Frequently Asked Questions
Banjo Strings

Q: It has taken me a long time to get my banjo to sound like I want it to. Now that it is right, what can Straight Up Strings do for my banjo's tone?
A: Actually, Straight Up Strings should not alter the character of your instrument. They are intended to improve the string-to-string balance, so folks typically notice an improvement in how each string sounds in comparison to neighboring strings, more than in an overall change in tone or "timbre." For example, if your flathead banjo had that "just right flathead sound" it will still be the same flathead sound but with better clarity, improved string-to-string balance, an greater sustain. As a result, your banjo will sound "better."

Q: Will your strings get me closer to [insert artist's name] sound?
A: It is important to realize that a major portion of the difference between one player's sound and another player's sound has to do with their attack. (There are five components of attack: location of attack, duration of attack, method of attack, strength of attack, and angle of attack.) An artist's attack becomes their signature, and their right hand is of equal importance to the banjo they play or the strings they use. While we can't bring you the artist's hand, Straight Up Strings will get you closer to a better sounding banjo and your attack.

Q: Isn't the three-footed bridge designed so that each foot has equal pressure on the head?
A: That may have been the intention, but it's not really what happens. On a three-footed bridge (Fig. 1) the outer two feet bear the weight of the strings above them plus about 50% of the strings that are over the arches, but the middle foot bears the weight of the string above it, plus about 50% of the TWO strings over arches. As a result, the middle foot receives a greater load than the outer feet. To further complicate the matter, because of the bridge's width and the fact that the head is a somewhat flexible membrane, the outer two feet impinge on the head more than the inner foot, which results in a significant imbalance in how the strings' energy gets to the head. Compensated down pressure is a key issue that we have addressed with Straight Up Strings.

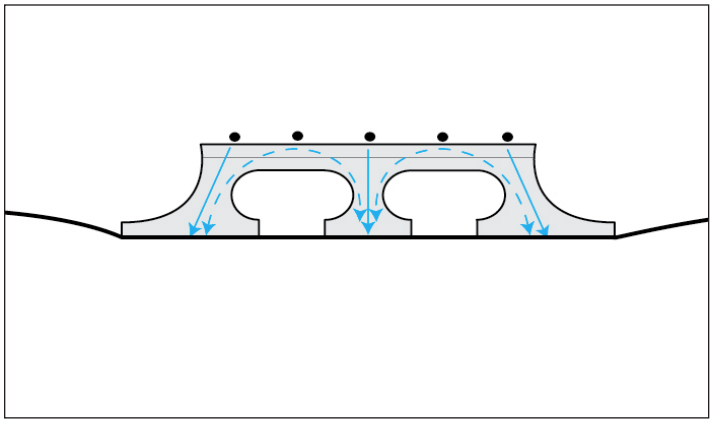

Fig. 1. The traditional three-footed banjo bridge presents an unequal distribution of the strings' loads to the banjo head.

Q: Will your strings work with a Kat Eyz bridge?
A: The Kat Eyz bridge does a good job addressing the problems of strings sitting over feet and strings sitting over arches. However, the problem of load distribution described in the previous question still exists and is an important issue that we addressed in our engineering of Straight Up Strings. We think that Straight Up Strings are a great companion for the Kat Eyz bridge.

Q: How does down pressure and string tension differ? Arn't they the same.
A: The tension is a lengthwise or "longitudinal" measurement, and the down pressure is a sideway or "lateral" measurement. When a string is brought up to pitch, the tightening of the string exerts a pulling force at both the peghead and the tailpiece, and this force can be measured in pounds; this is the "tension" of the string, and the measurement is taken when the string is brought up to pitch. It is this measurement that some string manufacturers report on their string packages. On a movable-bridge instrument (banjo, mandolin, jazz guitar, violin, etc.) the strings lay over the bridge and exert a downward force through the bridge to the head or soundboard. This lateral or downward force is the "down pressure" or "download" and it is also measured in pounds. The pressure is dependent on a combination of the string's tension, the string's gauge, and the string-break angle (the angle the strings make over the bridge, see Fig. 5). For movable bridge instruments such as the banjo, where the strings are anchored at the tailpiece and the peghead, the down pressure on the head is the important component to manage. Straight Up Strings are the first to consider this important aspect. (For fixed-bridge instruments such as steel string acoustic guitars where the strings are anchored at the bridge, the longitudinal tension is the important component.)

