



How To Make An Electric Guitar Body

In the last article, before I started discussing the ways to make a guitar neck, I mentioned a couple of important items. I'd like to touch on these items once again before you fire up the power tools.

First, I can't stress enough how important it is to follow not only a good plan, but also the correct order in which the project is completed. It's very important to carefully think through each task and how it relates to the ones that will follow. For example, if I wanted to install decorative binding around the top edge of the body, it would work best to do it before attaching the neck. Now some of you may be wondering what the heck I'm talking about. That just goes to show how complex the process can be. If you dive into a guitar-building project without following a carefully planned schedule, you'll wind up with an expensive mistake.

The second important item is safety. Woodworking can be uncomfortable and even dangerous if you fail to take the proper precautions. Always wear safety glasses and hearing protection. Avoid loose fitting clothing, tie back long hair and get rid of any jewelry that might get caught in a power tool. Read all of the manuals for the tools you'll be using and follow the manufactures safety recommendations. Remember, like I said in the last article, if you destroy your hearing or lop off a finger or two, that guitar you're building won't be of much use!

Okay, with that out of the way, we can focus on carving out the body.

This first step in making the body of an electric guitar is preparing the blank. If you purchased or are planning to purchase a ready made blank, just sit back and relax while I explain my method for making a blank to those who'd rather save some money and do it themselves.

In the third article of this series, I discussed how to purchase wood for building an electric guitar. If you'll recall, I stated how

difficult it might be to find a slab wide enough for the body. For most guitars, you'll need a piece at least 20" long, 14" wide and 1-3/4" thick. Length and thickness usually aren't a problem, but the width can be. I have found it is hard to locate boards wider than 9 or 10."

To solve this problem, it will be necessary to pickup a board around 40" in length and at least 7" in width. That way, you can cut it in half and glue the two pieces together side-by-side. You can also triple the length if you are unable to find a board wide enough, just be aware you'll have to glue up three pieces instead of two.

If you decide to go this route, you'll need at least three 24" bar or pipe clamps to ensure a proper bond. Also, I recommend high quality wood glue like Titebond II.

Before going any further, you'll need to decide if the guitar you're building is going to have a bookmatched, decorative top like quilted Maple or similar. A bookmatched set consists of two figured



It may be necessary to glue two thick boards together to get a blank big enough for a guitar body.



Gluing on a decorative top.

boards, which have been cut from the same board. When laid flat, side-by-side, the grain and figure appear to mirror one another. If that's the case, you'll need to glue the boards to the base wood so that when you glue the blank together, the mirror effect is preserved. Keep in mind that the edge of each blank will need to be squared before final gluing. Don't let too much of the bookmatched tops overhang the gluing edge because the process of squaring up the edges will remove a small amount of wood and that will likely impact the mirror effect.

After the base board, complete with the decorative tops has been cut--a table saw works best for this--the edges to be glued will need to be accurately squared. The best way to do this is with a joiner. However, if you don't have access to this piece of equipment, you can do the job with a table saw, a router or a hand plane.

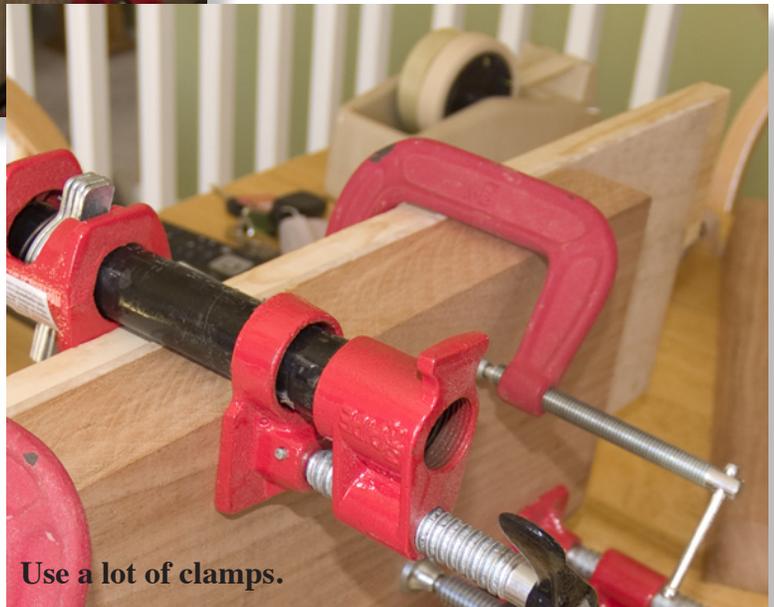
If you use a table saw, make sure the blade is sharp and positioned at a perfect 90° angle to the table. I'd recommend doing a couple of test cuts on some scrap wood to check how square and smooth the saw is cutting before running an expensive piece of wood through it.

