

INTERIOR DESIGN

Developing the interior of a cruising yacht is one of the most interesting aspects of the entire cruising-design process. Here the designer and owner can really get into the creative process, juggling an enormous mix of characteristics and coming out with the ultimate compromise. This is also an area where you can easily, with modest investment in time and/or cash, customize an existing yacht into something that better fits your perceived needs.

Of course, as with most of the topics covered in this book, there are trade-offs to be made. And it's essential to carefully evaluate how the interior is likely to be put to use. With a bit of effort, almost any interior can be made to suit your needs.

There's a wide variety of existing designs with which most of you will be working. Hence, we've tried to keep the following comments general in nature. The basics of good interior design apply to modern and classic yachts, both large and small.

DEFINING NEEDS

Two areas need to be defined. One is how many people will ordinarily be using the interior. If you frequently sail with one or two other couples, a fixed number of bunks are required, with the leftover space going to daily living needs. But if you sail primarily as a couple, perhaps with children aboard and a family member or friend visiting now and then, it makes more sense to devote most of the space to daily use. An example of this would be the saloon table. Why take the space for a table that comfortably seats eight when two people use it 98 percent of the time? Better to work out a system for the two of you, allowing space for one other couple at the table. When guests are aboard, serve buffet-style and let people eat on their laps. Obviously, the same holds true for sleeping accommodations, heads, and storage space.

The second area to define is anticipated offshore work (if any). Although most long-term cruisers spend less than eight percent of their time at sea, this time has a big impact on how the interior is best laid out. On the other hand, if it's mainly weekendening and coastal work you'll be doing, then taking some of the offshore trade-offs doesn't make a lot of sense.

Space

Visual spaciousness is more a function of design than physical interior volume. We'll cover this in much greater detail in a little while, but for now, here are a few basics.

The more open the interior is — i.e., the fewer bulkheads — the larger it will appear to be. Light colors on vertical surfaces further open the space. This also holds true for joinerwork — the darker it is, the more it closes in on you. Furniture above the countertop level reduces visual space very quickly. If high lockers are required for adequate storage, try to keep them light in color.

Light is important, too. This applies to deck hatches, hull or cabin windows, and night lighting. The more light you have, the bigger your interior will seem.

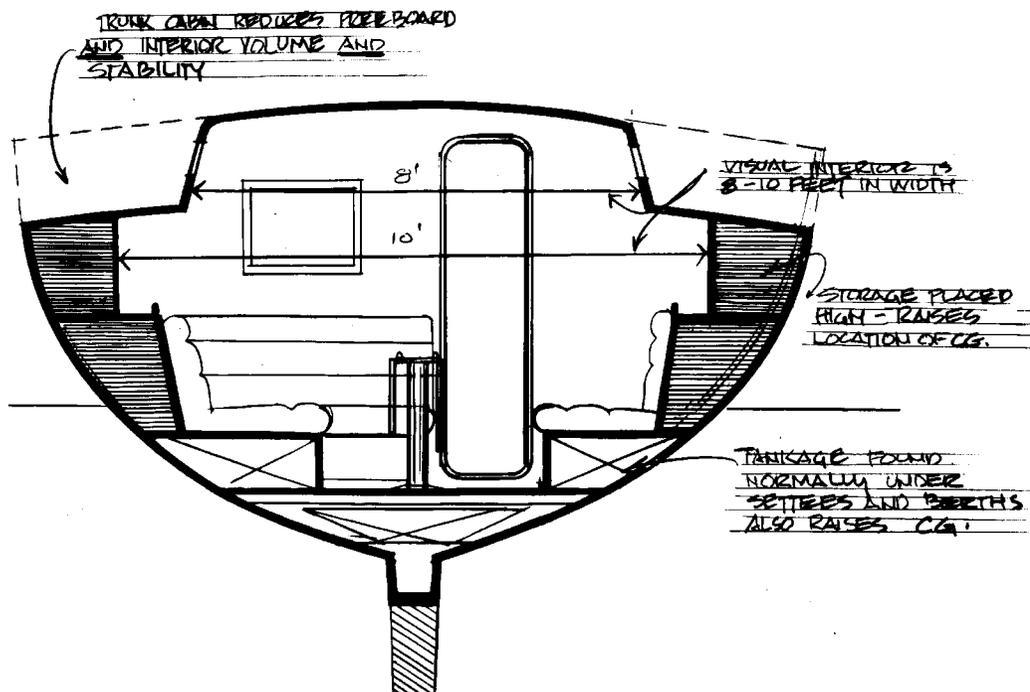
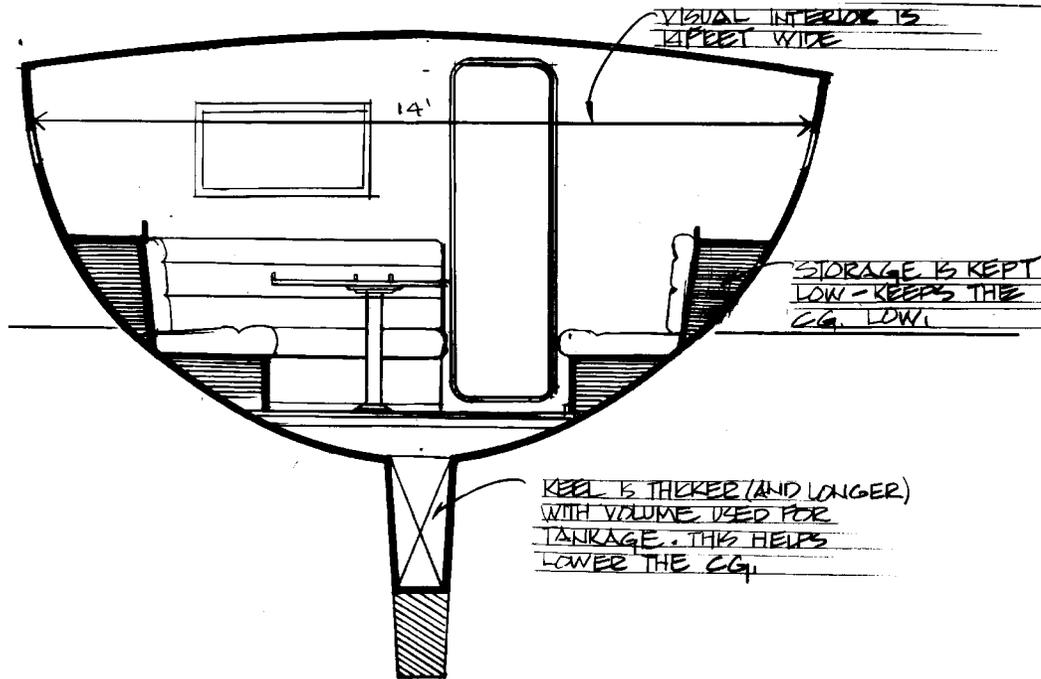
Coziness

Most people aspire to a visually large interior that is cozy at the same time. Because boat spaces are so tight, even the most open interior can be made cozy. This has more to do with choosing the right fabrics and accents than with layout.

One factor that can't be avoided, however, is the ability to move comfortably and securely at sea. This is a direct function of available space and the conditions you are likely to sail in. Larger vessels have more space in which to move and or fall, yet motion is considerably less. Smaller vessels must have furniture designed to contain the crew if you plan to head offshore.

Privacy

Look at privacy in the context of how you use the boat. Bulkheads and doors are required for privacy. Unfortunately, these reduce airflow, add weight and cost, and reduce visual space by cutting the interior into smaller spaces. If you plan to sail by yourself most of the time, why bother? On the other hand, if you have others with you most of the time, the ability to separate crewmembers into private space may be an integral part of a successful cruise. There is only so much "togetherness" most cruisers can stand.



Probably the biggest issue design wise in creating visual space is the type of deck structure used. If you have a trunk cabin, as in the lower drawing your eye stops at the deck to cabin intersection, several feet (.6 m) inboard of the widest part of the hull. If you happen to work in some lockers or a pilot berth below the deck visual space is restricted even more.

The flush-deck design has a lot higher freeboard, which is visual problem in vessels below 40 feet (12.3 m) or so. However, a plus side of the freeboard is increased range of stability and better skid factors when you are knocked down by a breaking wave. Another issue to be faced is location of liquid stores—fuel and water. It is common to place these under saloon seats. But this has a negative impact on storage. One approach which we've used with some success is to increase the keel volume and create a large fuel, water (or both) tank in the upper part of the fin.

STORAGE

The first step in evaluating an interior layout is to have some understanding of the vessel's storage requirements, and those of her crew. You'll want to determine right off the bat how densely packed things will be. The more gear that is crammed into a small space, the harder it is to get anything out. And what you usually need is invariably at the bottom of the pile. Linda and I hate to have to tear a locker apart to get something, so we tend to figure a maximum "stuff factor" of 70 percent of capacity (although somehow our gear seems to eventually expand to fill all available space).

You'll also want to think about center of gravity as gear is stored. As you now know, storing heavy equipment lower results in better VCG — and therefore better performance and comfort.

The most efficient storage is usually the hardest to use. Bulk space, without shelves or drawers, will allow the largest amount of gear to be stored. We usually divide our bulk space into three categories and assign storage to each based on its ease of access. The lowest category (in terms of ease of use and VCG) is under the floorboards. Here we put long-term canned goods, spare anchors, chain, and heavy tools. Next is under bunks. More canned goods, spare parts, spare sails, charts, and cold-climate bedding and clothing all find their way here.

The space under saloon cushions is saved for frequently used items, since this is usually the easiest to access. The most frequently used supplies, a vacuum cleaner, some everyday tools, a ditty bag, and special galley



Hanging lockers make excellent storage areas for items other than clothing. If you don't need the locker for clothing, add shelves for other critical gear. Elyse (left) is showing off the contents of the most important lockers aboard *Intermezzo*.

Locker doors can be used to store small items like toiletries or medicine. Shelves can be built in timber or plastic (middle photos).

If space is available above or below the hanging clothes, you can usually work in a bulk storage shelf (bottom left).

One of the problems with access to locker shelves is the restriction created by the fixed fiddle rail. This can be overcome by hinging the fiddle rail, using a barrel bolt to lock it in place (bottom right).



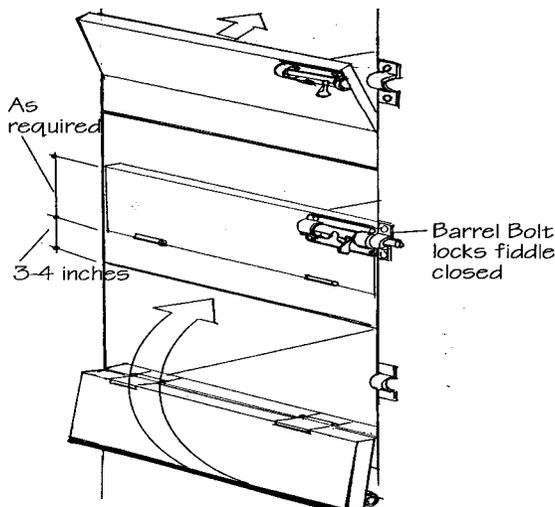


utensils will be found there.

Finally, if there's bulk space under pilot berths or behind lockers up high, we'll stow paper goods and other lightweight articles such as cereal, pasta, and cookies in this area.

For the rest of the storage we'll have shelves and drawers. Drawers are easiest to use, but the drawer hardware usually costs about 20 percent of available volume for overlaps and runners. As a result, I like to limit drawers to one set for the galley and a few under each bunk. For the rest of the storage we find shelving much more efficient.

Sometimes shelving is removable, so a locker can do double duty. A good example of this is a hanging locker. Perhaps there are several lockers aboard, and you find you only need one. In this case, adding shelves makes a lot of sense. They can always be removed.

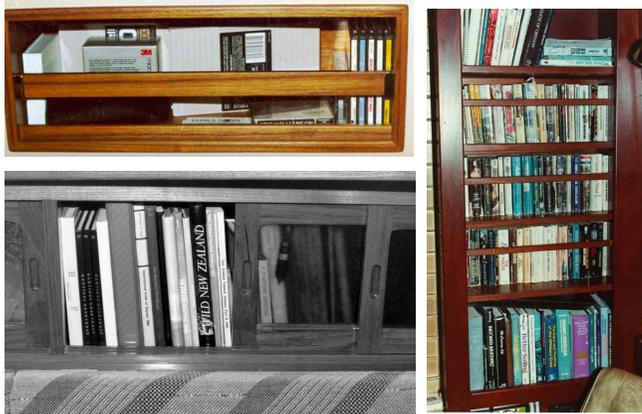


The hinged fiddle concept is quite easy to execute. You simply take a piece of timber (or plywood, although the edges will be tough to paint nicely), hinge it at the bottom, and then lock it in place with a barrel bolt on one end (or both ends if there's a heavy weight being stored or a long rail). The hinge can go on the edge of the shelf, or on an upstand. (If support is required at the edge of the shelf) as shown in the drawing.



If visually practical, open storage areas function better than those closed off with locker doors. This is lighter weight, allows you to see everything (which can be a problem if you tend to be messy) and, most important, provides good ventilation.

There are a number of ways to address the finish of open lockers. It is quite common to trim the openings with timber. This hides the end grain of the face plywood and gives a finished look to things. Or, you may simply use shelves with fiddles.



Bookshelves that face across the boat need some form of restraint at the bottom and in the middle. The lower fiddle should be kept low enough to allow you to get the tallest books out of the case without tilting them. When the bookshelves face forward or aft, fiddles are not required.

The bottom fiddle needs to be about 3/4-inch (19mm) in height.

It is also possible to use line for the same purpose. However, the eye straps to which the line is attached must be strong enough to take the occasional shock load that occurs when you get thumped by a wave.



Vessel Basics

At the minimum, your vessel is going to have certain basic storage needs for ground tackle, sails, fenders, docklines, hose, emergency gear, sheets and guys, bosun's stores, and an emergency tiller.

Cruising Equipment

Next you'll be adding some special cruising gear: awnings, dinghies, outboards and their flammable stores, extra anchors, diving equipment, and any other form of sports gear you may be carrying. The list can get rather extensive.

Spares and Tools

Stowage of spares and tools is more a question of access than bulk space, as most spare-parts inventories don't take that much room. But you do need easy access to some of this.

I divide my tools into four kits — everyday tools, an electrical tool box, a box with sockets and wrenches, and finally a heavy, hardly-ever-used, special-situation tool box. Basic and electrical boxes are stowed close at hand, and the rest wherever they are low and will stay dry.

Most spares are rarely used, so they go under one bunk, packaged in baggies. I usually have one shelf or drawer with pump parts, bulbs, batteries, and other frequently used items.

Clothing

We tend to carry two sets of wardrobes, one for the tropics and something more substantial for colder climates. Linda and I share about 2 feet (0.6 m) of hanger space for jackets and "nice" things. Clothes not in use are stored under the bunk in plastic bags. A couple of shelves or drawers are usually employed as well, but we've found our cruising wardrobe needs to be surprisingly modest.

Books

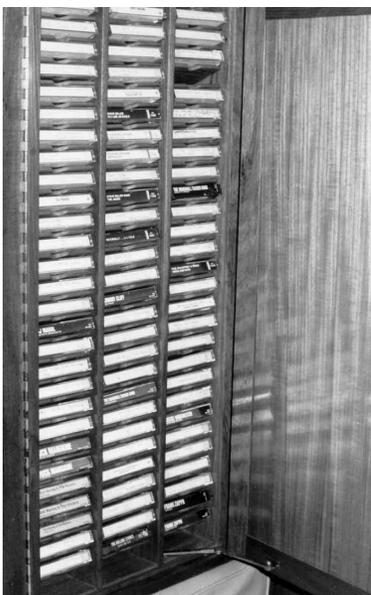
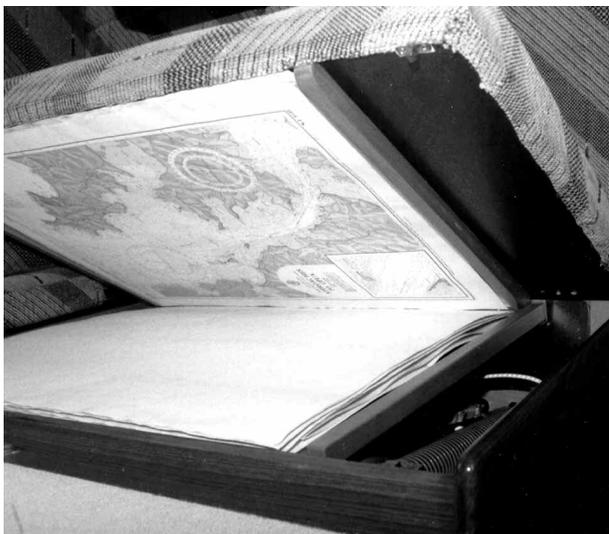
Book storage presents a conundrum. Most of us are used to looking at books as both reading material and to provide aesthetic ambiance. However, in a performance context they are heavy and ideally should be stored low in the boat, except for those currently in use.

Foul-Weather Gear

The need for specific foul-weather gear storage depends on where you cruise. We've always ended up converting this locker to something else, leaving wet gear under the dodger to dry. Jackets are normally stored in our clothes locker, with boots and pants finding a home (between passages) under a bunk or far back on a shelf.

Galley Gear

Stowage of galley equipment and supplies is geared toward frequent use. So the galley gets the best storage space for its day-to-day needs and initial storage or supplies. A big consideration here will be the amount of space needed for special cooking gear (covered earlier in Linda's chapter on galley equipment). Lack of space will, obviously, tend to limit equipment.



Here are two interesting chart storage approaches. Top right shows a locker built in under a saloon seat. This keeps charts flat (although folded) and easy to use. The left photo shows how to use an odd space with sections of PVC pipe let into the furniture.

Video and music storage can be as simple as a plastic container or as elaborate as a built-in shelving system. The middle photo is a timber shelf system while shelves in the right photo are made from clear plastic.

Navigation Materials

Nav books, pilots, and charts can take an inordinate amount of space. Occasionally we see proper chart drawers under a bunk, or behind a settee. However, we've always just rolled charts together by region and stored them under a bunk. Pilots also find a home under a bunk. And to minimize needed storage area when cruising extensively, we sent charts home every year or so when finished with them (if they hadn't been traded or sold).

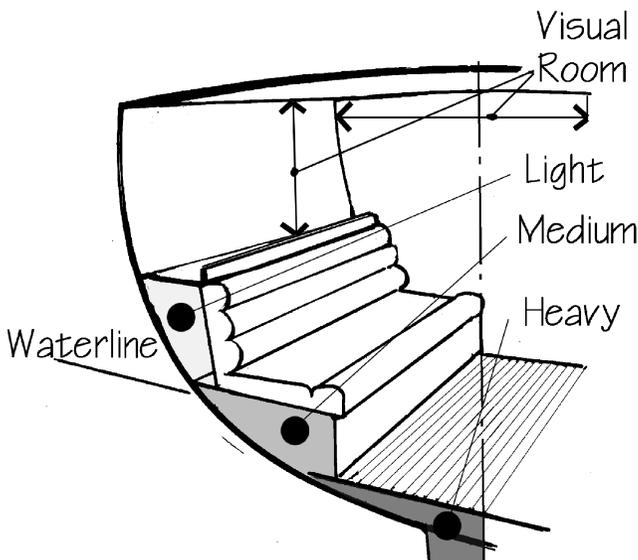
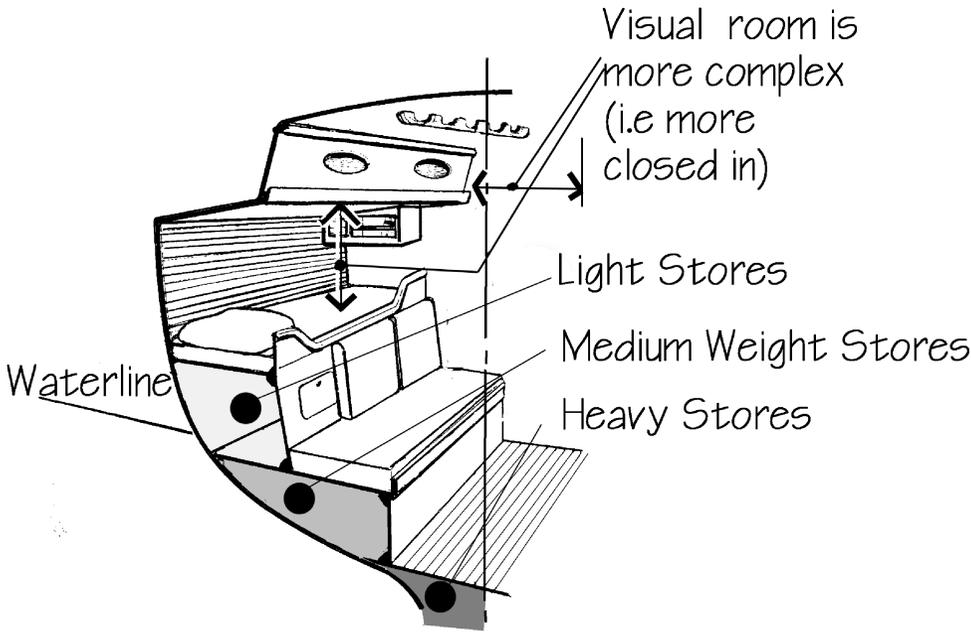
Business Materials

A certain amount of business usually must be conducted from on board. This may be as simple as tracking a few investments at home or as complex as running a day-to-day operation via e-mail and SatCom.

On smaller yachts, the saloon table usually works for larger projects. As the size of the navigation area increases, this begins to play a major role.

If you can work it in, file storage, in correct-size drawers, is ideal.

There also needs to be space for office supplies and tools such as calculators, computers, and printers.



Bulk storage space is always a concern. You need enough room for stores and supplies, and you'd like to be able to keep the heavier weights centered in the boat and low to help stability. Most boats absorb huge amounts of stores, far more than you can imagine standing below for the first time and looking around. Design type has an impact on all of this.

Heavier displacement vessels typically have more space in their bilges and below the floor boards than lighter boats. Lighter designs make up for lack of hull depth with more length of hull in which to store supplies. Both types can carry a proper cruising payload, if they are designed for it in the first place.

This drawing also emphasizes (again!) the visual advantage of a flush-deck design over trunk cabins.



Often the most important ingredient in constructing a locker is convenience. If you can find a rectangular spot, use shelves of adjustable height (right photo), as in this Sundeer 64 locker behind the fridge box.

Bulk storage areas, like those found behind seat backs, can be broken up with drawer stacks (top left).

By raising its forward bunk, room has been found for a washer/dryer unit.



Storage doesn't have to be sophisticated to work. The main thing is good access and security when heeled (left photo). Here's a neat solution to companionway slide storage — a simple drop-in rack alongside the companionway ladder (middle right). The underside of pipe berths can be turned into excellent storage for personal gear (bottom right).





Twin V-berths are common forward. These provide two sleeping spaces but do not allow for snuggling on more than a temporary basis.

Motion is increased as you are quite far forward from the pitch center. On smaller yachts this makes it very difficult to sleep forward unless sea conditions are quite smooth.

Moving the bunk aft (lower photo) makes for a smoother ride, and you have more beam with which to work.



SLEEPING AREAS

Sleeping arrangements are perhaps the most important aspect of an interior. If you can't get a comfortable bunk to sleep in when at sea, you will not be doing much voyaging. A comfortable bunk is not too big, ventilated with a flow of fresh air, and dry. The optimal location depends on sea conditions. Generally speaking, midships pilot or settee berths are most comfortable except when the boat is oscillating downwind. In this case, the pilot berth, being high and at the extreme edge of the beam, subjects the sleeper to a lot of motion. Bunks in the extreme forward part of the boat are generally used only under ideal conditions, unless children are aboard (they don't know any better). Among most of our friends cruising as couples, the main saloon area is the only part of the interior used at sea. Quarterberths set aft by the companionway are perhaps best in terms of motion, but they pick up noise from outside via the companionway opening and are known on most boats at some point as *quarterbaths*. If an aft cabin arrangement is employed, these bunks, except for occasional noise problems, are excellent.

At sea, when you're heeled and sleeping against the leeward hullside, if there's a substantial angle away from the centerline it can be uncomfortable. This sometimes occurs with a pinched stern when sleeping well aft. If you run into this problem, a couple of pillows or bolsters placed alongside the hull will tend to hold your body parallel with the centerline.

In-port living requires different answers. First, a good

snug bunk that keeps you from rolling at sea is too tight to be comfortable in port, especially in the tropics. I opt for maximum comfort in port, and if necessary, throw in a pillow or two offshore when the going gets rough to prevent excessive body movement.

Next, most offshore crews are couples and will want a double bunk at least for in-port sleeping. One end or the other of the vessel is usually the best place for a private double bunk. Doubles in the main saloon are less desirable, since they're in the middle of your living room. You have to make and unmake the bunk every day — not conducive to spontaneous cuddling.

Bunk Dimensions

For a single bunk, dimensions of 2 feet by 6 1/2 feet (0.6 m by 2.0 m) work well as a minimum, although another 2 or 3 (50 to 75 mm) inches really help. The width can taper down 6 inches (150 mm) or so at the foot if necessary.

Another consideration is upper and lower bunks. On most cruising yachts the upper becomes a storage shelf. I prefer to see uppers hinged so they can swing up or down, out of the way, increasing space and giving the lower bunk occupants more room to turn over. In some layouts it makes sense to have the narrower, foot portion of the upper bunk opposite the head of the lower. You need at least 22 inches (558 mm) of space between two bunks, and a couple more inches (50 mm) really help.

A minimum-size double bunk in the tropics is 42 inches (1,067 mm) wide at the head. In cooler climates you can get away with a substantially narrower bunk, down to about 36 inches (0.9 m), especially if you're snugglers. But overall, companionship is best in a good-size double bunk.

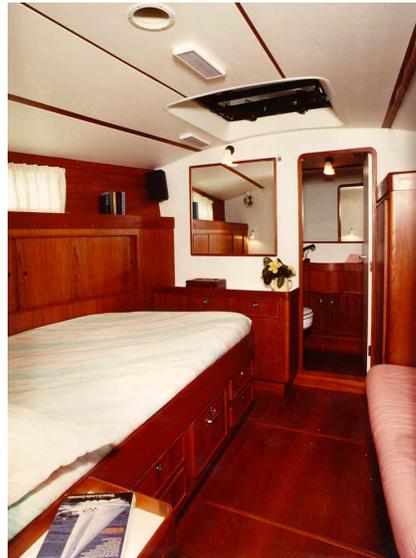


When the bunk is moved aft, a common problem is for the cockpit well to protrude down into your space. On the boat opposite, two surfaces of the well were covered with mirror to visually enlarge the area.

One negative of the aft location is that the noise of sailhandling and winching is transmitted below.



