Building R2-D2's Legs from Plywood

By Victor Franco
Based on Michael Senna's design
January 5, 2007

Introduction

This is an overview of how I built my R2-D2's legs from plywood. This only describes the construction of the legs and ankles, and does not cover other areas of the legs, such as the booster covers, layered shoulders, etc.

Contact me (Victor Franco) if you have questions, and I will try to help. As of this writing (January 5, 2007) my Yahoo e-mail address is victorfranco2003 @ yahoo . com (no spaces, of course).

I also highly recommend getting a copy of Mike Senna's wooden leg-building tutorial on the R2LA III DVD, it is available as of this writing from Michael McMaster at:

http://n2citrus.com/artoo/dvd.html

(This document was originally written prior to the video tutorial.)

Finally, you may wish to browse my weblog for July & August 2005 for additional information:

http://vfranco.blogspot.com

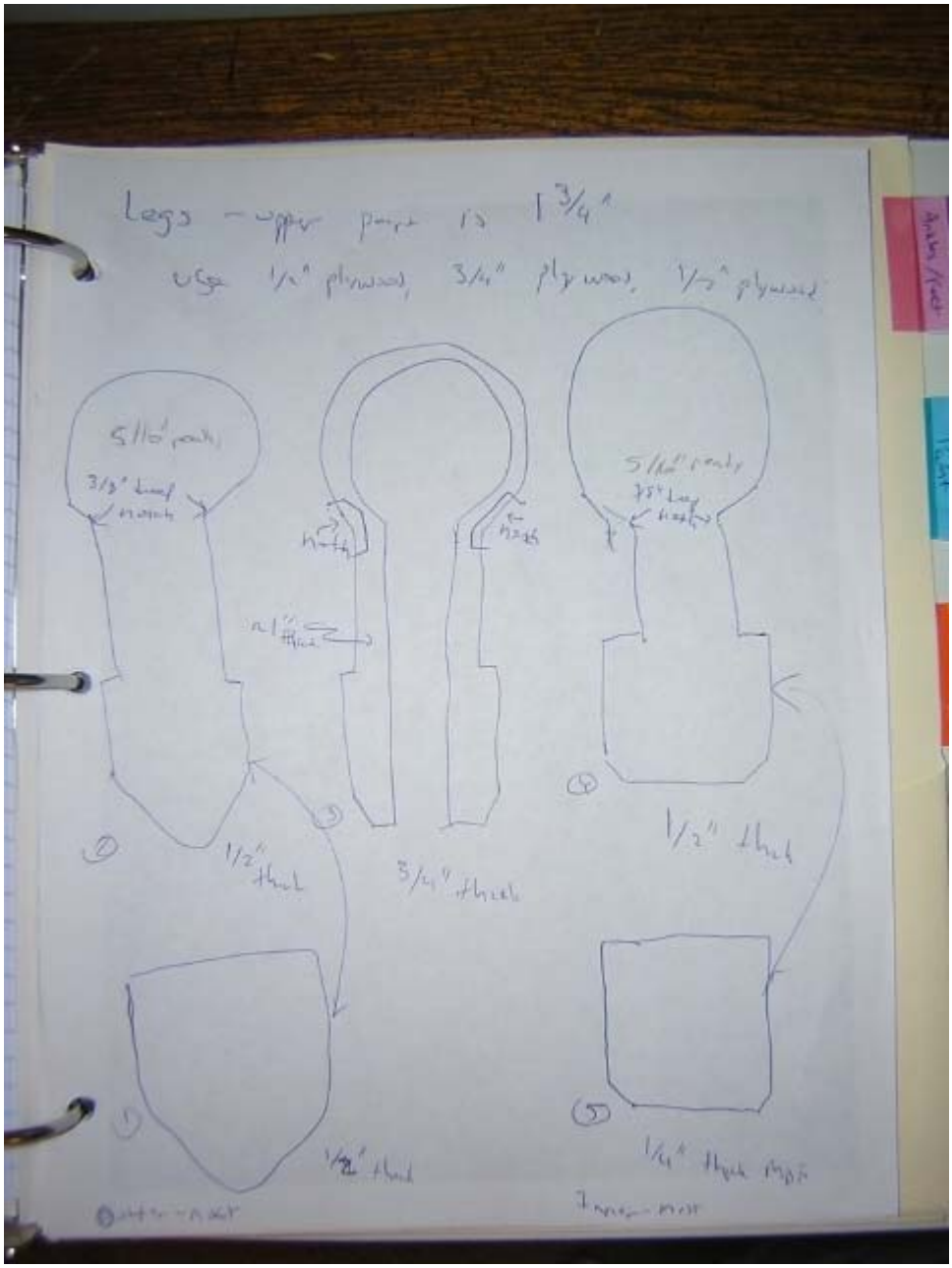
This overview more or less follows the chronological order of my leg build. I'll sometimes refer to the layer of the legs closest to R2's body the "inboard" layer or side, and the layer of the legs furthest from the body the "outboard" layer or side. Also, I don't cover the middle leg here, but believe me, if you can make the outer legs, you can make the middle leg easily. You'll want to refer to the leg blueprints in order to follow this tutorial. See the document "Leg - Leg & Ankle.pdf" from the Official Blueprints to follow along.

The legs in this tutorial are built and designed to fit a wooden frame. Other types of frames may also work, but they are not discussed here.

Overview & Getting Started

All wood used for the legs is birch plywood. Following Mike Senna's design, I have three layers of birch plywood running virtually the entire length of the leg and ankle. Unlike the blueprints, my legs and ankles are not two separate parts, they are one continuous piece.

One of the first things I did that helped me visualize how the legs were to come together was to draw a picture of each wooden layer of the legs. See **LegSketch.jpg**.



LegSketch.jpg

My drawing/writing is atrociously sloppy here, but it was enough for me to work from.

For this sketch, I drew the three layers of the leg that would go from shoulder to ankle, which took up most of the page, and then I belatedly added the outer-most layers of the ankle area toward the lower-left and lower-right of the page.

Looking at the sketch, the lower-left area represents the outboard layer of the ankle. This is made from 1/2" thick birch plywood.

Moving toward the upper-left, we see the only layer of the leg that runs the entire length of the leg, from the shoulder to the tip of the ankle. This layer is made from 1/2" thick birch plywood.

The upper-center of the drawing shows a "hollowed-out" layer of 3/4" thick birch plywood. This is hollowed-out for two reasons. First, it allows wires (and the antenna for the R/C) to run down to the feet, to power the motors that will be in the feet. Second, it reduces the weight of the leg. I've also noted where the "armpits" for the under-shoulder details need to be carved out. I'll come back to that a bit later.

Moving inboard now, the upper right of the drawing is made from 1/2" thick plywood. This is very similar to the upper-left part of the drawing, with the tip of the ankle cut off to conform to the blueprints.

Finally, at the lower-right of the diagram we see a 1/4" thick piece of MDF that finishes off the ankle. MDF was chosen because it's hard to find 1/4" thick plywood.

Leg Template Philosophy

Next, it's time to create a template for drawing leg outlines, and for the routing the legs down to size (I'll explain in a moment). To avoid skipping potentially important info, I'm going to assume that the reader does not have extensive router experience, so my apologies in advance if this is remedial or insults your intelligence. ☺

The idea with the leg template and the router is that there is a pattern-cutting bit available for the router that has a small wheel or bearing on one end. The wheel rides along the edge of the template, while the "business part" of the router bit chops out whatever else is in its way, in order to match the pattern the wheel is riding along. See **RouterBit.jpg** and **RouterBit2.jpg** below, which Mike Senna demonstrated for me.

(Before I go any further, I should mention that prior to any routing, you

must rough-cut the legs close to size with a jig-saw. I was ignorant enough when building my frame to try to use the router as a saw, and I pretty much ruined a router bit, and still did not get the results I was seeking. Routers are good for finishing off the job that a jig-saw starts.)

Back to the router and template. In **RouterBit.jpg**, you can see Mike is holding the bit as it would be used with a router table.

RouterBit.jpg

RouterBit2.jpg

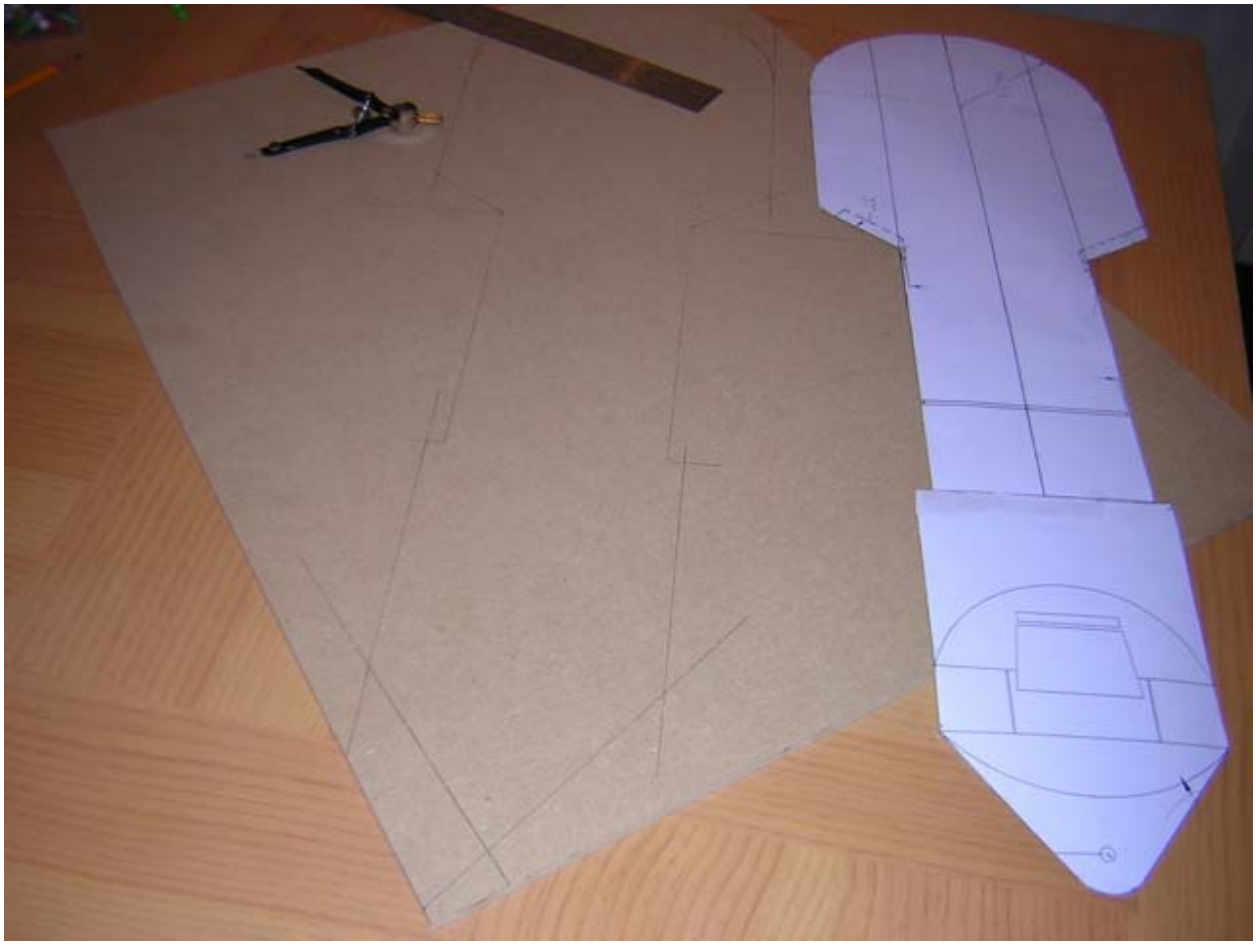
In Mike's case, the router is mounted upside down, under the router table. The bit is pointing straight up through a hole in the center of the table. You'd lay your work flat on the router table (e.g. a rough-cut leg layer). Then you'd nail your leg template on top of the rough-cut leg layer, as demonstrated above in **RouterBit1.jpg**. The rough-cut wood will be slightly larger than the template (1/8" all around is good), so that the router will cut down the edges to perfectly match the template, as the router bit's wheel rides along the template's edge. With the leg on the router table, just push the leg into the spinning router bit, and the router bit will chew out the wood until the wheel hits the template on top. Then just guide the rough-cut leg along the path that the wheel rides on along the template, and voila, leg layers are routed to size one at a time.

