

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.

RECOMMENDED TOOLS

Assembly of the guitar is pretty simple, requiring mainly common hand tools. Good quality tools will make your job easier and reduce the chance of damaging the guitar:

- Phillips screwdriver
- Slotted screwdriver
- Small hammer
- Soldering iron
- Electronic solder (resin core, not acid core)
- Needle-nose pliers
- Electric drill
- 3/16 inch drill bit
- 1/8 inch drill bit
- 1/16 inch drill bit
- Ruler/straight edge (I have two, both aluminum yardsticks from Home Depot, one cut down to only 18 inches)
- Tape measure
- Sandpaper
- Sanding block
- Ziplock bags

DRILLING

The body and necks are pre-drilled for most of the required mounting holes but some modification may be necessary. For best results, drill pilot holes the correlate to the screw size.

PRE-ASSEMBLY

A "dry-run" through the assembly process will enable you to be sure you are ready to put a finish on your guitar and do the final assembly without damaging the finish. Tighten all the screws only moderately; this is not the time to practice your gorilla skills. It IS possible to strip out the holes or break the screws, problems which are possible but difficult to repair.

CAUTION: *Be very careful handling the guitar body. Use tools such as*

screwdrivers with great care to avoid gouging the body. In its unfinished state, it can be easily damaged. Also, handle the unfinished guitar only with clean hands (the factory workers wear white cotton gloves). Fingerprints or smudges can be hard to get off.

NECK PLATE PREPARATION

Cover the shiny side of the neck plates with masking tape to protect them through this operation. Use a good masking tape; if you paid 98 cents for a roll, it's not what you want. I use the blue stuff that says it's good for 14 days. The cheap stuff will be hard to get off after a few days.

Measure a point about halfway across one neck plate. Mark the point, then use a punch to mark the spot. Then drill a 1/8 inch hole in the neck plate. This will be for one of the strap buttons, which goes on the 12-string neck plate.

Place each neck plate on the plastic bed, then place the assembly on the back of the body over the neck pocket. Line up the edges carefully, then mark where the four holes are for each neck. Remove the neck plates and drill 3/16 inch holes through the body into the neck pocket. Drill carefully; the holes need to be straight and true. Do not drill the pilot holes into the necks until after you have checked the neck angles.

NECK AND BODY ATTACHMENT

_____Fit each neck to the body. Note that the 12-string is the upper neck, and the 6-string is the lower neck. The neck pockets may be a tight fit and may need some adjustment to ease the fitting of the necks after finishing. Do not use a hammer or any other tools attempting to force the necks into the pockets. Do not try to slide the necks into the pockets by wiggling them back and forth; this can damage the fairly thin wood on both sides of the pockets. Instead, push the very end of the necks into the pockets at a steep angle, and then slowly lower the rest of the neck joints into the pocket by pushing down and applying a steady pressure to the fingerboard.

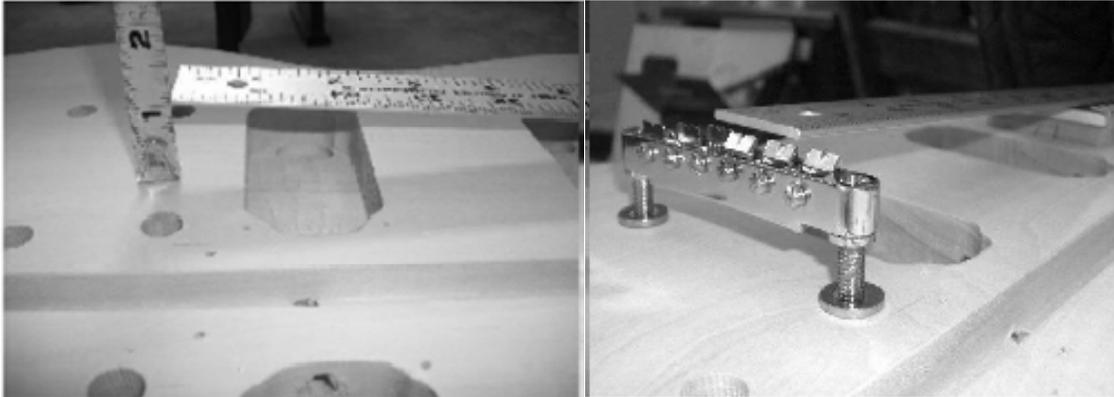
If you find it is too tight to fit, use the enclosed sandpaper, preferably wrapped around something like a paint stirring stick to keep it level, to sand the sides of the necks and the insides of the neck pockets. Take it slowly, and check your progress regularly. The necks are hard maple, and it will take a little while to sand them. Don't give in to the temptation to use a power sander; it's easy to remove too much wood and make the fit too loose, which will reduce the tone quality of your guitar. You want a good fit, but remember that during the finishing process you will add a little thickness back to the necks. Sand until you can slide the necks into place with only moderate pressure. Be sure that the necks are all the way forward in the pocket.

