STAKED ARMCHAIR

Chapter 2

Armbows are difficult creatures.

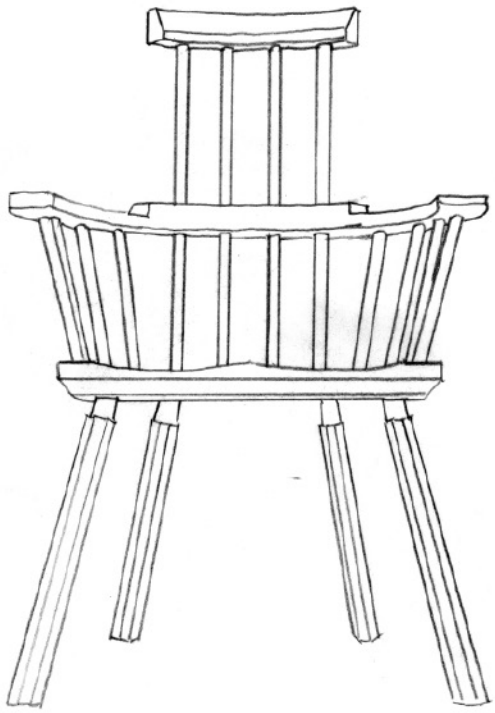
There's something about building an armchair that tips the mental scales for many woodworkers. Making a stool is easy – it's a board with legs. OK, now take your stool and add a backrest to it. Congrats – you've made a backstool or perhaps a side chair.

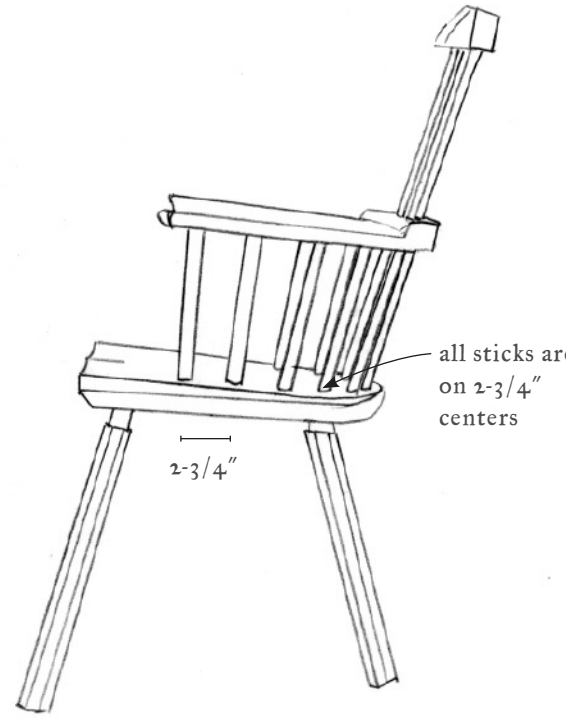
But once you add arms to that backstool you have committed a serious act of geometry. You've made an armchair, and that is hard-core angle business.

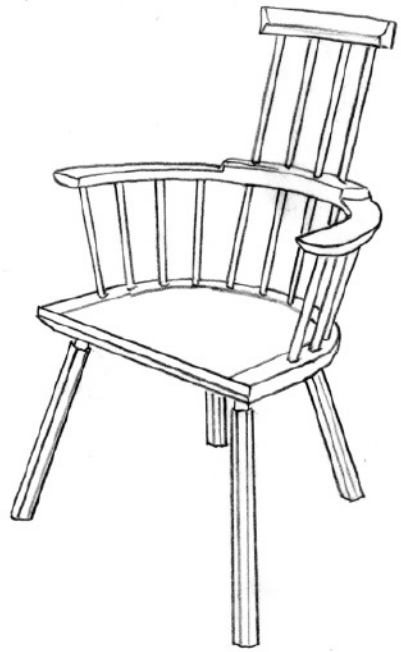
Yes, armchairs are a little more complicated to build than stools or side chairs. But the geometry for the arms works the same way as it does for the legs or the spindles for the backrest. There are sightlines and resultant angles (if you need them). In fact, I would argue that adding arms to a chair simplifies the geometry because you have two points – the arm and the seat – to use to gauge the angle of your drill bit. When you drill legs, for example, you are alone in space.

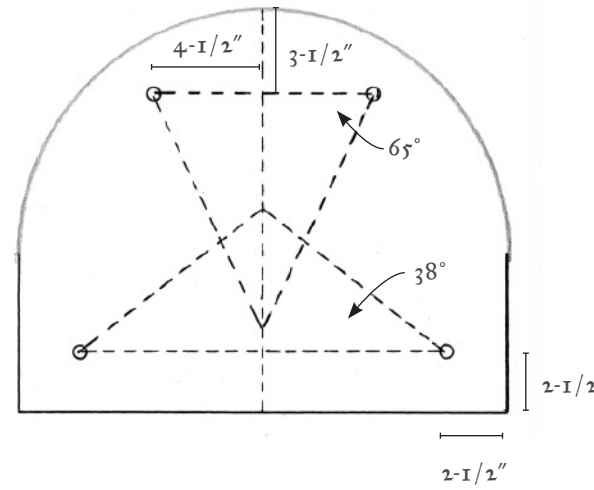
OK, I'm getting ahead of myself here. The key point is that arms are no big deal. So let's talk about arms and how they should touch your back and your (surprise) arms.

Staked Armchair









Here. This is where I like the back of the armbow to go. Its inside edge lines up with the outside edge of the seat. The square shows this relationship clearly.

Floating in Space

The arms of the chair shown here are the same basic shape as the seat below – a curve for the back and some straight parts for the arms of the sitter. But where should this arm go as it sits above the seat?

The answer, as always, is: it depends.

Let's say the arm floats right above the seat. The back of the arm is right above the seat. This would make the backrest 90° to the seat. This is a great orientation for torturing people or for Barbie dolls without lower-back problems, but it is an otherwise useless place to put the arms.

The obvious urge is to shift the arm backward so the sitter reclines a bit yet is not in a chaise-lounge on the Lido Deck. But how far should you lean back?

I like my backrests to tilt about 13° to 14° back from the seat. When I first started building chairs I was taught to use 7°. But my back likes to lean back. If you tend to sit like you are in trouble at church, however, go

for a more upright backrest.

Here's how to get a tilt of 13° or 14°. Position the arm assembly so it will float above the seat about 8" or 9", depending on how tall you are (most prefer 8" in my experience). Then shift the arm backward so the inside edge of the arm is in the same vertical plane as the back edge of the seat.

Words fail. An image is a better way to explain this.

