No Welding Required!

Kuffel Creek Press

Classic Camping Trailer Series

TEARDROP TRAILER PLANS

8' CUBBY

A Step-by-Step Guide
For the Home Craftsman

By Kevin Hauser

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How to use these plans

We recommend that you read through the entire document before starting your project. Not many of the steps in building a teardrop are very difficult; but there are a lot of steps.

We are constantly striving to improve our products. In case there is a conflict between a photo and the text, the text and drawings are correct. Be sure to log onto the update section of our website to check for any revisions or clarifications. The address is www.kuffelcreek.com/cubby_updates.htm. We strive to have a flawless product, but as with all our plans, if you find a mistake, no matter how small, e-mail us and let us know at support@kuffelcreek.com.

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Acknowledgements

Many thanks to the usual suspects: Larry Sorensen for your tireless tinkering and gadgetry input, Dawne Malone and Lisa Whipp for your brutal proofreading and making me look good (no small feat), Teddie Bozhilova for the wonderful work on our ads, Daniel Cozad for the confidence and inspiration, Bill Getty for your example of blind optimism, Brad and Jackie Romaine for their cheerleading and being just so darn nice, and of course, my darling wife Marty, who puts up with 6-month "projects" as well as a bathroom remodel thrown in during Christmas Vacation (looks cute with a vacuum, too).

TWO HOMEMADE MARKING GAUGES

The simple one on the left is adjusted by the thickness of the piece of wood the blade is screwed to. This one scribes a line exactly 3/8" from an edge.

The one on the right is a copy of a store-bought gauge I made from a tree that was cut down on a client's property. It has a nail on the end, and the fence adjusts to determine the width of the scribe.

Why a Teardrop Trailer?

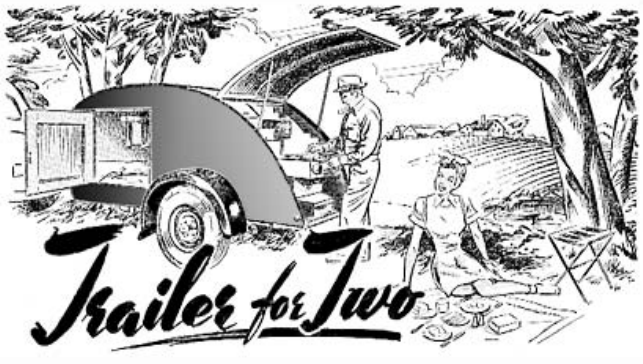
Not exactly the Ritz.

In October of 1998 my wife and I were returning from a cold, wet and windy tent camping trip in the Sierras. My wife (who had been in poor health) announced that her tent camping days were over, and if I ever expected her to come camping with me again, she wanted walls, a mattress, a kitchen and a potty.

Thus started our epic quest for a suitable RV trailer. Our initial search turned up a couple 15' trailers that were ***way*** beyond the towing capacity of either of our vehicles (a Camry wagon and an old Toyota pickup). We found a 13' trailer in Hemet that might fit through our side gate, but it had extensive water damage, was missing appliances, was filthy with debris and rat turds, needed new tires and was priced at $1,300. My wife was disgusted with the mess, and I still doubted the ability of either of our cars to pull it.

A while back we had seen the Huell Howser episode on teardrop trailers, and my wife was enamored with the charm and grace of teardrops, and I admired their compactness and efficiency. However, what had stuck in my mind was the owners saying how rare they were, as they weren't made anymore. I didn't think we could find one, and if we did, it wouldn't be cheap.

We gave up hope and lost interest. The purchase of a computer gave us access to the Internet, where we eventually came across an ad for a used teardrop. Elated with our find, we rushed over to view our "prize." What we found was the rotting hulk of a tin can that looked like a drummer had been beating it with an ugly stick. Another couple had gotten there first, had paid $1,100 for it, and were gleefully towing it off with their Jeep. My wife was heartbroken. The next few weeks we drove all over Los Angeles looking at more teardrops, all of which were overpriced and in terrible condition. As our frustration mounted, I started questioning the wisdom of spending $1,000+ on a trailer that needed everything replaced but the hitch and the dome light.

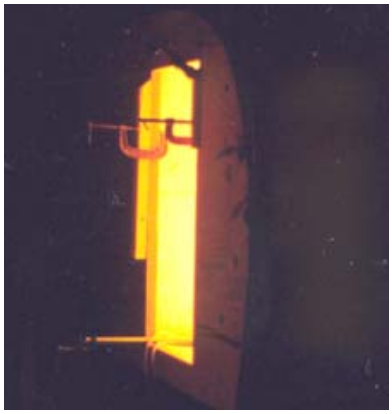


Once again the Internet came to the rescue. There was a growing Internet presence of the teardrop community, and I found reprints of a 1947 article on building a teardrop from scratch, as well as websites of other intrepid enthusiasts building teardrops. It

occurred to me that as a carpenter and electrician, why couldn't I build *our own* teardrop? It took some persuading to convince my wife, who finally agreed on the condition "it better be nice"! Thus started the epic quest of trying to plan the perfect trailer.

I soon found the plans and articles were very brief and left out many important details. I ordered most other available plans and reprints, and was frustrated with what I got. I was in the middle of building by now, and I ran into countless problems that I *knew* had been solved thousands of times before, but I could find no clear directions on *how* to do it. I had to remake things several times, but in the end came up with what I thought was a solid product.

I got a real break in the form of a RV show near my home. An inspection of the teardrops there showed that I was not far off in my thinking and design, and only minor changes were necessary to have a top-rate trailer. We took the half-finished trailer on a trip to the Sierras with our Camry, and were pleased with the result.



Burning the midnight oil.

However, a vexing problem developed with the hatch door, in that it changed shape with changes in humidity to the point that it could not be closed in damp weather, and would leak terribly. It was back to the drawing board. I had to re-work the whole concept, and used an unusual departure from traditional hatches. The new hatch was incredibly strong, simple to build, fits every time and proved itself water and snow proof on our last outing.

With a completed first class trailer, my frustration turned again toward the inadequate plans that caused unnecessary misery, wasted time and expense. If I, being an experienced craftsman, had trouble with them, how would the poor home handyman ever cope?

Fortunately, I was in a position to do something about it. I had written a book and started a publishing company a year earlier, and using that experience I set out to publish the best and most complete plans available in the world for a teardrop trailer that would allow for the average builder to easily complete a successful project. It is with this goal in mind that I proudly present the second of several models of trailer plans that will save you time, expense and headaches as you build a teardrop of your own.

The 8' Cubby

By

Kuffel Creek

SPECIFICATIONS

Chassis as shipped:

Built by Long Chih Ltd., Taiwan.
longchih@ms31.hinet.net
Distributed in the U.S. by
Harbor Freight Tools.
www.harborfreight.com
Long Chih Item No. **LCI-852T**
Harbor Freight Item **#6464**
Trailer Chassis Shipping
Weight: 242 lbs.
Max. Load Capacity: 1,845 Lbs.
Tire: 5.3-12 Tubeless, 6PR
Coupler Capacity: Class II
3,500 Lbs. Max Gross Load
Ball Size: 2"
GAWR: 2,090 Lbs. With 5.30-122 (D) Tire 12 x 4 Rims At 80 PSI Cold
GAWR: 2,090 Lbs.
Bed Frame 4' x 8'
Overall Length: 137"
Tire Inflation Pressure: 80 PSI Cold
Highway lights: 4-Pin Connector, 12 Volt

As Built:

Total Empty Weight (with 7 gallons of water and the spare tire): 910 Lbs.
Tongue Weight: 180 Lbs.
Overall Dimensions: 11' 4" Long x 6' 4" Wide x 5' 10" High
Interior Cabin Dimensions: 45" Wide x 72" Long
Water Tank Capacity: 7 Gallons
Ice Box Ice capacity: 18 lbs.
Highway Lights: 6-Pin Round Connector

Description:

The 8' Cubby is a response to many requests from those who have basic woodworking and carpentry skills, but have difficulty welding or finding someone to weld the chassis.

Off-road trials deep in the forest.

The 8' Cubby is built upon a heavy-duty utility trailer chassis from Harbor Freight Tools. This bolt-together chassis is rated for 2000 lbs. and is easily modified for the Cubby with simple tools, and absolutely ***no welding*** is required.

But no welding does not mean that it is not strong (for a good bolt is far better than a bad weld). All components interlock for a secure connection that makes for a rigid and road-worthy frame. Using this manufactured frame will save you hundreds of dollars and countless hours of hard labor, not to mention the danger of poorly executed amateur welds. It often goes on sale for around $300, and Harbor Freight will ship it free to almost anywhere. The components are dipped-painted and go together in a day. 12" high-speed tires, 2" hitch, light kit and certificate of manufacture are all included.

The rest of the trailer is appointed the way you've come to expect from Kuffel Creek. The Cubby has an amazing amount of cabinet storage, all executed in the finest methods. You will be crafting a family heirloom that will bring oohs and aahs from envious admirers. We combine the classic looks of the traditional teardrop with the modern conveniences that make camping a pleasure! Fully insulated, this trailer complies with the most stringent requirements when camping in bear country, as some parks require you to have a "hard sided" camper (tent trailers are not allowed). Although mostly intended for developed campgrounds, we road-tested the Cubby down some mean washboard roads to ensure that it can go where you want to go. (It seems anywhere worth camping is down a dirt road.) If your tow vehicle will fit, the cubby will fit.

An effort was made to use as many stock materials as possible from common sources, such as Home Depot, Wal-Mart and Camping World. The windows are a thickness that just happens to work out great on an insulated door, and give plenty of light and ventilation. Speaking of which, the roof vent with electric fan comes in handy, especially with the potty inside. When given the choice, I have used the "low-tech" method, such as a rod to prop up the hatch and simple turnbuckles to hold the drawers closed. I've become a believer in the simple method generally being the least expensive and most reliable way to construct something.

Customization

The question is always asked: “Can anyone customize these plans?” My answer is: “Ha! Try and stop them!” Of course you can, and I encourage it. It seems that no two teardrops are alike. I know there are hot rod enthusiasts out there who can’t wait to put custom fenders and wheels on their teardrop, as well as slick paint jobs. Not everyone’s style of camping is the same, either. I do not claim that my version of the teardrop is the best, or that my construction techniques are the best. There is always room for improvement. However, for those who are neophytes to teardrop building, I have thoroughly documented a procedure I have used to successfully build a teardrop that works wonderfully. This will save you countless hours of frustration and wasted materials.

You can be assured of many years of service from your custom trailer and then enjoy a high resale value if you can ever bring yourself to part company with it. (Whenever it's parked in the driveway, be prepared for people knocking at your door wondering where you got it.) We're always interested in photos of our client's finished projects, and plan to include a brag section on our website for them. The craftsmanship and ingenuity of teardrop trailer builders is one of the charms of teardrops, and I never cease to be impressed.

WARNING!

Never sleep in a completely sealed trailer! Always keep the vent or a window cracked open, or you may suffocate.

Teen Becksted, Teardrop Pioneer, 1946
Photo courtesy of Larry Becksted

Tools

Avoid the pitfall of using this project as an excuse to go buy a bunch of new expensive tools (after all, you don't want a ***drill***, you want a ***hole***). Most of my tools are from yard sales and would be considered "light duty." Save your money for nice flooring or a better mattress. Tools needed for this project are typical for a small home workshop with a few exceptions. The basic power tools needed are:

- Table Saw with a Dado Blade
- Router (optional)
- Circular Saw (Skill saw) with wood and abrasive metal-cutting blades
- Jigsaw
- 3/8" Electric Drill with Drill Bits up to 3/8", Wire Wheel
- Cordless Screw Gun
- Palm or Belt Sander
- Jointer, either a 4" tabletop or 6" floor model
- Doweling Jig or Biscuit Joiner

If you don't have any of these already, ***don't spend a lot of money on them!*** I paid $20 for my jigsaw (new) and it worked fine (having a sharp blade matters more than the type of saw). Assorted hand tools will be used, along with the following:

- Rasps, Metal Files
- Caulking Gun (get the high-leverage "skeleton" one)
- Spirit Level
- Lots of Clamps
- Saw Horses (at least 2)
- Rivet Gun

The following specialty tools aren't essential, but you're really, ***really*** going to wish you had them by the time you finish. I've given the Harbor Freight prices for them.

- Air Compressor $100-$150
- 1-1/8" Brad Nailer $35 (on sale recently for $14: I paid $90 five years ago)
- Air Shears $45
- 1/2" Pipe Clamps $3.50 (get at least 4 sets, and 5' lengths of pipe)
- Drywall Square $15
- 4 1/2" Angle Grinder $20

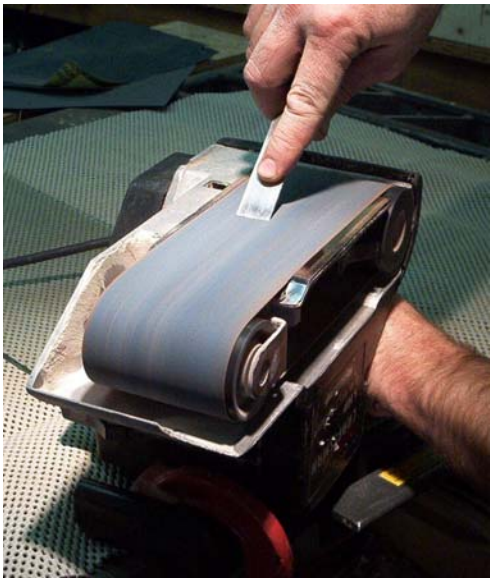
You will be working in some tight spaces, so you may want a right-angle adaptor or flexible adaptor for the drill that will let you drill and drive screws inside small cabinets.

The burn-up of my Craftsman chop-saw necessitated that I use an alternate method of cutting trim for this project. I bought a $5.00 plastic miter box and screwed it onto my workbench. Coupled with a Japanese-type saw, it was just as fast as the chop saw, and I quickly surmised that I have a much better chance of completing this project with all my fingers intact than with the electric saw. Thus, the chop saw still sits unrepaired to this

day. The miter box also excels in cutting aluminum trim if used in conjunction with a hacksaw. If the slots start to get sloppy from being worn from the saw, throw out the miter box and buy another one. For large crosscuts, I use the table saw and a crosscut sled.

For doing the woodwork, you will need a sharp ½" chisel, **much sharper** than the way they normally come from the store. The cheapest way I know to do this is with fine wet & dry sandpaper taped to a piece of glass, and a rolling angle gauge to clamp the chisel in. Once you've used a truly sharp chisel, you'll never settle for less.

Uncle Kevin's Cheapskate Sharpening Method



1.) If the edge has nicks in it or too steep of a bevel, re-grind it with a fine grit belt on the belt sander (remove the dust bag or it will catch fire from the sparks!) Have a tub of water handy to occasionally cool the blade. This method reduces the possibility of drawing the temper from the blade, as is possible on the bench grinder.

2.) Set a sheet of #600 wet/dry paper on a ¼" thick piece of glass, and smooth the back of the chisel until all the machine marks are removed.

3.) The back must be flat and polished. You can also final buff it on a felt wheel on the bench grinder, using polishing compound.

4.) Using a sharpening guide, go through #320, #400, and finally #600 grit wet/dry paper. Start with a 30° bevel, and then add a 25° micro bevel at the very tip. Strop the blade with a leather belt.

5.) You can test the sharpness by how low an angle the chisel will catch your thumbnail. If you stab yourself doing this, I'll come over and slap you silly!

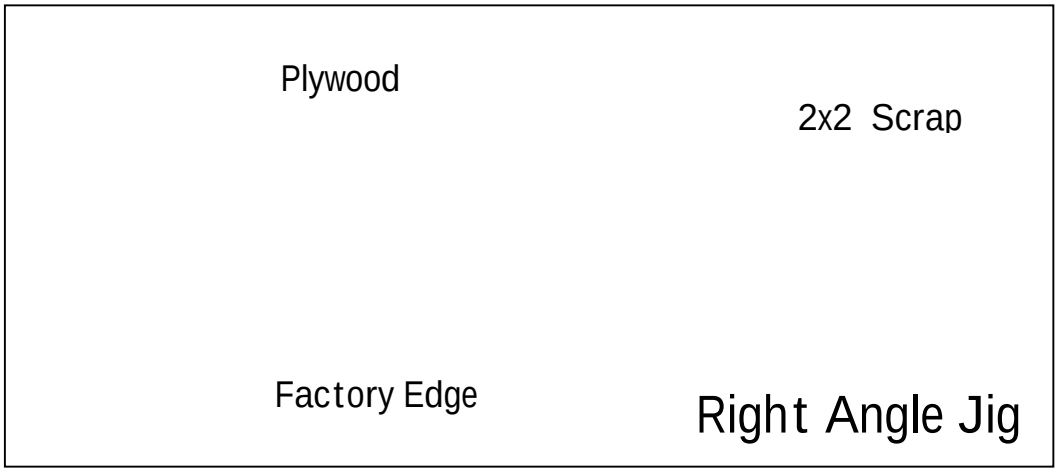
Suitable Workshop

The best place to build your trailer is in an enclosed, hard-surfaced, well-lit location where you can store your materials and tools close at hand. Unfortunately, I didn't have anything ***close*** to that at the time we built our first prototype, so I used the gravel space besides the garage and suffered the elements. (There's an unwritten law somewhere that it has to be at least 104° to either weld or build a redwood fence.) If nothing else, it's nice to have a spot inside where you can lean the plywood and aluminum to keep expensive materials out of the sun and rain.

I now have a nice rolling platform that holds sheet goods upright, and I've installed an awning over the side of the garage. The garage wall has a 50-amp arc welder outlet, 120-volt outlets, air hose and shop lighting. Finished trailers fit beside the garage, but once in a while it's still fun to leave them out in the driveway just to have people knocking at the door, wondering where I got a teardrop trailer.

Right-Angle Jig and Sawhorses

I know you're in a hurry to start building, but there are a couple of things you need to make in order to save yourself a world of misery. Foremost is a right-angle jig. This jig will be used in holding the sides straight so you can fasten them to the deck. It consists of a scrap of plywood and a couple of 2x2s. Glue and screw the 2x2s on the factory edge of the plywood. This will allow you to clamp the sides in place at the perfect angle before you screw them to the deck.



Assemble two sawhorses that are 5' wide and about 36" high. Rip a couple of 2x4s to give you four scraps on which to support sheet goods while you're cutting them on the sawhorses.

Materials

The materials for this project are broken down into stages, since you probably don't have room for both the trailer chassis and all the components at the same time. Items that can be mail-ordered as a group will be presented to help you possibly save on shipping and handling charges. However, material from Home Depot will always be there and is usually best bought "just in time." This prevents material from getting damaged and being in the way. Don't forget to promptly return unused material for a refund.

You will need to choose the type of interior, such as the wood types. I chose cherry for the prototype. I learned long ago that you spend way too much time and energy on a project like this to try skimping on materials. The material cost is such a small component of the overall project that it doesn't make sense to use anything but the very best. It will take you just as long to make a set of cabinets out of pine as it does making them out of cherry and oak, so you might as well use the good stuff.

If you haven't already done it, order the trailer chassis now. You may also order the windows, fenders, and water tank, as they are the other items that have a lead-time.
You should now purchase Materials List 1, p. 73.

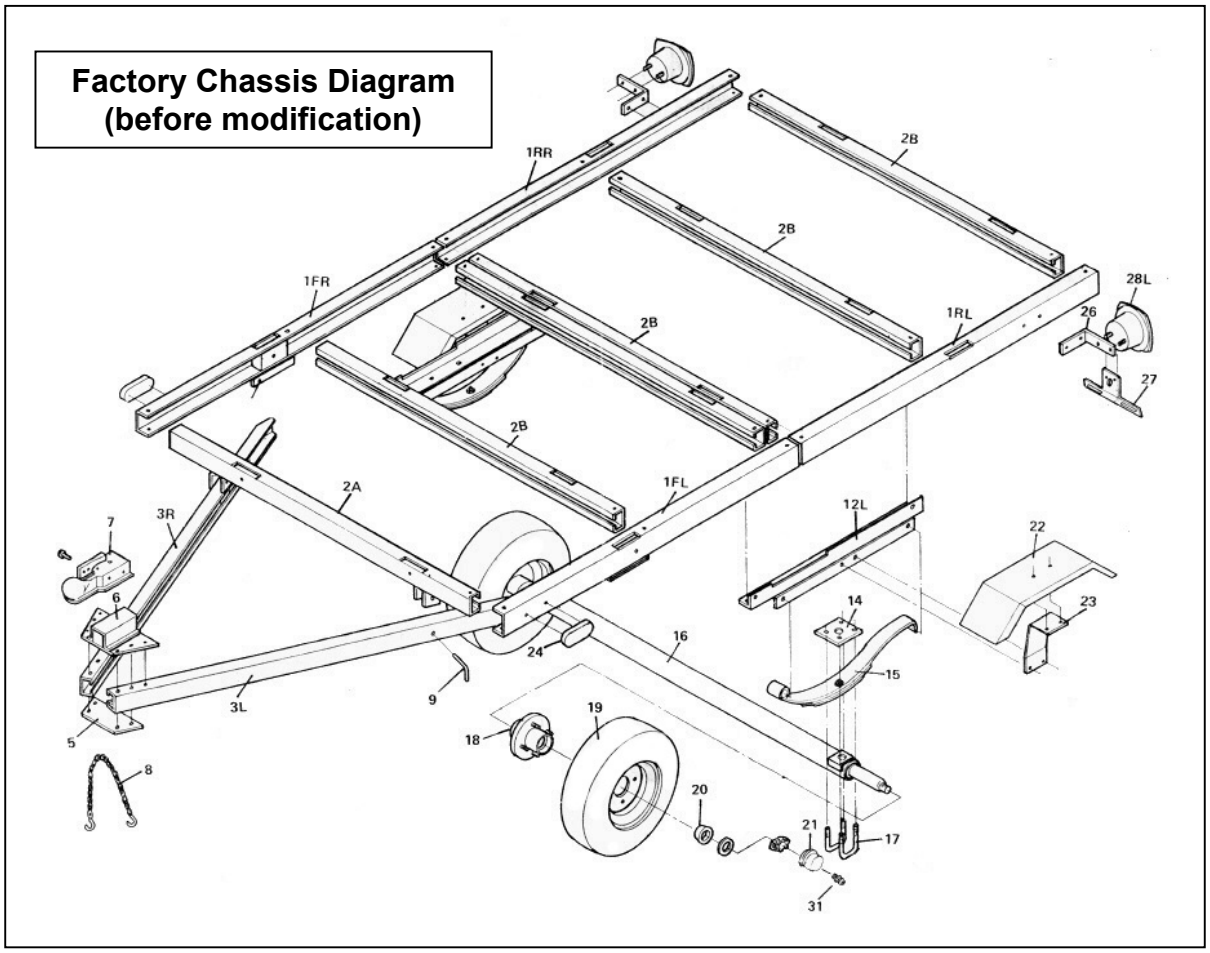
Trailer in a box.

Chapter 1: Chassis Assembly

Cleany cleany, ready for the sides.

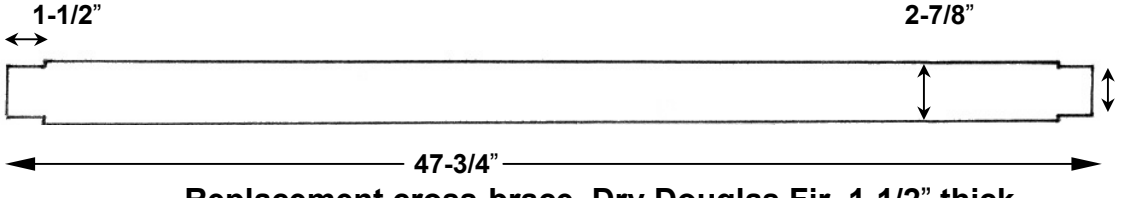
Chassis Assembly

You will need to do some slight modifications to the factory chassis in order to adapt it to the Cubby. Open the boxes and spread out all the parts. Keep the cardboard from the boxes to lay parts on or use for a ground cloth for any touch-up painting you need to do. Get a wide, shallow box or pan and dump all the bolts and hardware into it so you can find things easily. Also include the extra hardware you purchased from Materials List 1.



From the above diagram, you will notice that the deck is composed of two independent sections that are bolted together in the middle. Bah! We will take the parts supplied and make one rigid deck out of it. (Don't throw away any extra hardware yet.)

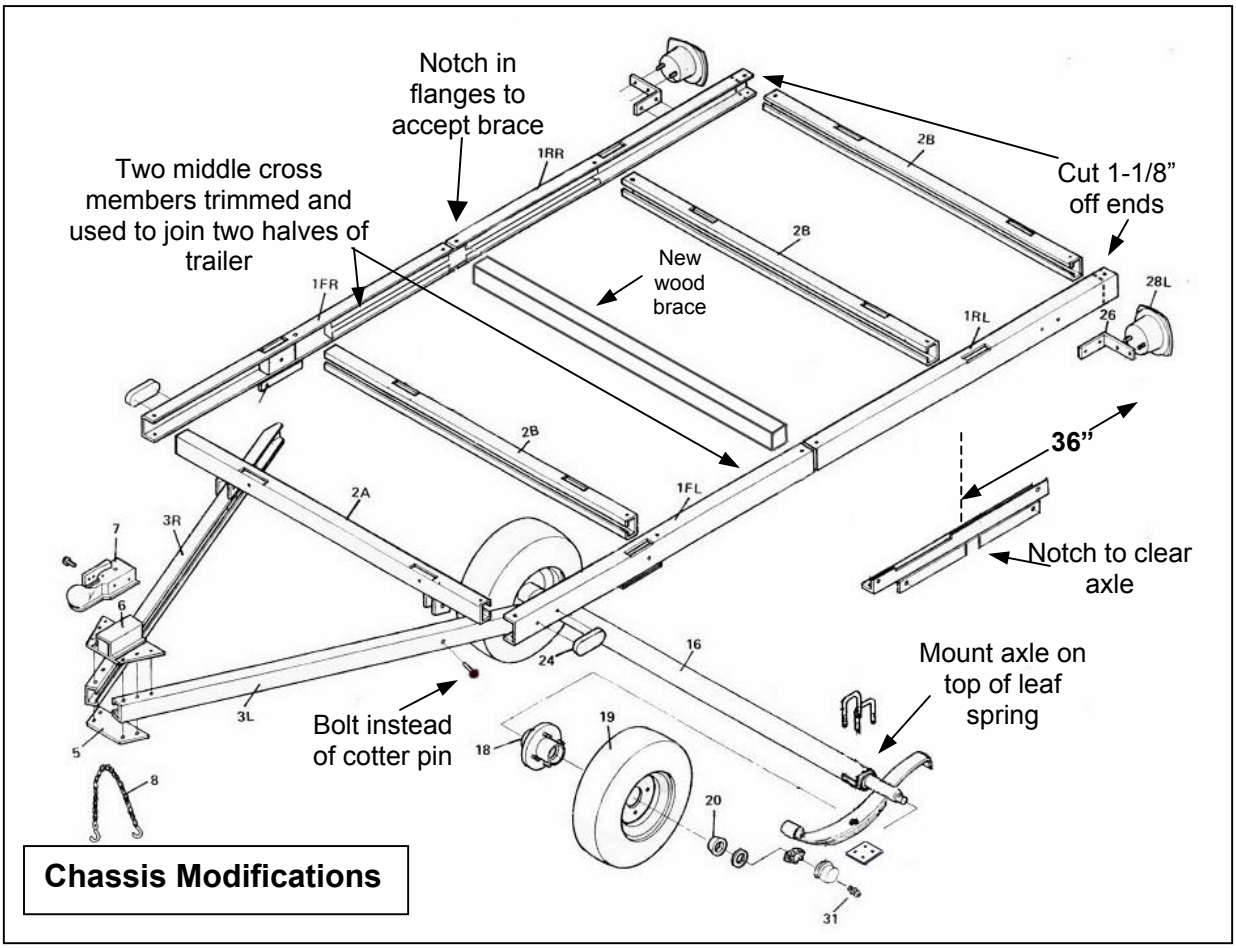
But before you get started on assembly, you need to make a wood cross-brace, shown below. This will replace the two steel ones that will join the two sections.



Replacement cross-brace, Dry Douglas Fir, 1-1/2" thick

Start by cutting 1-1/8" off the two rear side rails. When assembled, this will result in an overall chassis length of 94 – 7/8", which accounts for the curve on the front of the trailer.

Unless you *really* like hacksawing, the cutting is best done with an angle grinder using a thin cut-off wheel. For the best control, hold the grinder so the wheel rotates toward you, and start at the far side and draw the grinder towards you. Unfortunately, this results in the shower of sparks being directed toward your body, so you must be well protected with leather gloves, earplugs, face protection and maybe even a flannel shirt.



Chassis Modifications

Take two of the cross members and trim them to 44-7/8" in length. They will be inserted sideways into the two side rails to join the two halves together. The inside flanges must be notched to accept the new wood brace you just made. Center this notch by where the two halves join, depending on the width of your optional floor hatch. The wooden cross brace must be inserted during assembly, or you will have to take the whole thing apart to add it later.

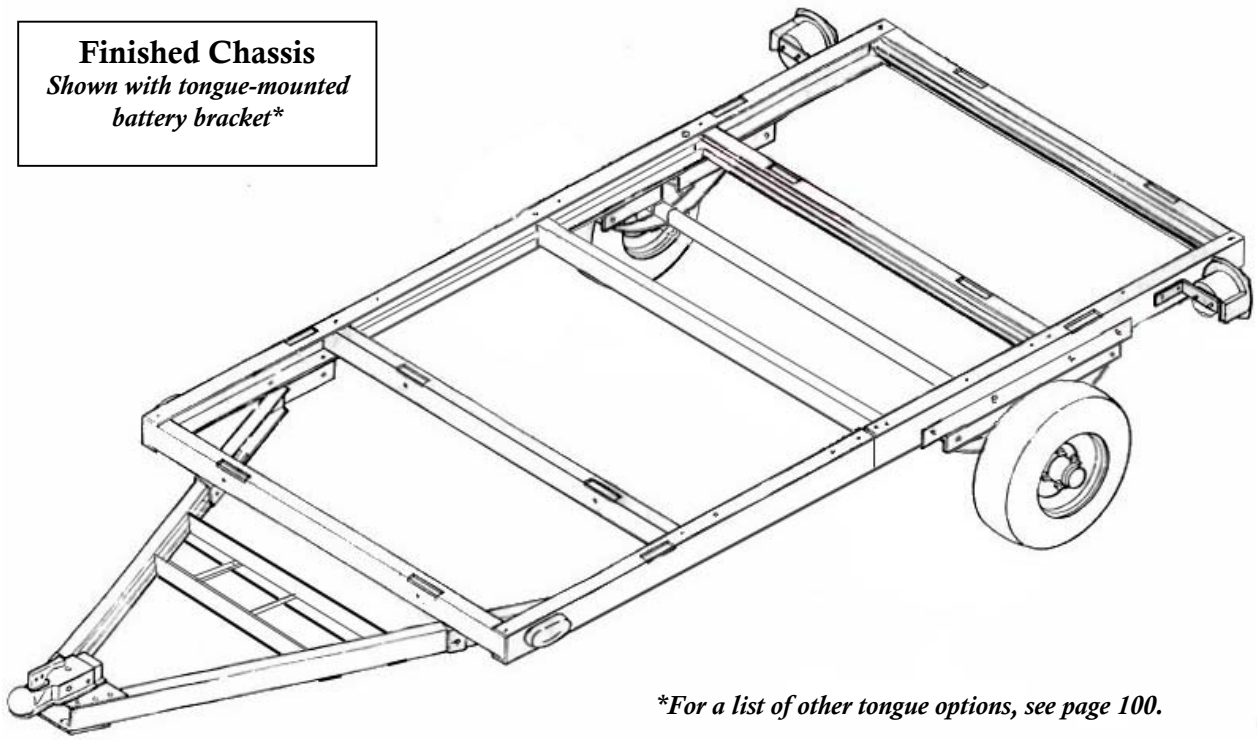
You will have to drill some new holes for the relocated parts. The fastest way is with a brad-point 3/8" bit and a high-speed drill. Using cutting fluid speeds the process up and extends the life of your drill bit. Make sure to wipe off the fluid before you try to paint. All bolts of the chassis should be secured with nylon locknut nuts.

The notches are also best cut with the angle grinder. Make the two vertical cuts first, then do a plunge cut for the bottom, making it flush with the inside of the channel. Touch up any raw steel edges with red spray paint, as this is the last chance you'll have access to them.

The axle is mounted on top of the leaf springs instead of below them. This lowers the profile of the trailer without affecting the ground clearance too much. However, the spring bracket must be notched to allow for axle travel. You should be getting pretty good with the angle grinder by now, so have at it. (I should mention that all your angle grinding is best done out where your neighbors can see you, since all the noise and sparks is so manly-man and very impressive.) Mount the axle assembly so that the axle is centered 36" from the rear of the trailer. This will give you the proper tongue weight.

A pipe clamp is useful for aligning boltholes on the frame for assembly. Before you tighten everything down, measure the frame with a tape measure from opposite corners, like an "X." If the frame is square, the measurements should be the same. If not, put the pipe clamp with a 10' pipe on the "long" corner and crank it until the measurements are equal. Then tighten the bolts.

