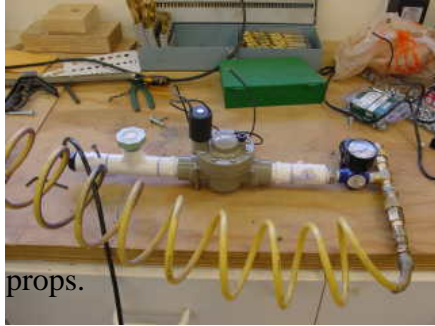


Technicians of Terror

<http://www.halloweenfear.com/ScissorProp.html>

These are pictures of our scissor prop.



This is the air valve we make to use with our air



This pictures the duel door closer cylinders hooked to the drawer closer.



This shows the closed scissor.

Obtained from
Omarshhauntedtrail.com

Building the Scissor Prop

Step 1: Cutting your aluminum flat bar.



Lay out your 1" X 1/4" X 8' bar of aluminum and with a tape measure mark at 16" centers. This should give you 6 equal bars of 16" each

Note: Even after cutting the bar into 6 pieces they may not be equal lengths. For this next step re-measure each bar and find the shortest one to use as your template. **It is always good practice to center punch your material where the drill bit will start. This will keep the drill bit from wandering.**

Step 2: Making the template.



Take one of the 16" bars and measure 8" from each end to find the center of the bar and make a mark. The reason you need to measure from both ends is that your bar may not be exactly 16" so if your 8" measurement does not meet exactly, you will find center between the two marks.



Now measure in from each end 3/8" and put a mark, then measure 1/2" in from the side of the bar on each of the three marks you have made to find center. You should now have three marks like this + where each hole will be drilled. Remember we are only doing one 16" bar, and remember to center punch.

Step 3: Drilling your holes and making your template bar.

After drilling the three holes in your bar you will now use this bar as your template for marking the holes on the other 5 bars. By doing this, it ensures that all holes are in the exact same locations on each bar.



Once all of the holes are drilled you will need to either file, grind or sand the back side of each bar to remove any extra aluminum that protrudes at the holes to make the bar smooth. At this same time also file, grind or sand the ends of each bar to get rid of all burrs while rounding off the corners of the bar. Rounding the ends of the bars is required to permit clearance at the brackets.



With the finished bar as a template, place it on each of the remaining bars and with a fine tip marker draw each of the holes for drilling. To make these bars as accurate as possible I like to drill the hole in one end of each bar, insert a long $\frac{1}{4}$ " bolt and through all 6 bars stacked on each other and tighten a nut on the end of the bolt. Drill the center and far end hole through the entire stack with your template bar on top. This ensures proper alignment of the holes in all the bars. This step may not be necessary for the prop to function properly but it does save some steps such as using the template to draw all 3 holes on all 5 bars.



Before we move on to step four, I want to take you back to the filing, grinding or sanding the bars. Depending on your accuracy in cutting the bars to the 16" lengths and using the shortest bar as your template, you might end up with a bar or two that are longer than the rest which could interfere with the working clearance at certain points of your prop mechanism. (See pictures below) Use your short template bar, line up the holes, mark where the bar should end and remove this excess. This will ensure proper clearances.



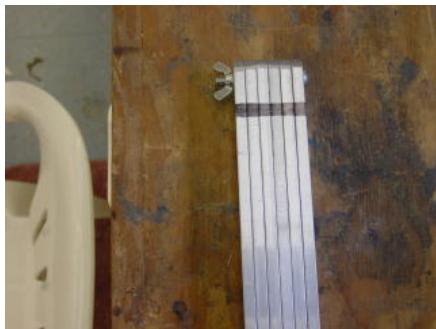
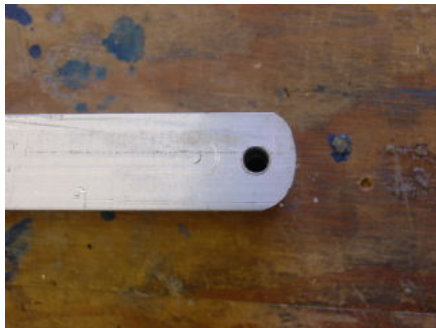
Step 4 Cutting and drilling your angle aluminum stock to use for brackets.



Picture 1-A



Picture 1-B



At left you see a finished bar with a rounded end. After drilling all the bars make sure that they remain in the same direction as when drilled. This step is important when putting them together so that all holes will line up correctly. I mark one end and use a bolt and nut to temporarily keep them in order. See picture below.