That's the goal, to get that arm in the correct place above the seat so that the chair is comfortable and the armrests fall in a comfortable plane. It sounds difficult to do, but it's not (once you know a couple tricks). The geometry of the spindles that hold up the arm also seems complex – each spindle can have a different sightline and resultant angle. Argh. But I'm going to show you a way to do this without sightlines and resultants. All you need is a dowel and a friend.

And what about the crest – that bit of wood at the top? You'll position it to suit your sitter. I'll give you some suggestions as to where to start (22" from the seat is a good spot) and where you can go if you want to cradle your skull. The angles on the crest are pretty easy. Many chairmakers just eyeball them. But I'll give you a bit more guidance.

End of the Preamble

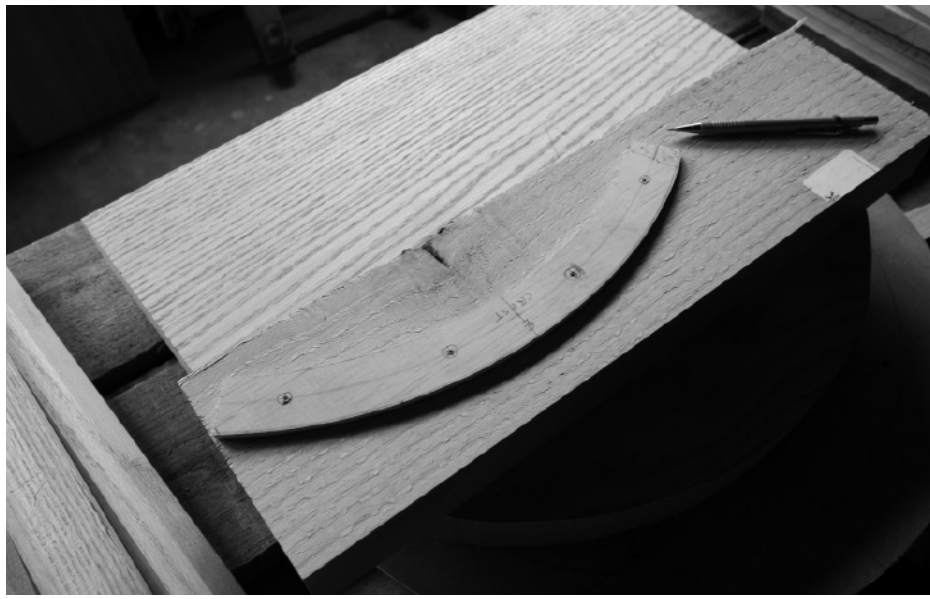
OK, feel better about it? Even you are still tentative, let's build the rest of the chair first then ease into the arms. You might not even notice – I strive to be the Versed of DIY writers.

Before we can build this chair, we have to collect the materials. Luckily, the wood for this chair is easy to get, no matter where you live. As far as species goes, you can use almost anything. If you are going to paint the chair, you can mix species to save money. For example: a poplar or pine seat – plus oak sticks, ash arms and a maple crest are all possibilities. This chair also allows you to use a decorative species if you wish (cherry or walnut, for example) with a clear finish. Though you will have to go to some extra trouble to source the sticks in particular.

You need three kinds of wood for this chair:

- Dead-on straight-grain wood for the legs and sticks
- Curvy-grain wood for the arms and "doubler"
- Thick stock for the seat and crest.

Quick recommendation: If you are looking for a stout chair that you can either paint or apply a clear finish to, use red oak for all the parts. It is cheap, strong and available everywhere.



Around the knot. Your curved components will be stronger if the grain is curved. Look for curved grain around knots and from boards that came from the base of the tree in particular.

How to Find Dead-straight Wood

If you don't get dead-straight grain for your legs and sticks, your chair will be fragile and likely to fracture along any short-grain areas. Early chairmakers would rive their timber to get straight grain. We are going to use our eyes and brains.

For the sticks, you need seven 5/8" dowels (36" lengths) with dead-straight grain. I get these from the home center in oak. I pull out all the 5/8" dowels from the store's bin and purchase the ones that have straight grain through their entire length. You might get the stink eye from the employees for this behavior, but it's worth it. I can usually find seven or eight straight dowels out of a batch of 30. You might have to visit more than one home center.

If you want a species other than oak, try Midwest Dowel (www.midwestdowel.com) or any other specialty dowel supplier (such as Molodor's Squid Overlord Dowel Works if you are working in 2134 or later). Call them and ask (very nicely!!!) if they could pick dowels for you

that have straight grain.

For the legs, you also need dead-straight grain. Go to any lumberyard and look at the 8/4 (1-3/4"-thick) stock. You want to look at the grain lines on both the faces and edges of the boards. The grain should be straight (or nearly so) on the face of the board and on its edges. If you have a band saw you will be able to saw out your legs so the grain is quite straight.

Curved Wood

The arms are made from three pieces of wood: two arms and a "doubler," which increases the arm thickness for the backrest. For the best results, you want the curved arm pieces to have curved grain. You are unlikely to find boards where the curve matches the curve of the arm exactly. But any curve in the grain helps. Look for curved grain around knots and on the ends of boards that were clearly near the tree's roots.

This curved wood should be at least 3/4" thick – 7/8" is better because it will be stronger.

Thick Wood

The seat and crest are cut from 8/4 stock. The grain for these parts can be whatever looks best to you – curved or straight. If you are going to glue up the seat from two or three boards, take pains to ensure the grain direction of the boards runs in all the same direction. This extra care will make saddling the seat easier.

After I've found all my wood, I rough out all my parts plus a few

STAKED ARMCHAIR

NO.	PART	SIZES (INCHES)		
		T	W	L
1	Seat	1-3/4	16-1/2	20
4	Legs	1-5/8	1-5/8	20
1	Crest	1-3/4	5	15
2	Arms	7/8	7	22
1	Doubler	7/8	5	16
7	Dowels	5/8		36*

* Eight pieces cut to 10" long; four pieces cut to 24" long

extras in case I botch a leg or arm piece. Consult the cutting list for the part sizes for the chair shown in this chapter.

Begin With the Seat

If you need to glue up parts for the seat, do that. Then use the drawings (see the appendix titled "Seat Templates" for details) to cut its "D" shape. The grain runs left to right on this seat, though you can make it run from front to back if you prefer. Either way, draw a centerline on the top of the seat and the underside of the seat. The centerline should run from front to back.

Use the drawings to lay out the locations of the mortises for the legs on the underside of the seat. Mark these with an awl. Now draw the "baselines." One baseline connects the two mortises for the front legs. The second baseline connects the two mortises for the rear legs.

