

# Body-Built Acoustic Guitar Kit

## #6630 Assembly Instructions



# Table of contents

## Getting started

Welcome to guitar building! .....	3
Recommended tools and supplies .....	3
Kit parts list .....	4

## Fit and fill the truss rod channel

Fitting the truss rod .....	5
Fill the channel .....	5

## Peghead shaping and drilling

Peghead overlay .....	6
Shape the peghead .....	6

## Fretting and fretboard gluing

Installing the frets .....	7
Installing the fretboard .....	8

## Neck shaping and adjustment

Neck Shaping .....	9
Installing the nut .....	9
Fitting the heel cap .....	10
Understanding the neck joint .....	10
The neck heel sets the neck angle .....	11
Fitting the neck to the body .....	11
Neck adjustment: side-to-side .....	12
Neck adjustment: tilt the neck back .....	12
Neck adjustment: tilt the neck up .....	13
Tightening the dovetail joint .....	13
Installing the last frets .....	13

## Finishing

Introduction to finishing and materials .....	14
Sanding the body .....	14
Filling the fret ends .....	15
Sanding the neck .....	15
Spray handles and hangers .....	15
Masking the neck and body .....	15
Staining .....	16
Applying a washcoat to seal the wood .....	16
Filling the wood grain pores .....	16
Lacquer spraying schedule .....	16
Sanding and rubbing-out the finish .....	17

## Final assembly and setup

Prepare for neck installation .....	18
Install the neck .....	18
Prepare for bridge installation .....	18
Installing the bridge .....	19
Fitting the bridge pins .....	20
Fitting the bridge saddle .....	20
Installing the tuning machines .....	20
Seating the strings .....	20
Understanding neck relief .....	21
Adjusting string action: nut slots & saddle height .....	21
Fine tuning the nut .....	22
Leveling the frets .....	22
Installing the pickguard .....	23
CONGRATULATIONS! .....	23

# Getting started

## Welcome to guitar building!

---

You are about to build a truly great guitar! We designed this kit with the small shop builder and a modest tool budget in mind, with the exception of a few specialty guitar making tools.

Please read these instructions before building your guitar.

It's very important to acclimate the wood to your building environment. The ideal building environment temperature is 70-80° Fahrenheit (21-26° Celsius), with a controlled relative humidity of 45-50%. The kit wood should be laid out and allowed to "equalize" for one week in your shop. Flip the wood daily. Depending upon your location and the season, you may need to humidify or dehumidify your shop to maintain the desired relative humidity. It is advisable to purchase a thermometer/ hygrometer to monitor your shop's climate. If you're unable to control the relative humidity in your shop,

we discourage building the guitar during the transition from dry to wet seasons, or vice-versa. The radical change in humidity can cause warping, splitting or other serious fit complications.

**Be safe when using tools, glues, and chemicals. Wear eye protection and gloves when needed, and always use proper ventilation.**

## Recommended tools and supplies

---

The following tools and supplies are recommended to assemble your kit. Though all of these tools aren't necessary to build your kit, they make many assembly steps easier and more professional. Where applicable, item numbers for ordering from StewMac are included.

### Tools

Electric hand drill  
Coping saw  
Center punch #2529 or awl  
Glue brushes #4167  
6" Steel rule #4894  
1/2" Chisel #1623  
File set #0842  
Small rasp #4154  
Fret Leveler #0862  
Dressing stick #1939  
Fret cutter #0619  
Deadblow fret hammer #1296  
18" Straightedge #3850  
.020" gauged saw #3572  
Scraper blade #0654  
4mm Allen wrench #6113  
Nut-slotting files: 0.016" width (#0827) and 0.035" width (#0832)  
1/4"-diameter bit #4850  
Bridge pin reamer #3227  
Fret dressing file, medium # 1602  
Radius-sanding block, 16" radius #0413  
Small cam clamps (at least 2) #3724  
Large cam clamp (2) #3725  
Spool clamps (24) #3715  
Clothes pins (50)  
Medium bar-style clamp (2) #3714  
X-Acto knife  
Small carpenter's square  
Feeler gauges #1811

### Supplies

3/4" plywood workboard 24" x 20"  
Titebond glue #0620  
Weld-On Cement #1975  
Super Glue (#0010 thin and #0020 medium)  
Double-stick tape #1689  
Low tack protective tape #1682  
Masking/binding tape (high tack) #0677  
Sandpaper (80, 100, 150 and 220-grit)  
Wax paper  
White pencil  
Felt-tip marker  
Capo #4571  
Gloves

### Finishing materials (for aerosol nitrocellulose lacquer finish)

Guitar Finishing Step-By-Step book #5095  
Fre-Cut® sandpaper 150, 220, 320, 600, 800, and 1200-grit at least 2 sheets of each grit (included in Finishing Paper Sampler Package #5562)  
ColorTone Concentrated Liquid Stain (tobacco brown #5034, red mahogany #5032)  
ColorTone Grain filler  
ColorTone Clear Gloss aerosol nitrocellulose lacquer (6) #3881  
Blush Eraser #1313  
StewMac Polishing Compound medium #1202 and fine #1203  
StewMac Swirl Remover #1204 (optional)  
Foam Polishing Pads (2 or 3) #3414 and electric hand drill  
Naphtha solvent #0775  
Paint stripper  
Masking supplies: brown paper, masking tape, cardboard and rubber balloon (or newspaper) for soundhole

StewMac has easy-to-order sets of tools for kit builders. Search "acoustic kit tools" at [stewmac.com](http://stewmac.com)

## Kit parts list



- |                        |                           |
|------------------------|---------------------------|
| 1 Pre-built body       | 8 Nut                     |
| 2 Neck                 | 9 Saddle                  |
| 3 Fingerboard          | 10 Bridge pins (Set of 6) |
| 4 Bridge               | 11 Pre-cut frets (20)     |
| 5 Truss rod and wrench | 12 Heel cap               |
| 6 Peghead overlay      | 13 End pin                |
| 7 Pickguard            | 14 Strings                |

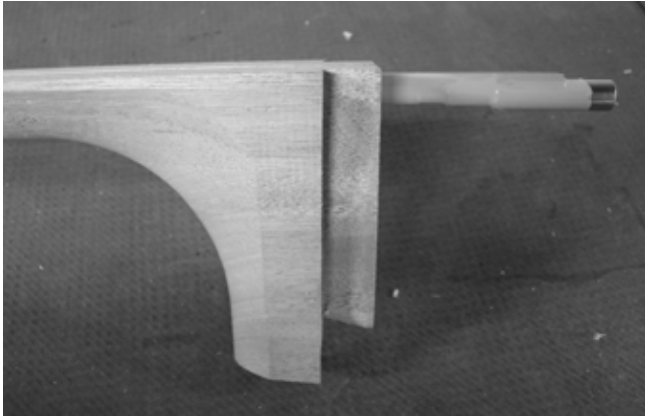
Not pictured: this assembly instructions book, shim stock, truss rod filler strip, bridge plate caul and large rubber band.

**\*Exact parts and materials may vary.**

# Fit and fill the truss rod channel

## Fitting the truss rod

The neck block and shoulder brace have been drilled to allow access to the truss rod's adjusting nut and the rod is designed to extend approximately 2-11/16" beyond the neck (**pictured**). This allows for neck removal, should it ever become necessary (this is normal on a dovetail neck reset).



The truss rod channel on the top of the body needs to be slightly squared off on the end to accept the truss rod's adjustment nut. The rounded corners of the access need to be squared off for a proper fit. A few strokes with a file (**pictured**) make easy work of this.

Additionally, the truss rod slot in the neck block needs to be around .060" deeper for the rod to seat properly. Use a razor knife and small chisel to remove the extra wood.



## Fill the truss rod channel

The truss rod filler strip will first need to be leveled flush with the neck. A block of wood clamped towards the peghead end (**pictured**) will help hold the filler strip in place while the majority of the filler is leveled with a scraper, chisel, or hand plane. Level the filler strip up to around where it meets

the clamping block leveled. Loosen the clamping block and swap it to the heel and finish leveling the filler strip down to the surface of the neck.



