

Resonator Banjo Kit

Assembly Instructions



Musicmaker's Kits, Inc.

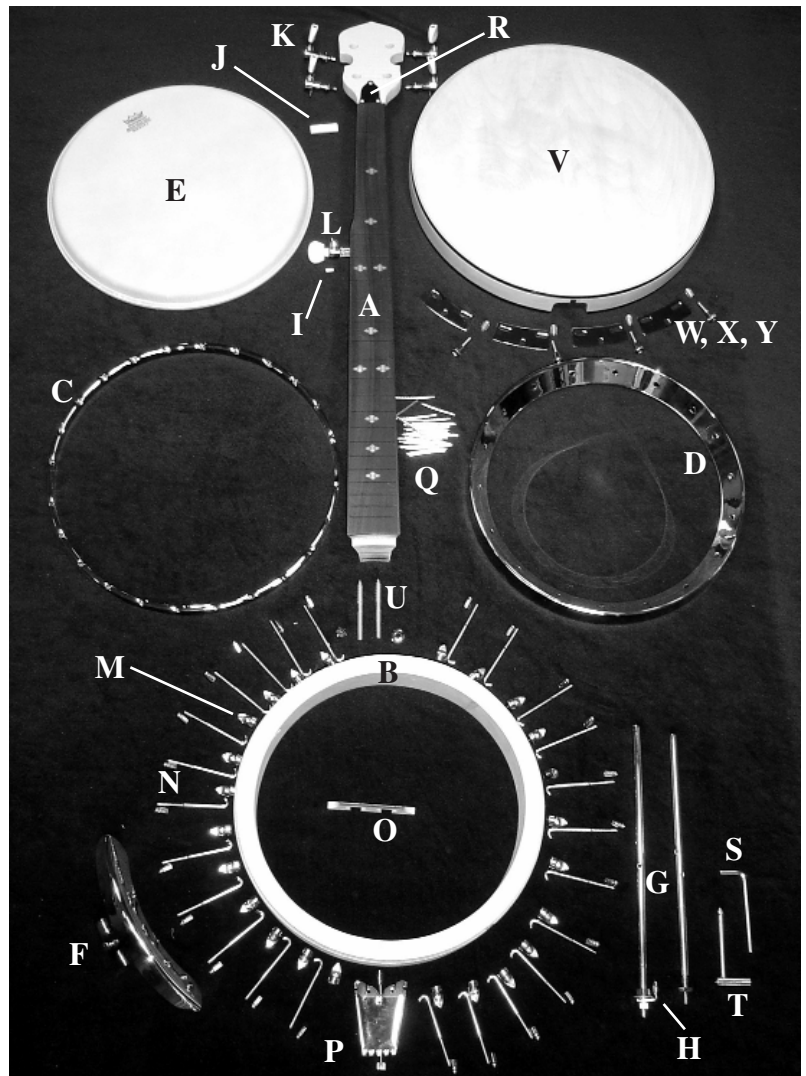
PO Box 2117

Stillwater MN 55082

phone: 651-439-9120 **email:** info@musikit.com **website:** www.harokit.com

Kit Parts

- A - maple neck
- B - 11" wood rim
- C - 11" notched tension hoop
- D - flat head alloy tone ring
- E - 11" remo banjo head
- F - arm rest
- G - 2 coordinator rods with hanger bolts
- H - L shaped tailpiece bracket (may be on coordinator rod)
- I - 5th string nut
- J - string nut (pre-notched)
- K - 4 geared tuners with screws
- L - geared 5th string tuning machine
- M - 24 shoe style lugs w/bolts and washers
- N - 24 hooks and nuts
- O - bridge
- P - tailpiece
- Q - 22 pre-cut frets
- R - truss rod cover with screws
- S - allen wrench for truss rod
- T - hex nut wrench
- U - lag screws and inserts
- V - Wood resonator
- W - 4 resonator plates
- X - 4 brass inserts (threaded on the inside)
- Y - 4 resonator bolts
- 1 set of strings



Please take the time to check over the parts of your kit now, to make sure everything is there. If you discover a problem, call us right away so we can rectify it quickly without causing you much delay in your project.

Tools Required

- small square
- razor knife
- sandpaper (variety of grits)
- electric hand drill
- phillips screwdriver
- drill bits (1/16", 1/8", 13/64", 9/32", 11/32")
- metal ruler
- small wood sanding block
- 2 - 4" spring clamps
- 1 - 9" spring or cam clamp
- scratch awl
- small tube crazy glue
- variety of wrenches
- masking tape
- finish and/or stain

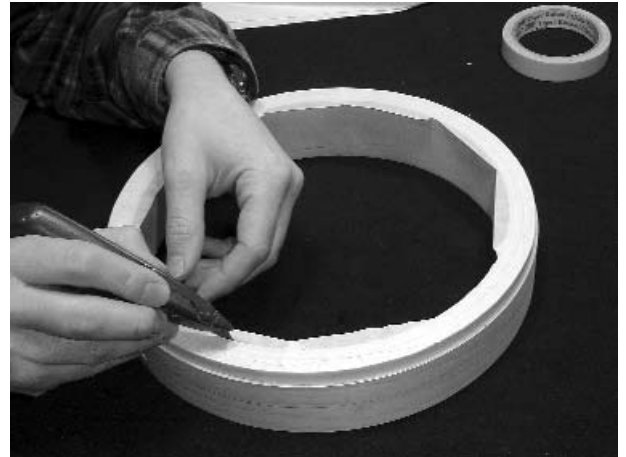
Note to Builder

Please read through the *entire* directions once before beginning work. This will give you a good overview of the project and give you time to gather any tools you might need. It should also help to prevent any errors saving you time, material, and money.