CHECKING THE NECK ANGLE

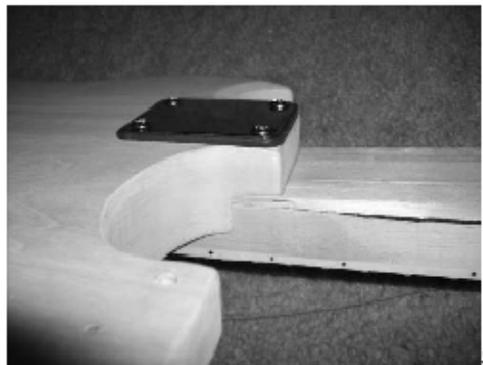
_____When you have each neck completely seated in the pocket, use a long straightedge to check the angle of the neck. Lay the straightedge along the top of the frets, down the middle of the neck, extending out over the body. About 6.5

inches from the end of the neck, measure the distance from the straightedge indicating the fret level to the body.

If the distance is more than about 1/2 inch, you will need to make an adjustment to the neck or neck pocket to bring it down to a reasonable level.



As you can see in the photo above, if the neck angle is not correct, you would need to raise the Tune-o-matic bridge to a height that is impractical to play, and at which it is very unstable. You don't want that bridge wobbling!



Next, you can shim the neck. What that would involve would be placing a tapered piece of wood in the neck pocket in order to lift the headstock up a little in order to get the proper height at the bridge. You can get such shims at most any hardware store. Trial and error is the only way to get them properly cut and installed. And it won't be pretty. However, shimming a neck is not an unusual operation.

NECK HARDWARE

TUNERS

____ Remove the six tuners from the plastic bag, three left-handed ones and three right-handed ones. Insert each tuner from the rear of the 6-string neck. The screw tab for each tuner should point toward the guitar body. Slip a washer over one of the ferrules and insert it into the hole in the neck from the front, tightening it down some to hold the tuner in place.

TRUSS ROD COVER

_____ Install the truss rod cover. This is a small black triangle-shaped piece of plastic. You will notice it has a thin plastic sticky film to protect the shine on it. Leave the film in place until final assembly.

BODY HARDWARE

PICKUPS

There are four humbucker-style pickups. Although they appear similar, they are not the same. The hold-down ring around one is thinner than the other, although both are tapered, with the lower part of the taper going toward the neck. The neck pickup will also have a longer lead. This is the neck pickup. The pickup with the thicker hold-down ring and shorter lead is the bridge pickup. The leads should also be different colors (usually yellow for the neck pickup and red for the bridge pickup). Note the colors; this will make your wire soldering easier later.

_____ Insert the lead for the neck pickup through the hole leading from the neck pickup rout to the rout running between the upper and lower pickups. It helps to twist the two wire conductors together in order to get them through the holes. Hold the pickup in place (It's a fairly tight fit so you shouldn't have much trouble getting it properly positioned.) and mark the four corner screw holes with a sharp pencil. Both neck pickups are identical, so you can use the same pickup to mark the screw holes for both neck pickups. Do the same with the bridge pickups (the ones with the red lead.)

