CSY Guide to Buying a Yacht

by John R. Van Ost

Dwayne Longenbaugh

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INTRODUCTION

In this book we are going to go into a great deal of detail about how yachts are designed and built and equipped. We are calling this tome the "CSY Guide to Buying a Yacht". Ours may not be the last word on how a yacht should go together. However it is a point of view of a company, Caribbean Sailing Yachts, Ltd. and the CSY Yacht Corporation, with over twelve years of experience in designing, building and maintaining yachts in one of the toughest marine environments in the world — the tropics. These yachts are under charter all year round and sustain the equivalent of several years of use *every* year.

There are many ways of building a yacht. Too often the effort of the manufacturer is to cut costs by cutting down on the quality of equipment and the quality of construction. Thus, it is quite possible for two identical yachts in design to be built to cost 25-30 per cent less than a better built one — and only the practiced eye can tell the difference.

This book is designed to help you — the buyer — to become better informed so as to be able to better recognize what is good design, good construction and good equipment.

Unlike so much that we buy for use on land, the sea and its environment is not so forgiving, and what a manufacturer may cut back on in a yacht so you can pay less for it will cost you more year after year for years to come and can even endanger your life.

Because of the competition in the marketplace to cut costs by cheapening a boat, we, who are trying to build fine yachts, feel we have to educate the buyer to know what he is buying and how to recognize it.

To this end, this book is being written. To this end, we are inviting you to come to our plant so you can see for yourself, in each stage of construction, what quality yacht building is all about and why it is necessary. To this end, we have a film program which is available to you or your group, showing graphically in color and sound how a CSY Yacht is built. It is shown to everyone who goes through our plant.

The CSY Yacht Corporation was founded by and is completely backed by Caribbean Sailing Yachts, Ltd. (CSY, Ltd.) which is in its thirteenth year of operation, and is the largest chartering organization in the world with over 140 boats under charter at its three company-owned marina-hotels in the Grenadines, the British Virgin Islands and in the Bay Islands off the Coast of Honduras. CSY, Ltd. serves over 25,000 charterers per year. CSY, Ltd. is the best customer of the CSY Yacht Corporation and the years of experience of the founding organization in maintenance and design is going into this company's boats. (See "The Story of the Development of the Ideal Chartering Yacht" inside).

The CSY Yacht Corporation ranks among the five largest sailboat manufacturers in the United States. However, our purpose is to be number one as the builder of the finest production yachts in the entire country and at the same time through direct-from-the-factory sales offer the best value of any yacht manufacturer anywhere. Since we are privately owned we are free to set our own standards and not those of some conglomerate's cost accountants.

Only quality yachts hold their value and even appreciate. Thus, only quality yachts can give you true value for your dollar.

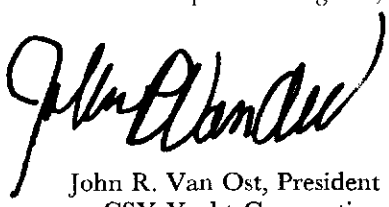
Whether or not you buy a CSY yacht, if this book makes you a more knowledgeable buyer, then our efforts in preparing it have been amply rewarded.

A yacht is a constantly evolving thing. Therefore, the details and specifications that are mentioned in the boat may have changed by the time you read them in this book. Only the latest literature which is available from the corporate headquarters in Tampa, (5250 West Tyson Ave., Tampa, FL 33611) can give you the details which are valid today.

We only sell our yachts direct from the factory. We are as near as your telephone. If you have any questions, don't hesitate to give us a call toll free at 800-237-2565 or call us collect at 813-839-5357 if you live in Florida or Canada. Our telephones are monitored 24 hours a day every day. We have a CSY Yacht advisor ready to answer your questions and to serve you.

We would appreciate hearing from you.

With kindest personal regards,



John R. Van Ost, President
CSY Yacht Corporation
Caribbean Sailing Yachts, Ltd.

CHAPTER I

The Objectives of Design

ONCE a plug is built and a mold made for a fiberglass boat — brother — that's it. Every part taken out of that mold thereafter is like every other one. It can only be changed in minor details without starting out from scratch and making new molds — a very, very expensive business. Thus, if the boat is ugly, if she sails like a pig, if parts don't fit together — the manufacturer is married to it and all the sales department can do is make excuses.

Therefore, it behooves the manufacturer to spend as much time and care as possible in the planning of a new model. In the case of CSY yachts, our input from our sister chartering company has given us a greater understanding as to what a cruising yacht should be than *any* manufacturer has ever had — backed by what tens of thousands of cruising sailors have been telling us.

With the sureness of that experience behind us, we went to our marine architect, Peter A. Schmitt, who has had fifteen years of experience working in the office of the late Bill Tripp, and laid out the parameters as follows:

1. A really good looking yacht.
2. A good sailing yacht — fast, seakindly, dry, stiff, easily single handed and above all, weatherly with superior to-windward performance.
3. Low maintenance and durable.
4. Comfortable and liveable.
5. Built-in convenience.
6. Outstanding storage.
7. The question of a walk-through or no walk through?

Planning — careful planning at the drawing board where corrections can be done with an eraser — is the most important step in the myriad steps in the evolution from an idea to the final product. So let us take these different objectives and discuss them one by one.

The Design — A Beauty Or A Beast?

All of us at CSY get the same feeling as you do when you come into a harbor and see one of those great all-time classics like Ticonderoga. What is it that makes your head turn and your breath become just a little bit short when a boat like that drifts around the corner of a harbor as she hoves into full view?

Truth and beauty are the same. To be beautiful, a thing has to be true to itself. Have you ever noticed that the really good-looking yachts, the timeless ones, are fast — and good sea boats as well? To achieve the classic beauty in a modern fiberglass yacht was one of our principal objectives in the design of the CSY yachts.

As inspiration for the design of the CSY yachts, Peter Schmitt reached way back to the genius and art of the design of L. Francis Herreshoff. These are proved designs that are recognized, and too often forgotten, to have those qualities that can only be called timeless. They are as beautiful today as they were forty years ago and they will remain as beautiful to look at for another forty years of tomorrows.

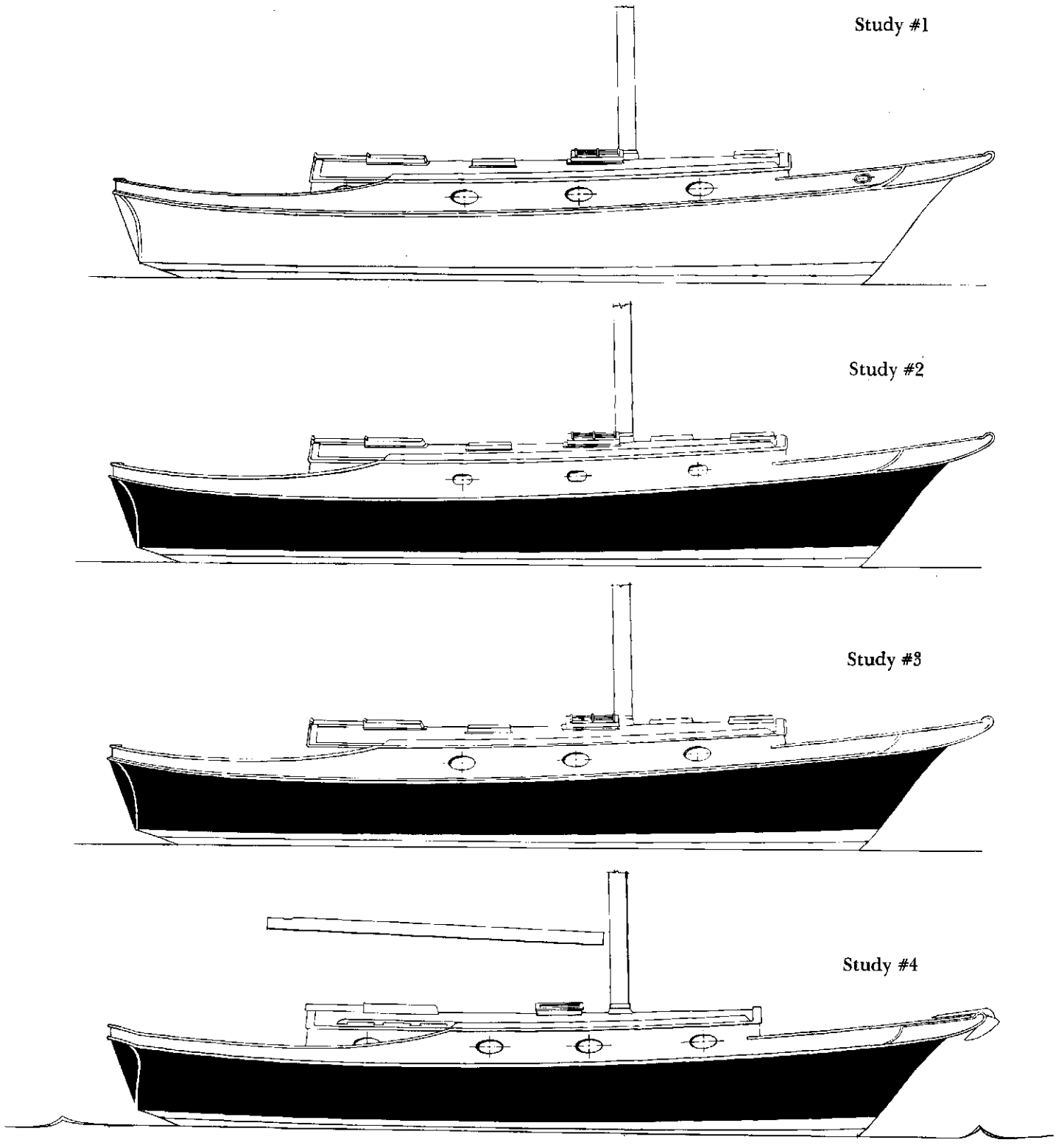
Beauty is self-evident. It is or it isn't. It can't be changed by adjectives or advertising slogans. Many factors lead to beauty in a fine yacht. Graceful lines — "spring" in the sheer — time-proven and accepted concepts. Combine the over-all design, the detailing such as the warm glow of brass oil lamps, teak and holly cabin soles. Bronze opening portholes, slate counter tops and the honest-to-God heavy cast bronze hardware below. Trailboards sweeping back from the bow. All these and more inside and out, put together with the feeling and judgment which comes from long exposure to the sea create the very subtle thing called beauty in a yacht.

Is it art? Is it a feeling? It's probably a combination of both and more. We don't know for sure, but what we do know is that a beautiful yacht is recognized by everyone. A beauty or a beast? The test is to put a CSY yacht in any harbor alongside the rest of the blue and white clorox bottles and tell us which is the beauty and which are the beasts.

The school of modern architecture follows the dictum that form follows function. In yacht design function has been overruled by form which has resulted in the ugly, nondescript cruising yachts we so often see crowding our harbors today.

We at CSY spend many hours agonizing over our yacht designs to get that elusive handsome profile we are seeking. Even so, subtle changes can make or break a design. As an example, we show you the evolution of the design of the CSY 37. Study #1 (opposite) was the first profile which Peter Schmitt came up with *before* we got into the detailing of the interior. As the interior developed to our satisfaction with proper headroom and storage areas, etc., the profile became altered — study 2. It just didn't look right. Thus, came some very subtle changes — a little more spring in the sheer — raise the rub rail an inch or two — more camber in the house — lower the house profile; thus study #3. This wasn't quite right either — the curve of the after coaming was too flat — some more adjustment in the curve of the sheer — oh so slight — and we think we finally have it in study #4 which is the way she went into tooling and as we made the tooling she changed some more.

Will this CSY 37 be recognizable from the rest of the crowd? You know she will! Because she utilizes the full width of her beam in the flush deck cabin, she's one of the roomiest boats of her size anywhere.



Evolution of the Design of the CSY 37.

CSY 44 Pilot House Ketch

Superior And Easy Sailing Ability

Whenever you see that claim in the advertisements that the boat being touted is a racing boat that you can cruise in or vice versa — watch out! Racing rules determine the design of racing machines. If a racing machine is fast and goes to weather which they all must, she is very likely to be wet, lightly-built and uncomfortable. Racing machines don't make good cruising boats (and vice versa, of course). Each have separate purposes and therefore all have separate and distinct design requirements.

Fast, seakindly, dry, stiff, easily single-handed, weatherly, superior windward performance — once the designer is unstrapped by racing rules he can then begin to design a yacht — a cruising yacht — that can *maximize* all of the above desirable characteristics, with as little compromise as possible.

To do this, we insisted that our CSY yacht designs be tank tested with all the care given to a racing machine design *before* we spent a hundred thousand dollars on tooling. Thus, the CSY 44 was tank tested at the University of Michigan and the CSY 37 was tested in the tank facilities at Stevens Institute of Technology — the very same facilities used to test the 12 meters for the America's Cup. Both were tested in the tank against a modern, one-ton racing machine.

Besides determining speed, leeway and windward ability, tank tests give an accurate reading of the vessel's stability — allowing the sail area and height of the rig to be adjusted, along with the placement of the ballast, to suit the desired angle of heel for a given wind strength. All the CSY yachts are designed to be stiff sailers. Thus, their heel in 35 knots of *apparent* wind or about 28 knots of true wind speed *under full sail* is only 30°. Only then have you barely got your rail under.

In addition, in the tanks we were able to determine accurately the ideal combination of the shaft horsepow requirements and propeller diameter and pitch to attain th required speed/water line length ratio of 1.25 to overcom really rugged seas that sometimes can be encountered und power. This speed/water line length ratio of 1.25 works ou to a desired 7.6 knots for both of the CSY 44's and 6.75 kno for the CSY 37. The ability of the yachts to achieve this pe formance is accomplished with large reduction gears an three-bladed propellers coupled to a Perkins 4-154 diesel wit a 3:1 reduction gear on the CSY 44's and a Perkins 4-10 diesel with a 2:1 reduction gear on the CSY 37 and CSY 3

The results of the tank tests for all the CSY yachts (dee draft version) as tested against a modern one-tonner we almost identical. Following is a table of the tank test resu for the CSY 37 at an apparent wind angle of 33°, whic means dead to windward. Both the CSY 44's speed, with i longer water line, would be somewhat faster, particularly higher wind speeds:

True Wind Speed	Angle of Heel	Leeway	Boat Speed	Performance of the One-Tonner
28 Knots	30°	7°*	7.4 Knots	Even
19 Knots	20°	6°	6.5 Knots	.1-.2 Knots Fa
10 Knots	10°	4°	5.5 Knots	.4 Knots Faster

*For comparison's sake, a good one-tonner at 28 knots wou have 5° to 6° leeway at 28 knots of true wind speed.

As a practical matter, at 28 knots of true wind speed th one-tonner would be reefed way down with a crew of de monkeys working like hell. It would only be at that point th the one-man crew on the CSY yachts would need to start t think about reducing sail. A pull of the roller furling li from the cockpit douses the topsail. Easily reefed slab reefi reduces the main. With the ample bulwarks forward on bo CSY yachts, it's easy and safe to quickly drop the self-tendi staysail. This is the difference between racing and cruisi boats.

Add to this the eight over-powered winches on both CS yachts. All sheet winches are self-tailing which are standar thus further making it easier to single-hand the CSY yachts.

Fast, safe, stiff, dry sailing with superior windwa ability is what the CSY yachts are all about.

The CSY 44 has had several tens of thousands of mil of overseas deliveries to the islands in all kinds of conditio Our policy of pretesting these yachts has paid off. The ski pers who have delivered these boats have said they ha never sailed a more rugged or a drier boat. The deliveries a 1,640-2,000 miles per trip from our plant in Tampa, Flori to the British Virgin Islands and St. Vincent. From th Bahamas to the BVI it is 700 miles to the east and only 4 miles south thus dead into the trades. Even at that, the boats are frequently averaging six knots plus for the trip 2 hours a day.

Careful design and testing pays off in a boat and no o has to make excuses for a boat with the capability of be able to take anything that the sea can dish up. Truly the are yachts with round-the-world capabilities.

CSY 44 Mid Cockpit Cu

Low Maintenance and Durability

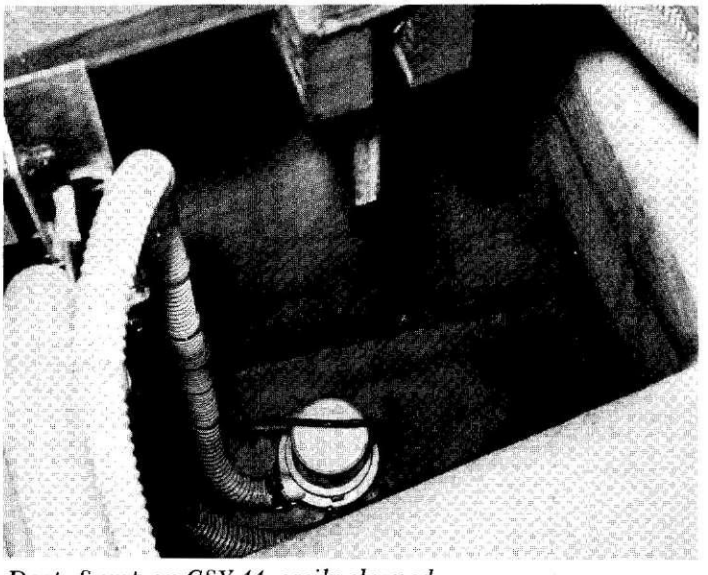
What goes into making a yacht a low maintenance yacht and durable enough to last for years has more to do with the quality and kind of construction and the careful evaluation and selection of each piece of equipment than it has to do with the design of the yacht. The discussion of construction and the selection of equipment follows.

However, there is much in the design phase that is imperative to the future ease of maintenance. All of our yachts have been designed to have large areas around the engine to make access to it and the stuffing box easy. In all the CSY yachts there are access hatches over the engine, not only to make working on them easy, but when and if it should become necessary to be able to remove an engine — a fuel tank or water tank and replace it without having to tear up the yacht. If you look at very many yachts, you will find this is usually forgotten. Too many Manufacturers don't understand yachts because they have never been in the business of maintaining them as we have for 12 years.

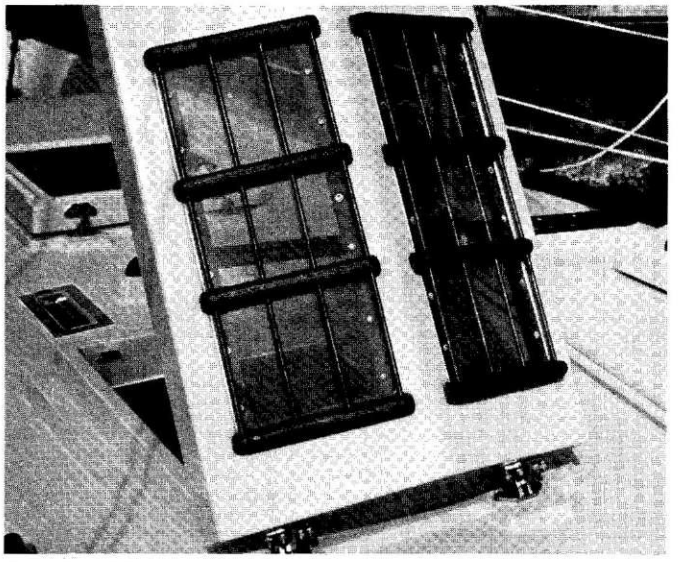
Since it is imperative to bolt the hull and the deck together, the boat has to be designed in such a way so these nuts can be tightened both while the boat is being built and later on. Some manufacturers will tell you that it is sufficient to "glass" the hull to deck joint which would seem logical except that a boat by its very nature has to move and "work" in a sea that requires not a stiff inflexible hull-to-deck joint but one which "works" such as the one we use as described later on in this book.

All the wiring should be out of the bilge — yet accessible — a conduit is designed port and starboard through the cabinets so there is access to the wiring. No wires should be molded into the headliner or put anywhere on the boat where they can't be easily accessible.

Water tanks should be designed with large cleanouts and access plates. The bilge should be deep and it should have a large capacity and rounded and gel coated and all the bilge water should go into one well-designed large open-top sump which has easy access with rounded edges and is gel coat smooth for ease of cleaning.



Deep, Sump on CSY 44, easily cleaned.



Overhead hatches over almost every enclosed space— custom designed by CSY.

Comfortable and Liveable

A cruising yacht should be a good and comfortable home. All the CSY yachts are designed for living aboard for long periods of time. Even forever.

We have not approached the design of our yachts to see how many we can sleep aboard. We shall leave that to the other manufacturers. The question shouldn't be "how many does she sleep" as so often heard from the tire kickers at the boat shows. The question should be how many can *live* for an extended period of time on the yacht in comfort and privacy.

The CSY 37 (plan A) is designed to be a four people yacht. The CSY and the CSY 37 (plan B) boats are designed for a couple in luxurious privacy. Either CSY 44 can be a six people yacht. The difference being that the CSY 44 auxiliary cutter is designed with the emphasis on *outdoor* living and the CSY 44 Pilot House Ketch is designed with the emphasis on *indoor* living. Although the CSY 33 can sleep five — she's the ideal yacht for a couple. All the yachts can sleep more bodies than they are designed for, but both comfort and privacy have to suffer as a result. You could probably sleep 20 in your living room if you designed it like a boat — but would you do it?

The chain plates should be easily accessible for regular inspection and repair. All through-the-deck bolts should be easily accessible from both sides — outside and inside.

Since we at CSY, Ltd. have been in the business of maintaining boats for going on thirteen years, all-day every-day in the year, low maintenance is uppermost in our minds. All CSY boats have these years of know-how built into every boat — and it doesn't cost you a penny more. No other manufacturer can make that statement.

Comfort is five or six inch cushions instead of the usual 3 or 4 inch. Comfort is careful attention to cutting out the possibility of leaks, and for once to get away from messed up clothes and books and bedding. This means designing hatches with high dams — more difficult to mold and making the hatches heavy so they will seal and stay sealed. There is

probably no other single factor which together with everything else that spells comfort than *a truly dry boat.*

Comfort is not just "adequate" ventilation, but super ventilation to keep the yacht both cool and dry. There isn't an enclosed space on any of our yachts that doesn't have both opening ports or can be provided *and* one or more overhead hatches in addition to companionways. Count the opening hatches and opening ports on any CSY yacht and compare with *any* yacht you may be contemplating.

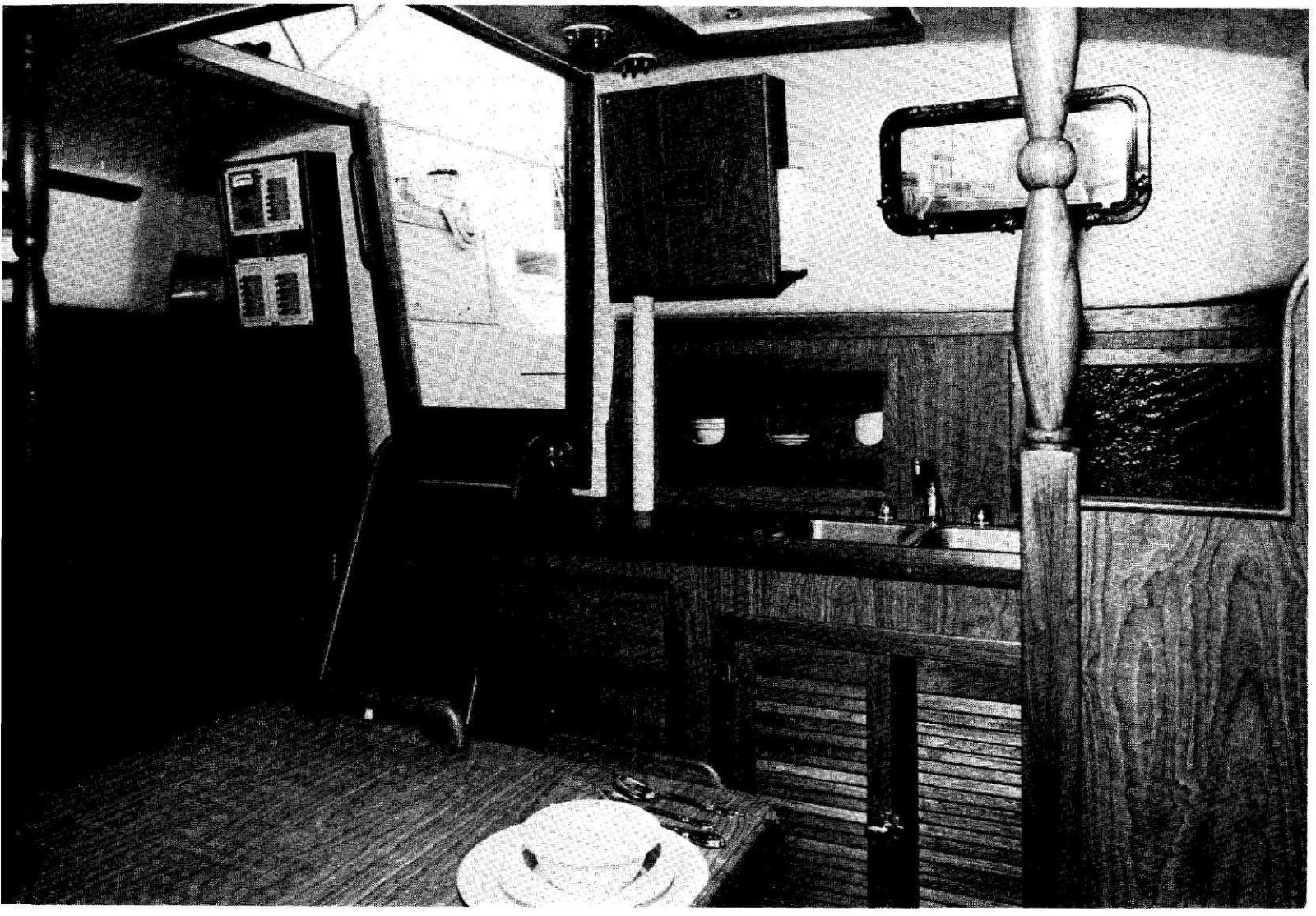
Comfort is large oversized *beds,* not bunks, designed fore and aft not athwartships, beds both port and starboard so you can sleep while under way without scrunching your head or toes against a lee hull or even making the use of bunk boards unnecessary on either a port or starboard tack.

Comfort is fun and pleasant times in a large enough cockpit to sleep in under the stars.

Comfort is lots of headroom — 6'4" minimum on all of our boats and going to 6'7" in the master stateroom of the CSY 44 cutter and the salon of the CSY 33. Comfort is a big, slow running diesel, insulated and out of the living areas, that chugs away through a quiet exhaust system.

Liveability means designing in a large and convenient and safe galley with a special odor free, bug-free place to put the garbage. A gas stove to cook on, to bake in with big sea rails to keep stuff on it and a latched oven door to keep stuff in it. Big heads with ample showers and hot and cold pressure water standard. Enough fuel and water tankage so you don't have to worry about it for even weeks at a time. With filters for the engine fuel and filters for the people water again standard. Lots of storage for food, clothes, tools. A place for everything and everything in its place. Carefully designed, deep bilges so water can't get in to the living part of the yacht. Cockpits that you can get to on stairs not ladders. Broad and uncluttered decks. A gauge to tell you the condition of each bank of batteries at the flick of a switch. A back saver super convenient electric anchor windlass (it's an option). A rugged Marinetics, easy-to-read electrical panel with convenient circuit breakers and no fuses. Spring hatch holders that *work* and that close with a simple tap. See-out fixed ports in the forward cabins to conveniently see what goes on outside without having to climb out on deck. An electric bilge pump that pumps out the bilge at the flick of a switch — but backed up by a big hand pump that you can pump all day long without tearing your arm off. A permanently mounted swim ladder that conveniently stores out of the way when not in use (another option).

Some people call this phase of the design-human engineering. We know from long years of experience from living on boats ourselves — every one of the managerial staff in this company have spent collectively many years living aboard boats as their permanent home. Few manufacturers that we know of can say this. Racing — yes — a couple of weeks now and then on a boat — living, no. It takes a lot of living on a boat to know how to design it, how to build it and how to equip it. This is what the CSY Yacht Corporation can offer you to a degree that few, if any, manufacturers can.



Built-In Convenience

A whole lot of attention and thought has been given to arranging everything in our yachts to make operating them and living in them and maintaining them easy and simple. In a word — convenient.

In the design phase, this has to do with relating each space to each other — the galley, the chart table, the sleeping areas, the cockpit, etc., each to the other so as to be as convenient as possible.

We have mentioned the designed-in convenience of getting at the engine and all of its parts through the opening hatch over it. In all of our yachts, the engine can be reached out of the weather as well as while underway. A space is provided for the radio/telephone and the other electronics which you may want to install which is adjacent to the chart table and easily accessible to the helmsman.

In all CSY yachts, the galley is located so as to be conveniently accessible to both the cockpit and the dining salon. In the Pilot House Ketch, the galley is conveniently accessible to the eating area in the salon with the big windows.

A great deal of study has gone into minimizing the heights between the cockpit and the inside of the yacht to eliminate dangerous and inconvenient climbs between the most often used passageway on a boat.

Convenient, fully-insulated beer coolers are installed right next to the helmsman's seat on all our yachts.

Both the cutter rig and the ketch rigs have their adherents. Both however, are preferred by the overwhelming majority of cruising yachtsmen over the sloop rig for its flexibility and convenience in handling and reducing sail. Very few really dedicated and knowledgeable cruising sailors today use any other rig at least for boats small enough to handle by one or two people.

Even a specially designed liquor storage locker with racks for bottles and glasses.

Cubbyholes in the cockpit for winch handles and other small stuff.

Big, big sail lockers in the cockpit for not only extra sails, but emergency anchor and rode, fenders, dock lines, mop, brushes, pails, life cushions, life preservers for all on board, cockpit cushions, outboard, dinghy oars, dinghy anchor.

A "dirty locker" on deck for charcoal grill, masks, snorkels, etc.

A handy beer cooler, coke-cooler, in the cockpit.

Outstanding Storage

Good storage on a yacht designed for cruising starts with listing some requirements before a pencil ever gets to paper to start the design. Then, once the list is totalled, and the design consummated, the design must be reviewed — the cross-sections, the layout, and the profiles — to study all of the space occupied and to recover any space overlooked.

Here are some of the requirements we listed for storage on the CSY yachts:

Everyone on the yacht should have 12" to 18" of linear space in the hanging lockers.

Each one should have at least two ample drawers close by their bunk.

The heads each needed one drawer for each person on the yacht for personal toiletries — no scrounging around in the usual lockers somewhere out in the main salon.

There were to be shelves convenient to each bunk to put earrings, watches and stuff before turning out the light at night — or a place to lay that paperback when you get tired.

Each cabin needed an area to put bedclothes and pillows — zap — out of sight, and dry to get away from dampness and to prevent that unkempt look so common on many yachts during the daytime.

There needed to be clothes hampers in each head. Sail bags don't conceal the odor of dirty socks very well.

A place for extra linen storage.

A place in the hanging lockers for mold-free, dry, shoe storage.

There needed to be a tool storage drawer and a drawer for line, extra shackles, tape, flash lights, etc.

In the galley, four or five drawers for cutlery, kitchen utensils, paper towels, napkins, etc.

A place under the sink for soaps, cleaning utensils and supplies.

The toilet paper roll mounted inside the under-sink locker door, so the shower doesn't get it wet.

A pots and pans locker.

A specially designed dish locker.

There needed to be a place for navigtion instruments and books and charts convenient to where the navigating was to be done.

Another for glasses and mixing bowls, etc.

A specially designed, self-contained bug-free, odor-free, garbage storage area.

A Spice rack.

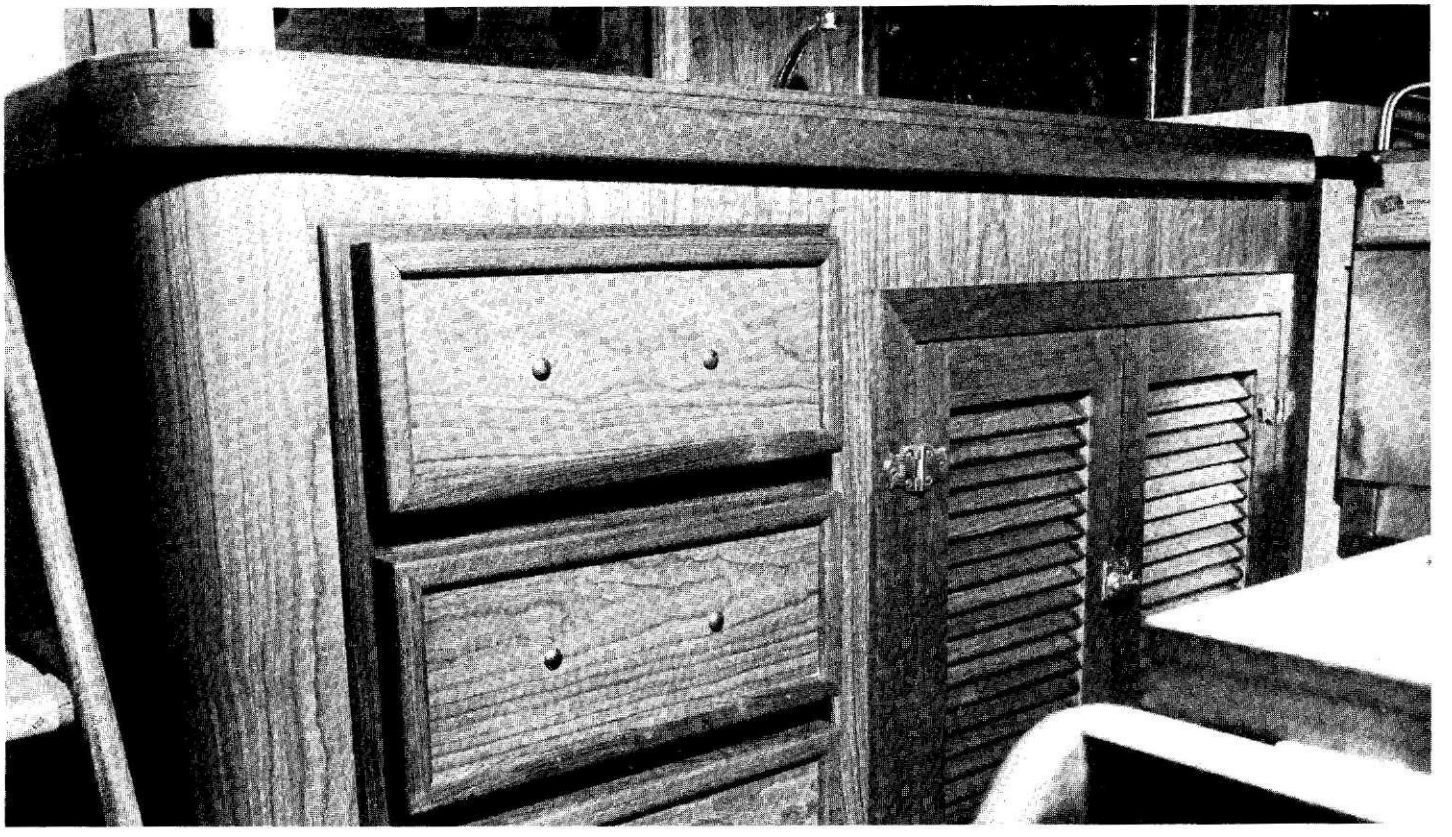
Safe, overboard vented storage for two propane tanks for a three-month supply of cooking fuel.

Anchor rode storage big enough to hold two 250 foot rodes.

Each CSY yacht is designed to be free of any home base and to be able to store the full amenities and food supply for at least three weeks for all aboard without touching any base of supply. A specially designed and tested combination refrigerator/freezer/ice storage unit run off the engine (no electricity) which will hold three weeks of perishables in a refrigerated section, a three week supply of ice cubes and a three week supply of frozen food and baked goods. And, of course, oodles of extra space all over the yacht to hold dry and canned goods to last a lot longer. Plus, a minimum of 500 to 600 mile motoring range of fuel capacity for each yacht with at least 400 gallons of fresh water on the 44's and 250 gallons on the 37 and 115 gallons on the CSY 33.

We have achieved these storage goals in our CSY yachts Another very practical reason why we can boast that they are designed to go anywhere in the world.

You should take a careful look at any boat you are buying and with a list such as the one above look at the boat's drawers, storage spaces, hanging lockers, etc., and consider how much thought has been given to meet these criteria. A boat, even as big as the CSY 44's is a very small compact world. Everything aboard must have its place. Otherwise, you will be living in utter chaos most of the time. It can make or break a boat for the lady in the household or whoever has



Extra large drawers on all CSY's—louvered locker doors for good ventilation.

the job of keeping things neat or having to find things. Adequate and *convenient* storage on a cruising boat is an absolute must.

Safety

We are only considering here those factors in the design phase which have to do with safety. A good deal of what will greatly enhance the safety of the boat will be discussed later under the heading of construction and equipment which has to do with laminate thickness, hull-to-deck joint, extra heavy chain plates, heavy rigging, two sets of heavy duty batteries, etc.

On the drawing board, we put high on our list the considerations for safety. One of these is to minimize high unsafe ladders at the companionways which will be gone into in greater detail in the section on walk-throughs. Steep high ladders, besides being inconvenient, are just plain unsafe at sea.

Another consideration is the design of the spaces below so as not to be too large without hand-holds so the passengers cannot be thrown about in a seaway. A very careful study has to be made for the location of handholds throughout the yacht. When you examine any yacht, no matter where you are standing anywhere on the yacht, there should be some method of bracing oneself which is readily accessible.

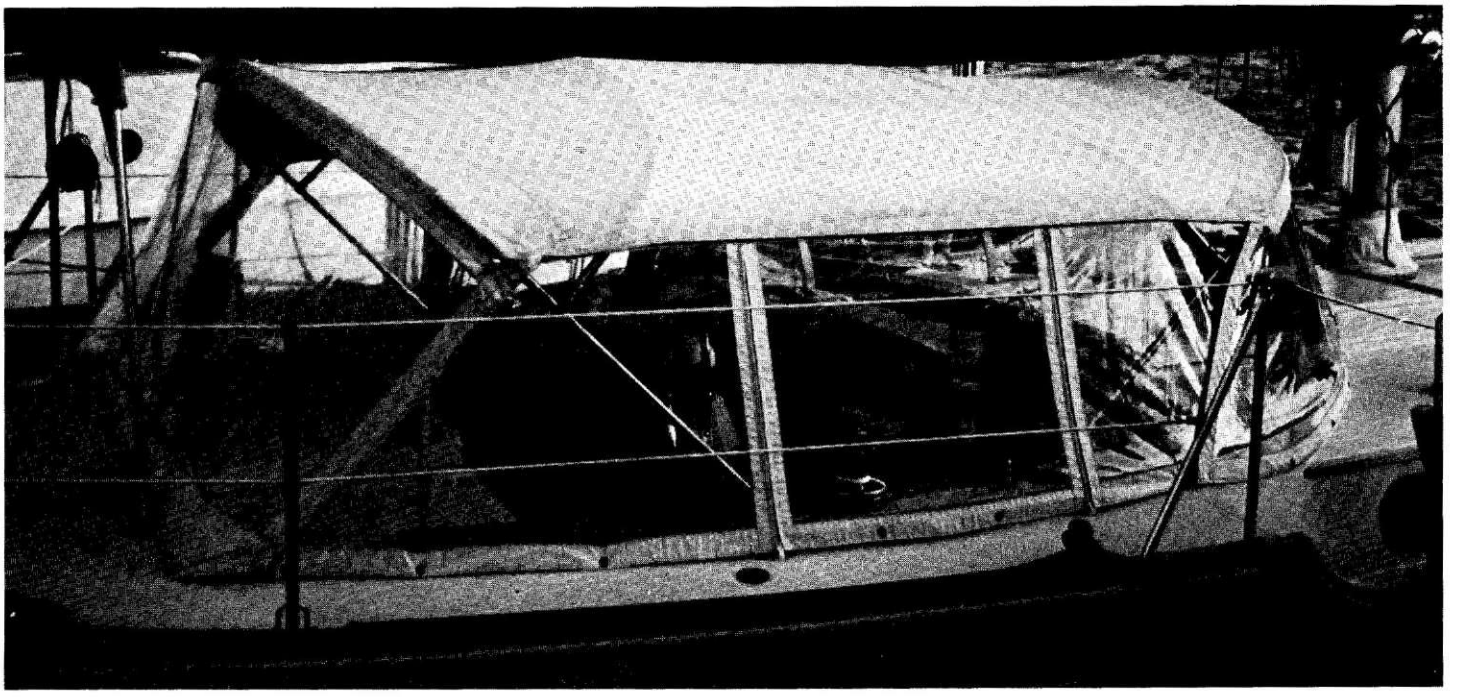
We consider deep bulwarks forward an absolute must for safety on any yacht going to sea to prevent sliding off the deck in a galloping sea when handling the headsails..

Non-skid surfaces should be truly non-skid. They should also be designed so when they wear, as they surely will in time, that these surfaces can be easily restored. The best way we know of to do this is with sand or walnut shells mixed with gel coat or urethane and paint it onto the taped off areas to restore the non-skid. Any other non-skid is almost impossible to restore.

Proper lighting on deck and in the cockpit is a must for cruising at night. The area around the mast and forward need lighting underfoot.

Any experienced cruising man will point out the inconsistency of having large deep cockpits on a boat which really expects to go ocean cruising because deep cockpits catch water and presumably then will get into the boat. With salt water weighing 8 lbs./gal. and 64 lbs. per cubic foot, a large filled cockpit can pose a threat to the safety of a boat in conditions where the seas are high and breaking. The problem is how to have large and comfortable cockpits which are at the same time safe.

All of our boats are fitted with slides over the doors closing off the companionways to keep water from getting below. Four large two-inch scuppers and hoses to match are provided in the CSY 44 cutter connected to truly large sea cocks mounted very low port and starboard to drain off the cockpit water rapidly. The CSY 44 Pilot House Ketch and the CSY 37 and the CSY 33 drain directly overboard above the water line so sea cocks are not necessary. The ample drainage of the cockpit has to be a major factor in the consideration of a yacht which could find itself in really rough ocean conditions — and who can predict if and when it will happen. It can be at anywhere at anytime. Such is the unpredictability of the sea.



The CSY 44 Mid-Cockpit Cutter with a specially designed Bimini with roll away top and side curtains with isinglass and roll down dodger —no stuffiness here—a better answer than any walk-through.

Walk-Through Or No Walk-Through

Our sister charter company was the first to have designed and have built a mid-cockpit yacht to be built on a production line way back in 1969. Now you see them everywhere.

Just about every manufacturer in the business has jumped on the band wagon. Alas, however, almost without exception all of these boats have a walk-through which allows passage from and to the aft cabin under the cockpit. Our CSY auxiliary cutter is one of the few, if not the only one, which offers an alternative — no walk through. The one and only advantage of the walk through is to be able to get to the aft cabin "out of the weather". In our CSY 44 cutter, passage to the aft cabin is up three steps to the cockpit and down three steps to the aft cabin and when the cockpit is properly fitted with a Bimini top, this passage is also "out of the weather". The companionways are in direct line with each other and passing through is an easy and safe matter.

Since we at CSY apparently are going against what seems to be the general consensus, we think we need to take time out and explain why we think the walk-through has many disadvantages as opposed to its one advantage. The public has been so brainwashed by the manufacturers and the dealers about walk-throughs, primarily because that is all they have to offer that an intelligent discussion of the pros and cons of the walk-through versus no walk-through is long overdue.

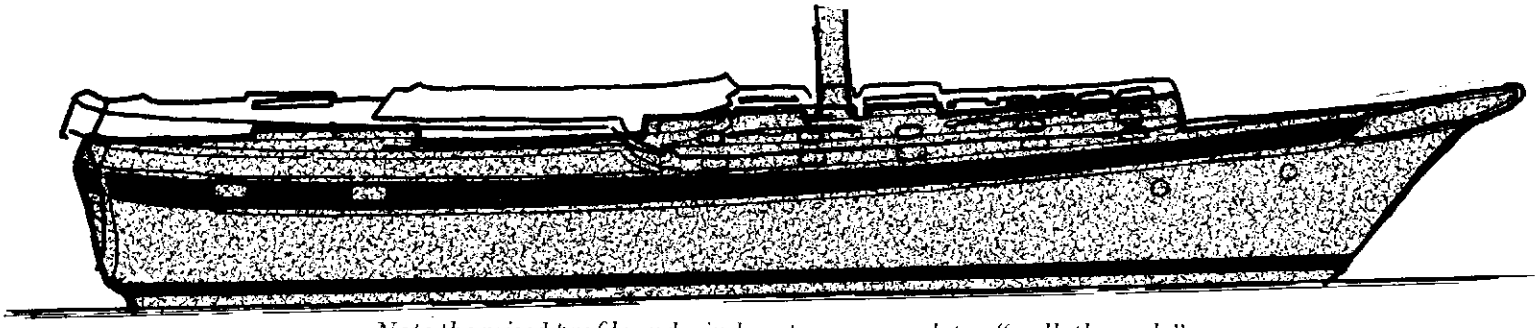
Any design concept always involves trading off one thing for another. The walk-through has one plus — which is, as we have mentioned — inside access from and to the aft cabin. If one considers having at least one place on a boat which is private, and physically separated from the rest of the boat then even this couldn't be considered a plus. Another plus for the manufacturer is that he can jam more useable space in a given water line length but at the sacrifice of deck storage, privacy and just plain compactness to the point of absurdity. This allows even 32 footers over-all or 37 footers over-all to really jam into it what shouldn't reasonably go into a boat under 42 feet. It all looks good in the boat shows, but does it work on an honest-to-goodness cruising boat? One that you intend to be aboard for any length of time?

As we said before, everything is a trade-off and before you consider buying a walk-through, you should know what those trade offs are.

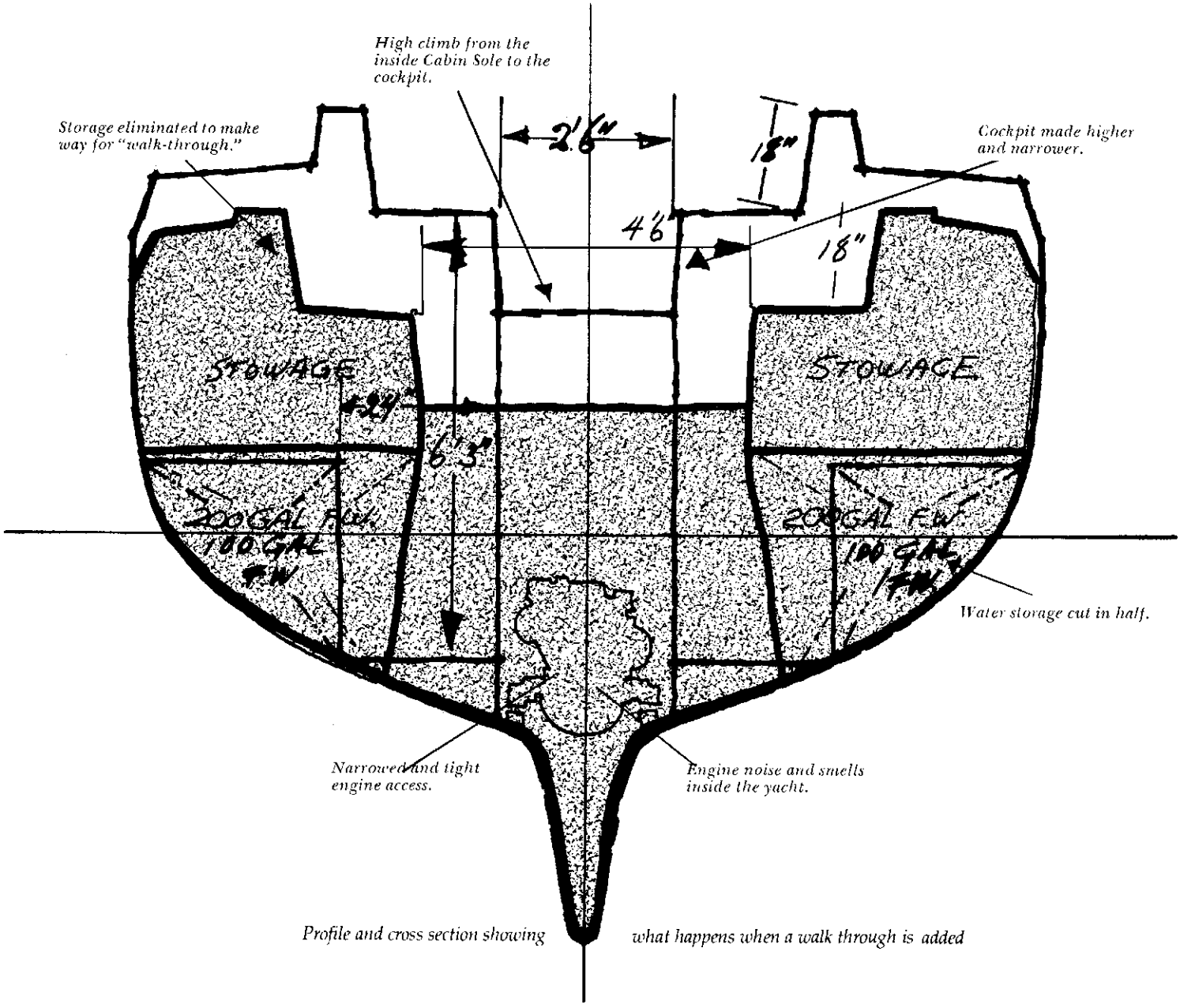
To illustrate our point, we have taken our CSY 44 cutter on the next page and shown it in profile and in cross section with a walk-through so we can see what happens. We are assuming that we need a 24″ wide passageway and 6′3″ headroom so it is really a walkthrough and not a "crawl through". Some manufacturers make the walk-through on both sides of the engine which really compounds the problem. So let's see what we lose:

1. The first thing that has to be done is to raise the cockpit by 21″ — almost two feet — see what this does to the profile (in blue). Wouldn't you say it looks more like "The Yellow Submarine" than "Ticonderoga"? To hide this, most designers raise the free board so the cockpit doesn't look like a conning tower as it does here — the result is the pregnant whale look and the resulting increased windage and much higher center of gravity which one sees so often in our harbors today. As the coaming is raised and the companionway

This illustrates the outline of how our CSY 44 Mid-Cockpit Cutter would have to be raised to accommodate a "walk-through."



Note the raised profile and windage to accommodate a "walk-through."



Profile and cross section showing what happens when a walk through is added

(See text)

eliminated and to get some deck storage often a lazerette is added which cuts into the aft cabin and eliminates the possibility of stern ports — each step of the way the all important ventilation of the aft cabin is inexorably closed off. Walk throughs make for poorly ventilated boats.

2. As can be seen in the accompanying cross section, some startling things happen when a walk-through is added.
   a. The most used passageway in any boat is the passage between cabin sole below and the cockpit. This changes from a gradual three steps up of less than 3 feet in our CSY 44 to a steep ladder of over five feet. It's not just inconvenient, it is downright dangerous.
   b. The cockpit has to be narrowed athwartships to get the ample width in the passageway.
   c. We lose most, if not all, deck storage so the question has to be where do you go with extra sails, extra anchors, dock lines, fenders, charcoal grilles, buckets, mops, snorkels, masks, extra oars, outboard storage, etc., etc. You need to look at any walk-through and see if there are any reasonable answers — there aren't.
   d. Our CSY 44 has two 200-gallon tanks for water storage port and starboard under the cockpit and it still leaves lots of storage over it. Where to go for water storage in a walk-through, it usually goes under the bunks and thus loss of further storage inside the boat.
   e. The engine access is drastically effected and the engine is now "inside" the boat with its dirt and its noise and its fumes.

To sum up, having the cockpit down in the boat without a walk-through allows us to retain a relatively low freeboard and a lowered center of gravity which makes for an outstandingly good-looking and a high performance boat. It preserves the privacy of the aft cabin while at the same time allowing it to be open, easily accessible from the cockpit and well-ventilated. The cockpit, the center of activity in any sailboat, is easily and conveniently and safely accessible to the rest of the inside of the boat while at the same time it can be kept large and roomy with more than ample storage space in the cockpit seat lockers and allowing at the same time for 400 gallons of water storage and over 100 gallons of fuel storage and still allowing for engine access from any side out of and away from the "inside" of the boat.

Because the cockpit can be kept low there is the possibility of mounting a Bimini dodger with full head room under it.

The price in tradeoffs for the walk through is simply too high in mid-cockpit boats the size of our CSY 44, in our opinion. It is a point of view. Judge it for yourself.

However, there is a way to get passage through a boat without the high cost in trade offs — this we have developed in our CSY 44 Pilot House Ketch built on the same proven sailing hull as the CSY 44 cutter. This puts the cockpit aft without loss of size or deck storage. The master or owners cabin with its private head comes forward of that taking up the full width of the boat which is larger than in a mid cockpit boat. Forward of that is the small step-up to a see-around salon with 18" windows with its own separate inside steering station. This Pilot House becomes the center of activity for this *inside living* boat. A couple of steps down brings you to the galley which occupies the full width of the boat and then a head and forward cabin as in the cutter.

You can walk through this boat from stem to stern and even go into the salon through a separate companionway from outside without disturbing the privacy of the aft cabin. At the same time, if anything, we get more storage than in the cutter — terrific engine access —over 400 gallons of water storage and 236 gallons of fuel storage.

Conclusion

CSY, Ltd. has been in the bareboat charter business for going on thirteen years. Until now, we, like you, have been a consumer — a buyer of yachts. Unlike you, the private yacht owner, however, each and every one of our 140 yachts sails 33 weeks each year under the helm of as many different skippers. All kinds of skippers with all kinds of sophistication when it comes to handling a yacht. Add constant year-round heat and add constant humidity and salt, add all of this up and multiply it times seven years and you have the toughest test possible for any yacht.

We have to look ahead. We have to trust our own experience and our own input from tens of thousands of charterers. We simply cannot afford to get caught up by the fads of the moment. We have to have designs with lasting qualities that we know will keep people coming back for years to come. We don't expect to be coming out with a new model every year. That only ups the cost to you, the consumer, and makes earlier boats out of date. With careful planning and careful design, this can't happen.

Thus, when we talk of the beauty of the design and the sailing performance, when we talk about low maintenance and safety and comfort, and liveability and storage requirements and construction and equipment, we talk about these things in terms based on needs that are even greater than yours. If you make a mistake in buying a yacht, you can sell it with little or maybe no loss of cash. If our sister company makes a mistake like that, with seven year leases on dozens of yachts -- we are out of business.

We shall sell you the exact same yacht built to the same standards that we build for our own use. We know what should be in that yacht — for us and for you — and we refuse to subtract from it. We build her to meet a standard and then we think about the best value that we can give you for your dollar in achieving that standard — but the standard comes first. *THAT'S OUR BUILT-IN CREDIBILITY.*

Our greatest fear is that you — out there — the yacht buying public, will not be able to differentiate between a high-quality yacht and the rest of them. That is the reason why we are writing this treatise and it is the reason we implore you to come to our plant and see how we put these boats together and then we welcome comparison with anybody anywhere. If anybody beats us -- not only do you learn — we learn — and they won't beat us — next time.

The most valuable thing you get when you buy a yacht from the CSY Yacht Corporation is thirteen years of know-how and the knowledge of CSY, Ltd., which is built into every yacht commissioned at our plant. It is a priceless ingredient. It is an ingredient that no other yacht builder can offer you — and yet, it costs you nothing more.

The CSY Pilot House Ketch.
The ultimate answer—an "indoor" living boat with an owner's huge aft cabin nearer the center of motion with easy two step access to the rest of the boat connected by a huge see-around raised salon to the galley and forward cabin. A truly practical walk-through without the loss of storage or tankage.

CSY

CSY Yacht Corporation

CHAPTER II

What is a Cruising Yacht?

By Peter Schmitt

(Author's Comment: If there is a more confusing area of misinformation in the sailing field than the advantages and disadvantages of light displacement versus heavy displacement yachts; of the racer versus the cruiser versus the cruiser-racer; well we don't know what it is. We asked our designer Peter Schmitt to try in his own words to define what a cruising yacht is and what it is not. We think you will find his discussion thought provoking and enlightening — we did, so we print it here.)

IT'S easy to design a fast boat, it's easy to design an attractive boat, and it's easy to design a roomy boat . . . but to design a fast, attractive, roomy boat is another matter altogether and that to me is what good cruising boat design is all about.

There is no excuse whatsoever for a cruising sailboat that is not performance oriented and therefore, having boat speed on all points of sail, stability and maneuverability which are all of the primary importance. These components of performance will only result from a well designed underbody consisting of the canoe body and the keel and rudder appendages. The canoe body must have the necessary volume to provide the best accommodations possible and support at a predetermined flotation line the entire weight of the vessel, yet . . . at the same time, the lines of the canoe body must be as sweet and fair as possible to give the minimum amount of resistance to the water flowing past the hull.

The keel and rudder are the appendages that contribute the most to windward performance. The keel must have enough internal volume to contain the necessary ballast for self-righting stability at all angles of heel for the chosen draft. Its fore and aft location is extremely important to the steering qualities of the vessel and its shape must provide a highly efficient, aerodynamic lifting surface to resist the side forces of the sails.

In addition to its function of being able to provide complete steering control in any type of sea condition, the rudder should also act as a hydrofoil providing side force lift. It is my own belief, that a balanced rudder, attached to a full span skeg of adequate size, located as far aft on the underbody as possible, provides the optimum steering control for a cruising boat. It is a known fact that a rudder with a skeg will be more efficient at higher degrees of rudder angle than a rudder without a skeg. Positioning the skeg well aft contributes to a more efficient lateral plane, thus making a better tracking vessel. In addition, the use of a skeg allows the placement of a heavy, cast bronze gudgeon at the lower end of the skeg to support the rudder stock. This places the stress on the rudder stock in the form of torsion only, and not torsion *and* bending as it is when a rudder without a skeg is used.

Another appendage of the underbody that is not found on many cruising boats but is used on all of CSY's boats is what I call the propeller skeg. This skeg is molded intergral with the hull shell and contains the stern tube and propeller shaft bearing. Its primary function is to act as a shroud to protect the lower propeller blade tips from debris. An additional function is that it is a much stronger method of captivating the propeller shaft and stern bearing whereas, the normally used bronze strut can loosen in time from shaft vibration and is subject to damage, the solid rigid structure of the molded skeg can never fail.

Perhaps the word heard most often during the design of a boat is the word compromise! And compromise we must! There are so many compromises made to a boat when it is on the drawing board that it is impossible to keep track of them. There are, however, three specific areas of a vessel that can never be compromised, as far as I'm concerned. These are the hull structure; the rig and rigging; and the steering system.

A failure of the auxiliary engine or the electrical system is an inconvenience to be sure, but the vessel is still intact and seaworthy. But . . . to have a failure of the hull structure, the rig, or the steering system — an occurance which will most likely take place in heavy weather conditions — will place the vessel in immediate jeopardy.

Fiberglass construction is a wonderful material for building a boat. The basic fibers which make up the glass fabric are among the strongest structural elements known to man. No other boat construction material gives us the freedom of design, the added interior volume due to the lack of frames, or the rot free, worm proof, easily maintained hull shell.

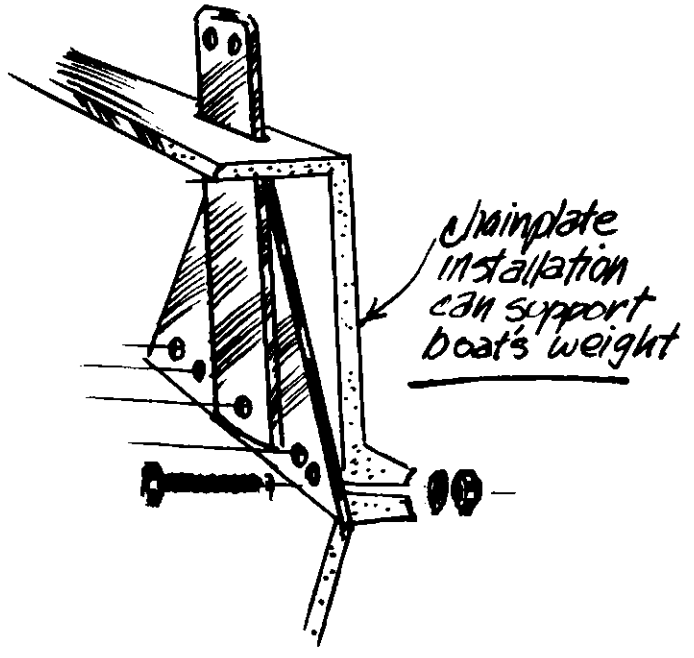
I suspect that when most people buy a fiberglass sailboat, they take it for granted that the hull laminate is carefully and painstakingly laid up and that the hull laminate is of adequate thickness to provide water-tight integrity under the most adverse conditions. Unfortunately this is not always the case. Each builder buys his resin and glass by the pound and it is one of the few areas in fiberglass boat construction where he can skimp on materials and labor, save money, and hide it from a buyer. No matter how it is constructed in actual sailing conditions, each boat must endure the same repetitive cycles of heavy stresses, the magnitude of which increases exponentially with the size of the vessel.

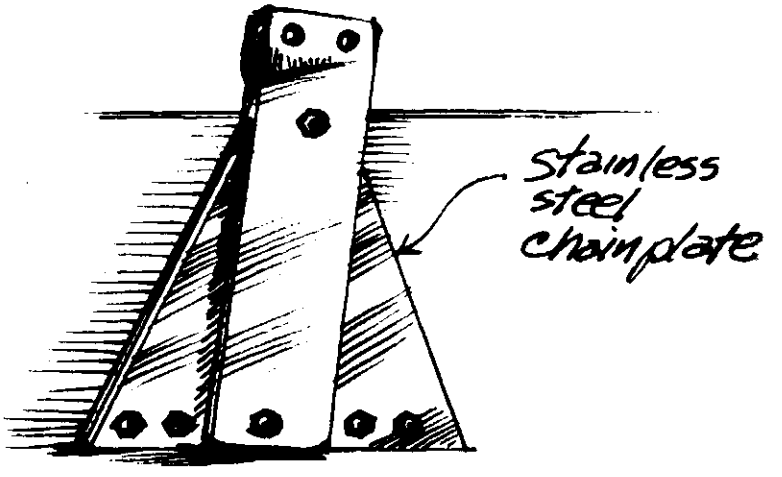
CSY 37 Aft Cockpit Cutter

When we analyze the forces applied to a sailboat sailing, to weather in heavy sea conditions, we find that the stresses involved are truly awesome. Let's look at a few of these. The wind pressure on the sails places the masts in compression, a loading stress which in effect is trying to drive the spar out through the bottom of the vessel. The weather shrouds are applying a direct tension loading to the topsides of the vessel. The net result of this is a high bending and tensile stress to the hull laminate in the immediate vicinity of the chainplates. We then have the headstay and backstay in tension producing a bending stress along the longitudinal centerline of the vessel. Everytime the boat falls off a wave or slams into a sea there is terrific, localized impact on the forebody of the hull shell. When sailing at high angles of heel the heavy ballast keel is producing a tremendous stress at the point where it is joined to the underbody.

There is only one way to adequately resist these forces and that is with a heavy, hand laid up fiberglass hull laminate with added layers of reinforcement at points of particularly high stress combined with an internal framing system of bulkheads and partitions that are securely bonded to the inside of the hull shell. The fiberglass laminate schedules that I have specified for each of CSY's line of boats is indeed a heavy one and I know . . . that when compared to what the majority of the boat building industry is doing at the present time, CSY's hulls would definitely be considered overbuilt, but their laminates have been carefully specified to adequately meet the stresses that can reasonably be expected at sea.

Mast design and construction is the second area where a failure will totally incapacitate a vessel. Mast design should be based on a careful analysis of the stability of a boat and not guessed at as is too often the case. My design procedure for selecting a mast section for a design is based on the stability of the boat at 30 degrees of heel. A factor of safety of 4 is applied to this compression loading thus found, to be absolutely certain that the mast section chosen will be able to withstand every stress applied to it. (See the chapter on Spar Selection.)





The standing rigging diameters and chainplates are also calculated based on the stability of the boat. The standing rigging sizes are determined from a percentage of the stability that they are known to be loaded with, based on tests carried out on 12-meter yachts. A factor of safety of 3 is applied and the wire diameter picked accordingly. A wire diameter would not be used if its breaking strength were below the design strength required.