If you use a router to square the edge, use a long pattern bit with a bearing guide on the shaft above the blades. That way you can clamp a straight board right to the edge of the body wood and use it as a guide for the bit. Make several passes, each one slightly deeper

than the one before it. Try not to cut out too much with each pass, or you'll risk tearing out chunks of precious wood.

Should either of these methods pose a problem for you, another alternative is to hand plane the edges. Only attempt this if you are confident in your skills with a hand plane.

Once you have the edges nice and square from one end of the board to the other, you're ready to glue and clamp. Start by placing a long sheet of wax paper on your workbench. This is done to prevent any glue from contacting the bench. Next, place one of your boards onto the wax paper and make sure the

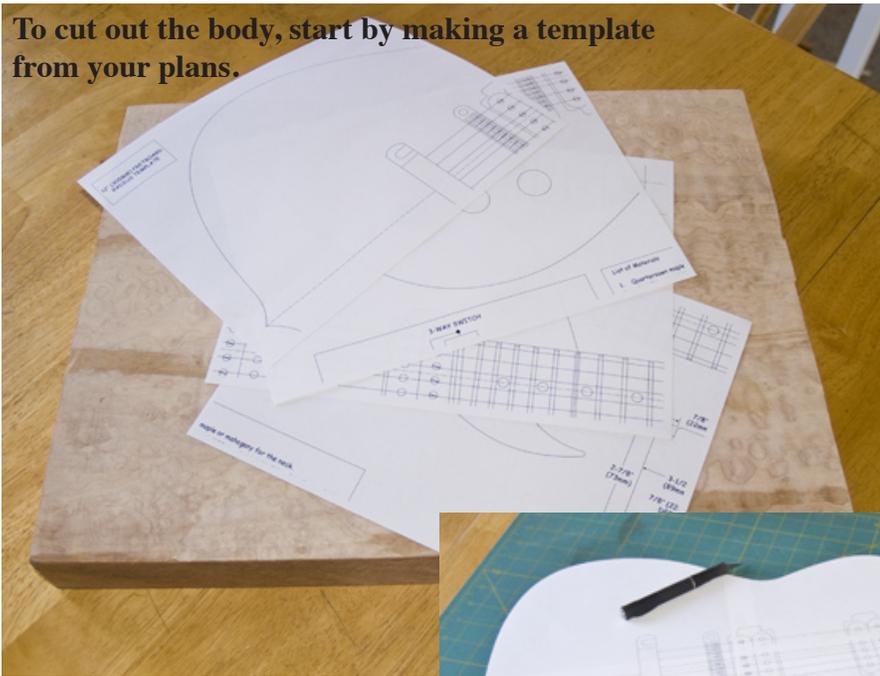


Use a lot of clamps.

edge you'll be gluing is centered on the paper. Then, apply a thick bead of glue along the squared edge of the other board. Evenly spread the glue with an old credit card or similar. I like to use popsicle sticks. Set the board with the glue next to the other on the wax paper and line them up. Make sure both boards are even with each other across the seam. Finally, place a clamp at each end and one in the center. Clamp tightly and wipe away as much of the excess glue as you can. Double-check the boards to make sure they are both even with each other across the seam. Adjust if necessary, but do so quickly as the glue will set in about 10 minutes. Now comes the hard part; waiting for the glue to dry. Let it cure for 24 hours.

After the glue has cured, remove the clamp and check the blank to make sure it's square across the

To cut out the body, start by making a template from your plans.



template, start by making a full size copy of your plan, showing guitar's body. You can do this easily by simply tracing your plan with tracing paper. Or, if you purchased a plan from eguitarplans.com, you can print out just the body pages and tape them together.

Once you have a full size copy, carefully cut out the body's shape using a sharp hobby knife. Make sure you cut very smoothly and precisely. Any errors here will find their way onto the template and eventually the body itself.