There's always a debate on double bunks. Which is better — against the hull (as shown here on Deerfoot 2-62) or freestanding? Against the hull is more comfortable at sea and gives you more floor space. On the other hand, it is more difficult to make up.



Fitting a Double

Where, you may ask, can I fit a serviceable double bunk without going into the main saloon? Consider an *athwartships* bunk up forward. Most modern boats are full enough in their bow sections to rearrange two single bunks that run fore and aft into a double that runs athwartships. We did this on *Intermezzo*, and she was fairly narrow forward. It resulted in a bunk that was 7 feet (2.15 m) long on the outside (aft), where I slept, and a hair under 6 feet (1.85 m) at the very inside (forward) edge, where Linda slept. At sea going downwind, this was fine for sleeping. On the hook in a roly anchorage, it was definitely preferable to fore-and-aft sleeping.

When you look at the bunks, consider also how difficult it will be to make them up each day. Most cruisers find that after a short while, sleeping bags are put aside in favor of sheets, pillows with nice casings, and blankets, just like at home. (In the tropics, matching print sheets and pillowcases look neat and cool, and in colder climates, matching quilts and pillow shams are an easy way to dress up a bunk.)

Leecloths

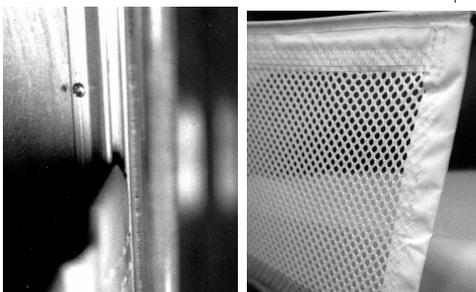
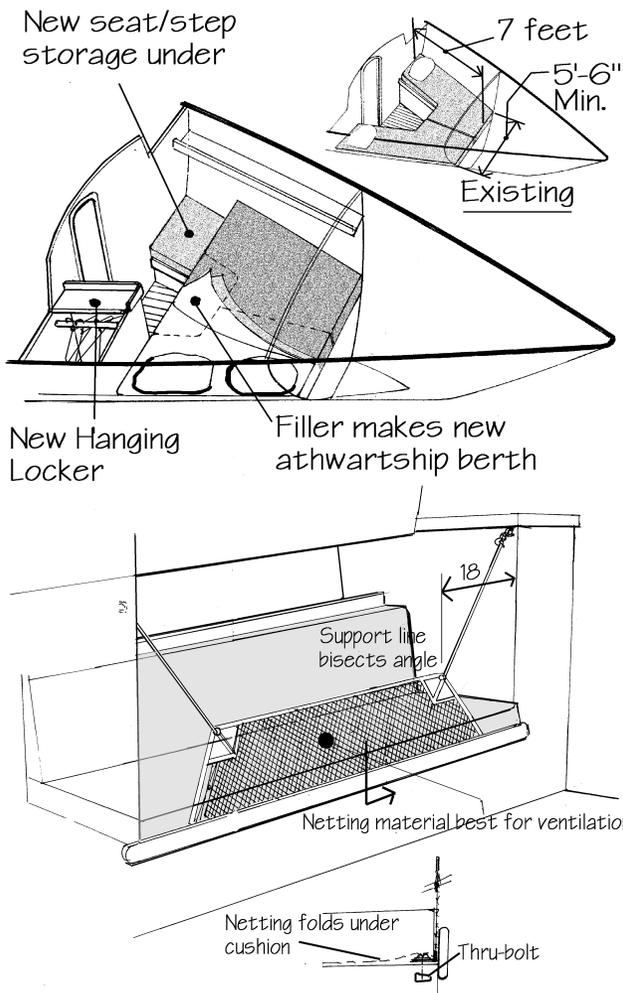
Leeboards or leecloths are necessary to hold you in place offshore. With either system, the attachment points must be strong enough to withstand the impact of a body being dumped by a wave.

We've used leeboards made from 3/8-inch (96mm) plywood, attached at the bottom with continuous hinges and tied off at the top, with some success. However, I prefer leecloths, as they're lighter and can have a mesh or open weave, allowing them to breathe.

Climbing over these restraints can be difficult, so a means of adjustment will be required if space is tight. This could be a simple snap hook or a more complex adjustable tackle.



Intermezzo had a V-berth arrangement, which we turned into an athwartships double (left), gaining some valuable storage space in the process. For downwind sailing it was comfy, but we did not use this bunk reaching or beating.



The best leecloths are made from breathable open-weave material. We like to attach ours with a bolt rope and awning track.



Two views of *Heart of Gold's* forward owner's stateroom. Note the detailed storage opposite the bunk and the large locker at the forward end. We've put lots of small seats like this one in boats. However, they usually end up being used to stow a quilt or bedspread, rather than for sitting. (Carl Schumacher photo).



A Deerfoot 62 (left) with the bunk against the hull and the head entrance at the forward end of the cabin. This bunk would have been more usable at sea if it had been turned around so your head was aft where motion is less.

The right photo is a Deerfoot 58. The seat opposite the bunk has been eliminated, creating a much larger locker opposite the bunk. Notice the mirror at the foot of the bunk. The image reflected in the mirror opens up the space of the cabin. The head of the bunk is aft where the sense of motion is much less. This arrangement has a larger range of seagoing usefulness than the approach on the 62. Live and learn!



The owner's suite is forward on the 69-foot (21.2m) *Wakarua* as well, but the head of the bunk is aft. Full-height hanging lockers are located on each side of the seat. The main purpose of this seat is to open up the space visually. If the full-height lockers were carried straight across, the cabin would become very claustrophobic.

The aft owner's cabin (right photo) on the original *Deerfoot*. While this was a freestanding bunk and therefore easy to make up, it was placed under the cockpit. This not only reduced space, but the bunk occupants were all too aware of whatever action was taking place above their heads. There are hull side lockers on each side, a night table with a mirror on each side, two fans and a couple of dorade vents. However, in the tropics this area is quite hot. It would have been a good idea to cut in several opening ports through the cockpit footwell for additional ventilation.



The bottom five photos show the forward owner's suite on two *Deerfoot* 74s. These vessels are sisterships in terms of interior layout. The bunk is freestanding, offset to port, with a small walkway between the bunk and the locker along the port hull side.

There is a large settee and relatively low lockers to open the space in this area. There's more than enough storage as it is, so we were trying to maximize visual space.

Notice how the hanging locker at the aft end of the cabin against the bulkhead is full height. But the locker at the forward end has been held down from the deck. This helps with visual space.

On *Interlude*, the second of these vessels built in Denmark, we incorporated a small makeup mirror and lighting into one of the hull side lockers.



The owners' suite is aft on the Cal 48. There's a double bunk to port with a ladder to the aft cockpit on the center line. On the starboard side is a single bunk with a small desk, usually used for navigation at the forward end of the bunk.

The double could be described as a partial quarter berth in that about half of the length is under the cockpit. However, the fact that your head is out in an area with full headroom opens the space up mentally and visually.



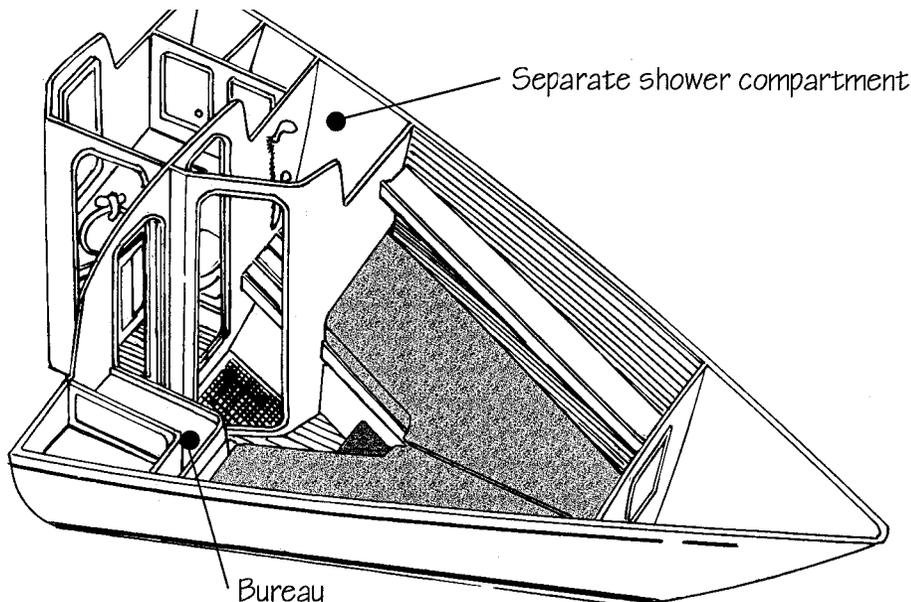
There are times when access or floor space make a wide bunk impractical. However, when it's time to hit the sack, you want more sleeping width.

The photo above shows one approach, using a sliding panel (like a pullman berth, only this one is on an angle) onto which is placed a wedge of cushion.

Any time there are two cushions being used in a single bunk, there will be a hard or soft spot where the gap occurs. Most of the time this seems to be under your hip, where it is most uncomfortable.

An easy way around this problem is to fit a Velcro tab across the top of the two mattresses. The Velcro serves to bridge the gap.

Another issue is access under large mattresses. Breaking the mattress between hatches or hinging it (by just sewing the bottom edge together) and then tabbing across with Velcro makes access much easier.

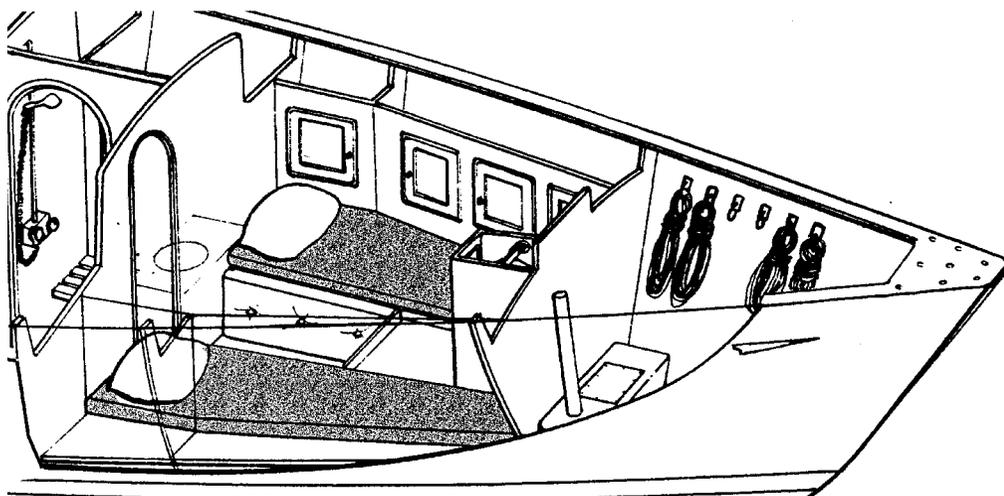


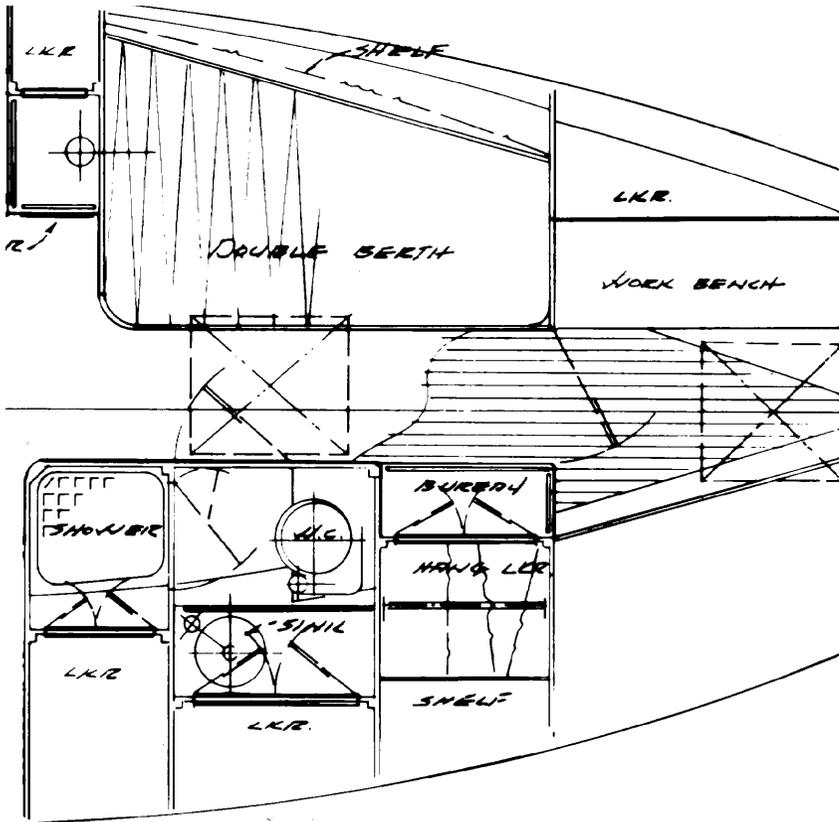
On a boat designed to cross oceans and to deal with inclement wind and sea conditions, beam and volume in the bow will be limited. Otherwise, with a full bow shape and wide beam, the boat becomes difficult to steer and begins to have problems with its range of stability.

These considerations force you into a narrower beam than you might otherwise desire for living aboard. Of course, you spend 90 percent or more of your time at anchor, so why pay all these interior penalties for that small percentage of time at sea? The reason is that if the boat is not sea-kindly, it will eventually scare you and end up sitting in the marina rather than taking you to the places you've dreamed about. If your dreams are of anchorages closer to home in more protected waters, then beamier boats with their larger interiors will do just fine.

Here we see two examples of forward owner's cabins that work well at anchor yet fit into a hull that won't embarrass itself offshore (where you'll undoubtedly be sleeping in the saloon). The upper drawing is a Chuck Paine-designed 36-foot (11.1 m) yacht. The lower is a 40-foot (12.3 m) design from Jay Paris's board. The Paris design has pushed the stateroom aft a bit, allowing for a small forepeak (very handy for cruising). By moving it aft, it takes advantage of the expanding beam. The lockers shown outboard of the bunk add marginally to storage, and cost a chunk of money to execute. They also narrow the space available above mattress level for your shoulders.

The top design shows a head with separate stall shower. Very nice, but if you were to switch to a wet head and give up the shower the bunks could be moved aft (making them wider) while the anchor locker becomes more of a general forepeak. For short-term cruising the shower is probably nice. For more time away from home, I'd vote for a larger forepeak.

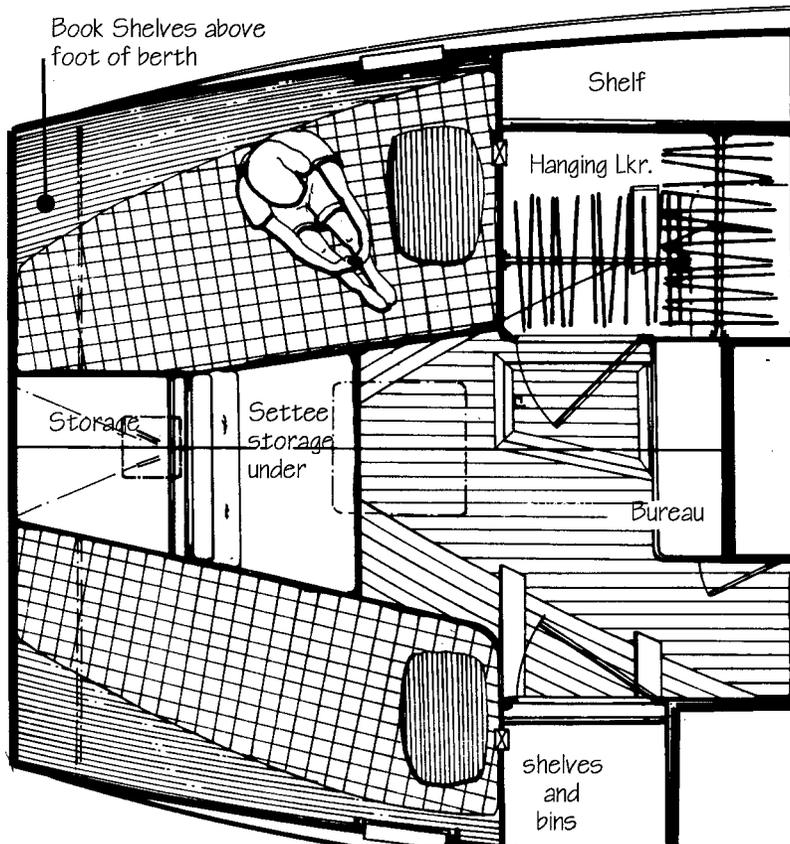


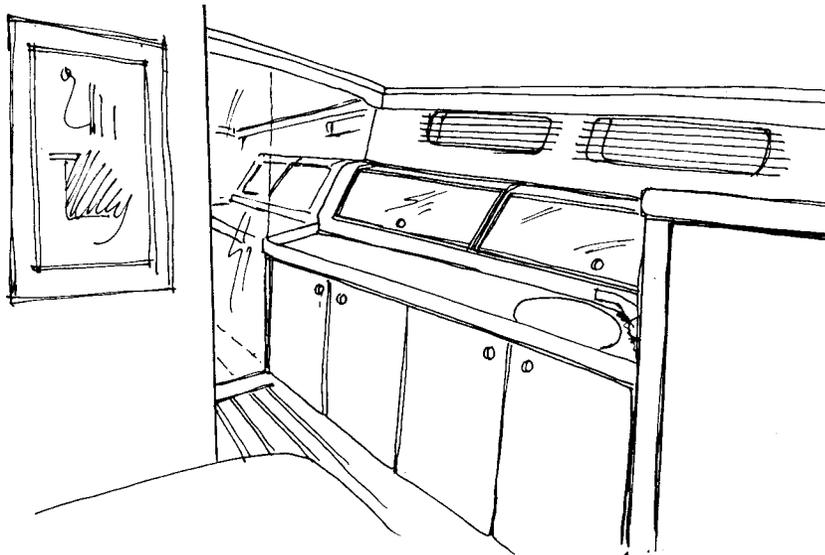


The top drawing is the 42-foot (12.87 m) *Sunflower*. The head of the bunk is almost the same size as the larger boats shown at the bottom and on following pages, although the foot of the bunk is quite a bit narrower. To achieve such width in a boat of this size requires the bunk to be raised about 40 inches (1,016 mm) above the cabin sole. This provides lots of storage beneath the bunk. There is a hanging locker and head opposite, and forward you have a small workshop/storage area, extremely handy on any boat.

The lower drawing is a 45-foot (13.84 m) motorsailer designed, built, and lived in by Steve Davis (our redoubtable artist). With a midship pilot-house and engine room, the aft cabin became a natural spot for the owner's suite (their daughter Melissa got the pointy end).

There is a wide single to port (usable for short-term snuggling) as well as a single to starboard. Lots of storage indicates this is a liveaboard vessel. By shoving the bunks all the way aft, and then bringing them in towards the center-line area (which is otherwise unusable for standing because of the hull shape) is efficiently employed.





The next two boats show what we've come to view as the ultimate solution in the 55-to-65-foot (16.9-to 20 meter) range. As a good compromise between seagoing comfort, visual openness in port, and good storage, it is hard to beat this layout.

There is a full-sized double bunk with 60 inches (1.52 m) of width at the head and 48 inches (1.2 m) at the foot of the bunk.

The small step at the foot provides a convenient place to brace yourself when making up the outboard side of the berth.

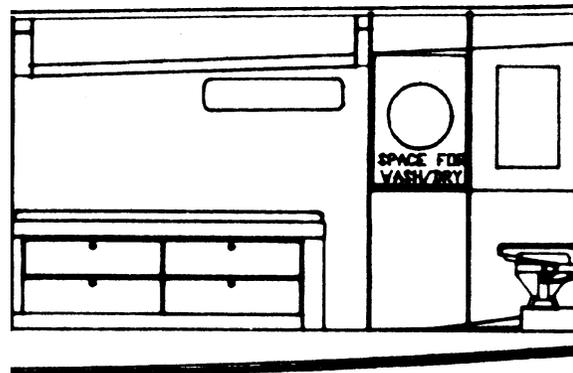
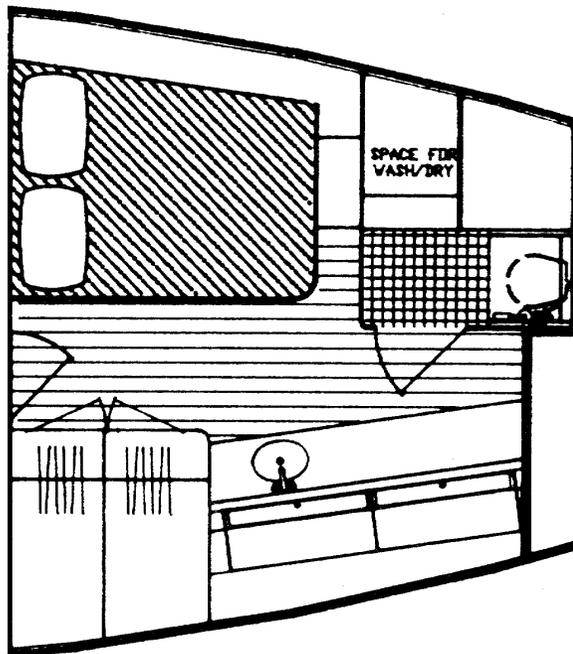
The top of the mattress is 28 inches (0.71 m) off the sole, which allows the top to push outboard with the hull flare in this area.

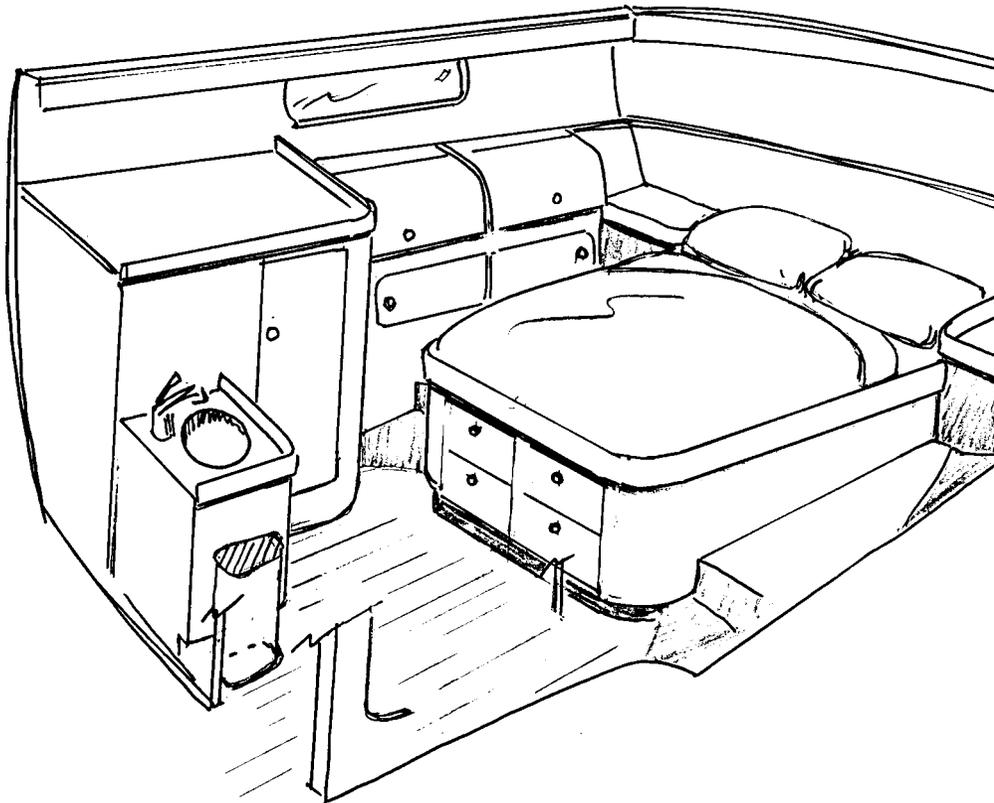
The wide sole helps visual space. The hanging locker is held down well below the deck. This drops down to a long vanity with good storage below and outboard.

The toilet compartment also acts as a wet head with plenty of room to shower and just enough space for a bath. There's a large linen locker in this area and room for a compact washer/dryer.

Separating the toilet and vanity in this manner allows the two spaces to be used for different activities at the same time. It also helps with the sleeping cabin's feeling of spaciousness.

We first developed this layout for the original *Sundeer* in 1988. We've since used it quite effectively on other boats. In the ensuing years we've seen it copied successfully on designs as small as 44 feet (13.5 m).





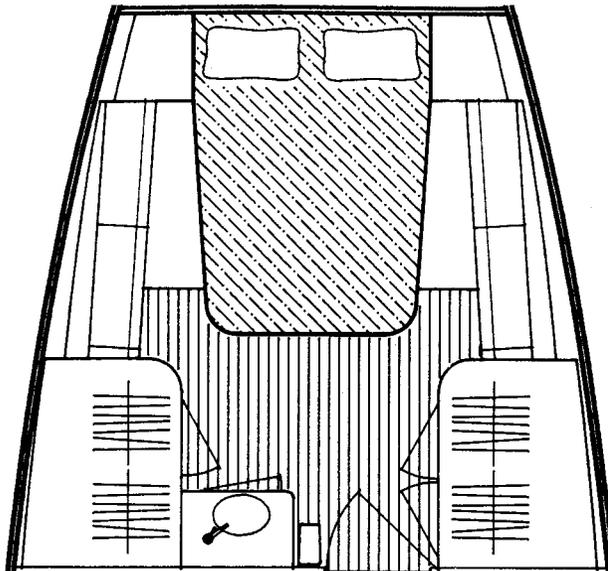
Free-standing bunks look great on paper and in boat shows. But how do they work when you're living with the boat on a day-to-day basis?