Chainplate lugs, which are that portion of the chainplates that accepts the turnbuckle, are designed to withstand a loading of twice the breaking strength of the wire shroud that attaches to them. Wherever chainplates are attached to the hull with bolts, the bolts are sized to withstand a loading of 3 times the breaking strength of the wire shroud. The area of the hull in the way of the chainplates is reinforced with extra laminates of fiberglass so that the hull shell in the immediate vicinity of the chainplate bolts will be able to withstand the designed load without permanently deforming the fiberglass hull. It is interesting to note that with the chainplate design as we have outlined it here, any CSY boat can be lifted from its cradle and put in the water with an attachment made to just any one pair of chainplates.

The pedestal wheel steering system in a boat is the most heavily used and most heavily stressed movable mechanical linkage on board any boat and as a result, it is the one system that is most prone to failure. The rudder and steering systems of CSY's boats are designed for a condition that allows for a boat to fall off a wave backwards with the rudder in the hardover position, a condition that places the most severe stress possible on the rudder and rudder stock. A safety factor of 4 is applied to the torsional loading derived from this calculation in order to select the diameter of the rudder stock which is solid bronze round bar and not pipe as so often is used. The wire rope portion of the steering system takes the most abuse. Even the slightest amount of misalignment between the wire and the quadrant, and fairlead and idler sheaves will cause chafe and the resultant breakage of the wire strands. It is imperative that the steering system fairlead sheaves be securely fastened to the hull of the vessel and that the wire be of adequate diameter to take the loads involved. All of the sheaves in the steering system must be of

a diameter to comfortably support the wire.

The interior accommodations of a production cruising boat are often the most difficult challenge of the design. Difficult because it is impossible to do an interior arrangement that will suit everyone's individual tastes and requirements. People use their boats in different ways and the accommodations should reflect this type of use to the greatest extent possible. Unfortunately, when buying a production fiberglass boat such as those at CSY it is impossible for the company to offer a customized interior for each individual buyer and maintain any semblance of productivity and profitability. Thus, the one or possibly two accommodation plans offered by a builder for a given boat must then meet the widest needs possible.

A good rule of thumb to follow when looking at a boat and judging the merits of the interior accommodations is this:

"A boat interior that is designed for use at sea can be made to work when living aboard at dockside, but an interior that is designed for use at dockside exclusively can never be made to work at sea."

If a boat is to be used for any type of offshore cruising where a passage of a few days time is required, the most important part of the accommodations are good berths and an efficient galley. The berths used at sea should be located as close as possible to the fore and aft middle of the boat where the pitching movement is at a minimum and there must be enough berths to sleep the entire off-watch crew.

The galley should be as compact as possible with everything within easy reach. There must be a method of securing the cook in the galley, either by a belt or by galley counter design, so that one's hands can be used to work rather than just hanging on. Adequate dish and dry food locker space is required as well as adequate and efficient refrigeration capacity. The icebox or refrigerator must be heavily insulated to reduce heat loss. The boats at CSY, have as a minimum, 4" of foam insulation on all sides of the refrigerated space including the top. The galley stove should be gimballed and the stove fuel efficient. When properly installed, propane gas is, without a doubt, the preferred stove fuel. Its flame is much hotter than that of alcohol without the mal de mer causing odor and the danger of flareups.

Perhaps the most important single facet of boat design that determines whether a cruising boat will be a comfortable platform for the interior accommodations both at the dock or offshore is the weight or displacement of the vessel.

If we compare two moderate size cruising boats of equal waterline length, sail area, and ballast, yet drastically different in displacement, the following conclusions can be immediately drawn: The heavier boat will provide more interior volume consistent with a more pleasing low profile than the light boat. This is to say that both boats could have the same amount of interior volume for accommodations but the light boat will have to raise the sheer line in order to achieve it because she does not have the volume or displacement below the waterline as does her heavier sister.

There is no doubt that the heavier the boat the more comfortable it is at sea. The heavier boat is less affected by wave action, thus its mass will push through the water with the least amount of adverse motion. The vertical center of gravity of the heavier boat, will be higher than that of the light boat resulting in longer and slower periods of roll and pitch which reduces violent motions in a seaway — in a word — a much more comfortable boat.

Displacement equals weight and weight equals the amount of construction materials that go into the boat. The heavier boat will reflect a thicker hull and deck laminate which means a safer and a quieter hull. The interior will have heavier components and the tankage for fuel and fresh water will be greater than that of the light displacement boat.

When comparing the light and heavy boats in actual sailing conditions, the lighter boat, in light air conditions, will have a distinct advantage on every point of sail. Sail area is horsepower and weight is resistance. The more a boat weighs the more the frictional and wave making resistance will be to the water flow around the hull. In moderate air conditions, the heavier boat will improve greatly in performance although the light displacement boat will still have a speed advantage going to weather and running. Reaching, both boats will be very close in performance. In heavy air, the heavy displacement boat comes into her own. She will most likely be faster upwind and reaching than her lighter sister ship, and only downwind in surfing conditions will the lighter boat be faster.

The disadvantage of the heavy displacement boat in light air can be overcome to great extent by the careful selection of adequate sails designed for use in such conditions.

What is the best rig for a cruising boat? This question again is a matter of personal preference for each individual owner, but the basic decision is whether to have one mast or two. Each rig has its advantages and disadvantages. The sloop is the simplest rig to handle in terms of number of sheets, halyards and sails to work but can present a problem in reducing sail fast. It is also the best rig in terms of aerodynamic efficiency in light to moderate wind velocities when a large jib can be used in conjunction with the mainsail.

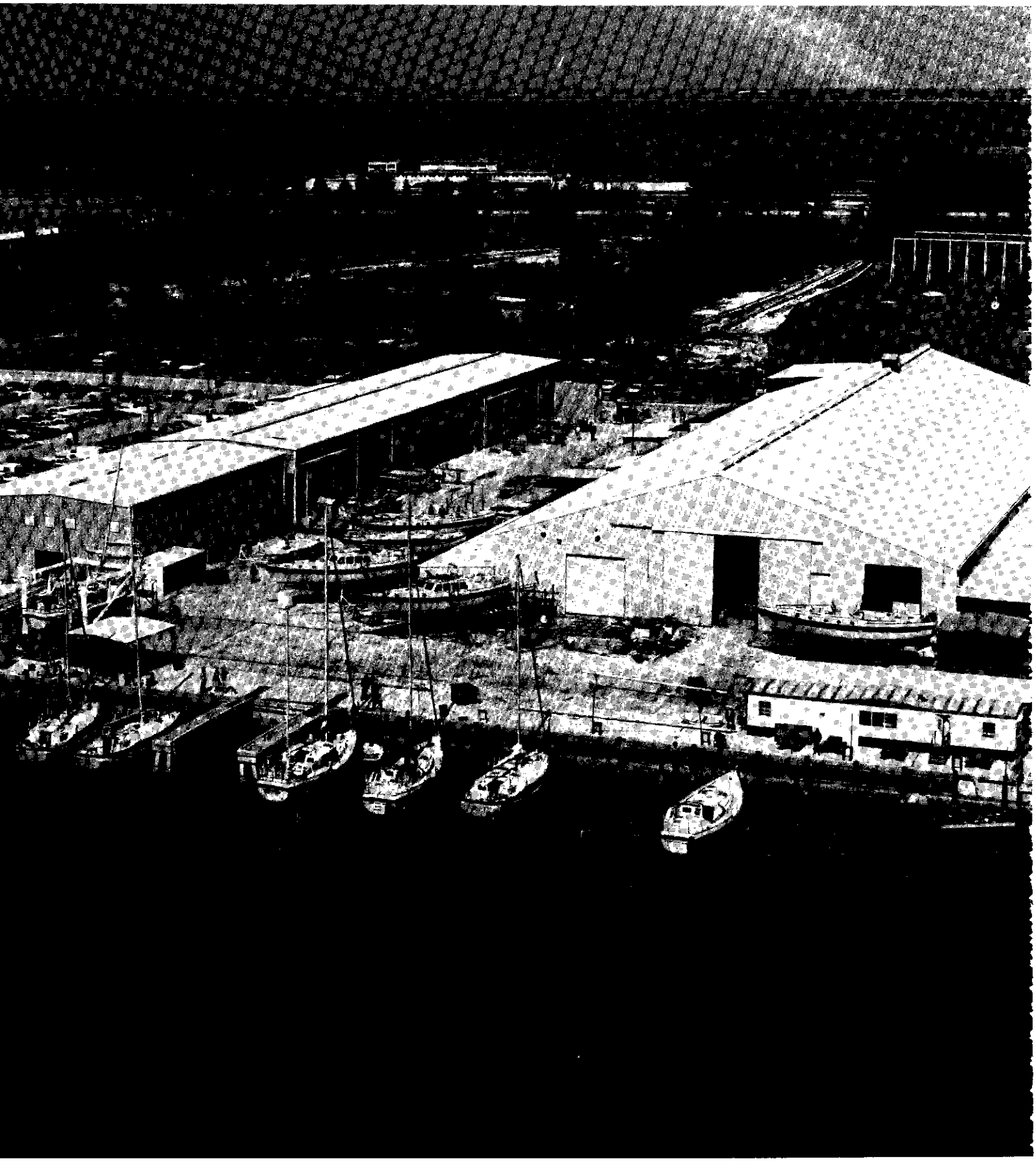
The cutter is next in terms of ease of handling and efficiency. While the forestay-sail adds clutter to the deck and is totally inefficient in light air conditions, it proves its worth in heavy air. In light air, a larger jib topsail or genoa can be used to equal the performance of the sloop with similar sized sails. In heavy air, the jib can be furled and one can carry on under forestaysail and reefed main. With the sloop, a headsail change would be required to reduce the sail area of the fore triangle.

The ketch is next when it comes to ease of handling and aerodynamic efficiency. The mizzen is ineffective until the boat is close reaching and a mizzen staysail can be used under only a very limited wind angle. The ketch's greatest advantage is that of being able to break total sail area up into smaller, easier handling sails thus making sail handling much easier for a couple. The ketch rig is also advantageous in heavy air sailing when the mizzen can be used in conjunction with a small jib, entirely eliminating the mainsail and the main sail reef process.

It was over 2200 years ago when Archimedes discovered the principles governing the laws of flotation of a vessel which are as true now as they were then. "Eureka! I have found it!", he was said to have cried when he made the discovery. It is a very rare and happy moment indeed when a designer of any type of boat can say these same words himself.

CHAPTER III

Construction



NO matter how well designed or well thought out, a boat can only be as good as its construction and the choosing and the care taken in installing the equipment. Here we are going to try to discuss in some detail how we build our boats and why we do things the way we do. Most of the detail which we shall be discussing here is covered up in the finished boat as you will see it in the islands or at the boat shows. There is only one way for you to see and understand how a boat is put together and that is to follow it after it leaves the drawing board, becomes a plug, a series of plugs and then a series of molds. From these molds are made many parts which along with the parts made in the mill and thousands of bits of equipment the yacht then comes together on the assembly line like some gigantic Tootsie Toy. From start to finish, the boat is in the assembly process for 42 working days on eight separate stations so that at any given moment on a trip through the plant you can see a yacht in most all of the various stages of construction.

Any prospective yacht owner should not put his money down until he has visited the factory and thoroughly understands how his yacht is put together at each step of the way. Any manufacturer who is reluctant to show you his plant openly and completely and answer all of your questions, is likely to have something to hide.

If it is not possible for you to visit the factory, a prudent investment is to send an independent surveyor to the plant to do a professional evaluation for you. He can do a much more thorough job at the factory than he can after the boat is built. To be sure you obtain the services of a truly independent surveyor, we would recommend that you contact:

The National Association of Marine Surveyors, Inc.
P.O. Box 55 Peck Slip Station
New York, N.Y. 10038
212-895-3677

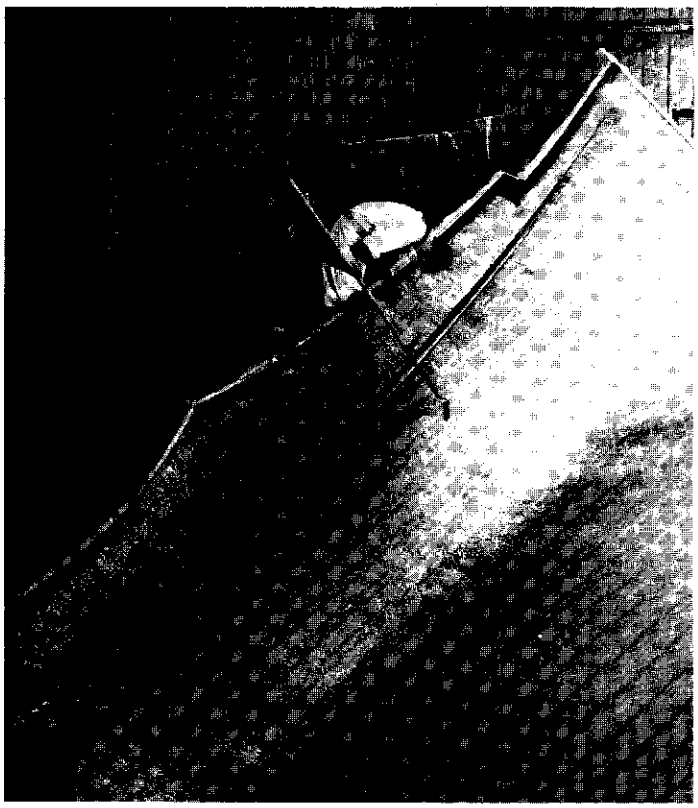
A call to them and they will send you a list of their member surveyors located in your part of the country or the part of the country where the manufacturer is located. Then you can contact the surveyor directly to ascertain his independence. We at CSY Yacht Corporation keep the latest list for all areas in the country and we should be glad to supply you with a xerox copy of the listing for your area.

You should get a definite price from the surveyor and a clear idea of what the survey is to cover. Fees for fiberglass boats generally run from $4-6 per foot based on over-all length (wooden boats are higher). For this, you should get a thorough written report. There can't be a more important investment that you can make when buying any boat. As a matter of fact it may be required by the bank or the insurance company for you to get coverage or a loan.

Our plant is open at any time by appointment for a survey of our yachts. We welcome it.

The purpose of this section is to help you make an intelligent evaluation of what you are seeing and what to look for on a visit to any boat manufacturing plant.

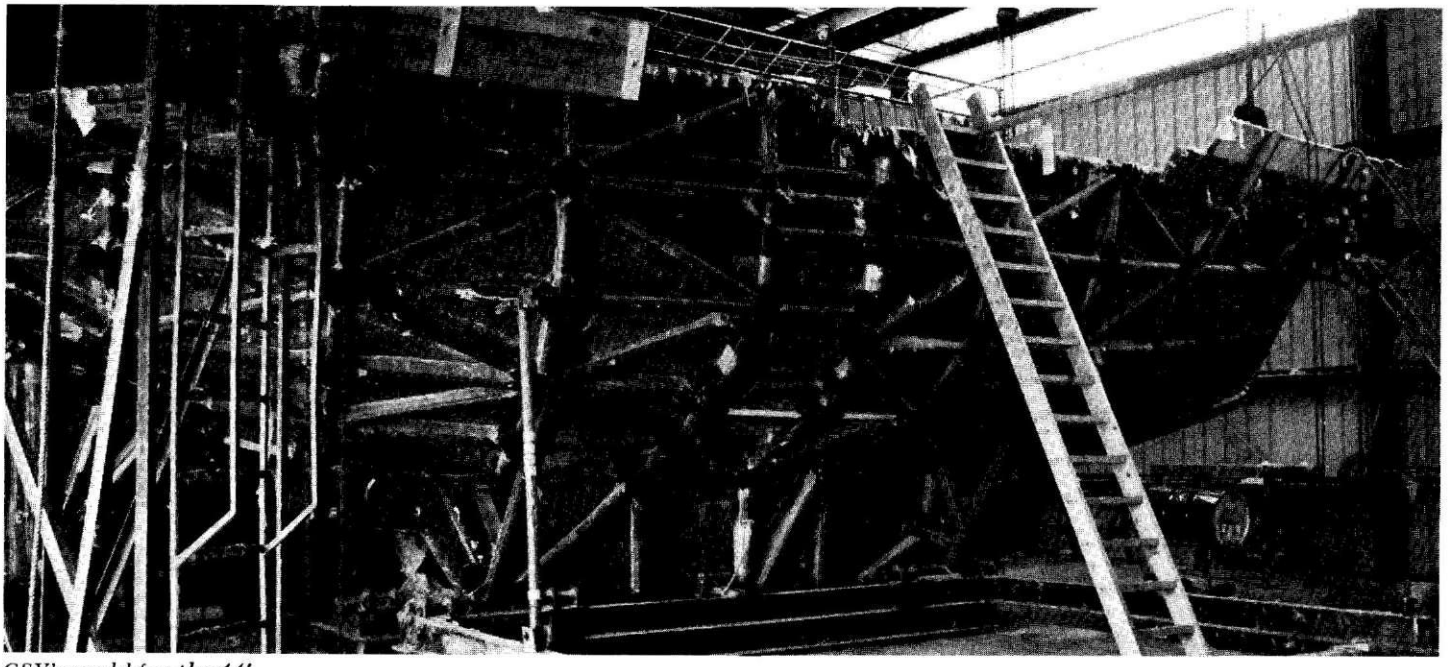
You should ask for a complete set of construction specifications as provided by a naval architect such as we are providing in this book so that you can at your leisure study the specifications preferably before you visit the plant. There should also be available a full scale set of plans if you wish to study the boat in more detail. We are not going to concern ourselves with every particular of those specifications, but our purpose here is to discuss the alternative ways of doing things and why we at CSY have chosen our particular way. To say that ours is the only way is ridiculous on the face of it. There are many ways to skin a goose. We are only giving you one point of view — ours.



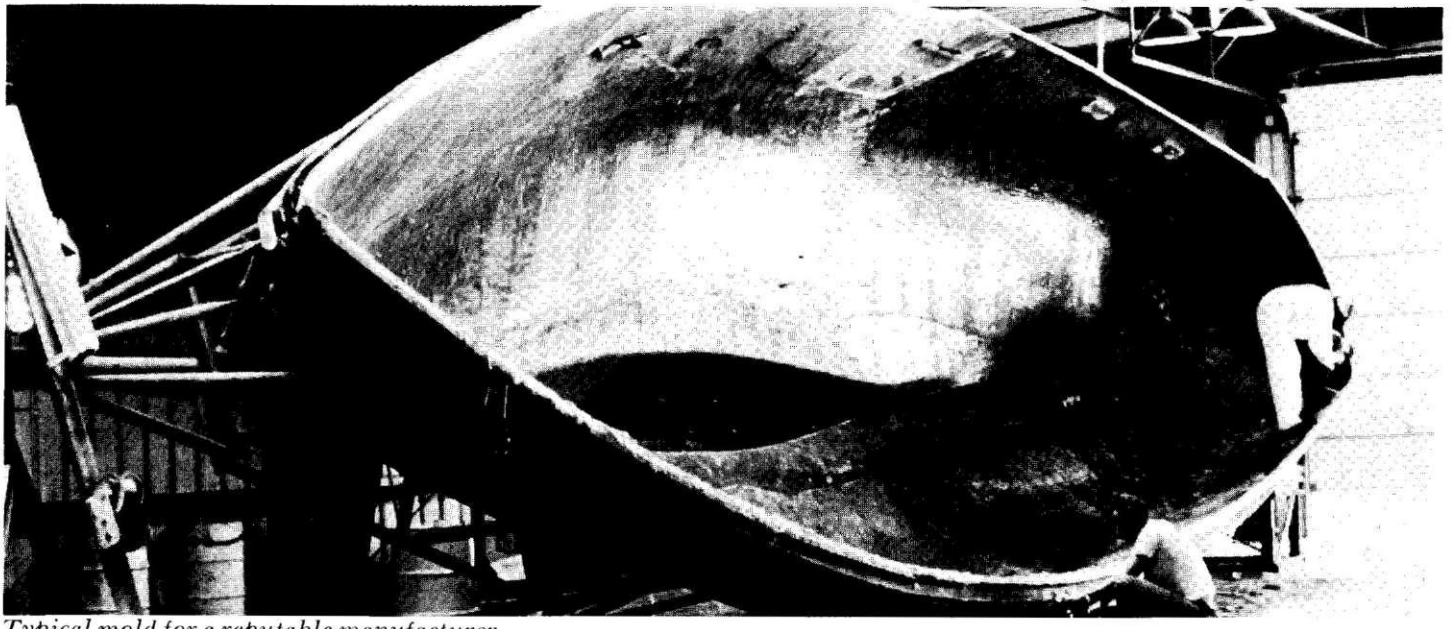
Carefully hand laid laminations.

When a manufacturer has a number of models available and if he uses a production line, he has to wait for a number of orders to pile up for a particular model before he can economically schedule a "run" through the line. The alternative to this is to set up a series of stalls where the yacht is placed after ballasting and stays there in its particular stall until the boat is finished. This means that the assembly crews move from stall to stall, rather than the boat moving from station to station where each crew is a specialist at that stage of construction. One crew may be working on a 42-footer one day, a 28-footer the next and a 32-footer after that. This defeats the specialization that can be achieved on the standard production line where each man at each station has his particular job at which he increases in efficiency as time passes and the quality of the yacht and the sureness of a quality control program is increased. The stall method can lead to poorer workmanship because of the lack of specialization. However the "stall" method allows a manufacturer to build a whole series of boats which is limited only by the number of stalls he has available and for which he has tooling. It's efficient for the sales department, but it has to be disastrous for quality control.

The huge 64,000 square foot assembly area where CSY yachts are built.



CSY's mold for the 44'.
This mold has two to three times the amount of steel reinforcement to absolutely keep the integrity of the original mold.



Typical mold for a reputable manufacturer.
This mold is "rocked" from side to side to lay it up. This can lead to trouble (see text).

The Plug

Once the architect's job is done and the hull lines have been drawn and the testing done, the drawings move from the drawing board to a full scale rendering of the lines on a specially prepared floor in the plant —a process known as "lofting".

This multi-dimensional rendering is then transferred to an exact full scale model preferably made out of wood. It is made slightly oversized to allow for finishing down to the final lines which in the hands of a master builder should be within an eighth of an inch of the true lines as lofted from the architects lines and his table of offsets.

There follows months of faring and sanding and filling and more sanding and filling and finally buffing with finer and finer grits until an evenly fared high gloss finish is achieved. Every mark — any unevenness must be eliminated. The mold and later the parts taken from the mold can never be any better than the finish of the original plug. From subsequent mishandling it can get worse but never better.

The Mold

The mold is built over the plug. The mold then becomes the end product from which every part thereafter is taken. Like the beautiful butterfly which dies upon laying its eggs,

the plug, too, has but one purpose in life — to be the male part from which the female part — the mold — is taken. The mold, in turn, will continue to produce parts for 500, even 1,000 times or more depending on how it is cared for.

The plug is first waxed and then it is carefully gel coated and then layer upon layer of fiberglass is laid over the plug building it up slowly allowing enough time between layers so that proper hardening and curing and sanding can take place to avoid distortion until a thickness of one and one half inches of uniformly solid fiberglass is achieved. Over the glass mold and glassed to it is a welded framework of steel tubing to stiffen it to preclude its changing its shape in even the minutest degree. (see photos)

A sign of good workmanship is the thickness of the mold and the amount of steel stiffeners which are built over it. Of course, the smoothness and freedom from blemishes of the mold itself which shows up better in the finished product indicates T.L.C. We show you in the accompanying pictures how the steel is applied to a typical manufacturers mold so you can compare it with the CSY mold.

Types Of Molds

There are basically two types of hull molds — a two piece mold and a one piece mold. A two piece mold has to be used where there are undercuts in the hull such as are built into rub rails or tumblehome (see diagram).

One piece molds require that the hull have enough tapering downward from the sheer line (top) of the hull so it can be withdrawn from the hull.

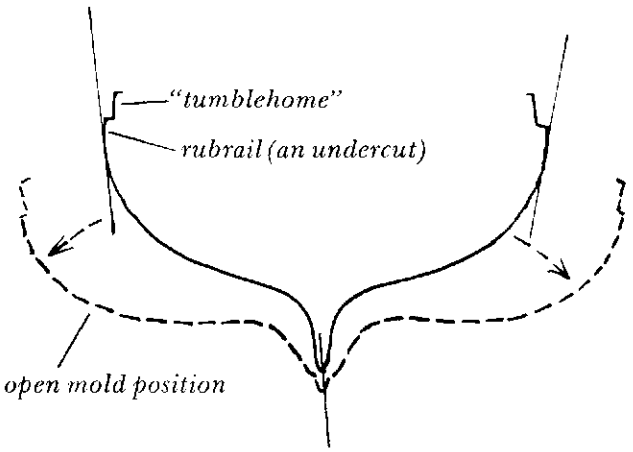
No matter what kind of a mold is used, a good layup can be done in it provided that the proper methods are used. However, time is money and short cuts are often employed to get the hull out of the mold fast and be on to the next one.

The best method for laying up a one piece mold is to set it upright, put a platform around it at the sheer level and drop men down into it on a suspended platform to lay up the various laminations. The advantage of the one piece mold is that the hull is laid up in one piece and thus the hull is all of one integral mass. The disadvantage of laying up the one piece hull as described here is that it is an awkward procedure for those doing the work and there is the possibility of not being able to properly roll out each laminate. Difficulty in working can equal poor workmanship. Another problem with the one piece hull is that it is difficult to get down into the narrow keel areas and narrow skeg areas. Thus, in this method, the hull must be designed to have wide keels or bolted on keels and/or skegs which complicates construction and increases the potential for leaks.

An easier method for laying up a one piece hull is to put it on a cradle that rocks it to one side while that side is laid up and then it is rocked to the other side to repeat the process. The proper procedure here is to lay up one laminate at a time each time the mold is "rocked" from one side to the other. However, to save time sometimes several laminates are laid up all at once, then if the mold is turned on its opposite side too soon after a lay up because it has not set and is still soft it will drop, causing horrendous ripples along the sheer.

The disadvantages of a two-piece mold have to do with procedures as it does with the advantages of one piece molds.

The Two Piece Mold



A two piece mold is partially laid up in the open position to get the skeg area properly laminated. Then it is bolted together and each side is carefully joined. Thus undercuts and "tumblehomes" can be built.

In either mold, it is very important to build up the laminates gradually and allow time for them to set in between laminate application and when they have set then the set laminate should be ground and sanded smooth for each layer is rough and unless it is properly smoothed before the next layer is applied, the chances for bubbles and voids and poor bonding is increased. In the two piece mold at the stem line where the two pieces come together each laminate that is applied *before* the two pieces are bolted together should be tapered — each laminate six inches away from the previous laminate. When the two parts are then bolted together and reinforced, the laminates that connect the two halves start with very narrow laminate in the center to very wide ones so that there is a constant bond and an extra thick bond.

We at CSY use the two piece mold and we shall describe in detail how the laminating is done and what to look for in a good lamination as opposed to a poor one. Suffice it to say that with a well-built mold, properly cared for, a good hull can be built in either a one piece or a two piece mold. The difference between a good part that comes from any mold and a bad one, is how it is done — the time and care that goes into it.

The hull and deck molds are the major molds in building a yacht. However, there are innumerable molds which are made to produce small glass parts which are made up in a separate department. Then these small parts are later added to the boat as it goes together — such small parts are cockpit seats, overhead hatches, counters, showers, ice boxes and the list goes on and on.

The Laminations

We shall say it again because it is so important, *no* part that comes from a mold can be any better than the mold. No mold can be any better than the amount of care and time that is spent to properly clean and wax it between the time a part is removed and a new one is laid up to begin again. There has to be enough wax on the mold before a new lamination is begun. If there is not, there can be a marriage between the mold and the part which can be disastrous. The mold is scarred forever, no matter how it later may be repaired. Speed equals screwing it up.

The first layer to go into the mold is the gel coat. Its thickness should be carefully controlled from 18 to 25 thousandths of an inch thick. If it is too thick it will cure unevenly, and may lift out of the mold or crack later under stress. If it is too thin it will craze or "alligator" being attacked by the styrene of the next coat. There are two types of gel coat — the organic and inorganic. The latter is more expensive (a third more), but it is harder and it holds its color and high gloss longer. A manufacturer can save here without the buyer being any the wiser — until years later.

The most lasting way to apply a boot top and whale stripe is in gel coat in the mold. Many manufacturers will not do this as it is more expensive and time consuming to have to apply masking tape to the mold and then to apply the hull gel coat color and later to remove the tape to apply the stripe colors. It is cheaper to paint these stripes on afterward which means more maintenance for the future owners — forever-better to a pay a little more now to have it gel coated permanently on your boat.

The fiberglass laminate consists of two parts — resin and fiberglass. The latter comes in three forms: a relatively fine glass fiber cloth, roving, which comes as a heavy and coarsely woven glass fiber fabric for strength, and mat which comes in various weights and consists of glass fibers pressed into a spongy mat which absorbs the resin to even out the thickness and the inconsistency between layers of roving eliminating resin-rich and resin-dry areas in the final laminate.

A method of speeding up the lay up and doing it more cheaply is to substitute for the rolled on mat and resin a sprayed on layer of resin and chopped fiberglass fibers with the use of a pressurized chop gun. Properly done, this can work satisfactorily. The problem is that more often than not, it isn't properly done which can lead to a very great unevenness in the thickness of the hull. An uneven hull is a weak hull. At CSY, we use a chop gun only once in the lay up being the next layer or skin out right after the gel coat. This has to go on fast and "hot" so it sets up fast to prevent the styrene in the resin from penetrating the gel coat causing it to "alligator".

The surest method for getting uniformity in the thickness of the lay up is to use mat between layers of roving instead of using a chopper gun which creates uneven and resin rich layers between the layers of roving. The mat is rolled on evenly by hand, layer by layer, of mat and roving to get an even density throughout the laminate. A spray gun is used to apply the resin between the fiberglass layers. It is of critical importance that not too many laminates are laid down in too short a time. Another cardinal principal is that at no time when a laminate has set — hardened — should another laminate be applied until the set laminate has been ground smooth. Why? One, the bond is better, but more important is that any "set" laminate is rough, very rough, (when was the last time you stuck your hand into a bilge to clean it — if you didn't cut your hand, you very likely scratched it.) Logic says that good bonds only happen over *smooth* surfaces and it is true. Thus the need for sanding each set layer of glass.

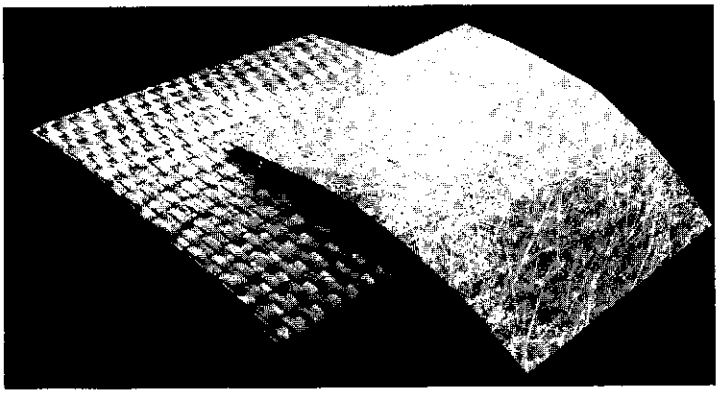
Where interior non-structural glass parts such as shower pans, or whole heads and counters are laid up (these are called IGU's in the trade, meaning Internal Glass Units), here it is acceptable to use a chopper gun along with the cloth and roving. However, too often these parts are made too thin and flexible. Where there is to be stress such as shower or on head floors, these should be reinforced with some sort of core to take the load.

Time is a key factor in quality glass work. Time for curing has to be allowed between layers of cloth and resin. If too many layers of laminates are applied in too short a time, the heat due to the chemical reaction of the resin setting builds up inside the laminate until it can get to several hundred degrees which can burn the mold and cause crazing of the finishes. At CSY, we take five days to lay up a hull or a deck.

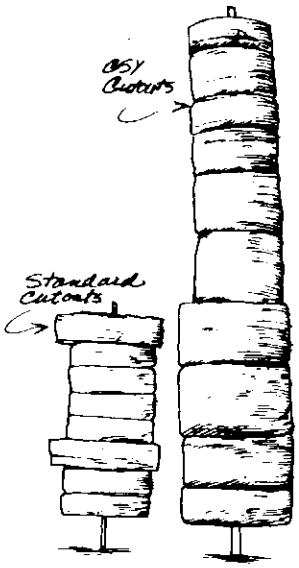
Our laminate schedule (the number of layers of mat and roving) for our hulls is twice what is recognized in the industry as an "adequate" lay up. At the turn of the bilge, our lay up approaches two inches. To bring this point home, we have strung out on a wire the cut outs for the through-hull fittings on our CSY 44. Beside it, we have strung out similar cut outs taken from the same place in the hull of a very reputable manufacturer. (See photograph)

Is it necessary? After you have bounced a few boats on a reef as we have in our chartering business, we don't have any doubt about it. For more than ninety-nine per cent of the time possibly this isn't necessary, but CSY yachts are built for that once in a lifetime when the ruggedness of the hull can save your boat — yes — and maybe save your life as well.

A thin hull, particularly in the larger boats, is a flexible hull. True, any hull must be flexible and "work", as it goes through the sea. However, too much flexibility means bulkheads that shift and doors that don't fit and will never fit because the hull shape is always changing. In a thin, flexible



A laminate is a layer of roving (the heavy weave) and fiberglass mat (the criss-crossed fibers which when soaked with resin makes a uniform layer between the layers of roving).



hull where the bulkheads are taped to the hull and there isn't enough room between the edge of the bulkhead to the hull, there is a tendency to create hard spots (rigid inflexible points) on the hull around which the laminate will flex and eventually delaminate resulting in structural failure. The flexing hull is also likely to break the fiberglass tape employed in attaching the bulkheads to the hull. If this happens, the bulkheads will shift which means a loss of structural support for the hull. Sometimes when a thin hull is out of the water, one can see the "sucked in" areas caused by the water pressure acting on insufficient laminate over an unsupported span. Not only does this indicate a scary degree of structural deficiency, it also detracts from the efficiency of the underbody from the standpoint of water flow and resistance.

However, in a new hull from the outside a two inch thick hull looks just like a ¼ inch thick hull to the unpracticed eye. You should ask any manufacturer in whose boat you might be evaluating to provide you with cutouts — all the cutouts — where the through hull fittings are to be placed, as well as the cutouts from the deck mold for the ports. Also look at the thickness at the sheer. Look for voids — pound the hull and listen for voids — yes, you can hear 'em!

A really good glass job should come out of the mold glassy smooth and without a defect. You should be able to sight along the hull and the light should be evenly reflected along the surface. Dullness in the finish, blisters, crazing, ripples, etc., indicate poor glass work. If such defects are present when the part comes out of the mold, they can be patched by the manufacturer so you can't see them now; however, those patched areas will weather differently and will show up later in use. Print through (being able to see the rough texture of the underlying roving from the outside) should be minimized or non-existent. You can easily see it.

If you have any doubts about the glasswork being done for a boat, you may be looking at, you can take some of the cutouts which you should request from the manufacturer, and have the sections tested. The sections can be sent to:

Reenforced Plastics Testing Laboratory
212 Burger St. Lindenhurst, N.Y. 11757

These people belong to something called the ASTM — The American Society for Testing Materials — if that means anything to you, but anyway, they don't have any axes to grind.

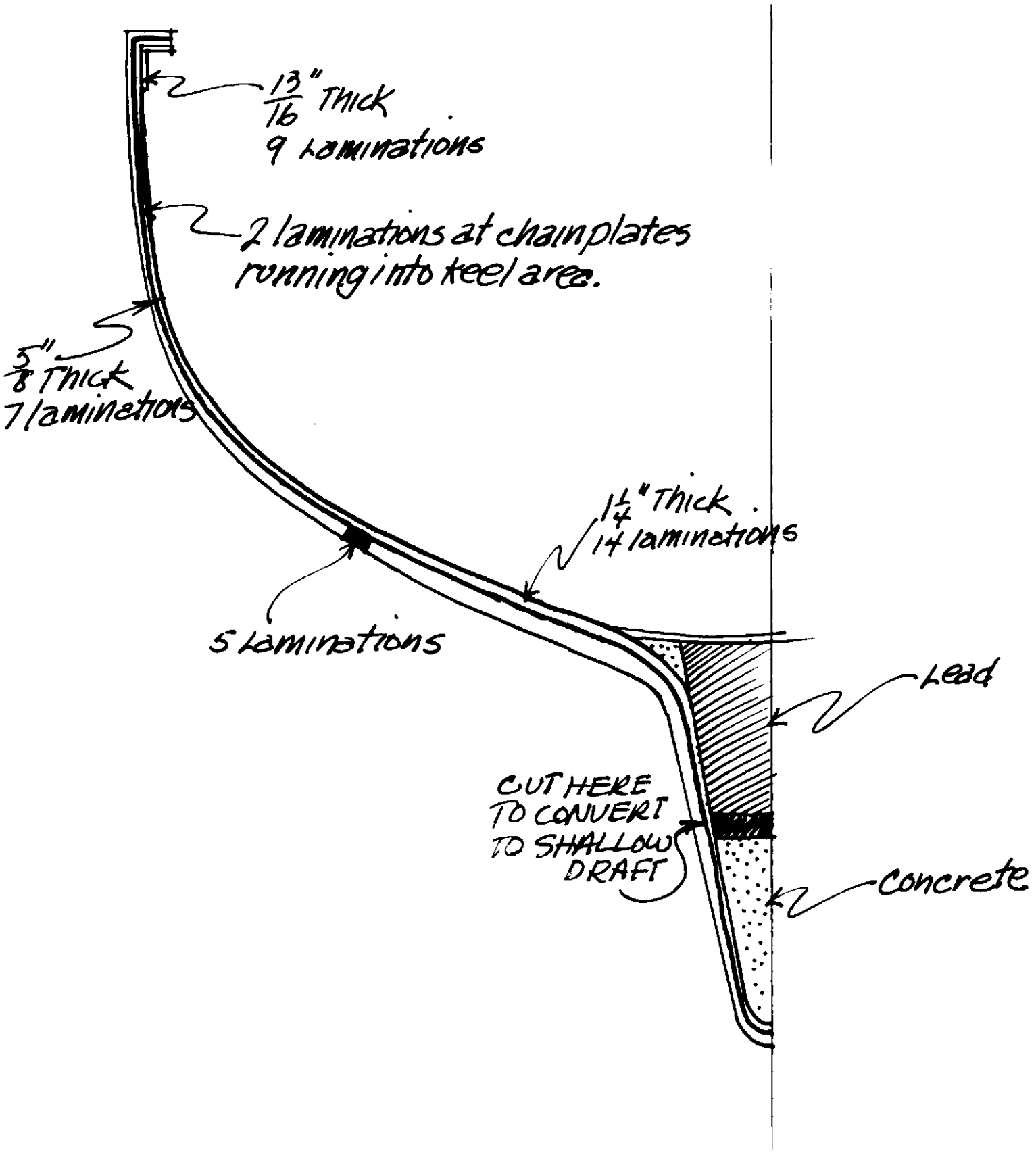
They can test your samples for flexural strength, tensile strength, compression strength, sheer strength and they can give you the resin-to-glass ratio. Each test for each category costs $12.00 (1977). To get an accurate reading at least three tests in each category is required. Five is recommended. However, it should not be necessary to do more than three tests in each category and these three categories should be sufficient — flexural strength, tensile strength, and resin-to-glass ratio. This last is determined by burning the sample.

We have not discussed glass-to-resin ratios although that was the big how-do-you-do in the industry ten years ago. The reason being that at that time, the boat industry was so young that no one really knew what they were doing or why. Some years later, there are now some standards and to put it into a layman's understanding is confusing. Why? Because put too much resin in the formula and the result becomes brittle like glass, because there wasn't enough glass — fiberglass. Of course, fiberglass doesn't have the properties of glass as we know it. It isn't brittle — it is supple but strong. The problem in fiberglass fabrication is to attain the right ratio of the flexible glass fibers in their various forms to the less flexible resin, the marriage of which should be of concern to every yacht owner as it might have been to his forebears who chose the wood to build his yacht.

We have subjected samples from both our hull and deck laminations to the major tests — flexural strength (breaking point); tensile strength (breaking point on stretching); interlaminate sheering strength, and the percentage of glass-to-resin in the laminate. We are comparing these values in the accompanying table with the guidelines of the Society of Naval Architects with a high and low range of values for *hull* construction. The lower figure is the absolute minimum acceptable value. The most significant figure is the flexural strength and is the figure most frequently used to determine strength. We are giving you comparable figures for ferro cement, mahogany plywood, steel and aluminum. We are also comparing our figures with those of a hull of a major sailboat manufacturer who uses a chop gun instead of mat in the lay-up. The only other comparable figure we were able to obtain was a reading of 21,800 psi (pounds per square inch) for the hull of a yacht made in Taiwan. You will note that our CSY deck is quite a bit stronger than most hulls.

	CSY HULL	CSY DECK	SOCIETY OF NAVAL ARCHITECTS	A MAJOR YACHT MANU-FACTURER	MAHOGANY PLYWOOD	STEEL
Flexural Strength	35,900 psi	30,900 psi	25,000 to 30,000 psi	13,300 psi	5,000 psi	60,000 psi
Tensile Strength	21,400 psi	13,400 psi	18,000 to 25,000 psi	12,700 psi	5,000-6,000 psi	60,000 psi
Interlaminate Sheer Strength	1,800 psi	1,400 psi	1,000 to 2,000 psi	1,500 psi	—	—
Percentage of Glass Fiber to Resin	45.2%	40.1%	30.40%	41.9%	—	—

A lamination-one layer of fiberglass mat and one layer of fiberglass woven roving.



This is a CSY cradle—very elaborate and expensive to make but the boat is firmly supported at every 4-5 feet so as the boat is built it will retain its shape—thus, every bulkhead fits and the deck will fit and the doors will always fit.

"A really good glass job should come out glassy smooth and without a defect."

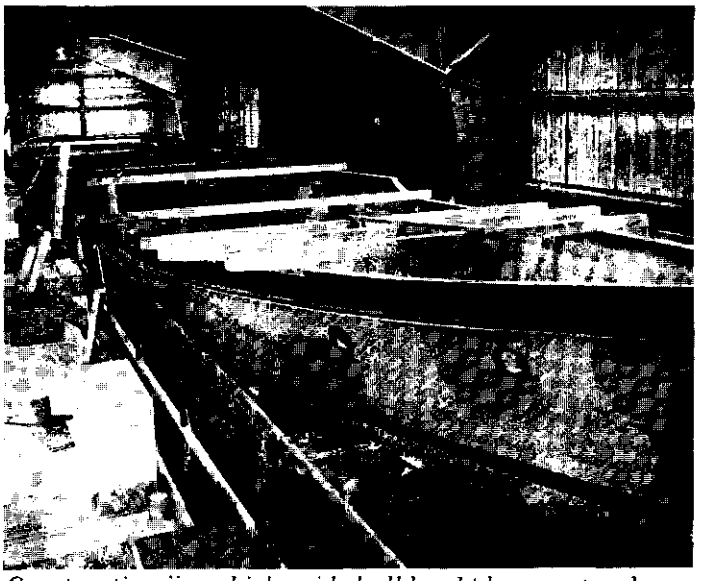
Until now we have talked only of the hull fabrication and the IGU's. The other most important part of a boat is the deck. The mold is first gel coated and laminated upside down on a well-supported steel frame set on wheels.

Most manufacturers lay up two laminates (a laminate is a layer of 1½ oz. mat and 24. oz. roving) over the gel coat and then put in a core material — more commonly plywood squares or end-grain balsa, or it may be foam. Then either a prefabricated headliner from a compatible mold is placed over this or it is simply covered with vinyl with wooden strips which can easily rip off or get dirty. If a core material is used, be sure to check and see that the core material is used *all over*. Sometimes it is left out on the side of the cabin house as strength is not necessary there. However, if ports are to be installed there and unless they have a solid base, it is very doubtful whether a good weather-tight seal is possible. Wherever a winch is to be attached or a stanchion or a block or anything which will sustain stress, a wood reenforcement should be inserted between the outer layer and the headliner.

One of the problems with using a coring material is the danger of delamination. One has to be sure that there isn't dirt or moisture in or on the core material when it is applied and that the resin soaks all the way through. Another problem is that there is not always a complete bond or there may be an uneven bond so that there is the possibility of water getting into the core and causing it to rot or having the water working its way from one area where it comes in to a completely different place where it might come out. Properly done, however, both strength and light-weightedness can be achieved with the use of core materials and properly done there shouldn't be any problems. The main problem we find, is to find a way that is the least subject to human failure. So what is the best way?

At CSY, we make our decks entirely of hand laid up solid glass all over up to the thickness of most hulls. The decks are gel coated and then skin coated with a chopper gun using a fast and rich resin mix followed by three layers of 1½ oz. mat laid on by hand. This is then followed by one laminate (a layer of 1½ oz. mat and a layer of 24 oz. roving) over the entire deck. This is allowed to set and then sanded. The hatch dams (coamings or lips as we have previously written) are not covered but are filled in absolutely solid with a low exothermic resin and aluminum trihydrate. The deck is then covered with four laminates of glass to give a ½ inch thickness. Two more laminates are put into the cockpit for a thickness of ⅝ inch.

This process does allow for some slight flexibility, but we have built-in stiffeners. Its strength is impregnable so that the deck is as rugged as the battleship strength that is in the hull. It adds quite a bit of weight over what the sandwich types of construction would be which is its greatest disadvantage, but we aren't racing, are we? — We are cruising — a different ball game. However, with solid glass construction all over the deck there is no need for added reinforcements for winches, blocks, travelers, gallows frame, or anything else now or later. The solid glass is stronger than any sandwich. Thus, with backup plates, 3M 5200 sealant, and stainless steel bolts, anything that we attach to the deck is permanently solid, rigid, and can't work or flex to cause leaks.



Construction jigs which guide bulkhead placement and force every hull into exactly the same shape.

Ballasting

After the hull is removed from the mold, it is first placed on its special cradle. These cradles are a very important element for the uniformity in the quality of CSY yachts. These cradles are formed exactly to fit the hull at close intervals. These supports were made on the original plug so that the hull form is exactly like it is in the mold.

Even with the super heavy layup, the forty-four by 14 foot by 11 foot bulk of these hulls do and can flex as they are moved. Even out of the mold, a hull continues to cure and change dimensionally particularly in the first month or so during the time the boat is being assembled. These special cradles that we use at CSY force the hull to keep its original shape all through the assembly process.

Manufacturers who have a zillion models running through their plants use adjustable cradles which don't do much more than hold the boat up and it can flex anyway it wants to. This is why bulkheads don't fit. This is why everything that seemed to fit in the plant goes awry when it gets in the water — joints open up, doors don't ever fit, etc.

These cradles do cost real dough, but they have saved us so much in being able to jig our parts so every one fits and stays fitted for good that they have more than paid for themselves.

Once solidly and immovably set in its cradle, the hull moves from the glass department to the next station to be ballasted — 13,000 lbs. of lead and concrete. In our diagram we show you how this is done on our CSY 44 models which come in two versions — deep draft 6'6" and shoal draft 4'11". If we are building a shoal draft model, we block out the mold to A on the diagram and first lay up a thick covering of glass along the bottom of the keel as an integral part of the hull and then place the lead which is cast in ingots to fit the area — more lead is needed to get the required sailing stiffness than in the deep draft model. The lead is set into a resin mix and surrounded with concrete so that it is forever bonded and

sealed to the hull and can never move. Care must be taken so there are no voids around the ingots. *Then* over that is placed a thoroughly bonded thickness of glass to seal off the ballast area. Thus, if in the almost impossible event, the keel is torn off, the boat will still float. There are three thicknesses of glass in the keel area to take care of *any* eventuality.

In the deep draft model, the original hull is molded to the 6'6" draft to B on land diagram. This is first filled with 3200 lbs. of cement to the 4'11" (shoal draft) level where a full thickness of fiberglass is installed then the lead, more concrete filler, then the whole thing is covered with fiberglass.

To get maximum performance, the deep-draft model is preferable. However, in a lot of places like Florida — Tampa Bay for one — the Keys for another, the Chesapeake and parts of Texas and Louisiana require shoal draft vessels. Right — so no manufacturer dares produce a boat with over five foot draft because he would close himself out of those markets.

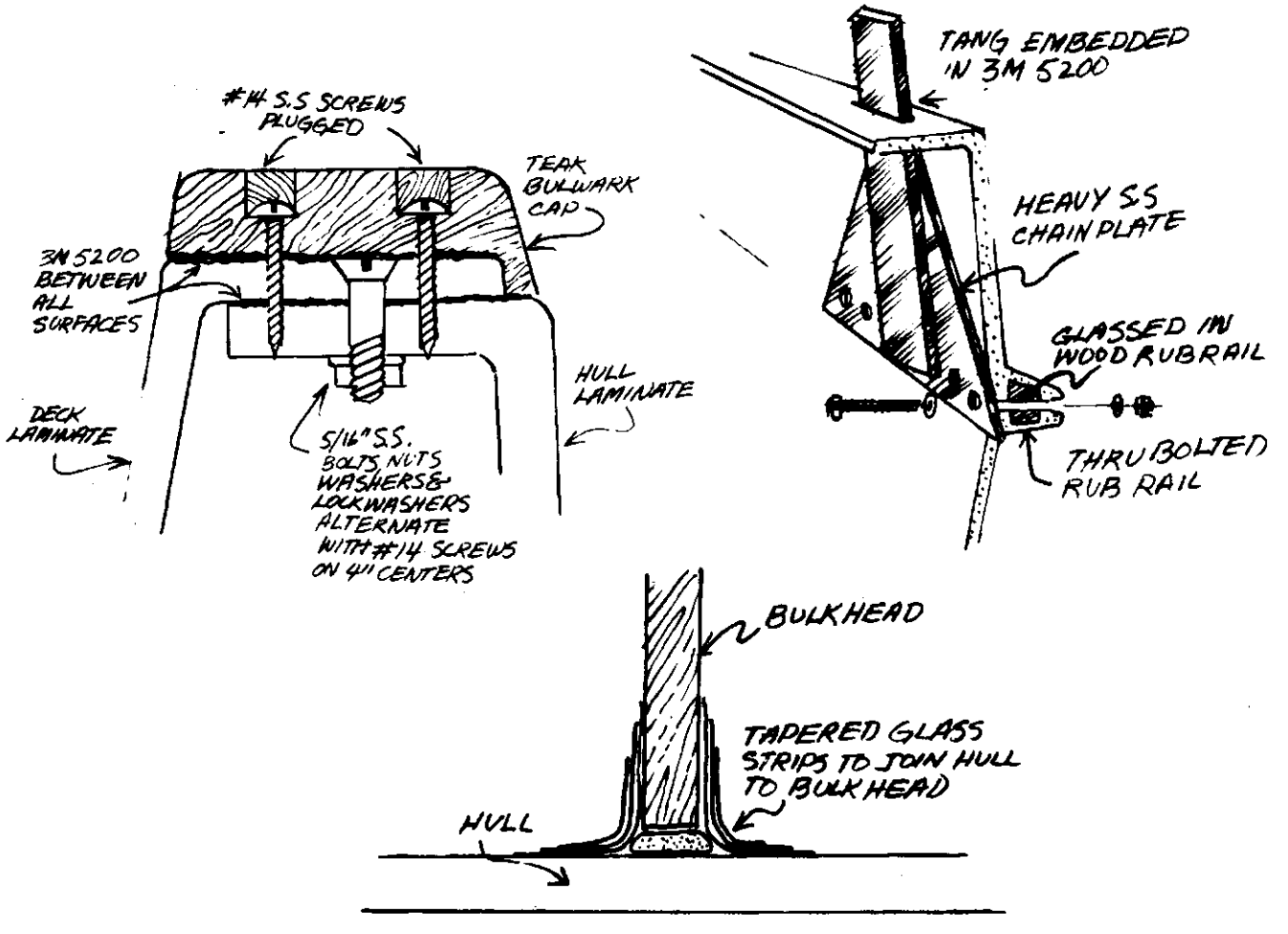
We have the same problem in chartering. The deep draft vessel is preferable in the Caribbean for its somewhat better sailing qualities and stiffness. However, when we finally bring them back north, the marketability could be affected because of the 6'6" draft.

We saw no reason why just because you have a 6'6" draft you have to be married to it forever. So back to the drawing board and we came up with the arrangement you see in the accompanying diagram. If we make the ballast in two parts as shown in the diagram, one can, if he wishes, score the keel at point A and cut it off and go from a 6'6" draft to a 4'11" draft — voila — no big deal. To get optimum sailing performance after the operation, some lead would need to be added, but this too can easily be done over the existing ballast. The same system is used in the CSY 37 to get a 4'8" or a 6' draft.

Interior Assembly

After ballasting — if you are in the factory — what appears as the biggest bathtub you ever saw, our "bare" hull, is rolled around to go onto the assembly line. At this stage with nothing in it, the hull weighs some 17,000 lbs. for the CSY 44's. She now starts down the line with five days at each station — it takes forty-two working days from the time a CSY 44 is started until it pushes its proud nose through the separating doors into its first sunshine and lifted up out of her special cradle and down for the first time into *her* element for which everything has been pointing to — the water.

We can't bore you with every single detail of the build-of our boat for that would become another book, but we do want to point out what you should be looking for.



The hull now goes on the production line. It has eight stations. On each station, there are several men. Each boat is on each station for five days. For each hour for each day for however long the boat is scheduled to be on a particular station, each man has an hour-by-hour assignment of what he has to accomplish. Having said that with 275 men spread out throughout a plant, there can only be efficiency if each boat is exactly the same as the last. Picture the chaos if each boat has a long list of "extras" or changes posted on its bow as is so commonly seen in the usual boat production line. This results in chaos and inefficiency in purchasing and in chaos in the routine at each station. We have designed and built a complete boat. All of what is on that boat is necessary. Anything that needs to be added can be done afterwards. If we are right, and we know we are, we can produce the boat we say we can at the price we say we can — if there are no changes.

Having said that now let's get back to building our CSY yacht.

So in its special cradle, CSY starts building your CSY yacht.

Special aluminum jigs are placed on each hull (which fit on the hulls precisely the same because of our special cradles) to exactly place the bulkheads. Each bulkhead is jigged to be cut like every other one because they fit — because then there can be no hull warpage. Space is left between the edges of the bulkhead and the hull and filled with airex foam to allow for movement, then the bulkheads are glass taped into place. The next time you are at a boat show as you should sight along any hull, see if you can see the "knuckles" where the bulkheads have made their mark on the hull — being too close — no room for movement.

The athwartships and longitudinal grid under the cabin sole, plus the bulkheads, plus the structural parts fore and aft which are all taped to the hull add up to getting good dependable reenforcement for the boat, where nothing can shift — doors fit and stay fitted. This is a boat you can take to sea because those who built it know what ole King Neptune can dish out. They've been there!

The boat you see on the assembly line is the center of a web. Funneling into the boat on the line is the product of the mill which prefabricates over a hundred wooden parts — drawers, trim, doors, and whole wooden sections. Other parts come in from the supply room — from the small parts glass department — each day each boat is on the line there is a kit prepared for each man at each station from every one of these departments.

When a diesel engine is delivered to our plant, it is placed on a separate station where all the special bits and pieces that CSY has specified for its engines are installed. The engine is started up and adjusted so that we are sure that everything is in working order *before* it gets into the boat. Brand new engines as they come from a supplier are as often as not in need of being tested and made bug free. This becomes an expensive hassle after the engine is installed in the boat and is in the water.

The engine is dropped in to be set on its fiberglass covered wooden heavy engine bed. This bed has to become an integral part of the boat which can keep the engine properly aligned with its shaft and the stuffing box which is the gland arrangement where the shaft goes through the hull.

The extra heavy chain plates are bolted through the rub rail with five stainless steel bolts which are embedded in the rail (see cross section). No possibility of leaks or shifting here.

Plumbing, wiring, everything on the boat is completed as much as possible before the boat is finally ready to be decked. Our "house" is ready for its "roof".

Decking

While the hull is being filled in and the interior installed, the deck has, in the meantime, been molded and is sitting at its own station where the deck hardware has been installed. The teak trim around the house and on the cockpit coamings has been put in place. The cutouts are made in the sides of the house cabin to have the bronze ports sealed and bolted in place. The handrails are put in place. The heavy hatches are hinged and the stainless steel springs and hold downs are put in place. In other words, the deck is pretty much done when it is put on the hull.

There is no more critical part of a boat's construction than the hull-to-deck joint. That is where the marriage of the hull and deck is achieved. The entire structural integrity of the boat is dependent on how well this is done.

There is usually a flange extending inboard all the way around the hull to which the hull is to be attached (in some boats, the flange extends outboard from the hull). This flange should be wide (at least 2-3 inches) enough so as to allow for any mismating between the hull and the deck.

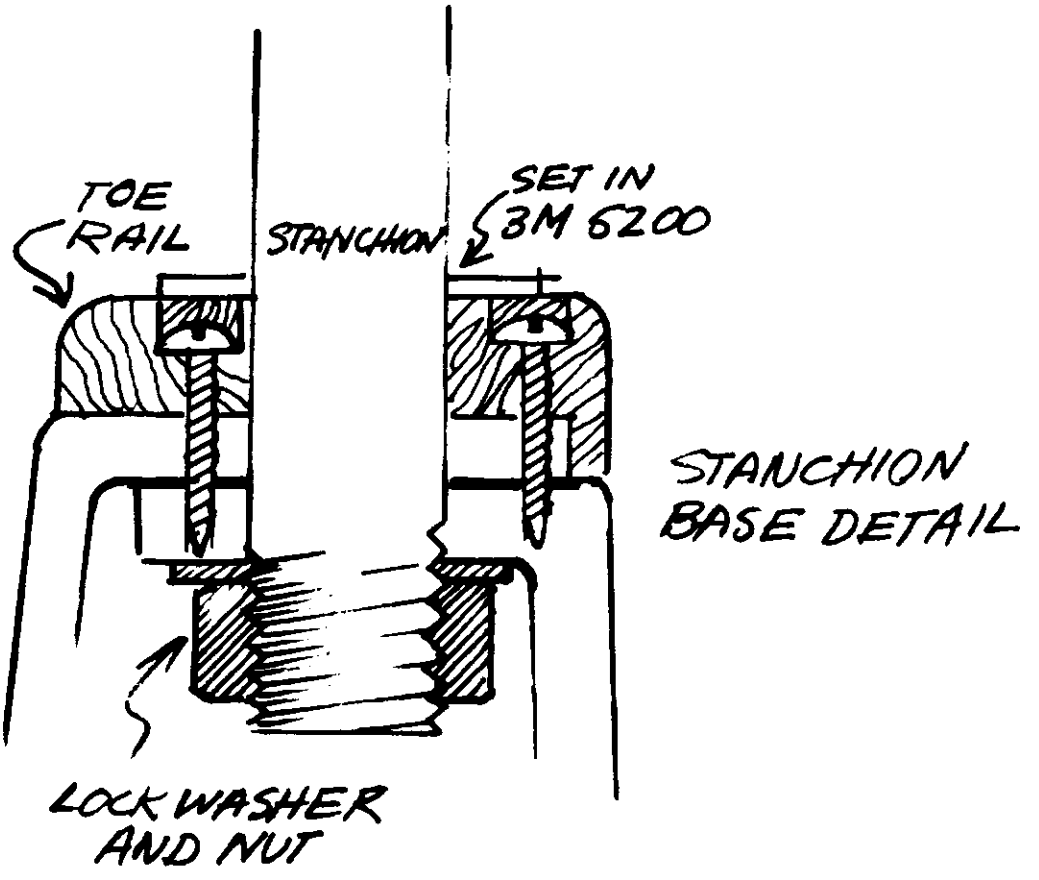
Whenever it is said that a laminate is carried to the sheer it is also carried above and beyond to the flange which is to wed the hull to the deck so the hull flange at the point of marriage to the deck is equal in thickness to the hull at that point.

The way the two are put together is of the utmost importance to the potential boat buyer. Here are some of the ways that this is accomplished and for you — as a boat buyer — to evaluate. Here goes:

1. Drill holes and use stainless steel rivets. Biggest disadvantage is that this does not allow for any positive means to securely close any gaps that may exist between the two parts. In any event, the fasteners should be stainless steel — nothing else.
2. Drill holes and use screws alone. Here the purchase between the two parts can be lost as the boat works or flexes in a seaway.
3. Drill holes and place wood under the joint for the screws to get a purchase into. A better method than above, but wood can and will eventually rot and it can also loosen as the boat flexes in use.
4. Drill holes — place heavy stainless steel bolts with nuts to tighten down and lock washers. Best and surest method.

Of course, any of these methods should have in addition, a flexible sealant placed in the joint — we think the best sealant is 5200 made by 3M.

At the CSY Yacht Corporation, we use a combination of the above (see diagram). The joint is first sealed with 3M 5200. Then the hull and deck are carefully aligned and held in place with #4 stainless steel screws set every eight inches. This is followed with heavy stainless steel 5/16" bolts with

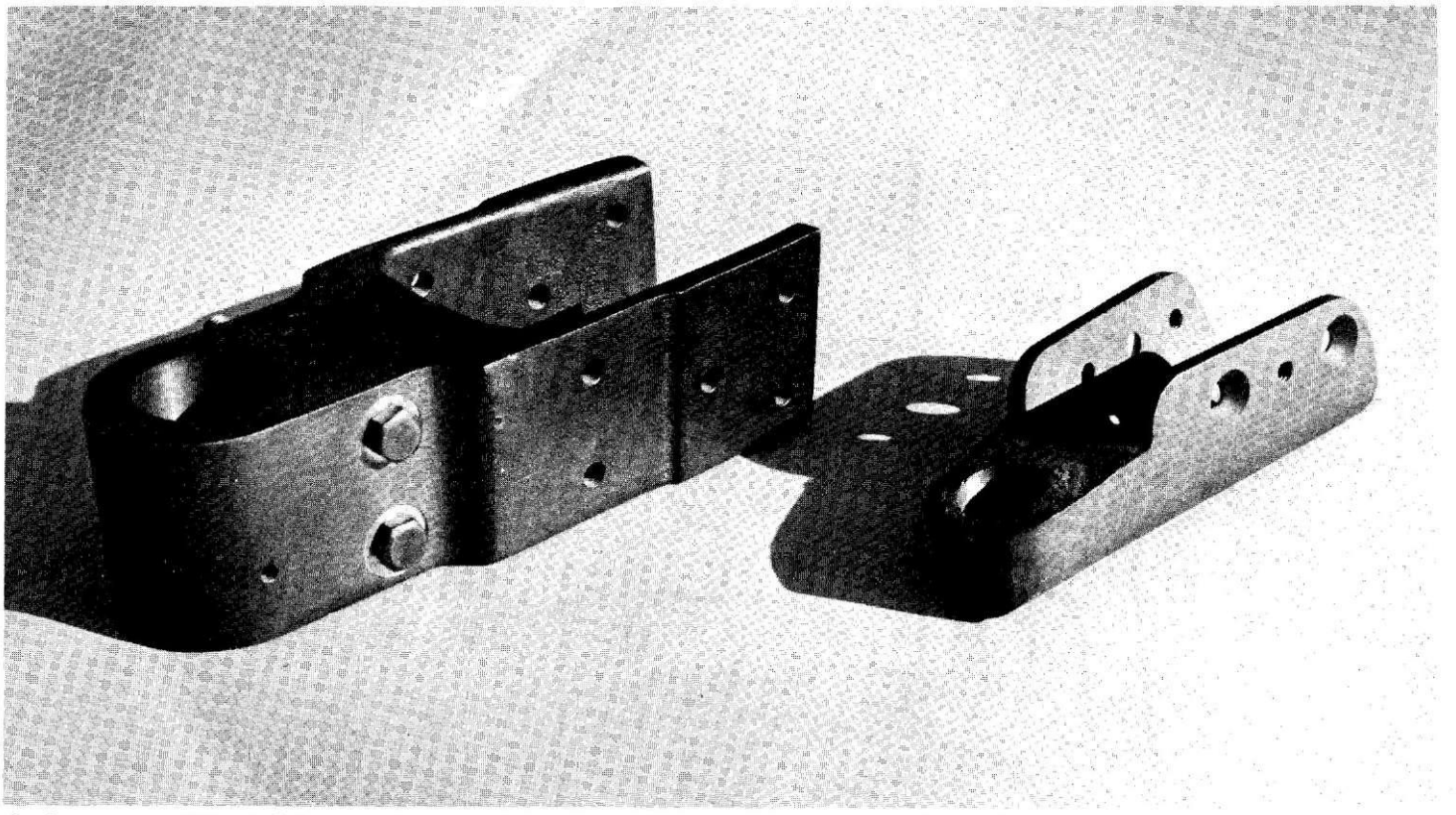


lock washers and nuts set on eight inch centers in between so there is a fastener every four inches. Over this is placed the teak toe rail which is also screwed through the joint every 12 inches with teak trim on the outside to further seal the joint. There may be different ways of making a hull-to-deck joint, but we can assure you there is no better way.