After cutting out the paper body shape, draw a centerline from where the neck joins the body all the way to the back edge. Next you'll need to round up a sheet of suitable material to make the template. I like to use 1/4" thick MDF board

top and bottom seams. If it isn't, the blank will need to be run through a surface planer. If you don't have a surface planer at your disposal, you can accomplish nearly the same thing with a portable belt sander, a hand plane, or if you're a glutton for punishment, a block of wood wrapped in 80 grit sandpaper. That's why I recommend getting the boards level in the first place when you glue them together.

Okay, so now we're ready to cut out the body, right? Wrong! First we need to make a template of the body's shape. In the last article I mentioned how making a template for the neck was only necessary if you're going to make more than one copy of your guitar. The body, however, is a different story.

You'll need a template to act as a guide for your router when cleaning up the sides after cutting out the body. Trust me, by the end of this article you'll understand why the body template is so important.

To make the



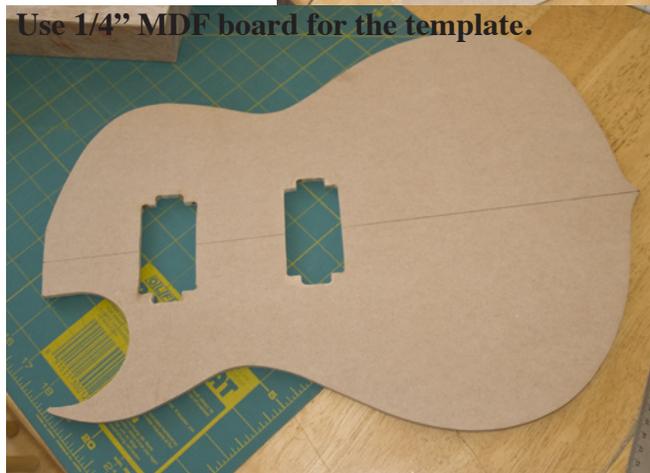
because it's cheap, easy to find at your local home improvement/lumberyard, and it's very easy to work with. Some people like to use Plexiglas or plywood, but there's higher cost associated with both.

Place the paper cut-out onto the board and carefully trace its outline. And, don't forget to mark the centerline. Take the board over to your band saw or use a jig saw to cut out the

template. Cut very slowly and precisely. It's extremely important to get the edges as perfect as possible. To check your work, run your fingers around the edge after you've finished cutting and be aware of any abnormalities such as lumps or dips. These can be fixed in most cases with a fine tooth file and



Use 1/4" MDF board for the template.



Trace the template onto your guitar blank. Use a washer to draw the line a 1/4" larger than the template.



some 220 grit sandpaper. In the end, what you want is an edge that looks and feels as if it were cut by a computer controlled router.

When you're satisfied with the accuracy of your template's shape and edges, you can position it onto your body blank. But, before you do this, draw a centerline on the blank so you can use it to help position the template. Then, grab a sharp pencil and trace the template's outline onto the blank. With the template still in place, draw a second outline, but this time, put the tip of your pencil into the center of a washer that's butted up against the template. Make sure you use a washer that's wide enough to give you a line about a 1/4" outside the first line. This second line will be the one you follow when you cut out the body's shape out of the blank.

Now you're ready to do some heavy-duty wood cutting. But, before you fire up the saw, you'll need to be aware of the limitations of your tools in order to avoid potential problems.

I always recommend the use of a band saw for the type of cutting you'll do on an electric guitar project. However, that doesn't mean you're guaranteed to make perfect cuts. For one thing, it's still possible to bind up the blade when cutting tight curves. To avoid this, cut slowly and listen to the sound the blade is making during the cut, especially through curves. If

the blade starts to complain, back off and try cutting the curve in sections.

If you have to use a jig saw, use a 4" long blade with 6 teeth per inch. Be aware that since the end of the blade isn't secure like it is on a band saw, it can angle in and out through the curves. The only way to avoid this is to cut verrrry slowly and do the tight curves by cutting them in sections.

Regardless of what tool you use, make the cut following the outside line you drew on the body. That way if the blade wanders, you'll have enough wood to compensate. And, don't forget your safety glasses. After

all, the worst time to get sawdust in your eyes is when you're cutting the body shape!

Cutting the body is pretty straight forward. Make sure you remove the template before you start and set it aside.

Go slow and watch as well as listen to your saw while you cut. I like to take a break half way through to avoid sloppiness.

