminating control panels and cabin interiors by low level 'red' light, as the cones are less sensitive to red light and have a quick recovery time and the rods are not sensitive to red and therebye keep their dark adaption. Fig 2. See also section on cabin lighting.

PREVENTION OF COLLISIONS

Vessels 'underway' (i.e. not anchored, aground or moored to shore).

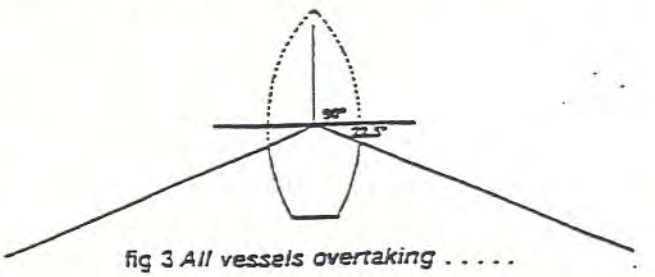


fig 3 *All vessels overtaking . . . . .*

. . . . . any vessel overtaking any other shall keep out of the way of the vessel being overtaken. Rule 13(a)

A vessel shall be deemed to be overtaking when coming up with another vessel from a direction more than 22.5° abaft her beam.

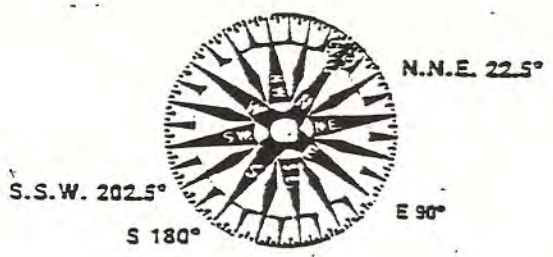


fig. 10: Green sidelight bearing NNE or 22.5°, reciprocal is SSW or 202.5°, deduct 10 points or 112.5°. The other vessels course lays between due East (90°) and SSW (202.5°). This coupled with knowledge of our own course can be useful, particularly when the other vessel may have 'privilege' as a 'stand-on' vessel. See Rules 9, 10 & 18.

MINIMUM VISIBILITY IN NAUTICAL MILES

Vessel length	less than 39.4' (12m)	39.4' - 65.7'	65.7' - 164.1'	over 164.1' (50m)
Masthead	2 n.m.	3 n.m.	5 n.m.	6 n.m.
Sidelight	1 n.m.	2 n.m.	2 n.m.	3 n.m.
Sternlight	2 n.m.	2 n.m.	2 n.m.	3 n.m.
360° light	2 n.m.	2 n.m.	2 n.m.	3 n.m.

Note: Rule 22 only specifies *minimum* visibility for each size vessel, an owner may well opt to exhibit the minimum for the next vessel size up.

HORIZONTAL SECTOR CUT-OFF

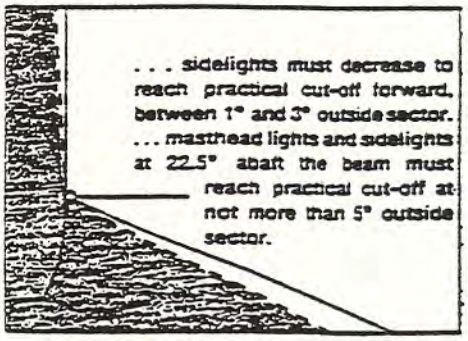


fig 11: Sidelights

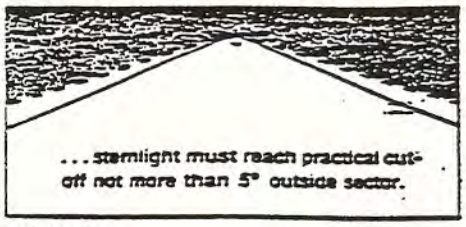


fig 12: Sternlight

VERTICAL SECTORS

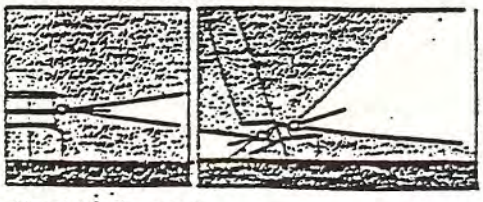


fig 13: Vertical Sectors

...T-FILAMENT LAMP PROPERTIES

Arc discharge i.e. fluorescent or H.I.D. is not practical in Nav. Lights and oil lamps cannot meet the visibility requirements. The only light source is the tungsten-filament bulb. The cheapest bulbs are those made by the millions for the automobile industry. Unfortunately as the lamp manufacturers themselves stress, the placing of the filament with respect to the socket cannot be controlled in economical large-scale production. And without the filament being positioned in the center of the bulb, it will not be in the focal point of the running light to meet the cut-off requirements or to take advantage of optical magnification. The five auto-type bulbs below (taken from eleven bought over the counter) show how varied the filament position can be.

