

Pioneer Tool Rack Hitch Mount

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This is how I built my hitch mount for a Pioneer Tool Rack. This is not intended to be an instructional document. Should you build a mount using these methods and materials, you do so at your own risk. By reading and using this document you agree take on any and all risks associated with the materials contained herein

The Pioneer Tool Rack is a surplus piece of kit, originally used to secure tools (an axe, a short dee-handle shovel, and a mattock) to the underside of a Humvee. As a surplus item, many people have used them to carry their tools in the trucks and SUVs; either just laying them in the bed, strapping them to the bed, or retrofitting some sort of mounting system.

As I have a cap on my truck bed, it's hard to get the rack in and out of the truck, while still keeping it out of the way. The solution I came up with is a hitch mount.

To keep costs low, I used a combination of purchased and scrap materials. You can view a list of the materials I recommend with rough costs (as of 2015), as well as a video on the construction, at my website at:

<http://www.selfsufficientpath.com/pioneertoolrack>

The main elements of the tool rack are constructed out of two inch square, mild steel, tube stock. I used stock with a 1/8" thick wall to give me plenty of rigidity and to make the welding easier.

A warning on measurements: The dimensions of the tool rack should be pretty consistent. I don't believe these varied much, if at all, over time. However, the dimensions of the various elements will need to be adjusted based on the vehicle on which you're mounting your tool rack. Proceed in the order given, reference the images provided, and pay close attention to the constraints colored in orange, and you should be able to reach dimensions that work for your vehicle. It's important to work out the dimensions of the various components before you start cutting, to avoid wasted material.

First you'll need to prepare the tool rack itself. Not much really needs to be done in this regard. After removing any rust from the rack, and determining if you want to paint, there's really only two things that need to be done:

1. You'll see two rubber bumpers that are bolted to the front of the rack. Remove the nuts from these bolts and take the bumpers off. I tried to figure out a way to repurpose these bumpers on the rack, but they're not really needed anywhere. So they ended up in my junk drawer.
2. Next, remove the bolts that secure the latches to the rack, and remove the rack. You can re-use these bolts to fasten the latches onto the front of the rack, with the latches facing down. These latches will be used to secure the rack to the mount by clipping into the latch bar.

Starting with the receiver tongue, cut a piece of 2" tube stock on a 45° angle such that the longer side is approximately 11". The dimension is not critical so long as **the distance from the hitch pin bore and the upright's eventual position is beyond the bumper, and allows you to pivot the frame (and the rack) downward**. Cut another piece of 2" stock approximately 13" long. Again, the length here is not critical, so long as **the height of the pivot bolt bore and the pivot**