If you have any questions about assembling this banjo please feel free to call our technical tip line at 651-439-9130 or you can ask your questions by email (info@musickit.com).

Preparing the Rim

_____1. Begin by taping off the top of the wood RIM where the TONE RING will rest. It is important that this rim be protected to ensure a good fit of the TONE RING. You will NOT apply finish to this part of the RIM. Trim off excess tape with a razor knife.

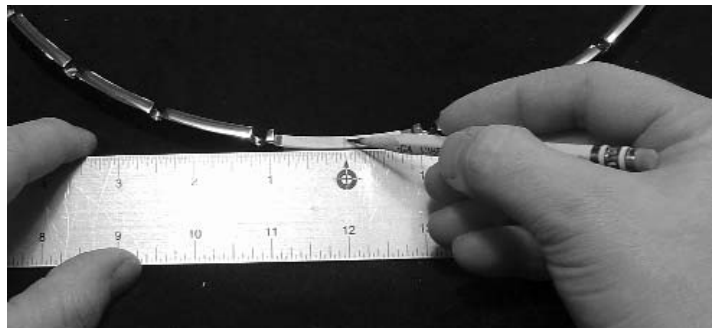


_____2. Check to see if your banjo RIM has a pencil line drawn around the outside. If it does, you can skip to step three. If not, you will need to add one. Mark a line all the way around the circumference of the RIM that is one inch from the bottom. (The top of the RIM is the part that you have taped off.)



_____3. Using your square and a pencil. Draw a line connecting the centers of the two coordinator rod holes already drilled into the RIM.

Next, find the neck notch on the TENSION HOOP. Place some tape on the neck notch and mark the center point of the notch.



_____4. Set the RIM upside down on a table (taped side down) Place the TENSION HOOP on the RIM with the notches facing down. Line up the centerline on the TENSION HOOP with the centerline on the RIM. Clamp the TENSION HOOP to the RIM making sure that the line drawn around the RIM shows through each of the notches (half-holes) on the TENSION HOOP.



Double check that the TENSION HOOP is clamped securely and that the notches are lined up on the line around the RIM. Now you can carefully mark the center of each notch where it intersects the circumference line.



_____5. Directly opposite the two predrilled coordinator rod holes, you'll see that two of your pencil marks are spaced farther apart than all of the other marks. This wider space will accommodate the tail-piece and the other end of the coordinator rods.

You will need to drill two holes here for the coordinator rods. Begin by marking a centerline between the two widely spaced marks. Be careful to make sure that your centerline is drawn perfectly square to the bottom of the RIM.

Now measure the placement of the predrilled coordinator rod holes on the other end of the rim (measuring from the bottom of the rim to the center of each hole), and transfer those measurements to the centerline you just drew.

HAVE A CARE! The holes at each end should match nicely so that the coordinator rods will fit straight.

_____6. Now you can drill all of the holes in the RIM. It is recommended that you use brad point drill bits to prevent the bits from wandering. If you do not own any brad point drill bits you can predrill each hole with a small drill bit (1/8"). This hole will serve to guide the larger drill bits. Begin by carefully making a punch mark in each location with a scratch awl.

Drill the holes along the centerline that goes around the RIM with a 13/64" drill bit. When drilling these holes be careful to keep the hole square both up and down and from left to right.

Use a 9/32" drill bit for the top coordinator rod hole (the one near the tape) and use an 11/32" drill bit for the bottom hole. The top hole may end up centered right on the ledge where the tone ring will sit. If this is the case you can clamp some scrap wood to the ledge that is the same width as the ledge.

Preparing the Neck

HINT - When working on the neck - be careful to support the neck so that you do not apply pressure to the PEGHEAD. You might make a simple neck cradle out of some scrap wood. Line the cradle with some padding so you don't mar the neck.

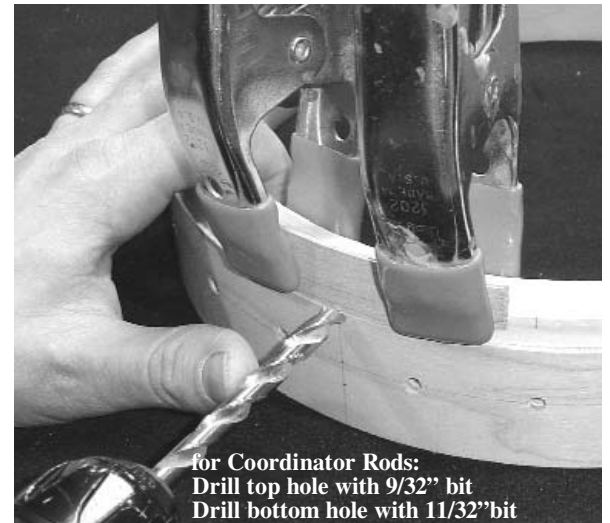
_____7. Begin by sanding the fingerboard. Use a sanding block with some fine sandpaper (220 grit). Sand lightly with the grain and be careful not to sand any depressions into the fingerboard. When finished, remove any dust or debris from the fret slots with a razor knife.

_____8. The frets have been precut for you. You will need to line up the frets from shortest to longest. Use a straight edge to do this, as shown.



