

Guitar Set-up & Adjustments of the Electric Bridge

1. Adjustment of the Action

Function of the Bridge

- Sets string length at bridge for proper intonation.
- Spaces strings at body.
- Places strings at playing height off fingerboard.

Indication of Problems with the Bridge

- Instrument won't stay in tune.
- Buzzing of strings on frets.
- Strings breaking at bridge.
- Poor intonation.

What to look for?

Because the hand often rest on the bridge, it is very pron to getting gunked-up from acidic sweat. This can cause adjusting screws to freeze up and plating to wear off. Keep the bridge wiped off to prevent problems.

Also look for signs of the bridge leaning or moving. If it seems to be out of place you may want your local repairperson to take a look.

Adjustments

Adjusting the OVERALL action of the instrument is done at the bridge. This is done by raising individual saddle pieces or by raising the whole bridge. Study the diagrams that show the different parts of the typical electric guitar bridges. (See Fig. #1) Some electrics have individual saddle pieces that adjust up and down. Some just have adjusters that raise and lower the whole bridge, but not the individual strings, and some have both. This applies to guitars with tremolo bars as well as those without.

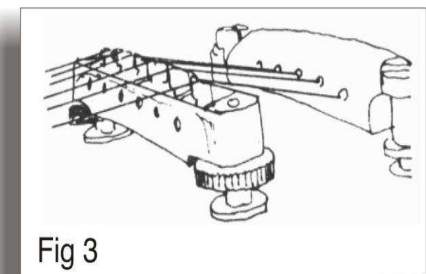
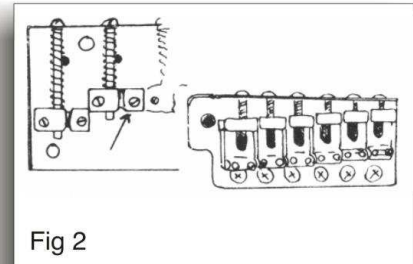
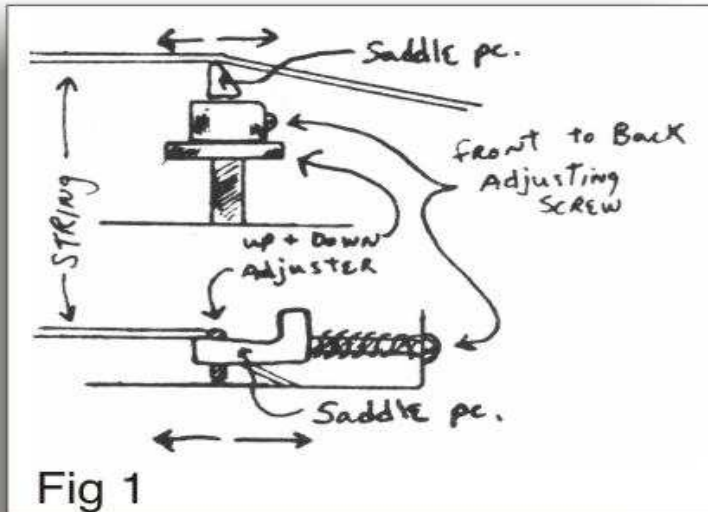
In the case of the individual adjusters, do each string individually until the action of that string feels right. (See Fig. #2) Typically there is a small screw slot or allen screw that adjust the individual saddles. On some models this may vary, particularly on some of the new wang bar assemblies. Consult your manual or your local guitar store if there is a question here.

You can leave all the strings on and tuned to pitch when doing this adjustment. As you do each string, be sure to retune and check that string before moving on to the next. If the instrument has the two adjusting screws on each side of the bridge, then turn these up and down to set action. (See Fig. #3)

If your bridge has both individual and outside adjusters; first set the individuals to the center of their range. Then roughly adjust the over all action of the guitar with the outside adjusters, then come back to the individuals and make your final adjustments.

Remember: We are only adjusting for up and down movement for getting the **playability right**. We are not adjusting the back and fourth movement which is discussed in the Intonation section.

Keep the individual saddle pieces clean and regularly check them for excessive wear. Left unattended, you will have intonation problems and string breakage. If you keep breaking strings at the saddles, then they may have sharp edges caused by wear. Have your local repairperson look at this for you.



2. Intonation Bridge adjustments

Function of Intonation

To keep the strings in tune as they are played up the neck.

Indication of Problems with Intonation

Instrument won't play in tune.

