MUSICMAKERS

OLD WORLD LYRE KIT

Updated November 2020

WOOD PARTS

- ☐ ☐ A. Spruce Soundboard (Front)
- ☐ ☐ B. Walnut Ply Back
- ☐ ☐ C. Tail Piece
- ☐ ☐ D. Arched Cap
- ☐ ☐ E. Bridge
- ☐ ☐ F. Cross Piece
- ☐ ☐ G. Left Arm
- ☐ ☐ H. Right Arm
- ☐ ☐ I. Saddle
- ☐ ☐ J. Inner Brace (Not Shown)

HARDWARE

- ☐ ☐ L. Tuning Wrench
- ☐ ☐ M. (10) Zither Pins
- ☐ ☐ (10) Strings (wire or nylon)
- ☐ ☐ (6) Plastic Beads for Nylon Strings - or
- ☐ ☐ (12) Tiny Washers for Steel Strings
- ☐ ☐ Harp Medallion (maple) 1-1/4" dia.
- ☐ ☐ (2) Walnut Dowels 1/4" x 1-5/8"
- ☐ ☐ End Pin
- ☐ ☐ Tail Gut (9" steel cable)
- ☐ ☐ (2) Aluminum Crimps
- ☐ ☐ (2) Drill Bits: 3/8" & 1/4"
- ☐ ☐ Assembly Instructions

Musicmakers
14525 61st ST CT N
Stillwater, MN 55082

BEFORE YOU BEGIN

____A. Inventory and inspect all your parts carefully. If anything is missing or defective, please call us right away. **651-439-9120**

____B. It is a good idea to read through the entire assembly instructions before you start, just to get an overview of the project.

A NOTE ABOUT GLUE

We recommend assembling this kit with standard woodworker's glue (such as Elmer's Carpenters Glue or Titebond Wood Glue). Don't use Hotmelt glue, Superglue, 5-minute Epoxy, or plain white School Glue for assembling the major wood parts -- those adhesives are not strong enough for a high-tension instrument. There is no need to look for any special instrument-maker's adhesive.

Every time you use wood glue on this project, it is wise to have a damp rag handy for cleaning up afterwards. It is always best to scrub away any excess glue that squeezes out of the joints before it dries, especially on the outside of the instrument. Keep your hands and workbench as clean as possible too. Glue smudges will show up vividly on the finished instrument.

CAUTION: Please do not open the sealed plastic bag containing the front and back panels until you reach Step #7. The light colored soundboard (front) is made of solid Sitka Spruce and needs to be kept very dry until you glue it to the frame.

ASSEMBLE THE FRAME

___1. We recommend checking off each step in the directions as you finish it. In fact, go right ahead and check off this step now -- feels good doesn't it? Hey -- you're off to a great start already!

___2. Gather the four main frame parts and lay them out on a flat work table to see how they fit. The longest arm should be on the right side, and the cross-piece should fit between the two arms with the precut half-lap joints. (fig. 1) Use NO GLUE yet. Just test the parts dry first to see if you need to make any adjustmsents to the joints.

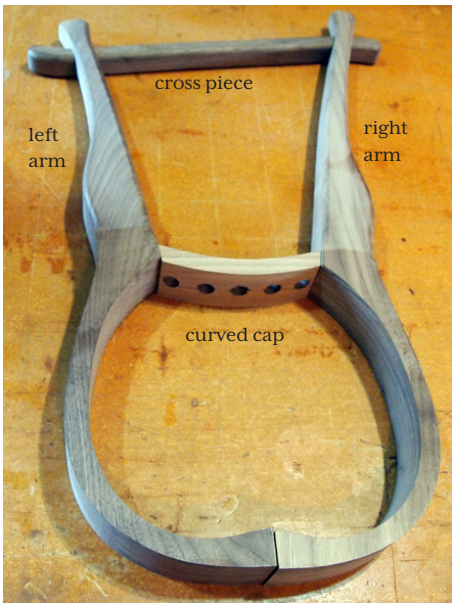


FIG. 1

___3. Once you are satisfied with how the parts fit, you can begin gluing them together. You'll need two small clamps and some masking tape.

FIG. 2

Start by squirting glue in the lap joints where the cross piece joins the two arms, as shown in fig 2.

Put these joints together with glue and use a clamp to hold the parts firmly.