Just a short note here: The sliders come in many lengths. We chose the 16" sliders because at our Home Depot they were cheaper than the 14" for some unknown reason. If you don't find this true in your store you can use a 14" slide. However you will find that the hole pattern is different on the two

The reason that I mentioned that here is of course the length that you will be cutting your angle aluminum stock will depend on what length you got. If it is 14" then cut your stock 14" long and if it's 16" then cut at 16". This prop requires 3 pieces cut 2" long.

Note: Each of the three 2" pieces will have holes drilled in them, but none of the holes in any of the pieces are drilled the same. On the last page you will find templates drawn for each of these. If you cut the templates out and wrap them onto the outside of each bracket it will provide an accurate location for each hole to be drilled. There is a template for both sizes.



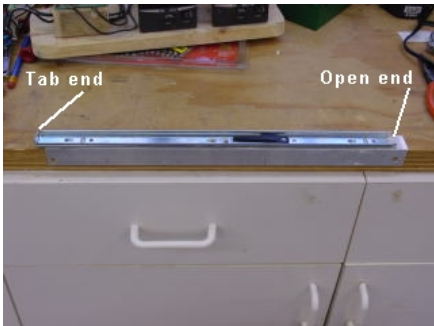
Take your drawer slider, push the plastic lock to the side and pull this slide out to separate the top slide from the rest. See picture here.

Step 5 Marking and drilling the brackets.



Now take your aluminum angle bar, lay it over the edge of a countertop or table with the flange down (as shown in the picture here), place the slider on top of the bracket and mark the holes to be drilled.

Slider

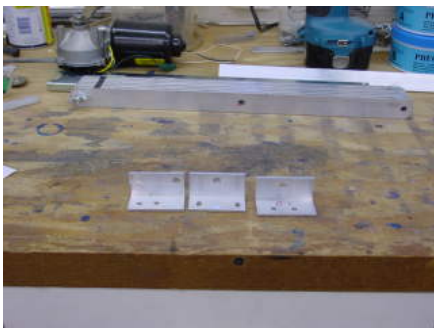


Bracket with slider on top for marking holes.

Very important before marking these holes ... Make sure that you have the tab end on your left and the open end on your right. There is a template to print and tape on for the other two holes needed in this bracket.



Now for the three 2" brackets. Cut out and tape the three templates onto the three brackets as shown in the picture below. Center punch and drill the three holes in each with the appropriate drill bit size for each hole. When you are done set these aside.





Now let's drill the last two holes. Place the long bracket bar flange down again over the edge of the counter .



Cut to the two remaining templates and tape them to the ends which will provide the position for the last two holes. Center punch and drill these holes.

You should now have all of the brackets and bars made, drilled and ready to assemble. But before we start putting the prop together we need to get the cylinders ready. If you are going to use door closers then this next step will show you what needs to be done to use them on your prop.

Step 6 Preparing the cylinders

Note:

We have always used the Stanley brand of door closers for no other reason than they are always available at our local By Mart store (under \$9.00) and they are what we started with years ago. I know that there has been a lot of talk about the use of door closers as air cylinders on the different Halloween related list's, but we have been using them for 9 years now with out ever having one fail. We have run as much as 140 lbs of air to them to lift a heavy prop. We have 10 prop's using them. The biggest advantage we find using these, is the spring return enables us to use a simple and much cheaper air valve (one way) to operate the prop. If you feel uncomfortable using these you can use any cylinder with a 6" stroke.



Stanley builds two different closers, one has a 5" stroke and the other has a 6" stroke. For this prop you will need the longer of the two.



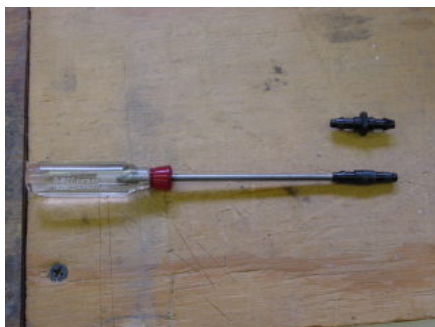
The first thing to do is remove the adjusting screw from the end of the closer using a Phillips screwdriver.



Now place the closer in a vice and with a hack saw first saw about 3/16 of an inch into the hole where you just removed the screw. We just want to remove the over hang and not into the threaded area.



Now tap the closer on the end you just cut to get rid of the fillings caused by the cutting. Repeat this procedure for your second closer. Now we are ready to prepare the plastic barb to screw into the closer.



