

DWF GUITARS

REFRETTING A VINTAGE YAMAHA FG

V2.1.1

Dave Fengler

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1.0 REFRETTING A VINTAGE YAMAHA FG v2.1.1 by Dave Fengler

While refretting an acoustic guitar isn't as hard as a neck reset, there is a certain level of unknown when refretting a vintage Yamaha FG acoustic guitar. They used frets that have .018" tangs, vs. the standard of .020" today. This might seem trivial, but the extra interference can cause a slight back bow in the neck. This might be useful for a neck that has an excessive forward bow, but not something you normally want.

Also, the method for fret retention is different on vintage Yamaha's. Until 1977 they crushed the end of the fret tang, vs. today's dimples on the sides of the fret tang. This made the vintage Yamaha frets much harder to install. They also crushed the frets into the fretboard, sometimes making removal difficult because there is no space under them. Also, if you use water to soften the fretboard when removing the frets, the water will cause the fret slots to swell slightly, making them a little smaller. The fret slots MUST be opened up with a fret slotting saw. Today's saws measure .023" wide. Since modern frets have .020" wide tangs and dimples on the sides, opening the slot to .023" makes installation easier, vs. the interference fit (mashed tangs) for vintage Yamaha's.

There is another unknown, typical of vintage Yamaha FG's. For approximately 2 years, from the beginning of 1969 to early 1971 (with some overlap) they used .028" tang frets. These slots don't need to be opened. The be replaced they need less common frets with .024" tangs to have a chance of staying in the fretboard.

I use **LMII FW74** for fret replacement or complete refrets for vintage Yamaha's that have .018" tang frets. I use **LMII FW75** for complete refrets for .028" tang frets. Replacing individual .028" tang frets is a bit harder. There isn't one perfect fret. Dunlop's 6S6200 is a good upper dimensional match (and a .045" fret tang stud width), but is a softer 12% nickel silver. Dunlop's 6260 and 6S6260 are also a good upper dimensional match and 18% nickel silver, but the fret tang studs are only .037" and may not hold well in the wide fret slots.

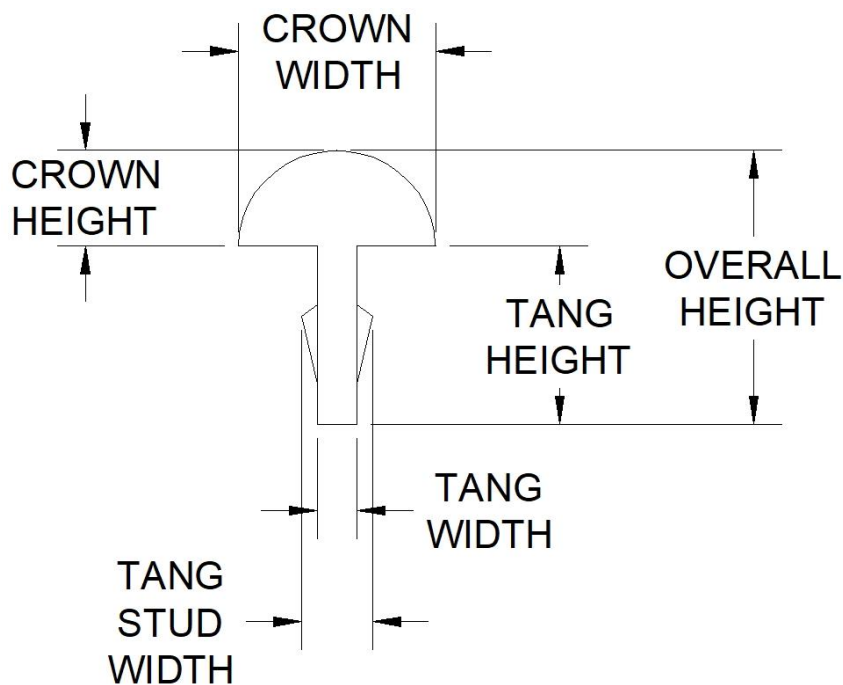
I originally created this document for myself to record the steps I took to replace the frets on a few vintage Yamaha FG's, based on what I've read and watched online and a few discussions with luthiers. It is not the only way to do it. I sometimes overcomplicate things. If you have a better method feel free to share it in the forum or send me an email at YamahaVintageFG@gmail.com. I'm always looking to learn new ways to do things. I will sometimes update this document if I get new ideas, learn from the one I just did, or get new information.

