

# RAS KITS

## INTRODUCTION

Congratulations on your purchase of your RAS Kit. While it can be a great challenge for an inexperienced builder, with care and attention to details, it can produce an excellent instrument that can last a lifetime.

## TOOLS

You will need some tools. Mostly, they're tools you probably have around the house, anyway.

- Very good straightedge.** I use a long aluminum yardstick, available at most home repair stores
- An electric drill.** A 3/8 standard drill works just fine. However, I use a drill/screwdriver with torque control, which will keep you from stripping most screws.
- Drill bits.** See the section on drilling holes for the bridge and stoptail studs. You will especially need a 1/16 inch bit for screw pilot holes. You will also need a 7/16 inch bit for drilling the holes for the bridge anchors. A Forstner bit is best, a brad-point drill will work, and a high-speed metal/wood bit should be your last choice.
- Screwdrivers.** Get good quality; it will save you a lot of grief.
- Pliers**
- 10mm box-end wrench.** Good for installing the tuners.
- Caliper.** This one is an electronic digital version making very accurate Measurements easy.
- Finishing supplies.** That includes sealers, stains, polyurethane or lacquer, sandpaper, brushes, etc. I can give you some pointers, but a complete instruction on finishing is beyond the scope of these instructions.
- Masking tape.** Get the good stuff. At a minimum, use the blue tape that is good for 7 days. Anything less than that will bleed through, leave residue, and otherwise disappoint you. Get a wide roll and a narrow roll.

## TEST FITTING PARTS

Before you are ready to put a final finish on the guitar, you need to be sure everything is going to fit properly. In addition to that, on this guitar you will need to glue in the neck. Take each piece and check its' fit on the body and neck.

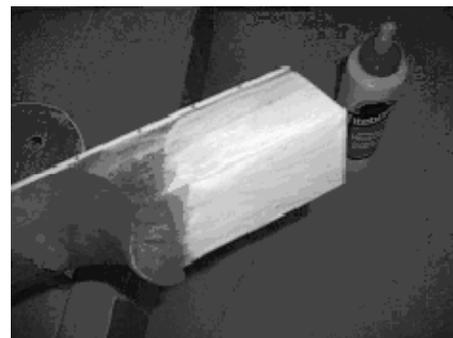
## GLUING IN THE NECK

On this guitar, the design is a set-neck or glued-in neck. The most commonly used glue for this purpose is Titebond Original. You can buy it at any hardware store. It can be cleaned up easily while it's still wet with just a wet rag. And once it dries, it's stronger than the wood itself.

Be sure you know exactly where the neck needs to be positioned, if it has any play in the neck joint. Push the neck all the way into the neck pocket and be sure that it fits tightly with very little play. Don't sand the neck pocket or the neck where it goes into the pocket unless you have a fit problem. Sanding will just make more play in the joint, increasing the chance of a misalignment in the neck now or a break at the neck later. Note how the neck pocket on the body and the neck itself are clean and unfinished. Put the neck in place, then mark lightly with pencil where the edge of the joint was. Mask off the part that would be in the joint, since glue sticks best to raw wood. Then apply your finish to the neck.



Test fit the neck and be sure that your clamp(s) will hold the neck securely. If you use some cardboard or something to pad the clamp, be sure no glue gets on it; it will be almost impossible to remove without damaging the guitar. Apply plenty of glue in the neck joint and to the neck, where it will be in the joint.



Then, place the neck in the joint and clamp it tightly. If glue doesn't squeeze out all around the joint, you haven't applied enough glue. Once you have the clamp(s) set, use a soft cloth wet with warm water to remove any excess glue. The glue sets up fairly quickly, but you have a few moments to check the neck to be sure it's where you want it to be.

**Then, LEAVE IT ALONE FOR 24 HOURS!!! Yes, it will feel dry and solid long before that. But it's not, and it can be broken apart for quite a while.**

## **FINDING THE CENTER LINE OF THE NECK**

This is where you use that long straightedge. You want to ensure that the tailpiece and anchors are close to aligned on the centerline of the neck. This is the best way find the correct position for the bridge and align the strings properly.

