

Guitar repair for music teachers

Paul White

Introduction

I've taught guitar in schools for over 25 years, and for a good portion of that time I've also worked in schools and colleges as a teacher and music technician. I've therefore been in a great position to notice that in recent years, the job of music technician has become something of a rarity. When I worked as one, it was my job to keep all the instruments working and fix any that had broken. It's now often left to music teachers themselves to either maintain and repair instruments. Or perhaps more likely for time-constrained teachers, broken instruments are sometimes banished to the back of a cupboard and replacements purchased instead.

Every school I've ever been in has a broken instrument cupboard whose contents are crying out for someone with a bit of knowhow and time to go through the instruments and give them a little TLC to get them going again. Over the years, I've picked up a lot of knowledge about the workings of a music department and what are the best, most effective and value-for-money ways to keep it running.

For the sake of space, I've restricted this article to the guitar, but the advice given here can be transferred to most other fretted instruments (ie banjo, ukulele, bass guitar, mandolin, etc).

This resource assumes a basic knowledge of the parts of guitar, but if you're unsure of those, this webpage (www.sweetwater.com/insync/parts-of-a-guitar/) may be useful.

The most common guitar repairs

Changing guitar strings

The first question when it comes to changing guitar strings is: what type of strings do you need?

Classical guitars

I'd advise you to get normal tension strings and steer clear of anything cheaper than £5 a packet. Cheap strings will corrode and deteriorate quickly, while a good set can last for years. Classical guitar strings tend not to break as easily as electric guitar strings, because they're not bent and abused quite as much!

Electric guitars

I'd advise you to get 10-gauge strings (usually 10-46): the 10 simply refers to the width of the string. It's common for electric guitars to come with 9-gauge strings, and this is also the gauge that many musicians like to use. A slightly thicker string, however, will last longer and has less chance of breaking. By all means go higher than a gauge 10 if you want the strings to be even harder to break, but your students might not be happy: the thicker the string, the harder it is to play. In terms of what brand to buy, try a more established company such as Ernie Ball or D'Addario (to name just a couple). And similarly to classical guitar strings, if a packet costs less than £5, I'd avoid it.

Acoustic guitars

I'd suggest you get 12-gauge strings. Acoustic guitar strings are always thicker than electric guitar strings, because they're generally not used for string bending in the same way that electric guitar strings are, and as such should last longer. I'd advise sticking to well-known brands, however, for example D'Addario, Ernie Ball or Martin (and many others do exist). As with the other strings, if they cost less than £5 a packet, they're probably not worth buying.

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Bass guitars

Bass guitar strings are far thicker than normal guitar strings, though they can and will break just as easily if they are misused. A gauge of 45 to 105 is about standard for bass guitars, and should also be fine for school use. In terms of pricing, they're more expensive than other guitar strings and would typically cost between £18 and £26, depending on the brand and quality of the string. As with the other guitar strings, you'd be safer sticking to the bigger brands.

Tips when buying strings

Look out for multipack deals: nearly all the big string manufacturers offer multipack sets with three or more packs of strings for a lower price. There are also string specialist websites (for example www.stringsdirect.co.uk) that have a wide range of strings for good prices.

Restringing guitars: difficulty level 2/5**Classical guitars**

Classical guitar strings are probably the most fiddly to replace, and it's important they're done in the correct way. If not, the string will slip and go flat, or come off altogether. This video (www.youtube.com/watch?v=4Cw84_oKHTI) is a useful illustration of how to correctly tie the strings at the bridge and at the headstock.

With classical guitars strings, it's very important that you create enough winds of string on the tuning pegs. Each string should have at least three complete winds of string on it, otherwise the string will slip and go out of tune. I'd also advise cutting the excess string only at the very end of the process, to avoid any unnecessary complications.

Electric guitars

The process of restringing electric guitars is generally more straightforward than that for classical guitars, but it still needs to be done with care. The first thing to assess is whether you have a guitar whose strings go through the body and are anchored on the back of the guitar (for example a Fender Stratocaster and some Telecasters), or one whose strings are anchored on the front of the guitar (for instance, Gibson Les Paul and SG).