1.1 WHAT ARE FRETS?:

The purpose of frets are to have a fixed hard point to create a musical note. The position of each fret is calculated to change the length of the string, changing the frequency that it vibrates at. They are spaced as required to be able to play modern 12 tone music.

The earliest style metal frets looked quite different than the ones we know today. They were known as "bar frets" because they were rectangular flat side metal bars with a radius on the top and bottom.

In the 1920's the "T" shaped fret was patented and became the industry standard. The bar style frets were phased out in the 1930's, although they are still available for restoring vintage guitars. <https://www.lmii.com/fretwire/3581-bar-fretwire-18-nickel-silver-2-pieces.html>



1.2 FRET TERMINOLOGY:

Crown Width – The width of the exposed fret on the fretboard.

Crown Height – The height of the exposed fret on the fretboard.

Overall Height – The height from the top of the crown to the end of the tang.

Tang Width – The width part that's in the fretboard.

Tang Stud Width – The width of the protrusions on the sides of the frets. This is what holds the frets in the fretboard.

Tang Height – The distance from the end of the tang to the bottom of the crown.

1.3 FRET WIRE SIZES:

1.3.1 FRET HEIGHTS:

Fret wire is typically grouped by size ranges – **Narrow (small), Medium, Jumbo (wide)**. The names generally are talking about the width of the crown, but the height of the fret is important also.

Higher frets (.047" And above) make bending, hammer-ons, and pull-offs easier because there is more space under the string. Another benefit is the frets will last longer since there's more to level as they wear. The disadvantage of tall frets are intonation problems when the string is pressed too hard, pulling the note sharp.

Short frets (.037" And below) are easier to slide up and down the string, but bends, hammer-ons and pull-off are harder since you can't get under the string. And they aren't going to last long since you'll be lucky if there's enough for one fret leveling.

Medium height frets (between .038" and .046") are obviously the best way to go, unless you need the added height for lots of bending, hammer-ons and pull-offs. And you don't press too hard and pull the notes out of tune.

1.3.2 FRET WIDTHS:

But when talking about frets you also have to consider the width – **Narrow, Medium, Wide.**

Wide frets (Jumbo) (.100" And wider) are usually taller than medium frets. Wider frets tend to wear slower, but as they wear they develop flat spots, possibly causing intonation problems as the point of contact shifts forward. Wide frets are most common on electric guitars, rarely on acoustics.

Narrow frets (.080" and narrower) are rare these days. They're seen mostly on vintage acoustic guitars and other instruments such as banjos and mandolins. They can give a good clean tone but have slightly shorter lifespans.

Again, **Medium frets** (between .081" & .099") are the best way to go, unless you absolutely have to have a different width for some reason.

1.4 FRET SIZE IMPACT ON TONE:

Different size (height & width) can have an impact on tone, although it is minimal. Taller or wider frets have more mass and can give slightly more sustain. Narrow/shorter frets can sound cleaner or a little more defined. But you'd probably be lucky to tell the difference between 2 identical guitars with different frets.

1.5 FRET WIRE MATERIALS:

Brass – Many vintage (before the 1950's) used brass frets. It is an alloy of copper and zinc, which is a soft material and will wear more quickly than any other fret material. They are still available in limited sizes, but the modern alloy frets last much longer.

Nickel Silver - Frets are normally made of a material called nickel silver, which ironically contains no silver and never did. It is actually an alloy of copper and zinc (essentially brass) with a percentage of nickel added for durability, as well as adding the silver color. Sometimes there is a percentage associated with nickel silver frets. This percentage is the amount of nickel, typically 12% or 18%. Frets with 18% nickel will last longer.