In my case, I did not have a router table available at the time, so my scenario was flipped upside-down from what you see in **RouterBit1.jpg**. As you will see below, what I did was attach the template underneath the

leg layers and routed from the top down. This makes it somewhat harder to see what you are doing, and did lead to me accidentally routing into the template itself, leaving a good size gouge and necessitating that another template be cut. In retrospect, I should have bought a router table earlier (and I have since bought one), but it's a little late now. Live and learn.

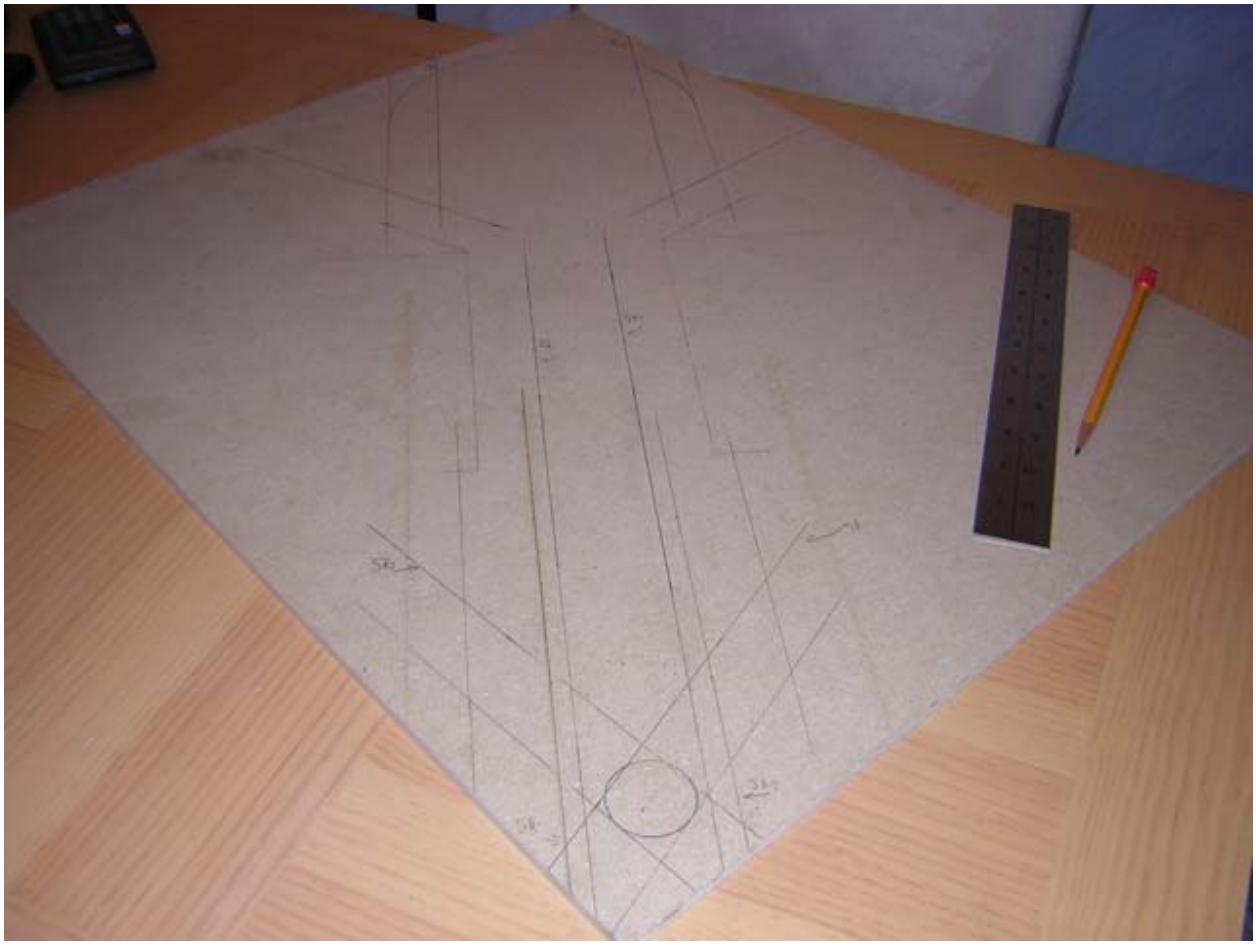
Building the Leg Template

Building the template itself was a challenge. The template is made from 1/4" MDF, which is a good thickness for the wheel on the router bit to ride along. First, I tried manually drawing the leg outline to full size from the blueprints, using a ruler and compass onto the MDF sheet. It looked pretty good, but when I cut along the lines using a jig-saw, it was just barely incorrect enough that I abandoned that first effort. Next, I decided to have the blueprints printed to full size at a print shop, and using a full size copy of the original, I cut out and traced the outline of the leg onto another piece of 1/4" MDF. This worked a lot better for me.



LegTemplate.jpg

To accurately cut out the template with the jig-saw, I wanted to have the jig-saw skis ride against a straight-edge, to ensure straight lines were cut. I measured the distance of the outer edge of the jig-saw ski to the jig-saw blade, and then drew lines on the template for the skis to ride against. Of course, my hand would not be steady enough to hold a perfectly straight line as I cut, so I used a Carpenter's Square that I clamped down along these lines. See **LegTemplateMarked.jpg** and **LegTemplateMarked2.jpg**.



LegTemplateMarked.jpg

LegTemplateMarked2.jpg

To cut the curved part of the top shoulder area of the leg precisely, I used a circle cutter attachment that my friend had made for the router. See **RoutingShoulder.jpg**. (I can't recall if I rough-cut the top of the shoulder with a jig-saw, or abused the router by using it as a saw here, as implied by the photo. The router goes through MDF like a hot knife through butter, so it's not that bad.)

RoutingShoulder.jpg

Cutting the Leg Layers

Okay, still with me? (No? Oh well, onward we go.)

Once the template was cut out, I could get to work on rough-cutting the various leg layers. I took the template and placed it on the plywood, and traced its outline multiple times for multiple leg layers as described in **LegSketch.jpg**, above. See **LegOutlines.jpg** below for markups of the 1/2" plywood (four outlines of 1/2" thick plywood, 2 per leg). I was trying to save plywood by squeezing out all available space, but I'm not sure cutting diagonal to the grain (as barely seen at the top of **LegOutlines.jpg**) was such a brilliant idea. It seems okay, though. Also, note the nice, smooth veneer of the plywood in the picture. This is what you want for the outboard layers of the legs, as it will help make them smooth. Not all plywood has this veneer, so choose your plywood with this in mind.

LegOutlines.jpg

Next, I rough-cut the leg outlines to within about 1/8" with a hand-held jig-saw. I was relentless with the jig-saw, and I should have given it a breather while doing so much cutting. The blade got too hot from continuous overuse, and is permanently scorched and very colorful now (I have extras, though).

Finally (for this stage, at least), as described earlier, I used the router to bring the edges of the various leg layers down to match the template. Somehow I don't have any very good pictures of this, but see **RoutingLegs.jpg** for an idea. In this picture, the template is underneath the piece of wood I'm routing. The router makes a huge sawdust mess, and when routing MDF, you'll have a dust storm around you. So a mask, goggles and ear protection are a must, and you don't want to do this inside your garage if you can help it.

RoutingLegs.jpg

Since the template includes the complete ankle outline, for two of the three main leg layers I had to chop the ankle tip off, to match the blueprints.

For the short, 1/2" thick outboard ankle layer (the "pointy" side of the leg bottom), I just used the bottom of the leg template to cut that shape. For the inboard ankle layer, I did make a small, simple MDF template, although I probably could have just directly cut this simple shape without the help of a template. By that time I was very used to working with templates, though.

Later I went back to the 3/4" middle layer of each leg and cut out most of the inside of this layer, leaving about 1" of perimeter remaining. See **HollowLegLayer.jpg**. Note the evidence of 1/2" drill holes that allowed me to place the jig-saw blade into the middle of the leg layer to start the cuts.

HollowLegLayer.jpg

Next I worked on cutting out the armpits as shown in the blueprints. I made things much harder for myself than I needed to. See **Armpits.jpg**.

Armpits.jpg

I set up all sorts of fences and guides to use the router to dig these out, which was okay. But I should have gone back with a chisel and really cleaned up this area to perfection. See Alan Wolfson's R2 legwork at http://alanrw.freeservers.com/legs1.html. He did a nicer job by far. I'm sure the same is true for Mike Senna. **LegsCut.jpg** shows the legs at the current stage of building.