You should see some glue squeeze out of the joints, so you can use a damp rag to clean up the excess. This will save time later -- it is harder to chip the glue away after it has hardened.

___3. Align the tail end of the arms together at the bottom and put glue between them. These curved parts are difficult to clamp (and too fragile to bear much pressure at this point), so we just draw them together with masking tape or strapping tape (fig 3).

FIG. 3

Press one end of the tape down against the wood on one arm and then hold the parts in alignment as you pull the tape across to the other side, as shown. The tape should cross over the glue seam so it will also hold the parts from sliding out of alignment.

Then flip the assembly over and add tape on the back side of this joint and across the bottom.

___4. Now you can glue the curved cap piece between the two arms, pushing it down until it fits snugly, using masking tap to pull the arms inward and hold the cap in place (fig 3). Put tape on both sides (front and back) to make sure the cap does not slide out of position.

Be sure to clean up excess glue with your damp rag.

Leave this assembly overnight to dry. It is a bit fragile in this state of assembly, so take care not to drop it on the concrete floor! Adding the front and back panels to the frame will make the whole assembly good and strong.

___5. To help secure the cross piece against the string tension, you will reinforce the joints with the provided walnut dowels.

Draw an X over the joint to mark the center and then drill all the way through with the 1/4" drill bit. (fig. 4)

Put some glue in the hole and a little on the dowel and hammer it through the hole so that it is sticking out both sides. Wipe up excess glue. Wait 30 minutes before you trim and sand the dowel flush.

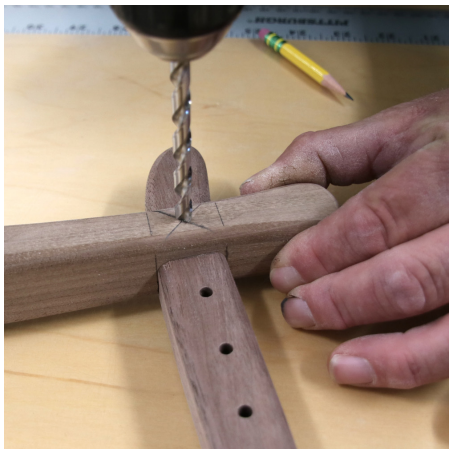


FIG. 4

___6. While the glue is drying on the dowels, you can remove the tape from the frame and check each glue joint for unevenness. Use coarse sandpaper to level the joints (taper the high parts down gradually) to achieve a smooth surface for gluing the soundboard and back panels to the frame (fig 5).

Look also for any blobs of glue that might interfere with the fit of either the front or back panels.

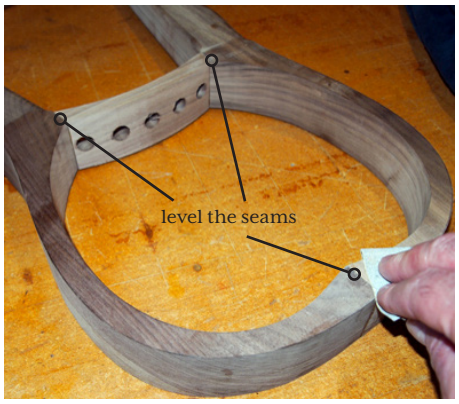


FIG. 5

INSTALL THE SOUNDBOARD

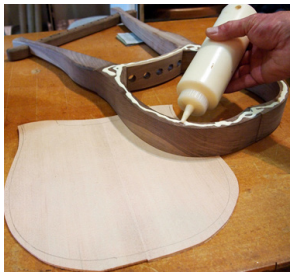
Now you are ready to glue the soundboard (front panel) in place. The soundboard is the light colored panel with very straight grain (made of Sitka Spruce). Decide which face you wish to show outward, and place that side facing down on your flat work table.

There is a difference between the front and back of the frame. The back is flat all the way up the arms, but the front tapers down from the soundchamber to the cross arm. Before proceeding to the next step, be sure you have correctly identified the front of the frame.

___7. Apply glue to the front of the frame where it will contact the front panel (fig 6), and then flip the frame over and carefully center it on the soundboard so that some spruce extends beyond the frame all the way around (fig 7).