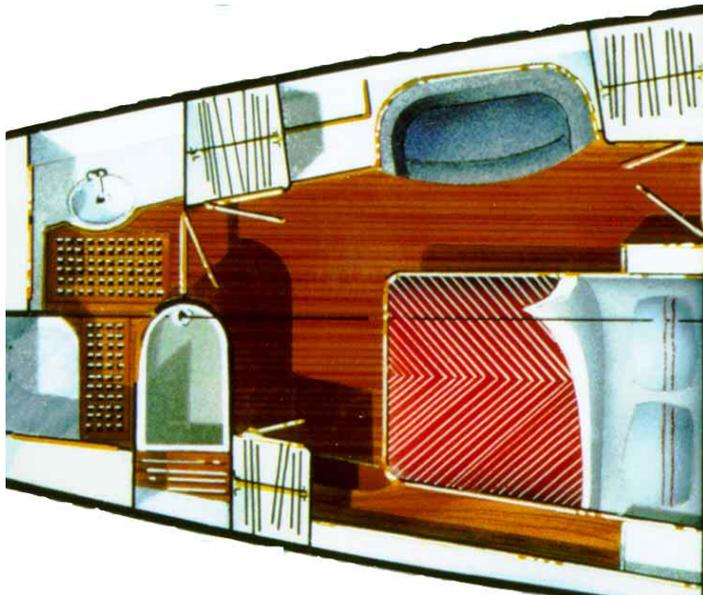
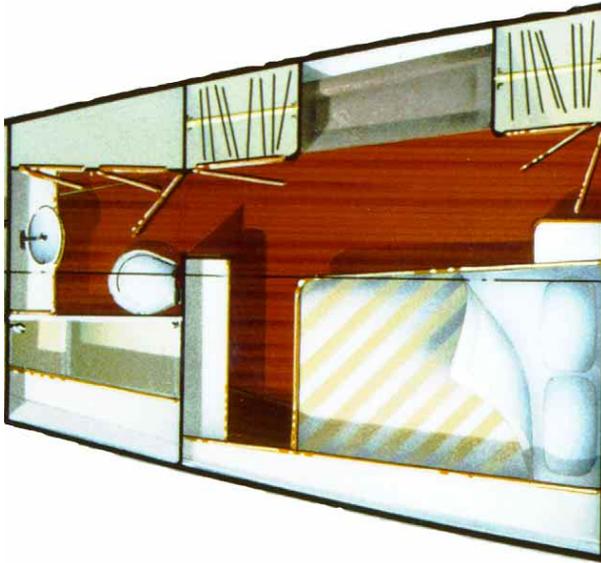
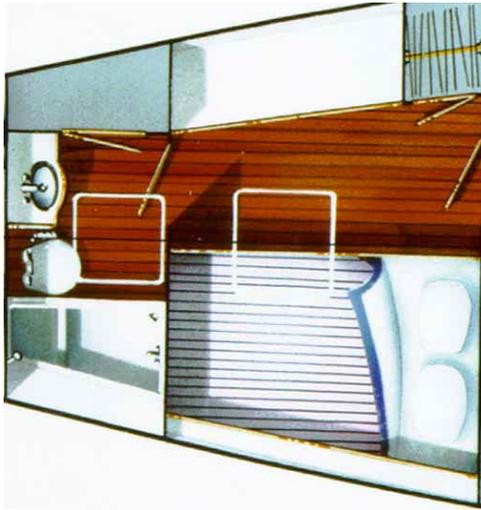
The answer is, it depends on your cruising life-style. If the free-standing bunk is designed correctly, it will not close down visual space in an excessive fashion. However, bunks lying against the hull side tend to show more cabin sole, and with the bulk of the bunk moved outboard, they usually take up less visual space in the cabin.

The freestanding bunk is easier to get into for the person who would otherwise be sleeping next to the hull. It is also easier to make up.

When your cabin is forward, a free-standing bunk almost always has the head of the bunk towards the bow (unless it is on a very large yacht). This means your motion sensor (located in your head) is that much further away from the pitch center. In conditions where you are barely able to sleep at sea with your head at the aft end of this cabin, it would be hopeless with your head forward.

On the other hand, it is very nice to have this sort of a layout when in port. On the Sundeer 56 our logic was based on the concept that this cabin would only be used at sea in ideal conditions. The rest of the time the owners would use the saloon or the aft cabin for sleeping during a passage. We expected to sell more of the off-center bunks than this design, especially to more experienced buyers. However, every one of our clients chose this layout, and after many thousands of miles, they all love it.





Regardless of boat size, an owners' suite must provide the same basic space for a bunk and toilet area.

The difference, as you go up in size, usually comes in visual and storage space, and perhaps a bit of cabin-sole space. The following drawings, all to the same scale, give you a good comparison of how this works.

The upper left shows a Deerfoot 58. She's a narrow boat forward and does not have the cabin sole width to allow a head opposite the bunk. In this case (as with all of the others here) the head is forward.

The middle left drawing is the Deerfoot 2-62. Note there is a seat opposite, between hanging lockers. This opens the area visually, and looks nice, but forces you to give up valuable storage space.

The bottom photo is one of our 74-foot (22.8 m) motorsailer designs. There's plenty of space outboard of the bunk for access, lots more floor space and, obviously, visual space as well.

Note that all three of the larger boats have compact showers which can also act as efficient bathtubs (using very small amounts of water for the bath).

Guest Cabins

There are a number of issues to be evaluated with guest quarters. The first is how comfortable you want to make your guests. If they are along for the cruise, you will want them to be comfortable. On the other hand, if they are just visiting, a certain level of discomfort ensures they won't stay too long — not that I'm antisocial, mind you!

If guest cabins are located in the after part of the boat, they will typically end up being used by everyone at sea. The smaller size and aft location make them much more desirable when the boat is bouncing about.

One decision you'll need to make is whether you want one larger bunk, located high off the sole where the hull is widest, or an upper and lower system. Both have advantages.

The lower, narrower single is more comfortable at sea, due to the fact that it feels less motion and is easier to wedge yourself into. In port, the opposite is true. If couples are using the cabin, you may prefer a double to accommodate their needs.



Four views of upper/lower doubles. The top two photos have the fiddle rail on the upper bunk cut away in the middle. This makes it easier to get into and out of the top bunk. The bottom bunk does not require this, as you can sit down onto it.

The cabin on the upper left is forward of the galley on a 60-foot (18.4m) Mason design, while the bunks on the upper right are in the aft cabin (one of two) of a Deerfoot 2-62.

Notice the Mason design has more vertical space between the bunks, making the lower bunk narrower, as it is lower where the hull is pinched in.

The lower right photo is on *Intermezzo II's* sistership. The lower bunk is 32 inches (812mm) off the cabin sole and 42 inches (1,067 mm) wide at the head. The upper bunk is all the way outboard and just 24 inches (610 mm) at the head in width. With so little of the bottom bunk covered by the upper, you lose the sense of claustrophobia that sometimes occurs in these cabins. The bottom left photo shows more overlap, and hence a restricted lower bunk.



Double bunks provide several times more storage space underneath than a single. On the other hand, if there are two bunks, the upper makes an excellent shelf for baskets, guitars, carvings, etc.

With upper and lower bunks, several design issues need to be considered. First is the separation between the two, which depends on the amount of overlap. Assuming the upper overlaps 60 percent of the lower, you can get away with as little as 22 inches (550 mm) of space between the top of the mattress and underside of the upper bunk. The same goes for the distance between top of upper mattress and headliner, at the heads of the bunk. If more vertical space is available, we prefer to put the next 2 to 4 inches (50 to 100mm) into the space between the upper and lower. The upper bunk can be narrower than the lower. Twenty-three inches (580mm) at the head and 21 inches (525mm) at the foot will work okay at sea and in temperate climates, although it is a bit tight for the tropics.



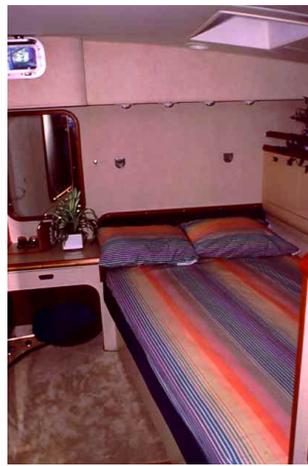
There's always a question about storage for guests, especially hanging lockers. If you have the length and need both ends of the cabin free for getting in and out, then the hanging locker has to go at the foot of the bunk (top left photo) rather than alongside the end of the bunk (upper right on preceding page).

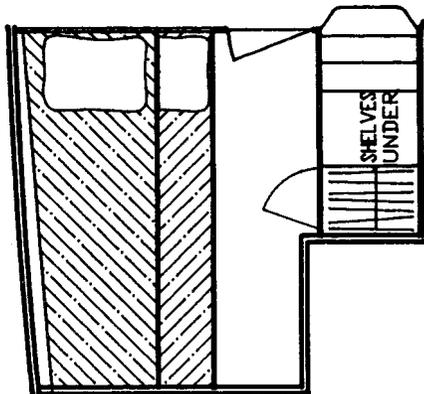
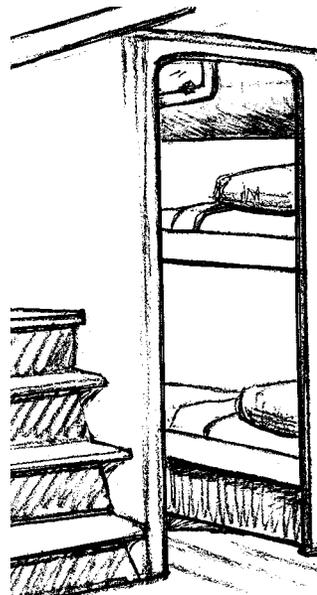
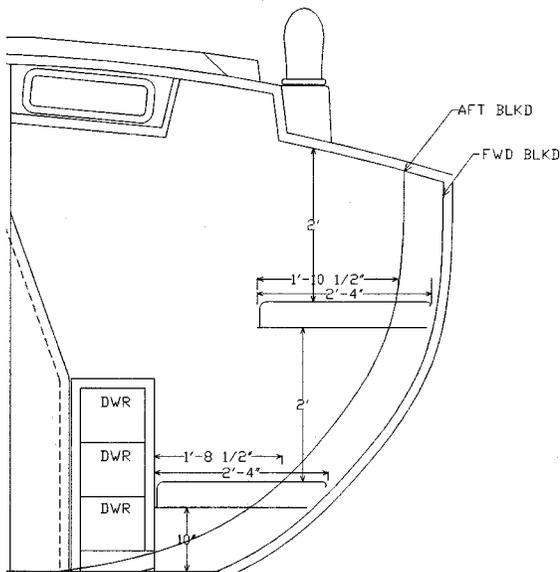
The upper left photo shows another way to deal with the second bunk — make a removable pilot berth. Do this with a bit of pipe, some canvas, and a 2-inch (50mm) mattress.

The middle right shot shows the aft end of a 50-foot (15.4m) cruiser/racer. This is light, easy to execute, and provides lots of space if necessary. Note the vent hatch through the cockpit. (Carl Schumacher photo)

The far lower right photo shows the double bunk on one of our 74s. This bunk is a full 48 inches (1.2 m) wide. Note the small table with mirror at the head of the bunk.

The lower left photo shows a wide double under the cockpit on a New Zealand 60-foot (18.4m) yacht. Being hemmed in on 5 of 6 sides is a bit too tight for me. I'd rather have a narrower bunk with a bit of cabin sole on the inboard side.





We've always put our guest cabins aft. The wider beam of the hull makes for two good-sized spaces, and this is the most comfortable section of the boat for sleeping at sea.

After determining where these cabins go, you then need to decide on whether to have two single bunks, one over the other, or one double that is higher and wider.

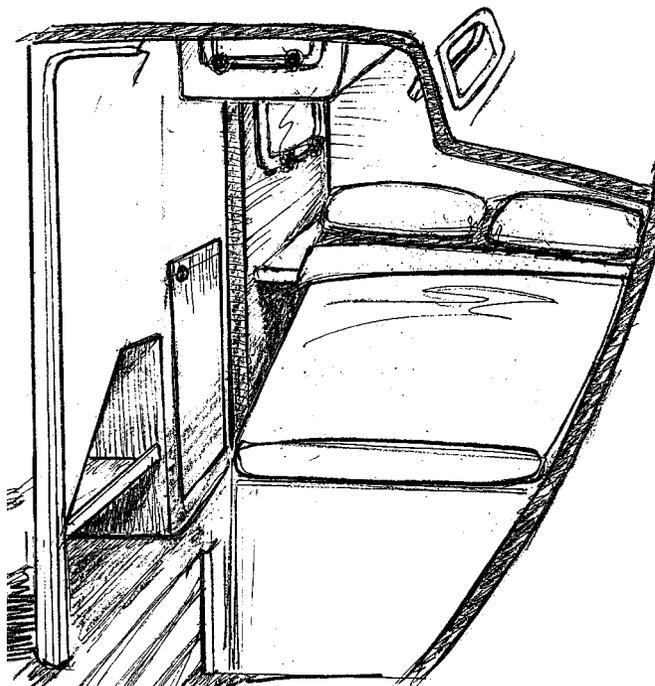
The two singles offer two separate bunks to sleep in, which will be more comfortable at sea (there's less room to roll around). In a knockdown, with a lee cloth set, you are much more likely to stay within the confines of the bunk without getting hurt.

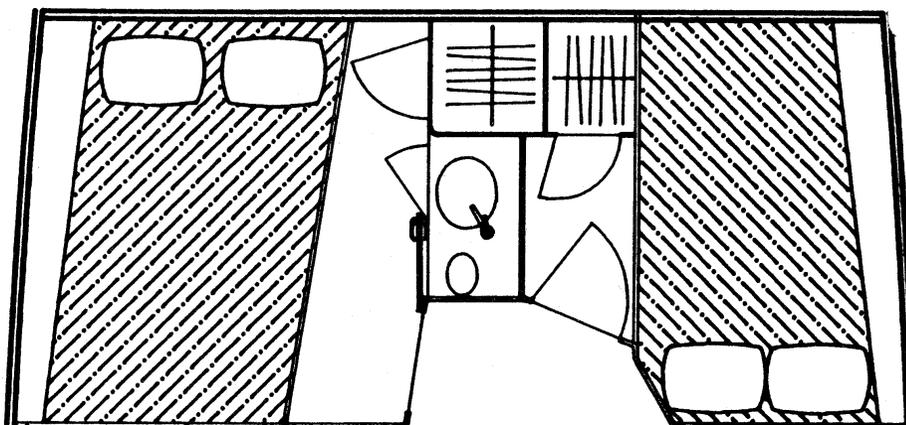
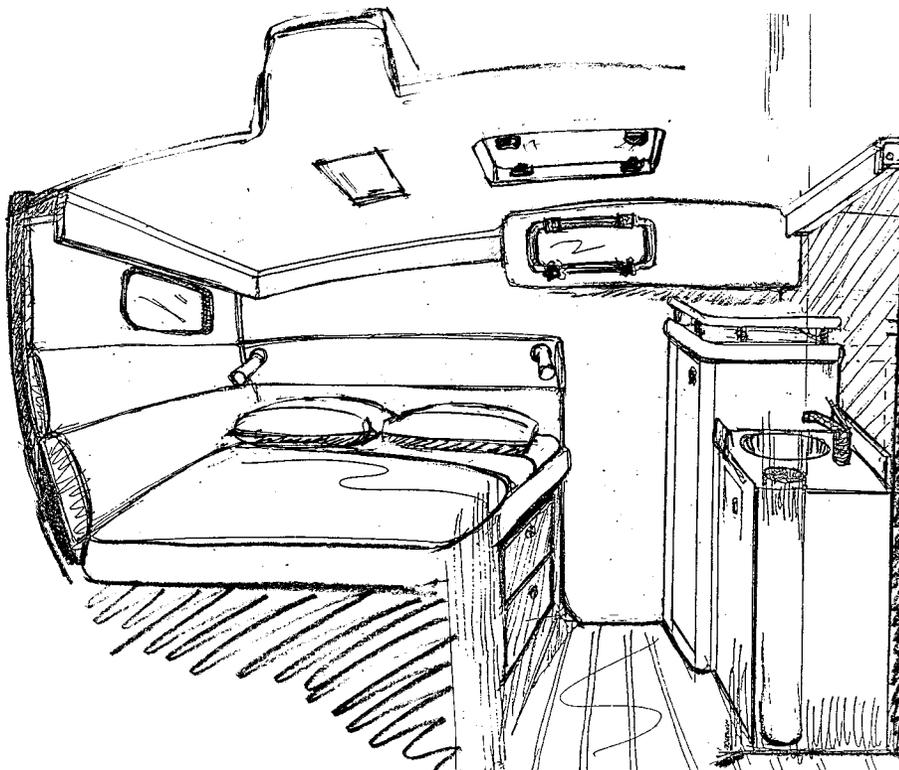
The drawings and sketches shown above and left are for the Sundeer 56. This basic geometry works regardless of boat size.

One option is to raise the bunk up, allowing the outboard edge to move out with the hull shape.

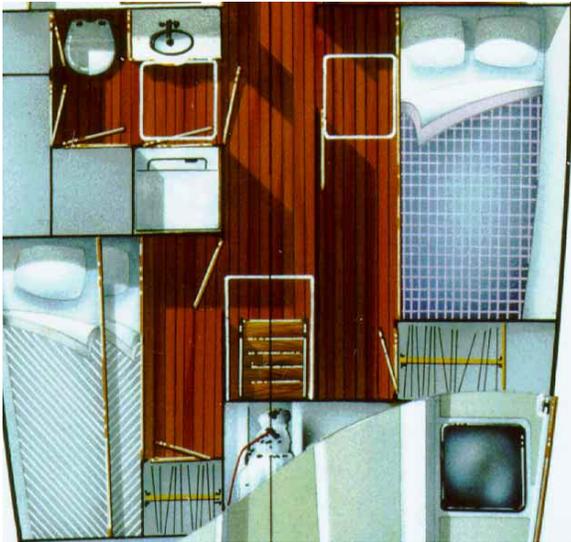
It's often possible to work a "cozy" double into the design (you do need to be a cuddler, however). Again using the Sundeer 56 as an example, by raising the bunk bottom to 40 inches (1 m) above the sole, there is room for a bunk with 36 inches (0.9 m) at the foot and 41 inches (1,041 mm) of space at the head. In this case we've put the head of the bed on the aft end, reducing the width of the sole as you move aft (and making the bunk wider in the process).

There are all sorts of storage possibilities under this bunk. And, with a light plyboard placed on top of the mattress (stowed under when not in use) you have a great work surface at just the right height.





As the desire to keep guests happy increases (and/or your boat gets larger) you begin to have more options. The layout shown here is one we've used on a number of our designs ranging from 62 feet (19 m) to 75 feet (23 m). We usually design one larger, really nice guest cabin, and a smaller cabin that can be used for the owners at sea, the kids, or crew. This particular design was developed for the *Sunder 64*. The guest suite has a hanging locker at the aft end and a small vanity with a sink. A large mirror is located outboard of the sink. The mirror and sink counter both add substantially to the visual spaciousness of the room. The bunk is high — 36 inches (0.9 m) off the sole. This gives us plenty of width with which to work — almost 44 inches (1,120 mm) at the head. That's enough for two folks to sleep together in the tropics, which is the ultimate test for love (or lust).



This is a very interesting guest-quarters layout on a 58-foot (17.85 m) design we built in Denmark.

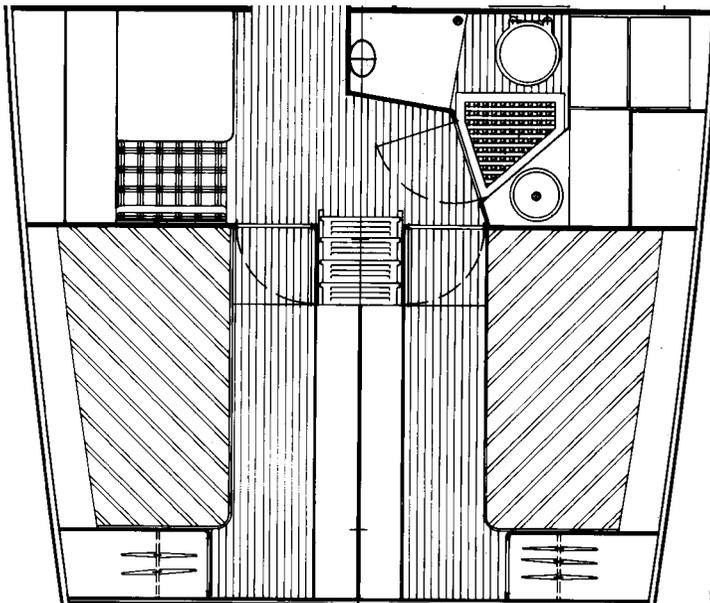
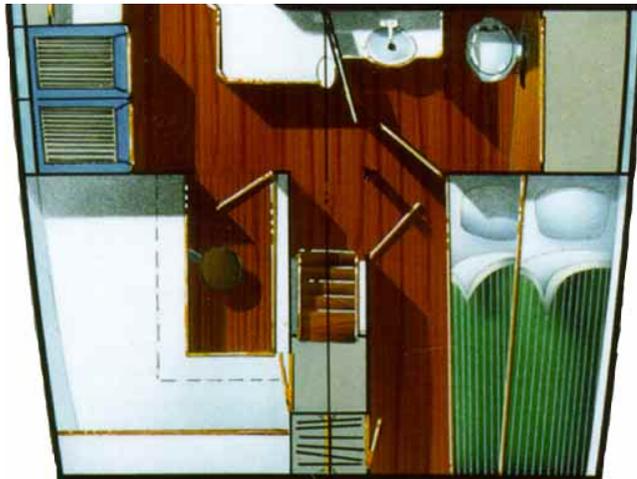
The port cabin has an upper/lower layout. The bunks are ideal for use at sea, and offer direct communication with the person on watch in the cockpit. If you are cruising short-handed, this becomes a very important feature.

The starboard cabin has a narrow double, 40 inches (1016 mm) wide at the head. Opposite is a very large head compartment that also serves as a shower. There's a stacked washer/dryer combo on the aft side near the door, and inboard is a very large hanging and general-storage locker. This is where all the foul-weather gear and heavy coats are stored.

One of the things I really like about this layout is the companionway between the cabins, the walls of which keep you nicely confined when the boat is heeled. This makes an ideal place to get into or out of oilskins. And, you are totally protected from falling sideways when transiting the companionway ladder.

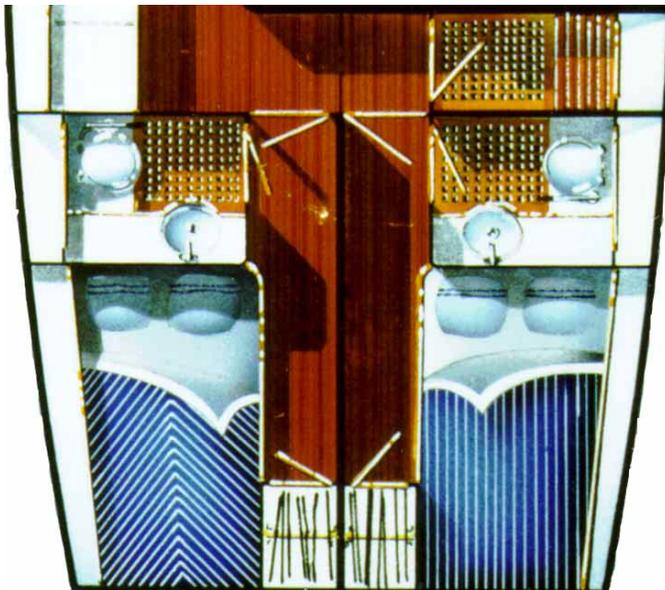
If there are just two of you, and you don't have a lot of guests, do you need two guest cabins? Of course not. Try turning one of them into an office area — but do it in a manner that allows the desk to be converted back to a guest bunk when required.

This drawing (right) shows a preliminary layout for a 65-foot (20 m) design that eventually became a 75-footer (23 m). She was built with this layout and it worked well for several years. But then the owners found themselves using the boat less, with a permanent couple to run the boat. Good crew need good quarters, so the office became a very nice crew cabin.



Many designers think on larger yachts you must have heads ensuite for the guests. This creates all sorts of negative trade-offs in access and general space utilization. Two of our 70-foot-plus (21.5 m) designs have been built with a head to be shared by the aft cabins. The left drawing is *Locura*, which did a circumnavigation with her owners and their two small children. The other boat with this layout, *Wakaroa*, also has two kids sharing the aft cabins.

A single head aft can easily serve as a "day head" for occasional guests. The space opposite, in both of the designs referred to above, was used for a compact nav station. The fact that the nav station is handy to the companionway is another benefit.

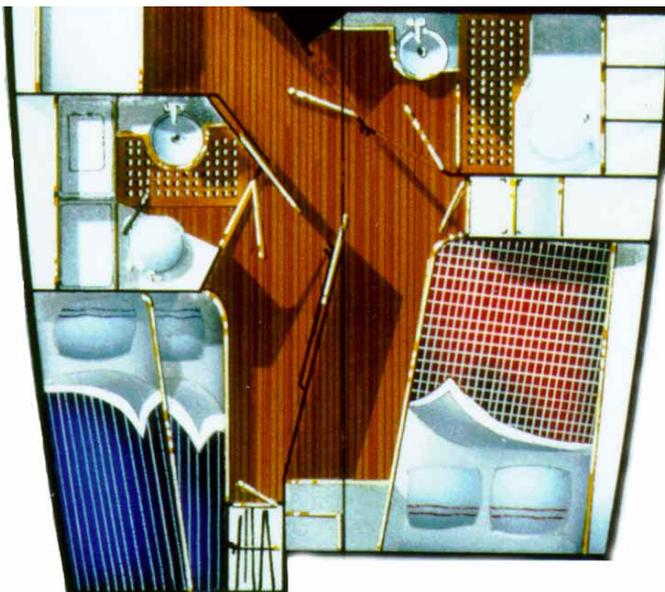


Once a yacht gets over 50 feet (15.4 m) or so in length, it becomes easier to work in twin guest cabins. You then need to decide whether you want the space equally divided, or whether to make one cabin really sumptuous and the other somewhat smaller.

These drawings are for two Deerfoot 74s. *Interlude* (above) has equal guest cabins, each with a compact, albeit functional (especially at sea) head compartment. Just forward of the starboard cabin is a shower, to be shared by the guests aft. The shower also houses the washer/drier. These cabins in no way would be considered skimpy. On the other hand, on a vessel of this size, they would not be considered luxurious either.

The drawing below is for my dad's *Deerfoot II*. He wanted his guests to be well taken care of, hence the asymmetric layout. The guest suite to starboard is really nice with a head/shower ensuite. The port cabin, with an over/under arrangement, is for grandchildren or crew (sometimes one and the same).

A nice feature of this layout is that the starboard head can also be accessed from the aft end of the galley, without going through the guest cabin. This makes it useful as a day head for occasional guests.



Secrets to a Dry Bunk

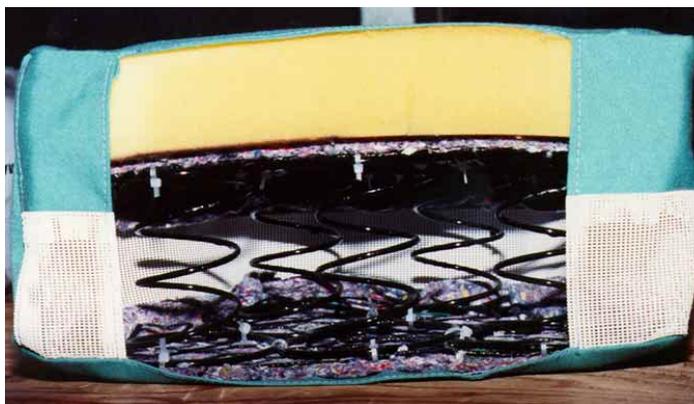
Nothing is quite as inviting as a dry bunk after a relaxing day afloat. But if your cruising takes place in cool water — 65 degrees Fahrenheit or below — chances are that your bunk mattress may be damp, if not when you get in the bunk for the first time, probably when you get up in the morning.