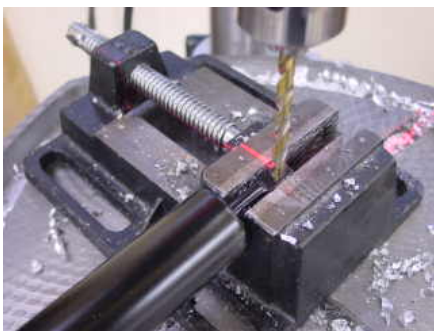
Take two of your 1/4" barbs and either sand or file the center collar down to the same diameter as the main barb. In the pictures below you will see how we do this with a sander. We use a very small screwdriver inserted into one end of the barb and turning the barb while sanding.



Once the center collar is close to flush you will need to sand or file the barb ridge off of one end of the barb until it also is close to being flush to the main trunk of the barb.



After the sanding/filing is complete put the barb in a vice being careful not to tighten the vice too tight as to crack the barb, use a 5mm.8 metric die to thread the sanded end of the barb down to the larger center portion of the barb.



We need to drill out the holes on both ends of the closer. The end with the barb we need to drill with a 3/16" bit (the outer hole only) and the rod end we need a 1/4" bit. See pictures below.





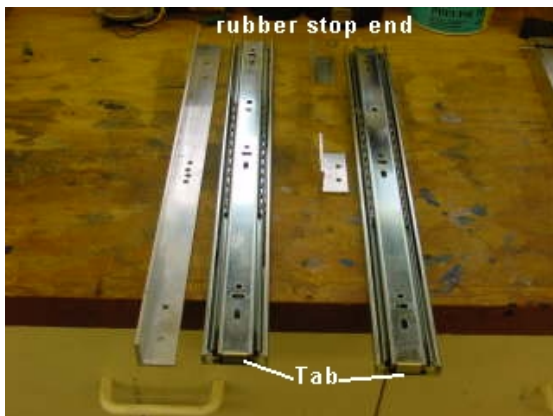
You are now ready to screw this barb into the closer. I like to use the same small Philips screwdriver that I used for the sanding to start the barb into the closer and take it in until the screwdriver starts slipping inside the barb. From this point I use a small pair of pliers to tighten it.



Closer with barb installed.

We are now ready to assemble the scissor prop.

Lets talk a little about orientation while assembling this prop. To make sure that we get the brackets on the correct side of the sliders we need to work with the sliders facing in one direction. The picture below will show them in the correct orientation for the assembly instructions.



Step 7 Assembly

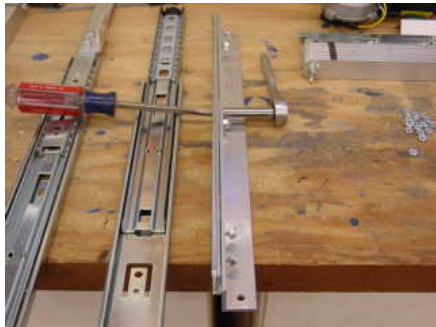
Scissor prop assembly Instructions



Step 1 Remove the top piece of one of the sliders as shown in the 4 pictures below.



Step 2 Then using 6 #8 X 1/2" bolts and nylon locking nuts mount the long bracket with the flange on your left to the slider



Step 3 Tighten all 6.



Step 4 Now you can re-insert the top piece back into the bottom half of the slider.



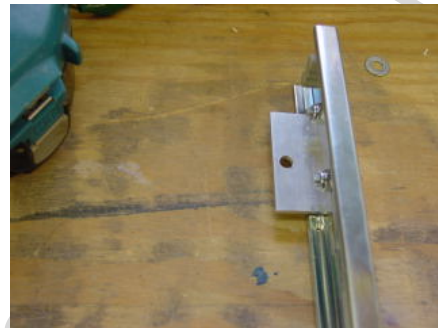
You now have three 2" brackets left, two of which get mounted on your second slider. The one that does not go on this slider is the one with the offset 1/4" hole identified here.

This bracket will be used later.



There is no need to remove the top piece of this slider to mount the brackets, just slide it open as pictured here.

Again using the # 8 X 1/2" bolts and nylon locking nuts, mount these brackets and tighten. Now you can set the two sliders aside and we will move on to the scissor bar assembly.



1) Find the six metal bars that are bolted together. Note they are marked with a black mark on the side.

A) Remove the bolt and set it aside as you will need this later.

Note: Again keep the bars laying the same direction IE in this picture on the next page you will see the black mark on the right side of each bar and on the same ends.