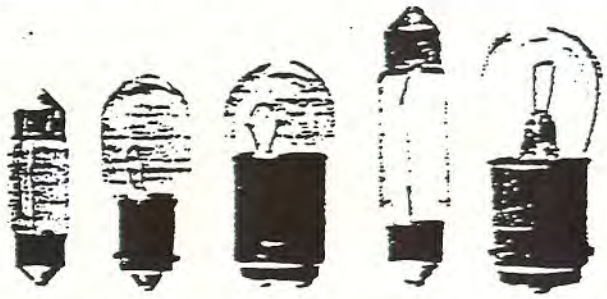


fig: 14 Five auto-type bulbs.

Additional problems come with bulbs with filament supports that 'block' light and bulb brightness dependent on automobile type operation.

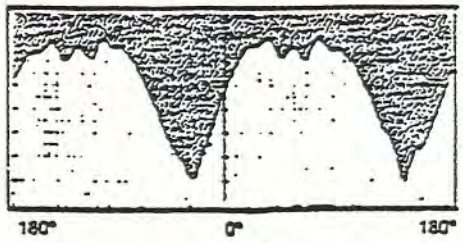


fig 15: Blockage of light by filament arms of a #1004 bulb (extreme right fig 14).

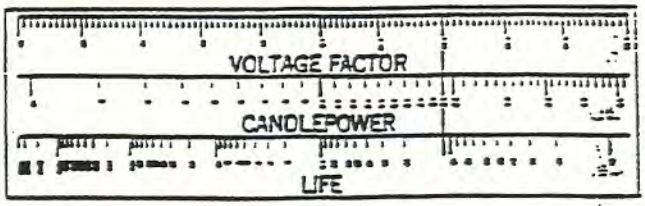


fig 16: Voltage/Candlepower/life

More than you may expect a decrease below the design voltage decreases light output (and extends life) just as an increase shortens life but increases light, i.e. a #90 lamp, third from left fig: 14 is rated 6 cd. at 13 volts, at 12 v. a drop of only 7.7% will lose 25% of its intensity. In auto use this is not important but at sea it can be critical for safety of vessel and crew.

0.9 cd	1 n.m.
4.3 cd	2 n.m.
12.0 cd	3 n.m.
27.0 cd	4 n.m.
52.0 cd	5 n.m.
94.0 cd	6 n.m.

fig 17: Candelpower required/nautical miles.

These figures are for 'white' light. Red or green, which forms only 20-22% of white, can require in excess of 4.5 cd for 1 n.m., 32 cd for 2 n.m. and 70 cd for 3 n.m.

QUEST FOR LIGHT SOURCE EFFICIENCY

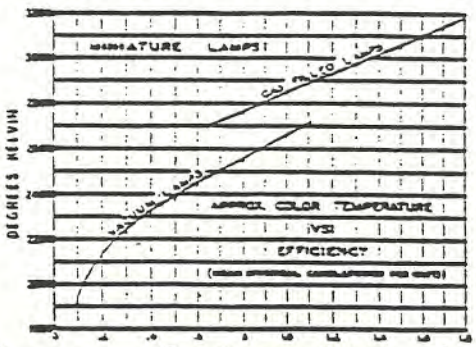


fig 18: Candlepower/Watt

The ratio of visible radiation to non-visible can be improved by having an inert gas in place of a vucuum, see 'Efficiency' page 1, but such lamps (Quartz-Halogen) cannot be 'optically' enhanced in a Nav. Light while a vacuum lamp designed for Nav. Light use can i.e. an AQUA-SIGNAL TRI-COLOR fixture has an enhancement factor of 1.3. It's lamp at 2700° K gives 1.1 CP/Watt (see fig: 18), 1.1 CP/W x 1.3 = 1.43 CP/W a total of 36 cd (1.43 x 25 watts), in practice 32-36 cd. In comparison, a Q-H, at 3200 K, should give 1.8 CP/W, a total of 36 cd (1.8 x 20 watts) but in practice yields 28-36 cd and in a TRI-COLOR may not 'reach' 2 n.m. in color (required by vessels 39.4' - 65.7'). It also has 33% higher cost and 33% shorter life.