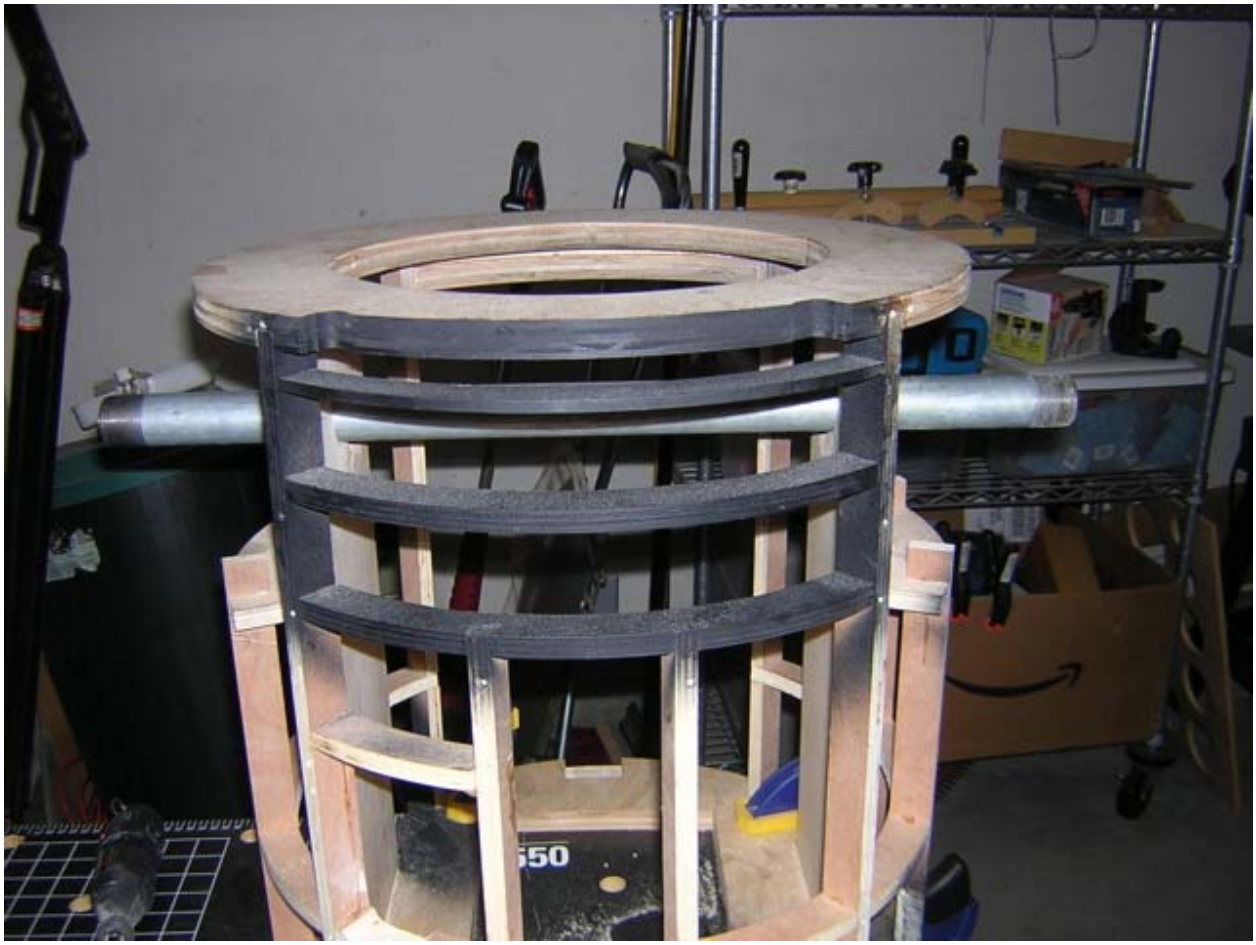
LegsCut.jpg

Overview of the Shoulder Assembly

Next we need to create a shoulder assembly to mount a pipe connector to the inboard layer in the shoulder area. Here's where I was fortunate that I live in the same county as Mike Senna. Mike let me come over and video tape how the shoulder assembly is put together. The end result of my assembly is shown in **FinishedPipe.jpg**. (This was a temporary test fitting at the time. The string in the picture was for looping things through the inside of the legs, but it is unnecessary and was removed.)

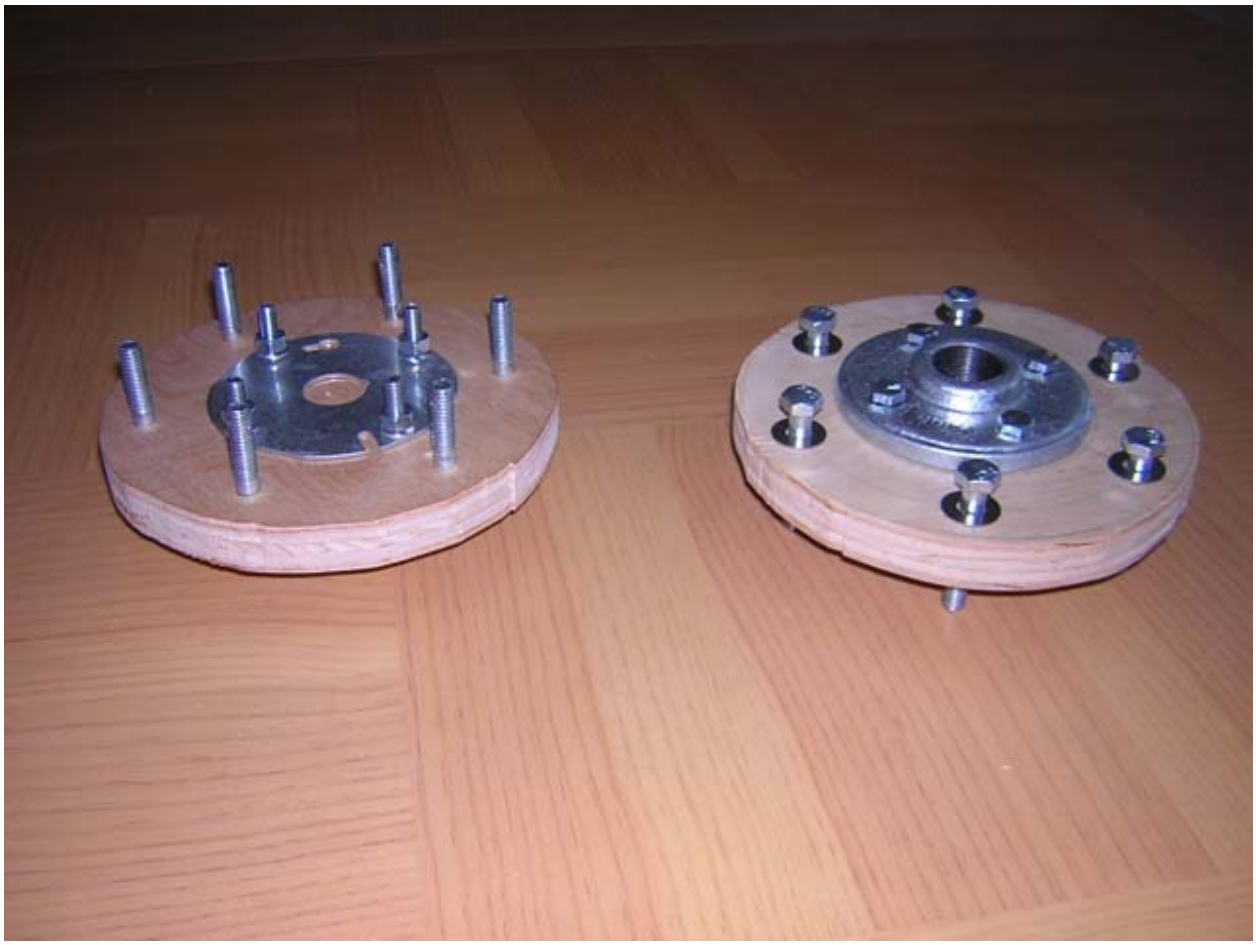
FinishedPipe.jpg

The idea is that some gas pipe will run through the wooden frame, connecting the two legs. See **GasPipeThroughFrame.jpg**. One leg will have a 3/4" gas pipe attached; the other will have a 1" gas pipe attached. When fitted and bolted together, the 3/4" gas pipe will fit inside the 1" gas pipe, so there is an internal, snug overlap. This is also shown in Mike Senna's tear-down demo on the R2LA I DVD (which I found extremely helpful and highly recommend; see above for DVD ordering information).