Finished Chassis
Shown with tongue-mounted battery bracket*



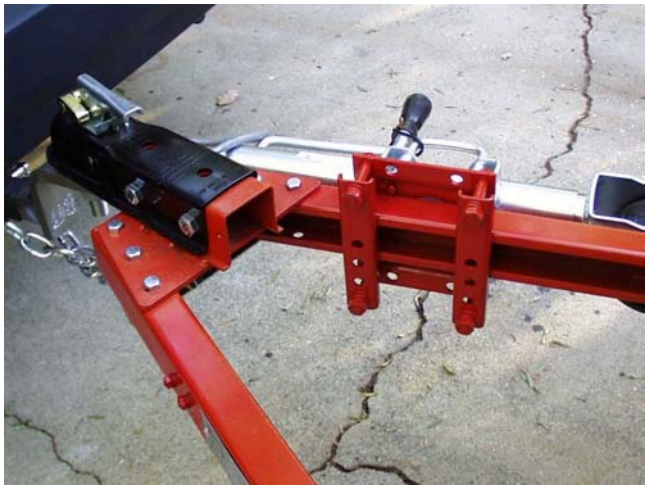
****For a list of other tongue options, see page 100.***

Replace cotter pin with a bolt.

The chassis has an ingenious design that allows it to tip back for loading by simply removing a couple of large cotter pins from the front of the trailer. However, we don't want it to tip (although that would be a great way to clean out the icebox) and so replace the two cotter pins with a couple of bolts and nylox nuts.

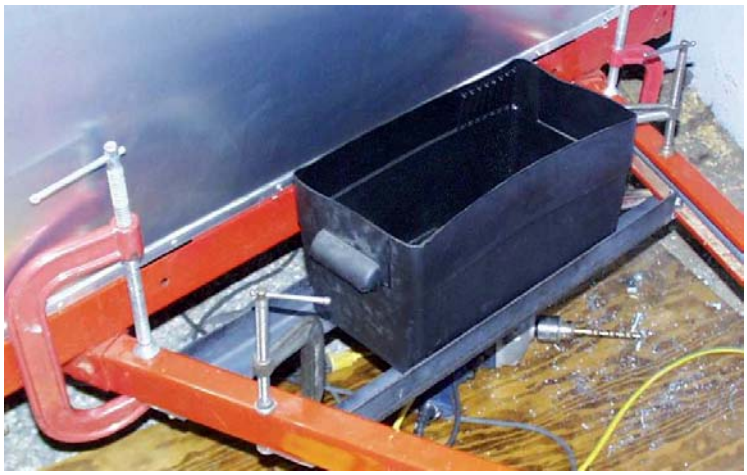
Swing-away Tongue Jack

A most convenient accessory is a tongue-mounted swing-away wheel jack. This lets you jack the trailer off the tow vehicle and easily move it around, yet swings out of the way to allow clearance in navigating the steepest driveways. No more creeping out of the driveway, waiting to hear that ***screeech*** sound of metal gouging asphalt.



Battery Bracket

This 8' Cubby was built with the battery mounted on the tongue. You could also just as easily mount an ice chest, cabinet, or scooter carrier on the tongue. For some suggestions, see page 100.



Angle iron clamped in place to check the fit before drilling and bolting in place from below.

The dimensions of the bracket will depend on the battery box you use. The 2" steel angle is notched and bolted under the tongue rails, with 1" angle spanning them on each side of the battery box to fix it in place. A heavy nylon strap bolted to the brackets holds the battery down. Make sure to keep the bracket out from the trailer so the battery lid has enough clearance.

Optional Floor Hatch

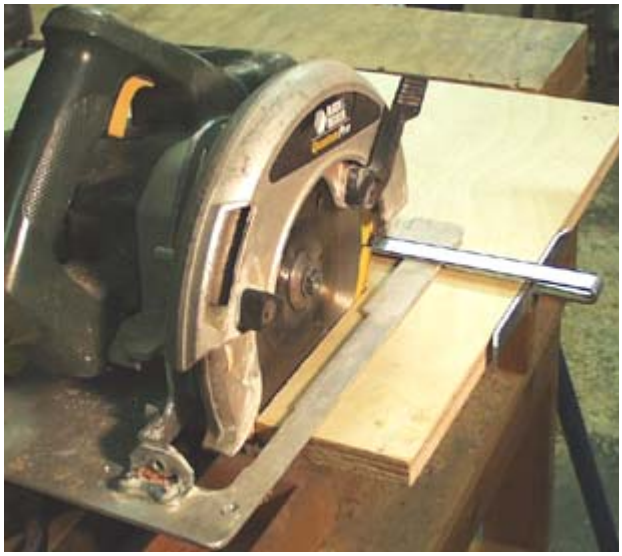
This hatch is used for extra storage, or to give a little extra headroom to set the porta-potty on, allowing you to sit up straight. (See page 83.)

You will need to mount the floor of the hatch now, as it is impossible after the deck is complete. The floor is suspended by 1/8" by ¾" aluminum angle screwed into the chassis flanges with self-tapping screws. The floor consists of a piece of ½" plywood covered on the bottom with aluminum (the aluminum goes in first).

Before installing aluminum, put a bead of caulk down on the aluminum angle, then the aluminum sheet, and then the plywood. Secure the floor in place with ½" stainless pan head screws that are driven from below.

Bottom view of finished floor.

Chapter Two: Body



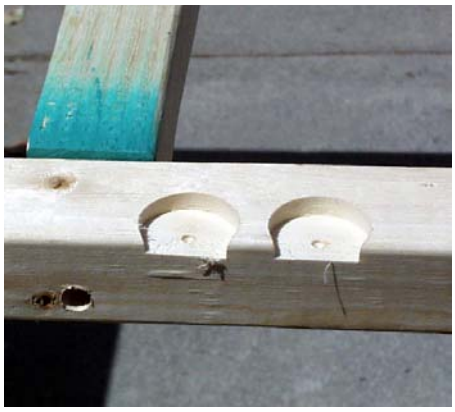
Two ways to saw a straight line with a circular saw: left, with a rip guide, and right, with a cutting guide. You can either use the store bought cutting guide as pictured, or make your own from a scrap of baseboard tacked in place. Measure the distance between the blade and edge of the saw foot on either side of the blade and write it on the foot. Add or subtract that much when doing the layout.

Wood Deck (Shop Drawing p. 84)

A frame made of 2x4s ripped in half supports the deck. Don't bother with exotic joints or hardwood for the frame: its main purpose is to give the sides something substantial to screw the sides into. Just use butt joints screwed together with 3" drywall screws. It gets glued and screwed to plywood and bolted to a steel frame anyway.

Assembling the wood frame.

Place this frame on top of the chassis, and tap it with a hammer where the frame rests on top of bolt heads securing the chassis together. This will mark where you must carve out some recesses so that the frame will lay flat on the chassis. A 1" forstner or spade bit works well for this.



Relief holes where the deck must rest on top of bolt heads.

The frame gets covered with 1/2" ACX plywood. Use plenty of glue and screws here, countersinking the screw heads to give a smooth floor. Because of the round shape of the front of the trailer, you will have to cut the front off at an angle (see detail on shop drawing p. 84). Do this after the deck is attached to the wood frame, using a Skill saw and a straight edge as seen on page 21.

Glue a ¾" reinforcing panel of plywood underneath the deck to mount the spare tire from, then countersink and screw it securely from on top. You should also attach some ¾" plywood where the water tank will mount.

Glue and screw the plywood to the frame. Note the floor hatch cutout (save the piece you cut out).

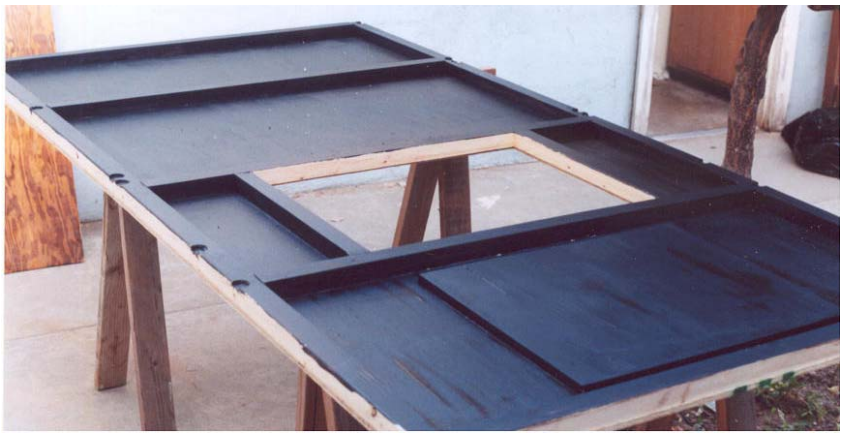
Give the bottom a good coat of asphalt emulsion to protect it from rotting due to road moisture. This would also be an excellent time to pre-fit the ¾" rigid foam insulation that goes on the bottom. Otherwise, you will have to do it upside

down from underneath. This saves a lot of misery lying on your back in the gravel. Use adhesive caulk to glue the insulation in, and secure with fender washers and 1-1/4" deck screws.

Place the completed deck on the metal chassis and check that everything lines up right. Clamp the deck in place and drill the 3/8" boltholes through the deck and the frame. Countersink the holes in the plywood for the carriage bolt head so the floor will be smooth. Unclamp the deck, remove it, and squirt a good bead of polyurethane caulk on the frame; then replace the deck and bolt it down.

Install the 2x2s on the sides of the hatch opening using glue and screws, centering the 2x2 under the edge of the hatch.

Glue ¾" plywood under the front of the deck for hanging the spare tire from. Use plenty of glue, then countersink and screw in place from the other side. Not shown is the plywood at the rear of the deck to bolt the water tank to.



Bottom of deck coated with asphalt emulsion to prevent rot. When this dries, it would be an excellent time to insulate.

You can decide to quit right now and just use the trailer to transport motorcycles, or you can boldly forge ahead and continue building the…

Trailer Sides

The distinctive shape of the trailer sides proclaims to the whole world that you aren't building a common trailer, but a teardrop! From this point on, be prepared for huddled masses at your door, asking…no, *begging* to have a glimpse of the work in progress, and to photograph their children in front of it. To the ordinary person, the pressure of countless eyes tracking your progress and all the media attention would be daunting and debilitating; but the intrepid teardrop craftsman *laughs* in the face of scrutiny and boldly continues his quest to certain and glorious victory! (I'm sorry; I get carried away sometimes.)

Side Profile

The side profile is enclosed on a grid matrix (page 85). The technique for transferring this profile to the full sheet of plywood is not difficult, and the only tools needed are a pencil, a drywall square, tape measure and a 1/8" by 4' dowel.

Cutting the sides out with the help of Mr. Whiskers.

Marked along the perimeter of the profile are "points" marked by pairs of measurements. It's a lot like playing "Battleship." The first measurement is the width from the front edge of the plywood, and the second is from the bottom of the plywood. Using the drywall square and tape measure, transfer these points to the plywood and mark them with dots. Using the 1/8" flexible dowel, connect the dots. It's that simple. Because I was working by myself, I pounded tiny brads on the dots to aid the alignment of the dowel. The main secret is to have the dowel touching as many dots as possible when drawing the line. If one of the dots seems way out of line, its measurements are probably wrong.

Clamp the two sides together and sand smooth.

Set up your sawhorses, and then put a few scraps of 8' 1x2s across them to support the plywood. Cut out the side with the jigsaw, staying on the "waste" side of the line. With a rasp or sander, sand down the cut edge so it is pretty close to final dimension, then lay it on top of the other plywood and trace the pattern. Cut out this side in like manner. Cut out the doors using the Skill saw and a jigsaw, saving the scrap for future use. You will have to use a plunge cut, finishing the cut with the jigsaw. Stack the two sides together and clamp. Sand them to the final dimensions, and you will have two identical sides.

The galley hatch is inset into the sides to make for a flush exterior, so the sides must be cut for it. Make a simple jig out of a 3/8" block of material with a utility knife blade attached to it (see page 5.) Using it as a thickness gauge, scribe a line where the galley hatch door will go and saw out the waste. Do the same on the other side, clamp them together and sand smooth.

While the two sides are still clamped together, lay out the interior cabinets full sized, as well as all the spar locations on the top edges of the plywood, and the bulkhead shear walls. This will assure that the interior components will be square to the sides. To transfer points and measurements to the other plywood side, drill small holes at the corners of the cabinets and shear walls.

Side assembly. Note temporary spar and right-angle jig.

Side Assembly

Pound several 8d nails between the trailer frame and the deck on each side to set the side panels on during assembly. Attach the sides to the deck using glue and screws, countersinking the screw heads to make for a flush surface. Use your right-angle jig (visible here in the front left-hand corner) to assure the sides are square with the floor. Put one of the spars in to hold the sides up while the glue cures, carefully checking the alignment with a framing square. (If the sides are crooked to the floor, you're going to hate life later on.)

Bulkhead shear walls, framed up and skinned with 1/8" plywood. Notice how floppy the sides are; this is normal.

Bulkhead Walls (Shop Drawing p. 86, 87)

The bulkhead walls are the dividers between the cabin and the galley. They give the body lateral stiffness and help support the floor. They are constructed of ¾" framing which is insulated and then skinned with 1/8" plywood.

Frame the walls as illustrated, gluing the members to the floor and walls with polyurethane glue, and screwing in place, from the outside on the sides and down into the floor. Test-fit the 1/8" skin on front side, and then attach it with plenty of polyurethane glue and brads.

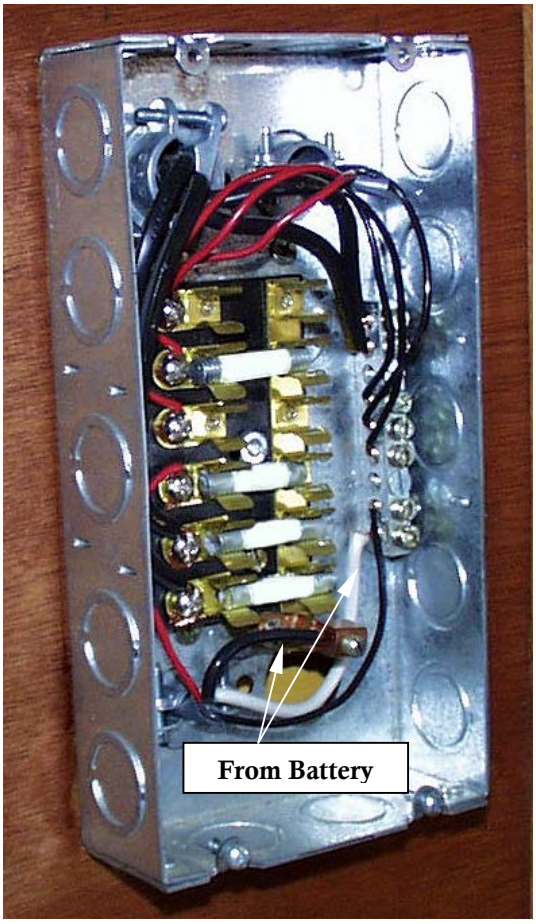
Pre-fit Inside Wall Skin

Remove the temporary spar so you have unobstructed access to the sides. Cut the inside skin to rough length, making the cut point towards the front of the trailer. Lay the skin against the side and butt it up against the bulkhead wall. Mark where it has to fit under the top wall. Measure the depth, and mark the cutout on the skin. (Make sure to cut out the right piece: it's easy to mix up.)

Slide the skin back in for a test fit, and if all is well, scribe the outline of the side on the back of the skin. Cut the curved portions with a jigsaw, and the straight sections using a utility knife and straightedge, making multiple passes. Put it against the wall again, and rasp and plane it to match the profile of the side. When finished, transfer the spar locations to the skin, as it will have to be notched out for the spars. (This is way easier than putting the spars in first, then trying to cut the skins around them.) Put the skins away in a safe place for installation later.

Sidewall Framing (Shop Drawing p. 87)

The sidewalls are furred out with ¾" pine to make room for the insulation and wiring. This also gives you something to attach the cabinets and door hinges to (called ***backing***). You should add backing for any additional shelves or coat hooks you plan to add, as the interior 1/8" skin won't hold a screw. The curved portions of the door opening are framed with ¾" plywood. ***You should now purchase Materials List 2, p. 74.***



Homemade fuse box. Large white wire goes to a ground bar, where all the neutral wires are connected. Large black wire feeds the right-hand side of the fuses, and hot wires are screwed to the left of them, feeding the devices listed on the door. Install finished fuse box after staining and varnishing.

Battery box. 10-gauge positive (black) wire is fused with a 30-amp circuit breaker. Entry conduit is in upper right corner, and is attached to battery box with a ¾" conduit strap. It would hook up the same to your car battery.

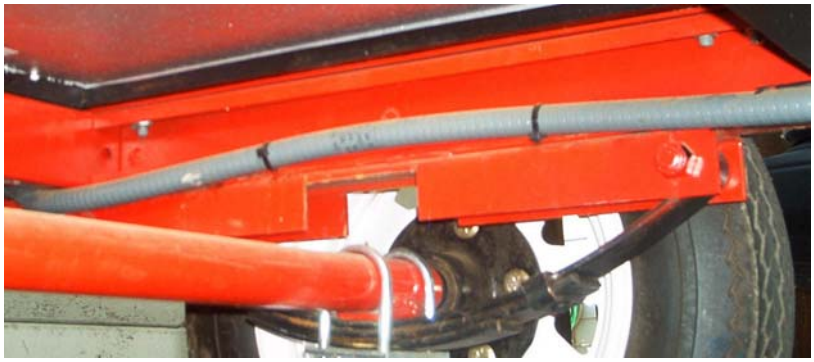
Cabin Wiring (Shop Notes p. 88, 89)

The wire I used for the lights and pump is normally used for built-in speakers on houses. It has red and black 16-gauge wires and is jacketed with blue insulation. For our discussion purposes, the red wire is called "positive," and the black wire is called "negative." (I know the wires can be black or white also; just decide a code and be consistent with it and you'll be fine.)

For the wire from the battery to the fuse box (primary wire), I used 10-gauge wire from Home Depot, with a 30-amp circuit breaker at the battery. If you choose to use you car's battery, you would hook it up the same way, using the center pin on the 6-pin trailer connector.

Front junction box. Top conduit goes to the tongue, bottom goes to battery, left conduit goes to rear junction box. Side marker wiring enters from top left.

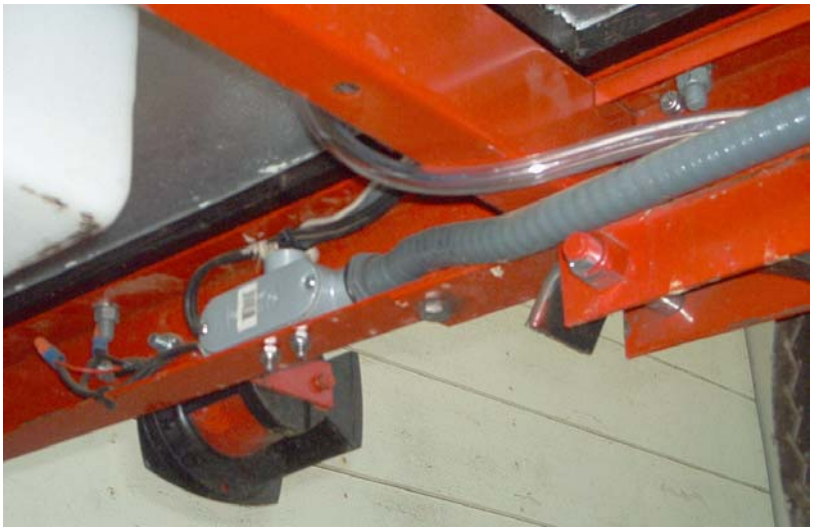
In order to minimize polarity conflicts, the cabin lighting is separate from the highway lights (brake lights, turn signals, license plate light, etc; see page 101 for details).



Wiring conduit passing over axle.

A car uses the chassis for the neutral conductor; thus the lights will only have one (hot) wire. RV lighting is made with two wires, positive and negative.

All wiring must be protected with fuses. This keeps your precious trailer from burning to the ground from a wiring short. Your car's fuses protect the highway lights, but you must provide a fuse box for the cabin lights and fan. I could not find a suitable fuse box, so I had to assemble one (see diagram p. 89) using a fuse block and large electrical junction box that I fashioned a cover for out of aluminum scrap.



Conduit body at rear of trailer where wiring from fuse box and taillights enters. Clear tube is drain from icebox, which normally hangs straight down.

I bought the biggest deep-cycle battery Wal-Mart carried and have never run it down on a typical trip. During construction it ran the lights for 30 hours straight without a charge. If you have heavy electrical needs, you should use two 6-volt golf cart batteries instead of one 12- volt deep cycle. Be forewarned of sticker shock with the golf cart batteries.

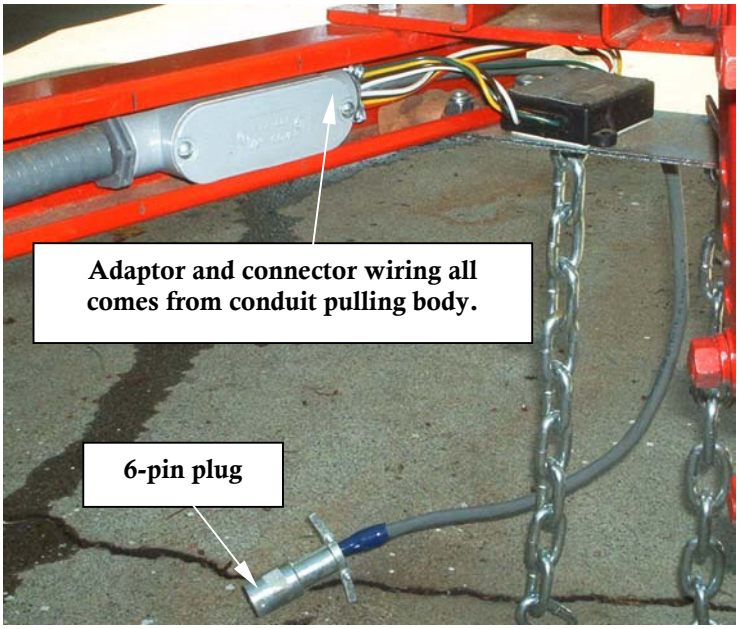
The cabin electrical consists of a double interior light switchable from each side, a porch light on each side, a reading light, a vent fan, a galley light and a water

Framing is notched for wiring to pass through.

pump. I know there are some sacrilegious heretics among you that will want an accursed TV inside, so they should also allow for that hookup. (To me, camping and TV are mutually exclusive: might as well stay home.)

The cabin wiring all runs from the fixtures or switches back to the fuse box. The fan vent and interior light wires will poke out of the top of the inside wall by the door to be connected after the lid is skinned. Leave about 4' of slack hanging.

Secure the wiring in place with a wire stapler; the special type used for telephone wires that shoots round-top staples. Under no circumstances use a regular flat stapler. It's too easy to harpoon your wires with it, then have a "mystery short" drive you nuts after the cabin's all finished. The galley light and license plate light are mounted on the rear hatch, so for now, just poke 1' of wire out the bulkhead wall for the future wiring, which will use a connector to hook to the hatch. Finally, take photos of your wiring so you don't drill or nail into it afterwards.



Tongue wiring and adaptor.

Highway lights consist of tail/stop lights, turn signals, a license plate light and clearance lights. The highway lights all run back to the tongue junction box, and finally through the wiring connector that plugs into your car. The lights that come with the chassis will work fine, but are set up for a four-pin connector plug. In order to use the 6-pin round plug (which expands your options), you need to use an adaptor, available at most chain auto parts stores. The wires are clearly labeled on the adaptor. The main thing to remember is that the taillights, marker lights and license plate light are all on the same circuit. The highway lights use the chassis for ground. The chassis comes with handy little clips that you can use to secure the wires coming from the right side lights to the junction boxes. ***You should now purchase Materials List 3, p. 75.***

Attach Fenders

It may seem that the trailer isn't even close to ready for the fenders yet, because they attach after the aluminum is on. However, I'm recommending you install them with T-nuts, and these must be installed before the walls are insulated and skinned.

Drill four holes in the fenders, position them in place on the trailer, then scribe the top two holes onto the plywood and the bottom two onto the chassis. Drill holes in the plywood and chassis, and hopefully, the holes in the chassis are where you can get a lock washer and nut on the bolt. Glue some plywood scraps over the top holes through the plywood, and drill the holes through the scraps. Install ¼" T-nuts from the inside of the trailer. The protruding chassis of the trailer will hold the fender 1/4" off the sides, so you must put some kind of bushing there. I used five 1/4" stainless washers, and attached the fenders using 1/4" stainless bolts and lock-washers. Does everything fit well? Great. Now take it all apart until after the aluminum skin and trim are installed.

If you're wondering how you're going to find the T-nuts after they're covered with aluminum, it's simple. Bolt the fender on the chassis and the other holes should line right up. Drill through the aluminum, and you're set to go.

Why Insulation?

It's a lot of trouble to insulate a teardrop, but it's insulated for a good reason. During the night, your body gives off about a quart of moisture. Some of this is from your breath, but most of it is from your skin. (Tie a Baggie around your hand and it will fog up.)

Insulate small spaces with expanding foam. Cut any that expands past the framing with a hacksaw blade. The gaps around the edges are filled after the inside skin is attached.

This moisture will condense on the relatively cool walls and floor, causing them to "sweat" by morning, even with the windows wide open. The bottom of the mattress will get damp and moldy, and the wood under the windowsills will get water damaged. Thus, the insulation helps keep the inside walls warmer and drier.

So it is that we go through all the trouble of making a "sandwich" wall construction and insulating the floor, with an added benefit that the trailer is far more comfortable and a little more soundproof.

Insulation

Insulate the spaces in the walls with ¾" rigid foam insulation. Cut out the foam where the wiring is, and then fill the space with expanding foam. The rigid foam should press-fit in the bays, but if it keeps falling out, attach it with spray adhesive. Finally, fill the holes where the wiring comes in from outside with expanding foam. Make sure that the foam is flush with the framing. If it sticks out at all, it will make attaching the wall skin difficult and produce soft spots. Don't worry too much about the gaps in insulation near the edges: once the interior skin is on, you can squirt expanding foam into the middle of the "sandwich."

Skinned wall, ready to install spars. Note the angle iron clamped to hold the wall straight.

Skin the Walls

Retrieve the wall skins you cut previously, and make the necessary holes for the wall switch wiring to pass through. Attach the skins to the walls with glue and brads. Cut the holes for the doors with a jig-saw from the outside after assembly. The plywood skins are sensitive to weather, so be sure to cover the trailer up at night.

Spar notched into the sides and screwed from the outside with two screws.

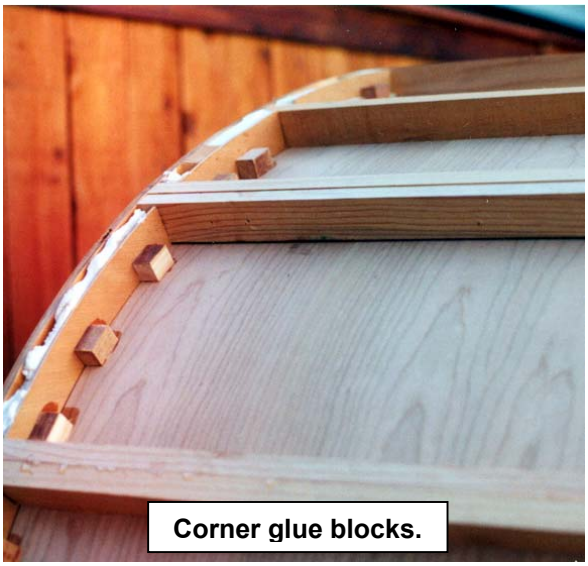
Install Spars

Using a piece of spar scrap for a template, pencil the spar locations on the inside skin, and then cut them out with a utility knife. Pre-drill and countersink screw holes, and then attach the spars with polyurethane glue and two screws on each side, and frame out the vent opening.

Rack the Body

Before you attach the skin to the lid, you must make sure the deck is not twisted, or "racked." This is done by "cross-sighting" the spars. Stand back from the trailer and visually line up a spar with one next to it. The gap between the two should be even all the way across. If not, jack up the front corner of the trailer where the gap is too close until it is even. Now the trailer is square, and the skin on the lid will hold it that way.

Cross-sighting spars: visually line up the top of one with the bottom of the next one; they should be even.



Corner glue blocks.

Skin the Inside Lid

The 8' skin is not long enough to stretch the whole length of the cabin, so make sure the joint falls on a spar inside the cabinet. Install the front long piece first, and then measure for the short rear piece. Attach them with brads only, then go to the outside and run a bead of polyurethane glue between the spar and the skin. Cut the hole for the fan vent with a utility knife, as well as

the wiring hole for the interior light. Poke the wires through for the fan and light. This is your last chance to add backing for anything on the ceiling. Set all the nail heads flush, so you won't be hammering the walls after the aluminum skin is on, possibly making a bulge on the outside.

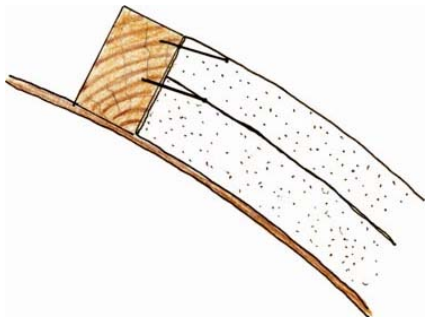
To support the outer edges of the skin, glue a bunch of ¾" x 1" blocks between the trailer sides and the roof skin.

Insulate the Lid

The lid is insulated with two layers of rigid foam: a ¾" layer and a ½" layer for a total of 1-1/4". (A single thick layer wouldn't make the curve.) These are tacked down with brads shot at an angle into the spar, so that the brad protrudes out (see illustration below). Any gaps are then filled with expanding foam.

If any of the rigid foam insulation sticks out past the spars, it must be shaved down to make a smooth profile or the aluminum won't lay flat. Use a sureform plane or a belt sander with a rough belt. (Be ready for a blizzard of foam dust that is electrostatically charged and sticks to ***everything!***)

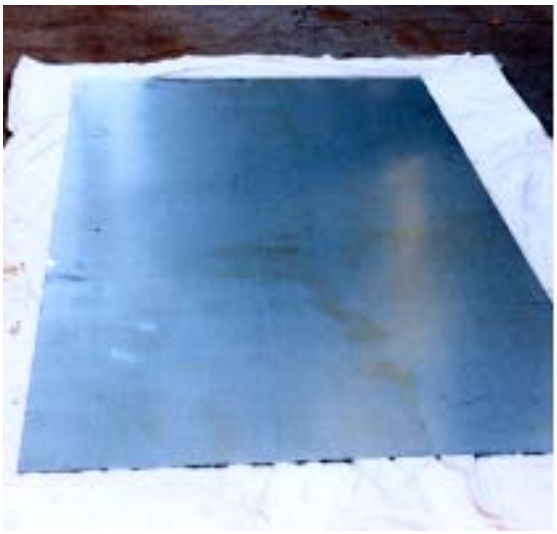
It is now time to remove the tires, put the trailer up on jack stands and purchase Materials List 4, p. 75!



To hold insulation down on a curved surface, use spray adhesive and brads shot in at an angle as shown. Hold the gun a little ways back from the cleat, and you can also bend the brads down afterwards.

WARNING!

Never sleep in a completely sealed trailer! Always keep the vent or a window cracked open, or you may suffocate.



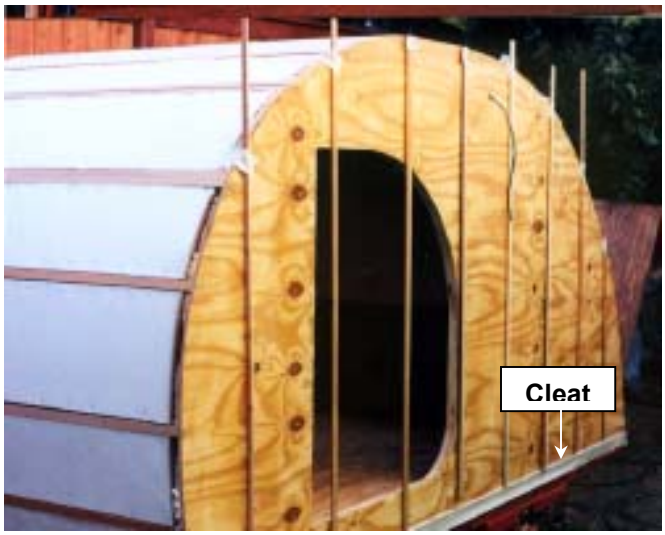
The .032 5052 temper H32 aluminum sheeting comes in 4'x12' size.

Skin the Exterior Sides

Choose a cool day to work, in order to avoid expansion and contraction problems between the plywood and aluminum. Sand the side of your teardrop smooth and wipe off all the dust, making sure all the screw heads are countersunk.

Clamp a cleat just underneath the plywood sides to set the shims and aluminum on during assembly. Have a can of lacquer thinner handy in case you have to pull the skin off after it's been glued.

