TECHNICAL NOTE ON THE GOLDFINGER AND HEADSTOCK RESONANCES

How can the little GoldFinger improve an instrument's tone so much?

When thinking about getting superb tone from stringed instruments, everyone naturally homes in on the quality, shape and thickness of the wood used for the body, the material of the bridge, the type of strings, the pickups for electric instruments, etc. All the focus is on the lower half of the instrument.

But headstock resonances have a far bigger effect than almost anyone imagines. That holds true for the tone of a guitar, mandolin, banjo, contrabass or any other stringed instrument, as our meticulous listening experiments prove beyond the shadow of a doubt. Attach a small piece of anything as highly damping as lead or rubber or plasticene to the headstock of your instrument and you will be amazed at how dead and lifeless it sounds. But attach a small piece of non-damping metal and you'll get an improvement in tone.

How can this be? The physics are simple. When you pluck or bow a string, you are pumping energy into the string to make it resonate. Half that resonant energy travels as vibrations down the string towards the tailstock and half travels up the string towards the headstock. The physics of strings says you can't have more energy traveling in one direction than the other. What happens to that energy? At the tailstock end, the vibrations flow into the body via the bridge and whatever anchors the bottom end of the strings. The body resonates in response and reflects those resonances or vibrations back into the strings. That's why the body and the bridge have such a big effect on how good your instrument sounds.

But remember, exactly the same amount of vibrational energy is also flowing up the strings into the headstock via the nut and the tuners that anchor the upper end of the string. So, just like at the bottom end, those vibrations flow into the headstock, causing it to resonate and reflect those resonances back into the strings. In other words, it is impossible for the headstock not to have about as big an effect on tone as the body of the instrument. That means anything you do that changes the resonances of the headstock has a very audible effect on tone, whether for better or worse.

A typical electric guitar's maple headstock weighs about 3 to 3 ½ ounces; the maple or rosewood headstock of a steel string acoustic guitar weighs around 15% more. Interestingly and not accidentally, the GoldFinger weighs about the same as the headstock. Obviously, attaching it will have a very large effect on the resonances of the headstock.

What makes the GoldFinger sound so much better than any old small steel C-clamp?

Mapleshade Studio's 30 years of pioneering vibration control research and listening experiments have established that four factors dictate success in improving sound: material, mass, shape and contact area.

A. Material: Over the years we have tested by ear almost 50 different materials for transmitting and controlling vibration including standard and high hardness steels, titanium, aluminum alloys, ceramics, carbon fiber and brass. Brass came out by far the best sounding, more uncolored and clearer than any other material. Not all brass alloys sound the same, so we tested half a dozen to come up with the optimum alloy that we use.

B. Mass and Shape: Our beta-test guitarists—playing a variety of electric and acoustic guitars—tested over two dozen prototypes of varying shapes, thicknesses, lengths and weights to arrive at the best-sounding configuration. Interestingly, we found that deviating from the optimum weight by only 1/8th of an ounce proved to be an audible degradation. We went on to test our final optimized design on banjos, mandolins, ukuleles, electric basses and contrabasses. To our surprise, we found the GoldFinger did even more for the tone of the banjo than for the guitar. And the largest effect was on ukuleles, greatly enhancing their sustain, attack and loudness. Equally surprising, the GoldFinger delivered as large a tonal improvement on a huge instrument like a full-size contrabass as on a guitar.

C. Contact Area: The area of contact between the GoldFinger and the headstock is of crucial importance. Without exception, transferring or draining vibration via small contact areas—preferably sharp points—sounds clearer and more resonant than transferring the same vibration across larger flat-to-flat contact areas. The reason is simple: with flat-to-flat contact, reflections and "micro-rattles" (because the two flat surfaces can never mate perfectly) muddy the sound; with point-to-flat contact, the high unit pressure eliminates reflections and micro-rattles. Thus, the GoldFnger has three tiny flattened points of contact with the front of the headstock and, on the back side, a single small circular contact area which is the clamping screw's flat and polished end.

What improvements in tone will you hear?

The first and most noticeable changes you will hear are punchier, cleaner attacks plus longer sustains. With a little more playing and listening, you will become aware that overtones sound clearer and have richer harmonic detail. Once you have played your way up and down the fingerboard a few times, you will become aware that your instrument's wolf tones are significantly suppressed, and the dead spots have almost disappeared. And, of course, as you fine tune the best position of the GoldFinger on the headstock and adjust the tension on the clamping screw to be just light enough, all these good effects will be strengthened even further.