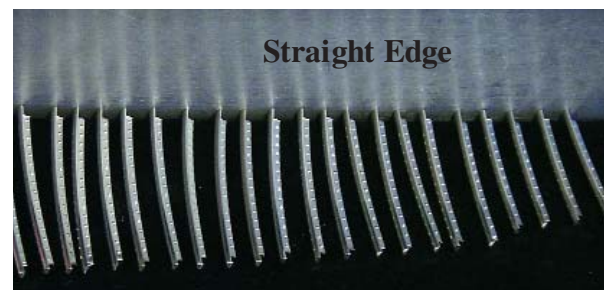
Drill the 24 holes for hanger lugs with 13/64" bit

HINT - If you don't have brad-point drill bits, drill a pilot hole with a 1/8" bit first, then come back and re-drill with 13/64" bit.



for Coordinator Rods:
Drill top hole with 9/32" bit
Drill bottom hole with 11/32" bit

HINT - Hold a piece of scrap wood on the inside of the rim where the drill point will poke through to prevent the inside of the RIM from chipping.



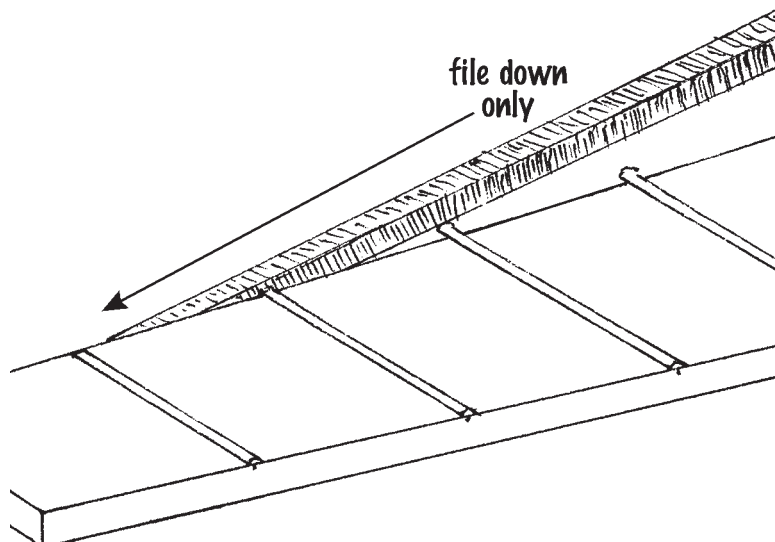
Straight Edge

HINT - Always support the neck directly under the spot on the neck that you are working on while installing the frets.

_____9. Set the pre cut fret in the slot leaving an equal amount of fret overhanging each side of the neck. Begin by tapping in each end of the fret to get it started correctly and then work your way toward the middle. Don't hit the fretwire too hard or you can cause an end to pop back up. Make sure each fret is seated completely.

The fretwire is made of soft metal so if a fret becomes bent or kinked you can pry it out with a chisel and bend it back into shape before trying again.

If you overwork a fret and the fret slot becomes too wide to hold the fret firmly, you can superglue the fret in place. Just make sure the fret is completely seated and securely clamped until the glue is dry.



_____10. Once the frets are installed you need to file the ends flush with the fretboard. Always work the file in a downward motion, as shown, so you don't inadvertently lift the end of a fret.

Next, you want to file a 45 degree bevel on each end of the frets.

To smooth things out you can sand the edge of the fretboard with 180 grit sandpaper.

Finally - run your hand up and down the neck as though you were playing and take care of any sharp edges you might find.

Final Sanding and Finishing

_____11. At this point your banjo is ready for a final sanding. Start with 180 grit sandpaper and make sure to remove and machine marks. Work your way up to some finer grits of sandpaper. How much time you put into this is up to you but the better job you do with sanding, the better your finish will look.

_____12. Before applying a finish, you should tape off the fingerboard. Fingerboards are traditionally protected with either Lemon Oil or Boiled Linseed Oil rather than varnish or lacquer. This will prevent the playing surface from becoming sticky from the oils on your fingers.

Now you are ready to apply the finish of your choice. On the following page we give a few suggestions for selecting a finish. Be careful to follow the directions on the container of whatever finish you choose.

STAIN -- STAINS are coloring agents and should only be used if you dislike the natural color of the wood. We usually do not apply stains to our projects, especially when they are made with naturally beautiful hardwoods such as on this project. These woods look very nice with just a clear finish. If you want to color the wood differently, however, your staining should be accomplished before applying a surface finish such as oil, varnish, or lacquer.

OIL -- An oil finish will give your wood a low luster appearance, bringing out the natural color of the grain, but it tends to soak into the wood and appear dry and "thirsty" after awhile. The principal advantage of an oil finish is that it can be applied and wiped dry immediately, so you can proceed with installing hardware (and strings) right away. The disadvantage of oil is that it usually does not give much surface protection or sheen, although there are some brands that include waxes and/or varnishes to give more surface build-up and luster. If you want a hand-rubbed oil finish, be sure to purchase the highest quality oil designed for hand-rubbing.

VARNISH -- Any satin or semi-gloss varnish will work on this project, but we like a wipe-on polyurethane best. We offer this type of clear top coat, called MUSICMAKER'S INSTRUMENT FINISH. Our complete finishing kit includes sandpaper sheets, tack cloth, foam applicator, lint-free wiping cloth, and a pint can of semi-gloss polyurethane varnish with the instructions printed on the can. The advantages of this finish are its simple application, durability, minimal odor, and deep, soft luster.

LACQUER -- Many professional instrument makers use lacquer for their finish. The most readily available lacquer is called Deft Clear Wood Finish. It is best to purchase a can of liquid to brush on as a sealer coat first, and then use an aerosol can of the same product to spray on the final coats. The advantage of this finish is its quick drying time, but the disadvantage is the strong odor of the toxic lacquer fumes.