Q: Why not just change the bridge design?
A: Well, actually, this has been an area of great focus for Roger Siminoff. Over the past 55 years, he has created almost three dozen banjo bridge designs, has written countless articles about banjo bridges, and has an entire chapter devoted to bridges in his book *How To Set Up The Best Sounding Banjo* (out of print). In fact,

some of his prototypes have been taken into account and even emulated by several bridge makers today. But the overwhelming portion of the banjo market still uses the traditional three-footed bridge, and Siminoff wanted to focus on solving the string-to-string balance for these players. Also, part of our focus was to achieve a better relationship between the wound *D* string and the neighboring plain strings. As it turns out, the benefits and features of our compensated Straight Up Strings may be enhanced by some of the other bridge designs.

Q: Can't this same idea of adjusted string download be used on mandolins and guitars?
A: Absolutely, and we have done a great job with our Straight Up Strings for mandolin. The problems with the mandolin bridge design are similar to those of the banjo bridge because it has two pair of strings sitting over posts and two pair of strings sitting in the middle of a wide and somewhat flexible saddle. Straight Up Strings for mandolin do a great job solving that instrument's string-to-string balance problem, and mandolin players are raving about them. (The guitar bridge functions differently but we do have a solution for it with our Straight Up Strings for guitar.)

Q: I've been using GHS PF140s and your gauges appear similar. Are your tensions the same?
A: There are two different measurements to consider: the longitudinal tension or pull of the string, and the lateral download – the pressure of the string pushing down on the bridge – and we do report both. For a movable bridge instrument such as the banjo, the download at the bridge is a more important consideration than the longitudinal tension, especially where strings are positioned over the bridge's feet compared to those strings over spaces or arches in the bridge (Fig. 2). The measurements we provide for our banjo strings are the overall tension and the down pressure at the bridge for each string measured at a 15° string-break angle (the angle the strings make as they pass over the bridge). The total down pressure for our #2600-L light gauge banjo Straight Up String set (which is the closest we have to the PDF140) is 16.3 pounds, and the total longitudinal tension is 55.6 pounds. (GHS does not report string tensions or downloads, so I really cannot comment on how our tensions compare to theirs.)

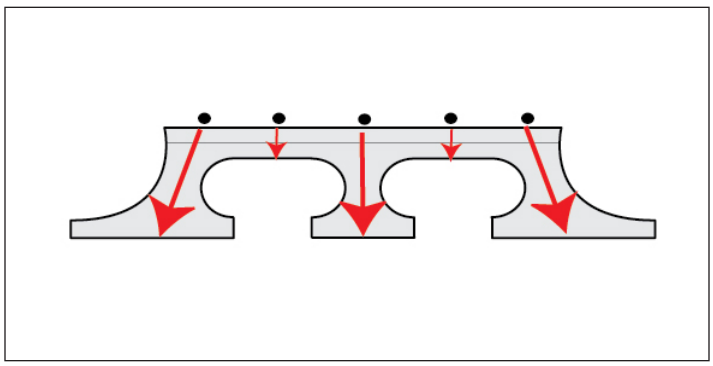

Fig. 2. Traditional three-footed bridges have three strings sitting over feet and two strings over arches.

Q: How can your .020″ string be different from a GHS .020″? Doesn't .020″ really mean .020″?
A: The outside measurement or "gauge" of the string doesn't tell the whole story. The banjo's wound *D* string can be prepared several different ways. As shown in Fig. 3, a .020″ wound string could be made with a .012″ core wire and a .004″ wrap wire (.012″ plus .004″ twice [since the wrap wire goes around the core, it has to be counted twice] equals .020″). You can also prepare one with a .014″ core wire and a .003″ wrap wire (.014″ + .003″ + .003″ = .020″), and so on. Each of these combinations presents the same gauge but different longitudinal tension and download when brought up to the same pitch.