Lay out a big tarp or some red rosin paper on the driveway to give you a clean surface to roll out the aluminum on. They rolled up all four of my sheets together to get them on my truck, and it was pretty…um…"exciting" when I cut the tape and they all unrolled at once. Measure where the porch light will go, and then drill a ¾" hole in the aluminum for the wire. A spade bit worked surprisingly well for this.



Shims and cleat in place, ready for aluminum.

Using a smooth nap or adhesive roller and disposable pan liner, roll out a coat of contact adhesive on the plywood. Stack a row of upright ¼" shims along the temporary support board to keep the two surfaces from contacting each other until you're ready. Hold them in place with tape.

Wipe off the aluminum and roll one coat of contact cement on. When the two surfaces are just tacky (not sticky), lift up the aluminum from the top, aligning it with the side and pulling the porch light wire through the hole. Start pulling out shims from the middle, smoothing the aluminum down with a rag and working your way out both sides.

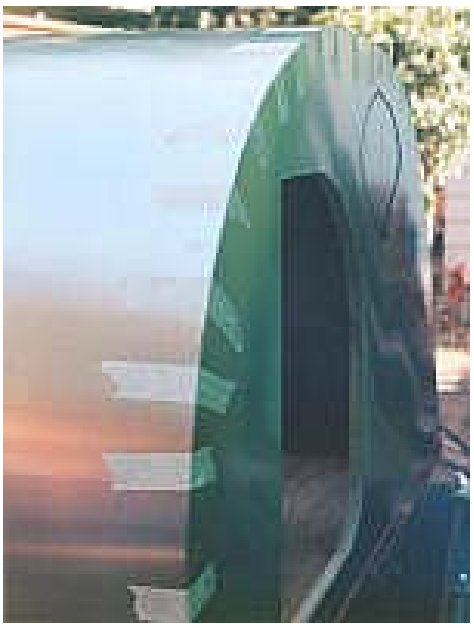
If something goes wrong, don't panic. Start pouring lacquer thinner between the skin and the body, and the glue will let go. Let the solvent evaporate, re-apply the glue, and try again.

It's time to give the pneumatic shears a rip. With a little practice, you can follow the plywood to trim the aluminum to fit the body. It may be necessary to follow up with a coarse rasp and a file. To cut out the doors, drill a small hole in the front top and bottom corners. Using the scrap of plywood you cut out to make the door opening, to draw the door pattern, aligning it with the two holes you just drilled. Mask each side of this line to protect the aluminum from scratches. Drill a 3/8" hole in the two corners, and cut the aluminum with a jigsaw, using a fine metal cutting blade. Save the pieces you cut out, as you will be able to use them for the doors. File any rough edges flush with the plywood.

Skin the Exterior Top

Measure from the front bottom up to where the hinge mounts, and then add an inch. (This will be trimmed off afterwards.) Cut the sheet to size. Sand the spars and wipe off the dust, making sure there are no protruding nails or screw heads. Have a roll of 2" masking tape handy, as this is what you will clamp the roof in place with.

Rear edge of lid temporarily clamped with tape until the cleat is clamped in place with C-clamps. Trim the excess aluminum after the glue dries.



Top clamped with duct tape.

Dampen the spars with a sponge, and then squeeze a generous bead of polyurethane glue. Start at the bottom front, making sure the sides are aligned. Once you're sure the sheet is square with the body, you can drive a couple temporary screws through the front bottom edge. Don't be nervous now; the polyurethane glue takes a while to set up, so you have plenty of time. Work your way back, taping it down with masking tape along the way. Clamp the back edge with a cleat and some C-clamps. When dry, you can trim the

aluminum flush and attach the body side of the hinge with a thick bead of polyurethane caulk and 1" stainless screws.

Jig for drilling holes in the trim, basically just two boards that support the trim while drilling. Lines at right are index lines to space the holes. Cross board at left holds the trim down while lifting the drill out.

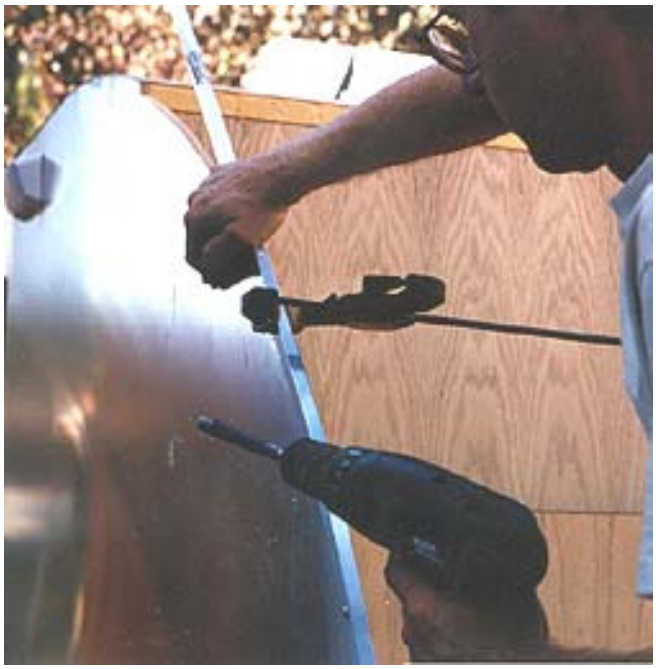
Corner Trim: Body

(*The hatch and tail trim will be covered in a later section.*)

I used the hard aluminum corner trim from Home Depot for most of the project. For some applications, it can be used as is in its hard, rigid state. But should you need to bend it around a corner, it can be wonderfully softened by heating with a torch and allowed to slowly cool (annealing). Directions for this are on page 82, as well as directions for safely cutting aluminum sheet safely on the table saw on page 81.

The Home Depot trim only comes in 8' lengths, and you need 10' lengths for the long curve on the front. You'll have to get this from the metal supply shop or a patio cover manufacturer. The corner trim comes without holes, so I constructed a jig for the drill press, as there are a lot of holes needed. The jig basically aids in spacing the holes and holds the piece down. You can use the same jig for drilling with a portable drill if you don't own a drill press.

I spaced the holes 6" apart, and staggered the holes from each side so you're not screwing into the same place. For the exterior pan head screws, drill 3/16" pilot holes, and for interior countersunk screws, drill ¼" pilot holes. To seal the trim and



Applying the corner trim. This goes a lot easier if you soften the angle trim by annealing first. Do not caulk the hatch trim yet, as you will remove it later for final shaping of the hatch/body gap.

screw holes, run a bead of polyurethane caulk down the inside corner of the trim before you install it. Have some paper towels and paint thinner handy for squeeze-outs, or let it set up for eight hours, then slice it with a razor blade and peel it off in one piece.

Start with the long curve on the front. Cut the end off the trim to match the angle at the bottom, and screw in the first holes. Slowly bend the trim around the curve, using slow and steady pressure, pre-drilling and screwing each hole. When you get near the end, you can mark right on the piece where it needs to be cut so that there is no guessing with measuring.

Install the trim where the hatch lid will close against it without caulking it in place. You might need to remove this later to do any final shaping of the hatch/body gap.

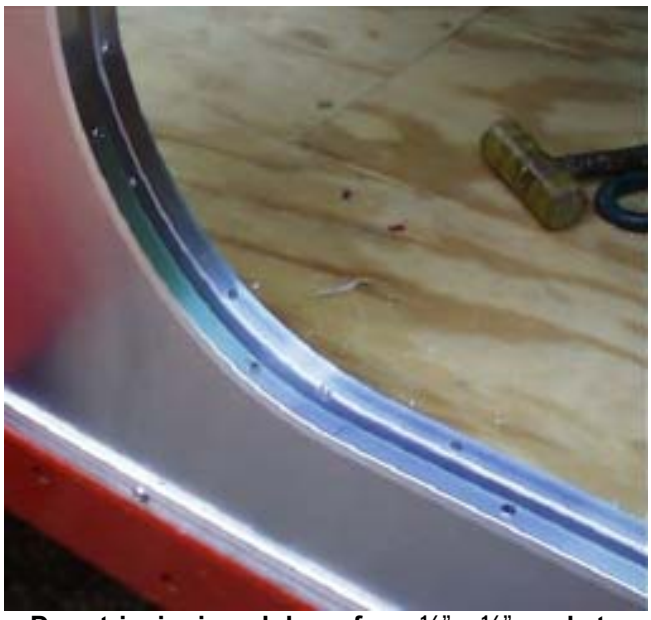
Now that the aluminum is secured in place, don't be surprised if on a hot, sunny afternoon the sides puff up like a pillow. This is from the expansion of the aluminum vs. the lesser expansion of the plywood sides. This is normal, and as soon as it cools off, the sides will tighten right up again with no harm done. **This is why you don't want to glue the sides on too tightly, or it will rip the daylights out of the plywood**.

The bottom trim pieces are 1/8" x ¾" flat trim.

Skinning the Tail

The tail is just a flat piece of aluminum glued in place. You see that the sides of the tail are trimmed with some specially cut angle. One side of the angle is notched with a "V" shape, and the other side is bent to make an outside corner. This is then caulked and screwed on.

As long as you are in a trim mood, you might as well trim the door openings. Fill any voids in the door opening edge with bondo, and sand smooth. Rip some strips of aluminum on the table saw, and glue them around the door opening edge. Trim out the inside and outside with ½" aluminum angle that has had one leg ripped down to ¼" on the outside. This profile will bend around the curves without annealing; but have a plastic mallet handy to tap it into the tight radius of the bottom corner. Obviously, there



Door trim is ripped down from ½" x ½" angle to make a ¼" leg on one side. The short leg goes on the outside, enabling it to be bent to the tight radius. A little "persuasion" with a plastic mallet may be necessary to get it to conform to the tight radius. The hinge sides of the opening just gets regular ½" angle.

is only room for screws on the door edge leg. Make sure to caulk these well, especially the part on top of the door.

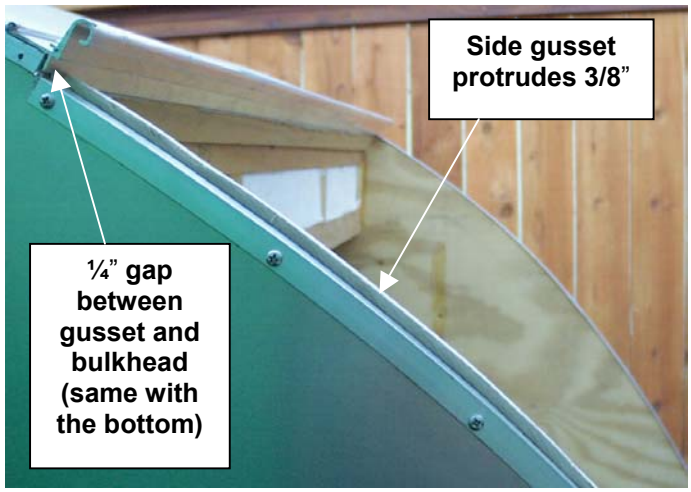
At this time you should purchase Materials List 5, p. 76.

Construct the Hatch (Shop Drawing p. 90)

The hatch is the single most complicated piece of engineering on the trailer, and is where having a set of plans pays off.

To aid you in getting the profile right, you need to make a template out of cardboard. Cut a piece of cardboard to fit snugly on the side of the hatch opening, and trace the profile onto the cardboard, adding 3/8". Using a cheap compass to do the tracing with makes this easy. You should also add a ¼" gap at the top and the bottom, where it meets the bulkhead and the floor.

Use this template to trace the profile onto ¾" plywood. Use a 1-1/4" guide block to draw a parallel line 1-1/4" away under the first line you drew. This will give you the outline of the side gusset. Cut it out with a jigsaw, and try it for fit on the trailer. If it is satisfactory, use it to trace a second one out. While you are in a tracing mood, also trace out the aluminum to cover the outside of the gussets. Clamp the two together and sand smooth. While they're still clamped together, mark out the spar locations, and then attach the spars with screws, carefully countersinking the screw heads. Now would be a good time to drill holes for the wiring. Set this skeleton frame in place on the trailer and test for fit before you put the plywood on.



Left side hatch gusset in place against the side of the trailer, showing the 3/8" extra to allow for the weather stripping.

Gussets clamped together for sanding. Layout marks showing where spars attach.

Add backing for the latch, galley light, paper towel holder, umbrella Velcro, or any other gadgets you intend to hang from the lid. You also need backing for where the hatch support rod will hold up the hatch. I temporarily screw a scrap of plywood in one corner to ensure the frame stays square during assembly.

The frame gets covered in 1/8" plywood on the outside. Measure the plywood so it will be a little long on the bottom edge. To make sure you don't flatten the frame during assembly, prop up the inside curve of the frame while it is sitting on the ground with a wood scrap. Apply a generous coat of polyurethane adhesive, and line up the plywood with the top edge of the frame. Start tacking the plywood with the brad nailer and work your way down the hatch. Trim the plywood flush with the bottom edge.

Spars screwed to side gussets. Note the double spar at the top where the hinge attaches. Test the hatch for fit.

Cut the aluminum skin for the outside just a little big. Glue it on with contact cement, using spacer shims like you did with the sides to perfect the alignment before you stick the sheet to the hatch. Trim the aluminum to the plywood with the air shears.

Temporary scrap screwed to the frame corner to ensure squareness.

Flip the hatch over and wire everything up, securing the wiring. Drill the hole for the license plate light, and poke the wire through. Insulate the hatch with rigid foam, using latex expanding foam for the small gaps.

The inside hatch is skinned with 1/8" skin. Cut small holes for the galley light wiring, pull the wires through and attach with glue and brads. This may be the easiest time to apply the finish to the underside skin, as you will have to work upside down once it's on the trailer. Attach the aluminum sides to the gussets with

Attach 1/8" skin with glue and brads, starting at the top and working your way down. Notice the support stick holding up the middle.

bead of polyurethane caulking, and attach the hinge with stainless pan-head screws. Attach "T" molding along the bottom edge where it will overlap the deck with ¾" stainless screws.

Install the latch assembly, and smear some lipstick on the latch (doesn't matter what color). Then close it to mark where the strike plate will be screwed to the deck. Attach the strike plate, and latch the hatch closed. Check the gap between the hatch and the sides. It should be a uniform ¼"-3/8". If it is tight anywhere, remove the ½" angle from the side and grind down the high spot, then re-attach the angle. (If the spot was really high, you may have to cut a new piece of angle.)

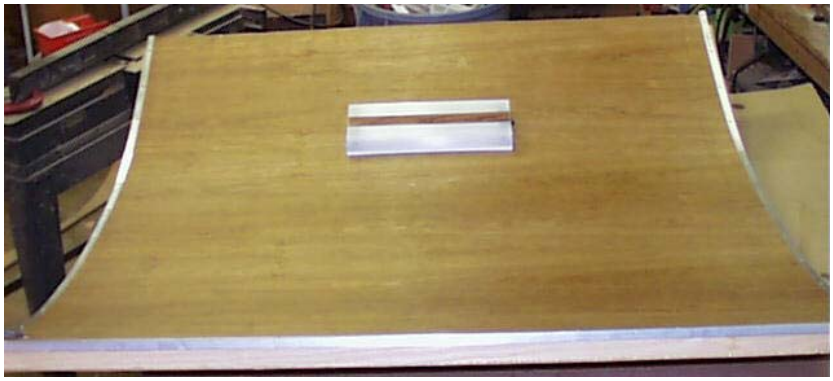
Wired, insulated, and ready for inside skin.

pop rivets, and trim out the underside with ½" aluminum angle. You may want to anneal the side pieces of angle to avoid any "springback" that would change the shape of the hatch.

It's time to hold your breath, and carry it over and set it in place on the trailer. Shim the top and bottom with ¼" spacers to give you the correct gap. Test-fit the hinge, then apply a generous

Aluminum edge is pop-riveted onto gusset. Notice the backing for the license plate light and latch.

The sides of the hatch have 1" aluminum angle that overlaps the sides of the trailer. This angle is stock hard aluminum that has been softened and beat around a form to obtain the correct shape. Using the cardboard template you made the hatch with, cut out a form made of two sheets of ¾" particle board nailed together. Clamp the top edge of the angle to



Skinned and trimmed, with galley light installed.

the form, and bend the angle around it. The angle will inevitably kink, but just beat on it with a rubber mallet, and it will flatten right out. Attach this angle to the hatch side, using 1/8" spacers taped to the sides to give the correct gap. Put a generous bead of polyurethane caulk underneath, and attach with 3/16" pop rivets. To flatten out the underside of the pop rivet where it will sit on top of the side, squeeze it with a C-clamp.

All the water running off the hinge will want to dump into the gap between the angle and the sides, unless you install a rain diverter. This is fashioned from a piece of ½" angle and screwed to the side, sealed with JB-Weld. A small piece of foam weather-stripping applied to the back completes the seal.

Hatch attached with caulk and 1" stainless screws.

Install the license plate frame and license plate light. In order to pull the hatch tight against the weather-stripping, I installed two latches on the side of the hatch. Weather-strip underneath the hatch side trim with ¾" wide foam weather-strip.

Beating the softened 1" angle around the particleboard form.

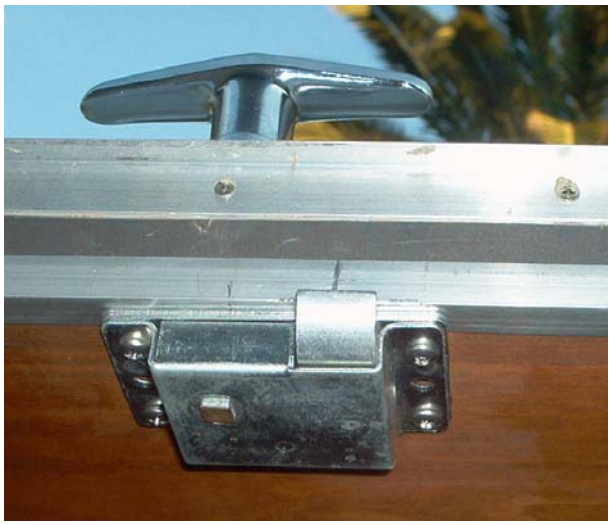
You will be installing a permanent hatch support later, but for now, prop the hatch open with a stick (A friend just uses the cardboard shipping tube the trim came in). Make sure not to accidentally bump this, or the hatch will really whang you one on the head (Ouch!).

Hinge rain diverter detail.

Hinge/side trim detail.

Side hatch latch close-up.

Weather-stripping under the edge trim.



Center hatch latch on a sunny January day in California.

Side porch light.

Roof fan vent.

Exterior Lights and Vent

Install the exterior porch lights on the sides, making sure to caulk around the wire hole, then filling it with caulk after installation. The fan vent installs from the top: pre-fit and pre-drill it, then remove it. Put a generous bead of caulk around the underside of the flashing, and then screw it in place, putting a blob of caulk over each screw head. Connect the wiring on the inside. Pre-fit and drill the inside escutcheon, but leave it off for now.

Door constructed of 3/8" plywood, with ¾" pine at the edges and ¾" plywood on the curved portions. Insulate with ¾" foam.

Construct the Doors

The doors are framed with ¾" x 1 ½" pine and then skinned with 3/8" plywood and aluminum on the outside, and 1/8" skin on the inside. The curved portions of the door use ¾" plywood for the interior framing.

Take the plywood cutout left over from making the sidewalls and brace it in place against the door opening. Using a compass or other tracing guide, trace a line onto the plywood ¼" smaller than the door opening all the way around. Cut and sand the plywood to the line. Take this plywood, and set your window where you want it to be, and trace the outline directly on the plywood. Cut out the opening so the window barely fits. Glue and tack the pine framing around the perimeter of the door, and then around the window opening. Add blocking for the latch assembly.

Insulate any voids with foam insulation, and then skin the inside of the door, cutting out the window opening with a utility knife from the outside. Finally, skin the outside with aluminum. Drill holes in the window corners, and cut out the opening with air shears, or with a jigsaw from the inside.

The edges of the door should be covered with aluminum skin. The outside edge is wrapped with "T" molding on three sides, omitting the hinge side, which gets trimmed with regular ½" aluminum angle.

Countersunk screw heads on door radius trim.

Completed door with trim and hinge attached.

The inside radius edges get wrapped with ½" angle molding that has one leg ripped down to ¼" as on the door opening. The hinge side on the inside is trimmed with regular ½" angle. Use ¾" screws countersunk into ¼" holes.

Test the windows one more time for fit. If all is O.K., install them in the door openings using plenty of caulk. Drill through the face channel and screw them in place. For the inside, rip ¾" x 1/8" strips of wood and tack them on with brads, wrapping the window reveal.

Inside window reveal trim.

The stainless steel continuous hinge often comes without any holes. Drill these 4" apart, using plenty of cutting fluid to speed up the process. Caulk and screw the hinge onto the door so that the barrel of the hinge is just hanging over the edge of the door. Wedge the door in place in the trailer so that the reveal is the same all the way around. Position the hinge so the barrel is centered in the opening, and scribe the holes on the door and body. Install the hinge with polyurethane caulk and stainless screws. Caulk the top and bottom "T" moldings and install them also. Mount the door latch on the inside and mark where the outside handle shaft penetrates the door. Drill a 3/8" hole for the shaft. Position the outside handle on the door and scribe the screw holes. On my trailer, the outside handle overlapped the "T" molding slightly, and I had to file

Inside door handle.

back some of the molding with a rotary burr chucked in a drill. Weather-strip the door using 3/8" dense foam on the hinge side and silicone tubing on the other three sides.

A 1" nylon strap gets screwed between the door and the wall on the hinge side to keep the door from opening too far. Finally, mount the rain diverter over the door using caulk and screws.

Outside door handle.

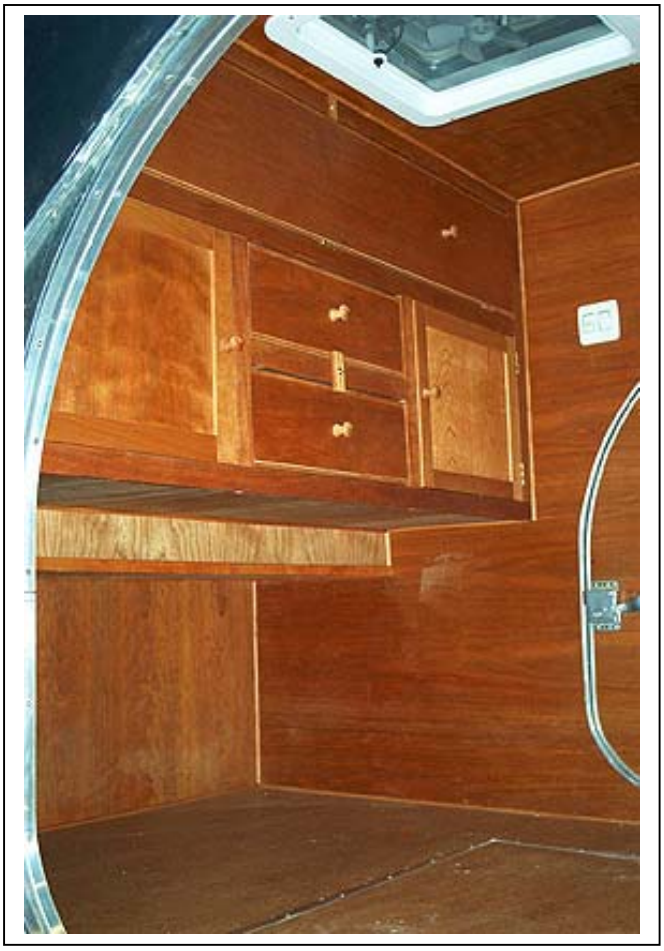
You should now purchase Materials List 6, p. 76.

Finished door.

Rain diverter detail.

Weather-strip the inside edge.

Chapter Three: Cabin



Stain and Finish Interior

The interior is finished prior to the installation of cabinets, as it is miserable trying to stain way back in tight cabinet corners afterwards. Remove the door hardware and mask off the interior aluminum trim with blue masking tape. Sand the walls and ceiling smooth, and wipe with a tack rag. If you will be staining your interior, I recommend a gel stain. (For details of how we finished the interior of the trailer shown, see page 77 in the appendix.) Stain the walls and ceiling, disposing of the stain rags in a bucket of water to prevent spontaneous combustion. (A client burned his shop to the ground by throwing an oil-stain soaked rag in the trash.)

Nail holes and imperfections are best filled after staining with wood color putty (the soft kind). Buy a couple of colors and mix them together until the color is good. Rub it in the hole and wipe with a clean cloth.

My finish of choice for the walls was a traditional oil and wax finish. I like it because it's almost impossible to mess up, is easily repaired, and I can do it even if there's a lot of dust floating around in the air.

Interior Lights

Mount the beauty ring escutcheon for the fan vent. You can also install the wall switches and interior light, except for the reading light, which will go under the front corner cabinet. You will be forgiven if you can't resist the urge to take the trailer camping for one night just like it is.

Front corner cabinet with the reading light mounted underneath.

Interior Cabinets (Shop Drawing p. 91-93)

It is not within the scope of this book to teach you basic woodworking skills and safety practices. A couple episodes of Norm Abrams' ***New Yankee Workshop®*** on PBS will do you wonders (*Go Norm, go!*). However, the cabinets on this trailer are not a difficult project, as they use straight lines and are assembled with mostly drywall screws. I hope you choose to try it rather than settling for shelves or contracting it out to a cabinet shop.

Slightly bending the drill bit.

The front corner cabinet above your head is basically a face frame with a couple solid doors, and a solid bottom. It is attached to cleats that are screwed into the front wall of the trailer into the spars you doubled up during the framing. On the prototype the doors opened down, but I would say to make them open "up," to make it easer to access from below, and to help keep them closed during transit.

You will be drilling holes in some awkward places for hinge installation on the teardrop. You can either get a flexible or right angle adaptor, or on skinny drill bits, actually bend the bit to get where you need to be. It takes a little practice, but you'll get the hang of it.

Reading Light

The main cabin lights shine in your eyes as you're lying down, so I installed a reading light underneath the front cabinet. The wire comes in from the front wall and goes through the bottom of the cabinet. It has its own switch.

Rear Cabin Cabinets

The rear cabin cabinets are built around a face frame. All other components hang from either this or the rear wall, and drawer rollers support the drawers. The drawers are held shut during transit by a simple turnbuckle, and have a bead shaped into their face by a molding head on the table saw. (A router bit is capable of the same profile.)

Rear cabinet face frame.

What sets the drawers and doors apart is that they are inset into the face frame, instead of overlaying it. Getting them to fit right is a time-consuming process, but gives the cabinets a distinct look of quality. I've even added instructions in hand cutting dovetail joints for the drawers in the appendix.

Shelf support assembly (Yours will look slightly different).

Two shelf support assemblies are visible here: one at the top and one at the bottom. A square roller guide support frame is then screwed into the top and bottom shelf supports, and the roller guides are attached to them. The resulting boxes are then skinned with 1/8" plywood to form the finished cabinet interior. The drawer cavities are left as is.

Finished cabinet is skinned and has a door strike.

The face frame is assembled first, and then screwed to the sidewall and roof. (Now is the time all that backing you installed during framing will pay off.) Shelf support assemblies form the top and bottom shelves, and square roller guide support frames form the sides and give something to attach the drawer rollers to. The cabinet portions are skinned in 1/8" plywood, and the drawer portions left as is.

The two side doors have a ¾" solid frame that encloses a ¼" plywood panel. Magnet catches are sufficient to hold the two side doors closed. The top cabinet is deeper than the rest, and has a ¾" solid door.

The drawers have a separate box and drawer front, which is screwed into the box. This simplifies the drawer construction and makes it easier to get a consistent reveal with the face frame.

Upper cabinet interior. The bottom is ¼" plywood.

Feeling a little more comfortable in the field of woodworking? Great! Because now you're about to start the drawers, and hopefully, to cut your first dovetails.

Drawers (Shop Drawing p. 92)

For those of the faint-of-heart or the behind-of-schedule, I have included directions for simple dado joints on the drawers. If the joint is nice and tight, and assembled with polyurethane glue and brads, it will be plenty strong and last the life of the trailer.

The drawers have a separate drawer front that is attached with screws from the inside.

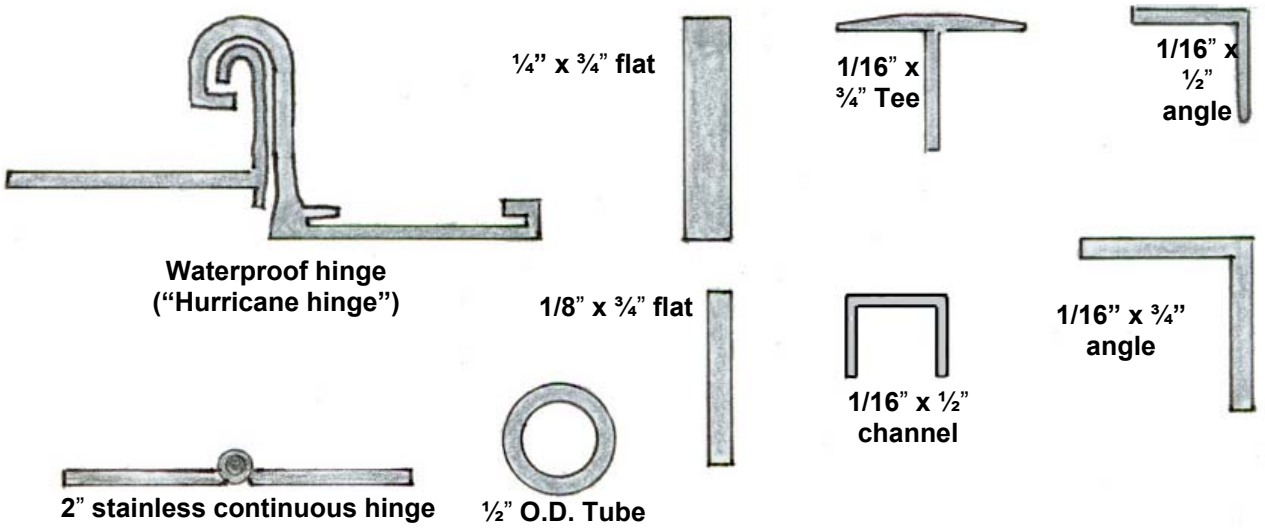
However, for those of you with a long winter and a heated shop, there's a section in the appendix on cutting dovetails by hand. If nothing else, at least cut the front joints this way. You'll be surprised at how proficient you can become at cutting these, and besides, women really dig hand-cut dovetails.

Interior Trim (Shop Drawing p. 51)

Most of the interior trim consists of quarter-round made with a router and table saw. With a ¼" round over bit, round over both edges of a ¾" thick board. Put it on edge and saw a slot down the middle of the edge. Then rip off the resulting two moldings. The corners are mitered and it is fastened in place with brads. You can pre-fit the moldings between the floor and wall, but do not install the trim until the flooring is in. You can

finish the interior cabinets at this time, or wait until the galley is done and do it all at once.

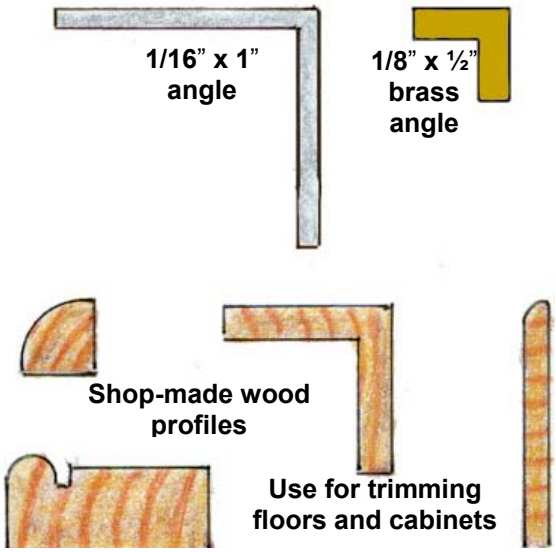
You should now purchase Materials List 7, p. 76.



Trim Profiles

The metal profiles are aluminum except as noted. They are commonly stocked by Home Depot and metal supply stores, except possibly the waterproof hinge and the Tee molding. The brass angle will need to be polished with a felt buffing wheel and polishing compound, then protected with a coat of spray lacquer.

When making the wood profiles, shape the detail first, then cut it out of the board.



FORMING THE BEADS

The beads on the drawer fronts were made with a molding head on the table saw. The head has three bead flutes, and I cover two of them up with a sacrificial fence, leaving one exposed at the edge. Raise it up until the bottom of the cove is just barely flush with the tabletop.

The same profile can be made with a router and router table.

Chapter Four: Galley

Sliding water spigot in the “closed” and “open” positions.

Galley

If you liked building the cabin cabinets, you'll love building the galley. You should have all the components on hand, such as the icebox, stove, water tank and pump. If any of your components are different than those used here, you may have to modify the plans somewhat to accommodate them.

In order to safeguard against making the cabinets so large that they prevent the lid from closing, I climbed inside and drew the closed lid profile on the sidewalls, and used a 4' stick to slide down the profile to see if it hit anywhere. Don't forget to allow for the light fixture, lest it hit a cabinet. The water system is installed in the base cabinets before the countertop. Here is an overview of the water system.

Water System (Shop Drawing p. 89)

Water tank mounting.