APPROVALS: VESSELS UNDER U.S. FLAG

USCG approval on Nav. Lights meeting 72 COLREGS (termed USCG Acceptance) has been restricted to vessels over 65.7' (20m). Fixtures for vessels under 65.7' cannot obtain USCG Acceptance but only a voluntary industry 'acceptance' which differs from 72 COLREGS in defining 'practical cut-off'. i.e. Practical cut-off (see fig: 11 & 12) is held by other nations to be 10% of intensity and this has to be met within 1-3° forward or 5° abaft the beam. The industry standard has a different definition and does not require 10% until 20° beyond the sector, either forward or abaft the beam. At a September 1981 Marine Trade Convention in Chicago, a USCG spokeman on being asked by a leading boat building how he could be sure of fitting 72 COLREGS lights (on boats under 65') was told, 'fit those with a foreign government approval'.

AQUA-SIGNAL APPROVALS: 72 COLREGS -IMCO

Write for detailed listing showing model number/restrictions/ vessel size, etc.

U.S.A. (U.S.C.G. Acceptance)	Norway (N.M.D.)
Gt. Britain (D.o.T.)	Denmark (N.P.)
Canada (D.o.T.)	Poland (P.R.S.)
South Africa (D.o.T.)	Russia (Reg. of S)
Germany (D.H.I.)	Sweden (S.V.)
Netherlands (K.N.M.I.)	Belgium (B.Z.)
France (M.N.)	Iceland (S.R.)
Finland (M.K.H.)	Greece (M. of MN)
Italy (R.I.N.)	Australia (AAPMA)

STROBE LIGHTS

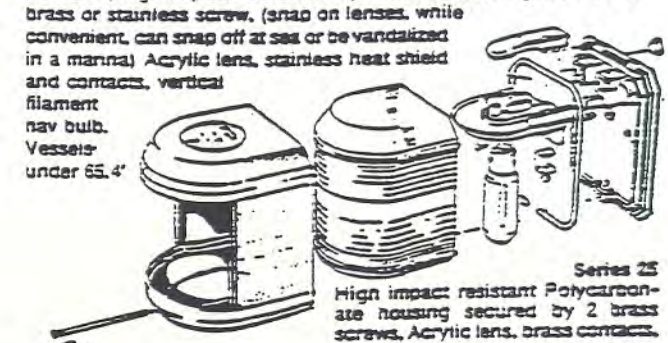
A frequency of 50-70 flashes per minute (strobe on lifejacket/liferaft, etc) is a distress signal and this frequency used for other purposes is not only unlawful under Inland Nav Act 1980 but could cause peak may only result in 5 n.m., compare to fig. 17.

CABIN LIGHTS

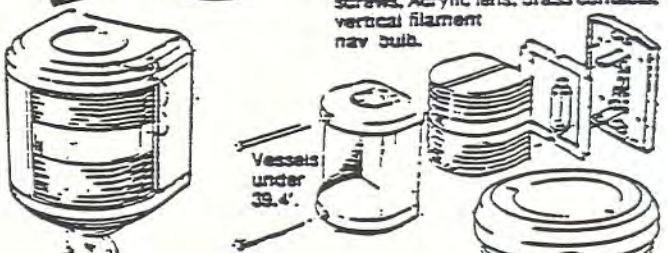
'Eye' adaption to full night vision takes 30-40 minutes and is maintained for helmsman and look-outs by screening lights in wheelhouse, etc. to show only 'red' light, to which the 'rods' are not sensitive and the 'cones' quickly adjust from, see page 1. For chart table use where red is impractical (some chart color detail cannot be seen) Federal Aviation testing has shown that a greatly dimmed white light will also maintain night vision.

AQUA-SIGNAL FIXTURES

Series 41, high impact resistant Polycarbonate housing secured by brass or stainless screw, (snap on lenses, while convenient, can snap off at sea or be vandalized in a marina) Acrylic lens, stainless heat shield and contacts, vertical filament nav bulb. Vessels under 65.4'



Series 25 High impact resistant Polycarbonate housing secured by 2 brass screws, Acrylic lens, brass contacts, vertical filament nav bulb.



Vessels under 39.4'.

Series 40, high impact resistant polycarbonate housing, Acrylic lens, stainless screens, brass contacts, vertical filament nav bulb. Vessels under 65.4'.