When you have all the screw holes marked, drill pilot holes with the 1/16 inch drill bit. Then install all the pickups. Screw the hold-down rings, with the thinner part of the ring toward the neck, to the guitar body using the screws that were in the bag with the pickups

Tighten them carefully in the predrilled screw holes. Do not over tighten them; it is easy to break the plastic hold-down ring. There is a built-in bevel in the hold-down ring. The thicker part should go toward the bridge of the body so that the top of the pickup is parallel to the fingerboard.

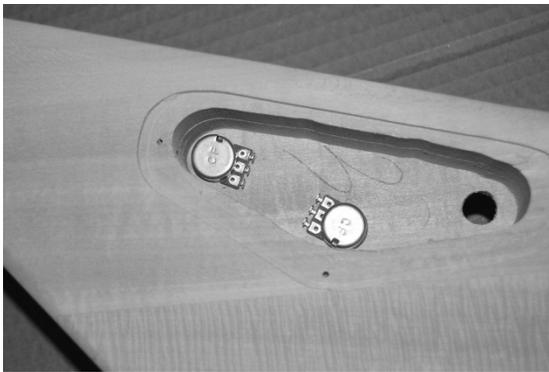
PICKUP AND NECK SELECTOR SWITCHES

_____ Install the three-way switches in the holes in the two pick guards. See the photos for which way to orient the switches. Remember that the connector that will be connected into the circuit is the one that is closest to the switch handle. In other words, if the switch handle is "up," the top connector is the one that is active. The two forward switches (the ones closest to the neck) will be wired to select which pickup to use. They will be wired so that if the switch handle is forward, the neck pickup will be used, and if the switch is rearward, the bridge pickup will be used. If the switch is in the center position, both pickups will be in use. The rear switch, by the back end of the body, will be wired to select which neck to use. In the upward position, the 12-string neck will be in use. In the

downward position, the 6-string neck will be in use. In the center position, both necks will be active. This is more like the orientation of a Fender pickup switch than Gibson, which switch up and down, which makes less sense to me. You can change them if you prefer.

VOLUME AND TONE CONTROLS

These four rotary controls are identical. Each has a round, flat body, with 3 wire connections, and a threaded shaft. The shaft is inserted through the body, and a washer and nut are used to tighten the control to the body. Each control should be mounted with the solder lugs (those 3 little tabs for attaching wires) facing into the main part of the cavity. This will make it easier to solder to, if you do the soldering in place, or less wasteful of wire and space if you wire the controls before final assembly.



OUTPUT JACK

_____The output jack goes through the large hole in the bottom tail of the guitar body. It is attached with four small screws. You will need to drill small (1/16 inch) pilot holes for the screws. Once you've test-fitted it, return the parts to their bag and set them aside.

ELECTRONICS CAVITY COVER

The electronics cavity cover will fit into the pre-routed location on the rear of the guitar body. It should have a sticky plastic film on it to protect it from scratches. Leave the film on until you do your final assembly.

_____The cover may not fit exactly into the routed opening. If that's the case, you can use the enclosed sandpaper to sand the edges of the cover and/or the edges of the opening to make sure it fits well. Remember that when you put a finish on the body, you will add a little thickness to the surfaces, so make sure the cover fits easily. Don't install the screws until you make sure the cavity fits well. Tightening it down with an edge hung up can crack it. Hold the cavity cover in place and insert a screw through each hole. Use a Phillips screwdriver to push on the screw and tighten it into place. Don't over tighten it; you can crack the cover. After you've installed all the screws on the cover, undo them and put the

cover and its screws in their bag for later.

FINAL ASSEMBLY

Finally, the fun begins.

First, we'll work on the body. It's easier to handle it without the necks installed, so we'll do the wiring first.

CAUTION: It's very easy to damage the finish on the guitar body. Work on a clean surface that you have thoroughly dusted, and put some sort of padding, such as a piece of carpet on your work surface.

WIRING

Please see the wiring diagram. This is not a big wiring job, but I have tried to make it as easy as possible. The pickup leads are shielded. That is, they have a center insulated conductor and a surrounding braided outside wire under the outside insulation. This is to help keep down extraneous signals. Each wire is already stripped and ready to use, although you may need to strip it a little more. Remember that the controls that are closest to the neck are the volume control, and the ones farthest from the neck are the tone controls. To make soldering easier, clean the top of the controls with alcohol and then lightly scruff up the surface with fine sandpaper.