B) Take two of the bars and insert a short 3/4 in. bolt through the center hole of the bars placing a nylon washer between the two bars and bolt together with a lock-nut. Don't over tighten or they won't move freely. Repeat this process until you have three X's.



C) Lay out the three X's on the table so that the tops and bottoms of the bars overlap appropriately and the holes line up. Bolt each X to it's" neighbor" with short 3/4 in bolts, nylon washers in between the bars and lock-nuts . Once again making sure the black marks are all facing the same direction and on the same end. Check the bolt and nut tension by expanding and contracting the mechanism a few times. It should move freely but not have any "Slop" at the joints. Too tight and the mechanism won't open easily , too loose and the joints will wear out quickly or rub noisily.

1) The next step is to mount the scissor to the brackets. And since I don't have enough room on this page for pictures and text, we will move on to the next.



2) Find the portion of the drawer slide with the long 90 degree bracket mounted to it. Separate it from its base by sliding it to it's maximum extension and you will see a small black plastic lever . Move this lever and continue to extend the slide until it separates. Note on the bracket the end with the hole drilled closest to the edge . This is the hole you will bolt the scissor mechanism using the short 1/4" X 3/4" in bolt and lock-nut. Mount the scissor mechanism to the "inside" of the bracket Make sure to put a nylon washer in between the bracket and scissor. Don't over tighten.

3) Find the short 2" bracket (the one left over) and mount it to the scissor mechanism on the same end as the long bracket, opposite side. Once again using a short 1/4" X 3/4" bolt, lock-nut and a nylon washer between the bracket and scissor.



4) Find the drawer slide with two small brackets. Mount the scissor mechanism (the only two holes left in it) to these two brackets. **Now this is where gets a little tricky** and I am again out of room for pictures so let's go to the next page.



You need to look close at the picture's below. **First** notice that the bottom of the slider in the picture on the right coincides with the top of the other slider and in the picture on the left shows the top of the slider you are now installing.



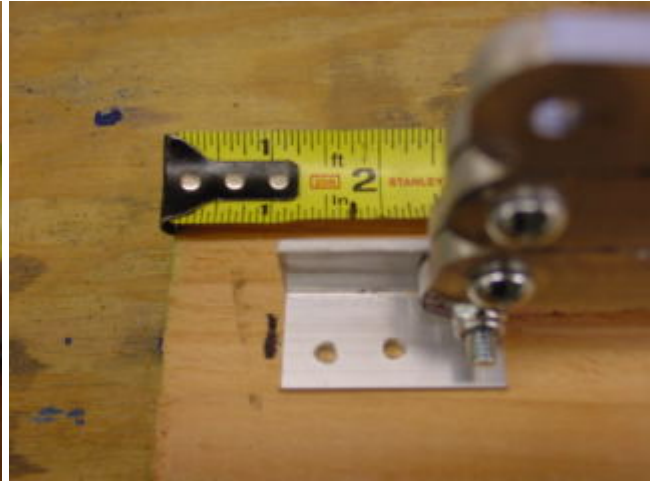
Next if you look close at the bars being mounted to the brackets, you will see that one of the bars is on top of the bracket and one is under the bracket. This is to keep the prop in alignment. So following the pictures use short $\frac{1}{4}$ " X $\frac{3}{4}$ " bolts with lock-nuts and nylon washers in between the scissor and brackets. Don't over tighten.

Hey go ahead and take a break if you want but hurry back there is not that much left to do It's just about mounting your prop to what ever you choose to mount it to. I am going to be mounting it to a 2" X 4" that is 4' long so that is what these directions will show. You can use what ever you want from plywood to what ever works for you. Keep in mind though that it needs to be at least four feet long to fit. If you haven't already done so put your lower slider back together and close it all the way.

5) Lay out the scissor mechanism with the small bracket at the top of the 2X4 approx 1 inch from the top. At the bottom find the center of the 2 X 4 ($1 \frac{3}{4}$ ") and place a mark.