Stanchion bases are usually installed on the deck with four bolts sealed with a backup plate under the deck. With the inevitable flexing as the stanchions are put under stress, there are leaks. At the CSY Yacht Corporation, we have devised a new way — a leakproof way, and a stronger way of installing our stanchions (see photo and diagram).

Some say sailboats can never be dry — we dispute that. One of the reasons sailboats aren't dry is poor hatch construction. The lip or coaming or dam that is built on the deck to receive the hatch is usually made low — as low as one inch and one inch wide or more. This is done because it is easier to manufacture. Then flimsy hatches are put over those low coamings which have no weight and are flexible, so even if proper gaskets are installed, they cannot be sealed. Another ploy to save money is to use the metal hatches now flooding the market which is even easier for the manufacturer to use because he has no lips or coamings to mold in, he simply has to cut a hole in the deck and bolt it on or screw it on. These hatches are usually made of aluminum and have a tinted plexiglass top. Aluminum corrodes. However, almost without exception, these hatches have very little flange around them and therefore little overlap and therefore have to depend on the gasket and dogging the hatches down to attain a seal. When the gasket goes, and they all do, the leaks start.

At CSY, we have designed on our decks high dams to receive hatches which are as high as four inches. Then we build *heavy* hatches which rest on the tops of the dams (not on the deck) to make a seal where there is a gasket. Even if the gasket doesn't seal or later deteriorates, there has to be four inches of solid water on deck before a leak can begin — even if the hatch is not dogged down — and how often do we forget to do it? A thick and heavy hatch is a rigid hatch which seals all around when it is dogged down and the Moonlite marine hatch holder is adjustable so that you always get a seal.



Gudgeon on a CSY 44 (left)–the Gudgeon for a popular 41 foot production yacht (right).

It is difficult to think of anything on any boat — sail or power — that is more important than the engineering and integrity of the rudder. The engineering for this installation needs to be considered in two parts. First is the construction of the rudder and the rudder post. The second is the attachment of the rudder post to the boat. Our CSY 44's weigh almost 20 tons loaded. With this kind of weight being thrown every whichway in a seaway, it doesn't take much of an imagination to appreciate the stresses that are exerted on the rudder and its attachment. We are using solid bronze stock 2¼" in diameter for the rudder post. They are bronze to match all the other metals which are under water to minimize electrolysis. A rugged rudder post isn't enough, it has to be solidly attached to the rudder itself. In the enclosed photo, you can see the rugged framework that is embedded inside the rudder not only to attach it to it, but to reenforce it. It is then embedded in *solid* fiberglass not foam as is sometimes done. Some manufacturers use light rods to imbed in the rudder. Some try to save money at the possible risk of your life by using tubing instead of solid stock for the rudder post. This rudder assembly is attached to the boat by a gudgeon at the bottom which is through-bolted to the skeg and at the top is a bronze stuffing box. You don't have to be an engineer to see how rugged these two pieces are on CSY yachts (see photos). Anything less than this is playing with the life of your boat — maybe your own.

Our marine architect — our engine supplier — our own engineers, even the makers of Perkins engines all agree that a one inch solid bronze shaft for the engine is perfectly adequate. Our own mechanic in Tortola, Ashton McCall, who has been servicing our boats for ten years insisted that the diameter be no less than 1½". What's the story? Who is right? Ashton doesn't do his figuring on paper — he learns by what gets results. Here's how Ashton came to his conclusion.

In the islands, as indeed off our own coasts, are fish pots and lobster pots which are attached with a line to a buoy to mark its location. No matter how good a skipper is, it is inevitable that sooner or later he will run over one of these fish pots and foul his propeller. Line is forgiving — it is elastic and in such an event either it is cut or it stops the engine without too much wrenching. However, the fisherman who has this happen is not very happy. Thus, the island fisherman took to using wire to run to their marking buoys instead of line. If you fouled a prop on such a wire, it is not as forgiving as line and stops the prop with enough authority to not only shear the shaft, but to throw the engine out of line and even wreck a transmission. Ashton replaced the until-then acceptable one inch shafts with 1¼" shafts. It still happened, but not as badly. He finally went to a 1½" shafts — no more problems.

This is a typical example of what is acceptable on paper or in theory does not always work in practice. Admittedly, the chances of running into such an object in the sea may not be too great. However, the difference in cost is infinitesimal when compared to the cost in time and money of replacing a shaft — realigning an engine and possibly replacing a transmission. Like so much else that we do at CSY that we are always trying to explain why we do it — we know why we do it, but it is hard to get it across to others. That is why we write this book. That is why we want *you* the buyer to know what you are buying and why you are buying it. And that is why we want you to come to our plant to see how we build our boats.

Quality Control

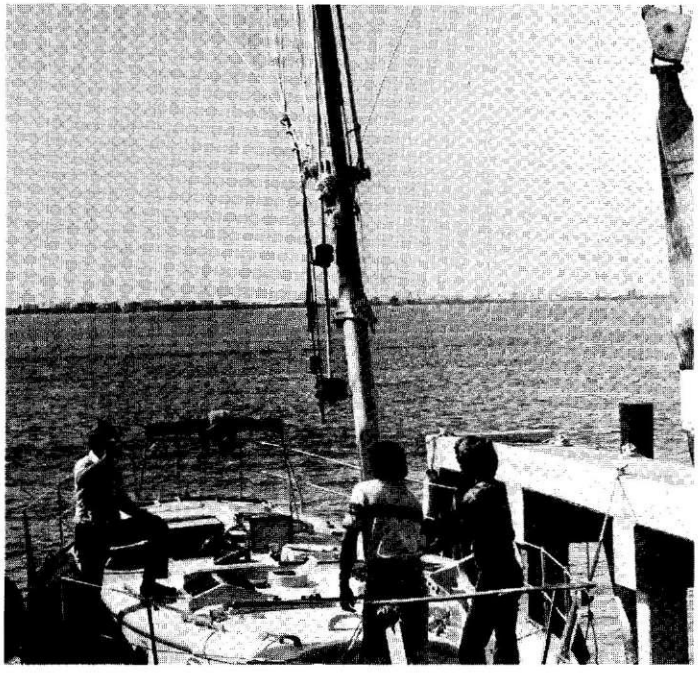
Within the scope of a book like this, we can only touch upon some of the things to look for and to look out for in yacht construction. Later in this book, we shall go through the specifications in greater detail. In every step of the way, we have only one standard — the best.

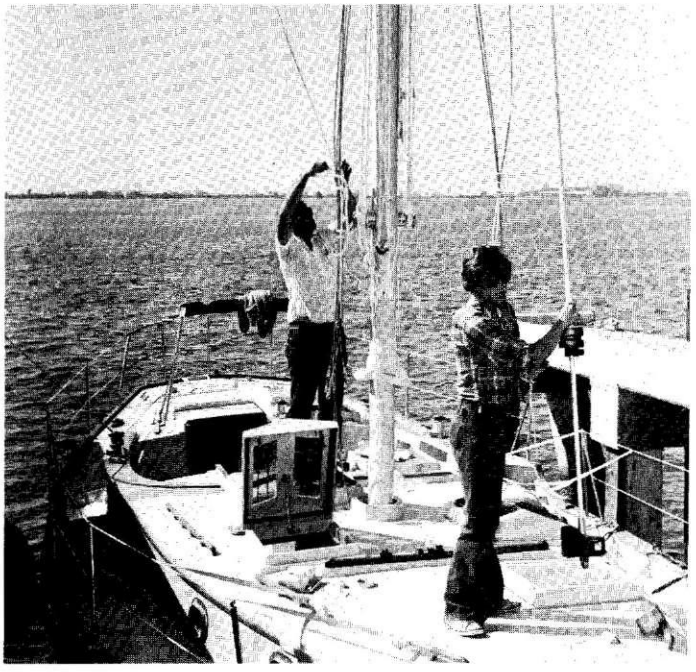
When the boat is ready to go out the door, the boat is held up for one whole day for its final inspection. This is done by means of a multi-page checklist so nothing can be missed.

However, quality control doesn't begin at the end of the line. It goes on every day that the boat is on the line while it is being built. The boats are built on eight stations with five days on each station. At the end of each day on each station, there is a quality inspection to be sure everything is being done to our standard and to meet specifications.

And that isn't the end. All CSY yachts are commissioned in the water right outside the door of our plant in Tampa Bay. This gives us the opportunity to test every through hull fitting for leaks. Every system on the boat is checked thoroughly, for proper installation and proper operation. The engine is run and given a 24-hour check by the Perkins people. All the rigging is properly tuned. The sails are bent. The tanks are filled. The batteries are charged. The refrigeration system is fired up. She is totally readied and is taken for a test run under sail and under power. With all systems checked and running, only then are you and/or a delivery crew put aboard to sail her on her own bottom to your front door. By the time it arrives your yacht will have been thoroughly shaken down and as near as is humanly possible free of the bugs that so often affect new yachts.

In the next section on equipment we shall be concerned with different kinds of metals. We shall be pointing out why we use bronze, stainless steel and aluminum for our hardware and our fasteners. Except for a few kinds of stainless steel with a low nickel content, all of these metals are non-magnetic. Therefore, when you are going to a boat show or doing your own survey of a yacht that you may be evaluating, a magnet is a might handy thing to have in your pocket to test whether that piece of hardware you are looking at doesn't contain a high iron content hidden by some chrome plating.



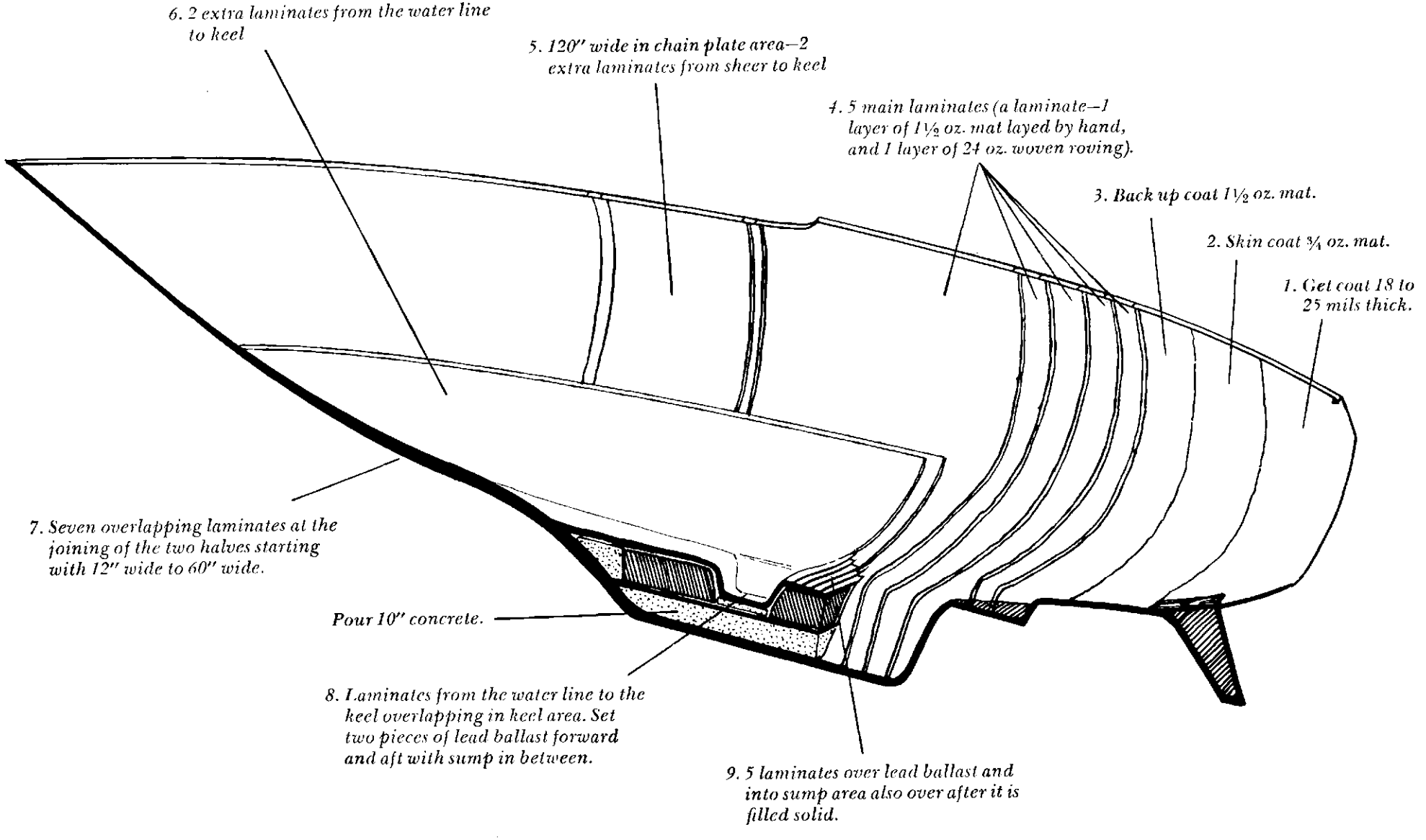


Stepping mast.

CSY

CSY Yacht Corporation

Detailed Description of the Lamination and Ballasting of the CSY44 Hull.



First Day

A. Mold preparation. Clean, polish and wax mold. Tape off flanges where the two parts of the mold will be bolted together. (This process is usually done the night before). Put masking taping over whale (sheer) stripe and boat top stripe.
B. Spray on hull color gel coat over entire surface of the mold 18-25 thousands of an inch thick (1).
C. Remove masking tapes for boot top stripe and whale (sheer) stripe and spray on appropriate color of gel coat.
D. Spray with chopper gun with a fast setting rich mix of resin to the equivalent thickness of ¾ oz. mat. This is called a skin coat (2). Let set. This is the only time a chop gun is used in the hull lay up.
E. Sand the entire surface after setting.
F. Hand lay 1½ oz. mat. This is called the back-up coat (3). Allow to set overnight.

Second Day

(From here on out when we refer to a laminate it means two layers — a layer of 1½ oz. mat and a layer of 24 oz. woven roving all laid up and rolled by hand.)

A. The hull is completely ground and sanded.
B. A base laminate is applied which is allowed to cure. (When a laminate is placed in one half of the mold — while it is curing, a laminate is placed in the other half so no time is lost but there is time for the all important curing time).
C. The above is allowed to cure on each side (port & starboard) and then is sanded. While the curing is taking place the rub rail is filled with 18 inch wooden strips which are set in a resin and fiberglass mush to make it flush with the hull. This is so that if the rub rail is ever subjected to stresses strong enough to tear it off, it will not disturb the laminate underneath (4) from which it is separate.
D. Two more laminates are applied at the same time over the entire hull. It is allowed to cure overnight. At the end of the second day there have been applied the gel and skin coat, back-up coat and three laminates.

Third Day

A. The entire hull is sanded.
B. A laminate 120 inches (5) wide is applied from the sheer to the bottom of the keel and while it is still wet another laminate is applied over the whole side.
C. This is allowed to set and is sanded.
D. Another 120 inch wide laminate (5) is applied from the sheer to the bottom of the keel and while still wet another laminate is applied over the whole side. (This as with other laminates are tapered away from the stem line.)
E. Two additional laminates (6) are applied wet from the bottom of the keel to six inches above the water line. This is all allowed to set overnight.

At the end of the third day there are as follows:
Chain plate area below the water line — 9 laminates.
Other areas below the water line — 7 laminates.
Other area above the water line to the sheer — 5 laminates.
In addition to the gel coat, skin coat and back-up coat.

Fourth Day

A. Grind and sand the surfaces of both halves of the mold and bolt the two mold halves together.
B. Center seam reenforcement to join two halves together is applied over the entire stem from the bow sheer to the stern sheer and to the bottom of the keel. Seven laminates (7) are applied - - the first being eight inches wide and centered on the stem line and rolled into place each successive laminate becomes wider until the last one to be applied is 60 inches wide. This is to insure an absolute and a sure bond. This is all done wet and rolled on by hand not using a spray gun and it is allowed to set overnight. At the end of the fourth day, in the most vulnerable area on a boat — the stem — there are now over the chain plate area — 27 laminates.
Other areas of stem below the water line — 25 laminates.
The stem above the water line — 23 laminates.

Fifth Day

A. The mold is unbolted and the two halves of the mold are broken away. The hull is then lifted into its cradle shaped to cause the hull to keep its true form. The hull stays in its cradle until the yacht is completed.
B. The hull and cradle are then moved to the ballasting station where the hull is leveled fore and aft and 2,300 lbs. of high density concrete is poured into the keel area to a height of 18 inches (8) This is allowed to set overnight.

Sixth Day

A. Entire area to 6 inches above the water line is sanded.
B. Seven laminations (9) are laid on one side from 6 inches above the water line to and over the cement ballast where it is overlapped with the seven layers to be added tomorrow.
C. A piece of plywood is glassed in over the skeg area. A hole is cut in it and a low heat build up resin with aluminum trihydrate is poured into the skeg to fill it up solid. Then five laminates staggered out to each side is applied to thoroughly seal it off from the rest of the keel should it ever be torn off (10).

Seventh Day

A. Sand area laminate over cement ballast.
B. Seven laminations (9) are laid from 6 inches above the water line on the opposite side laid up yesterday and overlapped yesterday's lay up. The primary addition now beside adding seven laminations port and starboard up to the water line in the area of the keel a new "bottom" has been formed over the cement ballast of 14 laminations so that in the future if it is desired to cut off the deep draft, there is a hefty stem line at its bottom. If a shallow draft vessel is ordered at the beginning, the 18 inches at the bottom of the keel is simply blocked off and construction proceeds leaving out the last three steps but adding more lead in the next step.

Eighth Day

A. 10,000 lbs. of precast lead pigs (11) are lowered into place — the larger one forward and the smaller one aft — these are set in a mush of resin and fiberglass. The space in between is to become the extra deep huge sump.
B. High-density concrete is poured fore and aft of the pigs with a four-inch thick slab of concrete poured in between (12) which becomes the bottom of the sump. This is so that these super heavy lead ingots cannot ever possibly shift. The concrete is allowed to set overnight.

Ninth Day

A. The laminates in the keel area to above the water line are ground and sanded.
B. Five laminations (13) are laid on one side from 6 inches above the water line over the lead and sump ballast. Let set overnight.

Tenth Day

A. Grind over sump and ballast.
B. Apply five laminations (13) to opposite side 6 inches over the water line and lapping over the lead and sump ballast to make ten laminations over the keel so no matter what is torn off below there will still be a full hull thickness between you and Davy Jones' locker.

Eleventh Day

The sump and bilge area is sanded and smoothed and sprayed with a coating of gel coat so the area can be always easily cleaned. The boat is moved to the assembly line - - now some 17,000 lbs. plus in weight completely empty.

CHAPTER IV

Architectural Specifications of the CSY 44 Midcockpit Cutter

Author's Note: Many of our readers have probably never seen a complete set of specifications as they come from the Naval Architect. Herewith are the specifications for the CSY 44 Mid-Cockpit. Even after building 150 of these yachts as of this writing these specifications undergo changes based on our experience and availability and other factors which leads us to improve our product. However we show you these specifications as representative of the high level of quality which goes into CSY yachts. All other CSY yachts are built to the exact same standard.

CSY 44 CUTTER DESIGN NO. 1-A
SPECIFICATIONS FOR THE CONSTRUCTION OF A 36'4" WATERLINE LENGTH CENTER COCKPIT FIBERGLASS CUTTER

In a continuing effort to improve the use, quality and serviceability of our yachts we must reserve the right to change specifications when and as deemed necessary without prior notice.

Design No. 1-A Specifications For The Construction Of A 36'4" Waterline Length Center Cockpit Fiberglass Cutter

General

It is the intent and spirt of these specifications that the builder, CSY Yacht Corporation, shall construct, equip and furnish a series of yachts complete in every respect and ready for service. The yachts are to be of the highest quality of workmanship and appearance.

As the consulting architect, Peter A. Schmitt & Company, shall be allowed to inspect any and all parts of the yachts while under construction at the builder's yard.

All materials and manufactured items used in the construction of the yachts shall be of the best possible quality for their respective purposes. Should there be a need for any changes in materials or trade name items listed in these specifications, or on the architect's plans, the approval of the final choice of the replaced item or items rests with the architect and CSY Yacht Corporation.

The workmanship throughout will be executed by skilled boat builders in keeping with the best yacht practice and this shall be done to the satisfaction of the architect.

These specifications have been prepared to cover equipment and materials as accurately as possible, however, it may become necessary in the interest of availability or improvement of function, durability, etc., to replace, delete, or alter items. In such cases the replacement shall be thoroughly investigated prior to approval to insure that structural integrity and function will not suffer.

Alterations

During the construction of this yacht, a situation may arise where it would be beneficial or necessary to make changes in the details or layout of the design. As long as these changes do not counteract the general style or type of the yacht, these changes are to be made by the builder. However, these changes must be determined and made before the actual construction on that particular item has commenced.

Access To Compartments

There shall be suitable arrangements made for the cleaning and painting of all lockers and compartments throughout the yacht. Wherever tanks, sumps, engines, steering gear, electrical equipment or any equipment that is located beneath the bunks of cabin sole, and requires maintenance, there must be flush access hatches over for this service.

Cleaning

The builder is at all times to keep the yachts reasonably clean throughout. Particular care is to be given that all chips, shavings, and other foreign matter is removed and all parts thoroughly cleaned, and that when the yachts are delivered, their bilges and pockets throughout, shall be entirely free from such matter.

Drawings By Architect Or CSY Yacht Corporation

Title

Lines Drawing
Sail Plan
Construction Plan
Accommodation Plan
Accommodation Plan, Port Elevation
Accommodation Plan, Starboard Elevation
Construction & Accommodation Sections Sheet 1 of 3
Construction & Accommodation Sections Sheet 3 of 3
Hull Lay-up Plan
Refrigeration Plan
Deck Construction & Arrangement Plan
Stem Fitting Details
Shallow Draft Keel Details
Deep Draft Keel Details
Rudder Details
Rudder Skeg Details

Accommodation Sections Sheet 2 of 3
Chainplate Details
Emergency Tiller Details
Machinery Arrangement Details
Boom Gallows Details
Fresh Water & Fuel Tank Details
Main Cabin Table Details
Anchor Bowsprit Details
Mast Layout & Construction Plan
Lower Mast Hardware Arrangement
Mast Step Construction Plan
Skylight Hatch Details
Fiberglass Hatch Details
Rigging Schedule
Elementary Wiring Diagram
Fresh Water Piping Diagram
Fuel Piping
Miscellaneous Detail Drawings

It shall be the sole responsibility of the builder to check dimensions on all plans and if in doubt should satisfy himself by full size layout if necessary, that all parts fit and interferences eliminated. Where sizes are not given, materials used shall be as light as possible, but consistent with strength requirements.

Capacities of Fresh Water and Fuel tanks as indicated on the final plans are expected to be obtained by the builder and should be checked by him before the tanks themselves or limiting joiner work progresses too far to permit any necessary change to obtain the indicated capacities.

Detailed Drawings By Builder

The builder shall provide to the owner the following drawings: Detailed diagrams of the wiring system; refrigeration system; bilge piping system, fresh water piping system and fuel piping system.

Trials

The first completed yacht of this Design shall be fully outfitted and rigged and shall be tested under both sail and power. The trials shall be of a scope to include sailing and steering qualities; to test the proper installation of rigging and deck fittings and the operation of all gear and equipment.

Hull Construction

General

The hull shall be fabricated in a two piece split mold, laid up using hand laid up Owens-Corning fiberglass woven roving and mat, as per hull lay-up schedule, and removed in one piece. Polyester resins of a type which shall permit as even multi-directional strength as possible shall be used. All fiberglass lay-up shall have their physical properties determined by a theoretical lay-up consisting of a 30% glass content, which shall have minimum wet properties (30 days immersion in water) as follows:

Flexural Modulus (min.) — 1.3×10^6 P.S.I.
Tensile Strength (min.) — 22×10^3 P.S.I.
Compressive Strength (min.) — 10×10^3 P.S.I.
Shear Strength Perp. (min.) — 11×10^3 P.S.I.
Density (max.) — .0555 lbs. cu. in.

Gel Coat

The gel coat shall be Glidden-Durkee polyester resins which meet the requirements of the U.S. Food and Drug Administration and National Sanitation Foundation Standards as not imparting non-palatable odors, tastes, and colors. The gel coat shall be spray applied evenly to a thickness of 18-22 mils.

The following gel coat color impregnation schemes shall be used:

Deck/Cabin Trunk — Off White
Sheer Stripe — Burgundy Red
Topsides – Light Carmel
Boottop Burgundy Red
Interior — Off White

Woods

All woods used during construction should be clear, sound and free of knots, shakes or checks. They shall also be of a type suitable for the intended purpose. The following types of wood should be used where called for and are not to exceed the given weights per cubic foot.

Fir	Douglas	36 lbs. cu. ft.
Spruce	Sitka	30 lbs. cu. ft.
Teak	Thailand	50 lbs. cu. ft.

Where plywood is called for it shall be of exterior or marine type according to application. Plywood under 3/8" shall be 3 ply and over 3/8" 5 ply. Plywood shall be glued with waterproof phenol formaldehyde resin glue and processed by the hot plate method. Veneer faces shall be free of mineral streaks, discolorations, worm holes, or ruptured grain.

Ballast Keel (Deep Draft Version)

The deep draft ballast keel shall be fitted internally into the hull keel and shall consist of a concrete molding and two lead castings imbedded into fiberglass as follows:

2,000 pounds of concrete shall be poured into the bottom of the keel at the 4'11" draft level. The concrete shall be "vibrated" while wet to remove air pockets. When dry the concrete shall be covered over with a lamination schedule fairing the laminations to the hull and resulting in a fiberglass second bottom of 1" of fiberglass.

Two lead castings with a total finished weight of 8,900 pounds shall then be fiberglassed in place inside the hull appendage. The lead castings shall have a 3% antimony content by volume, giving a density of .4000 pounds per cubic inch.

Ballast Keel (Shoal Draft Version)

The shoaldraft version shall be constructed by first placing an insert into the hull mold which results in a hull of 4'11" draft.

Two lead castings with a total finished weight of 8,900 pounds shall be fiberglassed in place inside the hull appendage. The lead castings shall have a 3% antimony content by volume, giving a density of .4000 pounds per cubic inch. Additional lead in form of appropriately shaped lead pigs shall be fiberglassed in place to a total of 2,000 pounds, forward, aft, and between the above castings.

Fastenings

All screw and bolt fasteners for wood to wood, and wood to fiberglass connections shall be Type 18-8 stainless steel. Where bronze fittings are attached to either fiberglass or wood, silicon bronze fasteners shall be used.

Where heads of fastenings are counter-sunk in interior or exterior joiner work, all will have plugs of the same matching joiner work material set in waterproof glue and sanded flush, with grain in corresponding direction.

Engine Beds

To be 2" thick Douglas Fir, shaped as per plan and over-lap bonded to the inside of the hull shell with alternate layers of three (3) layers of 1.5 oz. mat and two (2) layers of 24 oz. woven roving. The flexible engine mounts shall be fastened directly to the top of the beds with 4" long stainless steel lag bolts of a maximum diameter to pass the holes in the mounts.

Chainplates

To be Type 316 stainless steel flat bars of 3/8" thickness x 2" wide x 18" long which are heli-arc welded to a 12" x 18" x 1/4" thick stainless steel plate and through bolted to the hull in the area of the integrally fiberglass molded rub rail. All chainplates shall be fabricated and installed using six (6) 1/2" stainless steel bolts, lock washers and nuts in accordance with the Chainplate Detail Plan.

Bow Strap

To be Type 316 stainless steel flat bar of 3/8" thickness x 2" wide x 30" long through bolted to the centerline of the stem. The bow strap fitting shall be fabricated and installed using six (6) 1/2" stainless steel bolts, lock washers and nuts in accordance with Stem Fitting Details Plan, and the nuts on the bow strap fitting fasteners shall be accessible from the chain locker for periodic checking.

Stern Strap

To be Type 316 stainless steel flat bar of 3/8" thickness x 2" wide x 22" long through bolted to the centerline of the stern. The stern strap fitting shall be fabricated and installed using six (6) 1/2" stainless steel bolts, lock washers, and nuts in accordance with Chainplate Detail Plan.

Mast Step

To be an aluminum plate weldment or an aluminum casting mounted on a floor grid of transverse and longitudinal floors of Douglas Fir which are totally encased in fiberglass and bonded to the hull shell. The mast step will be fabricated and installed in accordance with Mast Step Construction Plan.

Rudder Skeg

The skeg shall be molded into the hull according to the lay-up schedule and filled with low-exotherm filler.

Rudder

The rudder shall be moded fiberglass laid up in two (2) halves. Each half shall be a solid laminate with a lay-up schedule as per plans. The rudder stock shall be 2¼" diameter solid naval bronze with three (3) flat bar stiffeners attached to and projecting into the rudder blade. The head of the rudder stock shall be drilled to accept the emergency tiller. The halves of the rudder shall be joined by filling the center void with a low-exotherm filler which shall completely captivate the flat bar stiffeners and the inside walls of each rudder half. Additional laminate is applied to center seam.

The lower rudder bearing shall be bronze sand casting with a minimum copper content of 90%. The rudder and lower bearing shall all be fabricated and installed in accordance with Rudder Details Plan.

Upper Rudder Bearing

To be a Wilcox-Crittenden Fig. 8652, 2" diameter, heavy duty cast bronze stuffing box. The hull laminate under the stuffing box shall be built up to a center line thickness not less than 2". The base plate shall be through bolted to the hull with four (4) 5/8" diameter silicon bronze, oval head bolts.

Steering System

The steering system shall consist of a cockpit mounted pedestal which is of CSY Yacht Corporation custom design and construction of FRP and Edson components as follows:

An Edson Fig. 644S, 30" diameter, highly polished stainless steel destroyer wheel, with an ovalized rim and straight spokes.

An Edson Fig. 410 #2 assembly securely mounted in the pedestal.

An Edson Fig. 630S 5/8" x 2.5' long stainless steel non-magnetic roller chain with an Edson Fig. 632 5/8" master link.

The roller chain shall be connected to pre- cut-to-length Edson Fig. 634 1/4" x 7 x 19 wire rope with two (2) Edson Fig. 635B 1/4" adapters, two (2) Edson Fig. 643 1/4" thimbles, four (4) Edson Fig. 730 1/4" Nicro Press sleeves, and covered with heat shrink sleeves to protect against frayed wire rope ends.

The wire rope shall be routed as follows:

Through an Edson Fig. 607 parallel idler, which is through bolted to the FRP cockpit sole and the stainless steel pedestal base plate,

Through an Edson Fig. 625 6" double sheave, through bolted to the port side of the aft engine room bulkhead,

Through an Edson Fig. 623 6" double sheave and an Edson 620 6" single sheave which are through bolted to the bulkheads under the aft cabin berth,

And around the quadrant and return.

Ends shall be wound around two (2) Edson Fig. 618 1/4" stainless steel take-up eyes and secured with four (4) Edson Fig. 664 1/4" wire rope clamps, two (2) per cable end.

Quadrant

The quadrant shall be an Edson Fig. 614, 16" radius, with a 2" diameter bore. In addition, the quadrant shall have Edson stainless steel take-up eyes to center the king post and both the quadrant and rudder stock shall be milled for a 3/8" x 3' x 2' long stainless steel keyway.

Rub Rail

To be molded fiberglass, integral with the vessel's topsides with a size and shape as per plan. A bronze half round, size and shape as per plans shall be fastened to the outboard face of the rub rail with stainless steel screws at 12 inch intervals.

Transverse Structural Floors

There shall be a total of seven (7) 1½" thick marine plywood, and/or Douglas Fir, structural floors encapsulated in a fiberglass laminate and bonded to the inside of the hull shell.

Sole Grids

There shall be sole grids constructed of 2" x 4" Fir through bolted to and spaced between the floor timbers to carry the cabin sole.

Emergency Tiller

To be a length of 2½" I.P.S. aluminum pipe with a shape as per Emergency Tiller Details Plan. The pipe shall be welded to a piece of flat bar stock that is machined to accept the squared head of the rudder stock. There shall be an access plate fixed under the berth in the aft cabin over the rudder stock head.

Anchor Handling Bowsprit

The bowsprit shall be constructed of welded Type 316 stainless steel in accordance with Anchor Bowsprit Details Plan, and securely through bolted to the deck with one Fairlead roller. The bowsprit shall be capable of stowing one (1) 35 lb. C.Q.R. anchor. Also, a chock shall be fitted to the bowsprit to facilitate retrieval and temporary stowage of a second anchor.

Trailboards

There shall be decorative trailboards at the bow, port, and starboard, approximately eight (8) feet in length, constructed of molded fiberglass gel coated black with burgundy and gold trim. The trailboards shall be through bolted to the hull at their aft ends and connected to the anchor bowsprit at their forward ends.

Deck Construction and Joinery

General

The one piece fiberglass deck shall be fabricated of hand laid up mat and woven roving. The deck shall be constructed so that the laminate on the underside of the deck forms the vessel's headliner.

Gel Coat

The gel coat on both sides of the deck laminate shall be a Glidden-Durkee polyester resin applied evenly to a thickness of 18-22 mils.

The following gel coat color impregnation schemes shall be used for the deck:

Deck - Off White
Headliner - Off White

Non-Skid Pattern

The non-skid pattern shall be of a molded in, sprinkled sand effect. The outlines of the non-skid pattern shall be as in accordance with Deck Construction & Arrangement Plan.

Deck Hatches

To be solid fiberglass hinged hatch covers seating on coamings molded into the deck structure in accordance with Deck Construction & Arrangement Plan.

The hatch covers shall be laminated in two (2) separate plys, each on its own mold in order to achieve a gel coated finish on both the inside and outside of the hatch cover. In addition, the hatch covers shall have a Glidden-Durkee Light Caramel color gel coat impregnated into the outside of the hatch cover around the center portion of the hatch. The center portion of the hatch cover shall be laid up with clear resin in order to emit as much light as possible.

A total of five (5) hatches, all 18" x 18" clear openings shall be located on the deck as per plan. Each hatch shall be equipped with the following hardware:

Two (2) — Triton Marine Fig. 4A-305 stainless hatch hinges.

One (1) — Moonlite Marine Fig. 0015-1 Fixed position giant hatch holder.

Two (2) - - Moonlite Marine Fig. 0100-2 hatch dogs.

Companionway Hatches

To be molded fiberglass cover with 1/2" plywood core, sliding on 1/8" x 1¼" stainless steel flat bar fastened to molded fiberglass coamings in the deck structure. There shall be a water tight, molded fiberglass sea hood to contain the cover when in the open position. The hatch shall be fitted with a 1/8" x 1¼" stainless steel flat bar hasp that shall protrude through the top of the upper companionway drop slide in the forward hatch and shall protrude through the top of the upper companionway door in the aft hatch, and shall be drilled out to accept a padlock.

There shall be two companionway hatches located fore and aft of the cockpit, to starboard as per plan.

Skylight Hatches

To be solid fiberglass hinged hatch covers seating on coamings molded into the deck structure in accordance with plan.

The skylight hatches shall be laminated in a mold in the same manner as the deck hatches, except that they shall be constructed in the traditional "hipped fashion" seen on the older vessels.

A total of two (2) skylights, both 18" x 24" shall be located on the deck as per plan. Each skylight shall be equipped with the following hardware:

Two (2) Triton Marine Fig. 4A-305 stainless steel hatch hinges.

Two (2) Moonlite Marine Fig. 0015-1 fixed position giant hatch holders.

Two (2) Moonlite Marine Fig. 0100-2 hatch dogs.

Lazarette Hatch

There shall be a molded fiberglass, hinged, lazarette hatch located in the aft deck as per plan. The hatch cover shall be laid up in a mold with the same laminate schedule as for the companionway hatches, including the marine plywood core, seating on coamings molded into the deck structure as per plan.

Cockpit Seat Locker Hatches

There shall be four (4) molded fiberglass, hinged gasketed seat locker hatches located in the cockpit seats as per plan, with one seat locker hatch each port and starboard for sail and other stowage, one seat locker under the helmsman's seat for stowage of smaller gear and one seat locker forward in the cockpit and over the galley area for access to removable dishes storage tray. The hatch covers shall be laid up in a mold with the same laminate schedule as for the companionway hatches, including the marine plywood reinforcing. The cockpit seats surrounding the hatch cover shall

have deep scuppers molded in as per plan, with drainage into the cockpit.

Each hatch shall hinge on two (2) Heavy Duty Perko chrome plated bronze "T" hinges, through bolted in place.

Cockpit Cool Box

To be fitted into the cockpit seats with a size and shape as per plan. The cool box shall be insulated with 1/2" thick urethane foam glued to the exterior walls of the box. The box shall be drained into the cockpit scuppers. A plug shall be provided to prevent heat loss through the drain. The cool box hatch covers shall be flush with the cockpit seats.

Winch Handle Stowage Lockers

Located port and starboard in the cockpit coamings are two (2) small stowage lockers with a size and shape as per plan, and are to be trimmed with a teak molding as per plan.

Gas Bottle Locker

There shall be a molded fiberglass bottle locker with cover located in the port cockpit molding as per plan. The locker shall accept the snug fit of two (2) Worthington 20 lb. aluminum vertical LPG bottles. In addition, the bottom of the locker shall be fitted with a gas tight vent line consisting of 1/2" clear vinyl tubing that shall discharge overboard to the atmosphere.

Engine Access Hatches

There shall be two one piece molded fiberglass engine access hatches located port and starboard in the cockpit sole with a size and shape as per plan. The port hatch shall be for access for maintenance to the engine from the cockpit. The starboard hatch shall be for access for maintenance to the engine from the cockpit and shall be of a size to permit easy removal of the engine. The hatch covers shall be laid up in a mold with the same laminate schedule as for the main companionway hatches, including the plywood core. The cockpit sole surrounding the hatches shall have scuppers molded in as per plan.

Opening Bronze Ports

Forward End and Sides of House — To be eleven (11) Rostand No. 12, cast bronze, wire brushed finish, heavy type oval port lights 5" x 9" clear glass size, with 3/8" thick clear polished plate glass, through bolted in place. The port lights shall be complete with 1½" spigots, bronze finishing rings and two (2) dog bolts with wing nuts, as well as one (1) port light jack chain per port light. Optional screens to be made available to customer on special order.

Aft Cabin — To be four (4) Gray 5" x 12" molded ABS plastic, black finish, smoked lexan window, two (2) each port and starboard, and three (3) Beckson 4" x 14" molded ABS plastic, white finish, smoked lexan window, located across the transom, all to be sealed and mounted strongly flush with the outside hull with self tapping stainless steel fasteners screwed directly to the hull at equal intervals around the inner port ring, complete with two (2) dog bolts per port light as well as tensioning hinges to hold the port in an open position. To be fitted with removable screens.

Round Fixed Hull Ports

Forward Cabin/Hull Topsides — There shall be four (4) Rostand No. 6, cast bronze, wire brushed finish, 6" diameter clear glass, inside type port light with 3/8" thick clear polished plate glass, complete with bronze finishing ring and 1½" spigot, through bolted to the vessel's topsides in a location as per plans for light and visibility in the forward cabin.

Companionway Drop Slides

The forward companionway shall be fitted with a two (2) piece sectional teak drop slide. The slides shall be ¾" thick teak, finished bright and the top slide shall be louvered for ventilation.

Companionway Door

The aft companionway shall be fitted with a solid teak door, hinged with Getty Hardware hinges and hasp, to open inward. Drop slides are optional.

Mast Collar

The mast collar shall be fiberglass molded into the deck structure. The collar shall be of a height and shape as per plans to allow attachment of a waterproof canvas mast boot and the insertion of teak wedges between collar and spar.

Boom Gallows (Optional)

The boom gallows shall consist of two (2) 1" O.D. welded tubing, Type 316, stainless steel stanchions with a 1½" thich teak cross piece. The stanchions shall have 1" O.D. x .065" wall, Type 316, stainless steel tube braces welded to the aft sides of the stanchions. Both the stanchions and braces shall be welded to 3/16" thick, Type 316, stainless steel deck plates that shall be securely through bolted to the deck. The gallows frame shall be of a shape and size as per the detail on Boom Gallows Detail Plan.

Backing Plates

Backing plates consisting of 1/4" thick aluminum plate shall be installed under the nuts of gallows frame bases, winches, mooring cleats, windlass.

Hand Rails

There shall be hand rails of sizes to suit located in accordance with Deck Construction & Arrangement Plan and through bolted to house top and to matching interior rails.

House Trim

To be teak molding extending around the perimeter of the cabin trunk about 2" below the turn of the cabin trunk top.

Cockpit Coaming Trim

To be shaped teak sections about 3/4" x about 10" atop the cockpit coaming to serve as decorative trim as well as good footing for stepping into and out of the cockpit.

Deck-To-Hull Joint

The outward facing flange of the deck shall be joined to the inward facing flange of the hull in the following manner:

Both deck and hull flanges shall be of a thickness no less than 3/8" of solid FRP laminate, and shall extend no less than three (3) inches.

Prior to seating the deck assembly upon the hull flange, the hull flange shall have applied to it a generous application

of 3M 5200 water proof strong-adhesive compound.

The deck assembly shall then be lowered upon the hull flange and fastened at eight (8) inch intervals with flat head stainless steel self threading screws, countersunk flush. Then, at eight (8) inch intervals, alternating between the screw fastenings, the deck-to-hull joint shall be through drilled to receive 1/4" stainless steel flat head bolts, countersunk flush and fastened with flat washers, lock washers and hex nuts, and brought up tight with air driven impact wrenches set at 35 ft. lbs. tension.

The screw and bolt heads shall be covered with a teak cap rail, tooled to conceal the flange joint. The cap rail shall be bedded with 3M 5200 sealant compound and fastened with stainless steel self threading screws to be spaced at about twelve (12) inch intervals between joint screw and bolt fastenings. Cap rail screw fasteners shall be countersunk and plugged and shall be of sufficient length to extend through both flanges of the deck-to-hull joint.

Equipment

Mooring Cleats

As follows, refer to Deck Construction & Arrangement Plan for locations. To be through bolted in place:

Foredeck — Three (3) Triton 12" Type 316 stainless steel, four hole Herreshoff-type cleats.

Amidships — Two (2) Triton 12" Type 316 stainless steel, four hole Herreshoff-type cleats.

Stern — Two (2) Triton 12" Type 316 stainless steel, four hole Herreshoff-type cleats.

Jib Topsail/Genoa Sheet Track

To be 1/4" x 1" x 6' track through bolted to cap rail, port and starboard, which is to be routered to accommodate car flanges. To be equipped with Schaefer Marine car block with integral stop.

Turning Blocks

To be Schaefer Marine, mounted upon teak bearing pads upon aft cabin deck, through bolted through aluminum back-up plates.

Chocks

As follows, refer to plan for location. To be through bolted in place:

Stern — Two (2) Skene Stern Chocks, port and starboard, bronze chrome plated.

Achor Windlass (Optional)

To be one (1) Powerwinch No. AWH-412, 12 volt D.C. windlass, located on the foredeck as per plan, with custom fiberglass protective cover.

Deck Pipes

To be one (1) custom built into the bow as per Deck Details Plan.

Compass

To be one (1) Ritchie No. SNF-44, Navigator Series compass with 5" diameter, 5 degree card. The compass shall be mounted on the steering gear pedestal in the cockpit with a binnacle guard fitted to the pedestal. The compass shall be wired for two (2) 12 volt D.C. lights as supplied with the compass.

Depth Sounder, Knotmeter, and Log (Optional)

To be one (1) Combi Unit with add on features in one console mount, mounted in the aft end of the deck house as per plans. The transducer shall be located on the vessel's starboard side, just forward of the ballast keel, with alarm to be specified by the manufacturer.

Knotmeter (Optional)

The 12 volt D.C. knotmeter, mounted in the aft end of the deck house in master console as per plans. The transduce shall be located on the vessel's starboard side, 10" forward of the depth sounder transducer.

Mattresses and Seat Covers

Berths in the forward and aft staterooms shall have 5" thick, 3.2 - 3.8 lb. density polyurethane foam mattresses. Berths and seat bottoms in the main cabin shall have 5" thick, 3.2 - 3.8 lb. density polyurethane foam mattresses and cushions. Seat backs in the main cabin shall be shaped 2.2 - 2.5 lb. density polyurethane foam bolsters of minimum 3" thickness at the top of the back.

All mattresses and cushions shall have 100% "Herculon" fabric covers of a standard color and pattern.

Lifelines and Stanchions

There shall be a total of ten (10) stanchions to be custom made per CSY Yacht Corporation plans and installed in accordance with Deck Construction & Arrangement Plan. Stanchions consist of 1" O.D. x .065" wall, polished type 316 stainless steel tubing with 3/16" thickness flange welded about 5" up from bottom, drilled for four (4) screws for affixing to rail cap to assist in mounting. A 6" rod is to be welded into the bottom of the stanchion and threaded for 7/8" nut and washer. Stanchions then to be through-deck mounted with 7/8" nut and washer holding each in place. The lifelines shall be a double of 3/16" diameter 7 x 7 stainless steel wire rope with extruded white vinyl cover (finished O.D. to be 1/4"). There shall be gates in the lifelines both port and starboard with braces to the deck. Minimum height of each stanchion shall be 26" above the deck measured to the center of the lifelines.

The following shall be supplied, all to be located in accordance with Deck Construction & Arrangement Plan:

Stanchion Caps — Ten (10) solid stainless steel caps of CSY Yacht Corporation design, with holes drilled to receive lifelines.

Stanchion Gate Lifelines Assembly — To consist of two (2) pelican hooks, four (4) eye sockets and four (4) jaw sockets.

Fore and Aft Lifelines Attachment Assembly — To consist of four (4) jaw sockets and four (4) 1/4" jaw and eye turnbuckles.

Bow Pulpit

To be 1" O.D. x .065" wall, polished, Type 316 stainless steel tubing mounted in the same manner as stanchions. In addition, the pulpit shall have mounting plates for the installation of the running lights and an eye welded to the aft port leg for fairleading the furling drum wire (should optional furling gear be installed). The bow pulpit shall be of a shape and located as per plans, with double rails to extend upper and lower lifelines.

Prism Light

A Simpson Laurence prism light is fitted to the deck above the shower stall.

Stern Pulpit

To be 1" O.D. x .065" wall, polished, Type 316 stainless steel tubing mounted in the same manner as the stanchions. The stern pulpit shall have a gate and shall be of a shape and be located as per plans, with double rails to extend upper and lower lifelines.

Interior

General

The interior of the vessel shall be formed from molded fiberglass components and crafted wooded cabinetry situated between structural plywood bulkheads. The interior of the vessel shall be laid out in accordance with plans drawings as listed.

The component laminate shall consist of 18-22 mils of Glidden-Durkee off-white gel coat syrayed up over carefully made molds followed by a skin coat of 1 oz. chop strand, and then 5 oz. of chop strand. Total thickness of the laminate shall be 7/32". Wherever a panel of the component laminate exceeds one (1) square foot in unsupported area, a core of 1/2" thick fir marine plywood shall be laid up in the center of the laminate.

The wooden cabinetry shall be done in the fashion of the finest marine joinery work, with interlocking, accurately constructed joints throughout, glued with resorcinol glue and fastened with silicon bronze fasteners in accordance with the best yacht practices and where particular sizes are not called for, the material used is to be consistent with high strength. All projecting corners of partitions shall be fitted neatly with rounded corner posts and all lockers fronts etc., shall have similar rounded corners, but with a smaller radius. All fastening pieces, rail, door sills, etc., to be screw fastened.

Joiner Bulkheads

To be 3/4" thick Douglas fir plywood located as per drawings. The bulkheads shall be fastened to the transverse floors and longitudinal gridwork with stainless steel screws and shall be fastened to the inside shell with three (3) layers of 10 oz. fiberglass tape on each side of the bulkhead. Each bulkhead shall have a 3/4" x 1" beveled strip of 5 lb. density "Airex" foam placed between it and the shell to eliminate hard spots.

The living quarter sides of the bulkheads shall be surfaced with Nevamar laminated plastic, H-5 grade, Silvan Teak wood grain finish. The head sides of the joiner bulkheads shall be surfaced with Nevamar laminated plastic, H-5 grade, solid color series, with a standard coordinating color as selected by the builder.

Doors (Passageway, Hanging & Access Locker)

To have solid teak frames, with Silvan Teak wood grain finish Nevamar covered plywood center panels. The hanging locker doors shall be paritally louvered. Located as per plans.

Sliding Panel Front Lockers

Main Salon and Bar Storage Lockers — To have solid teak frames with sliding panels of thick "Smoked Glass," mini-diamond, color No. 15, Traditional FRP panel to simulate leaded, colored glass, located per plan.

Galley and Heads Storage Lockers — To have solid teak frames with sliding panels of 1/8" thick lexan smoked glass, located as per plans.

Interior Joiner Hardware

To be Getty, bronze, with a No. 10 fine finish, as follows, correct hand and bevel to be determined by CSY Yacht Corporation.

Head Door Handles — Two (2) No. 1311, 1/2" Mortise Locks with thumb-turn inside, emergency key lock outside.

Head Door Hinges - - Six (6) No. 2532, 3", three (3) for each door.

Hanging Locker Door Handles — Two (2) No. 1851-B.

Hanging Locker Door Hinges - - Four (4) No. 2532, 2½".

Locker Door & Trap Front Locker Hinges — Ten (10) pairs No. 2710 Cuddy Door Hinges.

Locker Door & Trap Front Locker Latches - - Ten (10) No. 3708 cupboard latches.

Table Drop Leaf Hinges — Four (4) 3", No. E-14 hinges.

Table Arm Hinges — Four (4) 4", No. E-46 hinges.

Interior Joiner Hardware (continued)

Table Drop Leaf Hooks — Two (2) 2½" No. 3450 door hooks.

Upper Berth Hinge — One (1) heavy duty stainless steel piano hinge.

Upper Berth Lock Bolts - - Two (2) No. 3013, 1⅜" x 4" neck bolts, one at each end of berth.

Refrigerator Hatch Lift Rings — Three (3) Getty Fig. 6150 chest handles.

Drawers

To be Techtonic plastic drawers of a height, width and depth as shown on the plans.

Each drawer front shall be solid teak framed around Silvan Teak wood grain finish Nevamar covered plywood center panels bolted to drawers with bronze bolts with a hand pull routered into the bottom edge of the front. In addition, each drawer shall have a stop catch to prevent drawer accidentally opening.

Cabin Soles

Cabin soles in the main cabin, forward and aft cabins, and galley shall be 3/4" thick, teak planked plywood with holly splines, screw fastened to the transverse floors and longitudinal stringers and oil finished.

Soles in the heads shall be fiberglass with a non-skid pattern molded in.

Cabin Sole Hatches

There will be access trips in the cabin sole to provide access for stowage and inspection in the bilge. To be located as per plans. The hatches shall be flush, and each hatch shall have one (1) 1/4" diameter, bronze carriage bolt as a lifting handle.

Ceiling

Ceilings in the fore and aft cabins shall be constructed of 1/4" smooth, white surfaced pressed chip board, to be mounted against the inner sides of the hull port and star-

board in both cabins, to prevent possible condensate from entering cabins.

Teak slats measuring 3/6" x 2", spaced 1/2" apart horizontally shall be screw fastened to the ceilings in way of berths and behind shelf top lockers.

Locker Linings

Lockers shall be lined with naugahyde, plain pattern, to prevent possible condensate from reaching stowed items.

Counter Tops

The galley counter top, including refrigerator shall be 3/4" thick plywood surfaced with laminated plastic, H-5 grade, slate finish and color.

Counter tops in the head will be covered with smooth formica of "black marble" color.

Ice Compartment (Double Insulated, Etc.)

To consist of a built-in box with molded fiberglass liner. (See machinery section for compressor specifications). The entire void between the exterior and interior liners shall be filled with a 2 lb. density urethane foam to a thickness as per plans. The box will be fitted with 1½" diameter drain hose with trap at the lowest point to prevent cold temperature loss. Each compartment shall have a flush, hinged hatch for access. The refrigerator shall be built in accordance with plan.

Galley Stove

To be one (1) Shipmate three burner with oven, gimballed stainless steel stove, located in the galley as per plans. The oven door shall be fitted with a special heavy duty locking device as specified by CSY Yacht Corporation.

Table

One (1) table with a drop leaf on each side shall be provided of a custom CSY Yacht Corporation design. The table top shall be 3/4" thick plywood surfaced with Nevamar laminated plastic, H-5 grade, Silvan Teak wood grain finish with drop in access in top.

The table shall be built in accordance with Main Cabin Table Details Plan, to include teak fiddles and a teak grab rail.

Garbage Container

A molded plastic garbage container shall be placed in the galley counter top. The garbage container shall be complete with cover, drain, and beaded lip to secure a plastic garbage bag.

Fiddles

Solid teak fiddles shall be installed on the fronts of all berths, seats, shelves, and counter tops. To be of a height and length as per plans.

Painting

General

All materials to be used in the painting and finishing of the yacht, shall be in accordance with the manufacturer's latest instructions, in particular, the treatment and preparation of all undercoatings.

Finishing

All paints and oil finishes shall be rubbed between coats, and particular care shall be taken while painting that all workmen are clear of the yacht; also, that it is clean and free of chips, sawdust, fiberglass shards, and rubbish before final coats are applied.

Bilge

The bilge in way of the sump shall be ground smooth and covered with a heavy, multiple application of white, epoxy-base paint.

Interior Bright Work

All interior teak bright work shall be given a minimum of two (2) coats of oil finish hand rubbed.

Cabin Soles

All teak surfaced cabin soles shall be given a minimum of three (3) coats of oil finish.

Name and Hailing Port (Optional)

Name of yacht and owner's hailing port to be painted on the transom of the yacht.

Name of yacht to be painted on fiberglass scroll in gold letters and scroll fitted to transom.

Machinery

Engine

The engine shall be fresh water cooled, Perkins 4.154M, 60 H.P., 4 cylinder, 4 cycle diesel engine rated at 53 S.H.P. @ 3,000 R.P.M. continuous duty. The engine shall be equipped with a Borg-Warner hydraulic, 2.91:1 L.H. Rotation reduction and reverse gear transmission. In addition, the engine shall be equipped with the following:

One (1) 42 amp 12 volt D.C. Delco alternator.

One (1) 1½" diameter front power take-off shaft.

One (1) 6" O.D. double groove, power take-off sheave for two (2) #4 L/A belts.

Two (2) oil pressure switches to limit start-up of the refrigeration compressor and windlass only when the engine is running.

One (1) lubricating oil and water temperature alarm kit.

One (1) oil sump pump.

One (1) ten foot wiring harness.

Engine Instruments

Shall be the CSY standard rectangular illuminated panel containing a Motorola Electric 3000 R.P.M. tachometer with hourmeter, oil pressure gauge, water temperature gauge and ammeter. In addition, the panel on pedestal shall be wired with an audible alarm to warn of low oil pressure and high water temperature. The panel shall be located in the face of the cockpit as per plans, with water protective teak and lexan shield fitted over.

Engine Controls

The engine controls shall be one (1) Morse single level control for both the throttle and transmission. The controls shall utilize Morse Redjacket push pull cables for both the throttle and transmission.

Engine Exhaust System

The engine exhaust system shall consist of a pipe exhaust elbow (water injected), rubber exhaust hose, and Vernalift #1300108 water lift type muffler, all laid out as per plans. The exhaust system shall discharge through the transom via a bronze through hull fitting. To be equipped with the following:

One (1) 2" I.P.S. cast aluminum exhaust elbow with 1" O.D. water injection fitting shall be threaded to make with the manifold flange and bent in a radius as per Standard Westerbeke Plans.

One (1) Vernalift #1300108 FRP Molded Tank Muffler.

One (1) length of 2" I.D. Shields Marine exhaust hose.

One (1) Perko Fig. 755 non-drip, cast bronze, exhaust through hull fitting for 2" I.D. hose.

Engine Cooling

The engine's fresh water system shall be cooled from water taken in through a seacock on the hull surface, mounted low enough to supply ample cooling water even when under extreme condition of heel. The intake line shall be 1½" I.D. Shieldsflex rubber hose. To be equipped with the following.

One (1) Wilcox-Crittenden Fig. 1500, 1½" I.P.S. Seacock.

One (1) Raritan raw water basket strainer with 1½" I.P.S. inlet and 1" outlet to accept the rubber hose.

Fuel Strainer

There shall be one (1) Racor 500 FE fuel strainer installed in the engine fuel feed line.

Fuel Tanks

There shall be two(2) fuel tanks totaling 100 gallons total capacity. The tanks will have a transverse baffle and a cleanout plate for complete access to the tank interior.

The tanks shall be equipped with one (1) Perko, chrome plated bronze 1½" I.P.S. deck fill plate marked DIESEL and a length of Shields 30R5, 1⅞" I.D. fuel fill hose with two (2) stainless steel hose clamps at each connection.

Fuel Lines

Fuel lines shall meet U.S. Coast Guard standards which require a 2 minute burn resistance to open flame. All lines shall be well supported and fastened with stainless steel hose clamps. The tank vent line shall have one (1) vent fitting located on the outboard side of the vessel as per plans. All lines shall be sized and laid out in accordance with plans.

Fuel Line Valves

All fuel line valves shall be kerotest packless, two way line valves.

Refrigerator, Freezer and Ice Storage System (Optional)

To consist of a Crosby Yacht Service engine driven compressor with double sheave magnetic clutch, condensing unit, two (2) 3100 BTU cold plates, expansion valve, 1/4 H.P. 12 volt D.C. Oberdorfer raw water pump and control unit. In addition, Crosby Yacht Service shall supply all necessary end fittings, copper tubing and refrigeration hose as well as the check out and start up of each system.

The builder shall install the above system complete, as well as furnished and install the following:

Two (2) Wilcox-Crittenden Fig. 857R, 1/2" I.P.S. through hull fittings, one (1) with strainer.

One (1) 1/2" I.P.S. bronze seacocks with 1/2" I.P.S. bronze pipe nipples 3" long, inboard ends.

Shields 3/4" Shieldsflex rubber water hose as required with two (2) stainless steel hose clamps at each connection.

One (1) stainless steel plate compressor mounting bracket.

Two (2) 4 L/A drive belts.

The refrigeration system shall be laid out to provide a maximum 25 degree F. temperature in the freezer and maximum 45 F. temperature in the refrigerator based on a 1½ hour in 24 hour running time, 85 degree ambient temperature and 83 degree cooling water temperature.

Propeller

To be one (1) Columbian style "E" three bladed, left handed propeller with a 24" diameter and 15" pitch. To be bored for a 1½" diameter shaft, standard taper.

Propeller Shaft

To be 1½" diameter naval bronze. The shaft shall be properly tapered and keyed to fit the specified propeller and keyed and dimpled at the engine flange to permit keying with a set bolt drilled for safety wiring.

Stuffing Box

To be one (1) Wilcox-Crittenden Fig. 8657 heavyweight, cast bronze stuffing box for 1½" diameter shaft. In addition, the stuffing box shall be equipped with one (1) length of W.C. Fig. 8658, 2¼" heavyweight hose and four (4), 2¼" stainless steel hose clamps.

Stern Tube and Bearing

The stern tube shall be a 2¼" O.D. x .250" wall fiberglass tube securely fiberglassed in place. The stern bearing shall be one (1) BJ Rubber Products "Chub" cutlass type bearing for 1½" outside of the stern tube to aid in removal. The bearing shall be held in place with two (2) 1/4" diameter Money set screws.

Electrical

General

The electrical system shall be a two (2) wire, ungrounded, 12 volt D.C. system throughout, supplied with power from the belt driven alternator on the engine.

All wiring in the electrical system shall be neatly laid out with all connections, junction boxes, and panels to be accessible for inspection and servicing. To be in accordance with the standards established by the American Boat and Yacht Council on wire sizes, color codes, and installation practices.

Batteries

To consist of two (2) separate banks, each bank consisting of two (2) Extra Heavy Duty, 6 volt batteries, rated at 200 ampere hours each at 20 hour rate, connected in a series to produce 12 volts.

The batteries shall be located in a molded fiberglass box in the cockpit coaming.

Electrical Control Panel

The electrical control panel shall be one (1) Marinetics Model 708 master panel complete with master battery switch, test switch and voltmeter and two (2) Marinetics Model 709 accessory panels located as per plans in the galley. Switches shall be single pole circuit breakers of an amperage capacity as required. The switchboard will be wired to accept the following electrical equipment.

Legend on Control Panel	Items on Circuit
1. Cabin Light Ports	Berth Lights, wall lights
2. Cabin Lights Starboard	
3. Navigation Lights	Side lights, stern light, binnacle light
4. Anchor Light	
5. Bow Light	Combo light on face of mast
6. Deck Light	
7. Cockpit Light	Cockpit courtesy lights
8. Water Pressure	Fresh water pressure pump
9. Bilge Pump	Bilge Pump pump
10. Refrigerator	
11. Windlass	
12. Speed Indicator	
13. Radiotelephone	VHF/FM Radiotelephone (extra, at owner's additional expense)
14. Radio	
15. Ignition	Engine ignition
16. Engine Room Light	Engine Room Light
17. Depth Sounder	

Wiring

To be Michigan Wire Co. tinned copper covered with an impervious PVC sheathing. The wiring is to be adequately protected from mechanical damage and is to be installed in accordance with the best marine practice. Particular care shall be exercised that cables are large enough to prevent excessive voltage drop. Lighting distribution will be so arranged as to provide at least one (1) light in each compartment from another circuit in case of a circuit failure. Under no condition will wiring be molded into the headliner or interior components.

All wires of this system shall be in two (2) colors, black for negative, red for positive. All wires are to be numbered with plastic tape at each end, and a master list of numbers shall be provided for case of identification. A detailed wiring diagram will be made by the builder and every conductor will be shown thereon numbered to correspond to the wiring installed in the vessel.

Lights and Outlets

All lights shall be 12 volt D.C. and located as directed. The following lights shall be used:

Berth lights — Bass Products.

Wall lights — Perko.

The aforementioned lights shall be of a number and located as follows:

Forward Stateroom -- Two (2) berth lights.

Forward Head — One (1) wall light.

Main Cabin — Three (3) cabin lights.

Galley — Two (2) wall lights.

Aft Stateroom — Three (3) berth lights.

Aft Head — One (1) wall light.

Navigation Lights

Side Lights -- Two (2) Perko Fig. 955 mounted on the bow pulpit.

Stern Light — One (1) Perko Fig. 965 located on top of the stern rail.

Bow Light -- One (1) Bass Products combination bow/foredeck light located forward on mast.

Cockpit Outlet

To be one (1) Wilcox-Crittenden Fig. 149, chrome plated brass, watertight deck socket located in the cockpit as per plans.

Plumbing

General

The entire plumbing system shall be neatly laid out, with all valves, drains, etc., readily accessible. The plumbing system shall be laid out in accordance with Fresh Water Piping Diagram.

Fresh Water Tanks

There shall be two (2) fresh water tanks of 200 U.S. gallons each. The tanks shall be fabricated of hand laid up molded fiberglass with a thickness as per Fresh Water & Fuel Tank Details Plan. Each tank will have one (1) transverse baffle and a cleanout plate over both tank compartment for complete access to the tank interior.

Each tank shall fill separately through one (1) lexcel, chromed bronze 1½" I.P.S. deck fill plate marked WATER and a length of Shieldsflex 1⅞" I.D. fill hose with two (2) stainless steel hose clamps at each connection.

Each tank shall vent through a length of 1/2" I.D. x 1/16" wall Shields PVC tubing which shall gooseneck under the deck and return to discharge into the cockpit scuppers.

The tanks shall be connected via a 3/4" I.P.S. Shieldsflex with a 3/4" I.P.S. bronze valve at the filter, branching into the manifold to form one supply line from it.

Piping (Fresh Water)

To be 5/8" I.D. x .125" wall for hot and cold water Shields clear, nylon reinforced, PVC tubing with a stainless steel hose clamp at each connection. Elbows and tees shall be molded PVC barb-type fittings.

Fresh Water Filter

One (1) AMF Cuno Aqua-Pure AP 200 Dual Purpose Water Filter is to be installed in the cold fresh water line which services the galley sink, to remove any possibility of "tank" taste or odor from the drinking water.