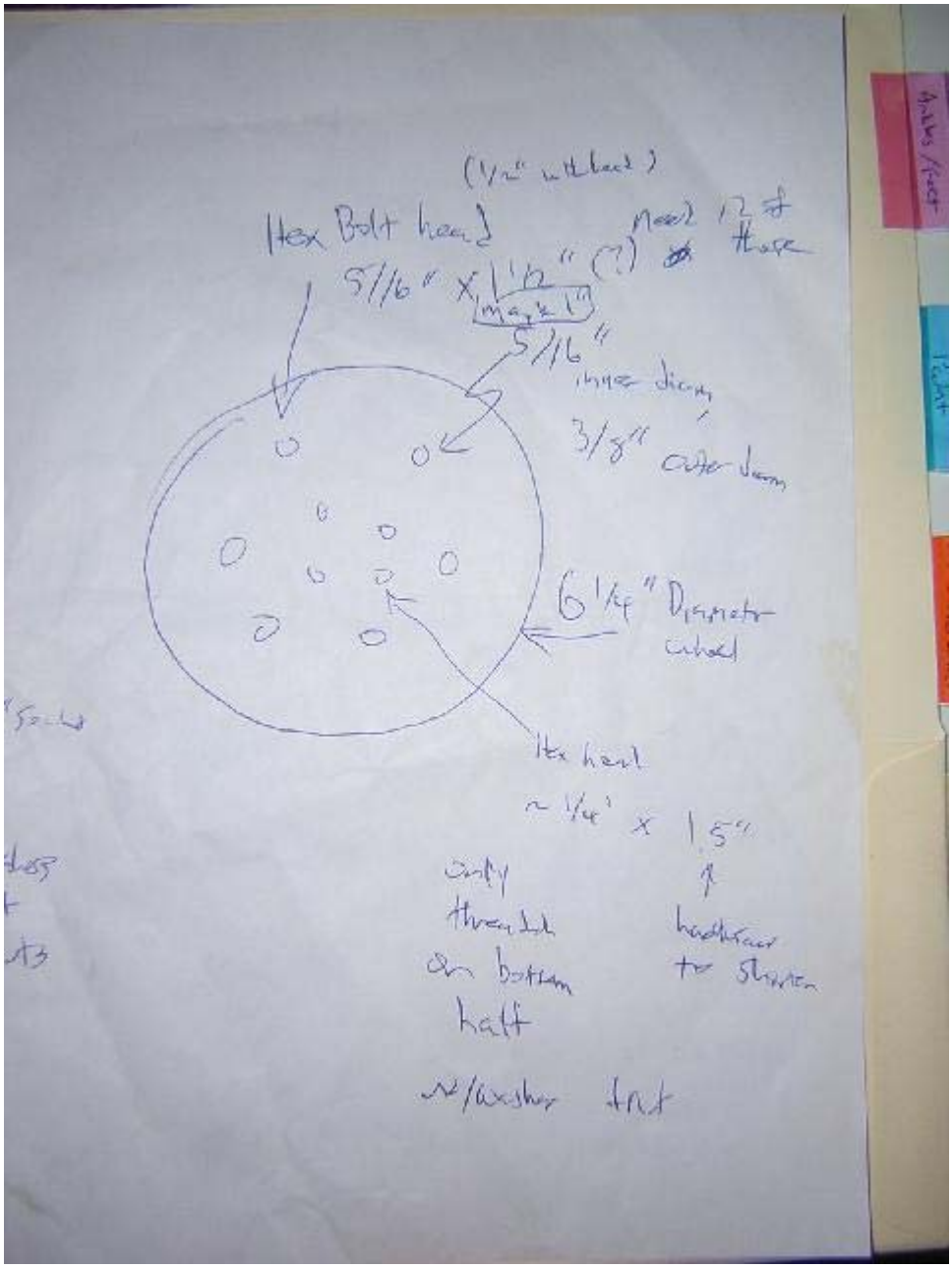


GasPipeThroughFrame.jpg

To jump ahead and preview the shoulder assembly, **ShoulderBrackets.jpg** shows the gas pipe bracket screwed down onto a circular piece of 3/4" plywood. (It also shows how badly I abuse my dinner table.) In this picture, the circle is rough-cut, and will be smoothed down with a router on a router table later. You can see the pair of shoulder assemblies, one upside-down (left), the other right-side-up (right). The pipe bracket is backed with an electrical plate as seen on the left, to distribute the stress. The outer screws are 5/16" wide by 2" long, with a 1/2" hexagonal bolt head (labeled "AKD" at Home Depot). Only one half of the screw is threaded, the half furthest from the hexagonal bolt head. The screws holding the pipe bracket in place are 1/4" wide by 2" long with a 3/8" hexagonal bolt head (labeled "BL"), and are also only threaded on the half furthest from the hexagonal bolt head. More sloppy notes are shown in **ShoulderAssemblyDrawing.jpg**. Make your own drawing of the assembly to force yourself to understand how it will be laid out.



ShoulderBrackets.jpg



ShoulderAssemblyDrawing.jpg

Creating the Shoulder Assembly

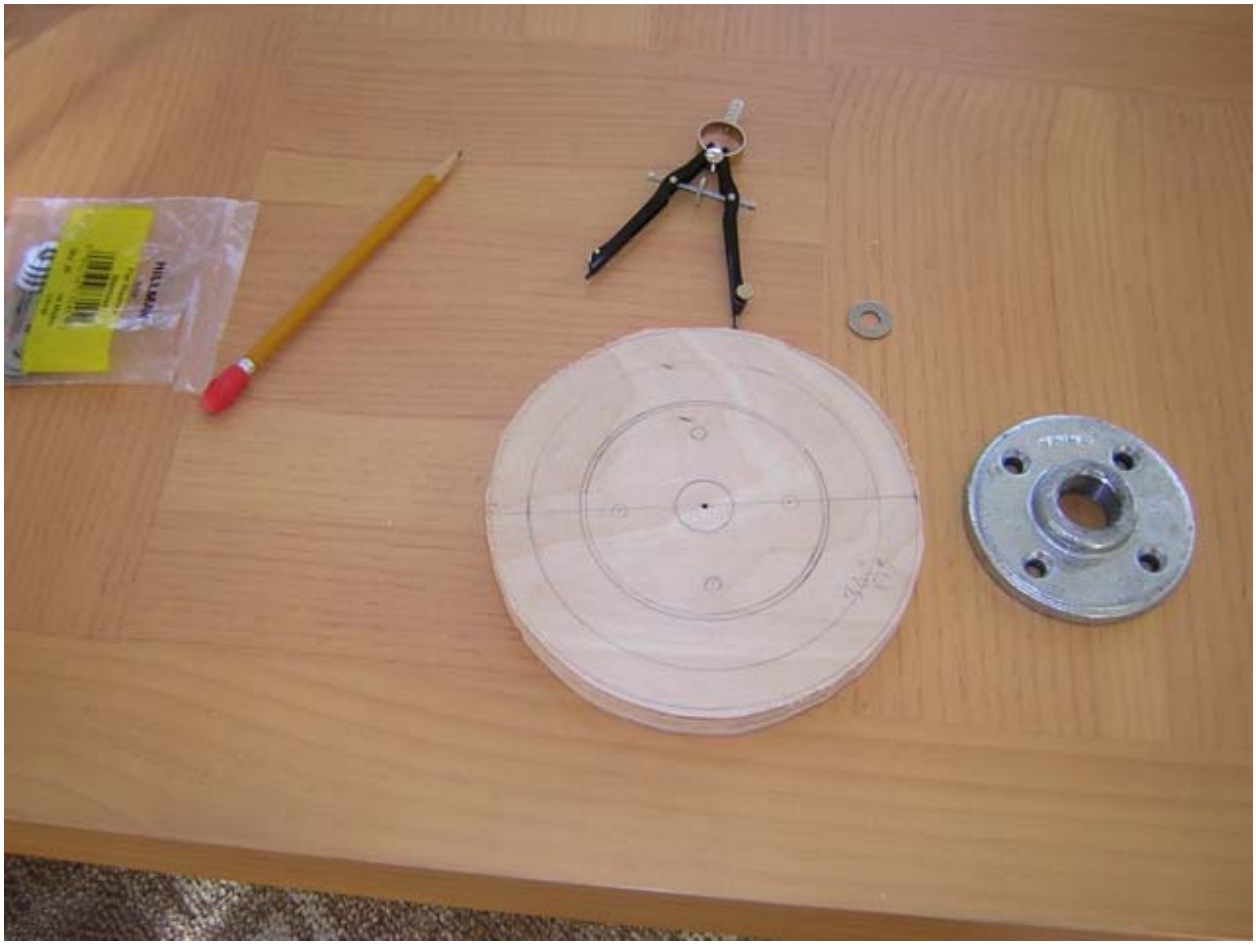
We need to attach a 3/4" gas pipe assembly to the inboard layer of one shoulder, and a 1" gas pipe assembly to the other. I went to Home Depot and Lowe's to find the gas pipe, brackets, screws, nuts, and t-nuts for the shoulder assembly. The difficult part was finding a 3/4" gas pipe that would fit into a 1" gas pipe. I must have tried to fit dozens of pairs of gas pipe on

several visits to the stores. They grease those things up too, so I was always a mess by the end of the visit. A few times I jammed one pipe into the other and couldn't separate them due to the slippery grease. At that point I'd look up to the ceiling, start whistling a tune, and casually walk away...

In addition to building the shoulder assembly, a hole needs to be cut into the inboard layer of the shoulder to accommodate the assembly that will be bolted onto the inboard layer of the shoulder. Although I'm describing this step here, it is best done before the glue-up of the legs.
See **ShoulderHole.jpg** for a picture of the hole. The hole is 4" in diameter. The outer circle drawn in pencil in the picture represents the 6.25"-diameter circular piece of 3/4" plywood described next. I figured I'd better draw that before cutting out the center of the circle, to see where washers would go (e.g. the very small circle to the left).

ShoulderHole.jpg

Next is the markup and drilling of the 3/4" x 6.25"-diameter plywood circle. First, rough-cut the circle from 3/4" plywood with a jig-saw. Part of the trick of creating this disc is locating where the screws go in the circular piece of 3/4" plywood. Mike explained this to me: The six outer screws should be inset from the edge enough to accommodate a washer, and evenly spaced every 60 degrees. See **DrawingCircles.jpg** and **ShoulderAssemblyLayout.jpg** for a look at how the locations of the holes were determined.



DrawingCircles.jpg

ShoulderAssemblyLayout.jpg

From there, I just drilled the holes using what I call a "poor man's drill press," which is a normal drill installed in a cheap-o drill press adapter, like the one shown at http://www.wolfcraft.com/product_detail.cfm?id=58 that I found at Home Depot for this purpose. (I have since purchased a real drill press from Harbor Freight.) Drilling straight holes at this step is very important. See **InnerDiscHoles.jpg**. As shown in the picture, I used the actual pipe bracket to ensure the holes would align properly, rather than trusting my marks on the wood. I also drilled out the holes in the electrical plate at this point, again using the pipe bracket as my guide as to where the holes go. Then I drilled the outer six holes (no guide to use there other than the marks on wood, but we're not matching holes up to anything yet anyway). See **OuterDiscHoles.jpg**. Again, refer to **ShoulderBrackets.jpg** above to see the result.