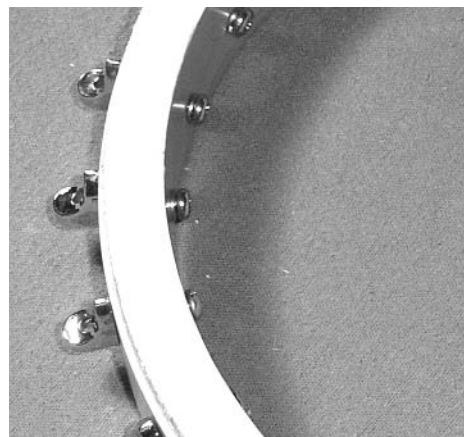
BE CAREFUL IF YOU TRY A HIGH GLOSS FINISH. Glossy finishes show off every speck of dust and irregularity in your sanding. Satin or semi-gloss is much easier for the amateur.

DON'T FORGET TO OIL THE FINGERBOARD. Remove the tape from the playing surface and wipe on a coat of boiled linseed oil. Then wipe off the excess so it dries quickly.

Assembly

13. When the finish is dry, you can assemble your banjo. Begin by carefully tapping two metal inserts into the inside of the wood rim where the lag bolts will pass through. These go into the 2 holes that were already drilled in the RIM.

14. Install the 24 shoes in the holes you drilled in the rim. Orient the pointy part of the shoe toward the top of the rim. Use the 24 screws and washers provided. Don't tighten the screws at this point. You will do that after you have installed the tension hooks.



HINT - Higher tension on the head will produce a punchier, brighter sound suitable for bluegrass style music. Lower tension will provide a plunkier, mellower tone suitable for old-time music.

15. Assemble the pot as follows: Place the TONE RING on the RIM lining up the notches with the holes at each end. Then place the Skin Head over the TONE RING (we like to orient the printed logo toward the neck).

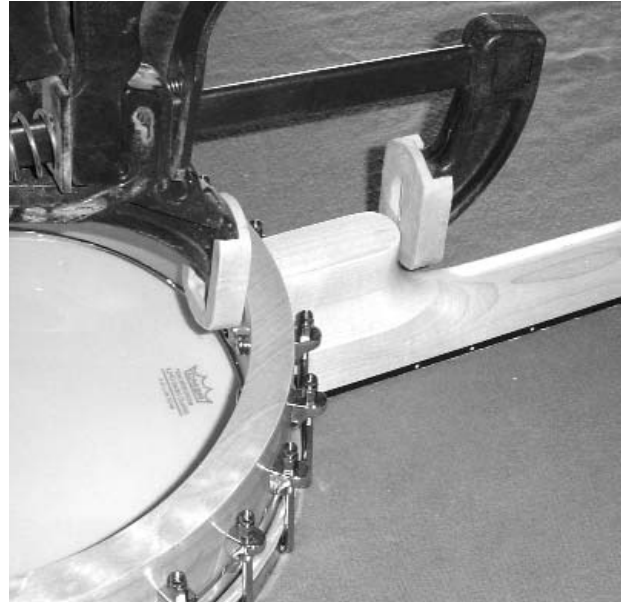
Now you can place the TENSION HOOP over the Skin Head, taking care to line up the slot for the neck over the two holes with the inserts.

Install the tension hooks through the shoes and attach the hex nuts until they are all hand tight. Take care to keep the head level all the way around the rim. Tighten all of the hex nuts a 1/4 turn at a time to keep the tension even. Tighten the head to your desired tension.

Attaching the Neck

Warning - The following steps are crucial to the success of this kit. Please take your time and proceed with caution.

____16. Clamp the neck to the body, centering it carefully at the pre-drilled holes in the rim. We highly recommend using a padded quick release clamp to hold the parts together, as shown. This clamp is easy to use and the rubber pads grip the neck without marring the finish. *(If you don't have one of these clamps, this is your excuse to buy one. Building your own banjo is perfect justification for adding a few tools to your shop....)*



Check to see that the fretboard is level with the notch of the TENSION HOOP. If the fretboard ends up below the metal hoop, the banjo will not play correctly. Adjust the position of the neck accordingly.

Once you are satisfied with the position of the NECK, lay the banjo on its belly and mark only the location of the lag bolt nearest the TONE RING first. You may need to whittle down a pencil to fit through the insert. You could also use a scratch awl, if it will fit through the insert.



____17. Remove the NECK from the body and clamp it to a sturdy table with your new clamp. Drill a $\frac{13}{64}$ " pilot hole for the lag bolt. Drill straight to a depth of at least one inch, to match the wood threads of the hanger bolts.

Warning - It is important that you drill this hole straight into the neck both up and down and side to side. Have someone else on hand as an extra set of eyes!

____18. Screw two 10mm nuts onto the lag bolts, tighten them together and use a wrench to carefully screw the lag bolt into the neck. Screw the pointed end of the lag bolt into the neck just past the threads.

Now attach the neck to the body with a 10mm nut and washer to the lag bolt on the inside of the rim. Tighten the neck to the body and sight down the neck to make sure everything is still in alignment.

Next mark the location of the second lag bolt, and install that bolt in the same fashion.

Temporarily attach the neck to the body with a nut on each lag bolt and again, checking for proper alignment.