# Peghead shaping and drilling

## Peghead overlay

Draw a line with a pencil on the neck across the break angle where the peghead begins. Align the peghead overlay with this mark. Mark a second parallel line approximately 15/64" from the break angle. This second line is for lining up the fretboard.

Using Titebond, glue and clamp the rosewood overlay veneer, grain running lengthwise, to the face of the peghead aligning it with the pencil mark. Use at least four C-clamps with protective wooden cauls, and prepare a V-shaped caul to fit around the "diamond" contour below the nut area (**pictured**). Unclamp when dry, and trim the overlay flush to the sides of the peghead with a knife and file.



## Shape the peghead

You can round the upper corners of the peghead, design your own shape, or leave them squared in the vintage style. Shape the bottom later, when you work on rounding the neck.

Enlarge the pegholes to fit your tuner bushings. Depending on your tuners, you could use a standard peghole reamer (**pictured**), or our Peghead Bushing Reamer (if you are using Waverly tuners, we recommend #2062). Ream until the collar of the bushing is about 1/32" from the face of the peghead; at this point the bushing should press in with a snug but not too tight fit.



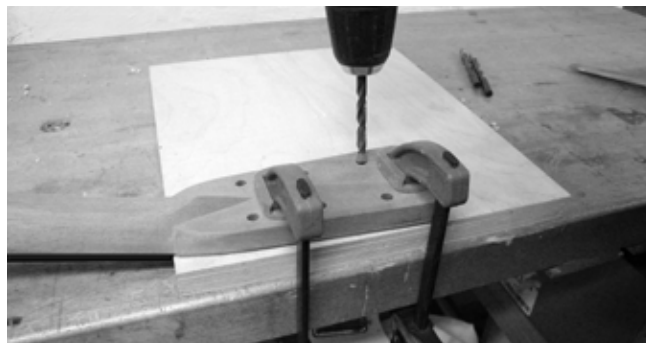
### **KIT TIP: Enlarging pegholes using a hand drill**

As an alternative to the preferred method of using a reamer you can drill out the hole to the proper size using a hand drill. This can be a risky job that could severely damage your peghead, but it can be done successfully when properly executed.

Clamp the neck to a backing board on your bench (**pictured**). The backing board will help prevent wood from chipping on the peghead face when the drill pushes through. Make sure the backing board is flat and clean there are no gaps between it and peghead face. Use padded cauls on your clamp to prevent denting the back of the peghead.

To drill the holes out to fit most press-fit bushings (11/32") you will need 3 drill bits. 9/32", 5/16", and 11/32". The idea is to gradually open the holes up a little at a time. Use standard general-purpose twist bits. We do not recommend using brad-point bits for this procedure. Tape off your bit as a depth stop to prevent drilling through the backing board.

**IMPORTANT!** For this task you will want to run your hand drill in REVERSE. The bits will act more like reamers and be less prone to wander, chip, or cause the holes to go out of round.



Starting with the 9/32" bit open up the pegholes running the drill in reverse, using care to make sure your drill remains square to the back of the peghead. Drill through going into the backing board. Proceed using the 5/16" bit, repeating the process until you have worked through to 11/32". Clean up the edges with sandpaper or a razor knife.

For enclosed tuners that require 13/32" (10mm) pegholes, continue as described using 3/8" and 13/32" bits.

Holes for non-tapered press-in bushings may require a countersunk hole, or careful filing to enlarge the reamed tapered hole. After you have fit the first bushing, use the peghole as a reference and wrap tape around the reamer as a depth stop for the remaining holes.

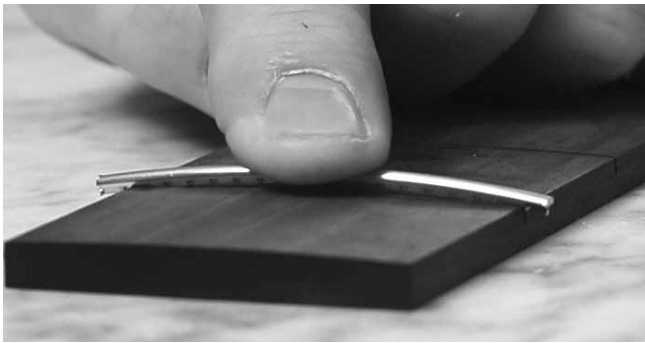
Press in the tuner bushings and set the tuners in place. Line up the baseplates of the tuners with the edges of the peghead, and centerpunch the mounting screw holes. Use a small drill bit of the appropriate size for the screws, with masking tape as a depth-stop on the bit. Install the mounting screws, and then remove the tuners and the bushings.

Later, during finishing, the mounting screw holes will fill over but will open easily with a light drilling. By installing the tuners at this stage you'll lessen the chance of chipping the peghead finish.

## Installing the frets

With a flat block (or a 16" radius block if available), stroke the fretboard lengthwise a few times, uniformly with 220-grit sandpaper, as a final smoothing to prepare for fretting.

Do your fretting on a flat hard surface (we used a slab of 1-1/4" thick marble). The frets come individually pre-bent and cut to size. They are laid out in a convenient roll according to size starting with the 1st fret. Keep the cut frets arranged in order.

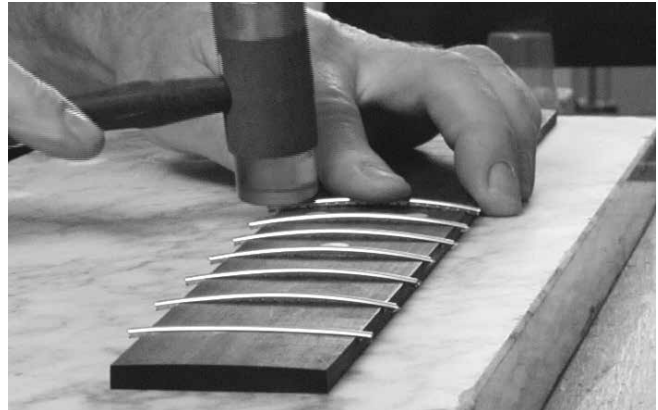


### KIT TIP: Gluing the frets

There's no need to use glue on a new fretboard, but the choice is yours. Glue keeps the frets tight and lubricates the slot for possibly easier fret installation, but also may produce an occasional loose fret end.

Set the first fret in place and hold it so that it can't tip, to prevent wood chipping (**pictured**). Seat the two fret ends with one sharp hammer blow each, then hammer back and forth across the fret. Since the fretwire is more curved than the fretboard, the fret straightens as it's hammered in. This causes the barbs on the fret tang to move sideways in the slot, tightening the fit. Avoid tipping the hammer face so that its edge hits the fret, or you'll dent the wire. Hammer from your wrist, in short crisp blows (**pictured**).

As you progress down the fretboard, the compression of the fret tangs will cause the fretboard to backbow a little, so be sure to hold the fretboard flat as you hammer. Install the wire up to the 14th fret and stop. The remaining frets, in the fretboard extension over the body, will be installed later, after the neck is "dry-fitted" to the body. We do this because the fretboard extension will curve slightly from fret compression, making sighting and fitting the neck more difficult.



With flush-ground fret cutters, nip the fret ends close to the edge of the fretboard (don't dig into the wood). Use a smooth mill file, or sandpaper on the carpenter's level, to bring the fret ends flush. Then, holding the fretboard flat against your work surface, use the mill file to bevel the fret ends at about 60°. Work slowly — you can always add more bevel, but you can't put the metal back. Lightly round over the sharp upper edges of the fretboard so they'll feel comfortable to your hand. Our Fret Beveling File makes this job quick and uniform.