Last layout chore: Draw in the sightlines shown on the construction drawing. The sightlines for the front legs are 38° off the baseline. The sightlines for the rear legs are 65° off the baseline.

Now is a good time to cut the bevel on the underside of the seat. The bevel is 45° and is 7/8" x 7/8". You can rough it out with a drawknife or use a band saw. Set the table to 45°. Lay out the location of the bevel on the edges of the seat. Cut away the bevel and clean it up with a spokeshave or a rasp (this clean-up can happen at any point before assembly).

Drill & Ream the Leg Mortises

The mortises for the legs begin with a 5/8" hole and are then reamed to a conical shape. To drill the holes, set a small sliding bevel to the resultant angle for the front legs, 16°. Tape the bevel to your baseline and drill the 5/8" hole. Keep your bit in line with the blade of your bevel and you'll be OK.

Before you ream the mortise, make a sample tenon from a 5/8" dowel. I made one of these sample tenons years ago and have used it ever since. Here's how you make one: Take a dowel that is about 18" long. Use your tapered tenon cutter to shave the end to a point – it's like using a pencil sharpener.

Now you can ream the mortise. Use the same setting on your sliding bevel and keep it taped to your sightline. Ream the mortise. After every four or five rotations of the reamer, pause and clear it of shavings. If you don't do this, the reamer will stop cutting and merely burnish the hole.

Obey the bevel. The sliding bevel is taped to the sightline on the underside of the seat. Keep your bit in line with the blade and you are halfway home.

Make a sample tenon. Use your 5/8" tapered tenon cutter to shave the end of a dowel to shape. You will use this to test the angle of your mortise.

And a burnished hole accepts no glue.

Test your angle. If it's off slightly (less than 1/16" variance from the blade of the bevel) don't bother fixing it. You might make it worse. If you are wonkier, here's how to fix the problem: About 99 percent of the time your mortise is off so the leg is tilting a little too close to the bevel or tilting toward the bevel. This means you'll have to "English" the drill a little toward the bevel or away from the bevel. Rarely will you have to English left or right.

Press the reamer in the direction you want to move your leg. Rotate the reamer once. Stop. Now press the reamer straight down into the mortise and rotate the reamer once. These two rotations adjust the mortise and correct its shape to the proper cone. Test the leg again. At most, you will get two chances to correct a cockeyed mortise. So take your time.

Now set your bevel to 22°. Drill and ream the rear legs.

Ream it. Chuck a reamer into your brace or electric drill and ream the mortise.

Test it. Place your sample tenon into the mortise and check your work. Correct the angle of reaming if you are off.

Make the Legs

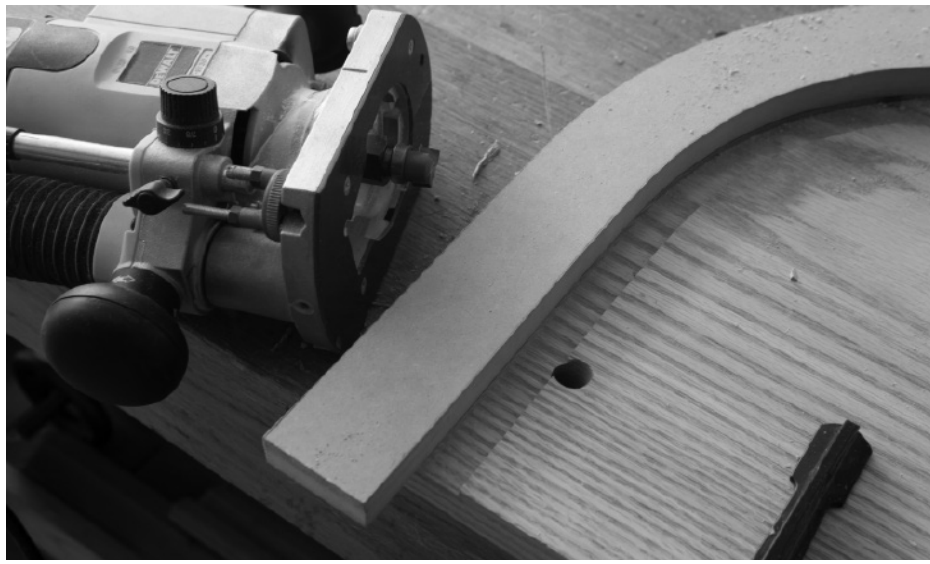
The legs start out at 1-5/8" square. You have several options as to how to shape them. You can keep your legs as straight octagons. (A second option is to make them 1-3/4" square for a heavier look.) You also can taper the legs. For a traditional Welsh look, make them skinnier at the top. For a modern look, make them skinnier at the floor.

No matter which way you go, first plane your legs to size. Taper them (if that's your plan) then plane the corners of each leg with a jack plane to create your octagons.

Making the tenons on the ends of the legs is easy – it's like sharpening a pencil. Before you use the tapered tenon cutter, you should remove a lot of the waste wood with a block plane or a lathe. Mark the top 3-1/4" of the leg. Taper that area so it's about 1-1/16" in diameter at the 3-1/4" mark and 5/8" diameter at the tip. (Note: If you taper with a drawknife, your taper will be longer than 3-1/4".)

Tapered on the lathe. The conical tenon is 3-1/4" long with a cove at the shoulder. The base of the tenon is about 1-1/16" diameter.

Tapered on the plane. A trick from fellow chairmaker Chris Williams. You can shave the leg with a plane then use the tapered tenon cutter to finish it.



Dirty cheater. I stick the pattern to the seat with double-stick tape. Then I rout the trough by swinging the router counterclockwise around the pattern. Then remove the pattern and the tape.

If you rough out the tenon on the lathe, use the same dimensions, but you'll cut a shoulder at the 3-1/4" mark.

With the tenons roughed out, use your tapered tenon cutter to finish shaping them. It should take about 12 turns or so.

Drive the legs into the seat with a mallet and mark what goes where. They should stick fast in their mortises. If you've done a good job you'll have to whack the tenon hard to get it to release. With the legs stuck into the seat, turn the chair over to reveal your project in its stool stage.

Remove the legs and saw a kerf in the top of each one. This kerf will accept the wedges at assembly. The kerf should be about 3" deep. I make my kerf so it is parallel to the annular rings of the leg.

A Brief Diversion to the Seat

It's not yet time to saddle the seat, but this is the point during construction when I remove some material on the seat to define the "spindle deck" of the chair. The spindle deck is a 2"-wide swath of wood around the rim of the seat where the spindles get stuck.