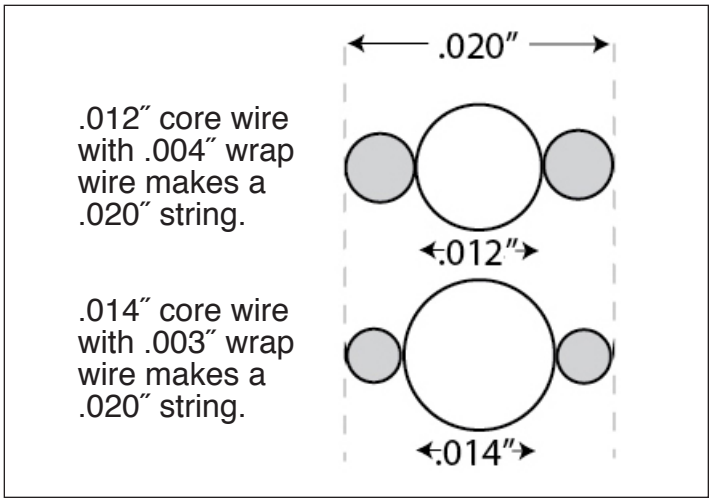

Fig. 3. The final gauge of a wound string is the result of the diameter of the core wire plus the diameter of the wrap wire. As shown here, there are several practical ways to make a string rated as .020″ gauge.

Q: Are your strings a good match for the Snuffy bridge?
A: Absolutely.

Q: To do your tests, did you use electronics or musical instruments?
A: We used a decibelometer to measure amplitude (loudness), and strobetuners to measure frequencies. Electronic instruments don't really decipher the quality and timbre of the tones produced, and it is difficult to relate that data to the human perception of tone. All other tests were evaluated by ear with several musician listeners providing input. The initial tests in our shop were conducted on several high-quality banjos that in-

cluded both arch-top and flat-top tone chambers, most of which were original pre-war Gibson RBs. Testing by other musicians was conducted on instruments of various makes, models, and vintage.

Q: What kind of bridges were used in your tests?
A: For the most part, we focused on instruments that had standard Grover-type three-footed bridges since it is by far the most popular banjo bridge in use today. The main focus of our work was to develop a set of strings whose down pressures at the bridge were compensated for their location on the bridge (whether the strings were sitting over feet or over arches in the bridge) as well s the tension of neighboring strings.

Q: Are your Straight Up Strings round core or hex core?
A: The G_1, B, G_2, and D_2 strings are semi-elastic nickel-steel "plain" round wire, and the D_1 is hex-core semi-elastic nickel-steel wire covered with a chromium-stainless-steel wrap wire.

Q: How did you measure the down load pressures you are reporting?
A: We have a fixture that measures any scale length from 26″ (banjo or guitar) to 13-7/8″ (mandolin). The fixture has a tailpiece at one end and various tuning machines at the other. The strings pass over a surrogate bridge that is suspended from a certified Dillon Force Gauge that accurately measures the pressure in 0.01 pound increments. Our fixture can be set to any "bridge height" so that the down pressure can be measured at any string-break angle. For our banjo string tests, we used 15° string-break angle since this is the ideal string-break angle for an RB banjo with a low tailpiece and a neck pitch set at 3°. We can measure single strings or all five at once.

Q: Wouldn't it be better if all the string tensions were the same?
A: In some cases, yes. If we were preparing strings for a solid-body electric guitar, then we would want the longitudinal tensions to be similar, but not exactly the same. And, we'd have similar tensions for banjos that use a five-footed or six-footed bridge, so that all strings were either over arches or all strings over feet. But for banjos that employ the traditional three-footed bridge, the downloads need to be adjusted for the strings over the feet and the strings that are over the bridge's arches. The only exception to this would be an adjustment to the gauges to compensate for the human perception of equal-loudness of low frequencies to high frequencies as described by the Fletcher-Munson curve (now more properly known as ISO: 226:2003).

Q: I'm just curious; what kind of steel are your banjo strings made of?
A: Even though the wire is used on banjos, the wire industry refers to this type of semi-elastic nickel-steel wire as "mandolin wire." And it is interesting to note that "mandolin wire" is also used for guitars, mandolins, resophonic guitars, dulcimers, and similar instruments that use steel strings. In the wire industry, wire of this type that is smaller than .050″ is called "mandolin wire" and wire of this type larger than .050″ diameter is called "piano wire." The wrap wire we use on our wound *D* string is a unique chromium-stainless-steel wire that provides a smooth feel and will not tarnish.

Q: I thought gauges and tensions were totally related to each other. If that's true, how can you make strings of the same gauge that have different tensions?
A: Gauges and tensions are related but since wound strings can be prepared several ways (see Fig. 3), not every .020″ string, for example, has the same tension as the same outside diameter wire prepared with another combination of core and wrap wire. Change the combination of core-to-wrap wire and you change tension requird to bring that string to pitch as well as the down pressure at that same pitch.