Use weights or clamps to hold the frame tightly down against the soundboard until the glue dries. (fig. 7)

FIG. 6



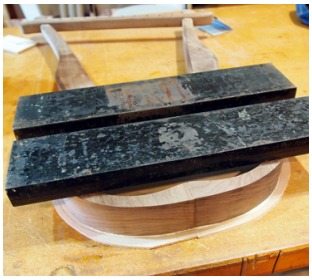


FIG. 7

___8. When the soundboard is dry, test-fit the inner brace. The brace should be located 4 inches below the inside of the top cap. (fig. 8) You may need to shorten it a little to get it to fit. Make sure to also remove any dried glue blobs inside the frame that are in the way of the brace. A sharp chisel should work well for cleaning those off to allow for the brace to set flat on the inside of the soundboard.

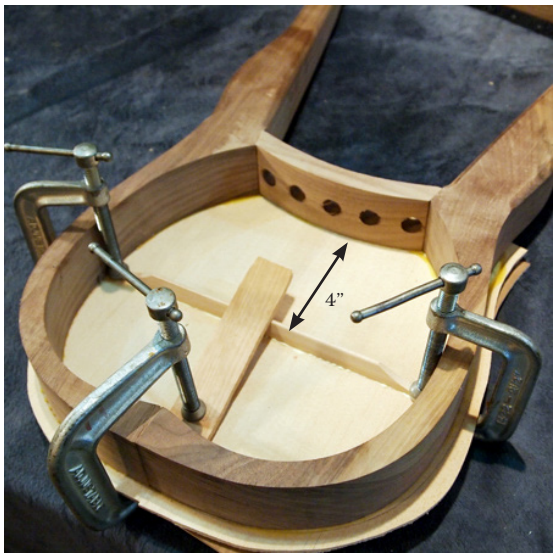


FIG. 8

Outline the brace in pencil so you can replace it in the same spot without need for measuring again. Then find a system for clamping the brace inside the box . Fig 8 shows a clamp at each end, which is important, and a scrap of wood being pressed down with a third clamp to put pressure in the middle of the brace. When ready, go ahead and glue the brace.

Be sure to add some scrap wood between the soundboard and clamp to prevent the clamp from denting the wood.

INSTALL THE BACK

___9. Double-check to make sure the glue joints are level on the back side of the frame too. When satisfied with the smooth surface, apply glue to the frame (fig 9) and then center the back in place, with the better face showing outward. Use plenty of clamps or weights to hold the back firmly to the frame until the glue dries (fig 10).


FIG. 9

CAUTION: One mistake we've seen novice woodworkers make here is to place the clamping pressure too far inside the perimeter of the box, so the clamps cause the back to be depressed in the middle. Keep the clamps pressing directly above the hardwood frame -- this gives the strongest construction and the best-looking results.


FIG. 10

___10. When the back is dry, you are ready to trim off the excess overhang on both the front and the back. Can you do this with a coarse sanding block? Well, how much time and energy do you have? How about using a belt sander? Yes, you can sand all but the tight corners between the arms with a belt sander.

FIG. 11

By far the best way to trim the soundboard and back flush with the frame, however, is to use a router. If you don't have such a tool in your shop, here is your excuse to buy one! If you enjoy woodworking, you'll find many uses for this great tool. We use two router bits for this step. (fig 11)

Use the Flush Trim Bit first, moving the router in a clockwise direction around the body of the instrument. (fig 12)

Yes, moving the router around in a clockwise direction violates the normal routing instructions, but here is why we recommend it: This "climb cutting" technique is especially useful when routing thin wood that is easily chipped by the spinning blade. You can do final clean-up by routing the other direction, but if you try to cut off a significant amount of overhanging thin wood, it is best to work the router clockwise around the piece.

FIG. 12

When the excess material is trimmed flush, then you can switch to the Round-Over Bit to ease the sharp corners nicely. Move the router clockwise with this bit too. Otherwise you'll end up with lots of little chips in the grain that will need sanding out.


FIG. 13

___11. We like to trim the excess soundboard and back material that extends a little bit up each arm of the instrument, just to make it look more finished. Use a pencil to draw where you'd like to have these panels end. (fig 13)

Use a sharp chisel to cut away the excess material above the pencil line. (Fig 14). We like to hold the chisel at an angle to make a beveled edge on the wood.


FIG. 14

Work the cuts with your chisel until you achieve the profile that you like.

Then finish up with some medium sandpaper (150 grit) to smooth the contours and clean up any left-over glue residue.