In the former case, you'll first need to remove the strings that are already on the guitar. You can usually do this by cutting them, but be sure to loosen them first because they can flick up if they're still under tension. You can then unwind the rest of the string from the tuning pegs by hand. It's also very important to check the holes on the back of the guitar that the strings go through, because the ball end of the string can often get stuck in them and may need to be pushed out from the other side (I'd use either the smallest Allen key or the end of a low E string to push it out). You may need to remove the plastic plate on Stratocaster-type guitars to enable you to see the holes properly, if they're not lined up with the holes on the plate.

Once all the old strings have been removed, you can start putting the new strings on. I usually start from the low E string and work across. You'll need to feed the string through from the back of the guitar and out and over the bridge saddles (Stratocaster type), or through the holes in the tailpiece or back of the bridge and then over the bridge saddles (Gibson type). The string will then need to be wound onto the tuning peg: make sure that you put a minimum of two complete winds of string on the lower strings, and more on the higher strings. The videos below show an effective way of doing this by leaving the correct amount of slack on each string, so that when you wind it up you'll automatically have the correct amount of winds on the peg. Once you've got one wind of string on the peg, you can use a string winder to speed up the process.

- ▶ Here's a video showing how to restring a Gibson (Les Paul) type guitar:
www.youtube.com/watch?v=DrLKIJS1wEo
- ▶ Here's a video showing how to restring a Fender (Stratocaster) type guitar:
www.youtube.com/watch?v=tIfP3v-bxE

Acoustic guitars

For acoustic guitars, replacing strings is usually done in one of two ways. First, you'll need to look at the bridge of your guitar to find out whether the strings are held in with bridge pins, or pass through and are anchored on the bridge.

If it's the latter, your task is relatively easy: simply remove the existing strings and restring the guitar using the same method used for restringing a Gibson-type electric guitar. If, however, your guitar has bridge pins, you'll need to remove them first. The best way to do this is with the end of a string winder, which has an indent specifically created for this job. Put the winder over the pin and lever it up (don't pull).

If you don't have a string winder, it can be done with a spoon or with pliers or wire cutters, but again lever the pin up – don't pull on it, because you'll easily lose grip and scratch it.

Once you've removed the pins, you need to work one string at a time, pushing the ball end of the string into the hole where the pin was, and pushing the pin back in on the string so that the string sits in the groove of the pin and the groove faces straight up the neck to the corresponding tuning peg.

As you tune up the string, you may find that the pin begins to push out of the hole. If this happens, you can usually just push it back in, but sometimes you may need to slacken the string first. Occasionally, if the pin is particularly loose, you might have to hold it down as you tighten.

► Here is a video showing how to restring an acoustic guitar with bridge pins:

www.youtube.com/watch?v=IIIVEWj3kZs

Other fretted instruments

A similar process applies to other fretted instruments, with some slight variations:

► **Ukulele:** strings can be either fixed with bridge pins, tied in the same way as classical guitar strings, or tied in a knot behind the bridge. This video shows the three different methods:

www.youtube.com/watch?v=FmrISmF6Q3I.

► **Banjo:** strings are held in place on the tailpiece in small slots. The important thing is to draw around the bridge so that you put it back in the correct place. The tuning pegs are usually similar to guitar ones, so this shouldn't be too much of a problem. The only difficult thing is the extra fifth string, which is sometimes just held in by friction. This works the same way as a violin tuning peg, and requires you to push the peg in slightly as you turn it so that it remains in place and doesn't slip. This video shows how to restring a banjo: **www.youtube.com/watch?v=G-E7o0geceo**

► **Mandolin and similar instruments:** these instruments are very similar to guitars in the way they are restrung. Some may have more or fewer strings, but the theory is the same.

Machine head/tuning peg replacement: difficulty level 4/5

There are a variety of different tuning pegs available for guitars. When replacing one, it's important to try and get like for like as much as possible.

For electric guitars, the tuning pegs are often either a sealed unit or one with a backplate that can be removed. When choosing your new pegs, be careful that you get the correct number per side for your guitar. Most Fender-type guitars have six tuners on one side of the headstock, but most Gibson-type guitars have three on each side.

Classical guitars have three per side, but each side comes as one complete unit with three tuning pegs attached to it. For this reason, it's important to measure the distance between the centre of each hole to the next one. You should then be able to match this to the new tuning pegs you're buying to ensure they will fit in the holes properly.