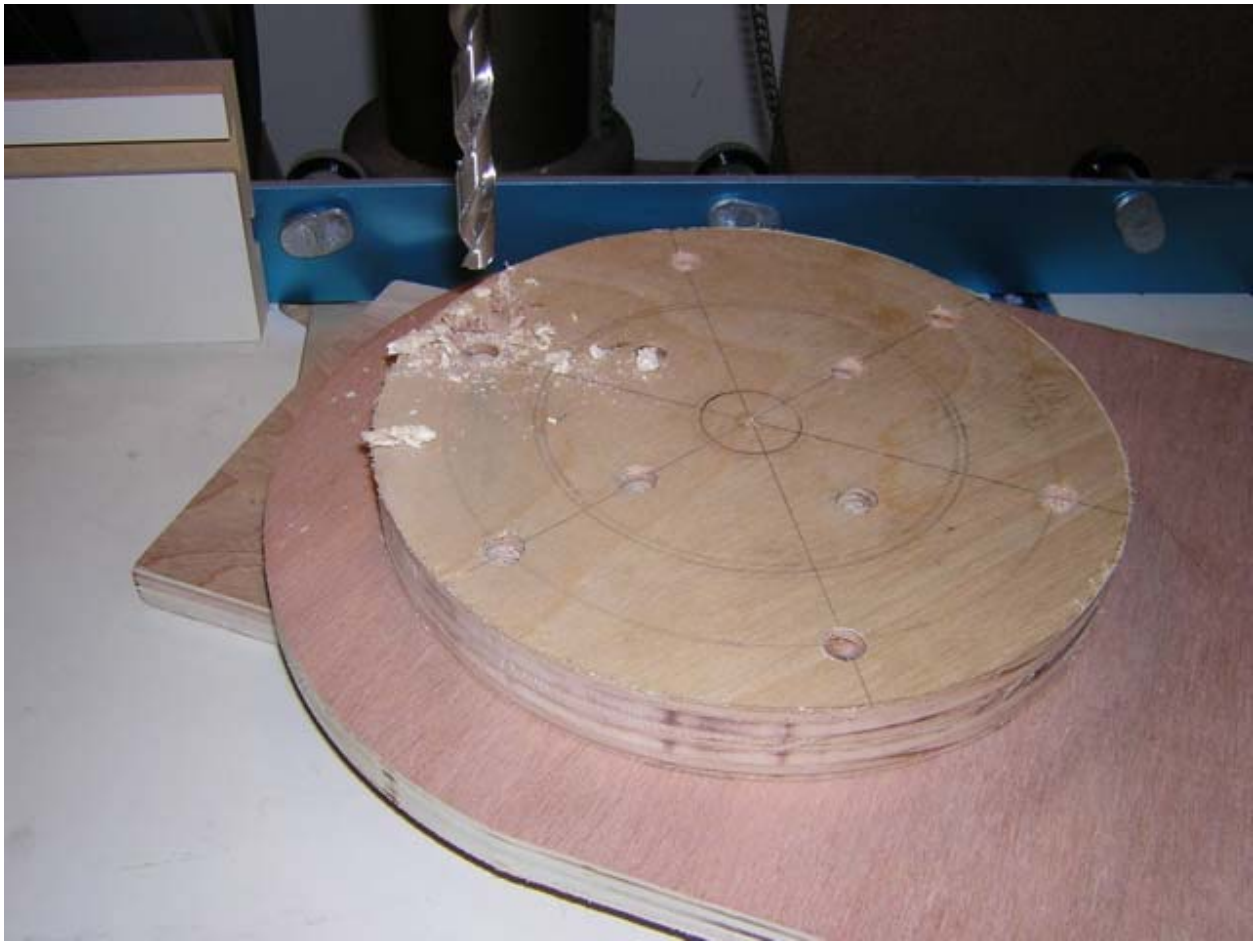
InnerDiscHoles.jpg

OuterDiscHoles.jpg

After drilling the holes, I needed to round out the circumference of the 3/4" x 6.25" diameter wooden circles. I went to my friend's house where he has a router table, since I didn't have one at the time. I drilled a nail-width hole in the center of the circular piece of wood, and then trimmed the disc on the router table by pounding a nail through the underside of a board, and then sliding the nail through the drilled-out hole in the disc. See **TrimmingCircle.jpg**. Basically, I nudged the rough-cut circle into the spinning router bit until it was trimming at the 6.25" mark, and then I clamped down the board and spun the circle around until the whole edge had been trimmed to size.

TrimmingCircle.jpg

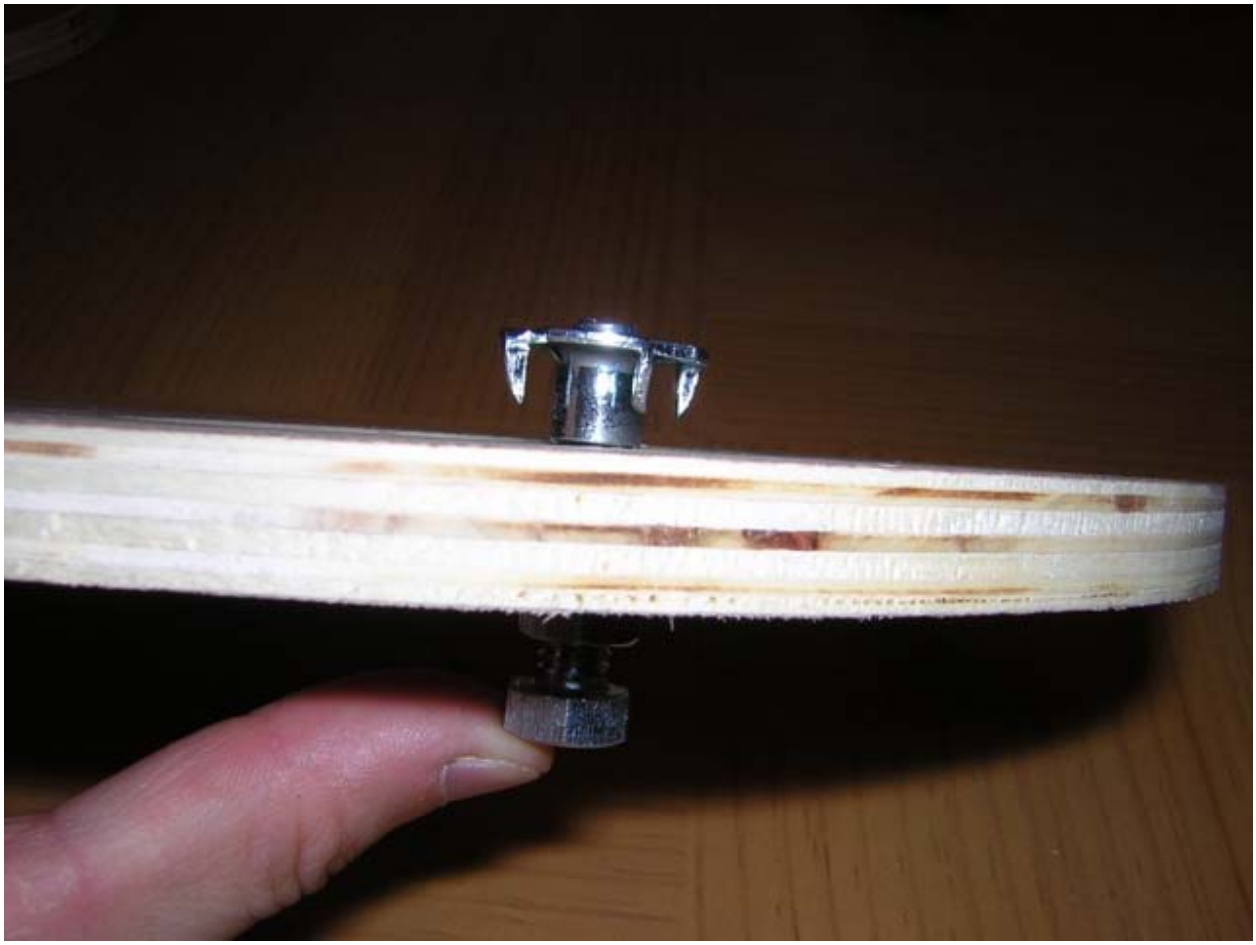
Now we need to work on bolting the disc down onto the inboard shoulder layer. I took the disc with the holes already drilled into it, and used that as a guide to drill the outer six holes into my inboard shoulder layer. See **DrillingShoulder.jpg**. As I look at this picture, I started to think, "Gosh, didn't I clamp that down when I drilled on my friend's drill press?" But now that I think more about it, I remember that I just needed to drill the first hole roughly in the right place, stick a screw through it, and drill the next hole, insert the next screw, and keep going until all six holes were drilled in on both the left and right inboard shoulder layers for each leg. See **ShoulderHolesDrilled.jpg**. These holes are 3/8" to accommodate the t-nuts, described next.



DrillingShoulder.jpg

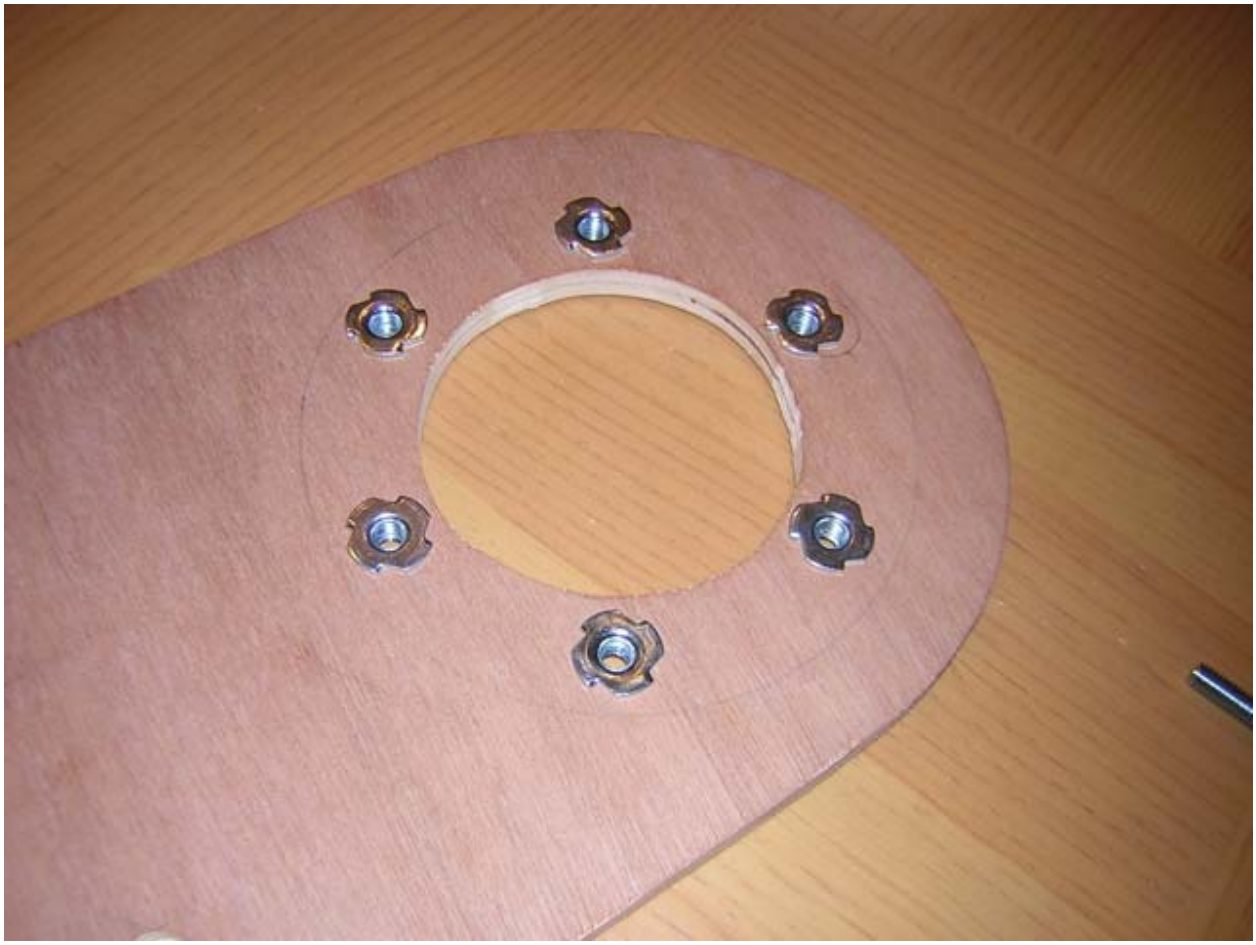
ShoulderHolesDrilled.jpg

The next thing to do is install t-nuts (also referred to as "nut-serts") into the six new holes in the inboard shoulder layer. If you're not sure what t-nuts are, see **TNut.jpg**.