- Placing the straightedge along one side of the neck, mark the inside edge at the tailpiece placement of the guitar. Then do the same along the other side of the neck.
- Using the caliper (or some other method of measurement), check that the two marks are within 1/8" from the seam on the tail of the guitar. If it is more than that, mark the centerline of the neck on the tail. If it's not, we can continue on.
- While you're making these marks, draw a line from the bridge pickup rout down an inch or so toward the tail of the guitar. These marks will help us get the bridge centered later.

## **TUNERS AND TRUSS ROD COVER**

Install the tuners from the back of the headstock. If the pilot holes for the screws are not already drilled, drill them now. Be sure not to drill all the way through the headstock!

Note that the truss rod cover should be test fitted at this time. The screw holes may already be drilled. If not, drill them now, being careful not to drill all the way through the headstock. You don't have to install the cover at all, but most builders do. It gives a more "finished" look.

## **FRONT STRAP BUTTON**

Mark the locations for the strap buttons, drill a pilot hole, and test fit the buttons. The usual locations are on the upper front bout of the body and the center of the tail of the body. Note the small rubber cushion between the strap button and the body.

## **PICKUPS**

The pickups need to be in place, but not screwed down yet, for the proper positioning of the bridge. Insert the neck pickup into its rout, putting the wire through the hole into the other pickup rout and then out into the cavity of the body

of the guitar. Put the bridge pickup in place, putting its' wire through the hole into the body cavity. Be sure the pickups lie in place properly.

After you have the bridge properly in place with the two strings crossing the pickups in the same place and with the pickups parallel to each other, you will need to mark the holes in the four corners of each pickup ring (the plastic part holding the pickup). Or, if you prefer, take this opportunity to drill the pilot holes for the pickup screws, drilling down through the corner holes. Again, do this AFTER you have the bridge properly installed, which you will do in the next steps.

## **BRIDGE**

This is the tough part of this build. Since this kit doesn't have the holes for the bridge anchors predrilled, you are going to have to drill them yourself. These holes have to be pretty precise, the right distance apart, and straight up and down.

The instructions here should work well, but be sure to carefully measure everything and doublecheck it! To check the scale length of a guitar, you should measure from the neck side of the nut to the center of the 12<sup>th</sup> fret. Take this measurement and DOUBLE it to get your scale length. The proper scale length for this kit is 24.75".

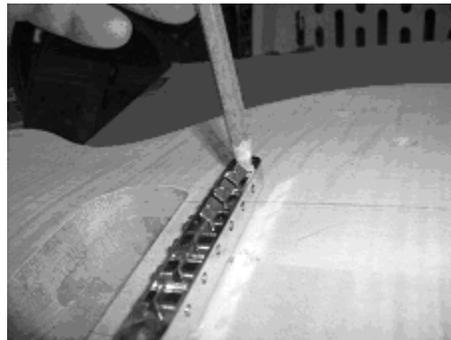
Measure along the edge of the neck, down along the lines you drew earlier, and make a mark 24.75 inches from the nut on each side. Then, draw a line through the two marks. The line you draw will be the reference for the anchor studs on the bridge. The TOM bridge high side bridge post (skinny string side!) should be 1/16" greater than the scale length or 24 13/16". The bass side is 1/8" greater than the treble side or 24 15/16". So, when the bridge is properly installed, it will be at a slight angle.

**The stop tailpiece is 1 1/2" past the bass side bridge post.**

- Here we're going to do some practical steps to improve our chances of getting a playable guitar. If they aren't still on from a previous step, install the first two tuners on the headstock, one on each side. You already have the tailpiece anchor in place. Using two guitar strings or even a couple of pieces of fishing line, put the tailpiece in its proper place, and install the outside strings to the two tuners you installed.