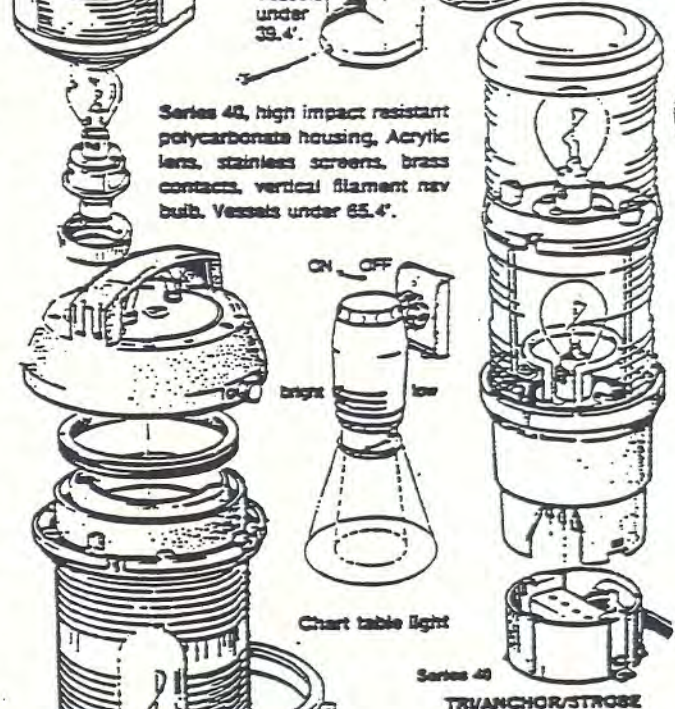


Chart table light

Series 70, high impact resistant Polycarbonate housing. For commercial vessels of unlimited length.

Series 40 TRI/ANCHOR/STROBE with 25-30 beam rate. Note strobe tube does not obstruct lower anchor light bulb and lens is prismatic to take light 'around' support columns. TRI-COLOR/ ANCHOR 2 n. miles STROBE 19 n. miles

AQUA-SIGNAL Series 50, 55 & 700 Nav Lights, Deck & Cabin lights - fluorescent, H.I.D. and incandescant not shown.

BROWNING MARINE INC
1W480 Fabyan Pkwy. #105
West Chicago, IL 60185

CERTIFICATE

of the electrically operated ships lantern

AQUA SIGNAL 25

for Sailing or Powerdriven vessels of less than 12 meters (39.4 ft) in length.

Combined sidelights Lantern

Bulb: 12v/10w Volt/Watt Minimum Visibility(k=0.8): 1 nm

Manufacturer: AHLEMANN + SCHLATTER . D-2800 BREMEN 44 . GERMANY

APPROVED IN THE FOLLOWING COUNTRIES

U.S.A. (U.S.C.G.)	GT. BRITAIN (D.O.T.)
CANADA (D.O.T.)	AUSTRALIA (AAPMA)
NETHERLANDS (KNMI)	FRANCE (M.M.)
FINLAND * (M.K.H.)	NORWAY * (N.M.D.)
DENMARK * (N.P.)	SWEDEN * (S.V.)
ICELAND * (S.R.)	POLAND (P.R.S.)
ITALY (RINO)	BELGIUM (B.Z.I.)
SOUTH AFRICA (D.O.T.)	U.S.S.R. (R.O.S.)
GREECE (MDMM)	NEW ZEALAND (M.O.T.)
ARGENTINE (P.N.A.)	

* less than 7m (23 ft.) in length for these countries.

BULB TO BE USED

In case of difficulty for replacement bulbs contact (312) 232-6425 or TLX 910 230 3110

The lantern is manufactured in compliance with the international regulations for preventing collisions at sea 1972 (IMCO 72).

This certificate becomes invalid when a bulb other than indicated above or a lens of different properties is used.

10/25/91

IMPORTANT NOTICE
WASTE STORAGE AND DISPOSAL

In order to preserve our Marine Environment and to comply with the MARPOL V Treaty tenants, which are enforced by the U.S.C.G. as well as other marine regulatory and policing agencies, Catalina Yachts reminds you that your boat must have the following on board. All boats 25 feet and larger must:

1. Display in a prominent place the MARPOL Treaty placard. All Catalina's, Capri's and Morgan's built after 5/1/91 have placards which meet MARPOL standards installed at the factory. Should you need a replacement or have a boat built before 5/1/91, placards are available through Catalina Parts Department. You are required to read, understand and educate your crew and passengers of these regulations.

2. All boats 42 feet and larger must display the MARPOL placard described above and have a written waste management plan aboard. A typical waste management plan follows. This is a waste plan model only. You may fill it out and use it if it suits your conditions or amend or modify as required. You may be asked to produce your waste management plan if boarded by the U.S.C.G. so please take the time to complete, modify or draft a plan as required and keep it aboard your boat.