What to Look for?

The following is for instruments, generally electric guitars, with saddle pieces that are adjustable front to back or guitars like arch tops that have free- moving bridges.

If you shorten a vibrating string exactly in half, you will raise the note of that string one (1) octave. Since the 12th fret is always the one octave point, it follows that the 12th fret must sit exactly under the string at the halfway mark. Then when you play the octave note (the 12th fret note), you have shortened the string by half. Since the frets are not movable, we must

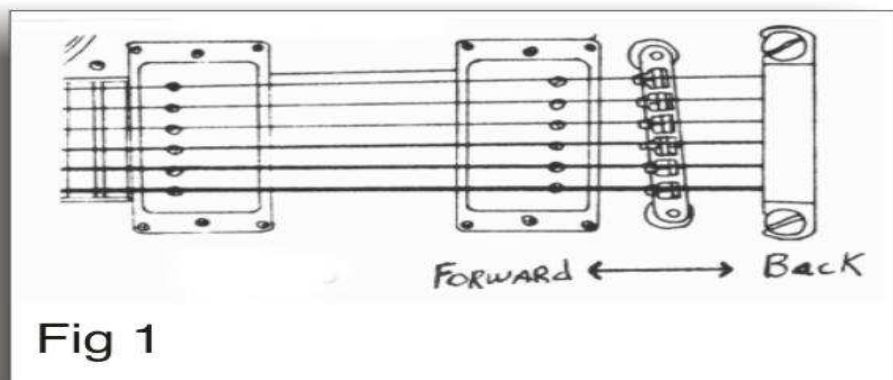
change the string length to accommodate the scale length (fret placement on the neck). All strings don't have the same length, because they have different diameters.

Adjustments

The following is how to set intonation using an electronic tuner. Later we'll talk about this procedure done by ear. First tune the string to standard pitch and read your electronic tuner. Next play the harmonic (or chimed note) at the 12th fret. This is done by lightly touching the string, without pushing it to the fret board, and picking it at the same time, then quickly removing your finger. If your finger is not positioned at the proper place on the string, it will not "chime". Try moving your finger back and forth a bit around the 12th fret, until you get the chiming sound. Once you have found the chimed note at the 12th fret, that note will be exactly one octave higher than the open note.

I like to read the electronic tuner with this chimed note because it better represents the frequency of the note played at the 12th fret. Now that you've seen the octave note chimed on the meter, you must match this octave chimed note to the octave fretted note (the note played at the 12th fret). These two must read the same on the electronic tuning device..

To adjust the saddle pieces in the proper direction to match notes, remember this rule of thumb-"Flat Forward" (forward being towards the headstock.) (See Fig. #1)



So, if the fretted note is flat (lower in pitch than the chimed note), then you must move the saddle piece forward. If the fretted note is sharp (higher in pitch than the chimed note), then you need to move the saddle piece backwards (away from the headstock). Repeat this procedure for all strings. The way you actually move the saddle piece varies from instrument to instrument. Usually the adjustment is made by turning some type of set screw, like a phillips head or an allen head screw adjustment.

Remember- the fretted note must always match the chimed note. The chimed note can not be wrong. If you want to try and set the intonation by ear, the procedure is basically the same as mentioned above. Instead of watching the meter you listen. When you hear the fretted note sounds the same as the chimed note, you have set your intonation properly.

Cautions

Since the hand often rests on the bridge, sometimes the adjusting screws get "gunk" on them and then don't want to turn. This "gunk" is from the sweat and acid produced from the skin and after time can corrode metal parts. If these screws don't want to turn easily, don't force them. Put a very small drop of penetrating oil on the problem screw and then slowly work it back and forth until it comes loose. If it refuses to budge, take your instrument to your local repairperson.

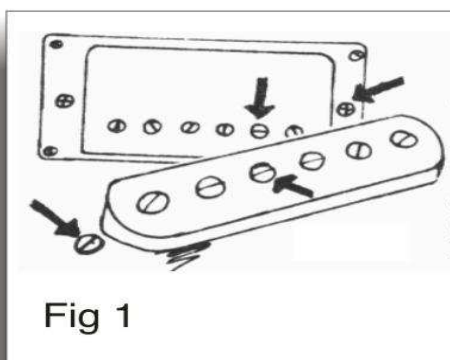
3. Picks-Up adjustments

It is important to have the pick-ups sitting properly under the strings for best sound and output. The trick is to adjust them so they are not too close and not too far away. If the pick-up is too far away from the strings, it will have weak output or not much volume and tone.