EVO Gold – This is JESCAR's proprietary nickel free hypoallergenic alloy originally designed to make eyeglass frames for people with nickel allergies. Like nickel silver, it contains no gold, but it makes a great looking fret wire. It's composed of copper, tin, iron, and titanium. Another advantage of EVO Gold wire is it's harder than nickel silver. It's somewhere between nickel silver and stainless steel.

Stainless Steel (SS) – Stainless steel is an alloy of iron, chromium and nickel. While stainless steel frets are much harder than nickel silver, they are much harder to install and destroy the tools installing them. For that reason, installing stainless steel frets is much more expensive than nickel silver.

1.6 FRET MATERIAL IMPACT ON TONE:

Like with different fret sizes, different fret materials can make a very minor difference in tone. Brass frets tend to be warmer, and stainless steel frets a little brighter. Nickel silver would be in the middle. EVO would be between nickel silver and stainless steel.

1.7 WHY DO YOU NEED TO REPLACE SOME OR ALL OF THE FRET?:

Guitar strings are set at a fixed height at both ends, at the nut & saddle. The height (the action) is required so when the string is pressed, the angle of the string changes, preventing the string from contacting other frets.

But, for them to work properly they all need to be at the same height otherwise, the string may contact another fret than the one you intended, cause a buzz or another tone. These problems can be caused by high frets or low frets.

Low frets are typically caused by lots of playing, wearing down the fret material causing a divot. The frets can be leveled, creating a new flat plane. But they can only be leveled so far. You need to have a slight rounding, or crown, on the tops of the frets so the string only contacts at one small point. Otherwise, the fret will contact the front edge of the fret and possibly cause a very minor change in intonation as the distance from the saddle shifts forward. If the frets are too low you won't be able to crown the top.

2.0 EVALUATING THE FRETTS: LEVEL vs. REPLACE. SOME, ALL or NOTHING??

If you're noticing some buzzing or dead frets with some divots, you probably need fret work. But, check your setup first! Low action or neck relief can also cause buzzing. *Always be sure your setup is correct before evaluating frets.* See my Setup Guide here... <http://yamahavintagefg.boards.net/thread/19/acoustic-guitar-setup-guide>

2.1 TOOLS REQUIRED:

1. **24" Straight edge** (to verify the fret plane is flat). I made mine from a Harbor Freight 40" ruler. <https://www.harborfreight.com/40-in-aluminum-ruler-69366.html> Place 2 of them on edge against each other and be sure there isn't any gap. You want them to be as straight as possible.
2. **Notched straight edge** – optional (to verify the fretboard is flat). These are insane money. https://www.stewmac.com/Luthier_Tools/Types_of_Tools/Straightedges/Precision_Notched_Straightedge.html I made mine from aluminum Harbor Freight 40" rulers, cutting the notches on my table saw. I made PDF drawings for all common scale lengths. I can send them to you if you request.
3. **Fret Rocker** (to find high frets). Stew Mac https://www.stewmac.com/Luthier_Tools/Types_of_Tools/Straightedges/Fret_Rocker.html
4. **Dial/digital caliper** (to measure fret height). You can get a cheap one at Harbor Freight.
5. **Your eyes and ears** (listen for buzzing, look for high/low frets).

2.2 EVALUATE THE FRETTS:

Mark any divoted frets, typically the first 5.

Use your dial/digital calipers to measure any divots or frets that look low. I'd replace any frets under .030" high. If all or most of them are about .030" or lower I'd replace them all. There's no sense sanding new frets down that low. Many vintage FG's have already been leveled once and don't have any life left in them. I've seen many that the frets were leveled and never crowned, probably because there wasn't enough left to use the crowning file.

If there are buzzing frets that don't have obvious divots, use your straight edge and fret rocker to find high or low frets and mark them.

At this point, you should have an idea of how bad your frets are. Now you have to decide if you're going to level or replace some or all the frets. You could even just live with it if they aren't too bad.

Obviously, replacing all the frets is more work than doing a partial refret. But it's not as bad as you'd think. Leveling a few new frets to existing frets is difficult. Some people have a minimum charge of \$100 for the first fret and \$20 for each additional fret, just to cover the time to level them. Once you have to replace more than 10 it's cheaper to just do them all. Replacing them all also allows you to level the fretboard. Many vintage guitars have a hump at the 14th

fret (where the neck joins the body). Leveling the frets will cause the frets in this area to become very low. Leveling the fretboard and replacing all the frets gives you essentially a new neck.