When you finish, don't be dismayed by how rough the cut looks. In the next step, you'll smooth the edge out with a plunge router.

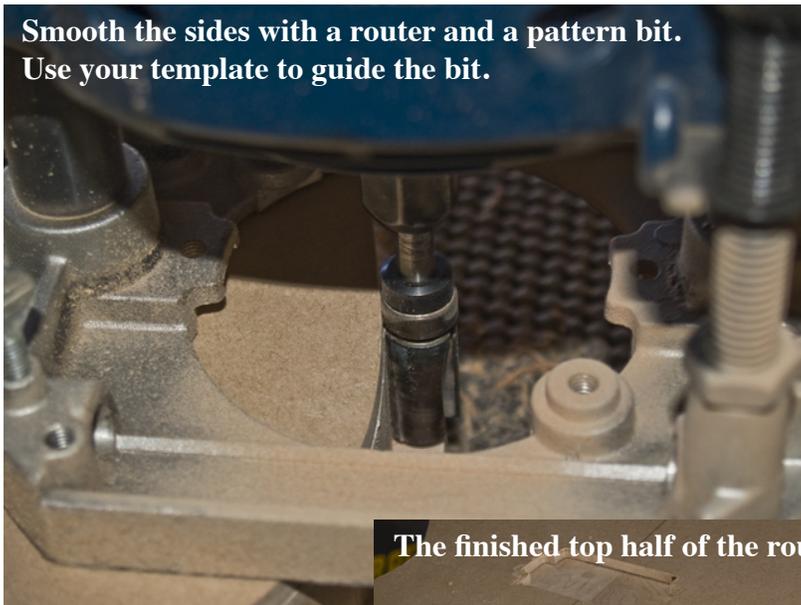
Grab your guitar's shape template and fasten it to the body with either clamps or wood screws. If you use the latter, be sure to place the screws where the holes won't remain, like where the pickup pockets will be located. That means you'll need to have a good idea of where pickups will be positioned. I prefer using clamps since I am usually not sure, at this stage, exactly where the pickups will be located.

Now you are ready to use your router to smooth the edge. The template will serve as a pattern, which means you'll need a pattern bit to do the routing. To be more specific, I recommend using a plunge router with two different types of pattern bits. Both bits should have blades that are 1/2" in diameter and 1" in length. One of the bits needs to have a bearing on the shaft above the blades while the other will have the bearing below them. Make sure you use a bit that fits your



Use a jig saw or a band saw to cut out the body.

**Smooth the sides with a router and a pattern bit.
Use your template to guide the bit.**



rout from the backside. Make sure the bit is set to a depth that will allow the bearing to contact the newly routed edge. And don't forget to bring the edge in gradually, just like you did when you worked from the template side.

Once you've finished routing out the edge, carefully inspect your work to make sure there aren't any gouges or rough spots. If there are, don't panic. The next step should take care of them.

I have found that even if you use a high quality router and super sharp bits, the edge of the body will still need some additional

smoothing. To do this, you'll need to sand the edge with some 120-150 grit sand paper. The easiest way to do this is with a sanding drum that's about 3" long and an inch or so in diameter. If you have access to an oscillating spindle sander, you'll get great results fast. But if

The finished top half of the routed edge.



router as they come with either a 1/2" or 1/4" shaft.

When routing the edge, do so in small increments using the top bearing bit. What I mean is, don't try to force your router to hog out the edge in one pass. Instead, gradually bring the bit in toward the template by carefully shaving the wood in multiple passes. Also be sure the bearing is set to a depth that will put it in contact with the edge of the template. That way, the bearing will follow the template and prevent the bit from cutting into the body's final shape.

Should you begin to notice chips of wood flying away from the bit, stop and change the direction of your router. Ideally, you want to turn the excess edge into sawdust, not chips. After all, if you're not careful here, one of these chips might extend into the shape of the body and that could spell trouble!

After you've routed the edge flush with the template, you'll notice that because the bit will only rout about 3/4 of an inch in depth there is still at least an inch or so left to rout all the way around. To go deeper, try setting the router lower as well as removing the template. At this stage you can use the new edge to guide the bearing. However, you probably won't be able to rout all the way down to the bottom. When you've gone as deep as you can safely go, you'll need to switch to the bit with the bearing below the blades. But first, you'll need to flip the body over so you can



The finished edge.

you don't, a drill press or even a hand drill will also work very well. Keep in mind that drum sanding with a hand drill requires skill. So practice on some of the scrap pieces you cut away from the body earlier.