Bottom

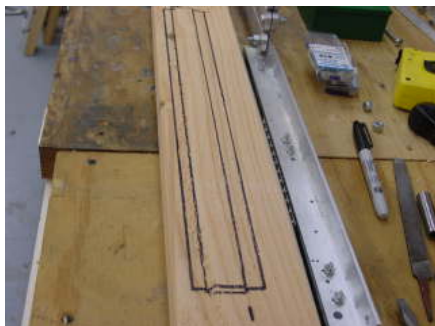


Top

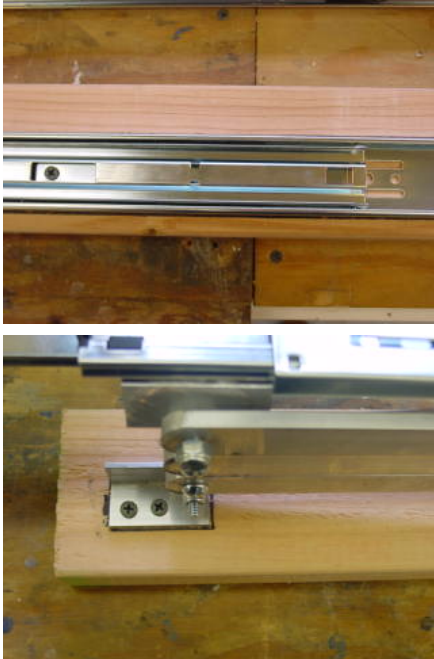
This mark will show you where the bracket should be aligned too.



Now measure the top and bottom of the slide to make sure it is straight in line of the 2X4 then draw a line all the way around this slide.



The lines drawn should look somewhat like the picture on the left. Now again separate the bottom slide and mount it to the 2X4 inside the lines that you drew using at least three good quality 1" wood screws. Next mount the top 2" bracket also using 1" wood screws.



We are now down to the last step ... Mounting the two door closer cylinders and hooking up the air lines.

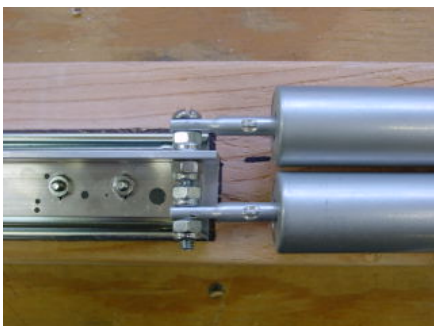
Installing the cylinders



8) Now to hang the cylinders. Remember the long bolt from 1 A. Insert it through the rod of one of the cylinders and put a 2 lock-nuts on it. Tightening it all the way down.

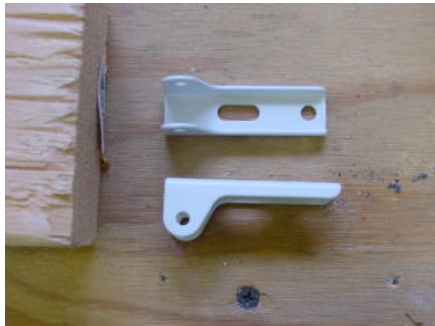


9) Put this same bolt through the hole in the long bracket, opposite the scissor and put another lock-nut on it , again tightening it all the way down.

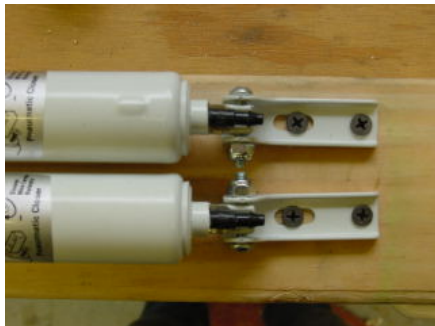


10) Put the rod of the second cylinder on the same bolt and lock-nut it down tightly.

Before you can mount the bottom of these cylinders we must drill the holes with a 3/16" drill bit to allow us to use # 8 bolts.



11) Rotate the cylinders so that the air inlet fittings are up and bolt on the cylinder mounts using #8 X 1" bolts with nylon locking nuts.



12) Fasten the cylinder mounts to the 2X4 with 1" wood screws, making sure that the cylinders are in good alignment with the scissor mechanism, so that no binding occurs.

Now for the air line.

Note:

I have always used 1/4" drip tubing for our air props for two main reasons. It is easy to find locally, and it is very inexpensive compared to other 1/4" line. I have never had it fail and have used it for 8 years. If you have any trouble pushing it onto a barb you can heat the end a little and push it on. When it cools it tends to shrink a bit for a very tight fit. Ok on to the plumbing.



What ever kind of tubing you use, cut two 4" pieces and slip them onto the barbs at the end of your cylinders, then using a 1/4" barb "T", slip the other end of each tubing onto the end's of the barb. Now you are ready to install the last piece of tubing ... The length of this tubing will be determined by how far your prop will be from your manifold. I like to keep this as short as possible because the longer the distance the more air pressure you need to get the prop to move the speed that you want. Air

Friction? Anyway it is way cheaper to run wire (I use telephone wire striped into pairs) from the trigger to the manifold and have the manifold close to the prop.