Q: Do I need to change the tuning of my head or resonator space to use these strings.
A: No. Our strings will only enhance the string-to-string balance and will not have an effect on the structural tuning or set-up of your banjo.

Q: Doesn't what you call the "download" change with bridge height? I would think that a taller bridge would create more pressure.
A: Yes, it absolutely does. If you first envision that a bridge could be so low that the strings basically pass straight over it from peghead to tailpiece, there would be zero down pressure. As the bridge height increases, the down pressure increases. At about a 15° string break angle, the average set of banjo strings pushes down on the head with a load of about 18 pounds, and this is typically the sweet spot for most banjos. Old time frailing banjos have a very low string break angle that reduces the down pressure at the bridge, and this is a major attribute that contributes to their warmth and mellowness.

Q: Your gauge selection is pretty unusual. How did you do the testing and come up with the gauges you have?
A: Straight Up Strings are designed to compensate for the down pressure of neighboring strings as well as the structural attributes of the design of the typical three-

footed bridge which, by necessity, has three strings (G_1, G_2, and D_2) sitting over bridge feet (with a rather direct access to the head) and two strings (D_1 and B) sitting over arches in the bridge (a more flexible area with less direct access to the head). Our goal was to balance the response from these strings by measuring the down pressure on the bridge for each string, and then determine the gauges as a result of that test. So, a more precise answer is that in our ultimate tests we didn't consider the gauges at all, but instead focused on balancing the down pressures. The gauges were just a result of the tests. It was a lot of testing of various gauges and core-to-wrap wire combinations, but in the end it was well worth it!

The early violin makers were plagued with the problems of bridge design and until Giuseppe Guarneri

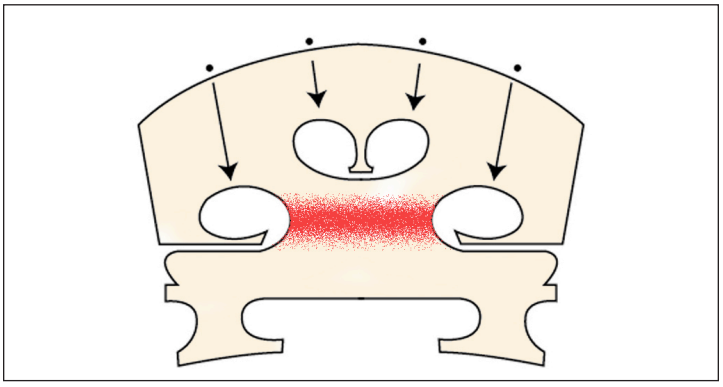

Fig. 4. The classic violin bridge created by Guarneri was designed so that no string has a direct route to the violin's belly (soundboard). All energy is attenuated through the waist of the bridge (red area).

(1698-1744) designed the classic violin bridge in which none of the strings had a direct energy route to the violin's belly (soundboard). In his design (Fig. 4), the energy path of the two outer strings was interruped by the bridge's kidneys and the two inner strings were interrupted by the bridge's heart.

Q: I am using a popular bridge with six feet. Will your strings work on my banjo?
A: Yes they will work, but the advantage will not be as significant on your six-footed bridge as on a standard three-footed bridge. Straight Up Strings were designed specifically to compensate for the imbalance caused by the location of the B and D_1 strings that sit over arches, compared to the G_1, G_2, and D_2 strings that sit over the bridge's feet. Your six-footed bridge requires strings with more similar down pressures.

Q: How similar is the steel covering on Straight Up Strings to the *D* string on the GHS PF135 set?
A: There are only a very few manufacturers of steel wire used for musical strings, and many types of metals are used on wound strings including steel, nickel, stainless, and monel. And, there are many grades and alloys of stainless steel. We use chromium-stainless-steel wire for the covering or "wrap wire" on our wound D strings, but are not sure of the specifics of the stainless wrap wire GHS uses so we cannot compare them.

Q: I have a Moon bridge with three feet. Will your banjo strings work on this bridge?
A: Absolutely. Straight Up Strings are a perfect partner for the Moon Bridge design. The Moon bridge helps to solve the intonation compensation problem and Straight Up Strings helps solve the string-to-string balance problem.