When you're satisfied with the edge, you can get ready to rout the neck pocket. Start by placing the body on a table long enough to support the guitar with the neck dummied into place. Next, grab your finished neck and clearly mark the fretboard's center at both the nut and the heel. Then, mark the centerline on the

To position the neck straight, first mark the center at the nut...



to have the thread pass directly over the heel mark. If it doesn't, adjust the neck until it does. Now you're ready to mark the outline of your neck pocket.

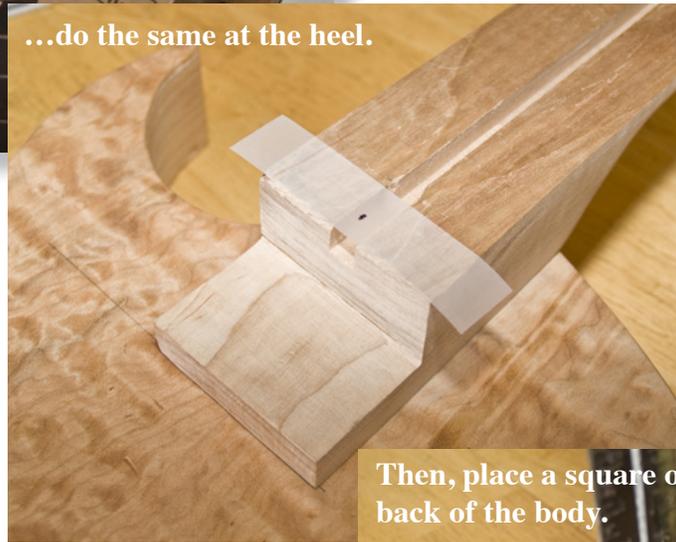
Take a sharp pencil and closely trace the outline of your neck's heel where it overlaps the body. Remove the neck and presto, you'll have the neck pocket's shape. Now you have to determine the pocket's depth.

Once you've determined the depth of the pocket, it's time to start removing wood from this area. Start by drilling out the area with a Forstner bit in a drill press. You could do it with a hand-held power drill, but a drill press is more accurate. If you have to use a hand-held drill, mark the depth on the bit with some

masking tape so you won't accidentally drill too deep. Stay well within the lines and drill down to the depth you've calculated. In fact, you may want to pull back about an eighth of an inch from the bottom. You can rout out the rest in a moment.

After drilling out the inside of the pocket, clamp

...do the same at the heel.



Then, place a square on the centerline at the back of the body.



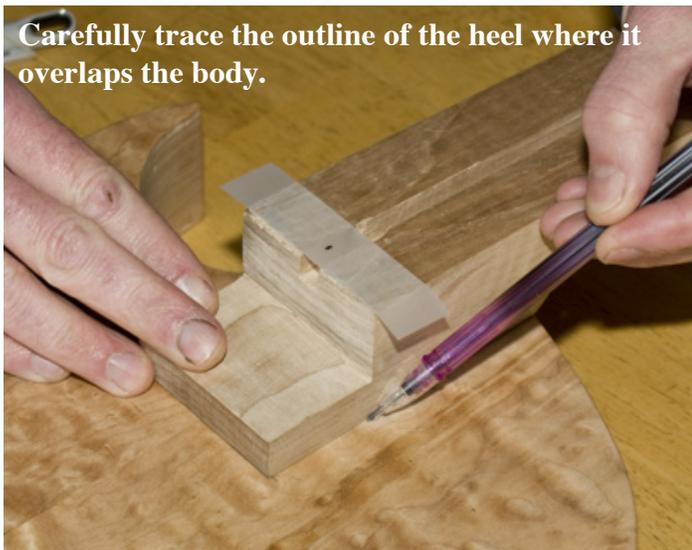
body as well. Now you can position the neck on top of the body where it will ultimately reside. Use a tape measure to mark the scale length from the nut back to where you plan to install the bridge. You'll probably have to check you plan to do this.

In order to be sure the neck is straight, set a carpenter's square against the rear of the body so the ruler portion is standing straight up and even with the body's centerline. Take a long length of thread and pull it tight between the center mark at the nut and the ruler. While holding the thread in this position, observe where it is in relation the center mark at the heel. Ideally, you need

Stretch a length of thread from the nut center to the square. If the neck is straight, the thread will pass directly over the heel center mark.