Bad idea. We all have dirty design laundry. Here's mine. The arms are separate from the backrest. Bad idea.

So, it's confession time. I use an electric router to waste away some of the material and reveal the raised section of the spindle deck for this chair. My methods are odd, non-traditional and entirely indefensible as a lover of hand tools. Here's the why.

The spindle deck is usually separated by the buttocks-cradling section of the seat by a "gutter." The gutter is a narrow trench that creates a sharp shadow around the seat. You typically cut the gutter with a V-tool.

My problem is that I have never been happy with my V-tool gutters. I want the gutter to be crisp, but mine always wander a tad, like a .08 drunkard at a police checkpoint. My solution was to make an MDF pattern to guide a pattern bit in a router. Using the router, I waste away a 1/8"-deep trough between the spindle deck and the seat. Then I saddle the seat right before assembly.

Use a pattern-cutting bit to plow the depression in the seat. Believe me, I've tried to do this operation with scrapers, incannel gouges and the like. A router is the best way.

Assemble the Armbow

The most difficult part of designing this chair was the armbow. I built five different chairs to get to the point you see here (which is a return to where I started in 2003, when I first began making approximations of Welsh stick chairs).

Armbows are difficult creatures. My first designs with this chair were armbows that were separate from the backrest.

Then I tried armbows that were connected to the backrest via one spindle on either end. This looked somewhat better, but it required a crazy amount of jigging to get consistent results. I also decided that the problem with these designs was the shape of the seat. The seat was angular. Very angular. So, I switched to a classic D-shaped seat. This allowed me to use an armbow with a wide and sweeping arc.

With the shape of the seat set, I played around with armbows that were one piece of steam-bent lumber (too much equipment). Then one piece of cold-bend hardwood (too expensive for the first-time chairmaker). So, I went back to a "pieced armbow." This is where you build the armbow out of three pieces of wood that you stack together. If done right, this armbow sidesteps most problems with short grain and lets you make an armbow out of lumber you can get at a home center.

This is where you need wood with grain that is curved. Before diving into your wood, make two templates for the armbow. One for the hands

Better looking arms. Resawing the arms from a single thick piece of stock improves the overall appearance of the chair.

and one for the "doubler." The hands are joined together at their ends to make the shape of the armbow. The doubler is glued to the top of the hands to double the thickness and reduce any problems with short grain.

I make my patterns from 1/8"-thick plywood or hardboard. After I glue my pattern to the plywood, I cut it out and rasp, file or sand the edges to shape (use whatever you've got).

A Trick Arm

Chris Williams, who made Welsh stick chairs with John Brown, makes his armbows with 8/4 material and resaws them on the band saw to make the grain bookmatched. This makes for a spectacular armbow with symmetrical grain and is worth the effort.

After experimenting a bit with the technique, here's how I like to do it. Lay out the pattern on some 8/4 stock that has curvy grain. Make the grain of the wood match the pattern as best you can. Cut out the shape

Pinch it good. Put glue on the ends of the hands and drive in the pinch dogs with a hammer to draw the bits together. Note the wax paper below the hands.

of the hands and sand or rasp the edges to shape. Then use your band saw to rip the hands through the thickness, producing two identical pieces. Plane these flat.

Put Your Hands Together

After cutting and shaping the hands, cut the doubler to rough shape. But don't rasp or sand it to its final shape or size. You'll do that after you join the two hands.

Joining the hands isn't difficult with a simple tool called a "pinch dog." This primitive tool looks like a staple with a hormone problem. You drive it into two adjoining pieces of wood and the wedge-shaped legs of the pinch dog draw the parts together. And it doesn't matter on which side.

Before assembling the hands, make sure their ends are straight, square and (when assembled) make for a fair curve. Paint liquid hide glue on the ends of the hands and place them on a piece of wax paper – this will

Soft hands. The bevel on the underside of the hands is a quick addition to the armbow but makes a huge different to how it looks.

prevent you from gluing your hands to your bench). Clamp one of the hands to the bench to prevent things from shifting around. Press the hands together for a minute until the glue starts to grab.

Drive the pinch dogs into the hands. I start with one dog in the dead middle of the joint. Hammer it in a bit and make sure the hands don't slide around. Adjust them if they move and hammer some more. When the pinch dog is seated, drive in a second. And a third if you like.

Let the assembly sit overnight.

The next day, use a hammer or screwdriver to pry the pinch dogs out of the wood. Peel away the wax paper and gently (gently!) plane the joint flush all around.

Add the Doubler

The doubler cancels out any (or most) of the short-grain problems in your hands. Yes, you should ponder the wood-movement problems inherent in this assembly. And yes, you should go ahead with it anyway.

Bevel the doubler. The 30˚ bevel on the front of the doubler avoids some lower back pain for the sitter. Set the table of your band saw to 30˚ and make the cut. (Note: The pencil line on the stock shows what a 45˚ cut would look like.)

The doubler should be slightly wider than the armbow you just assembled. The basic idea is that you should fair the armbow then trace its shape onto the doubler. You then shave the doubler so it's the same shape as the armbow and cut a 30˚ bevel on the front edge of the doubler. Finally, glue the doubler to the armbow.

Whew. Start by fairing the assembled armbow. Use rasps or sandpaper to make the armbow look nice. Then place the doubler on the armbow and trace its shape on the doubler. Use rasps and sandpaper to shape the doubler as close as you dare.

Now cut a 30˚ bevel on the front edge and the ends of the doubler. Leave a 1/4"-wide flat on the front edge and ends. I usually make this cut on the band saw.

Once you've cut the bevels, clean them up with files and some sandpaper. Leave the flats alone until everything is assembled. Finally, glue the doubler to the armbow.

After the glue has dried, remove the clamps. Now refine the armbow

Double down. Glue the doubler to the armbow. Make sure the doubler doesn't move when you apply the clamps. Use liquid hide glue so you have a lot of open time – this gives you the opportunity to shift everything in place.

as much as you like. I cut a 30° bevel on the front edges of the hands and smooth everything out.

Sticks & How to Drill Them

The sticks in this chair are dowels (will the blasphemy never end?). But they're not just any old home center dowel, they're… OK, they actually are home center dowels.

Now before you curse my name, let me explain. These dowels have dead-straight grain through their entire length, just like a stick in a traditional Windsor chair that's made with rived stock. How is this possible? The magic of manufacturing.

If you go to the home center and sort through a big bin of dowels, there is a better-than-average chance that you'll find some dowels with arrow-straight grain – usually enough for a chair. I haunt the home centers in my area and find a handful of prime dowels with each visit.