At first you don't notice. Then, after a few days, a clammy smell is detected. Spots of mildew form on the underside of the bunk. If you pull the foam mattress out of its cover, the foam will be damp at the bottom.

Once the mildew process starts inside the foam, it is difficult to stop. It becomes necessary to lift bunk cushions every morning just to dry out underneath! The culprit is condensation, created by the warmth of your body meeting cool air that has been transferred through the hull from the surrounding water. The warmer air holds more moisture. As it is cooled, the moisture is precipitated out as dew and forms a wet layer at the bottom of the bunk cushion.

The colder the water and/or the warmer the mattress, the worse the problem will be. Bunks with nearby showers (which put lots of moisture into a closed interior) will have more of a problem.

A series of things can be done to reduce or eliminate bunk condensation. These depend upon increasing air flow through and around the mattress and creating a thermal barrier between your warm body and the cool air beneath the mattress.



The innerspring mattress starts off with typical mattress springs, tied in to wire mesh with plastic wire ties. All metal ingredients are painted to prevent rust. High-density foam is then applied top and bottom. Medium-density foam is then laid over the top. After this, the entire sandwich is covered with a mattress cover — typically made of a breathable material — and an open weave is used around the perimeter below fiddle level to allow good ventilation.

To be comfortable for sleeping, bunk-cushion foam is open cell in structure, having little thermal insulation value. Using a thin layer of flexible closed-cell foam at the bottom of the mattress helps to correct this problem. The required thickness depends upon the ambient air temperature under the bunk, as well as how much humidity is normally present. The insulation value of the hull also has a bearing.

We've found with cored fiberglass hulls and 40-degree outside air/water temperatures that a 1/2-inch thickness of closed-cell foam does the trick. For colder conditions or solid fiberglass hulls, use 1 inch of foam.

The two layers of foam should be glued together with contact adhesive, forming a sandwich inside the bunk cover. Another approach is to take rigid closed-cell foam, 3 to 5 pounds in density, and put this under your mattress. This will do an equivalent job but is not as comfortable.

The next step is to promote air flow through the foam in the mattress. You can modify the existing cover by sewing in an open-mesh fabric around the vertical perimeter of the cover. This helps to ventilate the foam in the mattress, reducing the tendency towards condensation and mildew. The bottom side of the bunk cushion should be a breathable fabric, rather than a vinyl or tight-weave synthetic.

Until recently, what you've just read represented my understanding of the state-of-the-art in dry-bunk technology. It's the approach we've used for years with modest success. Then, as Linda and I cruised the Pacific Northwest, we were exposed to what the fishermen in this part of the world use — a hybrid open-cell foam/innerspring mattress combination that is not only unbelievably comfortable (for a boat bunk!) but also dry.

These mattresses start out with a steel spring (it looks like it comes from a car seat) that is dipped in a special paint to prevent it from rusting. Based on the shape of the bunk and the firmness of mattress required, the springs are then tied between layers of plastic-coated steel mesh to hold them in place.

The next step in the "sandwich" is to attach top-and-bottom layers of Firmstep, a mildew- and fire-resistant breathable material. A 2-inch thick layer of open-cell foam is put on the top. The resulting 6-inch-high mattress is then covered with a suitable fabric with an open-weave breathable perimeter.

The key is that the mattress is so open inside that plenty of air circulates, eliminating the tendency for condensation to form.

The end product is a comfortable, long-lasting, and condensation-free mattress, costing 14 cents per square inch, or about \$600 for the average double bunk — not that much more than a regular foam bunk cushion and its cover.

These mattresses are the creation of the Dean-Douglas Company in Seattle (1-800-322-0885, 1124 S.W. Massachusetts Ave., Seattle, WA 98125). Carl Sandbeck, who runs Dean-Douglas, figures they've made upwards of 1,000 of these mattresses in the last ten years.

We slept on one aboard *Sundeer*, and it really worked — not to mention that it was more comfortable than our old foam mattress.



If you sail in cool waters, odds are the underside of your mattress, heated by your body, will condense moisture from the surrounding air. To reduce or eliminate this problem, it's essential to provide ventilation to the underside of the mattress. One way is to drill holes in the plywood supporting the bunk cushion. Another approach is to use a layer of closed-cell insulation, either between the mattress and its support, or laminated right into the bunk top as a sandwich structure. If the hull has enough insulation, this will not be a problem.

GALLEYS

After sleeping accommodations, the galley rates as the most important part of the boat. Without exception, modern designs locate the galley so as to provide direct access to the cockpit. This provides good airflow from the companionway, makes it easy to take food on deck, and protects the cook from motion. But the major advantage cited in some sales literature — that the cook becomes part of the party — doesn't count when cruising for long periods. Remember, the party goes on, perhaps for years. On some boats a good place for the galley in terms of space and layout is farther forward by the mainmast. The steep angles of the topsides minimize sole area but allow for good counter space and related storage. Although motion is greater, many well-ventilated modern boats would benefit from this arrangement.



These three layouts on 40-foot (12.3m) yachts illustrate various trade-offs. All have their stoves outboard — the easiest location. However, this causes the safety risk of being thrown into the stove at sea. Because the sole area is confined to a C configuration, the only way to work is in line with the stove.

The right photo shows the sink outboard. This sink will flood when heeled, so it will need a pump for emptying on starboard tack, and you'll have to remember to shut off the through-hull! In the left photo, the sink is inboard, where it can drain without flooding on either tack.

In contrast is the middle left photo. The stove is still outboard, a little extra room allows the cook to work just forward of the stove. If something comes flying off, you'll be much safer. The galley sink is almost on center, preventing drainage problems. The aft counter (not clearly shown in the photo) provides a good work surface and creates a large fridge unit.



As the boat gets a little larger, more options are available. The lower right photo shows one galley counter running along the hull with another under the cockpit sole. The sink is on the center (under the cockpit) while the stove is outboard. Given the length of this galley, you can easily work forward of the stove when at sea. The counter space afforded in this type of layout is a big plus. (Carl Schumacher photo)





Something you don't see very often — a galley offset to starboard. With the long layout, the stove is situated to prevent the cook from falling into it at sea. On starboard tack, however, some form of a strap is required (upper left) to keep you within working distance. Note the open, easy access storage along the hull side.

The middle left photo shows several problems. The outboard stove should have been mounted at the aft end (instead of the forward end) of the counter. This would be safer when working at the sink.

If the sink were moved to starboard, closer to the centerline,

drainage on starboard tack would not be a problem (as it now is). Not clearly shown is the large dish locker over the sink counter. This offers excellent, easy-to-use storage. Unfortunately, it cuts off the saloon and galley from a visual standpoint, making a small area even tighter.

The lower left photo shows a Deerroot 58 with the stove mounted on the aft bulhead where it is safe at sea. This way there is no gimbaling. However in a larger vessel, heel is not as great an issue. With good fiddle rails and deep pots, it works fine at sea. The only negative comes when you are trying to bake on a heel — cakes tend to be angled.

The sink is outboard and connected to an electric pump. This frees the forward counter for the fridge box. Here, the volume is greatest and you are away from the heat load of the topsides. This allows a larger fridge box with less surface area than if the sink were mounted closer to the centerline with the fridge against the hull. The net result is a far more efficient fridge system, at the cost of a more complex sink drainage system.

We typically fit electric pumps in this situation. Unless they are macerator-type designs, a large filter is required to catch all those food bits that might otherwise clog the pump.

I prefer to use a hand-operated bilge pump. It requires less maintenance and will pump overboard without a strainer in the line. However, most owners prefer the convenience of the electrical pump.





The galley layout on the Deerfoot 2-62 was controlled by a midships engine room (top two photos). A long counter is outboard, with the stove more or less centered. The sink is close to the center. Access to the port side of the engine is through the sink counter. Notice how the sink and stove are offset from each other. This allows you to work at the sink without risk of falling into the stove.

The middle right photo shows *Intermezzo II*, with her stove mounted on the aft bulkhead. The sink is mounted outboard, where a pump is required to make the fridge more efficient.

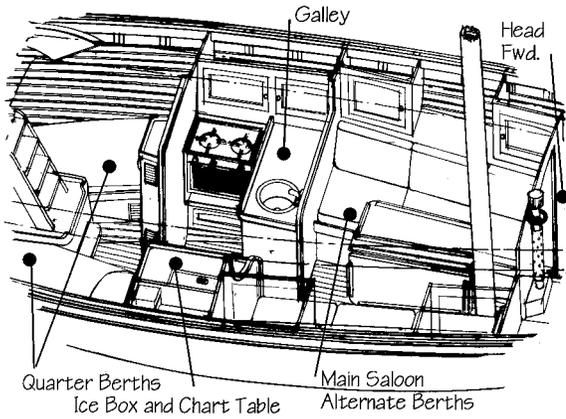
Note the use of tiles on *Intermezzo II* and the 2-62. These serve as a heat shield as well as a backsplash and add a nice touch of color. Cost and weight are moderate.

The middle left photo is *Sundeer*, with both stove and sink outboard and well separated. With an aft engine room, her fridge box is located under the cockpit footwell.

Wakaroa's galley (lower right) is optimized for going to sea. The stove is on the aft bulkhead, with galley sink outboard and well away from the stove. This keeps the forward counter free for a huge fridge while the centerline furniture houses a large freezer. This approach provides plenty of counter space for big galley projects.

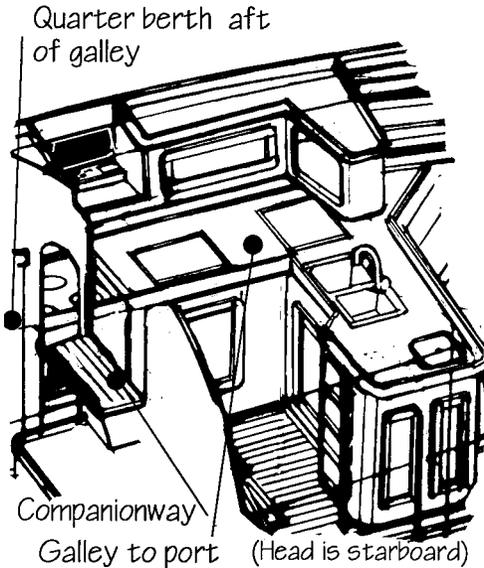
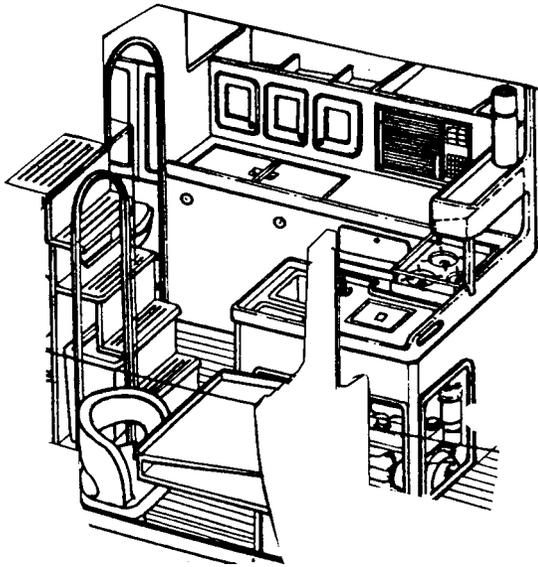
Maya (lower left) has a central engine room, so space is limited. This layout is similar to our 2-62 design with access to the port side of the engine through the sink counter. The shoji screens above the sink counter open to the pilothouse for ventilation and communication.





In a small boat, the galley is the toughest of all areas to design. It has the potential to cause dangerous burns, and yet it must function on both tacks, while keeping the cook happy at anchor.

The drawing to the left is a Concordia 33. The companionway lets you down between the entrances to a couple of aft quarter berths. You have one step to catch your balance before you're abeam of the stove. There is no way the cook can escape falling into the stove with this layout if the boat gives a lurch to port. However, if the port quarter berth were done away with, a wonderful storage space could be developed under the deck and the galley counter extended aft. The stove could then be moved aft so that when washing up at the sink you could lean against the counter.

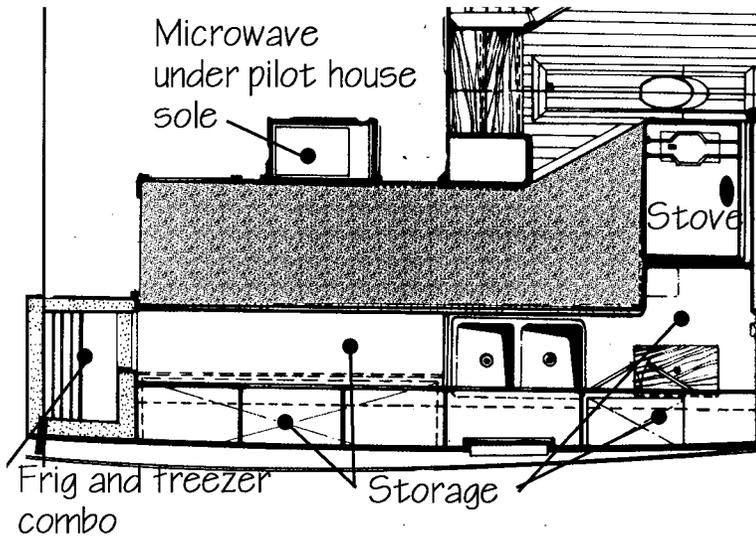


Quarter berth aft of galley

Companionway Galley to port (Head is starboard)

The two illustrations immediately above are both 40-foot (12.3 m) designs. On the left vessel the stove has been pushed forward and faces aft. The righthand drawing shows the stove well aft on the hull side counter, so you can work at the sink without worrying about falling into a hot pot of pasta. When the stove is to leeward you can lean on the counter ahead and be out of the line of fire.

The bottom drawing shows a 45-foot (13.84 m) design with the galley alongside the engine room — a common layout in mid-cockpit boats. Notice again that the stove faces aft, the safest position. This type of layout makes it possible to have counters on the hull side and under the cockpit or pilothouse sole. The latter, however, will cut into engine-room space.



Counter Space

It's important to have counter space that doesn't block other storage areas, so that you can keep several projects going at once in the galley. On smaller boats this entails sharing space with another area or giving up something else altogether. However, in general, keeping the cook happy will be one of your cruising priorities, and this is one of the easiest ways to do it!

Sinks

Marine sinks are on the small side. In most cases this is fine, since a small sink conserves dishwashing water, and space is limited in any event. But sinks must be deep — about 9 inches (230mm) is best for a small craft, although a larger, stiffer vessel can get by with a depth of 7 inches (178 mm). If located off the centerline, chances are that unless the boat is of very light displacement and high freeboard, the sinks won't drain when the boat is heeled. In this case, it's necessary to fit a hand pump or electric macerator pump for getting used water overboard under sail.

Seagoing Considerations

Floor areas should be constructed so that there's always a good place to brace yourself in the galley when at sea. Safety straps with sturdy padeyes will have to be worked in to the design. If possible, the stove should be mounted athwartships, facing forward or aft, as opposed to being mounted on the side of the hull. This athwartships orientation means that a sudden roll won't throw the cook into the stove or the stove's utensils onto the cook. Gimbals aren't necessary if deep pans are used and good pot restrainers are mounted on the stove top. But one gimballed work area while at sea is handy for keeping ingredients and prepared food in place. If the stove is placed outboard, most people gimbal it. A locking hook should be handy for severe weather.

Insulating the area around the stove with fiberglass wool helps the oven tremendously. If space permits, an overhead hood with an exhaust fan works wonders in the tropics. Without an exhaust hood it is not unusual for an evening meal to warm the interior of a small boat 10 degrees Fahrenheit or more — another plus for the microwave.

Design stowage for dishes, glasses, pots and pans so that they'll stay in place at sea.



Intermezzo had a very small galley, shy on counter space for baking projects. We added this simple, hinged flap to give Linda more space when she needed it. When the flap wasn't in use it folded down and hooked to the adjacent fridge box.



Rigadoon (above) has a centerline sink set on a tile bed. Notice how much slope there is to the counter to make sure everything drains to the sink basin. The only negative with this is the grout between the tile — it's hard to keep clean.

Stainless counters incorporating the sink are the ultimate for ease of cleaning. It is possible to build a custom counter with fiddle for less money than a conventional timber and Formica or Corian counter. Note the open handrails around the galley on *American Eagle* (lower left).



Stoves

There are really only two stove fuel options for cooking — kerosene and propane. Kerosene, less popular by far, is cheap and extremely safe, but it is less convenient to use than propane and very messy, and it requires an inordinate amount of maintenance. If the stove valves and related gear aren't cleaned and adjusted on a weekly basis, the burners won't properly utilize fuel, resulting in a layer of soot all over the headliner. Even with good burner maintenance, the headliners get dirty. When it's time to start up the stove, alcohol must first be burned to heat up the kerosene. The smell of burning alcohol is offensive to some crewmember, and on a rolling vessel...

Alcohol doesn't even deserve mention, except as a priming fluid for kerosene. It's unbelievably expensive and hard to come by in other parts of the world. The people we know with kerosene stoves all say that the alcohol used for starting purposes costs as much as the kerosene used for cooking.

I don't like the dangerous aspects of propane on a boat, but for us it's the best compromise. It is essential to have an electromagnetic solenoid valve at the tank that shuts off the flow of gas when the stove is not in use.

You can take several steps to minimize chance of explosion. Make sure the line from the tank to the stove has no couplings. It should also be insulated where it passes through a bulkhead or support point so it can't chafe over the years. It helps to keep the tanks on deck or in a vented, isolated locker. An accessory to consider is an inexpensive explosive atmosphere control that automatically shuts off the solenoid valve at the tank if a leak is detected. However, never depend on these devices. They are only an adjunct to shutting off the flow of gas manually when you are finished in the galley.

Worthington Manufacturing makes aluminum propane tanks that are excellent in a salt-water environment. They're less than half the weight of the steel tanks and eliminate untold hours of chipping rust and repainting.

Propane or butane is available all over the world and is the primary cooking fuel in such far-off spots as Rodriguez Island in the Indian Ocean, the Solomons in the Pacific, and Saint Helena in the Atlantic. We've never had a problem finding it. Occasionally, we have to go to the main station rather than to a neighborhood store, but our tanks have always been filled.

We learned a useful trick in American Samoa. If you want to go from a large propane tank (perhaps at a restaurant) to a smaller one, open the

On smaller yachts you will want fiddle rails even when the stove is gimballed. They should be easy to operate and allow you to hold two pans at once. Be sure to check the shape of your frying pans, as some don't work well with fiddle rails.

If there is space, it is helpful to have a tray attached to the gimballed stove

(second photo) to hold cups when at sea.

On smaller yachts, a stove area with a cover can do double duty. Of course, you need to stow the cover when the stove is in use. This can usually be worked in behind the stove.

On larger yachts, fiddles are not as critical. This Seaward stove has a place for fiddles to attach at the forward and aft end.

bleeder valve on the top of the small tank after the two tanks have been connected. Then place the small tank you're filling below the big one, and tip the larger tank on its side. The liquid gas will flow between the two, just like water, albeit somewhat more slowly, and eventually you'll be rewarded with a small stream of liquid propane at the bleeder valve on the lower tank. When this occurs, your tank is filled.

Diesel stoves are fine for high-latitude sailing. They're inexpensive to run and, since they're very hot, can heat the rest of the vessel, as well as maintain the water heater. But in the tropics it's impossible to cook with diesel. It heats up the interior too much.

Electric cooking, combined with one of the other systems, is a good bet. On its own, electric cooking leaves you dependent on machinery, which in turn makes it necessary to carry an extra generator as a backup. The daily noise is hard on your neighbors.



Diesel stoves are ideal for cold climates where the heat they generate can warm the entire boat. However, in the tropics they make the cook's job unbearable!

Since the entire stove is usually hot it must be installed where it is out of the traffic pattern, especially when heeled. Consideration also must be given to the exhaust and what is downwind of it.



Want your stove mounted fore and aft so it is safe, but need gimbals? By reinforcing the back part of the stove you can attach a large plate to which a bearing is affixed a bearing. The bearing in turn is bolted to the bulkhead in back of the stove. This allows the stove to pivot with heel.

It does require a heavy bulkhead and enough space on either side of the stove for it to swing into.

The roller (top left) reduces the bending load on the bearing.



Electrical Appliances

With the advent of small, efficient inverters, electrical galley appliances have become practical. The first choice is usually an electric mixer. Next is a small microwave. Microwaves don't usually use much power as they pulse on and off. Their efficiency is a function of size, since radiation efficiency varies with the square of the distance from the magnetron to the item being heated. We like the smallest models, typically about 4/10 cubic foot (11 liters). With microwave ovens, it's important to allow for heat to escape from the back. We've found a small toaster to be a good investment as well. It takes about 25 to 40 watts of power to toast a single piece of bread and is much quicker than using a stove rack.



The microwave can be installed in joinerwork (above left), set inside a locker (middle left), or left out on a counter. Our own preference is to set it in a locker. This way the oven is out of sight when not in use, yet easily changed if something goes wrong. Note the separate gas-fired grill on the right side in the upper left photo.

A large mixer (upper right) is handy for making bread. We've run into several boats with them aboard and the owners swear by them. If you are inclined towards one of these units, be sure to check it with your inverter. Certain models are not happy on modified-square-wave electricity.

The ultimate cruising appliance (lower right) is a Champion Juicer. Not only is this good for juicing everything right down to pits and skin, but it can be used to make an ice cream-like desert from frozen fruit.

We were first introduced to this wonderful machine by Kathryn and Mayer Page in Fiji when they invited us over for frozen bananas and papaya. It was cold and delicious, with the texture of frozen yogurt!

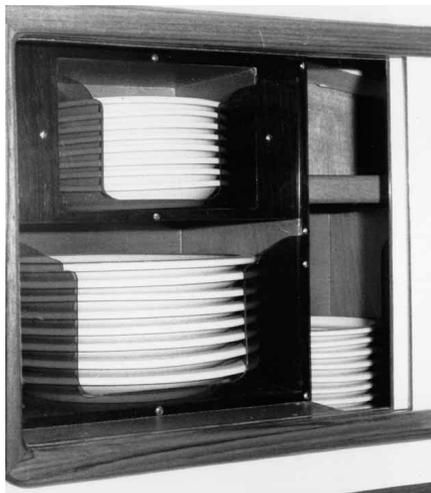
Considering that tropical fruit tends to come in quantities greater than you can consume before it goes bad, this machine starts to make even more sense. Simply freeze the excess fruit, then whenever you feel like a cold treat, drag out the Champion Juicer and go to work! These machines are available in health-food stores or from the Champion Company in Lodi, California.



Galley Storage

The most critical storage aboard is in the galley. Utensils and supplies must stay in place when heeled and keep quiet when rolling downwind in the trades. You need to be able to reach most used items on both tacks, when the gear in question is to leeward or to weather.

There are all sorts of ways to accomplish these goals, ranging from simple approaches such as a bit of bungee cord, to sophisticated built-in racks.



Dish storage can take many forms. One of the simplest to execute (and good-looking, too) is to make racks from Plexiglas (top photos). Regardless of the material, you'll need an opening in the front to get your hand into. You'll also need space open at the top left in order to remove dishes or bowls. Vertical pegs accomplish both goals (middle right). This works especially well if a series of holes are drilled for the pegs, so they can be adjusted as requirements change. Storage can also be quite simple (middle photos). If dishes are stored over the sink, they can be put away wet with the storage area draining into the sink. Low lockers (lower right) are okay for occasional use. But for everyday storage it is better located at or above counter height for easier access, especially at sea.





The degree of containment is a function of location. When subject to heeling you need tight storage (upper left). In this case, cup handles protrude from the rack. The only negative here is difficulty in cleaning. Plastic racks (upper right) can perform the same function and allow you to see any dirt that is trapped (a double-edged sword). The clear plastic fiddles come up one-third of the height of the dishes and spice jars, which is sufficient in this fore-and-aft facing locker. The middle right shot has cups sitting in a shallow locker, with a sliding door to keep things from falling out. This is not really a deep enough containment and in heavy weather will be unworkable.

Athwartships lockers can be used much like in a house, with dividers to keep things from moving side to side with heel. However, specialized storage can be minimized (middle left photo).



Without handles, drinking and wine glasses are a little tougher to store. Several approaches are shown here on *Lady Kathryn*. The top three photos indicate a simple plastic-rack approach. Wine glasses are held by their stems, while the drinking glasses are let into a cutout in the plastic shelf.

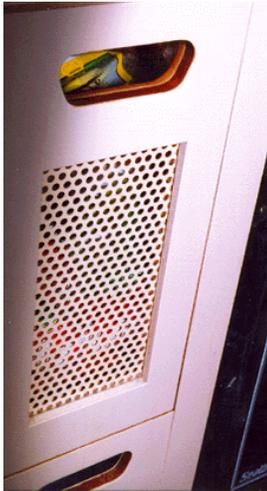
The lower left photo shows the solution on *Sundeer*. We used the end of the galley drawer stack and dropped these heavily tapered glasses into simple plastic shelves with openings cut out. The glasses sit down to half their height to prevent them from tipping over and falling out.



General storage comes in all forms. If the locker has a deep face, then specialized racks are not needed and the space can be allocated as required. Note the spice rack built into the downward-opening locker door (upper right). Baskets (middle left) can be quite handy, light, and allow their contents to breathe. This is especially helpful with fruits and veggies.

Large athwartships lockers between living spaces (lower left) should be avoided if possible, as they reduce air flow and visual space throughout the interior.





Putting louvers, air slots, or rattan in locker doors (upper left) helps with air circulation — absolutely essential to keep food fresh for long periods of time. We like to have one area in the galley with an open shelf suitable for basket storage (upper/middle right). This usually requires a fiddle that is higher than normal, so we typically fit a second fiddle to help with containment.

Think about what happens to locker doors when opened. If they cover counter-space, then to gain access something will probably have

to be moved. This tends to push you towards sliding doors (lower right) or lift-up doors (if there is space above the locker) as you can see here on a Sundeer 64. We've used these on most of our designs for years. Sliding doors tend to rattle, so we avoid them when possible.



Drawers used for utensil storage should have some form of a lip at the aft end (bottom left) to prevent utensils from dropping out to leeward or jamming the drawer. Fitting a utensil storage area into the saloon table makes sense (lower middle), as long as this does not block an area of the table used for serving. Plastic dividers set into a timber drawer (lower right) make a nice-looking drawer that is easy to keep clean.