Carefully trace the outline of the heel where it overlaps the body.



A simple jig is all you need to rout the neck pocket.



the body to your workbench. Next, clamp two long, $\frac{3}{4}$ " thick, straight edged boards on each side of the pocket so they cover the lines. Then, clamp another board with the same thickness to the body, between the two parallel boards so that it just covers the heel line. The idea is to use these boards as a guide for routing the edges of the pocket. I recommend you position the boards so the pocket will be almost too tight for the neck's heel to fit into. You can, and probably will, need to sand the sides and back of the heel in order for it to squeeze tightly into the pocket. A tight fit will mean better tone and sustain.

Now you can rout the sides and back of the pocket with a top-bearing pattern bit like the one you used to rout the top edge of your guitar's body. Also be sure to set the router's plunge depth to what will be needed for the pocket. When doing this keep in mind the router will be sitting on top of the $\frac{3}{4}$ " thick boards, so you'll have to account for this added thickness when you set the depth.

When you finish routing, you'll notice where the

Neck Pocket Depth. It's All About The Angle.

There are two things to consider when determining the neck pocket's depth. The first is how high off the body you need the fretboard to be. The second is whether the neck will need to sit flat in the pocket, or at a slight downward angle. Both of these factors can be decided by having an accurate plan that shows both the height of your bridge as well as the nut on the guitar's side view. By drawing a line from the nut to the bridge saddle, you can get a pretty good idea of the string action you'll end up with. If the string is going to be too high off the frets, you can raise the fretboard by decreasing the neck pocket's depth. However, be aware that doing this may increase the distance between the bottom of the strings and the pickups. An alternative would be to keep the fretboard low to the body and angling the neck a couple of degrees so the headstock is below level. In most cases, an angle of -2 to -3° is sufficient. The nice thing about modern bridges is the saddle height can be adjusted if the angle is too great or not enough.

I have found that regardless of whether the neck will be flat or angled, the pocket is easier to cut if the bottom is kept flat. If you need to angle the neck down a bit, I feel it's better to plane or sand the bottom of the heel at an angle so that when the neck is inserted into the pocket, it will automatically assume the correct downward slope. To do this, the angle you generate should be in the opposite direction of what the neck will ultimately need to be. In other words, the back of the heel will be slightly thicker than the front where the neck exits the body. This will cause the neck to angle down toward the headstock.

The reason I like to do it this way is because I can gradually plane or sand the heel—periodically test fitting it into the pocket—until I get the angle I need. Other builders like to cut the angle as they rout the pocket, but if you don't get perfect on the first try, you'll have to adjust the angle by removing more wood from the bottom of the pocket until you get it right. But if you have to shave the bottom of the pocket more than a couple of times to get the correct angle, you could end up with a pocket that's too deep for your neck.

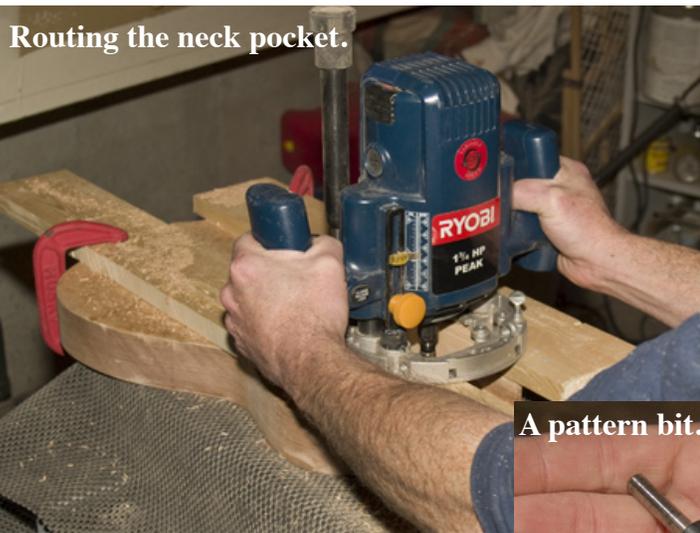
An angled neck means low string action.



A flat neck may result in excessively high string action



You'll need an accurate plan to determine neck angle. You could always guess based on the standard of between -1.5° and -3° , but if you're wrong, it could be impossible to fix.



Routing the neck pocket.

A pattern bit.



Test fitting the neck.