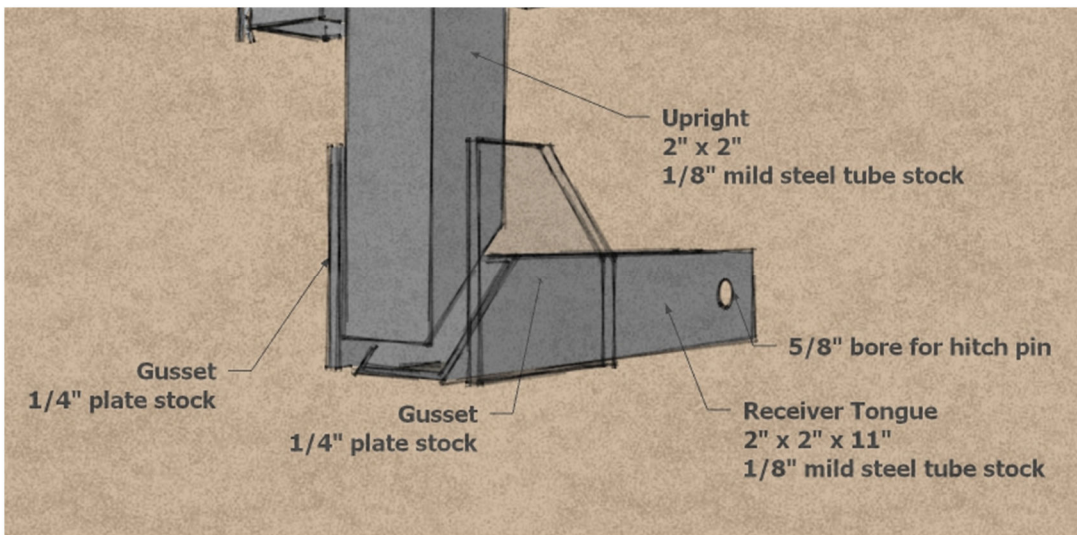


Figure 1: Bottom section

point allows the rack to pivot without interfering with the tailgate. Go ahead and bore the hitch pin bore, centered across the width of the short piece, and positioned such that the edge of the bore is no less than 1" from the end of the leg. Some hitch pins, mine included, are slightly over 5/8" (thanks manufacturers), meaning you'll probably

have to use a Uni-bit to drill the hole. Go slow, be careful, use a slow drill speed, and use plenty of cutting fluid or oil to lubricate / cool the cut.

The 45° angled cuts should then be welded together to form a 90° "L". Clamp the joint firmly, and tack weld them to hold them temporarily. Once tacked in place, run a full bead across the two short sides (think of them as the top and bottom edges. You can't weld the long sides, as they will interfere with the placement of the gussets.

Starting with a 4" x 4" square of 1/4" thick mild steel, cut off a triangle from one tip with the two short legs of 2". You can do this with a hacksaw, but a 4" angle grinder makes short work of it. Once the gussets are cut you can weld them in place, firmly connecting the receiver tongue to the upright. Note that if you weld the gussets in now, you will need to use parallels to drill the pivot pin and hitch pin holes later. But, if you don't weld the gussets in now, your lower frame could fall apart during construction. Better safe than sorry.

Now it's time to cut the vertical frame members. These are the two longest pieces of 2" needed in the entire assembly. For my mount, they came out at 21". The length itself isn't critical, so long as it is sufficient to mount the handle mounts and the latch bar in the correct places, and still leave enough length to place the pivot hole and hitch pin hole. However, it is critical that they be cut to exactly the same length.

Cutting the horizontal frame member is fairly straightforward:

$$\text{Length} = \text{length of the rack handle} - 1/2" \text{ (to account for the handles mounts)} - 1/8" \text{ (to give us a little slack)}$$

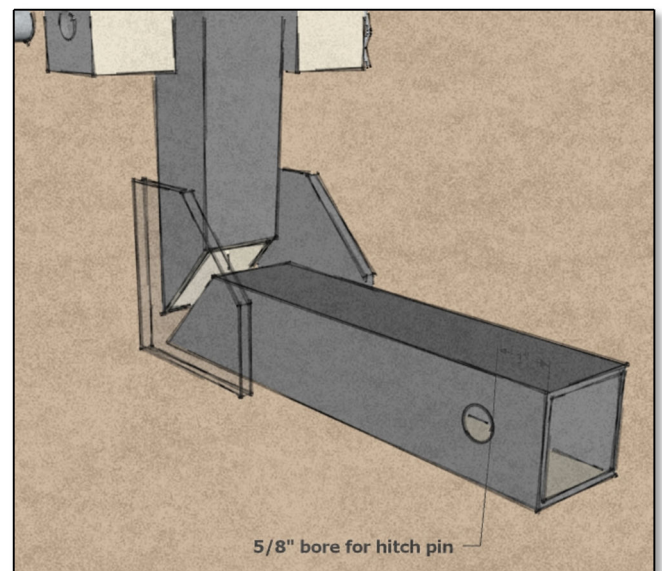


Figure 2: Hitch Pin bore position

Using the Upright as a spacer and using the Horizontal Frame Member as a square, welding the Vertical Frame Members to the Horizontal. This is critical. If you allow the welds to pull the verticals inward, it will cause the pivot joint to bind, or could prevent you from fitting the Upright between the Frame Members at all.