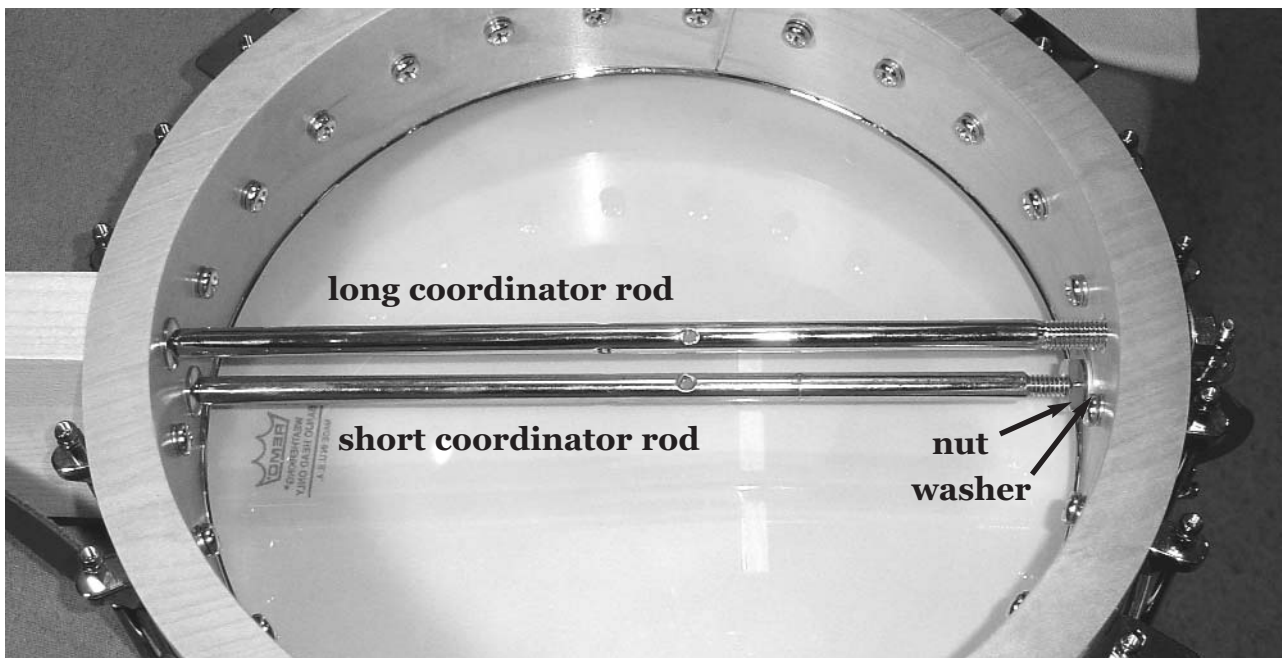
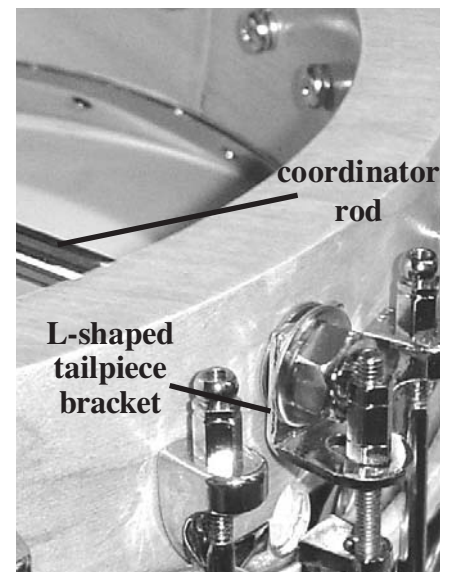


If the neck needs some alignment after installing the lag bolts, you can thread a coordinator rod onto the lag bolts and *gently* bend the lag bolt in the proper direction. Care should be taken during this operation for obvious reasons.

_____19. Now you can actually attach the neck to the body. Begin by attaching a nut and washer to the shorter coordinator rod. Thread the nut on as far as it will go. Slide the end with the nut into the hole in the back of the rim closest to the tone ring. Next slide the lag bolts in the neck through the holes with the inserts. Thread the coordinator rod onto the corresponding lag bolt until it is hand tight.

You will have to insert the longer coordinator rod through the hole in the back of the rim and then thread it onto the lag bolt. Install a washer, the L-shaped tailpiece bracket, another washer and then a nut onto the coordinator rod on the outside of the rim.

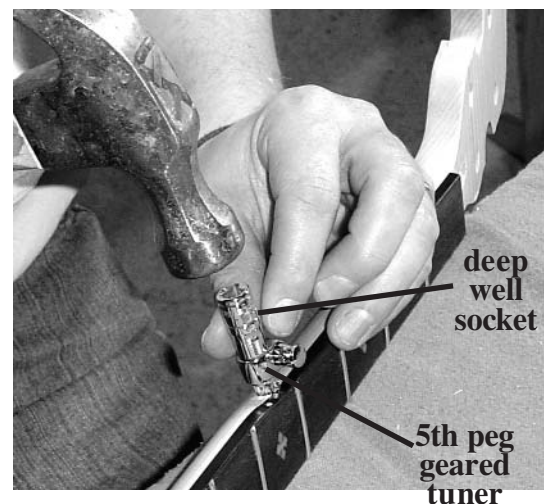
There are some holes in the coordinator rods. Use a small screwdriver or other suitable tool in these holes to tighten the coordinator rods until the neck is snug against the pot assembly. Be careful not to tighten the coordinator rods so much that you pull the lag bolts out of the neck.