3.0 **FRET REMOVAL:**

Fret removal is fairly simple, but using the right tools and some precautions will make the difference between a clean job and a chipped disaster.

3.1 **FRET REMOVAL - TOOL REQUIRED:**

1. **Fret removal pliers** – I recommend Stew Mac ...
https://www.stewmac.com/Luthier_Tools/Tools_by_Job/Tools_for_Fretting/Pullers_nippers_sizing/StewMac_Precision_Fret_Pullers.html
2. **Chip stoppers** (optional) – Stew Mac ...
https://www.stewmac.com/Luthier_Tools/Tools_by_Job/Tools_for_Necks_and_Fingerboards/Chip_Stoppers_Set_of_2.html
3. **Water** (to moisten the fretboard, which will reduce chipping, not always required)
4. **Soldering iron** with notched tip – Optional (Will soften the glue, if it was used to hold frets in)
5. **Small chisel** (optional – To get under stubborn frets)

3.2 **FRET REMOVAL - PROCEDURE:**

Wet the area where the frets will be removed. Be sure it's on both sides of the fret, along the whole length.

Use the fret removal pliers, held tightly against the fretboard, to grab 1/16" of the treble side of a fret crown.

If it goes under and lifts the fret easily, move over 1/8" and take another bite.

If it just takes a chunk out of the fret crown, try the other end of the fret.

It looks like Yamaha pressed the frets in so far many times the bottom of the fret is below the wood. That makes it difficult to get under them for removal.

If you can't get under the fret with the pliers use the small chisel to get under and pry the fret up.

If the slot chips use Stew Mac's Chip Stoppers. I only use them if I have to.

4.0 **LEVELING THE FRETBOARD:**

If you're doing a complete refret you should level the fretboard with a radiused sanding block. As mentioned earlier, vintage guitars tend to have a hump at the 14th fret. And you can sand out some minor divots. The Yamaha fretboards are supposed to be 16" radius, but I found the 15" radius block to be a better match. Unfortunately, Stew Mac no longer sells that size.

4.1 **LEVELING THE FRETBOARD - TOOLS REQUIRED:**

1. **Radius Sanding Blocks.** I recommend Stew Mac
https://www.stewmac.com/Luthier_Tools/Tools_by_Job/Tools_for_Sanding/4_Radius_Blocks.html and
https://www.stewmac.com/Luthier_Tools/Tools_by_Job/Tools_for_Sanding/8_Radius_Blocks.html 4" long for spot leveling, 8" long for leveling a larger area. They no longer sell the 15" radius blocks, which is what I use. They also sell longer aluminum sanding beams for much more money. I made one using (2) 4" blocks (14" & 16"

radii) taped to a piece of 1.5" x 3" x 18" aluminum extrusion, or you could use a 2x3. The 16" radius block has the 80 grit sandpaper taped to it, the 14" block has tape on it as a smooth surface.

2. **Sandpaper.** 80 grit for rough sanding (I use it on my 18" sanding beam), 220 & 320 grit for finish sanding. Stew Mac sells 2-3/4" self-adhesive sandpaper https://www.stewmac.com/Materials_and_Supplies/Sanding_and_Polishing/Sandpaper_and_Finishing_Papers/3M_Stikit_Gold_Abrasives_2-3_4_inch_Roll.html But I just use regular sandpaper and hold it to the block with my hand. Just be sure to keep firm pressure on the block or the sandpaper rolling around the sides will take more off the outer edges of the fretboard than the middle.
3. **24" Straight edge** (to verify the fretboard is flat).
4. **Feeler Gages** (optional) to check the gaps under the 24" straight edge.
5. **A good light source and a white background.** To check for gaps under the straight edge.
6. **Painters tape** – Top protect the headstock, tuners and guitar top.
7. **Razor blade, a small block of wood, and a hammer** – to remove the nut if you're doing a complete refret.