## Installing the fretboard

Gluing cauls can be made to match the radius and length of the fretboard, and notched to rest over the frets. However, a simple method that works well for gluing and aligning the fretboard is to wrap it onto the neck with a large rubber band. You may need two rubber bands, but one worked for us. One rubber band is included in the kit.

With the truss rod and filler strip installed, clamp the peghead into a swivel-jawed repair vise or to your benchtop, with the neck overhanging. Cut a broomstick or a scrap of wood as a prop and wedge it under the neck heel with just enough force to push the neck into a slight upbow, or "relief," of about .012" or .015", as noted using a straightedge. This will be approximately the same amount as the slight backbow the fretboard probably took on during fretting. The two curves, upbow and backbow, will cancel each other as the fretboard is glued on, resulting in a straight neck and an unadjusted truss rod.

Lightly spread Titebond glue evenly on the neck surface. Leave the edges of the truss rod channel almost dry, the glue squeeze-out will spread right up to the edge of the channel. Be careful not to get glue in the channel. Set the fretboard on the glue surface, and align the nut end with the nut line on the neck. Tie the rubber band at the nut end, and start wrapping (**pictured**). The fretboard will align itself as you wrap, and can be easily moved if one edge is off-center. Stretch the rubber band tightly as you wrap toward the neck heel, go around the neck joint and the heel, and then wrap back to the nut. Even with a light glue application, you'll probably get a lot of glue squeeze-out. Wipe off excess glue and let the neck dry overnight.



StewMac tool recommendation  
**Essential Fretting Tool Kit** Item #3125

Our fretting experts compiled this kit of tools you'll need for the fundamentals of fret work: installation, removal and dressing. Our photo-illustrated book, *Fretwork Step By Step*, is the most complete work ever published on the subject, and it is included **FREE** to get you started!



# Neck shaping and fitting

## Shaping the neck

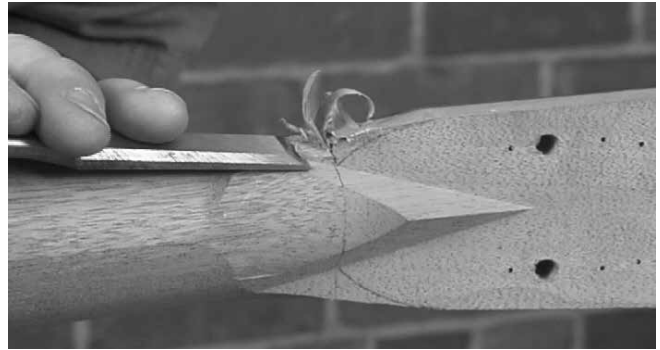
When the glue is dry, remove the rubber bands. The neck must be trimmed to meet the edges of the fretboard, without removing any of the fretboard edges or filing deep marks into them.

To complete the peghead “diamond” a little carving is necessary. Visualize the back of the neck shape continuing right up to an imaginary line at the end of the fretboard. A chisel or a file is best for establishing these lines, as well as for carving the diamond into a more delicate shape (**pictured**). Follow with a half-round bastard file or a smooth mill file (**pictured**). Finish with 150, then 220-grit sandpaper and a couple of small sanding blocks for smoothing. Always switch to the next tool or sanding grit just before you think you need it, to avoid overdoing it with any one tool.

### **KIT TIP: Neck sizes**

Although the neck has been machined to reasonably close tolerances, plenty of extra wood has been left to accommodate different neck sizes and shapes. We penciled the entire backside of the neck and used our files at a slight angle along the length of the neck (**pictured**). When the pencil marks were removed, or left evenly and slightly below the grain of the mahogany, we switched to finer grit sandpaper.

Using a rasp, followed by a half-round bastard file, shape the neck’s heel. When the heel is close to the final shape, stop. Finalize the shape later, when you add the heel cap.



## Installing the nut

Lightly glue the nut into place with a couple drops of Titebond on the bottom of the nut and the end of the fingerboard. Sand the edges of the nut as you final-sand the neck.

## Fitting the heel cap

Rough-cut the shape of the heel cap from the plastic blank provided, leaving a little overhang to be trimmed with a file after gluing. Attach the heel cap trim to the flat bottom of the heel with medium-viscosity super glue, and let it dry thoroughly. Carefully and gently file and sand the material

flush to the wood, and avoid tearing it loose. Now continue final-shaping the heel with your half-round file and sandpapers. The neck should be final-sanded to 220-grit.

## Understanding the neck joint

Ideally, the neck block has remained square to the side assembly. The neck will meet the top at a subtle 1-1/2° angle. When they are square, a minimum of hand-fitting is needed to get the proper neck set (the angle of the neck/body joint). However, it's not uncommon to find that some adjustment is needed in setting the neck. Use the following information to adjust the angle of the neck in any direction.

The neck is attached to the body using a dovetail joint. A dovetail joint is glued together using a tenon with angled sides.

### KIT TIP: Understanding neck angle geometry

Here's the way to determine how much wood must be removed from the cheeks for the correct neck angle at the bridge. Always remove wood gradually and check your progress frequently. A little adjustment goes a long way! Our example measurements below are based on the scale length of this guitar: 25.4 inches.

The measurement we want is **X** — the amount of wood to remove from the heel to change the neck angle so that a straightedge laid on the frets will be flush with the top of the bridge.

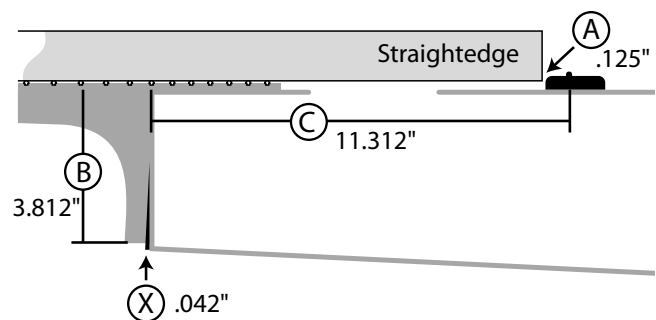
**A** = How far the straightedge falls below the top of the bridge. In this example: 1/8" (.125").

**B** = The heel length from the fretboard bottom to the heel cap. In this example: 3-13/16" (3.812").

**C** = The distance from the neck/body joint to the saddle. In this example, that's at the 14th fret, and **C** = 11-5/16" (11.312").

$$X = A \times B \div C$$

In this case, those numbers are  $.125" \times 3.812" \div 11.312" = .042"$ . So in our example **X** = .042" which is between 1/32" and 3/64". This is the amount to remove at the bottom of the heel.



## The neck heel sets the neck angle

The neck angle is controlled by the shape of the neck heel as it contacts the sides of the body. It is not determined by the fit of the dovetail joint. (In fact, correctly setting the angle on a dovetail neck actually loosens the dovetail joint, which is later re-tightened by using a wood shim.)

Removing wood from the top or bottom of the neck heel tips the neck forward or back. Removing from either the bass or treble side changes the neck's angle in relation to the center of the bridge.

## Fitting the neck to the body

The two roughly triangular surfaces on either side of the tenon are called the "cheeks" of the neck heel. These cheeks are machined flat, but the guitar sides they contact are not flat: the guitar has a slight curvature at the neck block. Most of the handwork in fitting a neck is cutting away the inner part of these cheeks to fit this curvature. Only the outer edges of the heel make contact with the body, and these edges set the neck angle (**illustrated**).

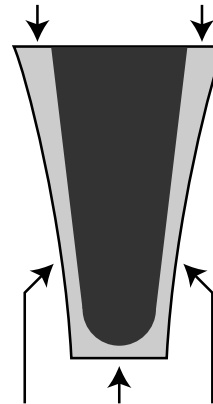
The contact area of the heel is an area about 1/8" to 3/16" wide around the outer edges of the bass side, treble side, and bottom of the cheeks. Mark this area on the heel with a pencil. Using a sharp chisel, remove wood from the remaining inner area up to the tenon (**pictured**).