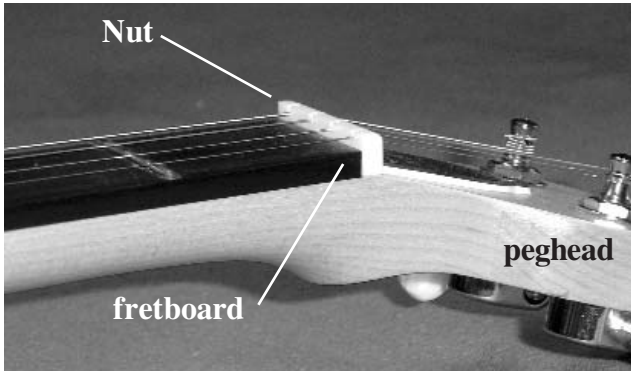
Installing the Hardware

_____20. Locate the 5th string tuning machine (it's the one that doesn't look like all the others). Remove the pearl button. This tuning machine is to be press fitted into the pre-drilled hole on the side of the neck near the 5th fret.

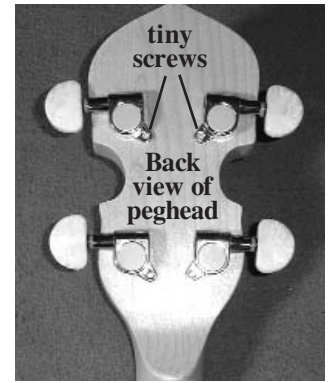
Secure the neck on your work table and push in the tuning machine as far as you can by hand being careful to keep the tuning machine properly aligned **with the tuning shaft pointing up** so it rises above the plane of the fingerboard. Place a deep well socket over the buttonless shaft and gently pound the tuning machine in to the point where the taper stops, as shown.



21. Note that there are two left-hand geared tuners and two right-hand ones. Install these tuners as shown in the picture. Use the threaded sleeve to secure the tuners on the front side. Then drill $1/16$ " pilot holes in the back side for the tiny screws. Put some masking tape on the drill bit as a depth guide so you don't accidentally drill all the way through the peghead.

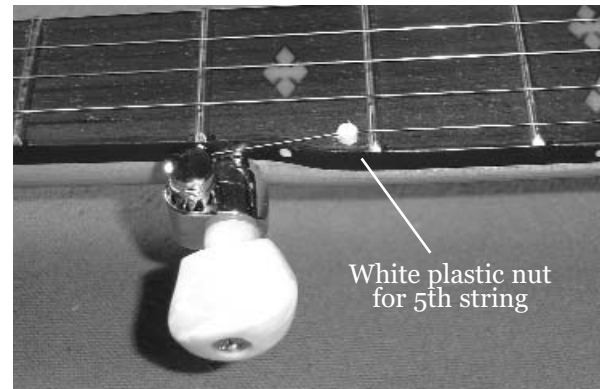


22. Test fit the nut to see that it will seat completely against the peghead and the fretboard. The nut will likely be taller than needed. It only needs to be $1/16$ " taller than the top of the frets. You can sand a pencil in half so that it is flat on one side. Hold the nut in place and lay the flat part of the pencil across several frets and mark a line on the nut. Now you can sand down the top of the nut if necessary.



23. When you are satisfied with the size, shape and fit of the nut you can glue it in place with a small amount of superglue.

24. To install the small plastic nut for the 5th string, drill an $1/8$ " hole about $1/4$ " deep just behind the 5th fret, as shown. The hole should be centered about $3/16$ " from the edge of the neck. Install the small white 5th string nut in the hole and cut the nut so it stands about $1/16$ " above the 5th fret.

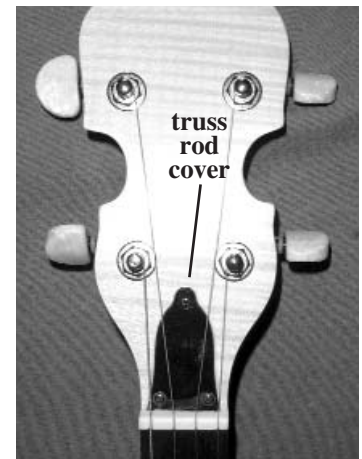


Use a tiny saw blade or needle file to cut a shallow notch in the top of the white plastic nut to hold the 5th string. This groove should be parallel to the strings and should be deep enough to allow the 5th string to rest firmly on the 5th fret.



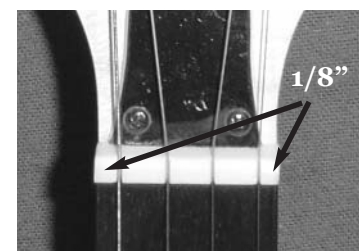
25. Attach the truss rod cover using the three screws provided. Drill $1/16$ " pilot holes being careful not to drill all the way through the peghead.

26. Attach the tailpiece by setting it on the edge of the tension hoop and running the attached screw through the tailpiece bracket that is attached to the lower coordinator rod. Thread the hex bolt onto the screw and finger tighten.



Installing the Strings

27. Before you can install your strings you need to cut 4 notches in the nut. Mark the positions of the two outer strings $1/8$ " from the edge of the fingerboard. Space the other two string slots evenly in between. Use a tiny saw or needle file to cut a shallow notch for each string, just deep enough to hold the string in place. You will cut a little deeper to adjust the action (playability) after the strings are installed.



_____ 28. Attach strings number 1 and 5 first. Then you can install the bridge. The bridge will be located roughly 26 1/2" from the front of the nut. (You will fine tune this later).

Wind the strings onto the inside of the tuner posts, as shown. This makes it much easier to remember which way to turn the gears each time you tune the instrument.

Install the remaining 3 strings in the same way.