WASTE MANAGEMENT PLAN

Vessel Name: _____

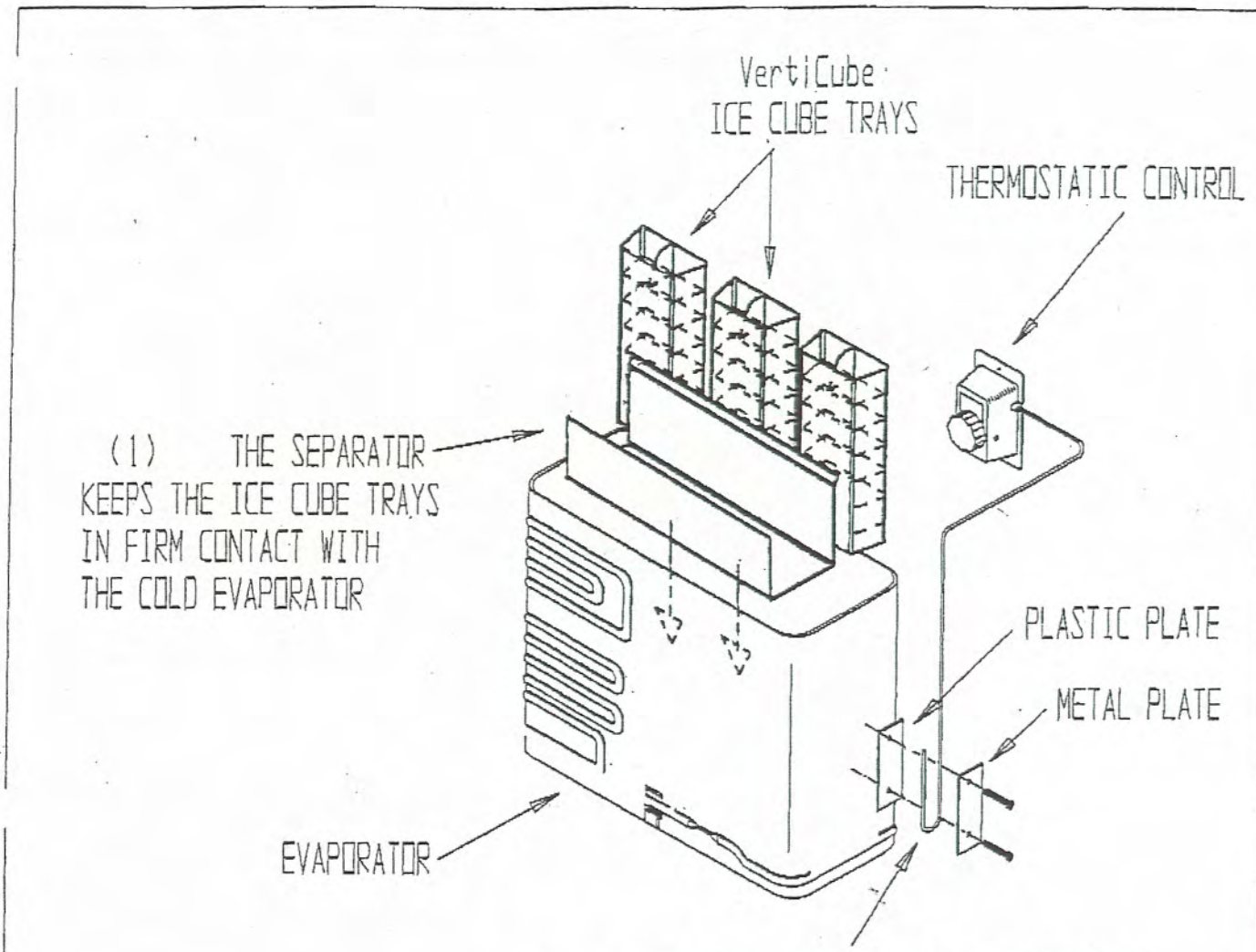
Person in Charge: _____

Solid waste management procedures:

If the vessel is outside of 12 miles from shore:
All the garbage with the exception of food materials and paper is put in a garbage bag to be hauled to the dockside trash receptacle at trip's end. Food materials and paper generated in the galley are collected in a bucket (or in a paper bag or cardboard box) and the bucket emptied over the side (or the food filled bag or box is thrown overboard) by a crew member.

If the vessel is within 12 miles of shore or returning to shore:
All refuse materials are put in a garbage bag and at the end of the trip are hauled up to the dockside trash receptacle by the deck hand.

Crew education: At the beginning of each season all crew members are reminded of the refuse discharge laws and shown the MARPOL V placard posted in the galley. Crew is told that it is vessel policy to stow all garbage materials on board except for food and paper when the vessel is outside of 12 miles. The captain orients all new crew and passengers to the rules governing the vessel including refuse laws and refuse handling.



(1) USING THE ICE TRAY SEPARATOR

(2) FORMING AND ATTACHING THE THERMOSTAT SENSING TUBE TO THE EVAPORATOR

INTERNATIONAL MARINE CERTIFICATION INSTITUTE

Rond Point Schuman 6, Box 8
B - 1040 BRUXELLES
BELGIQUE
tel: (32) 2-238-7892
fax: (32) 2-238-7700

CERTIFICATE

We hereby certify that the following boat type

Catalina Yachts, Inc.