CSY Yacht Corporation is to maintain an adequate supply of replacement cartridges for sale to yacht owners.

Seacocks

To be Wilcox-Crittenden cast bronze, "Full-Way Seacox" Fig. 1507 — depending on hose tail piece — of a size as herein specified. Each seacock shall have a 3/4" thick douglas fir plywood backing block under the inboard flange and be through bolted in place with two (2) 1/4" diameter bronze carriage bolts.

Toilets

There shall be two (2) Par Model 59128-0000 manual marine toilets located as per plans. Each toilet shall be securely fastened in place with S.S. bolts, with access ports supplied to these fastenings. Intake lines shall be installed close to the centerline of the yacht to assure ample submergence at all times. Each toilet shall be equipped with the following:

One (1) Electra San Unit (Optional)
One (1) W.C. 3/4" Fig. 1511 seacock for intake.
One (1) W.C. 1½" Fig. 1511 seacock for discharge.
One (1) length each of 3/4" I.D. and 1½" I.D. Shieldsflex hose.

Faucets (Pressure)

Pressure faucets to be fixtures located as per plans. To be as follows:

Galley — One (1) Top Mount swing spout and No. 1000 handles "mixer" with 1/2" O.D. slip tail pieces.

Heads — Two (2) No. 2802 Tiffany Quaturn Fittings with No. 500 handles, self-closing, 1/2" O.D. slip tail pieces.

Faucet (Hand)

There shall be one (1) Par "Topsider" hand pump located in the galley counter top convenient to the sink, with a check valve included to hold the prime.

Showers

There shall be a hand type shower located in the forward shower stall and aft head. Each head shall have the following:

One (1) No. 1750 WV hand and wall shower with 59" of reinforced white vinyl hose and wall mounting bracket.

One (1) No. 2562 pressure balancing shower valve with lucite handle.

Head Fixtures

Each head shall be fitted with each of the following fixtures:

Towel Bars — One (1) 1" O.D. x 24" long stainless steel grab bar, to be mounted in teak, and bolted to a bulkhead as directed.

Toilet Paper Holder — To be CSY Yacht Corporation design, of teak.

Galley Sink

To be one (1) double sink, each sink of the "double" to be 10" x 14" x 10" deep, provided by Polar Sinks, Inc., located in the galley counter top as per plans.

One (1) Legion Fig. AS803, stainless steel 3½" stainless steel basket strainer and 2" x 1½" slip tail piece.

Sink compartments to be joined in the drains with 1½" PVC pipe to a "Y" fitting, terminating to one (1) Wilcox-Crittenden Fig. 1507 1½" I.P.S. seacock, connected with one (1) length 1½" I.D. Shieldsflex hose with two (2) stainless steel hose clamps at each connection.

Head Sinks

Each head shall have an oval stainless steel sink, measuring 8½" x 11¼" x 5" deep, provided by Polar Sinks, Inc., located in the toilet counter top as per plans.

Cockpit Scuppers

There shall be four (4) 1½" diameter cockpit scuppers located in the recesses of the cockpit sole hatch covers, two (2) each port and starboard of the cockpit, essentially in the four outside "corners" of the cockpit sole. Each set of two (2) scuppers shall be connected with a "Y" fitting and be plumbed to one (1) 2" seacock port and starboard. Scupper assembly installation to have the following:

Four (4) chrome plated for 1½" I.D. hose.

Four (4) lengths Shieldsflex 1½" I.D. hose.

Two (2) 1½" I.P.S. bronze "Y's" of 2" I.P.S. to take 1½" I.D. hose from scuppers to "Y" and 2" hose from "Y" to seacocks.

Two (2) Wilcox-Crittenden Fig. 1508, 2" I.P.S. seacocks.

Deck Scuppers (Amidships)

To be two (2) Perko bronze, chrome plated hawse hole fittings, which also serve as through-the-gunnel fittings for mooring lines, one (1) each port and starboard.

Refrigerator Drain

The refrigerator will be fitted with a drainage system that shall drain naturally and discharge into the bilge sump:

One (1) length of Shields 3/4" I.D. x 3/32" wall nylon reinforced, clear PVC tubing. The tubing should be fitted as a "gooseneck" to form a water trap or prevent cool air loss and bilge odors from entering refrigerator.

Bilge Pump

To be one (1) Rule 1500, 12 volt D.C., 1500 G.P.H. submersible bilge pump located in the bilge sump. To be equipped with the following:

One (1) length of 1" Shields Bilge Flex hose.

One (1) bronze through hull fitting for 1" I.D. hose located at the center of the boottop in the engine room, port side.

Shower Drains

Each shower shall have a flush drain at the lowest point of the head sole or shower stall, draining naturally and discharging into the bilge sump via open drain runs created in the bilge as per plans.

Water Pressure System

To be one (1) Raritan Super Galley Mate D.C. pump rated at 4.3 G.R.P. The pump shall provide hot and cold fresh water to the following areas: forward head sink and shower, galley sink, aft stateroom sink and shower.

Hot Water Heater

To be one (1) Raritan Model R6E; 6 gallon capacity water heater connected to the engine and located as per plans.

Rigging and Fittings

General (Cutter Rig)

The builder (Ulmer Spars) shall refer to the "Rigging Schedule," as per plan, for all blocks, shackles, cleats, thimbles, etc., not listed herein.

Fastenings

Fasteners shall be Type 316 stainless steel machine screws or through bolts as called for.

Main Mast

To be Awl Grip Painted, 6061-T6 aluminum alloy, hollow and elliptical in section. The following minimum physical dimensions of 11.0" x 7.0" x .188" wall thickness (IL=67.33 $^{In\ 4}$ IT=33.58 ^{In4}) shall be provided. The approximate total length of the mast, including bury is 56'4".

The mast shall be rigged with all halyards external and every halyard shall have its own winch and cleat. In addition, the mast shall be wired internally for masthead light, combination foredeck and bow light, and radio antenna leads.

Masthead Truck — to be welded 5086-H32 aluminum alloy plate. There shall be one (1) spinnaker halyard crane with 3/8" diameter stainless steel U-bolt as an integral part of the masthead unit. Headstay/backstay tang fitting shall extend over and be bolted to the truck with 3/8" stainless bolts tang fitting to 316 stainless steel.

Masthead Sheaves — there shall be four (4) 3¾" minimum outside diameter sheaves scored for 1/4" wire and 1/2" rope. If sheaves are cast material to be aluminum alloy 357-T6. If sheaves are machined material to be 5086-H32 aluminum alloy. Sheaves shall ride on .125" thick wall Oilite bushings over 5/8" diameter Type 316 stainless steel sheave pins.

Tangs — the following tangs are to be provided and shall all be fabricated from highly polished Type 316 stainless steel. All tangs shall be through bolted to the mast as directed with compression tubes where required.

Upper Shrouds — two (2) tangs of 3/16" thick plate drilled and reinforced for one (1) 5/8" diameter pin. (3/8" diameter wire).

Intermediate Shrouds — two (2) tangs of 3/16" thick plate drilled and reinforced for one (1) 5/8" diameter pin. (1/4" diameter wire).

Lower Shrouds — two (2) tangs of 3/16" thick plate drilled and reinforced for two (2) 5/8" diameter pins. (3/8" diameter wire).

Forestay - one (1) double plate tang of 3/16" thick plate drilled and reinforced for one (1) 1/2" diameter pin. (1/4" diameter wire). The forestaysail tang shall also have an oblong hole capable of accepting the shackle of the forestaysail halyard block.

Forestaysail Boom Topping Lift - - one (1) single plate tang of 1/8" thick plate drilled for one (1) 5/16" diameter pin.

Spreaders — there shall be two (2) painted, 6061-T6 aluminum alloy spreaders per mast. The spreaders shall be tapered, hollow, oval in shape with physical dimensions of 5.0" x 1.5" x .188" wall. Approximate length of each spreader to be 5'6".

Sail Track — the sail track shall be riveted with the mast section per plan and shall have internal dimensions of 1' x 7/32" to accommodate the plastic sail slides.

Winch Pads — aluminum winch pads shall be located as directed to properly align each winch with its halyard. The following winch pads shall be provided to suit the base diameter of each winch. The winches shall be provided by CSY Yacht Corporation and be installed by same:

Jib Top'sl Halyard — One (1) Lewmar, two speed.

Main Halyard — One (1) Lewmar, two speed.

Forestay'sl Halyard — One (1) Lewmar, single speed.

Cleats — the following cleats shall be furnished and installed on the mast by CSY Yacht Corporation as directed:

Three (3) Merriman, Aluminum Alloy, #6 cleats.

One (1) Merriman, Aluminum Alloy, #4 cleat.

Mast Lighting — the following lights shall be furnished and installed by the builder as directed with all bulbs and wiring connections complete and ready for service:

Combination Bow and Foredeck Light — to be one (1) Perko light located as directed on forward side of mast.

Flag Halyard Cheek Block — to be one (1) Schaefer Fig. 30-06, Series D cheek block, furnished and mounted on the spar by the builder as directed.

Eelectrical Wiring Conduit — Two Awl Grip painted nylon conduits shall run full length of the mast.

Main Boom

To be Awl Grip painted 6061-T6 aluminum alloy, hollow elliptical in section, fitted out for slab reefing. The minimum physical dimensions of the boom shall be 7.75" x 4.75" x .125" wall. Total length of the boom is approximately 17'6". The boom shall be equipped with the following fittings, all located as directed:

Gooseneck — to be of extra heavy, polished Type 316 stainless steel construction with 5/8" diameter pins, fixed in place on the mast. Minimum plate thickness of the gooseneck shall be 1/4". In addition, the gooseneck shall have two (2) luff reefing hooks of 5/16" diameter polished stainless steel rod welded to it.

Outhaul Car — to be of extra heavy, polished, Type 316 stainless steel construction sliding in boom track.

Outhaul Lashing Eye — a heavy duty aluminum eye shall be provided in the casting at the extreme aft end of the boom to secure the outhaul car in the desired position.

Sail Track — the sail track shall be extruded integrally within the boom section.

Topping Lift Lug — to be provided on the end casting. Drilled for shackle as directed.

Boom Bales — there shall be two (2) 7/16" diameter, polished, Type 316 stainless steel round bar, boom bales located as directed. Each bale will be fastened to the boom with one (1) 5/16" diameter stainless steel through bolt.

shall be furnished and installed by Ulmer Spars and located as directed:

Reef Line Cheek Block — One (1) Schaefer Fig. 30-09, machine screw fastened to the boom. Mounted on a welded aluminum plate bearing pad.

Winch Pad — a welded aluminum winch pad shall be provided to level the winch from the curvature of the boom. One (1) Lewmar No. 9 winch shall be provided by CSY Yacht Corporation and installed by same.

Cleats — one (1) Merriman 6" aluminum alloy, one (1) 3" clam cleat.

Forestaysail Boom

To be Awl Grip painted, 6061-T6 aluminum alloy, hollow, elliptical in section. The minimum physical dimen-

sions of the boom shall be 5.5″ x 3.375″ x 0.11″ wall. Total length of the boom is approximately 12'3″. The forestaysail boom shall be equipped with the following fittings, all located as directed:

Gooseneck — to be of extra heavy polished, Type 316 stainless steel construction with 1/2″ diameter pins. Minimum plate thickness of the gooseneck shall be 3/16″. The gooseneck shall be capable of being attached to the 1/4″ diameter forestay by means of a stainless steel tubular fitting that will clamp on to the forestay.

Outhaul Car — to be of extra heavy, polished, Type 316 stainless steel construction, sliding in the boom track.

Outhaul Lashing Eye - - a heavy duty aluminum eye shall be provided at the extreme aft end of the boom in the casting.

Sail Track — the sail track shall be extruded integrally within the boom section to receive the plastic sail slides.

Topping Lift Lug — to be provided in end casting.

Boom Bales — 3/8″ diameter, polished, Type 316 stainless steel round bar, boom bales located as directed. Each bale will be fastened to the boom with one (1) 1/4″ diameter stainless steel through bolts.

Standing Rigging

All standing rigging shall be 1x19 stainless steel wire rope with the following diameters:

Headstay	— 3/8″
Forestay	— 1/4″
Upper Shrouds	— 3/8″
Intermediate Shrouds	— 5/16″
Lower Shrouds	— 5/16″
Backstay	— 3/8″

Standing Rigging End Fittings

To be "Castlok" wire rope terminals of appropriate sizes to match each piece of standing rigging.

Turnbuckles and Toggles

Each shroud and stay that reaches the deck shall have a turnbuckle with a toggle. The turnbuckles shall be Merriman, open center bronze chromed. The toggles shall be Merriman, bronze chromed. Both turnbuckles and toggles shall be appropriate sizes for the given rigging diameters.

Running Rigging

Rope — To be New England Rope Co. braided Dacron of a diameter and length as per plans.

Wire — To be 7 x 19 stainless steel wire rope of a diameter and length as per plans.

Splicing — Wire to be spliced to rope in a location so as to allow the splice to remain between the winch and cleat after a minimum of three (3) turns of wire are on the winch.

Winch List

General

The following listed winches shall be supplied and installed by the builder. Each deck mounted winch shall be through bolted with a backing plate under.

PRIMARY COCKPIT — Two Lewmar No. 48, two speed self tailing winches located on the cockpit coaming.
MAIN SHEET — One (1) Lewmar No. 34, single speed self tailing winch located on the aft house top.
JIB STAYSAIL SHEET — One (1) Lewmar No. 8, single speed winch located on the forward house top.
MAIN SLAB REEFING — One (1) Lewmar No. 8, single speed winch located on the boom.
JIB STAYSAIL HALYARD — One (1) Lewmar No. 8, single speed winch located on the mast.
JIB HALYARD — One (1) Lewmar No. 16, two speed winch located on the mast.
MAIN HALYARD — One (1) Lewmar No. 16, two speed winch located on the mast.
WINCH HANDLES — Two (2):
One (1)Lewmar Lock-in chrome plated bronze handle
One (1) Lewmar Ratchet

Commissioning

When a CSY Yacht is fully commissioned, all standard installations are fully checked out, operated and ready to go. When Cast-Off Package, Provisions, etc., are ordered, these also are fully installed with a layout chart furnished identifying where every item is stored aboard the yacht so that the item wanted can be found when it is needed without problem.

Including in commissioning is:

- All surface inside and outside neat and clean, including the bilge.
- Engine properly installed, run-in per factory recommendations and properly aligned to propeller shaft.
- Rudder properly installed and properly aligned to work smoothly.
- Steering assembly properly installed and working freely.
- All rigging properly installed and properly tuned.
- Electrical system working properly, all electrical components and fixtures working, and batteries fully charged.
- Fuel system safely and properly installed with all connections tight and leak free, fuel tank full, all shut-offs in the "off" position.
- Water system properly installed with all connections tight and leak free, all plumbing components working properly, and water tanks full.
- Exhaust system properly installed with all connections tight and vapor — and fluid-leak free.
- Refrigerator, Ice Storage, and Ice Box system working properly, if ordered.
- Galley stove working properly, safety shut-off valve checked out and working properly, LP Gas bottles full and system off.
- Electric anchor windlass checked out and working properly, if ordered.
- Compass checked out and accurate — swung and compensated.
- Owner's Manual in place in book shelf.
- Bottom Paint — two (2) coats.
- The yacht properly moored and ready for boarding.

As the manufacturer, we reserve the right to make

changes in specifications and price without notice.

It is our duty and responsibility to you, our prospective customer, to constantly strive to improve our product by incorporating into this product better materials, equipment, or manufacturing procedures which will result in an improved yacht. We vigorously accept this responsibility and conduct an on-going program of research and testing toward this end.

So far as is possible, with the constant updating and reprinting of our sales brochure (which has been designed specifically to allow this), we will attempt to keep our customers and prospective customers apprised of these changes and any resultant effect on total price. However, we cannot be held responsible for our inadvertant failure to do so.

Prices and specifications quoted on this date are those currently in effect.

Should you enter into a purchase and sales agreement with the CSY Yacht Corporation, as per the terms of the contract, prices and specifications shall remain firm for the entire term of the contract, which is: From six (6) weeks prior to the time your yacht goes into construction until final construction and commissioning of the yacht.

CSY

CSY Yacht Corporation

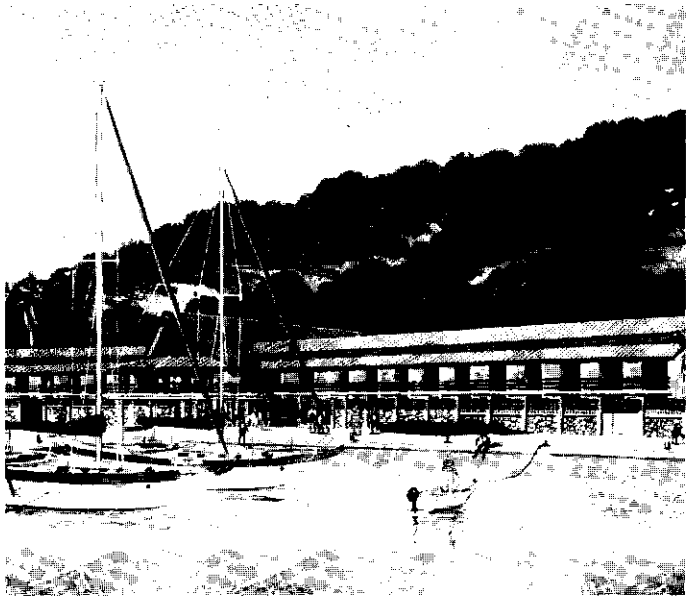
The Story of the Development of the Ideal Charter Boat

This story has relevance for anyone contemplating buying a yacht for cruising now or in the future. The world of the cruising sailor is the most rapidly expanding one in all the field of recreation. We are firmly convinced that the requirements for the ideal charter yacht, with some minor exceptions, are identical to those that any cruising yacht should have which is to be used for any serious blue water cruising.

In almost thirteen years, Caribbean Sailing Yachts (CSY), has grown from Capri 30s to 140 sailing yachts, the world's largest charter fleet, ranging in size from 33 feet to 44 feet, all brand new CSY built yachts. They are based in three marinas: Tortola in the British Virgin Islands, Roatan in the Bay Islands of Honduras, and St. Vincent at the head of the Grenadines. Yacht chartering has come of age and is fast becoming a major tourist attraction south of our border, where there are the finest cruising waters to be found anywhere in the world.

CSY has pioneered full-service chartering from the beginning to bring it to a level of sophistication and dependability undreamed of just a few years ago. Today, our company-owned marinas are the most modern and completely equipped to be found anywhere. We even have our own hotel accommodations at each marina.

During the past two years we put into service 96 CSY 44s for charter work at our marinas. This is the boldest and largest gamble that we or any other charter firm has ever taken. The success of this yacht has been overwhelming. It is the result of almost three years of research and study. It is the culmination of our ten years of experience with several tens of thousands of charterers in every conceivable condition. This is the story of the development of that yacht. It is this same experience which has gone into the design of the CSY 37 and 33.



CSY Marina, Roatan

Basically, we were seeking four major requirements.

First, she must sail well: go to windward, be stiff, and be seakindly and simple rigged, so that two or even one could handle her easily.

Secondly, she has to be comfortable, convenient and safe to live aboard whether underway or at anchor. The layout should be designed to provide privacy for one, two or three couples, with the possibility for more capacity. Since sailing is basically an outdoor sport, the cockpit is to be large, comfortable, and well down in the boat, convenient to the rest of the accommodations below. She is to be designed so she can sail for several weeks if necessary away from a base of supplies.

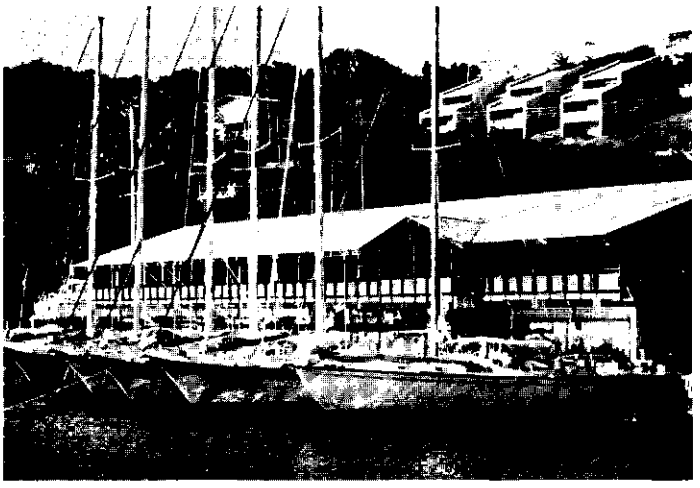
Thirdly, she has to be built with materials and equipment which only require low maintenance and have a long life. Everything needed is there, but no more than necessary.

Fourth, and far from least, we want a good-looking boat both inside and out – design which has lasting qualities. This, we felt, required reaching back and going to a tried-and-true, traditional design.

In 1969, CSY introduced the first production mid-cockpit boat, which was specially designed to meet our requirements by Alan Gurney. This started a trend in mid-cockpit boats which we see so much of today. In our opinion, most have gone too far in raising the cockpit to get a walk-through under it, with the loss of almost all that valuable deck storage space and engine access, as well as making the cockpit a towering appendage which results in too many ugly boats.

Our next boat must be another breakthrough in refinement and sophistication which the result of our years of experience tells us is the next step in the development of the cruising yacht.

These yachts are bought by private owners and leased back for a period of seven years by CSY. During that seven years, CSY agrees to maintain the yacht at its expense. The yacht can never be any better than the product that comes out the factory door which for all intents and purposes is, as



CSY Marina, St. Vincent

far as a charter yacht is concerned, when the manufacturer's responsibility ends: thus, our insistence that everything about the yacht be of the best quality.

It was extremely difficult for us at CSY to get on the same wave length with most manufacturers of production yachts. They are tuned in to one song — to put out the most boat for the least number of dollars. In this, they are most successful. However, if we have to sign a lease in which we agree to take on the full maintenance of a yacht for seven years, we are necessarily tuned to another song — the yacht must be equipped and built to stand the gaff; a quality product designed to go to sea every day with the minimum of maintenance — which is another way of saying, with a minimum of expense. This is not to say we don't want a good value for each dollar spent.

Against our original intentions, to get the yacht we wanted we had to go into the yacht building business ourselves so that we could control every aspect of the construction from building the molds and plugs through to building and equipping the yacht and to its final commissioning.

The CSY 44 is being built by the CSY Yacht Corporation located in Florida and the exact same boat which we are using in charter service is being sold direct from the factory to the public — no dealers.

In the design of the Mid-cockpit 44, we are providing a huge cockpit well down in the hull allowing for a handsome yacht. The great after cabin and raised deck aft provide a spacious aft cabin and broad deck above. There are deep-bulwarks forward to make for safety in the handling of the headsails. The CSY 44 is available in either a shoaldraft of 4'11" or a deepdraft of 6'6".

The effort in the layout below decks is to make the forward cabin the equal of the aft cabin in comfort and convenience, each with its own head.

The forward cabin has two round, fixed ports, Port and Starboard, at bunk level to give light and take away from the claustrophobia so common in forward cabins in even the largest yachts. A completely separate stall shower is provided next to the forward head so both the head and shower can be used at the same time.

The main salon is designed to be open and airy. The settee starboard can be made up into a large double, and the back of the settee raises to provide another berth. The galley back of the settee raises to provide another berth, the galley is aft, with a large pass through port at eye level into the cockpit. The galley sports a specially designed fiberglass garbage bin with cover to keep the contents both odor-free and bug-free.

The cockpit itself is almost seven feet square. There are huge storage areas port and starboard under the coamings and cockpit seats.

The cockpit sole is designed with two large engine access hatches so the engine can readily be worked on from both sides, and if need be, can be easily removed. The engine is located forward so the transmission and stuffing box are easily accessible. There is access from the main cabin to the engine compartment, so that it can be entered while underway. Port and starboard of the engine are two incredibly large tanks which together hold 400 gallons of water. The fuel tank is aft in the engine compartment. The fill for the water tanks and fuel tanks are far apart to avoid the mistake of putting fuel in the water tanks, or vice versa. The fuel tank has a straight filler pipe so that the level can be gauged with a stick. Water tanks have sight gauges.

Any boat needs good ventilation, but this is especially true for cruising in the tropics. The CSY Mid-cockpit 44 has seven hatches and 18 opening ports. With this, in addition to the two companionways, the boat always remains cool and dry below.

The ballast is inside and covered with a full hull thickness of fiberglass to, in effect, give the yacht a double bottom. The bilge areas are gelcoat smooth and any corners rounded so they can be cleaned easily and thoroughly.

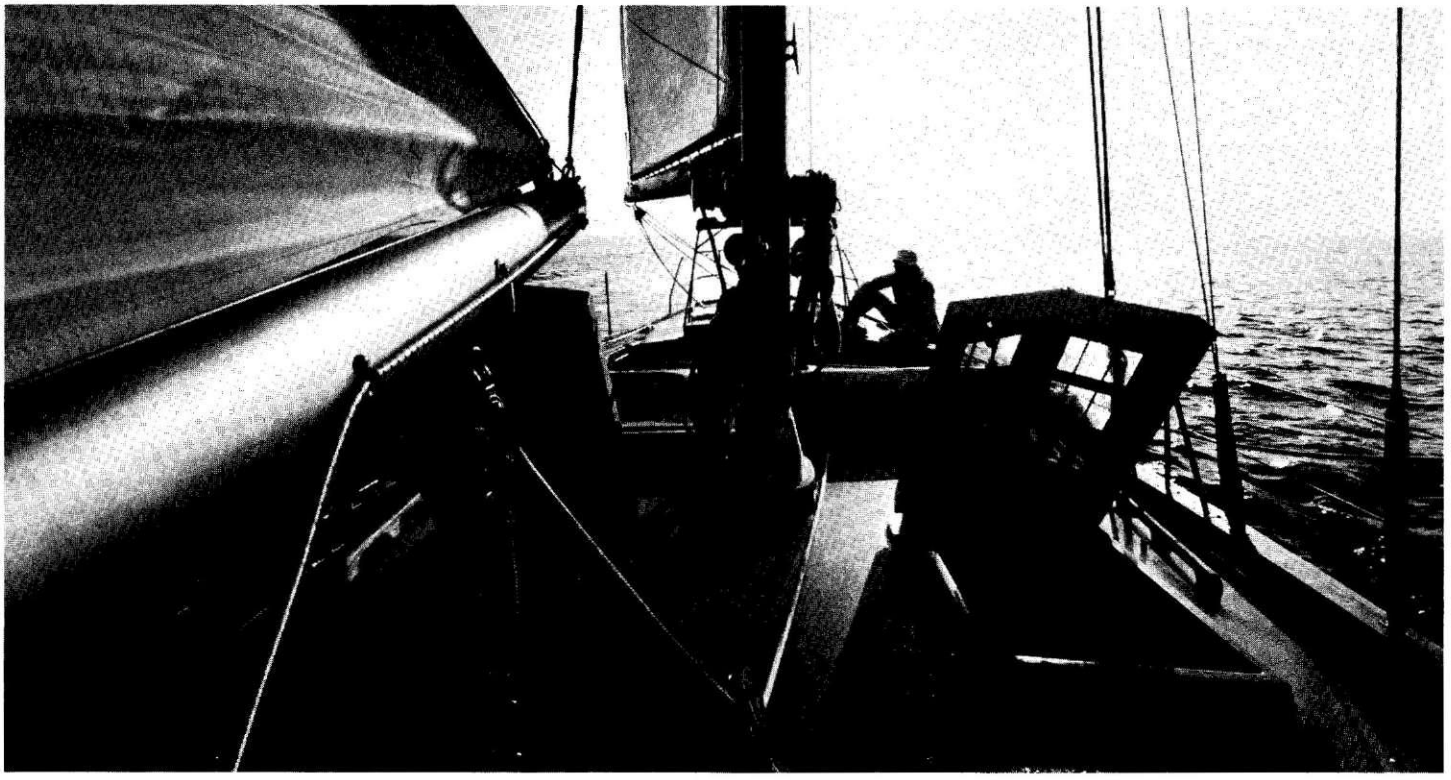
We have selected the cutter rig to give almost twice the luff area in the foresails where the driving power is. There is great flexibility in reducing sail with a roller furling high clew jib topsail and self-tending staysail. The main has jiffy reefing which is far more practical and maintenance-free than the worm-geared roller reefing on the boom that we have used heretofore. With the low cockpit, a Bimini top with a rolled curtain aft and a rolled up windshield forward gives full headroom underneath it and still clears the boom.

CSY

CSY Yacht Corporation

CHAPTER VI

Hardware and Equipment



IT was the advent of aluminum, dacron, stainless steel and fiberglass that made possible the low maintenance yachts of today. If we had to contend with the problems of wooden yachts of yore, there would not be the thousands of yachts on the water that we now see because the average owner would neither have the time nor the money to maintain them. The charter business as we know it simply couldn't exist without modern materials. However, there was an awful lot of the hardware that the older boats used that is far better than the cheap substitutes of today. From those standards we have a lot to learn. The hardware that works in your kitchen just won't take it in the marine environment. Yet that is what is being put on too many boats at the present time.

In over a decade of experience of having to maintain yachts we have found various pieces of hardware and equipment that we find that works.

In this chapter much of this will be discussed and in the architectural specifications for the CSY 44 you will find the details. Here we are going to attempt to give the whys and wherefores of why we have specified the equipment that we have. This is an ever changing milieu. Any boat company worth its salt is constantly combing the market place for better answers. CSY more than any company is doing this because with one hat on it produces yachts and with another commits itself to maintain them. We are testing new products all the time to find a better answer. So by the time you read this book it probably is all out of date.

Deck Hardware

As you have seen earlier we have designed a special stanchion which for the last six inches is a solid stainless steel shaft not a tube, which is threaded at the end. It is almost an inch in diameter and bolted with a washer and sealed on top of our coamings to preclude any leaks. It works. Its the answer to the usual stanchion with four drilled holes into the deck which almost always leak in spite of the best installation.

We feel that if you are going top drawer there is only one way to go in cleats and hatch hinges — 316 stainless steel which is what we specify for all CSY Yachts. The cheaper way to go, of course, is aluminum. We very carefully supervise the suppliers who produce our custom stainless steel — stanchions — boat stem pulpits — anchor chock — chain plates and bow and stern straps. These are not stock items — they are built specially for each boat. We allow nothing less than a 304 stainless steel alloy and every piece has to be carefully finished — pacified and electrically polished, aluminum will corrode and all are weaker than stainless.

Hatch Holder and Hatch Fastener

Until about seven years ago, hatch holders were a problem for which we could not find any satisfactory solution. Those that slide and are adjustable soon corrode and don't slide anymore. They lost the little adjustment knobs as well. We finally ended up relying on sticks to hold the hatches open — a most unsatisfactory solution.

In 1972, we saw the spring hatch holder made by Moonlight Marine and specified them on our Charter Yachts. These have been trouble-free and they always work and lock themselves in the open position with no fuss. Its almost automatic. If a line gets fouled around an open hatch instead of ripping the hatch from its hinges, it springs open with no damage to the hatch. A slight tap in the middle of the opened spring and the hatch closes.

A new product with Moonlight Marine is the adjustable hatch fastener which allows a really tight seal for the hatch when it is fastened down.

Both products are simplicity itself — they work without a lot of gimmickry — quality products.

Blocks and Shackles

Most of the blocks and shackles on CSY yachts are made by Schaefer Marine Products. This young, family-owned company is another firm run by yachtsmen who understand the needs of the marine environment. We have used several kinds of blocks at our three marinas, and we have found that those produced by this New England based company stand the gaff better than the others we have tried. These blocks are made of stainless steel, and the sheaves are high impact Derlin plastic. We are particularly impressed with the durability of the jib sheet swivel block mounted on a spring on the car, which swivels a full 360°. Our jib topsail is led through this block to a turning block, also a Shaefer product.

The Schaefer family has been in business since 1914 as the principal manufacturer of freight car brake equipment in the United States. In pursuit of their favorite sport sailing, they decided there was the need for their manufacturing expertise in the sailing market and thus started the marine division some twelve years ago. Proving again the importance of filling a need with a quality product, Schaefer has in a few short years become a leader in its field.

Hardware such as blocks and shackles is always going into an area of change. Our purchasing department consists of two departments — one department monitors ordering and watching quality control but another separate department's full time task is to search the world over for something better than we are getting. That is the reason discriminating buyers will find things on a CSY yacht he has never seen before.

Cast Lock Rigging Terminals

Here again we have tried them all. The strongest terminal used to be the swaged terminal which is twice as strong as the Norseman type. The Norseman fitting consisted of unravelling the stainless 1 x 19 rigging wire within the fitting and then bolting down the end of the terminal into the wire to hold it in place.

The disadvantage of both terminals is that no matter how it is sealed at the top water manages to work its way down inside of the fitting. Even though both the wire and the fitting are stainless, rusting and corrosion eventually takes place. The swaged fitting cracks and then has to be cut off and replaced. Unless swaging equipment is available this can be a problem.

The Norseman type fitting will also corrode but it does have the advantage of being able to cut the wire and reattach the terminal fitting without a lot of exotic equipment.

For three years now we have been using the Cast Lock terminals. This consists of a heavy terminal similar to a swaged terminal. The end of the wire is unravelled and inserted into the fitting which is then filled with epoxy. These have been tested to have twice the breaking strength of the wire. Because the fitting is completely sealed in epoxy water cannot get into the terminal as is the case with the older types.

The epoxy remains hard up to 400° F. at which point it turns into a powder. Thus with a blow torch it is easy to remove the terminal and, of course, it is simplicity itself to attach the fitting to the wire.

Here is another long standing problem that has been solved by modern materials.

Roller Furling Gear

The roller furling jib has almost become a must on cruising sail boats. Over the years, we have tried many systems. The earlier ones used a luff wire which had the disadvantage of bowing out to leeward in heavy winds, thus affecting windward performance. The wire also on occasion became unravelled.

In St. Vincent, we had to eliminate the early roller furling gear because the drums and swivels could not take the sometimes heavy winds encountered there, and they came apart.

One of our charterers, Bill Zimmie, who is a marine architect and a manufacturer of marine products, decided that there had to be a better way. The result is the Hyde Streamstay which Bill designed and his company manufactures. This equipment has been in use on all of our yachts and has met all of our specifications.

Bill has designed a superior drum and swivel for heaviest use. The drum is designed so the furling line cannot get tangled on itself or jump out of the drum. The real improvement, however, is the use of a rod on the luff of the sail which keeps the luff straight and solves all of the problems posed by the old luff wire. The rod has a groove built into it to take a rope sewn into the luff of the sail which makes it possible to change sails without taking the whole rig down.

We have given the Hyde Streamstay the equivalent of several years of ordinary use in every conceivable kind of condition, and it has performed superbly with the very minimum of maintenance. The Hyde Streamstay is an optional item.

Winches

Most cruising yachts are under powered so far as winches are concerned. Our winch sizes are chosen for each of our yachts to be adequate for the standard sail area designed for each yacht. We feel that self-tailing primary winches are now a must for any cruising yacht therefore, they are standard on all of our yachts. When you select a yacht you should be very careful to try out the yacht under good windy conditions, if that is possible, to see if the winches have adequate power for you *and* your wife. You may want to specify larger winches. This is a matter of individual preference and needs.

Once it has been decided what winch power is necessary then comes the problem of the selection of whose winches to use. To sort out the true power of a winch fairly and compare the products of each winch manufacturer is more difficult than it would appear on the surface. We find that in order to try to get at the real power of a winch that the only valid criteria for comparison is to compare gear ratios rather than so-called power ratios which can be misleading. These ratios are available from any manufacturer. To minimize the complications in maintenance and simplify operation, we think for a cruising boat that anything more than two speed winches are superfluous.

The difference in cost in winches of the same size is in whether the casing drum is bronze, chrome plated bronze, anodized aluminum or the most expensive-stainless steel. These differences, are not any where near as significant as how well the *inside* is constructed and the absence of electrolysis due to difference in alloys.

If one chooses the product of an established major manufacturer of which there are three-Barlow, Barient and Lewmar, you can reasonably be assured that they will be around in the years to come. A major consideration is to choose a winch which has parts readily available, and as much as possible, interchangeable between the different size winches that may be on your boat.

We consider Barient to be one of the finest winch manufacturers. However, recently we have switched to Lewmar because we think their self-tailing feature is better.

By the time you read this we may have switched again, our account to a winch manufacturer is such a valuable thing to him because they know we set a standard. Thus we are constantly getting them to improve their products.

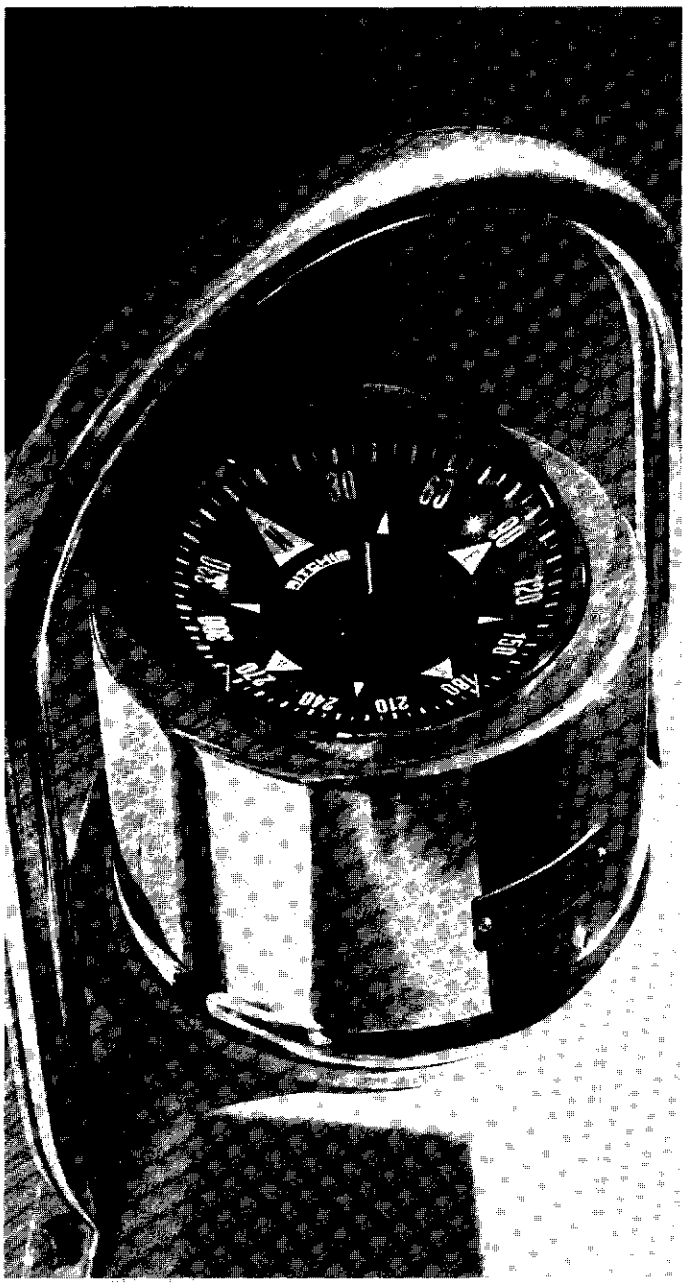
Compass

Probably the most vital piece of equipment, particularly for the off-shore cruising man is his compass. CSY is specifying the Ritchie Globemaster SP-5 compass with a 5″ dial.

We have standardized on Ritchie compasses for several years now and find that they stand up best to the twin problems in the tropics of loss of liquid and crazing of the plexiglass. Instead of a plastic gimbal ring a lighter ring of aluminum improves card performance. We also prefer the night lighting feature over others.

We are using the SP-5 with a removable plastic hood, which allows full view of the compass, and the cover protects it from the tropical sun when not in use. The SP-5 is considerably less expensive than the D-515-E model with the sliding brass cover although the compass is exactly the same. We have found the brass cover can corrode or bend, making it difficult to use, and the over view of the compass is restricted.

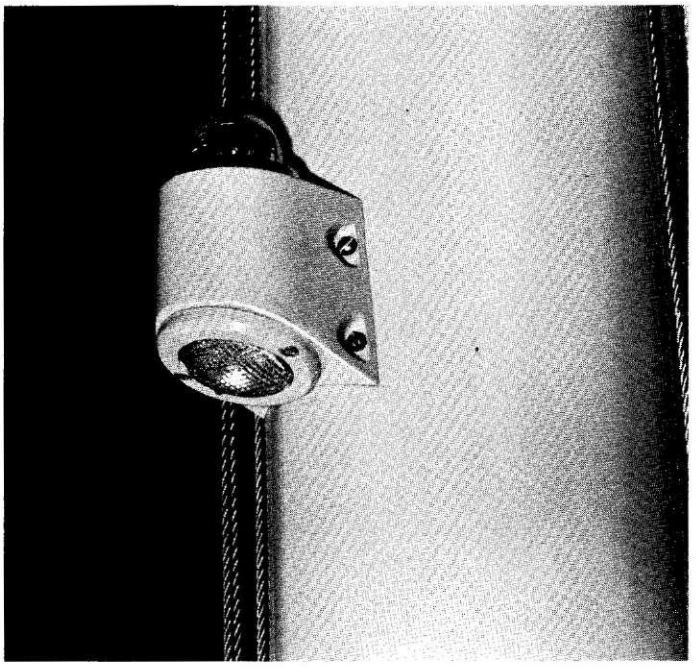
The Ritchie Company is another one of those old line New England companies and has been in business since 1850. To be in business that long, making navigation equipment, they have to be doing something right!



Combination Bow Light and Foredeck Light

This combination light is mounted high up on the forward side of the mast on CSY yachts. Being well inboard on the mast, it does the job of spreader lights without the

hazard of entangling halyards on the lights as so often happens, and it puts the light farther forward on the foredeck where it is most useful. This combination light serves the double purpose of bow light and foredeck light with a minimum of wiring.



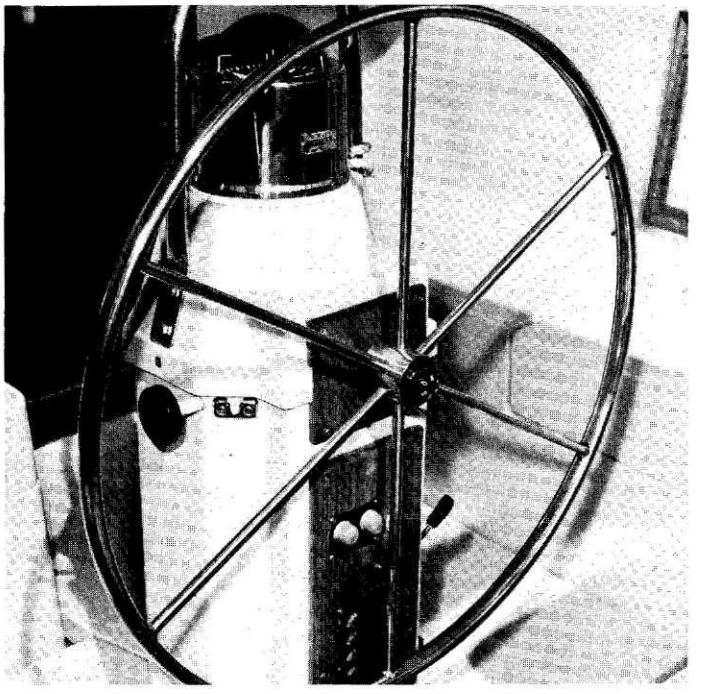
Steering System

We have standardized on the Edson steering system on all the CSY Yachts that we produce. We have used their systems in our charter operation for over a decade and it says something for the engineering and the materials used that these Edson systems have been almost entirely trouble-free. The Edson system uses stainless steel chains as a driving method and change over to wire around sheaves to a quadrant attached to the rudder post. We extend the rudder post so an emergency tiller (which is standard) can be attached to it if one of the steering cables lets go. As in the best of winches, Edson pedestals use stainless steel needle bearings which gives the smooth performance to give a good "feel" in steering. Properly maintained, they are trouble-free. For the cruising man, the Edson Wrap-Around brake is a must.

The most important consideration in a steering system is the design and the care with which it is installed. The usual wheel system is connected ultimately with a quadrant which is attached to the rudder post. To get the maximum leverage the quadrant needs to be big enough. From the quadrant stainless steel wires are led around a series of sheaves until these wires are connected to the mechanism of the steering system mounted in the pedestal on which the wheel is mounted. These sheaves have to be firmly mounted and exactly lined up with the direction of the steering wires to make the system easy running with a minimum of friction and wear on the wires. If you see your prospective boat out of the water, push the rudder back and forth to see if this can be done easily. We feel that this is a much safer and dependable arrangement than a hydraulic system.

Of the several wheels Edson has available, we prefer the smooth, all stainless steel destroyer wheel. One reason, it is cheaper, and another reason is that in the tropics, we have found that the vinyl covered wheel, which has the vinyl bonded to an aluminum wheel, will finally corrode and break after some years of exposure. Even though Edson makes good on their guarantee of these wheels, we recommend the stainless wheel as being the surest to be trouble-free.

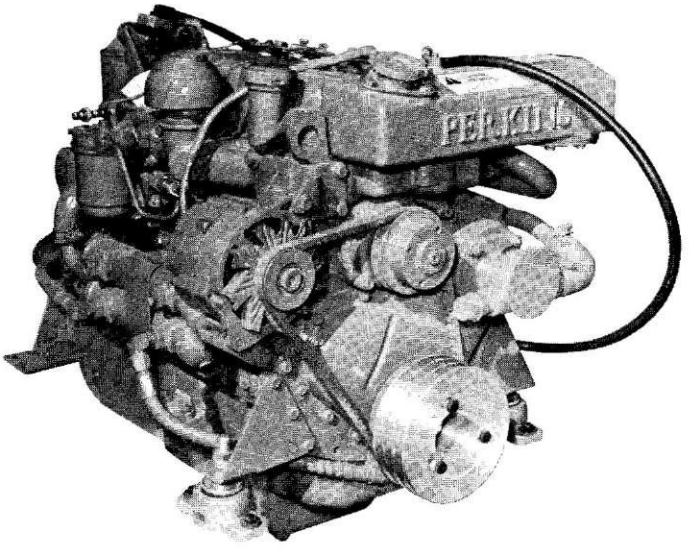
Edson is another one of those old live New England firms who have had their staying power because of the continuing quality of their products.



Auxiliary Engine

Thankfully the day is pretty much gone when gasoline engines were used as auxiliary power on sailboats. Unfortunately this is not yet true on power boats. Although gasoline engines cost quite a lot less than diesels and they are also considerably lighter the advantages of the diesel engines far outweigh the consideration of cost. Diesels are less expensive to operate. However, the safety factor of a diesel engine over a gas engine makes it an absolute must in our opinion. Diesels will also far outlast a gasoline engine and the maintenance is far less.

We are using Perkins Diesel engines now as standard on all of our yachts. Not only do we think they are at least the equal of the best but they are probably the most universally used marine engine in the world. Parts are available worldwide. With the recent opening of the new Perkins manufacturing plant in Canton, Ohio, Perkins will have plants on every continent in the world, thus further assuring the availability of parts. Since Perkins is the largest marine diesel engine manufacturer in the world, we can be as sure as it is possible to be that they will be around for as long as the engines can be expected to be in service and the parts will always be available.



The Perkins 4-154 diesel is the most modern diesel engine in the whole Perkins line. It not only is a rugged, quiet-running engine, but produces more horsepower per pound of weight than most other diesels. It is designed to run at its full RPM, 3000 RPM, continuously at which it produces 53 shaft horsepower. With the three-to-one, reduction that is specified for the CSY 44, it produces almost as much horsepower as the next larger engine in the Perkins line.

The Perkins 4-154 is standard on the CSY 44 Mid Cockpit Cutter and the CSY 44 Pilot House Ketch. As an option on the Pilot House Ketch the more powerful Perkins 4-283 can be installed. Both the CSY 33 and the CSY 37 have the Perkins 4-108 as standard which is more power than either boat really needs, but it is there in the extreme conditions when only such power could do the job.

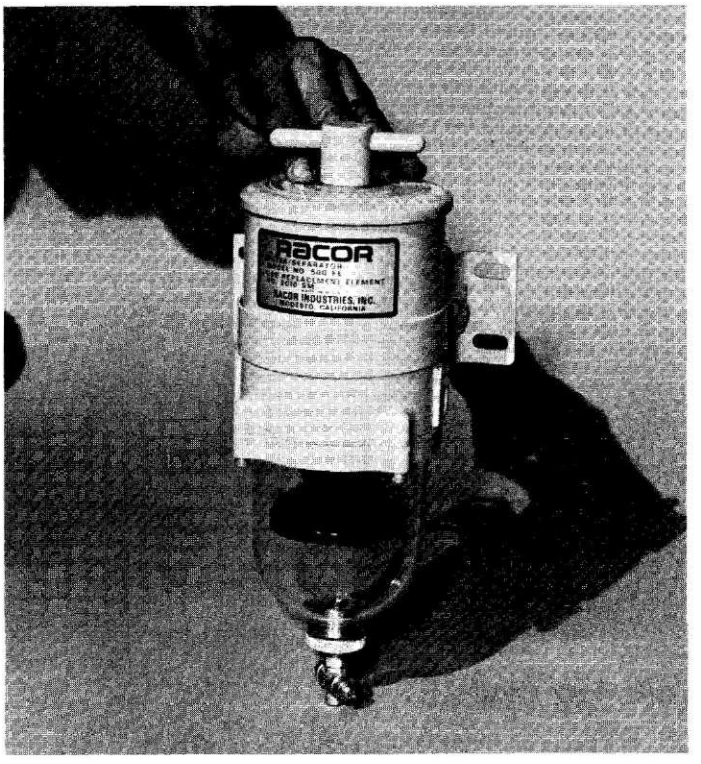
Fuel Filter

A necessity on any cruising auxiliary is a fuel filter, but this is particularly true if you expect to cruise far afield where fuel supplies may be more suspect as it is in the Caribbean. Most diesel engine dealers offer the filter as an extra and the usual filter does not always do the job. Only the best is good enough to protect a $500 injection pump and a $4,000 engine.

The best fuel filter we know is the Racor Model 500-FE. It is the smallest one they make and works at maximum flow rate of .9 gallon per minute.

It is a three stage filter. In the primary stage, the fuel is run through a rotating disc with 30° vanes in it which by centrifuge action removes the heavy solids and liquids. There then is a secondary stage which coalesces out those contaminants which are lighter than the fuel. In the third and final stage, the fuel passes up through the center of the filter element which is the most efficient part of the filter and into the injection pump. Any water and everything down to 2 microns has been filtered out of the fuel.

The advantage of this filter, besides its thoroughness, is that the filter housing is transparent so you can see the water and sediment when it accumulates. Unlike ordinary filters, both the sediment and water can be removed and the filter element changed without bleeding the system. There is also another Racor model 500-FE filter to keep the crankcase oil clean which greatly-lengthens the life of the engine.

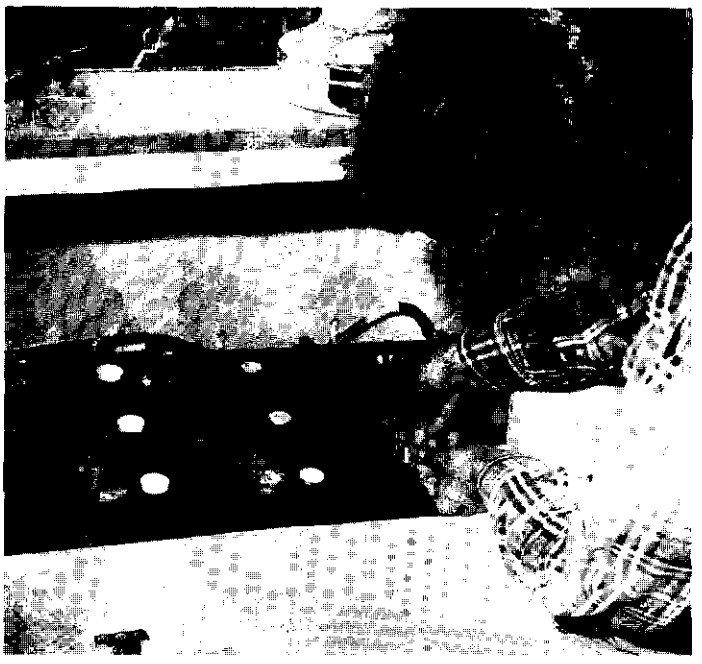


Engine Muffler

CSY has tried all kinds of mufflers. We have used copper, which goes blooey in a year in the tropics under charter use. We have used stainless steel which stands up fine, but is very high in cost. We finally settled on the water-lift type of muffler which eliminates space-robbing risers. However, those generally available in the market place are usually of galvanized steel. They may not last too long, but are relatively inexpensive to replace.

On CSY yachts we use the water-lift type muffler. We have found that the very best way to construct it is of fiberglass. We make these ourselves.

The water-lift principle is simple; the inlet pipe comes into the top of a container with the exhaust gases and water. The outlet pipe is a standpipe which goes to the bottom of the container. The pressure of the gases forces water and gas out. When not in use, the muffler container acts as a reservoir to catch any water coming in through the exhaust so it cannot back up into the engine. The exhaust gases and water normally are at 125°. The fiberglass can withstand temperatures over 400°. Exhaust water never exceeds the boiling point. The fiberglass muffler has higher insulation properties than metal mufflers so it absorbs more of the sound and more of the heat goes overboard. The indestructible, non-corrosive (the key word), fiberglass muffler system will last indefinitely.



Batteries

There are no more expensive and dangerous items on a boat than cheap batteries. Most yacht manufacturers use the regular automotive type batteries which simply aren't made for the marine environment. Such batteries mean constant replacement cost — we know, we have gone that route.

A dependable battery system has to be one of the most important items on a yacht. There are times when it can literally mean life and death to get an engine started or to run a bilge pump. Two banks of batteries is an absolute must so that one set can always be kept fully charged to start the engine. The other set is used to run lights and the other more mundane uses.

Every CSY yacht comes standard with two 12 volt batteries each with a capacity of 100 amp. hours. We offer an optional package of four batteries in two banks. Each bank consists of two six volt batteries wired in series. These give 200 amp hour of capacity on each set for a total of 400 A.H. This extra power package also gives a longer life.

You should not accept the usual automotive type batteries on a boat as most manufacturers supply. Be sure that you have heavy duty batteries made especially for marine use. CSY uses Chloride batteries and we find them as trouble free as any ones we have been able to find.

If you expect to leave your boat for long periods of time and you have a 110 volt available, it is a good investment to add the optional constavolt charger to keep your batteries always fully charged. Nothing will do more damage to a battery than allowing it to go dead.

Electric Wiring

We learned early what happens to the usual stranded copper wiring in the tropical marine environment. Such wiring is pretty much standard with production yacht builders.

Among our charter yachts, our Carib 41's, were wired this way and in only 2 years we had to completely rewire them. The usual stranded copper wire had been reduced to brittle dust. We rewired them with tinned copper wiring and haven't had a problem since. The stranded wire is drawn through a bath of molten solder which protects the copper from breakdown.

Of course, tinned wire is specified for all CSY yachts. Finding a supplier for such wiring is not always an easy matter. There are very few wire manufacturers making the stuff. The Michigan Wiring Company is one of those rare ones who can fill the need.

It's one of those "small" things on a yacht which cost so little more, but can save the ultimate yacht owner a real bundle in the years to come.

Electrical Panel Battery Switch and LP Gas Control

Standard on all CSY yachts is the Marinetics electrical distribution panel, another fine marine product developed by yachtsmen who understand the rigors of the marine environment and have applied their engineering background to develop a product that matches. Several years ago, because of the problems that we were having with the usual production manufacturers installed panels, we replaced them with the Marinetics product, without a moment of problem since, and with the equivalent of several years of use under our belt. This reflects good engineering with the right concept, the proper choice of hardware and good marine practice throughout the product, which together guarantees the safety and dependability of a cruising yacht's electrical system.

Every circuit is protected by circuit breaker — no fuses. The gimmick-free battery selector switch is built into the panel and each set of batteries has an easily read jeweled battery condition monitor which gives accurate readings at a flip of a switch.

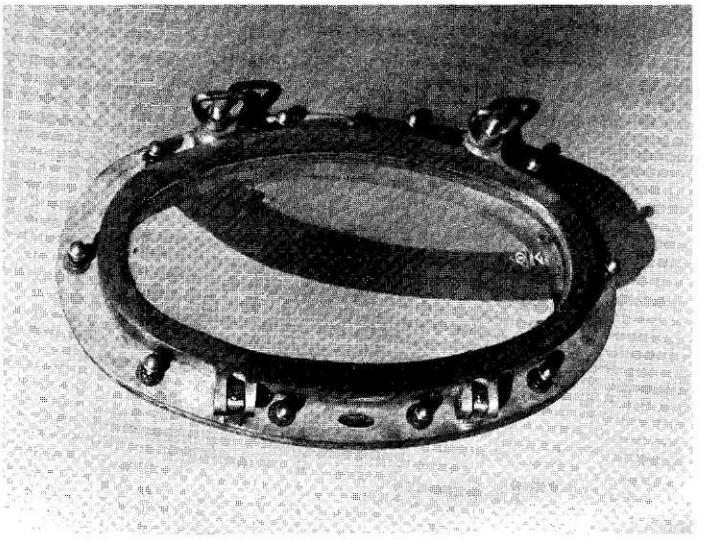
Over the propane stove standard on all CSY yachts is installed a Marinetics LP gas control panel which leads to a solenoid valve at the LP tanks. A switch at the control panel turns on the gas supply and exhibits a red light to remind the cook that the gas supply is on. When cooking is done, the gas is turned off — the light goes out. The gas is sealed in its tank with no pressure in the lines. It is a fail safe system, the valve automatically closes if the electrical supply or pressure regulator fails. A must for any cruising yacht using LP gas.

Portlights

A good boat has to have good opening port lights for the maximum comfort of its occupants. On the CSY 44, for instance there are, 19 opening ports, this is an area of critical importance.

They have to be strong enough to withstand a breaking sea on deck, without leaking or rupturing. They should open and close easily, have screen inserts and spigots, designed to prevent water from spilling below when opened after a rain.

We tried plastic ports. We feel they just don't have the inherent strength to stand up. We have gone to the all-bronze port lights made by the Rostand Manufacturing Company. This company has been making marine hardware, mostly for



ocean-going ships, since 1902. Their ports are of the highest quality and even have an adjustable screw arrangement to take up wear in the gasket to assure no leaks practically for the life of the bronze.

Plastic ports break easily. They discolor. Because they are not rigid it is difficult to get a truly tight seal. Most plastic ports have plexiglass panes which scratch and can be completely clouded by the use of some commonly used solvents.

Bronze ports have been used for years and are good for the life of the boat.

The CSY 33's and the CSY 37's have oval ports that we designed and are custom built for us in Spain.

Bronze ports cost at least four times as much as plastic ports. We think they are worth every penny of it.

Hand Bilge Pump

We have found that the Whale G-25 diaphragm pump which is made in Ireland is the finest hand bilge pump available. This model is actually two pumps in one and can pump 30 gallons per minute. One of its main features is the instant access to the synthetic rubber diaphragm – very easy to service. The body of the pump is made of anodized diecast alloy coated with epoxy resin. It comes with a removable stainless steel handle. We have used the Whale G-10 on the CSY 37 and CSY 33 and have found them to stand up flawlessly. The larger G-25 is being specified for the CSY 44.

Electric Bilge Pump

All CSY yachts have an electric bilge pump as back up in addition to the hand bilge pump.

As with the rest of our equipment, we have tried them all.

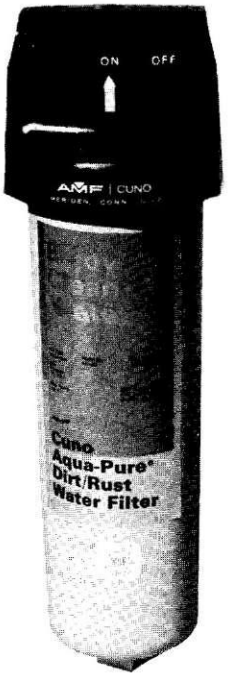
The best and most trouble-free electric bilge pump that we know of is the "Rule" Heavy Duty model 1500, which can pump 1,500 gallons per hour. It has a double teflon seal system so that it goes on working if one seal fails. The housing and internal parts are molded in high impact Acetal Resin so it is free of electrolytic damage. It incorporates an open impellor design with a stainless steel shaft which permits the pump to discharge trash and particles overboard. The pump is safe on "dry runs" if allowed to run dry by mistake. The teflon seals are self-lubricating. It's a great piece of quality equipment which has stood up for us under the most difficult use. No way could anyone get us to change.

Seacocks

Probably the most fallacious and dangerous practice that manufacturers indulge in to save money is the use of ordinary house variety gate valves for through-hull fittings instead of seacocks. The gate valves corrode, they break easily, they leak, and they do not allow for full pipe size passage of the flow of water.

There are all kinds of seacocks that are being made to make them cheaper than the honest-to-God real thing – rugged, all-bronze seacocks. The best ones that we know of are the "Full-Way" Seacox made by Wilcox Crittenden. Properly installed, (which means mounted on a wood backing block and through bolted to the hull) occasionaly lubricated, they will give a lifetime of safe service, as we have found to be true.

On all CSY yachts, all the seacocks, the propeller, the shaft, everything that is metal and underwater is bronze to minimize the electrolytic action of dissimilar metals.



Water Filter

When cruising anywhere, but particularly in the islands, care has to be taken in selecting water to be put in the yachts tanks. Even with the greatest care, a water filter right at the water tank is a must. On CSY yachts Aqua-Pure #AP200 is standard. This is a dual purpose filter with a white cellulose filter to strain out rust, dirt, silt, or other solid particles. The Second stage is filled with activated carbon crystals which removes disagreeable taste or odors. Spare cartridges are available which, of course, must be changed regularly. This filter is for cold water use only and therefore has to be installed in the line between the water tank and hot water heater.

Interior Hardware

It is a regrettable trend in production yachts that hinges, door hardware, handles, knobs, you name it, being put on yachts today are the garden variety of cheesy hardware made of sheet steel which is chrome-plated, or even cheaper alloys not made or intended for the marine environment. The trend is so well established that it is difficult to find the good precision cast bronze or high quality stainless steel hardware that is the only kind that should ever be put on a yacht if you expect it to stand up for any length of time.

We finally found a supplier of fine bronze hardware in New Jersey; H. S. Getty. This company's main business is providing hardware for large ocean-going vessels. The quality of their product would even draw admiration from the likes of that old perfectionist, L. Francis Herreshoff. We have specified Getty bronze interior hardware throughout all CSY yachts. Costs a little more, but we know it's a one time cost – period.

Drawers

We are a great believer in lots of drawers on a boat. CSY yachts are designed to provide at least two drawers for every person on board. There are two drawers in each head. Altogether there are over 24 drawers on a boat like the CSY 44.

As any cruising man knows, drawers are a pain in the you-know-what on any boat. They take on moisture and swell and stick or they come apart.

We have found the answer to the drawer problem by using the Techtonic one-piece, continuous frame section drawer. These are plastic drawers made in a continuous frame so any size drawer can be made and it won't come apart. They won't be affected by water or humidity. They are shatterproof. They are smooth so they glide as if greased. Because the patented Techtonic method of making drawers does not require a lot of expensive molds, these drawers cost less than conventionally made drawers. Another case of where the best costs less.