Ok so it is built and all put together!

Regulate the air pressure to about 60 or 70 lbs. and PRAY!

Parts list and cost.

Sorry I haven't added the cost yet but ours cost \$65.00

Quantity	Amount/Size	Description	Cost
1	8 foot	1/4" X 1" Bar of Aluminum	
1	4 foot	1" X 1" Aluminum angle	
2	6" stroke	Door closer cylinders	
11	1" X 1/4"	Bolts	
11	1/4"	Nylon Washers	
15	1/4"	Nylon locking nuts	
1	1/4" X 2"	Bolt	
10	#8 X 1/2"	Bolts	
2	#8 X 1"	Bolts	

12	#8	Nylon locking nuts
1 set	14" or 16"	Drawer slides
<p>NOTE: The slides that we use were purchased at Home Depot. They are Liberty Brand D806 Series. On the Bar Code they read: 14" D80614C-UC-CU D7 16" D80616C-UC-CU D34 The Templates only work for these.</p>		
2	1/4"	Dig (brand) barbs for air line to cylinders
1	1/4"	Dig (brand) barb T To connect 2 cyls. to 1 line
10	#6 X1"	Wood screws
X feet	1/4"	Tubing
		Total Cost:

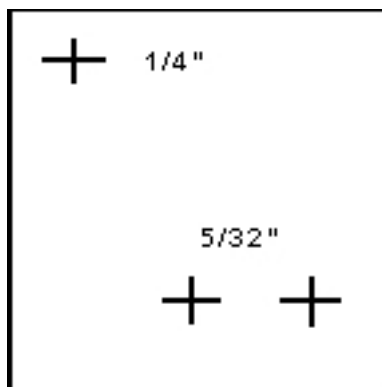
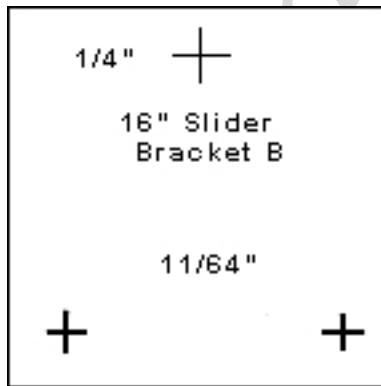
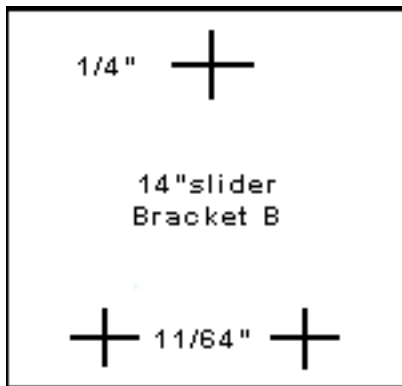
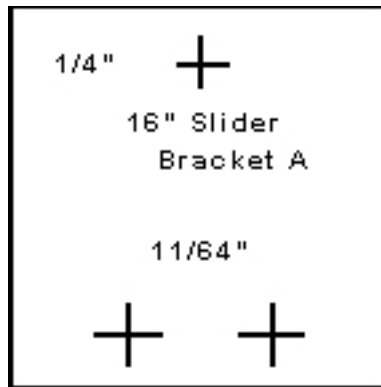
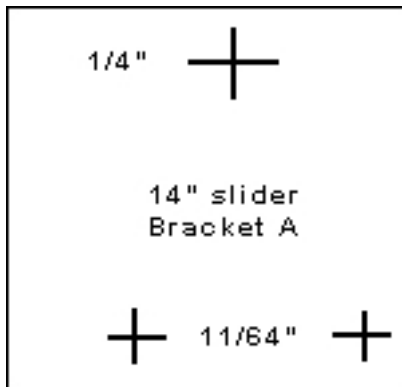
Obtained from Omarshaunteadtrail.com

The next two pages has the bracket templates.

Bracket Templates

For 2" brackets

The 14" slider Brackets --- The 16" slider Brackets



This Bracket is used for 14" and 16" slider

Cut these templates out and fold them over the outside of your 2" brackets

And tape them in place, then center punch at +. You can then drill the holes using the + as center.

Bracket Templates

For long angle bracket.

14" slider long angle bracket-----16" slider long angle bracket