That's a tight fit!

First of all, don't wait until now to figure out where the cavities are going to be located. It's very important to layout the pickups and controls so the cavities won't run into each other or interfere with the installation of the bridge. Also you'll need to plan for the depth of each cavity. For example, it's a good idea to make each pickup cavity conform to the shape of the pickups themselves. Avoid making the cavities more than 1/8 of an inch larger all the way around each pickup. This is especially important if you're going to be mounting the pickups with trim rings. If you make the pickup cavities too large, the trim rings won't cover them up.

With regards to the controls, if you plan to rout the cavity into the back of the body, you'll need to measure the height of the pot and switch shafts to determine how deep the cavity can be routed. But, be very careful not to make the cavity excessively deep or the wood between the bottom of the cavity and the front of the guitar may become too thin. For that reason, if you plan to rout the cavity into the back of the body, I recommend the use of long shaft controls just to be safe.

On the other hand, if you plan to rout the control cavity into the front of the body, you'll need to cover the resulting hole with a plate or a pickguard that holds the controls. In this case, before you start routing, you'll need to measure the distance from the back of the cover to the bottom of each control. The control, which extends down the furthest from the back of the cover, will determine the depth of the cavity.

The method I use for making the cavities works for both pickups and controls. Start by making a template



Dummy up your hardware to determine cavity placement.

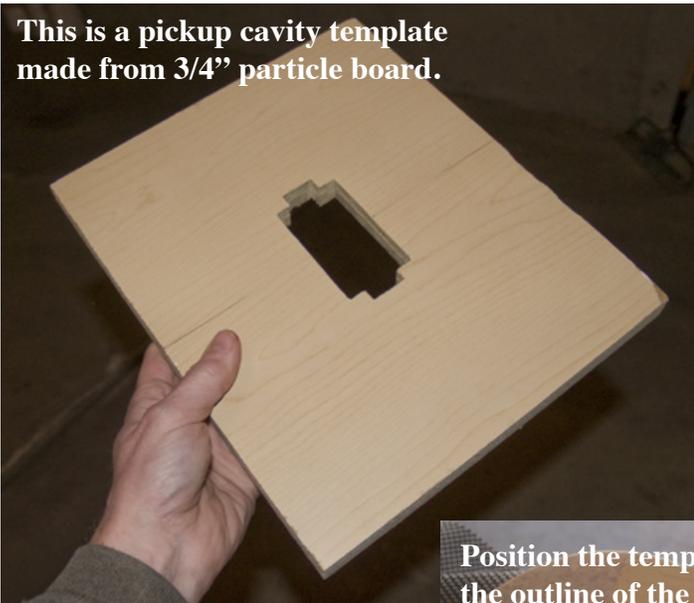
sides of the pocket meet the back, are rounded. You can either round the heel of your neck to match, or chisel out the rounded corners. The choice is purely aesthetic, so it's up to you.

At this stage, the neck pocket is finished. All that remains to be done is to sand the sides and back of the neck's heel in order to get the tight fit that's required.

Next, you'll move on to drilling and routing the pickup and control cavities.

When it comes to the pickups and controls, the cavities they are installed in are made using the same technique. But, there are a few things to be aware of when preparing to carve them out.

This is a pickup cavity template made from 3/4" particle board.



for each cavity out of 3/4" thick MDF board. I like to use the 3/4" thick stuff because I can use my 1" long, 1/2" diameter, top bearing pattern bit. If I used anything thinner, the 1" long bit would have to be plunged too deep for the bearing to contact the edge of the template.

After you've made the templates, use them to mark the position of each cavity on the body. Make sure you give the neck pocket and the bridge location enough room so as not to interfere with either. Also, try and stay away from the body's sides especially if you plan to round over the edges.

Before we go any further, let me say a few words about pickup placement.

No matter what type of pickups you plan to use, there is always a question of exactly where to place them in relation to the neck and the bridge. My answer is simple: Don't worry too much about it. For now, just make sure the bridge pickup is in front of the bridge and the neck pickup is immediately after the neck's heel. You could spend hours studying the theory and science behind pickup placement, but in the end, you'll discover it has very little impact since the variables are too numerous and often uncontrollable. However, the one piece of advice I can give, that you should follow, is to make sure the strings will be directly over the pickup poles. Bridge pickups usually have slightly wider pole spacing than the neck since the strings are converging as they head toward the nut.