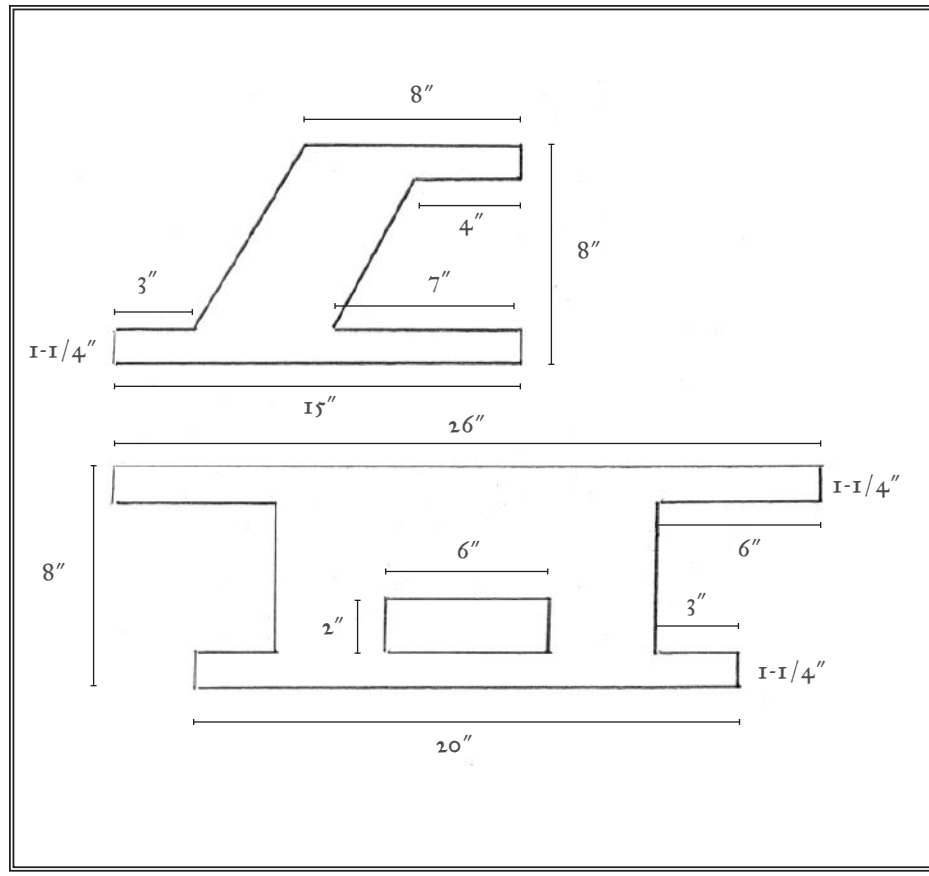
A handy notch. This V-shaped notch tells you when to stop drilling the mortises in the seat of the chair.

All dowels are slightly oblong in cross section. You'll compress these a bit to fit them in an undersized mortise (more on that in a bit). So, don't worry that the dowels aren't perfectly round or that they aren't perfectly 0.625" in diameter. Just pick ones with straight grain.

Before you drill the holes, you need to tweak your spade bit. For these chairs, I use 5/8" spade bits. They come in two lengths – about 18" long and about 6" long. Get both lengths – spade bits are cheap. Do not buy the bits that have a threaded screw-like tip. These suck for chairmaking.

The beauty of spade bits is that you can grind (or file) their long edges to make the bit drill a slightly undersized hole. I do this on the grinder and it takes 23 seconds, tops. Kiss both long edges of the bit to the grinder's wheel. Try to remove the same amount of metal from each edge. Then use a dial caliper to check your progress – I shoot for a bit that is about 0.010" less than 5/8" – 0.615" or so. If you don't have a grinder, a coarse file will also work.

Before you step away from the grinder, grind two notches in the long



edges that are 1" up from the bit's cutting spurs. This notch will tell you when to stop drilling. Blue tape slips and allows you to drill all the way through your seat.

Before attaching the jig to the seat, mark the location of the holes in the armbow and the mortises in the seat using the drawings to guide you.

Now it's time to suspend the armbow over the chair seat and drill the mortises in both pieces. To do this, I make a jig from some scrap construction 2x12s. I cut these two jigs out on the band saw. This jig is not fine furniture – it takes about five minutes to make it.

The jig has two parts that are not attached to one another. One part clamps to the seat and holds the hands in position. The second part

The jig is down. Here's the armbow jig in action. The front piece supports the hands. The back piece supports the remainder of the armbow. This jig – rough as a cob in an outhouse – provides unparalleled drilling stability.

The magic wand. The magic wand is better than a magic eyeball. Since we added it to our chairmaking regimen, drilling errors have diminished.

clamps to the seat and holds the rear part of the armbow in place.

The only fancy part of the jig is that I mark out some lines every inch away from the centerline of the jig that goes under the hands. These marks allow me to center the armbow over the seat.

Clamp the jigs to the seat and put the armbow on top. To get it in position, place a combination square on the seat. Position it so the blade touches the outer edge of the seat. Shift the armbow to touch the blade. Move the square to several points on the seat to ensure the armbow is positioned correctly.

If the above description flummoxes you, think of it this way: The inside edge of the armbow should hover directly over the outside edge of the seat.

The meat bushing. Use your fingers to keep the drill bit centered in the hole in the armbow and it will be difficult for you to botch this job.

When you achieve this, clamp the hands in place. Then clamp the rear of the armbow to the jig.

The hard part is over.

Now you just have to drill the holes through the armbow and into the seat. This is easy if you have a friend and a straight stick, which I call the "magic wand."

The magic wand is a straight stick that your assistant holds up to check the pitch of your drilling. The assistant sits 90° to you and holds up the wand so it looks like the wand intersects the location of the mortise in the seat and your drill bit. Then they tell you to lean forward or back.

Before you drill, clamp a backing board under the armbow to prevent massive spelching when your spade bit explodes through the bottom of your armbow.

You might be wondering: What are the sightlines for this drilling operation? Good question. The sightlines are "baked in" to the design. You are trying to join two points (the two mortises) with a line (your drill bit). Only one line in the universe can join those two points. So, align the two points in front of you by eye. Have your assistant sit at 90° to you. You will get very close by eyeballing it.

Now listen to your assistant for the fine tuning….

After drilling through the armbow, place the lead point of your spade bit in the mark on the seat. Use your fingers to keep the bit centered in the hole you just drilled in the armbow – I call this the "meat bushing." It works. Drill until the notch in your spade bit reaches the seat.