If the pick-ups are too close, the strings may rattle against them. Or the magnets of the pick-ups may pull the string out of its natural orbit as it vibrates. This causes a funny out-of-tune sound. This is particularly true with very light gauge strings.

Adjusting the pick-ups up and down is a simple matter of turning the one or two set screws that sit on each side of the pick-up. (See Fig. #1) Adjust them from 1/8th to 1/4 of an inch under the string. Be sure that after you have made the adjustment, you hold all the strings down on the last fret of the neck to see if you are hitting the pick-ups. If all looks good, play the instrument through an amp and check the output. Re-adjust as needed.

On some pick-ups you will notice one or two individual set screws under each string. These allow you to adjust the output of each string separately. (See Fig. #1)



This need only be done when you feel that an individual string is not coming through as loudly as the others. If this is the case, bring the set screw for that string up closer to the string. Or, if you feel one or more strings are too loud, lower the screws away from those strings. These adjustments should then balance the output of all the strings. If there seems to be major differences, have your local repairperson look at this for you.

4. Electronics clean-up

Crackles and Static: If you have a crackling of static sound when you turn your volume or tone controls or when you flip the switches, then these controls and switches need to be cleaned. A product (used in the electronics industry) called contact cleaner is used to clean these dirty controls. You can find this at places like Radio Shack.

To use, spray the noisy part, on the inside where the working parts are, and work the switch or pot back and forth for a minute or so. Let the part sit and dry for a few minutes and then plug in the guitar and see if it still makes noise. You may need to repeat the procedure several times. Even then you may find the part is beyond repair and needs to be replaced. You may want to have your local repairperson to do this cleaning.

If you are getting noise whenever you move your guitar cable, check it for shorts or dirty contacts.

Hums and Buzzes: There are many things that can cause humming through the electric system of your guitar. Things like room lighting and appliance transformers etc., can cause problems. If you are having these kinds of troubles, try moving to a different area of room. Set up your equipment the same and see if you still have the buzz. If the problem seems to be in the guitar or amp and not caused by outside influences, then have your local repairperson take a look for you.

5. The Neck Set-up

Function of the Neck Set

To align the neck properly with the body.

Indication of Problems with the Neck Set

Proper action can not be obtained.

What to look for?

If you have properly straightened the neck and you have lowered your bridge and/or saddles as low as possible, and you find that the action is still too high... then the neck set is too low.

Or (less common) if the bridge is as high as it will go and your strings still buzz/hit the frets... then the set of the neck is too high. These adjustments are related to the way the neck fits the body, called the NECK SET.

If you have an instrument that has a glued in neck (often called a SET NECK) then you will need to have a professional repairperson look at this problem. But if your instrument has a bolt on neck, FOUND ON MANY ELECTRICS BUT FEW ACOUSTICS (See Fig. #1), where bolts hold the neck to the body, you should be able to reset this type of neck yourself.

Adjustments

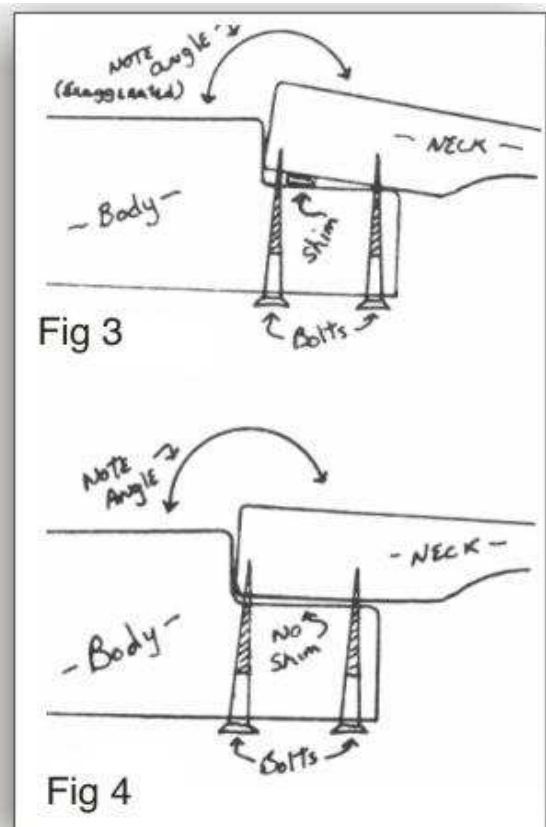
Again, we must work from a common point or reference, which is the instrument with all the strings on and tuned to standard pitch. With this done, look at how high the strings are off the fret board (or how close, if too close). Now loosen all the strings (you shouldn't have to take them off) and take the large screws out of the back. This loosens the neck from the body of the instrument. Very carefully, remove the neck from the body. When you do this, watch for "shims" that might already be in place. A shim is a small piece of material, which could be plastic, wood or cardboard, usually about the thickness of a matchbook cover. Matter of fact, matchbooks make good shims. By placing a shim under the end of the neck (See Fig. #3) you will change the angle at which the neck sits in relation to the body. By removing a shim you will cause a change in the opposite direction (See Fig. #4) If the strings were too high, add shims. (If there are already shims in the neck joint, you must add to them.)