To cut out the cavities, you'll use much the same

approach you used for the neck pocket. After marking their positions, drill out the cavities with a large Forstner bit. Then clamp the template into place and rout the edges with a top bearing pattern bit. It's that simple.

At this point, you'll need to drill or rout a spot for your input jack. The shape of this hole will be determined by the style of mounting plate. Just make sure the hole is positioned so that the jack wires will enter the control cavity.

If you are going to use a tune-o-matic or other fixed-type bridge, you are done with cavity routing. Just sit back and relax for a few while I explain what

needs to be done to install a tremolo bridge.

More cavities to rout! That's right, if you've opted for a tremolo, you're like going to have rout some more cavities in the body to account for any return springs as well as the bridge

Position the template and draw the outline of the pocket.



After pre drilling, rout the edges of the pocket.

itself. The size and shape of these cavities will depend on the type of tremolo you plan on using. Hopefully, the bridge you purchased came with a schematic that shows both the dimensions and placement. If not, you'll have to do some research. I hope you took care of this early on during the design phase of your guitar. After all, now wouldn't be the time to discover you



The finished neck and pickup cavities.

can't use your intended bridge due to the placement of the control and pickup cavities. If you purchased your plan from eguitarplans.com, you can relax as all of the cavities are clearly marked.

Routing the tremolo cavities is accomplished in pretty much the same manner as the other ones I have already described. Of course you'll need accurate templates to do the job. You can make them yourself, or purchase ready made ones from stewmac.com. Just make sure the template you choose will work with your bridge.

Regardless of whether you are going to use a fixed bridge or a tremolo, you'll need to connect all of your cavities so you can run your wires where they need to go. That means you'll have to drill holes or cut channels to link the cavities together. You'll also need to drill a hole or rout a cavity for your output jack. The choice here will depend on how the



Use your plan to make the template(s) for your control cavity.



Use two templates for the control cavity. One for the cavity itself and one for the recessed shelf that will support the cover.



Predrill the cavity with a Forstner bit.



Use the templates to guide your router when finishing the cavity.

The finished cavity with it's recessed cover shelf.



hole where it will contact the threaded insert when its installed. For tremolos, I drill into the return spring cavity and hook the wire to the bridge block. Whatever you do, just make sure you have a wire making good contact to your bridge, or ZAP!

If you drill holes, be very careful of the direction and angle. Also, you'll need to use an extra long 1/4" bit to do this. Any miscalculation (these calculations are done by eye) could result in the bit missing its target.

With all of the sawing, routing and drilling out of the way, you can now proceed with final shaping and

sanding. Now is the time to carve any comfort contours or rounded edges. I normally do this with a rasp file and follow up with a fine tooth file and some 120-150 grit sand paper. Later on when you get ready to stain or paint your guitar you'll treat the body to an even finer grit

jack will be mounted. A Les Paul style jack will require a hole 7/8 of an inch in diameter, drilled into back edge of the body and directly into the control cavity. A Stratocaster style jack will need a oval shape either routed into the front of the guitar and into the control cavity or cut into the pickguard.

There are a couple of ways to route the wiring for your guitar. If you rout the control cavity into the front of your guitar and plan to cover it with a pickguard, you can rout a 1/4" wide by 1/4" deep channel between the pickups and into the control cavity. However, make sure your pickguard design will cover everything. On the other hand if you plan to rout the control cavity into the back of your guitar or if your pickguard won't cover any channels, you'll need to drill tunnels instead. Regardless of how you plan to proceed, be aware of how the wiring harness will be laid out. Usually, the wire starts in the neck pickup pocket and is run back to the bridge pickup pocket. From there it heads to the control cavity where it will be soldered to the pots and switch before connecting to the jack. The last tunnel or channel you'll need is one which leads from the control cavity to the bridge so you can ground the strings For a tune-o-matic bridge, I drill from the control cavity into the post mounting hole. That way I can run the ground wire into the post

Use a long bit to drill holes linking the cavities.



Carefully angle the drill to connect the pickup cavities with the control cavity.



Drilling the jack hole.



along with a few other prepping techniques. But that's for a future article.

In the next article, I'll discuss how and why you'll need to dummy up the guitar as well as how to make the nut.

For more information about electric guitar building, be sure to visit my web site at eguitarplans.com. There you find a selection of unique and original electric guitar plans available for download at a very reasonable price.