- Now, put the bridge on the line that you drew previously, with the screws facing the neck. Use the two strings you installed to hold the bridge firmly in place with the strings in the first and last bridge saddles and, using a sharp pencil, mark the hole in the treble end of the bridge. Check that the strings are not too close to either edge of the neck and pass across the two pickups at approximately the same point. The pickups can be moved around a little in their routs to get the alignment correct. If it all looks good, using a very sharp pencil, mark the treble screw hole of the bridge and all the corner holes for the pickups.

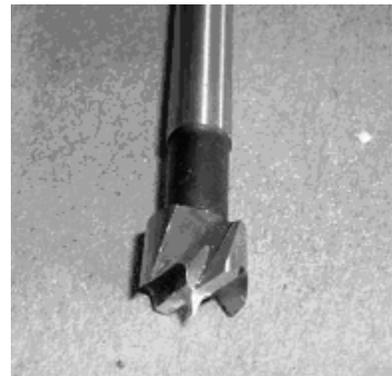


- While you have the bridge in place, and the two strings going across it, move the pickups so that the strings are positioned equally side-to-side on the pickups. The neck pickup will probably be against the end of the neck, or very close to it. Be sure the bridge pickup is parallel to the neck pickup. It helps to get a few feet away from the guitar and look at it with a critical eye. It won't affect the sound much if the pickups are all misaligned, but it will be very obvious to anyone looking at it from across the room. Mark the corner screw holes or use the pickups for a template and drill the pilot holes through the screw holes. Then, remove the strings, the tailpiece, the tailpiece anchor, and the pickups.

Now comes one of the most important and trickiest operations in the construction of this guitar. You need to drill the holes for the bridge anchors. The difficulty is that the holes must be precisely positioned and exactly vertical. Drilling a vertical hole on the compound curves that form the guitar top is not easy. The ideal tool

to do this is a drill press. If you have one, you're set up. If you don't have one, check to see if you have a friend who does. Failing that, you CAN drill the holes with an electric hand drill, but it must be done very carefully. Get the bit to be exactly vertical, and drill slowly. If you have two friends with a good eye, invite them over and position them 90 degrees apart. Have each one watch the bit to be sure it looks straight up and down to them. There are drills that have a level attached, and that might help.

The next question is, "What drill bit should I use?" The stud anchors are 7/16 inch in diameter, so you need to drill a 7/16 inch hole about 1 inch deep. Sounds simple, right?



A forstner bit is the ideal bit. It has a small pilot point so it's easy to center up, but it drills a clean, flat-bottomed hole. So, now you know how to do it; drill the two stud anchor holes, about 1 inch deep, centered on the marks you made earlier.

Once you have drilled the holes, test fit the anchors, studs, and bridge. You can install the anchors using a light craft hammer (plastic). It's important to protect the top of the guitar; a stray whap with that hammer, and you'll have a dent in your guitar body that is impossible to remove. A piece of cardboard or thin wood, with a hole cut in it works well. Put it in place, put the anchor in place, and tap it into the hole. The anchor needs to go all the way down to the surface of the wood, but not below it.

When you've finished trial-fitting all your parts and get ready to paint/finish your guitar, you will need to remove the bridge anchors. The easy way to remove them is to leave the stud installed, put some object like the handle of your hammer (or a body protector, as below) close to the stud, and use a large screwdriver or pry bar over that handle as a lever.

## **BRIDGE GROUND WIRE PASSAGE**

After removing the bridge anchors, you will need to drill a passage for a bridge ground wire. This is crucial to helping eliminate hum in your guitar electronics. Without it, you may hear a hum in a room with fluorescent lights, or when you touch the strings. It ties the ground from all the other controls together with the

strings.

□ Using a long ¼ inch drill bit, drill from the anchor hole into the bridge pickup rout. You will pass the wire through there, then through the passage from the pickup rout into the body cavity.

## CONTROL MOUNTING HOLES

Test fit the tone and volume controls, the output jack, and the pickup selector switch. Remove the nut and washer off the threaded shaft and insert the controls from the outside of the body to check the diameter of the hole. I found most of them to be a little too small, so I used a drill to open them up a little. “Easy does it” is the motto, here.