After under-cutting the cheeks this way, you should have a neck fit that is very close. Still, you may need to remove a little wood from the outer contact edges to adjust the neck alignment. Removing wood from the upper part of the neck cheek edges will raise the neck (decrease the angle), removing from the bottom will lower it (increase the angle). Taking wood from either side will move the neck in that direction.

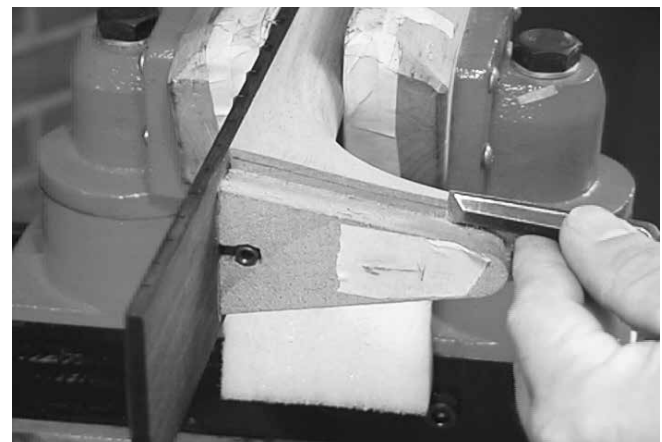
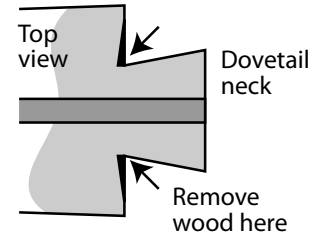
It's important to note that removing wood from a dovetail neck will move the neck toward the bridge slightly. This will loosen the dovetail joint, and introduce a slight side-to-side play. You want the neck to be in the same position each time you check it for fit, so firmly hold the dovetail against either the bass or treble wall of the dovetail socket. It doesn't matter which side, as long as you always use the same side during fitting.

Tape the bridge to the soundboard (guitar top) using low tack draftsman's tape. Center the bridge on the soundboard so that it is square to the centerline. The center of the bridge saddle should be 11-3/8" from the neck end of the guitar. (Since the neck block has an opening for the neck joint, you can measure from the center by laying a flat object across this opening.)

Remove from shaded area



Leave edges intact



## Neck adjustment: side-to-side

The first area that may need to have a small amount of wood removed is the treble or bass cheek. Wood removed here controls the “side-to-side” alignment of the neck to the centerline. If the neck is misaligned side-to-side, one of the outside E-strings will be too close to the edge of the fretboard. A tiny amount of wood is all it takes to make an adjustment here. Remove this bit of wood uniformly across the contact area on one cheek to tip the neck in the proper direction (this won’t change the neck angle when viewed from the side of the body). Use a straightedge laid against both the treble and bass sides of the fretboard to check the alignment: it should extend out the same distance from center on either side at the bridge (**pictured**).

You may not need to make an adjustment at this stage. If the neck is off-center by only  $1/32$ " or less, don’t try to correct it. Remember that a tiny bit of wood removal makes a big difference in the neck’s relationship to the centerline!

The top edge of the cheeks is the pivot point between the neck and body. This controls the neck angle as viewed from

the side. To check the angle, lay a straightedge on the frets so that it extends to the bridge. Ideally, it will just graze the top of the bridge (without a saddle). If it falls above or below the top of the bridge by more than  $1/32$ ", an adjustment is needed at the heel.

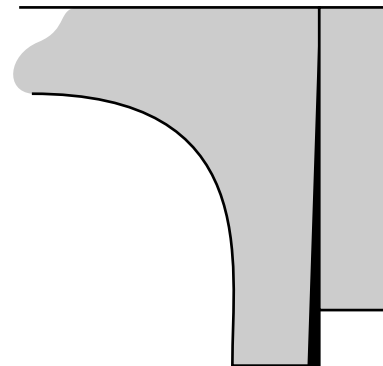


## Neck adjustment: tilt the neck back

The most common adjustment is removing wood from the bottom of the heel cheeks. Removing wood from the bottom of the heel on both the treble and bass sides equally will tip the neck back (**illustrated**). Remove the wood in a wedge shape which tapers to zero at the top edge of the cheeks.

Use the formula in “Understanding neck angle geometry” to determine how much wood to remove. With a sharp pencil and a straightedge, mark the area to be chiseled away in a straight line from the bottom of the heel to the zero point at the top. Continue this line across the heel cap and up the opposite side. These lines may be tricky to draw, because they must taper away to nothing — to the zero point at the top of the heel.

With a sharp chisel, remove about half of the measured amount of wood. Don’t overdo it: set the neck into the body and check the fit. You’ll finish the shaping with sandpaper — preferably 100-grit emery cloth (cloth-backed sandpaper). Loosen the neck joint and slide a strip of this sandpaper or emery cloth between the heel cheek and the body with the abrasive side facing the cheek. Slide the strip almost — but not quite — to the top edge of the heel (this top edge should be left intact). Be sure to angle down to keep the heel cap in contact with the sides. Hold the heel against the guitar body and pull the strip out toward you (**pictured**). This removes a little bit of wood while conforming to the shape of the guitar body. Shake the sawdust off the sanding strip and repeat the procedure on the opposite cheek. Sand equally from side



Removing wood at the bottom edge tips the neck back



to side. If you need to remove a lot of wood, make two or three passes before changing to the other cheek. The fit will change rapidly, so check your progress frequently.

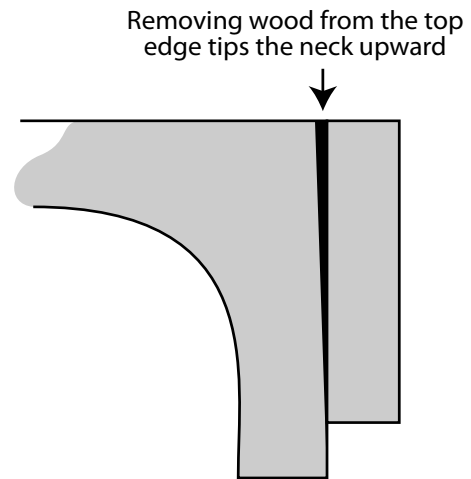
A small ledge of unsanded wood will remain on the bottom of the heel between the sanded cheeks. Either “pull-sand” it with the strip, or use a sharp chisel to remove it.

## Neck adjustment: tilt the neck up

Wood is seldom removed from the top of the heel, but if the neck block was mistakenly tipped forward when glued in place, the neck may be “overset” too far away from the body. In this case, the straightedge laid on the fretboard will extend above the bridge. Removing wood from the top of the heel on both the treble and bass sides equally will bring the neck up so the straightedge comes down to the top of the bridge (**pictured**).

Use the formula in “Understanding neck angle geometry” to determine how much wood to remove. With a sharp pencil and a straightedge, mark the area to be chiseled away in a straight line from the top of the heel to the zero point at the bottom. Repeat this line on the opposite side.

The sandpaper strip described above won’t work here because the fretboard is in the way, so you’ll need to use a sharp chisel to remove the long taper of wood on each cheek. Cut in the direction of the top edges. A final light, downward pull of the sandpaper strip will clean up any marks left by the chisel.

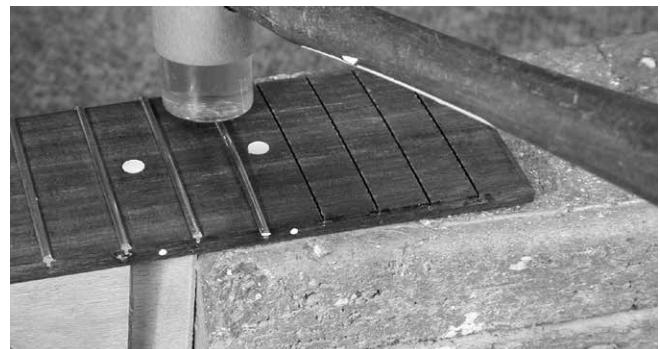


## Tightening the dovetail joint

When the cheeks fit accurately and look good on both sides, fit a piece of the supplied shim stock into the loose side of the dovetail. Hold the dovetail neck into the mortise and rock the heel. It will most likely be looser at either the top or bottom of the cheeks. File the shim stock in a wedge-shape to fill the gap. You may need to make more than one shim to get it right. When the shim is fit properly. The dovetail will pull the cheeks in tightly and the neck will stay in the body on its own.