Propane Tanks

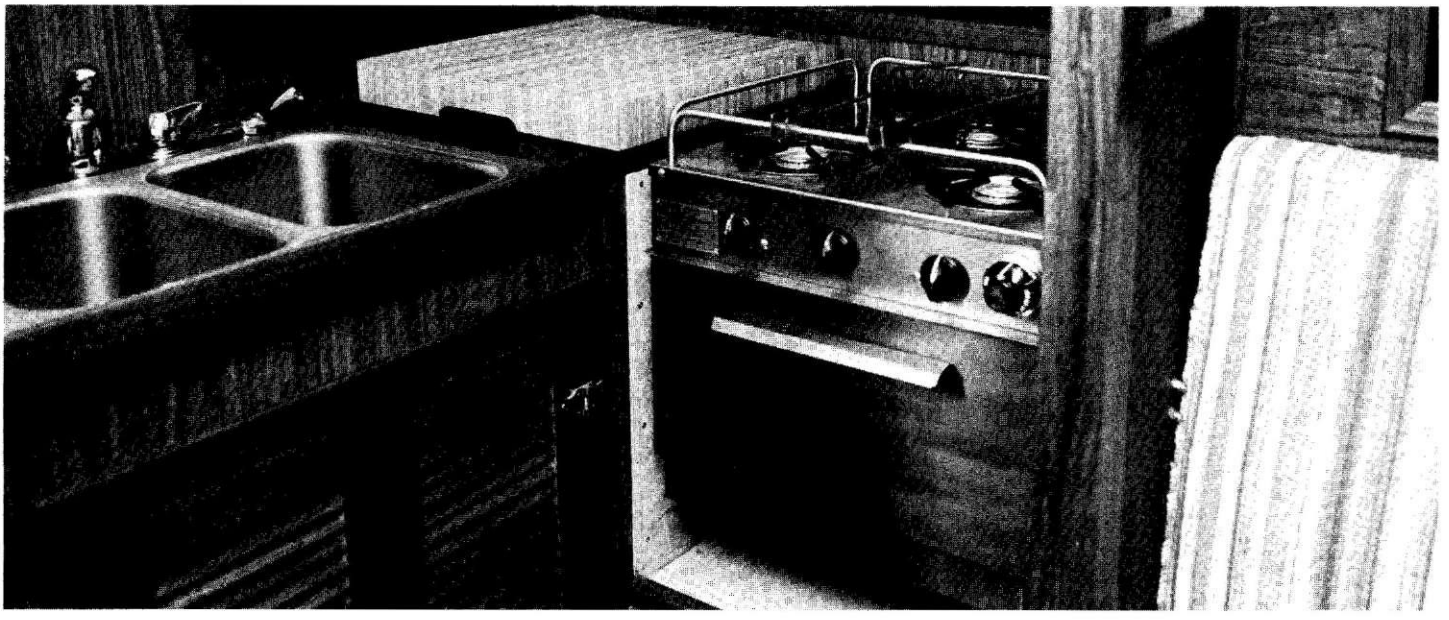
It is an absolute must on a boat if you are using LP gas that the gas cylinders be of aluminum. This cuts down on maintenance. More important, it precludes the possibility of the tank rusting out and causing dangerous leaks which they will surely do in the marine environment. Neither can there be internal scale to clog fuel lines. The aluminum tanks are 40 per cent lighter and unlike steel, aluminum tanks are non-sparking. The Worthington Company supplies aluminum tanks from a 6 lb. capacity to 40 lbs. We have been using these tanks successfully for almost ten years with no mishaps. They can be provided for in horizontal or in vertical installations.

Propane Stove

Properly installed, we consider propane to be safer than alcohol. Our problem, however, was to find a stove and oven that would stand up under the most rugged use and could withstand the combined corrosive effects of exposure to salt water, heat and humidity.

We have tried just about every one of the garden variety of stoves purported to be marine stoves. Most of these are enameled sheet steel. The burners usually are aluminum. The burners clog and the hinges break and in short order the whole body of the stove begins to rust. It is incredible how badly these stoves look after only about three months of use in the tropics, even though they may be tolerably usable for as much as a year. However, these stoves have needed constant replacement – a very expensive business.

Here's where almost any manufacturer you want to name will save a few bucks. CSY learned a long time ago that the only stoves worth putting on a boat are stainless steel stoves and that means stainless steel inside and out with stainless steel hinges and non corrosive burners and parts. They are standard on all CSY yachts.



Refrigeration

This subject is discussed in greater detail in a later chapter by Mr. Crosby who installs all refrigeration for CSY yachts.

For years the level of dependency of marine refrigeration has been pretty low. It annoys us that what is laughably called refrigeration is installed as standard on some production yachts. These are $200. units (at retail) which are electricity eaters and are totally unsuited for marine use (again refer to Mrs. Crosby's chapter).

When we approached the matter of refrigeration for our charter yachts we had to be absolutely certain we would have a system that would work and be easily maintained by our staff. The requirements were these — no battery drain or the need to hook up to a 110V supply. It therefore should be run off the engine. It was to be designed with as few connections as possible to cut down on the chances of leakage. Components were to be choosen for their quality and parts availability not based on cost.

We wanted three sections — one, a freezer to hold food for six people for three weeks including bread which goes fast in the tropics. The second section would hold 200 lbs. of ice cubes below freezing. The daily need for ice for six people in the tropics is more than most small marine freezer sections could handle. The third section was to be a refrigeration space at 38°F. for vegetables, cheese, butter, etc.

The system had to be designed for tropical use which means steady high temperatures. Translated this meant heavy insulation — 4″ on all our boats.

All of this to be kept going with no more than an hour's use on the engine at 1,000 R.P.M. less time at higher R.P.M.

The Crosby Company met our requirements and more. They are strictly marine refrigeration specialists. They designed and tested their system outside the boat for a month under the conditions that could be expected on the CSY 44.

Three notable features of this system are the space saving palletized condensing units with open access to all parts for visual inspection; a separate 1/4 H.P. longlife sea water pump in lieu of using the engine sea water pump for condenser heat removal.

This system is available as an option on all CSY yachts. The boxes range in size from 17 cu. ft. on the CSY 33 to 21 cu. ft. on the CSY 44's.

The most important part of any refrigeration installation is the insulation-top-sides and bottom. It is doubtful whether any manufacturer provides the 4 inches of insulation that CSY does on its boxes. They will keep ice far longer than regular boxes. There are few things on a yacht more important than a good refrigeration-freezer system that can make a boat a home.

Note heavy insulation.

Paints and Finishes

The only cheap bottom paint is the one that lasts the longest. Tropical waters can grow a marine hay field on the bottom of a boat in three weeks time. A good bottom paint consists of two basic elements — toxicants — the anti-fouling ingredients — and the resins that bind the toxicants together. A successful anti-fouling bottom paint must have more than just a high percentage of toxicant. The key is in the resins that bind the toxicants into the paint film. If that isn't properly formulated, the toxicants will not leach or they will leach too rapidly. In both cases, the paint is a failure.

We are using Copper-Lux which contains 67.5 per cent cuprous oxide and one per cent tributyl tin fluoride which kills the grass growth. All I can tell you, it works better than anything we have ever used and we have tried practically everything.

We are using the three coats of the Interlux #97 Polyclear urethane varnish on the teak and holly cabin soles. To the last coat will be added some pumice for its nonskid qualities.

Two coats of Interlux #60 rubbed effect urethane varnish is going on all the teak and teak trim below decks on all CSY yachts.

These urethane varnishes are easy to apply — are tough and long-lasting. To keep the yacht in a new condition, they should be applied right at the factory.

We are standardizing on International Paint Products because, by experience, we know they work and being the largest manufacturer of marine paints and varnishes, their products are widely available.

Swim Ladder

The swim ladder that we offer you as an option has ten years of development behind it. In our charter business we have tried everything and not until now would we say we have an answer.

This specially designed and patented ladder is the result. It is all stainless steel so it is rugged enough to take a 300 lb. man. It lies unobtrusively against the stanchions on the side of the yacht. It recesses against the stanchions so it is not vulnerable. It swivels outboard and turns around and hooks over the coaming. It is permanently attached to the yacht so if it is forgotten when the boat gets underway it will not be lost. It rests solidly against the rub rail and it has the added advantage of going two feet below the water so one does not have to chin himself to get onto the ladder.

It is not an inexpensive piece of equipment but it is a high quality one-time investment.

CSY

CSY Yacht Corporation


CSY
CSY Yacht
Corporation

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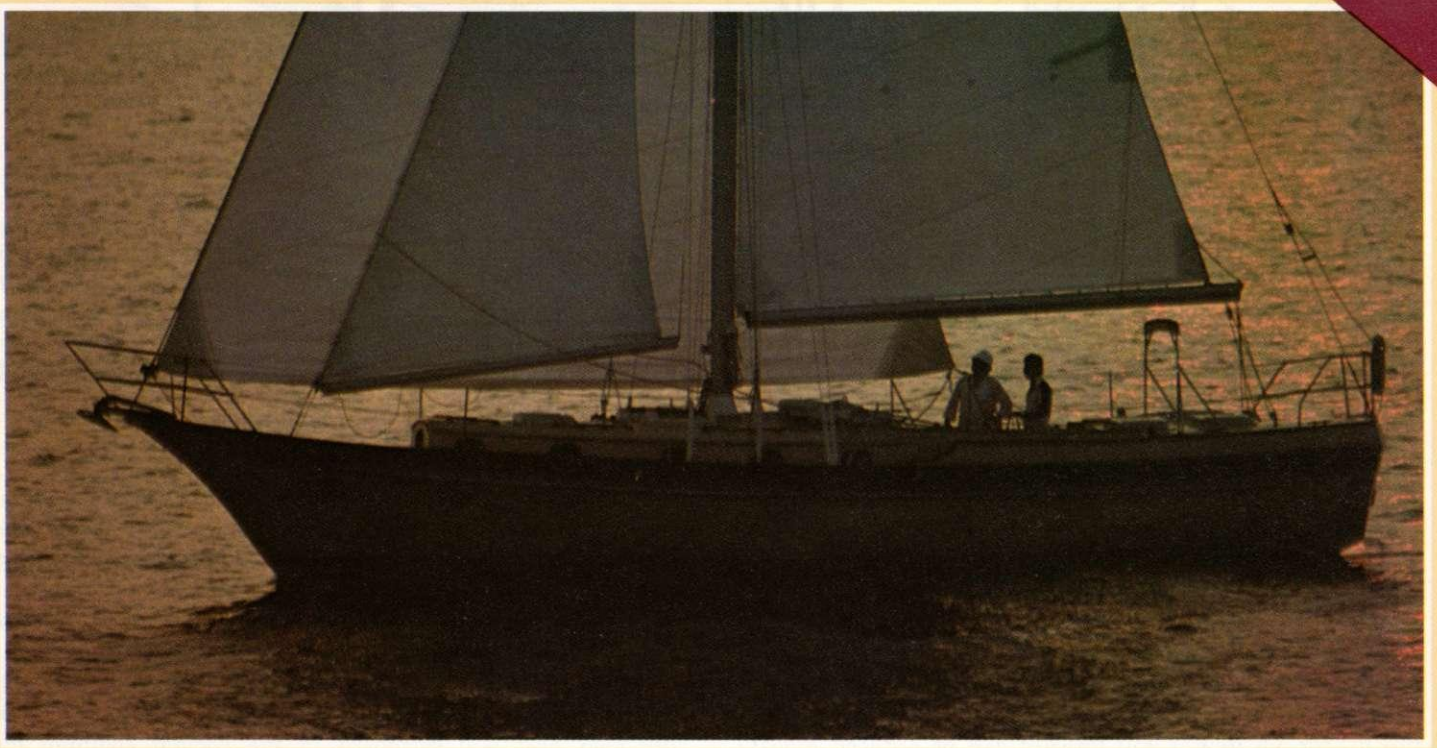
See latest specification sheets for those items which are standard and which are options.

CSY Mid Cockpit Cutter



Design Concept

This design is the culmination of ten years of experience of Caribbean Sailing Yachts, Ltd. in the charter business. It is the ideal cruising yacht for two, four or six. Simple enough to be handled by two and fully capable of housing three couples in privacy.

This yacht is an outdoor living yacht with the cockpit as the center of activity. With its seven hatches and seventeen opening ports and two companionways, it offers the most superior ventilation to keep the boat both cool and dry.

On Deck

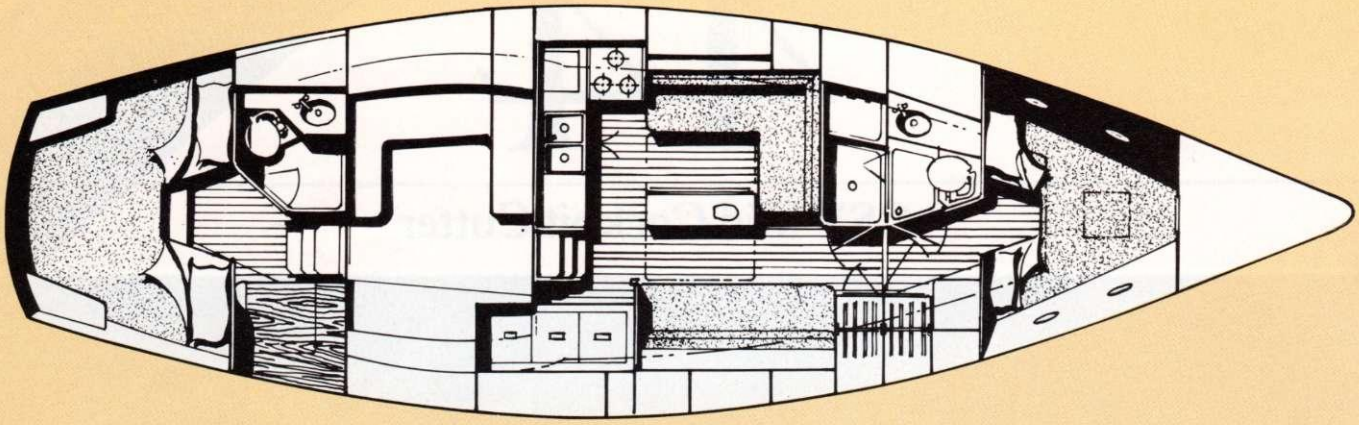
Starting at the bow, we find the specially designed bow chock to hold a 35-pound CQR plow or Danforth anchor in the chock without jumping out. Two hawse holes are provided into the divided anchor locker to take two anchor rodes. An optional electric windlass is mounted forward for hauling the anchor line. The switch for activating the windlass is connected through the oil pressure switch on the engine so that it cannot be started unless the engine is running. From the bow to the step up to the great after deck besides the cockpit port and starboard are the very high bulwarks which with the easily repaired sanded non-skid gives sureness and safety under foot when sail handling in rough weather. Hawse pipes for dock lines are forward and amidships just forward of the step up. Scuppers are installed at the step up to drain off the excess water that can be caught inside the bulwarks.

The deck house is trimmed in teak and the rugged bronze opening ports (eleven of them) are through bolted and sealed to the side of the forward house. The teak toe rail tops the bulwarks all around. The genoa track is just aft of the step-up and the sheets for the jib topsail are led aft to the car and block on the genoa sheet; then to a turning block; and then to the self-tailing winches on the cockpit coaming. A gallows frame is aft of the cockpit which is made of stainless steel uprights and a teak crosspiece.

A lazarette is provided on the afterdeck for an emergency anchor, dock lines, snorkels, masks, etc.

Especially designed leak-proof and extra sturdy stanchions with double life lines are all around the yacht with gates port and starboard at the step down. The bow and stern rails and stanchions as well as all the cleats and deck hardware are 316 stainless steel.

The seven opening hatches are extra heavy so as to provide a good inflexible seal. The dams around the hatches



DIMENSIONS:

LOA	44′0″
LWL	36′4″
BEAM	13′4″
DRAFT	4′11″ (6′6″)
DISPLACEMENT	37,000 lbs.
BALLAST	12,000 lbs.
SAIL AREA	905 sq. ft.
MAST HEIGHT ABOVE W/L	56′0″
FUEL	100 gallons
WATER	400 gallons

DESIGNED BY: CSY, LIMITED & PETER SCHMITT

are 4 inches high — more than twice as high as usually found on production boats to assure that there can be no leaks around the hatches.

The Rig

The double head sail cutter rig provides a flexible, efficient and powerful windward capability. Shortening sail is by jiffy reefing on the main. With the ability to easily roll up the jib topsail, sail forward can be reduced quickly and easily.

With the main and the clubfooted forestaysail alone, you have an easily handled rig — easily singlehanded, too.

The Cockpit and Engine Room

The cockpit is well down in the boat. It is almost four feet from the cockpit sole to the cabin top — high enough to be out of a direct hit by flying water, but low enough for good visibility at the helm both standing and sitting. The companionways forward and into the aft cabin are opposite each other for easy passage with three steps down into each. Slides are provided for installing boards over the companionway doors in rough conditions. Four large scuppers lead into two large seacocks port and starboard for maximum drainage. The cockpit is roughly 7 feet by 8 feet — large enough for outdoor sleeping. A special folding table is provided which can be attached to the binnacle for eating outside. Beside the helmsman's seat to port is a handy insulated cold drink cooler which can hold the melted ice and water until it is ready to drain into a scupper hose. Huge sail lockers (7 feet long) are provided port and starboard for the storage of all manner of things needed on deck.

The specially designed rugged fiberglass binnacle has a 5 inch Ritchie compass — Edson steering with a brake. The starter button and engine cut-off are built into the binnacle.

The engine panels are mounted in their own protected box on the forward bulkhead of the cockpit. Above the engine panel is the Combi digital depthsounder, log and knotmeter — all standard.

To port over the galley is a large pass-through opening port for passing food and for communication from below.

The forward cockpit seat raises so dishes in the dish locker underneath can easily be removed. Cubby holes are provided port and starboard in the cockpit coaming for winch handles. To port, there is a locker in the coaming where two 20-lb. propane tanks are stored in their own sealed compartment which is drained overboard. A Marinetics switch turns off the gas at the tanks so gas pressure does not remain in the line when the gas isn't being used. A locker is built into the starboard coaming for the storage of the two banks of 200 AH batteries — dry and accessible.

Being well down in the boat, the cockpit can be fitted with a Bimini top with 6′6″ and even more head room. A mylar window above helps, but the after end of the top stops short of the wheel so the helmsman can see his sails. A rolled up aft curtain is provided which can be rolled back to the gallows frame to shade the helmsman or lowered to cut out the late afternoon sun coming over the stern. Forward a mylar dodger can be mounted to keep the spray out of the cockpit and if you really want a comfy, all-weather protection, side curtains can be added — an all weather pass thru too!

In the cockpit sole are two hatches which raise up for easy access to both sides of the engine below. The engine is the 62 h.p. Perkins diesel 4-154. Weighing only 150 lbs. more than the next smaller 4-108, it develops two thirds more power. The stuffing box and all parts of the engine and transmission are easily accessible. The engine can be removed through the starboard hatch if the need should arise.

The 100-gallon diesel fuel tank (500-600 mile range) is aft of the engine. Two 200-gallon water tanks are placed, one to port and one to starboard.

The Forward Cabin

In most mid-cockpit boats, the aft cabin is far superior to the forward cabin. Our effort in the design of this cabin was to make it more nearly the equal of the aft cabin. To get light and air into the cabin, we placed the hatch forward on deck which is where it should be to get easy access to the deck and proper ventilation. The piece de resistance are the two rugged fixed ports at eye level port and starboard beside the bunk so the occupants can see out on the outside world—a real innovation for a forward cabin which are usually claustrophobically dark, cramped and stuffy.

This cabin can be closed by a door farther aft so there is room to move around and then the head becomes an integral part of the cabin. The V berth filler is stored under the forward berths when not in use. This compartment is also designed to store the bed clothes out of sight during the day. There are two drawers under each bunk, a bureau with three drawers and an ample hanging locker for two is on the starboard side.

The forward head divides into two sections which can be closed off into a separate head and sink section and a separate sit-down shower section so that both can be used at the same time in privacy. The shower has its own prism light overhead and the head has its own overhead hatch and opening port for light and ventilation. Two handy drawer and lockers over and below the counter complete the accommodations.

The Main Cabin

The main cabin as well as the rest of the yacht is a reproduction of the wood feeling of the boats of old with teak battens across the headliner, holly and teak sole, teak table and counter tops and bulkheads finished with teak Nevermar. There is a kerosene brass lantern for soft lighting at night which saves the precious batteries. Headroom throughout this spacious cabin is 6′6″ or more, as it is throughout the rest of the boat.

The main cabin of the boat has the proven favored arrangement with a U-shaped galley, aft, and a settee arrangement port and starboard, with a sturdy dropleaf table in the middle. The 13′4″ beam of the CSY 44 is such that this arrangement allows a wide passageway to the starboard of the table with an L-shaped settee to port. You will note that passage through the boat from stem to stern is one direct straight line.

We have engineered the settee to starboard so that the back is hinged and can be raised. In the half-way "up" position it becomes a comfortable hanging berth – 30″ wide held by heavy barrel bolts fore and aft. Once the back of the settee is raised there is a 52″ pull out double bed underneath going all the way outboard to the curve of the hull. Thus, two can sleep in separate bunks or two in the double below and one above without making up a dinette which is so common in the boats of today. There are three drawers under the starboard settee and one under the port settee. The rest of the area under the settee provides a large dry storage area. Bed clothes are quickly stowed behind the settee back to starboard when it is lowered for the day. A separate hanging locker is provided for main cabin use.

The L-shaped settee, to port, seats four, and with the table fully opened, two more can be seated to starboard. The drop leaf table can double as a chart table with stowage for navigation instruments and books in the lockers behind the settee. There are two, large ventilating hatches in the main cabin plus a third over the galley.

The galley has got to be the sea-going wife's dream. It has 7 linear feet of counter space. The dinette table, with its nearness to the galley, provides additional counter space. Pots and pans are stowed under the counter just to the left and inboard of the stove with a drawer for cooking utensils over it. There are five drawers, inboard of the sink. Storage is under the sink for drawboards, soap, etc.

Dishes are stored in a carrying case which can be easily removed by lifting up the cockpit seat on deck and then taking home for the dishwasher. Conveniently located over the stove is a locker with a shelf over it for spices or condiments easily available for cooking. And the all stainless steel stove is by shipmate with a 3-burner propane range and an oven.

Probably the most appreciated item on board is the fiberglass insert to contain garbage. It is adjacent and built into the counter just aft of the stove. It is designed to take the capacity of a standard plastic garbage pail bag. The lips which protrude from the self-contained compartment are notched to receive a shock cord to firmly secure the garbage bag. It also has a soft rubber gasket along the edge so when the fiberglass cover is on — all odors are sealed in. This will not only keep the boat neat and clean by eliminating garbage rolling all over the boat, but will also keep the bug population down as well. A hose led into the bilge sump with a valve on it can be opened so the garbage unit can be easily and thoroughly cleaned. The bilge sump is of smooth gel coated fiberglass. The skipper's wife will appreciate the convenience of being able to literally stand in one spot and do all her work with everything at hand and still be able to serve the dinette or cockpit — all within arm's reach. A large opening port is between the galley and the cockpit at eye level for serving thus enabling the ship's cook to see, hear and join in conversation with those in the cockpit so she's still part of the action — even when in the galley.

The large ice box and freezer is to starboard, opposite the galley, and adjacent to the companionway. Over it is a locker set up as a bar with secure inserts for glasses and liquor bottles. Here the skipper can serve drinks, chop ice, and be out of his wife's way as she prepares the meal; and at the same time, he is only an arm's reach away from those in the cockpit.

The freezer is a specially designed, gimmick-free unit which runs off a compressor which is driven off the engine. The shape of the box, insulation, design of the equipment and the installation of this unit was especially created for the CSY 44. There is enough space in the freezer to hold three weeks of fresh meats and bread for everyone aboard. There is also a holding plate in the huge ice compartment to keep the temperature low enough to conserve the ice supply for 2-3 weeks. The entire unit can be maintained at optimum temperatures by running the engine for just 60 minutes a day. This will certainly be a great relief to those who cruise in the Tropics. Should the refrigeration system go on the fritz, the ice supply will last for a week or more.

On the bulk head, over the icebox, is the 18 circuit 12-volt Marinetics panel which has switches with circuit breakers instead of fuses which go to all the lights and pumps and electric motors on the boat. It also has a four-way switch to switch from one bank of heavy-duty marine batteries or the other or both to draw upon or to charge them. Each bank of batteries has an indicator on the panel showing the amount of charge on each set. The engine has a 60-amp alternator rather than the standard 42-amp generator to be sure there is enough capacity available to charge the batteries quickly.

The Great Aft Cabin

There are seven large rectangular opening ports just under the deck line recessed into the hull — two to starboard; three in the transom, and two to port, one of which is in the head. In addition, there's an opening hatch forward for added light and ventilation. The light and airy feel of this cabin has to be seen to be believed although the cabin is almost eleven feet square (121 square feet, including the head). The openness created by the ports make its already big size seem even more spacious. As you can see on the plans, there are two large single berths. There is double bed accommodations by sleeping athwartships across the after end of the bunks.

Both beds have handy shelves alongside them for stashing knicknacks. There are five drawers — three in the bureau and two under the beds. A 3′ wide hanging locker is beside the companionway with the radio telephone in a weatherproof box on a shelf above, yet easily accessible to the cockpit. Over the hanging locker and bureau on the starboard side there has been designed a large chart table which can be worked at seated on the head of the bunk or standing up. There's plenty of room for the addition of electronics. In the head the toilet paper dispenser is under the sink and protected from getting soaked by the shower water by sliding doors. There is the usual locker outboard for stowage in addition to a special drawer for toiletries and a clothes hamper. This head has its own opening hatch overhead for ventilation as well as an opening port and, of course, has a large area for showering.

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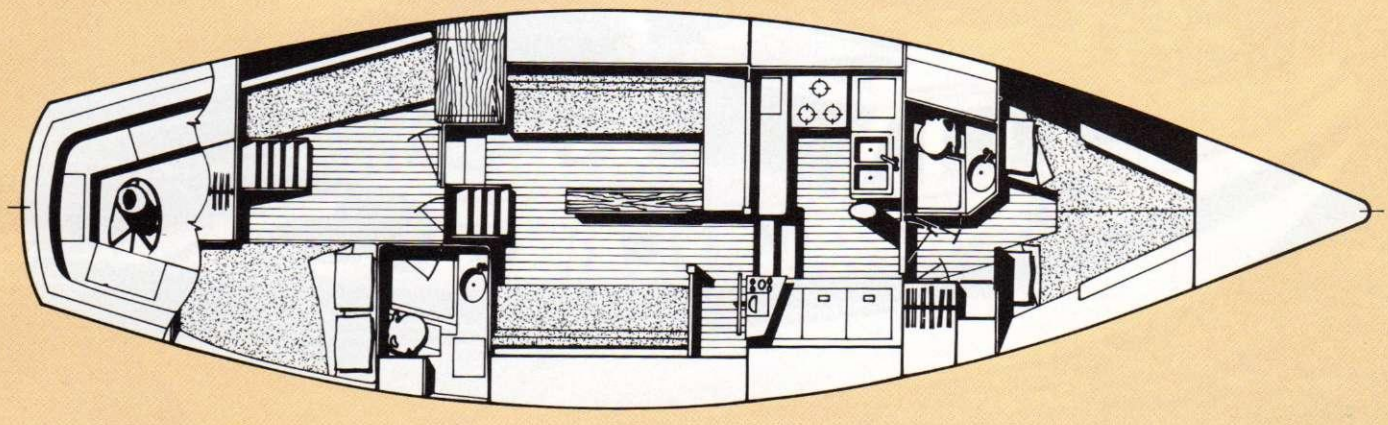
CSY Pilot House Ketch



DIMENSIONS:

LOA	44′0″
LWL	36′4″
BEAM	13′4″
DRAFT	4′11″ (6′6″)
DISPLACEMENT	38,000 lbs.
BALLAST	13,000 lbs.
SAIL AREA	937 sq. ft.
MAST HEIGHT ABOVE W/L	58′3″
FUEL	225 gallons
WATER	393 gallons

DESIGNED BY: PETER SCHMITT

The Concept

Built on the same hull as the CSY 44 Mid-Cockpit Cutter, the effort in the Pilot House Ketch version is to retain the superior sailing characteristics and good looks of the original hull, but to make it an inside living boat giving the advantages of the walk through without its disadvantages. This boat is aimed particularly at the live-aboard couple who will have occasional guests. The boat has been specifically designed to put all the amenities aboard if desired. The center of living in this boat is the enclosed salon-pilot house which lends itself to air conditioning and reverse cycle heat systems. The boat is built to exactly the same high standards as her sister — the CSY 44 Mid-Cockpit Cutter.

On Deck

Forward the deck is almost a duplicate of the cutter in every respect, including the anchor chock and power-winch, two hawse pipes. The cockpit is placed aft with a walkway beside the pilot house for passage aft. The pilot house has two opening hatches with tinted, transparent safety glass so that the set of the sails may be observed from inside the pilot house. The 18″ high windows on the pilot house are 3/8″ heat treated glass set in heavy bronze extruded frames. The center window in the forward part of the pilot house opens out for ventilation. The two large aft windows open inward. The rest of the windows are fixed. From the inside steering station, there is almost 360° visibility. As in our other yachts all the stanchions, cleats and deck hardware are 316 stainless steel.

The Rig

We have chosen the ketch rig for this boat. It is a full size rig with some 30 more square feet sail than the cutter. All the fittings are 316 stainless — the rigging, turnbuckles, and main and mizzen mast are all over-sized so there need be no fear to take this boat anywhere. Jiffy reefing is provided on both the mizzen and the main and the Hyde Streamstay roller furling gear is standard.

The Aft Cockpit

The cockpit is a full 6′6″ long so it can be used for sleeping. It is well down in the boat so there are ample back rests all around. Four large scuppers are provided which drain through the stern and can drain the cockpit rapidly. The binnacle and wheel are raised for visibility over the house. A high helmsman seat is provided behind the wheel with a folding backrest.

The engine instruments and the Combi digital knotmeter, log and depthsounder are mounted on the forward bulkhead in the cockpit. Duplicate instrumentation is at the wheel in the pilot house with a 5″ Ritchie compass at both locations. The steering system is hydraulic. There are night lights on the binnacle. A built-in ice drink cooler is to port beside the helmsman. Large lockers for deck stowage are

under the cockpit seats both port and starboard. Space for two 20-lb. aluminum propane bottles, (a three-month supply) is provided in its own sealed locker under the raised helmsman's seat.

The Pilot House

Two steps up and forward of the owners stateroom is the full width 8½′ x 11′ salon-pilot house which is raised and with its large 18″ high windows all around affords maximum outside visibility while inside the boat. That is why we call it an inside-outside yacht. This is the focal point for activity in this boat. It being the center for socializing, eating and lounging — even entertainment as well as inside steering.

This area has a full length settee-bunk to port with oodles of drawer space beneath. The helmsman's seat folds down at the forward end of the starboard settee. Between the settees is a drop leaf table which opens for eating. Food is passed from the galley via the pass through over the credenza separating the galley from the salon.

Under the salon is the easy-to-get at main engine — an economical Perkins 4-236 with room forward of it for an extra 120 gallon water tank. Not only is the engine room easy to get at, but if the generator or engine needs to be removed, it can be done easily without tearing the boat apart. There is room under the salon for four tanks. Three for water carrying an aggregate of 393 gallons and two tanks for fuel together giving 225 gallons of diesel fuel (1,200 mile range). Fuel tanks and water tanks can be used in various combinations to suit the owner and to get more or less water or fuel as may be required for the expected use of the boat. The CSY Pilot House Ketch is designed to be able to be away from a base of supplies and still live very comfortably for weeks at a time.

The Galley and Forward Cabin

Two steps down forward of the salon brings you to the spacious uncluttered galley which is five feet wide fore and aft and takes up the full width of the boat. As in all CSY yachts to starboard is a 19 cubic foot specially built refrigeration system run off the engine divided into three sections — freezer, ice preservation and refrigeration. The same deluxe stainless steel propane stove as on all our boats is to port. A credenza separates the galley and the salon.

Forward of the galley is a large head to port and a hanging locker and bureau to starboard. This whole area can be closed off to become a commodious forward cabin. With the 2 fixed ports in the hull five opening bronze —

ports and an opening hatch forward in the deck and over the head — it all adds up to a spacious light and generally delightful stateroom.

The Owner's Stateroom

Down the companionway ladder and forward of the cockpit is a large master stateroom with dimensions rarely found on a sailboat — 8½′ x 11′ (93.5 sq. ft.) with full 6′8″ headroom from beam to beam. A large full-size double bed is to starboard and a full-size settee bunk is to port. Forward of the double bed on the starboard side is an extra large private head with pressure hot and cold-water shower. A large chart table is located forward to port with seating provided by the head of the settee bunk. Above the chart table is a very ample area for the installation of any needed electronics. The chart table is in a direct line of sight with the steering station in the aft cockpit and within easy communication with the pilot house steering station. The chart table can double as a vanity for m'lady.The storage on this boat is outstanding. In the master stateroom there are 13 drawers and two his 'n hers hanging lockers.

The Pilot House Ketch is the luxurious flagship of the CSY line of yachts. It is designed for the all-weather liveaboard. She is first and foremost a sailing yacht with world wide capabilities. It has 225 gallons of fuel tankage (1,200 mile range) and, an incredible 393 gallons of water in five tanks. One tank can be removed so that a 7.5 KW generator can go behind the main engine. The windows in the Pilot House all framed in extra heavy bronze extrusions with 3/8″ unbreakable glass. The manufacturers of these windows make windows for tug boats and ocean liners. They are not the usual flimsey aluminum frames. They are made to go to sea.

Of course, the Pilot House Ketch has to cost more money than the mid-cockpit cutter. It is a much more complicated boat to build. It is a different boat for different climates for different people with different needs and different pocket books.

The Pilot House Ketch is a very different yacht than what is generally available on the market today. She is therefore extremely distinctive and is a standout in any harbor.

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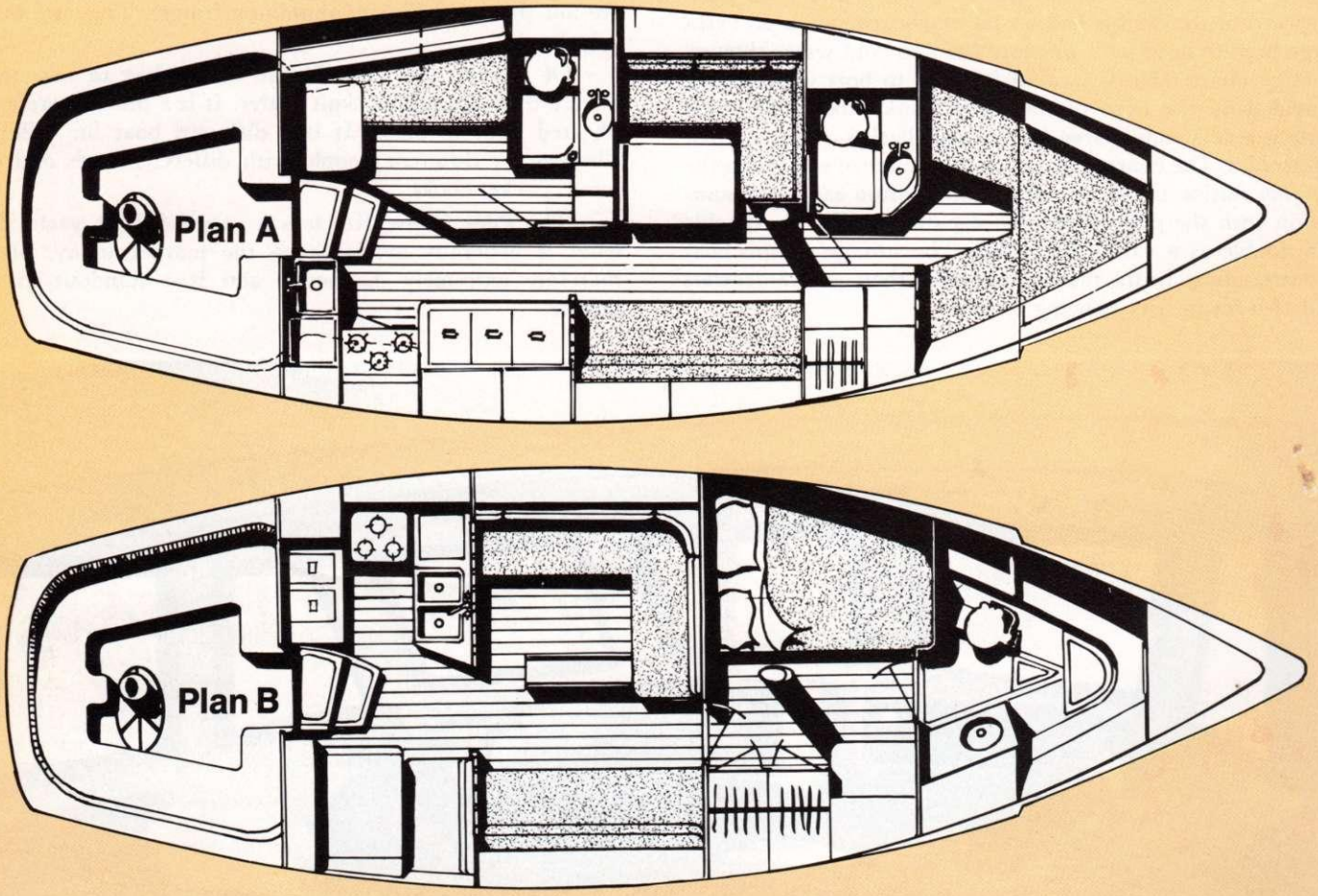
CSY Aft Cockpit Cutter



DIMENSIONS:

LOA	37′3″
LWL	29′2″
BEAM	12′0″
DRAFT	(4′8″) 6′0″
DISPLACEMENT	19,689 lbs.
BALLAST (LEAD)	8,000 lbs.
SAIL AREA	610 sq. ft.
MAST HEIGHT ABOVE W/L	50′4″
FUEL	50 gallons
WATER	130 gallons

DESIGNED BY PETER SCHMITT

Plan A (Two Stateroom Model)

The Concept

This boat is basically conceived as a two people or four people boat although it can sleep six in privacy. If guests are aboard, the owners stateroom retains the owners privacy with its own head and a separate one for the guests or the kids. The design is traditional. She is a handsome and distinctive boat. The rig, storage and water supply are designed for cruising for long periods away from a base of supply and it can be easily handled by two or one. It is built to the same high standards as other CSY yachts.

On Deck

The deck has the usual CSY easily repaired sanded non-skid. Stanchions with double life lines are standard with gates port and starboard by the cockpit. The bow and stern pulpits have double rails and all the hardware on deck is 316 stainless steel. Forward there is a bow chock for the plow anchor and forward of the house is a nice well with bulwarks all around for safe handling of the headsails. A hawse pipe leads to the anchor locker.

As with all CSY yachts, the boat is designed for efficient ventilation to keep the areas below cool and dry. There are seven heavy opening hatches so that every cabin and head — every enclosed area has at least one opening hatch which added to the eight opening bronze ports make this boat a particularly airy one — again like all of CSY boats.

The Rig

The cutter rig, we feel, is the best all-round rig for a cruising yacht for reasons that we have discussed in greater detail in other places in this book. She is a fast but stiff performing boat with the great flexibility of easily varying sail area. This yacht is surprisingly fast.

The Cockpit

Large enough to sleep in, it has the large areas for deck storage so necessary in a cruising boat. The propane tanks are in their own sealed compartment which is drained overboard drainage port and starboard. Four large scuppers allow quick overboard drainage. The 40 h.p. Perkins 4-108 diesel engine has a V-drive so that it doesn't have to be inside the main part of the boat. Thus, the engine is easy to get at through the T-shaped hatch in the cockpit and can be easily removed, if need be. The molded stairs into the main cabin can easily be removed exposing the forward end of the engine for servicing.

The cockpit can easily be fitted with a combination dodger and Bimini top. An insulated ice drink cooler as on all our CSY boats is built into an area beside the helmsman's seat.

A boom gallows for the main boom is to facilitate furling the sail under any conditions. The engine instrument panel is mounted on the cockpit bulkhead.

The Aft Owner's Cabin

Two steps down the companionway steps partitioned off to port is the owner's stateroom. It communicates with the cockpit via a bronze port under which is a folding chart table. When the chart table is folded down, the area where the radio telephone is revealed where there is room for further electronics.

The bunk can be pulled out to make a commodious double, but during the day can be kept as a very private daybed. Forward of the bunk is the private head and shower, inboard of which is a hanging locker with three drawers under it which added to the drawers under the bunk gives this stateroom more than adequate storage. This cabin is right at the center of motion of the boat and this is the most comfortable place to sleep on a boat — particularly when underway.

The Galley

To starboard as you go below and forward, is the galley with a deep double sink CSY garbage storage unit, Shipmate stainless steel 3 burner stove and oven forward of which is the three part freezer, ice preserver and refrigerator unit which is run off the engine and provides food for four for three weeks with a liquor locker over it convenient to the salon. Since the house on the CSY 37 goes all the way outboard a great deal of storage space is made available.

The Salon

This salon is deceptively large-lookng for a boat of this size since it uses all the headroom outboard to the hull. The L-shaped settee to port is not meant for sleeping but for lounging and eating. The dinette table is folded against the bulkhead when not in use so as to unclutter this area except when dining. The settee berth to starboard is designed for sleeping and can be pulled out to make a double with the back of the seat being raised to make another berth area. Every effort in this cabin is utilized with the use of wood and warm colors and a brass kerosene lantern to reproduce that warm patina which is so much the trademark of the traditional yacht.

The Forward Cabin

The forward cabin is designed to be closed off together with the forward head-shower to become a really large cabin for a boat of this size with a seat, hanging locker and bureau with four opening bronze ports — a fixed port in the hull at bunk level and the overhead hatch all contributes to make this an unusually light and airy cabin. *Liveable* forward cabins are a CSY trademark.

The CSY 37 is a traditional boat. It is a practical boat. It is a low maintenance boat and its layout provides a flexibility for accommodations with privacy rarely found in a boat of this size without over-crowding.

Plan B (One Stateroom Model)

This unusual design is aimed squarely at the one couple sailors who want the ultimate in comfort for weekending or living aboard. It would work too for a couple with two or three kids.

This plan is set in exactly the same hull and deck as the Plan A two stateroom — two head model.

As in many older boats the head and shower is placed in the forepeak. The large main stateroom is placed aft of the head much nearer the center of motion in the boat. To port is a full sized double bunk. To starboard are large hanging lockers and a chest of drawers, a dressing table and a locker behind it.

The main salon is huge for a boat of this size. The feeling of spaciousness is enhanced by the cabin top going completely from port to starboard, there not being any cabin house as there is in the usual design.

To starboard there is a full 6'6" settee which makes up into a bunk. Opposite that on the port side is a large dinette which too can be made up into a double bunk without lowering the table (an extra).

Aft of the dinette is a very ample U Shaped galley with a three burner stainless steel stove with an oven outboard. Aft is a large deep ice chest which can be divided into a freezer and refrigerator.

A very large chart table is on the starboard side opposite the galley with a wet locker forward of it.

Both models of the CSY 37 are available in a deep draft version (6') or a shallow draft version (4'8").

The Plan B model design has few if any counterparts in todays market place. It obviously is meeting a need as it is fast becoming the most popular yacht in our line.

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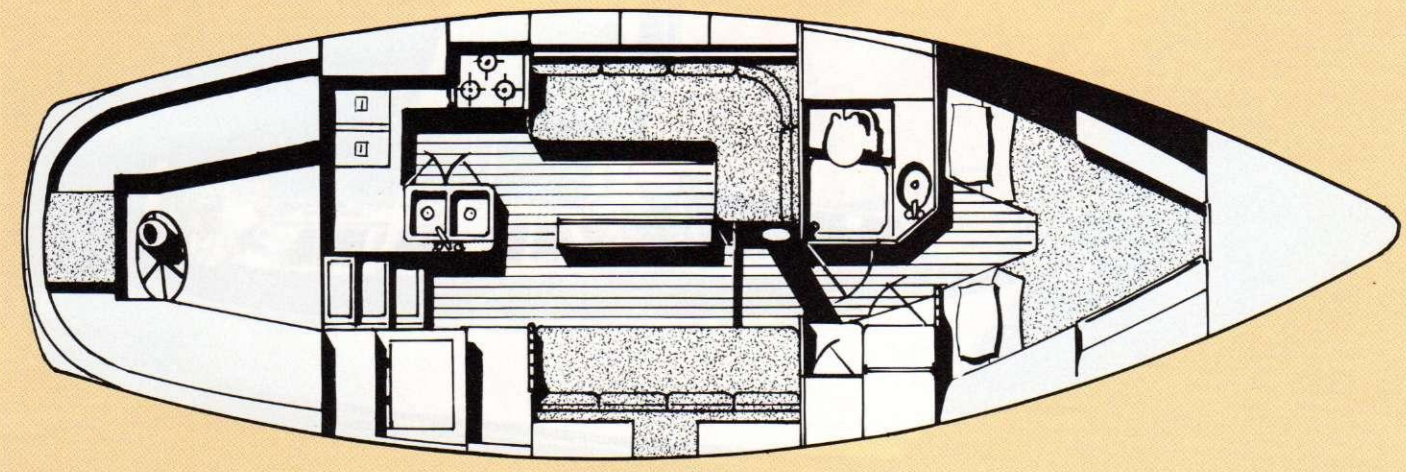
CSY Aft Cockpit Cutter



DIMENSIONS:

LOA	33′04″
LWL	25′00″
BEAM	11′00″
DRAFT	5′00″ (3′11″)
DISPLACEMENT	15,200 lbs.
BALLAST	4,650 lbs.
SAIL AREA	538 sq. ft.
MAST HEIGHT ABOVE WL	47′06″
FUEL	46 gallons
WATER	115 gallons

DESIGNER: PETER SCHMITT

Concept

The idea of this yacht was to design something which is generally traditional and built to the same standards as the others in the line. It would be a smaller boat, but with enough freeboard to be dry in a sea way. She needed to be roomy and comfortable for longer passages. We wanted particularly to develop a design that had good windward performance and be light and airy inside — not claustrophobic feeling that too many boats of this size have. She must have the fuel and water tankage that every cruising yacht that expects to be at sea for extended periods must have. How do you get all this and make a really good looking boat? That was the problem which we posed to our architect Peter Schmitt — the CSY 33 was his answer.

On Deck

She is flushed decked from port to starboard with a see-around raised house. The boat has been designed with one heavy CSY overhead hatch forward. The deck has been designed so others can be added over the house or in the head. There are two custom bronze opening ports, port and starboard forward. The fore deck is lower than the house to afford a thoroughly drained well with a coaming all around for safety underfoot. She comes as a sloop or as an optional cutter. The heavy stainless steel anchor chock is standard on all of our yachts. The rugged rub rail is built into the hull also standard on all CSY yachts. The cockpit is deep with full back support all the way around with a raised helmsman seat. Large sail lockers are port and starboard and the full 6 foot length of the cockpit allows for sleeping under the stars. There is a built-in hatch in the cabin sole to service the stuffing box and for further storage. The cockpit has extra large scuppers feeding through commensurately large seacocks to allow the cockpit to be drained rapidly.

The yacht can be built in a medium draft of 5 feet or for an extra charge the mold is blocked out to provide a 3′11″ draft which requires more ballast. Anyone having the boat built to the shallow draft configuration can expect markedly poorer windward performance and increased leeway.

What is so surprising about this boat is that in spite of the fact her freeboard is almost as high as her bigger sisters in the CSY line, she is a strikingly handsome boat. Because of her heavy displacement and thus resting lower in the water, she manages to escape the effect of looking like a pregnant whale like so many of her competitors do.

Main Salon

Anyone stepping down into the cabin of this boat simply can't believe that she is only a 33 feet boat. The feeling of space is heightened by the raised pilot house which gives a 6′7″ head room throughout not just in the middle. You should hear the tall guys at the boat shows ooh and aah since

its one of the few boats in which they can stand up straight of any size!

The finishes – teak trim – cabin sole etc. are exactly up to CSY standards.

The U shaped galley opening onto the dinette on the starboard side is not only convenient but doubles the working space since the fold-down dinette table can double as a working surface. The dinette can be made into a double *without* lowering the table optional). There is the usual 3 standard CSY burner stainless steel stove and oven outboard. The deep double sink is located in the best place possible – along the mid line. The 17 cu. ft. refrigerator freezer will hold food and ice for two for three weeks.

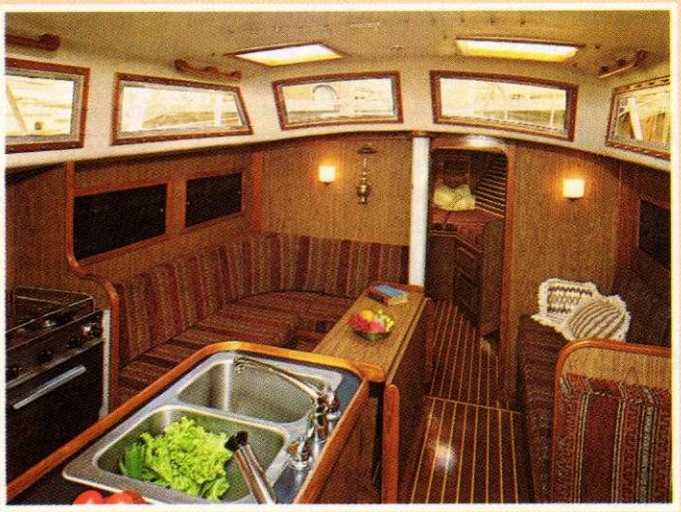
Opposite the galley to starboard is a full sized chart table with room above it for any electronic installation you may need. It faces aft so eye contact can be made with the guy at the wheel. Just aft of the chart table right next to the companionway is a wet locker. There is storage all around port and starboard. The 115 gallons of water tanks are stored under the settees and port and starboard. There's a full 6'6" settee-berth on the starboard side forward of the chart table and opposite the dinette. The table can be raised so people on opposite sides of the cabin can eat at the table, if necessary.

Forward Cabin

It is a step down to get into the forward cabin where the headroom goes down to 6'3". At the step there is a door which closes off the whole forward section to become a very large cabin contiguous with the head and shower. Opposite the head and shower is a hanging locker – storage locker and a dressing table with a set of drawers under.

The forward bunk can be made into a double by the addition of a V insert. Both sides have a reading light and storage shelves forward, with drawers underneath. Entrance may be gained into the anchor rode locker by way of a door at the forward end of the bunks.

Finally, she sails and man does she go! She's dry. She's comfortable, She's good looking. She's a winner and priced to compete nose-to-nose with any boat her size and of much less quality.



Specifying the Spars for a Cruising Boat

A large, preheated ingot of aluminum alloy rests horizontally on a carriage in front of a huge hydraulic ram. Slowly the ram begins to move forward, pressing the ingot through a steel die under thousands of tons of pressure. Emerging from the opposite end of the die is a hollow mast section that had its shape defined in a wind tunnel as the optimum in aerodynamic efficiency. Included integral within the aluminum section is the sail track, spinnaker pole lift track and a variable wall thickness that produces the maximum stiffness.

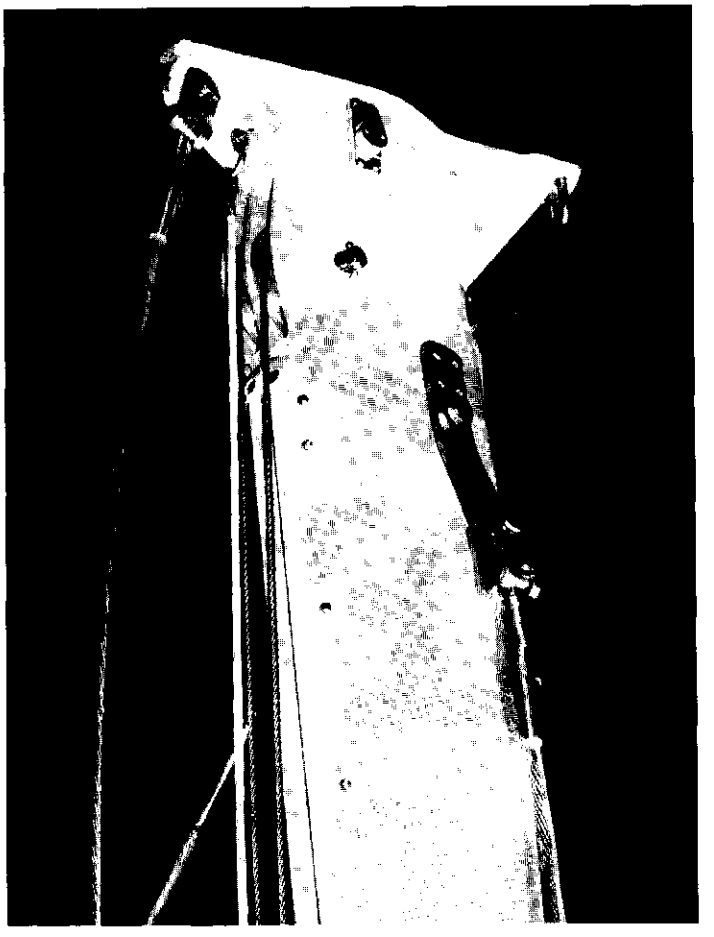
Sound far-fetched? Well it isn't! It's being done every day to produce state of the art spars for the latest ocean racing sailboats. Boats that demand nothing else but the lightest, strongest and cleanest rigs available!

The process is known as extruding and is providing the cruising sailor with the latest technology in spar shapes and fabrication methods. And why shouldn't the cruising sailor have the optimum in spar design? It's a known fact that rigs with low wind resistance and the lightest possible weight, consistant with strength requirements improve upwind boat performance.

There are two aluminum alloys that are commonly used for spar extrusions, namely 6061-T6 and 6063-T6. The 6000 series alloys are heat treatable, possess good cold working and machining properties and are readily weldable. In addition, 6061 and 6063 alloys provide good overall corrosion resistance in a marine environment. Both metals are alloyed with various quantities of silicon iron, copper, manganese, magnesium, chromium, zinc and titanium.

We said that the 6000 series of aluminum was heat treatable. The designator T6 following the basic four digit numbering system classifies to what extent the alloy has been heat treated. Heat treating makes a tremendous difference in the strength of the alloy. For instance, with the 6061 series alloy, the difference in the compressive yield strength, (that point at which the metal begins to deform) between the "0" temper and the "T6" temper is 7 times, 5000 PSI versus 35,000 PSI. Quite a difference!

The selection of a mast section for a new design is something that should never be picked out of the blue. Any designer of sailboats worth his salt must have an intimate knowledge of the stresses applied to spars and he must know how to calculate the ideal mast section for any given boat. The calculation required to pick the optimum mast section is quite simple in itself. However, this calculation takes into account the vessels stability at 30 degrees of heel with factors of safety introduced to elevate the mast compression to a knock down condition. If the mast calculation is for a new design, the only way that one can get a true picture of the vessel's stability is to know where the vertical center of gravity of the entire ship is. This can only be accurately found by calculating the weight of all items on board and the center of gravity of each in a vertical position. The weight calculation itself if done carefully is very time consuming and incredibly boring, yet vitally important to the design of any boat. With the known vertical center of gravity and displacement we can proceed with a stability calculation that provides us with something known as a right-



Masthead fittings.

ing arm. The righting arm times the displacement equals the righting moment or that force resisting the heeling moment of the vessel and producing the compression on the mast. Without these tedious calculations a designer is only kidding himself because he would have to guess at the righting moment.

To re-rig an existing boat, the stability may be found by performing an inclining experiment, a not altogether difficult task.

Joining thin wall spar sections and attaching fittings to the exteriors of spars (and we should clarify spars as masts, booms, spreaders, struts, downwind and spinnaker poles, etc.) must be a procedure that is carefully controlled considering that the wall thickness of the mast section on an average 45 foot cruising boat will rarely exceed $\frac{3}{16}$ of an inch. Spreader and spinnaker pole wall thicknesses for the same size boat will generally be $\frac{3}{32}$" and $\frac{1}{8}$" respectively.

The best advice that can be given about welding either 6061-T6 or 6063-T6 is that it should be kept to a minimum. The terrific amount of heat generated during the welding process causes either of these alloys to lose about 40 percent of their tensile yield strength,quite a loss! This strength loss is generally considered to happen within one inch either side of the weld line. Welded areas can be brought back to full strength by a reheat treatment but spar-makers do not have the facilities to do this.

Welded masthead fittings, splices, and winch pads are fine providing the welding is good. There is usually more than enough unaffected metal around these fittings to more than offset any loss in strength due to welding. Welding of thin wall sections such as spreaders directly to the mast wall is taboo! Anytime that an aluminum weld in a thin walled structure is exposed in a marine environment and subject to cyclic vibration and repeated bending or torsional stresses, look out! Chances are excellent that the fitting will fail close to the weld line. For this reason I prefer gooseknecks and spreader dips to be heavy stainless steel plate fastened to the mast wall with machine screws.

Machine screws should of course be stainless steel. It's a good idea to set the heads of all machine screws with a punch or use "Loc-Tite" on the threads so that they will never loosen.

Tang bolts must have their nuts drilled for a cotter pin so that it is absolutely impossible for the nut to loosen and back off. This even applies to the "aircraft" type self locking nuts with the plastic inserts. After years of weathering and periodic tightening I have seen this fastener readily back-off.

Shroud tangs should be stainless steel plate and it really matters little as to whether they are double or single plate to captivate the end fitting of the shroud. Both the jaw and eye fittings are equal in strength. I do recommend external tangs for the cruising boat however. They should be right out in the open where periodic inspections aloft can detect latent failures.

Every spar builder has his own masthead design, some good, some bad. The best masthead fitting will be fabricated from welded aluminum plate integral within the walls of the extrusion. This type fitting offers the least amount of windage and weight consistent with adequate strength. Bulky cast aluminum or heavy stainless steel masthead fittings should be avoided.

Section of mast showing wall thickness.

A good masthead fiting will possess sheaves that have a minimum diameter to the bottom of the score of the wire portion of the halyard of 18 times the diameter of the halyard. This is the absolute minimum. Anything less will absolutely destroy the wire which in turn will absolutely destroy ones hands and sails. Masthead sheaves will ride over heavy stainless steel pins with oil impregnated, metal bearings that reduces friction to a minimum. Masthead sheaves themselves should be forged or machined from aluminum alloy. Phenolics are not as good as aluminum for sheaves and plastics should never be used under any circumstances.

Good spars will either be anodized or painted. Anodizing is an electro-chemical process whereby the ever present oxide film on the surface of aluminum is thickened by passing an electric current through an acid, electrolyte (usually sulfuric acid) with the aluminum as the anode. Besides thickening the oxide, anodizing can impart specific properties to it such as hardness, corrosion resistance and wear resistance as well as coloring the metal if dyes are added.

Anodizing is a complex process, more so for spars, because of the large tanks required for dipping the extrusions. For this reason very few spar builders possess their own anodizing equipment and must subcontract it out. Spars that have been welded just do not look very attractive after anodizing. The anodizing highlights any bit of weld on the spar surface, even when ground completely flush, producing unsightly blemishes.

It seems that the majority of quality spars manufactured today are being painted rather than anodized. With the advent of truly hard, flexible, gloss retaining urethane paints such as AWLGRIP, the former problems of chipping and chalking in short periods of time have all but disappeared. These two-part mixture urethane paints are used on aircraft exteriors, truck bodies, and railroad cars as well as ships, where durability and resistance to acids and ultraviolet lights are a must. Gloss retention is excellent so one needn't worry about his spar coating fading and chalking even after several years in the tropics.

If asked my preference between the two finishes, anodizing and painting, I would have to say I prefer the urethane paint. I just happen to think that the smooth glossy finish of the paint that is offered in almost any color you can imagine is the more attractive of the two finishes and the more durable and also the easiest to touch up afterwards if that becomes necessary.

The proper selection and careful engineering of the spars on a cruising yacht is certainly one of the most crucial steps in the designing and building of a fine yacht.

Marine Refrigeration, Air Conditioning, and Shore Power

Marine Refrigeration vs. Home Refrigeration

By Howard Crosby — Crosby Yacht Service Inc.

MARINE refrigeration may operate as little as 40 minutes a day while your home refrigerator may grind away as much as 20 hours per day.

You bought your 17 cubic foot home refrigerator because of the price, the color, and it fit a certain place in the kitchen. You could easily overlook the fact that it made some noise, vented some heat and cost you a few dollars a month to operate. But, take this chrome beauty aboard a 40 footer, live and sleep with it within arms reach, and minor faults are magnified tenfold. Dimensionally it's too big . . . physically it demands too much power, regardless of the source . . . acoustically it's just too noisy, especially on still nights . . . environmentally it raises the cabin temperature.

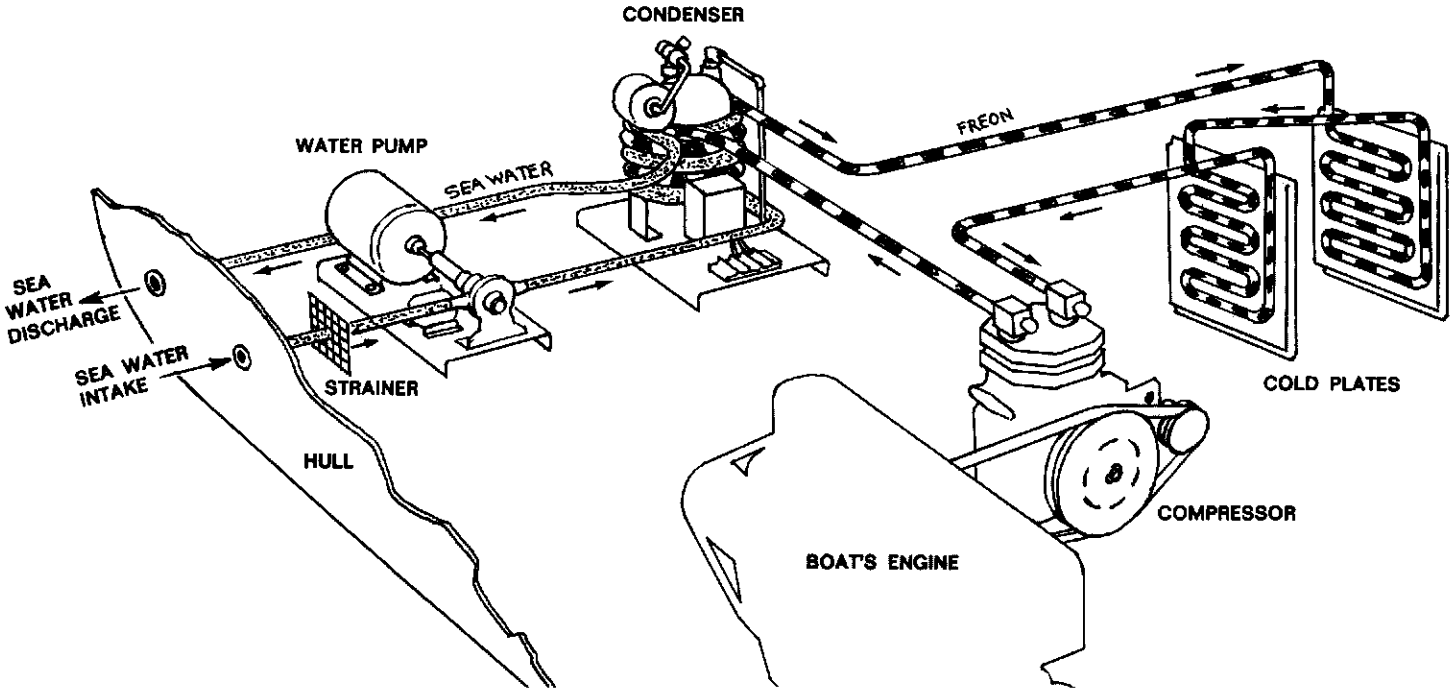
Before we can answer the question as to what makes marine refrigeration different than domestic refrigeration, we must first understand something about how a refrigerator operates. Most new refrigerators locate the condensing unit beneath the box. It has a hermetically sealed 110V AC compressor and either a radiant condenser coil or a fan cooled coil which dissipates heat which must be removed from inside the box. A first consideration is that this is a relatively simple unit, but rather inefficient since it is exchanging heat from the box with air which is not a very good conductor of heat. Generally, the air is rather reluctant to accept the heat removed from inside the box. Secondly we must realize that inside the domestic box is something known as a U-coil evaporator. In simple terms it is a set of tubes in which freon, after it has been compressed, is allowed to expand and absorb energy. The coil, therefore, is made cold by the expanding freon. As soon as the compressor/condenser assembly is turned off, this U-coil evaporator begins to warm up because there is no longer any removal of energy. This basically describes the household refrigerator. If it is put in a corner where air circulation is poor, its running time can reach 15 to 20 hours per day. If it is placed in cool surroundings in which the heat load on the box and the temperature is much cooler, its running time could be as little as 8 to 10 hours a day.

In a boat, however, we are faced with a different set of conditions. We have a great deal of space in the average home for heat to be dissipated. In a boat, space is restricted, air flow is restricted and, therefore, air-cooled condensers used in domestic refrigerators systems are impractical because of their inability to dissipate heat and thus the long length of time necessary to cool the box. Secondly, the U-coil evaporator is not as desirable to use on board a vessel since it requires the vessel to be plugged into shore power or to have 110V AC power available at all times due to the fact that the condenser and evaporator assembly must be operating for a large number of hours per day.