The water system consists of a 7-gallon poly tank with a 12-volt pump mounted under the floor. A pushbutton runs the pump to flow water from an extendable brass spigot mounted on the face frame (see page 52). No sink was used, because most of the teardroppers we interviewed considered it a waste of space.

The tank was custom manufactured with threaded outlets that I specified. The tank is fitted with a filler hose, a vent valve, and an outlet hose. I used clear vinyl tubing for the hoses, and nylon barbed hose fittings with hose clamps.

Secure the tank underneath the trailer with ¾" wide aluminum

straps and stainless steel bolts. I used an old-time water filler inlet, for which I had to make an interior elbow assembly out of PVC fittings. The pump is mounted underneath the trailer, which makes priming easy. If the pump ever fails to prime, just suck a little bit on the nozzle and the water comes easily.

The nozzle is just a piece of 3/8" i.d. brass pipe with brass street ell fittings. It slides in and out of a hole drilled into the face frame, and must be pushed all the way in for the hatch to close.

Pump hookup. The pump threads directly into the water tank and is suspended by an aluminum strap. The valve over the 3/8" on the tank is used as a vent, and the "T" fitting is used to drain the tank if needed (or if the battery goes dead!) The large hose is the ¾" inlet hose.

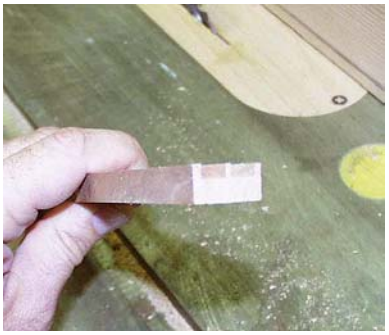
Galley face frames set temporarily in place to correctly position the backing in the shear walls for the drawer guides. (The shop drawings show the correct locations.)

Upper Cabinets (Shop Drawings p. 94, 95)

I started with the upper cabinets in order to minimize stooping over the countertop. The upper cabinets contain two drawers and two large cabinets, with the left side tall enough for a box of cereal. This cabinet also houses the fusebox. The right side has a shelf for canned goods, and they both are closed with sliding plywood doors. Despite cramped quarters, this space also houses an ABC rated fire extinguisher. I don't know if anyone's ever timed how long it takes a teardrop to burn to the ground, but I don't want to know. I bet it's fast.

The sliding doors are glued up from 1/8" plywood faced with pieces of 1/8" solid wood to make a total thickness of ¼". While gluing, clamp the piece against something flat to keep everything straight. See details p. 95

As with the interior cabinets, the first step is to construct and install the face frame. You cannot screw into the sidewalls as they are much too thin. Instead, the frame is glued in place with polyurethane glue. Two shelf support assemblies are fabricated, one top and one bottom. These both get insulated with rigid foam, as does the back of the cabinet. The drawer guide supports are then screwed in place, then the drawer guides, and the cabinet portions sheathed in 1/8" plywood.



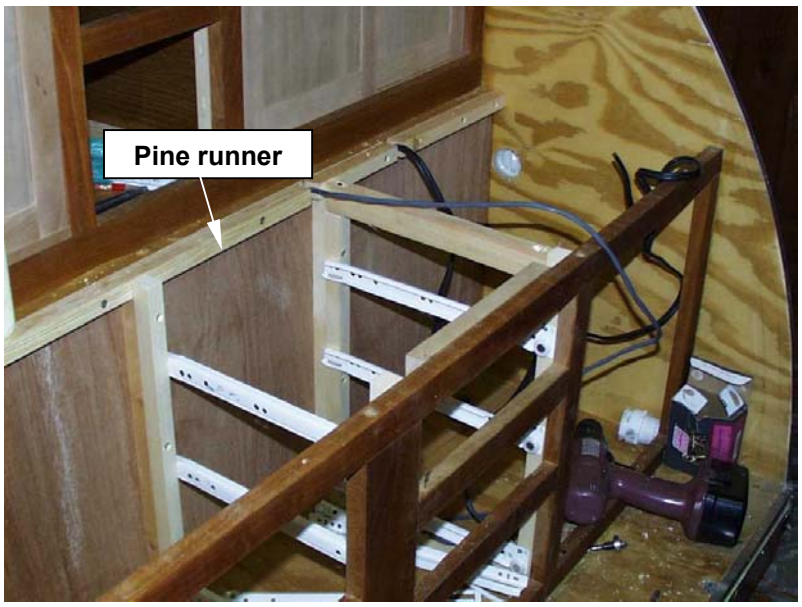
Sliding door track.

The sliding doors are 1/8" plywood with pieces of 1/8" solid wood glued on to make a total thickness of ¼". These doors slide on a track made from ¾" wood. A finger hole is cut out and backed with a very thin piece of wood.

Lower Cabinets (See Shop Drawing p. 94)

Galley lower cabinet rough-in.

The lower cabinet houses the icebox, three drawers, and a cabinet whose door doubles as a small table. (A fake drawer front is above the icebox food door, which allows access to the screws securing the countertop.) The drawers are mounted on roller guides, and the countertop consists of a ¾" solid wood top. As with the interior cabinets, the drawers are inset for a nice touch. The aluminum icebox is a custom-made, home-built unit that loads ice from the top, and food from the front. A drain hose keeps water from accumulating.



Lower cabinet rough-in.

I chose to use disposable bottles for the propane stove since you really don't use that much propane on a typical trip. A large propane tank would just be excess weight. If you need to, you can always bring along a couple more bottles, and it is available in every little country store. A rack for holding two propane bottles sits inside the lower left cabinet. The hose for the stove goes up through the countertop and attaches to the bottom of the stove, which slides back and forth on rails mounted to the countertop.


Plumbing for water filler pipe and discharge hose. This is later boxed in with 1/8" plywood to hide the hoses.

Assembling the Lower Cabinet

You can see from the photos that I built the structural components in place piece by piece, as I was engineering along the way. This was inefficient and time-consuming, so I am now recommending a more modular approach.

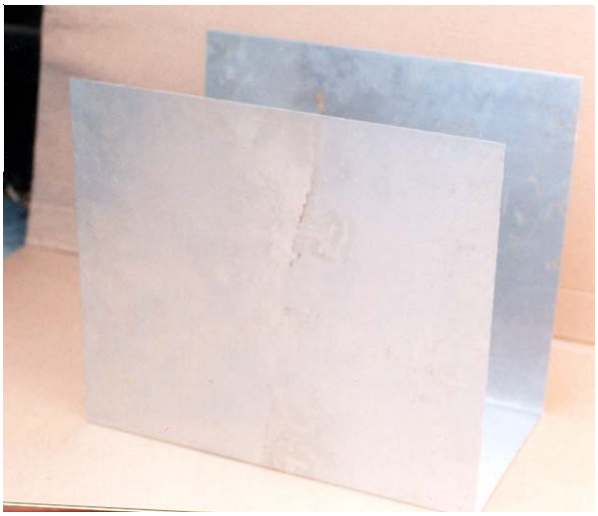
The drawer guide supports are installed and screwed to the bulkhead and face frame, and then the plumbing and wiring are installed. Screw the drawer guides in place, then sheath the cabinet portion with 1/8" plywood. The insulation for the icebox is fitted in place, and then the icebox is slipped in for a snug fit.

The countertop is designed to be removable in the event the icebox needs replacing. Screw a pine runner along the back of the cabinet, and then drive screws through it up

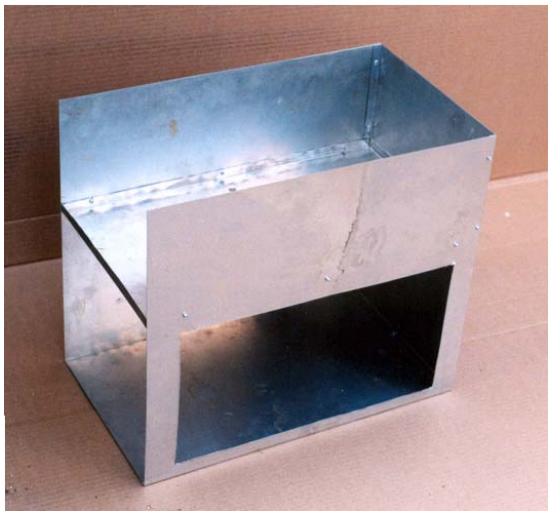
into the countertop. Screws drilled up through the face frame will secure the front. The only inaccessible screw is the one behind the icebox. For this, a screw is partially driven into the countertop, and then slipped into a slot cut in the rear runner to hold the countertop secure. Pre-fit the countertop, and then remove it to install the icebox.

View of the right-hand drawer rollers showing the plumbing for the sliding water spigot and wiring for the pump pushbutton.

The door to the right cabinet converts to a small tabletop by lifting it up and sliding out a support runner mounted underneath the countertop (see page 60). It is a small surface and cannot hold much weight, but I felt it was better than just having a plain door.



First step in making the icebox.



The ice shelf is tacked in place, and then securely riveted. Caulk the seams before adding the top.

Icebox (Shop Drawings p. 96-98)

An ice*box* is different from an ice *chest*, in that the ice sits on a shelf above the food and drains out through a tube in the tray. An ice chest usually keeps the ice on the food, which gets waterlogged, soaks your grapes in hot dog juice, and other scrumptious combinations.

The icebox is fashioned from the same aluminum that covers the trailer. It is wonderful stuff to work with, and is durable and easily bent by clamping it between two 2x4s and beating it with a rubber mallet (see page 97).

Insulate the icebox cavity before slipping in the icebox. You will need to pre-drill the hole for the drain before the box goes in. Make sure not to drill into the water tank! (The hole here is just under the "D").

Icebox in place. Another layer of insulation goes on top before the counter is installed.

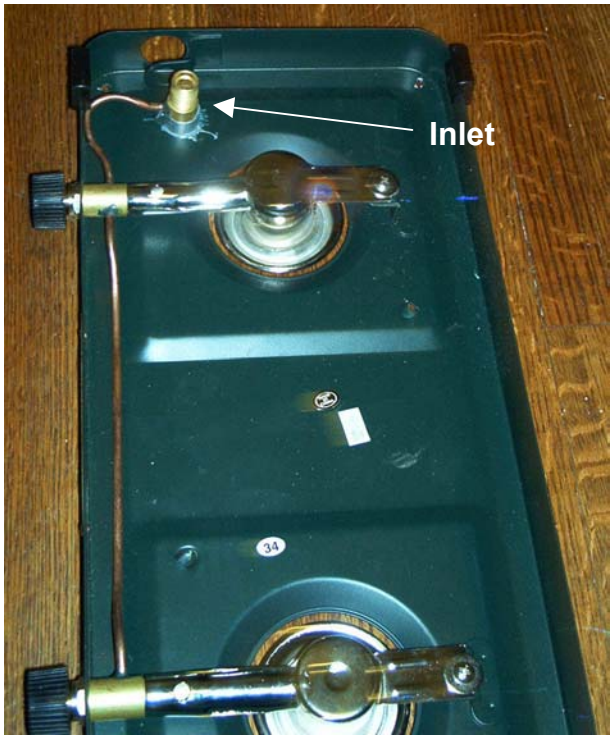
Insulated icebox doors trimmed out with aluminum.

The seams are riveted and then sealed with polyurethane caulk (caulk the rivet heads also). When complete, fill up the ice compartment with about 3" of water to see if it is watertight. You do not want water leaking out and ruining your new trailer! Short pieces of ½" angle are epoxied to the ice compartment shelf both to stiffen it, and to allow the melted water to reach the drain hole.

Applying Finish

Sand and prep the galley and cabin cabinets. Set the flooring trim out to be finished at the same time. Vacuum everything out and wipe with a tack rag. If you're going to stain, use an oil stain, or a clear oil finish (see p. 77).

The galley is bound to get soaked, so I recommend an outdoor finish like spar varnish. Lacquer is definitely a poor choice because it cannot stand up to the sun. The best finish is obtained with two coats of gloss varnish, topped with one coat of semi-gloss. It is important to sand between coats to assure adhesion. Shave any drips off with a razor. The galley is trimmed out with the same quarter-round used in the cabin. Do not secure the floor trim yet, as you must install the flooring after finishing.



Flip the inlet to point straight down and epoxy in place. (Should have been centered more.)

Stove (Shop Drawing p. 98)

I used one of those inexpensive stoves from Wal-Mart that costs about $20, and it works great. The stove slides back and forth on rails that allow the hatch to close; yet the stove can be pulled out enough to set a folding camp oven on top. The flames have a tendency to be affected by strong winds, so park the trailer facing the wind, if possible.

I modified the stove in order to use remote fuel bottles. Unbolt the inlet fitting, and point it straight down, gluing it to the stove deck with JB weld epoxy. Mount the stove on the sliding brackets and mark the countertop for the limits of travel of the fuel inlet. Cut a slot in the countertop for the fuel hose.

Using a tubing cutter, cut the brass fuel arm in half and flare the cut ends of the arm to keep the hose from sliding off under pressure. Slip 3/16" fuel hose over the end and clamp it with hose clamps. Be sure to only use fuel hose that is marked "LP Fuel," usually obtained from a propane gas dealer. Gasoline fuel line is too soft and will fail (bad thing).

Sliding brackets for stove mounting. The slot at the right is for the LP gas hose. Center the inlet fitting on the stove to move the slot on the countertop farther back out of sight.

Flooring

I used a flooring material called Marnoleum on this trailer. It is a true linoleum product, consisting of linseed oil and wood dough. It is expensive: the minimum order was $125. But it is the most incredible stuff, and is far superior to any sheet vinyl. It is rated for 400 lb. casters and has solid color all the way through. On the next house I build, it is going in the kitchen and laundry.

There is no need to be apprehensive about the flooring installation, as there is an illustrated guide on page 68 for making a template that makes the process idiot proof. After installation, nail down the quarter round. In the galley, run a bead of caulk on the seam between the floor and wall before you nail in the quarter round; this will reduce the chance of water soaking under the linoleum and swelling the deck. Also screw down the hatch bumper, caulking it in place.

Flooring adhesive. Propane bottle brackets are added after flooring is installed (middle left photo).

Hatch support bracket (details p. 93)

Hatch Support

Hatch support rod

It figures that the hatch support rod is the last thing that goes in, now that you've been getting bonked on the head for weeks.

The pivot bracket is made from some brass scraps left over from the icebox trim. The support rod is aluminum tubing that seats inside a brass finger pull recessed into the hatch lid. A rubber grommet keeps the rod from damaging the countertop during transit.

If you have any aluminum left over, you can cover the side- walls of the galley with it. Make a pattern first like you do for the flooring. Don't try to do it all in one piece; trim out the seams with pieces of the legs you cut off the ½" angle, and cover the seam between the floor and the wall with ½" angle. See the hatch details on page 90 to see how the top edge is trimmed out.

Chapter Five: Appendix

Traveling light. Yes, there is a teardrop under there somewhere.

Accessories

These are some little goodies that make trailer living more comfortable:

- A **cutting board** saves your countertop from destruction.
- A **folding camp oven** fits just fine on top of the stove (save me a piece of pie).
- Keep a plastic tray with **stainless screws**, **aluminum tape**, a small tube of **silicone**, **electrical tape**, **flashlight bulbs and batteries**, **fuses**, **bailing wire**, **multi-tool** and the trailer's **registration** in one of the drawers.
- Leave a couple **flashlights** inside the drawers.
- A small **mirror** mounted on the back of one of the interior cabinet doors.
- A **Bible** (if hotels all come with one, why not a trailer?)
- A couple **wheel chocks** for blocking the trailer wheels on steep hills.
- A 4" thick **foam mattress** will run you around $90, and it is well worth the price. However, Larry swears by a futon. We got by with just sleeping bags at first, but for true luxury, nothing beats regular **twin size flannel sheets** and a **down comforter** in the winter time.
- Don't forget the folding **picnic table** and **umbrella**
- An ABC rated **fire extinguisher**
- If you go to a lot of teardrop outings, an **EZ-Up** shelter is almost mandatory**.**

For extreme conditions, a couple of innovations may make life easier for you:

- A **12V mattress pad warmer** is much safer than an interior heater, and only draws 8 amps. Many teardroppers use the one sold by Patented Products, Inc. of Danville, OH. Their website is http://www.electrowarmth.com/

Uncle Kevin's Guide To Making Hand-Cut Dovetails

Hey there, router breath! Don't you wish there was another way to cut nice dovetails besides using $300 router jigs? Well, pull up a stool and let Uncle Kevin show you the way they did it for hundreds of years.

Tools needed:

- Marking Gauge
- Bevel Gauge
- Square
- Dovetail Saw or Hacksaw
- ¼" Chisel, Extra Sharp
- Long, Skinny Knife
- Hammer
- Coping Saw
- Vice or Large C-Clamp

I planed the pine down to ½" thick. You can either do it this way, use ¾" stock, or order ½" stock from a catalog.

1.) When measuring the stock, add an extra 1/8" to the length. Set the marking gauge to the stock thickness + 1/16", and scribe a line all the way around the ends of each board. Here the stock thickness was ½", so I set the marking gauge at 9/16". (The extra 1/16" will be sanded smooth.)

2.) Lay out the tails on the ends of the sides (see drawing p. 65 for the layout guide). Mark the portions that are to be cut out with an "X," so that you don't accidentally cut out the wrong portions. If you ever see a drawer side flying out of a woodshop window, this is probably what happened!

3.) Saw down to the scribed line, being careful to saw on the "waste" side of the lines. Also saw the shoulder cuts on each side.

4.) Use a coping saw to remove the wedges between the tails, staying above the scribed line.

5.) Scribe the tails onto the front or back board to lay out the pins. Using a square, draw vertical lines from the marks you just scribed down to the scribed line.

6.) Mark the waste portions with an "X" and saw down to the scribed line, sawing on the "waste" portion of the line.

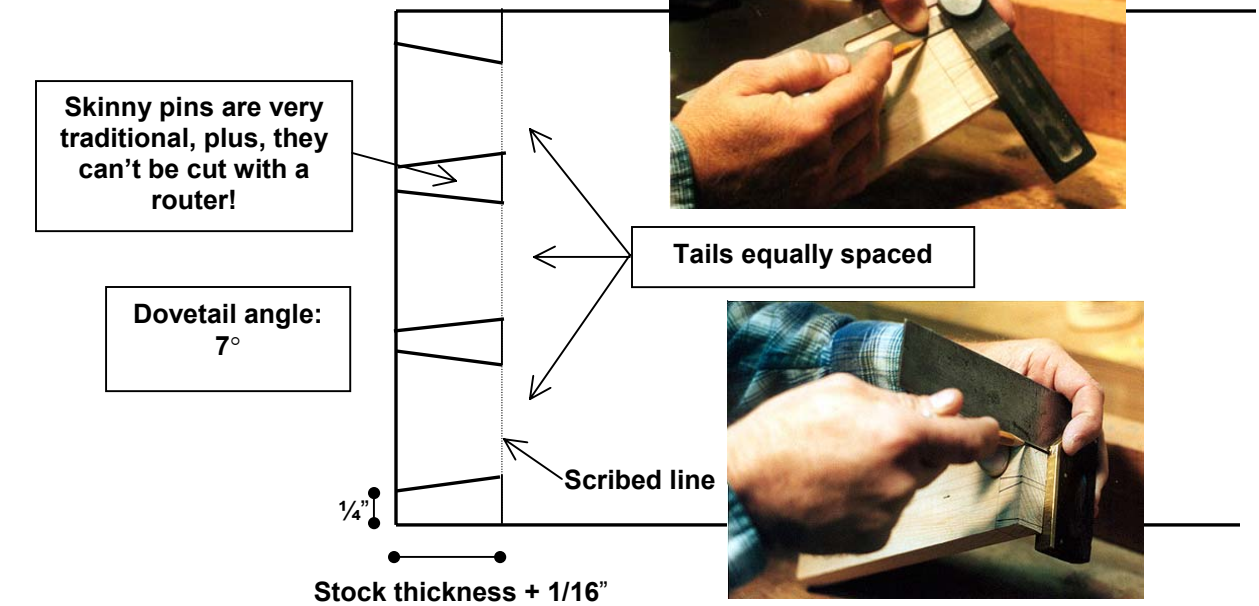
7.) Saw out the waste portions with a coping saw, staying above the scribed line.

8.) With a sharp chisel, clean up the cuts, paring down to the scribed line.

9.) Align the two pieces and tap them together. Don't look too surprised when they go together on the first try, in case someone is watching. Act like it does this all the time.

10). The next three joints will be easier, since you will have something to hold up the other end of the board while you're doing the layouts.
Add the drawer to the growing stack with pride and satisfaction.

Dovetail Layout Guide



Add more tails or vary spacing depending on the width of the sides. Don't be too fussy about the layout, lest someone think you cut the dovetails with a machine. I usually do the spacing by eye. Practice makes perfect.

Add ½ " for cut
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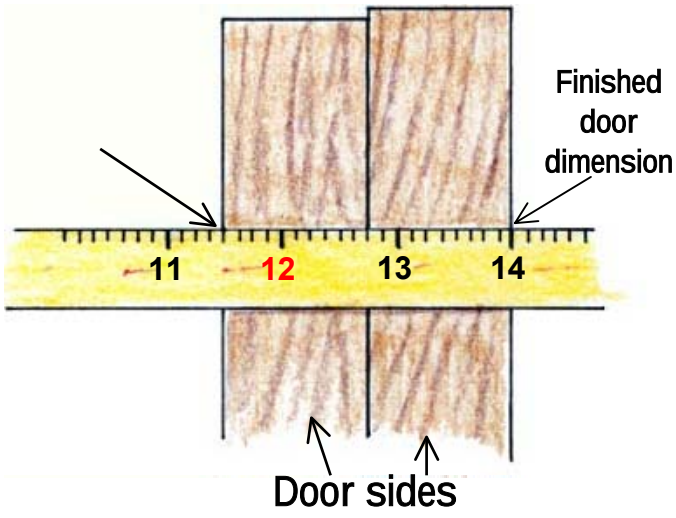


Foolproof Cabinet Doors

Inset cabinet doors require a little more fitting than overlay doors. I make my doors to fit the opening tight, then plane them down on the jointer to get the proper 1/16-1/8" gap between the door and face frame.

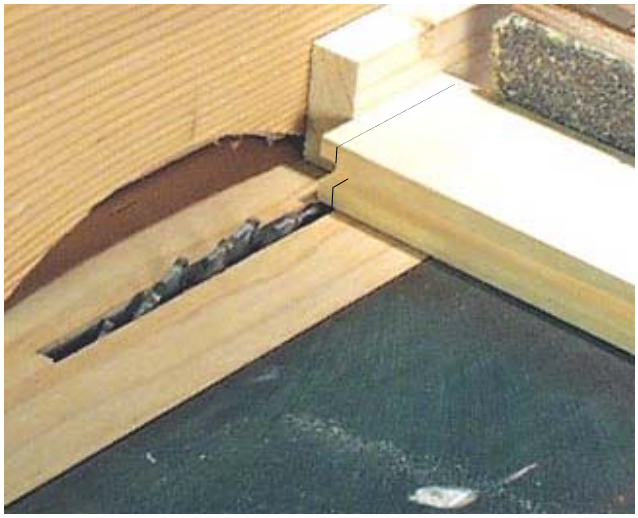
The hardest part about building cabinet doors is figuring out the width of the top and bottom pieces, since they fit into dado joints cut into the sides. Here's how to do it.

(*TOP*) Cut the side pieces full length. Lay them flat against each other on the bench. Lay your tape on them with the finished dimension lined up on the right side. Now read the dimension the tape indicates on the left side. Add ½" to that, and those are the top and bottom piece dimensions.

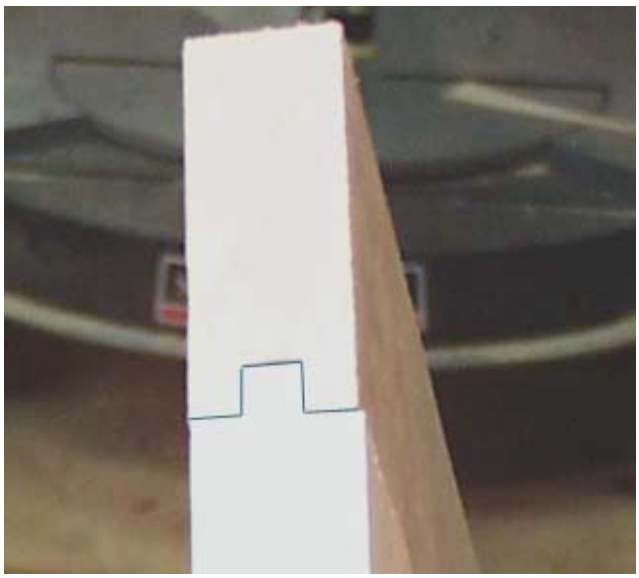
(*MIDDLE*) Saw a ¼" by ¼" dado down the length of all the sides, centering it in the board. Just in case you are a little off center, keep track of which side of the pieces went up against the saw fence.

(*BOTTOM*) Adjust the saw for the exact height of the groove in order to make the shoulder cuts on the top and bottom pieces.

Make all the cuts on one side of the pieces, then flip them over, re-adjust the blade and do the rest of the cuts.



(*TOP*) To cut the shoulders of the top and bottom pieces, clamp a guide block to the saw fence, positioning it *before* the blade to avoid kickback. Adjust the fence so that you trim ¼" off. The pieces are run past the blade with the sliding T-square.



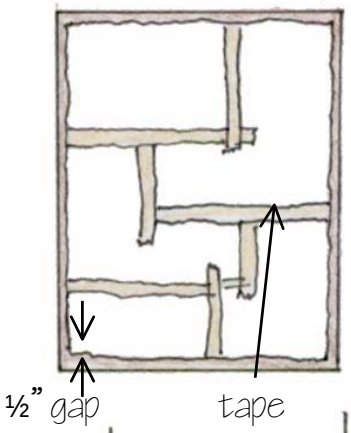
(*MIDDLE*) The resulting tongue will fit into the groove of the sides. A 3" drywall screw driven in from the side strengthens the joint. Be sure to pre-drill and countersink the screw, filling the resulting hole with a wood plug. Sand the joint smooth.

Assemble the pieces out to form a door. Measure the inside dimensions, then add 7/16" to get the dimensions of the ¼" plywood panel that forms the center of the door.

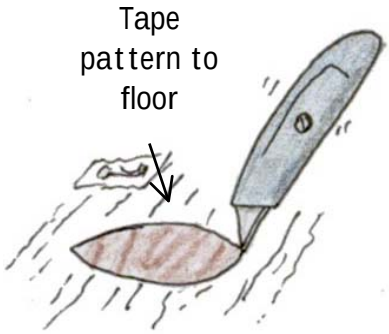
(*BOTTOM*) Assemble the door with 2-1/2" drywall screws. Countersink the heads with a 3/8" drill, and then plug the holes with 3/8" matching wood plugs. Cut your own plugs from scraps using a plug-cutter.

There is no need to use glue on the center panel.

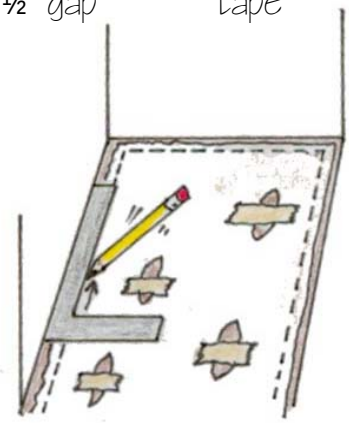
Uncle Kevin's Guide to Installing Flooring Perfectly On the First Try



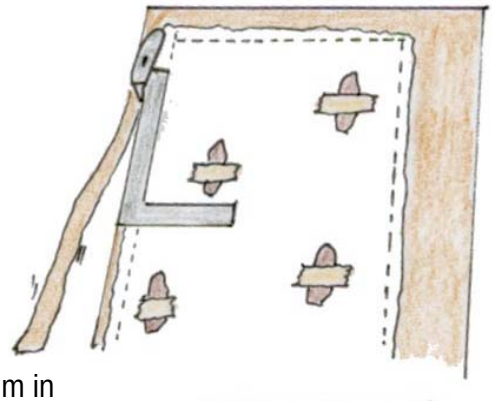
1.) Tape together newspaper or rosin paper for a paper template, leaving about a ½" gap between the template and the walls.



2.) Cut out some holes, and tape the template to the deck to keep it from moving.

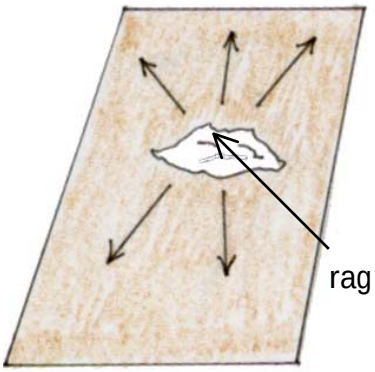


3.) Lay a framing square or ruler against the wall and trace the **inside** of the square onto the paper pattern.

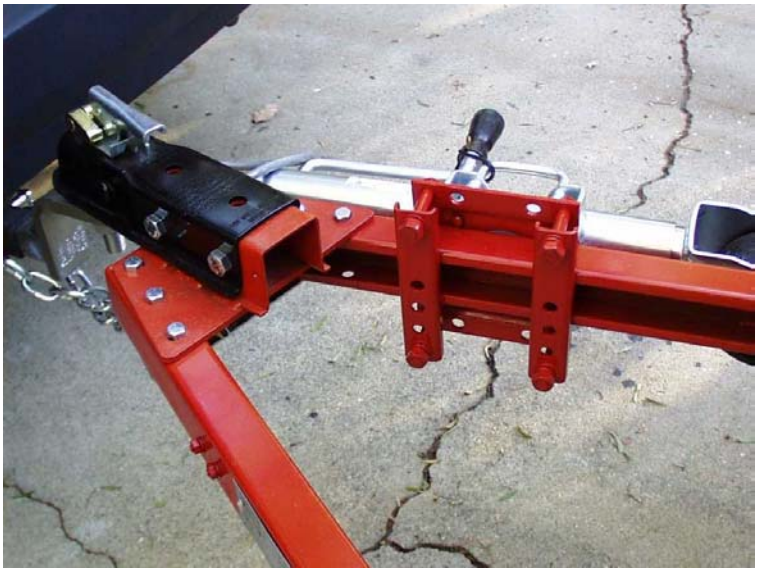


4.) Transfer the pattern to the linoleum. Lay the square along the line you scribed and trim on the **outside** of the square.

5.) Lay the linoleum in place and check the fit, trimming any tight spots. Roll back half the sheet and trowel adhesive on the deck with a **1/16**" notched trowel. Lay the sheet into the adhesive and then repeat on the other half.



6.) Smooth out from the center with a roller or rag, cleaning up any adhesive squeeze-out with water. Tack the quarter-round trim in place.



Safety chains cross under trailer tongue, forming a "basket" to catch it if it comes loose (bad thing).

Towing Your Teardrop

Safety chains are necessary to keep your trailer from coming loose and passing you on the freeway. They crisscross under the tongue to make a "basket" to support the tongue should your hitch become separated from the vehicle.

I use a padlock to lock the hitch closed, and quick links to hook the safety chains together under the receiver. Also, put a dab of grease on the hitch ball. Remove the hitch receiver when you're not towing anything to avoid damaging the ball, and to keep yourself from rubbing up against a greasy hitch ball and ruining your pants.

A teardrop is usually a pretty benign thing to tow, as you usually can't even see it in your side-view mirrors. But there are a couple of guidelines you should follow. Towing a trailer requires more attention, so you have to plan ahead. Give yourself extra time for stopping because you can't "stop on a dime." Your turning radius is larger. When coming to steep driveways or speed humps, try to approach them at an angle so you don't scrape the hitch going over. (You'll recognize these hazards by all the scrapes in the asphalt.)

When parking on a hill, first put chocks under the tires of the trailer; release the parking brake to allow the tow vehicle to settle, then set the parking brake. While storing the trailer in the rainy season, don't forget to put a scrap of wood under the tongue jack wheel to keep it from sinking in the mud. (It's a blast trying to get it back up again.) And never, ***ever*** let anyone ride in the trailer while the vehicle is in motion.

When hitching the trailer up, prop a tall stick by the trailer hitch to act as a "target" that you can more easily see from the driver's seat while backing up. You know you're close when you bump the stick over.

At first I was apprehensive about backing the trailer up. But one afternoon, our cat Squirrelly jumped up into the driver's seat, and to our delight, showed an amazing proficiency in backing it up--quite often on the first try. So, I'm swallowing my pride and letting Squirrelly the Wonder Cat give you tips on backing your "rig" up.

Squirrelly the Wonder Cat

Trailer backing tips by Squirrelly the Wonder Cat

"Roll down your windows and have a human as a spotter on the rear driver's side. His or her main job is to keep you from hitting anything, and their main command is 'STOP!' The trailer turns opposite from the vehicle, but there's an easy way to remember which way to turn the steering wheel. Put your paw at the bottom of the wheel with your paw pads up. Turn the wheel in the direction you want the trailer to go. After the trailer is pointing the right direction, turn the wheel to follow the trailer around the corner.