The color of wire used in the following instructions is not crucial and may not always correlate, although the longer two-conductor black and white wires should be reserved for the output jack.

12-STRING PICKUPS

_____ Install the pickups just as you did in the pre-fitting. First install the 12-string neck pickup, with its yellow wire lead, threading its lead wire into the center passage and into the front switch cavity. Screw the pickup down to the body, being careful not to over tighten the screws. Then install the bridge pickup, with its red wire lead, threading its lead wire into the center passage and into the front switch cavity. Screw the pickup down to the body, again being careful not to over tighten the screws and crack the pickup ring. The yellow lead will probably be longer than it needs to be, so you will want to cut it shorter. Not too short!

12-STRING PICKUP SELECTOR SWITCH

_____ The selector switches on this kit select the input in the direction the switch toggle is placed. I installed the switches on the pick guards, just to remind myself which wire went where. This isn't necessary, but I found it easier. The side with the plastic protective film is the top of the pick guard; install the switches to the bottom of the guard.

_____ Wire the center wire of the neck pickup to the forward lug of the switch.

_____ Wire the center wire of the bridge pickup to the rear lug of the switch.

_____ Separate the long yellow and green wires, and solder the green wire to the center lug of the switch. Thread it down the center rout of the body, through the route for the 6-string bridge pickup, and into the rear electronics cavity. This will be the output wire for the 12-string pickups.

_____ Strip both ends of a short wire and solder one end to the ground lug on the body of the switch. Twist the other end with the shielding wire from the 2 pickups, plus a longer wire long enough to reach the rear switch on the center pick guard.

Solder these all together. Clip off the excess length of the stranded wires beyond the solder joint, so you just have a neat ball. This is the ground wire for the 12-string parts.

6-STRING PICKUPS

_____ Thread the long yellow wire (that was attached to the green wire you used up above) from the 6-string pickup selector switch cavity, into the neck pickup cavity, the bridge pickup cavity, and then into the main electronics cavity. There are pre-drilled holes that you can use. This wire will be the output wire for the 6-string pickups to the volume and tone controls.

_____ Thread another wire (from your own supplies--I used light speaker wire) following the same path as the yellow output wire. This will be the ground wire for the 6-string parts.

_____ Thread the red lead for the bridge pickup into the neck pickup rout and then into the switch selector cavity. It is just barely long enough. Install the pickup onto the body. Solder the central lead to the rear lug on the selector switch.

_____ Thread the yellow lead for the neck pickup into the pickup switch selector cavity. Install the pickup. The lead will be much longer than necessary, so you will need to trim it and re-strip it. Solder the central lead to the forward lug of the selector switch.

_____ Solder the yellow output wire to the center lug of the switch.

_____ Strip both ends of a short wire and solder it onto the side lug of the selector switch.

_____ Twist the short ground wire, the shield wires from the two pickups, and the exiting ground wire together and solder them. Cut off any extra wire sticking out, and install the lower pick guard.

CONTROLS

_____ Install the volume and tone control pots. Insert the shaft through the hole in the body, put on a washer and nut, and tighten it down, being sure to put the tabs

on the pots back in the holes you made for them earlier. Be careful with your tools, so as not to damage the finish. The nuts should be tight enough to pull the control body tight against the wood in the electronics cavity, but not so tight as to damage the surface of the body. In the photo below, the controls on the left are volume controls. The controls on the right are the tone controls. The upper controls are for the 12-string side, and the lower controls are for the 6-string side.

INPUTS FROM THE PICKUPS

_____ Clip the yellow and green wires so they aren't excessively long. Then, strip the ends and solder the green wires to the lower lugs on the volume.

_____ Use the pieces you cut off the green and yellow wires. Strip both ends of both wires. Solder the short green wire to the volume input lugs and the upper lug on the tone controls.