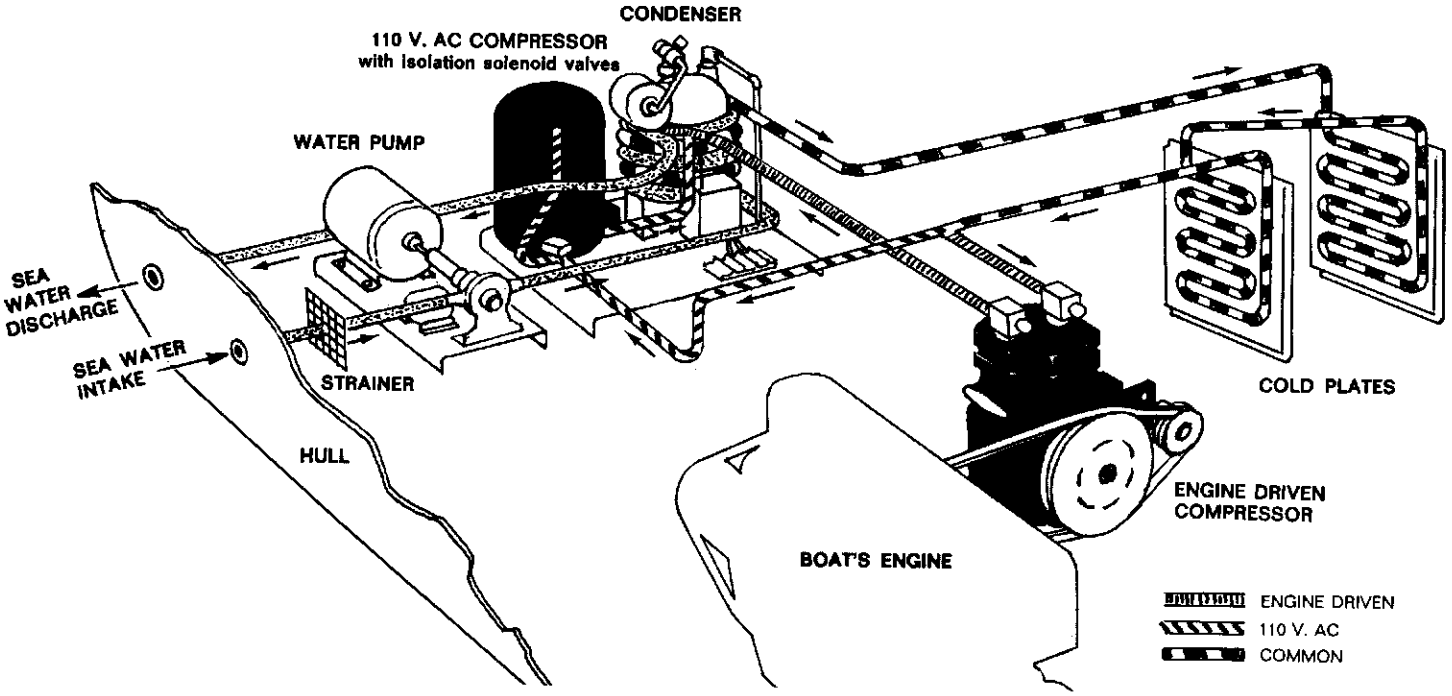
Marine refrigeration tends toward a more complex form of refrigeration which manifests itself in holding plate refrigeration. A holding plate is nothing more than a tank or container of aqueous solution with refrigerant piping transversing it. The refrigerant lowers the temperature of the solution below its freezing point, thereby effecting a change of state from a liquid to a solid. It is a thermo-dynamic principle that the energy necessary to change a liquid to a solid is much greater than the energy necessary to simply lower the temperature of either a liquid or a solid. For example -- it takes one calorie to raise or lower one cubic centimeter of water one degree Centigrade. So, if we have one cubic centimeter of water at 28° C. and want to lower the temperature to 0° C., we must remove 28 calories of heat.

Now, let's approach the freezing point of water. At 1° C., you take out one calorie and you have water at 0° C. (32° F.). Now we have a cubic centimeter of water at 0° C., and we take out one calorie. Nothing happens. Take out two calories nothing happens. Take out three calories -- still, nothing happens. You have to take out 79.7 calories before that cubic centimeter of water becomes a cubic centimeter of ice at 0° C. You have not changed the temperature whatever, but you have changed the state from a liquid to a solid. That's known as the heat of fusion. It took all that energy to line up the molecules in that water into the crystal lattice necessary to make the crystal of ice. All molecules had to line up and be forced into position before the bonds could be formed that made ice. Now that you are in the solid state called ice, you are back into your one calorie per degree per cubic centimeter as stated above.

Now, let the ice warm up. To do this, you put a calorie of heat into it and it comes up from −7° C., −6°, −5°, −4°, −3°, −2° to 0° C. From −1° C. to 0° C., you put in one



Engine Driven System



Engine Driven System plus 110 Volt Compressor

caloric, but at 0° C. you put in a caloric and nothing happens. You have to put in 79.7 calories of heat to disrupt those bonds that have been formed to make the ice crystals. Now you have water at 0° C., and on up the scale we go again.

An advantage of holding plates is the ability to add a solution of minerals to the plates that lowers the temperature at which this massive change of state occurs to −10° C. (14° F.) or −20° C. (−4° F.), rather than at the usual 0° C. (32° F.). This means we can precisely control the temperature in the freezing, cooling and refrigeration compartments. Marine refrigeration, when it comes on the line, is so massive in its ability to remove heat that in a very short length of running time it is able to store enough cold to coast for many hours.

The length of running time of marine refrigeration varies between boats, but if we use CSY as an example, you'll get an idea based upon years of experience. The CSY 44 has a 21 cubic foot box with four inches of insulation. It is divided into 14 cubic feet of freezer compartment and ice keeping and seven cubic feet of refrigeration compartment. The engine-driven system, which has the highest capacity normally available, works for about 40 minutes per 24 hours in the tropics. They effectively have as much refrigeration as a standard size condominium double-door refrigerator/freezer, and they are only running for 40 minutes, (less than an hour) every day. I would wager that the condominium refrigerator would be pushing close to 18 hours a day.

Let's go back to the condenser. We've noted that the exchange of heat through air is not very efficient. Heat exchange through water is very efficient, water being a much better conductor than air. Therefore, we change the condenser. Instead of an air-cooled condenser, we now flow water from the sea, through a condenser absorbing the heat removed from the box. A much smaller condenser can do much more work when it is water cooled than when it is an air-cooled condenser.

Since the condenser is now in contact with sea water, a non-corrosive material, such as cupronickel, must be used. Therefore, the actual construction of the condenser itself is much more expensive and is a much higher capacity rated system than the simple air-cooled condenser for domestic refrigeration. The reason for the higher capacity is that the cold plate is able to deliver an enormous amount of heat in a very short length of time and absorb that heat back during a very long period of time; meaning that box will maintain a rather flat, level temperature profile when the condensing unit has been turned off.

What we have attempted to describe here is basically the difference in condensers needed for marine use and domestic use: one, air-cooled corrosive materials; the other, water-cooled non-corrosive materials — much higher capacity. The difference in evaporators is a U-coil evaporator with only transit ability to maintain cold, while the cold plate evaporator, or holding plate, is a massive heat sink into which mammoth cold can be stored and called upon at a later time.

Now that these differences have been noted, let us turn to the power requirements for the condensing unit that we must use for marine refrigeration. In a domestic refrigerator, we have an unlimited supply of 110V current, with very little concern shown for the number of hours it runs. On the marine side, we are very conscious of the amount of time the condenser must operate. There are three major sources of power on board a ship; the primary drive engine, the ship's auxiliary generators, such as an Onan or Kohler electric power plant, and the ship's battery banks which are a reserve of power. The marine condensing units are designed to operate on one or more of these power sources.

The highest capacity marine refrigeration systems operate off of the main ship's engine using compressors that are driven from power take-offs or from prop shafts. The second most powerful unit would be the 110V/220V unit that is run off of the ship's auxiliary electric set. The third most powerful unit would be the 12V or 24V DC condensing unit run off the ship's battery. Each of these three methods has its particular place and application in the marine field — some being applicable where others are not. Some typical examples of units using the holding plate principle with actual running times and cubic footages of boxes that are in service would be a 12 to 17 cubic foot box equally divided between refrigerator and freezer, powered by an engine-driven condensing unit which would operate between 40 minutes and 60 minutes in each 24 hour period to maintain proper temperatures in both boxes. This would, of course, be using the main ship's engine as the power source. This same box 12 to 17 cubic feet, using the ship's auxiliary generator as its generating source of power would operate a 110V water-cooled condenser between 1 and 1½ hours per 24 hour period to maintain proper temperatures in both boxes. A 10 to 12 cubic foot box, using a 12V DC water-cooled system would operate the 12V DC system approximately 2 to 3 hours per 24 hours to maintain proper temperatures in both boxes. So it can readily be seen that marine refrigeration is based upon short running time creating stable temperatures for long periods of time. This, in effect, amounts to storing cold. This is contrary to the concept of the domestic refrigerator that has only limited ability to store cold.

There are certain visible areas in which a person perusing refrigeration equipment could discern quality marine refrigeration equipment in contrast to converted domestic or industrial equipment. The first, and most obvious, would be in the area of condensers. If any type of fan or air-cooled coils were used, a person could recognize immediately that this is a domestic or industrial condenser. Even though it may be used in conjunction with a water-cooled condenser, it will suffer the same ills as mentioned previously; i.e., noisy, large, demanding a ventilated space and releasing unwanted cabin heat.

Additional data can be obtained by observing the type of evaporator used. Any evaporator configuration other than a holding plate type would indicate domestic service equipment. The general appearance of the holding plate will give some indication of the concern and quality of the manufacturer. It is standard practice in the industry to use hot galvanized steel plates for holding plate material. However, if a manufacturer were to offer stainless steel plates instead, it would, of course, be preferable. Electro-polished stainless steel plates not only have the advantage of being aesthetically pleasing, but also are immune to common corrosion.

Data concerning the reliability of the equipment can be obtained by scanning the manufacturer's warranty section. Generally, long written warranties and warranty problems are closely related.

Good, dependable marine refrigeration equipment will be expensive compared to domestic equipment. When investigating the price lists of the various manufacturers, beware of hidden cost items that must be used in conjunction with the equipment. Complete system packages are preferable to component pricing. The three largest manufacturers of marine refrigeration equipment are Adler & Barbour, 43 Lawton Street, New Rochelle, N.Y. 10808, The Grunert Company, 195 Drum Point Road, Osbornville, N.J. and Crosby Yacht Service, Inc., Marine Refrigeration Division, 204 2nd Avenue South, St. Petersburg, Fla. 33701. Literature furnished by these companies should give one a well-rounded background for selection of the system that fits their needs.

If you have done your homework well and find a reliable, dependable firm, your marine refrigeration system will give you many years of trouble-free, carefree refrigeration.

When Does Marine Reverse Cycle Air Conditioning Become A Significant Option?

Certainly not if the yacht is going into charter in the Bahamas, Caribbean, or the South Pacific. These areas have adequate breeze which eliminates the need for air conditioning and generally do not have 110 Volt shore power available which is necessary for the air conditioning to function. The dependability of 110V power away from U.S. shores is problematical at best.

But what about the private owner who is going to dock his boat behind his house, on a mooring, or at a marina?

Let us first consider the owner who has his boat behind his house or at a marina. It would be safe to say that he would have 110 Volt shore power available, therefore this is not a consideration. It is necessary to determine under what circumstances he would need air conditioning. If he sails his boat on weekends and occasionally for a longer period, during vacation, it hardly would seem worthwhile to go to the expense to install air conditioning. However if more serious usage was considered such as a lengthy trip from New Jersey to Florida, air conditioning would be necessary indeed. If these circumstances so warrant air conditioning then the boat would have an added attraction of being a home away from home at your private dock or at a marina. Many a relaxing hour can be spent enjoying the climate controlled atmosphere in your boat tied snuggly in its berth.

If this be the case, how much air conditioning is needed to satisfy your requirements? We can speak of air conditioning in two ways: *Full Air Conditioning* which means exactly that. i.e. the complete boat: all cabins independently controlled and enough BTU's to handle the solar heat load even in the hottest weather. *Nite-Time Air Conditioning* which as the name implies, is just enough to handle the heat load of the boat during the evening hours.

Full air conditioning has controlled air ducts to all the cabin areas and in almost all circumstances has to have a separate shore power inlet and breaker system to supply power. Generally 30 amp service is needed exclusively for Full air conditioning, with the ships requirements being satisfied by an additional shore power inlet. Nite-Time air conditioning can be integrated into the yachts environment somewhat easier due to the limited current needed and the reduced number of air handlers. Generally Nite-Time air is ducted only into the sleeping areas and can be tied electrically into the existing ships shore power without the need for additional power inlets.

There is usually a considerable cost differential between the two types of systems as each is designed for a particular function.

Therefore, before marine air conditioning can become a significant option the need for this equipment must be established and then a determination, of what kind. Your CSY Yacht Advisor can help you.

Shore Power

Under only limited circumstances would the yacht of today not need the advantages of shore power. These situations could be covered under the general heading of cruising boats, used in remote areas, not having dockside facilities available. Due to the fact that most of our carry-on items such as toasters, blenders, microwave ovens, hair dryers, electric shavers, electric tooth brushes, reading lamps, radios, televisions and innumerable others require 110 Volt current it would seem almost a necessity to have 110 Volt power available. In addition to satisfying these requirements, one usually has the advantages of having a built-in marine battery charger and the luxury of having hot water. Shore power, as with so many other options available today, is much easier installed during the initial construction of the yacht. Adding it at a later date is not only difficult, but of considerable expense. Shore power like refrigeration is one of those things that makes a boat a yacht.

CHAPTER IX

The Selection of Electronics for a Cruising Yacht.

ONE of the first considerations in marine electronics should be a reliable depth indicator. This not only serves the obvious purpose of helping to keep from going aground but may be used as an aid to navigation. The depth reading when compared to the bottom contour lines on nautical charts will indicate how far offshore the vessel is sailing. Of the types available, the type using the rotating disk and flashing neon lamp or light emitting diode (flasher) has been most popular and usually the least expensive. The major limitation of the flasher is the difficulty in reading it in bright light. With the advent of micro electronics the digital displays have become increasingly preferred. A good digital depth indicator has a brightness control to vary the intensity of the display and may be adjusted to be easily read in bright sunlight. One advantage of the digital as opposed to the flasher is that scale factor is not a consideration, i.e., a digital indicators can all be read to the nearest foot of depth whereas the accuracy in reading the circular flasher dial is largely determined by the diameter of the dial. Regardless of the type, if the depth indicator is to be mounted in an open sailboat cockpit, one must be sure that it is adequately sealed against salt water. The depth sensor or transducer should be mounted through the hull and be constructed of bronze.

Of even more importance than a depth indicator is reliable communications when needed in times of distress; for contacting other vessels; for reserving a mooring or dock space and placing telephone calls through marine operators. This is achieved with the installation of a VHF-FM and single-sideband (SSB) marine radiotelephones.

Federal Communications Commission (FCC) regulations require that VHF-FM radiotelephones be installed prior to or concurrent with a SSB (Single Side Band) installation. VHF-FM has a relatively short range. It is a line-of-sight means of communication generally useable up to 100 miles maximum. FCC regulations also require that VHF-FM be used if you are within VHF-FM range even though a SSB transceiver may be on board. The question of whether to purchase a 12 channel VHF-FM unit or a 55 channel unit depends on your cruising area. Communications requirements for local cruising can generally be satisfied with a 12 channel unit. International voyages might dictate a need for a 55 channel synthesized transceiver. If your cruising will take you more than 50 miles from the U.S. coast or to foreign ports then a SSB radiotelephone should be considered. SSB radios are capable of providing reliable communications at ranges of up to 10,000 miles. Your particular cruising requirements should be discussed with a qualified marine electronics dealer. He can provide a radio customized to your needs. In selecting your VHF-FM transceiver beware of sets advertised as ranging "up to 25 watts" power output (25 watts is the maximum authorized). They may mean as little as 10 watts actual output. Sets with transmitter on-off switches usually use tubes in the transmitter which cause unnecessary drain from the battery when in use. Look for all solid state equipment. Sets with rotary channel selector switches are generally more reliable than those with push button channel selectors. The reason is that each time the rotary switch is used the wiping action across the contacts helps keep the contacts clean. Push button switch contacts are exercised only when that particular channel is selected. A booklet well worth reading to aid you in determining your VHF-FM communication requiremeints is "How To Use Your Marine Radiotelephone" published by the Radio Technical Commission For Marine Service (RTCM). Copies may be purchased for three dollars from the RTCM. The address is P.O. Box 19087, Washington, D.C. 20036. An excellent booklet on SSB is "Marine SSB Latest Fact Book" which may be obtained by writing to SGC, Inc., P.O. Box 3526, Bellevue, WA 98008 which is generally free. Copies of both should be available from your marine electronics dealer.

The most popular and least expensive electronic aid to navigation is the radio direction finder (RDF). The most convenient and most accurate kind for use on sailboats is the hand-held unit with an integral compass. The accuracy of an RDF is effected by any ferrous material in its proximity. With the hand-held unit the navigator can locate himself as clear from the rigging as possible thereby improving the accuracy of the fix. RDF's which use the rotatable compass card usually must be positioned under the rigging, the compass card set to the ships heading, and the helmsman must maintain that heading while a fix is taken. Many of the RDF's on the market also offer VHF-FM and FM standard broadcast reception. While this may be desirable from the entertainment viewpoint, these sets usually do not have the receiver sensitivity or range of those sets designed solely for radio direction finding. The only bands needed on an RDF are the beacon band, the marine band and the AM standard broadcast band. In terms of accuracy when compared with the Loran-C and Omega marine navigation systems the RDF is the least accurate. The best one can hope for is an accuracy on the order of plus or minus 2°. At a distance of 100 miles from the beacon transmitter this would equal plus or minus 3½ miles.

Two very useful aids to navigation during long distance cruising are a knotmeter indicator and a log. A knotmeter indicates the yachts hull speed just as a speedometer indicates speed in an automobile. A log summarizes trip mileage as the odometer does in an automobile. Knowing how fast

but must be manually activated in order to transmit.

In 1974 the U.S. designated Loran-C as the government navigation system for the U.S. Coastal Confluence Zone. The Coastal Confluence Zone is defined as an area extending seaward from the shoreline a distance of 50 miles or 50 fathoms, whichever is greater. Experience has shown that with a good Loran-C receiver that range may be exceeded. It is not uncommon to use the East Coast chain with transmitters as far away as Dana, Indiana and Nantucket, R.I. for navigation off the Florida Keys. A Loran-C receiver measures the time delay in reception of signals from a master and associated slave transmitter. The Unit of Measure is the microsecond. A microsecond is equal to one millionth of a second. The transmitted signal travels approximately 1000 feet in one microsecond. Therefor a time delay display change of 1 microsecond means the vessel has moved 1000 feet from its prior position. For a given time delay there is a Locus of Points called a Line-of-Position (LOP). When plotted on a nautical chart this LOP forms a hyperbolic line which will be two LOP's are required to determine your location or fix at the point where the LOP's cross. A fix the yacht is traveling and how far it has gone, you may estimate the time of your arrival at your destination. Knotmeters are available in two types. One is similar to that in an automobile, the other is of the digital type. If the digital is selected, it should read to the nearest tenth of a knot, and should have a variable intensity control so as to be readable in bright sunlight yet be adjustable for nighttime use. All Logs which are available are of the mechanical counter type as in an automobile. All units should be fully sealed front and back to prevent saltwater from getting to the unit.

For yachts cruising more than 20 miles off shore an Emergency Position Indicator Radio Beacon (EPIRB) should be considered. When activated, the EPIRB transmits a distress signal on the two VHF frequencies which military and civilian aircraft are required to monitor at all times during a flight. Virtually all U.S. Coast Guard aircraft are equipped with homing devices to locate the EPIRB's transmission. EPIRB are available in two classes, class A which will float free and begin transmitting automatically should the vessel sink, and class B which may or may not float free, using Loran-C can be accurate to within 1/4 mile and can return you to that same location with an error of as little as 50 feet. The degree of accuracy achieved is primarily dependent upon the characteristics of the set used. Manual sets which display the line of position (LOP) to the nearest microsecond may realize an accuracy of only 300 feet. Autotrack, auto acquisition sets with LOP readouts to the nearest 1/100 of a microsecond will achieve accuracies of 50 feet. The reasons for the increased accuracy are twofold. First the auto acquisition set can electronically lock on the received signal far more precisely than the navigator can manually. Secondly, the resolution of 1/100 of a microsecond allows the operator to take full advantage of the inherent accuracy of the Loran-C system which is approximately 50 feet. Computerized Loran-C's are now available which will display the yachts present position in geographic coordinates of latitude and longitude. When destination coordinates are provided, the set will compute and display range and bearing to the destination, course error and will dead reckon time to the destination. For further information on Loran-C contact Loran-C Information Project, U.S. Coast Guard (G-WAN/73), Washington, D.C. 20590.

At the same time that Loran-C was designated as the system to use in the Coastal Confluence Zone, the Omega Navigation system was designated as the high seas electronics navigation system. Eight Omega transmitters provide coverage for the entire globe. Omega signals typically have a range of five to seven thousand miles. One can sail from Maine, through the Panama Canal to Hawaii using the same Omega transmitter stations for the entire voyage. Accuracy of fixes taken with Omega receivers average 1 mile in the daytime and two miles at night. Navigation with Omega is slightly more complex than with Loran-C. Due to the great distance between transmitters, signals may be received from one transmitter which is in daylight and the other in darkness. This causes predictable errors which are printed in Predicted Propagation Correction Tables published by the U.S. Naval Oceanographic office. This correction factor must be determined and applied to the reading from the Omega receiver before a fix can be plotted. Unlike Loran-C which measures time delay, Omega receivers measure the percentage of an Omega lane crossed. This percentage is known as the centilane count. An Omega lane can be imagined as a corridor say 12 miles wide. These corridors or lanes are plotted on Omega charts. By referring to the chart prior to departure, the initial lane count may be entered into the Omega receiver. As lanes are crossed, the receiver will display the lane count as well as the centilane count. If the receiver is turned off and the yacht continues to cross lanes, the lane count will be lost. Without the lane count, the navigator will not know in which lane to plot the centilane count the receiver computes when it is turned on again. Therefore the receiver must be left on for the duration of the voyage. Most Omega receivers have an internal battery back-up should the external power be interrupted. A desirable feature on the receiver is a chart recorder which records lane crossing. If the receiver for any reason stops tracking the stations, the rate of lane crossing as recorded prior to failure may be used to extrapolate the correct lane count when proper operation resumes. An audible alarm alerting the operator to loss of external power is also a desirable option. As with Loran-C, computerized Omegas are available which can furnish present position in geographic coordinates, great circle or rhumb line bearing and range to destination, course error and time to destination. The operational status of the Omega system is transmitted by voice hourly over radio station WWV from Boulder, Colorado and WWVB, in Hawaii.

The electronic aid which will probably add the most to

the enjoyment of a cruise is the automatic pilot. While the mechanical pilot should not take the place of the human one, it can relieve long tedious hours at the helm. Also in most sea conditions the auto-pilot can steer a more accurate course than a human pilot. An auto-pilot consists of three basic components. A control unit, a sensor, and a drive unit. The sensor may be either a compass or a windvane responding to the earths magnetic field or the relative wind point respectively. The control unit processes the signal from the sensor and if an error exists between the actual course and the desired course, it determines how much correction is needed and sends a signal to the drive unit. The drive unit is the mechanical/hydraulic link between the auto-pilot and the yachts steering system.

Ideally the drive unit should link directly to the rudder quadrant. It then will serve as a back-up steering system if helm steering is lost. Some of the features available for sail-boat auto-pilots are optional windpoint or compass point steering, trim control so that pilot trim may be changed as sail trim is changed. A hand held dodger will permit the helmsman a freedom of movement away from the helm and still retain control of the yachts heading by using the "manual" mode of operation of the auto-pilot. In this mode the pilot acts as a power steering system permitting the helmsman to go around obstacles in the yachts path yet resume the previously selected course when clear of the obstacle.

I work closely with the CSY Yacht Advisors and I shall be available to you for whatever advice you may need in the selection of electronics for your boat.

CSY

CSY Yacht Corporation

CSY 37 Aft Cockpit Cutter

CHAPTER X

"All at Sea with MSD's"

A YACHTING Special Report on the dilemma facing boatowners in the tangle of marine head regulations.

Preamble by Charles Lawton

Sales Coordinator of the CSY Yacht Corporation

It seems safe to say that no other nautical subject is so obscured by confusion, misinformation, obfuscation, and controversy as is the question of marine sanitation devices – *heads,* to a simpler boating era, MSD's hereafter – aboard pleasure craft." "While it's possible with care to thread a path through the existing maze of regulations, their implications for the future remain both clouded and ominous."

This was the succint preamble to an in-depth article by Tony Gibbs in "Yachting" in June 1977 which follows and is reprinted by permission of the magazine.

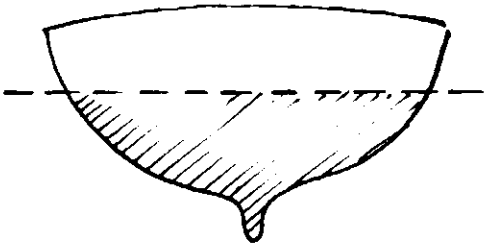
Since then, the January 1980 deadline for Type I MSD's have been rescinded. Type I and Type II MSD's are essentially the same. They both allow discharge into the water, with the Type II being, "pollutantly stated", more restrictive. Type III, as most people have come to know is a "holding tank", type MSD. Yacht builders and yacht owners have to look at the MSD situation today with a crystal ball and a clothespin. First and foremost to be considered is the capability and intended use of a yacht. For CSY, the answer is; from here, around the world, and back again. That means everything from behind your home, living aboard in a marina, cruising periodically or extensively, remaining at sea for extended periods of time or being in rivers and large lakes.

Next we have to consider the state-of-the-art, so to speak. We are going to satisfy ourselves first of all that whatever gets installed in a yacht is capable of meeting the test, our test. To begin with, we will use a top grade marine toilet having a hand operated pump for drawing water through a bronze through-hull (through-bolted) fitted with a seacock. The short connecting hose will be double clamped and the through-hull installed with a 3/4" backing plate. Up to here, we are dealing with technology and products proven over many years for their durability and reliability. From here on it's all downhill, in our opinion.

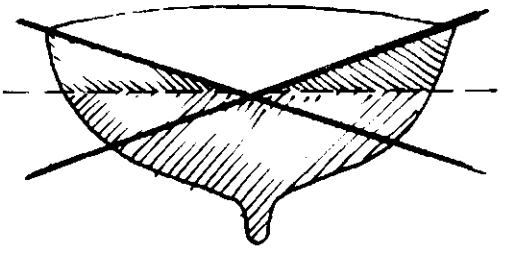
To illustrate, aboard a yacht there is a limited supply of electricity, generally 12 volts DC. There is also limited capability to replenish/or generate available electricity. There is a law which applies to all yachts that go to sea. It was written by "Murphy" and should tell you that when you most need 12 volt DC power, it may or may not be available. So much for all electrical contrivances that draw unhealthy portions of your available 12 volt DC power reserve.

Next we consider those electrical appliances that once in operation are continuously in the intimate proximity of a seawater, or liquid, circuit through the boat. It is bad enough that dissimiliar metals immersed in seawater establish a current which generates a condition known as electrolysis, but add some 12 volt DC current to this situation, obviously not intentionally, and standby! The electrically operated devices currently available are produced by reputable people, are safe to use, and function as they are suppose to when properly installed and maintained. We are not saying otherwise.

Next is an MSD system involving tanks, vents, gravity flow, filtrations, chlorination, bacteria colony, time and possible odor. The equipment and process is tried and proven over a long period of time – on trains. It is the best of its kind for some boats, i.e. those that operate always upright and stable – like trains and even RV's. The success of these units depends literally upon the activity of the bacteria colony, gravity, and venting. Venting a tank or line on a yacht is no problem. Keeping alive an active bacteria colony, likewise, is no problem either as long as materials that will kill it are not introduced to it. Filtration tanks installed aboard boats operating on gravity flow do present problems. First of all they must be located above the waterline of the boat, even if the eventual discharge line is below the waterline.



The area then below the waterline is space that should not be considered for use when installing such a system unless you incorporate additional tankage for collecting percipitate which also means most likely that an electrical pump will have to be incorporated to clear the collection sump or tank. When we consider two heads you either duplicate MSD's, or size one unit to the number of people that will be utilizing the system. In any event, the tank, or tanks are of some size and shape generally of from one to several feet in height, width, and/or length. Sailing yachts heel on either tack as much as 40°.



In order for a filtration tank to be able to clear itself by gravity, it must be installed up high with the discharge line lead both to port and starboard through hull drains located above the LWL. If we apply the KISS principle, it is easy to understand why a number of yacht manufacturers have gone straightaway to the holding tanks for new yachts. Even this Type III system has drawbacks, especially when we know that a very limited number of pump-out facilities are available. We do not think highly of tank(s) full of waste matter bouncing around while underway.

One Coast Guard Officer allowed as how he would probably have to trade in his boat after it was full. A pun to be sure, but perhaps a lament as to certain aspects of the Federal Water Pollution Control Act of 1972 and the EPA. Being perfectly honest with ourselves, no one wants to be guilty of pollution. It has always been a rule in Yachting to use the shore facilities when in a marina. If you berth your yacht at a marina that has pumpout facilities, then a holding tank is, most importantly, a usable method. We must also consider alternatives. A yacht at a dock or able to reach land is capable of receiving spare parts, repairs, and whatever it takes to make whatever function properly. Not so with yachts staying at sea or located in remote areas. Therein lies the need for alternatives. Unacceptable alternatives for defective MSD's are known as "inspecting the backstay" or the Type A "bucket". The acceptable alternative to our way of thinking is the bypass valve which allows straight through pumping. This would have to be fitted with a seacock in order that in "no-discharge" waters this alternative may be "secured". As closely as we can determine from the EPA and Coast Guard regulations Type I, II and, therefore, certainly Type III MSD's must have through-hulls that are rigged in such a way as to prevent accidental discharge. Does a seacock meet that requirement? For years they have been capable of keeping the oceans from entering through holes in boats, and we believe they are as effective for blocking the reverse flow of liquids.

One of two things seems to us most likely to happen downstream.

a. All pleasure craft will be required to have holding tanks, or

b. MSD requirements for pleasure craft will be withdrawn completely.

This also leads us to believe that many manufacturers who otherwise jump into further developing Type I and II MSD's will not spend the time and money needed to place approved devices on the market.

One parting bit of "gotcha" to direct toward big brother. The Type III tank is to be of an approved system. This is sheer governmental intervention of the absolute worst type. Who in their right mind would put a holding tank system in a boat that would not remain secure and operable for many years of use. It is no more difficult to make and install than a good aqua-lift exhaust system is for a large diesel engine; and most every boat builder in the world is capable of doing that. The only difference between an approved and an unapproved tank is the cost to the consumer goes up drastically.

All at Sea with MSDs:

Staffer Tony Gibbs delved into the red tape jungle and tells here how unworkable the contradictory laws are. Reprinted by permission of Yachting Magazine July 1977.

IT seems safe to say that no other nautical subject is so obscured by confusion, misinformation, obfuscation and controversy as is the question of Marine Sanitation Devices — *heads,* to a simpler boating era, MSDs hereafter — aboard pleasure craft. And while it's possible, with care, to thread a path through the existing maze of regulations, their implications for the future remain both clouded and ominous.

Pollution politics

To begin with, there is no comprehending the Federal Water Pollution Control Act of 1972, and the ensuing standards and regulations, unless one considers it as a political document first and a pollution control effort a long way second. Reams of paper have been expended proving conclusively that pleasure craft contribute virtually nothing to sanitary pollution of waterways, except in a few isolated and easily identifiable situations.

No one argues with these conclusions, yet the hammer continues to fall on the yachtsman, while the major polluters — cities, industries, the military — get endless extensions or even outright exemption. The reasons, to anyone with a working knowledge of politics, are childishly obvious: To begin with, there is the tiny kernel of fact — boats *do* pollute. Forget for the moment the insignificance of the pollution.

More important by far is the basic truth that politics is a continual adjustment to pressures. And unless a person or a group is in a position to respond with accurately aimed counter-pressure, he or they will continue to be pushed. Boating people in the United States today are virtually without collective leverage. The only organization working nationally on their behalf is Boat Owners Association of the United States, based in Alexandria, Va. While this group does speak for some 50,000 people — and does so with intelligence and energy — its constituency is scattered and incredibly diluted even among the nation's boating population.

Compared to the financial muscle that even a single industry can put on the political line and the increasingly heavy counter-pressure of organized environmentalism, the boat owner is largely helpless. It is a considerable tribute to Boat/U.S. and — yes — the Coast Guard that the MSD regulations affecting yachtsmen are not a great deal more savage, with a flat no-discharge regulation throughout the nation.

That's the first political reality. The second is that politics, especially in the United States, does not focus for long on any one subject. Having, as they claim, solved a particular problem by enacting appropriate legislation, lawmakers tend to press on the next situation, with seldom a backward appraisal of the effects of what they've done. Sometimes the results are so appalling — as in the case of Prohibition — that there's no way to ignore it. Mostly however the various enforcement agencies digest as much of each new piece of legislation as they can or care to, and ignore the rest. Anyone who doubts this is invited to examine his local code of Blue Laws.

What the regulations say

There is a considerable difference between what the regulations emitted by the Environmental Protection Agency state and what they actually mean. On January 29, 1976, the EPA modified its earlier stand against all flow-through marine heads and issued a set of Marine Sanitation Device Performance Standards which apply to all vessels on which toilet facilities have been installed. (Note that word, "installed": It is one of two places where the authorities have given themselves a little running room.)

These regulations do not require, contrary to what many yachtsmen believe, that any toilet facilities be installed on a vessel that does not already have them. Two and a half months after the EPA's regulations, the Coast Guard, which shares responsibility for the Water Pollution Control Act's operations, issued its own manifesto. This defined Marine Sanitation Devices as "any equipment for installation on board a vessel which is designed to receive, retain, treat, or discharge sewage and any process which treats such sewage."

Back to "installed": According to sources at both the EPA and the Coast Guard, the regulations do not apply to any toilet facilities which are not installed: The portable, self-contained heads of any description, designed to be carried off the vessel for emptying ashore, simply do not come under the federal regulation. This applies by extension even where a portable unit is attached to a vessel with a manufacturer-supplied hold-down bracket.

The kicker here — and there are escape routes for authority throughout the regulation — is that the question of what is and isn't "installed" is a matter of interpretation, and can always be changed — nowhere in the legislation or the regulation is the term defined. And if that's not enough, there is also the fact that any device ignored by the federal regulation is by definition an appropriate subject for local legislation. This will become important below, in considering which authority has jurisdiction over what.

"Installed" devices, in the EPA/Coast Guard vocabulary, basically consist of two types — those that dump effluent, treated or otherwise, from the boat directly into the water, and those that retain it (treated or not) for pumping into an on-shore container or — in the case of incinerators — destroy it more or less completely.

Working to standards established by the EPA, the Coast Guard certifies certain discharge and non-discharge units as "Type I," "Type II," or "Type III" systems. In broad, non-technical terms, Types I and II are essentially the same: They treat sewage and then discharge it over the side into the water in which the boat is floating. The difference between them is in the degree of treatment. For the record, a Type I unit must consistently provide under test conditions an effluent with a fecal coliform bacteria count not more than 1,000 per 100 milliliters, and no visible floating solids. A Type II must treat the effluent so it has a coliform bacteria count no more than 200 per 100 milliliters, and no more than 150 milligrams of suspended solids per liter.

Once a device has been tested by the Coast Guard and certified as Type I or II, it can and will be subject to occasional spot checks to make sure that commercially available models continue to meet the standards. At least one Type I model has already had its certification suspended, and another is said to have passed the lab tests by the narrowest of margins.

Certified Type I and II units can be identified either by a label saying so, and giving the Coast Guard certification number, or in the case of a device built before January 30, 1975, by an official certification letter from the Commandant of the Coast Guard, which should be included with the owner's manual. Anyone buying a device that's claimed to be a Type I or II should insist on seeing this evidence.

No-discharge systems

For most people, Type III MSDs are synonymous with holding tanks. In fact, of course, the category also includes incinerators and recirculating toilets, in which the flush water is partly cleansed and re-used several times, but which is in effect similar to a holding tank. The regulations state that "any Type III device that was installed on an existing vessel before January 30, 1975, is considered certified."

Further, under section 159.12a of the Coast Guard regulations, "Any Type III device is considered certified under this section if it is used solely for the storage of sewage and flushwater at ambient air pressure and temperature"; and if it meets the basic definition of a Type III device, by being designed to prevent overboard discharge of treated or untreated waste. The accompanying list includes those devices which the Coast Guard currently certifies for "Small Vessels" (their term). A quick inspection will show that while there are three approved manufacturers of Type I units and eight companies manufacturing approved Type III devices (mostly recirculating toilets), there is only one firm, Microphor Inc., of Willits, Cal., making an approved Type II installation. Besides the units listed, there are numerous others approved, but not sized for use on yachts.

Which type of MSD?

Deciding among Types I, II and III — or considering a portable head not covered by regulations — is a complicated business. The factors involved are:

Where the vessel will be sailed;

Whether she is "new" or "existing";

When the unit is installed;

— And very much last, one's own preference and the yacht's capacity for absorbing space-consuming gear. According to government definitions, a "new vessel" is one whose keel was laid on or after January 30, 1975. All others are classified as "existing" vessels. Until January 30, 1978, owners of "existing" vessels may choose any of the three numbered types; and after that choices are between Types II and III only.

Until January 30, 1980, owners of "new" craft may choose any of the three numbered types; and after that date they, too, will have to install a Type II or III. Type I devices installed by January 30, 1978, in existing yachts or by January 30, 1980, in the new yachts may be used for the repairable life of the device — that is, as long as it meets the standards defined above for Type I units. Once the applicable deadline passes, however, if the Type I becomes kaput, it must be replaced by a II or III.

"Discharge" vs. "no-discharge" waters

The question of choosing a particular MSD is further complicated — as if anyone needed it — by the division of

waters in the United States into "discharge" and "no-discharge" areas.

Basically, the EPA/Coast Guard standards described so far apply to coastal, Great Lakes and other navigable waters. Within the timetables noted above, Types I, II and III are equally acceptable, and non-rated portable units, by avoiding the law entirely, are also satisfactory from at least a legal standpoint.

On other bodies of fresh water — landlocked lakes, reservoirs and streams not navigable by interstate commerce — the regulations specify that only no-discharge MSDs are acceptable. In addition, a state (but not any other governmental subdivision) may prohibit the discharge of sewage, whether treated or not, into some or all of its waters, but only after receiving an affirmative determination from the Administrator of the EPA that "adequate facilities for the safe and sanitary removal and treatment of sewage from all vessels are reasonably available for such water to which the prohibition would apply."

According to Boat/U.S., only three states — Michigan, New Mexico and Vermont – currently have state-wide no-discharge. Other states are pursuing this status, notably Texas and Minnesota. New York and Vermont have collectively managed to ban discharge on Lake Champlain.

This raises a further point, since Champlain is a part of the north-south route from the Hudson River to the St. Lawrence Seaway, and is thus very much an interstate waterway. According to a Coast Guard handout, no-discharge status "shall not be construed to prohibit the carriage of Coast Guard-certified-flow-through treatment devices which have been secured so as to prevent such discharges."

Translated into English, this means that one may not operate a Type I or II device in no-discharge waters, but that they may be carried if they are "secured." Readers who are beginning to acquire an ear for government prose will already have spotted "secured" as the key word in this context.

Questioned closely, neither EPA nor Coast Guard officials would give a flat-out definition of the term. "It's being interpreted to mean a through-hull that is rigged to prevent accidental discharge," was the way one Coast Guard officer put it.

Then would a seacock be acceptable? After some waffling, the officer agreed that it would, at least at the moment. "But," he added, "some state enforcement people might not agree."

Questions of enforcement

The matter of which regulations are enforced when and by whom is one of the foggier and more painful aspects of the MSD situation. This state of affairs derives from three things: First, the MSD regulations are still in a state of shakedown and their real significance will probably not be wholly apparent for some time, until questionable areas of interpretation– remember "installed" and "secured"?—are resolved. At the taxpayer's expense, to be sure.

Second, there are the intransigence and ignorance of local legislative bodies, many of which are not aware that the federal regulations on MSDs pre-empt their own laws and ordinances, or don't care. A citation from a local marine policeman may be unconstitutional, but it can take a lot of time and money to prove it.

And finally, there is the unannounced reluctance of many enforcement authorities to get any more involved in the whole thing than they absolutely have to. No police officer in his senses will say flatly and for publication that he plans to ignore a law on the books. At the same time, nothing could be more clear than the attitude of many Coast Guard and police when approached off the record. Virtually in the shadow of Washington, D.C., one Coast Guard base commander was approached by a yacht importer for information on what MSDs should be installed aboard a boat built in Britain for use in the United States: "I don't know," was the reply, "and we're not going to be boarding boats in search of MSD violations anyway."

This attitude was at least temporarily confirmed by an officer at Coast Guard headquarters. Well aware that the vast majority of the nation's new boat owners will be technically in violation of the MSD regulations for at least the coming season, the Coast Guard "wants to make the first year's enforcement more of an educational experience" than a punitive one.

Locally, however, the boatman will be under the guns of various species of marine police, themselves impelled by local governments of varying attitude toward sewage from pleasure craft. And it must also be borne in mind that many states and localities have laws that go beyond the EPA regulations, in prohibiting the discharge of "noxious matter" (a favorite phrase) including but not restricted to human sewage. In such cases, I was told by the EPA people, federal pre-emption would probably apply only to that part of a local statute concerned with human waste, and the rest of the ordinance would presumably remain enforceable. The Coast Guard would, in any case, only enforce federal regulations, leaving miscellaneous state and local laws to marine police.

What of the future?

A number of yachtsmen assumed that when the federal regulations allowing flow-through treatment devices were passed, a host of such devices would spring onto the market. The nearly complete absence of competition for the Lectra/San Type I and Microphor Type II has been as startling to the Coast Guard as it has been to boat owners. In retrospect, it now seems that few manufacturers were eager to get heavily involved in research and development of Type I devices *per se*, since their sales life was a maximum of four years. Only Type I devices that had a strong potential of development into Type IIs seemed worth the trouble.

Now, according to one Coast Guard officer, the outlook for more Type IIs is even bleaker. For one thing, there is a notable absence of applications for certication, and for another, many boatbuilders are taking the path of least resistance and making holding tanks standard equipment on all new yachts.

From the builder's standpoint, this practice is certainly simpler: A holding tank in a fiberglass boat can be molded into virtually any otherwise unused cranny, and the accompanying plumbing is simple and cheap. What happens when an odd-shaped tank has to be cleaned is a question a lot of people seem to be putting off indefinitely.

Another thrust toward holding tanks as opposed to Type

I or II devices is the continuing effort in many states to achieve no-discharge status for their waters. The Coast Guard officer involved in evaluating devices was quite blunt in his opinion: "Inside ten years, it'll all be holding tanks."

But for a state to gain EPA approval for no-discharge status, there must be "adequate pump-out facilities in existence." Except for a few limited areas, these facilities seem not even on the horizon, let alone in existence. One returns again to the political aspect. As long as the term "adequate pump-out facilities" is not defined in terms of boats per pump-out station, hours of operation, accessibility, and cost per flush, then it will almost inevitably wind up interpreted according to the convenience of authority.

And there remains the bypass, whether it be a seacock in the line from head to tank or a so-called "cheater pump" dropped into the tank from deck level. In California recently, a charter boat skipper remarked that he had had a holding tank for some time, but had no idea of its capacity, since he had never used it. "I wait till I get out of the harbor, and pump over the side," he remarked, his tone indicating that this was perfectly normal. And since his harbor's only pump-out station is seldom in working order, he's probably right.

And in conclusion . . .

It would be pleasant to be able to say that there is some way to resolve the MSD situation to please everyone, but there isn't. There is no Type II device available designed for anything but large cruisers: The smallest Microphor tank, suitable for two people, is a foot wide, two feet long and two-and-a-half feet high. Unless there is some fairly rapid development of practical Type II devices, it seems inevitable that flow-through treatment will be merely a way station on the voyage toward holding tanks and cheater pumps all around.

So far, this article has concentrated on reality, avoiding recommendations. It seems clear, however, that if the concept of flow-through treatment is to continue as a viable alternative, the EPA and the Coast Guard must make some radical alterations in their stance.

- First, the federal government must take an active rather than a passive role in publicizing and interpreting, once and for all, its own regulations;
- Second, the question of pre-emption must be resolved, so that a boatman investing several hundred dollars in a device isn't going to be hauled in by a local cop on a municipal ordinance;
- Finally, massive confusion created by the Type I–Type II phasing schedule could be cleared up by revising the regulations to reflect boat design and manufacturing capabilities: The effluent standards are not keyed to any divine writ—not even to the effluent standards of shoreside sewage treatment plants. The Coast Guard's expressed policy in the design of MSDs is not to impose any constraints on the manufacturer. This has proven to be quite unrealistic: EPA creates its standards in blissful ignorance of how they are to be lived with, and the Coast Guard is tossed the job of certifying MSD's without consideration of whether the devices will operate successfully in real boats.

In researching this article, it became increasingly apparent that the average cruising-boat owner was at once willing to obey any reasonable regulation and at the same time frustrated and bewildered nearly to the point of shrugging off the MSD regulations as unnecessarily difficult, another example of bureaucracy run wild.

Ultimately, the success of any law depends on the consent of the people who operate under it, and unless the aim of the EPA and the Coast Guard and the several state governments is to achieve a state of near-total hypocrisy, then the regulation will have to be re-cut to match reality.

SMALL VESSEL M.S.D. FORMAL CERTIFICATIONS GRANTED AS OF 1 OCT. 1976

Type I

Dist. by Raritan Engineering Co.
1025 North High Street
Millville, N.J. 08332
Lectra/San Model 12VDC-159.15/1001/1/I
Lectra/San Model 12VDC-159.15/1001/2/I
Lectra/San Model 12VDC-159.15/1001/3/I
Lectra/San Model 24VDC-159.15/1001/4/I
Lectra/San Model 32VDC-159.15/1001/5/I

Nautron Corporation
P.O Box 366
587 Granite Street
Braintree, Mass. 02184
Model 350 159.15/1009/1/I

Koehler Dayton
P.O. Box 309
New Britain, Conn. 06050
Enviro-Mac
Model 13-702145 159.15/103/2/I

Type II

Microphor, Inc.
P.O. Box 490
Willits, Calif. 95490
Model M-8 159.15/1025/1/II
Model M-10 159.15/1025/2/II
Model M-12 159.15/1025/3/II
Model M-14 159.15/1025/4/II

Type III

Raritan Engineering Company
1025 North High Street
Millville, N.J. 08332
Model CHTT 159.15/1017/1/III
Model RHT 15 159.15/1017/2/III
Model RHT 30 159.15/1017/3/III

Mansfield Sanitary, Inc.
150 First Street
Perrysville, Ohio 44864
Model 911-M28 159.15/1014/4/III
Model 912-M28 159.15/1014/5/III
300 Series 159.15/1014/1/III
400 Series 159.15/1014/2/III
600 Series 159.15/1014/3/III

KOEHLER DAYTON
P.O. Box 309
New Britain, Conn. 06058
KONVERT-A-HEAD
Model 13-701595 159.15/1013/1/III
WILCOX-CRITTENDEN DIVISION of Gulf & Western Mfg. Co.
P.O. Box 1111
Middletown, Conn. 06457
Model 6012 159.15/1004/1/III
Model 6013 159.15/1004/2/III
Model 6014 159.15/1004/3/III
THETFORD CORPORATION
2300 Washtenaw Ave.
Ann Arbor, Mich. 48106
Sea Farer 159.15/1018/1/III
Safari 159.15/1018/2/III
Penta-Potti 159.15/1018/3/III
Electra Magic 159.15/1018/4/III

GENERAL AMERICAN RESEARCH DIV.
7449 Natchez Ave.
Niles, Ill. 60648
Model ETS-II 159.15/1012/1/III
FIRESTONE COATED FABRICS CO.
Box 869
Magnolia, Ark. 71753
Flexible holding tanks
15-gal. capacity 159.15/1020/1/III
30-gal. capacity 159.15/1020/2/III
40-gal. capacity 159.15/1020/3/III
100-gal. capacity 159.15/1020/4/III
CLEAR WATER OF LAMERE INDUSTRIES
227 North Main Street
Walworth, Wisc. 53184
Incinerating toilets
159.15/1015/_/III

The Selection of Sails for a Cruising Yacht and the Cutter vs. the Ketch vs. the Sloop

By Charles Ulmer
President of Ulmer Sails

IN trying to help you with the selection of sails for your cruising boat, I am going to address myself to the questions I hear most often from you, the consumer and I shall try to answer them as completely as space permits.

The first and most important question is "What Makes Good Cruising Sails?". We're often asked if there's a difference between our racing sails and those which are made "just for cruising". As to quality, the answer is a flat no, but since the requirements and the end use of the two types of sails are so different, many of the other considerations which go into a sail require that this question be answered in the affirmative. For instance, in the area of cloth selection, we find some significant differences between the needs of the cruising sailor and the racing man. For the racing skipper, speed is the all important factor and while durability and longevity are nice if you can get them, these are usually given the back seat for the "god of speed". For the cruising man, longevity and durability are the ultimate factors in a good cruising sail. With these as the primary considerations, the cloth selection process yields a completely different product. In general, cruising sails are best made of soft, nonresined fabrics whose strength is derived from the amount of dacron present and how well it is woven not from the addition of plastic resins which serve to stabilize the fabric. Two words of caution are appropriate here:

1. "Soft" fabric is not necessarily soft to the touch when brand new. Many fabrics come through with a surface finish on them so as to make the sails easier to sew together. This finish breaks down with a little bit of use and the sails become soft and pliable.
2. I don't mean to imply that "Resin" is always undesirable and should be left out of cruising sails. Small amounts of resin often improve a fabric's stability significantly while not seriously affecting its handling characteristics or longevity. A resined fabric when used within its tested limits can last indefinitely.

Does the use of this softer fabric mean that cruising sails will not perform? Once again, the answer is a qualified no. The statement can be made that nonresined fabrics are in general stretchier than their resined counterparts and therefore not as good from a performance point of view. This is particularly true in light air genoas. However, this factor can be dealt with by the skill of the sailmaker in changing his designs so as to incorporate this additional stretch or in the addition of stretch corrections so as to allow for it.

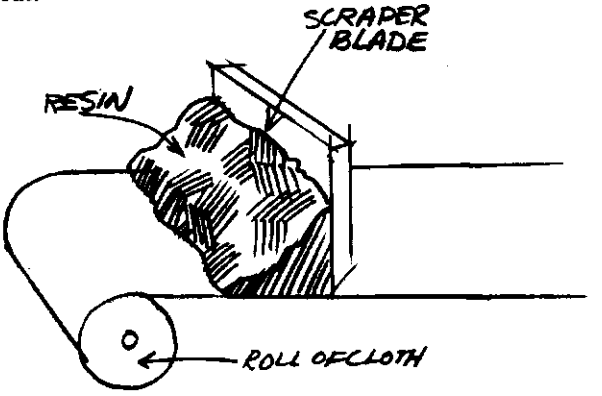
The area of cloth selection is a very complex one. At the risk of preempting some of my later remarks on the selection of a sailmaker, you should quiz your potential sailmakers on their fabric. Find out if they indeed test the fabric and ask to see the results. After years of testing fabrics, I have come to the following conclusions:

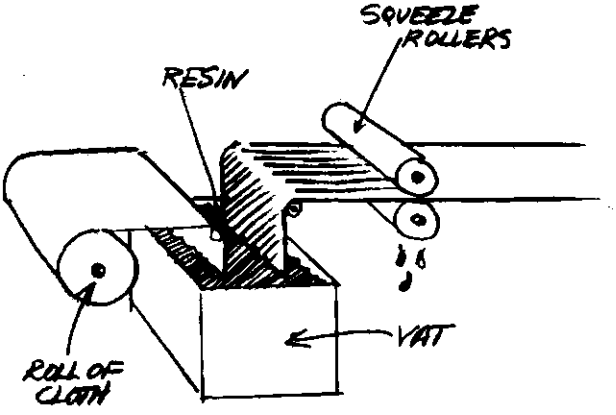
1. Most sailmakers don't test their fabric.
2. Specifications for cruising or racing fabrics must go well beyond soft or stiff. These factors along with the stretch characteristics have to be quantified and then related to the intended size and use of the sail.

Another factor to consider in good cruising sails is physical construction. In this area any good sailmaker has similar capabilities. Triple stitching, heavy reinforcing patches, handwork where appropriate are all items to consider. Another word of caution here, nice looking handwork (handsewn grommets, handroped sails, handsewn hanks) is not necessarily indicative of quality. Handwork served its purpose when sails were made from natural fibers. These fibers were so much weaker than the synthetics we use today that elaborate handwork was necessary to distribute the loads from the corners (where it's concentrated) out far enough into the sail so that a single layer of fabric could handle it. The fact that it looked nice was just a fringe benefit. With today's synthetics, this type of handwork is not only unnecessary but with today's inflation the cost is prohibitive. Properly done, the modern methods used in installing rings, grommets, etc. can be significantly stronger than handwork and at the same time help to keep the cost within reason. I don't mean to condemn this type of work, but as a consumer, you should not be misled in using fine looking handwork as a measure of the quality of a modern sail.

Lastly, what one has to consider as making a good cruising sail is the design of the sail itself or, as some call it, the "black magic" of the sailmaker. The choice of design for any particular purpose is the heart of our business. We are constantly accumulating facts and experience which help us substantiate and update our designing process.

If possible, you should have a discussion with your prospective sailmaker covering your intended use of the boat so that the design can be amended or tuned to your particular needs.





An Ulmer flasher on a Carib 44′ in the British Virgin Islands on the occasion of the visit of Queen Elizabeth II.

The next most important question on your mind is probably "How many sails should I buy?" A really complete racing inventory on a medium size boat (40 ft. or so) will consist of as many as 18 sails in an extreme case. At the other extreme the minimum is 2 sails, a main and a jib. My philosophy for the cruising sailor is very simple; you should buy as few sails as possible and those which you do purchase should have little or no overlap in purpose.

In short, for the cruising sailor this means 4 sails:

1. A mainsail with an appropriate number of reefs.
2. A heavy air jib.
3. A light to moderate air jib.
4. A downwind sail.

I always recommend the purchase of heavy air jib first in the event your finances limit you to two sails because this sail can be used in all conditions and its use in light air simply means a lack of performance. Purchasing a light to moderate air genoa first precludes sailing in very heavy air entirely.

As to whether the downwind sail or light air genoa should be purchased first, that's entirely a matter of your personal preference. You might consider where you'll be sailing, what the prevailing winds are in that area before making this decision.

The sizes of your heavy air jib and your light air genoa are a function of the boat you're buying, and the geographic area in which you intend to use it. These can be arrived at fairly easily from experience and from consultation with your sailmaker and yacht broker.

The selection of a downwind sail as I see it is between a spinnaker and a Flasher. I've always believed that the spinnaker was a good cruising sail provided you had the crew to handle it. Its advantages over the Flasher come mainly in the performance area and its disadvantages are that it requires an additional investment in equipment plus more crew to handle that equipment.

For those of you not familiar with it, the Flasher is a light weight full draft sail intended for use when sailing off the wind in light and moderate air. It combines the handling ease of a jib or genoa with the pulling power of a spinnaker and in most cases will give you 75% to 80% of the performance of a chute. It costs substantially less than a spinnaker and does not require any additional equipment other than a spinnaker halyard.

The most common alternative raised to this type sail is the twin wing arrangement which some ocean travelers have used successfully. What most people don't understand about the twin wings is that it is the most expensive of all rigs in terms of equipment and the sail itself and is additionally very inflexible in that it limits you to sailing almost dead down wind all the time.

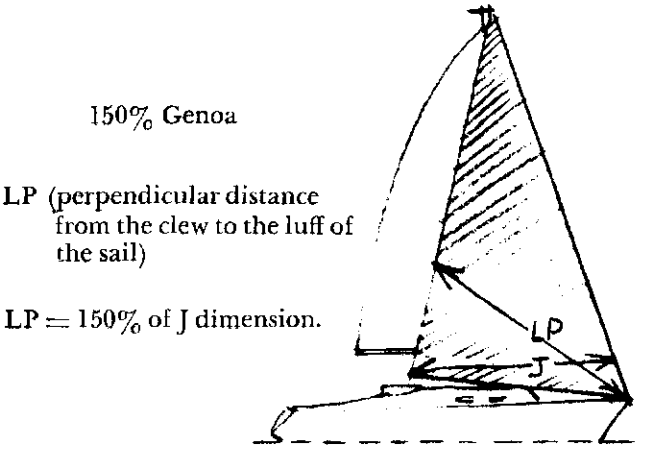
Another frequent question that falls in this category is "Do I Need Storm Sails?" For the average cruising man who never goes offshore and will be spending most of his time in coastal or protected waters, storm sails are the worst investment you could make. Their price per sq. ft. is the highest of any sail and they'll spend their entire life in your sail locker. For those occasional Spring or Fall frontal passages where the wind really gets up, I suggest a reef in your heavy air jib and nothing more.

Now for those of you who are going to venture offshore, storm sails are a necessity and should be looked upon as part of your safety equipment.

You wouldn't consider going offshore without a life raft or a radio and you shouldn't consider going without storm sails. When you do buy storm sails, make sure they're right for your boat! Don't buy a used storm jib that's 20 years old and think you've covered this problem. Get properly made storm sails designed to fit your boat and then try them before you go offshore to make sure you know how to set and trim them.

Another question I'm often asked is "What is a good cruising rig?" Since just about every rig I know of is currently in use of cruising boats, it would be foolish to condemn any or to push any one particular rig too hard. However, there are some considerations worth thinking about while you're shopping for a boat. Does the rig on the boat you're considering break up the sail area into manageable increments? This is particularly important in selecting a large boat. An oversimplified answer to this question would be that the sloop does not and the cutter does. Another would be that the yawl or ketch do and the sloop does not. Obviously, in one case I'm considering the foretriangle and in the latter case, the main triangle. Lest one think I'm biased against the sloop, the simplicity of its rig is often very desirable.

How much work is involved in sailing with one rig as opposed to another versus how much work is involved in getting one rig ready to sail as opposed to another? Once again in making a comparison between the sloop and the cutter, the cutter has two self tacking sails (mainsail and forestaysail) and a jib topsail which has little or no overlap and thus is easily trimmed. The sloop has one self tacking sail

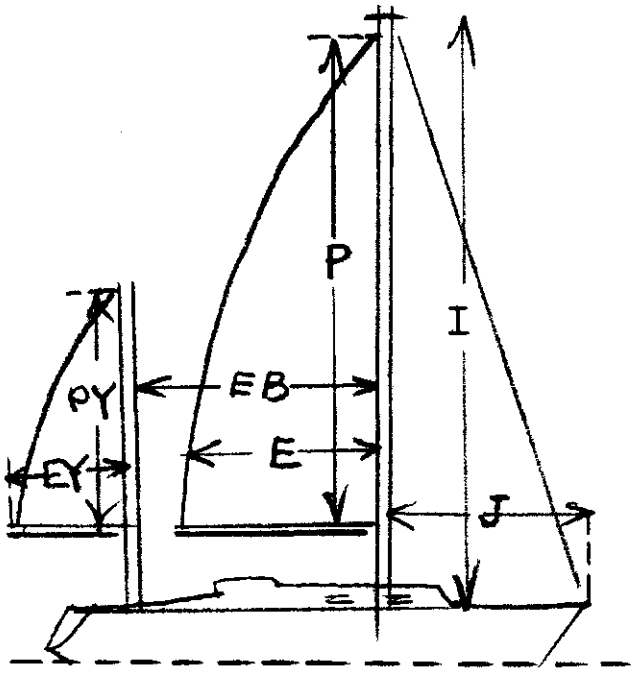


(the mainsail) and an overlapping jib or genoa which can be quite a bit more work to trim. In answering the latter part of the question, it's obviously somewhat easier to get a sloop ready to go sailing.

Split rigs such as yawls, ketches, and schooners offer even a greater diversity in terms of splitting up the sail area since all of them can have a foretriangle rig similar to that of the cutter and because they have two masts, they've broken up the after part of the sailplan into smaller increments too. Split rigs are also renowned for their ease of handling in storm conditions. The negative side here is the additional bother in setting more sails, the clutter and maintenance of the additional rigging.

In short, there is not one ideal rig for a cruising boat. The rig itself must be evaluated in the context of the boat that it's sitting in. My own opinion is to favor a single mast with the broken up foretriangle (the cutter) as having the ideal mixture of simplicity and ease of handling.

While discussing rigs, I've decided to include a little diagram and some definition to help you understand and evaluate sail different sailboat rigs. The letters shown in the diagram are the names used in the IOR Rating Rule for the critical dimensions which establish the size of a boat's rig. They are convenient names to use for the dimensions because they are short and generally understood throughout the sailing industry.



"P" is the luff length of the mainsail, measured from the top of the boom to the highest point up the mast to which the sail will be hoisted.

"E" is the foot length of the mainsail, measured from the after face of the mast to the point farthest out along the boom to which the sail will be pulled.

The "foretriangle" is the area bounded by the mast, the foredeck and the headstay where jibs are set.

"I" is the height of the foretriangle measured from its uppermost point along the mast to the deck.

"J" is the base of the foretriangle measured at the deck from the mast to the headstay.

"JC" in most cases is the same as "J". It is the length of the spinnaker pole, which normally is the same as the length of the base of the foretriangle. "JC" determines the size of the spinnaker under the various rating rules.

"PY" and "EY" are, respectively, the luff length and foot length of the mizzen of a yawl or ketch measured in the same manner as the mainsail.

"EB" is the distance between the masts of a yawl or ketch. It is an important dimension in establishing the area of an appropriate mizzen staysail.

If all these dimensions are known, the area of any sail can be calculated from them. I'd like to include another bit of information here. When one talks about the size of a genoa, it is generally referred to in terms of its overlap percentage, sometimes called an LP percentage. For example, we often hear of people talking about 150% or 160% genoas. What they are really saying in referring to a 150% genoa is the fact that the LP dimension (the perpendiclular distance from the clew to the luff of the sail) is equal to 150% or 1.5 x the "J" dimension. For example, if "J" on your particular boat is 10 ft., a 150% genoa will have an LP of 15 ft.

The last question I want to address myself to is "Who should I buy my sails from?" Picking a sailmaker at face value would seem to be an easy job since there are so many around. However, since you're talking about *investing* a lot of money, it behooves you to take some time in picking the right one.

Some of the factors you should evaluate are the product itself, its cost, the availability of service, and the integrity of the company you're getting involved with.

Taking these items in order, the evaluation of the product can be handled in a number of ways. Find a customer or two who's already using that person's sails. Ask the boat dealer or yacht broker from whom you're purchasing the boat who he recommends. Find out if the sailmaker has previous experience with that particular boat. How is that particular sailmaker thought of by his competitors? Is that sailmaker's product thought well of in other areas of sailing?

As to cost, a price comparison is easy to do. Make sure you're comparing apples to apples and then simply evaluate the numbers. I think you'll find most major sailmakers in the same ballpark pricewise. A word of caution! If you're new to sailing, you may not realize the importance of your choice of sails. They are not a minor accessory, and buying for price alone is a false economy. Later alterations and corrections are expensive and sometimes they are not even possible. Make sure your sail dollar brings you more than just a bag of fabric; it should also bring you experienced help in choosing and using what's in the bag.

This leads us right to the availability of service. Proximity is implied here and is important. The closer you are, the more service you can get and take advantage of. I don't mean you should buy an inferior product just because a sailmaker is next door to you but in evaluating equal sailmakers, the closer one can certainly offer more.

To evaluate a company's integrity is to make a judgment about the people you are dealing with. The yachting fraternity is a relatively small one and the fraternity of sailmakers is a lot smaller. It doesn't take much investigation to find out who the good ones are and who are the baddies. It is a constant source of amazement to me how many otherwise astute businessmen get taken when they buy a boat. It's a decision that is unfortunately guided more by emotions, and all normal business acumen is thrown out the window. It is the same when buying accessories for the boat.