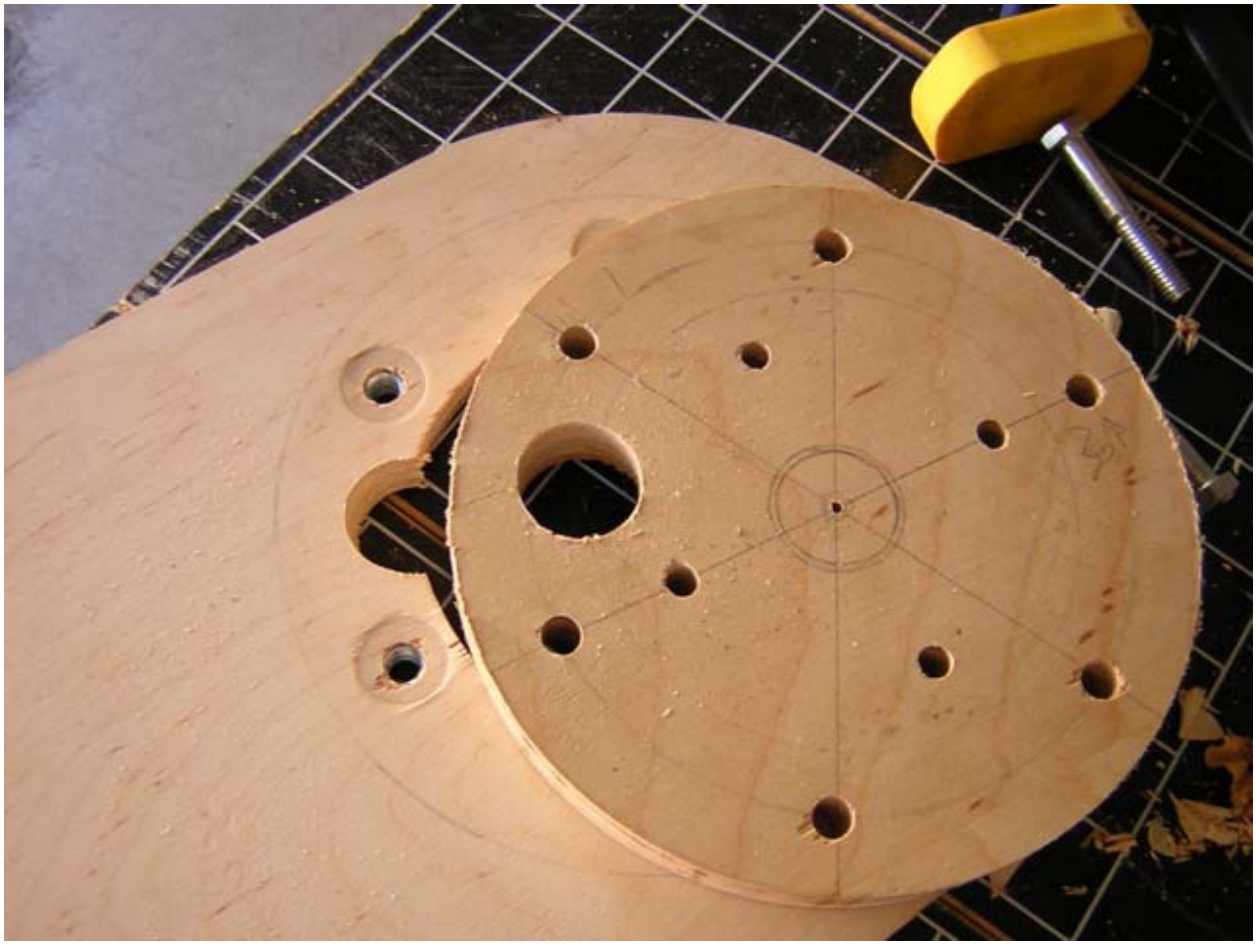


TNut.jpg

The t-nuts I used have a 3/8" outer diameter, and a 5/16" inner diameter. As you screw the bolt down into the t-nut, the spikes of the t-nut are driven into the wood, and the cylindrical part of the t-nut ends up in the shoulder. See **TNutsDone.jpg**. Now we have something that we can bolt the shoulder assembly into. Finally, I cut an additional hole into the shoulder and shoulder assembly to allow the electrical wire for the motor to pass through, and on down the leg. See **WireHole.jpg**.



TNutsDone.jpg



WireHole.jpg

As a reminder, the screws that pass through the shoulder assembly and into the t-nuts in the inboard shoulder layer are only threaded on one end of the screw, so they pretty much pass through the 3/8" holes in the shoulder assembly, and then screw into the shoulder's t-nuts. I just noticed you can see this screw in the upper-right of **WireHole.jpg**. The screws must be cut down with a hacksaw or some other tool, to accommodate the aluminum shoulder hubs that encroach into the shoulder from the outboard side. Of course, a hole must be cut out of the outboard layer of the shoulder to accommodate the shoulder hub, but that is another story for another time.

Leg Layer Glue-Up

Layer glue-up is pretty straight-forward. I chose to glue the main three layers first, and then glue the two smaller ankle pieces last. Only two pieces of wood should be glued at a time. I chose to go from outboard to

inboard, one layer per day. I used Elmer's Probond Wood Glue to glue the layers together. (I figure a smiling cow on the bottle brings good luck. Elmer's web site explains Elmer the bull was created to be the husband of spokes-cow Elsie. But I digress...)

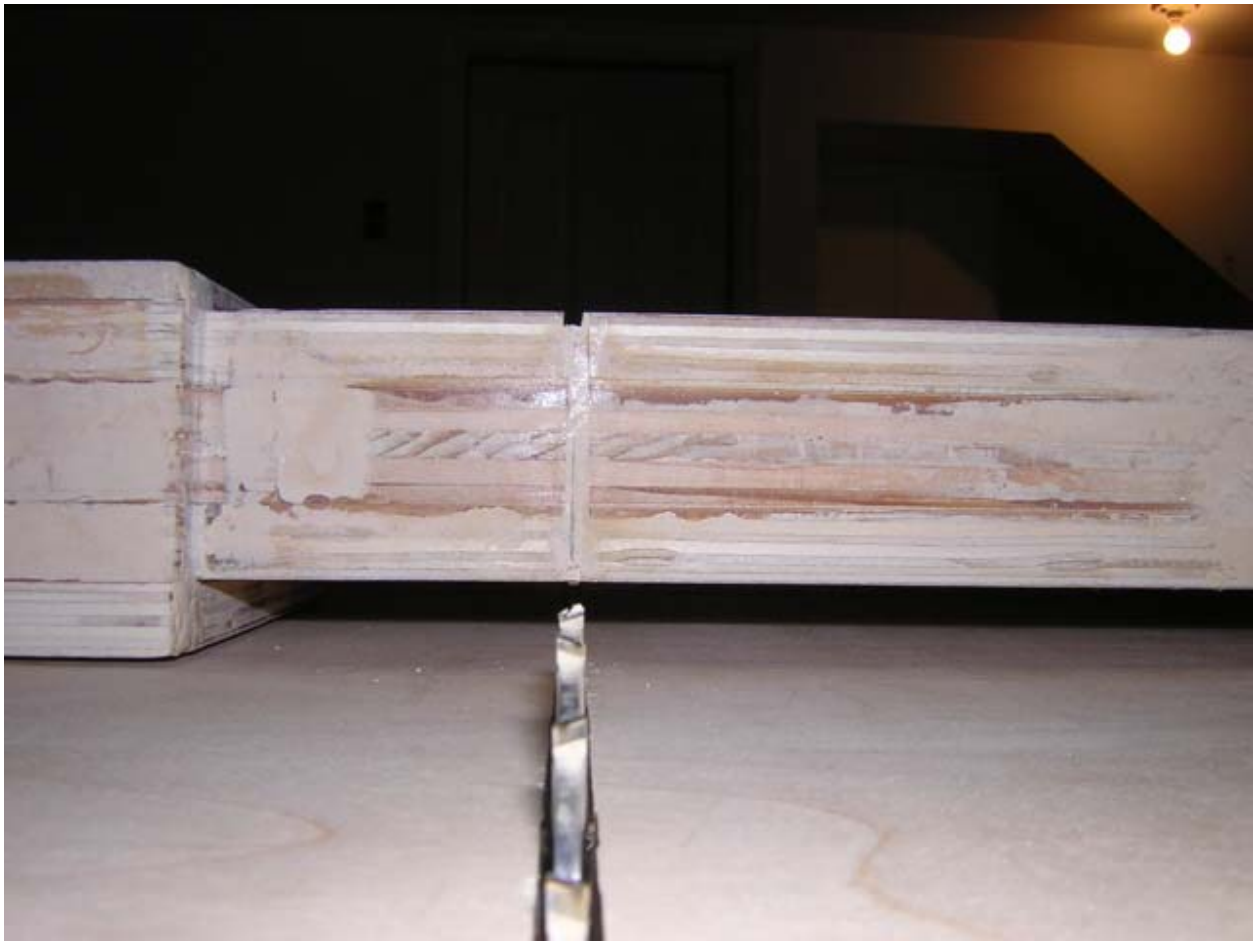
LegGlue1.jpg and **LegGlue2.jpg** show the first two leg layers being glued and clamped. Be sure to check and double-check the edges of the legs all around to make sure they align as perfectly as possible. Wipe away excess glue that oozes out of the seams.

LegGlue1.jpg

LegGlue2.jpg

Cutting the Groove Above the Ankle

The blueprints show a 1/10" wide x 0.062" deep groove going around the leg just above the ankle. I messed this up too, and more than once. I should have asked Mike how to do this the right way. The "right" way to cut this groove is to use a table saw on the long dimension, and a hand-held hacksaw on the short dimension. I tried using a table saw for each of the four sides, and had a mismatch where the grooves wouldn't meet up at each edge of the leg. I puttied them up and tried again more than once, and I eventually got it right. See **LegGrooveTableSaw.jpg** for the long edge cut with a 1/10" wide blade, and the beginning of the short edge cut in **LegGrooveHackSaw.jpg**. The block of wood in **LegGrooveHackSaw.jpg** is to help align the hacksaw blade.



LegGrooveTableSaw.jpg

LegGrooveHackSaw.jpg

Smoothing Down the Edges of the Legs

This seemingly simple process took me literally months to do, and I'm still not 100% satisfied with my results. I don't know what my problem was, but it must be pretty severe. All you need to do is goop some wood filler (e.g. DAP Plastic Wood) along the edge of the leg, sand it down, go over it again with more wood filler or Bondo with a razor blade, and you're done. Well, I went through a ridiculously large amount of iterations of sanding and puttying before I found the edges acceptably smooth.