## Installing the last frets

Now that the neck is fitted, it’s time to install the remaining frets in the fretboard extension. On your workboard, butt the tenon against the edge of something sturdy and tall enough to meet the underside of the fretboard extension (we used a brick). The entire neck and fretboard must be supported when you hammer to avoid breaking the fretboard extension. Nip the fret ends, file them flush, and bevel them as you did earlier; keep the extension supported here, too.



# Finishing

## Introduction to finishing and materials

We recommend finishing the neck and body separately, for a better job of sanding and buffing. When the neck is attached, it's more difficult to fill the grain, sand, and buff around the neck/body joint. Also, lacquer tends to build up in that area, and unsightly air bubbles may become trapped there.

The quality of your finish work is certainly important to the appearance of your guitar. A thin "nonprofessional" finish won't necessarily harm the sound of your guitar, however. If the following instructions seem beyond your skills (we assure you they're not), or to be more work than you'd like, you can simply apply a low-gloss "wipe-on" finish by hand, consisting of a couple of coats of waterbase lacquer or freshly mixed shellac. This will seal the wood and protect it from the elements, and you'll be playing your new guitar a lot sooner.

The following instructions, for spraying an aerosol nitrocellulose lacquer finish, are relatively foolproof and don't involve an investment in shop spraying equipment. Aerosol lacquers require no thinner, or course, but it's nice to have thinner around for cleanup. Feel free to apply the finish of your choice, however, according to the manufacturer's directions. If you decide to use spray equipment, always thin nitrocellulose lacquers with nitrocellulose thinner only.

## Sanding the body

All the wood surfaces should be fine sanded up to 220-grit using Fre-Cut® paper on a sanding block. Start by sanding the back and sides. Mask the soundboard with brown paper and masking tape, to protect it from the darker wood dust. The sandpaper should be no coarser than 150-grit, and you should switch quickly to 220-grit. Sand in the direction of the grain, not across it. After the first 220-grit sanding, dampen the entire surface lightly with a water-dampened (not soaked!) cloth to raise the grain. Let it dry, and sand again with 220-grit. Blow-off and vacuum the wood dust.

### KIT TIP: Aerosol Lacquers

Aerosol lacquers have a tendency to "spit" if the spray tip gets clogged. Wipe the tip clean often. Also, you can clean the tip by turning the can upside down and spraying until the spray stream stops. We recommended doing this each time you are done spraying, to keep the tip clean.

There are many gallons of finishing information in our book *Guitar Finishing Step-By-Step*, and we know of many customers who are glad they studied the book before finishing their first guitar. In brief though, here are some pointers and a finishing schedule to follow.

### KIT TIP: Finishing

ALWAYS practice on scrap wood until a finishing method has been perfected. Scraps of wood are included in each kit so you can practice all the finishing steps. If you'd like your guitar to look as good as it sounds and plays, DON'T RUSH!

### KIT TIP: Sanding

Always use a backing block or pad when sanding the guitar body. It will help maintain a level surface. On round surfaces, use a flexible rubber backing pad, a thick piece of felt or leather, or fold the sandpaper three or four times to give it firmness with flexibility.

Unmask the top, and sand it just as you did the back and sides. Don't use the same sandpaper you used on the rest of the body. Blow-off and vacuum the dust from the open grain pores.



StewMac tool recommendation

### ColorTone Aerosol Finishing Kit Item #1850

Even if you're a beginner, you can achieve beautiful results you'll be proud to show off. You'll also get professional guidance from the best instruction book available— included FREE with the kit.

## Filling the fret ends

---

Before sanding the neck, “drop-fill” the small fret slot spaces under the ends of the frets. Blend super glue with some fine wood dust, reserved from when you shaped the fingerboard. We brushed super glue accelerator on the openings first, waited five minutes, then used a toothpick to apply the super glue mixture. After thirty minutes we added accelerator again, and filed the small mounds of glue flush before sanding the neck (**pictured**). If you don’t fill the ends of the fret slots, holes will remain which the lacquer finish won’t fill.



## Sanding the neck

---

The neck needs extra sanding and grain raising in the end-grain areas of the heel, and the “ears” and the end of the peghead. Sand up to 320-grit, dampening to raise the grain. Do this several times, so the endgrain pores will absorb stain more uniformly for a better appearance.

Finish the wood preparation by wiping the neck and body with a rag, dampened (not soaked) with naphtha, to degrease all the surfaces to be finished. Handle them with clean gloves from now on.

## Spray handles and hangers

---

You can add a spraying handle to the neck by installing one or two small drywall screws in the butt-end of the dovetail tenon. Or, as an alternative, simply hold the neck at the center, spray the peghead, the heel, and a good portion of the neck up to where you are holding it. Loop an S-shaped wire hanger through a tuner hole and hang the neck for spraying the center area. You can also rest the neck fretboard-down on a riser block and spray it in the horizontal position.

For a dovetailed body, a handle installed with a couple of small drywall screws in the neck block won’t harm anything.

## Masking the neck and body

---

Apply masking tape to cover the areas that won’t be stained or finished. This includes the fretboard playing surface, the sides of the fretboard (to be unmasked after staining), the nut, the dovetail gluing surfaces on the neck and body, and the underside of the fretboard extension.

Mask the interior of the guitar by stuffing newspaper into the body, being sure to tuck it completely into the soundhole. For a more professional seal, prepare a 4-5/16" diameter cardboard disk, hinged in the middle with tape, and insert it into the soundhole. Hold it in place against the inside edge of the soundhole with an inflated rubber balloon.

Mask the soundboard when staining the back and sides.

## Staining

---

Wear plastic gloves when handling stains! The neck, back and sides of this kit should be stained. For the rosewood kit, only the neck should be stained (the back and sides don't require staining).

We recommend our ColorTone water-soluble stain in an equal mix of tobacco brown and red mahogany. Add 25 drops of each color to each ounce of water to produce a warm dark stain. For a lighter, redder color, you can use only the red mahogany at 50 drops per ounce of water. Test these stains on sanded scrap mahogany first.

Four ounces of mixed stain is plenty for a neck and body; one ounce is enough for a neck. Pour the stain into a shallow bowl. Wet a soft clean cloth with stain and apply in long uniform strokes in the direction of the wood grain. It shouldn't

take more than a minute to stain the neck, nor more than three minutes to stain the body. Stain the peghead veneer, too — it's easier than trying to mask it.

Let the stain dry. Unmask the sides of the fretboard, sides of the nut, and the soundboard (if the body was stained). Everything else should remain masked.

### **KIT TIP: Stain or not to stain**

You can also use colored grain fillers to slightly color the bare mahogany or rosewood while filling the pores, and skip the stain entirely. Test this on scrap mahogany and see if you like the somewhat lighter appearance.

---

## Applying a washcoat to seal the wood

---

Wear clean cotton gloves whenever you touch the wood. Lacquer is highly flammable — always work in a dry, well-ventilated area, away from open flames or sparks. Be sure to wear an appropriate respirator while spraying.

Spray one uniform "washcoat" of clear lacquer on the neck

and body. This is a coat that's not so heavy as to cause runs. The washcoat seals the stain or the natural color in the wood, and keeps the upcoming coat of paste filler from producing a smudged look. Sealed in this fashion, only the open pores of the wood accept the filler. Let the neck and body dry overnight.