INSTALL THE WOODEN SADDLE AND ENDPIN

___12. Now you need to inset the little wooden saddle at the tail end of the instrument, just above the end-pin. One flat edge will rest on the frame, with the curved corner forming a guide for the tailgut that will hold the tail piece to the end pin. See fig. 15 to see what it will look like when done.


FIG. 15

Begin by holding the saddle carefully centered above the end pin, and use a razor knife to outline its position in the spruce soundboard. (fig 16) Set the saddle aside while you deepen those outline cuts with the razor knife.

Use a sharp chisel to chip out the spruce within the outline. (fig 17) You will probably need to switch back and forth between outlining and chipping to get down to the walnut frame.

Then glue and clamp the saddle in place. (fig. 18)

FIG. 16

FIG. 17

FIG. 18

INSTALL THE ENDPIN

___13. Drill for the end-pin through the bottom of the frame. Use an awl to punch a mark on the center seam, midway between the front and back panels, as shown. (fig 19)

Use the 3/8" drill bit provided to bore the hole for the endpin, all the way through to the inner cavity.

FIG. 19

The endpin provided in this kit has a larger cap than is necessary. You can leave it full size, but we like to trim off about half of the cap and round it over so it looks less massive. (fig 20)

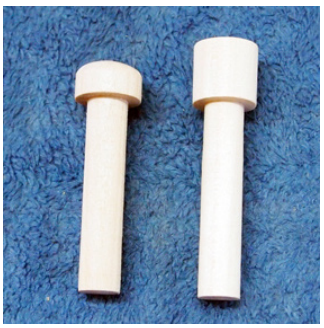


FIG. 20

Then you can glue the endpin in place, but be sure to leave a little space (1/8") under the cap for the tailgut to hook around. (fig 21) Squirt some glue into the hole and just a little on the shaft of the pin and push the pin in until you have at least 1/8" space between the cap and the frame.

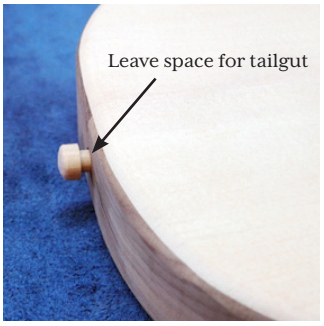


FIG. 21

INSTALL THE MEDALLION

___14. Lighly sand the harp medallion and glue it in the tailpiece.

FILL AND SAND

___15. This is a good time to check for any gaps in the joints or under the front and back panels. Use wood filler paste to patch them up. There are several brands of good sandable and stainable fillers on the market. We've pictured a couple good ones that we use here. (fig 22)

FIG. 22

You can purchase these fillers in different colors to match the wood, thus minimizing the noticeability of your repairs. The main thing to look for with fillers is to get one that is marked "sandable and stainable". That way you can darken a little if necessary, to match the wood tone.

Some woodworkers like to mix a little natural sawdust (from sanding the wood) with slightly diluted wood glue to make their own filler paste. This also works well.

___16. Now it is time for final sanding. Plan an unhurried time slot for this activity. Find a comfortable chair, put a towel over your lap to catch the dust, and pour a refreshing drink, turn on the TV or radio, and have at it. You may find a few rough spots that require 80-100 grit paper to clean up, but then you'll want to switch to about 180 grit to smooth everything out. Look for machine marks, glue spots, pencil marks, etc., and try to sand with the grain direction wherever possible. (fig 23)


FIG. 23

Don't forget to sand the bridge and tailpiece too!

People often ask us how our musical kits turn out when built by amateurs. We tell them that the major sign of an amateur job is a lack of attention to sanding. Glue spots, sharp edges, machine marks all point to a hasty job. So take your time and make this something you will be proud to show off!

APPLY A FINISH

___17. Now you are ready to apply the finish. Here are some ideas to consider:

STAIN: Stains are coloring agents used to darken wood. We like the natural look of the wood on this project. If you would like to use stain we recommend testing your stains on some scrap wood first. Also - do your staining before applying any other sealer or top coat.

VARNISH: Any regular varnish will work fine for a clear top coat. We like Minwax Polyurethane in semi-gloss or satin sheen. The advantages of these finishes are simple application, durability, and deep, soft luster. They add depth and vibrancy to a stain as well.