Don't turn the trailer too much, or it will 'jack knife,' and if you keep going, will damage the trailer. If it starts to turn too far, pull forward to straighten out and try again. The best way to learn is practice. I'm sure you'll get the hang of it, and then you'll be able to strut your stuff with the big kitties."

Registering Your Teardrop

Finally, it's time to declare to the world that you've built a teardrop, and formally register yourself in the Teardrop Builder's Hall of Fame by petitioning the State for permission to tow the trailer on the wide-open highways. Here in California, we are not exactly known for bureaucratic friendliness, but registering the teardrop turned out to be no big deal and cost $40.

Typically, you will have to have your teardrop weighed. I weighed mine at a metal scrap yard, which charged me $10. But the weigh master liked the teardrop and bought a set of plans from me, so I guess it was a good deal. Take the weight certificate along with your receipts to the State DMV. They will calculate your registration on the value of the trailer and weight. They will issue a VIN (Vehicle Identification Number) and license plate. Congratulations! You're legal now!

Teardrop Maintenance Tips

- Tires: Rated tire pressure on trailer tires may be higher than on normal passenger tires. Check the rating on the side of the tire. (I keep a little 12-volt compressor inside the trailer.) If you store the trailer for long periods, consider using pieces of plywood to cover the outside of the tire to protect against UV damage and animals urinating on them.

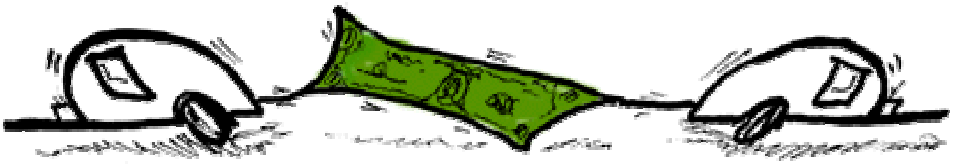
- Wheel Bearings: This is probably the most critical issue. A worn bearing can cause the wheel to fall off (bad thing). It's a good idea to re-pack your bearings once a year. Bearing maintenance information is best obtained from your axle manufacturer, and is often available free on their website, or by writing to the manufacturer.

- Battery: A word of caution. Lead-acid batteries contain a sulfuric acid electrolyte, which is a highly corrosive poison that will produce gasses when recharged and explode if ignited. This will hurt you--BAD! When working with batteries, you need to have plenty of ventilation, remove jewelry, wear protective clothing and eyewear (safety glasses), and exercise caution. Whenever possible, please follow the manufacturer's instructions for testing, jumping, installing and charging. This information is also usually available free on the manufacturer's website, or from most retail battery distributors.

  You will need some sort of charger for your battery, one that is suitable for deep-cycle batteries. A regulated (automatic) solar charger can help extend the life of your battery by keeping it fully charged during storage.

- Water Tank: You need some provision for draining the water tank completely. Inserting a "T" fitting at the lowest part of the water line as it passes under the floor, then installing a short piece of tubing with a plug in it easily does this. This allows you to flush out the water tank occasionally and to drain the water system for winterization. It has the added benefit of allowing you to get at your water supply should your battery fail, disabling the electric pump.

- Trailer Cover: A custom cover can be ordered from an awning shop. This is probably a good option for you motor heads that have an expensive custom polish or paint job.



If properly maintained, your teardrop should last for years. A teardrop trailer is a wise investment, holding its value much more than any tent trailer or RV.

MATERIAL LISTS

Source Abbreviations

MSS Metal Supply Store	**FSS** Fastener Specialty Store
PCS Patio Cover/Sheet Metal Shop	**HD** Home Depot™
RS Radio Shack™	**TSS** Teardrop Specialty Shop
HFT Harbor Freight Tools™	**JCW** J.C. Whitney™
WM West Marine™	**LY** Lumber Yard
HSS Hose Specialty Shop	**WM** Wal-Mart™
CFS Carpeting & Flooring Shop	**TS** Trailer Shop
RVS R.V. Supply	**APS** Auto Parts Store
MMC McMaster-Carr	**HWS** Hardwood store
ATC American Tank Co.	**RH** Rockler Woodworking Hardware

The Great Scavenger Hunt

You will soon realize why teardrop trailers were popular in kit form. Your materials will come from a plethora of suppliers depending on their specialty, availability and price. If it's any consolation, you have a tremendously wider choice of materials than pioneer teardroppers had in the 1930's, and the quality and durability is such that they could only dream of. It just goes to show the choices we are afforded as Americans. What a country!

Adhesives and Sealants

- **Polyurethane glue** (HD) This glue is sold under the proprietary name Gorilla Glue™, but a generic equivalent is available in the paint aisle at Home Depot, called "PL." Read the instructions carefully on the bottle, as it has some odd characteristics, such as being moisture cured. It has a limited shelf life, so buy small bottles. Latex gloves are recommended to keep from getting "slimed."

- **Polyurethane caulk** (HD) This caulking usually comes in white, tan and black. Buy two tubes of tan and one of black. It is rather thick and smells like a chocolate malt. Use paint thinner for clean-up.

- **Yellow carpenter's glue** (HD) Buy the type that is "Type II," the waterproof kind. Yellow glue has a faster set-up time than polyurethane glue, and cleans up with water.

- **Latex caulk with silicone** (HD) Buy the tan color for caulking interior trim.

- **Contact cement** (Non Flammable) (HD)

Some people have been concerned that using contact cement to glue the aluminum to the sides would result in wrinkles, due to the different coefficient of expansion of the aluminum and plywood. My part of the country can have 40° temperature swings in the day, and I have had no problems with it. My guess is that the contact cement really doesn't stick too well on the plywood, as I only use one coat. Also, I don't seal the plywood before applying the cement. If nothing else, skin the walls on a cool day to minimize expansion conflicts. In theory, adhesive is unnecessary, as the trim holds the aluminum in place regardless.

- **JB Weld** (APS) Accept no substitutes. A wonderful metal-filled epoxy.

Materials List 1- Chassis, Body and Framing Materials

- **Super Heavy-Duty 4' x 8' Utility Trailer**, item # 6464-OVGA, $399.99 (HFT)
- **Spare tire** (5.30" x 12" i.d.), item # 552-OVGA, $49.99 (HFT)
- **800 lb. Capacity Swing-Back Trailer Jack**, item 41004-OVGA, $19.99 (HFT)
- (2) **7-1/2" x 24" fenders** (or hot rod fenders of your choice) (TS)
- 7 Gallon **water tank** (ATC) See notes page 79.
- 4' piece of **2" angle iron** (HD)
- (2) ¾" x 1/8" x 8' **aluminum angle** (HD)
- (1) ½" **4x8 ACX plywood** (HD)
- (2) **3/8" 4x8 ACX plywood** (HD)
- Half sheet of ¾" **ACX plywood** (HD)
- (3) 8' ***dry* 2 x 4's**, the best you can find (the ones with the wax on the ends) (HD)
- Enough **ash** or clear **douglas fir** to make (12) ¾"x 1-1/2" x 48" spars (HWS)
- Enough **pine** to make (9) ¾" x 1-1/2" x 48" spars (HD)
- (9) ¾" **x 3-1/2" x 8' pine boards** (HD)
- 1/8" x 4' long birch **dowel** (HD)
- (22) **3/8" x 2-1/2" galvanized bolts, nuts, lockwashers**. (HD)
- (2) ½" **x 6" carriage bolts, washers, wing nuts** (HD)
- (2) Lbs. of **1-1/4" drywall screws** (HD)
- (1) Lb. **2" drywall screws** (HD)
- (1) Lb. **3" drywall screws** (HD)
- (50) 2" steel flat head **wood screws** (HD)
- **Yellow carpenter's glue** (HD)
- **Polyurethane glue** (small bottle: it has a lousy shelf life) (HD)
- (2) **3/8" x 3" grade 5 bolts, washers, nylox nuts** (HD)
- **Black polyurethane caulk** (HD)
- (8) **1-1/2" x 3/8" bolts, washers, nylox nuts** (HD)
- (1) Gallon **asphalt emulsion** (HD)
- 2" **disposable paint brushes** (HD)
- Can of Krylon **red spray paint** (or color of your choice) (HD)
- Can of auto body primer **spray paint** (HD)
- (4) ¼" **T-nuts** (HD)
- (24) ¼" **stainless steel washers** (HD)
- (8) ¼" **x 1" stainless steel bolts** (HD)

For an elegant way to date your project, inset a penny into a shallow ¾" hole somewhere in the woodwork.

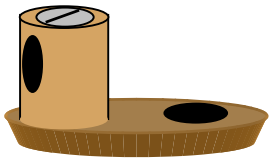
- (4) **¼" x 2-1/2" stainless steel bolts, nylox nuts** (HD)

Now is also a good time to order your windows, as you will need them to make your doors.

> ***About Hardwood Lumber Quantities***
>
> Hardwood is usually sold "S2S SL RW RL" (**S**urfaced **T**wo **S**ides, **S**traight-**L**ined, **R**andom **W**idth, **R**andom **L**ength). This means that the boards may have one curved edge and contain knots, planer skips and other unusable portions (that you are charged for). Thus, it is impossible to tell you how many board feet to purchase in order to complete this project. My strategy is to buy a large quantity of lumber and then return what I don't use. For the structural elements, pick clear, straight-grained wood, as it is the strongest.

Materials List 2- Rough Wiring

- Deep cycle **battery** (biggest one Wal-Mart has) (WM)
- Plastic **battery box** (WM)
- **Nylon strap w/ buckle** (in the camping section at Wal-Mart)
- 16' of 10/2 non-metallic sheathed cable (**Romex**) (HD)
- (2) **Copper screw-adapter terminals**, sized for #10 wire (HD)
- 16' of ½" non-metallic outdoor **flex conduit** (HD)
- (5) **1/2" liquid-tite flex connectors (flex to threaded)** (HD)
- 2) ¾" 2-hole **EMT straps** (HD)
- (5) **¾" 1-hole EMT strap** (HD)
- 1/2" **pulling body** (HD)
- (2) 4 hole ½" weatherproof **electrical box** (single-gang) (HD)
- (2) weatherproof single-gang **blank covers** (HD)
- 60' **speaker wire**, 16 gauge, blue jacketed (HD)
- (6) 5/32" x 1" stainless steel **bolts**, **nuts** and **lock washers** (HD)
- **Ground bus bar** (HD)
- **Copper terminal screw** (HD)
- 6-space **fuse block** (JCW, WM, APS, RS)
- **4-gang interior electrical box** (HD)
- (5) 3/8" **Romex strain reliefs** (HD)
- Package of medium **zip ties** (HD)
- Trailer highway lights **plug and socket** (6-pin round type) (APS, WM)
- 4-wire to 6-wire **trailer light adaptor** (APS)
- (2) Double **light switches** (RVS)
- (1) Pushbutton **galley water switch** (momentary contact) (RS)
- (2) **Dual light bulb light fixtures** for galley, cabin (RVS, WM)
- **Single bulb reading light** with integral switch (RVS)
- (2) Exterior **porch lights** (RVS, WM)
- **Roof vent/fan** (RVS, JCW)
- **License plate light** (JCW, APS, WM)
- **12Volt pump** (JCW, RVS)



Screw-Adapter Terminal

Materials List 3- Fenders, Insulation, Walls and Roof

- (3) 4'x 8' x ¾" Styrofoam rigid **insulation** (HD)
- 4'x 8' x ½" Styrofoam rigid **insulation** (HD)
- Can of **expanding foam insulation** (HD)
- (20) ¼" **fender washers** for under floor insulation (HD)
- (5) **4' x 8' x 1/8" veneer plywood** (hardwood species of your choice: I used cherry)

I obtained the 1/8" cherry plywood from *Ganahl Lumber* in Corona, CA. (909) 278-4000 www.ganahllumber.com. They had it shipped in from somewhere, and I suppose it could be shipped anywhere else just as easily. It came wrapped in two 4 x 8 sheets of cardboard that came in real handy.

- 4' x 8' x ¼" **luan plywood** (HD)
- 4' x 8' x 1/8" **luan plywood** (HD)

Materials List 4- Exterior Aluminum Skin

- (4) **4' x 12' x .032" 5052 H32 aluminum sheets (**MSS**)**

You might be able to get away with three sheets, or have two of them cut to 8'. For me, the shear charge was more than the extra aluminum, so I used the extra 4' for the icebox, etc. It's swell stuff to work with.

- 4' **aluminum waterproof hinge** (TSS)
- (2) **½" x ½" x 10' aluminum angle (**MSS**)**
- (12) **½"** x ½"x 1/16" x 8' **aluminum angle** (MSS, HD)
- (3) 1" x 1" x 1/16" x 8' **aluminum angle** (HD)
- ½" x ½" x 1/8"x 6' **brass angle** (MSS, MMC)
- ¾" x 1/8" x 8' **flat aluminum stock** (MSS, HD)
- 4'x ¼" i.d. **aluminum tubing** (HD, MSS)
- 4'x ½" **aluminum channel** (HD)
- (2) Itty bitty **sheet metal screws** (for stove sliders) (HD)
- (3) ¾" x ¾" x **"T" molding** (TSS)
- 6' **Rain Gutter** molding (TSS)
- **(**200) #8 x ½" stainless steel **pan-head screws** (FSS)
- (100) #8 x ¾" stainless steel **pan-head screws** (FSS)
- (100) **#**6 x ¾" stainless steel **flat-head screws** (FSS)
- 6' **continuous stainless steel hinges** (MSS)
- Small can of **cutting fluid** (MSS)
- (2) stainless steel **latches** for sides of the hatch (MMC)
- **Plastic miter box** (HD)
- Quart of **lacquer thinner** (HD)
- **Paint tray** and **disposable tray liners** (HD)
- Gallon of **contact cement** (HD)
- (4) **1 x 2 pine boards** for clamping cleats (HD)
- **Grey polyurethane caulk** (HD)

Materials List 5- Galley Hatch, Doors, Windows

- (2) ¾" **closet pull rings** (HD)
- Quarter sheet of ½" **particle board** (HD)
- (2) **Interior door latches** (1 right and 1 left) (RVS, TSS, MMC)
- (3) **Exterior door handles** (keyed alike) (RVS, TSS, MMC)
- Rear trunk **latch** (TSS)
- Box of 3/8" long 1/8" aluminum **pop rivets** (HD)
- Box of 3/8" long 3/16" **pop rivets** (HD)
- ¼" i.d. hollow tube **weather strip** (HD)
- 3/8" x 3/8" dense foam **weather strip** (HD)
- ¾" x 3/8" dense foam **weather strip** (HD)

Marnoleum™ **linoleum flooring**

Materials List 6- Cabin Cabinets

- **¾" Hardwood** of choice (LY, HWS)
- **½" Pine** for drawer sides and back (LY, HWS, RH)
- (13) hardwood **knobs** (RH)
- (5) **Magnet catches** (HD)
- (7) 12" **drawer roller guide** sets (HD)
- (2) quarts of **varnish** (1 gloss and 1 semi-gloss) It's tempting to get a gallon can, but varnish goes bad after it's opened. If there's any delay in your project, you may end up wasting half a can. (HD)
- **Weenie roller frame** and foam **roller covers** (HD)
- Gallon of **paint thinner** (HD)
- Purdy 2" Nylon Bristle **sash brush** (HD)
- 120 grit and 150 Grit **sandpaper** (HD)
- 1" wide blue **masking tape** (HD)
- (6) **Tack cloths** (HD)
- **Minwax Wood Putty** (get 4 different shades, red, brown, tan and blonde) (HD)
- (2) Packages of straight **razor blades** (HD)
- (18) Brass **butt hinges** (HD)
- (2) Recessed **finger pulls** for optional floor hatch (HD)
- Brass **catch** for icebox door (RH)

Materials List 7- Galley

- **Stove** (WM, K-Mart, if they're still around)
- 4' of **LP fuel hose** (I had to end up using 3/16" i.d., as ¼" i.d. was just a bit too loose. Get whatever fits tight over the brass fuel tubing.) Obtain at a propane dealer and accept no substitutes. Clamp with stainless steel clamps.
- 10' of 3/8" i.d. **vinyl tubing** (HD, HSS)
- 4' of 3/4" i.d. **vinyl tubing** (HD, HSS)
- **Water fill inlet** (RVS, TSS)
- 3/8" threaded **plastic spigot** (to vent the water tank) (RVS)
- (2) ¾" thread x ¾" barbed **nylon fitting** (HD)

- **Drop leaf support bracket** (Rockler part number 29512) (RH)
- 3/8" Tee **nylon fitting** (HSS), (HD)
- 3/8" Plug **nylon fitting** (HSS), (HD)
- 3/8" Ell (barb to barb) **nylon fitting** (HSS), (HD)
- 3/8" Ell (barb to 3/8" thread) **nylon fitting** (HSS), (HD)
- **PVC fittings** to convert from 1-1/4" male thread to ¾" female thread, making a 90 turn for the water inlet (see page 56). This will depend on the selection of PVC fittings your supplier has.
- (2) 1/4" i.d. **brass street ell** (HD)
- 6"x ¼" i.d. **brass nipple** (HD)
- 1/4" i.d. **brass coupling** (HD)
- 1/4" i.d. **male barbed/male threaded adapter** (HD)
- (2) Stainless **hose clamps** for ¾" tubing (HD)
- (9) Stainless **hose clamps** for 3/8" tubing (HD)
- (6) Yards of **flooring** (or minimum order) I used #766 ***Caramello*** Marnoleum Dual-13 by Forbo industries. (Vinyl and Linoleum Store)
- Quart of **sheet flooring adhesive** (see what they recommend for your specific flooring) (HD)
- 1/16" square notched **adhesive spreader** (HD)

i.d. = **I**nside **D**iameter
o.d. = **O**utside **D**iameter

Oil and Wax Finish

This finish is what some of the world's best furniture makers use. It is labor intensive, and requires annual waxing. Why go to all this trouble? Because some people want the very best.

Sand your project with 220 grit sandpaper. Mix one part **Turpentine**, one part **Varnish** and one part **Linseed Oil**. Apply with a rag; let it set for an hour, then wipe off all remaining oil. (Soak your used rag in a bucket of water to avoid burning your garage down.) Allow drying overnight. Repeat two more times, rubbing down with extra fine steel wool between coats as necessary. Finish up with 4-6 coats of paste wax. The silky feel of the finish begs to be touched, and avoids the "plastic" look of lacquer.

This finish is especially effective on cherry, as it allows it to develop that rich reddish-golden brown patina that is so coveted. However, wax is wax, and this finish is unsuitable for outdoors. Use it on the cabin cabinets only. For the galley, let the oil finish cure for about a month, then varnish with spar varnish. Sunlight will speed the darkening process on cherry before you varnish. (The UV inhibitors in the varnish will prevent the cherry from darkening if you varnish it first.)

The natural color of cherry cannot easily be duplicated with a stain.

SUPPLIERS

National Chains

These are all national companies with mail order catalogs. They may also have storefront locations near you.

- **Harbor Freight Tools** www.harborfreighttools.com (800) 423-2567 International: (805) 388-3000

Import tools of moderate quality, but very attractively priced. I've had my $20 angle grinder for years.

- **West Marine** www.westmarine.com (800) BOATING

The Mother Lode. A supplier for yachts, they carry everything 12 Volts. Stainless steel parts, tanks, stoves, light fixtures, cabinet hardware. Everything is top shelf quality. For you woody fans, they carry the epoxies and UV-inhibiting varnishes. They'll mail you their thick catalog for free, but you won't get it very fast.

- **McMaster Carr** www.mcmastercarr.com (562) 692-5911

An industrial supply company, similar to Grainger, but they sell to the public. Hardware and stainless steel, electrical and plumbing. You can request their 2" thick catalog.

- **Camping World** www.campingworld.com (800) 616-2267

RV Supply store. I recommend their electric-flush porta-potty ($130).

- **JC Whitney** www.jcwhitney.com (800) 529-4486

Automotive Supplies, with specialty catalogs for RV supplies. Sometimes they offer free shipping on orders over $150.

- **Rockler Woodworking and Hardware** www.rockler.com (800) 279-4441

Woodworking supplies, hardwood lumber, hardware and knobs.

- **All-Rite** www.all-rite-ca.com (800) 642-9464

RV supplies, including the elusive M34 Insert Roof Edge. They usually sell through retail RV supply stores. They'll send you a catalog on request.

- **American Tank Co.** www.watertanks.com PO Box 340 Windsor, CA 95492 (707) 838-1616

Item number 260-046, 7 Gallon Rectangular Poly Tank-HW. 24-1/4" Long x 12-1/2" Wide x 5-3/4" High. Also included one 270-020 ¾" FPT Spin weld tank fitting and two 270-010 3/8" FPT spin weld tank fittings. They will fax you a diagram of your tank and have you mark exactly where you want the fittings installed. A high-quality unit sold by friendly people.

Teardrop Specialty (Mail Order Only). *Be sure to tell them you're building the Kuffel Creek 8' Cubby.*

- **Lil' Bear Tag-Alongs** www.teardrops.net/LilBear/parts.html 12442 Maria Dr. Redding, CA 96003 (530) 275-6728

Galley hatch waterproof hinge ("hurricane hinge," comes in black only, but is paintable), fenders.

- **R.W. Johnson** -No website (savages!) 3330 Mary Lane, Auburn, CA 95602 (530) 878-0407

Trim, parts, fenders, crank-out windows.

- **Teardrop Fix-it Shop** www.teardropparts.com 1830 Hillside Dr., Glendale, CA 91208-2513 (818) 243-0097

Trim, fenders, galley hatch waterproof hinges, crank-out windows, vintage original and reproduction parts. Nice catalog and website.

Teardrop Links

If you don't already have a computer, a teardrop trailer is a great excuse to get one. The Internet is the best way to get the world's best information while sitting in your jammies at two in the morning drinking coffee.

Tales & Trails www.teardrops.net

Everything teardrop. Builders, suppliers, teardrop newsletter, events and gatherings.

Outback Teardrop www.outbackteardrop.com

Larry's Outback Teardrop Trailer, an off-road version he built for towing behind his 4x4 on desert excursions. Construction photos, gathering photos, lots of great links.

Jim & Linda's Restoration page
http://geocities.com/MotorCity/Downs/5723/Teardrop.html

Jim and Linda's heroic restoration of a vintage teardrop to tow behind their "Fat GMC" (See what you miss out on by building a teardrop from scratch).

Links that might interest you

Lehman's Non-Electric Catalog www.lehmans.com (888) Get-Lehman's (438-5346)

Mostly serving the Amish Community, this catalog has a wonderful assortment of hand tools, farm equipment, gas lighting and other non-electric items.

Lee Valley Tools www.leevalley.com (800) 871-8158

High-quality and unusual tools, plus some very interesting camping and shop books from the 1890's thru 1930's, including the 1901 *A Boy's Handybook: What to Do and How to Do It*, which has chapters on taming wild birds, hot-air balloons and snowball warfare.

Exile Cycles www.exilecycles.com (818) 768-7667

A custom motorcycle shop that can make just about any rolled fender from steel or aluminum at a very reasonable price.

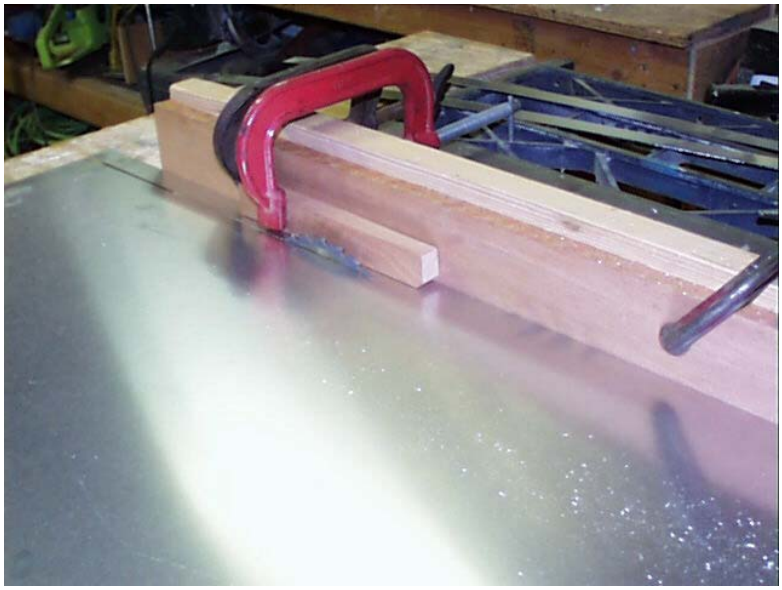
Black Lake
www.blacklakeny.com/battery.html

Deep cycle battery maintenance tips.

Aluminum Shop Tips

Working with aluminum is different than working with steel, and in some ways is much easier. It is lighter, softer, and much less prone to cutting you to ribbons.

However, it also has some odd qualities. It is difficult to weld and solder, and must be prepared correctly for paint to stick. Still, it is easily worked with a minimum of tools, most of which are not out of the realm of the average woodworker.



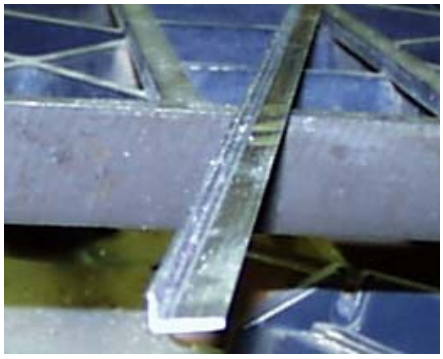
Sawing aluminum sheet on the table saw. The red C-clamp is actually farther away from the blade than it looks.

The easiest way to cut sheet aluminum is with air shears. They nibble a ¼" wide strip out of the middle of the cut, and so they can cut just as easily from the middle of the sheet as at the edge, something that would be difficult with tin snips. They leave a fairly smooth edge, and most of the cut edges will be covered with trim anyway. Best of all, it's really hard to hurt yourself with them. But for precision straight cuts, it's hard to beat the table saw.

To safely saw **aluminum sheet** on the table saw, use a wood scrap clamped to the fence to keep the aluminum from slipping under the fence, and another piece of wood clamped 1/16" off the table to keep the aluminum from flying up. Stop the saw 1/4" before the cut is finished, and cut the last part with tin snips. A thin-kerf blade and zero-clearance blade insert keep the cut edge from being ragged. Eye and ear protection is mandatory!

Sawing aluminum trim. Do not attempt this without the featherboard and zero-clearance blade insert. Some thick washers suspend the featherboard just above the saw tabletop, and allow the trim to slide under.

Aluminum trim can also be cut on the table saw. To safely rip aluminum trim, use an auxiliary fence, and a featherboard that is set on top of some thick washers to allow the



½" angle with one leg ripped down to ¼".

side of the angle to slip under it, but will still clamp the other side against the fence. Again, the zero clearance blade insert and thin kerf blade are mandatory, as are eye and ear protection. I use a full-face shield to keep my face from getting pelted with hot aluminum shavings.

With this technique, you can fashion your own "J" moldings or any other shape of angle with unequal leg lengths. This will allow you to use stock trim on tight radiuses if you use the short leg on the radius side.

By trimming one leg shorter, stock "hard" aluminum trim can be bent around tighter radiuses, such as on the door openings. Use a plastic mallet to make sure the trim is seated all the way in the curve. For wider trim, it must be annealed first, or else it will kink.

Annealing aluminum trim. Let it cool slowly and it will soften. If you pick it up while it's hot, you won't forget it! (ouch…)

Annealing

Stock "hard" aluminum trim from Home Depot can be made soft as butter by heating. This will allow you to bend it around curves without kinking, and use larger profiles.

The heating process is called annealing, and is simple to do with a propane or mapp torch. Set the trim on a couple pieces of scrap steel and preheat the trim by going back and forth with the torch. Then start at one end and slowly work your way to the other. If the aluminum "blisters," it is about to melt (aluminum doesn't turn orange first like steel). You want it just before it blisters, and if you do this in low light, the flame coming off the aluminum will have a very slight orange glow. Practice makes perfect.

After you heat the length of the piece, let it cool slowly. It will be much softer afterwards. Oil from fingerprints seems to affect the process, so before you heat the piece up, wipe it down with some type of fast-evaporating solvent, such as acetone.

Floor Hatch/Porta-Potty

We received a lot of questions from people who can't quite picture how the floor hatch and porta-potty work. A picture is worth a thousand words, so here's four thousand words worth!

***Upper Left*: A view of the 8' Cubby with the 4" mattress in place, sleeping position (the 10' Comet is the same).**

***Upper Right*: The mattress rolls up and tucks under the cabinet, exposing the floor hatch lid.**

Lower Left: **The floor hatch lid slides out of the way, either to the front or under the rolled up mattress, exposing the 4" lowered deck below that runs the width of the trailer.**

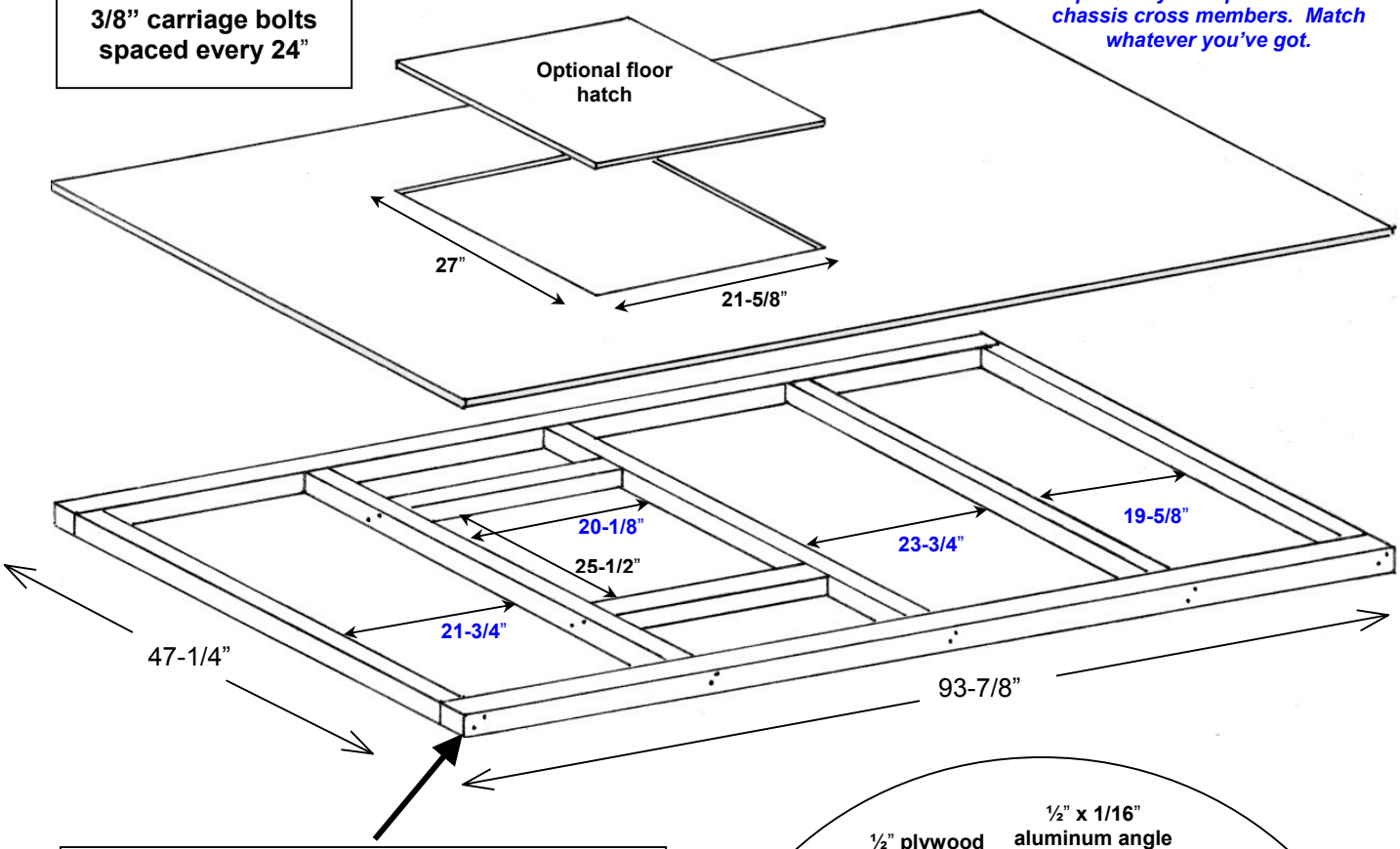
***Lower Right*: The porta-potty sits on the lowered deck, allowing you to use it while sitting straight up. It can be braced in this position during transit to allow "pit stops." At night, it is removed either to a dome tent, your vehicle, or, if you're out in the wilderness, just outside the door. We highly recommend the electric flush porta-potty from Camping World. It doesn't smell, is easy to empty, and if you use the magical blue stuff, is way better than using those nasty campground toilets.**

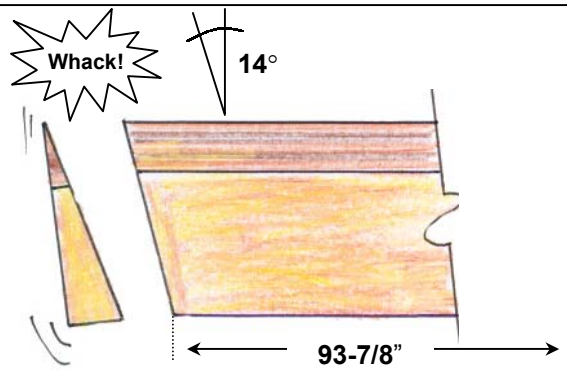
Chapter Six: Shop Drawings

WOOD DECK

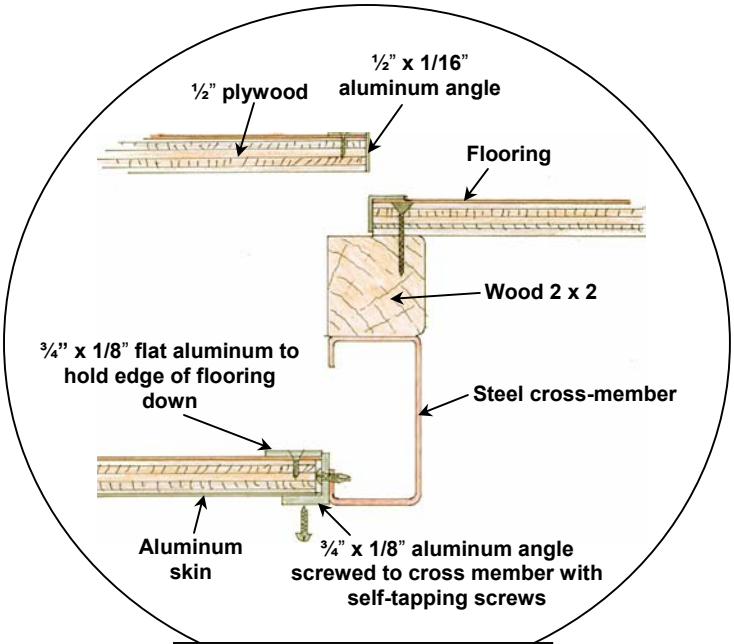
Bolt to chassis with 3/8" carriage bolts spaced every 24"

Although the cross-member spacing dimensions are given here, the wooden cross members should line up directly on top of the steel chassis cross members. Match whatever you've got.