My advice is to buy your sails the way you would buy any other expensive commodity i.e., from a responsible, well known company. Name and reputation don't just happen, they're earned. Don't gamble thousands of dollars for the sake of a few hundred.

The Selection of Options and Extras

By Ed Hall—A CSY Yacht Advisor

WHAT is a standard boat for one manufacturer is a loaded boat for another manufacturer. Thankfully the days are going when it seemed that just about everything but the basic hull and deck was an extra. These days the so-called "base boat" includes most of what is essential to take a boat away from the dock. The battle in the market place to come in with the lowest base price is giving way to common sense. It is recognizing the inherent intelligence of the consumer. Nevertheless it is still difficult to compare boats properly on an apples-to-apples basis. (See Chapter XVI.)

So what are options? They should be only those things that a manufacturer or a dealer supplies *outside* of what should have been on the boat in the first place. True options are those items that are not considered standard because of the variety of needs of different areas, of different uses that the boat will be put to, and personal preference. Sails, for example, come in different weights, and a broad range of sizes which are designed for different uses (see our Chapter XI) and so it is with electronics, head treatment systems, refrigeration, roller furling gear, deep or shallow draft, canvas coverings, etc. All are things which according to your sailing area, the prevalent weather where you sail, the water depth etc. you may or may not need or want. These are things which are properly called options.

Adequate ground tackle is a necessity on a boat, but can logically be an option, i.e., whether to use a plow anchor or a Danforth. This depends on the kind of holding ground that you will be using the most. You should have a light anchor-popularly called a luncheon anchor for calm-day anchoring when people will remain aboard. A regular size plow and/or Danforth anchor of the recommended size for the size and weight of your boat. In addition a heavy storm anchor should be aboard. Each should have at least 200 feet to 250 feet of nylon rope with 15 feet of chain of a size commensurate with the size of the anchor. If you do a lot of anchoring in warmer waters we should recommend stainless steel chain over galvanized. Galvanized rusts eventually, which dirties decks, hands and sails.

A proper working engine, a stove, water pumps, bilge pumps, hand and motor driven, a proper electrical system a set of batteries — an engine — proper rigging and you have the bare necessities where options start.

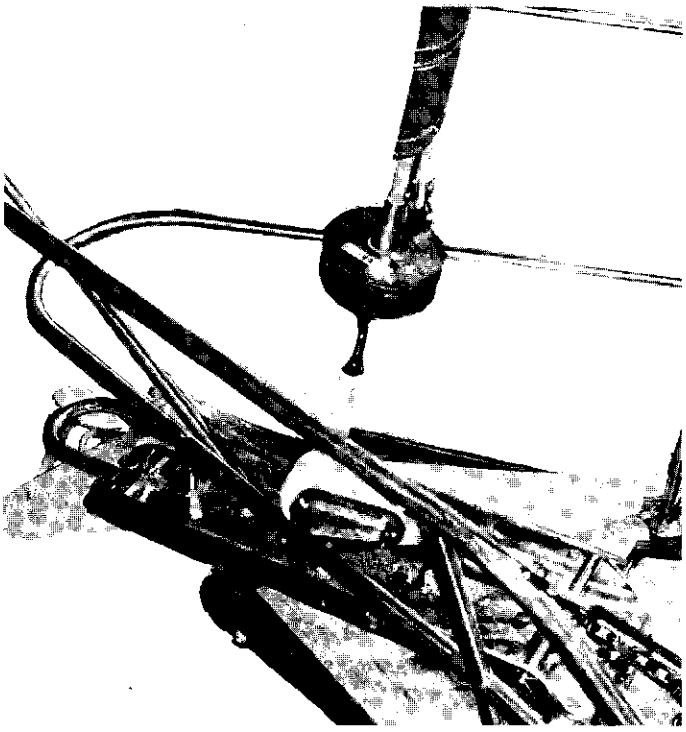
A good deal of these options — M.S.D.'s, sails, electronics, self-steering devices and roller furling are discussed in other chapters in this book. *It is not* our intention to have you get any more options than you need. We are in the business of selling boats — not options. Your CSY Yacht Advisor is there to advise you as best he can. The last thing that you should do is load your boat with a lot of stuff that you don't need or that can go on the fritz. Simplicity is the watch word for a successful carefree cruising yacht. What options you do choose should be the very best, commensurate with cost.

Wherever possible it is advisable to order the deep draft version of the yacht you have chosen. To choose the shallow draft version is to sacrifice some performance, particularly windward ability. You have to balance this against the frequency of shallow waters where you expect to do most of your sailing. Places like Tampa Bay, Texas, and the Chesapeake or the Bahamas may require your choosing a shallow draft. However, carefully analyze whether the sacrifice you are making in choosing a shallow draft is in fact worth it. If you order the deep draft in a CSY 44 or 37 it can be converted to a shallow draft at any time in the future (see Chapter III). We are the only manufacturer offering this feature.

In an effort to have the best of both worlds some manufacturers will offer a centerboard version. Over many years of experience with centerboards we find they are a constant source of trouble. They bend. They get caught in the centerboard trunk, the centerboard pennant breaks or jams, and they are a cause of leaks. Bottom-line, we think you are asking for trouble with a centerboard.

Of course every yacht that goes to sea must meet Coast Guard requirements — C. G. Approved life preserver for everyone on board — a fog bell and a fog horn — 3 fire extinguishers (three) and a horseshoe life preserver with a light and line or what is defined by the coast guard as a "throwable life saving device" (an approved life preserver cushion would qualify).

Other items which would come under the heading of safety would depend on whether or not you go off shore. If that is your intention then you may need such items as a safety harness, a life raft with emergency rations and a C.G. approved E.P.I.R.B. (Emergency Position Indicating Radio Beacon). It would be wise to add a smoke detector in each of the major enclosed areas of the boat, particularly in the engine room and the galley area. An automatic fire extinguisher system throughout the boat is not the must that it once was when gasoline engines were used as auxiliary power. We consider gasoline engines much too dangerous to be used for auxiliary power on a sail boat. Flares, an overboard light and pole with an attached plastic whistle should round out your safety gear.



Hyde Streamstay Roller Furling.

Although electronics is discussed in another chapter a radio telephone would be considered an important part of safety equipment. A depthsounder, knotmeter and log are not musts but nice to have. The new digital types tend to be more trouble free.

In addition to ground tackle, fenders, chafing gear, dock lines (4 or 5) and possibly a fender board and boat hook are necessities.

Of course domestic and navigation equipment necessary on your yacht is closely tied to how much you use your yacht and where you use it. A thoroughly thought-out tool kit is a must on any boat and your CSY Yacht Advisor can help you put together those spare parts that you should have aboard, again depending on the extent of your cruising plans.

It is sometimes said that the limiting factor in the size of a yacht you buy is the amount and weight of ground tackle that you can handle. An anchor windlass is normally not necessary on small boats, but the weight requirements increase proportionately with the increase in the weight and size of the vessel. In the larger yachts an anchor windlass may become a necessity. If so, buy the best one you can afford, and it should be coupled with a hand back up. To conserve batteries it is a good idea to wire the windlass through the oil pressure switch so that it can't be used except when the engine is running.

Bimini tops, dodgers, and awnings are a short subject. They are a good investment. Get what you need for your area. Your CSY yacht advisor can advise you from long experience.

Roller furling gear is an often ordered option and considered by some to serve more purposes than it should. It is often used as reefing gear as well. It is not intended for this since a partially furled roller furling jib will stretch the sail. This is of concern only to those to whom performance is paramount. If you find yourself in the need of changing jibs the roller furling gear may not be for you. The old reliable hank-on-jib is easier and quicker to change. So why do so many order jib furling gear? Convenience!

You will need a method of getting back onto the yacht when you are in the water. Every swim ladder there is has been tested by CSY Ltd. at one time or another. We have finally designed and patented one of stainless steel that works. It's not cheap but it will last. A good back-up to get someone out of the water is a bosun's chair. Also a must to go up a mast and retrieve a run-away halyard.

Another popular item is a dinghy and an outboard. Generally cruising people prefer an inflatable because of its ease of storage aboard the boat, its portability, lightness and its use as a back-up life raft. Hard dinghys are preferred by some. However, for long passages it requires either davits or storage on deck which is not always possible.

The outboard should be the lightest one possible commensurate with its being able to drive your dinghy with the average number of people you expect to carry. Weight is important since you will be putting it back and forth aboard the yacht and dinghy thus the lighter it is the better. Know how to fix it and maintain it. There should be a motor bracket on the stern rail for outside storage and blocks to tie down the outboard fuel tank on deck. Gasoline should *never* be stored in the yacht or its lockers.

Commissioning is normally not available from a manufacturer so it is usually an extra at the dealer's end – possibly hidden in the dealer's mark up but, nevertheless still there. There is no more important single operation in the process of building and delivery of your boat. The unique method of commissioning and delivery of CSY Yachts is discussed in detail in Chapter XIII.

We have covered in a broad sense, the major options except the ones you will see on a manufacturer's option list which in our opinion should be standard equipment. An emergency tiller should be standard – it's a must. A carpet covered plywood cabin sole is inexcusable. The cabin sole should be teak or some other suitable hard wood. An electric as well as a hand operated bilge pump should be standard. Boats over 32 feet or so should have pressure hot and cold water throughout including the shower as standard. A back-up fresh water pump is a necessity. A quality *double* rail with bow and stern pulpits should be standard. All navigation lights plus a bow deck light should be standard. All of the necessary winches should come with the boat and all of the large primaries should be self-tailing. A system for reefing the main should be standard. Look for a quality stainless steel stove either propane or kerosene. Whatever you do don't install alcohol. A rub rail should be standard. We feel it should be built as an integral part of the hull (see Chapter III) not as an optional add on.

Make up your list of options and then start cutting. Less is more. Save your money and don't go overboard by purchasing a lot of unnecessary equipment. Consult your CSY Yacht Advisor, he can help you make the wisest selection based on your real needs.

CHAPTER XIII

Windvanes and Autopilots

by Mike Lowery
CSY Yacht Advisor

We all know that "sailor's have more fun" and that cruising is the most relaxed form of sailing; but try to convince yourself (or your crew) whether it is fun or not after a week of "watch after watch" at the helm.

WHEN a yacht is outfitted for long distance sailing, coastwise or offshore, serious thought should be given to the installation of some type of "self-steering" gear. These devices range from being practically a necessity to being a luxury depending on the particular yacht, the size of the crew and the extent of the sailing you expect to do.

Installed on board a well-found 40′ yacht that normally sails with a crew of 6, the self-steering gear approaches the luxurious, allowing the crew-member at the helm to lounge around the cockpit, keep a look-out, and perhaps help out with other duties on deck or below. On board, the same yacht with a crew of 2, the role of the gear changes radically. "George", whether mechanical or electronic, becomes a very welcome member of the short-handed crew. This extra "hand" releases a crew-member from constant attention to the helm and the attendant fatigues, both mental and physical—"George" is good crew and doesn't complain about rain or cold; doesn't gripe about the cooking and never drinks the skipper's beer. The biggest single asset of having a "self-steering" device aboard a short-handed cruising yacht is that it frees the crew to work (or play) together without worrying about who's steering. The disadvantage is that, regardless of type, "George" can't make decisions and will steer the programmed course regardless of freighters, reefs, beaches, or other obstacles.

The sailor who would like to install or have installed a self-steering device is faced with a number of decisions, and, if like most of us, he has limited experience with or knowledge of the various types available. The remainder of this section will be devoted to a general description of the various types, comparison of the advantages and disadvantages of each and, hopefully, will leave you with a better understanding of what makes "George" tick.

Types:

Basically, we can divide self-steering gear into two groups: those which use the wind as a power source and those which are powered electrically. Regardless of type there are common components and requirements. Any gear can be broken down into 3 basic components:

1. Steering—the means by which the gear maneuvers the yacht to maintain course—usually the yacht's rudder, but many be a separate rudder or a trim tab.
2. Course Sensing—some method of sensing a programmed course and reacting either mechanically or electrically, to correct any deviations in that course.
3. Communication—some type of linkage to transmit the "course sensing" reactions to the "steering" and cause a corrective course change.

Some requirements for any reliable self-steering gear—

1. You, the helmsman, are required to exert a certain amount of power to steer; the gear must be able to develop enough power to steer your particular yacht on any point of sail and to offset the effect of a sea.
2. A good helmsman can steer a relatively straight predetermined course—the same holds true for a good self-steering device.
3. Reliability.

Do It Yourself Gear

For the purist, and those of us who are occasionally left short-handed, there are numerous ways to achieve "self-steering" by using sails, running rigging, and/or spare hardware.

Seemingly, the simplest system would be to balance the sails and rudder for any particular course. The trouble with that is that most yachts will only balance on certain points of sail and even then minor changes in wind speed will change the weather-helm and make constant changes of rudder alignment necessary.

A better way is to use the various sheet-to-tiller arrangements, whereby the tension of a sheet is utilized to control the rudder.

In the arrangement illustrated; as the boat falls off, the tension on the sheet lessens and the shock cord pulls the tiller to the lee causing the boat to steer back toward the wind; conversely, if the apparent wind comes forward, the sheet hardens and the boat falls off to windward.

The disadvantages of the sheet to tiller method are:

1. Loss of speed.
2. A different arrangement must be worked out for different points of sail.

The Wind-Vane Gears

The most popular type of self-steering device for cruising sailboats is the wind-vane gear. Wind vane gears can be constructed by the home-builder, but here we will only try to cover some of the different types of manufactured gear

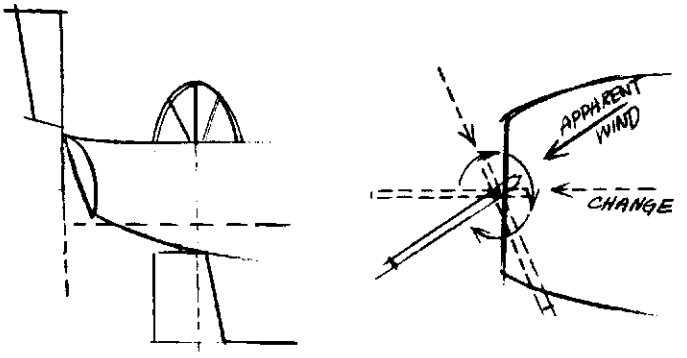
available. For the really ambitious sailor interested in designing and constructing his own gear, and for those desiring a thorough treatment of self-steering theory, an excellent book is "Self-Steering for Sailing Craft" (John S. Letcher, Jr.—International Marine Publishing Co.).

The three components of the vane-gear are:

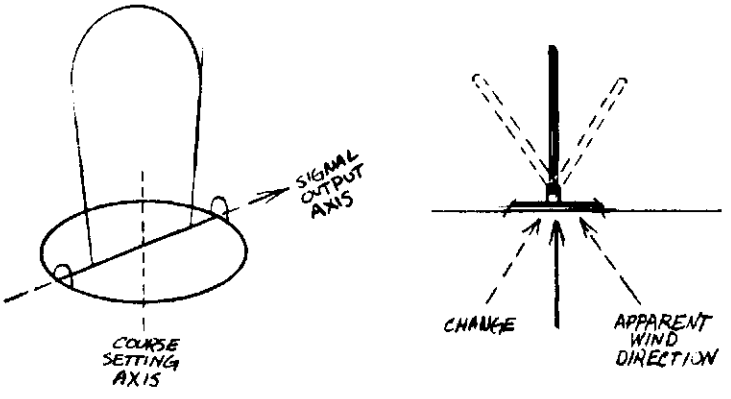
1. The vane—which senses a course relative to the apparent wind direction and reacts to any change in that course.
2. The linkage which transmits the signal from the vane to the steering component.
3. The steering component itself.

The Vane

The simplest vane system is the single (vertical) axis vane which uses the same axis (relative to the yacht) for both course setting and signal output—



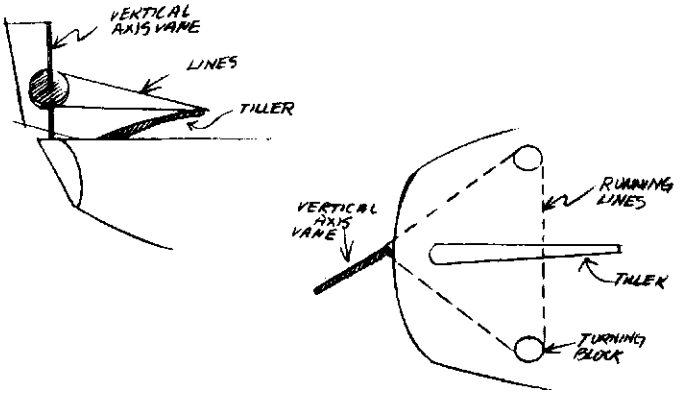
—more complicated is the dual-axis vane which uses a different axis for each course setting and signal output—



The single (vertical) axis vanes have the advantage of mechanical simplicity since the vane and the rudder post turn on the same axis. The disadvantage is that the single axis vane is limited in the amount of output axis rotation it can produce; for instance, in a wind shift of 10° the vertical axis vane would only turn 10° while a horizontal axis vane could rotate on its axis as much as 90° (dependent on wind strength) creating more signal to be transmitted to the steering.

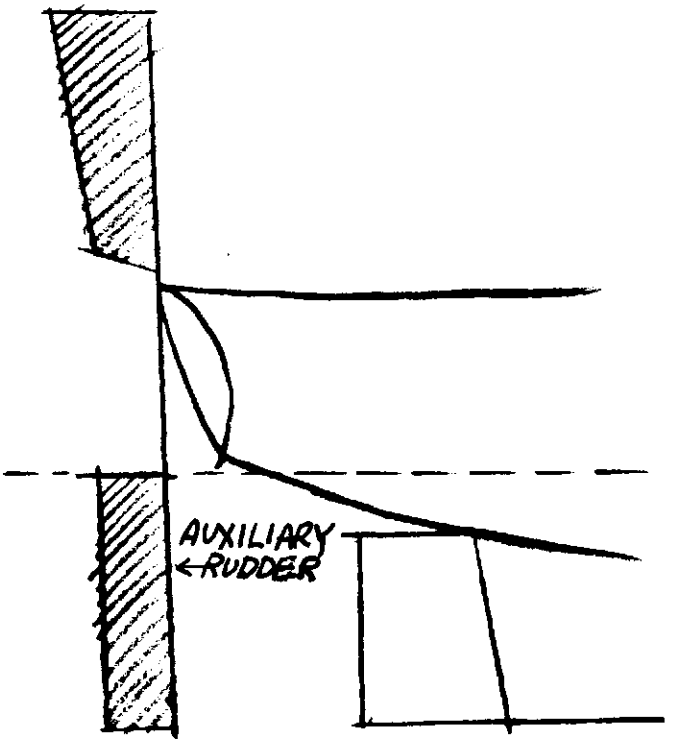
Linkage and Steering

The least complex linkage and steering system is a direct linkage from the vane to the helm using running lines from either a vertical or horizontal axis vane.



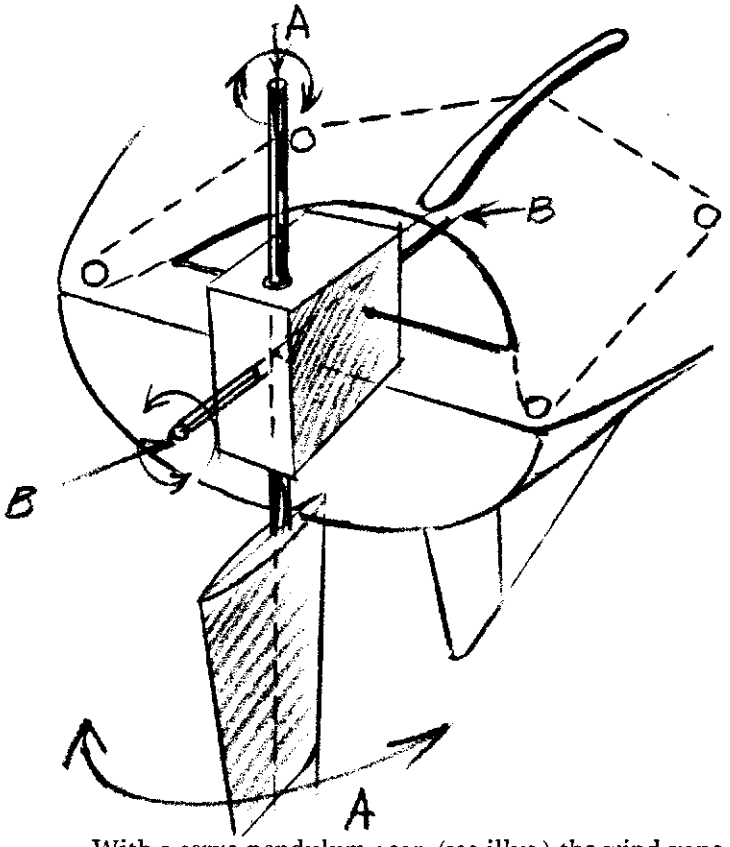
This system, while the simplest is also the least powerful and generally not suited for larger yachts.

The next step is the directly linked auxiliary rudder. This type gear steers independently of the yacht's steering system by using a separate underwater appendage (the auxiliary rudder) for steering, with the yacht's primary rudder immobilized. This type gear has the same power limitations as the above but since the auxiliary rudder is much smaller than the primary, less power is needed. A powerful type auxiliary rudder gear utilizes a trim tab in the linkage.



With this system the signal from the vane is only required to turn the small tab. When the tab is turned the force of the water moving past forces the auxiliary rudder to turn greatly multiplying the power from the wind vane.

The most mechanically sophisticated and usually most powerful gears are the servo-pendulum type.



With a servo pendulum gear (see illus.) the wind vane rotates the pendulum (or a tab controlling the pendulum) on axis A-A, when the pendulum turns on this axis the water moving past causes lift and rotates axis B-B turning a quadrant which is connected by lines to the tiller or wheel resulting in course correction.

The disadvantage of both the servo-pendulums and the more powerful auxiliary rudder gears is that they are so mechanically complex that any other than minor repairs will usually require a machine shop to repair. (However, a malfunctioning electronic unit usually can't be repaired locally and must be shipped back to the factory.)

The advantages of the wind vane gears are:

1. Power source (wind & water).
2. Being mechanical minor repairs and maintenance can be handled by the average cruising sailor.
3. Maintaining a course relative to wind direction allows optimum boat speed under sail.

Disadvantages:

1. Mechanically complex.
2. Will change course with wind shifts.
3. Not effective when becalmed or motoring.

Electronic Helmsmen

Autopilots are discussed in the section, "Selecting Electronics for the Cruising Yacht" so the brief treatment here is to fill in the areas not covered earlier.

Autopilots have been used for some time aboard commercial vessels and power yachts, where electrical power is available in excess—only recently (thanks to solid state miniaturization) have units been available with power requirements low enough for practical use aboard cruising sailboats.

These "pilots" steer a course relative to a compass heading (although some manufacturers now offer the option of an apparent wind direction sensor) by electronically "reading" a course. A deviation from the programmed course will generate a small electrical signal in the 'sensing' unit.

This signal is amplified enough to control the operation of an electric motor which then turns the rudder either port or starboard causing the boat to come back to the programmed course.

The compass sensing and amplifying units can be solid state and require very little current to operate, most of the power required is used by the motor. Much care should be taken to select a unit powerful enough to steer the yacht on all points of sail but with low enough power requirements to allow use at length, without excessive battery drain.

A quality marine "auto-pilot" has definite advantages over the wind gear:

1. Ability to steer a compass course (with the option of a course relative to w. dir.).
2. Ability to steer through a calm.

Some of the electronic gear's offsetting disadvantages:

1. While steering a compass course down-wind under sail, a shift in wind direction can easily cause an accidental jibe.
2. Murphy's law works overtime when combined with salt, water, and electronics.

Summary

Both electronic auto-pilots and wind-vane gear are worthy of consideration and perhaps ideally both could be installed. If only one is to be installed the deciding factor should be the type of sailing you anticipate. If long off-shore passages under sail are planned a wind vane gear would be indicated; if coastal or waterway cruising, an auto-pilot. Regardless of type make sure the gear is suited for your particular boat, maintain it properly, and carry a good spares kit.

Some sources of more info:

Wind Vane Gear

"Aries"—Dual axis servo-pendulum
Cruising Gear, Inc.
POB 1350
Coconut Grove, FL 33133

"Neco Autopilot"—compass and wind steering
Neco Marine Inc.
222 Severn Ave.
Annapolis, Md. 21403

"Tiller-Master"—portable, tiller or wheel
Tiller-Master
POB 1901
Newport Bch., CA 92663

"First-Mate"—portable, tiller or wheel
Vek/Trac R&D
186 E. Main St.
Elmsford, N.Y.

"Hasler"—vertical axis servo pendulum
Gibb-Henderson
82 Border St.
Cohasset, MA 02025

"Hydrovane"—dual axis auxiliary rudder
Regent Marine
1051 Clinton St.
Buffalo, N.Y. 14206

"Navik"—dual axis servo-pendulum with trim-tab
Goïot U.S.
809 Aquidneck Ave.
Middletown, 02840

"RVG"—vertical axis auxiliary rudder with trim-tab
Madeira Marine
PO Box 1218
Pinellas Park, FL 33565

Electronic

"Sharp Sea-Pilot"—compass and wind steering
I.M.I.
Signal Rd.
Stamford, CT 06902

Commissioning and Delivery

CSY cannot warranty or be responsible for yachts not commissioned at our plant. When yachts are shipped out by truck, with all the bits and pieces which are then put together by someone else, we, the manufacturer, are blamed for what is wrong, even though we have no control over it. No matter how carefully a boat is built – no matter how good the quality control – there always are things that are wrong and do not show up until after a shakedown cruise. If a boat is delivered by truck, one of our personnel must be at the commissioning. The cost differential will have to be borne by the customer in order to validate the warranty.

In just about every instance, it is to your advantage to have your yacht delivered on its own bottom, and you will save money over trucking, launching and commissioning at some distant point.

We have a full-time department at our plant which concerns itself exclusively with commissioning each boat. We are able to completely equip your boat ready to go to sea.

You can deliver your boat part way or all the way yourself. We have regular professional crews which can deliver our yachts anywhere – right to your front door – fully found and fully tested and ready to go. You will be quoted the complete cost, which we can live with, *before* you make a commitment to have your boat delivered by our crews.

Our crews are from our factory and are familiar with the boat. While the yacht is being delivered, it is, in effect, undergoing a sea trial under the eyes of professionals. Their job is to correct all and any defects that may come up and bring your boat up to factory condition before the keys are handed over to you. Thus, when your boat is delivered, it will be as free as possible of those bugs so often found in new boats.

From your very first contact with the CSY Yacht Corporation you are assigned a CSY Yacht Advisor who acts as advisor to you on anything to do with buying a yacht or selling your old one. He is your contact with the plant. He supervises the commissioning and delivery of your yacht. He will advise you in regard to what options to buy. He will be shepherding your boat, through the plant as it is built. He will assist you when you take possession of your yacht. He will expedite warranty claims for you. These people are carefully chosen by the CSY Yacht Corporation for their long knowledge and experience with sailing yachts.

There can be no more important step in the process of building and delivering your new yacht than the commissioning process. This takes from two to three weeks to carry out properly. This is an extra cost, but absolutely essential.

The commissioning process at CSY is the most complete service of its kind being offered by any yacht manufacturer. From the time your new yacht comes out the door of the plant, a quality control representative is assigned to your yacht full time to supervise the commissioning process. This includes launching, stepping of the mast and installing all rigging and tuning it. The engine alignment is checked once the boat is in the water and it is given a 24 hour run and the Perkins engineer is brought in for the final check. The rudder and steering systems are checked. All electrical systems and any added equipment is carefully checked. All fuel and water tanks and lines are checked for leaks. The water and fuel tanks are fitted. The gas lines are checked and the gas bottles are filled. The boat is taken out on a trial run at which time the compass is swung and compensated. If a refrigeration system is aboard it is given a trial and checked by the Crosby people. The people from the plant are put aboard to clean the yacht and touch up inside wherever necessary.

The owner is not allowed on the boat until every system and everything on the yacht is functioning to the satisfaction of the chief of Commissioning (who has been in the marine field for over 40 years) and the builder's representative assigned to the boat. This is accomplished through the use of a detailed check list.

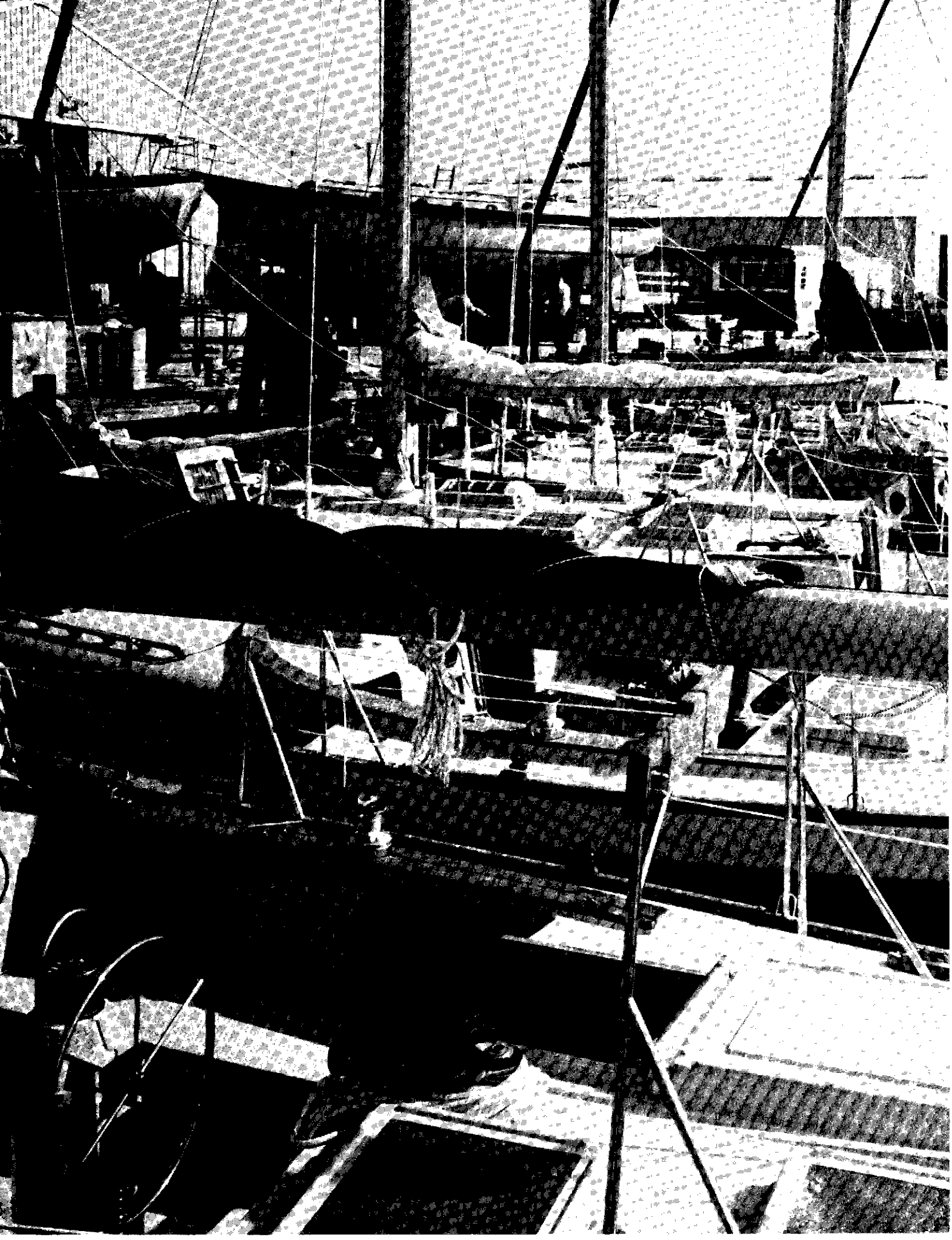
Then and only then is the owner put aboard. The CSY Yacht Advisor and the Builder's Representative assists the owner in getting the boat ready to go to sea.

When the boat is ready to go, the Builder's Representative goes along with the owner for a two day shake down cruise in Tampa Bay. The purpose of this is two-fold. It allows us to find any further problems. It's in those first hours that most of the problems show up. By having a factory trained representative aboard, most problems will be recognized.

The second purpose in having a Builder's Representative aboard is to teach the new owner how to use his boat. How all systems work and how to maintain it properly. No other manufacturer offers this invaluable service. It can only be done properly at the factory where the boat was built.

CSY

CSY Yacht Corporation



The Warranty and Servicing the Warranty

WARRANTYS are just so many pieces of paper. Like any other contract they are only as good as the person or, in this case, the manufacturer who writes it.

One of the great advantages of dealing direct with the factory is that you are dealing directly with the guys who know the boat best. There is no dealer or other third party between you and that person who makes the decisions at the factory.

Some manufacturers are notorious for not honoring customer's claims under the warranty. If there is one thing you should know about any manufacturer whose product you intend to buy, it is what their reputation is in regard to warranty claims. The best way to find that out is to ask for a list of owners' names and check them out for yourself.

There is one person at the CSY plant who is authorized to handle warranty claims. He is just a toll free telephone call away from you.

Any work done under warranty must first be authorized by the plant in writing. Any parts which are replaced must be returned to the plant.

Unlike most manufacturers we shall process warranty claims and expedite them for equipment that is on our boat which is under warranty by the original manufacturer such as winches, the engine, the stove, the marine toilet, pumps etc. Most other manufacturers will require that you deal directly with the manufacturer of such equipment which can be time consuming and frustrating. Since, in most cases, we are large users of a supplying manufacturer's product we will have a lot more clout with him than you would or a dealer would, so we shall see to it that you get satisfaction. Chances are that if a piece of equipment needs to be replaced we shall have it in stock and can get it to you right away.

In situations where the problem may involve a large sum of money to correct or there is a special problem that cannot be solved locally in your area we shall either send in a surveyor at our expense or we may send a representative from the factory to get your problem solved.

As in everything else that he does to help you your CSY Yacht Advisor is your expeditor and representative at the factory whose job it is to see that you get satisfaction.

We have asked many boat owners if they know what their warranty covers. Most don't. When they do have a written warranty, once they have plowed through the whereases and the wherefores and the other legal garble, they end up with the same thing — almost nothing. If the engine, filters, pumps, stove etc. go on the fritz — it's the supplier's problem. Where does the damage under a warranty stop and insurance take over? We don't like this passing of the buck any more than the consumer does. We know whereof we speak since we have been on the consumer's side of the fence for over a decade in buying boats for our charter fleets.

So our policy is to have the buck stop here — with us. Whether it's a supplier's responsibility or our responsibility, we think we should sort it out for the customer. So we have written our warranty which goes like this:

CSY Yacht Corporation Warranty

CSY YACHT CORPORATION, a Florida corporation, warrants the following:

1. CSY Yacht Corporation guarantees the integrity of the hull, the deck, and the deck-to-hull joint against failure due to poor workmanship for the life of the yacht, fair wear and tear excepted, and provided there have been no previous alterations made to these parts.
2. That it will replace, repair or cause to be repaired, free of charge, any defect or failure discovered in builder's workmanship, which are proved to be defective due to poor workmanship or to have failed prematurely under normal and proper usage, and not caused by reason of unskilled handling or lack of proper maintenance and service. This does not include the repair or replacement of any electronic equipment, sails, or items not manufactured by the builder.
3. It will reimburse the original owner for the labor cost involved in the specific repair work that must be done provided it has been previously approved by the CSY Yacht Corporation.
4. Repairs and service adjustments or replacement of equipment required because of misuse, negligence, alterations, accident, lack of reasonable and proper maintenance and normal wear and tear are not covered, nor are the replacement of maintenance items made in connection with normal maintenance and servicing. Any equipment added to the yacht other than original standard equipment is specifically not covered under this warranty nor are any damages which may be caused directly or indirectly by overloading or alteration of the electrical, plumbing, propulsion, steering, or rigging systems or any other damages due to the installation of such added equipment.
5. The obligations under this warranty are limited to and solely for the benefit of the original purchaser of the yachts and said warranties are non-transferrable.

6. The sole liability of CSY Yacht Corporation are the warranties contained herein and it shall not be liable for any damages arising out of improper use, lack of maintenance, acts of God, insurance claims, collisions, alterations or any modifications to the original standard equipment.
7. This warranty is void if the yacht is used commercially, leased, chartered, used for racing, or used in any other service other than the private pleasure use of the original owner.
8. It will be the obligation of the owner to deliver the yacht and/or defective parts to the CSY Yacht Corporation in Tampa, Florida, or at some other destination approved in advance by the CSY Yacht Corporation. CSY Yacht Corporation shall not be held liable for the cost incurred by the owner regarding said delivery or for any delays, inconvenience or loss of use of the yacht.
9. Except for the hull, and deck, and hull-to-deck joint, this warranty is for one year (12 months) from the date of delivery to the original owner.
10. *THIS WARRANTY IS EXPRESSLY MADE IN LIEU OF THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE AND ANY OTHER WARRANTIES EXPRESS OR IMPLIED.*
11. Gelcoats and finishes are not covered under this warranty.

CSY 44 Mid Cockpit Cutter

CHAPTER XVI

Insurance, Financing and Leasing

IT is still true today that, for the most part, bankers just simply don't understand boats. They are not acquainted with marine law. They have difficulty in understanding the intricacies of placing a lien on an asset which they feel can run away from them at anytime. Generally they haven't gotten the message that modern fiberglass boats at least hold their value and in most cases appreciate over the years. Although fiberglass boats have been around for over twenty years, bankers generally feel they can go to pot like their wooden forebearers and finally because of their inexperience with boats they have a hard time placing a value on a boat as a basis for a loan.

Of course, there are many enlightened bankers around. More and more of them are joining the yachting fraternity themselves, however, the doubts do persist. A few banks recognize boat loans for what they are — good ones. In spite of all the skepticism, boat loans are among some of the best that the banks make.

So in financing your boat you have three avenues for seeking a loan:

(1) From your own bank
(2) Through a banker's broker — who places loans with banks
(3) From a financing company

Obviously, where it is possible, your own home town bank is the best place to borrow money. They know you. They know your ability to pay. They probably know everything on your balance sheet. Too often, however, they don't know boats. More often than not they will lend you the money on the strength of your balance sheet alone and/or your pledging other assets to guarantee the loan. If you have the wherewithall, this is the best way to get the best terms both from the stand-point of the interest you will be charged and the length of the loan.

There is a company which we deal with which is called Yegen Marine. This company is basically a broker for some 250 banks all over the country. They act on behalf of the banks they represent to place marine loans. Since they are specialists in marine financing they understand what boat values are; which manufacturers produce higher quality boats, whose value will last, and above all they know how to do the paperwork that banks don't understand. Interest rates vary and the money supplies are different at any given moment throughout the country. Thus a firm such as Yegen is in a position to go shopping for the best deal for you.

Up until a very few years ago the average boat loan was three to five years — seven was unusual. Recently Yegen has pioneered the ten, twelve and fifteen year loans so that monthly payments can be radically trimmed from what they used to be. This means with these extended terms that you may now be able to buy a lot more boat than you thought you could. Companies like Yegen are paid a fee by the bank for placing the loan. It doesn't come out of your pocket.

The third kind of financing is with a finance company. There are many of these which specialize in financing many kinds of equipment. A few are in the marine field. Generally these firms borrow money from the banks at prime or more and then turn around and lend it to you. This means they have to charge a percentage point or two more in interest above a regular bank loan. They are also not as likely to advance money for as long a term as some of the other sources of financing might.

The availability of money and the interest rates vary from day to day like the weather. Money is a commodity like anything else, and to get the best terms requires some shopping.

Our CSY Yacht advisor can be of very great assistance in helping you to locate the best source of financing. He keeps abreast of the best place to get financing on a day-to-day basis. He does not nor does the CSY Yacht Corporation benefit in any way from locating this financing for you. Our only interest is to sell you a boat — period. This is unlike many dealers who get an added income by steering you to a particular source of financing.

The placing of marine insurance is another area where it pays for you to deal with specialists in the marine field. Our sister company CSY Ltd. has for over ten years been placing several million dollars worth of marine insurance thus we have become intimately acquainted with marine insurance specialists and marine insurance companies on both sides of the Atlantic.

The mistake that the average boat buyer makes is that he throws the matter of insuring his boat into the lap of his friendly insurance agent who insures his car, his house or his business. Marine insurance, for most of these people, is completely outside of their knowledge. Many don't even know where to place it, or how to place it. The result is usually a mixed bag where no one is sure what your coverage is and usually the bottom line is that you will pay more for it than you should.

The amount of premium that you pay for your marine insurance is based on whether it is power or sail; if the power is gasoline or diesel; whether you intend to race it or not; how many months in a year that you use the boat; and the extent of your cruising and where you cruise. So to compare insurance quotes from different companies gets back to the

apples and apples routine. You have to read the fine print to find out whether or not the rates being quoted are based on the same premises.

Like automobiles there are higher rates where there is a higher loss ratio. Thus Boston, Long Island Sound, Florida, the Chesapeake, or the Great Lakes will have different rates. When you make application for your insurance you will be asked questions about your past boat ownership, where you have cruised, past losses, if any, and whether you have taken power squadron courses and similar questions. This process is called underwriting and some guy sitting up in an ivory tower who is called an "underwriter" will adjust your rate based on what he can gather from your answers to the questions put to you.

Unfortunately insurance rates generally are set based on the overall experience of *all* boats, good and bad, whether built like egg shells or battleships. So like financing you should shop for your insurance, but above all, be sure you are dealing with specialists in the field.

As we mentioned earlier we have been dealing with marine insurance underwriters from all over the world. We have gotten to know them and they have gotten to know us.

For the last several years we have become well acquainted with Lloyds of London — the leading marine underwriters in the world. In late 1978 the head underwriter who sets the rates for Lloyd's came from England to inspect our boats and our plant in Tampa. He had heard glowing reports about our yachts from their surveyor (a copy of survey is available from the plant) so he come to see for himself.

While here we persuaded him the higher quality boats and safer boats such as CSY builds should have a better rate than the flimsier products.

They have agreed that this is deserved. Therefore, if you buy a CSY Yacht you will be given rates which are substantially lower than the best rates you could get anywhere else. Cruising areas have been broadened so that larger areas are covered *and* coverage can even be world wide. In addition there is no "underwriting" penalties as described above — your name and address and the name and home port of your yacht is all that is needed. If there are no accidents in the first year and you have not proven to be a drunkard, you will get a 10% reduction the second year.

Because of the heavy laminates and the general overall quality of CSY Yachts we are the only company in the world who have been rewarded by Lloyd's for their high quality of construction. That ought to say something to you.

Besides financing a yacht or by paying cash there is another way to get the use of a yacht — lease it. Whether this is for you depends on a number of factors. Leasing does have many advantages. It may surprise you to know that 60% of all cars sold today which cost over $15,000 are leased. For the same reason that cars are leased, yachts can be leased also.

Here are some of the advantages of leasing:

(a) It conserves capital. The down payment when you finance a yacht is 20-30% of the total cost of the vessel. Under a lease arrangement the up-front money is only three months rent.

(b) If the yacht is for corporate use, or if it is used for business, the government will usually allow 100% of the lease payments as a deductible expense whereas in financing they will usually only allow a partial deduction for the time that is proved for business use.

(c) Unlike financing if you lease a yacht you preserve your lines of credit. In a leasing arrangement it is the leasing company whose credit is used — not yours.

(d) Leasing keeps your balance sheet clean. A leased yacht, unlike one that is financed does not show up on your balance sheet as a liability.

(e) Very often by careful negotiation with a leasing company it can be arranged so that the residual value, that is the value placed on the yacht at the end of the lease for which you can buy it back, the monthly payments very often can be lower than the payments made under a financing arrangement.

As can easily be seen it pays to go shopping both for your marine insurance and the method by which you purchase or lease a yacht. Your CSY Yacht Advisor can help you to make the right choice. However, a careful analysis of your own financial situation is a must to determine which method is best for you.

CSY

CSY Yacht Corporation

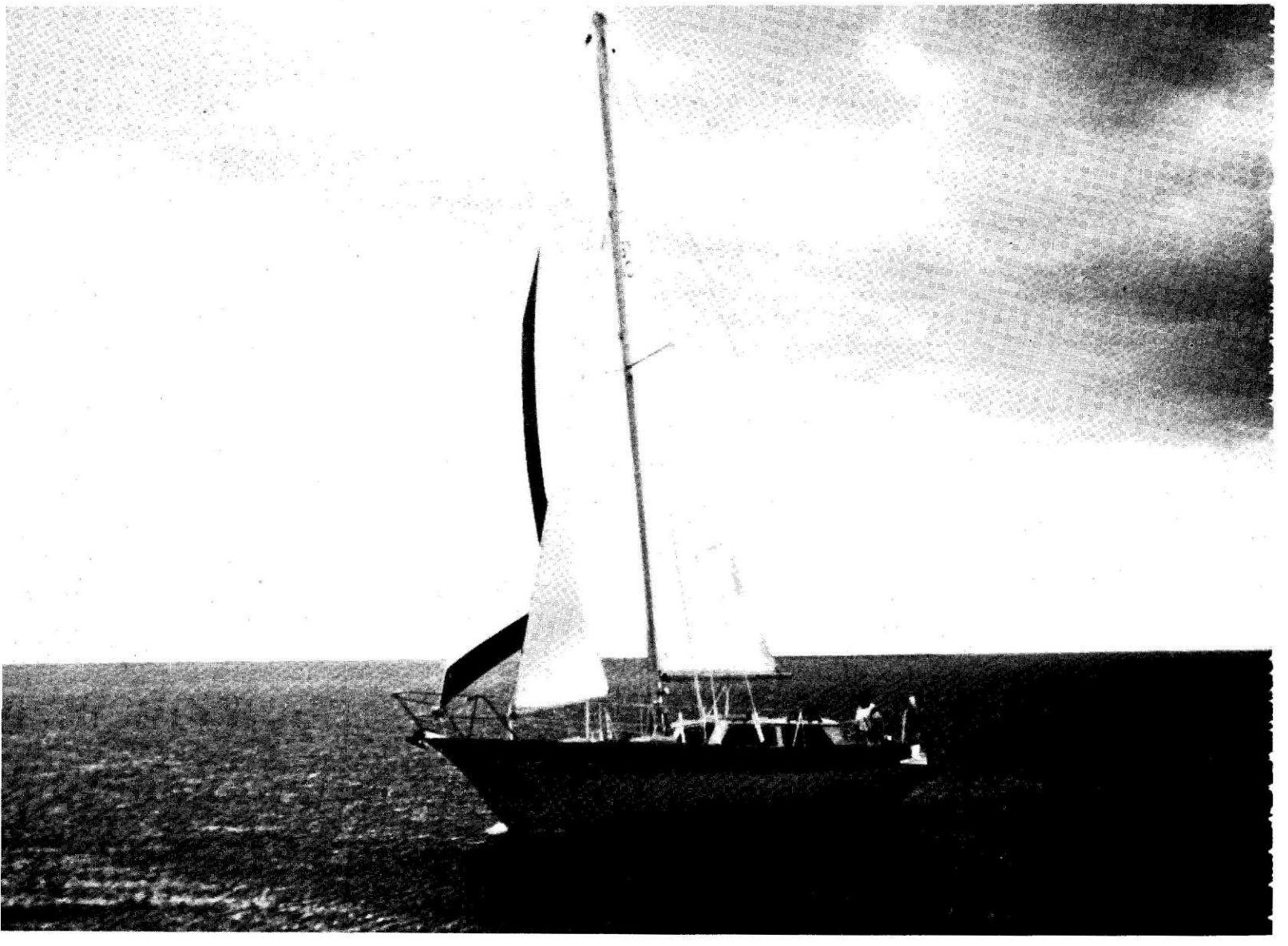
On Comparing prices, Affordability and the CSY Pricing Policy

LET'S get right to the nub of it — the CSY yachts are priced lower than other comparable yachts because there are no dealers. Dealers average up to a 20 per cent commission, so you save a real bundle right there. A high rate of production, saves. Direct commissioning at the factory saves. Direct delivery by water, saves.

You get the most for your dollar in a CSY yacht for all the reasons we have written about, but is a CSY yacht, or any yacht, affordable?

If you use a boat three or even ten weekends out of a year for a place to relax at dockside, or only in good weather to take her out for a couple of miles in protected waters, then you pay the yard bills, store her, pay her repairs, recommission her in the spring, etc. Well, fellah, you have to have a hell of a lot of extra cash coming in every year to make her affordable. Pardon us if we put in a plug, it's cheaper to charter and a heck of a lot more practical.

On the other hand, if you *are* a serious sailor, and you want the capability to really go to sea for weeks on end, *you* do consider you and your boat as an island unto itself, you *are* interested in cutting costs, you *do* want to be able to take care of everything yourself easily without being a marine engineer,



you *are* interested in having the capability of your boat being your home maybe now or eventually, then a CSY yacht is definitely for you.

Really fine boats with universal appeal, like really good homes, hold their value and, historically, they appreciate. Even if you change your mind, you can get your money back. The CSY yachts are the forerunners — designed with that idea in mind. They are an investment, not just for now, but for the future as well. Then they surely are affordable.

A yacht as a home? Think about it. Its initial cost is lower than a good home. Its upkeep alone makes it a good investment. You can do it all yourself for infinitely less than keeping a home. Utilities amount to pennies a day. *There are no taxes,* property or otherwise, as there are with your home. A lot of your food, superb food, is all around you in the sea. It can be your primary home or your sometime home. Either way, a good yacht is not only affordable, it is the cheapest and most pleasant living there is, and it can take you anywhere.

Now as to our philosophy regarding pricing.

When any manufacturer starts out to build a boat, he can only guess at his costs. The greater the time lapse between the beginning of the planning of a new model and the time the boat actually gets in the water, the greater the discrepancy between an educated guess and the actual costs. The passage of time alone means increased costs as costs inexorably increase.

Lloyd's has given CSY yachts an insurance rate lower than the market because of the quality of construction. In December 1978, Lloyd's sent in their surveyor. See his report in this chapter.

We have had to raise the price of our yachts not only to reflect increasing costs as they actually become known to us, but also to reflect the changes and improvements that we have made to the boat over the original specifications. Nevertheless, our price remains a lot more than merely competitive.

We are able to keep the price down on our yachts for two reasons. One — is that we don't have dealers — we sell direct to the customer. This means cutting the cost by 15-20 per cent right off the top. Two — we generally have a backlog of yachts we have to build for our sister charter company, Caribbean Sailing Yachts, Ltd., who will always be there as CSY Ltd's needs are always growing. This means we have extra sets of tooling — three production lines that can produce and are producing three boats a week. This translates into high efficiency and a drastic reduction in the cost of overhead per boat which we pass on to you as long as we can.

When we apply the usual formula to our costs that other manufacturers use to price a boat, and with a dealers commission, we do indeed come up with a price that is scary!

It is our aim to keep the boat priced as low as we can, however, this hinges on a continuation of a high rate of production.

All of our yachts come off the line as complete yachts. Additions and changes must be made *after* the boat comes out the factory door which we can arrange to have done for you or you can do yourself. One of the secrets in being able to give you as low a price as we do is that there is no customizing or changing or adding or subtracting of equipment while the boat is on our production line. Low cost to you requires standardization. Please don't ask us to change our policy — *we can't do it at any price.*

Now, having said what every other manufacturer has been telling you — ours is "the best value in the industry." How can you really tell? In other words, how does one go about comparing prices and values between similar boats by different manufacturers. It isn't easy — even for someone who knows. Understanding what a quality boat is helps and that is what this book is trying to do.

We are sure you have seen in the advertisements a boat you are interested in with the price quoted something like: "$30,000 — until?" It really looks like a bargain but when the thing is finally in the water, commissioned and equipped and ready to go, you have something like this: "$60.000 — how come?" This happens even today, though we like to think the manufacturers are now giving the public a little more credit for having some intelligence. For the most part, the days are gone when one came to find out that the "basic boat" was so basic that it was without an engine or a rig or winches. Better call it more like a do-it-yourself kit.

Nevertheless, to fairly evaluate two different boats, first you need a full set of specifications of what is "standard" — what is included in the "base" price being quoted. One manufacturer's base boat is another manufacturer's loaded boat. So it is with CSY. The only way you can compare boat prices is to add it all up or subtract, as the case may be, to find out whether you are in fact comparing apples with apples or apples with lemons.

In order to compare prices, you will have to be the one to do it. In order to assess the difference, we would like to help you.

To be fair, one really can't make reasonable comparisons by talking in generalities — each case has to be compared by itself. As we said before — all our cards are face up — we should like to help you.

We hasten to add we are not in the price game. Our competitors can beat us all hollow in building a boat to meet a price. We build our boat only one way — to meet our standards. We can't afford to do it any other way. We confess we don't know how to do it any other way. The whole purpose of this book is to help you understand what we mean when we say that. If we have achieved that — win or lose — we've had a fair shake. We can't ask for more than that.

The people in our sales department have an evaluation of just about any yacht that could be considered competitive with any CSY Yacht. These are priced so that we end up with an apples and apples comparison between our yacht and just about any other yacht you may be considering. We shall be glad to provide you with a copy upon request.

When it is all said and done, a quality yacht is a better investment.

A good investment maintains or appreciates in value.

A cheap product that deteriorates with use, is *not* a good investment. Conversely, a Rolls Royce is.

By the same token, a cheaply built sailboat is not a good investment because what you save in the beginning, you lose in the end. You lose in the excessive cost of maintenance while you own it and you lose in equity value when you sell it.

CHAPTER XVIII

Custom Boats, Kit Boats and Used Boats.

Custom Boats

IT wasn't too many years ago when a yacht of 35 feet was large — the largest production yacht. Most of the yachts built before 1970 were designed as racing machines and only incidently as cruising yachts. Thus, if a buyer was looking for the large ocean racing yacht or for an out-and-out cruising yacht of any size in order for him to get what he wanted required that he go to a marine architect to get his ideas on paper and then to a custom builder. To go this route multiplied the cost of a yacht by four or five times over the cost of a comparable production yacht - - if such were available at all. If he did have the dream, but not the money, he built it himself. For the few that made it, the literature is replete. We don't hear about those who didn't.

There are several yacht builders who build three or four to possibly twenty yachts per year, but they customize each yacht so that each yacht is built fairly closely to the custom specifications that the owner may specify within certain limitations that cannot be changed such as the hull and deck configurations. These yachts cost anywhere from two to three times what their production counterparts might cost depending on the prestige of the manufacturer and the extent of his overhead.

For those desiring a yacht of much over fifty feet, the custom route is for the most part his only option. However, in recent years, most manufacturers have yachts in just about any configuration one could ask for in the 40-45 foot range and several are featuring yachts in the 45-55 foot range. These yachts are so-called production yachts, but are nearer to custom yachts and their prices reflect it.

Some so called production yacht builders allow extensive customizing and an endless list of extras, these yachts are more expensive than they would be if a "standard" yacht with all the necessary extras were built on the production line -- every one the same. This does not preclude extensive customizing once the yacht is off the line. By this method, the manufacturer can produce the maximum boat for the least amount of money, particularly if the sale is direct from the factory to the buyer with no middle man's commission. At the same time by standardization the highest quality can be obtained. It is this latter course that CSY is taking in building its yachts.

Kit Boats

Many manufacturers who make completed yachts will deliver a yacht in various stages of construction which varies from a bare hull and deck to one which is finished enough to motor away or even sail away but unfinished below, but all the parts are available if you want them.

We are not competing with this kind of thing. However, this tome is setting forth to be a guide in buying a yacht and this is certainly one form of buying a yacht. A good reference, the best we know of, is "Bare Hull" by Ferenc Maté published by Westsail, which goes into great depth on how to build a proper yacht from a kit and it also points up a lot of the problems. It also comes from one of the best yacht builders in the business.

Among the reasons for going to a kit boat usually start with number one — and only number one — money. On the other extreme would be someone where money wasn't the object, but the buyer wanted a highly customized boat and either has a surfeit of money to hire someone else to do it, or a surfeit of time and plenty of know-how to be able to do it himself. His object is to get his particular boat built to *his* specifications — not to save money.

To begin to talk about money and what is saved possibly we need to know where the costs are that go into a boat. Since we know our costs we can only give you those as an example.

They are as follows:

Materials and Equipment	45%
Labor	19%
Manufacturing Overhead	9%
Selling and Administration	7%
Gross Profit	20%
	100%

This is based on a direct factory cost as we sell our boats. To get a dealer's cost, another 15-20 per cent would have to be added to the above, but for our discussion let us consider our figures as we show them. And if the boats were being built at the rate of one per week instead of two the overhead could almost double.

To the average person, the biggest surprise would be that labor is only 19 per cent of the cost of a boat. This is why today yachts can be built in the U.S. cheaper than in foreign lands where labor is cheaper but when freight is considered, they no longer can be competitive. It is also why the savings in building your own boat are not there as they used to be not too many years ago.

When one sees in the literature that someone has built a $60,000 boat for $25,000 this is because he hasn't figured the cost of his labor and probably a lot of other costs like tools, electricity, delivery to the building site to name just a few. Anyway, cardinal rule number one in building from a kit from scratch your time must be cheap, and you should have a lot of it. There are 168 hours in a week. If you work forty hours and take 76 hours to sleep and eat and bathe and dress, that leaves maybe 40 hours available each week considering ordinary delays and weather and working every spare minute outside of your job. Most people work at a full time regular job about 1,800 hours per year. There are over 1,600 hours of labor in a CSY 44. This is at a level of efficiency that only can be achieved on a production line where each man knows his job and every boat is the same. Therefore, even allowing for the labor the kit buyer buys in his kit, it would be safe to assume because of his natural inefficiencies some 1,600 to 2,000 hours would be required to finish the boat of the breed of the CSY 44. You can do your own arithmetic depending on your available time but it would be pretty safe to say that two years of labor would be a minimum for anyone to build this boat or one like it, using all his spare time.

The second cardinal rule is that one who is buying a kit and wants to save money had better have a wholesale source of marine supplies. Our cost of materials are bought at OEM prices which is 40 per cent off retail. Thus, the "retail" cost of our materials could more than wipe out the cost of labor savings by almost twice.

The third cardinal rule is that you should have an in-depth knowledge of how to put a yacht together or have such a person regularly available to you and for free.

A kit boat may be the path for getting more boat for less, but it is not an easy route to getting your yacht. It would be safe to say that the chances of your being successful in building the kit boat is in reverse proportion to the size of the yacht -- the bigger it is the tougher it is and the greater are the chances of your not finishing your "dream boat".

If you do decide after weighing all the pluses and minuses fairly and squarely that a kit boat is for you, buy it from the most reputable manufacturer you know of -- you know his product and you know his integrity. Too often those who sell kits have picked up an "old" mold someplace that no one wants. It is out-of-date and no matter whether you produce it today or not, it is old-fashioned and therefore worth less in the marketplace.

Used Boats

To try to equate depreciation of yachts with cars or airplanes or anything else is useless. Used boats have no wholesale value as do cars. The fact is that good yachts often appreciate in value as the years go by. The cost of yachts in recent years has risen faster than inflation primarily due to the sharp increase in the cost of fiberglass resin which is an oil derivative. When the Arabs raised their prices for oil in 1973, the cost of fiberglass resin multiplied by over three times going from 19 cents per pound to 60 cents per pound in a few short months. The cost of many of the other components rose dramatically at the same time. At any rate, the cost of new yachts has been rising at an average rate of 10 per cent annually which appears to be accelerating.

Your best bet for getting top dollar for your yacht is to sell it yourself directly. However, a broker's commission which is usually 10% may be a good investment for you. Whether you are selling or buying a used boat the first thing you have to know is what is its true market value.

There is a Used Boat Directory which is kept up-to-date with a new edition every three or four months which lists the latest prices for every boat made by every manufacturer from 1921 to date. This is the bible of the industry. You can obtain the latest copy by sending $29.95 to:

BUC International Corporation, 1881 N.E. 26th St., Suite 95
Fort Lauderdale, Fla. 33305 305-565-6715

They also print a new boat directory which is available at $5.95. To get all the books for the whole year is $55.85 p.p.

This book is extremely valuable to the prospective buyer or seller of a used boat. It covers everything in power or sail -- big or small. It discusses how to ready your boat for sale, and the price spread over the last few months. It allows you to adjust your price for your boat according to the area in which you wish to sell it. It gives you a yardstick for making your own appraisals. It discusses the factors entering into a successful sale. It gives you the tools to properly evaluate a trade-in price for your boat.

At CSY, we are not in the brokerage business, but we shall assist you in every way we can to get the top dollar for your used boat. At all times, we have the latest BUC Used Boat Directory and we shall be glad to help to establish a price for your boat. If you are seeking a broker to handle your sale, we can probably give you some help there also.

There is a recent book out called "Commonsense Sailboat Buying" which is written by Hewitt Schereth who is a full-time yacht broker with the McMichael Yacht brokerage office in Mamaroneck, N.Y. -- one of the best in the business. The book is available through the Dolphin Book Club or marine bookstores. It can be ordered through your local bookstore. The publisher is Henry Regnery of Chicago and the price is $9.95, 210 pages. We should recommend this book to help you in your boat buying whether it be new or used.

Cruising World magazine offers a very valuable service to the prospective boat buyer whether it be a new or used boat. They list the owners of yachts who have indicated a willingness to accept telephone calls from buyers who want to know what their experience has been with their boats and the people who built them.

Dealers Vs. No Dealers.

THE most obvious advantage in dealing direct with the factory is that you save the 15-20% and more in some cases that a dealer gets as his commission in selling you a boat, but there is a lot more to it than that.

Certainly in small boats where many units have to be sold the dealer is absolutely essential.

However, we have found that in large yachts such as we produce, and especially in a high quality product like ours, in almost every instance, the prospective owner wants to come to the plant. This happens even with customers of manufacturers' who have dealers.

We feel strongly that we have a story to tell and we don't want that story filtered through a third party — the dealer. Too many dealers don't know their product.

Boats that are delivered to dealers are usually delivered by truck and then are checked and commissioned by a dealer. Here again it is a rare dealer to whom we would entrust this all important task — probably the most important single step in the long process of building a yacht and delivering it to a customer. How a manufacturer can warranty a boat that someone else has commissioned is hard for us to conceive.

We have discussed in Chapter XIII our procedure for commissioning a yacht which is the most complete in the business. Only the factory personnel who know the boat best can carry out this procedure adequately.

A dealer may try to convince you that servicing your yacht's warranty is best done by the dealer because he is closer to you is another fallacy. We discussed warranty servicing in Chapter XIV. Any warranty work can be authorized by a toll free telephone call to the plant. The dealer only serves as a middle man which can actually interfere with the relationship between the customer and the manufacturer. It is the manufacturer, not the dealer, who determines what work is to be done under the warranty.

It is a rare dealer who will keep in stock a complete line of large and expensive boats such as CSY Yachts. Thus the customer too often buys a yacht from a set of plans. This should never be done. Rarer yet is the dealer who has the yachts in the water ready for a trial sail. Because of its location on the water the CSY Yacht Corporation always has a full representation of every boat in its line ready to sail right at our front door step.

There is no substitute for the customer coming to the plant to see how his yacht is put together from start to finish. We feel that anyone contemplating the sizeable investment required to buy a yacht like any of those that CSY makes owes it to himself not to trust any dealer, but should go and see for himself.

As conscientious as any dealer may be the ultimate servicing of any warranty claims is only as good as the manufacturer himself. Thus there is another important reason why a prospective buyer should meet the guys who will be building his boat to get a line on what kind of people they are. Part of this can be learned by personal contact. Part can be learned by contacting owners of the yachts you may be considering.

There is only one area where a dealer can help you where a manufacturer cannot and that is in giving you help in selling your old boat. However, there is much we can do even here. This is discussed in the previous chapter.

Add it all up and we believe you will find that not only do you save money by buying direct from the manufacturer but in every other way both before you buy your yacht and afterwards, you are better served to deal directly with the people who know your boat best — the guys who built it.

CSY

CSY Yacht Corporation

Leasebacks, Two for One, and Yacht Management

THERE are a number of ways to put your boat to work which not only will help you to pay for it, but also may give you some tax advantages. However, what it does best is to allow you to sail in the best sailing areas in the world for a relatively few bucks. We shall discuss these ways with their advantages and try to help you to avoid pitfalls.

Lease Backs

Caribbean Sailing Yachts, Ltd. was the originator of the idea of leasing yachts from private owners for its charter operations.

When we first started the chartering operation back in 1967 we had 14 boats which was later increased to sixteen in 1968. In that year our charter operations boomed and we saw the need for new boats. Banks were reluctant to lend money for such a purpose, as bareboating was then brand new and thought to be terribly risky.