LACQUER: Many professional instrument makers still use lacquer for their finish. The most readily available lacquer is called Deft Clear Wood Finish (semi-gloss is easiest and most successful). 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.

Don't forget to put a top coat on the wooden bridge and harp medallion!

CAUTION: be careful about forcing varnish into the tuning pin holes in the cross arm at the top of the instrument. Squeeze out the excess varnish from your foam applicator before going over those open holes.

On the other hand, however, you might get a Q-tip to swab some finish inside the five larger soundholes of the cap piece that forms the top of the body. It looks nice to darken the edges of those holes with at least one coat of varnish.

Follow the instructions provided with the finish you choose and take your time to do a nice job. It's almost always better to apply a few thin coats, sanding between, rather than one thick coat. A well-done and patiently applied finish will be well worth the effort.

INSTALL THE ZITHER PINS

___18. Use a hammer to install the ten zither pins into the cross bar. (fig 24) Be sure to put the threaded end into the hole. The square end aims up to fit the tuning key. Pound the pins down to about 7/8" height

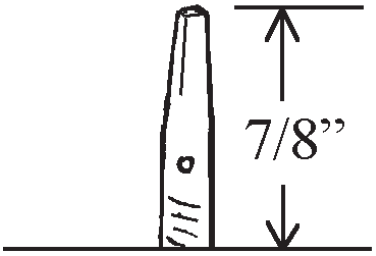


FIG. 24

PREPARE THE BRIDGE

___19. Prepare the bridge as follows: Put masking tape over the top edge of the bridge and mark the positions for ten strings. Space the strings 8mm apart. Use a small triangle file to mark the notch positions into the wood. (fig 25) Then you can remove the tape. The notches should be angled to the left a little because of how the bridge will be oriented on the front -- see fig. 33, pg. 11

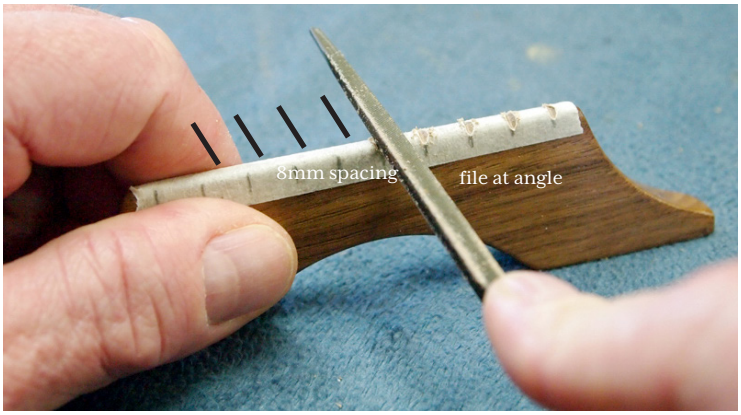


FIG. 25

PREPARE THE TAIL PIECE

The tail gut for this instrument is made of steel cable because anything weaker will break from the string tension! We have secured one end of the cable for you, so please take care to secure the other end carefully.

___20. Thread the plain end of the tailgut through one hole in the tail piece from the inside, and then back through the other hole to the inside. (fig 26)

Find the extra aluminum crimp and push the cable through one side of it and back down into the other side of the crimp, so the end is hidden in the crimp. (fig 27)

Pull the crimp to tighten the small loop to about 1/4" size. (fig 28) Then use a hammer to pound the crimp firmly against a cement floor or steel anvil to flatten it so the wire cannot be pulled back out. Pinching it hard in a metal vise also works well.

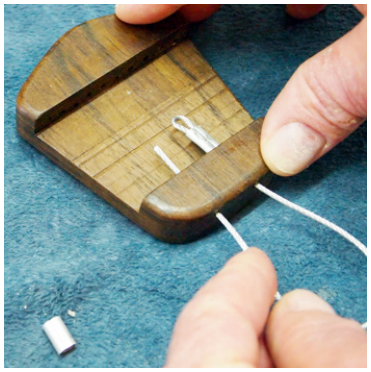


FIG. 26

FIG. 27

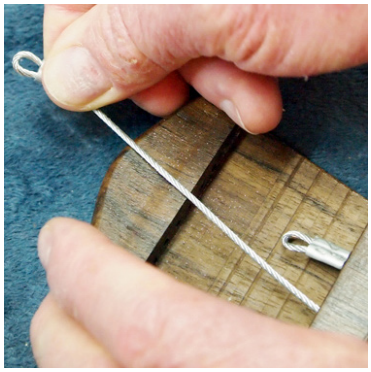


FIG. 28

INSTALLING WIRE STRINGS

If you have nylon strings - skip to Installing Nylon Strings (pg 12)

I highly reccomend you watch our video about attaching wire strings to zither pins. Find it here:

http://tiny.cc/installing-strings

___21. It is easiest to insert all the strings into the tailpiece first.

The steel strings are individual ball-end strings which need a tiny washer added onto the end before threading through the tailpiece.