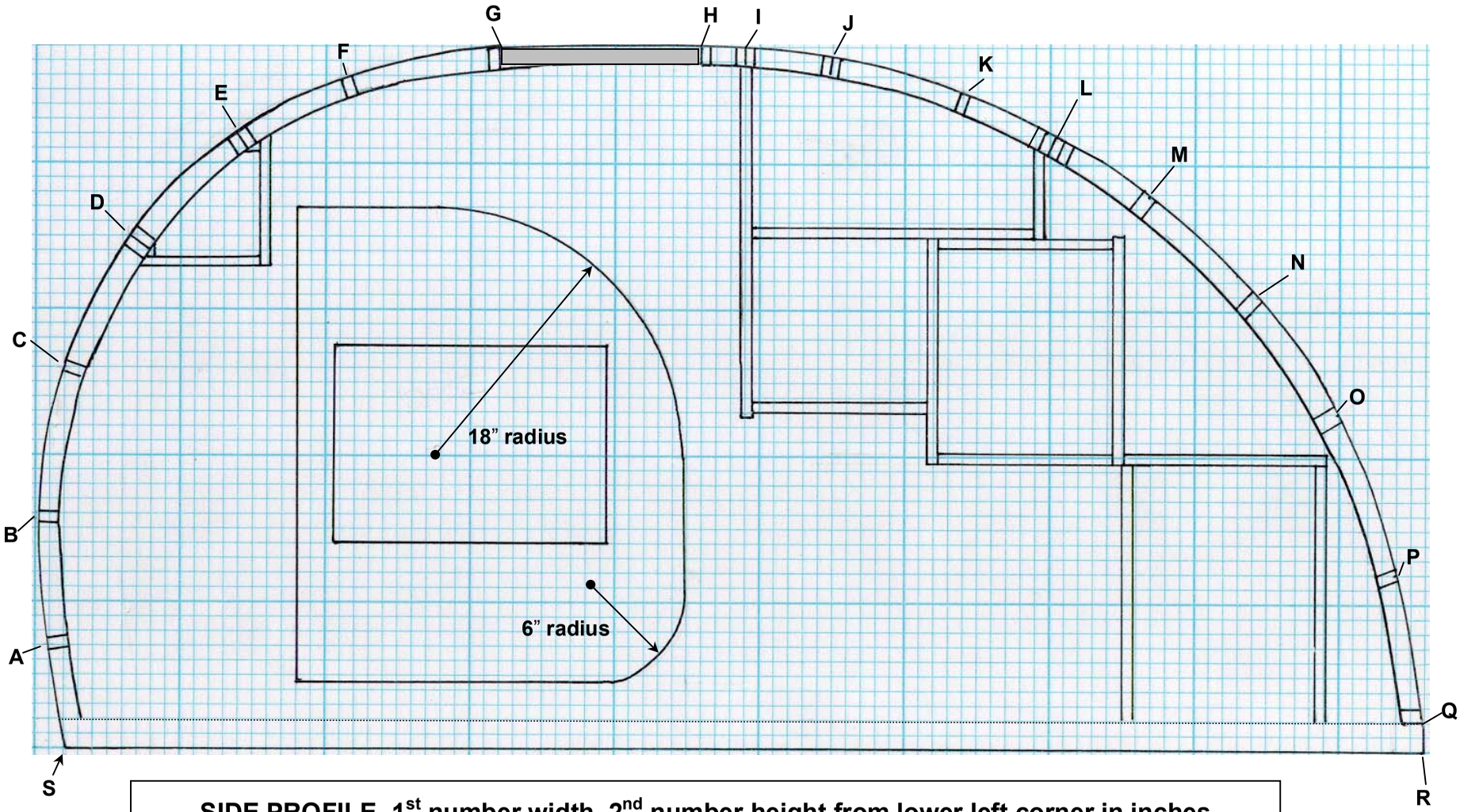




The front edge of the deck must be beveled 14° to match the front curve. The total length of the "short" edge of the bevel is 93-7/8" to match the chassis.



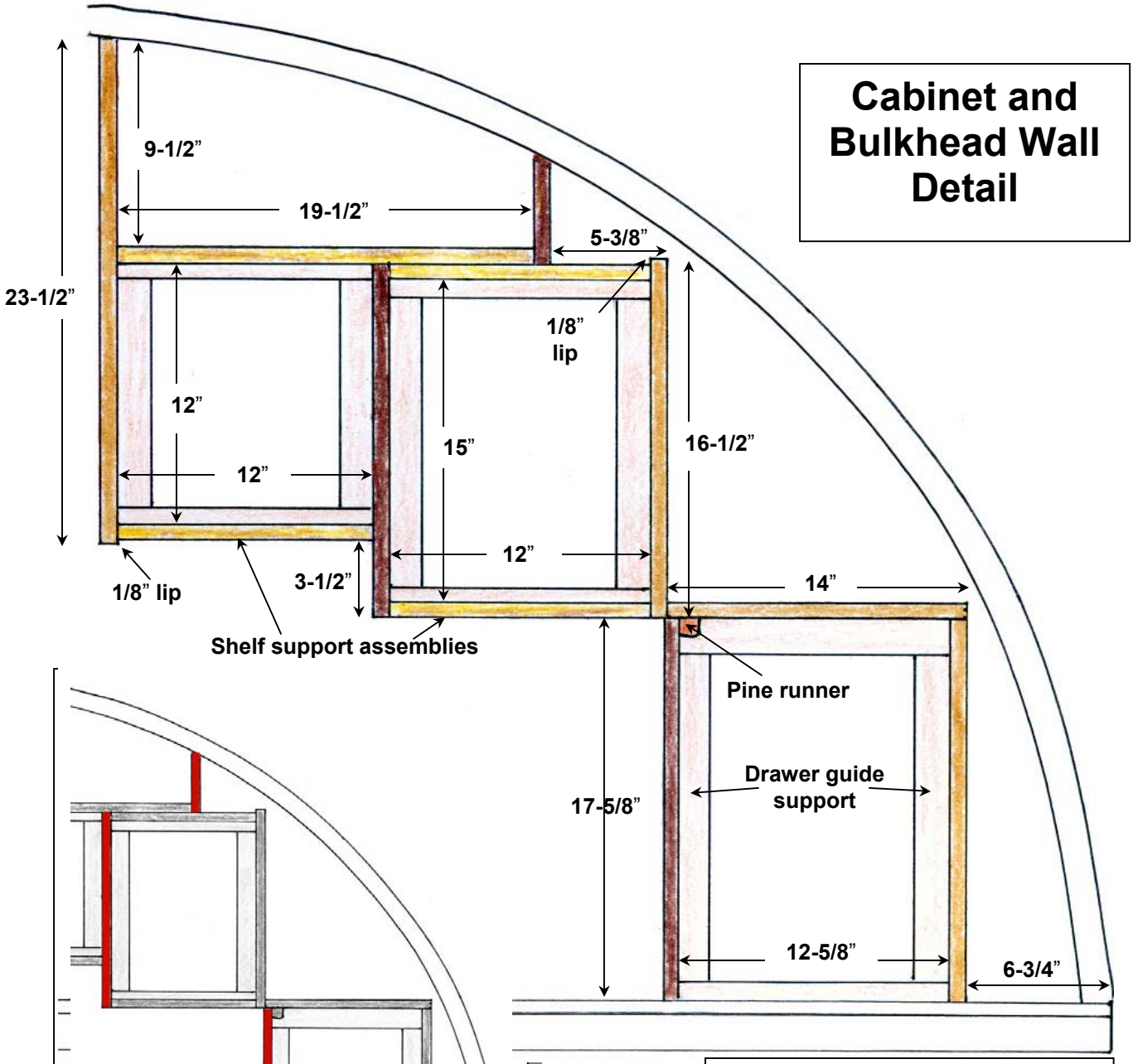
Floor Hatch Cross-Section

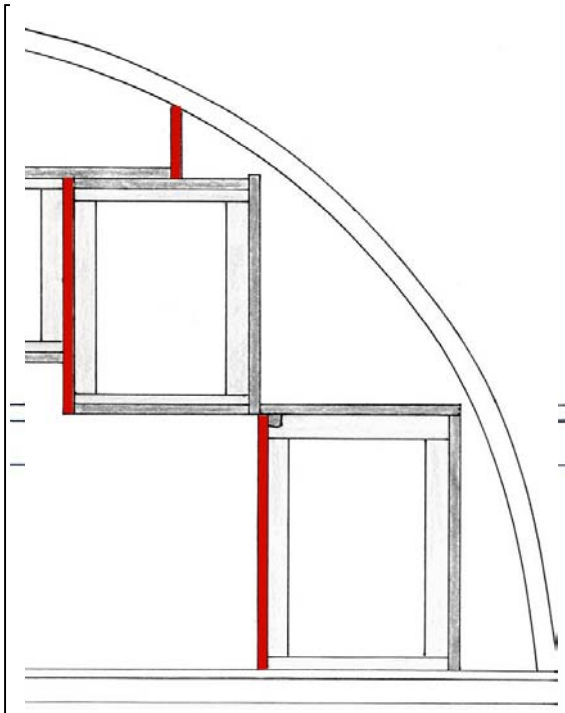


SIDE PROFILE- 1st number width, 2nd number height from lower left corner in inches
1 square = 1". Note: the large squares are divided into 10 smaller squares, not 12.

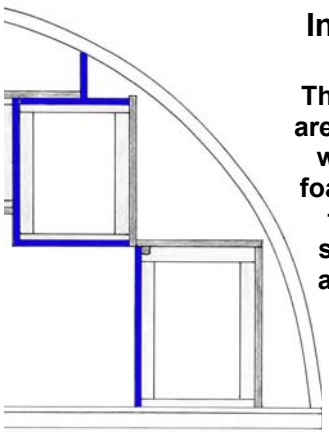
A 1, 7	E 13-3/4, 42-1/2	I 49, 48	M 77, 38	Q 96, 2
B 0, 15-1/2	F 21-1/2, 46	J 55, 47-1/4	N 84-1/2, 31	R 96, 0
C 2, 26	G 32, 48	K 64, 45	O 90, 23	S 0, 2-1/8"
D 6-1/2, 35	H 46, 48	L 70-1/2, 42	P 94, 12	

Cabinet and Bulkhead Wall Detail





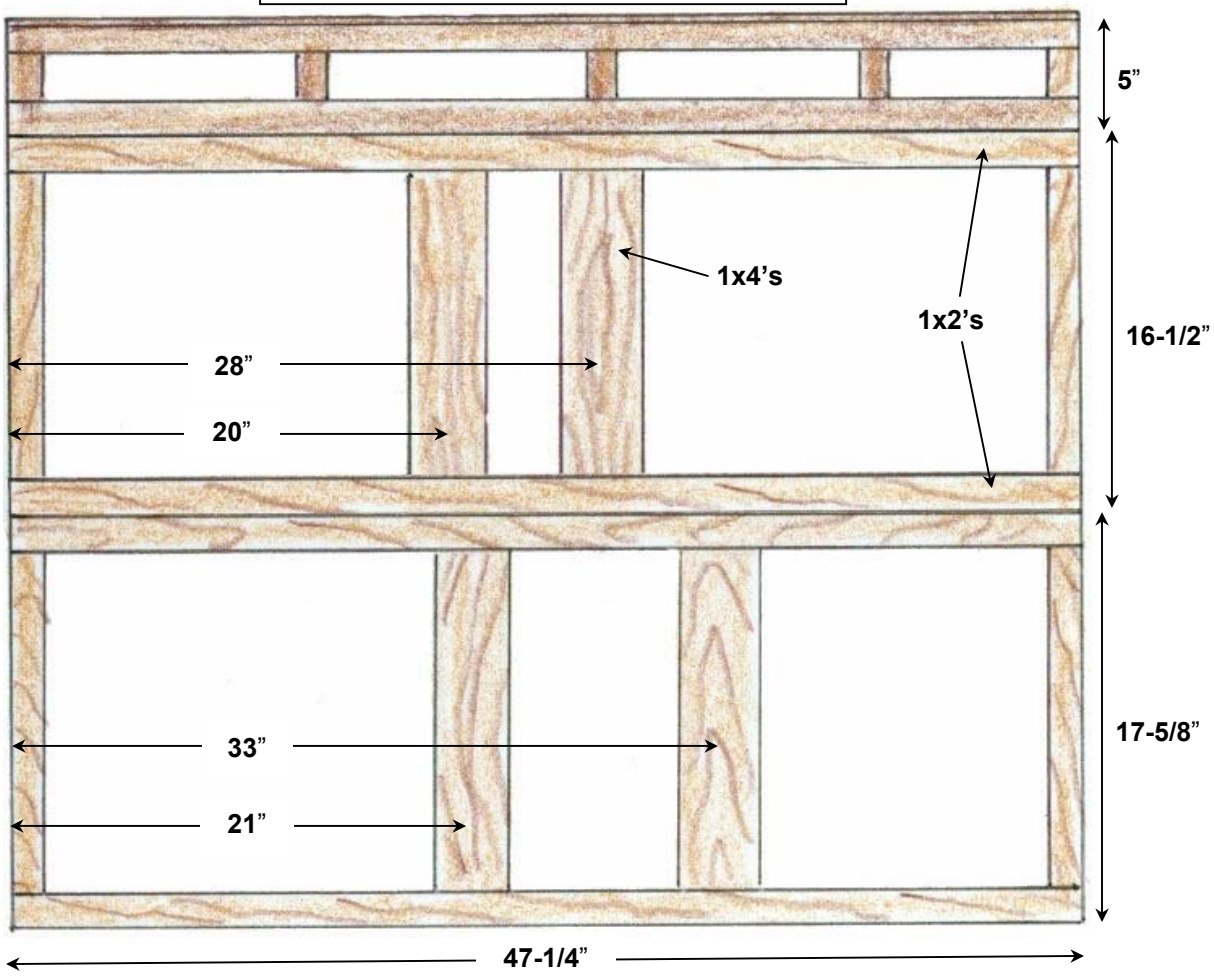
Bulkhead walls. They are the dividers between the cabin and the galley, and give the body lateral stiffness and help support the floor. Use plenty of glue when attaching the skins.



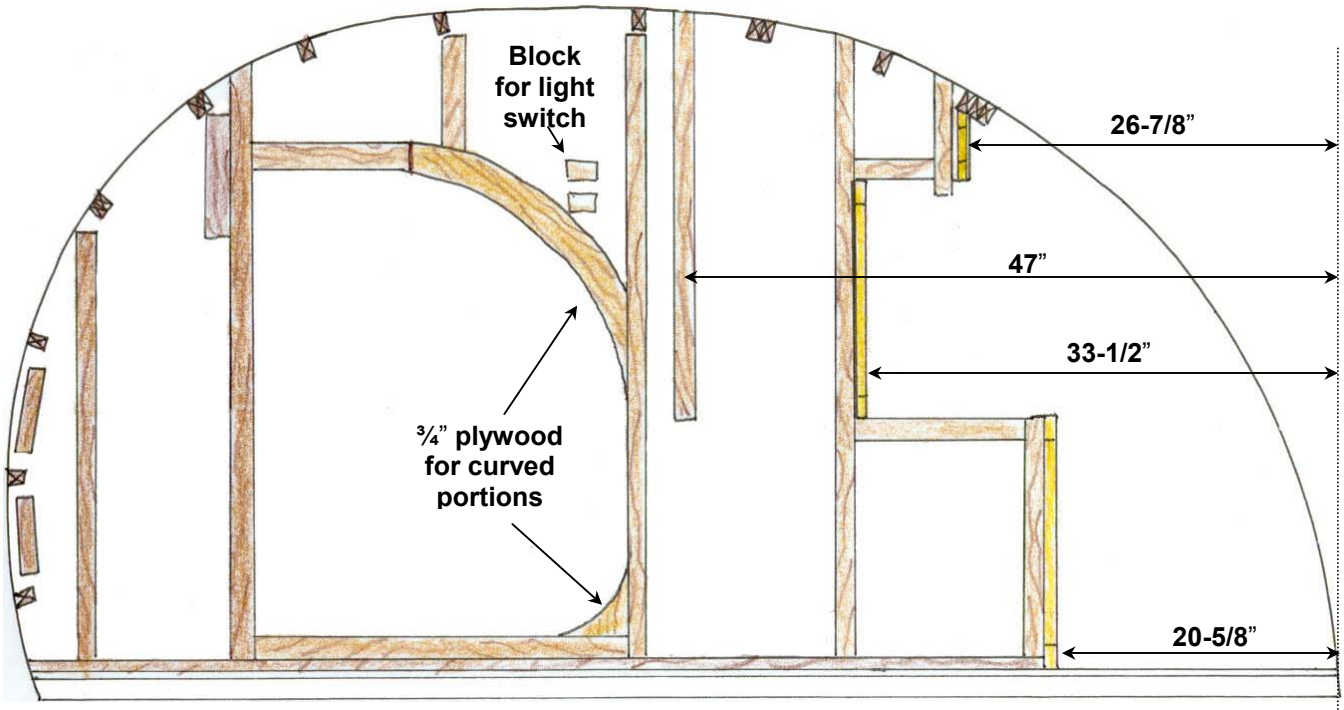
Insulated Walls

These walls are insulated with rigid foam before the rear skins are attached.

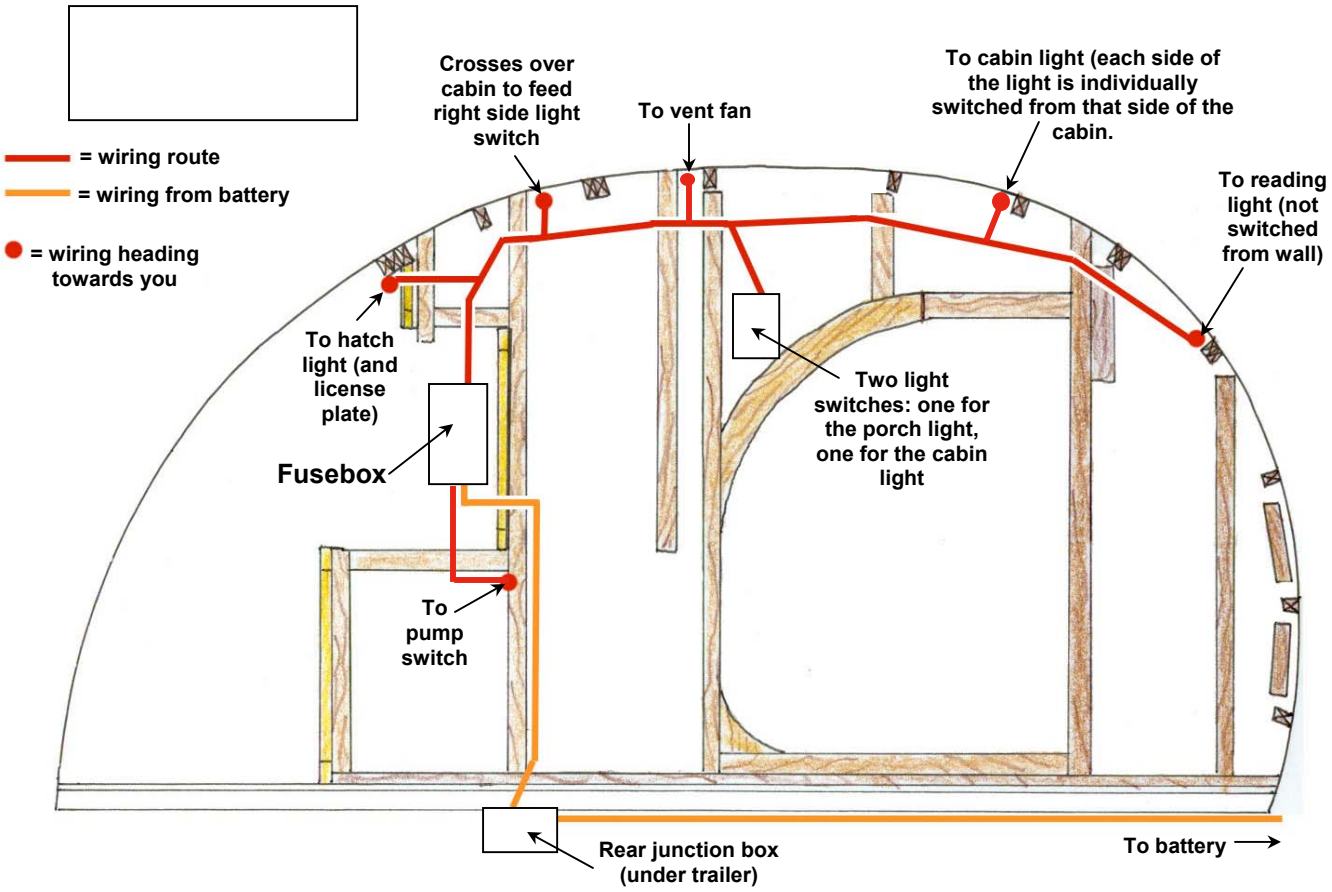
Bulkhead Wall Framing: Rear View



Note: only critical dimensions are given. Otherwise, just make it “look kind of like this”.

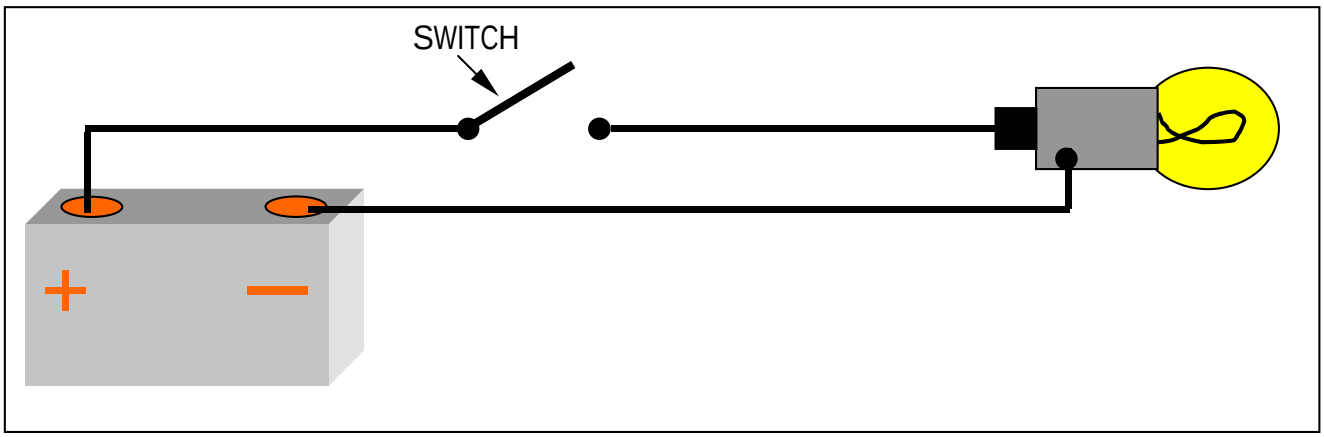


Interior Framing: Right-Hand Side

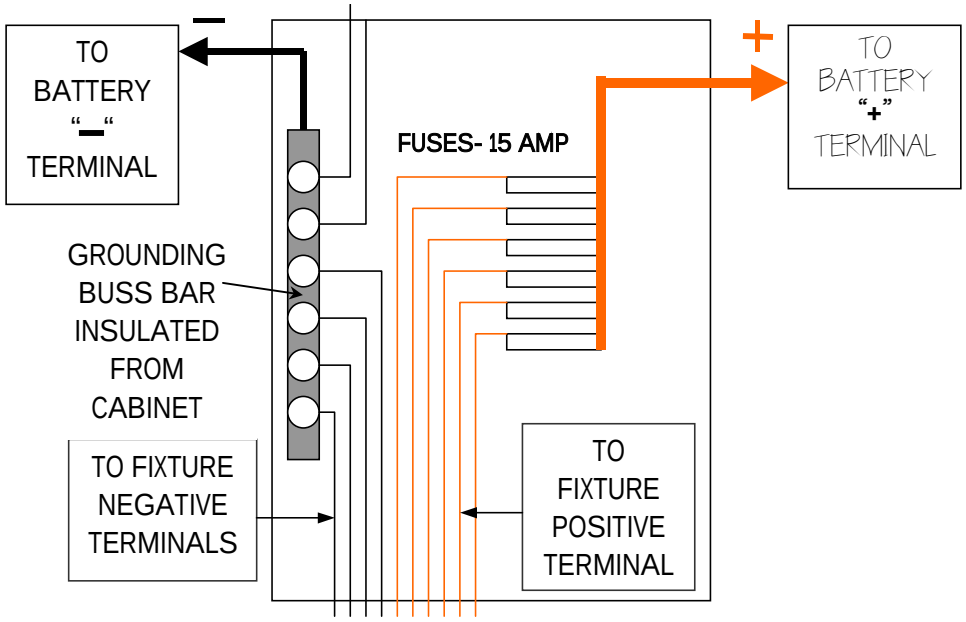


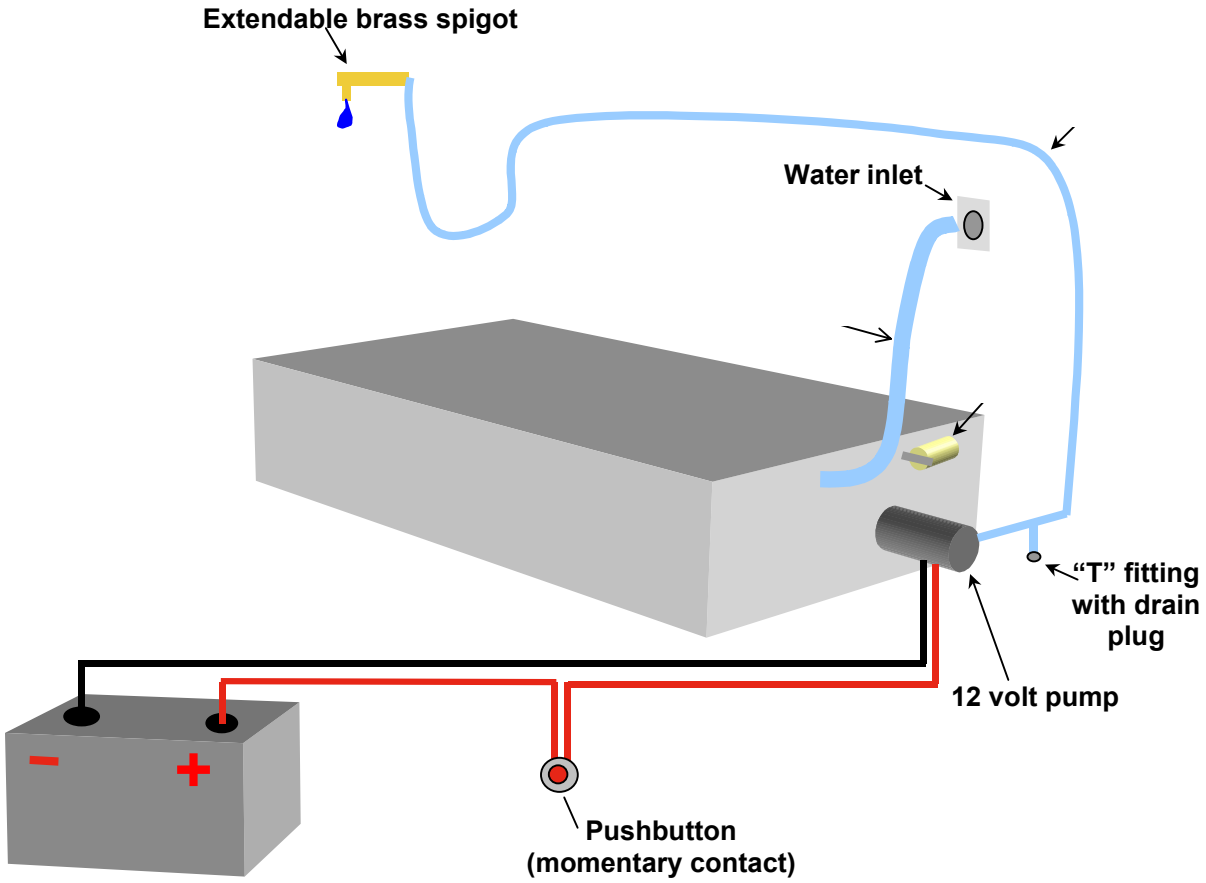
IT'S NOT ROCKET SCIENCE

If you look at the wiring in a big mass, it's confusing. Instead, work on one wire at a time, labeling each end. Below is how a circuit works. Remember that both wires will be in one jacket. The negative wire will never be interrupted with a fuse or a switch; it always goes straight from the fixture to the battery or fuse box to be connected with all the other negative wires.