CATALINA 400

Boat type:	Sail
Boat design category:	A
Module:	B + C
Type-Examination:	EC
Length of hull [m]:	12,34
Beam of hull [m]:	4,11
Loaded displacement mass [kg]:	11.672
Maximum rated engine power [kW]:	32
Number of persons recommended:	10
Recommended load [kg]:	1.054
Certificate Number:	CATAL009

meets the requirements of the EC Directive 94/25/EC
for Recreational Craft

Lars E. Granholm (Managing Director)
EU - Notified Body: 0609
08-Oct-1999

This certificate is valid for boats identified by the HIN as a 2000 model

INTERNATIONAL MARINE CERTIFICATION INSTITUTE

Trèves Centre, Rue de Trèves 45
B - 1040 BRUXELLES
BELGIQUE
tel: +32 (0) 2-238-7892
fax: +32 (0) 2-238-7700

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Beam of hull [m]:	**4.11**
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Maximum rated engine power [kW]:	**32**
Number of persons recommended:	**10**
Recommended load [kg]:	**1,054**
Certificate Number:	**CATAL009**

meets the requirements of the EC Directive 94/25/EC for Recreational Craft

Lars E. Granholm (Managing Director)
EU - Notified Body: 0609
21/6/1998

This certificate is valid for boats identified by the HIN as a 1999 model

INTERNATIONAL MARINE CERTIFICATION INSTITUTE

Trèves Centre, Rue de Trèves 45
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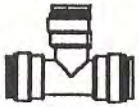
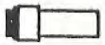
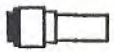
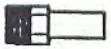
Number of persons recommended:	**10**
Recommended load [kg]:	**1,054**
Certificate Number:	**CATAL009**

meets the requirements of the EC Directive 94/25/EC for Recreational Craft

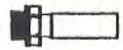
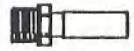
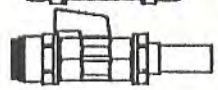
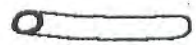
Lars E. Granholm (Managing Director)
EU - Notified Body: 0609
5-Jun-98

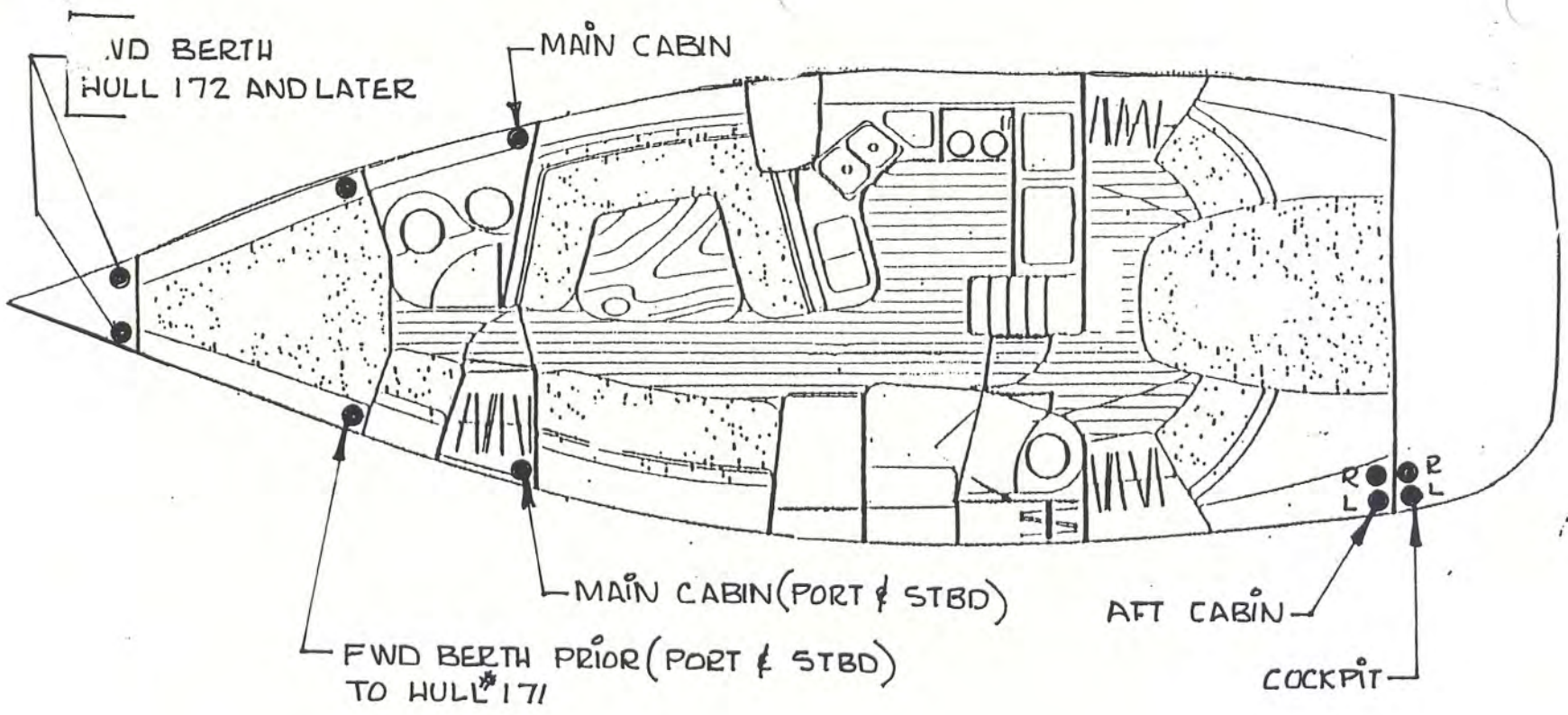
This certificate is valid for boats identified by the HIN as a 1998 model