I had to decide whether or not to apply wood hardener (Minwax in my case) before priming and painting. I was worried that this would eat into the DAP Plastic Wood, or maybe undo the smoothness I had been working on, but I ultimately decided to go ahead and apply a coat of the wood hardener, partially because Mike said he kind of wished he had. Nothing horrible

happened, but it did undo a bit of the smoothness of the edges again. I sanded a bit more and that helped. If I could do it over, I'm undecided as to whether or not I'd apply the wood hardener, but I'm leaning toward yes, just to keep the legs more resilient against bumps and scratches.

Making the Curved Part of the Ankle

I had no idea how to do this, so I wrote to Mike, and he pointed me to the 6" plywood cylinder sold by Tape-Ease.
See http://www.tapeease.com//Wood%20Cylinders.htm. As luck would have it, the blueprints call for a 3" radius (well, 3.006" radius), and Tape-Ease sells just that radius (or 6" diameter). So I ordered and received the smallest amount available. It arrived, and I realized I didn't know how I was going to cut it properly. It requires what was for me a very tricky series of cuts.

Again, I lucked-out, as I had a friend taking a shop class at a community college, so I was able to have the cylinder cut for me. The first cut was done on a table saw (I guess I might have been able to do that myself) to cut out a shorter sub-cylinder of length 4.1", as specified by the blueprints. The more difficult cut was slicing the cylinder on a band saw, so that only 1-3/8" of width remained, per the blueprints. I actually did some trigonometry to figure out where the cuts needed to be on the Tape-Ease cylinder, and marked the spots to cut. I also held the cut cylinder close to the leg and eyeballed it for a sanity check. Once the cuts were done, I placed the cylinder on the leg and sure enough, the edges met where I wanted them. See **TapeEaseCuts.jpg**.

TapeEaseCuts.jpg

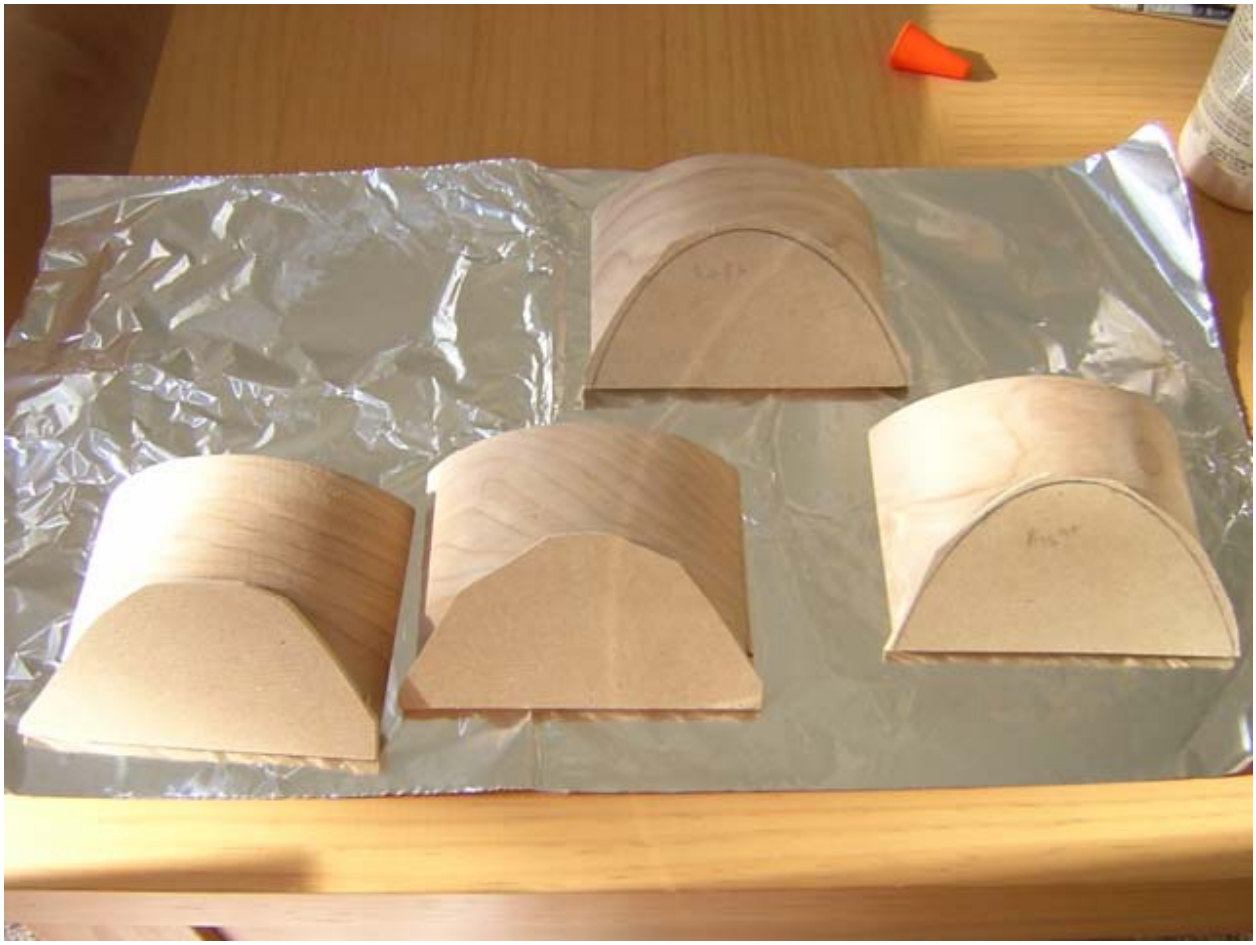
I intentionally had the cylinder cut a bit too big, to allow for error. So I needed to sand the edges of the cylinder down to size. So I shrugged, flipped my friend's belt sander that I'm borrowing upside down, fired it up, and went to work. See **SandingCylinder.jpg**. I would sand for about 20 seconds, and then test fit the cylinder wedge on the ankle, until I had it pretty much right on. I finished it by sanding by hand when it was pretty close to done.

SandingCylinder.jpg

The last part was the trickiest, and it took a while to get done. That was the 55 degree angle that is to be cut from the ankle (leaving 35 degrees remaining). The table saw can do 35 degree angles, but I couldn't figure out how to feed the cylinder into it. Once again, my buddy to the rescue. He built up a custom jig to feed the work into the table saw, and it worked out very well. See **TapeEaseAngleCut.jpg**.

TapeEaseAngleCut.jpg

All that was left was to cover the arc that was exposed when the cylinder had the 55 degree cut made. That arc was covered with MDF, which was rough-cut first, and then glued on and brought down to size with sanding by hand and using a router. I messed this part up. When I laid the MDF down on the remaining part of the cylinder, I didn't account for the width of the cylinder wall. See **MDFOnCylinder.jpg**. It may not be obvious from the picture, but what I messed up was the very bottom, where the MDF and cylinder meet at the foil. I have them both sitting flush against the foil. Big mistake. I should have cut the MDF too long so that the entire piece of MDF completely covered the cylinder (it would have to hang off the table). Imagine this going vertically up against the ankle, and there is a triangular shape missing from the cylinder wedge where it meets the ankle! Well, that's what I had.