## Filling the wood grain pores

---

We recommend using a grain filler for leveling the rosewood and mahogany grain pores. Let the filled wood dry overnight after application. Light sanding with 320-grit Fre-Cut® will remove any remaining buildup of filler on the sealed surface. Try to avoid sanding through the washcoat into the stained mahogany. If a sand through does occur, touch up the area with matching stain and wipe off the excess.

## Lacquer spraying schedule

---

**Day One:** Never apply more than three coats of lacquer per day. Spray an initial light misting or "tack" coat, followed several minutes later by a heavier wet coat. The tack coat gives the wet coat better adherence and lessens the chance of a run or "sag" in the finish. Spray three wet (not runny!) clear coats on the neck and body, an hour between coats, and let them dry overnight.

**Day Two:** Lightly "scuff-sand" the neck and body with 320-grit Fre-Cut® paper to knock off the high spots in the finish (on flat areas, be sure to use a backing pad on the sandpaper). Sand just enough to "open" the finish; don't try to sand out every shiny spot or sunken area in the lacquer. Clean off all the sanding residue. Now spray the neck and body with three uniform coats of clear lacquer, one hour between coats. You now have SIX coats. Let the guitar dry overnight.

### **KIT TIP: Running**

If you get a "run" in the finish, let the surface dry for 24 hours and level-sand the problem area. If you touch wet lacquer, you'll leave a deep impression which will be much more difficult to fix.

---

**Day Three:** Lightly scuff-sand the finish with 320-grit paper again, and clean off all the residue. You can be slightly more aggressive in flattening the sprayed surface now, but be careful on the curves of the neck, and on ANY of the edges of the neck and body (it's easy to sand through the edges). Don't try to sand out all the shiny spots yet. This sanding will release solvent from the finish and help it to cure. Let the finish dry for two more days.



**Day Six:** Once again, spray three wet clear coats, one hour apart, on the neck and body. The guitar now has NINE coats. Let the finish dry overnight.

**Day Seven:** Scuff-sand the finish with 320-grit again. This time most of the shiny spots will disappear, leaving a uniformly dull look. Spray three more clear coats, one hour apart. You now have TWELVE coats. Allow overnight drying.

**Day Eight:** Lightly scuff-sand the finish with 600-grit Fre-Cut® paper, to help the solvent escape. The neck and body should now be left in a warm dry location for TWO WEEKS to let the finish harden and shrink.

## Sanding and rubbing-out the finish

Dry-sand the neck and body to a flat, dull sheen with 800-grit Fre-Cut® paper. Clean the residue from the paper often by wiping on a scrap of carpet or a brush.

“Orange-peel” texture caused by lacquer shrinkage as the solvents cure out of the finish should be removed, but don’t oversand. When all the little shiny low spots in the lacquer have been removed, you’re ready to go to the next step.

Wet-sand with 1200-grit micro-finishing paper and water, to bring the finish to a smooth satin surface that’s ready for final polishing. Excess water and residue should be wiped off the finish with a clean dry soft cloth as you work. Rinse the sandpaper in soapy water often, to remove hard specks that can scratch the finish.

### KIT TIP: Blushing

Buy a can of aerosol “blush eraser” for lifting the bluish haze which can occur when moisture is trapped in the lacquer finish. Blushing can result from humid conditions, or if the coat is sprayed too heavily.

### KIT TIP: Wet sanding

Soak the micro-finishing paper in water overnight before use. It will scratch less, and last longer. Always keep it wet from then on. Using soft cloths, or an electric hand-drill with foam polishing pads, rub-out the fine wet-sanding scratches to a final gloss with medium and fine polishing compounds.

Use a separate pad for each compound. You can follow this with swirl remover if desired. Clean off the residue left by the polishes, remove the remaining masking tape from the neck, and remove the soundhole masking materials from the body.



StewMac tool recommendation

### Foam Polishing Pads Item #3414

Your instrument finishes can have a more professional look when you use these fiber-free foam buffing pads. The gentle polishing action helps avoid swirl marks, fine scratches and burn-through, leaving a beautiful mirror-gloss surface.

# Final assembly and setup

## Prepare for neck installation

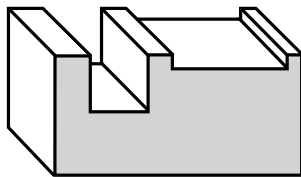
Be sure that the gluing surfaces of the neck joint and fretboard extension are free from dirt, finish and buffing residue.

With the help of a wooden shim, press the dovetail into the body. The joint will be a bit tight due to the thickness of the lacquer. If the neck and its shim go all the way down into the neck block, you can ignore the lacquer on the sides around the dovetail opening and glue the neck right over the finish. If they're too tight, file a tiny amount of wood off the shim until the neck seats correctly.

You will need 3 cauls to install the neck. Using scrap wood, use a saw and chisel to make these cauls. First, you'll need a 5° tapered and padded wedge to protect the body and to provide a clamping surface.

Second, you'll need to make a caul to go inside the body that will clear both the shoulder braces. Place this caul (**pictured**) inside the guitar so that it spans the tall and flat shoulder braces, they should fit into the notches you cut. This caul will serve as your clamping surface through the soundhole.

Shoulder brace caul



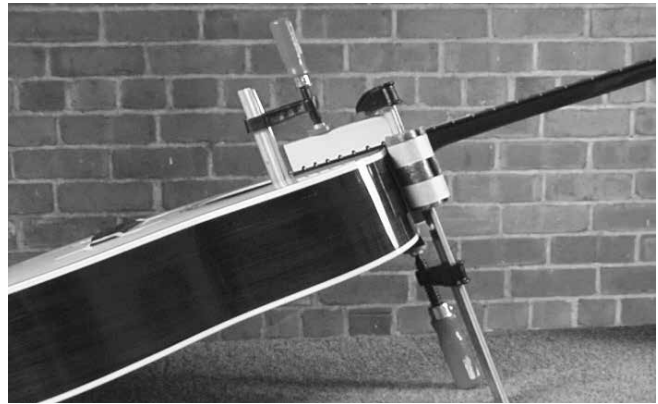
Last, you'll need a clamping caul for the fretboard extension; we made one from a 16"-radius wooden sanding block, and notched to fit over the frets. Clamp the neck into the body (**pictured**), and use a sharp razor knife to cut through the finish around the fretboard extension. Don't cut into the soundboard!

## Install the neck

Apply Titebond glue to the underside of the fretboard extension, the two sides of the dovetail, and if you wish, add a small amount on the interior walls of the neck block dovetail mortise. Be sure glue contacts both sides of the shim, too.

## Prepare for bridge installation

The bridge was positioned earlier when fitting the neck, and we'll repeat the process now. Place an accurate 18" straightedge on the centerline of the fretboard, butted against the nut. Mark on the straightedge the position of the center of



Remove the neck. The lacquer finish on the soundboard inside the scribed line must be removed with a chemical paint stripper. You **MUST** be careful when applying and removing the stripper—don't get it outside the scribed line!

Mask the soundboard to protect the lacquer finish from accidental splashing. Use low-tack drafting tape to fasten clean paper on the soundboard around the area. Keep the tape away from the line by 1/16" so the stripper won't touch or overlap the tape. Stripper will soften the solvent in the tape's adhesive, which will cause a permanent wrinkle in the new finish.

Apply stripper with a small artist's brush. Allow sufficient time for the stripper to loosen the finish, and then slowly remove small bits of the finish with a 1/2" chisel used as a vertical scraper. Always pull the stripper inward from the edge of the line to the center of the area to be stripped. After each pull, wipe the residue from the chisel with a scrap of paper towel, which should be carefully lifted away from the area for disposal. When all the old finish is removed, wipe the exposed wood carefully with a damp cloth to neutralize the remaining stripper, and let the surface dry.

Slide the dovetail neck and the shim in place and apply your clamps and cauls as you did when "dry-clamping" before stripping the lacquer. Wipe off the excess glue for about five to ten minutes as it squeezes out, using a clean damp cloth.