Turn the tailpiece upside down, and thread string #10 (the thickest string) through the first hole on the **left** side of the tail piece. (fig. 29).

Put string #10 on the hole on the left and continue in order, working your way to the right: string #9, string #8, etc.

FIG. 29

WIRE STRING CHART

String	Note	Gauge	Code
1	High E	.010	BALL010
2	D5	.010	BALL010
3	C5	.012	BALL012
4	B4	.012	BALL012
5	A4	.014	BALL014
6	G4	.014	BALL014
7	F4	.016	BALL016
8	E4	.016	BALL016
9	D4	.018	BALL018
10	Mid C4	.020	BALL020

Now you can flip the tailpiece right-side-up and hook the steel tailgut around the end pin. (fig. 30)

FIG. 30

___22. To begin stringing, start with the two middle strings -- #5 and #6

A) Take one string and stretch it across the instrument to the corresponding tuning pin and clip off the excess length of wire so that it measures about 2-3 inches beyond the tuning pin.

B) Put the wire into the pin so that the end almost shows through the other side of the pin. (fig. 31)

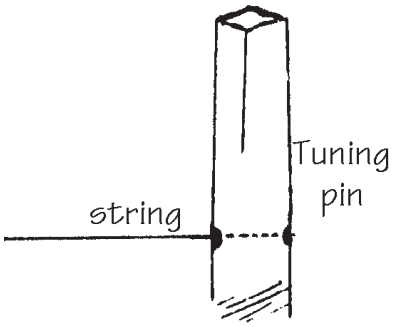


FIG. 31

C) Use the tuning wrench to turn the pin clockwise about one-half turn before putting tension on the wire. (fig. 32-C and D)

D) Pull on the wire to "set" it in the pin. (fig. 33-E) This puts a sharp kink in the wire where it enters the tiny hole. If the wire jumps out when you pull, you may need to clip off the kinked end and try again.

E) Keeping tension on the wire at all times, turn the pin clockwise until you take up all the slack. You should be able to make about two or three complete turns of the pin before the wire is tight.

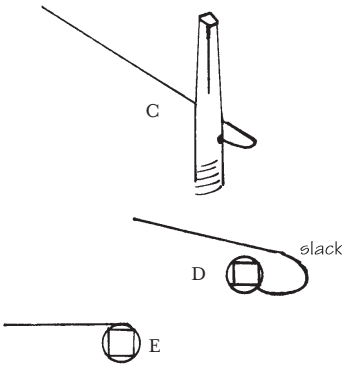


FIG. 32

Try to keep the windings tidy! (consult the video)

Don't put too much tension on the strings yet, just enough to take up the slack.

Before you get all the strings in place, you'll want to slide the bridge to its optimum location. When we tune the Lyre to the notes shown in the tuning chart, we place the bridge at an angle so the highest string will have a vibrating length of about 13" and the lowest string about 17".

FIG. 33

Just measure the space between the tuning pin and the top of the bridge at each end. (fig. 33)

Install the rest of the strings in the same manner. Adjust the bridge if needed. When all the strings are installed - jump to the tuning section. (pg. 13)

INSTALLING NYLON STRINGS

___23. It is easiest to insert all the strings into the tailpiece first.

One length of nylon makes two strings, but don't cut it in half. Thread a bead to the center of the string and poke both ends of the string through the first two holes in the tailpiece. Pull evenly until the bead is tight against the tail piece and you have equal lengths of nylon for each string. (fig. 34)

Begin with strings #10 (Middle C4) and #9 (D4), which use the thickest string (.050"), on the left side of the tail piece when it is upside-down. (fig. 34)

Continue with remaining pairs until all the strings are in the tailpiece.