Q: Do you make these strings yourselves?
A: We design our strings and specify the wire diameters, core and wrap tensions during winding, and winding specifications. Straight Up Strings are made to our strict specifications in the United States by a prominent musical string manufacturer.

Q: Do your Straight Up Strings have a longer life?
A: The wire used for our strings is made of semi-elastic nickel-steel wire that stretches something like, but not as easily as a rubber band. The process of drawing rhe wire through a series of dies and managing its temperature and elongation provides the wire with unique strength and reslilance properties. As a result our strings do demonstrate longer life. This is often evident by the instrument being in tune each time you take it from the case; an indication that the strings have not lost their elasticty and stability. Enduring elasticity equates to enduring string life which equates to rich tonal properties for extended periods of time.

Q: What does "semi-elastic" mean?
A: As mentioned in the previous question, semi-elastic wire can stretch and then spring back to its original shape. You may notice that as you put new strings on your banjo you keep tightening the knob to bring the strings up to pitch. By doing so, you are not just tightening the string, but stretching it as well (proven by the fact that the string post is turning and winding on additional string as the string stretches). It may surprise you to know that a plain .010˝ D string stretches about 3/16˝ when brought up to pitch. The elasticity gives the string brightness, richness, and sustain.

Q: Can I use Straight Up Strings on my Stelling Staghorn that is fitted with a Stelling compensated nut?
A: Geoff has made strides with his development of a compensated nut to solve the D string intonation problem. Our Straight Up Strings for banjo work wonder-

fully on Stelling banjos with compensated nuts as long as you are using a three-footed bridge (which is what Straight Up Strings are designed for). I think you'll find them to be a great match for your Staghorn.

Q: Is the string-break angle important and how can I measure it?
A: The string-break angle is the angle the strings make as they pass over the bridge. It is important to know what the angle is because it does have an affect on the tone and clarity of the instrument. Ideally, a 5-string banjo used for bluegrass should have a 15° string-break angle.

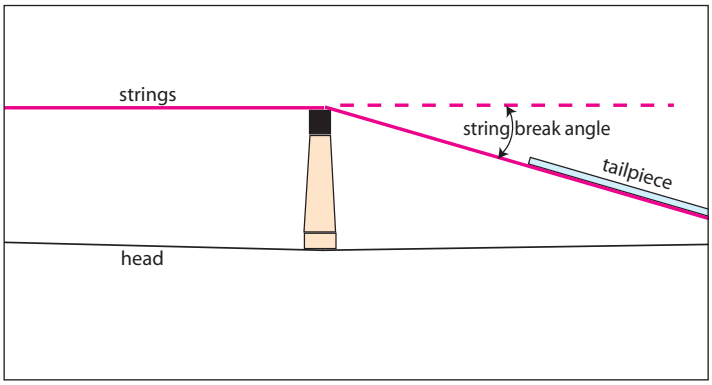

Fig. 5. For optimum tone, brightness, and sustain, a 5-string banjo that is finger-picking (i.e., not frailed) should have a 15° to 16° string break angle.

Q: You say your strings have a "balanced tone." What does it mean and how did you do that?
A: All string musicians seek an even transition in tone, sustain, and amplitude from their lowest to their highest note, in essence balancing the tone from string to string. Achieving this requires a delicate relationship between the tension and down pressue load of each string as well as between wound and plain strings. This is especially important on the banjo where three strings sit over feet and two strings sit over arches. By carefully compensating the down pressure loads, we believe that we have accomplished the goal of providing balanced tone.

Q: The 5-string banjo has a notorious 2nd string intonation problem Do your compensated string sets have any affect on intonation?
A: Yes, our string sets absolutely do, but for the better! Intonation problems are caused by a string being sretched as it is being drawn to the fretboard. As the string stretches its pitch increases and this is what causes intonation problems. The improved elastic qualities of our strings coupled with the tensions they are designed to have when at pitch allows the string to stretch more easily resulting in improved intonation.

Q: I'm used to using medium gauge strings that have a heavier first string than what your report for your medium set. Do you make custom sets with a heavier first string?
A: The core technology of Straight Up Strings is the development of string sets with compensated tensions that produce compensated down loads at the banjo's bridge. Providing custom sets would violate all the research and effort we put into preparing these carefully adjusted string sets. As a result, we do not provide custom sets.