

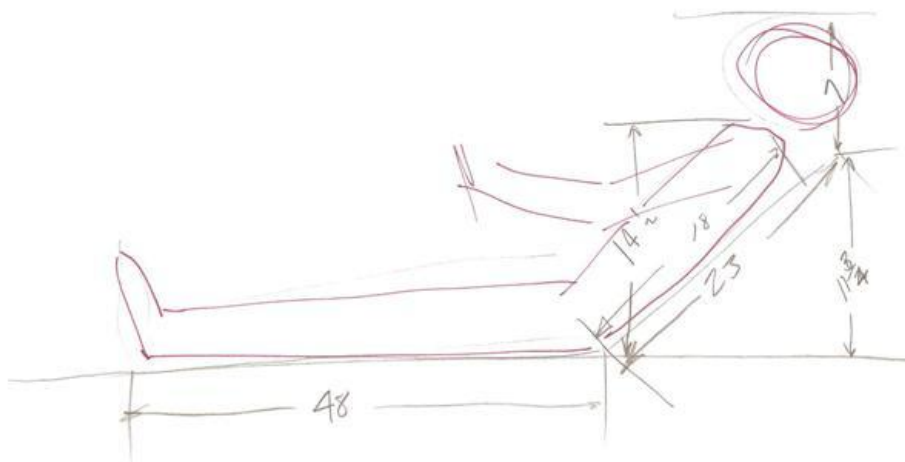
When we designed the car above, I put a student on a table with his legs stretched out straight and a board under his back. I propped the board up with books until he could easily see over his toes. Then I started taking measurements. I did a similar process with the orange car, but I propped up the "driver's" knees with a bar to simulate the front axle under his knees and then propped up his back until he could easily see over them. In both cases I did a quick diagram with measurements. Then it was time to start building... 😊

The next step is to acquire something to build with. Some of the well-healed teams in the Northeast use some pretty exotic materials in their builds like carbon fiber and Kevlar, but I'm on a budget here so we'll stay a bit more conventional. I made a trip to the local Lowe's and picked up some EMT conduit. I got four 10-foot pieces of 1/2 inch and two pieces of 3/4 inch. I also grabbed a roll of aluminum "kick panel" from the area where they have siding and porch screen stuff. The aluminum is .024" thick, 16 inches wide and 16 feet long. All together it was \$45. 🇺🇸

I did some poking around in my old files and came up with this diagram I sketched back when we built the car above. It obviously is not to scale and the human form is not reclined as much as the dimensions indicate, but it gave me some measurements to work from. The student I used as my "model" was 6'3" tall. Once we had his back supported at the desired angle, we started taking measurements. I measured from the bottom of his shoes to approximately where his tailbone would contact the table. I measured the height of the plywood at the top of his shoulders so I could make the seat back. I measured to the front of his shoulder so I would know how high to make the sides. I measured to the top of his head so I would know how high to make the roll bar. Etc, etc.

I'm sure I must have made a preliminary sketch of the frame before I started building, but it apparently did not survive.

Attached Images



OK, the first step in construction is to make some preparation. As noted earlier, I already picked up the conduit for the frame. Next, we need a few tools; in addition to a welder and few other usual fabrication tools, we need a couple of conduit benders (1/2" and 3/4"), an ordinary framing square, a tape measure, and a tubing cutter. Also, not pictured, we'll need a chalk line, a combination square, and a half-sheet of plywood (scrap plywood is OK as long as it's flat).

I began by splitting a sheet of 1/2" plywood down the center (24" x 96") and laying it across two tables. This would become my frame jig.

Next, I struck a chalk line down the center. Using the chalk line as the center line of the vehicle, I used the tape measure and framing square to lay out some key points. Then I used a straight-edge and pencil to "connect the dots" and end up with a rough outline of the frame. 🤖

I cut some small pieces of scrap wood to make "fixtures" or "stop-blocks" and screwed these to the plywood in some key locations. More precisely, I put the "outside" blocks right against the pencil lines and then used a piece of 1/2" conduit to locate the "inside blocks". Finally, I was able to start fitting and bending some conduit. 🤖

Attached Images





OK, notice in the pic above right that I bent the front of the conduit so that the pieces will come together at the front. They will be positioned so that they come together and also turn slightly upward.

I determined that to accommodate the shoulders of an average person, the width of the car needs to be 21 inches at the shoulders. On the original car, we tapered from the rear cross member forward. However, at the area of the driver's elbows the width has shrunk down to a little over 17 inches. That's fine for a driver that is of slender build, but from driving that car myself, I have determined that comfort would be improved if I maintain the 21 inch width at least to the area of the driver's elbows before beginning the taper. With that in mind, that is how I laid out the outline and set the stop-blocks on the plywood jig.

With a very slight bend at the "elbow area", the conduit lays in the jig like it should. I used a piece of the 3/4" conduit and a couple of clamps to hold the pieces in place. This was not clamped tightly enough to damage the conduit, just tight enough to make sure they stayed flat on the jig while I did some welding. I then tack-welded the front of the conduits together and cut, fit, and tack-welded a crossmember where the back of the seat will be. At this point I also formed the main hoop of the roll cage from 3/4 inch conduit and tacked it in place. The crossmember and the bottom of the hoop converge at the same place. 😊

Bending the roll cage hoops is a challenge... I do it by bending the conduit a little, sliding it through the bender, bend a little more, repeat, repeat, until I get the shape I want. 🤖
Attached Images