## PICKGUARD

With the pickups in place, compare the pick guard to their position. If openings are not exactly as you want them, trim the pick guard a little to get it to fit. Do not remove the plastic film covering the guard until after final assembly is finished.

Mark the hole(s) for the pick guard screw next to the neck pickup. The other hole is for attachment to the pick guard support. Install the support using a short machine screw with a washer, which will be in the parts bag. Install the screw by the neck pickup, then mark the screw hole for the support in the side of the body. Drill a pilot hole and install the pick guard support screw.

## FINISH

This would probably be a good time to put your finish on the guitar. Remove all the hardware that is on the guitar, such as tuners, pickups, tailpiece parts, strap buttons, bridge anchors, etc.

**Masking the neck-** Cover the fingerboard, being sure to get the masking tape all the way down next to the frets, and cutting the masking tape at the edge of the fingerboard. Then go around the fingerboard with tape, covering down to the edge of the binding. That way you can pull off the second wrap when I am ready to put a finish coat on.



Detailed finish instructions are way beyond the scope of these instructions, and

there are many web sites and books that can give you very good pointers. Just in passing, although the gold standard in guitar finishes is nitrocellulose lacquer, it can be a very fussy and time-consuming finish. For an easy finish, stick to polyurethane.

**Example-** Stain the neck & glue it in place. Then apply 2 coats of sanding sealer over the entire guitar before beginning to install the hardware. Once the hardware is in place, remove it all and sand the body with 220 grit sandpaper. Apply 2 coats of preferred finish. Then sand with 400 grit and apply 2 more coats of finish. Then sand with 600 grit and apply 2 more coats of finish. After that, if you want a true stunner, you can wet sand it with 2000 grit and then polish.

## ASSEMBLY

### PICKUPS

Thread the neck pickup's wire through the hole leading to the main electronics cavity and put the pickup in place. It should right up next to the end of the neck, not necessarily touching, but it can if that's where it has to be. Screw the corner screws in carefully, with the torque of your screwdriver turned down or by hand, so as not to strip the screwholes.

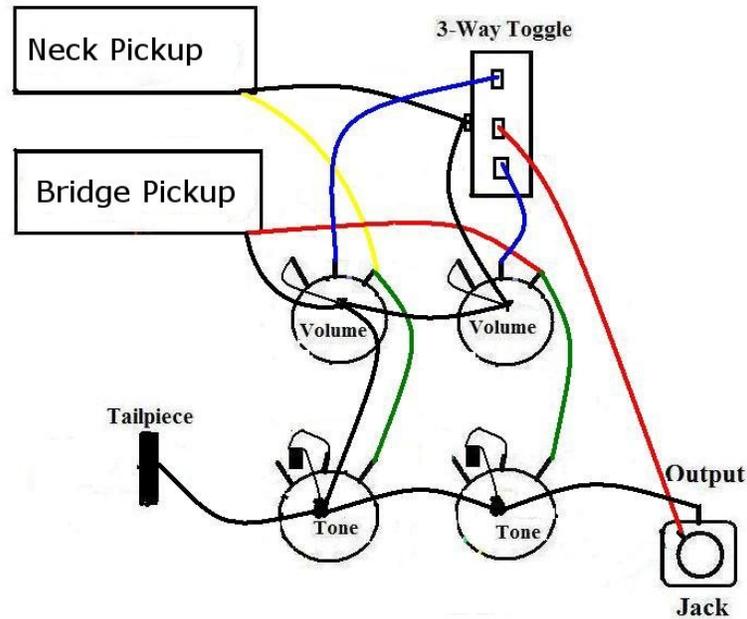
Install the bridge ground wire. Strip the wire about ½ inch on each end. Thread it in through the bridge anchor hole into the bridge pickup rout, then from there into the body cavity. Spread the stripped end that will be in contact with the bridge anchor so that it won't crowd the anchor much. Pull the so just the stripped end is protruding into the anchor hole and install the bridge anchor. It will be a tight fit, and it will hold the wire in place.