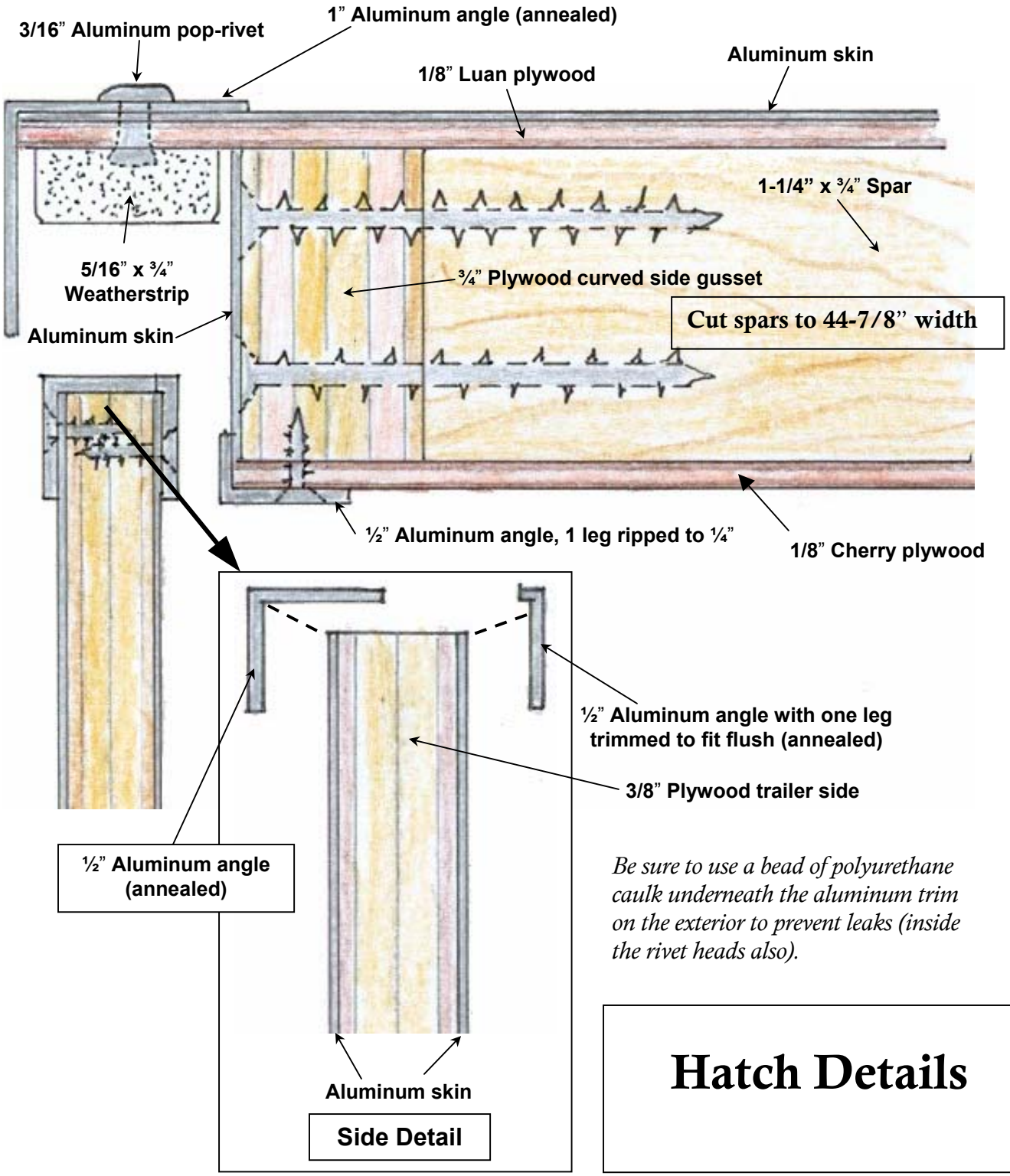
FUSE-BOX SCHEMATIC: CABIN





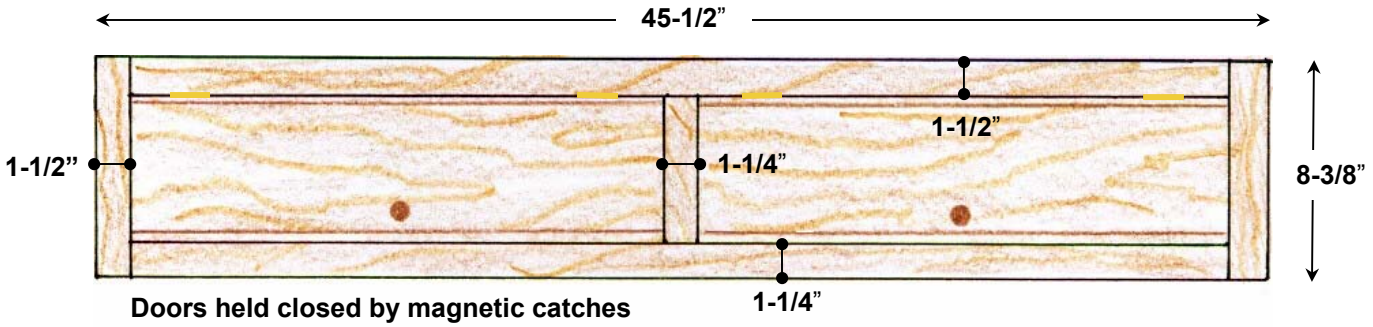
Water System Schematic

The water tank is filled through a hinged water inlet leading to a ¾" I.D. vinyl tube. The tank must be vented during filling and using, and this is accomplished with a regular 3/8" spigot threaded into a fitting near the top of the tank. The spigot is closed during transport to avoid spilling. The pump was threaded directly into the tank, but could have also been connected with tubing.



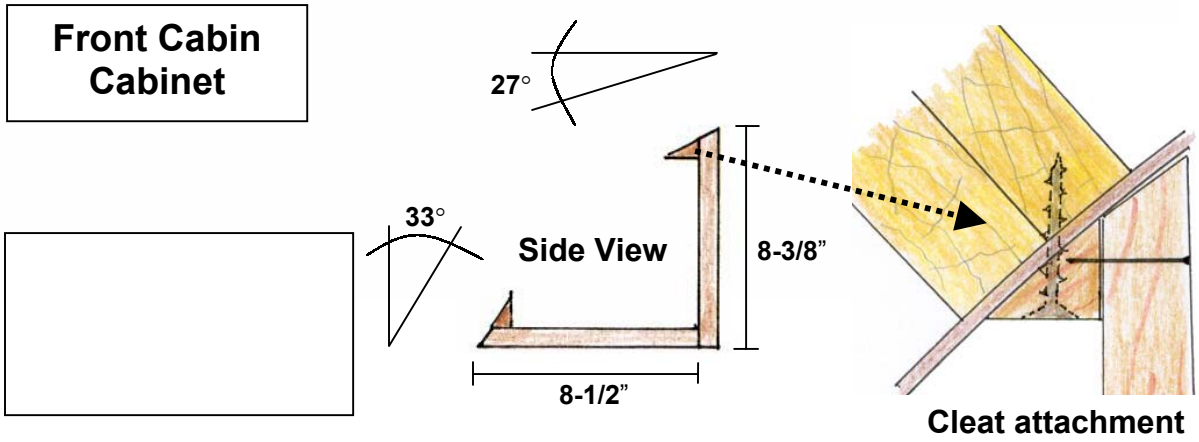
Be sure to use a bead of polyurethane caulk underneath the aluminum trim on the exterior to prevent leaks (inside the rivet heads also).

Hatch Details

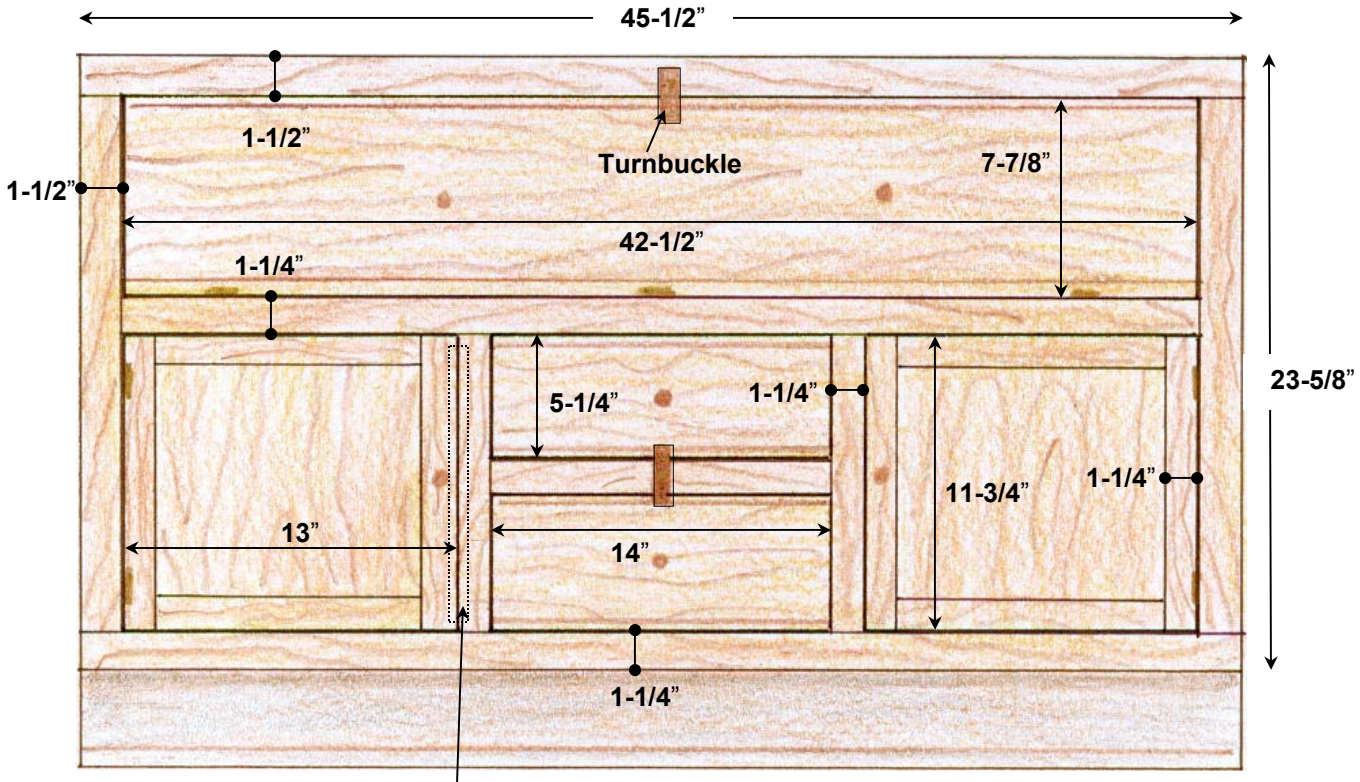


Doors held closed by magnetic catches

Front Cabin Cabinet



Cleat attachment



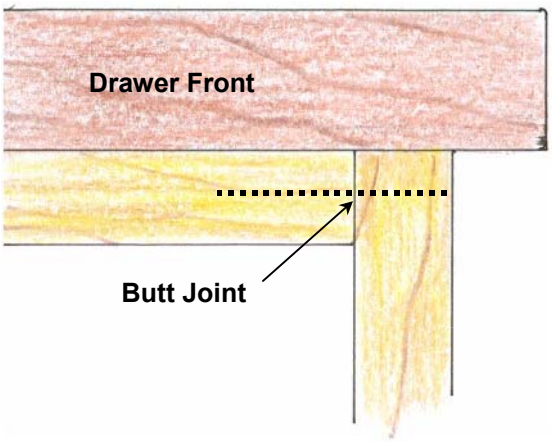
¾” x 1” piece glued inside acts as a stop for the cabinet doors.

Doors are held closed with magnet catches. When both doors are open, they serve as supports for the upper door to act as a tabletop.

Rear Cabin Cabinet

Drawers

The drawers are mounted on roller guides. Typically, the guides require the drawer body to be 1" narrower than the drawer opening (check the instructions on your guides to make sure). The drawer body usually needs to be shorter than the opening to allow insertion into the cavity. All the roller guides in this project were 12".



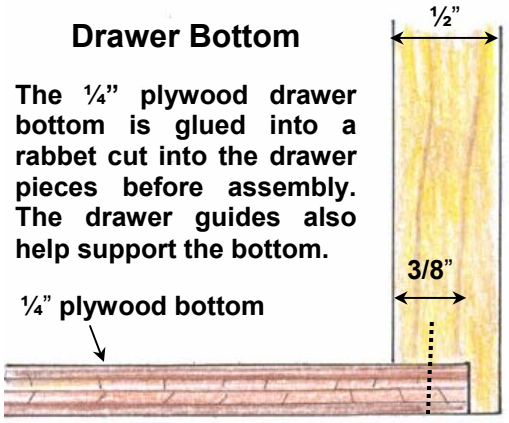
"Help Mr. Wizard! I don't wanna cut dovetail drawers anymore!"

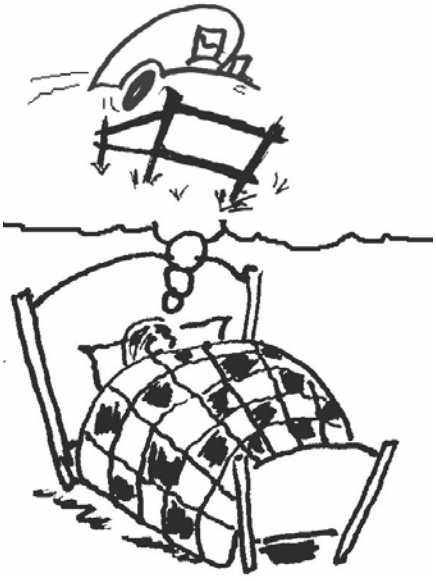
O.K. pilgrim, calm down. If you're faint of heart, or way behind schedule, you can use simple butt joints on the drawers. If you use finishing nails, and you only camp a few times a year, they should hold up fine. Who knows: maybe the drawer fairies will come during the night and assemble them all while you're asleep (yeah, right).

But if you end up selling this trailer and plan to make another one, I will expect to see dovetailed drawers on it, mister.

Drawer Bottom

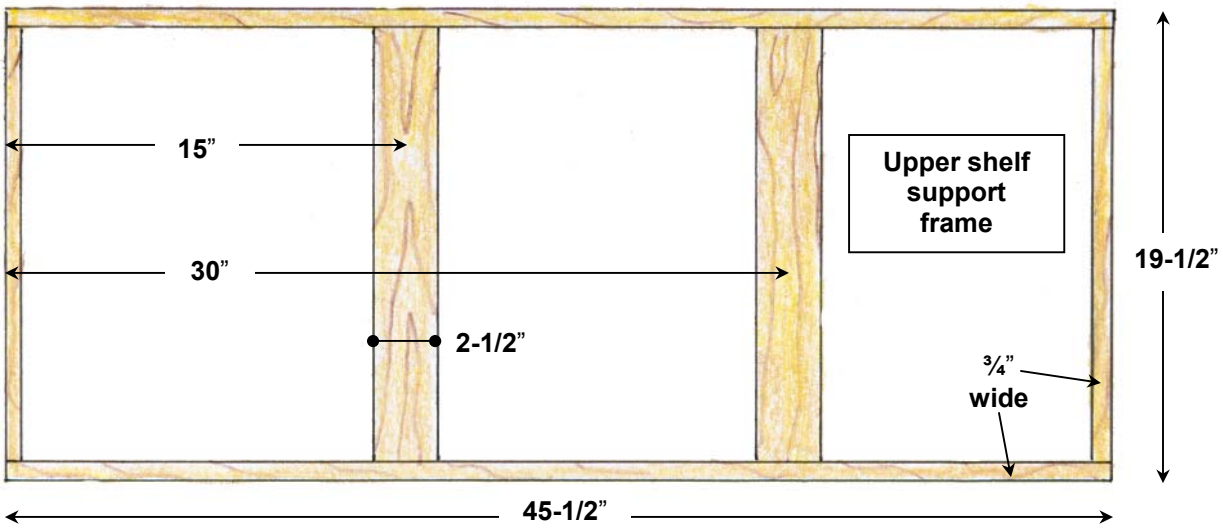
The ¼" plywood drawer bottom is glued into a rabbet cut into the drawer pieces before assembly. The drawer guides also help support the bottom.

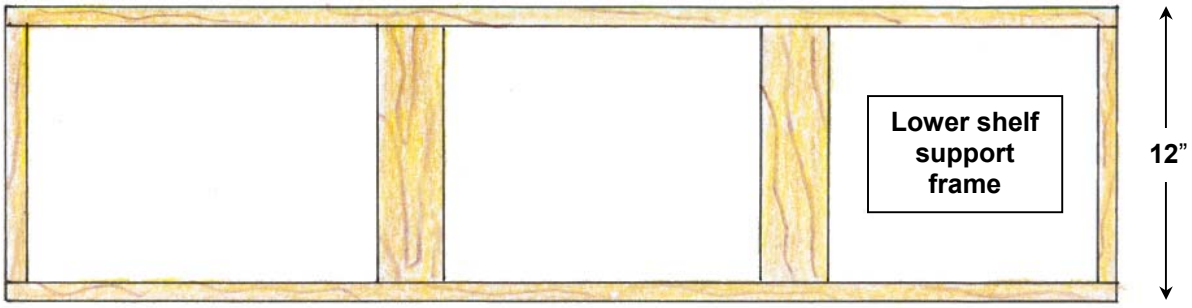


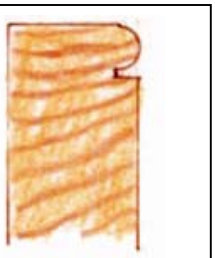


Teardrop Dreams

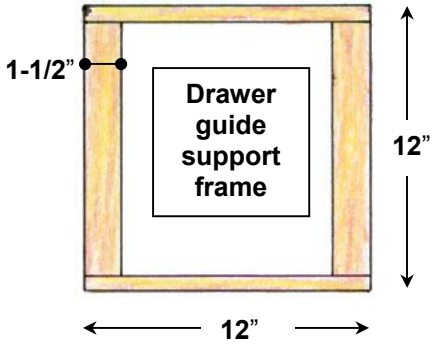
Cabin Cabinet Frames and Details

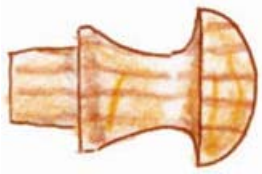




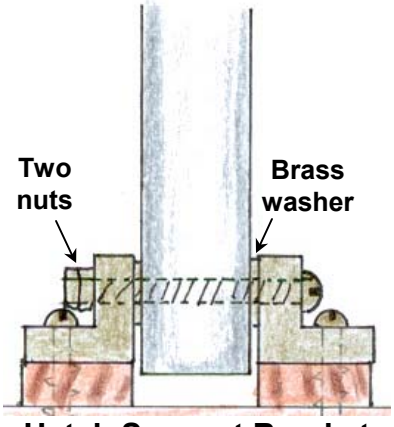


Drawer bead detail





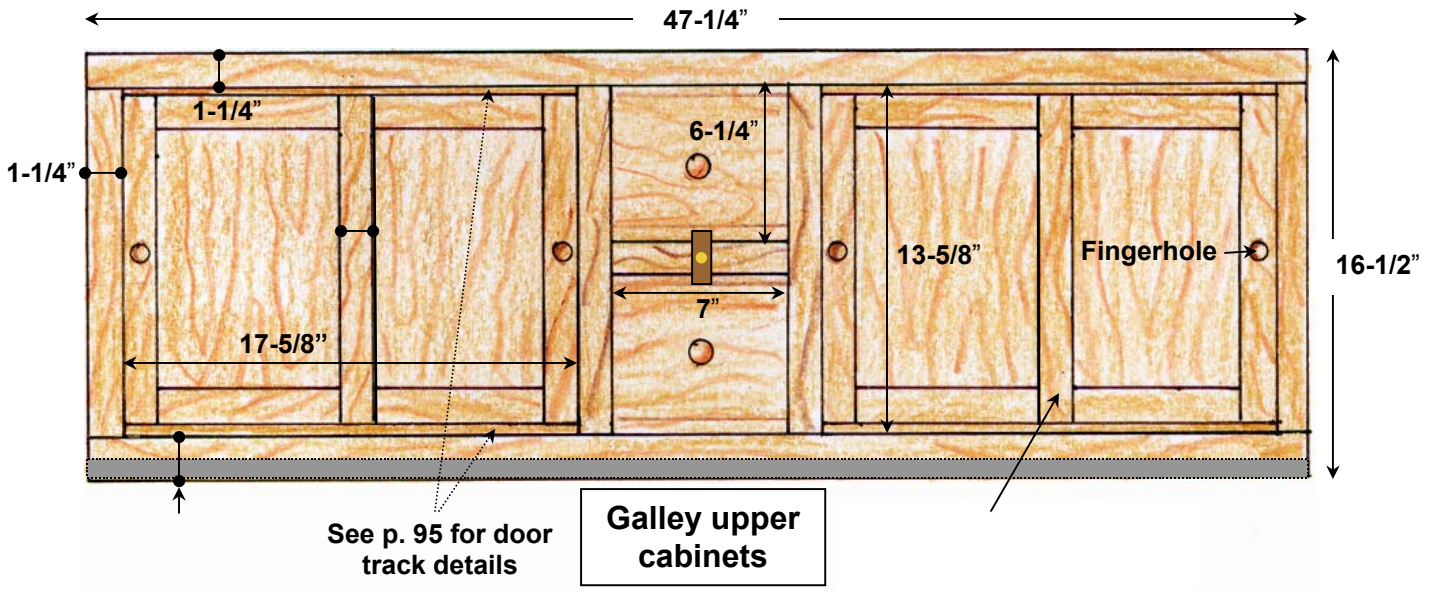
Shaker knob



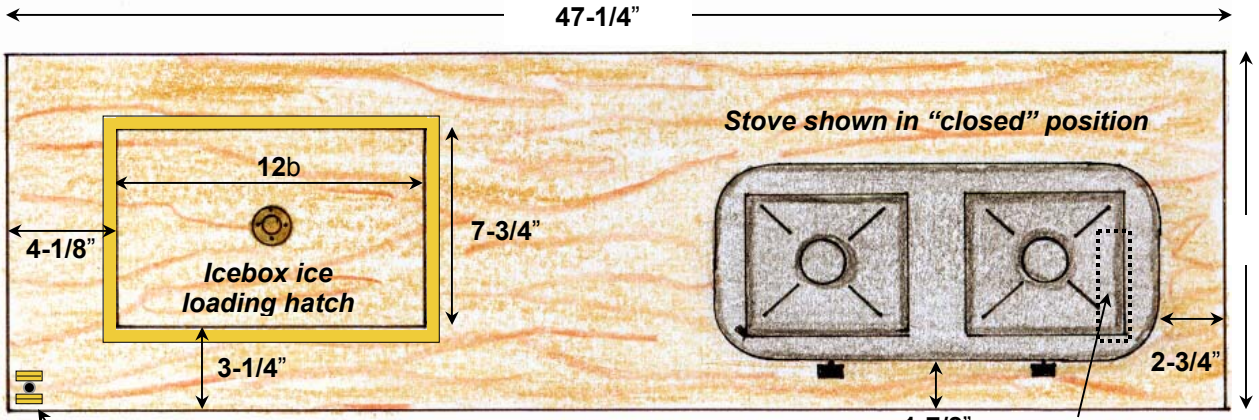
Hatch Support Bracket

The hatch support bracket is made from brass angle conveniently left over from the countertop ice hatch. It must be raised up on ¼” wood blocks to allow the support rod room to pivot. The top of the rod seats into a brass finger pull cup recessed into the hatch.

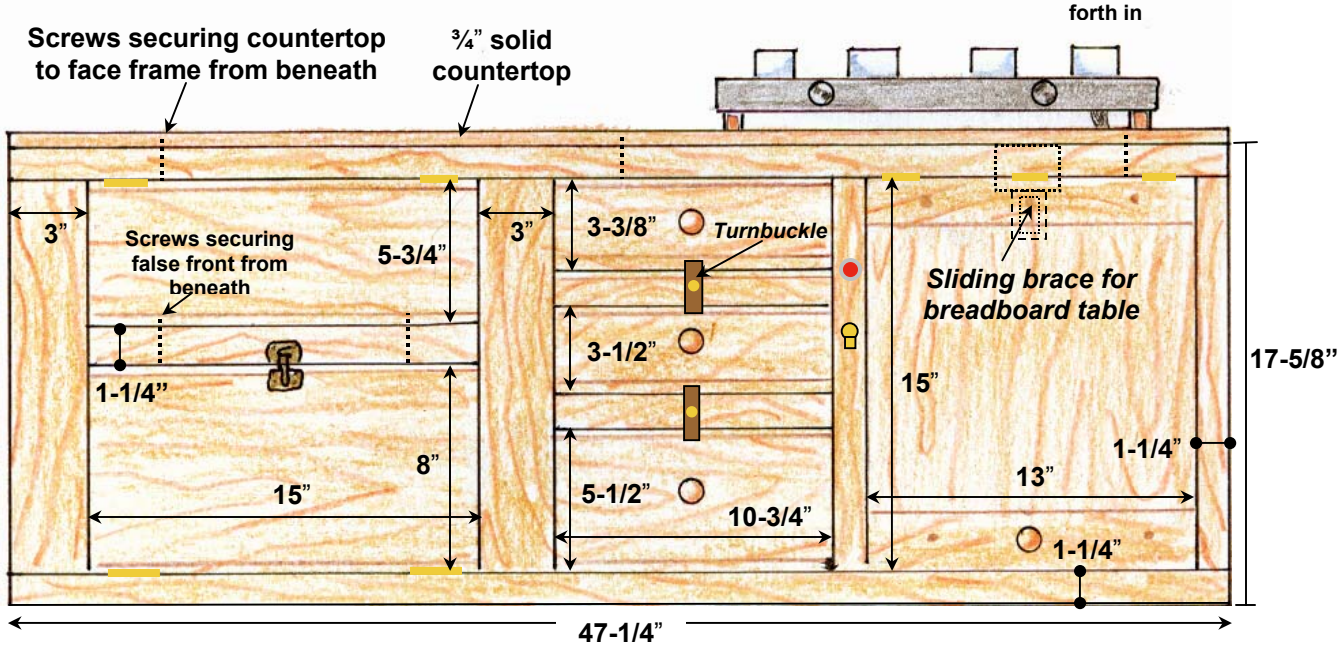
The shelf support and drawer guide frames are assembled with drywall screws, and also hung in place with drywall screws driven from the inside. Machine the drawer bead detail on only after the drawer front is sanded to its final dimension, to avoid sanding off part of the bead detail.



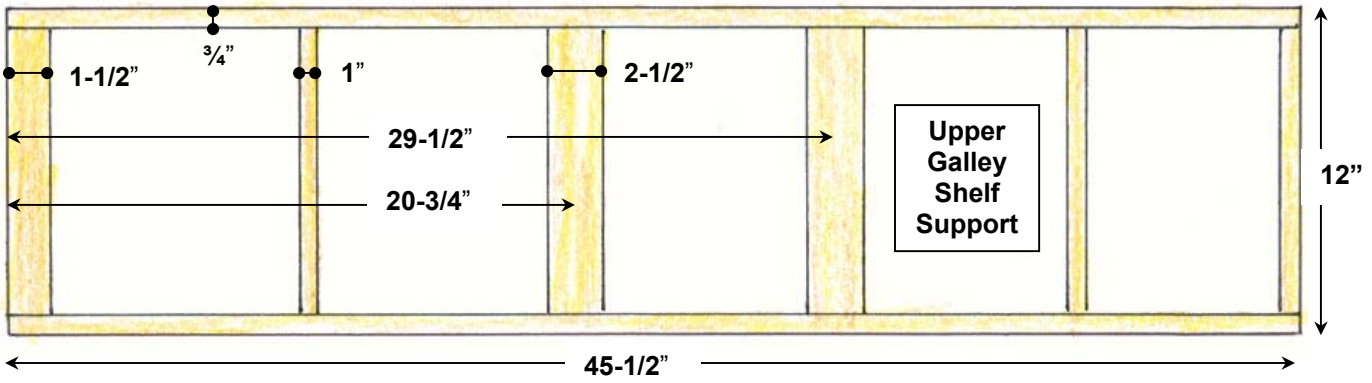
Galley upper cabinets

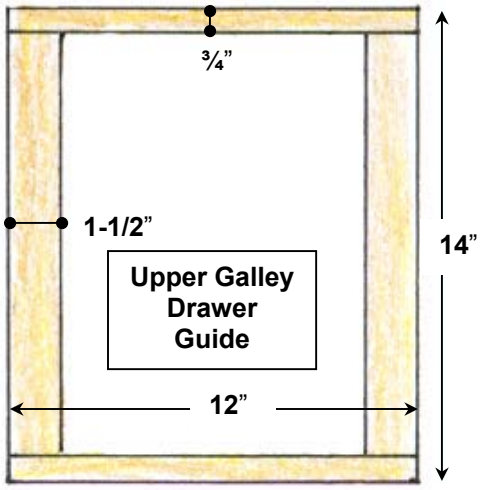


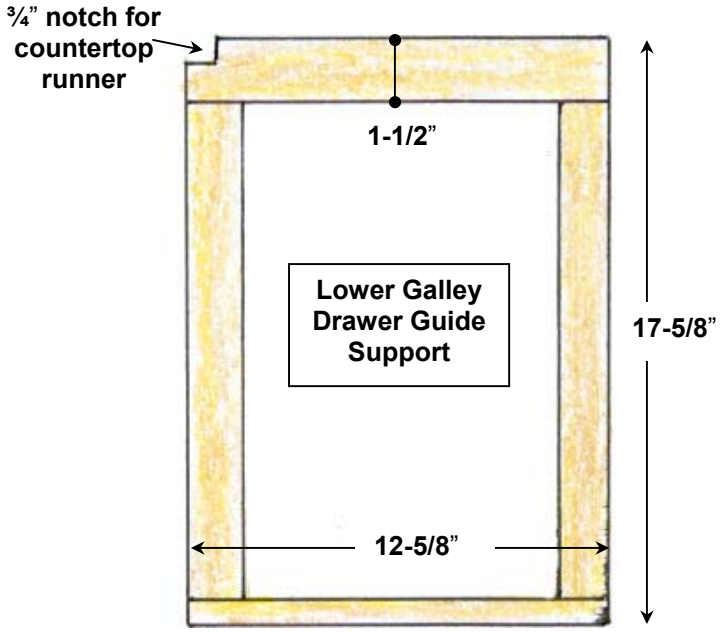
Galley Countertop (Top View)

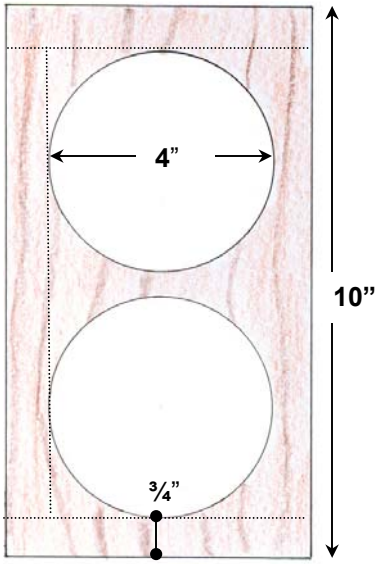


Galley Lower Cabinets

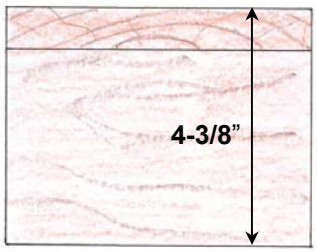


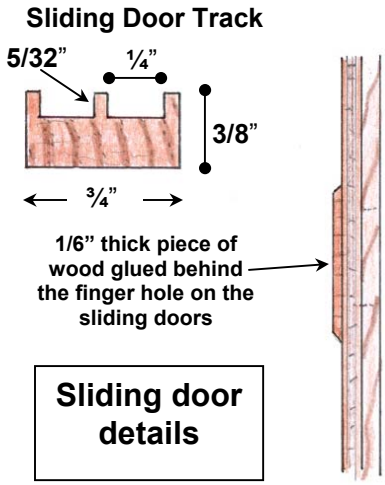


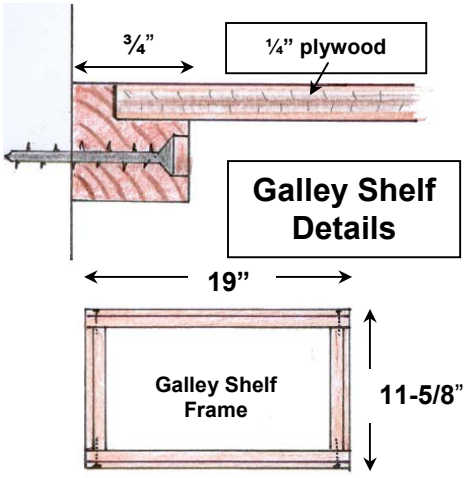




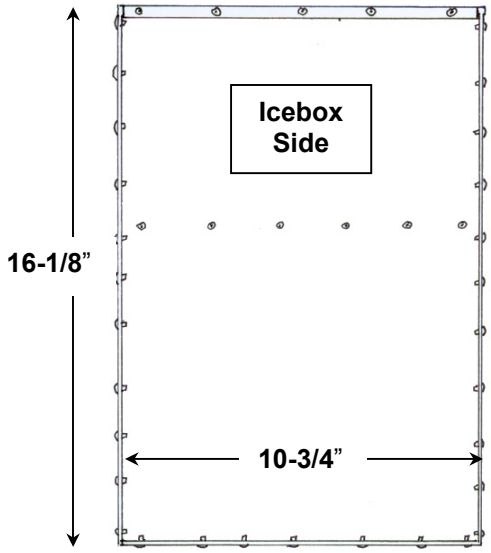
Propane Tank Holder

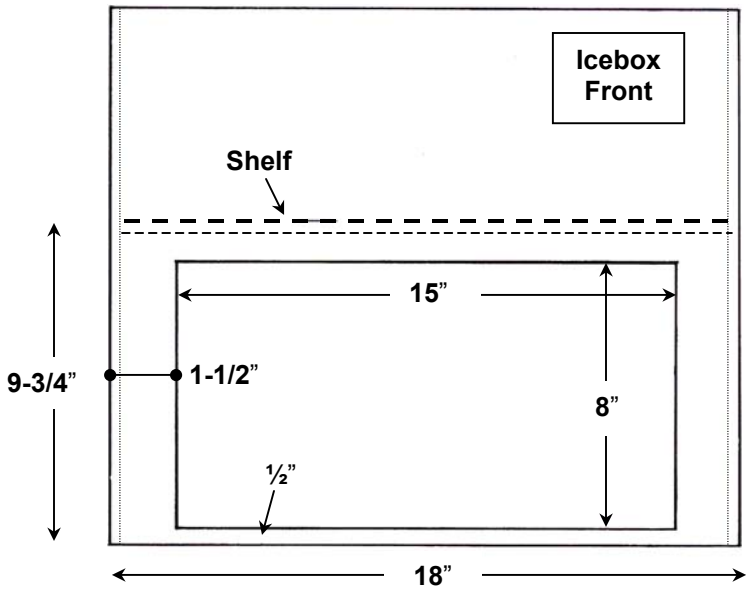


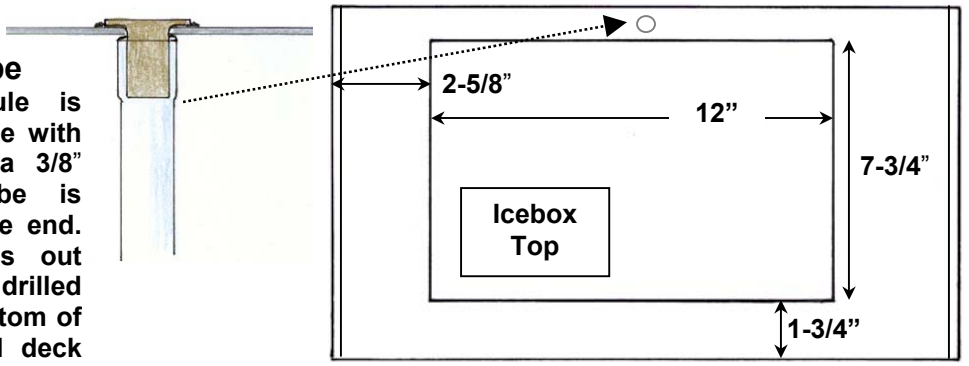




Upper galley cabinet shelf is constructed of a frame that is first screwed in place, then a ¼" piece of plywood is glued into the rabbet of the frame.