OUTPUTS, TONE CAPACITORS, AND GROUNDS

_____ Thread the shorter of the black and white paired wires from the electronics cavity up to the neck selector switch. These will be the outputs from the controls to the neck selector switch. Solder the black wire to the center lug of the top (12-string) volume control. Solder the white wire to the center lug of the bottom volume control.

_____ Solder a tone capacitor from the center lug of each tone control to the body of the tone control.

_____ Cut two short wires, strip both ends, and solder one end to the remaining lug on the volume controls and the other end to the body of the volume controls. Cut two slightly longer wires, strip both ends, and solder one end to the bodies of the tone controls and the other end to the bodies of the volume controls. Cut a short wire, strip both ends, and solder one end to the body of the top volume control and the other end to body of the bottom volume control. Strip the end of the ground wire from the 6-string pickup selector switch and solder it to one of the volume control bodies. This assures that all the components have a good ground.

NECK SELECTOR SWITCH

Some of the wires involved in this step were short enough that it worked better to temporarily remove the neck selector switch from the upper pick guard. If you do this, remember when re-installing it that the switch selects the input that the toggle handle is flipped toward.

_____ Strip the ends of the black and white wires from the electronics cavity. Solder the black wire to the lug that will be "up" when the switch is installed. Then solder the white wire to the lug that will be "down."

_____ Thread the longer pair of connected black/white wires up from the

electronics cavity to the neck selector switch. These will be the output jack wires. Strip the ends of each and solder the black wire to the center lug of the neck selector switch.

_____ Cut a short wire, strip both ends, and solder one end to the ground lug of the neck selector switch.

_____ Cut a long wire, eight inches or so. Light speaker wire works great. Strip one end. Thread the other end into the electronics cavity. Strip that end and solder it to one of the control bodies (it doesn't matter which one, since they are all now grounded). This wire will serve to ground the neck selector switch.

_____ If you drilled a passage from the neck selector cavity to the stop-tail anchor holes, cut two more short wires and strip both ends. These will serve to ground the stop-tails, bridges, and strings.

_____ Twist one end of each of the short wires with the short wire from the ground lug, the ground wire from the 12-string pickup selector switch, the ground wire you made in the previous step, and the white wire for the output jack. Solder all these together, and then cut off any excess coming out of the solder joint.

_____ Insert the stripped end of the two short ground wires through the holes you drilled from the switch's cavity into the stop-tail anchor holes. Place the anchor in the hole and drive it in gently with your small hammer. The anchor will pinch the wire against its hole for a good contact. Do this for both the 12-string and 6-string anchors closest to the neck selector switch.

_____ Reinstall the neck selector switch on the center pick guard, and install the pick guard.

OUTPUT JACK

_____ Insert the black/white wires from the electronics cavity through the hole in the body for the output jack. Solder the black wire to the lug for the center electrode and the white wire to lug for the ground. If you get these turned around, your guitar will work but will have a very buzzy and weak output.

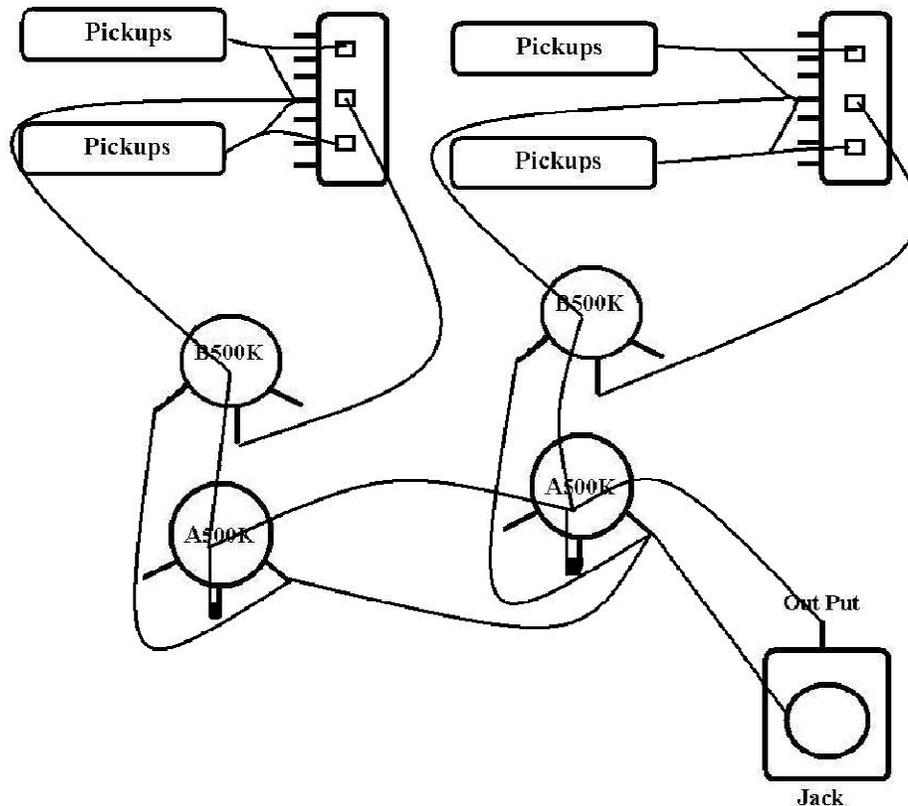
_____ Check with the included guitar output cord that the cord jack connects securely in the output jack. It may be necessary to adjust the center contact to be sure it connects properly. Then, remove the jack and install the output jack in its large hole in the edge of the body, using the two small screws included.