Now you can flip the tailpiece right-side-up and hook the steel tailgut around the end pin. (fig. 30 - pg. 11)

NYLON STRING CHART

String	Note	Gauge	Code
1	High E	.025	NYL025
2	D5	.025	NYL025
3	C5	.032	NYL032
4	B4	.032	NYL032
5	A4	.036	NYL036
6	G4	.036	NYL036
7	F4	.040	NYL040
8	E4	.040	NYL040
9	D4	.050	NYL050
10	Mid C4	.050	NYL050

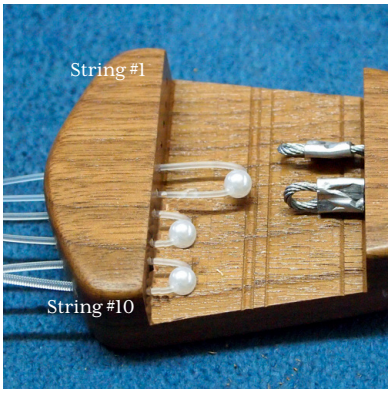


FIG. 34

___24. Here's how to begin stringing:

Find the two middle strings -- #5 (D4) & #6 (E4) -- and thread them through the corresponding tuning pins.

Leave yourself some slack and begin to tighten the tuning pin. Make your first winding go above the hole and then cross over the winding and then guide the rest of the windings down toward the cross bar. (fig. 35)

FIG. 35

Crossing the windings like this is important because nylon is so slippery.

Don't add too many windings on the first string yet. Attach the other half of the string to the neighboring tuning pin. Once you have the length of nylon attached to both tuning pins you can work up some tension. This can be a bit tricky and you may want an extra pair of hands.

Before installing the rest of the strings, position the bridge as shown in fig. 33 on page 11.

Attach the rest of the strings.

You might find our video about installing harp strings helpful. This link will take you right to the part about installing nylon strings and how to cross windings.

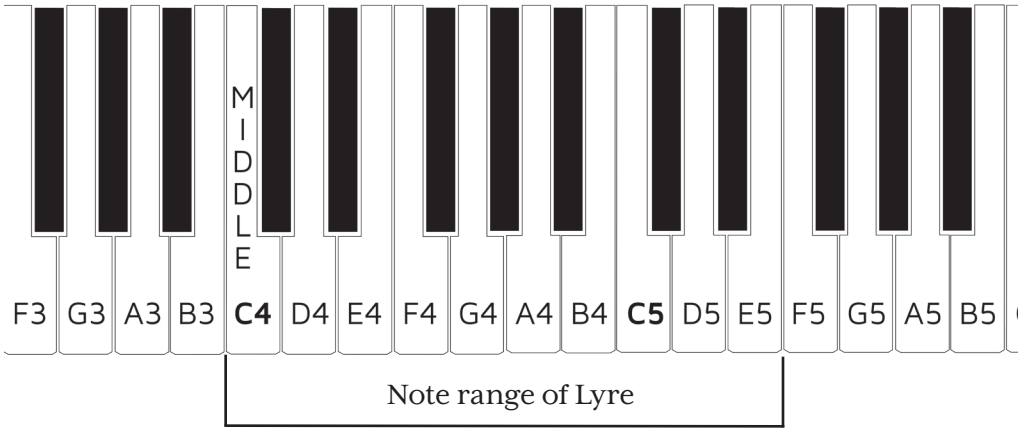
http://tiny.cc/nylon-strings

TUNING

Once all the strings are installed, you can begin tightening them up to pitch. This may require several tunings because the strings (especially nylon) are stretching and the instrument is adjusting to the tension.

Tune the strings to the C major scale, beginning on Middle C (longest string) and proceeding up the scale to high E5 (shortest string). To help you tune, you can buy an electronic tuner, download one of the many free tuner apps on your phone, or use our free online tuner - https://www.harpkit.com/online-tuner

Don't worry that one half of each nylon string is being used for a different note than the other half. Tune each pair fairly evenly, and when they are close to the correct pitch, you can fine tune them to their respective notes. The tension on each half of the pair will be so similar that there will be no slippage through the tail piece.



NOTES: *Use this section to jot down any notes about the project you might find helpful at a later date.*

MUSICMAKERS

Congratulations!

We hope you have enjoyed your project and are proud of your work!

Musicmakers
14525 61st ST CT N
Stillwater, MN 55082