

DIY Kalimba “Thumb Piano”

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This DIY Kalimba “Thumb Piano” build is made using materials, tools, and supplies that are commonly found at a home improvement center, or at a hardware store and lumber yard. *Prices given are for a Home Depot in the NYC Metro area, 2014.* I wrote these instructions to be useful for people with different levels of experience working with their hands and using tools. I have included *Tips* throughout. Even if you think these tips are obvious, I do suggest you read them all, especially about assembly. This project should take around 2-3 hours to complete depending on your experience and how fast you work. If you choose to finish the wood before assembly, then you obviously need to add drying time.

Materials:

- 1 x 4” hardwood board (5-6” long piece) **FOR SOUNDBOARD**
 - I used oak, but maple, poplar, cherry, walnut, etc... will all work for this. *Please remember, 1x4” is the nominal measurement, when you measure it with a ruler the actual dimensions are ¾” thick x 3 ½” wide.*
- ½” wide x ¼” thick hardwood trim (3 ½” long piece) **FOR TENSION MECHANISM**
 - I used oak. If you can’t find this exact material, you should be able to substitute a ½” square dowel (typically made of poplar), or in the hardware section get a piece of ½” x 1/8” plain steel bar (this will be more difficult to cut and drill, but is excellent or even preferable if you can do it).
- Electricians “fish tape” **FOR KEYS**
 - The ¼” size spring steel.
- 1/8” diameter metal rod (3 ¼” long) **FOR BRIDGE**
 - Steel rod is good, but galvanized (zinc coated) steel rod is better.
 - Brass is excellent if you can find it.
- #8 sheet metal screws (¾” long) **FOR TENSION MECHANISM**
 - You need 3 screws.
 - Stainless steel is best to avoid stripping the screws during assembly and future tuning adjustments.
- #4 phillips head screw (1/4” or 3/8”) **FOR BRIDGE**
 - You need 2 screws, they should be pan head type screws that will sit flush when they are tightened down.
 - You can use CyA glue, aka “superglue” instead of the screws.
- *Optional* metal bottle cap buzzer (from glass beverage bottle) ***OPTIONAL***
 - If you want to add a buzzer like this, make sure your soundboard is at least 6” long, otherwise the buzzer will be in the way of your fingers when you are trying to play.
- Total estimated cost for materials: _____

Tools and Supplies:

I am listing the simplest and least expensive tools and supplies you will need to finish this project. If you have access to better and know how to use them, then of course use them as you wish, and please be safe.

- Ruler
 - Ideally with 16th (1/16”) inch markings on at least part of it.
- Pencil with a sharp point
- Saw to cut wood
 - Most places will cut if for you if you ask them, or you can use the hand saws in the aisle with all the wood trim pieces.

- Sand paper or foam sanding pad
 - 100 (medium) grit and 220 (fine) grit.
- Hacksaw
 - Small size is fine, and can be used for cutting the metal pieces and small wood pieces.
 - Larger size are also rather good for cutting wooden soundboards.
- Hand drill or power drill
- Drill bits: 3/16", 1/8", 1/16"
 - *Only need 1/16" bit if you are using screws for your bridge.*
- *CyA glue, aka "superglue," only if using instead of screws for bridge.*
- Large bastard file (hand file)
 - A brick can be used instead of the file, this will probably damage the brick.
- 8" crescent wrench
 - Locking pliers can be used if necessary.
 - *Other pliers may be used at your own risk of being cut if the piece slips while you are trying to bend it!*
- Clamps or vice to hold your work to the table while cutting and drilling.
 - A piece of scrap wood if you need it to avoid damaging your work surface.
- Small hammer or stone.
- Safety Equipment:
 - Eye protection.
 - Gloves to protect against cuts and scratches while handling metal.
- **Optional** shellac, polyacrylic, etc... for finishing the wood, plus whatever supplies for this.
- **Optional** digital tuner (or phone app) for tuning the finished kalimbas.
- Total estimated cost for tools and supplies: _____

Step by Step Instructions:

- 1) Make your Soundboard:
 - a) Cut your board to size. Mine was 5" long, if you want to have a bottle cap buzzer on yours then make sure it is at least 6".
 - b) Sand with 100 (medium) grit sand paper or sanding pad.
- 2) Make your tension bar:
 - a) Cut the 1/2" x 1/4" piece of oak trim to 3 1/2" long.
 - b) Mark the locations where you will pre-drill your holes 1/4" from each end, and also center (1 3/4"). There will be a total of 3 holes.
 - i) *Tip: center punch the marks using a nail, screw, awl, or center-punch etc..., this will make your drill point more accurate.*
 - c) Clamp the piece down and drill straight through using the 3/16" bit.
 - i) *Tip: use a piece of scrap wood underneath to avoid damaging your work surface.*
 - d) Sand entire piece with 220 (fine) grit sand paper, making sure to clean up the holes.
- 3) Use tension bar as template to mark your soundboard:
 - a) Measure 1" down from the top of your sound board and use pencil to lightly mark a horizontal line across from one edge to the other.
 - i) *If the top of your board doesn't have 90 degree corners, you will need to use some kind of t-square.*
 - b) Position the top of your tension bar on this line and use the holes you drilled through the tension bar as a template to mark these points onto the soundboard.