4.2 LEVELING THE FRETBOARD - PROCEDURE:

It's easier to do a refret if the neck is off the guitar. Most vintage Yamaha's need neck resets. Doing the refret while the neck is off makes it much easier to handle. The refret should be done BEFORE the neck reset to have a flat plane to check your numbers from.

BEFORE DOING ANYTHING adjust the truss rod to get the neck as flat as possible!! Especially in the 1st thru 5th fret area. You want to take off as little wood as possible.

Remove the nut, if doing a complete refret. You'll need to cut the finish where it meets the body (very important!), then place the wood block against the nut on the fretboard side, and tap with a hammer to loosen it.

Removing the tuners makes the neck much lighter and easier to handle. Put the tuners and screws in a plastic bag to not lose anything.

Cover most of the headstock with painters tape to not sand it by accident.

Cover the area around the fretboard and sound hole with painters tape if refretting with the neck attached to the guitar.

Identify any high or low spots. You want to bring down the high spots first, like the 14th fret hump.

To take down high spots, use the longer radius block or sanding beam with 80 grit sandpaper only on one end, put tape on the other end for a smooth surface on the fretboard. The longer block/beam keeps the sandpaper level, making it easier to take the high spot down without the smaller block rolling over it and possibly creating low spots. Be sure to use even pressure to not sand the radius deeper on the top or bottom of the fretboard.

Check your progress often with the 24" straight edge. Check in many places across the width of the fretboard. A high/low spot may not be across the whole fretboard.

Once the high spots are gone you can use the 4" block with 220 grit to slowly level the whole fretboard. Start with the block partially on the first fret area and draw it completely across the whole fretboard in one pass. Don't reverse, always go in the same direction. The idea is to take an even cut across the whole fretboard. Keep an even pressure to not take more off on the top or bottom of the fretboard.

Check your progress often with the 24" straight edge. Check in many places across the width of the fretboard.

This will take some time. You want to get the fretboard as flat as possible. That should reduce the amount of sanding of the fret tops when leveling them. And a clean level fretboard looks great too. But, you don't need to sand out all the divots in the fretboard, they add "character".

You can fill and remaining divots with rosewood sanding dust and thin superglue. Put the rosewood dust in the hole and add the glue, mixing and flattening it quickly. This will need to be scraped and sanded flush. Beware the repair will be darker than the fretboard. You can use a fine sharp edge to draw some "grain lines" in it to somewhat hide it.

Once the fretboard is flat, take a few passes with the 320 grit sandpaper.

5.0 PREPPING THE SLOTS:

The Yamaha slots are approximately .018" wide. Modern frets require a .023" slot. If you're not leveling the fretboard, let the fretboard and slots dry before doing this. BUT!! If your guitar had .028" tang frets, you do not have to open the slots. Skip to the last step and break the edges on the slots.

5.1 PREPPING THE SLOTS – TOOLS REQUIRED:

1. **Fret slot saw with depth stop.** I use the LMII saw and made my own wood depth stop. <https://www.lmii.com/fretting-tools/2695-fret-saw-beech-handle.html> Or you can use the Stew Mac saw with their stop. https://www.stewmac.com/Luthier_Tools/Types_of_Tools/Saws/Fret_Saw.html
2. **Small triangular file.**

5.2 PREPPING THE SLOTS – PROCEDURE:

Firmly hold the neck in your left hand.

Place the fret slot saw in the far side of the fret slot, on a slight upward angle, and pull towards you. The saw will probably bind in the slot and get stuck.

Be careful to keep the saw lined up in the slot.

DO NOT let the saw teeth reach the other side of the slot! It will pull a chunk of the side of the fretboard out, requiring it to be filled.

Keep cutting on an angle until the depth stop hits the fretboard, then lower the angle until the teeth almost reach the far side of the slot.

When all the slots are done, turn the neck around and repeat.

This time you can, and should, let the saw cut the full depth all the way across.

After cutting all the slots, use the small triangular file to break the edges of the slots .01"/.02". This will make installing the frets easier.