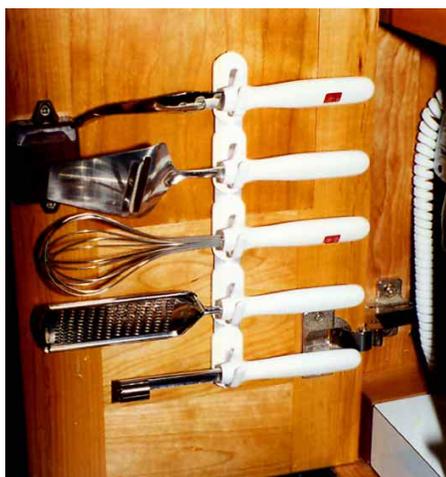




Thermos bottles are ideal for both hot and cold drinks. We like to keep tea in one and soup in another when in cold climates. The type with the pumps are best as they can be operated without ever opening the top. However, these have glass liners and require careful storage. One brief trip across the boat with a roll, and the liner is history. We typically see these held in place with bungee cord. However, an ideal place is to let them into the galley counter (upper right).

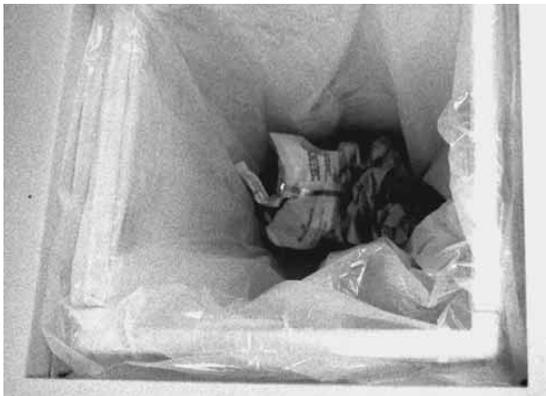
Sometimes simple household racks work well offshore (lower left). This simple plastic holder is ideal for containing galley implements. Make sure the holders are plastic, however, as any metal is likely to be mild steel and will soon rust.

The bar detail (lower right) is very clever. The locker door opens downward to expose drinking glasses and a couple of bottles of liquor (not shown). The door is built with a high edging to contain glasses while they are being poured.



Trash

Trash storage is always a difficult problem. Rarely does a good trash-storage area get designed into a new boat. Without it you're left to catch as catch can. If you're building, allow for at least a 3-gallon (11-liter) container. This is sometimes possible to work into a hard-to-use corner of the galley counter.



On *Sundeer* we created an opening in our Corian galley counter with a lip around which was fitted a trash bag (upper photos). This worked well but was expensive to execute and depended on a supply of plastic bags.

The best trash system is some form of simple plastic bucket attached to a door or let into the counter (middle left). On occasion the trash lid can do double duty (middle right) as a place to store galley gear or plates about to be served. This lid is reversible — when you don't need the fiddled storage area, turn it upside down and you have a flush counter top.

Another approach we've used is to build a fiberglass receptacle, typically fitted to a door or drawer in the galley. This works quite well but is neither inexpensive or light (bottom left).

NAVIGATORIUM

The navigating area on the proper cruising vessel can vary from the reefer top or saloon table to a luxurious chart table navigatorium. Strictly from a navigation standpoint, very little specialized space is required. All you really need is storage for charts, sight reduction tables, the pilot book currently in use, light and radio aids list, and a few instruments. If you use electronic navigation aids, you'll want a dry home for them.

The chart table itself, if there is one, should be large enough to handle U.S. charts folded in half. A pencil sharpener should be close at hand, and a rack or drawer for dividers, parallel rules, and pencils. The chart table top should lift up and allow for storage of at least a dozen charts.

Use for Office Work

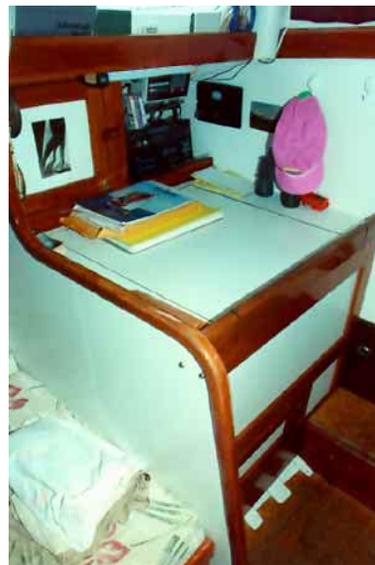
Aboard all our boats the navigating area has been used more as a desk/work area than for pure navigation. And since the area has always been handy to the companionway, with a comfortable seat in which we could brace ourselves on either tack, we've found we spend most watches reading at the chart table with a trip topside to scan the horizon every 10 to 15 minutes.

Most office work today takes place on a portable computer. The space required for this is less than you'll need for charts. If you tend to spread out paperwork (as we do), that becomes a consideration in the design of the "office area." For a number of our clients we've installed special file-sized drawers.

Three different approaches to chart tables and seating. The Express 37 (lower left) allows you to work from the end of the saloon seat or the edge of the quarter berth with the table overhanging your knees.

The 40-foot (12.3m) cruiser (top) has a small nav desk with an outboard shelf, which becomes very important when doing office work or reducing celestial observations.

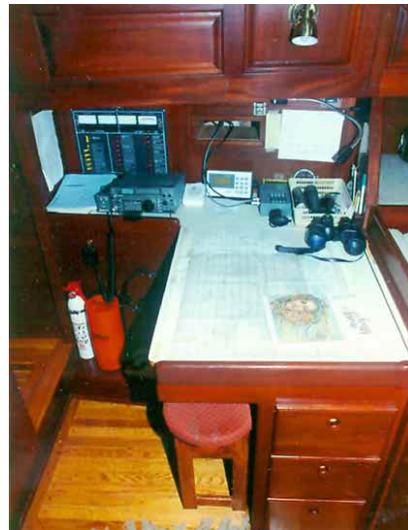
The chart table on this 45-foot (13.8m) ketch (lower right) has no provisions for sitting, but is handy to the companionway so that the watch can drop down and use it when necessary. A large fridge box is contained under the desktop.



Electronics Installation

This is where the debate begins. The norm is to inset electronics into some form of furniture face, giving everything a very finished look. There are several problems, however, with this approach. The first is that it is costly — you'll spend as much or more on carpentry as on the electronics. Second, when the time comes to work on the gear, it is less accessible. And finally, when you change to a new piece of gear, odds are you will have to call a carpenter to make the new piece fit.

We prefer to install the electronics under or on top of a shelf, so that it can be easily removed for maintenance or replacement. With shelved installation, the location of gear can be easily changed as you cruise — you almost always find you want gear placed differently after you've used it. If designed correctly, these installations can be quite attractive.



Look at the radars in the upper left and middle left photos. In the upper left photo you can see it from seated position or when passing by. In the middle shot it is viewable only when bending over or seated in front. This could be a problem during a difficult approach when you want to be on deck and looking at the radar at the same time. In the upper right photo there is no fiddle rail on the inboard edge of the table. This will be a problem on starboard tack, as things tend to slide to leeward. The bottom right photo has a radar that is only viewable when seated. The owners are forced to use a removable seat so they can get into an aft cabin. This makes the table difficult to use at sea. The simplest approach (lower left) is to install things loosely. In this case, there's a locker door that can be closed when you are not using the gear.

It gets easier as the boat gets bigger! The upper three photos show the nav/office area aboard *Terra Nova*, one of our 58-foot (17.8m) designs.

This nav area is located opposite the galley, down a short companion-way from the cockpit. It has all the usual electronics of a modern yacht, including an Apple computer and printer. The desk is laid out in an L-shape to maximize work surfaces. In order to use this area most efficiently, a swiveling chair has been worked in for seating. This also makes the cabin look larger, as it opens up some sole space visually. The negative is that it is not as comfortable to use at sea — but it works really well in port. A file drawer is an integral part of the design.



The bottom two photos show two of our 62-foot (19m) designs. The lower has an athwartships-facing table and chair. We did this to open up the saloon area by reducing the intrusion of a large nav desk into the saloon. However, this was not very comfortable at sea, and we returned to a "normal" layout on the next boat (middle left).



Most of the electronics on both boats are shelf-mounted. On the upper design, the radar is set into an opening, rather than into furniture faces as with *Terra Nova* (above). This makes it a lot easier to change. Notice the low shelf running around the perimeter, under which is hung a variety of gear.

A nav seat rather than a bench is required, as access to the engine room is directly behind this area.



An interesting comparison in design approaches. The upper photo is *Heart of Gold*, a 50-footer (15.4m). The lower photo shows a 62-foot (19m) sistership to *Intermezzo II*. In *Heart of Gold*, one of the objectives is to separate the nav area from the saloon area. This is done very effectively by the high locker.

Our preference is to keep the interior as open as possible, so there are no high lockers on our design. A 1-foot (0.3m) "modesty" panel rises up from the nav desk, allowing a shelf from which electronics can be hung. There is also space for a row of gear to be mounted on the desktop. Even though the overall beam and length of these areas is the same, the lower design will have a saloon that appears twice as big as the upper, simply due to the lack of the high cabinets.



Comfortable use at sea has always been our design criteria. This means a seat in which you can relax on either tack. To do this you need to be able to brace yourself on something to leeward (usually a galley locker) to keep from falling out of the seat when you happen to be on the windward side.

When you are to leeward, some sort of a built-in or loose cushion is required to support the back. There should be enough space for a little taper to the back cushion.

The two photos (above) show seating systems that work well for short uses but that would not be comfortable to use for long periods of time. On the left is a flat bottom cushion with no room behind for a back cushion (although there is plenty of room outboard when heeled to leeward). The strap looks efficient, but will not be comfortable at its height. It would be much better to brace yourself to leeward (if there was something there to put your feet onto). The curved seat (right) is quite common in Europe. This tends to hold you in place at moderate angles of heel but is not as comfortable when sitting sideways.



At the risk of being repetitive, I want to come back to shelf mounting of electronics. If executed correctly, it can be both a simple and a good-looking installation.

The key is to have the shelf, under which gear is hung close enough to the desk surface below so that you only see the faces of the electronics. We typically set our height at between 6 and 8 inches (150 to 200 mm).

The upper photo shows one of our 64-foot (19.7m) models. The middle shot shows *Sundeer*. When we started with *Sundeer*, all the electronics were hidden inside lockers. However, we soon grew tired of leaving the lockers open at sea and moved our gear below, as seen here. Note how the electronic faces are underhung 2 inches (50mm).

We used this area for our writing and design work and eventually had a complex of computer gear on the aft desk, with laser printer and CPU on a shelf beneath the desk.



Having the clutter on the aft end kept it somewhat out of the line of sight from the rest of the saloon area.

The lower photo is of my dad's *Deerfoot II*. Although this design is much larger than *Sundeer* — 74 feet (22.7m) compared to 67 feet (20.6m), the nav area is much smaller. This was forced onto us by a mid-ship engine room. *Deerfoot's* bulkhead is directly aft of the nav area; *Sundeer's* engine room is all the way aft.

The nav area is fine for writing up a log or looking at a chart and works okay with a portable computer, but it's a little small for big projects.

An interesting comparison here is the height of the modesty panel. Compare this to the one we used on the 62 on the preceding page (middle left). This is about 50 percent higher and shuts off more of the mess, but also makes the total saloon area seem somewhat smaller.



A compact head (top) with toilet, sink counter, and shower area all in one. The toilet faces aft, and a bulkhead on each side keeps you in place while the boat is heeled. Note the mirror on the bulkhead. This helps to open the space that is otherwise very tight.

The bottom photo shows a typical sink basin on one of our boats. The face of the basin has been curved to match the oval shape of the sink and pulled out from the rest of the cabinet. This makes it possible to use a large sink in a small cabinet and creates some toe space at the same time.

With experienced cabinetmakers, this type of detail is not too difficult to execute.

On the right side of the photo you can see the forward part of the shower opening. Notice the high threshold. A shower of this design can be used in adverse conditions without too much difficulty.

HEADS

Following the recent trends in new-home construction, it appears that the heads on production boats are getting larger and larger. On a vessel with already severe limitations on interior volume, this allocation of space to an area that is used so little is puzzling. Further, a good head at sea *has* to be compact. There are certain times in the head when you must have one or both hands free. If the vessel is bouncing around, the tighter the quarters are, the better off you'll be.

Toilet Orientation

If possible, the toilet itself should be placed fore and aft, between the side of the hull and the sink or the sink counter on larger craft. This way you're naturally braced when the boat is heeled on either tack. If the toilet is athwartships, strategically placed handholds are necessary.

As for the toilet itself, most seem to work well if they're simply constructed and not misused. *Intermezzo* had an inexpensive Wilcox Crittenden "Headmate" that stood up well for three-and-a-half years. For the last 15 years we've used Raritan PH11 toilets with good success. They need an overhaul of their rubber parts about every 9 months to a year. One tip: Always keep the cover down when the head's not in use, or sooner or later something will fall into the bowl and crack the porcelain or choke the plumbing.

Showering

You should be able to shower in the head at sea while the vessel is pitching. Again, handholds are the solution. We've found the best shower arrangements for smaller yachts to be handheld units connected to the sink faucet with a quick-disconnect fitting. Using a shut-off valve right at the shower wand makes it easier to shut off the water between soaping and rinsing.

On small yachts, space forces you to use a "wet-head" arrangement, where you shower in the same area as you use the toilet and sink. This sounds awful, but judicious use of shower curtains and hand sprayer keeps splatter to an acceptable level.

With a little more room you can create a shower space in conjunction with the toilet. Yes, the head will have a wet seat, but the rest of the shower area will stay dry.

When creating shower spaces, think about how they will be used at sea. We like to have a divider that can be leaned against with the shoulder. Where you step into the shower area there should be a lip of at least 16 inches (406mm), and preferably a bit more. This is just enough to lend support to your legs.

The best way to take a shower at sea is to sit down with your shoulder against a bulkhead. It is fre-

quently possible to build in a seat where the hull slopes outboard, or at the forward or aft end of the shower compartment.

I like to keep shower compartments as narrow as possible to constrain your movement at sea. This ends up being between 22 and 24 inches (550 and 600 mm) in width at shoulder height.

Sole Gratings

Linda would not let this subject pass without adding a word on the gratings typically found at the bottom of most heads. These look very nice but are hell to keep clean. To do the job properly you have to take a toothbrush to each slimy-bottomed little square, a time-consuming and unappetizing task to say the least. A better bet is no grating and a good nonskid finish. If a grating is a must, use one in which the timbers only run in one direction.

Are Two Heads Better Than One?

Many vessels today are built with two or more heads. On an offshore boat these extra heads usually end up full of sailbags and other odds and ends because space is too valuable to waste. Consider putting removable shelves in the second head, as we did aboard *Intermezzo*. This transforms the space into a fantastic pantry, and for a modest investment gives a tremendous increase in easy-to-use storage. When the time comes to sell the boat, if her new owners want the multi-head arrangement, the shelves can be removed easily. Hanging lockers are another good candidate for this treatment. Shelved stowage space is usually the most sought-after accommodation on any boat, and these are easy ways to increase it.

Day Head

As yachts grow larger, extra heads are the norm. One of the decisions to be faced involves access. If you are having lots of short-term guests aboard, a head with direct access to the saloon is a good idea. Otherwise, anyone using a head has to go through someone else's stateroom to use the facilities. However, this approach sometimes makes access to the guest stateroom more difficult. So, if you take this approach, be sure it is really necessary.

Do You Want A Bathtub?

A bathtub on a cruising yacht? Yes, they are possible and, when fresh water is available, are really nice to have. The key is to keep volume as tight as possible in order to reduce the quantity of water required. We usually make our tubs about 20 inches (508mm) wide at the thickest end, tapering to 17 inches (430 mm) at the feet. With this sort of arrangement, you can take a nice bath for less than 15 gallons (58 liters) of water.

Shower Curtains

Before we leave the subject of heads, a word on shower curtains. Do everything possible to avoid them. They are impossible to keep clean and quickly become mildewed. With careful design it is usually possible to eliminate the need for a curtain, especially if the crew is careful with the handheld shower.



Sometimes it make sense to put the sink in the corner rather than the middle of a counter. This allows you to use a narrower counter in the rest of the area. If there is a toilet opposite, this reduces the space required for the head compartment. However, make sure there is somewhere to brace yourself on both tacks when working at the sink.



Heads are usually located outboard, and, due to the hull shape, not all of the horizontal space can be used for sole. This makes it possible to work in a large locker (or shower seat) between the area where the sole ends and hull (upper left).

If you have a wet head, the locker needs to be sealed or the contents will invariably become damp. There are two approaches to this. One is to use a rubber seal around the perimeter of the door. The second is to cover the door with a shower curtain.

The cleanest way to mount sinks is under the counter surface (upper right). If the sink is designed for this, it is not difficult to execute and makes for a much nicer-looking counter. In addition, the counter is easier to clean — this applies to galleys as well. Notice how the faucet is set at an angle rather than directly opposite the bowl. This makes it possible to use a thinner counter.

When sink, counter and shower are in close proximity, the same fixture can be used for both (middle right). This reduces plumbing complexity and works quite well, as long as you can easily reach the valves from your showering position.



Enclosing the shower area with Plexiglas as on this Deerfoot 74 (left) keeps water contained while maintaining visual space in the head. The only negative is cleaning the Plexiglas with each shower (especially if you have hard water).

Race boats frequently have heads constructed with curtains (right). They actually work quite well, and are light and easy to construct.



SALOONS

The main saloon gets the leftover space after you've designed the sleeping areas, head or heads, galley and nav area. It will normally serve as entertainment center, dining room, library, and perhaps boudoir.

In general, the saloon has the most open floor area, so be sure there are enough handholds to get from one end to the other in a seaway.



Traditional saloons (top two photos) usually had one or more pilot berths outboard of the saloon seats. This provides extra bunks in the middle of the boat and creates huge storage areas beneath the pilot berths. However, it also forces the saloon seats towards the centerline, reducing visual space in the process. If you don't need the bunks (due to their height, they're uncomfortable when rolling downwind), it is better to do without them and have the larger saloon. Note the difference in mainmast location. When it bisects the saloon, it reduces the sense of spaciousness way out of proportion to the actual size.

The bottom photo shows a smaller yacht where a C-shaped seat that doubles as the bunk is placed forward of the galley areas in the aft end of the interior.



The saloon-design equation gets easier as boat size increases. *Heart of Gold* (top two photos), a Carl Schumacher 50-foot (15.4m) cruiser-racer, has a nice open saloon, yet the space is tight enough to be traversed with ease at sea. Note the handrails overhead to ease passage across the saloon sole. (Carl Schumacher photos)

Sunset Blvd (next two photos), a 54-foot (16.6m) design, is shown in the second set of photos. She was originally a stripped racing boat that was converted to a cruiser. The curtained-off area forward contains bulk storage for cruising and the sail inventory.

The first *Deerfoot* (third two photos), a 68-footer (20.1m), had a trunk cabin (the only boat we've done this way) and a traditional saloon layout with C-shaped seating and settee opposite. The trunk cabin makes for low, sleek topsides but compromises interior volume.

The lower photo is the eating area opposite the galley on the 72-foot (22.1m) *Locura*. We used this same arrangement (saloon forward-eating area opposite galley aft) on *Wakaroa*.



On *Intermezzo II* we built a handrail (top left) onto the edge of the saloon table. This worked so well for traversing the saloon sole that we never used the overhead handrails. The only problem was that it was fixed, making it difficult to eat on that side of the table.

On subsequent yachts we made the handrails removable. This way, in port a tablecloth would lay flat and you could eat or play cards with wrists resting on the table surface — a much better arrangement.

An idea on *Intermezzo II* that did not work so well in practice was the fixed center fiddle. This was great at sea, but in port made the use of a tablecloth impractical. On subsequent boats we went back to simple removable fiddles.



A clever approach to using a saloon or pilothouse seat for eating (upper left two photos). A simple but robust stainless-steel arm with a tapered base fitting is easily removed for storage. Table bases need to be solidly secured and of substantial diameter, or the table will wobble, a most annoying feature. For tables that fit into an 8-foot (2.4m) area, we usually specify two supports. In aluminum these are generally at least 4-inch-diameter (100mm) schedule-40 pipe. Be sure that whatever they are secured to is heavily reinforced. If you try bolting to a piece of 3/4-inch (19mm) plywood without close support nearby, the sole will bend and the table will rattle!



Ideally, the saloon table will fold into a smaller size when not being used for dinner. If it were to drop to cockpit-table height, that would really be nice. We've done a few of these, but have found that they tend to move around a bit. However, the system on *Lady Kathryn* (lower photos) works well. The secret is a large-diameter (8-inch/200mm) table support.



Seat Arrangements

Saloon seating arrangements vary with available space, how many people you need to fit in, and the desired ease of access to seats and storage.

A general rule of thumb is to allow 24 inches (610 mm) per person, although you can get by with a little less.

One option is to have opposing bench seats, each with room for one or two people, and a table in between. You can then add a folding chair to the outside, giving room for three or five to sit at the table.

Another way to go is with an L-shape, generally with two seats on each leg of the L. This is the approach Linda and I favor, as it allows easy access to hull-side seating and storage. We carry a couple of folding chairs for use in port when we have guests over for a meal.

You will fit in the most people with a C-shape, but this is the most difficult to use, and what you gain on the end could be replaced with a folding chair.

Then there's the issue of straight versus curved. Curved seats are sexy to look at, but it's impossible to sleep comfortably on a curved seat. Our preference is to tolerate the aesthetics of the straight line and go for the comfortable seat when lying down.



On smaller yachts like this 25-footer (7.7m) (top left), it is sometimes necessary to have just a single settee opposite the galley area. While tight, this arrangement works fine at sea as long as it is comfortable to brace yourself against the leeward side.

With a modest-beam 35-foot (10.7m) interior, there is room for opposing settees as in the previous section. However, having the table off to one side, as shown here (middle left) with facing seats, adds a bit of visual room to the sole and really opens up the interior.

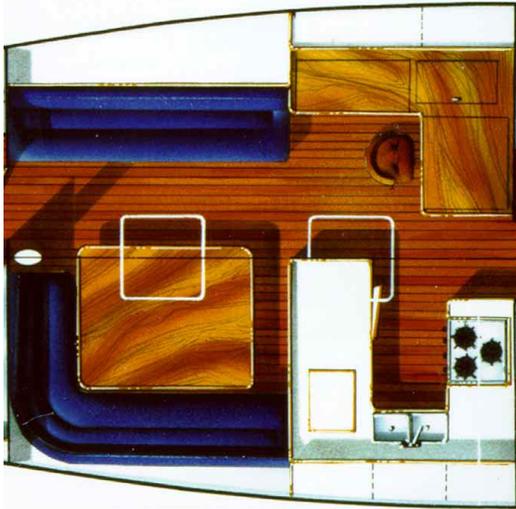
A very traditional saloon on this Salthouse-built Al Mason 60-foot (18.5m) (lower left). There's room for two on each side, or three if you really crowd it. Note the lack of back cushions. Cruisers were tougher in the olden days!

Sometimes there will be a bit of space that you don't need for storage and don't know what to do with. That's what happened here (lower right) so we put in a small table with room for one person on each side. We thought that having a second area to read, work or play cards made sense. However, if we had it to do over again, we would turn the area into a large closet.





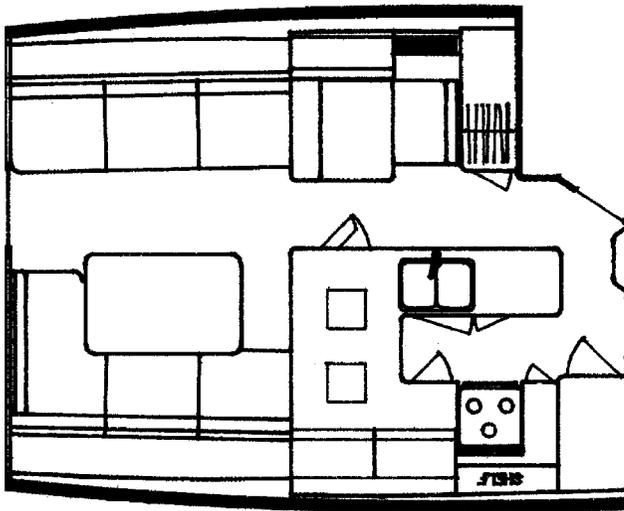
A comparison of seating concepts. The top four photos have L-shaped settees, while the bottom four show different types of curved seating. The curved look is more sophisticated and great for entertaining. But at sea you lose the ability to sleep on the curved seats. If the curves are present on both side of the boat, or if you have divided chair-like seating opposite the table, then there is no place in the middle of the boat to snuggle down with a book, or to try to catch some shut-eye in bouncy weather. Both approaches make sense, as long as you are clear about your goals.



The main saloon area (on most boats, the galley, formal saloon area, and sometimes nav or office area) can be designed in many different ways. We like to see a combination of visual openness at eye level with furniture at counter top level spaced closely enough to keep you secure when moving about at sea.

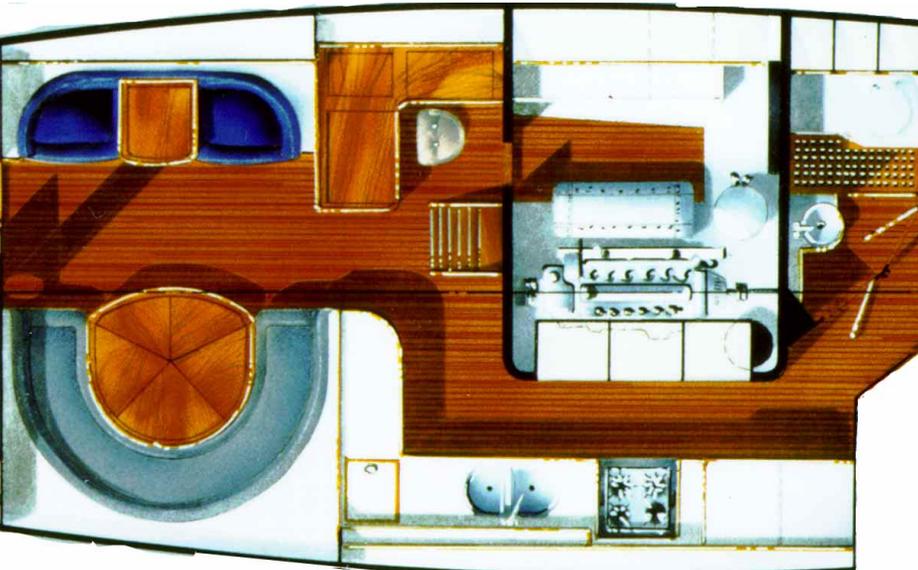
The top drawing shows the saloon area on *Terra Nova*, a Deerfoot 58. This follows what I would call the "classic" approach. The settee is L-shaped to port, which allows easy access around the table. The seating to starboard is in bench form, so you can sit, sleep, or read with your feet up on both tacks.