_____ 29. Adjust the action of the strings at the nut by cutting or filing the notches for each string until each string sits 1/16" above the *fretboard*. Use a 1/16" drill bit as a guide. **Be careful not to file the notches so deep that the string buzzes against the first fret.**

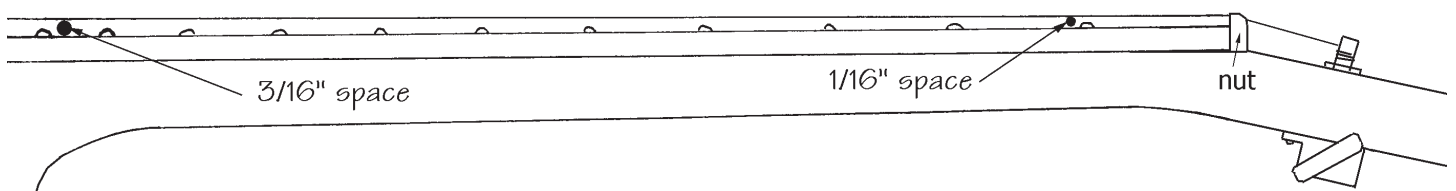
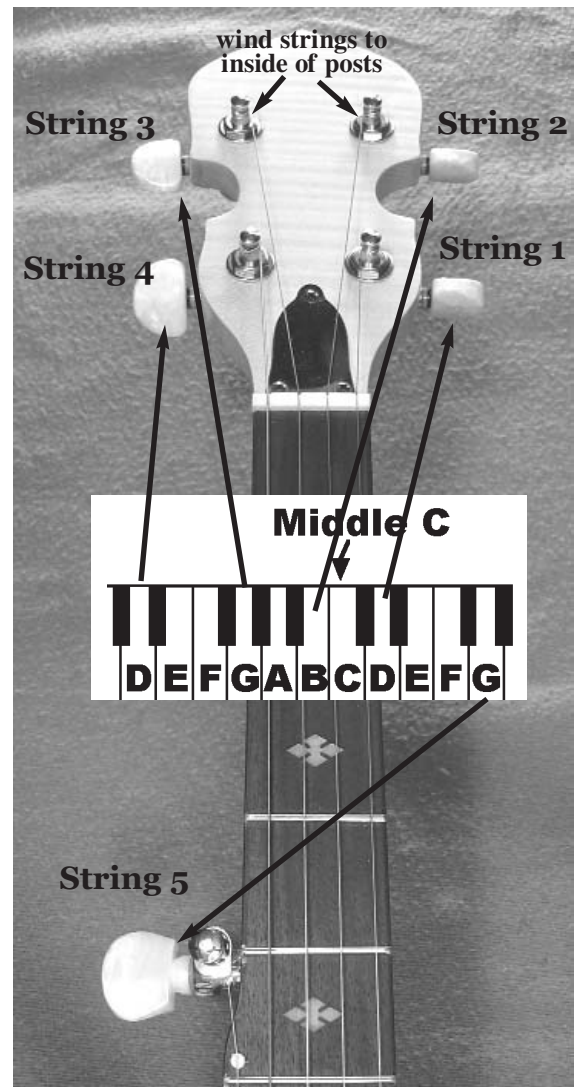
NOTE: If you happen to cut a notch too deeply, the easiest way to fix the buzzing problem is to loosen all the strings, tap the Nut off the peghead, and re-glue the nut with superglue. The additional layer of glue will raise the entire Nut slightly. Repeat the process if the problem persists.

_____ 30. At the 12th fret the strings should sit roughly 3/16" above the *fretboard*. It is OK to have lower action than this but anything much higher will make the banjo difficult to play up the neck.

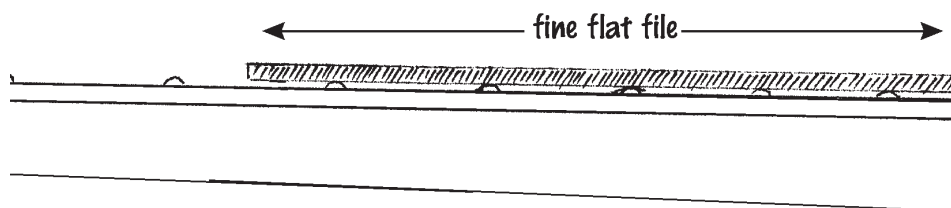
Hopefully, you won't have to make much of an adjustment here, but if necessary, you can do one of following things:

1) Sand or shim the bottom of the bridge to raise or lower it slightly.

2) Loosen or tighten the coordinator rods to tilt the neck slightly. Tightening the bottom rod will lower the action (string height). Tightening the top rod will raise the action. You can achieve even greater change if you loosen one rod while tightening the other.



_____ 31. Play and fret each string up and down the neck to check for buzzes or skipped notes. If you find a problem, you need to level the frets in that area. Work a flat mill file across the tops of the frets, taking care to lay the file across many frets at once. It doesn't take much filing, so go easy. Check the trouble spot again and see if you have taken care of the problem. If not, repeat the process. Once you have eliminated the problem, you can use some fine sandpaper (280 grit or higher) and some steel wool over the frets, in the direction of the grain of the fingerboard, to smooth out the file marks.



_____32. Before you bring all of the strings up to pitch it would be a good idea to fine tune the position of the bridge. You will need a chromatic tuner to do this. Bring string 1 to a reasonable pitch (clear tone), play the string unfretted and take a reading on your chromatic tuner. Then fret just behind the 12th fret and take a second reading on your tuner. The second note should be exactly one octave higher.

If the second note is more than an octave higher (sharp) you will need to move the bridge toward the tail.