6.0 INSTALLING THE FRET:

I use a 4 foot length of LMII FW74 (.020" tang), or FW75 (.024" tang), depending on if the guitar had .018" or .028" fret tangs. This fret wire comes in a coil and you don't have to bend a radius in it. Or you can use pre-cut & pre-radiused frets. You'll need slightly more than 4 feet if refretting a 12 string guitar unless you cut them very close to length.

6.1 INSTALLING THE FRETS – TOOLS REQUIRED:

1. **Fret cutters** (end nippers). Stew Mac
https://www.stewmac.com/Luthier_Tools/Types_of_Tools/Pliers_and_Cutters/StewMac_Fret_Cutter.html
2. **Fretting hammer**. I prefer an 8 ounce plastic “dead blow” hammer. It doesn’t bounce, and won’t make flats in the frets like a metal hammer. Some people use a brass tipped hammer. Stew Mac
https://www.stewmac.com/Luthier_Tools/Tools_by_Job/Tools_for_Fretting/Hammering/Deadblow_Fretting_Hammer.html OR
https://www.stewmac.com/Luthier_Tools/Tools_by_Job/Tools_for_Fretting/Hammering/Fretting_Hammer.html
3. **Fret Press/pliers** (optional).
4. **Thin super glue (CA)**. BSI 103 https://www.amazon.com/Bob-Smith-Insta-Cure-Super-Thin/dp/B001NI4JWI/ref=asc_df_B001NI4JWI/ This isn’t the stuff you find at Home Depot or Walmart, it’s only available at good hobby shops. Use a thin “whip tip” to control the amount of CA applied. Or you can get it from Stew Mac
https://www.stewmac.com/Materials_and_Supplies/Glues_and_Adhesives/Glues/StewMac_Super_Glues/StewMac_Super_Glue.html Get it in the smallest container possible. It goes bad with time, and the cap eventually builds up with glue and becomes impossible to remove.
5. **Renaissance Wax**. https://www.amazon.com/Renaissance-Wax-Polish-200-ml/dp/B0012S1XBO/ref=asc_df_B0012S1XBO/ They sell a smaller container, but I figured I’m going to use this stuff for many things.

6.2 INSTALLING THE FRETS - PROCEDURE:

You can cut the frets one at a time, or cut them all. I prefer to cut them one at a time and install them. It’s easier on the hands to not make so many cuts at once and there’s less chance for error.

Measure the fret slot and cut the fret wire $\frac{1}{4}$ " to $\frac{1}{2}$ " longer. The extra length makes it easier to hold when tapping them in, but don’t go too long or you’re run out of fret wire.

Place the fret wire in the fret slot.

Tap the fret wire in, starting at one end and moving across.

After you think it’s in, tap it harder to be sure it’s fully seated.

Be careful to not hit too close to the end of the fret or it will bend over the edge of the fretboard. Your only option is to remove the fret and straighten it or replace it. It will look bad otherwise.

Be sure ALL the frets are fully seated all the way across.

Because you had to open up the fret slots and the saw probably bound up a lot and may have wandered, some of the slots may be a little oversize. It would be best to glue them in.

Using a paper towel, apply Renaissance Wax lightly to the whole fretboard. If you skip this step, the clean up after the next step requires a lot of scraping and sanding. Not fun! Be sure all the frets are still fully seated.

Put the “whip tip” on the thin CA bottle and carefully wick the CA under only one side of the frets, immediately wiping up any excess. 2 sides if the fret was loose in the slot. It is thinner than water and runs quickly. Keep the tip about $\frac{1}{4}$ " away from the ends of the frets to not have the glue run off the fretboard onto the finish. If the fret won’t stay seated you can use your radiused sanding block to clamp it down while the glue dries. Don’t forget to put some wax paper on it to prevent it from possibly being glued to the fret.

After gluing in all the frets, put the neck aside for 10-15 minutes to be sure all the CA sets.

Place the end nippers vertically against the side of the fretboard and cut off the excess fret wire.

7.0 PROTECTING THE FRETBOARD:

Before sanding and filing the frets you need to protect the fretboard from the metal dust and accidental damage from files and sandpaper.