The galley and nav/office are contiguous with the seating so that the whole area has an open feeling. Note that the nav/office desk has been rotated onto the aft bulkhead. This opens up the cabinsole, helping visual space. It also avoids what would otherwise be a restriction between the galley fridge counter and the nav desk. The only negative in this layout is the fact that on port tack it is a bit of a hike from the companionway to the table area. The stove is on the aft bulkhead, and does not gimbal. The sink is outboard and is pumped overboard rather than allowed to drain (this avoids mistakes that could lead to a flooding!). This sink/stove relationship allows for a large, efficient fridge/freezer box.



The bottom drawing is one of the Deerfoot 74s. The engine room is located amidships, under the pilot house sole. The engine room bulkhead forces you to use an L-shaped galley, the bulk of which runs alongside the engine room. The advantage in this is that the galley and most of the mess associated therewith is hidden. The disadvantage is that visual space is substantially restricted. If you went from *Terra Nova* to the 74 you'd think that both areas were on comparable sized boats.

The center drawing is a Sundeer 56. Because guest quarters are limited, the total length of the saloon area on this design is larger than on some of our much bigger designs. The total length is over 17 feet (5.23 meters). Compared to the Deerfoot 58 and 74 with 13.5 foot (4.15 m) of space, you can see how this would feel huge.



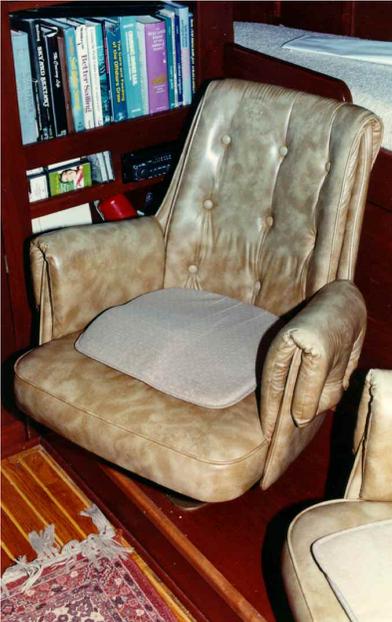
The point I am trying to make is that being clear about your design objectives can lead you to different, extremely effective solutions. We create this space in the 56 precisely because the mission for the boat is clear — two people aboard 97% of the time.

Built-In Chairs

We have frequently been asked by clients to work some sort of chair into the main saloon. This has a lot of appeal in theory. It gives more of a feeling of being at home and, if ergonomically designed, can certainly be comfortable.

However, there are several trade-offs, some of which we've discussed already.

If you plan to spend most of your time in port and are not concerned with having the best possible berths at sea, then go for it. But to make your yacht as comfortable as possible for passaging, you are better off with a bench-style seat opposite the table.



Here's a simple approach to saloon chairs (upper left). Build a platform raised a bit from the sole, then go to an RV supplier and pick up a couple of "captain's" chairs. These are far less money than you can hope to pay for on a custom chairs.

In spite of my protests to the contrary, my dad wanted chairs opposite his curved saloon seating (upper and middle right). They look great and work fine in port. After living with them, he would still do the same thing the next time — and I still don't like them!

Home-like chairs were a prerequisite from the beginning when we designed the Deerfoot 72 (lower right). These chairs were constructed and upholstered at a regular furniture company, with provisions for bolting them into place on the boat.



Pilot Berths

Twenty-five years ago almost every yacht had a couple of pilot berths in the saloon. This was a convenient way of packing in bodies, especially to windward when the weight would help boat speed. It also created cavernous storage spaces.

A good pilot berth will be tight to keep you in place in bad weather. The norm is typically about 22- to 24-inches (550 to 600mm) in width at the shoulders. If the hull tapers in a bit towards the feet, this is okay.

Pilot berths tend to get a bit stuffy when cruising in the tropics, so be sure each has an electric fan.

If you happen to have a boat with pilot berths in the saloon but don't need the sleeping space, consider taking them out and moving the settees outboard or converting the space to storage with a locker front.



Pilot berths come in all shapes and sizes. The pilot berth in the upper left photo has been converted to a deep shelf for general storage. There are no seat back cushions on the vertical face to make access to storage easier — throw pillows are used for back support).

Traditional pilot berths were very narrow at the foot (middle photo). This berth tapers down to 15 inches (380mm), the minimum for use in the tropics.

In the lower photo, there are back cushions for the saloon settee. This will be more comfortable than throw pillows. The pilot berth is also quite a bit wider.

Note the difference above the pilot berths between the lower and middle photos. The lower boat has about 75 percent of the berth covered with deck, while the middle berth, being a flush deck design, has more space above it. There will be a big difference in air flow in the tropics between these two layouts, although the tighter berth will be better in severe weather.



Aside from a place to sleep at sea, pilot berths provide a huge amount of storage volume below their mattresses. This is due to the fact that they are high where the hull is widest. Of course being high, you would keep this space for lighter materials (keeping the heavy stuff below the center of gravity where it helps stability).

The top photo is a 42-foot (12.92 m) Bob Perry Design. Access under the bunk is covered by simple cushions which are attached with Velcro. Note the large cutout in the center of the mattress fiddle. This makes getting into and out of the bunk easier, yet provides a bit of support for your shoulders when heeled (at sea you would use a lee cloth). The bottom

photo shows it like the old days when pilot berths were used for ship pilots. The curtains give the occupant some privacy and will darken the bunk when the rest of the boat is lit.

You need somewhere to put a book, a drink, or eyeglasses when using one of these pilot berths. A small fiddled shelf (upper right) helps in this regard.

COMPANIONWAYS

Companionways are always difficult to design. There is never enough room to get the angle that makes them as easy to use as stairs in a home, yet they have to function at sea with the boat heeled and bouncing around.

The ideal situation is to have a companionway that enters the boat between two bulkheads. If this is not possible, it helps to have the last step close or between two pieces of furniture.

The steeper the ladder, the more difficult it is to use. This is very much a function of the age of the user. Younger and more agile crewmembers can live with steeper ladders.



There are as many ways to design companionways as there are designers. The main issue is that they should be easy to use at sea. The curved steps (upper left) send you down between two bulkheads. The bulkheads provide good support on either tack. The grating at the bottom of the companionway contains drips and provides an excellent nonskid surface to catch your feet as you step off the ladder.

A flat step with angled sides keeps your feet more efficiently braced to leeward when heeled (upper middle photo). However, this is less comfortable when the boat is upright. You can achieve the same effect with good nonskid and correct width allowing you to spread your feet for the best support. The leeward leg will take more load, but with moderate heel and when the boat is upright, this is more comfortable and safer.

When we have a companionway open up to a saloon area, we try to have the last step send you between supporting furniture, as on *Sundeer* (upper right).



Sometimes you need a ladder for direct access to the deck and for use as an escape hatch if the companionway is blocked by fire. Using curved steps (left) reduces the intrusion of the ladder into the living area.

On larger yachts the tendency is to splay the bottom of the ladder. This looks great but is a little difficult to use at high heel angles.



Steps

Our preference is to use flat steps, typically 6 inches (150mm) in depth (fore and aft) and anywhere from 15 to 18 inches (380 to 457mm) in width. On the other hand, many designers and builders like to use curved or angled steps. These are somewhat easier to use when heeled, but more difficult when sailing upright.

Our experience is that with a good nonskid finish on the tread of the step, the angled/curved approach is not necessary.



A common method of creating nonskid on a varnished ladder tread is to use unfinished and grooved teak. This way when the teak wears over the years you can easily replace it.

Another approach is to route out grooves and inset rubber strips. The strips catch your feet or the soles of your shoes and provide an excellent anchor. These are also replaceable.

We most often use walnut shells (not shown) for nonskid.

HANDRAILS

As you move through the boat at sea you need support for every step. This can be provided by waist-high furniture, or by handrails strategically placed throughout the interior. Remember, they need to work on *both* tacks.

We often find that it works well to put vertical handrails on bulkheads.

Overhead rails need to be positioned so that they work for all crewmembers, the shortest of whom may require different rails than the rest.

To be effective, handrails should allow your hand to close all the way around. This is the strongest grip. If you can only get your fingers partially around, it will be difficult to hold yourself when the boat gets slapped by a big wave.

Most handrails are made from timber. However, stainless is much stronger, can be made smaller in diameter, and are therefore easier to hang onto.

If adding rails, wait to install them until you've spent some time on each tack at major heel angles. Once you've had this experience, your ideas on what's required will probably change.



We frequently route out handholds in high fiddle rails (left). This allows fingers to close around the opening, rather than just gripping the edge of the fiddle.

With exposed deck beams, a dowel can be run longitudinally to provide excellent support (second photo). Ideally, dowel diameter should not be more than 1 inch (25 mm).

Most handrails are made from timber (third photo). This means they have to be substantial in diameter or have very close supports. There should be adequate space between the deck and top of the rail to slide your fingers through. We like to see at least 1.5 inches (37 mm).

A handrail built into the cabin trunk edge is often very handy. However, as your hand cannot close around this, it is not totally effective in heavy weather.

ENTERTAINMENT CENTERS

It seems that even the smallest yachts today have enough entertainment electronics aboard today to warrant an entertainment center. We tend to look at the design of these the same with navigational electronics. Ideally, whatever system is used for installation will be flexible, allowing for future changes and upgrades. This means avoiding built-ins when possible, staying with shelf-mounted gear.



Under ideal circumstances, entertainment centers will retain a certain amount of mounting flexibility, so you can change (or maintain) gear with ease.

The swiveling TV stand (upper left) meets this test, as does the system installed in the locker above and alongside. However, the installations below are built-in. They look great but will require a carpenter to update to new gear.



Two major questions are: Where do you want the gear, and should it all be together? Take the TV, for instance. There will be times when you prefer to watch it from your bunk, and other times when it will work best in the saloon. And if in the saloon, can it be seen by the cook as well? What about on deck, under the dodger or in the pilot house?

Of course, you could install a series of TVs. Our preference is to go with a small, portable unit, with built-in VCR. These are available in 12-volt configuration, with small carrying handles built into the top. Portable and easily stowed, they do not require a permanent installation. All you need is a bit of space under a bunk or at the bottom of a hanging locker where they can be stowed when necessary.

Music systems are typically very compact, assuming you are going with automotive gear. If using household systems, quite a bit of space is involved and you'll have to devote significant thought to installation. Also consider how to dissipate heat.

Speakers are always an aesthetic problem. For good sound you need large speakers. However, these are hard to fit into the interior and even with available space are unsightly, unless expensive timber boxes are custom-made.

One approach that works efficiently is to use speakers designed for flush wall mounting. These are generally about 3.5 inches (82mm) deep and so will fit through a bulkhead or inside a headliner without a great aesthetic impact. Some of these speakers have excellent sound reproduction.

ENGINE SPACE

Here we get into one of the biggest trade-offs in interior design. Ideally, you want to have a separate engine compartment with lots of space for access to all gear. An engine room done in this manner will be less expensive to install and much less expensive and less frustrating to own. Our experience in new builds is that whatever it costs to add to the length of the boat for adequate engine room space is more than saved in construction labor.

The machine should also be as low as possible in the boat and isolated for noise and odor.

Our preference is to have the engine room isolated behind a watertight bulkhead, in the aft end of the boat. This is sometimes difficult due to weight concentration in the rear end; however, over the last 20 years we've learned how to deal with this very effectively. You pay a slight center of gravity and pitching penalty, but the benefits are so enormous they are well worth the penalties.

Of course, this is only practical if you design with this goal in mind from the beginning. If you have an existing engine space, the odds are it will share living quarters with the crew.

The main thing is access. You need to be able to investigate all critical elements without taking the boat apart — this means belts, filters, fuel and water pumps, injectors, and the starter motor. And it must be in an area that remains dry regardless of weather or sea conditions. Good access to the stuffing box is also required.

Once this is taken care of, you then need to look to the rest of the accessories. Gensets, fridge compressors, and watermakers all live by the same rules. Access and dryness are essential.

On modern light-displacement designs there is usually not the depth of hull to allow engine installations under the floorboards. The shallow bilges of these yachts require the engine to be under a galley counter or perhaps under the cockpit.

In either case, there should be room for at least 1 inch (25mm) and preferably twice this for sound-absorbing material.

Finally, consideration must be given to the engine (and other gear) in the event of a flooding. Higher installations offer better flood protection. Since the oil dipsticks (both on the pan and the injection pump) are usually what first allows water into the engine, it sometimes makes sense to extend these with a bit of hose and a longer dipstick. This way, even with a severe flooding, you can still use the engine to help pump the bilges.

CABINETWORK

Furniture on a yacht has to function in an extremely difficult environment — hot at times, cold at others, with humidity levels varying according to weather as the vessel moves from one region to another. Meanwhile, timber is swelling, shrinking, and warping as its environment changes.

If everything is done just right — the correct woods are chosen, cut properly from the log, air dried over a sufficient period of time, and used in a manner that encourages the furniture to stay in one place — *maybe* everything will fit.

But it's more realistic to assume that the shapes will change, and to allow for this in design. Otherwise, carry a wood plane for some judicious shaving now and then.

Door Design

If a solid timber frame surrounds a thinner plywood panel, raised panel doors are usually the most stable. Another approach is to make a sandwich from plywood, structural foam, then ply again. This is usually warp-resistant as well as light.

Whatever system you're looking at, be sure to allow lots of tolerance between edges for shape change.



Corner details are the toughest to design and execute. This is where you separate the real craftsmen from the house carpenters.

On *Sundeer* we laid out the timber grain horizontally (top left), then wrapped it around the corner. This looks good but was very difficult to execute and in a few small areas led to the veneer separating from the corner post substrate. The production 64s (upper right) were

done with a conventional corner post (grain running vertically). In hindsight, we feel that what we did on *Sundeer* looked too "manufactured" for our taste. Note the second fiddle on stainless upstands.

Wakaroa has very traditional furniture made from solid teak (middle photos). The wood was chosen for its rich grain. Note the lack of a fiddle rail. The timber front runs past the seat base to form the cushion retainer.

When you go for very light construction, solid timber must have some means of keeping the joints together over time (lower left). This hatch coamings are just 3/8-inch (9.6mm) thick and so are reinforced on the corners with an epoxy/fiberglass laminate.



Wakaroa (top) carries the same traditional solid-timber theme throughout her interior. The drawer faces are solid with edges gently radiused. Tall pieces of furniture have grain running vertically, while drawers and lower pieces of furniture have horizontal-running grain.

Sometimes a combination of timbers can be used (below). This combination of New Zealand kauri with teak trims is quite dramatic, although the kauri does not have the rich graining of teak.



Timbers

On most yachts, the overwhelming choice of wood is teak. Color and grain structure have an aesthetic appeal, and if teak becomes water-stained, the stains can be sanded or bleached out and the finish returned to a like-new state. With other timbers, if the varnish is damaged and water stains result, there will always be some residual staining when refinishing is completed.

Many shades of teak are available, running from a light, golden-colored “honey” teak to the dark shades seen so often on boats built in northern Europe. We much prefer the lighter shades.

We’ve used other timbers in areas where they weren’t subject to damage. Light timbers such as ash or holly make interiors look wonderful. But try to stay with teak for hatch coamings and galley fiddle rails, as these are the areas most subjected to damage.

Since most furniture is built today from veneer-faced plywood, one factor you’ll want to evaluate is the thickness of the veneers, which can run from paper-thin to 1/8 inch. The thicker the veneer, the more damage-resistant the timber.

If you’re adding some cabinetry and trying to match older materials, keep in mind that all timbers lighten in color with age. Newly milled teak will be substantially darker initially than after six months. If modifying an existing interior, careful removal of old joinerwork can salvage large amounts of timber for use in new work where it will match the old.



Joinerwork styles can go in almost any direction, as long as the timber is used to advantage. When we built *Intermezzo II* in South Africa (upper left) we used a native yellow wood for large surfaces with teak corner posts, fiddles, and cappings. It looked beautiful, but over time the busyness began to bother us.

Some of the best craftsmen in the world worked on the original *Deerfoot*, as you can see from this corner in the trunk cabin (upper right). Kauri is used here, as well as for exposed deck beams (not shown). The rest of the boat had Formica on the large surfaces with teak corner posts and fiddles.

We feel that the interior of a boat (even a large one) is so tight that styling should be consistent throughout. With raised panel doors, this look should be carried on throughout, as it is here in the trunk cabin below the opening port (middle left).

When we did *Maya*, the owners were looking for something with an oriental look. The cabinet and cabin doors were all made up to look like shoji screens. Ash was used because of its light color, and we filled the latticework with a high-tech fiber-reinforced material that would transmit light. Surprisingly, this has stood the test of time.

Sometimes a clean race-boat look (lower left) can be very effective aesthetically, especially if you keep stores good and orderly. This cutout ply is light, easy to execute, and stands up well as long as you keep an eye on the exposed edges.

Fiddle Rails

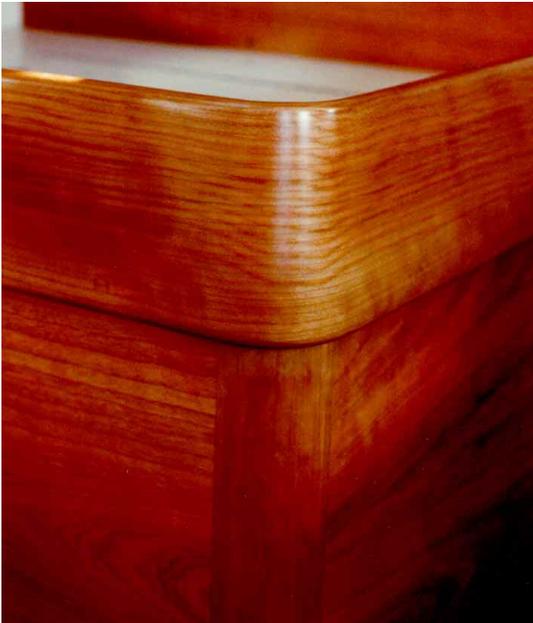
Fiddle rails serve many purposes. First, they keep stores from spilling out of shelves when a locker door is opened. At the shelf edge they can also serve as a stiffener — the higher the better, as long as you still have access to place items high onto the shelf. A good bet here is 2 to 3 inches (50 to 75 mm). Second, the fiddle rail will hold various items on furniture. In the galley and in other areas where you really want things to stay put, a 3-inch-high (75mm) fiddle is ideal. In other areas, about 1 1/2 inches (38 mm) seems to do the trick of protecting and covering an edge and providing security for low stores.

You need to decide if the corners of the fiddles are to be closed. This will contain a spill, but makes it more difficult to clean a counter. We opt for spill protection.

It often makes sense to have an extra removable fiddle or two placed on galley counters for use at sea. This way glasses or serving dishes can be stacked up at meal time.

Another approach, when you don't want the bulk of a high fiddle but need protection, is to use a low fiddle on the furniture top, with a second, higher fiddle supported on stainless-steel brackets. The space between the two opens things up visually, yet there's a high (usually about 4-inch/100mm) rail for good support when heeled.

The face of the fiddle that does the holding should be vertical with little or no cove on the counter intersection. Any sort of a cove (which makes cleaning easier) prevents glasses and pans from lying flat against the fiddle. In a seaway this can create problems.



Two approaches (upper photos) to fiddle construction: One is to laminate the corner using thin strips of veneer. The second is to use solid timber and join it.

In order for the laminated fiddle to look good, it must be made over a jig with plenty of clamping pressure to squeeze the various pieces tightly together. Done correctly, there will be no visible glue line. In production, once you get the hang of it, this is very efficient.

A solid corner is harder to execute correctly in that you need very good tools and skilled craftsmen to get the fit. However, for the natural look of the different wood grains, it is the preferred approach.



We frequently inlay different timbers in top fiddles to create a sophisticated style (upper photos), depending on the owner's desires. In this case, the basic fiddle is teak with a large inlay of birch and a smaller inlay of rosewood. This design is carried throughout the boat on all large fiddles. Note how the two beveled edges of the vertical capping rail and horizontal fiddle mate.

With solid fiddles, you need to decide on the grain approach in the corners. You can attempt to make the grain match or have it contrast as shown here (middle). There is a generous cove inside this fiddle. This makes cleaning easier, but the rail will be less efficient at holding dinnerware in place. Foxed fiddles like these on saloon tables also make dining in port somewhat more difficult.

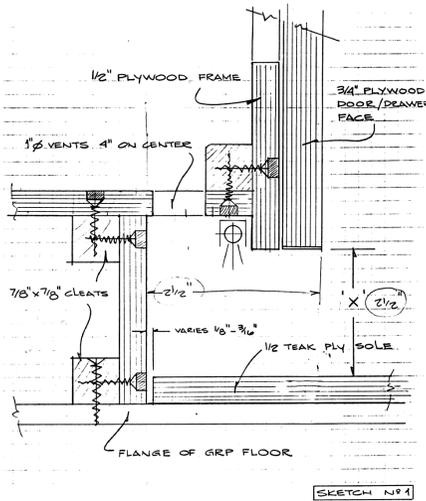


Another approach with fiddles is to leave toe corners open. This makes it easier to clean up, although it allows spills to drop down to the cabin sole.

Also, this type of corner is much easier to execute.

Furniture Ventilation

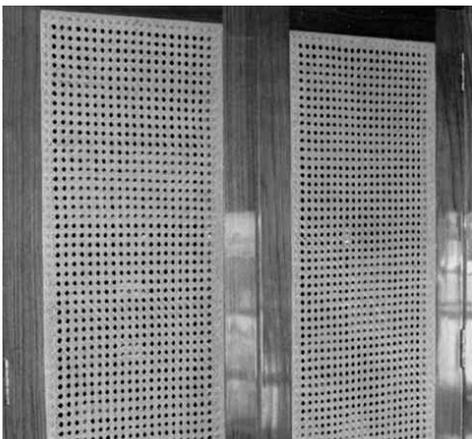
Air circulates through the bilges and interior (hopefully), keeping things fresh-smelling and reducing or eliminating mold and mildew. It would be nice if this air also moved through the lockers. To further this end, we usually drill holes or cut slots at each non-structural bulkhead and in the backs of all lockers, or where two lockers meet. If a bunk or locker is over a bilge area, it sometimes make sense to have breathing holes, covered with screens, cut into the locker bottom. Door faces can be louvered, have air slots cut into the edges, or held open with hooks. The key is to let air into and out of the lockers.



Locker ventilation is tricky. Most forms of slatting, grillwork, and rattan rarely let enough air in or out of the lockers to be truly effective.

We've found it better to cut large slots in the toe spaces (upper left drawing), then be sure the ends of all lockers are open through bulkheads and/or common locker end panels.

The very best system is to use a large eye-hook (middle left) to hold the door open. This affords an open breathing area when necessary, yet results in a simple, clean-looking door that is easier to fabricate and longer lived.



Hardware

Hinges need to be stronger than you might expect, in order to take the load of heavy objects leaning against the doors. Door latches must be secure during a knockdown, as discussed earlier. Remember that when heeled, heavy objects inside the locker may tumble against the latches.



Finger latches (upper left) are unreliable. When they are to windward, locker contents can tumble against the release lever, unexpectedly opening the locker. It partially helps to fit a guard.

We've had good results from the push-button-style latches (upper right), where pushing the button forces a flat plate out to lock the door. This is not as subject to accidental opening if properly installed. To open the door, you push on the button to pop it out, releasing the lock and providing a nice handle with which to pull the door open.

On some of our custom boats we've created special timber knobs (middle and lower photos) attached with a bolt to a flat stainless

plate. The plate is rotated to catch the vertical edge of the door frame. These are extremely positive, and as long as the knob is turned to the locked position, will not accidentally release.



Johnson Touch Latches (upper photos), developed for aircraft furniture, work quite well at keeping lockers closed when heeled. They require no knobs on the outside. Instead, they work by pushing the door, which in turn opens a detent that allows the lock to unlatch. The only negative is that they tend to be noisy — there is a definite “clunk” when you open or close the door with one of these.

Sliding doors often develop annoying rattles especially under power. This type of screw adjustment (left) with a rubber tip can be used to reduce or eliminate vibration.



A simple rotating hasp (right) creates a positive lock on the outside of the door. These are easy to install and work in the worst of conditions.

Another approach is to attach a piece of line to the inside of the locker, bring it out through the finger latch hole, and tie it to an eye strap on the exterior face (left photo). This is about as positive as you can get and relatively unobtrusive when not in use.



Alternatively, a simple flat plate that rotates past the door or drawer (right) will get the job done.

Locking washboards to the sliding hatch from inside the boat can be accomplished in several ways. One is to use a simple barrel bolt (not shown). A more sophisticated approach is to have an overcenter arm (bottom left) that slips into a receptacle on the sliding hatch. Note the two holes at the bottom. These are for locking the latch when leaving the boat.

Supporting nav desks and vertically opening lockers is easy with these stays from Sugatsune (bottom right). They lock when you open the door. To unlock, raise the lid a hair higher.





When drawers are mounted in an athwartships plane, they need to be somehow held in place. The most common practice is to have a ramp on the drawer runner to prevent the drawer from sliding out unless it has been lifted over the ramp. This works well in moderate conditions, but in heavier going — especially on smaller craft — pounding can cause a drawer to jump its ramp.

One way around this is to use individual hooks (upper right). Another is to have an eye strap at the top and bottom of the drawer stack, with a line tied between. With overlay drawers (upper left) you won't see any visual evidence of the ramp system. However, if you have a flush-drawer look (middle left), space has to be left at the top so the drawer can be lifted before it is withdrawn. The best approach is to design all drawers so as to face forward or aft (bottom right), in which case they'll stay in place when heeled.

Drawers

Drawers are better if arranged fore and aft. This way it isn't necessary to worry about spilling their contents at high heel angles. The only alternative is to use a lifting drawer, cutting down on storage space. For offshore work, the minimum lift is 1/2 inch (12.6mm).

Finish

When the time comes to varnish timberwork — whether for the first time or for maintenance — the question of finish will arise. Do you want matt or gloss surface or something in-between? We tend to like the glosses better. They're typically harder, stand up better and, to our eye, have a more finished appearance. But gloss shows fingerprints more and so has to be wiped down more often. It also shows flaws — if 6 coats of matt yield a nice-looking surface, 10 or 12 coats of gloss would be required over the same grain.

As the varnished area grows to include all furniture surfaces and bulkheads, gloss becomes less of an option because of maintenance and the higher cost of application.

HEADLINER SYSTEMS

Headliners are major cost and weight centers. They have an impact on access to deck hardware and electrical systems, affect interior noise and heat level and, if executed incorrectly, can be a major source of frustration.

If you buy a used boat or a production design, the headliner details will be fixed in advance. The main issue instead will be access for maintenance. Be sure you can get at hardware fasteners and wiring without tearing up the boat. *Intermezzo* had a fiberglass headliner — pure hell for access!