WHALE SYSTEM-15 FITTINGS

BULK QTY.			
50		EQUAL TEE 15 mm	WS 1502B
100		EQUAL ELBOW 15 mm	WS 1503B
100		EQUAL STRAIGHT 15 mm	WS 1504B
250		END PLUG 15 mm	WS 1508B
200		STEM REDUCER 15 mm-10 mm	WS 1510B
100		ADAPTOR 11 mm-15 mm	WS 1511B
100		STEM REDUCER 15 mm-12 mm	WS 1512B
150		STRAIGHT ADAPTOR MALE 1/2"BSP-15 mm	WS 1514B
150		TAP TAIL ADAPTOR ASSY 15 mm	WS 1515B
10		STRAIGHT ADAPTOR MALE 3/4"BSP-15 mm	WS 1516B
1000		COLLET CLIP 15 mm	WS 1518B
100		STEM ELBOW 15 mm	WS 1522B
100		STEM ADAPTOR MALE 1/2"NPT-15 mm	WS 1524B
100		ADAPTOR FEMALE 1/2"BSP-15 mm	WS 1532B
100		STEM NRV ADAPTOR MALE 1/2"NPT-15 mm	WS 1534B
100		ADAPTOR ASSY 3/8"F- 15 mm	WS 1538B

WHALE SYSTEM-15 FITTINGS

BULK QTY.			
100		ADAPTOR FEMALE 3/4"BSP-15 mm	WS 1542B
100		TUBE-HOSE CONNECTOR 15 mm-1-2"	WS 1544B
200		END STOP 15 mm	WS 1546B
80		SERVICE VALVE 15 mm	WS 1550B
150		STEM ADAPTOR MALE 3/8"BSP-15 mm	WS 1563B
150		STEM ADAPTOR MALE 1/2"BSP-15 mm	WS 1564B
500		MOUNTING CLIP 15 mm	WS 1565B
150		TANK FITTING ASSY 15 mm	WS 1566B
20		SHUT-OFF VALVE 15 mm	WS 1574B
20		STEM SHUT-OFF VALVE 15 mm	WS 1576B
50		CHECK VALVE 15 mm	WS 1582B
400		COLLET COVER 15 mm	WS 1590B
500		RELEASE AID 15 mm	WS 1592B
50m		TUBE 15 mm X 11 mm BLUE	WS 7152
50m		TUBE 15 mm X 11 mm RED	WS 7154
10		TUBE CUTTERS HEAVY DUTY	WS 7950



● = 24" COIL DROPS
R = RIGHT SPEAKER
L = LEFT SPEAKER

CATALINA 400
STERO SPEAKER WIRE
DROPS FOR SPEAKERS

7-13-99

Customer Maintenance

General:

Batteries:

Check water level often. In summer at least every 30 days.

Only fill with Distilled Water.

Check for Corrosion on terminals

Check Terminals for tightness

- ON **BENETEAUS** Note: DO NOT TURN BATTERY NEG SWITCH TO OFF POSITION WITH ENGINE OR GENERATOR RUNNING.
- Note: DO NOT TURN POSITIVE BATTERY SWITCHES TO OFF AT THE SAME TIME WITH THE ENGINE OR GENERATOR RUNNING.

Bilge:

Check Bilge for water. Note: some boats have the AC condensate drain into bilge.

Pump bilge every time you come to boat.

Check Auto Float switch for operation by raising float and listening for pump to come on.

Check manual Bilge pump for proper operation frequently

Stuffing Box:

Check for unusual leaks. Non-Drip less type (Conventional) Packing Gland should not drip when shaft is not turning. Should drip once every 5 to 10 seconds when shaft is turning.