7.1 PROTECTING THE FRETBOARD – TOOL REQUIRED:

Painters tape, 1" & ¾". Stew Mac's Orange tapes are great and come in ¾", ½" ¼" widths.

https://www.stewmac.com/Materials_and_Supplies/Glues_and_Adhesives/Tapes_and_Adhesives/Orange_Multi-Purpose_Tape.html Highly recommended. It's much easier than tearing or cutting ¾" tape to narrower widths.

7.2 PROTECTING THE FRETBOARD - PROCEDURE:

Tear off pieces of tape as required to cover the fretboard (top and sides), wrapping a bit around the neck. Be sure to cover ALL of the fretboard, don't leave any small gaps.

8.0 FILE AND BEVEL THE FRET ENDS:

Obviously, you don't want sharp fret ends to cut your hand or catch on stuff.

8.1 FILE AND BEVEL THE FRET ENDS – TOOLS REQUIRED:

Large flat file. I cut the tang off of a file and belt sanded a slight taper on the ends so it didn't catch the fret ends. Or you can buy one from Stew Mac.

https://www.stewmac.com/Luthier_Tools/Types_of_Tools/Files/Fret_Beveling_File.html I don't use a holder, I prefer to hold the file in my hand.

8.2 FILE AND BEVEL THE FRET ENDS - PROCEDURE:

Hold the large flat file vertically against the edge of the fretboard. Carefully file the sharp points left by the end cutters.

Once the file starts biting the masking tape, angle the file inward between 15 and 30 degrees, depending on how much you want. If you're opening the string spacing I'd keep this angle to a minimum. Hold the file consistently at that angle and bevel all the frets. The bevel should go down to the start of the tang without digging into the fretboard.

9.0 LEVELING THE FRETS:

Just because you leveled the fretboard doesn't mean the frets will automatically be level. They will need to be leveled using the same radius block and sandpaper.

9.1 LEVELING THE FRETS – TOOLS REQUIRED:

1. **Radius Sanding Blocks.** I recommend Stew Mac
https://www.stewmac.com/Luthier_Tools/Tools_by_Job/Tools_for_Sanding/4_Radius_Blocks.html and
https://www.stewmac.com/Luthier_Tools/Tools_by_Job/Tools_for_Sanding/8_Radius_Blocks.html 4" long for spot leveling, 8" long for leveling a larger area. They no longer sell the 15" radius blocks, which is what I use.

2. **320 grit Sandpaper.** Stew Mac sells 2-3/4" self-adhesive sandpaper https://www.stewmac.com/Materials_and_Supplies/Sanding_and_Polishing/Sandpaper_and_Finishing_Papers/3M_Stikit_Gold_Abrasives_2-3_4_inch_Roll.html But I just hold it to the block with my hand. Just be sure to keep firm pressure on the block or the sandpaper rolling around the sides will take more off the outer edges of the fretboard than the middle.
3. **24" Straight edge** (to verify the frets are level).
4. **Notched straight edge** (to verify the fretboard is flat after fret installation). These are insane money. https://www.stewmac.com/Luthier_Tools/Types_of_Tools/Straightedges/Precision_Notched_Straightedge.html I made mine from aluminum Harbor Freight 40" rulers, cutting the notches on my table saw. I made PDF drawings for all common scale lengths. I can send them to you if you request.
5. **Fret Rocker.** Stew Mac https://www.stewmac.com/Luthier_Tools/Types_of_Tools/Straightedges/Fret_Rocker.html Very useful for finding high frets.
6. **Flat file.**
7. **Black permanent marker.**
8. **Feeler Gages** (optional) to check the gaps under the 24" straight edge.
9. **A good light source and a white background.** To check for gaps under the straight edge.

9.2 LEVELING THE FRETS - PROCEDURE:

If you have one, use the notched straight edge to verify the fretboard is still flat AFTER fret installation. If you don't have a notched straight edge, use the regular straight edge to see if the first 5 frets are low. There's a chance if the slots were tight the neck could be slightly back bowed. Adjust the truss rod if necessary.

Use the side of the black marker to mark the tops of all the frets.

Using the radius block (the one you used to level the fretboard) with 320 grit sandpaper, start on the first fret and make one full pass across all the frets. Don't reverse. Always go in the same direction.