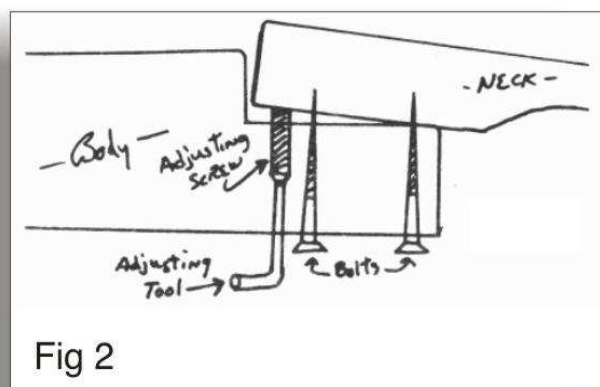
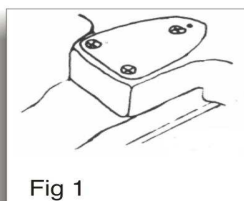
If the strings were too low, we will want to take away some shims (if any). If the strings are too low and there are no shims to take away and your bridge is as high as it will go, then this is a job for professional repairperson. After you have made the adjustment, rebolt the neck to the instrument, put the strings back, tune to pitch, then look at the results. If you feel more adjustment is required (more or less shims), repeat the above steps until you are happy with the results.

This often takes several tries, I know it's a hassle, but be patient!!

Some bolt on necks have adjustors built-in. These are usually some type of small recessed allen screw which take the place of the shim and are accessed through the plate on the back of the guitar. (See Fig. #2) Here you don't have to remove the neck, just loosen the bolts slightly, make the adjustment to the recessed screw and retighten the bolts. Retune to pitch, check action and re-do until you are happy with the results.

Caution: If you do this yourself, one of the first things you will realize is that it doesn't take much thickness in the shim to affect the neck set. Often, it just takes the thickness of one or two pieces of masking tape to put the neck where it needs to be. *This can be frustrating*, you may want to consider having your local repairperson do this for you.





6. Setting up the Nut

To start our setup, we are going to take a close look at the NUT. We want to know that our nut is in perfect working condition before we do any other adjustments.

Function of the Nut

Sets string length at neck for proper intonation.
Spaces strings on neck. Places strings at playing height off fingerboard.

Indication of Problems with the Nut

Guitar won't stay in tune. String buzz on first fret.
Strings breaking at nut. Poor intonation.

What to look for

First make sure the nut is sitting in its proper position. In other words, make sure there are no gaps between the nut and the areas it sits against. (Tight against the fingerboard, etc.) (See Fig. #1) If there are gaps, you will need to take this to your local repairperson to fix.

Next, let's look at the spacing between the strings. Looking straight down on the nut, do all the strings appear to have the same amount of space between them? They should.

As you play, do you feel that some of the strings are closer than others?

Also, sometimes the two outside strings will be too close to the edge of the fingerboard and have a tendency to "fall off" when pressed down.



If any of these things happen, then you need to reposition one or more of the strings. To do this will require either a new nut or a repair technique beyond the scope of this manual. Consult your local repairperson.

If the nut is sitting properly on the neck, and the strings are spaced properly, then the next step is to look at the slots themselves. This is the most important (and often most overlooked) part of the nut, particularly as it relates to how well the instrument stays in tune.

The main thing to understand about the string slots on the nut, is that this is the point at which the string length begins. The nut slot must always be cut so the slot falls away from the leading edge (next to the fingerboard). (See Fig. 2) In other words, as the slot goes from front (front being next to the fingerboard) to back (headstock side), the slot should cut downwards as well. If this slot were cut straight through the nut (parallel with the strings), then the string would and could sit at different points within the slot, thus changing string length and causing tuning problems.