Now move the backing board under a new hole and repeat the drilling process.

Fashion Your Sticks

The good news is that your sticks don't need a lot of work. You need to compress the ends of the sticks that go into the seat. And you need to scrape the four back sticks a little to pass through the armbow.

Cut your sticks to length. Leave the back sticks about 24" long so you can adjust the position of the crest for the sitter.

Sand all the sticks. I start with #180-grit and finish with #220-grit. You might have to start at a coarser grit depending on your dowels. After everything has been sanded, use "non-scratch pliers" to compress the tenons on the short sticks. Non-scratch pliers have plastic jaws that won't chew up the wood. If you don't own this tool, wrap the jaws of your pliers with masking tape to mimic the action of the non-scratch pliers.

A little compression. The pliers press and burnish the wood a bit. When the tenon encounters the warm hide glue (which is nearly 50 percent water) it will swell up to its full size and lock the joint.

Scrape up. Here I'm using a Veritas chair devil to scrape the stick so it is round and will pass through the armbow.

Here's how you compress the tenons. Squeeze the tenons gently and rotate the stick. You'll feel the tool's handles flex as they encounter the oval shape of the dowel. The pliers can squeeze most of this out and create a round tenon that will fit into the undersized mortises in the seat and armbow.

After your first few tenons, check the fit of the tenons in the seat or armbow. The tenons should need light mallet taps to seat them. If you are whaling on the stick it's too tight. If it drops into the mortise you are too loose.

With chairmaking, it's easy to make the joints too loose or too tight. If they are too loose, the glue will fail and the chair will fall apart. If things are too tight the chair won't go together without self-destructing. The margin for error is pretty low, I'm afraid. The good news is that

Fit sticks. Here you can see the back sticks that slide smoothly into the armbow.

most chairmakers learn the margin of error by rote after only one or two missteps. I did.

For the four long sticks, you'll need to shave the section of the sticks that passes through the armbow. This is done with a scraper or a scraper shave – a tool you can buy or make. Sometimes called a "gunstock scraper" or a "chair devil," this is a tool much like a spokeshave that scrapes instead of slices.

To scrape the long sticks, wrap some tape around the point where the scraping should stop and get to work on everything above the tape. I clamp my sticks in my face vise and work them with a scraper – no spokeshave required.

Scrape the four sticks and test their fit in the armbow. When everything fits, saw a kerf in the top of each short stick – just like you did for the legs. The kerf should be about 3/4" deep. Now set the sticks and armbow aside. It's time to saddle the seat.

A is for Adze. Adzes are an important part of the pre-industrial method for processing lumber. You can also use it to scoop out a seat, as shown here.

Seat Saddling

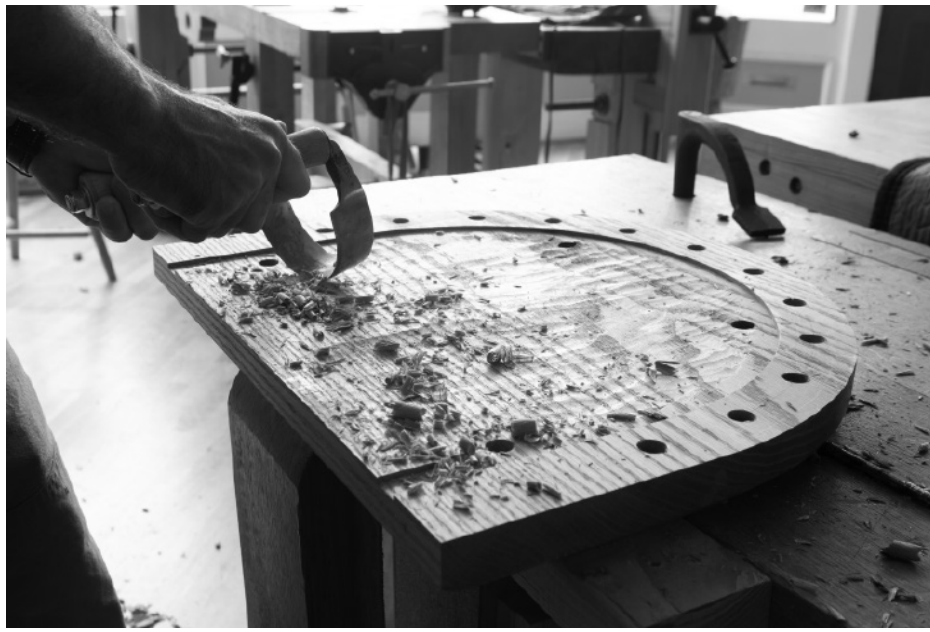
I've saddled a lot of seats, but I am not an expert. If you want a master's thesis on the topic, read Peter Galbert's "Chairmaker's Notebook." If you want the "Dick & Jane" version, read on.

I prefer seats that are lightly saddled – about 3/8" to 1/2" deep at maximum butt projection. I have a lot to say about why I prefer shallow saddles, but the short answer is that I don't want to create a Jell-O mold for my customers' butts.

There are lots of ways to carve away the seat and make room for your butt cheeks. While I've tried many ways – both hand- and electric-powered, I prefer the simple hand-powered ways. They don't take too long – I can saddle a seat to completion in three to four hours – and you are unlikely to mess one up with hand tools.

Using an angle grinder or router jig, on the other hand, can botch a seat in seconds.

To begin the process I usually start with a "scorp," also called an "in-



Across and angled. The grain in this seat runs from left to right. So, when I scorp the material, I work across the grain but have the cutting edge skewed slightly toward the right. This helps control tearing. As the saddle gets deeper you'll have to adjust the tool to always work downhill.

shave." It's like a drawknife that was wrapped around a cylinder. Recently, I have begun using an adze at the start instead. The adze is a like a carving gouge and an axe had a baby. It works.

Work across the grain. In oak, this is a bit of a slog. In pine, it's a breeze.

Cut as deeply as you dare without marring the spindle deck of your seat. Then get ready to switch to the scorp.

Scorping

The seat needs to be flat on the bench to quickly scoop out the wood with a scorp. To keep the seat in position, I screw a 2x4 to the underside of the seat and affix it in my face vise. Arrange the seat so you can work across the grain – called traversing. Scorping parallel to the

From the hill to the valley. If the grain in your seat is dead straight, use the travisher to cut from the high points to the low points. Cutting uphill is difficult and mostly naughty.

grain is asking for abuse.

Learning to use the scorp (especially in oak) is a challenge. Do not clench the handles with your hands. Use your arms to set the angle of the tool. Use your body to pull the tool across the grain. Repeat to yourself: Keep the wrists loose.