After 2 or 3 passes, you should visually have an idea where your high frets are.

Use the 24" straight edge to see the overall flatness of the frets. Check in many places across the width of the fretboard. A high/low spot may not be across the whole fretboard.

Use the fret rocker to find individual high frets. Check in many places across the width of the fretboard.

You can carefully use the flat file to lower any frets more than .010" high. Check often. You want to bring down the high spots first.

You can also take down high areas use the longer radius block or sanding beam with the 320 grit sandpaper only on one end, put tape on the other end for a smooth surface on the fretboard. The longer block/beam keeps the sandpaper level, making it easier to take the high spot down without the smaller block rolling over it and possibly creating low spots. Be sure to use even pressure to not sand the radius deeper on the top or bottom of the fretboard.

Check your progress often with the 24" straight edge and fret rocker. Check in many places across the width of the fretboard.

This will take some time. You want to get the frets as level as possible. Otherwise, you'll end up with buzzes or dead spots.

10.0 CROWNING THE FRETS:

Frets are crowned to have a small central single point of contact with the string. Too much contact will change the contact point and alter the intonation.

10.1 CROWNING THE FRETS – TOOLS REQUIRED:

1. **Fret crowning file.** Stew Mac https://www.stewmac.com/Luthier_Tools/Types_of_Tools/Files/Double-edge_Fret_File.html But that tends to leave a rougher finish than Stew Mac's 300 grit diamond file, which is what I use. https://www.stewmac.com/Luthier_Tools/Types_of_Tools/Files/Offset_Diamond_Fret_File.html
1. **LMII's 3 corner "cant" file** (optional) <https://www.lmii.com/fretting-tools/26464-3-corner-cant-file-for-fretwork.html> This file works great to add a bevel to the fret before crowning.
2. **600 & 1500 grit sandpaper.**
3. **0000 steel wool.** You can go farther with finer grits but I don't.
4. **Black permanent marker.**

10.2 CROWNING THE FRETS - PROCEDURE:

Using the side of the black marker, mark the tops of all the frets.

If you have it, use LMII's "cant" file to taper the sides of the frets, leaving about 1/16" of marker in the middle.

Use the crowning file to take off all but a thin line of the marker in the middle of the fret. That thin line is the contact point of the string.

Use the 600 grit sandpaper to smooth the lines on the sides of the frets. Then sand the top of the frets to just remove the 320 grit sanding marks.

Do the same with the 1500 grit sandpaper to make the fret shiny.

Take a close look at the frets and be sure you've removed all the sanding & filing marks.

11.0 ROUNDING THE FRET ENDS:

You want the fret ends to be smooth to not catch your finger or other stuff.

11.1 ROUNDING THE FRET ENDS – TOOLS REQUIRED:

1. **Fret end dressing file.** Stew Mac's https://www.stewmac.com/Luthier_Tools/Types_of_Tools/Files/Fret_End_Dressing_File.html This is a great tool for cleaning up the sharp edges. Highly recommended.
2. **0000 Steel Wool.**

11.2 ROUNDING THE FRET ENDS - PROCEDURE:

Use the fret end dressing file to round over and blend the bevel into the fret end. Also use it to break any sharp edges, checking if any fret tangs are sticking out of the side of the fretboard.

Run your hand back and forth over the sides of the fretboard a few times to find any sharp or rough edges and hit them with the file again.

Once you're satisfied with the frets, remove all the tape from the neck and admire your work. You may have worn or nicked thru the tape in a few spots.

Use the 0000 steel wool all over the fretboard & frets to make everything look uniform. Pay close attention to any super glue residue from gluing in the frets. It will be easily removed with the steel wool (if you used the Renaissance Wax) if you press it tightly into the corner of the fret with your nail.

YOU'RE DONE!! CONGRATS!!!

FINAL NOTE - As you may have noticed, there are many expensive tools required. It will cost \$250 to \$350 to have someone do a complete refret for you. The cost of the tools can far exceed this. A few of the tools can be bought at Harbor Freight, but many of them are specific to the job and can only be bought from a luthier supply store such as Stew Mac or LMII.