Since the strings themselves act like files as they drag through the slot (while tuning or string bending, etc.), over time you will wear the slots flat. You will then need to recut the slot to put the string length back properly to the front of the nut. Take the strings out of the slots and examine the bottom of the slots carefully. If the slot seems to go from front to back almost straight, without falling away from the string, it may need to be filed.

Note: If you are having trouble keeping the instrument in tune, then this is the FIRST area of potential problems and should be dealt with first.

Adjustments

The tools for cutting these slots are not common, everyday, around-the-house tools and can be expensive. For this reason, to do the job properly, you may want to take the instrument to your repairperson if you feel this needs attention.

But, if you have access to a suitable set of files (like small diameter needle files that can cut thin slots), and wish to do this yourself, remember to mask off all areas around the nut so your files won't damage or mar the finish. (See Fig. #3)

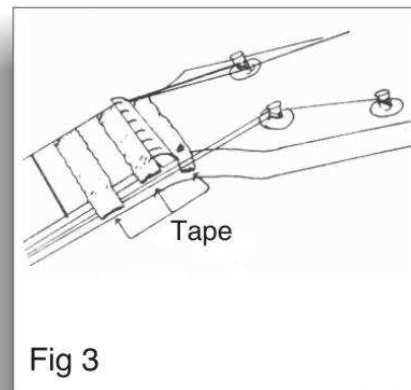


Fig 3

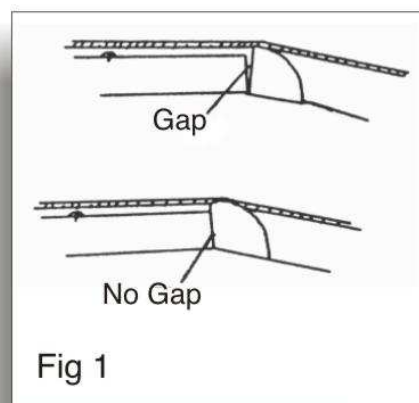


Fig 1

Tuning Heads Adjustments

7. Function of the Tuning Heads

Tuning the instrument.

Indication of Problem with the Tuning Heads

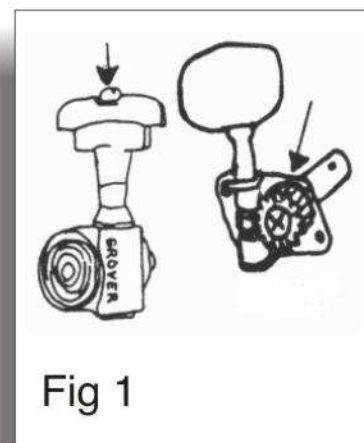
Hard to turn; Turns without tuning guitar; Instrument won't stay in tune.

What to look for: The most common complaint I get as a repairperson is that the customer's instrument won't stay in tune. Matter of fact, that's one of the main reasons for writing this booklet; to help you keep your instrument playing in tune! If there are tuning problems, many times the player thinks the tuning heads (also called machine heads or tuners) are "slipping". Most of the time, this is not the case. If the instrument is going out of tune, there are usually other reasons. Under normal conditions the tuning heads work fine and need little care.

Adjustments

Closed machines.... the kind where you can't see the gears, are lubricated and sealed at the factory and need no further maintenance. Often this type of machine has a small screw on the end of the button. This is used to change the amount of resistance between the gears, thus giving a stiffer feel to the tuner and holding the gears tighter. (See Fig. #1, left example) Do not over tighten this screw, a snug fit is best.

Open machines.... the kind where you can see the gears on the back, may be lubricated a couple of times a year with petroleum jelly or cork grease (which is used on woodwind instruments). Place a small amount of one of these on the tip of a toothpick and work it between the gears. Be sure to wipe off all excess grease. Too much lubricant can and will hold dirt and fuzz which will cause the gears to wear. On open machine heads, check the small screw in the middle of the gear. (See Fig. #1, right example) Check these for looseness, but be aware this screw only holds the tuner together, it does not make the tuner feel tighter as with the closed tuners mentioned above.



Cautions: Do not over-tighten any of the screws on the tuning heads. If over-tightened, the gears of the tuning head will wear prematurely, therefore requiring replacement.