On some of our earlier boats we used light plywood panels covered with Formica and held in place with teak battens (top photos). This approach is very heavy and somewhat costly.

Removable panels with stretched fabric, like on the *Sundeer 64* (middle photos) is easier to do, lighter, and more versatile.

Regardless of the system used, some form of grid will be required, onto which the panels are attached. The only exception to this is in metal boats, where deck frames can sometimes be used.

Finished Structure

The lightest approach to a headliner is to finish off the fiberglass laminate. All deck hardware fasteners will be exposed, which is good, as you can locate leaks as soon as they occur. For wiring you must plan ahead and insert conduit into the core of the laminate so that you have somewhere hidden in which to run wiring. Otherwise, wires will be run on the surface, covered with some form of beading that does not look nearly as neat.

There are two negatives with this approach. One is that it is very labor intensive. To get a nice finish requires many man hours. Using a textured paint that has been matted off will help in this regard. The other negative is with noise. The hard finish of the fiberglass laminate tends to bounce sound onto the other hard surfaces in the interior.

Stretched Fabric

Another approach is a stretched-fabric headliner. In this case, install a series of battens, usually across the boat. Starting at one end of a cabin, staple the headliner to the first batten, then stretch it tight to the next, and staple it around the edge of the batten. Spans of 2 to 3 feet (0.6m to 0.9m) are common. The next fabric panel is then stapled over the end of the first, using a thin piece of plywood veneer to staple through. Then that section is stretched to the following batten, where the process is repeated. Staples will show at each of the extreme ends in the cabin, although all other staples are hidden. Use a batten of some sort or a fabric welt to hide the staples. Once you have a set of fair battens stretched, the headliner is very quick to install and extremely light. It absorbs rather than reflect sound, and helps with insulation by trapping air between it and the deck structure.

There is just one negative — access. To get at something, you need to pull down large sections of headliner. For this reason, we usually only use this approach on metal boats on which all fasteners are tapped into blind fastenings, preventing leaks.

The fabric used must be stable (with limited stretch) so as not to develop large drapes or wrinkles with age.

Drop Panels

Removable panels are probably the most common form of headliner system. Light plywood panels are typically covered with a thin layer of foam then wrapped in fabric, with the edges of the fabric stapled to the back side of the panels. A framework is then put into place on the underside of the deck to which these panels are attached.

To keep weight down, you can trim out the centers of the plywood. We've gotten away with 1/4-inch (6.3mm) plywood, with 3 inches (75 mm) of meat around the perimeter and the rest of the plywood removed.

This type of system offers excellent sound absorption (especially if the fabric is foam-backed) coupled with good easy access since the panels are individually removable.

Fastening

The key issue is how they are fastened. Velcro is commonly used but tends to release over time. It is common to see multimillion-dollar yachts with headliner panels hanging down after a passage. Although industrial grades of Velcro that hold fantastic amounts of weight are available, it is difficult to hold the Velcro itself to the panels and supporting framework. The adhesion between the two sides of Velcro is so strong that it tends to pull the material free from the surface to which it is attached.

Another approach is to use exposed fasteners, which are reliable and easy to install. The only problem with these is that you end up with a series of dots all over the headliner — an aesthetic hit. This can be somewhat mitigated by using buttons covered in matching fabric over the fastener covers, but in the end, even these break up the smooth look of the finished headliner.

My personal preference is to use exposed fasteners and put up with ugliness. (I hate Velcro.) However, not many owners or interior decorators agree with this philosophy.

Panel Layout

Panel layout is usually constant throughout the boat — i.e., either all run fore-and-aft, or all run across the boat. The decision is usually made based on the dimension you wish to emphasize. If area is short and you want to emphasize length, run the panels fore and aft. But if there's adequate visual length and you need beam, run the panels across the boat (providing there's not more than about four percent of deck camber). Fore-and-aft panels are easier to do on decks with lots of camber, and generally are easier to build and install.

DECOR

A few years ago most folks would have laughed at the term “decor” in the context of a cruising sailboat. We lived and sailed in a macho world, and it was rare that a crew-member had the temerity to place a colorful pillow onto a box-shaped saloon cushion. The concept of artwork on the bulkheads, or coordinated colors, wasn’t in the consciousness of most designers, builders, or buyers.

But today the cruising world is becoming more enlightened and more demanding. There’s no reason a yacht interior can’t be both functional and aesthetically pleasing.

The problem comes in those trade-offs we always seem to be fighting. And for the average interior designer, the strange shapes and tight, often dark spaces of a sailboat are mysteries that are difficult to solve.

Linda and I struggled through these issues on our own, trying to convert our various yachts into something we could comfortably call home. We worked in various little details to soften things a bit, experimented with colors, brought aboard knickknacks from home. But something always seemed to be lacking. We were never able to get everything just right. We couldn’t put our finger on the problem but felt we lacked a systematic approach to the overall decor.

Then we met Anne and Phil Harrill of Harrill House Design in Fort Lauderdale. This very interesting couple specialized in designing and installing yacht interiors. When asked, they will cover the entire gamut of furniture design, down to supplying fitted sheets and especially made



This series of photos of *Sundeer's* saloon provide a good idea of what is possible with a small investment in accents. At the top, the saloon is bare. In the second photo, we've added some art and a couple of plants. Notice how the space expands and softens with the addition of the art. In the third, photo we've added some colorful pillows. These are functional both for back support and for adding a bit of color to the otherwise neutral surroundings.

The advantage of this approach is that the feeling of the interior can be easily changed. Some new pillows and art, and the saloon will feel like a totally different space.

china and crystal. With a combination of good sense, experience, good taste, and innovation, they've done hundreds of yacht interiors over the 20 years they've been in the yacht design field. Having worked with the Harrills now for over 17 years on a variety of projects, Linda and I have learned a great deal. We are indebted to Anne and Phil for spending time to help us crystallize some of the comments that follow.

DESIGN COORDINATION

Because space is limited even on the largest of yachts, it's important to carefully coordinate interior decor. It's generally best to pick one design theme for the entire vessel, maintaining that concept and range of color throughout. This avoids abrupt changes, which tend to be discordant in a small space.

The safest approach is to maintain a monochromatic color scheme with color accents. This also allows you to easily vary your decor by changing the accents.

Using the proper colors helps to create an open or spacious feeling, while softening the sometimes hard lines that occur on the furniture designs of small yachts.

Anne Harrill suggests using beige, off-white, or champagne colors, as they compliment wood and are the best visual space creators. Pastels also work well, she says, especially certain shades of coral, blue and green. She strongly suggests staying away from pea-green shades, as these sometimes have an adverse affect on those with sensitive tummies.



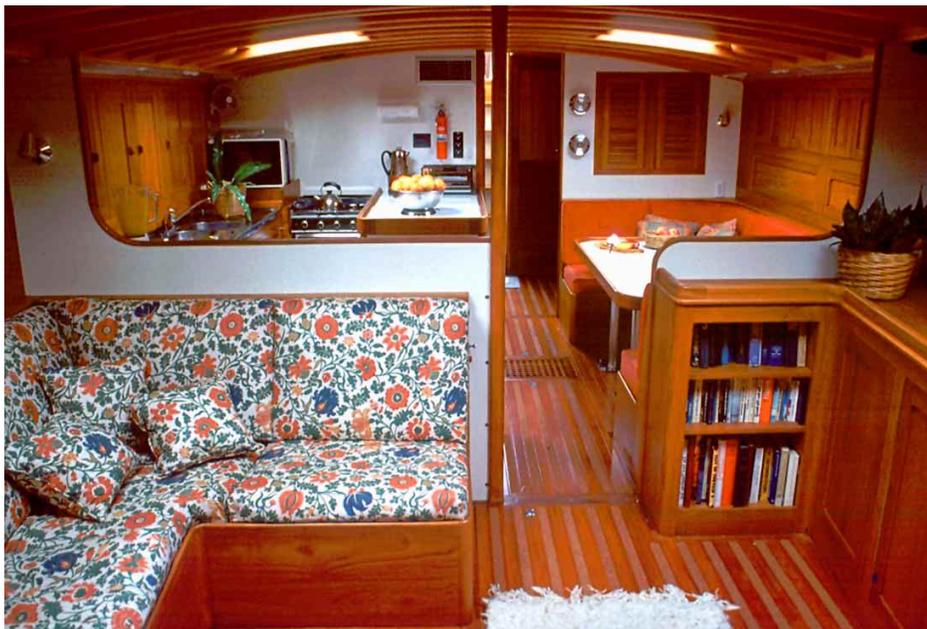
Sleeping cabins are typically quite small, so decor needs to emphasize space and at the same time resonate on a peaceful level with the subconscious. When the cabin is not being used, you can be bolder with the design approach.

On all of our yachts we've tried to work in colorful bed spreads to liven up the atmosphere. Since these are removed for sleeping, you don't have to worry about their impact on the cabin's occupants.

This series of photos is of *Sundeers* owners' stateroom. At the top you have what we started out with, before the colorful bed spread that Anne Harrill designed for us.

What a difference a little color makes! These spreads and the pillows in the saloon were made of Guatemalan Indian fabrics, rich with design interest and color. As they were in the same motif as the saloon, the throw pillows could be interchanged. The spread was made like a thin sleeping bag with a removable liner. In cold climates it served as a comforter. In the tropics, the liner was removed and stored, to make the spread easier to stow.





The design concept on *Wakaroa* is just the opposite of that on *Sundeer*. When we were working through her interior details it was very clear that the Schmidts wanted to emphasize the beautiful woodwork and craftsmanship of Kelly Archer and his crew. The lovely teak and exquisite joinery reduce the visual space, but in a comfortable way.

Plants, baskets, and fabrics add interest to the interior but are a very minor part of the equation.

When *Wakaroa* was first completed, Linda and I felt that there was too much wood for our tastes. However, over the years we've gone through a bunch of large boats, while the Schmidts have stayed with their boat. We've come to the conclusion that the universal nature of *Wakaroa's* elegant interior is one of the keys to the many years of enjoyment the Schmidts have had from her.

And today she looks better than new. It would be impossible now to find the quality of timber used in her construction, let alone the carpentry skills. The only negative in this design approach is that visual space is reduced. With so much timber (although the teak is very light in color), she's a little darker below than would have been the case with less wood. Still, the interior is in no sense tight or claustrophobic.

Spacial Concepts

Early on in the game a decision must be made about visual space. Some cruisers (and we include ourselves in this lineup) like or need more visual space than others and are willing to make some sacrifices towards this goal. Others appreciate a compact interior bursting with storage space.

In either case, there are some basic rules about creating visual space which apply to both categories.

First is light. The better lit a given space is, whether in the daytime or at night, the more visual space there will be. This makes deck hatches, port lights, and lighting at night more important as your need for space increases. Tremendous increases in space can be achieved by adding an extra deck hatch or some extra space lighting.



One of the easiest ways to achieve interior spaciousness and range of stability is with a flush deck design. Compare *Deerfoot* (above) with *Pegasus* (below). Both boats have a beam of 14.5-feet (4.45m), yet *Pegasus* looks much beamier below. This is due to the trunk cabin versus flush deck designs. With the latter, your eye goes all the way across the full beam, as opposed to stopping at the edge of the trunk cabin. Note the direction of the headliner panels in the lower panel. The help to increase the feeling of spaciousness, as do the large hull windows.



A direct corollary is the color of interior surfaces. The lighter they are, the more open things will appear to be. If you have teak bulkheads and want to get a feel for what would happen if they were lighter in color, tape up some off-white paper (butcher paper or wrapping paper works well). You'll be amazed at how quickly this opens up the interior.

Next, keep interior views unobstructed. Any time a locker is hung from the overhead, or a vertical handrail is placed on a counter edge, the visual space has just been cut by a large percentage. When we rebuilt the fridge system on *Intermezzo* we temporarily removed a handrail. The interior space doubled instantly. Needless to say, this 2-inch-diameter post was replaced with a handrail on the overhead.

Keeping lockers low, below eye level, keeps the center of gravity down and allows the eye to roam, unobstructed, to the edge of the hull. This helps a lot and is one of the reasons flush-deck designs look so much bigger inside than vessels with trunk cabins. Your eye is caught by the deck-to-cabin edge on a trunk cabin, as opposed to going to the hull on a flush-decker.



Staterooms are generally quite tight on space and so take careful design to accomplish a feeling of spaciousness.

These two photos show 62-foot (19m) designs of the same beam and displacement.

Both have the double bunk against lockers on the hull side with minimum space (14 inches/350mm) between the bunk and narrow dresser. This space allows room to slide by to make up the bunk and to

sit on the end while using the small vanity against the bulkhead. The hull side lockers are a trade-off. They provide good storage, but by forcing the bunk away from the hull they cut down on the cabin-sole space. As sole space is very important to your feeling of spaciousness we take some hits here.

Notice the large mirrors on the bulkheads. The bigger the mirror the better for increasing the feeling of space, as long as what's reflected isn't disconcerting.



The door into the forward head is open in the top photo. This allows your eye to be drawn into that space with its large bulkhead mirror. When laying out this type of arrangement you need to position the toilet so that it is not seen when the door is open. In this case the toilet is off to port.



Mirrors

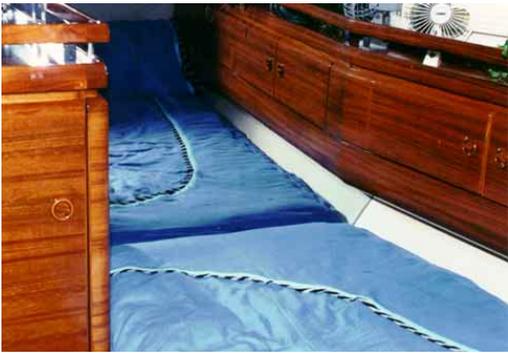
One of the easiest ways to increase your apparent space is with the judicious use of mirrors. Since mirrors reflect an image back at you, they can double the amount of visual space. We've successfully used them to totally cover one bulkhead in staterooms and heads. They also can be a help in a saloon, although a mirror in the saloon will not have the warmth of a fabric or painted bulkhead with a piece of art attached.

It is even possible to use mirrors on two adjoining surfaces. However, this has to be done carefully, and not in areas where you spend a lot of time at sea as the reflection between one mirror and the other can be disconcerting. Avoid using mirrors where they're easily marred by belt knives, duffle bag zippers, or even the rivets on jeans.

It's important to make sure that the mirrors are flat and vertical. If they're not, the image will be distorted.

What to use for mirrors is something of a dilemma. Glass is inexpensive, has excellent reflecting properties, and tends to produce distortion-free images. But it's heavy and can shatter. If you do use it, gluing it to a piece of light plywood (and making the plywood/mirror combination removable), will reduce danger if and when it's broken. With glass mirrors, be sure to seal the first 2 or 3 inches (50 to 75 mm) in from the edges to prevent the silvering from turning green. There are a number of products available for this purpose.

Plastic mirrors are a fraction of the weight of glass, but create a distorted image in anything but the smallest of areas. Another problem with plastic is scratching. Be very careful not to mar the surface when handling, installing, and cleaning.



We normally try to work mirrors onto the aft and sometimes centerline bulkheads of our aft guest cabins. Occupants have to be warned, however, to keep items which can scratch the mirrors off the bunk.

Two views of a vanity cabinet with a bulkhead mirror forward (right) and with a mirror let into the angled locker front. The counter top is Corian with a polished Scanvik sink mounted below the Corian level. The combination of stainless and mirrors is softened by the Corian and nearby timber.





You can create a very nice feeling with upholstered panels on your vertical surfaces. They provide visual interest, do a wonderful job of absorbing sound, and are very comfortable to lie against, especially to leeward.

In this stateroom, there are a series of three vertical panels that start at the head of the bunk, then run down the hull side. At the foot of the bunk they return toward the centerline. Notice how the panels end in line with the bunk, allowing the fabric-covered bulkhead to establish a vertical line which helps to define the door frame.

If the panels were run to the doorframe there would be problems with ending the bunk fiddle rail, and integrating the top panel into the curve at the top corner of the doorframe.

These panels are made up of 1/4-inch (6.3mm) plywood to which 1-inch (25mm) thick medium-density foam has been glued. This is then wrapped with fabric, and the edges of the fabric are stapled into the plywood. The panels are held in place with Velcro strips.



A compromise is a composite sandwich produced by Mitsubishi for use on mirrored buildings (although this material is becoming difficult to obtain). This distorts less, since it's stiff, and is less subject to scratching than normal plastics

Vertical Surfaces

There are a variety of approaches to bulkheads, hull sides, and the vertical surfaces of furniture. Lighter color means more apparent space. If you're reading this while sitting below, surrounded by teak bulkheads and thinking about a larger boat, you can just about double your perceived interior size by lightening up on that teak. That's simpler than the hassle of selling one boat and buying another.

Lightening can be accomplished with a paint brush or, surprisingly, very quickly with a variety of synthetic wall coverings with fabric or knit backing integrated with a vinyl face. I like the wall covering approach, as it allows some interesting textures to be brought into play. A skilled paperhanger can prepare and apply wall coverings much faster than you can paint. Of course if you're doing your own work, painting will be less costly.

One of the keys to a good job is a fair surface. If wall coverings have been previously applied, these will have to be totally removed first.

Ideally, the hull sides — assuming they're exposed — will be of the same color as the bulkheads. With timber battens this can be accomplished with a paint brush. The horizontal lines created by the battens tend to lengthen your space.

If the hull side is exposed, the same material used on the bulkheads can be applied to the hull. Anne Harrill cautions not to use striated or plaid patterns in areas of the hull side where there are compound curves, as the lines will end up running askew.

Not much can be done with furniture that already exists, except for painting out some of the timber. Again, lightening up expands the space. But one is sometimes loath to paint over beautiful timber work.

If you're starting new, consider using some of the high-pressure laminates (HPL) like Formica for furniture fronts. It wears well, never needs repainting, and there are a variety of textures and colors from which to choose. We've used a good deal of the HPLs over the years and find them easy to live with.



HPL (in this case Formica) is relatively easy to apply and lasts indefinitely if taken care of properly. Production time is much quicker with HPL surfaces than with paint or timber, as you don't have to go through the finishing processes. You do, however, have to be careful with aesthetics.

There are usually two grades of HPL: Vertical grade is quite light and flexible and can be bent around moderate radii (typically down to 2 inches/50 mm with a jig). Horizontal grade is thicker and will take more abuse. It is normally used for counters.

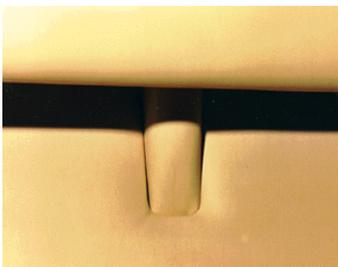
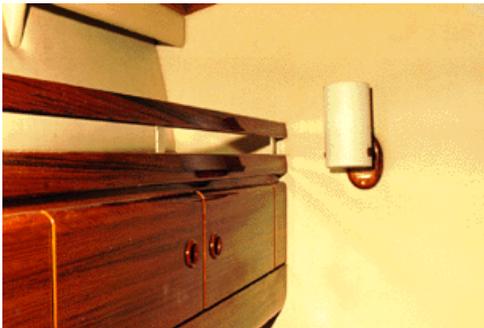
A major negative with HPL is weight. Adding a layer of HPL is like making your plywood 1/4-inch (6.3mm) thicker!

Breaking up large surfaces with a hint of timber is one way to soften the look of HPL. We like to use a bit of tile as well. Small areas do not contribute significantly to weight and are relatively maintenance free while adding interesting color to the space.

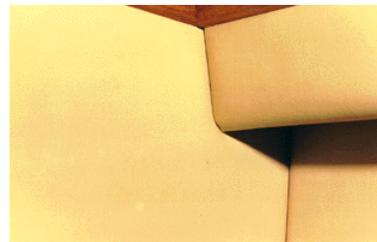
Another approach to vertical surfaces is the "soft" look. You start out by gluing 1/4-to-3/8-inch (6 to 10mm) thick upholstery foam to your vertical surfaces using contact adhesive. A pliable fabric (in these photos we are using Doeskin, a polyester vinyl with a knit backing from Kravet) is then glued over the foam. The edges are captured by a trim piece, or tucked into a thin joint left for the purpose.

On this project we held the edges of furniture back 1/8-inch (3mm) from the nearby vertical surfaces to provide a spot to tuck in the fabric.

The hull side panels, which are removable, are done in the same manner. This approach can also be done with just hull side panels while another treatment is used on the bulkheads.



When correctly executed, this has an elegant look and feel, especially when you press some art into the foam so there is a rounded edge around the frame. Another advantage is with noise. Having your living area surrounded in foam and fabric really attenuates sound levels.



Horizontal Surfaces

The same choices are available for countertops aboard as at home. A touch of tile looks nice and can be very functional, whether as an accent or a full countertop. Mosaics can be worked in behind the stove or galley counter areas. High-pressure laminates also do well, as long as they aren't used for cutting. Corian is another material that goes to sea well. (Its polyester competitors work, too). In order to keep weight down we usually specify 1/4-inch-thick (6.3mm) Corian glued to a plywood substrate. Although the manufacturer, DuPont, says you must use half inch (12.6mm) material, we've been using the thinner material with good results for many years. Any splashes are made from thicker material.

When working with thin Corian, be careful with cutouts, especially corners. Stay away from right angles or sharp radii. It is generally best to make a right angle from two pieces rather than one large chunk. This reduces the risk of cracks.

Corian moves around quite a bit with heat and cold, so make allowance around the perimeter for expansion and contraction. And when affixing the Corian to a substrate, it should be fastened with a flexible adhesive, sparingly used. This lets the Corian move without cracking.

Most cabinetmakers prefer to work with thicker Corian, about 1/2 inch (12.6 mm). This only needs some stringers for support. Since it is thicker, with the substrate eliminated, there is less chance of cracking. However, it is quite a bit heavier.

Despite all protestations to the contrary, we've been using thin Corian for many years without difficulty.

Artwork

Another way to open space is with artwork. Photos, posters, prints, or original works of art on bulkheads and hull sides tend to create additional space and visual interest. Of course, you'll want these to coordinate with the rest of the decor in the interior. You will want to pay attention to color and scale, and avoid overpowering the cabin space with art which is too powerful or bold.

Because this is a trial-and-error process, and since most of us don't want holes all over our bulkheads, it can be a problem to attach these works of art. We've solved this on a temporary basis by using conventional picture hooks with layers of double-sided tape on the backs of the frames. The double-sided tape keeps the photos from moving when we heel. Once we've lived with a piece for a while and decide we like it, we then use more permanent fasteners through the frame into the bulkhead.

You may want to consider using plastic instead of glass over the art. It's much lighter, and eliminates the problem of breakage.



We've had good luck keeping plants below (where they get plenty of light from the hatches) and in the pilothouse. A small, colorful array of temperate climate flowers can do wonders for your moral in the tropics! The flowers do better inside as they are protected from the direct sunlight.

Linda usually takes her garden out on deck in the morning or late afternoon a couple of times a week so the plants get a direct dose of the sun.

Plants

Living plants add a wonderful sense of softness and color to any interior, which can be kept in plastic pots with woven baskets, or even in ceramic pots — allowing, of course, for the weight. We put nonskid rubber beneath baskets and pots to keep them in place and to prevent them from scratching the surface on which they rest. When we go to sea, the plants are either locked in place with books or Kleenex boxes, or stored on the floor of a head that won't be used offshore.

Windows

Hull and cabin-side windows not only allow light into the interior, but also invite the eye to roam outside. A couple of judiciously placed windows can easily double the visual space of the adjacent area, while allowing copious amounts of light into the cabin.

For hull windows I favor non-opening designs because they're less likely to leak. It's also a good idea to use an approach that allows a gasket to be changed at sea, should a leak develop on a long passage.

Remember that any time an opening is cut into the hull or cabin, it creates a weak spot, and reinforcing must be allowed to bring the structure back to its original strength. (For more data on windows look under aluminum and fiberglass construction.)

One issue you'll soon face is window alignment. Do you make them parallel to interior furniture or have them follow the sheer? From outside, the answer is follow the sheer. Anything else looks quite strange. However, from inside this diverging angle from the furniture takes some getting used to.

If there is a lot of sheer in the hull, one way you can cut down on the contrast with the flat lines of the interior is to maintain separation between the bottom of the window and top of the lockers.

Window Treatments

If there are cabin-side or hull windows, some form of closure will be necessary for privacy and to reduce sun load. On *Intermezzo II* we never solved this problem and used — if you can believe this — paper towels held in place with fishing sinkers while in port. Linda and I just never found a curtain that appealed to us. While curtains are certainly common enough, to our eye they broke up the hull panels into which the windows were set.

About a decade ago we started using “mini-blinds.” These are usually hidden behind a valance when not in use. There are many shapes, textures and sizes available and can be custom-made within a few weeks by most suppliers to the home market.

One thing to take a good look at is the control hardware. Make sure it is a non-rusting material of rugged design.

Cushion Fabrics

Fabrics in the main saloon will work much harder than those on your couches at home. They get a lot more use (after all, the saloon settees are the only place to sit below), are subjected to spills when eating, soak up body oils from your bare legs and arms, and have to be comfortable in the tropics as well as temperate climates.

If you assume that a year at sea equals three to four years of wear at home, you'll be about right in evaluating materials for longevity.

There are literally thousands of types of fabrics from which to choose. Over the years Anne Harrill has found (and we agree) that the new “breathable” vinyls are the best overall. These are the most stain-resistant, will keep the underlying foam dry in the event of a spill or leak, and are just as comfortable in warm weather as other materials.

Even if the vinyl doesn't breathe, if it's grained (has a texture) Linda and I have found it works well in the tropics. Sarah and Elyse used to prefer sleeping on our vinyl cushions when they had a choice.

Some of the new polyesters with a leather look are wonderful. One of these is called Doeskin, by Kravet. A similar material is available from Clark and Burchfield (your upholsterer can get samples and prices for you). We used this material on the settees and bulkheads of *Sundeer* and after a years of use we were very pleased with the look and function.

Ultrasuede, also in the polyester family, are excellent for bulkheads and upholstery if backed properly. It releases soil better than any other comparable synthetic or natural material on the market. They add a touch elegance but cost three to four times as much as Doeskin. (There are several Nylon materials which look and feel like Ultrasuede, but which don't work well for headliners or large expanses of cushions. These materials tend to stretch with changes in temperature and humidity.)

Blends of cotton and synthetics (about 50 percent each) also can be used. These offer more texture and softness than some of the other materials but should be ScotchGuarded for protection. Anne suggests staying away from linens in the marine environment, because once they get damp they give off an unpleasant odor which tends to linger.

The same color rules we've already discussed apply to cushions, with pillows providing accents. Checks or plaids are generally better left ashore because of their busy appearance.