Drip less type packing Gland should not drip at all.

On Beneteaus make sure thru hull valve that feeds water to the Shaft Log is OPEN before running engine. Periodically remove hose from shaft log to check for good water flow.

Compass Adjustor:

Sea Lake Yacht Sales does not adjust compasses. If you wish to have this done call:

Rick Jones
GSI Marine
281-542-6000 or 1-800-685-9373

Engine Compartment:

Check Tension on Belts monthly. Look for excessive black rubber dust in engine compartment
Check Engine Oil Level
Check Engine Coolant level.
Check Engine water intake thru hull for operation. Make sure it is open before running the engine.
Check Engine water intake strainer to make sure it is clear. This should be done more often in the spring when the water gets low and muddy.
Check Transmission Fluid level: Be sure and replenish with Proper fluid for transmission.

General:

Check all thru hulls for operation at least every 6 months.

Check all hose clamps for tightness at least once a year.

DO NOT PUT BLEACH or any harsh cleaners in the head, as it will destroy the rubber valves.

Only, clean heads with specific cleaners that are made for Marine Toilets.

Maritime Sanitation (281-334-7383) is good source for getting Holding Tanks pumped. It is important to note that overfilling the holding tank and continued pumping can cause leaks. Leaks, caused from this are not covered under warranty.

Rigging:

Check all standing rigging for proper tension. Make sure all cotter pins are in place.

At least once a year:

1. Have the rigging aloft checked for cracks and chafe
2. Inspect masthead sheaves for wear.
3. Inspect all halyards for chafe and wear.
4. Roller furling headsails should be removed from head stay and inspected for wear.
5. Roller furling mains should be removed from Mast and inspected for wear.
   - typical wear points are the head, tack, and clew connections and points that might rub on mast spreaders.
6. Check Genoa lead blocks for wear. Lubricate lock pins on the lead blocks at least once a year.

Steering:

Tension on steering cables should be checked once a year or before any major offshore trip. ¼ to ½" of vertical play is about the proper tension for cables. Too tight will only wear out the sheaves and bushing.

Steering sheaves should be lubricated every couple of years depending upon use of boat.

LPG Stove:

At least once a year remove LPG tanks and have checked by Professional for corrosion.
Use soapy water to check all connections for leaks
DO NOT check for leaks with an open flame.

Anchor:

Check anchor rode for wear.
Check chain to rope splice for excessive wear at least once a year or sooner if anchoring frequently.

Sail Boat Winches:

Winches should be washed off with fresh water after every days sailing.
Once a year winches should be broken down and lubricated with Winch Grease. Consult winch manufacture's manual on this procedure.

Electronics:

Instruments should have salt washed off after use.
Knot Meter removable plugs and speed sensors should have O-rings lubricated with a small amount of Vaseline once a year.

General Hull Maintenance:

Gel coat should be waxed or polished at least once a year.
Stainless steel fittings should be washed frequently. If surface has rust spots present, use some type of stainless Cleaner.
Stainless Steel should not be WAXED. Polish is ok.

Plexiglas:

Clean only with soap and water. Best to use distilled water and a few drops of dishwashing liquid. **DO NOT USE HOUSEHOLD WINDOW CLEANER ON PLEXIGLASS.**

INTERIOR WOOD SURFACES:

Household furniture Polish is ok Pledge with Lemon oil works quite well. Nicks and Scratches some times can be removed using furniture touch up kits available at HOME DEPOT and other Home Improvement Centers.

Bottom:

Boats coated with Interlux Ultra with BioLux should not be hard scrubbed or pressure washed. If cleaning is desired only a sponge or soft towel should be used. Other bottom paints should only be cleaned lightly. On new boats it is very easy to remove the paint to the gel coat with a scotch brite pad.

Engine:

Periodic running of the engine is good. Put engine in gear while running. Diesel engine like to be under a load. This also helps clean the prop.

It is a good idea to have a diver check the prop for baracles at least every three months. At this time have the diver check the zinc on the shaft or prop also. In Clear Lake it is not uncommon for zincs to be gone or badly deteriorated in 3 months. At HYC will probably last 6 months or longer.

Warranty Issues:

Individual pieces of equipment have their own Warranties. These warranties vary, so please read each warranty statement carefully. Sealake will aid in affecting the manufacturers warranty to the extent of the coverage. But understand some things are not covered such as shipping, when returning a defective item back to the manufacturer. In some cases the labor to change out a part such as batteries and some electronics is not covered and is the responsibility of the owner.

Please Email all Warranty Issues to :

Receiving@sealakeyachts.com

This will go to Dorinda who will immediately add the items to our weekly Warranty Report.