Other fretted instruments can have similar tuning pegs to guitars, or friction pegs. Make sure you measure everything correctly, and you shouldn't have many problems replacing them.

Nut and bridge replacement: difficulty level 5/5

A common problem on guitars and basses is that the nut can snap in one of the string grooves. If this happens, the nut should be replaced. Replacing a nut, however, is one of the more difficult jobs to take on, but as replacement nuts are quite inexpensive, it's worth making an attempt because you can't really do any damage to the guitar by simply trying.

The easiest way to replace a nut is to try and get as like for like as possible. To ensure you get the correct nut, you'll need to measure both the width and the length of the nut to make sure it fits in the slot properly. (Nuts are usually a standard depth, so there's no need to measure that dimension.) You should also get a nut that's: trying to file string slots into a blank nut is best left to the experts!

- ▶ **Removal of the old nut:** use a small screwdriver or similar to get underneath the old nut and gradually, with gentle pressure, lever it up off the neck. It will be glued down, but it shouldn't take too much leverage to get it off. You may need to tidy up the slot that the nut came out of and file off any excess glue that's left in there.
- ▶ **Fitting the new nut:** the new nut will probably be a bit deeper than the nut you took off the guitar. You'll need to make them the same depth, otherwise the strings will be too high off the fretboard and difficult to press down. The easiest way to do this is to use the old nut as a guide and file down the new nut to the same depth. You need to file the nut from the bottom (not the slot side) and keep checking it against the old nut to make sure you aren't filing too much off. The easiest way to do that can be to lay a file flat on a table flat and rub the nut against it, rather than the other way around.

Once you have it to the correct size, try it on the guitar. You don't need to glue it yet: first put it on the neck and check how it fits. The nut should sit flat and not rock from side to side. If it does, find the bit of the nut that's causing this and file it flat. With a bit of trial and error, it shouldn't be too difficult to make it fit. You can now restring the guitar to check the strings vibrate freely and that there's no buzz at the nut. If the strings sound okay, loosen them sufficiently so that you can take the nut out. Now put a small amount of glue on the bottom of the nut to fix it to the neck. I'd recommend Gorilla Glue for this. The strings can now be reattached and tightened to hold the nut in place until it glues together.

For nut replacement on other fretted instruments, the process is the exactly the same. Banjo bridges should also be relatively straightforward to replace, as long as you match the new bridge to the dimensions of the old one.

Bridge saddle adjustment and replacement: difficulty level 3/5

If you have an electric guitar that buzzes on one particular string, it could be that the height of the bridge saddle needs to be adjusted.

This is usually done with an Allen key or small screwdriver. I'd recommend setting the height in line with the other saddles and seeing how that sounds. If it still buzzes, the saddle can be adjusted higher to compensate. The trade off, however, is that the higher it goes, the more difficult that string will be to play. Obviously this can also be done in reverse: if the string looks and feels too high, the saddle can be lowered.

It's common that with electric guitars used in schools, when a string breaks some (or all) of the bridge saddle comes off too and gets lost. New bridge saddles are readily available online, and you can usually find one cheaply. It's important, however, to make sure you get the correct saddle for the guitar you're attempting to fix. Generally in schools this would be a Fender Stratocaster-type saddle, since these are most common and also tend to come off easily.

With a quick search online, however, it should be straightforward to find the saddles and both the Allen key grub screws and the standard screws that attach the saddle to the bridge. Once you have your replacement, it should be relatively simple to reattach it and adjust the small Allen key screws to get the saddle to the correct height so that the string doesn't buzz against the frets.

Intonation adjustment: difficulty level 2/5

When buying relatively cheap guitars in bulk, as schools often do, the quality of the set-up on the guitars is often lacking. One of the ways this will manifest itself is in the intonation of the instrument. If, when your students play a particular guitar, the notes sound in tune at some parts of the neck but out of tune at others, you have an intonation issue.

Before you start trying to fix this problem, however, be aware that it only really applies to electric guitars and basses. Acoustic instruments are more tricky to adjust. If your guitar has old strings on it, this can also affect the intonation because they start to stretch unevenly with age.

You'll need an accurate tuner and either a small crosshead screwdriver (Fender) or small flathead screwdriver (Gibson) to adjust the bridge saddles.