Travishing

The travisher is a curved-edge tool much like the adze and is used in the same direction as its coarser brethren. The only difference is the travisher takes a lighter cut.

Like all the tools before it, cut across the grain but skew the tool in the direction of the grain in the seat. But, as the cut deepens, you will need to adjust your approach to cut the seat based on the feedback it provides. Learning to read and follow the grain is the single-most important lesson when saddling.

Shave your thighs. Use a spokeshave with a curved bottom to dress the front edge of the seat where your thighs grow. With this tool you'll work (mostly) parallel to the grain.

Sandpaper is not evil. As you get better with your edge tools, you will sand less. Until you get really good, don't be ashamed of a little sandpaper. Abrasives pre-date hand-planes, after all.

When you have done everything you can with a travisher the seat will be a little lumpy. Dress the front edge of the seat with a curved-bottom spokeshave. This tool will avoid spelching if you use it mostly parallel with the grain. Again, work from the top of the hill to the valley.

Now scrape and sand the sucker. I use a card scraper with a broadly curved edge. Then I follow that with coarse sandpaper (#120-grit) if necessary. And then finish with finer sandpaper.

Make Pretty

Before assembly, derail your head for a moment. Take a walk, drink a beer or do some yoga. Then come back and look at all the parts with a critical eye. Look at them in raking light for defects or damage. Repair that stuff. Feel the edges for bumps and try to fix them.

Spend some time dressing the spindle deck. This is the last time it will be easy to do. Ditto for the armbow.

Take all the sticks and blunt the corners of the tenons that will enter the seat. Sharp corners can scar the spindle deck during assembly.

Clean off the underside of the seat if you like (I like).

When nothing else can be improved, it's time to assemble. I prefer hide glue in all instances. It is reversible and easily cleaned off, even when dry. Make sure your glue is fresh and the correct viscosity (like runny snot) before beginning. Lay out rags, glue brushes and a toothbrush for cleaning glue out of corners.

Assemble the Undercarriage

The undercarriage is easy on this chair because there aren't stretchers. Basically, you glue the legs into the holes and wedge them.

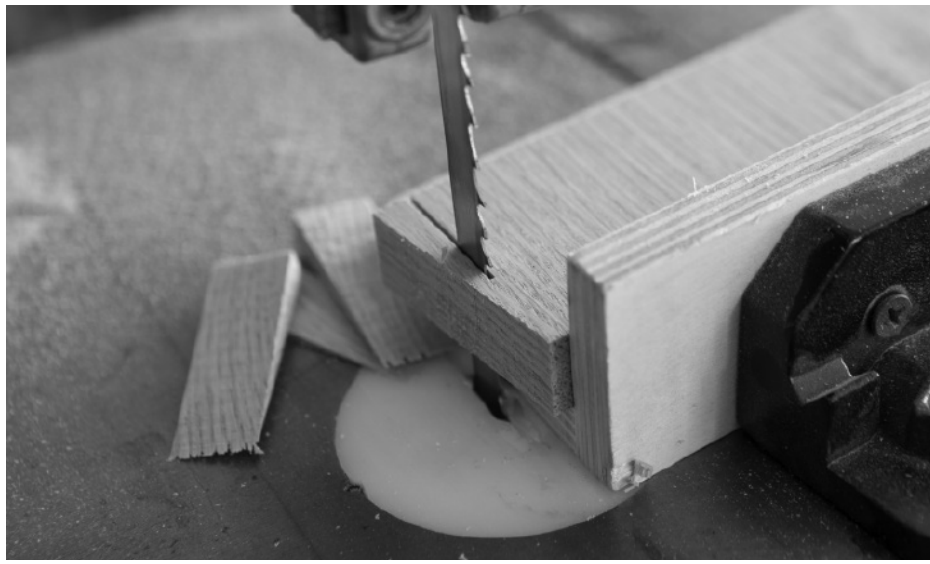
But wait, where do wedges come from?

I make wedges on the band saw using a variety of methods. Both methods use a blank of oak that is 5/8" thick, 8" wide and 1-1/2" long. If you think about it for a minute, this makes sense – you want the grain to run the length of the wedge.

One method uses a miter gauge set to 2° to rip wedges from the blank. Make a cut, flip the blank over and make a second cut.

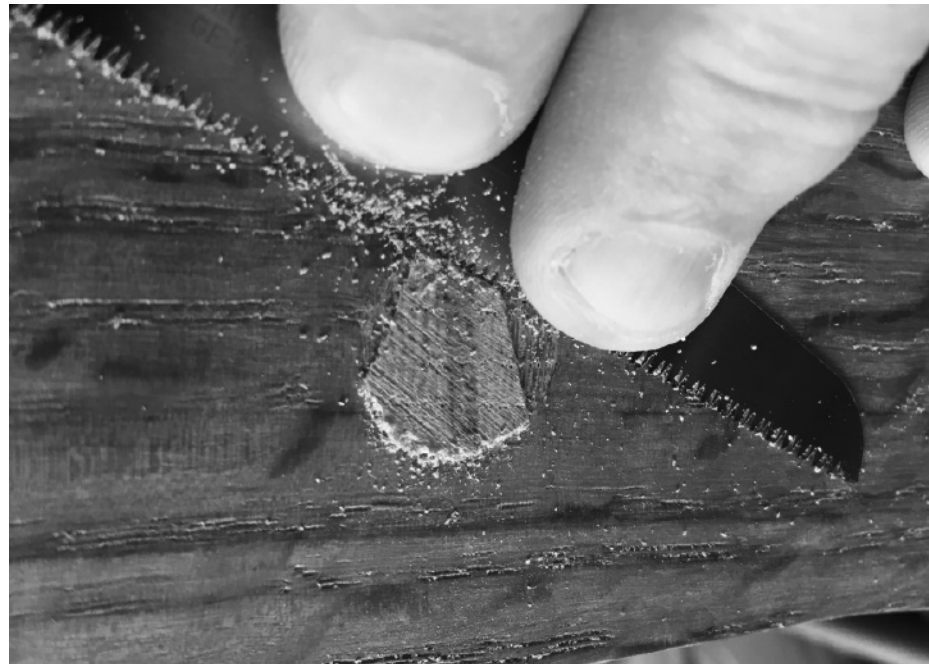
Or you can make a dedicated jig that passes between the band saw's blade and a fence. There's a wedge-shaped notch cut into the jig. You press the blank into the notch and saw. Flip the blank and saw again.