CAVITY COVER

_____ Install the electronics cavity cover using the 3 included screws. Finishing the body might have affected clearances; it may be necessary to sand the edges of the cover to get it to fit properly.

STOP-TAIL AND BRIDGE ANCHORS

____ Remove the studs from the anchors and tap all the anchors into place. Note that the anchors and studs may not all be the same. Keep them together in pairs, at least. Tap the anchors into place with a small hammer, being careful not to hit the finished guitar body and mar it. Screw the stop-tail and bridge studs into place. Don't install the stop-tails and bridges yet; the strings hold them in place.



WIRING DIAGRAM

NECKS

____ Install the tuners on the two necks as you did in your trial fitting. Be careful not to strip out the screws.

____ Slide the heel of the neck into the neck pocket, being sure it's completely seated by checking with an awl or a very small screwdriver that the screw holes in the body are aligned with the screw holes in the neck. Put the neck plate on its plastic bed and put it on the back of the body, starting one or two of the long neck screws into place. Install all four screws loosely before you tighten any of them

down completely. This is not a gorilla job; get the screws as tight as you can manually, but don't try to use a power screwdriver or anything that will damage the screw heads, strip out the screw holes, or break the screws. You're screwing into hard maple, and all of those outcomes are possible.

Should you happen to strip the head of any of the neck screws, you CAN get replacements at most hardware stores. They are just #10 wood screws, oval Phillips head, 1.75 inches long.

STRAP BUTTONS

_____ Install the strap buttons, one on the 12-string neck plate and one on the end of the body, using the included grommets and long thin screws. Put the rubber grommet between the button and the body. Don't over tighten them.

TRUSS ROD COVERS

_____ Install the small triangular truss rod covers on the headstocks, using the 3 small included screws.

BRIDGES

The Tune-O-Matic bridge with saddles with single slots in the 6-string bridge. The one with double slots in each saddle is the 12-string bridge. The saddle-adjusting screws may be placed facing either direction, but in this case it will work best if you turn the bridges so the saddle-adjusting screws are away from the stop tail and toward the neck.

STRINGS

There is a lot of discussion about the strings on a 12-string guitar. That many strings exert a great deal of pressure on the neck. This can cause the neck to bow, twist, or otherwise misbehave. At one time, it was common practice to tune the strings a half step lower, then put a capo on the first fret to raise the strings to normal tuning. I'll let you do your own research; electric 12-string necks are much stronger than those on acoustic guitars, so tuning to normal scale is fairly common.

6-STRING NECK STRINGING

Before you start, you should apply a little petroleum jelly to the nut slots and the bridge saddle slots. This will make tuning much easier.