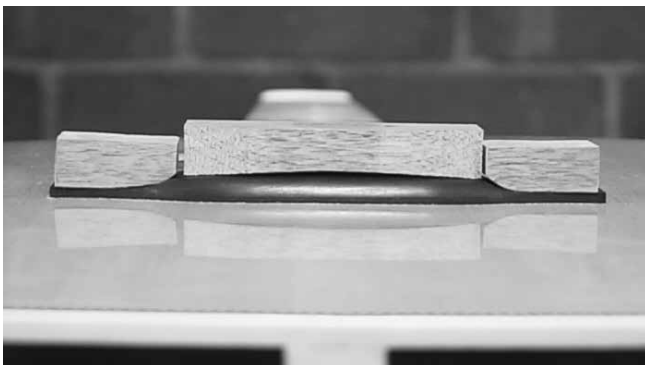
Remove the clamps after the glue has dried.

the 12th fret. Add an additional 7/64" (toward the bridge) to this distance and mark this position as well. This is the necessary "compensation" added to the actual scale length that will provide accurate string intonation at the saddle.

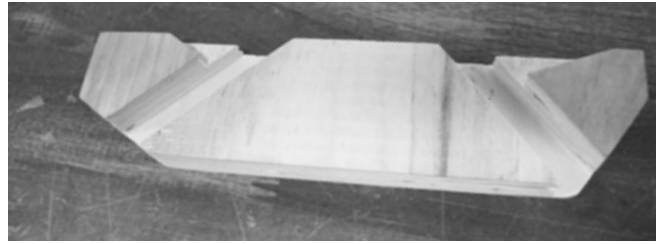
Staying on the fretboard's centerline, move the end of the straightedge to align with the center of the 12th fret, letting the straightedge extend over the bridge. The second (compensation) mark on the straightedge should rest over the center of the saddle slot's thickness, midway between the 3rd and 4th string bridge pin holes, when the bridge is positioned laterally on the soundboard's centerline. Mark the bridge's front edge location with a small piece of masking tape on the soundboard.

To determine the correct lateral bridge position, place the straightedge against each side of the fretboard, extending over the bridge. Center the bridge pin holes between the straightedge positions, and mark the bridge's side locations on the soundboard with masking tape. To "square-up" the final location, be sure both sides of the bridge's front edge are equidistant from the last fret.

Prepare three small wooden clamping cauls to fit over the center and sides of the bridge (**pictured**). Use a hand plane, file or sandpaper to match the bridge's contours, and glue sandpaper to the bottom of each caul to help keep it steady when clamped.



A internal caul that spans the bracing is supplied with the kit (**pictured**).



Align the bridge with the tape on the soundboard. Dry-clamp it with a deep-throat clamp to the internal bridge clamping caul provided with the kit, and the center exterior bridge caul. Using a sharp X-Acto knife, carefully scribe tightly around the bridge's outline (**pictured**). The knife blade should cut only through the lacquer finish, in several light passes.

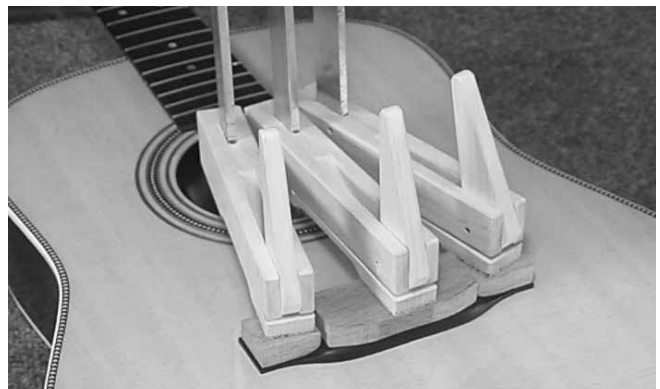


Remove the bridge and the masking tape, and mask the soundboard around the bridge. Strip the lacquer from inside the scribed outline, using the same cautions and techniques you used for the fretboard extension. When the finish is removed, wipe the exposed wood carefully with a damp cloth to neutralize the remaining stripper, and let the area dry.

## Installing the bridge

Apply Titebond to the bridge, and reclamp the bridge in place on the soundboard. Use at least three deep-throat clamps with your exterior and included interior bridge caul (**pictured**). Position the interior caul so the braces of the

top fit through the notches on the caul and it fits snugly against the bridge plate. Clean up the squeezed-out glue with a damp cloth, and allow at least 24 hours drying time.



## Fitting the bridge pins

---

When the glue has dried, remove the center clamp to expose the bridge pin holes, leaving the outer clamps to hold the interior bridge caul in place. The caul will act as a backing block to prevent wood from splitting out as you drill.

Drill the holes through the soundboard, and into the caul, with a 3/16" drill bit (**pictured**). We recommend using a bridge pin reamer for tapering the holes to fit the supplied bridge pins.

Use a section of coping saw blade or jig saw blade, with the teeth cutting on the upstroke to avoid tear-out, to form slight notches in the bridge, soundboard and bridge plate. These slots will accommodate the strings, and should be no deeper than 1/3 to 1/2 the diameter of the string, just enough so the strings don't pop out (the remainder of each string will fit

in the bridge pin groove). The slot widths should match the diameters of the strings. Clean the saw marks with a needle file, and file a slight "ramp" at the upper edge of each bridge pin hole to soften the angle of the string.



## Fitting the bridge saddle

---

The slot in the bridge is 2-13/16" in length and 1/8" wide. The saddle must be thinned and ends trimmed to fit.

Thickness sand: Attach two pieces of sandpaper, 100-grit and 220-grit, to a hard flat surface with double-stick tape. Sand the flat sides of the saddle blank back and forth on the papers. Check the thickness frequently by attempting to slide the saddle into the slot. Work slowly and test often. You can remove a little more, but once you've gone too far, it's impossible to add it back on!

Trim the length: Mark the center of the saddle. From the centerline, measure and mark 1-1/2" out from each side. Equally from each end, saw off excess to make a 3" wide saddle (slightly larger than the slot). Using the same sanding method to thin the saddle (above), sand equally on each end to reduce the saddle length, test fitting often. You'll feel the saddle "click" into the slot when it reaches the bottom. The taller side of the saddle radius is for the bass strings.

You'll adjust the bridge height later during setup.

## Installing the tuning machines

---

Lightly twist your reamer in the bushing holes on the peghead face, just enough to clean the lacquer and polishing residue from the edges. Carefully press the tuner bushings into the holes. Take care not to crack the lacquer finish (heating the bushings with a soldering iron can help if needed).

With the tuners in place on the peghead, mark the mounting holes with a scribe or an awl through the small holes on the baseplate. Remove the tuners, and drill the holes with the correct size drill bit. The tuning machines and screws can now be mounted.

## Seating the strings

---

Use either medium or light gauge strings. Install each string so that it seats into the bridge pin hole notch. The groove in the bridge pin should hold the string as well, and the ball end should snug against the bridge plate under the soundboard. Align the ball end with the string (**pictured**). Thread the strings loosely into the tuners.



## Understanding neck relief

Neck “relief,” the upward curvature of the neck in the direction of the string’s pull, is adjusted with the truss rod. You should set the neck relief before final adjustment of the nut and saddle heights. Although the truss rod will affect string height, it shouldn’t be used to do so. It’s intended to control the relief, which can affect “buzzing” in the lower frets. Depending on your playing style and the accuracy of the fret heights, the neck should have anywhere from zero (straight) to 0.012" of relief. A straight neck tends to play better, but few guitars end up with no relief at all, and several thousandths or more is perfectly normal.

Start with the nut and saddle roughed out to height, and the guitar tuned to pitch. With a straightedge resting on the frets, along the centerline of the neck, use feeler gauges between the seventh fret and the straightedge to determine the amount of relief. The heavier you strum, the more relief you’ll need. Bluegrass players may need more relief, fingerpickers less, and the majority of players will be somewhere in between.