UPHOLSTERY

Of all the problems and frustrations in upgrading or building a yacht, none is as difficult to cope with as upholstery. I am not sure if it is the plastic fumes that upholsterers deal with, the odd shapes of most boat interiors, or simply the fact that even on land this is a tough business. Whatever the cause, be sure that the folks doing your work can perform up to your standards.

One way to achieve this is by looking at samples of their work. This is usually best after the pieces in question have had some use, so you can see how they stand up to wear.

Then make sure you get complete samples of everything being done for you. If the sample isn't exactly right, don't accept it. Make sure the sample is satisfactory before you release the job to production.

Pricing is no guarantee of a quality job. We've had some very expensive, high-end upholsterers do poor jobs for us. We've also had some wonderful work done at very modest prices.

Types of Foam

The foundation of your cushions and mattresses is the support foam. Good-quality foam will last years. Cheap stuff will develop compression dents within months.

Remember that unlike a house where there are a variety of chairs on which to sit, and many of the sitting and sleeping place utilize inner springs, only a few spots on a boat get all the wear.

The key characteristic with foam is its density, not to be confused with the firmness. The higher the density, the longer the foam will maintain its shape.

The firmness of the foam affects comfort. Comfort is very much a subjective consideration.

Frequently, foam will be layered with high-density form materials on the bottom and medium-density softer materials on top. The softer materials give just a little bit more so that body projections have somewhere to go.

When you test sitting or lying on different types of foam, make sure they are constrained with fabric. Fabric stiffens the foam by limiting where it can move. If you sit or lie on bare foam, it will be much softer than after it is finished inside a cushion cover.

Watertight Integrity

Mattress and cushion foams are open-cell and therefore readily absorb moisture. With freshwater leaks or condensation, if provision for ventilation is made (see below) the moisture will eventually find its way out. However, if your foam gets wet with salt water, you have a problem.

It is virtually impossible to get rid of salt. And salt, being hygroscopic (attracted to moisture) will keep foam damp indefinitely.

If you think you can beat the system with a hose at the dock, guess again. Even if you soak the foam with fresh water for hours, some salt will be left that will eventually attract moisture. The only thing to do with foam that has gotten wet with salt water is to replace it. I know — I've been there.

The key, obviously, is not to let the cushions get wet with salt water. Easy enough in theory, but almost all boats leak. Even if yours doesn't, one mistake with a cracked hatch and an errant wave and you have a disaster on your hands.

The one thing to do (other than making sure your deck is watertight and not taking chances with hatches) is to use an impermeable fabric on the surface of the cushions.

If the material doesn't let water in, it won't let air in either. But here are other ways of dealing with ventilation.

Because of this issue we always use a synthetic nonwoven material for the tops of our bunks and in the saloons where there is any chance of getting water on the seats (these types of fabrics are typically easier to keep clean around the saloon table, too).

Ventilation

Of course, it is important that cushions be able to breathe. Otherwise they will eventually become damp just from condensation and will have no way to release moisture. A damp cushion soon becomes a moldy cushion, and moldy cushions smell really bad. They're especially noticeable on a hard beat, with the boat totally shut up because of water on deck, when everyone is feeling a bit queasy. Yuck!

There are a number of ways to deal with ventilation. One simple approach is to cut vent holes in the bottom of the seats or mattress supports.

Another is to use a webbed or mesh band of fabric around the perimeter, beneath fiddles, and/or at the back of the cushion where it is not visible.

While we generally specify impermeable fabrics for our cushion tops, we do just the opposite for the bottoms. These are made of an easily permeable material that allows the cushion to breathe.

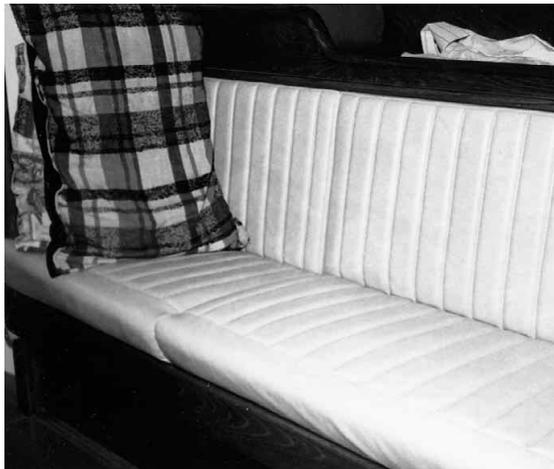
Fabric Issues

Fabric construction and stretch characteristics vary widely. In most cases you will want a material that stretches a little when worked by the upholsterer, and then becomes stable so that it doesn't loosen and pucker over time.

This is sometimes a problem with some soft materials, which have a very nice feel. You can get around this by using a "backed" fabric (a backing is glued to it during construction) or by stitching the fabric to an underlying layer that provides stability.

If quilting is used, you need to work out a pattern that is both easy to execute for the upholsterer and looks good. Many times a bit of bonded Dacron fill (in the three- to six-ounce density range) or a thin layer of foam is placed between the top fabric and an underlying stabilizing layer.

Another way to stabilize fabrics is to sew buttons through the material.



When I was in high school we used to take our cars down to Mexico to have a "tuck and roll" upholstery job done. We thought it looked really cool; it was cheap; the girls loved it; and it lasted. The concept is still valid today. Because the fabric is stitched to an underlying layer with an intermediate layer of foam, the surface of the cushion is stabilized. Over years of use it will tend to maintain its shape better than if the fabric is pulled loosely over a simple cushion.

Bunk Mattresses

Mattress construction is very much a function of personal choice. Linda and I like a firm mattress, so we always specify the very stiffest foam available. Sometimes it helps to have a firm underlayer with a top of something a bit softer (but we don't go this route ourselves).

For living aboard, the mattress should be at least 4 inches (100 mm) thick, and 5 inches (125 mm) is better.

Upper berths, bunks in two-bunk cabins, and pilot berths, where space is tight, can get away with 3-inch-thick (75mm) foam. If you are using a pipe berth with cloth supports, 2 inches (50 mm) is acceptable.

When your cushions are sized, if you plan to be sleeping with a mattress pad, sheets, and covers, allow about 1/2 inch (12.6 mm) all the way around the perimeter to tuck in bedding. Failure to allow enough space will create all sorts of problems when you make the bed!

On large bunks there is sometimes the tendency to break a mattress in half. This makes it easier to maneuver, and to get under the bunk, but if not carefully treated creates a soft spot on the joint.

One way around this problem is to have the bunk cushion joined at the top only. This helps reduce the soft spot, while providing a hinge point to flip half of the cushion around when looking for that lost bit of gear under the bunk.

Saloon Seating

Now we get into some interesting trade-offs. Let's start with cushion height. Most couches at home are around 16 to 17 inches (406 to 432 mm) high. If you deduct 5 inches (125 mm) or so for a bottom cushion, that doesn't leave much storage under the cushion in the furniture base.

With saloon seats being the best bulk storage in the boat, you may want to compromise and raise the seat bases a bit. You then need to reduce cushion thickness so that your legs can touch the floor, or say goodbye to truly comfortable sitting in favor of good storage.

This may not be as bad a trade-off as it sounds. Our own experience is that we rarely sit on our saloon seats. The more normal position is to recline for reading or snoozing with feet up, so the height of the sole is meaningless.

We generally make our seat base height 12 to 14 inches (310 to 360 mm) off the sole.

Cushion design varies with the look that you are trying to achieve. However, there are a couple of basic principles. First, the seat should recline a bit. You can achieve this by tilting the seat bottom (this reduces storage volume and is hard to execute for the carpenters), by tapering the foam, or by adding a roll or wedge to the front of the cushion.

Generally speaking, about 1 inch (25 mm) of taper in 24 inches (610 mm) of seat width seems to work out right.

The choice of seat-bottom foams is difficult. If you go with the stiffest, longest-lasting foams, they will be a bit on the hard side for seating. On the other hand, the really soft, comfy foams will look terrible after six months or a year.

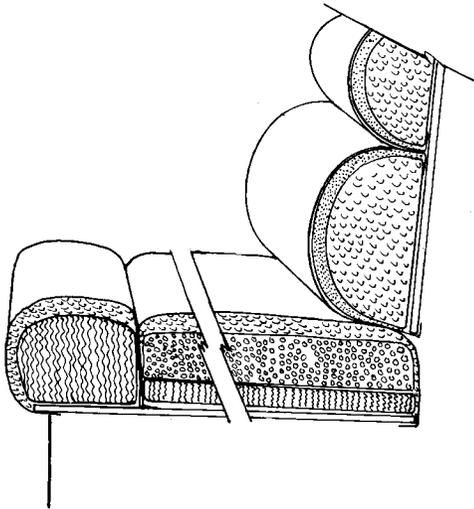
We generally specify a mixture. Firm on the bottom, followed by medium, sometimes followed by a very soft material or Dacron wrap. However, be aware that if you use a Dacron wrap, it will quickly compress and after a year or so will need replacing. If the cushion is easily opened with zippers or Velcro, this is okay.

The seat backs present a different set of requirements. These do not support as much load as the bottoms and should be a degree or two softer for comfort.



These rolled cushions look good at a distance but the workmanship was very poor close up — and this was our second try!

The rolls on the backrest are uneven in size and do not line up in the corners (upper left and lower right photos).



This cutaway drawing shows how different grades of foam are used. The back cushions have a single large piece of medium-density foam, covered with a piece of very soft foam.

The roll on the front of the seat is made in similar fashion, except the foam is somewhat stiffer. The bulk of the bottom cushion is made of very firm foam, covered with medium, then topped with a moderately soft material.

An edge roll (bottom photo) adds some design interest and acts the same as an angled cushion would to hold you on the cushion.



The norm is to have storage behind the seat backs, so the design of the backs needs to account for access to storage area as well as containment of the stores in case of a knockdown.

There are two ways to go. One is to make the seat backs an integral part of the locker face, an upholstered door in effect. The other is to have a separate plywood door with a loose cushion.

If you go the loose cushion route, some means of holding the cushion in place must be used. This can be accomplished with Velcro or with stainless hooks.

Seat backs need to have some angle to them. This is usually accomplished by carving the foam. We like to see about a 15-degree face angle. Of course this cuts down on seat width as the bottom of the back cushion has to project inboard. Sometimes, when there isn't enough cushion width for this, a steeper back is used, supplanted with a throw pillow in the small of your back.

Height of back cushions can vary. A minimum is 14 inches (355 mm) above the seat, but 16 inches (406 mm) is better. Many men with long torsos require 18 inches (457 mm). The more outward slope there is to the back cushion, the taller it needs to be.

Loose or Mounted Construction?

There are two approaches to cushion construction. The easiest for the upholsterer is to have a light plywood bottom. This gives him or her something on which to glue the foam, as well as a place to pull the fabric tight and on which to staple.

With modern rolled cushions, a timber bottom is essential.

This also forces you into hard edges and sharp corners. While this looks good with a modern design theme, for more traditional cushions you want a softer appearance. In this case, the cushion is built without a plywood insert. While somewhat more difficult to execute, this gives the advantage of a reversible cushion. When one side is dirty, simply turn over the cushion.

This approach also allows you to have a different fabric on the bottom.

When we left on *Intermezzo* we had a vinyl material on one side and a cotton/polyester blend on the other. At sea and when working on the boat, the vinyl side would be up. When we wanted ambiance, the softer side was exposed.

Saloon Sleeping

We're more concerned with sleeping on saloon seats rather than sitting. Not only do we typically sleep in the saloon when it's bouncy at sea, but we tend to spend a lot of time reclining with a book in our hands, which frequently leads to eye closure.

If you optimize for sleeping as opposed to sitting, this affects the width of the seat. When sleeping to leeward with the boat heeled, not as much seat width is required. About 22 to 23 inches (558 to 584 mm) does nicely as your body is pressed into the seat back cushion — another reason for keeping it on the soft side.

When the boat is upright, more space is required. Here the minimum is about 24 inches (610 mm), but another couple of inches (50 mm) would be better. Of course, you can remove the back cushions to gain space, which is frequently necessary on smaller boats.

In this case, obviously you would want removable back cushions.

Corners

If you have a C- or L-shaped settee, you will have to deal with corners. This can be done in cabinetwork or in the upholstery.

Unless the interior design demands soft corners, we prefer to



It's amazing what a good craftsman can do with fabric and foam. This corner section is one way to treat a difficult area. To achieve the same look with a curved surface requires a piece of plywood molded to the desired shape, to which foam is glued and fabric stapled. In this case, the corner piece is made from just foam and fabric.



Here's another look at a rolled-bottom cushion (top). Note how the body of the seat is tapered. This, along with the roll at the edge, makes for the most comfortable of all seat shapes.

The foam is glued to a piece of 3/8-inch (9.6mm) plywood. This is a bit heavier than I like to see, but allows more meat for the staples that hold in the fabric.

Below is Bruce Withers, the New Zealand upholsterer who changed our plywood-bottomed saloon seats to cut-outs with rubberized webbing in the gaps. The webbing acted as springs, making the seat cushions much more comfortable. The only exception to this was if you happened to sit on an across-the-boat strut, in which case there was a bit of a hard spot!

keep them at right angles, which supports the back. If the corner is curved, you've lost that spot to sit up against and read.

Access

You will want to look at access and at how the cushions are broken up. The bigger the cushions are (within reason), the easier they are to make. On the other hand, the bigger they are, the harder they are to move out of the way when looking for something in saloon seat lockers.

We generally break a 6-to-8-foot (1.85 to 2.4m) long seat into 3 sections.

Another issue is how tightly the cushions fit. If they are squeezed together, they will be difficult to get out and to replace. This gets to be a real pain after a while.

With plywood bottoms there should be about 3/8 inch (9.6 mm) of space between the sheets of plywood. This allows space for the cushion to overhang a bit.

Also, look at the fit between the back cushion and the bottom cushion. If this is tight, you will have a problem lifting up the bottom, or will be forced to remove the back to get the bottom out — a most disagreeable situation. It doesn't take much space — sometimes just 1/2 inch (12.6 mm) or so to get the bottom to slip out.

Cockpit Cushions

The best thing to do with cockpit cushions is to leave them ashore. They're okay for daysailing, when they can be stowed down below in inclement conditions, but on a full-time cruiser cockpit cushions generally stay in the cockpit. This means they are always getting wet with either salt or fresh water. They also have the sun beating down on them day after day. Before long, they are a stained, scruffy looking, mildewed, smelly mess.

I much prefer a couple of small throw cushions. Linda, however, likes cockpit cushions. She is more willing than I to try to keep them clean. If you must have cockpit cushions, here are a couple of ideas.

First, make them from closed-cell foam. This is much harder than regular foams, but at least it doesn't absorb moisture. Of course, these are not a great deal more comfortable than sitting on the deck without a cushion.

The other approach is to use an open-weave synthetic like Texelene, then take a closed-cell foam and enclose it with an outdoor-rated Dacron wrap. The Dacron gives some softness and the Texelene, being very porous, allows the cushions to dry in the sun.

Medium to dark colors are generally better — they tend to hide the dirt, and heat up in the sun, which leads to faster drying. On the other hand, on a hot day in the tropics, you'll probably need to sit on a towel as the cushion may be too hot to sit on with bare legs.

Supplying Your Own Materials

Availability, quality, and pricing of upholstery materials vary widely. Many fabrics carry a markup of 50 percent or more between retail and trade or wholesale prices.

As a result we often supply our own soft-goods on most projects. This usually saves money and ensures that we get what we want.

If you take this route, there are a number of factors to consider. First, you need to buy enough material for a fudge factor. The odds are some material will be damaged during fabrication. As availability varies and colors do not always match from batch to batch, you need to order enough extra to cover contingencies. Obviously this adds to your cost as compared to an all-inclusive price from an upholsterer.

Fabrics are usually shipped in rolls. Specify extra protection for the rolls, then check for damage and color upon receipt. If the roll of fabric has been sitting in a truck with a heavy box on one end, the odds are it will have been damaged. Fabric stretches or wrinkles and sometimes will not return to its original shape.

If forwarding the material on to another location, be sure to protectively package it.

There are times when you will want a foam-backed material. This is usually obtained by supplying the fabric to a vendor who attaches foam to the back side then returns it to you. The shipping and handling on foam-backed stuff must be done with great care, since it is easily damaged.

Bunk and cushion foam qualities vary all over the world and even regionally in the U.S.

If you are having cushions made overseas, and if you plan to send a container load of goods for other projects, look into supplying your own foams. This material is easier to ship and can usually be placed on top of the heavy equipment in your container.

Many of the lessons in this book have been learned the hard way. These three photos are a \$7,000 example of what not to do when supplying fabrics.

The roll on top and several others came to us with broken center tubes around which the fabric is wrapped. This allowed the tubes to bend and the fabric to wrinkle — we lost over half the material on this project. Had we been more alert to the problems we would have sent them back immediately to our supplier. However, this wasn't discovered until the material was already overseas.

The middle photo shows a fabric that has been wrinkled because of bending, items resting on it, and/or improper packing.

Sometimes this type of wrinkling can be removed with a medium-temperature iron used over a damp towel on the back side of the fabric. Other times you can deal with it by stretching. If you can recover the material, it is only after the expenditure of substantial amounts of labor.

The bottom photo shows something you should never do — two rolls of material tied together. Even gentle ties like these make creases. Both ends of these two rolls were unusable.

The supplier, Bluatext, in Florida, told us they would never ship material this way. After we sent them these photos they changed their tune and said it wouldn't hurt the fabric if left on for a short period of time, and if we'd return the material from New Zealand they'd see if they could salvage it!

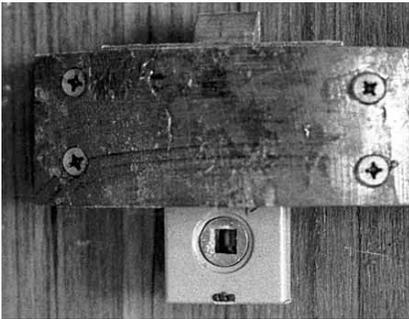


Ground walnut shells make the ultimate nonskid finish for teak cabin soles. It is easy to apply (see beside) and looks great.

Lou Varalay, who made a reputation building racing Snipes in the 1950s, first showed us the technique.



One of the simplest systems I know of for locking cabin soles is to use a door lock mechanism. One end of the floorboard is held in place with an overlap connection of metal, plastic or timber. At the other end you install the door-locking mechanism. When the tongue is out (in the locked position) it holds the floorboard in place.



To lift the floorboard you take door handle part of the mechanism, stick it through the floorboard into the lock, and turn. This unlatches the floorboard, allowing you to lift it up. This is easy to install and relatively foolproof.



Raised timber strips can also provide traction. Since they run fore-and-aft they will do a good job of holding your feet from sliding to leeward. However, they don't do much to avoid slipping in a forward or aft direction.

CABIN SOLES

Nothing in the interior gets abused like the soles. They get walked on, have cans dropped onto their surface, are constantly being tracked with water and dirt, and are opened periodically to get at stores and to do maintenance chores. They need to be finished in such a way as to handle the abuse that cruising life dishes out.

Sole Locks

Regardless of the materials used in cabin sole construction, certain structural and seagoing requirements must be met.

The first is to keep the soles in place during a knockdown. This can be accomplished with external door buttons, using hidden rotating locks, or even standard door-jamb hardware at one end (where the other end is fixed).

Our preference is to screw down the majority of the panels, leaving just a few necessary for access to check the bilges with easily used locks.

Timber Soles

The most common sole is built of teak veneer, sometimes with a light colored runner every couple of inches (50mm) — the ubiquitous teak-and-holly combination. Because of the damage potential, the veneer should be at least 1/10 inch (2.5 mm) thick, preferably more.

The best-looking finish on timber soles is a gloss varnish. Unfortunately, it's slippery and tends to show every ding and piece of dirt.

Nonskid Varnish

We solved the slipperiness problem years ago by using strips of ground walnut shells every 3 inches (75 mm) or so, running fore-and-aft. These are an excellent nonskid, match the teak in color, and are easy to apply and maintain.

Start out by bringing the overall sole to within one coat of the final desired varnish finish. Then,

using a good grade of masking tape, line out the areas to be nonskidded. We use 1-inch wide (25mm) stripes at 3-inch centers (75mm), in most of the saloon, galley, and head areas. Companionway steps are done as well — but don't put shells on the edge of the steps, or they'll grate the backs of your legs if you slip.

A heavy coat of varnish is then laid down inside the tape. While this is still tacky, walnut shells are liberally sprinkled into the wet varnish. A soup can with a series of nail holes works well for distribution. Once the varnish has dried, the excess shells are removed with a light vacuuming. Don't use too much suction pressure, or too many shells will be pulled off. The remaining surface should be reasonably even.

Two coats of varnish are then applied over just the walnut shells. When these have dried, the masking tape is pulled. A final coat of varnish is then given to the entire sole area to even the appearance, making a total of three coats over the shells.

The entire procedure is simple and doesn't take much time once the basic prep work is done on the sole. You might want to experiment a bit to perfect your technique before tackling the entire sole.

Carpeting

Carpeting gives a nice warm feel to sleeping areas and sometimes to the saloon as well. But it's hard to keep clean, traps dust, and is difficult to dry out when it gets wet. *Intermezzo* came to us with carpets, but after a brief period we dispensed with them in favor of a few throw-rugs.

The throw-rugs brought in a feeling of homeyness to the interior and were easy to pick up when we went to sea. We've continued with this approach on subsequent boats.

Vinyls

A nice-looking, nonskid industrial vinyl can be used for flooring in a yacht. Done properly with colors to match the rest of the interior and accented with throw rugs, it can give a handsome finish that's easy to maintain. Anne and Phil Harill like the dramatic high-tech look of the low-profile stud rubber in work areas like the galley and heads.

LIGHTING

The lighting system has to perform a number of functions as efficiently as possible to reduce electrical consumption. You'll need lighting for general work and special reduced-output lighting for running at night without ruining night vision, for reading in bed, and for general ambiance.

This last category, or what we refer to as mood lighting, is fun to work with and can have a major positive impact on interior ambiance once the sun goes down.

There are a couple of things to keep in mind with mood lighting. First, try to have light sources at the ends of the cabin space to help increase visual size. A low level of light should be just enough to make your way by. In the saloon seating area, a source of light that illuminates the faces of the party will be necessary. This means a light in the headliner usually above the table, or it can be as simple as a candle on the table.

Fluorescent

The most efficient way to get light is with a fluorescent fixture. The output of light per watt of power is several times that of an incandescent bulb. They're ideal for working in the galley or saloon, changing clothes, or working in the head.

It's generally better to use larger rather than smaller fixtures. We like the 30-watt units the best. One in the saloon, one or two in the galley, and one for each head and stateroom usually does the trick.

The negative with these is the harsh glare that tends to reveal any imperfections in surrounding surfaces — even face wrinkles. To mitigate this, fluorescents can be ordered with "soft white" bulbs. These are somewhat less efficient but produce a warmer (softer) and more pleasant light. Another factor is the type of diffuser lens. Clear acrylic lets more light through, but is harsh. Translucent plastic gives a softer light but is not quite as efficient. Most manufacturers offer both types of diffusers, and bulbs are easy to buy. Experiment with both to find the best solution for your interior.

Another consideration is electrical noise, which the power units for fluorescent will generate unless suppressed. This can affect SSB radio reception as well as the weatherfax receiver. If you have a noise problem, try using a ceramic or Mylar capacitor between the electric leads. You'll have to experiment to find the right values.

Incandescents

Typically used for reading lights, conventional incandescent lights are most efficient if used with a reflector built into either the light fixture or the bulb. In most cases several sizes of bulbs will be available for each socket type. The ideal compromise between light and electrical consumption can be found by experimenting with different wattages.

We usually carry several types of bulbs. When we're at sea or trying to conserve power, we use the smaller bulbs. When we want lots of light, the larger units are screwed into place.

Quartz Halogen

Quartz halogen bulbs are substantially more efficient at producing light, but the light quality is extremely harsh and glary. For over-the-shoulder reading this is okay, but for ambient lighting I find it a little disconcerting.

They are very sensitive to overvoltage. Using quartz halogen bulbs while doing an equalizing charge, for example, will substantially reduce their life.

There are a number of easy to install, inexpensive fixtures on the market which can be flush or surface mounted. Anne Harrill likes a new line made by Seagull. She reports that these are clean looking, moderately priced, and have baffles which can alleviate the harsh glare which we find so objectionable.

Tube Lighting

Tube lighting is the ideal way to provide that soft glow in the evening. These are essentially a string of tiny bulbs, held inside either a flexible or a rigid plastic tube. Voltages and spacing vary, and some experimentation will be necessary to find the right values. They are most efficient at the hull-to-deck edge, behind a valance and reflecting downward. If there's a timber ceiling along the hullside, it's frequently possible to remove one batten and replace it with a thin piece of translucent plastic, behind which reside the tube lights. They can be used around cabin-sole perimeters if the furniture has an overhang, or under the saloon table.

We generally specify 1/2-watt bulbs at 4-inch (100mm) centers along the hullside and under the saloon table.

For denser lighting of the saloon table and/or galley or nav work surfaces, we go to 2- or 3-inch (50 or 75mm) centers.



What a difference a few lights make. Compare this photo to that on the next page. Although this design has tube lights around the perimeter of the saloon cabin (including across the bulkheads) and halogen spots over the table, they are turned off.

Dimmers

Electrical controls are available to reduce voltage to a light fixture and in the process dim the light. This tends to soften the value of the light (so that it turns a nice golden color) and is especially valuable with quartz halogen light sources.

Dimmers can be as simple as a variable resistor (easily found at an electronics store) or more sophisticated “choppers” that electronically reduce voltage and are more efficient in the process.

Changing Bulb Voltage

A simpler form of dimming is to use a high-voltage bulb in a low-voltage circuit. If you have a 12-volt system and use 24-volt bulbs, you will have half the output of light in a much softer color. With 24-volt circuits you can use 32-volt bulbs.

Another approach is to use several bulbs in series. For example, if you have a 24-volt system and can only find 12-volt bulbs, wiring the bulbs in series reduces the voltage to each bulb to 12-volt.

Watch Lighting

Once you head offshore at night, a different set of parameters takes effect. Now you want the minimum amount of light required to accomplish a task. To achieve this, change to smaller, higher-voltage (hence dimmer) bulbs; or paint smaller bulbs with heat-resistant red paint. I have recently read, however, that it is the intensity of light rather than the color, that affects night vision.

We’ve taken our fluorescent light fixtures and added a small incandescent bulb with its own switch for night lighting. This is easy and inexpensive. We use 1/2-watt bulbs and at 3 feet (0.9m) from the work surface, there’s enough light to make a cup of tea or a sandwich — or find the cookie jar.



Lighting on this 93-foot (28.6m) cruiser (on which the Harrills did the interior design work) was a big part of the evening ambiance equation. She has hull side lights, an array of dimmer-controlled halogens in the headliner panels, and additional spots designed to wash the bulkheads in light. The light that hits the vertical surfaces is reflected elsewhere, creating a nice atmosphere for very few watts.