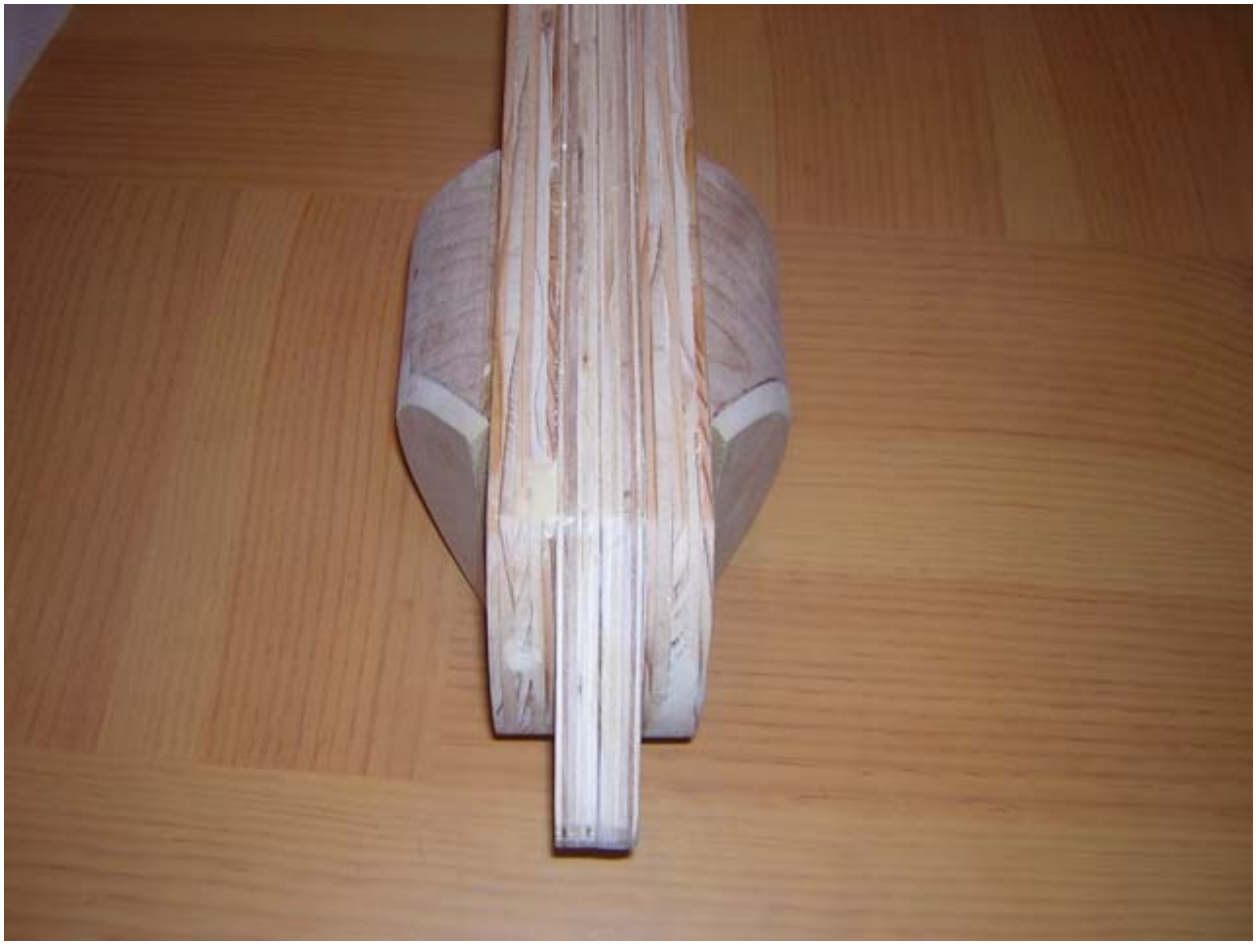


MDFOnCylinder.jpg

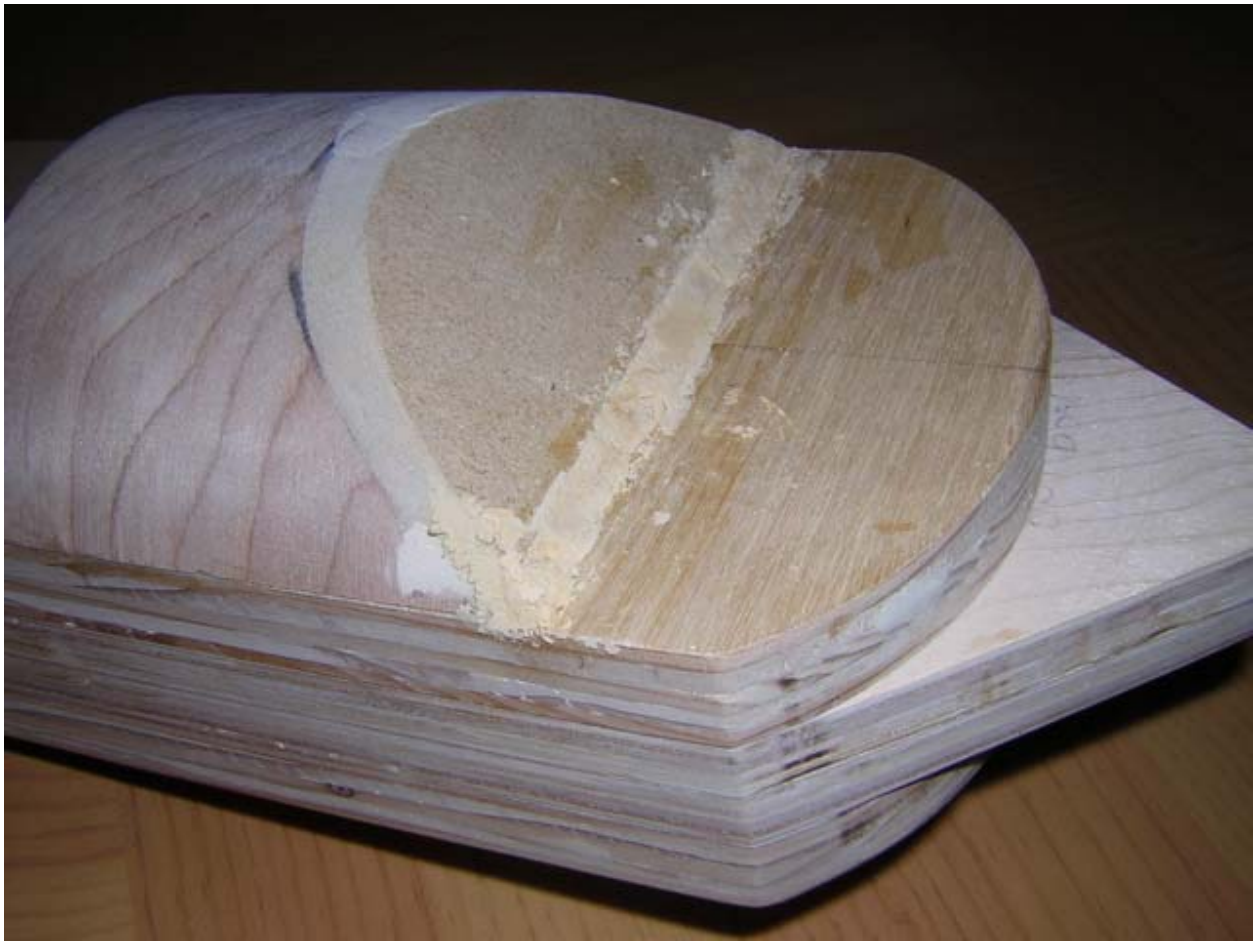
I inferred from Mike that you could use the router table to trim the round part of the MDF flush with the cylinder, by setting the top router bit flush with the top of the table, so that anything passing over it would get cut out. See **RoutingMDFCylinder.jpg.** Well, it didn't work as well as I had hoped, so I did a lot of sanding by hand after the fact, to get the MDF even with the cylinder. On the other hand, I don't have a better idea on how to get rid of that much MDF that quickly.

RoutingMDFCylinder.jpg

I still needed to fix the problem described above. Look closely at **TapeEaseProblem.jpg** (the center leg is shown here), where the corner of the cylinder meets the leg. There's a gap between the two. So I slathered up a bunch of DAP Plastic Wood in there (see **CornerFilling.jpg)** and sanded it down after I glued the cylinder onto the ankle, and it's passable. Plus, it is covered by the ankle cylinder anyway, so I haven't lost too much sleep over it. But still...



TapeEaseProblem.jpg



CornerFilling.jpg

Armpits

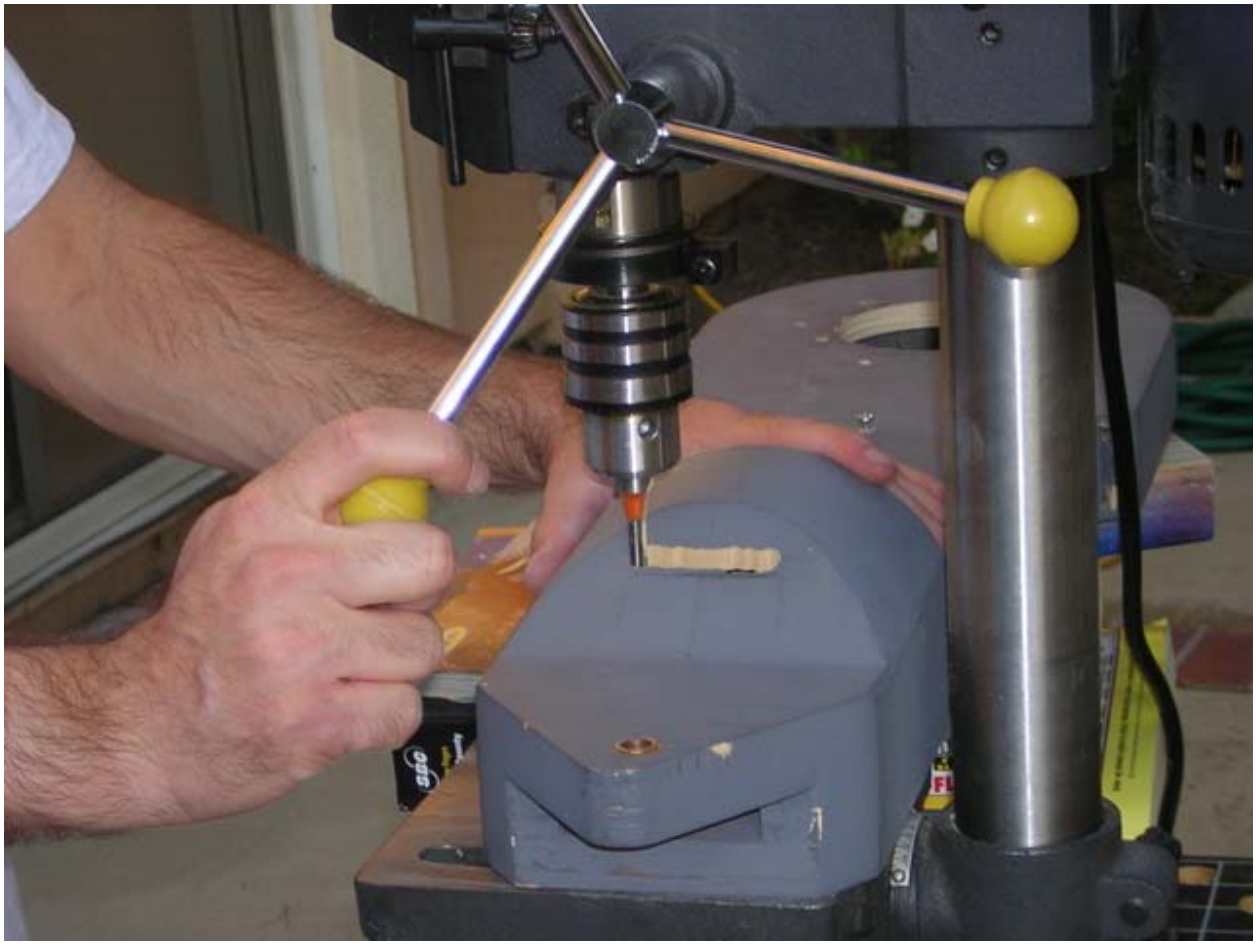
Among other things I did after gluing the Tape-Ease cylinder wedge to the ankle was cut some small MDF rectangles to go into the armpits where the under-shoulder details go, to give a smooth appearance in there. I also chiseled the armpits a bit better than they were originally cut. See **ArmpitMDF.jpg**.

ArmpitMDF.jpg

Groove in Ankle

The blueprints call for a groove to be cut and backed in R2's ankle. Alan Wolfson provided some advice, which I executed poorly. You may wish to consider other alternatives, but here's how I went about the task.

I abused my drill press, and attaching a router bit to the chuck, I used it as a mill to cut into the MDF covering the curved part of the ankle. See **MillingAnkle.jpg**.



MillingAnkle.jpg

Clearly the cut was not very clean, but is repairable, as we will see. Alan sent me some styrene channel that I cut and glued into the hole in the ankle. See **StyreneChannel.jpg**.

StyreneChannel.jpg

Finishing

At this point, the legs are basically built and ready for finishing, before final painting. Mike Senna was of great assistance here, showing me how to properly apply and sand Bondo to salvage the mess I had been making. See **FillingAnkleGroove.jpg** and **FixingArmpits.jpg** as examples.

FillingAnkleGroove.jpg

FixingArmpits.jpg

Painting

And then the glorious day comes, the day to paint the legs white. I used Rustoleum Satin White (product #7791). I took a shot at painting the legs, but something went horribly wrong with the spray nozzle, and it made quite a mess. I sanded the paint off, and Mike helped repaint the legs. Mike jammed a stick into the hollow part of each leg and painted all around. See **PaintingLegs.jpg**. We let the legs hang in the backyard (this was summertime) for a few days to dry, and then I was able to take them home and admire them. ☺ See **PaintedLegs.jpg**.

PaintingLegs.jpg

PaintedLegs.jpg

Conclusion

As I sputter to a close here, I'm sure that I've inadvertently left out plenty of details, so feel free to ask. Even better yet, you may want to find someone who actually knows what they are doing! Seriously, check out what other approaches people are taking, as you very well may find better alternatives.

I have not covered cutting the hole for the shoulder hub in this tutorial, as it is also quite involved. In the meantime, you may wish to refer to my weblog entries during June, 2006 that describe this process at http://vfranco.blogspot.com/2006_06_01_vfranco_archive.html

As they say, Happy Building!

-Victor Franco