Make a ton of wedges with thin tip and thick tips. You'll be glad you



Cut and flip. The advantage to using the miter gauge is it's faster. The downside is that your fingers get closer to the blade at the end of the process.

With a fence. For this jig, you need a fence on your band saw (or clamp a piece of stock to your table). The jig is a block of wood with a wedge-shaped notch cut into its side. The jig passes between the fence and the blade. Press your wedge wood into the notch, push the jig forward and cut a wedge free.



A close shave. Here you can see how closely I cut my tenons before finishing them off with a flush-cut saw. You might prefer a chisel here – that's fine, too.

have a variety of wedges to choose from when the glue is getting hard.

To assemble the undercarriage, paint each mortise and the tenon with glue. Rotate the leg so the kerf in its tenon is perpendicular to the grain of the seat. Drive it in hard with a small sledge. After driving in all the legs, turn the chair over.

Likely the kerfs in the tenons have closed up. Don't panic. This is normal. Fetch a 5/8" chisel and drive it into each kerf to open it up. The bevel of the chisel will deform the kerf enough that you can slip a wedge in there.

Paint a wedge and drive it into the kerf. Keep striking the wedge until it stops moving. When the wedge stops moving, stop hitting it.

Let the glue dry overnight – even if you are in a rush. Leveling the tenons with soft glue around is ruinous to your tools and results.

The next day, trim the tenons with saws and/or chisels. My preferred method is to cut the tenon as close as possible with a saw, then use a fine

Wiggle up. Here I'm rotating the short stick as I push it upward. This spreads the glue around the joint and allows me to position the kerf in the stick correctly.

flush-cut saw to finish the job.

After you trim the tenons, dress the seat again with a scraper and sandpaper. Then you can assemble the armbow and sticks.

Assemble the Top Stuff

This part is easy if you do it correctly. First thread the four long sticks into the armbow. This is important. Here are the next steps:

1. You'll glue the sticks into the armbow.
2. You'll add glue into the seat mortises.
3. You'll wrangle the armbow and sticks into position on the seat.
4. You'll knock the armbow in position.
5. You'll wedge the short sticks.

It's easy to get in the weeds quickly. Follow the steps above and it's difficult to make a fatal error.

Glue is cheap. Don't skimp on glue. The surfaces need to be wetted with glue to get the best bond.

Hand fit. It takes a few minute to get all the sticks in place. This is why liquid hide glue – and its long open time – are an asset.

Bring on the mallets. Drive in the back spindles until they bottom out in their mortises. Then start knocking the armbow and the short spindles down.

So, let's begin by gluing the short sticks into the armbow. Put a short stick into a mortise in the armbow only about 1/32". Paint the inside of the mortise with glue and wiggle the stick up and rotate it so its kerf is perpendicular to the grain of the armbow (just like you did with the chair legs).

Repeat this process for all the short sticks. Then add glue in the mortises in the seat.

Now dock the armbow into the seat. This takes some wiggling and bending and cussing. Try to use hand pressure only to get the sticks started in the seat. You'll switch to the mallet in a bit.

Seating the short spindles is a game of eyeballs and tape measures. The chair has to look right. The tape measure can guide you, but the eyeball is the ultimate judge. The goal here is to knock the armbow around until it hovers 8" above the seat. It will want to tilt on you. Dive. Rise up.

Wedged for good. The wedges ensure the armbow won't go anywhere.

Sticks will move up and down.

Knock things around. Check your work. Don't say you are done until it looks good to your tape measure and your eye. Then walk away to get the wedges.

Wedge the sticks into the armbow just like you did the legs. Let the glue sit overnight. Level the tenons the next day.

Sawing for strength. The grain bends a little around this knot. I wish it bent more, but this what I had on hand.

Make the Crest Rail

The crest rail is sawn out of solid 8/4 material – no steambending here. But it pays to use wood that has some curvy grain, both for looks and for strength.

Cut the crest on the band saw. Lay out the locations of the mortises in the crest. Their spacing matches the spacing of the holes in the armbow and the seat. That consistency is what gives the back its straight appearance.

Drill the 5/8" mortises in the crest. These mortises need to be angled and the angle should match the lean of the back sticks. Use a sliding bevel gauge to determine the angle that the back sticks lean. Then use that same setting on your bevel gauge to drill the mortises in the underside of the crest.

Note that the sightline is at 0° – straight ahead. These mortises should be 1" deep.

Also angled. If you drill these holes vertically, the crest will look very odd. Drill them at the same angle as the back sticks intersect the seat.

Three fingers. On my hand, three fingers is about 2". Prop up the bubble level with your fingers. When the bubble level reads level, the slope is correct.

Now shape the crest to your liking. I sawed a 30° bevel on the front edge of the crest and cleaned off all the machine marks with spokeshaves and scrapers. Test the crest on your spindles. Sit in the chair and see if the crest hits you in a nice place. Lower the crest by shortening the back sticks as needed.

Then glue the crest to the back spindles. Again, this is a case where the tape measure and your eyeball need to come to a compromise. Once you are happy, clamp the crest in place overnight.

Sawing the Legs

Leveling the legs is straightforward. In the end, you want the top of the pommel about 17" from the floor. And you want the back of the seat 15" from the floor. Here's how to do it.

Create a level surface on your bench. Shimming a piece of plywood

An artificial floor. Think of the scrap as an artificial floor. Here I've planed a carpenter's pencil in half and have it held tightly to the scrap. Mark all around all four legs.

is a good solution if your shop floor is wreck. Place the chair on top and level it left to right using a bubble level and shims below the feet. To get the seat to slope backward, prop up the front legs until a bubble level reads as level when it is floating 2" off the back of the seat.

Now let a tape measure hang down from the pommel 17". The space between the end of the pommel and the floor should be about 2-1/2" or so. Measure that distance and crosscut a scrap of wood to that length.

Use that scrap of wood to scribe the final length on all of the legs.

Then it's just a matter of sawing on your lines.

After all the legs are cut to length, use a rasp to chamfer the feet a bit so they resist splintering when the chair is dragged across the floor.

Finishing

There are lots of good and easy finishes for chairs. Milk paint followed with a coat of oil or wax wears nicely. Many woodworkers like

Follow the lines. Make shallow kerfs on three facets on the legs. These kerfs will guide your sawblade as you finish cutting the leg to length.

shellac. I love shellac, but it can get too shiny for my tastes. When I use shellac, I knock down the sheen with wax and an abrasive pad.

My two favorite finishes for chairs are soap (for maple, ash or beech chairs) or a blend of linseed oil and wax (for oak, walnut and cherry). Neither finish provides much protection, but they are easy to apply, maintain and repair.