Thread the bridge pickup wire through the hole leading to the body/control cavity and put the pickup in place. Again, center it up on the seam and make it parallel to the neck bridge. Then drill the corner screws' pilot holes.

**\*\*\*Note that each pickup lead really contains 2 wires. There is an internal white wire with a thin conductor inside it, and wrapped around it is another stranded wire that serves to shield the inner lead from extraneous signals and is also the ground wire for the pickup. The internal wire is connected to one of the lugs on a volume control, and the shielding/ground wire is soldered to the back of the volume control to put it in the ground circuit.\*\*\***

### CONTROLS

These electronics have plug 'n play ends allowing easy connection. The wiring diagram below provides a guide to ensure proper connections.



## WIRING DIAGRAM

### BRIDGE ANCHORS

Install all the remaining bridge anchor, using the body-protecting cardboard again. Tap them down until the flange of the anchor just contacts the surface of the body. Then screw in the bridge anchor studs. Leave them about  $\frac{1}{4}$  inch high. Now, the moment of truth. Install the bridge on the studs, with the intonation adjustment screws facing the pickup. I hope you already check them, but I always hold my breath at this point.



### TUNERS

Install the tuners in the headstock. If your tuners like mine, they have top washers with a flat side and a smoothly rounded side. Put the rounded side up.

Tighten the nuts on the tuners only after you have installed the screws on the back of the headstock. The nuts do not need to be extremely tight, just tight enough that they don't come loose. Too tight, and your tuners might not work smoothly. If you find that any of the tuners turn too easily or too stiffly, you can adjust their tension with the screw in the end of the knob. Install the truss rod cover at this time, too.

## **STRAP BUTTONS**

Install the strap buttons in the holes you drilled and tested earlier. Remember to use a long screw (included in the kit), and the little round cushion between the button and the guitar body.

## **PICK GUARD**

Install the pickguard, using the holes you drilled earlier. Be sure the machine screw holding the pickguard support to the pickguard is tight before you finish installing it.

## **STRINGS**

Lay the guitar on a flat surface, preferable with a soft cloth under it to protect the finish. Install the bridge and stoptail studs in their anchors. Place the Tune-omatic bridge on its studs, with the saddle adjusting screws facing the neck.

Adjust the studs with a small screwdriver so the bridge is about  $\frac{1}{4}$  inch above the body. Then place the tailpiece on its anchor. It won't stay in place until you have a couple of string on the guitar, and a helping hand will pay off here. Thread the thinnest string through the hole in the tailpiece closest to the control knobs. Place it over the last saddle on the bridge, then through the last (thinnest) slot in the nut. Finally, wind it onto the first tuner post from the nut. (If you are unsure how to secure it, there are a number of web sites that can explain it fully. I put the string through the hole in the post, leaving a couple of inches of play in the string. I use a string winder to wind the string onto the post, getting it tight enough that it has some tension over its length.

### **DO NOT FULLY TIGHTEN THE STRING YET. INSTALL THE LARGEST STRING BEFORE YOU DO SO.**

Be sure it has stayed on the bridge saddle and in the nut slot. Then do the same with the thickest string, threading it through the hole in the tailpiece farthest from the knobs, over the saddle of the bridge, through the widest (top) slot of the nut, and wind it onto the post of the first tuner on that side of the headstock. Continue, putting the strings in the proper order, thickest to thinnest, top to bottom.

## **KNOBS**

Install the four knobs onto their shafts. They are just a press fit.

## **TESTING**

Plug the guitar into an amplifier and check that all the pickups, switches, and

knobs work. If something doesn't work, check your soldering work; that's the likeliest source of trouble. If you have no sound at all, first be sure your volume knobs are turned up. Then use another guitar to check that your amp is working. Then, again, start checking your wiring.

### **CONTACT**

If you have questions or your kit is missing any parts, please contact us at [customerservice@rasdistrutors.com](mailto:customerservice@rasdistrutors.com).