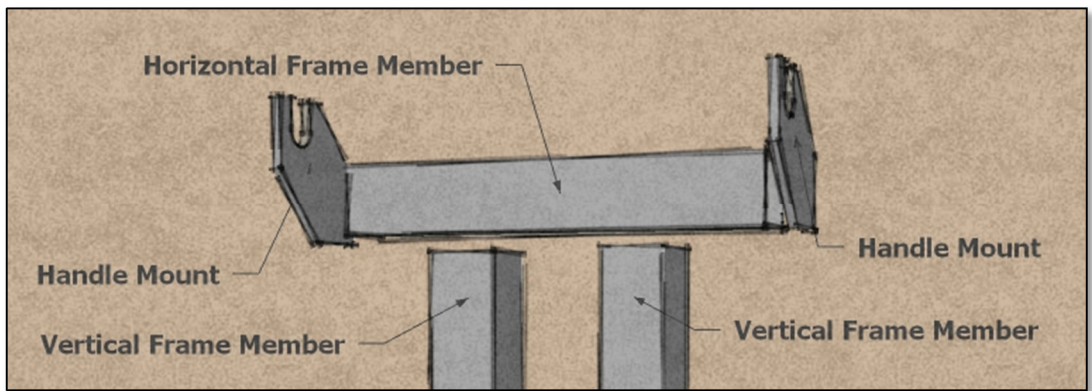


Figure 3: Top section

Cutting the Handle Mounts isn't especially exacting, but it does involve a lot of detail work if you want to make a clean job of it. Start with a 4" square piece of 1/4" mild steel plate. Begin by cutting two opposing corners off beginning 2" from the corner. The picture below will help you envision this. One of the remaining corners will form two sides of the square which will be welded to the horizontal frame member. But don't weld it yet. First we have to cut, grind, and file the rounded slots for the handle to fit down into. How you do this will depend on what tools you have, how neat you want the job to be, and how much patience you possess. I used an angle grinder and cut-off wheel to slot most of it out, and then finished up with a round file. This resulted in a nice job, but admittedly took a good deal of time.

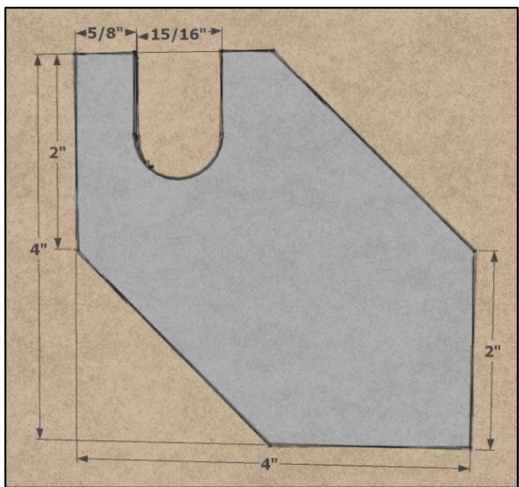


Figure 4: Handle Mount Detail

Once the handle mounts are shaped, go ahead and weld them onto the Horizontal Frame Member. Again, you need to take care in your welding. Any warping or skewing of the handle mounts will begin to reduce the 1/8" slack we've left. Too much of this, and the rack handle won't slip down into the handle mounts.

The easiest way to ensure that the hitch pin and pivot bolt holes line up is to clamp the mount together and drill the holes. The holes should be centered on the stock. The greater the distance between the holes the better to decrease the leverage on the hitch pin and the frame members. But, **be sure not to spread the holes so far that the frame interferes with the truck/SUV when folded down.**

The length of the latches are adjustable using the nylon nuts on the inside of the latch body. Adjust those now to a position in the middle of the adjustable range. Now place the rack into the handle mounts in the slots and mark where the end of the latches reach on the Vertical Frame Members. This will be the top position of the Latch Bar on the Vertical Frame Members. It doesn't have to be exact, due to the adjustability, but it does need to be close. If this measurement is off by too much, the latches won't latch and you won't be able to secure the rack to the mount. Once you have the position correct, mark where the actual latches fall on the latch bar. Next using either a small belt grinder, a bench grinder, or if absolutely necessary a file, grind across the corner from one edge of