At that time almost daily we received calls from owners of yachts who wanted us to take over their yachts for charter either on a straight lease or under management. Since the secret of an efficient charter operation is to have fleets of identical boats so as to be able to standardize on parts, maintenance procedures and marketing we couldn't take on a mixed bag of boats with different sails and different engines of various designs and operate with any semblance of efficiency. However, it did occur to us that if there were so many out there who wanted to put boats into service with us then why not have the boat we wanted designed and built to our specifications and build a number of them — sell them to individuals and then lease them back? Our thought was to pay a 10% return on the investment. In addition the owners would get a 10% per year depreciation deduction on their income tax which in effect would make our payments to them tax free. They would benefit from the investment credit plus they could have four weeks free use of their yacht at any of our marinas in the off season which was between May 1st and December 15th. That was the real kicker.

We proposed the idea to our mailing list at about the time of the N.Y. Boat Show in January 1969. At the time we didn't have a clear idea of what we wanted except the boat should be a midcockpit boat of about 40 feet — something which didn't exist on the market at the time. We stated that anyone that might be interested should send us a $1,000 deposit which would be returned if the details of the boat or its price or the lease was not satisfactory. We received 53 checks in two weeks. Obviously we had tapped a need. We were only planning to build 25 yachts. Alan Gurney designed the Carib 41 and we had the boats built. Thus began an idea which has been the prime reason why the chartering industry in the Caribbean has expanded from 21 boats in 1967 to probably close to 700 today.

In subsequent years we built and put into service fifty-four more boats. All of these leases, as of early 1979, will have run their seven year course. The CSY Yacht Corporation had built some 140 yachts by mid-1979 for CSY, Ltd. all of these boats are lease backs. As the originator of the idea, CSY, Ltd. has more experience with the lease back idea than any other company. Over the years it has served more people than all of its competitors combined.

We do not sell this idea as an investment although it has been a lot better investment than a lot of other things over the years. We are primarily interested in getting sailors — who are interested in sailing and using their boats in the time alotted to them. It is the most inexpensive way to enjoy the sport, and the least expensive way to buy a boat. Sailors make the happiest lessors.

To illustrate how the original lease-back owners of the Carib 41 made out. They paid $30,800 for their boat originally. We were then, as now, selling at direct factory prices so they started out with a best value. Over the seven year lease they received some $24,000 in lease payments. In addition they benefited by about $22,000 in depreciation thus at the end of the lease they had written their boats down to about $8,000. At the end of the lease we sold the boats for the owners at $30,000. Some kept their boats and sailed off into the sunset. Fifteen turned in their Carib 41's on a CSY 44 which allowed them to escape capital gains taxes, and build on their original investment.

Under the original arrangement, if an owner put up half the cost in cash and borrowed the other half, our lease payments paid off the loan in seven years.

Therefore, an owner over the years under the terms of the lease had a 10% return on his investment. If he was in the 50% bracket he saved another 5% in taxes and if he used his four weeks due him each year to go sailing he realized another 4 or 5% return, plus being able to deduct interest payments on the loan. He could also legally deduct some flight expenses to oversee his investment.

Under the leaseback plan CSY, Ltd. takes on *all* expenses to maintain it and replace equipment as needed and to pay the insurance as well.

The Carib 41's were not well-built boats. They were far less sophisticated than those we build today, yet they held their value. There certainly is no certainty about anything seven years hence, but past experience would indicate that

yachts like the CSY yachts will most certainly hold their value and will probably appreciate.

Presently the CSY, Ltd. offers a 7.5% return on the entire investment which includes the boat, all its extras and its delivery costs and duties, if any. We have also modified our plan somewhat in that we will write leases for less than 7 years. Check with your CSY Yacht Advisor for the latest details. Added to the vacation benefits and the 10% depreciation this could mean as high as a 15% return in real dollars depending on your tax bracket.

A lease-back arrangement like this guarantees a return regardless of whether or not the yacht is chartered. The disadvantage, as opposed to a yacht management contract which will be discussed later in this chapter, is that there is no way to make more than the lease calls for. Your use of the yacht is also limited to the off season. Although CSY, Ltd. does allow lease-back owners a 15% discount on in-season charters.

There is a heavy demand to get into the lease-back-plan. We have a waiting list of those who want to buy a boat and lease it back. CSY, Ltd. has to be careful not to take on any more yachts than it can reasonably charter and at the same time make a profit. Every year demand is increasing thus more boats will be going into service under the plan. Those who want to be on the waiting list can do so by posting a $1,000 deposit. We don't take any more of these deposits than we can reasonably predict the demand will be. The deposit merely reserves a building position when one opens up.

So far as use is concerned under the plan, CSY, Ltd. is unique in that it can offer the owner the use of his boat or an identical boat at any one of our marinas in Tortola, in the British Virgin Islands where most of the charter companies are located; in St. Vincent where you can sail south through the Grenadines or north to St. Lucia and Martinique; and in Roatan in the center of the Bay Islands off the coast of Honduras in Central America. No other firm can offer this. This would allow an owner to sail every year for seven years and rarely cover the same ground twice. Any owner under the plan can charter his boat for the 4 weeks that he is entitled to each year and collect the money himself and charge whatever he wants to. CSY, Ltd. will arrange the charter but reserves the right to review the qualifications of the charterer.

Because the boats are under charter it is in the best interests of CSY, Ltd. to keep these boats in top shape — a built-in-insurance that your boat will be well cared for. If the boat is lost, you are guaranteed under your contract to get all that you put into it back under the insurance policy that CSY, Ltd. carries on the owners behalf.

Needless to say the success of our plan has brought in a swarm of would-be investors. Some thirty-three bareboat charter firms are operating in the Caribbean, The Bahamas, in our Southern states and even Tonga in the South Pacific (and they use CSY yachts). Some are good, some are fly-by-nights. This has all been because of the lease-back plans. Thus there are things that a prospective buyer should be wary of. Some so-called charter firms are set up primarily to sell boats. It is an easy way to sell boats. Everyone except CSY is selling boats for lease-back at retail prices. It's a good way to make a fast buck. Some firms with absolutely nothing — no money — no marina — no personnel and no experience have put ads in the boating magazines and sold ten or twenty boats. There is only one guy who can get screwed in this and that is the owner. With these companies there is no guarantee they can make their lease payments and if they default where is the owner? He's left hanging with a boat 2,000 miles away and no recourse.

These people can do these things because owners have been successful under the plan with companies like CSY, Ltd.

Let's see how fast the numbers add up and why there are so many getting into the game. For a firm to sell twenty boats in the $100,000 range which is a common price these days at a 20% commission he collects $20,000 per boat which multiplied by 20 comes to $400,000. Not bad for a couple of ads in Yachting and someone to answer the telephone! You can see why dealers are hopping on the gravy train.

If someone gets hurt, it hurts everyone. We deplore the fast buck artist. So let us make some suggestions:

(1) **Know the outfit** you are proposing to do business with. How long have they been in business? What kind of a facility do they have. Charter with them to check both the facility and personnel.

(2) **Financial Statement and Credit:** Ask for a financial statement and the names of the company's banks.

(3) **References:** Ask for the names of *all* those who have or have had lease-back contracts with the company and check them out for yourself.

(4) **The Company's Reputation:** Examine the company's literature – are they competitive? How long have they been in business? Get names of charterers to see how they stack up in service compared to the competition.

(5) **Personnel and Facilities:** Does the Company have full time trained mechanics? Have their own hauling facilities or something nearby? Are there completed facilities for sail repair and engine overhauling? Do they maintain a complete set of parts?

These are just for openers. You should also be sure that there are no hidden costs. Everything that is on the boat and the complete specifications for the boat should be clearly listed and everything included in the price should be itemized. Some firms don't pay for delivery or they don't pay for insurance or duties are extra. Find it all out.

It is a sad thing to say, but many owners who have gone into the lease-back programs recently are going to get hurt. As we said before, if that happens, it hurts us and it hurts everyone. Look before you leap has got to be the watch word for anyone contemplating going into a lease-back program.

Two-For-One

We have had people approach us with the dilemma of whether to buy a yacht for their own use *or* one for lease-back. If the capital is available there is a lot to be said for buying two yachts one for your personal use and one for lease-back. For the guy who can use the tax write off and use

the vacation time to go sailing, we have already discussed the advantages of the lease-back program. One of the major problems with the lease-back is that at the end of the lease, the boat has been depreciated so that a sale results in a pretty hefty capital gains tax.

By buying two identical yachts at the same time and putting one out on lease you get all the benefits of the lease payments and tax benefits at the same time you have a twin of it for your own use in your home waters. It has the extra benefit that the real sailor can extend his sailing in May and November or even into December on his lease-back boat.

The big advantage however, is at the end of the lease instead of selling the lease-back boat he sells the boat he has been sailing up North and he can probably make a profit on it. He then keeps the lease-back boat thus he still has a boat and has no tax to pay.

As crazy as it may sound it makes good economic sense.

Yacht Management

The original charter boat firms obtained their yachts by taking boats under management.

In this arrangement the owner takes all the risk. Under this arrangement the owner buys the yacht that a firm may designate. He pays full price and in some cases a lot more since the prices are often loaded as is true also with some lease-backs. He pays to get the boat delivered. He pays to moor it or dock it. He pays the insurance. He pays for fuel, ice and a get ready charge. He pays for all the maintenance costs at often inflated prices, and there usually is nothing to stop the operator from charging whatever he wants to. In addition he pays the operator an annual fee of something around $2500. or more for the privilege of having the boat managed. Sometimes he is asked to pay some of the advertising costs and finally he pays a commission of 25-30% on each charter. He pays and pays and pays.

Of course, the big advantage that gets the customers in the paddock is that he can make unlimited income, which is great -- but what incentive does the operator have to charter the boat? He has made his big money on the commission when he sold the boat and he is making money every day the boat sits at his dock in dockage fees and in repairing and maintaining the boat. A careful examination of one of these management firms charter schedule will show he only charters for two weeks at a time - - he has no summer rates and his regular rates are higher than anyone elses for the same boat. What does that say to you? Why, of course, he doesn't want to charter the boat! He's doing fine without it.

There are good firms which have boats under management. Most are a polyglot fleet which equals a lower level of maintenance than is possible with a standardized fleet. Every precaution that we have listed under lease backs should be carefully exercised before you get into a management contract. We don't want to sound entirely negative there are some good honest firms who take yachts under management. Just be careful that you are dealing with one of them.

Remember -- under a management contract the operator can't lose. The only guy that can lose is you -- the owner.

Conclusion

There are other schemes being presented to the public. One is time-sharing. Here you buy a weeks usage of a boat at a set price. You may buy one week or two. Others buy a similar share of the same boat. For that price you get to use the boat for the designated week for a specified period of time for 5 or 10 years. Of course, the price you pay pays for the boat. Then the owners are to share in the maintenance cost of the boat. There is nothing that says what those costs are. We do not have experience with these programs so cannot comment. Probably the best evaluation of these programs is that they have had little success.

We should like to close by warning again that lease-backs or yacht management programs are only as good as the companies that offer them and the people behind them. This kind of thing is fertile ground for the charlatan and the quick buck artist. As Barnum once said "there's a sucker born every minute". Don't be one of them!

How to Decide What Boat To Buy

By Ed Hall — A CSY Yacht Advisor

IN a later chapter we have put together a Boat Buyer's Check list. This is to help you select the right boat. However, it presupposes that you know what *kind* of boat and what size boat you want. The Boat Buyer's Check list is more of a quantitative analysis of which boat to buy. This is more of a qualitative approach to which boats you should consider.

Unfortunately the same guy who is hard nosed and efficient in his business becomes an emotional dreamer when it comes to buying a boat. He buys a racing machine that he never races or he buys an around-the-world cruiser that never leaves the dock. He is an easy target for a glib salesman.

Here we are going to try to help you separate fact from fantasy. When you're planning to buy a yacht you're looking for the perfect yacht, the last one — the final answer to your sailing needs. If its your first one, you have little experience to rely on. If you're stepping up to a bigger and better boat you have more experience and are less likely to make the same mistakes you made in buying your current "clorox bottle."

The first consideration is to realistically assess how the boat is to be used. For example a light or medium displacement boat is not suitable for offshore cruising. A wiser choice would be a full keel heavy displacement design.

Next you need to determine whether you are looking for a racing machine, a club-racer/cruiser, a weekend cruising boat, a boat for extended cruising or something to semi-permanently tie to the dock to party on and show off to your friends.

An out and out racing machine will do nothing for you beyond the racing circuit. She is normally a light or an ultra-light boat designed to meet a racing rule. She is usually custom fitted with a lot of very complex and exotic hardware for the sole purpose of winning races. Take her away from racing and she is generally totally useless for cruising and lacking in the basic amenities for living aboard. Because she was built with only one purpose — to win races — there usually has to be severe compromises in the areas of safety, durability, liveability and maintenance. Generally a light boat will not rate as well as a "cruising boat" (see Chapter VII "What is a Cruising Yacht"?) and in a critical situation will certainly not be safe. Durability and low maintenance have been sacrificed. These are not the goals a racing yacht designer has in mind.

For racing another curious animal has evolved known as the Club racer/cruiser which is an attempt to combine the best of two, incompatible worlds. It is pretty obvious that by putting several thousand pounds of amenities into the shell of a racing machine you are going to end up with an overweight loser. In such a boat an even greater sacrifice is made in comfortable cruising which is just not compatible with underweight racing hulls. Nevertheless, for those confining their racing to the club and then cruising for relatively short periods, a club racer/cruiser may be an answer for you.

Another kind of yacht which makes no claim to be a cruising yacht, literally misses the boat when it is built too light. These are cruising boats which are built to meet a price.

A thoroughbred cruising boat is a boat designed exclusively for cruising and must be heavily built of a medium to heavy displacement with a full keel. She is a vessel with uncompromising emphasis given to sailing performance, comfortable accommodations, adequate tankage, low maintenance, durability and safety.

Finally, we have the last category of yachts — the semi-permanently moored party boat. There are more of this breed than you might think. More are power boats than sailboats since their house-boat kind of accommodations fit the bill better. It is possible that any of the foregoing type of yachts could fall into this category. However, this breed normally has several special features — ample ice storage, wet bar and generally an elegant interior not wholly suited to the marine environment. Enough said.

The dealer emphasis and the question many inexperienced buyers first ask is "How many can she sleep?" Few people — no matter what size the yacht — sail with more than four aboard for any extended period of time. Unless its a family it is usually less. More thought should be given to the amount of storage space — for everything — food, clothes, navigation equipment, books and the list goes on and on. The amount of fuel and water and of ice storage are very important considerations in choosing a yacht.

How much boat you can afford is a question that often can bring the buyer out of the clouds fast. You may, by a careful search for financing, be able to afford more boat than you think you can (see chapter XV). It may surprise you to know that the average boat owner keeps his boats for only four and one-half years For the most part they are buying up — to a bigger or better boat. If there is one cardinal rule, it has to be to buy the best quality boat that you can afford. These hold their value best thus preserving your investment when you are ready to buy your next one. Too often the relationship of boat length to dollar value is the criterion for selecting a boat. Many manufacturers will try to sell you on

buying the most length of boat for a dollar. You may actually be getting more value in a 37 footer than a 41 footer for the same price. Nobody has any magical formula, a boat that is too cheap has to have something left out. It must come from somewhere.

Another yardstick for you to make a judgment as to what boat you can buy is how big a boat you can handle. This has much to do with the simplicity of the rig. You and your expected crew need to determine what you feel comfortable with.

Of great importance is the matter of safety. Here the basic structural integrity of the top notch cruising boat will be at the top of the list. It is designed and built to take what the sea can dish up. Next will come the weekend cruising fair-weather boat and, of course, at the bottom is the semi-permanently floating palace which will seldom be subject to anything more than a passing wake.

When you are caught at sea in unexpected extreme conditions it's then that quality construction takes on a new meaning. The sea is not a forgiving element. There is only one logical route in selecting any yacht and that is to select the best one you can. Get to know what a good yacht is so that you can't be hood winked by a fast talking salesman. Above all try to get the names of yacht owner's boats built by any manufacturer you may be considering – ask the man who owns one – the answers can reveal a lot about the boat and about the attitude of the manufacturer towards his customers after the boat has been purchased.

Finally when you have gone through all the steps in selecting the yacht that is just for you there is another way to either confirm your choice or possibly change your mind. Before you buy it, charter it.

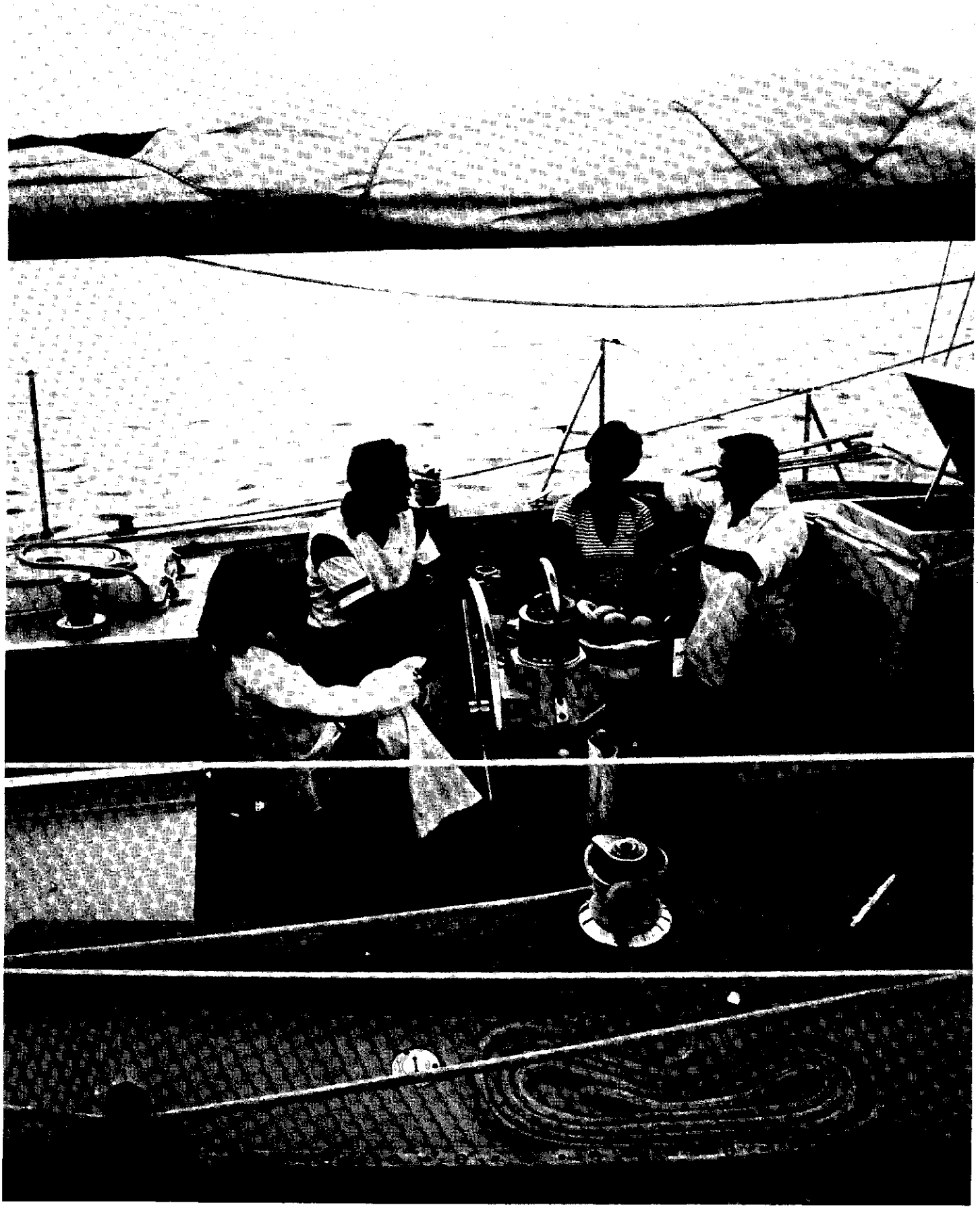
Of course, we are in the charter business too, and we should like you to charter a CSY, but we just aren't being prejudiced when we make this suggestion. A charterer hasn't made a commitment. He tends to be hypercritical. Every kind of cruising yacht worth its salt is up for charter in the Virgins-Gulfstar, Pearson, Morgan, Irwin, C&C, Endeavour, Tartan, you name it. It's out there somewhere. If you're an inquisitive sort, there is no better place than a gathering around a bar at Marina Cay or Bitter End or on the dock at Peter Island or Virgin Gorda to question charterers of the various boats as to what their opinion of them is. After you have lived on a boat for a few days the teak that covers up everything and those fancy finishes and fuzzy carpets that looked so great at the boat show fade into the background and what the boat is really all about comes to the fore. Is she convenient? Is she dry? Does she perform? Is she easy to handle? Is she comfortable? All that thought and care that the designer and the builder put into the boat comes into its own.

We should love to have you stack our CSY yachts against anyone else's whether you charter from us or not. Ask the other guy, don't be bashful. Did you ever ask a yachtsman about his boat. Stand back!

There are five CSY Yacht Advisors based at the CSY Yacht Corporation plant in Tampa. They are all experienced sailors whose job it is to keep up with the whole field of sailing. We have one man who is on retainer, whose job it is to visit other plants and survey all the boats available on the market. Thus our CSY Yacht Advisors have comparative figures on all the yachts which are competitive with CSY yachts. These are available to you on request.

CSY

CSY Yacht Corporation



CSY 44 Mid Cockpit Cutter

CHAPTER XXII

Survey of 62 Voyagers.

By Jimmy Cornell

Printed by permission of Motor Boating & Sailing Magazine March 1979.

Authors Comment: Here is a survey which tells it as it is, of sixty-two round-the-world cruisers. It appeared in the March 1979 issue of Motor Boating & Sailing and is reprinted by permission of the publishers. We think this should be valuable unbiased information for the serious cruising man. For the most part we find that our philosophy here at CSY is corroborated by the facts found here. A good many CSY yachts are being bought by people such as those described.

IF you dream of voyaging, this is must reading. A veteran cruising man asked 62 blue-water skippers passing through Fiji some hard questions on everything from engines to furling genoas. They're questions you would ask if you had the chance — and the answers may surprise you.

During the past four years, I've sailed through the major crossroads of the cruising world: Rhodes, Gibraltar, Antigua, Panama, Tahiti. And everywhere I was struck by the absence of the "ideal" blue-water cruising boats, the ones written about in magazines and praised at boat shows. Instead I saw production boats new and old, home-built boats large and small, with every kind of keel and rig known.

To find out if there is indeed an "ideal" boat, I decided to talk to dozens of cruising people, and the place I chose to do this was Suva, Fiji. Suva is one of the ports seldom missed by world cruisers. About 250 foreign yachts pass through each year, half of them during September and October, when the port acts as a filter for boats sailing west, rushing to leave the cyclone zone before the hurricane season starts.

I interviewed the owners of all the boats that passed through Suva in those two months. Each of 62 cruising skippers answered an extensive questionnaire, and their responses drew a picture of what a good offshore boat really is like.

To get an idea of the expertise I was drawing on, I limited my survey field to boats that had been sailing at least three months, or a minimum of 2,000 miles. In fact, I found that most of them had been sailing continuously for at least a year, and many for far longer (15 years in the case of the ketch *Coryphena*).

Together, my 62 boats had sailed on their present cruise a total of 930,000 miles. Three were completing their first circumnavigations (*Warna Carina, Ben Gunn* and *Sarrie*), and one her second (*Caravela of Exe*). The average length of the present cruise for each boat was 2.6 years or 15,000 miles, while the sailing experience of the skippers totaled an astonishing 856 years, a biblical age that averaged out to 13.8 years per skipper.

In every instance, I talked to the skipper myself, usually on board his boat and away from the bar and other ears. This, I believe, resulted in fair comments, as hardly any of the skippers tried to impress me with the sailing performance of his or her (yes, two were ladies) boat. In fact, several skippers asked me not to publish the ratings under their names, as they personally knew the designers of their boats.

Of the 36 questions I asked, 14 required rating some feature of the boat on a scale from 1 to 10, 10 being the highest grade. In this way, I was able to attempt a simple statistical analysis of the data acquired.

The experience of the skippers, the amount of miles sailed and the size of the sample adds weight to the various ratings obtained. In my attempt not to be biased, I did not include my own boat in the survey. After all, I feel quite strongly about a few things myself!

The hull and rig

The size of a cruising boat has been discussed too often only on a theoretical level, so I asked the 62 skippers to rate not only the design and sailing performance of their boat, but also the relationship between size of boat and size of crew. Children were counted as crew when living permanently aboard, but crews joining boats for a limited time only were excluded.

The happiest lot seemed to be people on board in the 35- to 40-foot range, with a ratio of crew per boat of 2.5. Skippers on boats in this range rated these boats an average of 9.27.

The 12 boats in the lower category (up to 35 feet) gave size an average rating of only 7.75, the average number of crew being two. Several skippers of boats over 45 feet complained about them being too large too handle, especially when they had only a crew of two. Some of the larger boats took on temporary crew for the longer passages, and at this time of year Suva was a good place to be an itinerant deckhand.

The shape of keel was another point rated by the skippers, but no real pattern emerged from the data gathered. As expected, the larger boats were happiest with a full keel, but even in the lower categories this type of keel was rated an average 9.

That often debated feature — center or aft cockpit — seemed to be dictated by the size of the boat. I found that the people who had an aft cabin and a center cockpit were very happy with this arrangement, especially with the privacy gained when they had a large crew. Otherwise, the positioning of the cockpit did not seem a major consideration, as long as the helmsman had some sort of protection.

RIG EVALUATION				
Type	Number	% of Total	Average LOD	Average Rating
Ketch with club-footed staysail	12 } 27	19.2%	42	8.38
without staysail	15 }	24.1	42	7.86
Sloop	19	31	33	8.58
Cutter	12	19.2	39	9.25
Schooner	3	5	67	7.33
Yawl	1	1.5	42	5

Six boats had a permanent doghouse and 65% had a canvas dodger that also protected the main companionway. All skippers agreed that this was an essential fixture on any cruising boat. Every skipper with a completely unprotected cockpit said that some kind of dodger was high on his list of priorities to add at the first opportunity.

Of the total number of boats surveyed, exactly half were one-masted, generally the smaller ones. Among the ketches, the 12 that had a club-footed staysail were rated higher by their owners (average rating 8.38) than the ketches without a staysail (7.86). Most owners of the latter type stated that they would have preferred a staysail arrangement.

As for the schooners, it was interesting to note that one with a small crew rated this rig at 2 (skipper: "I only chose it for its looks"), whereas a larger schooner, with a crew of eight, was rated 10. The third schooner was also rated high by the skipper who uses a square sail extensively when short-handed.

Overall, cutters had the highest rating and a number of sloop owners specified that they would have preferred a cutter to a sloop.

Among the 62 boats I surveyed, 33 (53%) were fiberglass. The average rating given was 9, the same as for ferrocement of which there were only four boats (6.5%). Steel and aluminum were rated high. Each of the five steel boats was rated 10, as was the only aluminum boat. As expected in the tropics, wood had the lowest rating: 15 wood boats (24% of total) had an average rating of 7.9. The four plywood boats rated even lower at 5.6. In the few instances where the hull was sheathed, either solid or ply, these boats attracted higher marks from their owners.

Power plants

Only two of the boats surveyed had no engine. Two (the smallest) had gasoline outboards, one had a gasoline inboard (rated 0) and the remaining 57 had diesel engines. Overall, the reliability of the diesel engines was shown by the average rating of 8.8.

More than half the boats were equipped with either Perkins/Westerbeke (32%) or Volvo (21%) engines. The 18 Perkins/Westerbeke (14 Perkins, 4 Westerbeke) received a high average rating of 9.53. Parts for these engines are relatively easy to find; the same parts are widely used for heavy plant or truck engines. The five Ford engines were also rated high at an average of 8.9.

Two boats were engineless by choice, although both skippers agreed that life would be easier with engines.

The question of adequate power is difficult to assess, although for cruising in the Pacific most skippers were of the opinion that a sufficiently powerful engine was essential. Many passes into lagoons have strong outflowing currents, being on the leeward side of the islands, and most of them are too narrow for tacking. Not a single skipper complained about having too much power, although several complaints came from those inadequately provided for.

I tried to find an answer to the question of adequate power by calculating the ratio between engine power and the length of boat in feet. As the power increased at a faster rate with size, I subdivided the boats into three categories: up to 40 feet, 40 to 50 feet, and over 50 feet. Over half the boats (32) fell into the first category (under 40 feet) and the average ratio of horsepower to length on decks was 0.8. The 17 boats in the middle category of 40 to 50 feet showed a ratio of 1.5, while the 8 boats over 50 feet had an average of 2.4 h.p. for each foot of length.

One of the questions concerned itself with fuel capacity, but as diesel oil is available in most places, the size of the fuel tanks depended on individual requirements. Most boats carried a minimum average of 50 U.S. gallons of fuel.

Exactly 50% of the boats had a generator of some kind; 12 boats had inboard diesel generators, 15 had portable gasoline generators and two boats were equipped with solar panels, which the skippers, regarded as satisfactory even if rather expensive to install. One boat had a generator attached to its freewheeling shaft, while another had a trailable hydrospinner. On the whole, boats under 40 feet seemed satisfied to charge their batteries from the main engine.

Sails

Working sails were not discussed, only special arrangements such as twin jibs for downwind sailing in the trades. Sixteen boats had twin jibs (or genoas) and every one of their skippers swore by them. Most twins were set flying or on the same stay with hanks alternating and a few boats had twin forestays. Two of the schooners use square sails, generally only in winds over 20 knots.

Twenty boats had spinnakers in their sail lockers, where they remained most of the time. Asked to rate the spinnakers as a cruising sail, out of twenty skippers only four came out in its favor, the average rating for "spinnaker as a cruising sail" being 4.2.

Only five boats were fitted with furling genoas and all their owners were satisfied with them, although they specified that they seldom reef their gennies by furling. As three of these boats also had a staysail, reefing did not seem to present a problem.

Ground tackle

The majority of boats (53) used all chain with their main anchor, only nine used chain and line. To qualify as "all chain," the boat had to have at least 100 feet of chain on board, although I found that most boats carried twice that amount or even more. As for the strength of chain, I found a single boat over 36 feet long (a trimaran) with 5/16" chain. On the whole, boats between 36 and 45 feet long used 3/8" chain, the larger boats went heavier still.

All boats had at least one spare anchor of sufficient

weight to be used as a main anchor in an emergency. Forty-nine boats (79%) used a plow as their main anchor, giving this type an average rating of 9.1. The 11 boats using a Danforth as their main anchor rated its holding power at 8.8, although I found that the Danforth anchors used were much heavier than recommended for the size of boat in question (two were over 200 pounds).

By working out the ratio between anchor weight in pounds and boat length in feet for each boat and then balancing out the results, I arrived at the average figure of 1.17 (i.e., 30-foot boat, 35-pound anchor).

Nearly half the boats (30), mostly the non-American ones, had no radio transmitter at all (VHF not included). Of the total, 23 boats (37%) had ham radio on board and their skippers gave them very high ratings (average 9.35) both for reliability and usefulness. On large tracts of the ocean, skippers complained that nobody seemed to listen to the emergency frequencies, whereas ham radio raises countless amateurs.

Navigation gear

The question "what do you regard as your most useful instrument besides the compass?" surprised me when I realized how many skippers forgot to mention their old loyal friend, the sextant. Only 70% gave the sextant as their most useful navigation instrument, the rest varied between log (16%), depth-sounder (8%), radar and Omega. This may mean that they prefer to sail by DR and thus have more use for these instruments rather than the sextant. The number of wreckings caused by erroneous DR unfortunately could bear out this assumption.

At least one skipper did not hesitate at all when he gave the bottle opener as his most useful instrument! Another question concerning the "least useful instrument" twice drew the unflinching answer "my wife" (the ladies in question being present on both occasions). Marital problems aside, RDF was not considered useful far offshore nor were wind-speed indicators and a host of other electronic instruments.

In astronavigation, the sight reduction tables no. 249 were the most popular, being used by 73% of the navigators, followed by no. 229 (16%) or their non-U.S. equivalents. Four skippers used electronic calculators in working out their sights, while, at the other extreme, two skippers swore by the cosine-haversine method.

Wind vanes and autopilots

Of the 62 boats, 42 (68%) had some kind of wind-vane and self-steering, 27 (44%) had autopilot and six boats had neither; 14 boats had both self-steering and autopilot, hence the percentage discrepancy. Of the total number of self-steering devices, 29 were commercially made and were rated higher (average rating 8) than the 13 home-built ones (rated 6.7). The self-built gears were rated higher when copied from proven models.

Generally, I found that the well tried and proven makes were given a higher rating by their owners. The most commonly used gear was the Aries, the seven skippers who own them giving this make an average rating of 9.86. Of the five trimarans three had self steering and their skippers were satisfied with their performance giving them an average rating of 8. Obviously, a good self-steering system is a high priority.

RATING THE HULL MATERIAL

Type	Number	% of Total	Average Rating
Fiberglass	33	53%	9
Wood	15	24	7.9
Steel	5	8.5	10
Plywood	4	6.5	5.6
Ferrocement	4	6.5	9
Aluminum	1	1.5	10

WHICH COOKING FUEL?

Type	% of Total	Average Rating
Propane/Butane	53%	9.35
Kerosene	39	7.95
Electricity (110-v)	6.5	9
Alcohol	1.5	6

The galley

Although the internal arrangement of the yachts did not come within the scope of this survey, I tried to find at least an answer to the often debated question of cooking fuel: 53% of the boats used gas (propane or butane), and the high average rating of 9.35 indicates that their users are happy with this fuel, although almost all specified that adequate measures of safety were essential. From what I was told no real problems were encountered in having the gas bottles filled in any of the main islands of the Pacific and Caribbean, or anywhere in Europe.

The 39% who used kerosene seemed less happy with this fuel and rated it at 7.95. Four of the boats used electricity (110v) in the galley and were equipped with powerful generators. Electricity as a cooking fuel received an average rating of 9, whereas the only user of alcohol rated it at 6.

Some 28 boats (45%) had refrigerators of some kind. Mechanical compressors were rated high at 9.4, the electric ones rated at 7.7, kerosene at 7.5 and gas at 6.3. In the case of freezers, the 17 boats (27% of total number) that had them rated those driven by mechanical compressors much higher (9.3) than those with electrical compressors (rated 6.3). On the whole, I found that a mechanical compressor attached to the main engine gave by far the best ratings and can supply both the freezer and the fridge. On average, the engine had to be run about 45 to 60 minutes a day, and this charged the batteries at the same time.

Dinghies

In the question of hard (wood or fiberglass) versus soft (inflatable) dinghies, I found the loyalties fairly evenly divided. I asked the skippers to rate their dinghy from the point of view of an "overall yacht tender." The 43 hard dinghies received an average rating of 8.6 as opposed to the 7.8 rating given to the 40 inflatable ones. The total number of dinghies shows that several boats had more than one. Most smaller boats had only an inflatable dinghy because of the problem of space.

I found that only 40 boats (65%) had an inflatable life raft on board, the remaining 22 claiming to have other arrangements in case of emergency. Actually, four of these

THE 62 BOATS SURVEYED

Name	Homeport	Designer/Design	Rig	Materials	LOA	Crew
Eryx II	Gibraltar	Camper & Nicholson	Sc	S	78	4
Constellation	San Diego, CA	Alden	Sc	W	76	8
Mandalay	Seattle, WA	CT 54	K/s	F	54	3
Spellbound II	Dartmouth, England	Alan Buchanen one-off	K/s	W	52	3
Merry Maiden	Boston, MA	Rhodes	K	W	52	4
La Bohème	San Francisco, CA	Force 50	K/s	F	51	4
Integrity	Lahaina, HI	Eldredge-McInnis	K	W	50	5
Mac's Opal	Koos Bay, OR	Samson Sea Breeze	K/s	C	49'9	2
Mortall	San Francisco, CA	Owner-designed trimaran	K	P	47	3
Enchantress	Honolulu, HI	Wellington 47	K/s	F	47	5
Galatea IV	Vancouver, BC	Charles Kendy	C	F	47	3
Sea Swan	New York, NY	Owner-designed	Sc	W	46'6	3
Antigone	San Francisco, CA	Piver 46	K	P	46	4
Con Tina	Los Angeles, CA	Cal 2-46	K	F	46	2
Jolly II Roger	Portland, OR	Cal 2-46	K	F	46	2
Whistler	Lyons, CO	Cal 2-46	K	F	46	2
Honeymead	Brisbane, Australia	Bruce Roberts Offshore 44	K/s	F	44	2
Norseman	Long Beach, CA	Block Island 42	C	W	42	2
Aminadab	Santa Barbara, CA	Westsail 42	C	F	42	2
Rhodora	Key West, FL	Robert Perry one-off	C	F	42	2
Caravela of Exe	Exeter, England	Alden Caravelle 42	Y	F	42	2
Sarrie	Auckland, N.Z.	CT 41	K	F	41	4
Kaunis Uni	Juno, AK	Piver AA	Sl	P	41	3
Hägar	Sydney, Australia	Adams	C	S	40	2
Fair Lady	San Francisco, CA	Laurent Giles	C	W	40	3
Tikitere	Auckland, N.Z.	Brian Donovan	K/s	C	40	2
Whale's Tale II	Lahaina, HI	Islander 41	K	F	40	4
Gitana del Mar	San Diego, CA	Garden Gulf 40	Sl	F	40	3
Camdella	Napier, N.Z.	Herreshoff	Sl	W	38	3
Riptide	Kimbe, Papua, N.G.	S&S 38	Sl	A	38	3
Akahi	Honolulu, HI	Cross 38	K	W	38	2
Taurewa	Nelson, N.Z.	Perry CT 37	C	F	37	2
Hero	Portsmouth, NH	Mariner Polaris 36	C	F	36	2
Spindrift	Melbourne, Australia	Jan Alemgeeste	C	S	36	4
Active Light	Pt. Townsend, WA	Atkin Tally-ho Major	C	F	36	2
Coryphena	San Diego, CA	Hanna Carol	K	W	36	2
Sea Foam	Newport Beach, CA	Angelman Seawitch	K/s	W	36	3
Sea Rover	Manele, HI	Angelman Seawitch	K/s	W	36	2
Super Roo II	Newport Beach, CA	Ericson 36	C	F	36	4
Swan	Portland, OR	Cascade 36	Sl	F	36	2
Warna Carina	Perth, Australia	Randall	K	C	36	5
Karak	Morlaix, France	Knocker Karak	K	S	35'6	2
Windrose	Vancouver, B.C.	Nicholson 35	Sl	F	35'6	2
Banjeeri	Newcastle, Australia	Randall	Sl	S	35	2
Lorbas	Köln, Germany	Kirk	Sl	F	35	2
Olive Marie	Oxnard, CA	Garden 35	K/s	F	35	2
Ranger	Victoria, B.C.	Garden 35	K/s	W	35	2
UFO 2	Arnhem, Holland	Telstar trimaran	Sl	F	35	2
No Name	Honolulu, HI	Robb 35	Sl	F	35	3
Hibiscus	Witianga, N.Z.	Woollacott Ladybird	K/s	W	34	2
Jocelyn	Newport Beach, CA	Lapworth	Sl	F	33'3	2
Kemana	Vancouver, B.C.	Brewer 32	Sl	F	32	2
Noa Noa	Miami, FL	Rhodes Dogstar	K	W	32	2
Horizon	Stowe, VT	Golden Hind	Sl	P	31'6	3
Lou IV	Elmshorn, Germany	Jensen	K	F	31	2
Runestaff	Whangarei, N.Z.	Herreshoff Compass	C	F	29'7	2
Ben Gunn	Wellington, N.Z.	Herreshoff 28	Sl	F	29	2
Pink Mola Mola	Tokyo, Japan	Nakayoshi 30	Sl	F	28'9	1
Alonda	Brisbane, Australia	Hartley Tasman	Sl	C	27'3	2
Sara III	Stockholm, Sweden	Grinde	Sl	F	27	2
Lookfar	Seattle, WA	Westerly Centaur	Sl	F	26	2
Jonathan	San Francisco, CA	Columbia 24	Sl	F	24	2

Rig:

K	Ketch
K/s	Staysail ketch
Sc	Schooner
Sl	Sloop
C	Cutter
Y	Yawl

Material:

S	Steel
F	Fiberglass
W	Wood
P	Plywood
C	Ferrocement
A	Aluminum

told me that they had no intention of abandoning the boat, ten plan to use their inflatable dinghy (seven keep them permanently inflated, three have them fitted with CO_2 bottles for rapid inflation), six intend to use their hard dinghies (three were fitted out with mast and sail) and two rely on Hawaiian paddling canoes lashed on deck. It was interesting to note that all European boats had a life raft.

The owners of the life rafts had been generous in allowing two raft places per crewmember. The overall ratio of 2:1 certainly makes sense when one considers the restricted space inside a life raft and the length of time one might have to spend there.

Incidentally, I was surprised to find that only 45 skippers (73% of total) kept a full system of watches on their boats. The remaining 17 boats (and not necessarily those with smaller crews) kept what they termed as "loose" watches, going to sleep in mid-ocean and keeping a minimum of watches at other times.

Regarding antifouling the average time since the last application worked out at 11 months per boat, although hardly any paint appeared to give satisfactory results after the initial six months. The majority of boats surveyed were only hauled out once a year, or even less often than that, the skippers stated that they preferred to use a hard vinyl paint that enabled them to scrub the bottom underwater as soon as the first slime or growth started forming.

Some conclusions

What then are the boats that people actually cruise in? There may not be a "perfect" cruising boat, but a certain consensus of opinion did emerge from these experienced cruising people. It has been said often that a short-handed crew should try and keep to a small boat, possibly under 35 feet long. This survey, however, showed that not a single boat in the 35 to 46-foot range with a crew of two was considered too difficult to handle, even in the worst conditions (and a lot of the crews were not all that young either). But, with only three exceptions, every owner of a boat under 34 feet complained about the size and wished for a larger boat.

Long-distance cruising boats usually spend more time at anchor than at sea and this is when more space was regarded as important. The carrying capacity of a larger boat was another consideration mentioned as stores, books and souvenirs always weigh more than designers allow for. Also, with a little more storage space available, stores can be bought where they are the cheapest.

The ease of handling sails explains why a cutter or a staysail ketch emerged as the most popular rigs. A twin jib arrangement, preferably on twin headstays, got high marks for long runs with the wind astern or on the quarter.

Adequate engine power is another point to be kept in mind when planning a long voyage. The average consensus was that one horsepower per foot of length was just about enough. The same rule-of-thumb also applies to the main anchor (one pound of anchor for each foot of boat length).

The basic instruments—compass, sextant, log—satisfied most navigators' requirements. Ham radio is rapidly becoming the yachtsman's best friend at sea, although, unfortunately, getting a license for a mobile unit isn't too easy. Several skippers felt that one should be allowed to carry a ham set aboard provided it is only used in emergencies and that a basic license should be acceptable in such a case.

On the subject of emergencies I found that many were willing to trust in a maneuverable dinghy as a "life raft." A sailing dinghy with sufficient buoyancy to make it unsinkable was seen as a means of getting somewhere if the boat has to be abandoned.

There may not be a "perfect" cruising boat as people's individual requirements differ. But this survey confirmed my belief that it is the determination to go that matters most, and people often set off in whatever boat they happen to own. The motley collection of boats one sees in the major cruising centers such as Suva may not all be the ideal cruising boats but they certainly got there.

CHAPTER XXIII

Boat Buyers Checklist

AS a prospective buyer of a sailing yacht you may find going to a Boat Show, such as the Sailboat Show, a very confusing exeperience. It needn't be if you inject some system into your quest.

The first step is to determine at the start what size boat you are looking for — one that fits both your ability to handle it and your ability to pay for it. By doing some careful shopping for financing you may find that you can buy a lot more boat than you thought you could.

In our questionnaire the first seven questions need to be answered to narrow your search. If you sail in the Chesapeake or Tampa Bay, one of the limiting factors has to be draft. If you sail in the Florida Keys, mast height becomes a major factor. Whether you and your wife like the looks of the boat is important. You will be living with the boat a long time, and an ugly critter gets to you sooner or later.

So, once you have sorted out from the hundreds of boats on the market those boats that can be tested affirmatively to the first seven questions under the General-Design Section of our questionnaire you will probably find only a handful left which you can concentrate on and to analyze thoroughly.

It must be remembered that for the most part, any boat that a manufacturer brings to a Boat Show is likely to be the best of his product. It is not unknown that a "Boat Show" model is taken aside for considerable extra attention to finishes and detail. Everything is done in the way of decoration and knick-knacks to make the boat look attractive. Sometimes those fuzzy carpets and that overdone teak is hiding things you should know about. Too often the knick-knacks and gadgets that look so well in a Boat Show were never intended to go to sea.

To help you to really see a boat for what it is you need an organized and thorough check list. We have attempted here to prepare such a list. Extra copies are available free from the CSY Yacht Corporation. The questions are designed so that the recommended answer to each question is yes. There will be few boats that will have every question answered in the affirmative. However, it will serve as a scorecard for you to more fairly evaluate one boat against another that you may be considering. Another very rough rule of thumb in judging two boats of similar construction is to calculate it's cost per pound. Multiply the lead ballast weight by 40¢ per pound and subtract from the cost of the yacht. Divide the remaining weight into the remaining cost to get cost per pound.

Besides a very observant eye, the other tools which might help you are a magnet to test hardware for iron content and a tape measure to check berth lengths, head room and locker sizes, etc.

This check list is particularly designed for the in-the-water Boat Shows, thus nothing is said about the underbody. So far as how the boat functions under sail or power will have to be determined by making an appointment with the dealer or the manufacturer for a trial — and don't ever buy a boat without a thorough sea trial. If this check list leads to any doubts, insist on a survey before you buy, and make any deposit returnable if the survey is not satisfactory.

A check list such as this can't cover everything so at the end of each section a space has been left for your special remarks or notations.

Boat Buyer's Check List

Boat: Model:
Manufacturer: Salesman's Name:

LOA	Displacement	Water
LWL	Ballast	Fuel
Beam	Sail Area	Base Price
Draft	Mastheight (WL)	Cost Per Pound

General Design Considerations

	Yes	No
1. Is the boat available in a draft sufficiently shallow so that you can operate in the waters where you plan to do your sailing?	☐	☐
2. If the height of the mast is a factor in your sailing area for bridge clearance, is the mast height of the boat suitable?	☐	☐
3. Is the head room in the boat high enough for you?	☐	☐
4. Is the size of the boat within the limits that you and your wife and/or crew can handle easily?	☐	☐
5. Is there adequate fuel and water tankage for the cruising range that you may contemplate now or in the future?	☐	☐
6. Do you and your wife find the looks of the boat to be pleasing to your eye?	☐	☐

On Deck:

	Yes	No
1. Is the non-skid surface effective?	☐	☐
2. Are there bulwarks or a sufficiently high toe rail to prevent slipping off the deck?	☐	☐
3. Are the stanchions and everything else attached to the deck thrubolted and thoroughly set in bedding compound with a back-up plate?	☐	☐
4. Is there a rugged anchor sprit with a non-corrosive anchor roller for storing anchor?	☐	☐
5. Is there a hawse pipe for the anchor rode and and is it large enough to take the chain *and* thimble?	☐	☐
6. Is the anchor locker big enough to store a second anchor rode with a divider and another hawse pipe?	☐	☐
7. Are the dams around the hatches high enough off the deck to prevent easy entrance of deck water to the cabin below?	☐	☐
8. Are the hatch hinges heavy enough and of non-corrosive metal and thrubolted to the deck (not screws)?	☐	☐
9. Is the gasket material under the hatches heavy enough to make a thorough seal?	☐	☐
10. Are the hatch adjusters and the dogging devices to hold the hatch down adequate.	☐	☐
11. Are the hatches heavy enough to stay closed down under most conditions without being dogged down?	☐	☐
12. Are the winches adequate for the size of the boat and the strength of your crew?	☐	☐
13. When you walk on the deck or jump on it, is it solid feeling?	☐	☐
14. Does the cockpit have sufficiently high coamings around it to make comfortable back rests (18″ is ideal)?	☐	☐
15. When sitting in the helmsman's seat is there sufficient visibility over the bow?	☐	☐
16. Are the cockpit seats long enough to sleep on (6′6″)?	☐	☐
17. Is there adequate clearance of the boom over cockpit so an awning or Bimini top can be installed to be able to stand under it?	☐	☐

	Yes	No
18. Is the construction of the cockpit seats heavy enough?	☐	☐
19. Are the hinges on the cockpit seat hatch—non-corrosive—heavy enough and thrubolted (not screwed?	☐	☐
20. Do the cockpit seats have molded in drains around them so the water drains onto the cockpit sole rather than into the sail lockers?	☐	☐
21. Is there provision for locking the cockpit seats?	☐	☐
22. Are there large and and adequate number of scuppers in the cockpit sole to drain it rapidly in case it should be filled up by a sea?	☐	☐
23. Are there adequate dams or coamings in the deck design to shunt away deck water from getting into the cockpit?	☐	☐
24. Are there sufficiently high dams on which the sliding companionway hatch is mounted to prevent excessive water leakage?	☐	☐
25. Is there a boot for the companionway sliding hatch?	☐	☐
26. Are there provisions to close off the companionway with duckboards or a solid piece of wood to keep water from coming through the companionway in a seaway?	☐	☐
27. Are the sail lockers in the cockpit adequate to store all the necessary equipment — fenders, dock lines, extra anchors, pails, extra sails, charcoal grill, deck mops, etc.?	☐	☐
28. Are there double life lines and bow and stern pulpits with double rails?	☐	☐
29. Are there hand rails all along the top and both sides of the cabin house?	☐	☐
30. Is the deck woodwork carefully fitted?	☐	☐
31. Are the ports of a non-corrosive metal (stainless steel or bronze)?	☐	☐
32. If the ports are opening ports, are they self-draining (they should not catch water which drains into the cabin when opened)?	☐	☐
33. If propane gas is used in the galley, is the locker for the gas tanks sealed and vented overboard so if there is a gas leak, it can't get into the boat?	☐	☐
34. Is Genoa track thrubolted to the toe rail or deck?	☐	☐

Engine:

	Yes	No
1. Can it be easily removed?	☐	☐
2. Is it a diesel and does it have adequate power for the size of the boat?	☐	☐
3. Is it an engine that you can readily get parts for?	☐	☐
4. Is there easy access to all sides of the engine for maintenance?	☐	☐
5. Is the engine bed heavy enough and glassed over to prevent rot?	☐	☐
6. Are both the fuel and crankcase oil filtered?	☐	☐
7. Can the engine oil be changed easily and conveniently without messing up the boat?	☐	☐
8. Is the muffler of a non-corrosive long lasting material	☐	☐

Electrical:

1. Is tinned copper wiring used throughout?	☐	☐
2. Is an electrical diagram available for the boat?	☐	☐
3. Are there two banks of batteries and a battery switch?	☐	☐
4. Are the batteries of a heavy duty marine type?	☐	☐
5. Does the electrical panel have circuit breakers instead of fuses?	☐	☐
6. Are there extra circuits available on the electrical panel for future electrical additions?	☐	☐
7. Is the wiring color coded?	☐	☐
8. Is the wiring accessible at all points (not embedded in glass or behind pressure laminate or in the bilge)?	☐	☐

9. Would you judge the quality of the light fixtures as rugged and being able to withstand the marine environment? ☐ ☐
10. Can you get at the back of the electrical panel? ☐ ☐
11. Are the wires in the mast dampened so that they will not rattle? ☐ ☐
12. If there is 110V service is there a separate electrical panel for it and a battery charger? ☐ ☐

Rigging:

	Yes	No
1. Is the mast made of one extrusion?	☐	☐
Is it heavy enough?	☐	☐
2. Are the tangs and the mast and the chain plate tangs angled at each other?	☐	☐
3. Are the tangs, goose neck and outhaul fittings on the spars of stainless steel?	☐	☐
4. Is the rigging heavy enough?	☐	☐
5. Are the terminals sealed?	☐	☐

Topsides:

1. Is there a rub rail? ☐ ☐
2. Is the rub rail molded as an integral part of the hull (as opposed to being of wood and bolted or screwed on?) ☐ ☐
3. When sighting along the hull is the glass work shiny and the reflections even with no hard spots or no print through (the pattern of the roving showing through)? ☐ ☐
4. If you put pressure on the hull at any point, the hull is absolutely rigid with no flexing? ☐ ☐

Interior:

1. Is there enough privacy for the use you are going to put the boat to and the number of guests you expect to have? ☐ ☐
2. Is the companionway ladder easy to negotiate? ☐ ☐
Is it wide, of gradual rise and broadsteps? ☐ ☐
3. Is there enough hanging locker space (an ideal is 12″ or 18″ per person)? ☐ ☐
4. Are there enough drawers (at least two per person)? ☐ ☐
5. Is the general layout what you are looking for (every layout has its reason for being and if you find one that doesn't seem to suit you – try to get the purpose for that layout from the salesman – you may be missing something)? ☐ ☐
6. Does each area of the boat have its own hatch and enough opening ports for proper ventilation? ☐ ☐
7. Is there enough light coming into the boat – particularly in the forward cabin? ☐ ☐
8. Are there 5″ or 6″ cushions on the bunks? ☐ ☐
9. As you pass through the boat either to port or starboard are there always hand holds within easy reach? ☐ ☐
10. Are the coverings on the bunks stain resistant as well as comfortable? ☐ ☐
11. Are the drawers made of water resistant material that won't change dimension under humid or wet condition? ☐ ☐
12. Do the drawers have a catch or some other means of preventing the drawer from falling out in a heeling boat? ☐ ☐
13. Is all the interior hardware rust proof and non-corrosive (test with a magnet)? ☐ ☐
14. Are the plywoods used in the boat of marine grade? ☐ ☐
15. Do the doors (passage doors, hanging locker doors – storage locker doors) fit evenly without sticking allowing sufficient room for swelling? ☐ ☐
16. Are the ends of the doors sealed? ☐ ☐
17. Is the stock for the doors heavy enough? ☐ ☐
18. Is the woodwork and joinerwork of high quality? ☐ ☐
19. Is the woodwork sealed or finished in some way? ☐ ☐
20. Is the headliner of durable material? ☐ ☐
21. Can the headliner be adapted to or be able to be removed to bolt on future deck fixtures? ☐ ☐
22. When the side of the house is pounded – is it solid? ☐ ☐
23. Can the ports and hatches be thoroughly dogged down to be water tight? ☐ ☐
24. Are the gaskets on the ports and hatches heavy, of durable material and easily replaced? ☐ ☐
25. Are the insides of the storage lockers properly finished to be able to be cleaned easily? ☐ ☐
26. Is the cabin sole of a suitably rugged material and finish (if there are rugs on the cabin sole – lift up to see if something is being hidden)? ☐ ☐

Galley:

	Yes	No
1. Is the stove gimballed?	☐	☐
2. Is the stove made of non-corrosive and non-rusting materials (this includes all interior parts)?	☐	☐
3. Are there deep double stainless steel sinks?	☐	☐
4. If there is a pressure water system is there or can there be installed an auxiliary hand pump?	☐	☐
5. Is there an adequate place to store garbage?	☐	☐
6. Are there adequate drawers for silverware and cooking utensils, and all the other stuff needed in a galley – towels, foil, plastic wrap, linen, etc.?	☐	☐
7. Is there adequate storage for pots and pans for the number you expect to be cooking for?	☐	☐
8. Are there adequate dish lockers?	☐	☐
9. Is there adequate dry storage in the galley or elsewhere for the longest cruises you might anticipate?	☐	☐
10. Is the ice box properly insulated (feel the inside of the box and the outside – you should have 4″ to 5″ of insulation)?	☐	☐
11. Is the ice box or refrigerator top opening rather than opening from the side?	☐	☐

12. Does the ice box top have a definite seal when in place and is it fully insulated? ☐ ☐
13. Does the ice box drain into the bilge and does it have a check valve or water trap to prevent loss of coldness? ☐ ☐
14. Is the ice box of sufficient capacity for your needs? ☐ ☐
15. If you add refrigeration and freezing units, is there room for them? ☐ ☐
16. Are there shelves and baskets in the ice box to maximize storage? ☐ ☐

Main Salon:

	Yes	No
1. Is there adequate light and ventilation?	☐	☐
2. Are the accommodations adequate for your purposes?	☐	☐
3. Is there adequate storage for charts, navigation books and tools and radio telephone and other electronics that you would contemplate?	☐	☐
4. Is there an adequate area for navigation?	☐	☐
5. Is the artificial lighting well placed?	☐	☐
6. Is the dining table rugged and well anchored to the cabin sole?	☐	☐
7. Is there enough seating for the maximum number expected to dine?	☐	☐
8. Is there an adequate tool drawer?	☐	☐
9. If there are pull out berths — are they properly engineered? Do they in fact pull out and are they adequately supported?	☐	☐
10. Is there adequate general storage?	☐	☐
11. If the mast is stepped on deck is there adequate support below?	☐	☐

Head(s):

1. Is it at least three feet wide?	☐	☐
2. If there is a shower, is there room to place a curtain?	☐	☐
3. Will the head meet government requirements?	☐	☐
4. Is there space to store dirty laundry?	☐	☐
5. Is there a drawer or two for toiletries?	☐	☐
6. Are there towel racks (to double as a handhold); hooks to hang clothes; toilet rolls protected from shower water; soap, glass and toothbrush holders?	☐	☐
7. Is there adequate light and ventilation?	☐	☐

Below the Cabin Sole and Outboard:

	Yes	No
1. Is there adequate space below the cabin sole and sufficient sump capacity to keep water out of the cabins when at a severe angle of heel?	☐	☐
2. If the mast is stepped below the cabin sole are there drainage holes around the mast step?	☐	☐
3. Are the metals of the mast step and the mast electrolytically compatible?	☐	☐
4. Is the mast step heavy enough and securely enough fastened to the ballast area?	☐	☐
5. Are there access hatches around the mast?	☐	☐
6. Is every seacock or pump, or sump or whatever else is below the cabin sole easily accessible with a hatch?	☐	☐
7. Can you reach outboard areas under the sole to clean them?	☐	☐
8. Are there all bronze seacocks on all the through hulls instead of gate valves?	☐	☐
9. Is all the wood below the cabin sole treated or glassed to prevent rotting?	☐	☐
10. Are the bulkheads glass taped to the hull on both sides with a cushion of foam between the bulkhead and the hull?	☐	☐
11. Are the chain plates sufficiently heavy?	☐	☐
12. Are you satisfied that the attachments of the chain plates to the hull are heavy enough and will withstand both the torsion and stress of the magnitude that can be expected in a boat of this size?	☐	☐
13. Is the hull-to-deck joint thrubolted with stainless steel bolts (not screws)?	☐	☐
14. Is the overlap where the hull and the deck meet at least two inches?	☐	☐
15. Is the thickness of the hull and of the deck where they join at least 1/4" each (combined 1/2")?	☐	☐
16. Are there both an electric and a hand bilge pump?	☐	☐
17. Is the intake hose into the bilge pump protected with a screen?	☐	☐
18. Are there adequate limber holes in bulkheads for the drainage of water into the bilge?	☐	☐

Notes: _____

We Invite You to Come and See Us.

Our large and efficient 65,000 square foot plant is located on over eight acres, with 700 feet of waterfront on navigable waters in Tampa Bay right at our front door. All of our yachts are fully commissioned and thoroughly tested by our trained personnel, in the water, right at our plant.

We invite you to come and visit our factory at any time to see how a really fine yacht is put together.

Just call our sales department for an appointment at 1-800-237-2565 toll free.

Or if in Florida or Canada call collect at (813) 839-5357. 5250 West Tyson Ave. / Tampa, Florida 33611.

Film:

See our color-sound movie which takes you step-by-step through the fascinating process of building a CSY Yacht. It is available to your group or club. Call to reserve your date.

Plant Tours:

Hour-long conducted tours every day Monday through Friday or by appointment.

In-The-Water Boat Show: 365 days a year

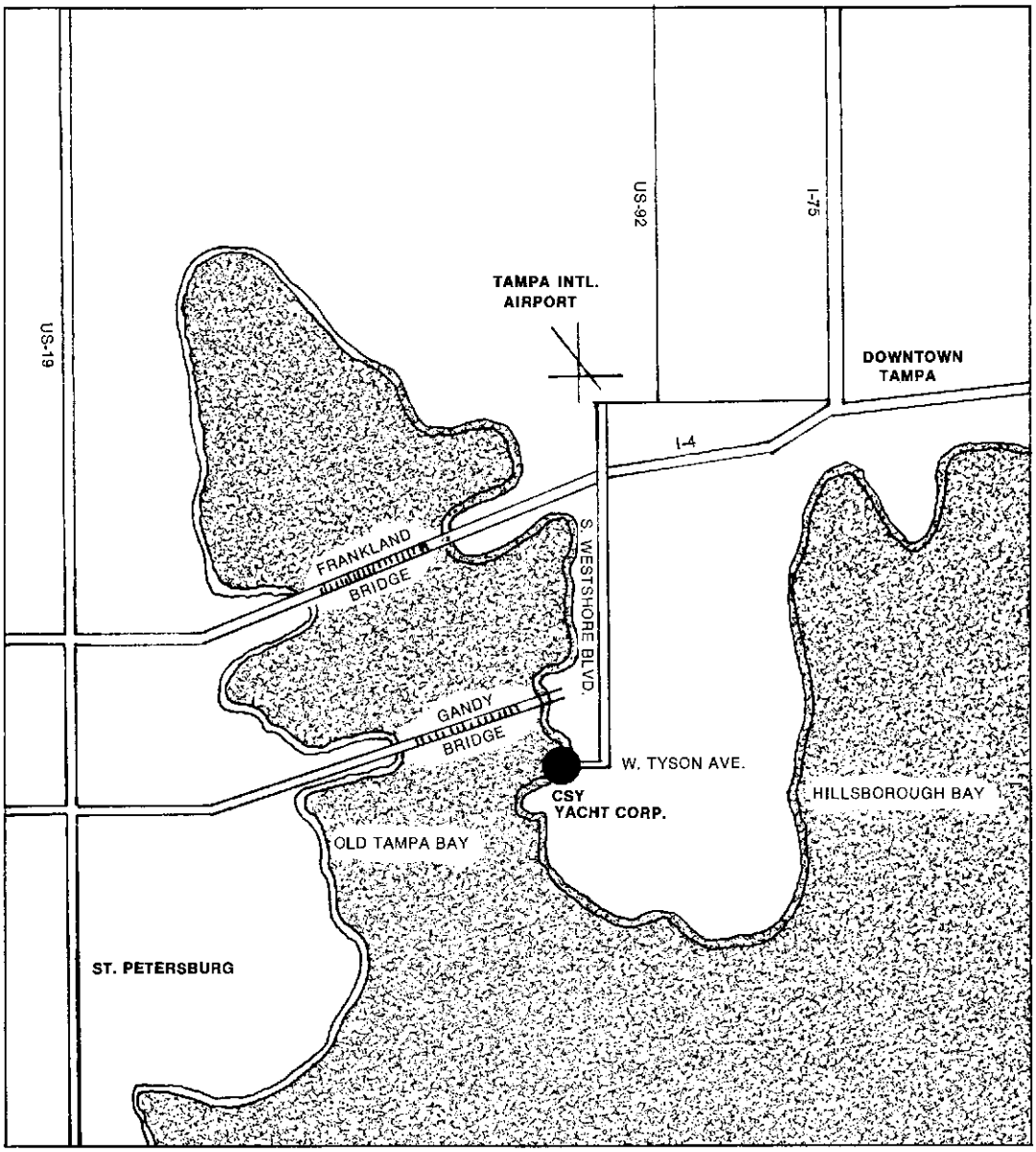
Each one of our CSY Yachts is in the water for you to inspect right at our plant. Fully found and ready to go.

Trial Sail:

You can come aboard for a trial sail on any of our CSY Yachts from our plant dock. By appointment only, please.

CSY

CSY Yacht Corporation


US-19
US-92
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TAMPA INTL.
AIRPORT
DOWNTOWN
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I-4
FRANKLAND
BRIDGE
S. WESTSHORE BLVD.
GANDY
BRIDGE
W. TYSON AVE.
CSY
YACHT CORP.
HILLSBOROUGH BAY
OLD TAMPA BAY
ST. PETERSBURG

CSY

CSY YACHT CORP., 5250 West Tyson Ave., Tampa, Florida 33611