## Adjusting string action: nut slots and saddle height

The first stage of setup will produce a medium-high action (this may be suitable for bluegrass players, but can be lowered for other playing styles). The heights of the nut and the saddle should be adjusted together; changes in one will affect the other. Adjust the truss rod to make the fretboard playing surface as straight as possible. If your neck has uneven fret heights, you must level them in order to “read” the frets accurately (see “Leveling the frets”).

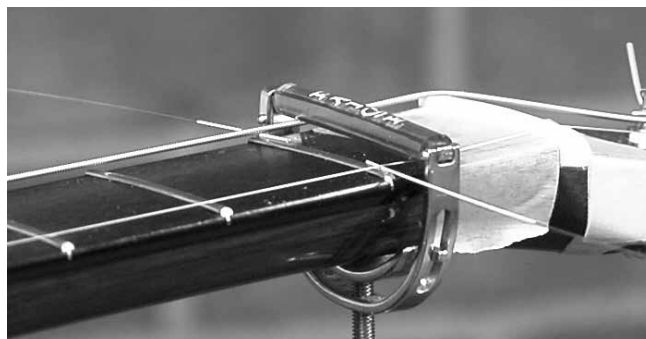
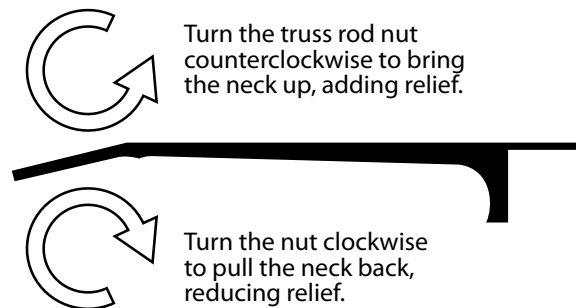
Install the two outside E-strings to establish the string clearance over the first fret and the saddle height above the top of the bridge. The latter two measurements determine the action height, judged by measuring string clearance at the 12th fret.

Install a guitar capo behind the first fret and tighten it just enough to pull the strings down for clearance between the bottom of the strings and the top of the first fret. Set this clearance at about .020" below the treble E-string, and .030" below the bass E-string. Use .020" and .030" guitar strings to measure the clearance as the capo is tightened (**pictured**). Now measure the overall string action at the 12th fret. A comfortable medium action is about 3/32" to 7/64" under the bass E-string, and 1/16" to 5/64" under the treble E-string.

### KIT TIP: Feeler gauges

Unwound guitar strings make excellent feeler gauges for measuring relief. Turning the truss rod nut clockwise straightens the neck and reduces the relief.

Turning it counterclockwise bows the neck upward, adding relief. Always adjust the truss rod with care — a little bit goes a long way.



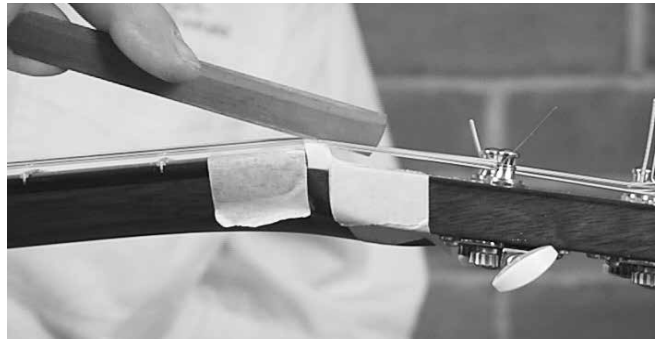
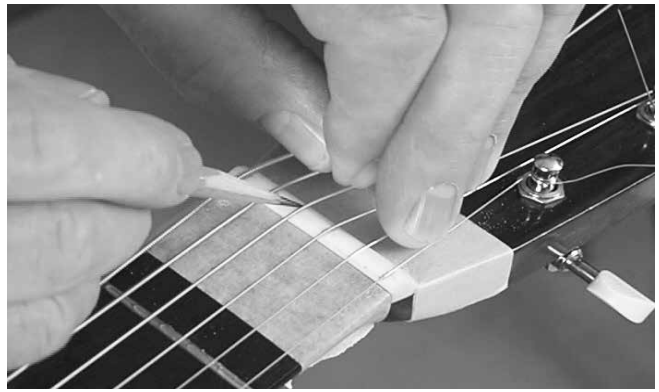
Your bridge saddle may be too tall. Decide how much each string must be lowered at the 12th fret. Twice that amount must be removed from the saddle height (this is a proven formula for lowering or raising the strings accurately).

The top of the saddle is already shaped, so we recommend you remove material from the bottom of the saddle. Remove the saddle and measure up from the bottom the required amount to be removed. Use the same sanding method as recommended in “Fitting the bridge saddle.” sanding evenly. Work slowly and test often. You can remove a little more, but once you’ve gone to far, it’s impossible to add it back on!

## Fine tuning the nut

Install the remaining strings and tune to standard pitch. The nut is pre-slotted, but will need to be fine tuned to your desired action. Using a small razor saw and several nut-slotting files, lower the strings, one at a time, until they're close to the desired clearance over the first fret as measured with feeler gauges. Here are good clearances: E (1st), 0.012"; B (2nd), 0.012"; G (3rd), 0.014"; D (4th), 0.014"; A (5th), 0.016"; E (6th), 0.016".

When filing the nut slots, angle the file downward toward the peghead, and toward the appropriate tuning machine string post (**pictured**). The bottom of each slot should be slightly rounded, so each string will fit without binding.



## Leveling the frets

Reinstall the nut (without glue) and play the guitar. Check for false notes or string buzzes caused by uneven frets. Buzzing is corrected by leveling the frets.

Remove the strings and the nut, mask the soundboard around the fretboard, and the fretboard between the frets. Adjust the neck perfectly straight.

### **KIT TIP: Use your truss rod**

Remember that you have a two-way adjustable truss rod that can help you straighten the fretboard in either direction for fret leveling! You will need to readjust the truss rod if you changed the adjustment during leveling.

Using a flat fine-tooth mill file, gently level the tops of the frets with long full-length strokes down the fretboard. Restore and polish the rounded crown on the top of each fret with a fret crowning file and/or 400 and 600-grit finishing papers. Work along the length of each fret to remove any scratches left by the leveling file.

Unmask everything. Lightly glue the nut in place with Titebond, and restring the guitar. The strings will hold the nut in place to dry.

### **KIT TIP: Ink the frets**

Ink the top of each fret with a felt-tip marker pen; the frets will be level when all the marks begin to disappear.

## Installing the pickguard

---

Place the pickguard in position on the soundboard. Be sure it fits and looks correct, and trim it with scissors if necessary. Sand the trimmed edges with 400-grit paper to remove the burr. Practice placing the pickguard in position before removing the backing from the adhesive surface.

### **KIT TIP: Pickguard placement**

Mist the guitar top with a mixture of water and a little dishwashing soap. Remove the backing from the pickguard and carefully place the pickguard on the guitar top. The soap and water mixture will allow the pickguard to slide a little for exact placement. Working from the center of the pickguard, carefully squeegee out the water to remove bubbles and air pockets from beneath the pickguard, and let it dry overnight.

---

## Installing the endpin

---

Mark the centerpoint of the endpin on the guitar's end trim strip, using a centerpunch or an awl. Using a 1/16" bit, carefully pre-drill a perpendicular hole in the tailblock at this location. Place the endpin in position and hand-tighten using a phillips head screwdriver.

## CONGRATULATIONS!

---

Now that your guitar is complete, we hope you enjoy playing it for many years. Protect it with a quality case, keep it away from extremes in temperature and humidity, and install only medium or lighter gauge strings.

And start building another guitar! You can't stop now can you?

-StewMac Staff



21 N. Shafer St • Athens, Ohio 45701 • USA  
USA & Canada call toll-free: 800-848-2273  
9am-6pm weekdays Eastern time

**How can we help?**  
**[stewmac.com/contactus](http://stewmac.com/contactus)**