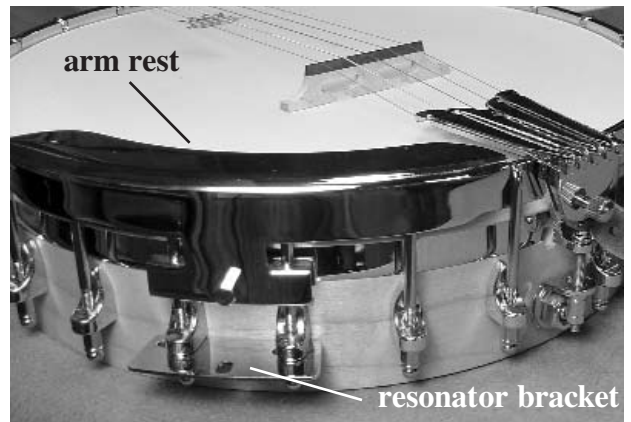
If the second note is less than an octave higher (flat) you will need to move the bridge toward the neck.

Repeat this process until you get a perfect octave at the 12th fret. Then all the frets will be in tune.

_____33. Tune the strings to the notes shown in the picture on the previous page. If you don't have a tuner or piano you can use our free online tuner. Just browse to www.musikit.com/freetuner

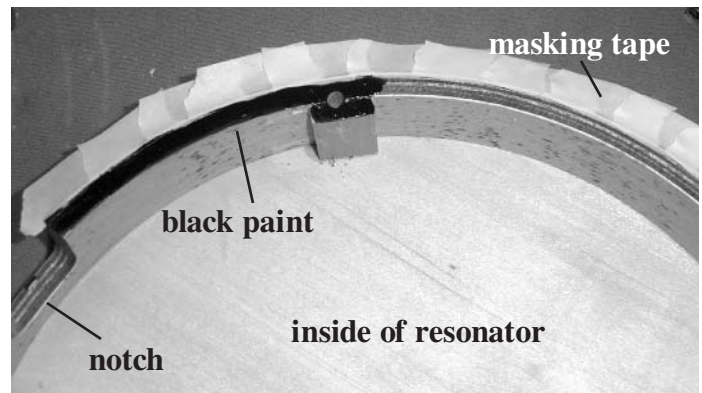
Optional Arm Rest

_____34. Attach the armrest to two of the tension hooks near the tail end of the banjo, as shown.



Optional Resonator

_____35. Attach the four Resonator Brackets by removing the 3rd and 4th nuts from the tension hooks counting on either side of the neck and the tailpiece. Slide the resonator brackets onto the tension hooks and replace the hex nuts, tightening them to the same tension as the surrounding hex nuts. You should have the 4 Resonator Brackets evenly spaced around the pot when you are finished.



_____36. The resonator looks better if you paint the edge of the rim so you don't see the laminations of wood. You can also paint the entire inside if you want to.

Mask off the edge binding before painting. It is difficult to scrape the paint off that decorative trim later.

_____37. When the black paint is dry, pad the notch in the resonator with the adhesive backed felt provided.



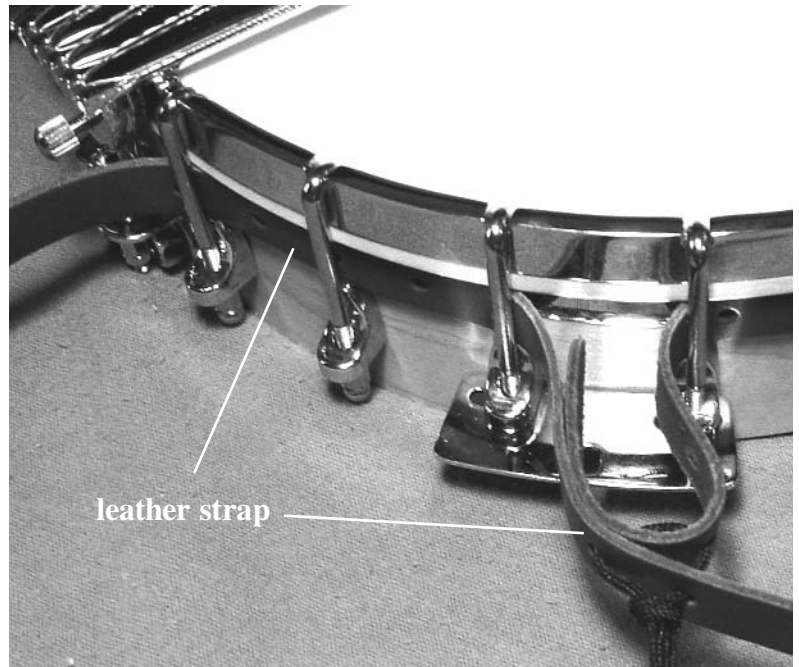
_____38. Now set the banjo assembly onto the resonator and use an awl to mark the location for the threaded inserts. Use a drill bit that is the exact size of the outside diameter of the insert, not counting the little burrs. Drill the holes slightly deeper than the insert is tall. Use a hammer to gently tap a threaded insert into each hole until fully seated. Attach the resonator to the pot assembly using the 4 knurled screws provided.

Installing the Optional Leather Banjo Strap

_____39. Thread one end of the strap through the three tension hooks on the bottom side of the tailpiece. (The bottom side as you hold the banjo)

Starting on the second tension hook below the neck - thread the other end of the banjo strap through the tension hooks until it meets the other end of the strap. Overlap the two strap ends and tie them together with the string provided. Then the strap can be pulled tight and it should sit completely inside the tension hooks.

Make adjustments for height as necessary.



_____40. Pick!

_____41. Grin!

Congratulations!!

You have assembled a high quality musical instrument that should give you many years of musical enjoyment.

Musicmakers offers several accessories for banjo playing:

- Leather strap
- Instruction books
- Songbooks
- Fingerpicks
- Thumbpicks
- Banjo case
- Spare strings

Please consult our catalog or web site (harpkit.com) for more details.