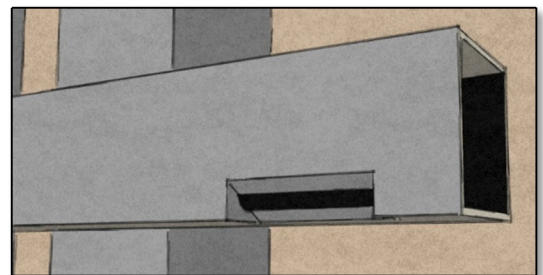
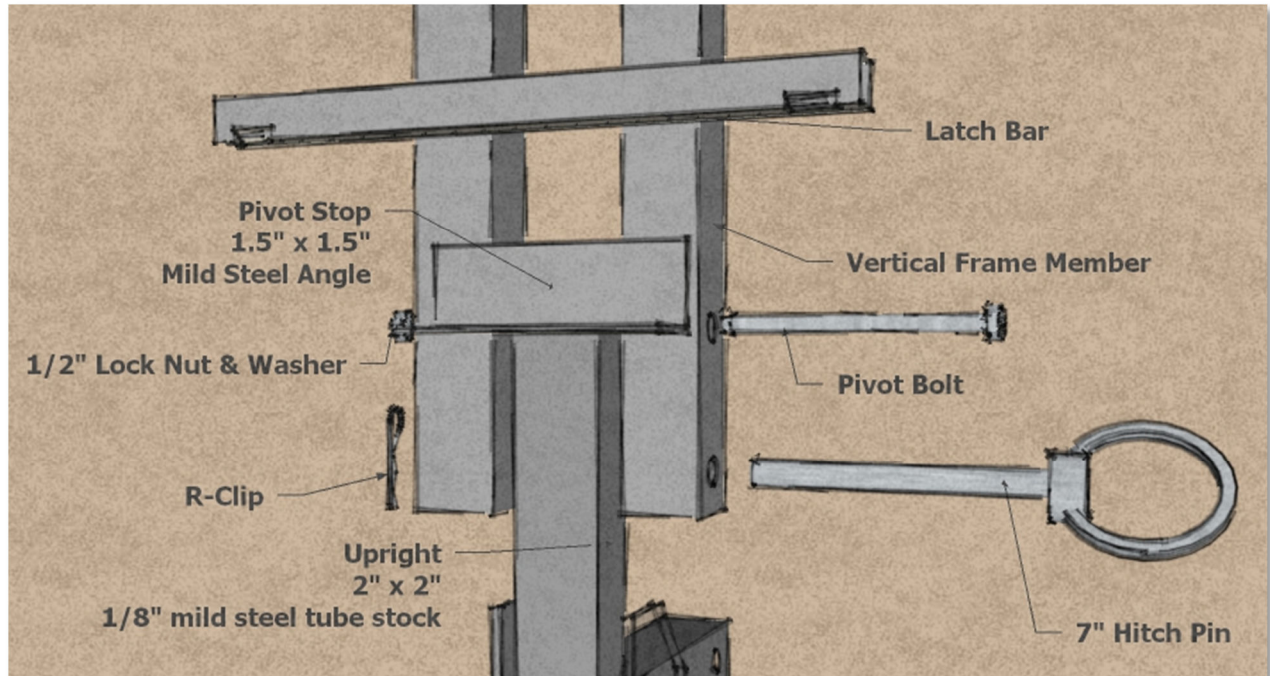


Figure 5: Latch Bar Grind Detail

the latch marks to the other. Continue grinding until you've gone completely through the corner and created a slot in the corner large enough for the latch to fit through. You can clean this up with a file to neaten up the job. Before welding the Latch Bar to the Vertical Frame Members, line everything up one last time to make sure everything lines up correctly. As the old saw goes, measure twice, cut once.

The last piece to assemble is the pivot stop. This is a piece of angle welded to the Vertical Frame Members. When the mount is pivoted down, the Pivot Stop swings down and comes to rest against the Upright, letting the rack and Vertical Frame Members stop at a 90 degree angle to the upright. You'll need to pivot the mount to the proper point, and mark where the Stop needs to be placed. This is not something you can measure. Trust me.



Description	Size	Cost ¹	Link
Heat Treated Hitch Pin	½" x 6 ¼"	\$10.32	http://amzn.to/1OU5u8g
Mild Steel Plate	4" x 12" x ¼"	\$14.90	http://amzn.to/21QmaEW
Hot Rolled Steel Square Tubing	2" x 2" x 36"	\$25.57	http://amzn.to/1OS2c7s
Plastic square caps (optional)	2" x 2"	\$4.06 / 6	http://amzn.to/1OS1NBN

¹ As of 12/09/15