_____ Start with the heaviest string (low E), the "top string" when you are holding the guitar in the normal position. Insert the string from the back of the stop-tail, over the first string saddle on the bridge (which you will put in place when you start to install the strings, since it is held in place by the strings), and up through its slot in the nut (the plastic string holder at the end of the fingerboard). The string goes on the first tuner after the fingerboard. Do not attempt to wind the whole excess length of the string around the tuner post. Insert the end of the string through the hole in the tuner post, wrap the string around the post once or

twice leaving the string with a little slack, and then wind the string onto the post. Three or four turns around the post when the string is tight is about right. Tighten the string to its correct pitch (use a tuner of some sort), and then wiggle the excess string sticking out of the post back and forth in order to break it off. This will give your headstock a neat look but keep the strings tight without slipping off the post.

_____Second, do the lightest string, the high E or bottom string when you are holding the guitar in the normal position. Insert the string from the back of the stop-tail, over the bottom bridge saddle, through the smallest slot in the nut, and wrapped on the first tuner after the nut. Don't worry about getting it all the way up to pitch; just get it tight enough to hold the bridge in place.

_____Install the rest of the strings, working from the smallest to the largest. Check to be sure the strings are going over the saddles in the bridge and through the correct slots in the nut.

12-STRING NECK STRINGING

OK, here's where it gets complicated. The idea of a 12-string guitar is to have a much "fuller" sound. To that end, each main string has another string next to it. The four lower strings (E-A-D-G) have the a smaller string next to them, tuned one octave higher than the main string. The two higher strings (B-E) have a second, identical string next to them, tuned to the same note. How does this change the sound? Think of the Byrds and "Mr. Tambourine Man" or "Turn, Turn, Turn," or the guitar intro to "Hotel California." THAT'S the "12-string sound." Here are the sizes of a fairly normal 12-string set of strings:

.009, .009 (E)
.012, .012 (B)
.020, .009 (G)
.026, .012 (D)
.036, .020 (A)
.046, .026 (E)

In most sets, the .020 on G would be a wound string and the .020 on the A would be a plain string.

So, set out the strings from the kit in order of size or in the order you will install them. Remember that on the four lower strings the high string goes above the low strings. You can see this from the slots on the nut, if you get confused.

Start with the largest string you have, and put it through the 2nd hole from the top in the 12-string stop tail. Put it over the 2nd notch in the first saddle on the bridge, then through the second slot in the nut, and wrap it around the second tuner up from the nut. Don't worry about tuning it to pitch right away. Then string one of the skinniest strings through the last (bottom) hole in the stop tail, over the bottom slot in the last saddle of the bridge, through the bottom slot on the nut,

and wrap it around the first tuner up from the nut. Again, don't worry about getting it all the way up to pitch.

Now, add the rest of the strings according to the list above. Check to be sure each string is going through the right hole in the stop-tail, the correct slot in the bridge saddle, and the proper slot in the nut. Work slowly, double checking
TUNING THE GUITAR

When you get all the strings in place, you can begin tuning your guitar. First, adjust the bridge so that the string are about 3/16 of an inch above the frets at the body end of the neck. As you tighten the strings, the neck will probably bow up a little and you may have to lower the bridge some more. You will have to tune both necks repeatedly over the next few days as the strings stretch to their elastic limits.

CONTROL KNOBS

____ Slide the plastic control knobs onto the shafts protruding from the body of the guitar. They just push into place. Be sure to leave a little space between the knob and the body.

ADJUSTING PICKUPS

____ When you get all the strings installed and tuned, you'll need to raise the pickups close enough to the strings to be effective. Turning the middle screw of the three on each end of the pickups will adjust the height. Hold the low E string down at the last fret on the neck, and raise the pickups to about 1/8 inch below the string by turning the adjusting screw clockwise. Do the same for the high E string. This should get you in the ballpark.

FINAL ADJUSTMENTS

Fully adjusting your guitar for proper playing is beyond the scope of these instructions, but you can find plenty of such information online at any number of guitar sites.

You will probably want to check the intonation, string height, pickup height, etc. Those are things that can be very involved and require a lot of skill, or at least a lot of patience and willingness to experiment.

CONTACT

If you have questions or your kit is missing any parts, please contact us at customerservice@rasdistrutors.com.

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