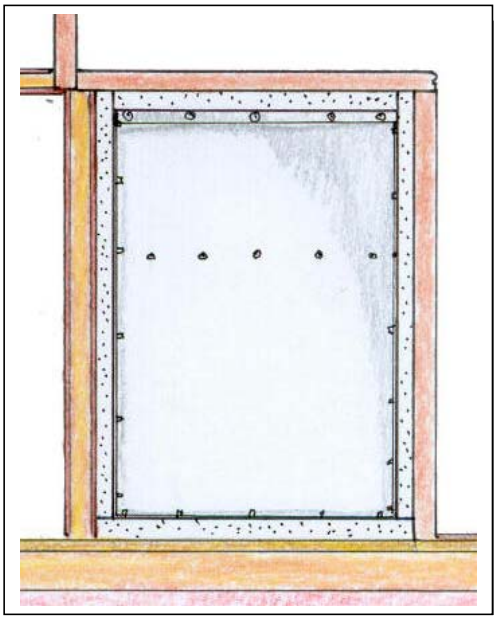




Drain Tube

A brass ferrule is epoxied in place with JB-Weld, and a 3/8” i.d. nylon tube is slipped over the end. This tube runs out another hole drilled through the bottom of the icebox and deck (don’t drill into the water tank) and drains on the ground.

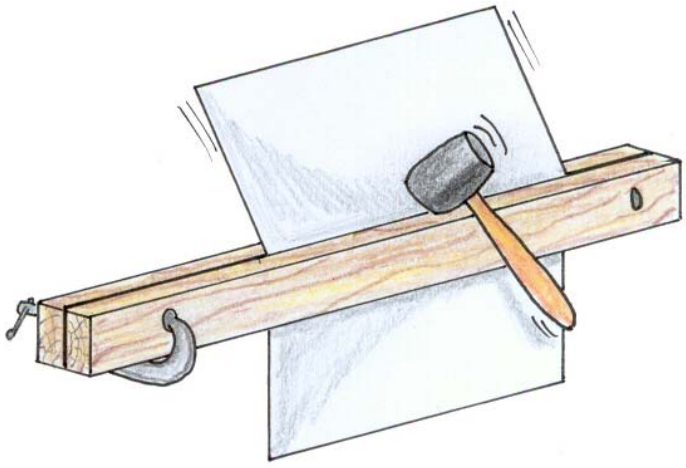
The brass ferrule used is commonly used in tubing compression fittings.



Insulation

The icebox is surrounded with rigid foam insulation: one layer on the top, bottom, rear, and front, and two layers on either side.

The bulkhead shear wall is also insulated, as well as the floor, so that helps to keep things cool.

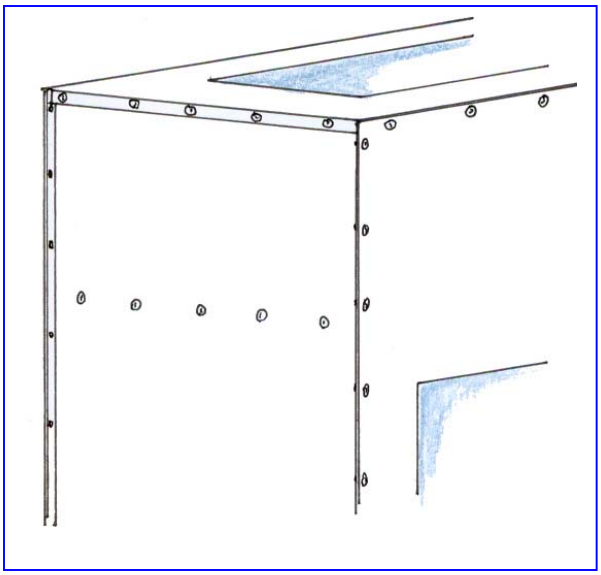


Icebox Fabrication

The aluminum sheet is best cut on the table saw (see p. 81 for safety instructions). The bending can be easily done with two dry Douglas fir 2x4s clamped together. Rip ¼" off the edges of the 2x4s to make a sharp corner. To clamp them together, use a carriage bolt with a wing nut on one end and a C-clamp on the other.

Start bending the aluminum back, using a rubber mallet to start to make the crease. Try it on a scrap first to build your confidence up before moving on to your finish material.

I have not found an aluminum solder that is suitable for the home craftsman, so the seams are riveted and caulked. It is easiest if you make the seams bend "outside." This allows good access for the rivet gun, and also gives you a nice inside joint to caulk. The exceptions to the outside seaming are the interior ice shelf, and the sides of the top. These seams are bent down.

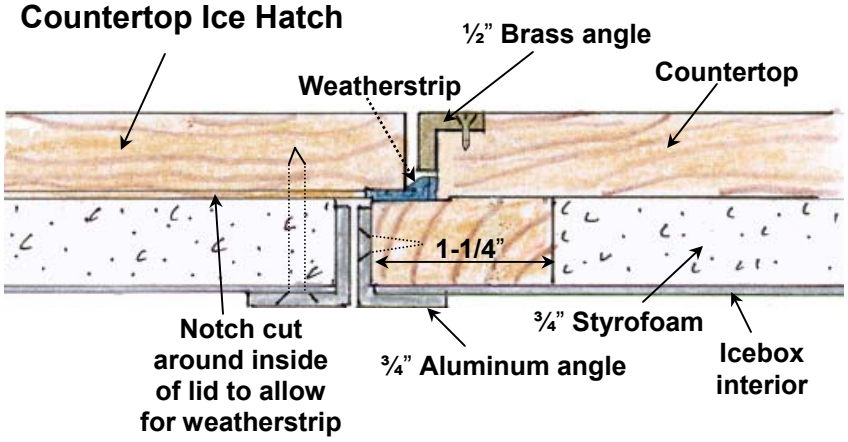


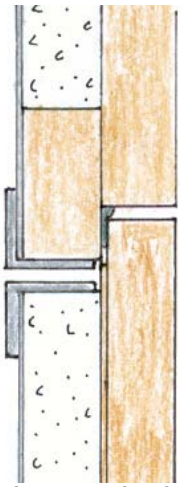
½" angle shelf stiffeners epoxied in place.

Caulk the ice shelf and sides before installing the top, as it is difficult to access afterwards. Attach pieces of ½" angle running the short way across the shelf with JB-Weld epoxy to stiffen the shelf, and to allow water to drain out the hole. There is room for a couple bags of ice in this compartment, plus room for plenty of canned drinks or other things that can set directly on ice.

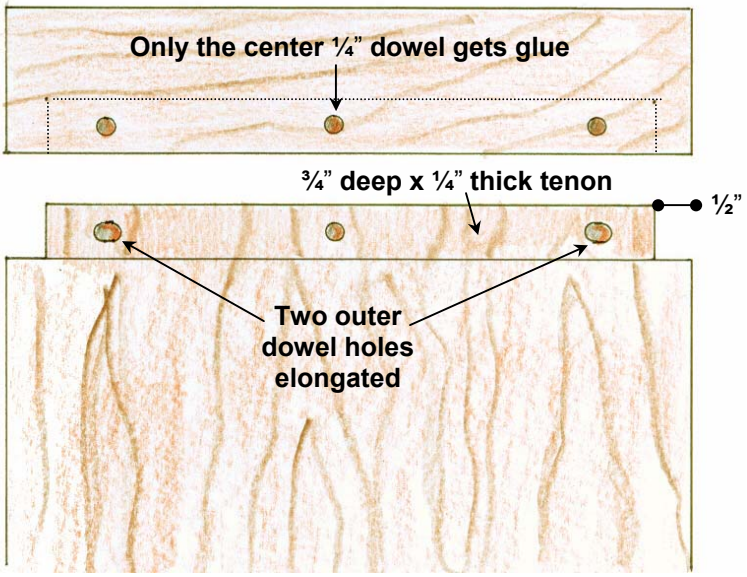
You can also freeze things hard by using dry ice. With dry ice, there are some precautions to take. Never directly touch the ice, as it can give you frost burns. Never plug up the drain hole, as dry ice releases carbon dioxide as it melts. (Our scout troop rolls up frozen food with dry ice in their sleeping bags.)

Countertop Ice Hatch





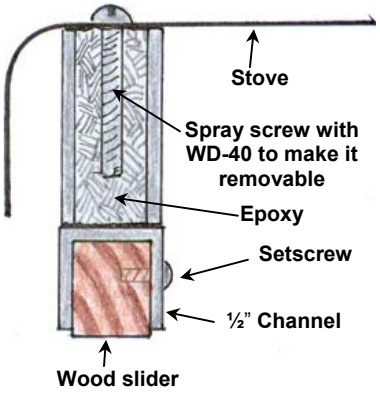
The front door on the icebox is constructed the same way as the countertop ice hatch, except that is not trimmed out with brass angle.



Breadboard Door Detail

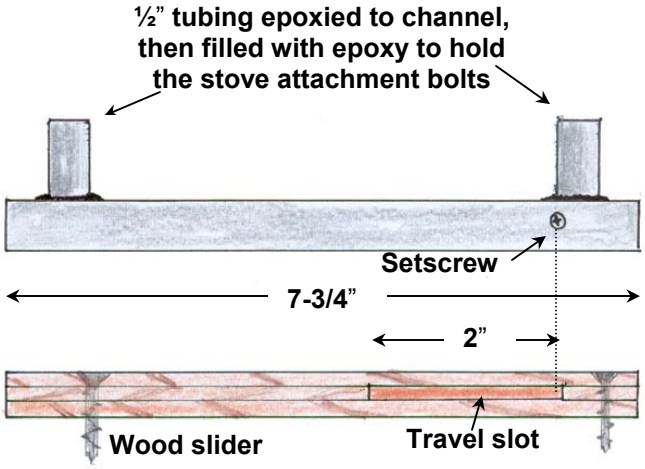
The solid wood breadboard door has two end pieces running cross grain to prevent the door from warping. However, if glued in place, these end pieces would also prevent the natural expansion and contraction, which would invariably result in a cracked door.

To accommodate this, the door is mortised into the end caps, and held in place with dowels. The two outer dowel holes are elongated crosswise to allow sideways movement of the door, but still keep it secured in the mortise. Only the center dowel is completely glued in place. This procedure is unnecessary if you use a plywood door.



Stove Slider

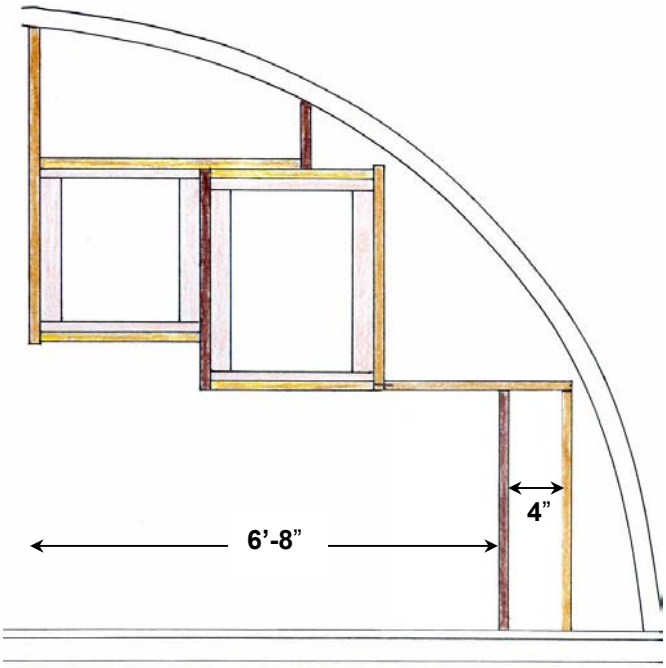
The stove is mounted to ½" channel tracks that slide back and forth on wood sliders. A setscrew rides in a slot in the side of the slider that limits the travel, plus keeps the stove secured to the countertop.



Assembling the Slider

To make the travel slot on the side of the wood slider, saw a kerf all the way along the side of the slider, then fill in the unused portions with a wood strip, leaving the slot. Wax the wood runner with several coats of wax to make the channel slide easier.

Screw the wood slider to the countertop, and then attach the channel assembly. Spray WD-40 on the stove attachment bolts. Fill the tubes with epoxy, set the stove in place on them, and then stick the bolts down the tube into the epoxy. After it sets up, you can unscrew the bolts to remove the stove, allowing you to hook up the gas line.

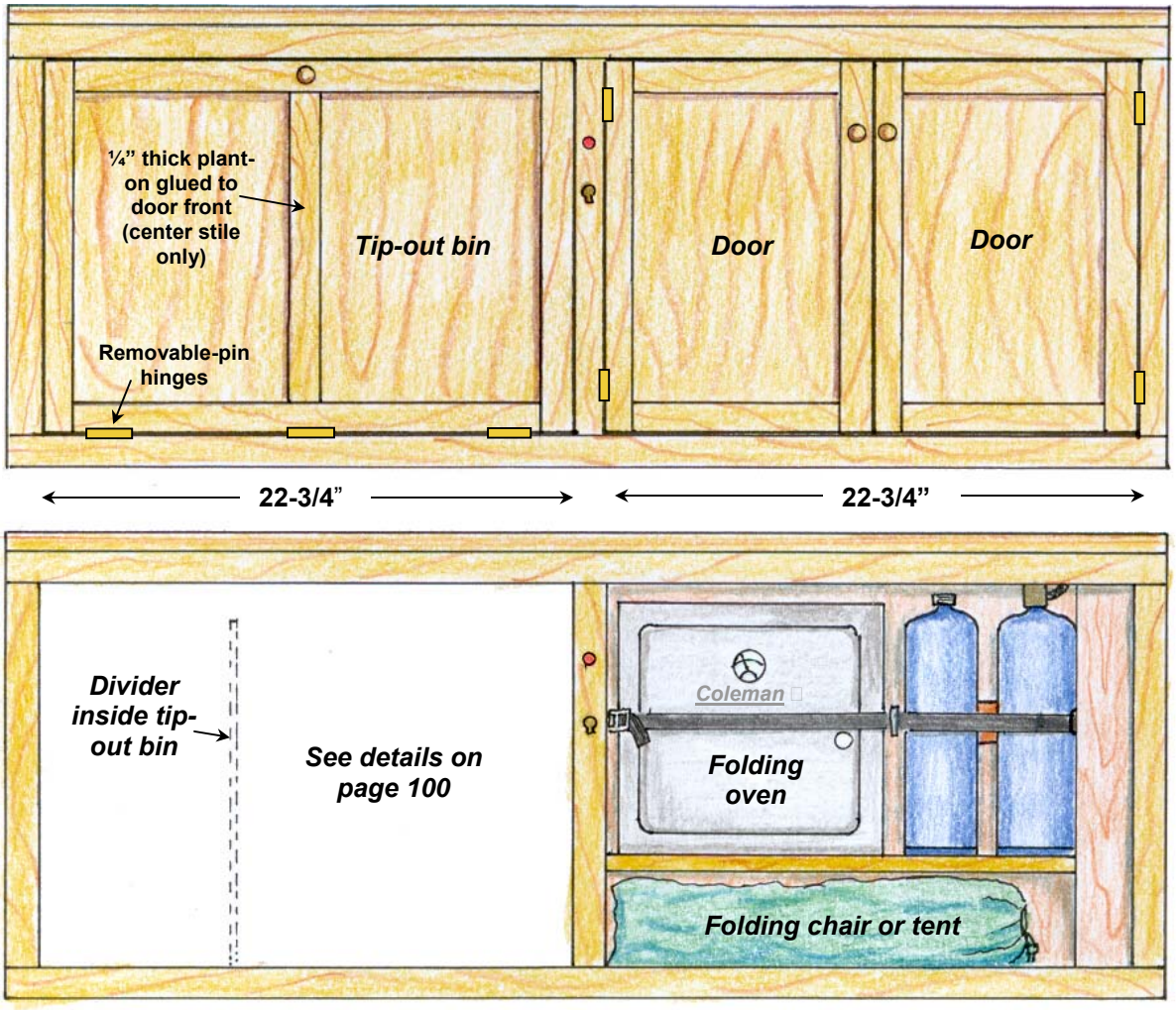


Extending the Cabin Length

As designed, the 8’ Cubby has a cabin length of 6’. In order to accommodate our long-legged friends, I am suggesting the following alterations. This will extend the cabin up to 6’8”, enough for most of the tall folk.

Obviously, the icebox has to go somewhere else. I suggest mounting one of those new Coleman stainless steel coolers where the battery usually mounts (see p. 100). You can easily run the trailer off the car’s battery, which is what teardrops did for years. The battery bracket can be enlarged to fit the cooler base, and the same strap arrangement holds it in place.

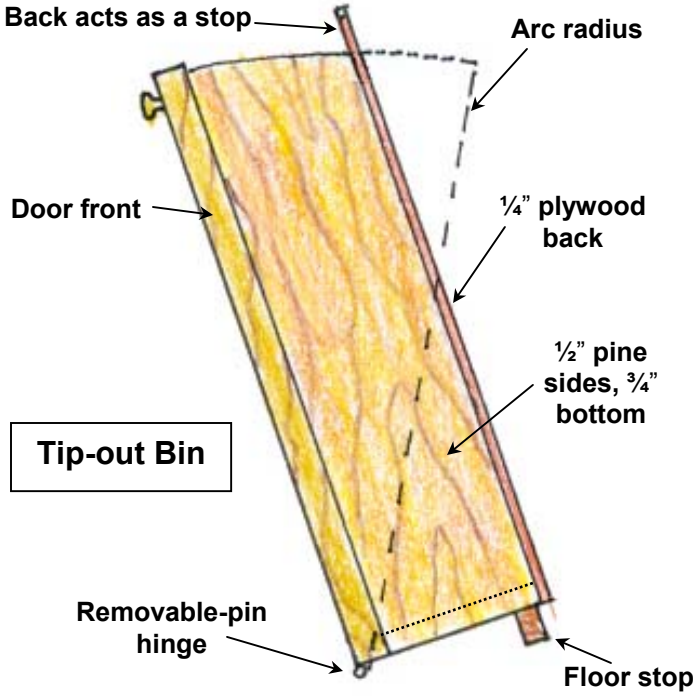
I have designed a lower galley cabinet only 4” deep. If you don’t need quite that much legroom, you can make it larger, such as 8” deep.



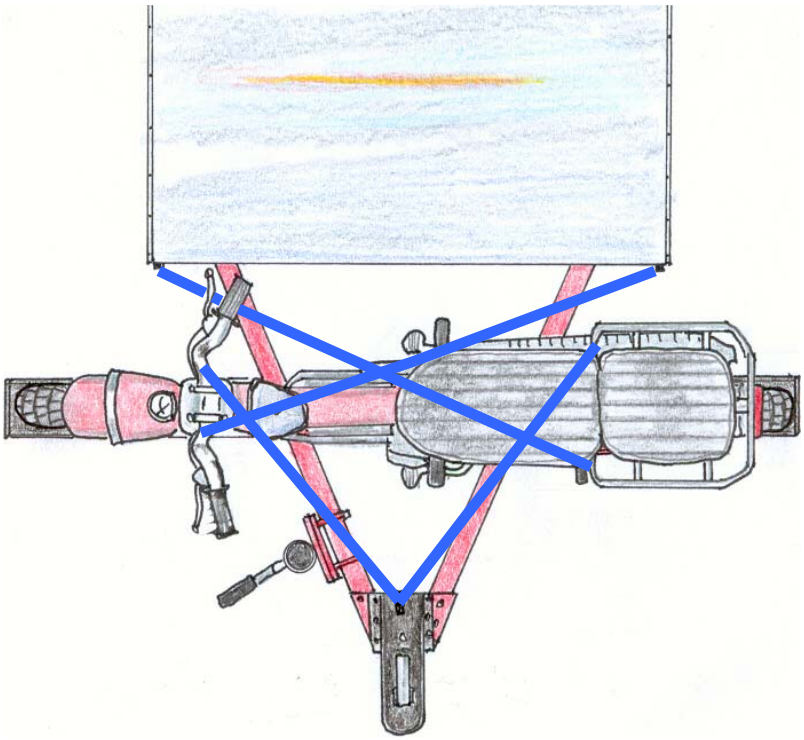
The 4” deep cabinet still affords some storage area. You can keep the propane canisters inside if you use the tall, skinny ones (plumbing section at Home Depot). The tip-out bin can hold canned goods, skillets, plates, paper towels, and other flat items.

You could fabricate your own ice chest as outlined previously, or you could mount a commercial ice chest on the tongue (my choice).

Coleman makes a stainless steel exterior ice chest that would look great with a teardrop, and save you a whole heap of work.



The tip-out bin makes efficient use of narrow spaces; as you can load it like a drawer, then tip it back. Make the door like a regular cabinet door, then glue the sides and bottom to it, then screw the back on. Use removable-pin hinges to facilitate insertion.



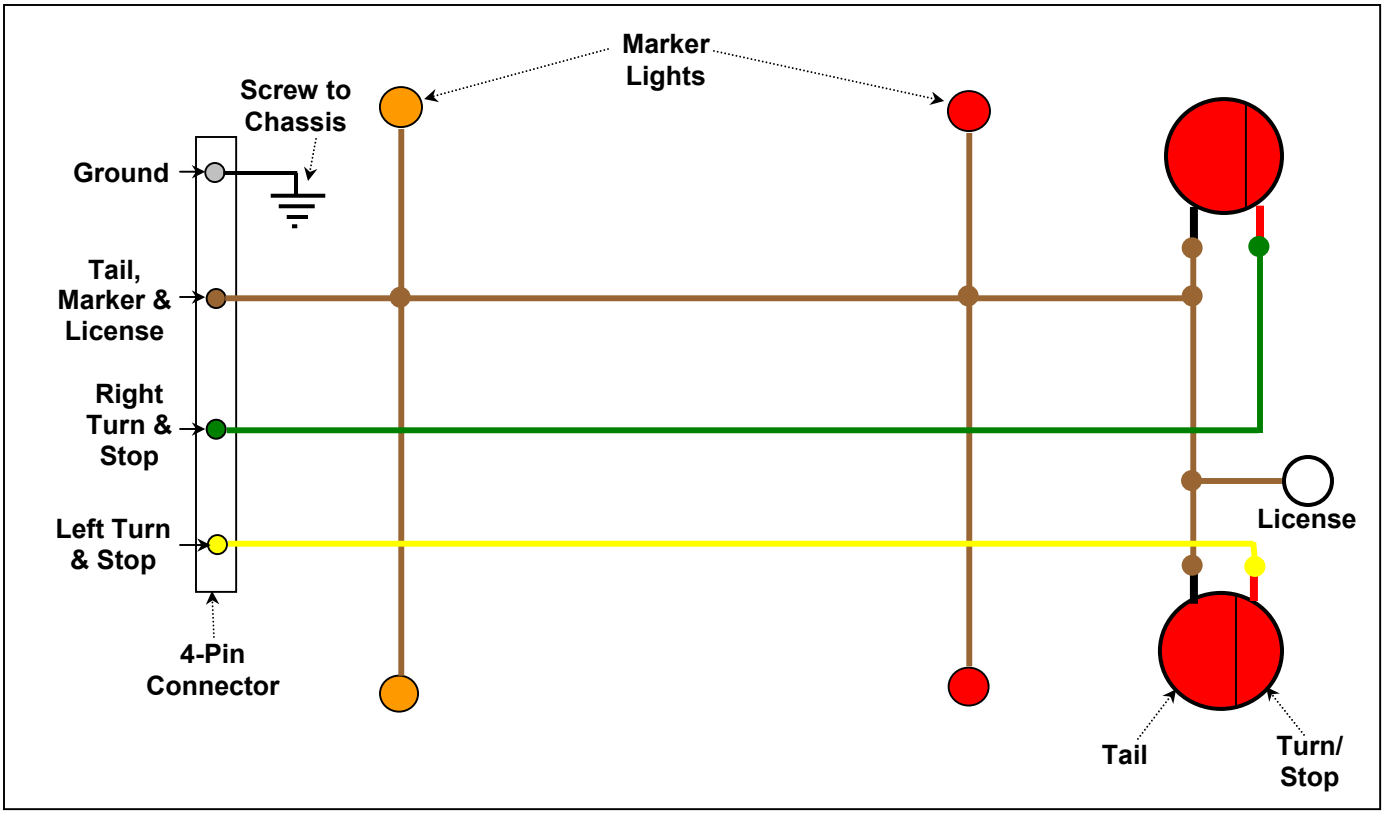
= Tiedown Strap Routing

Trail bike rack

A small motor scooter such as a Honda CT-90 could be carried on the tongue on illustrated. Mount a 6' piece of 4" channel on the tongue. Close up one end, and make a hinged ramp on the other end.

This adds about 200 lbs. to the tongue weight, so it is not for small cars. You can compensate some by moving the wheels forward, but this will affect the handling when the motorcycle is absent.

Another strategy is to mount a 2" receiver on the rear of the trailer, and put in one of those bike rack platforms that mount in the receiver. Again, consideration must be made for how it affects the handling.



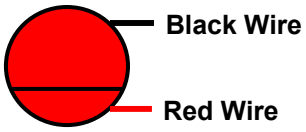
SINGLE TAILLIGHT WIRING DIAGRAM

When is this used?

Single taillights on each side are typically used on utility trailers. It uses a rectangular 4-pin connecter. If your car has a round 6-pin connecter, get a 6-pin/4-pin adaptor (available at any chain auto parts store). The 6-pin connector is handy if you want to run a wire back to the trailer battery to charge it while driving, or if you want to use the car's battery for interior trailer lights.

Legend

Only the positive wires are shown, as the negative wires are grounded to the chassis, either through a white wire, or the metal bracket on the light fixture.

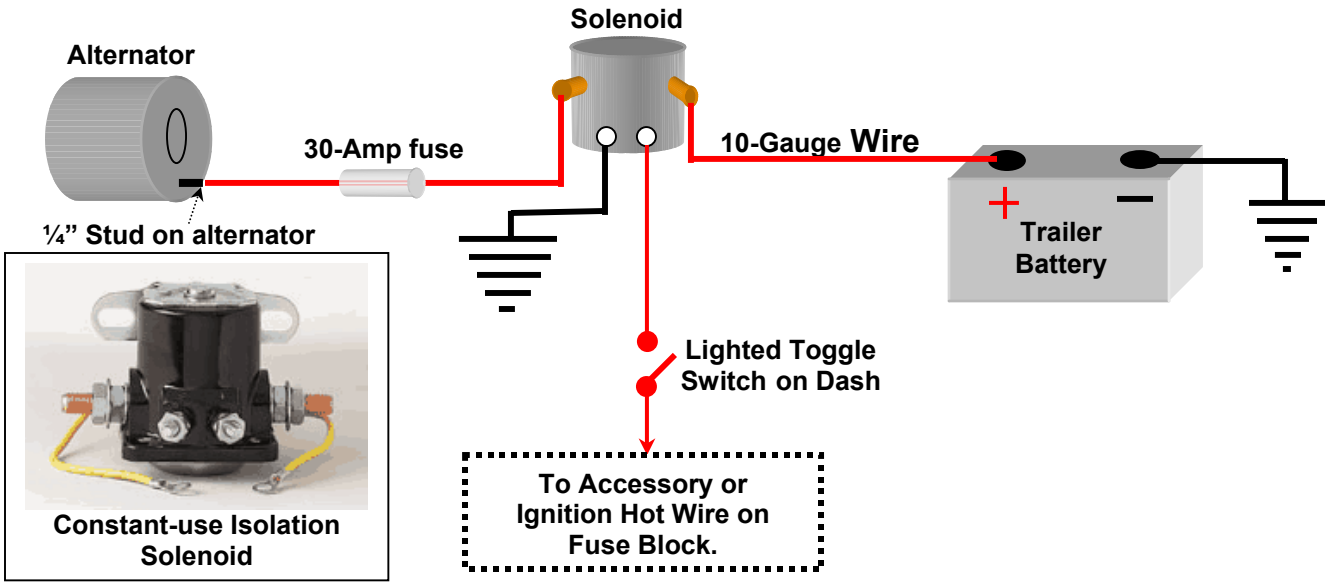


Turn/Stop/Taillights **This fixture will either have two bulbs, or one bulb with two filaments. The red wire goes to the Stop/Turn portion, and the black wire goes to the Taillight. The fixture case usually has a clear portion on the bottom for illuminating the license plate.**

Marker Lights **Typically used on the four corners of the trailer. They are usually orange on the front of the trailer, and red at the rear of the trailer. Wire them to the taillight circuit.**

License Plate Light **If you mount the license plate in the middle of the hatch instead of under one of the taillights, you must add a license plate light above it. Wire it to the taillight circuit.**

CHARGING THE TRAILER BATTERY WHILE DRIVING

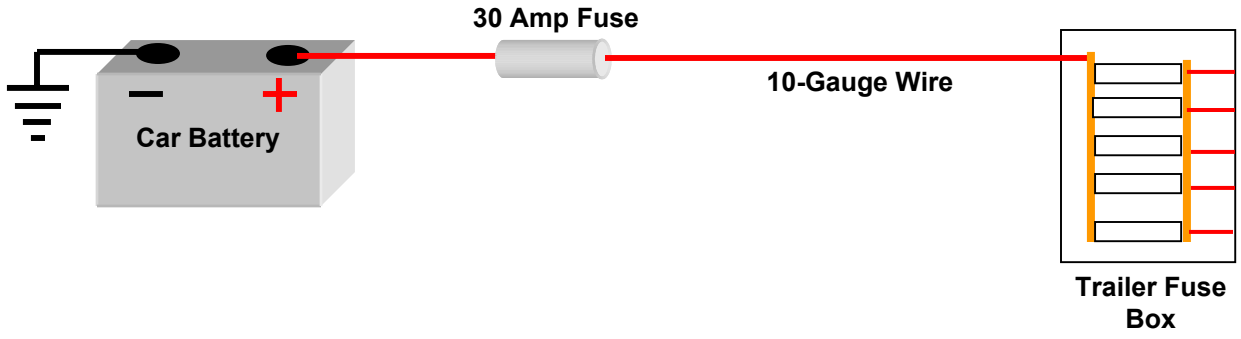


If you simply hooked up the trailer battery to the car battery, the trailer lighting would discharge the car battery equally with the trailer battery, potentially stranding you.

This system allows you to charge the trailer battery with the car's alternator while driving, and automatically disconnects it when you shut the key off. This allows you to fully discharge the trailer battery, while maintaining a full charge on your starting battery.

The switch on the dash also lets you shut off the circuit manually.

USING THE CAR BATTERY FOR THE TRAILER ELECTRICAL SYSTEM



If your electrical needs are modest, such as lighting only for a weekend, you can probably get by using the car battery. They did it this way for years on the old teardrops, and it saves weight and expense by not having to have a second battery.

Zip-tie the 10-gauge wire to the car frame, and be sure to put a 30-Amp fuse near the battery. If the battery is difficult to connect to, you could instead connect to the ¼" stud on the alternator as shown on the top illustration.

Teardrop Trailer Plans

A Step-by-Step Guide For the Home Craftsman

8' CUBBY

The 8' Cubby is built upon a heavy-duty utility trailer chassis from Harbor Freight Tools. This bolt-together chassis is rated for 2000 pounds and is easily modified for the Cubby with simple tools, and absolutely no welding is required.

The rest of the trailer is appointed in the way you've come to expect from Kuffel Creek. The 6' long sleeping cabin is complete with beautiful cabinets, interior lighting, two doors with windows, and a roof vent fan. The galley contains a custom, homemade icebox (directions included), slide-out propane stove, 7-gallon water tank with electric spigot, and generous, beautiful cabinets that will put the ones in your kitchen to shame. All this in a 4'x8' trailer that weighs around 900 pounds, with a 180 pound tongue weight.

With 100 pages and over 200 full-color photos, drawings and illustrations, our step-by-step instructions will guide you through every step. Included are *Uncle Kevin's Guide to Hand-Cutting Dovetails*, making *Foolproof Cabinet Doors,* and *Installing Flooring Perfectly On the First Try*; plus, the return of *Squirrelly the Wonder Cat*.

No Welding Required!

We heard you! There are a lot of talented craftsmen out there who are excellent woodworkers, but cannot weld and are having trouble getting someone to make the trailer chassis for them. Have we got a trailer for you!

Kuffel Creek Press

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