- i) Tip: with the tension bar still in place as a template, make a light pencil mark on the upper right corner of your newly made tension bar. This mark will be used for reference during assembly.*
- 4) Drill pilot holes into your soundboard:
 - a) Center punch your marks (see step 2b).
 - b) Clamp board to work surface (see step 2c).
 - c) Use 1/8" bit to drill 1/2" deep pilot holes into your soundboard. You will drill a total of 3 holes.
 - i) Tip: you can use a ruler and a piece of masking tape on the bit to set the 1/2" depth.*
 - ii) If you drill too far and go all the way through the board, the kalimba will be fine, and it will still look ok. There is no need to start over.*
 - d) Smooth holes with medium sand paper.
 - e) Smooth entire board using fine sand paper.
- 5) Optional step, apply finish to wood pieces:
 - a) If you want to apply a finish, this is the point in the project where you should do it.
 - b) You can use shellac, polyacrylic, spray paint, cutting board wax, etc...
 - i) Tip: I find that wiping/padding on shellac is the simplest and least time consuming.*
 - c) Allow to fully dry and cure before assembling.
- 6) Make your bridge:
 - a) Cut a 3 1/4" long piece off of the metal rod using the hacksaw. If you have bolt cutters you may wish to use these instead. DO NOT try to use tin snips or cable cutters, you will ruin them.
 - b) Smooth the rough ends using the file.
 - i) Tip: plain steel rods are typically sold covered with a protective coating of grease. Be aware of this when you handle them in the store. Before working with the material, you will probably want to remove the grease using rubbing alcohol, denatured alcohol, or a little dish detergent and water. Dry thoroughly with a paper towel to rub off any remaining residue.*
- 7) Assemble tension bar to the soundboard:
 - a) Use the #8 sheet metal screws to attach the tension bar to the sound board.
 - i) If you took my advice and marked the right side of the tension bar, be sure to position it correctly before you start screwing it in place.*
 - b) Screw in all 3 screws just a little bit, then make sure the bar can move up and down without much trouble, this way you can correct the angle of the screws incase the bar is too difficult to move.
 - c) Tighten down screws until there is approximately a 1/16" gap underneath the tension bar.
 - i) This will make it easier to position the kalimba keys later on.*
- 8) Mark the position for the bridge:
 - a) Use an extra piece of the 1/2" wide tension bar material and place it snugly below the tension bar, and mark the bottom edge across the width of the sound board.
 - b) The bridge needs to be positioned 1/2" below the bottom edge of the tension bar, which should be extremely close to 2" down from the top of the soundboard, if all your measurements and markings are precise.
 - i) If for some reason your measurements are not perfect and the bridge is slightly out of position, it is still very likely that your kalimba will work fine. So, try to be accurate, but don't go crazy if things don't measure up perfectly on this step.*
- 9) Do the bridge. There are two ways:
 - a) Use a ruler to measure 1" in from each side of the soundboard, and mark those positions on the line you made in the previous step (8a).
 - b) Between 1/8" and 3/16" below these new marks, mark and center punch the points for the screws that will prevent the bridge from being forced out of position by the tension from the keys during final assemble and playing.

- c) Use a 1/16" bit to make pilot holes for the screws, you will be making 2 holes the depth of whatever #4 screws you plan to use.
- d) Tighten the #4 screws using a #1 tip screwdriver
- e) Or, skip steps 9a – 9d above and just use superglue to glue the bridge into place!
 - i) Clamp the bridge into position before applying the super glue, spreading it along the bridge with a tooth pick.

10) Make your kalimba keys:

- a) Put on safety gloves to protect against getting scratched or cut if you slip while working with the spring steel material.
- b) Uncoil about 18" of the electricians' fish tape and clamp the strip to the work surface.
- c) Use the edge of the file in a saw-like fashion to cut (score) a slight groove into the steel strip.
 - i) *You can also try the hack saw for this, although it may be more prone to slipping.*
- d) Unclamp the strip and take into your hands, position the jaws of the crescent wrench next to this groove and snap the metal along this edge. CAUTION! Newly cut edges are very sharp!
 - i) *Tip: use thumb of hand holding crescent wrench to press onto adjustment screw so the jaws remain tight and the piece doesn't slip as you are trying to snap it.*
- e) Use crescent wrench to bend the cut end of the coil so it doesn't retract and get lost inside the case. *It is difficult and dangerous to try to retrieve the end if it gets lost inside.*
- f) Use paper towel or rag with rubbing alcohol to clean oil residues off of the strip.
- g) Clamp strip to work surface and repeat steps 10c and 10d to cut 6 keys to the following lengths:
 - i) 1) 2 3/4" 2) 2 3/4" 3) 2 1/2" 4) 2 1/2" 5) 2 3/8" 6) 2 1/4" CAUTION! Newly cut edges are very sharp!
- h) Use the file or brick to remove sharp edges.
 - i) *Tip: I like to hold the file down on a table and work the piece against the file in a smooth dragging motion. Be careful and do what is most comfortable for you.*
 - ii) *Tip: you may choose to spend more time shaping and smoothing the playing end of the key, and just minimal time of the other end to make it safe.*
- i) Smooth keys more by dragging the ends against sand paper. I often skip straight to 220 fine grit.
- j) Use crescent wrench to bend the ends of the keys to improve playing comfort.
- k) Arrange in size order and tape to the bottom of the sound board, to ease assembly.

11) Position keys onto the kalimba:

- a) Put bridge into place, if it wasn't glued.
- b) Take longest key (#1) and place it over the bridge and under the tension bar, to the right side next to the center screw. About 1/4" should stick out on the non-playing end.
 - i) If it slips around too easily, slightly tighten the screws until it is easy to position the keys but they aren't falling out of place.
- c) Put in key #2 on the left side of the center screw.
- d) Put the shortest key (#6) next the screw on the left end of the tension bar.
- e) Put key #5 next to the screw on the right.
- f) Put key #3 in the middle between #5 and #1.
- g) Put key #4 in the remaining place between #6 and #2.
- h) Move the keys as needed to space them evenly.

12) Get the keys ready for tuning:

- a) Test the sound by plucking down on key #1.
 - i) It will likely be weak or buzzy sounding
- b) Tighten the screws a little bit at a time until you get a clear sound when you pluck down on the keys. Then stop tightening so you can finish tuning the keys before fully tightening the screws.

13) Tune your kalimba. There are two basic approaches for this:

- a) Make your own unique tuning, best for playing solo, by yourself.
 - i) As a general rule, if you will only be playing the instrument by itself, then it is “in tune” if you like the way it sounds when it is played. It doesn’t matter if it isn’t tuned to a particular “scale,” if you like how it sounds then that is good enough. If it makes you feel better, then name your new “scale” after yourself, and if anybody gives you a hard time about it tell them that you call it the _____ scale. Don’t let anybody tell you otherwise.
- b) Tune to a pentatonic scale, recommended for playing in a group with other instruments.
 - i) If you want to try playing with other instruments, don’t like the way your own tuning sounds, or simply like the idea of tuning to a popular scale, then you can follow this chart to tune it to an F major pentatonic scale:
Key 1 = F, 2 = G, 3 = Bb, 4 = C, 5 = D, 6 = F
- c) The pitch or note of the key is determined by the amount that is sticking out past the bridge. The longer the part that sticks out, the deeper the note. The shorter the part sticking out, the higher the note.
- d) You can adjust the position by wiggling the end of the key gently side to side while pushing or pulling it.
- e) Unless you have a trained musical ear (and even if you do), you will probably want to use some kind of electronic tuner, computer software, or phone app. At the very least, use an electric keyboard to try and match the pitches.
- f) *If you choose to tune only by ear, and you can understand the musician jargon in the contents of this bullet point, then here is my advice:*
 - i) Tune the octaves first, #1 and #6 should be an octave apart.
 - ii) Tune #3 to be a fourth from #1.
 - iii) Tune #4 to be a fifth from #1.
 - iv) Tune #5 to be a sixth from #1, or a minor third down from #6, whichever is easier for you.
 - v) Tune #2 to be a fourth down from #4, or a whole step up from #1, choose your preference.

14) Tighten down all screws carefully:

- a) Slowly tighten down the screws all the way, being careful not to strip out the heads. Make several small rotations on each screw then move to the next, and repeat until they are all tight.

15) Optional step, if your board is at least 6” long, add bottle cap buzzer (from glass beverage bottle):

- a) Select an attractive looking bottle cap, or sand the top to reveal the metal beneath.
- b) Use an awl or nail to drive a hole through the top of the cap.
- c) Attach to the bottom of your soundboard using a screw.
 - i) Depending on the size of your hole you may need to use a washer with your screw.
- d) If you add the buzzer and decide you don’t like how it sounds, just tighten the screw down enough to stop it from buzzing when you play.

16) You are done!

- a) Play your kalimba, make up your own patterns, enjoy the sound of your instrument.
- b) If you are inspired to make more kalimbas, you can get ideas from the make/build section of nyKalimba.com
- c) Are you happy? Tell people about nyKalimba.com and about this tutorial. Thanks!