Now tune each string to the correct note, and check this note played open (with no fingers pressing down) and at the 12th fret (an octave higher). If there's a difference in the reading of these two notes, your intonation is out. Don't pluck the note too hard when you're checking, however, as this will cause the note to sound sharp.

If the fretted note is flat, move the bridge saddle forwards towards the neck of the guitar. If the fretted note is sharp, move it back towards the bridge. Get your screwdriver and adjust the screw that holds the bridge saddle in place, moving it in the appropriate direction until the intonation is correct.

Here's a video to illustrate how to adjust intonation: www.youtube.com/watch?v=mn3Zl-4IGsg

Strap button replacement: difficulty level 2/5

Strap buttons often get pulled off or gradually work their way loose and fall out. A lot of schools aren't too concerned about this issue, because guitars tend to be played sitting down. If you do need to fix a strap button back in, however, you might be relieved to know that this is one of the easier jobs.

All you need are some matches, which you'll use to pack into the hole that the screw for the strap button came out of. Use one match at a time, and use the non-striking end in the hole. You can then break off the excess that's sticking out of the hole.

Repeat this with more matches until the hole is completely filled. You can now screw the strap button back in, you should have a strong hold. This technique also applies to most other fretted instruments that have strap buttons.

Electronic problems

The first step with anything electronic is diagnosing what the problem is. The two main problems that occur most often in schools are these.

Jack socket unsoldered: difficulty level 4/5

This is a very common fault on electric guitars, and can be quickly diagnosed. The first thing to do with all electrical faults is to find an amplifier and lead that you know are working correctly, in order to test the guitar. This may seem obvious, but it's easy to think a guitar is 'broken' when it's actually a lead or amp that are the problem.

Next, plug in the guitar and see what happens. If you get no sound at all, then check the jack socket. Jack sockets are usually mounted onto a piece of either plastic or metal and screwed onto the body of the guitar. Use your screwdriver to remove the mount, but don't unscrew the jack socket – leave it on the mount. If your jack socket is mounted directly onto the body of the guitar, you will probably need to access it by taking the back plate off the guitar. You should then be able to see the jack socket from the back of the guitar. In a healthy jack socket, you should see two wires coming from two terminals. If you can see that one or more wires have come off, then you've found your problem. You can now get your soldering iron out and solder it back on to the terminal it was previously attached to.

Another common problem is that the socket itself becomes too loose as the piece of metal that's pushing against the tip of the lead gets bent and gradually becomes too weak to make good contact. You can usually bend this part back to make a better contact, but eventually, you will need to replace the whole socket with a new one. For guitars you'll need a mono 1/4-inch jack socket – check on the picture that it looks like the one you're trying to replace.

► Here's a link to a useful video on wiring up a guitar's jack socket:
www.fralinpickups.com/2018/06/25/how-to-install-an-output-jack/

Volume/tone knob spinning or unsoldered: difficulty level 5/5

The next most common problem is a knob that has worked its way loose, and has been turned so much that it has broken its connecting wires.

First, ascertain how you get to the back of the knob to reattach those wires. If you have a guitar with a scratchplate on the front, unscrew the scratchplate and take it off. You'll usually just need to loosen the strings on the guitar to do this: there's no need to take them off completely. If the knobs are mounted directly onto the guitar body, however, you should access them from the back of the guitar from underneath a plastic plate.

Once you've found the problematic knob, you'll probably notice that there are one or more wires that have broken off from either it or from somewhere else in the cavity. First, figure out which wire should be connected where! There are many wiring diagrams available for free on the internet: just search for the type of guitar you have. Once you have the diagram, you should be able to see where the wires ought to be going.

Bear in mind, however, that wires are often different colours from the ones in the diagrams and can sometimes even go to different places. You can often find the end of a bit of wire that has broken off on one of the terminals, which shows you where that particular wire broke off from.

Summary

I hope this short guide will help encourage more teachers to have a go at repairing some of the broken instruments that may be blocking up their store cupboards. If, however, you decide that an instrument is beyond your capabilities, please don't throw it away: there are many great charities that will happily make use of them – Electric Umbrella (www.electricumbrella.co.uk) is just one of them.

A final word: this resource has been written after many years of experience, and should be achievable for most teachers. But as with anything involving DIY, always be careful, read and watch all advice and guidance carefully, and take care in what you're doing. All work is carried out at teachers' own risk.